Designation: C1272 – 16b

Standard Specification for Heavy Vehicular Paving Brick[1]

This standard is issued under the fixed designation C1272; 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 a paving material in areas with a high volume of heavy vehicular traffic. The units are designed for use in such places as streets, commercial driveways, and aircraft taxiways. These units are not intended for applications covered by Specifications C410 or C902.

1.2 Units 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 Terminology C1232).

1.3 Brick may be shaped during manufacture by extruding, molding, or pressing. Brick may have spacing lugs, chamfered edges, or both.

1.4 Use of this standard and the requirements herein to evaluate and corroborate the performance of a paving unit made from other materials, or made with other forming methods, or other means of binding the materials is not covered by the scope of this standard.

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.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

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

C88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

C410 Specification for Industrial Floor Brick

C418 Test Method for Abrasion Resistance of Concrete by Sandblasting

C902 Specification for Pedestrian and Light Traffic Paving Brick

C1232 Terminology of Masonry

E303 Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester

3. Terminology

3.1 *Definitions*—Terms used in this specification are defined in Terminology C1232.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *heavy vehicular traffic*—high volume of heavy vehicles representing trucks or combination vehicles having 3 or more loaded axles.

3.2.1.1 *Discussion*—High volume traffic is considered to exceed 251 daily Equivalent Single Axle Loads (ESAL). Defined by the American Association of State Highway Transportation Officials (AASHTO), an ESAL converts a mix of axle loads on a pavement to an equivalent number of 18,000 lb (80 kN) single axle loads.

4. Classification

4.1 *Types*—Heavy vehicular paving brick are classified by type according to their intended installation:

4.1.1 *Type R*—Brick intended to be set in a mortar setting bed supported by an adequate concrete base; or an bituminous setting bed supported by an adequate asphalt or concrete base.

4.1.2 *Type F*—Brick intended to be set in a sand setting bed, with sand joints, and supported by an adequate base.

4.2 *Applications*—Heavy vehicular paving brick are classified by application according to their dimensional tolerances, warpage, and extent of chips.

4.2.1 *Application PS*—Pavers intended for general use.

4.2.2 *Application PX*—Pavers intended for use where a higher degree of precision and a lower permissible variation in dimensional tolerances and warpage are required than for Application PS.

4.2.3 *Application PA*—Pavers intended to produce characteristic architectural effects resulting from nonuniformity in size, color, and texture.

[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**

5. Physical Properties

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

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

5.1.2 *Freezing and Thawing Alternative*—The 24-h cold water absorption requirements specified in 5.1.1 shall not be required provided a sample of five brick, meeting all other requirements, passes the 50 cycle freezing-and-thawing test in Test Methods C67 with not greater than 0.5 % loss in dry weight of any individual unit.

NOTE 1—The provisions of 5.1.2 are specified only as an alternative when the sample does not conform to the requirements 24-h for cold water absorption prescribed in Table 1.

5.1.2.1 *Sulfate Soundness Test Alternative*—The 24-h cold water absorption requirements specified in 5.1.1 shall not be required if a representative sample of five brick survives 15 cycles of the sulfate soundness test in accordance with Sections 4, 5, and 8 of Test Method C88 with no visible damage.

NOTE 2—The sulfate soundness test is an optional substitute test for the freezing-and-thawing test (5.1.2).

5.1.3 *Performance Alternative*—If information on the performance over time of similar units in a similar application with similar exposure and traffic is furnished by the manufacturer or the manufacturer's agent and is found acceptable to the specifier of the pavement material or the specifier's agent, the physical requirements in 5.1.1 or the size requirements in 7.2 shall not be required.

5.2 *Abrasion Resistance*—Each individual brick tested shall meet the requirements of either the Abrasion Index column or the Volume Abrasion Loss column of Table 2.

5.2.1 *Abrasion Index*—The abrasion index is calculated from the 24-h cold water absorption in percent and the compressive strength in pounds per square inch as follows:

$$\text{abrasion index} = \frac{100 \times \text{absorption}}{\text{compressive strength}} \quad (1)$$

5.2.1.1 The compressive strength shall be determined on half-brick, which are the full height (no less than 2¼ in. (57 mm)) and width of the unit, and with a length equal to one half the full length of the unit (±¼ in. (±6 mm) for each dimension). For abrasion index testing purposes, the brick shall be without core holes, frogs or other perforations. Other shaped specimens may be used provided that a correlation is established with the results of the specified shape and the results are converted to be equivalent to those that would be obtained with the specified shape.

5.2.1.2 In those cases where the height requirements for determining compressive strength cannot be met, the abrasion resistance should be determined according to the volume abrasion loss method.

TABLE 2 Abrasion Requirements[A]

Type	Abrasion Index, max	Volume Abrasion Loss, max, cm^3/cm^2
R and F	0.11	1.7

[A] See 5.2.1 and 5.2.2 for additional information.

5.2.2 *Volume Abrasion Loss*—The volume abrasion loss should be determined in accordance with Test Method C418, with the following changes in procedure:

5.2.2.1 The sand shall be a natural silica sand from Ottawa, IL, graded to pass a No. 50 (300-µm) sieve and retained on a No. 100 (150-µm) sieve.

5.2.2.2 The test shall be run on dry brick.

5.2.2.3 The duration of the test shall be 2 min.

5.2.2.4 The rate of sand flow shall be 400 g/min.

5.2.2.5 The volume loss shall be determined by filling the abraded depression with modeling clay, striking off level with the original surface of the brick, and removing and weighing the modeling clay. The volume loss shall be calculated from the bulk density of the modeling clay. The bulk density should be determined on each lot of modeling clay. An alternative method of determining the weight of clay used in filling the sandblast cavity is to determine the weight of the modeling clay sample before and after filling the cavity.

5.3 *Skid Resistance*—When specified, the units shall be tested for skid resistance in accordance with Test Method E303.

5.4 *Coring*—The brick shall be without core holes or other perforations.

5.5 *Chips or Cracks*—The brick shall be free of chips or cracks larger than those listed in this specification that would significantly impair the performance of the system.

6. Efflorescence

6.1 When specified, the units shall be tested for efflorescence in accordance with Test Methods C67. The units shall be sampled at the place of manufacture.

7. Dimensions and Permissible Variations

7.1 The size of the brick shall be as specified by the purchaser.

7.2 The minimum specified thickness of the unit depends on the Type and shall be as follows:

7.2.1 *Type R*—2¼ in. (57.2 mm).

7.2.2 *Type F*—2⅝ in. (66.7 mm).

7.3 When chamfers are specified by the purchaser, the dimensions required in 7.2.2 are exclusive of chamfers.

TABLE 1 Physical Requirements

Type	Minimum Compressive Strength, Gross Area, psi (MPa)		Minimum Breaking Load, lb/in. (kN/mm)		Maximum 24-h Cold Water Absorption, %	
	Avg. of 5 Brick	Individual	Avg. of 5 Brick	Individual	Avg. of 5 Brick	Individual
R	8000 (55.2)	7000 (48.3)	. . .	. . .	6.0	7.0
F	10 000 (69.0)	8800 (60.7)	475 (83)	333 (58)	6.0	7.0