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Standard Specification for Architectural Cast Stone¹

This standard is issued under the fixed designation C1364; 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 includes the physical properties, sampling, testing, tolerance, and appearance requirements for architectural cast stone.

~~1.2 Units covered by this specification may be made from facing and backup mixtures or from a homogeneous mixture. Either wet cast or dry cast production methods may be used.~~

1.2 Cast stone units covered under this specification include both wet cast and vibratory dry tamp products. Production methods of cast stone can vary among manufacturers; many production methods are acceptable provided the delivered cast stone meets the requirements of this specification.

1.3 Surface textures, finish, color, or other special features should be specified separately by the purchaser.

1.4 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.

1.5 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

A615/A615M Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

C33 Specification for Concrete Aggregates

C150 Specification for Portland Cement

C173/C173M Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C260 Specification for Air-Entraining Admixtures for Concrete

C426 Test Method for Linear Drying Shrinkage of Concrete Masonry Units

C494/C494M Specification for Chemical Admixtures for Concrete

C595 Specification for Blended Hydraulic Cements

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

C666/C666M Test Method for Resistance of Concrete to Rapid Freezing and Thawing

C979 Specification for Pigments for Integrally Colored Concrete

C989 Specification for Slag Cement for Use in Concrete and Mortars

C1157 Performance Specification for Hydraulic Cement

C1194 Test Method for Compressive Strength of Architectural Cast Stone

C1195 Test Method for Absorption of Architectural Cast Stone

D1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials

D2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

2.2 ACI Standards:

318 Building Code Requirements for Reinforced Concrete³

¹ This specification is under the jurisdiction of ASTM Committee C27 on Precast Concrete Products and is the direct responsibility of Subcommittee C27.20 on Architectural and Structural Products.

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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.

³ Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333.

3. Terminology

3.1 Definitions:

3.1.1 *cast stone, n*—an architectural precast concrete building unit intended to simulate natural cut stone.

3.1.2 *vibrant dry tamp (dry cast) products, n*—cast stone manufactured from zero slump concrete densely compacted by apparatus. (See Note 1.)

3.1.3 *wet cast products, n*—cast stone manufactured from measurable slump concrete consolidated by apparatus. (See Note 1.)

NOTE 1—Apparatus used in the production of cast stone may include automatic, semi-automatic, or manual devices that deploy internal or external vibration, vibrant tamping, vibration under pressure, centrifugal casting, or combinations of these techniques to achieve the specified physical properties.

4. Materials and Design

4.1 *Raw Materials*—Materials shall conform to the following specifications:

4.1.1 Cement:

4.1.1.1 *Portland Cement*—Specification C150.

4.1.1.2 *Blended Cement*—Specification C595.

4.1.1.3 *Hydraulic Cement*—Specification C1157.

4.1.2 *Aggregates*—Specification C33, except for grading requirements.

4.1.3 *Coloring Pigment*—Specification C979, except that carbon black pigment shall not be used.

4.1.4 *Reinforcement*—Specification A615/A615M.

4.1.5 *Chemical Admixtures*—Chemical admixtures shall conform to the following applicable specifications:

4.1.5.1 *Air Entraining Admixtures*—Specification C260, except for vibrant dry tamp products.

4.1.5.2 *Water Reducing and Accelerating Admixtures*—Specification C494/C494M.

4.1.5.3 *Other Constituents*—Integral water repellents and other chemicals for which no ASTM standard exists shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.

4.1.6 *Ground Slag*—Specification C989.

4.1.7 *Fly Ash or Natural Pozzolan*—Specification C618.

4.2 *Design*—Samples shall be submitted for approval of color and texture. The manufacturer shall prepare drawings for approval showing shapes, sizes, reinforcement, exposed faces, and anchorage provisions. The purchaser or his authorized representative shall approve the samples and drawings before manufacture.

4.3 Reinforcement:

4.3.1 Reinforcement shall be new billet steel reinforcing bars meeting the requirements of Specification A615/A615M unless specified otherwise by the purchaser.

4.3.2 Reinforce units when necessary for safe handling and structural stress.

4.3.3 Reinforcement shall be noncorrosive where faces exposed to weather are covered with less than 1.5 in. (38 mm) of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.

4.3.4 Area of reinforcement in panels greater than 24 in. (600 mm) in more than one direction shall be not less than 0.25 % of the cross section area [in that direction]. Units less than 24" (600 mm) in both their length and width dimension shall be non-reinforced unless otherwise specified.

5. Physical Requirements

5.1 *Compressive Strength*—At 28 days after manufacture, not less than 6500 psi (45 MPa), when tested in accordance with Test Method C1194.

5.2 *Absorption, Cold Water*—At 28 days after manufacture, not greater than 6 %, when tested in accordance with Method A, Cold Water of Test Method C1195.

5.3 *Absorption, Boiling Water*—At 28 days after manufacture, not greater than 10 %, when tested in accordance with Method B, Boiling Water Test of Test Method C1195.

5.4 *Air Content*—Provide sufficient air content to meet the freeze-thaw requirements for wet cast products, when the air content is tested in accordance with Test Method C173/C173M or Test Method C231.

5.5 *Field Testing* of cast stone shall be in accordance with Test Methods C1194 and C1195. Field tested specimens shall have a minimum compressive strength of 85 % with no single specimen testing less than 75 % of the design requirement as allowed by ACI 318.

5.6 Resistance to Freezing and Thawing:

5.6.1 The manufacturer shall satisfy the purchaser that the units have adequate resistance to freezing and thawing either through proven field performance of similar products made from the same materials or through laboratory testing.

5.6.2 If laboratory testing is required, the cast stone shall be tested using Test Method C666/C666M, Procedure A, except the method of evaluation is to be based on cumulative percent loss in mass and not relative dynamic modulus of elasticity and durability factor (that is, do not measure the fundamental transverse frequency during testing). Follow the procedure modifications to Test Method C666/C666M in 5.6.2.1 through 5.6.2.5.

5.6.2.1 After the cast stone is 14 days of age, wet-saw three 3 by 4 by 16 in. (76 by 102 by 406 mm) beams from a single sample of cast stone to represent three specimens for a single test. One surface of each beam shall be from the exposed, formed face of