



Designation: **C1262/C1262M – 16 C1262/C1262M – 18**

## Standard Test Method for Evaluating the Freeze-Thaw Durability of Dry-Cast Segmental Retaining Wall Units and Related Concrete Units<sup>1</sup>

This standard is issued under the fixed designation C1262/C1262M; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. Scope\*

1.1 This test method covers the resistance to freezing and thawing of dry-cast segmental retaining wall (SRW) units (see Specification **C1372**) and related concrete units. Units are tested in a test solution that is either potable tap water or 3 % saline solution depending on the intended use of the units in actual service.

NOTE 1—Related concrete units include units such as hollow and solid concrete masonry units, concrete brick, and concrete roof pavers.

1.2 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 this standard. Some values have only SI units because the inch-pound equivalents are not used in practice.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

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

**C1093** Practice for Accreditation of Testing Agencies for Masonry

**C1232** Terminology for Masonry

~~C1372~~ **C1372** Specification for Dry-Cast Segmental Retaining Wall Units

### 3. Terminology

3.1 Terminology defined in Terminology **C1232** shall apply for this test method.

*3.2 Definitions of Terms Specific to This Standard:*

*3.2.1 chamber capacity, n*—the number of specimens contained within the test chamber during verification of chamber temperatures and cycling.

*3.2.1.1 Discussion—*

The number of specimens in the chamber must remain the same at all times during testing. Chamber temperature cycling verification must be performed at the chamber capacity that will be used during testing. If at any time during testing the actual number of test specimens is less than the chamber capacity, dummy specimens must be used to maintain the same thermal load. A change in chamber capacity requires verification of temperature cycling.

<sup>1</sup> This test method 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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<sup>2</sup> 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

3.2.2 *dummy specimen, n*—a specimen with the same approximate mass as actual test specimens which is used to maintain a consistent thermal load in a test chamber.

3.2.2.1 *Discussion*—

Dummy specimens could be leftover specimens from previous testing, additional specimens cut from manufactured concrete products, or even a measured amount of sand approximately equal to the mass of the tested units. The dummy specimen is placed in a sample container which contains an equivalent amount of test solution as used in the other test containers in order to maintain approximately the same thermal load in the whole test chamber.

4. Significance and Use

4.1 The procedure described in this test method is intended to determine the effects of freezing and thawing on SRW and related units in the presence of potable tap water or saline solution.

4.2 The procedure is not intended to provide a quantitative measure to determine an expected length of service for a specific type of concrete unit.

NOTE 2—The testing laboratory performing this test method should be evaluated in accordance with Practice C1093.

5. Apparatus

5.1 *Freeze-Thaw Chamber*—Use a chamber that has:

- 5.1.1 Forced air circulation,
- 5.1.2 A programmable air-temperature controller capable of automatically performing at least two freezing and thawing cycles per 24-h period during testing,
- 5.1.3 A temperature range of at least -10 to 100°F [-25 to 40°C], and
- 5.1.4 The capability of maintaining the air temperature throughout the chamber within the specified temperature ranges for the duration of the test cycle.

5.1.5 The chamber shall comply with the temperature requirements for cycling contained in 7.2.1 and 7.2.2 at chamber capacity. When testing is conducted, the total number of test specimens and dummy specimens combined shall equal the chamber capacity used when the temperatures are verified.

5.2 *Containers*—Use containers that are:

- 5.2.1 Made of non-rigid plastic,
- 5.2.2 Of sufficient size to contain each test specimen and specimen supports as illustrated in Fig. 1,
- 5.2.3 Of sufficient size to provide a minimum of 1/8 in. [3 mm] and a maximum of 1 1/2 in. [40 mm] of test solution surrounding the sides of the specimen,
- 5.2.4 Supplied with a tightly-fitting lid to reduce evaporation, and
- 5.2.5 Flat enough so that the specimen will not deviate from level by more than 1/16 in. [2 mm] from one end of the specimen to the opposite end when placed on the support rods.

5.3 *Specimen Supports*—Support the specimen above the container bottom. Use supports that are:

- 5.3.1 Rods having a thickness of 1/8 ± 1/24 in. [3 ± 1 mm] and a width of the portion that contacts the specimens of no greater than the rod thickness (see Note 3),
- 5.3.2 Made of a solid, non-corrosive, non-absorptive material (brass, plastic, and so forth), and
- 5.3.3 Capable of supporting the specimen in both the longitudinal and transverse directions (see Note 4).

NOTE 3—The rods can be of any cross-sectional shape (for example, round, square, or triangular) as long as the specimen is held off the bottom of the container by the required rod thickness and the width of the portion of the rod that contacts the specimen is no greater than the rod thickness.

NOTE 4—Examples of longitudinal and transverse support configurations including placing the supports in an I, Z, or box configurations.

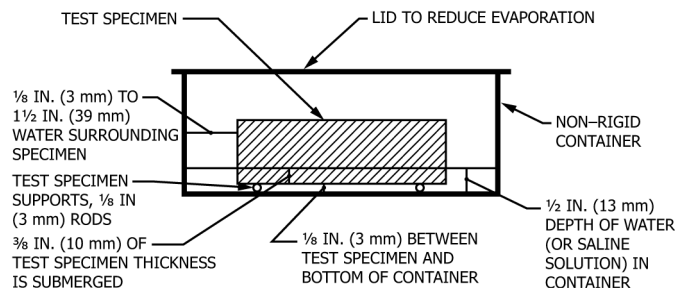


FIG. 1 Test Specimen in Freeze-Thaw Container

#### 5.4 *Temperature-Measuring Equipment:*

5.4.1 *Reference Temperature-Measuring Device*—The reference temperature-measuring device shall be readable and accurate to  $\pm 0.5^\circ\text{F}$  [ $0.2^\circ\text{C}$ ] within the range of use. A certificate or report that verifies the accuracy shall be available in the laboratory for review. Verify the accuracy of reference temperature-measuring devices at intervals not exceeding twelve months. The certificate or report shall provide documentation that the reference standard used in the verification is traceable to the National Institute of Standards and Technology (NIST).

