



Designation: C936/C936M – 16

Standard Specification for Solid Concrete Interlocking Paving Units¹

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1. Scope*

1.1 This specification covers the requirements for interlocking concrete pavers manufactured for the construction of paved surfaces.

1.2 When particular features are desired, such as weight classification, higher compressive strength, surface textures, finish, color, or other special features, such properties should be specified by the purchaser. Local sellers, however, should be consulted as to availability of units having the desired features.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

2. Referenced Documents

2.1 *ASTM Standards*:²

C33/C33M Specification for Concrete Aggregates

C140/C140M Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

C150/C150M Specification for Portland Cement

C207 Specification for Hydrated Lime for Masonry Purposes

C260/C260M Specification for Air-Entraining Admixtures for Concrete

C331/C331M Specification for Lightweight Aggregates for Concrete Masonry Units

C418 Test Method for Abrasion Resistance of Concrete by Sandblasting

C494/C494M Specification for Chemical Admixtures for Concrete

C595/C595M Specification for Blended Hydraulic Cements

C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

C979/C979M Specification for Pigments for Integrally Colored Concrete

C989/C989M Specification for Slag Cement for Use in Concrete and Mortars

C1157/C1157M Performance Specification for Hydraulic Cement

C1240 Specification for Silica Fume Used in Cementitious Mixtures

C1645/C1645M Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units

3. Terminology

3.1 *Definitions*:

3.1.1 *architectural finishes*—surface modified by mechanical means such as blasting, hammering, polishing, tumbling, washing, or other methods.

4. Materials

4.1 *Cementitious Materials* shall conform to the following applicable ASTM specifications:

4.1.1 *Portland Cements*—Specification C150/C150M.

4.1.2 *Blended Hydraulic Cements*—Specification C595/C595M.

4.1.3 *Hydraulic Cement*—Specification C1157/C1157M.

4.1.4 *Hydrated Lime, Type S*—Specification C207.

4.1.5 *Fly Ash*—Specification C618.

4.1.6 *Ground Slag*—Specification C989/C989M.

4.1.7 *Silica Fume*—Specification C1240.

4.2 *Aggregates* shall conform to the following ASTM specifications, except that grading requirements shall not necessarily apply:

4.2.1 *Normal Weight*—Specification C33/C33M.

4.2.2 *Lightweight*—Specification C331/C331M.

4.3 *Chemical Admixtures* shall conform to the following applicable ASTM specifications:

4.3.1 *Air-entraining Admixtures*—Specification C260/C260M.

4.3.2 *Water-reducing, Retarding, and Accelerating Admixtures*—Specification C494/C494M.

¹ This specification is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.03 on Concrete Masonry Units and Related Units.

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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

4.3.3 Pigments for Integrally Colored Concrete—Specification C979/C979M.

4.4 *Other Constituents*—Integral water repellents, and other materials for which no ASTM standards exist, shall be previously established as suitable for use in concrete or shall be shown by test or experience not to be detrimental to the concrete.

5. Physical Requirements

5.1 Units shall have an exposed face area $\leq 101 \text{ in.}^2$ [0.065 m^2], and their overall length divided by thickness shall be ≤ 4 . The minimum specified thickness shall be 2.36 in. [60 mm]. See Fig. 1.

5.2 Concrete units covered by this specification may be made from lightweight or normal weight aggregates or mixed lightweight and normal weight aggregates.

5.3 *Compressive Strength*—At the time of delivery to the work site, the average compressive strength of the test samples shall be not less than 8000 psi [55 MPa] with no individual unit less than 7200 psi [50 MPa] as required in 6.2.

5.4 *Absorption*—The average absorption of the test samples shall not be greater than 5 % with no individual unit greater than 7 % as required in 6.2.

