



Designation: C 1646/C 1646M – 07

Standard Practice for Making and Curing Test Specimens for Evaluating Frost Resistance of Coarse Aggregate in Air-Entrained Concrete by Rapid Freezing and Thawing¹

This standard is issued under the fixed designation C 1646/C 1646M; 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 practice covers procedures for making and curing test specimens for evaluating frost resistance of normal-weight coarse aggregates in air-entrained concrete in accordance with Test Method C 666/C 666M, Procedure A or B.

1.2 The values stated in either inch-pound or SI units shall be regarded separately as standard. The SI units are shown in brackets. 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 nonconformance with the standard.

1.3 *This practice does not purport to address all the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. (Warning—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged use.)²*

2. Referenced Documents

2.1 *ASTM Standards:*³

C 33 Specification for Concrete Aggregates

C 39/C 39M Test Method for Compressive Strength of Cylindrical Concrete Specimens

C 143/C 143M Test Method for Slump of Hydraulic-Cement Concrete

C 150 Specification for Portland Cement

C 173/C 173M Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C 192/C 192M Practice for Making and Curing Concrete Test Specimens in the Laboratory

C 231 Test Method for Air Content of Freshly Mixed

Concrete by the Pressure Method

C 490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete

C 494/C 494M Specification for Chemical Admixtures for Concrete

C 666/C 666M Test Method for Resistance of Concrete to Rapid Freezing and Thawing

D 75 Practice for Sampling Aggregates

2.2 *ACI Standard:*⁴

211.1 Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

3. Significance and Use

3.1 This practice provides standard requirements for evaluating frost-susceptible coarse aggregate in air-entrained concrete subjected to freezing and thawing in accordance with Test Method C 666/C 666M.

3.2 Concrete containing frost-resistant paste may not be resistant to freezing and thawing if it contains coarse aggregate that becomes critically saturated. An aggregate particle is considered to be critically saturated when there is insufficient unfilled pore space to accommodate the expansion of water that accompanies the freezing.

3.3 The potential of the coarse aggregate to cause damage due to cycles of freezing and thawing is evaluated by Test Method C 666/C 666M.

4. Apparatus

4.1 Equipment for mixing concrete and procedures for making and curing test specimens shall be in accordance with Practice C 192/C 192M.

5. Coarse Aggregate Preparation

5.1 *Sampling*—Sample in accordance with Practice D 75.

5.2 *Grading*—When coarse aggregates are to be compared using this practice, standardize the coarse aggregate gradings by recombining individual size fractions in accordance with

¹ This practice is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.67 on Resistance to the Environment.

Current edition approved Jan. 15, 2007. Published February 2007.

² Section on Safety Precautions, Manual of Aggregate and Concrete Testing, *Annual Book of ASTM Standards*, Volume 04.02.

³ 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.

⁴ Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, <http://www.aci-int.org>.