

# Standard Specification for Segmental Retaining Wall Units<sup>1</sup>

This standard is issued under the fixed designation C 1372; 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 segmental retaining wall units of concrete, machine-made from portland cement, water, and suitable mineral aggregates with or without the inclusion of other materials. The units are intended for use in the construction of mortarless segmental retaining walls.

NOTE 1—When particular features are desired, such as weight classification, higher compressive strength, surface texture, finish, color, or other special features, such properties should be specified separately by the purchaser. Local suppliers should be consulted as to availability of units having the desired features.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- C 33 Specification for Concrete Aggregates<sup>2</sup>
- C 140 Test Methods of Sampling and Testing Concrete Masonry Units<sup>3</sup>
- C 150 Specification for Portland Cement<sup>4</sup>
- C 331 Specification for Lightweight Aggregates for Concrete Masonry Units<sup>2</sup>
- C 595M Specification for Blended Hydraulic Cements<sup>4</sup>
- C 618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete<sup>2</sup>
- C 989 Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars<sup>2</sup>
- C 1157/C 1157M Performance Specification for Blended Hydraulic Cement<sup>4</sup>
- C 1262 Test Method for Evaluating the Freeze-Thaw Durability of Manufactured Concrete Masonry Units and Related Concrete Units<sup>3</sup>

## 3. Materials

3.1 *Cementitious Materials*—Materials shall conform to the

following applicable specifications:

- 3.1.1 *Portland Cements*—Specification C 150.
- 3.1.2 *Modified Portland Cement*—Portland cement conforming to Specification C 150, modified as follows:
  - 3.1.2.1 *Limestone*—Limestone, with a minimum 85 % Calcium Carbonate (CaCO<sub>3</sub>) content, shall be permitted to be added to the cement, provided these requirements of Specification C 150 as modified are met:
    - (1) Limitation on Insoluble Residue—1.5 %.
    - (2) Limitation on Air Content of Mortar—Volume percent, 22 % max.
    - (3) Limitation on Loss of Ignition—7 %.
- 3.1.3 *Blended Cements*—Specification C 595M or C 1157/C 1157M.
- 3.1.4 *Pozzolans*—Specification C 618.
- 3.1.5 *Blast Furnace Slag Cement*—Specification C 989.
- 3.2 *Aggregates*—Aggregates shall conform to the following specifications, except that grading requirements shall not necessarily apply:
  - 3.2.1 *Normal Weight Aggregates*—Specification C 33.
  - 3.2.2 *Lightweight Aggregates*—Specification C 331.
  - 3.3 *Other Constituents*—Air-entraining agents, coloring pigments, integral water repellents, finely ground silica, and other constituents shall be previously established as suitable for use in segmental retaining wall units and shall conform to applicable ASTM standards or shall be shown by test or experience to be not detrimental to the durability of the segmental retaining wall units or any material customarily used in segmental retaining wall construction.

## 4. Physical Requirements

4.1 At the time of delivery to the work site, the units shall conform to the physical requirements of Table 1 when tested in accordance with 7.2.

4.2 *Freeze-Thaw Durability*—In areas where repeated freezing and thawing under saturated conditions occur, freeze-thaw durability shall be demonstrated by test or by proven field performance that the segmental retaining wall units have adequate durability for the intended use. When testing is required by the specifier to demonstrate freeze-thaw durability, the units shall be tested in accordance with 7.3.

4.2.1 Specimens shall comply with either of the following: 1) the weight loss of each of five test specimens at the conclusion of 100 cycles shall not exceed 1 % of its initial

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C-15 on Manufactured Masonry Units and is the direct responsibility of C15.03 on Concrete Masonry Units and Related Units.

Current edition approved May 10, 1998. Published November 1998. Originally published as C 1372-97. Last previous edition C 1372-97.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.05.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 04.01.

TABLE 1 Strength and Absorption Requirements

Minimum Required Net Average Compressive Strength, psi (MPa)		Maximum Water Absorption Requirements lb/ft <sup>3</sup> (kg/m <sup>3</sup> )		
		Weight Classification Oven-Dry Density of Concrete lb/ft <sup>3</sup> (kg/m <sup>3</sup> )		
Average of 3 Units	Individual Unit	Lightweight: Less than 105 (1682)	Medium Weight: 105 (1682) to less than 125 (2002)	Normal Weight: 125 (2002) or more
3000 (20.7)	2500 (17.2)	18 (288)	15 (240)	13 (208)

weight; or 2) the weight loss of each of four of the five test specimens at the conclusion of 150 cycles shall not exceed 1.5 % of its initial weight.

## 5. Permissible Variations in Dimensions

5.1 Overall dimensions for width, height, and length shall differ by not more than  $\pm \frac{1}{8}$  in. (3.2 mm) from the specified standard dimensions.

NOTE 2—The term “width” refers to the horizontal dimension of the unit measured perpendicular to the face of the wall from the exposed surface of the unit to the back of the unit. The term “height” refers to the vertical dimension of the unit as placed in the wall. The term “length” refers to the horizontal dimension of the unit measured parallel to the running length of the wall.

5.1.1 Dimensional tolerance requirements for width shall be waived for architectural split faced surfaces.

## 6. Finish and Appearance

6.1 All units shall be sound and free of cracks or other defects that would interfere with the proper placement of the unit or would significantly impair the strength or permanence of the construction. Minor cracks incidental to the usual method of manufacture or minor chipping resulting from customary methods of handling in shipment and delivery, are not grounds for rejection.

6.2 Where units are to be used in exposed wall construction, the face or faces that are to be exposed shall not show chips or cracks, not otherwise permitted, or other imperfections when viewed from a distance of not less than 20 ft (6.1 m) under diffused lighting.

6.3 Five percent of a shipment containing chips not larger than 1 in. (25.4 mm) in any dimension, or cracks not wider than 0.02 in. (0.5 mm) and not longer than 25 % of the nominal height of the unit is permitted.

6.4 The color and texture of units shall be specified by the purchaser. The finished surface that will be exposed in place

shall conform to an approved sample consisting of not less than four units, representing the range of texture and color permitted.

## 7. Sampling and Testing

7.1 The purchaser or authorized representative shall be accorded proper facilities to inspect and sample units at the place of manufacture from the lots ready for delivery.

7.2 Sample and test units for compressive strength, absorption, and dimensional tolerances in accordance with Test Methods C 140.

7.3 When required, sample and test five specimens for freeze-thaw durability in water in accordance with Test Method C 1262. Freeze-thaw durability shall be based on tests of units made with the same materials, concrete mix design, manufacturing process, and curing method, conducted not more than 24 months prior to delivery.

## 8. Rejection

8.1 If the samples tested from a shipment fail to conform to the specified requirements, the manufacturer shall be permitted to remove units from the shipment, and a new sample shall be selected by the purchaser from the retained lot and tested at the expense of the manufacturer. If the second sample fails to conform to the specified requirements, the entire lot shall be rejected.

NOTE 3—Unless otherwise specified in the purchase order, the cost of tests is typically borne as follows: (1) if the results of the tests show that the units do not conform to the requirements of this specification, the cost is typically borne by the seller; (2) if the results of the tests show that the units conform to the specification requirements, the cost is typically borne by the purchaser.

## 9. Keywords

9.1 absorption; aggregates; cementitious materials; compressive strength; concrete masonry units; dimensions; durability; weight classification

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