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Standard Specification for Pedestrian and Light Traffic Paving Brick[1]

This standard is issued under the fixed designation C 902; 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 brick intended for use as paving material to support pedestrian and light vehicular traffic. The units are designed for use in such places as patios, walkways, floors, plazas, and driveways. The units are not intended to support heavy vehicular traffic covered by Specification C 1272 or for industrial applications covered by Specification C 410.

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 4) of this specification 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 requirement of this specification (see firing, fired bond and incipient fusion in Terminology C 43).

1.4 The brick are available in a variety of sizes, colors, and shapes. They are available in three classes according to exposure environment and three types according to type of traffic exposure.

1.5 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards:*

C 43 Terminology of Structural Clay Products[2]

C 67 Test Methods of Sampling and Testing Brick and Structural Clay Tile[2]

C 88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate[3]

C 410 Specification for Industrial Floor Brick[2]

C 418 Test Method for Abrasion Resistance of Concrete by Sandblasting[3]

C 1272 Specification for Vehicular Paving Brick[2]

3. Classification

3.1 Light traffic paving brick are classified according to the severity of their use-environment. Two types of environment are considered: (*1*) weather and (*2*) traffic:

3.1.1 *Weather*:

3.1.1.1 *Class SX*—Brick intended for use where the brick may be frozen while saturated with water.

3.1.1.2 *Class MX*—Brick intended for exterior use where resistance to freezing is not a factor.

3.1.1.3 *Class NX*—Brick not intended for exterior use but which may be acceptable for interior use where protected from freezing when wet.

NOTE 1—A surface coating may be applied to any class of brick of this standard when protected from freezing while wet. The function of the coating is to prevent penetration of dirt or liquids into the pores of the brick. Coatings should be applied only after complete drying of the paving.

3.1.2 *Traffic*:

3.1.2.1 *Type I*—Brick subjected to extensive abrasion.

NOTE 2—Type I pavers would be used in such places as sidewalks and driveways in publicly occupied spaces.

3.1.2.2 *Type II*—Brick subjected to intermediate abrasion.

NOTE 3—Type II pavers would be used in such places as heavily traveled residential walkways and residential driveways.

3.1.2.3 *Type III*—Brick subjected to low abrasion.

NOTE 4—Type III pavers would be used in such places as floors or patios in single-family homes.

4. Physical Properties

4.1 *Freeze Thaw Resistance*—Use one of the following methods:

4.1.1 *Physical Property Requirements*—The brick shall conform to the physical requirements for the class specified as prescribed in Table 1.

4.1.1.1 *Absorption Alternative*—If the average water absorption is less than 6.0 % after 24-h submersion in room-temperature water, the requirement for saturation coefficient shall be waived.

4.1.2 *Freezing and Thawing Test Alternative*—The requirements for water absorption (24–h cold) and saturation coefficient specified in 4.1.1 shall be waived provided a sample of five brick, meeting all other requirements, passes the freezing and thawing test as described in the Rating section of the

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[2] *Annual Book of ASTM Standards*, Vol 04.05.

[3] *Annual Book of ASTM Standards*, Vol 04.02.

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

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TABLE 1 Freeze Thaw Resistance Property Requirements[A]

Designation	Compressive Strength, flatwise, gross area, min, psi (MPa)		Cold Water Absorption, max, %		Saturation Coefficient, max[B]	
	Average of 5 Brick	Individual	Average of 5 Brick	Individual	Average of 5 Brick	Individual
Class SX	8000 (55.2)	7000 (48.3)	8.0	11.0	0.78	0.80
Class MX	3000 (20.7)	2500 (17.2)	14.0	17.0	no limit	no limit
Class NX	3000 (20.7)	2500 (17.2)	no limit	no limit	no limit	no limit

[A] Minimum modulus of rupture values should be considered by the purchaser for uses of brick where support or loading may be severe.
[B] The saturation coefficient is the ratio of absorption by 24-h submersion in room temperature water to that after 5-h submersion in boiling water.

Freezing and Thawing procedures of Test Methods C 67 with no breakage and not greater than 0.5 % loss in dry weight of any individual unit.

NOTE 5—The 50 cycle freezing and thawing test is specified only as an alternative when brick do not conform to either Table 1 requirements for maximum water absorption and saturation coefficient, or to the restrictive absorption requirements in 4.1.1.1.

