



# Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale)<sup>1</sup>

This standard is issued under the fixed designation C 62; 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 brick intended for both structural and nonstructural masonry where external appearance is not a requirement. The brick are prismatic units available in a variety of sizes, shapes, textures, and colors. The specification does not cover brick intended for use as facing units or where surface appearance is a requirement, (see Specification C 216). This specification does not cover brick intended for use as paving brick (see Specification C 902).

1.2 The property requirements of this standard apply at the time of purchase. The use of results from testing of brick extracted from masonry structures for determining conformance or nonconformance to the property requirements (Section 3) of this standard is beyond the scope of this standard.

1.3 Brick are manufactured from clay, shale, or similar naturally occurring earthy 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 and durability requirements of this specification. (See firing, fired bond, and incipient fusion in Terminology C 43.)

1.4 Brick are shaped during manufacture by molding, pressing, or extrusion, and the shaping method is a way to describe the brick (see Terminology C 43).

1.5 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.

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

## 2. Referenced Documents

### 2.1 ASTM Standards:

C 43 Terminology of Structural Clay Products<sup>2</sup>

C 67 Test Methods for Sampling and Testing Brick and Structural Clay Tile<sup>2</sup>

<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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<sup>2</sup> Annual Book of ASTM Standards, Vol 04.05.

C 216 Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)<sup>2</sup>

C 902 Specification for Pedestrian and Light Traffic Paving Brick<sup>2</sup>

E 835/E 835M Guide for Modular Coordination of Clay and Concrete Masonry Units<sup>3</sup>

## 3. Grades

3.1 Grades classify brick according to their resistance to damage by freezing when wet, as defined in Note 1. Three grades are covered and the grade requirements are shown in Table 1.

3.1.1 *Grade SW (Severe Weathering)*—Brick intended for use where high and uniform resistance to damage caused by cyclic freezing is desired and where the brick may be frozen when saturated with water.

3.1.2 *Grade MW (Moderate Weathering)*—Brick intended for use where moderate resistance to cyclic freezing damage is permissible or where the brick may be damp but not saturated with water when freezing occurs.

3.1.3 *Grade NW (Negligible Weathering)*—Brick with little resistance to cyclic freezing damage but which are acceptable for applications protected from water absorption and freezing.

NOTE 1—The word “saturated,” with respect to this standard, refers to the condition of a brick that has absorbed water to an amount equal to that resulting from submersion in room temperature water for 24 h.

## 4. Physical Properties

4.1 *Appearance*—If brick are required to have a particular color, texture, finish, uniformity, or limits on cracks, warpage or other imperfections detracting from the appearance they are purchased under Specification C 216.

4.2 *Durability*—When Grade is not specified, the requirements for Grade SW shall govern. Unless otherwise specified by the purchaser, brick of Grade SW or MW shall be accepted instead of Grade NW; and Grade SW instead of Grade MW.

4.2.1 *Physical Property Requirements*—The brick shall conform to the physical requirements for the Grade specified as prescribed in Table 1. For the compressive strength requirements in Table 1, test the unit with the compressive force

<sup>3</sup> Annual Book of ASTM Standards, Vol 04.07.

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

TABLE 1 Physical Requirements

Designation	Minimum Compressive Strength gross area, psi (MPa)		Maximum Water Absorption by 5-h Boiling, %		Maximum Saturation Coefficient <sup>4</sup>	
	Average of 5 Brick	Individual	Average of 5 Brick	Individual	Average of 5 Brick	Individual
Grade SW	3000 (20.7)	2500 (17.2)	17.0	20.0	0.78	0.80
Grade MW	2500 (17.2)	2200 (15.2)	22.0	25.0	0.88	0.90
Grade NW	1500 (10.3)	1250 (8.6)	no limit	no limit	no limit	no limit

<sup>4</sup> The saturation coefficient is the ratio of absorption by 24-h submersion in cold water to that after 5-h submersion in boiling water.