5.5 *Resistance to Freezing and Thawing*—If the units are exposed to freezing and deicing materials during service, the manufacturer shall satisfy the purchaser either by proven field performance or a laboratory freezing-and-thawing test that the paving units have adequate resistance to freezing and thawing. If a laboratory test is used, test in accordance with Test Method C1645/C1645M. Specimens sampled from units that will not be exposed to deicing salts in service shall be tested in tap water. Specimens sampled from units that will be exposed to deicing materials in service shall be tested in 3 % saline solution. The average mass loss of all the specimens tested shall not be greater than: (a) 225 g/m^2 when subject to 28 freeze-thaw cycles, or (b) 500 g/m^2 when subject to 49 freeze-thaw cycles. This test method shall be conducted not more than 12 months prior to delivery of units.

NOTE 1—For some pavement applications subject to severe winter temperatures and deicing materials, a lower freezing temperature should be considered when conducting Test C1645/C1645M using a 3 % saline solution. See the non-mandatory Appendix X1 for this temperature option.

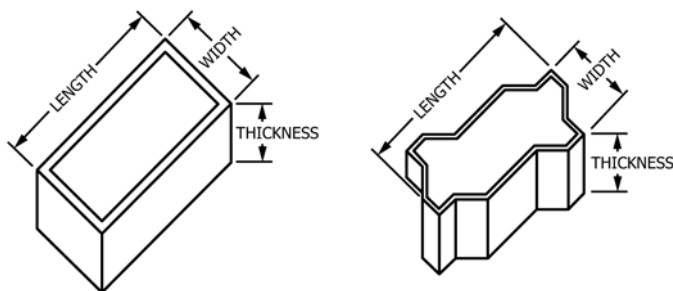


FIG. 1 Length, Width, and Thickness of Concrete Paving Units

5.6 *Abrasion Resistance*—When requested by the specifier or purchaser, units shall be tested in accordance with Test Method C418 or the manufacturer shall provide adequate record of field performance from a similar application. Specimens shall not have an average volume loss greater than $0.92 \text{ in.}^3/7.75 \text{ in.}^2$ [$15 \text{ cm}^3/50 \text{ cm}^2$]. The average thickness loss shall not exceed 0.118 in. [3 mm].

NOTE 2—Applications that may require testing include areas with severe abrasion, such as exposure to point loads from the repeated turning of hard rubber non-pneumatic wheels or heavy channelized foot traffic. Vehicular traffic usually does not constitute a severe abrasion condition.

5.7 *Dimensional Tolerance*—Measured length or width of test specimens shall not differ by more than $\pm 0.063 \text{ in.}$ [$\pm 1.6 \text{ mm}$] from specified dimensions. Measured thickness of test specimens shall not differ by more than $\pm 0.125 \text{ in.}$ [$\pm 3.2 \text{ mm}$] from the specified dimension. All tests shall be performed as required in 6.2. Units shall meet dimensional tolerances prior to the application of architectural finishes.

6. Sampling and Testing

6.1 The purchaser or his authorized representative shall be accorded proper facilities to inspect and sample the units at the place of manufacture from the lots ready for delivery. Prior to delivery of units, the supplier and purchaser shall decide on the lot size from which to sample test specimens for resistance to freezing and thawing, abrasion resistance, absorption, compressive strength, and dimensional tolerances.

6.2 For compressive strength, absorption, and dimensional tolerances, test units in accordance with Test Methods C140/C140M. Sample a minimum of three (3) test specimens each for compressive strength and absorption. Determine dimensional tolerances from either the compressive strength or absorption specimens prior to testing. Sample a minimum of three (3) specimens and test for resistance to freezing and thawing in accordance with Test Method C1645/C1645M. Sample a minimum of two (2) specimens for abrasion resistance and test in accordance with Test Method C418. Separate specimens shall be used for compressive strength, absorption, freeze-thaw, and abrasion resistance tests.

7. Visual Inspection

7.1 All units shall be sound and free of defects that would interfere with the proper placing of the units or impair the strength or performance of the construction. Minor cracks incidental to the usual methods of manufacture or minor chipping resulting from customary methods of handling in shipment and delivery shall not be deemed grounds for rejection.

8. Rejection

8.1 In case the shipment fails to conform to the specified requirements, the manufacturer may sort it, and new specimens shall be selected by the purchaser from the retained lot and tested at the expense of the manufacturer. In case the second set of specimens fails to conform to the test requirements, the entire lot shall be rejected.