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## Product Guide Specification

### SECTION 04 72 00 (2020)

#### ARCHITECTURAL CAST STONE

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES – Architectural Cast Stone.

- A. Scope – Cast Stone shown on architectural drawings and as described in this specification.
  - 1. Manufacturer shall furnish Cast Stone covered by this specification.

##### 1.2 RELATED SECTIONS

Specifier Notes: Edit the following list of related sections as required for the project. List other sections with work directly related to the Cast Stone.

- A. Section – 01 33 00 – Submittal Procedures.
- B. Section – 04 05 13 – Masonry Mortaring.
- C. Section – 04 05 16 – Masonry Grouting.
- D. Section – 04 05 19 – Masonry Anchorage and Reinforcing.
- E. Section – 04 20 20 – Unit Masonry.
- F. Section – 07 90 00 – Joint Protection.

##### 1.3 REFERENCES

Specifier Notes: List standards referenced in this section, complete with designations and titles. This article does not require compliance with standards, but is merely a listing of those used.

- A. ACI 318 – Building Code Requirements for Reinforced Concrete.
- B. ASTM A 185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- C. ASTM A 615/A 615M – Standard Specification for Deformed and Plain Billet Steel Bars for Reinforced Concrete.
- D. ASTM C 33 – Standard Specification for Concrete Aggregates.
- E. ASTM C 150 – Standard Specification for Portland Cement.
- F. ASTM C 595 – Blended Cement.
- G. ASTM C 1157 – Hydraulic Cement.
- H. ASTM C 173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volume Method.
- I. ASTM C 231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the

Pressure Method.

- J. ASTM C 260 – Standard Specification for Air-Entrained Admixtures for Concrete.
- K. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
- L. ASTM C 426 – Standard Test Method for Linear Shrinkage of Concrete Masonry Units.
- M. ASTM C 494/C 494M – Standard Specification for Chemical Admixtures for Concrete.
- N. ASTM C 618 – Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
- O. ASTM C 666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
- P. ASTM C 979 – Standard Specification for Coloring Pigments for Integrally Pigmented Concrete.
- Q. ASTM C 989 – Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete.
- R. ASTM C 1116 – Standard Specification for Fiber Reinforced Concrete and Shotcrete.
- S. ASTM C 1194 – Standard Test Method for Compressive Strength of Architectural Cast Stone.
- T. ASTM C 1195 – Standard Test Method for Absorption of Architectural Cast Stone.
- U. ASTM C 1364 – Standard Specification for Architectural Cast Stone.
- V. ASTM D 2244 – Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- W. Cast Stone Institute Technical Manual (Current Edition).

#### **1.4 DEFINITIONS**

Cast Stone – A refined architectural concrete building unit manufactured to simulate natural cut stone, used in Division 4 masonry applications, produced by the Dry Cast Method and meets ASTM 1364 requirements.

Dry Cast Method – Manufactured from zero slump concrete.

- a. Vibrant Dry Tamp (VDT) casting method: Vibratory ramming of earth moist, zero-slump concrete against a rigid mold until it is densely compacted.
- b. Machine Casting Method: Manufactured from earth moist, zero-slump concrete compacted by machinery using vibration and pressure against a mold until it becomes densely consolidated.

#### **1.5 SUBMITTAL PROCEDURES**

- A. Comply with Section 01 33 00 - Submittal Procedures.
- B. Samples: Submit pieces of the Cast Stone that are representative of the general range of finish and color proposed to be furnished for the project.
- C. Test Results: Submit manufacturer's test results of Cast Stone previously made by the manufacturer.
- D. Shop Drawings: Submit manufacturer's shop drawings including profiles, cross-sections, reinforcement, exposed faces, arrangement of joints (optional for standard or semi-custom installations), anchoring methods, anchors (if required), annotation of stone types and their location.
- E. Warranty: Submit Cast Stone Institute Member Limited Warranty or equal.
- F. Certification: Submit valid Cast Stone Institute Plant Certification or equal.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
  - 1. Cast Stone shall be produced in a plant certified by the Cast Stone Institute or Equal.
  - 2. Manufacturer shall have sufficient plant facilities to produce shapes, quantities and size of

Cast Stone required in accordance with the project schedule.

3. Manufacturer shall submit a written list of projects similar in scope and at least ten (10) years of age, along with owner, architect and contractor references.
- B. Standards: Comply with requirements of Cast Stone Institute Technical Manual and the project specifications. Where a conflict may occur, the contract documents shall prevail.
- C. Mock-up (optional): Provide full size unit(s) for use in construction of sample wall. The approved mock-up shall become the standard for appearance and workmanship for the project.

Specifier Notes: Mock-ups are optional and will add expense to the project. Scope of the mock-up construction must be clearly specified or indicated on the drawings.

Mock-ups allow the Architect to verify:

1. The color and texture of the Cast Stone.
2. The fit of adjacent components.
3. The quality of construction.

Revise as required for the project. Delete this paragraph if mock-up is not required.