4.1.2.1 *Sulfate Soundness Test Alternative*—The requirements for water absorption (24–h cold) and saturation coefficient specified in 4.1.1 shall not be required if a sample of five brick survives 15 cycles of the sulfate soundness test in accordance with Sections 4, 5, and 8 of Test Method C 88 with no visible damage.

NOTE 6—The sulfate soundness test is an optional substitute test for the freezing-and-thawing test (4.1.2).

4.1.3 *Performance Alternative*— If information on the performance of the units in a similar application of similar exposure and traffic is furnished by the manufacturer or his agent and is found acceptable by the specifier of the pavement material, or his agent, the physical requirements in 4.1.1 may be waived.

4.1.4 *Molded Brick (Soft Mud, Semi-Dry Pressed, and Dry Pressed Brick*)—The requirements listed in Table 1 shall be changed for molded brick to permit maximum absorption of 16.0 % average and 18.0 % individual, and minimum compressive strengths of 4000 psi (27.6 MPa) average and 3500 psi (24.1 MPa) individual for Class SX, provided that the requirements for saturation coefficient of Table 1 are met.

NOTE 7—The resistance of brick to weathering cannot be predicted with complete assurance at the present state of knowledge. There is no known test that can predict weathering resistance with complete accuracy.

Brick in general is superior in weathering resistance to other building materials. There are innumerable instances of satisfactory performance beyond 200 years and even into the thousands of years. Nevertheless, there are some brick that cannot survive a few winters of a severe freezing and thawing environment.

The durability requirements of the specification attempt to exclude such brick. This specification utilizes the best knowledge available at this time and is based on extensive research by several investigators. The durability requirements have an excellent correlation with in-use performance. Nevertheless, it is known that some brick that meet this specification may not be serviceable in severe climates. Furthermore, other brick that do not meet these specifications may show superior serviceability in the most severe climate. The best indication of brick durability is its service experience record.

4.2 Unless otherwise specified by the purchaser, brick of Classes SX and MX shall be accepted instead of Class NX, and Class SX shall be accepted instead of Class MX. Type I and Type II shall be accepted instead of Type III, and Type I shall be accepted instead of Type II.

4.3 *Abrasion Resistance*—The brick shall meet the requirements of either column (1) or (2) of Table 2 for the applicable traffic use (see 3.1.2).[4]

NOTE 8—Skid/slip resistance should be considered by the purchaser for uses of brick where pedestrian traffic is anticipated. Methods of testing this characteristic are under study and it is hoped that a specification for this property can be added in future revisions of this standard when suitable test methods are developed.

5. Efflorescence

5.1 When paving brick are tested in accordance with Test Methods C 67, the rating for efflorescence shall be: "not effloresced."

6. Size

6.1 The size of the brick shall be as specified by the purchaser or produced by the manufacturer as a stock item.

6.2 The tolerance on dimension shall depend on the bond pattern and method of installation of the units. Three different methods of applications are covered (see Table 3):

6.2.1 *Application PS*— Paving brick intended for general use and installed with a mortar joint between individual units, or in an installation without mortar joints between units when they are laid in running or other bonds not requiring extremely close dimensional tolerances.

6.2.2 *Application PX*— Paving brick intended for installation without mortar joints between the units, where exceptionally close dimensional tolerances are required as a result of special bond patterns or unusual construction requirements.

6.2.3 *Application PA*— Paving brick manufactured and selected to produce characteristic architectural effects resulting from nonuniformity in size, color, and texture of individual units. (The textures may exhibit inclusion of nonuniform nodules of mineral substances or purposely introduced cracks that enhance the appearance of the units.) The requirements on warpage as specified in 6.4 do not apply to this application.

6.3 When the application is not specified, the requirements for Application PS shall govern.

6.4 *Warpage*—The concave and convex warpage (distortion) of any face intended to be the exposed surface or edge of the paving shall not exceed the values of Table 4 when sampled and measured in accordance with Test Methods C 67.

7. Visual Inspection

7.1 The brick shall be free of cracks or other imperfections detracting from the appearance of a designated sample when

[4] McBurney, J. W., Brink, R. H., Eberle, A. R., "Relation of Water Absorption and Strength of Brick to Abrasive Resistance," *Proceedings, ASTM*, Vol 40, 1940, pp. 1143–1151.

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