



Designation: C62 – 23

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

This standard is issued under the fixed designation C62; 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 brick intended for use in 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. This specification does not cover brick intended for use as facing units or where surface appearance is a requirement. 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 C216. This specification does not cover brick intended for use as paving brick (see Specifications C902 and C1272).

1.2 The requirements of this specification 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 requirements of this specification is beyond the scope of this standard.

1.3 Brick are ceramic products manufactured primarily from clay, shale, or similar naturally occurring earthy substances and subjected to a heat treatment at elevated temperatures (firing). Additives or recycled materials are permitted to be included at the option of the manufacturer. The heat treatment must develop sufficient fired bond between the particulate constituents to provide the strength and durability requirements of this specification (see Terminology C1232).

1.4 Brick are shaped during manufacture by molding, pressing, or extrusion, and the shaping method is a way to describe the brick.

1.4.1 This specification and its individual requirements shall not be used to qualify or corroborate the performance of a masonry unit made from other materials, or made with other forming methods, or other means of binding the materials.

1.5 Three grades of brick are covered.

<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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1.6 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 specification.

1.7 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.

1.8 *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:*<sup>2</sup>

C67/C67M Test Methods for Sampling and Testing Brick and Structural Clay Tile

C216 Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)

C902 Specification for Pedestrian and Light Traffic Paving Brick

C1232 Terminology for Masonry

C1272 Specification for Heavy Vehicular Paving Brick

## 3. Terminology

3.1 *Definitions*—For definitions relating to masonry and building brick, refer to Terminology C1232.

## 4. Classification

4.1 *Grades*—Grades classify brick according to their resistance to damage by freezing and thawing when saturated at a moisture content not exceeding the 24-h cold water absorption. Three grades of building brick are covered and the requirements are given in Section 6.

<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

4.1.1 *Grade SW (Severe Weathering)*—Brick intended for use where high resistance to damage caused by cyclic freezing and thawing is desired.

4.1.2 *Grade MW (Moderate Weathering)*—Brick intended for use where moderate resistance to cyclic freezing and thawing damage is permissible.

4.1.3 *Grade NW (Negligible Weathering)*—Brick intended for use where little resistance to cyclic freezing and thawing damage is acceptable.

NOTE 1—Although grade is associated with resistance to deterioration under freeze/thaw exposures, freeze/thaw resistance of a clay brick unit is also affected by the properties of the surrounding materials, the construction details, and the overall environment in which the clay unit is placed; each of which may influence exposure to moisture and freezing conditions. Brick masonry should be detailed to minimize saturation or near-saturation of the units in freezing conditions. Measurement of moisture content of brick in buildings indicates that, when the building is designed and constructed to reduce water penetration, the 24-h cold water absorption is unlikely to be exceeded.

5. Ordering Information

5.1 Orders for building brick under this specification shall include the following information:

5.1.1 *Grade (4.1)*—Grade SW governs when grade is not specified.

5.1.2 *Size (7.1)*—Specify width by height by length.

5.1.3 *Sampling (10.2)*—Person to select samples and place or places of selection of samples for testing.

5.2 Orders for building brick under this specification may include the following information:

5.2.1 *Strength (6.2)*—Specify only if above minimum compressive strength in Table 1.