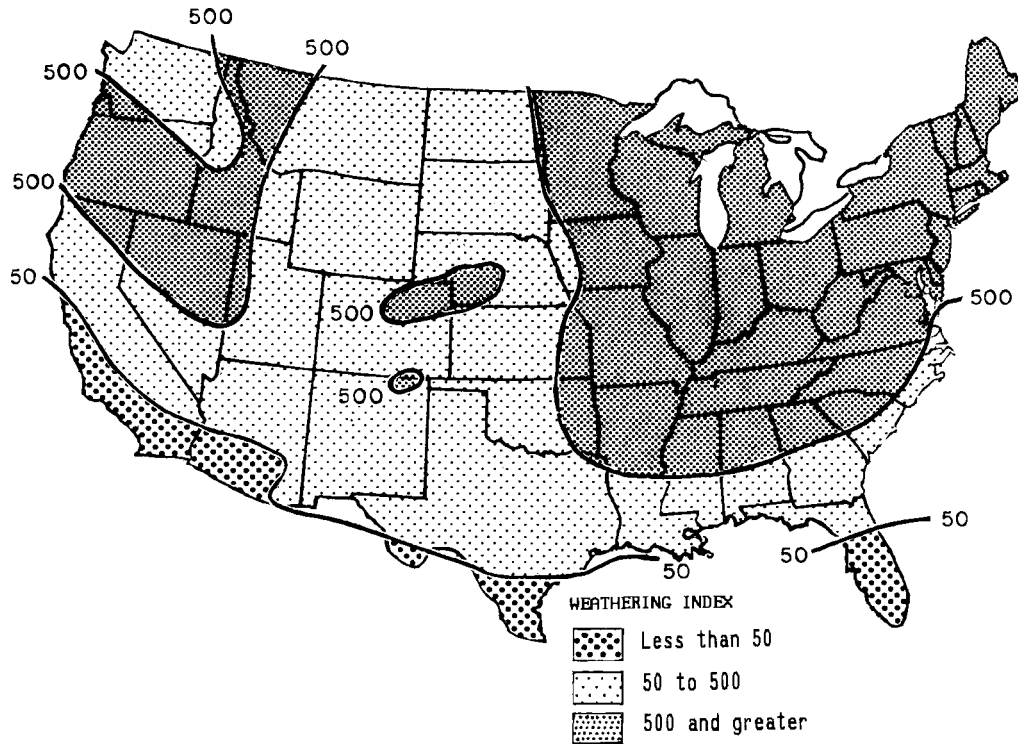


FIG. 1 Weathering Indices in the United States

perpendicular to the bed surface of the unit, with the unit in the stretcher position.

4.2.2 *Absorption Alternate*—The saturation coefficient requirement does not apply, provided the 24-h cold water absorption of each unit of a random sample of five brick does not exceed 8.0 %.

4.2.3 *Freezing and Thawing Alternative*—The requirements for 5 h boiling water absorption and saturation coefficient do not apply, provided a sample of five brick, meeting the strength requirements of Table 1, passes the freezing and thawing test as described in the Rating Section of the Freezing and Thawing test procedures of Test Methods C 67.

4.2.3.1 *Grade SW—Weight Loss Requirement*—Not greater than 0.5 % loss in dry weight of any individual unit.

NOTE 2—The 50 cycle freezing and thawing test is used as an alternative only when the brick do not conform to either Table 1 requirements for maximum water absorption and saturation coefficient, or to the requirements of the Absorption Alternate in 4.2.2.

4.2.4 *Waiver of Absorption and Saturation Coefficient Requirements*—If the brick are intended for use exposed to weather where the weathering index is less than 50 (see Fig. 1), and unless otherwise specified, the requirements given in Table 1 for 5 h boiling water absorption and for saturation coefficient

shall not apply but the minimum average compressive strength requirement of 2500 psi (17.2 MPa) shall apply.

NOTE 3—*Weathering Index*: The effect of weathering on brick is related to the weathering index, which for any locality is the product of the average annual number of *freezing cycle days* and the average annual *winter rainfall* in inches defined as follows:<sup>4</sup>

A *Freezing Cycle Day* is any day during which the air temperature passes either above or below 32°F (0°C). The average number of freezing cycle days in a year may be taken to equal the difference between the mean number of days during which the minimum temperature was 32°F or below and the mean number of days during which the maximum temperature was 32°F or below.

*Winter Rainfall* is the sum, in inches, of the mean monthly corrected precipitation (rainfall) occurring during the period between and including the normal date of the first killing frost in the fall and the normal date of the last killing frost in the spring. The winter rainfall for any period is equal to the total precipitation less one tenth of the total fall of snow, sleet, and hail. Rainfall for a portion of a month is prorated.

Fig. 1 indicates general areas in the United States which correspond to the weathering index categories found in Table 1. The index for geographic locations near the 50 line should be determined by an analysis of

<sup>4</sup> Data needed to determine the weathering index for any locality may be found or estimated from the tables of Local Climatological Data, published by the Weather Bureau, U. S. Department of Commerce.

weather bureau local climatological summaries, with due regard to the effect of microclimate conditions, especially altitude.

The use of Grade MW brick in a wall area above grade is structurally adequate in the severe weathering region, but Grade SW would provide a higher and more uniform degree of resistance to frost action. The degree of durability called for by Grade SW is not necessary for use in wall areas above grade in the moderate weathering region. Grade MW brick performs satisfactorily in wall areas above grade in the no-weathering region, where the average compressive strength of the units is at least 2500 psi (17.2 MPa). Grade SW brick should be used in any region when the units are in contact with the ground, in horizontal surfaces, or in any position where they are likely to be permeated with water.

The recommended correlation between grade of building brick, weathering index, and exposure is found in Table 2. The specifier can use these recommendations or use the grade descriptions and physical requirements along with use exposure and local climatological conditions to select grade.

**4.3 Strength**—When brick are required having strengths greater than prescribed by this specification, the purchaser shall specify minimum strength.

**4.4 Initial Rate of Absorption (IRA)**—Test results for initial rate of absorption (IRA) shall be determined in accordance with the IRA (Suction) (Laboratory Test) of Test Methods C 67 and shall be furnished at the request of the specifier or purchaser. IRA is not a qualifying condition or property of units in this specification. This property is measured in order to assist in mortar selection and material handling in the construction process. See Note 4.