5.4.2 *Temperature Recorder*—Equip the chamber with a device to record the air temperature every 15 min or less; this device shall be accurate and readable to  $2^\circ\text{F}$  [ $1^\circ\text{C}$ ]. Verify the accuracy of the temperature measuring device at least every six months. During testing, evaluate the data from the temperature recording device at least once every twenty cycles to ensure that cycles meet the temperature requirements of 7.3.1 and 7.3.2. A record of this evaluation documenting the date checked, a confirmation that the data is within the required temperature range, and the name of the individual performing this evaluation shall be maintained in the laboratory.

NOTE 5—This requirement may be satisfied by an initialed and dated temperature recorder chart. Brief changes in the temperature due to door openings should be ignored.

NOTE 6—A convenient time to evaluate the temperature results is when the chamber is stopped for residue collection.

5.4.3 To verify the accuracy of the temperature-measuring devices, position the reference temperature-measuring device in the chamber in a readable position as near to the temperature-measuring device probe as possible. Close the door and leave undisturbed for at least 5 min. Read the temperature immediately after opening the chamber door. Record the temperature readings of both devices. If the temperature readings differ by more than  $2^\circ\text{F}$  [ $1^\circ\text{C}$ ], adjust or replace the temperature-measuring device.

5.5 *Scales*—Scales for weighing full-size specimens shall have a capacity of at least 50 % greater than the weight of the largest specimen tested and shall be accurate to at least 1 g. Scales for weighing the filter paper and specimen residue (spall), as required in 7.3.3, shall be accurate to at least 0.2 g.

5.6 *Oven*—A ventilated oven of appropriate size capable of maintaining a uniform temperature of  $230 \pm 9^\circ\text{F}$  [ $110 \pm 5^\circ\text{C}$ ]. Ovens shall be verified in accordance with Practice C1093.

## 6. Sampling and Preparation of Test Specimens

6.1 *Selection of Units*—Select five whole SRW units representative of the lot from which they are selected. The units shall be free from visible cracks or structural defects.

6.2 *Freeze-Thaw Test Specimens*—Test specimens shall consist of solid coupons saw-cut from full sized units. Do not saw-cut test specimens from units that have been previously oven-dried. Do not subject test specimens to oven-drying prior to completion of freeze-thaw testing.

6.2.1 Cut one coupon from each of the five sampled units. Cut the coupon from the exposed surface of the unit as the unit is used in service unless the exposed surface is an architectural or other nonplanar surface (see Note 7). In the case of a unit with an exposed architectural or other nonplanar surface, cut the coupon from another flat molded surface ideally as far as possible from the architectural or other nonplanar face and in no case less than 2 in. [50 mm] from that surface. Immediately following saw-cutting, remove loose particles and residue from the coupon by rinsing in tap water and brushing with a soft bristle brush. Do not fully immerse coupons in water. Each specimen shall be marked with a unique identification number on the non-molded surface of the specimen.

NOTE 7—Split-faced surfaces are the most common surfaces used to provide an architectural appearance to segmental retaining walls. However, other means could be used to obtain similar architectural effects like tumbling, grinding, and slumping.

6.2.2 Sawing shall be performed in an accurate, competent manner, subjecting the specimen to as little saw vibration as possible. Use a diamond saw blade of proper hardness.

6.2.3 Place the coupons on edge on a  $\frac{3}{8}$  in. [10 mm] or coarser mesh such that there is an air space of not less than 1 in. [25 mm] between coupons. Allow the coupons to dry for not less than 48 h in laboratory air at a temperature of  $75 \pm 15^\circ\text{F}$  [ $24 \pm 8^\circ\text{C}$ ] and a relative humidity of less than 80 %.

6.2.4 The thickness of each coupon shall be  $1\frac{1}{4}$  in.  $\pm \frac{1}{16}$  in. [32 mm  $\pm$  2 mm], unless the unit does not permit this thickness, in which case the thickness shall be the maximum thickness that can be obtained from the unit. The thickness of the coupon shall not be less than  $\frac{3}{4}$  in. [20 mm].

6.2.5 The area of the submerged surface of the test specimen shall be at least 25 in.<sup>2</sup> [160 cm<sup>2</sup>] and shall not exceed 35 in.<sup>2</sup> [225 cm<sup>2</sup>], unless the unit does not permit a coupon meeting the minimum area, in which case the test specimen shall consist of two coupons. The combined area of the two coupons shall be at least 25 in.<sup>2</sup> [160 cm<sup>2</sup>] and shall not exceed 35 in.<sup>2</sup> [225 cm<sup>2</sup>]. These two coupons shall be tested as and considered to be a single specimen.

6.3 When compression and absorption testing will be conducted in addition to freeze-thaw testing, obtain a specimen (coupon) for each test from each of five SRW units to facilitate correlation among the properties. If this is not possible, then obtain compressive strength and absorption specimens from different units manufactured in the same production lot as the freeze-thaw