Designation: ~~C279 – 13~~ C279 – 13a

Standard Specification for Chemical-Resistant Masonry Units[1]

This standard is issued under the fixed designation C279; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers solid, kiln fired brick and tile made from clay, shale, or mixtures thereof, suitable for indoor and outdoor use in masonry construction subjected to chemical environments (see Terminology C1232).

1.2 The ~~physical and chemical properties of~~ brick and tile ~~differ from supplier to supplier, mainly because their composition is determined by the source of raw materials. Regardless of the differences,~~ covered herein are intended for use in chemical environments where resistance to thermal shock may be a consideration. The brick and tile are ~~considered to be one of three types and one of two classes as follows:~~normally used with chemical-resistant mortars.

~~1.2.1 *Type I*—For use where low absorption and high acid resistance are not major factors.~~

~~1.2.2 *Type II*—For use where lower absorption and higher acid resistance are required.~~

~~1.2.3 *Type III*—For use where minimum absorption and maximum acid resistance are required.~~

~~NOTE 1—*Types I, II*, and *III* may not differ significantly in thermal shock resistance. The suitability of a given brick, for a particular application should be determined at the time of purchase by agreement between the purchaser and the supplier.~~

~~NOTE 2—*Types I* and *III* were formerly designated Type "H" and "L" respectively.~~

~~1.2.4 *Class S*—For use in standard applications.~~

~~1.2.5 *Class X*—For use where a higher degree of precision and lower permissible variation in size than that permitted for Class S is required.~~

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.

1.4 *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*:[2]

C20 Test Methods for Apparent Porosity, Water Absorption, Apparent Specific Gravity, and Bulk Density of Burned Refractory Brick and Shapes by Boiling Water

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

C1232 Terminology of Masonry

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Terminology

3.1 *Definitions*—For definitions relating to chemical-resistant masonry units, refer to Terminology C1232.

4. Classification

4.1 The physical and chemical properties of brick and tile differ from supplier to supplier, mainly because their composition is determined by the source of raw materials. Regardless of the differences, brick and tile are considered to be one of three types and one of two classes as follows:

[1] 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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[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.

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

4.1.1 *Type I*—For use where low absorption and high acid resistance are not major factors.

4.1.2 *Type II*—For use where lower absorption and higher acid resistance are required.

4.1.3 *Type III*—For use where minimum absorption and maximum acid resistance are required.

NOTE 1—*Types I, II*, and *III* may not differ significantly in thermal shock resistance. The suitability of a given brick, for a particular application should be determined at the time of purchase by agreement between the purchaser and the supplier.

NOTE 2—*Types I* and *III* were formerly designated Type "H" and "L" respectively.

4.1.4 *Class S*—For use in standard applications.

4.1.5 *Class X*—For use where a higher degree of precision and lower permissible variation in size than that permitted for Class S is required.

5. Physical Properties

5.1 *Strength*—The brick and tile when tested in accordance with Test Methods C67 shall conform to the requirements for modulus of rupture (flexural strength) for the type specified, as prescribed in Table 1.

5.2 *Water Absorption*—The brick and tile when tested in accordance with Test Methods C20 shall conform to the requirements for water absorption (based on the 2 h boil) for the type specified, as prescribed in Table 1.

~~4.3 *Sizes*—The sizes of the brick and tile shall be as specified by the purchaser. The length, width, and depth measurements of the brick or tile shall be within ±3 % of the specified dimensions for Class S units and within ±1.5 % of the specified dimensions for Class X units when tested in accordance with Test Methods C67.~~

~~4.4 *Warpage*—The brick and tile when tested in accordance with Test Methods C67 shall conform to the requirements as shown in Table 2.~~

~~4.5 *Surface Textures*—Brick or tile surfaces should be textured in order to promote better bonding. Texturing may be accomplished by scoring, wire cutting, matting, or other means consistent with a manufacturer's process. If texturing is done, the protrusion or indentation shall not exceed ⅛ in. (3 mm) in depth.~~

6. Dimensions and Permissible Variations

6.1 *Sizes*—The sizes of the brick and tile shall be as specified by the purchaser. The length, width, and depth measurements of the brick or tile shall be within ±3 % of the specified dimensions for Class S units and within ±1.5 % of the specified dimensions for Class X units.

6.2 *Warpage*—The brick and tile shall conform to the requirements as shown in Table 2.

7. Finish and Appearance

7.1 *Surface Textures*—Brick or tile surfaces are often textured in order to promote better bonding. Texturing is accomplished by scoring, wire cutting, matting, or other means consistent with a manufacturer's process. If texturing is done, the protrusion or indentation shall not exceed ⅛ in. (3 mm) in depth.

7.2 The brick and tile shall be free of open surface laminations or cracks which would impair the performance of the construction.

NOTE 3—Open laminations or cracks within the brick or tile observed in the brick or tile cut or broken during testing, should be noted with their size and number indicated as part of the test report. If internal open laminations or cracks, or both, are reported, the purchaser shall determine the suitability of such brick or tile for his application.

7.3 *Black Heart*—Brick or tile when broken may have a dark area that has a steely appearance and is sharply delineated from the surrounding normal color of the brick. It is known as *black heart* or *black core*. Black heart is generally the result of the reduction of iron minerals during the firing process. Its presence, regardless of size, in brick or tile which otherwise meet the physical and chemical requirements of this specification, shall not be cause for rejection.

TABLE 1 Physical and Chemical Requirements for Brick and Tile

Designation	Modulus of Rupture (Brick or Tile Flat-wise) min. psi (MPa)	Water Absorption Maximum % by 2 h Boiling Test		H_2SO_4 Solubility Maximum % Weight Loss
	Average of 5 Brick or Tile Low Individual	Average of 5 Brick or Tile High Individual		Average of 5 Brick or Tile
Type I	1250 (8.6) 1000 (6.9)	6.0	7.0	20
Type II	1250 (8.6) 1000 (6.9)	4.0	5.0	12
Type III	1250 (8.6) 1000 (6.9)	1.0	1.5	8