**NOTE 4—Initial Rate of Absorption (Suction)**—Both laboratory and field investigation have shown that strong and watertight joints between mortar and masonry units are not achieved by ordinary construction methods when the units as laid have excessive initial rates of absorption. Mortar that has stiffened somewhat because of loss of excessive mixing water to a unit may not make complete and intimate contact with the second unit, resulting in poor adhesion, incomplete bond, and water-permeable joints of low strength. The IRA of the units is determined by the oven-dried procedure described in the IRA (Suction) (Laboratory Test) of Test Methods C 67. IRA in the field depends on the moisture content of the masonry unit and is determined in accordance with the IRA (Suction)—Field Test of Test Methods C 67. Units having average field IRA exceeding 30 g/min per 30 in.<sup>2</sup> (30 g/min 194 cm<sup>2</sup>) should have their IRA reduced below 30 g/min per 30 in.<sup>2</sup> prior to laying. They may be wetted immediately before they are laid, but it is preferable to wet them thoroughly 3 to 24 h prior to their use so as to allow time for moisture to become distributed throughout the unit.

**5. Size and Coring**

**5.1 Size**—The size of brick shall be as specified by the purchaser. The maximum permissible variation in dimensions of individual units shall not exceed those given in Table 3.

**NOTE 5**—For a list of modular sizes see Guide E 835/E 835M. Sizes listed in this standard are not produced in all parts of the United States.

**TABLE 2 Grade Recommendations for Face Exposures**

Exposure	Weathering Index		
	Less than 50	50 to 500	500 and greater
In vertical surfaces:			
In contact with earth	MW	SW	SW
Not in contact with earth	MW	SW	SW
In other than vertical surfaces:			
In contact with earth	SW	SW	SW
Not in contact with earth	MW	SW	SW

**TABLE 3 Permissible Variations in Dimensions**

Specified dimension, in. (mm)	Maximum Permissible Variations from Specified Dimension, plus or minus, in. (mm)
Up to 3 (76), incl	3/32 (2.4)
Over 3 to 4 (76 to 102), incl	1/8 (3.2)
Over 4 to 6 (102 to 152), incl	3/16 (4.8)
Over 6 to 8 (152 to 203), incl	1/4 (6.4)
Over 8 to 12 (203 to 305), incl	5/16 (7.9)
Over 12 to 16 (305 to 406), incl	3/8 (9.5)

Brick names denoting sizes may be regional and, therefore, may not be included in all reference books. Purchasers should ascertain the size of brick available in their locality and should specify accordingly, stating the desired dimensions (width by height by length).

**5.2 Coring**—Unless otherwise specified in the invitation for bids, brick shall be either solid or cored at the option of the seller. The net cross-sectional area of cored brick in any plane parallel to the surface containing the cores shall be at least 75 % of the gross cross-sectional area measured in the same plane. No part of any hole shall be less than 3/4 in. (19.1 mm) from any edge of the brick.

**5.3 Frogging**—Unless otherwise specified in the invitation for bids, one bearing face of each brick may have a recess or panel frog and deep frogs. The recess or panel frog shall not exceed 3/8 in. (9.5 mm) in depth and no part of the recess or panel frog shall be less than 3/4 in. (19.1 mm) from any edge of the brick. In brick containing deep frogs, frogs deeper than 3/8 in. (9.5 mm), any cross-section through the deep frogs parallel to the surface containing the deep frogs shall conform to the requirements of 4.2.

**6. Sampling and Testing**

**6.1** For purpose of tests, brick that are representative of the commercial product shall be selected by a competent person appointed by the purchaser, the place or places of selection to be designated when the purchase order is placed. The manufacturer or the seller shall furnish specimens for tests without charge.

**6.2** The brick shall be sampled and tested in accordance with Test Methods C 67.

**NOTE 6**—Unless otherwise specified in the purchase order, the cost of tests is typically borne as follows: If the results of the test show that the brick do 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 do conform to the requirements of this specification, the cost is typically borne by the purchaser.

**7. Visual Inspection**

**7.1** The brick, as delivered to the site, shall, by visual inspection, conform to the requirements specified by the purchaser or to the sample or samples approved as the standard of comparison and to the samples passing the tests for physical requirements. Minor indentations or surface cracks incidental to the usual method of manufacture, or the chipping resulting from the customary methods of handling in shipment and delivery, shall not be deemed grounds for rejection.

**7.2** The brick shall be free of defects, deficiencies, and surface treatments, including coatings, that would interfere

with the proper setting of the brick or significantly impair the strength or performance of the construction.

7.3 Unless otherwise agreed upon between the purchaser and the seller, a delivery of brick is permitted to contain not more than 5 % broken brick.

## 8. Keywords

8.1 building brick; clay; fired masonry units; masonry construction; physical properties; shale; solid brick

## SUMMARY OF CHANGES

Committee C15 has identified the location of selected changes to this standard since C 62–99 that may impact the use of this standard.

(1) Paragraph 4.2.2 was modified so that the 24-h cold water absorption limit applies to all units in the sample.

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