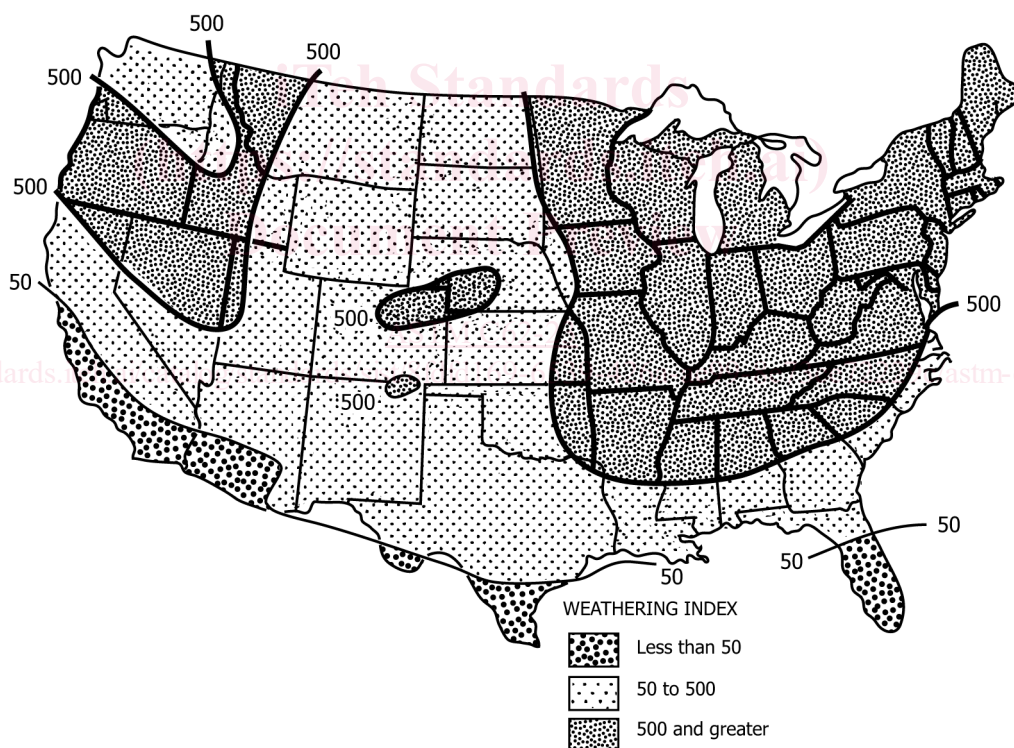
5.2.2 *Coring (9.1)*—At option of manufacturer if not specified otherwise.

5.2.3 *Frogging (9.2)*—Frog permitted in one bearing face if not specified otherwise.

5.2.4 *Costs of Tests (Note 8)*—Party who will pay and conditions for payment of compliance testing.

5.2.5 *Special Shapes*—Specify size, dimensions and finished faces by approved shop drawing or other means.

NOTE 2—Nominal dimensions should not be used to specify size. See 6.3 for optional information.



Grade Recommendations for Face Exposures

Exposure	Weathering Index (Note 4)	
	Less than 50	50 and greater
In vertical surfaces:		
In contact with earth	MW or SW	SW
Not in contact with earth	MW or SW	SW
In other than vertical surfaces:		
In contact with earth	SW	SW
Not in contact with earth	MW or SW	SW

FIG. 1 Weathering Indices in the United States

TABLE 1 Physical Requirements

Designation	Minimum Compressive Strength gross area, psi (MPa)		Maximum Water Absorption by 5-h Boiling, %		Maximum Saturation Coefficient <sup>A</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>A</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.

6. Physical Properties

6.1 Durability—When Grade is not specified, the requirements for Grade SW shall govern.

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

6.1.2 Absorption Alternate—The saturation coefficient requirement does not apply, provided that the 24-h cold water absorption of each of the five units tested does not exceed 8.0 %.

6.1.3 Freezing and Thawing Alternative—The requirements for 5 h boiling water absorption and saturation coefficient do not apply, provided a representative 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 C67/C67M.

NOTE 3—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 6.1.2.

6.1.3.1 Grade SW: Breakage and Weight Loss Requirement—No individual unit separates or disintegrates resulting in a weight loss greater than 0.5 % of its original dry weight.

6.1.3.2 Grade SW: Cracking Requirement—No individual unit develops a crack that exceeds, in length, the unit’s least dimension.

6.1.4 Low Weathering Index Alternative—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 4—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 (millimeters) defined as follows:<sup>3</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

<sup>3</sup> Data needed to determine the weathering index for any locality may be found or estimated from the tables of Local Climatological Data—Annual Summary with Comparative Data available from the National Oceanic and Atmospheric Administration.

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 (millimeters), 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 listed. The index for geographic locations near the 50 line should be determined by an analysis of weather bureau local climatological summaries, with due regard to the effect of microclimate conditions, especially altitude.

The recommended correlation between grade of building brick, weathering index, and exposure is found in Fig. 1. The specifier may use these recommendations or use the grade descriptions and physical requirements along with use exposure and local climatological conditions to select grade.

6.2 Strength—When brick are required to have strengths greater than prescribed by this specification, the purchaser shall specify the desired minimum gross area compressive strength.

6.3 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 C67/C67M 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 5.

NOTE 5—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. IRA of the units is determined by the oven-dried procedure described in the IRA (Suction) (Laboratory Test) of Test Methods C67/C67M. 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 C67/C67M. 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.

7. Dimensions and Permissible Variations

7.1 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 2.

NOTE 6—Brick names denoting sizes may be regional and, therefore,