- D. Warranty Period: 10 years.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURER**

Indiana Cast Stone, Inc., 650 W. Market St. Spencer, IN 47460.  
Phone (317) 847-5429. Website: [www.indianacaststone.com](http://www.indianacaststone.com) .  
Email: jim@indianacaststone.com

### **2.2 ARCHITECTURAL CAST STONE**

- A. Cast Stone: Comply with ASTM C 1364
1. Casting Method: Vibrant Dry Tamp; Machine Produced
  2. Compressive Strength: ASTM C 1194: 6,500 psi minimum for products at 28 days.
  3. Absorption: ASTM C 1195: 6 percent maximum by the cold water method, or 10% maximum by the boiling method for products at 28 days.
  4. Freeze-thaw: ASTM C 1364: The CPWL shall be less than 5% after 300 cycles of freezing and thawing.
  5. Linear Shrinkage – ASTM C 426: Shrinkage shall not exceed 0.065%.
- B. Job Site Testing: One sample from production units may be selected at random from the field for each 500 cubic feet delivered to the job site.
1. Three field cut cube specimens from each of these samples shall have an average compressive strength of not less than 85% with no single specimen testing less than 75% of design strength as allowed by ACI 318.
  2. Three field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6%.
  3. Field specimens shall be tested in accordance with ASTM C 1194 and C 1195.

### **2.3 CAST STONE MATERIALS**

- A. Portland Cement: ASTM C 150, Type I, white or gray as required to match specified color.
- B. Coarse Aggregate: ASTM C 33, except for gradation; granite, quartz, or limestone.

- C. Fine Aggregate: ASTM C 33, except for gradation; natural or manufactured sands.
- D. Pigments: ASTM C 979, inorganic iron oxides.
- E. Admixtures:
  - 1. ASTM C 494.
  - 2. Integral water repellants and other chemicals for which no ASTM standard exists. Previously established as suitable for use in concrete by proven field performance or through laboratory testing.
- F. Water: Potable.
- G. Reinforcing Bars: ASTM A 615/A 615M, galvanized or epoxy coated.
- H. All anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel, brass, or stainless steel Type 302 or 304.

## 2.4 COLOR AND FINISH

- A. Match sample on file in architect's office.

Specifier Notes: Insert Indiana Cast Stone color.

- B. Indiana Cast Stone Color: \_\_\_\_\_.
- C. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 in. and the density of such voids shall be less than 3 occurrences per any 1 in.<sup>2</sup> and not obvious under direct daylight illumination at a 5 ft. distance.
- D. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 ft. distance.
 

ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.

  - i. Total color difference – not greater than 6 units.
  - ii. Total hue difference – not greater than 2 units.
- E. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20 ft. distance.
- F. The occurrence of crazing or efflorescence shall not constitute a cause for rejection.
- G. Remove cement film, if required, from exposed surfaces prior to packaging for shipment.

## 2.5 REINFORCING

- A. Reinforce the units as required by the drawings and for safe handling and structural stress.
- B. Minimum reinforcing shall be 0.25 percent of the cross section area.
- C. Reinforcement shall be noncorrosive where faces exposed to weather are covered with less than 1.5 in. of concrete material. All reinforcement shall have minimum coverage of twice the diameter of the bars.
- D. Panels, soffits and similar stones greater than 24 in. in one direction shall be reinforced in that direction. Units less than 24 in. in both their length and width dimension shall be non-reinforced unless otherwise specified.
- E. Welded wire fabric reinforcing shall not be used.

## 2.6 CURING

Specifier Notes: Curing Cast Stone components with a direct fired steam generator as used at Indiana Cast Stone provides the following benefits:

1. Increases the first day strength of the Cast Stone.
2. Increases the hardness of the corners of the Cast Stone and increases longevity.
3. Minimizes efflorescence.

1. Cure Cast Stone components with a direct fired steam generator at a minimum temperature of 110 degrees F (41 degrees C) for a minimum of 6-8 hours.

## **2.7 MANUFACTURING TOLERANCES**

- A. Cross section dimensions shall not deviate by more than  $\pm 1/8$  in. from approved dimensions.
- B. Length of units shall not deviate by more than length/ 360 or  $\pm 1/8$  in., whichever is greater, not to exceed  $\pm 1/4$  in.
  1. Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.
- C. Warp, bow or twist of units shall not exceed length/ 360 or  $\pm 1/8$  in., whichever is greater.
- D. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features – on formed side of unit,  $1/8$  in., on unformed sides of unit,  $3/8$  in. maximum deviation.

## **2.8 PRODUCTION QUALITY CONTROL**

- A. Testing
  1. Test compressive strength and absorption from specimens taken from every 500 cubic feet of product produced.
  2. Perform tests in accordance ASTM C 1194 and C 1195.
  3. Have test performed by an independent testing laboratory every six months.
  4. New and existing mix designs shall be tested for strength and absorption compliance prior to producing units.
  5. Retain copies of all test reports for a minimum of two years.

## **2.9 DELIVERY, STORAGE AND HANDLING**

- A. Mark production units with the identification marks as shown on the shop drawings.
- B. Package units and protect them from staining or damage during shipping and storage.
- C. Provide an itemized list of product to support the bill of lading.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Installing contractor shall examine Cast Stone materials for fit and finish prior to installation. Unacceptable components shall not be set.

### **3.2 SETTING TOLERANCES**

- A. Comply with Cast Stone Institute Technical Manual.
- B. Set stone  $1/8$  in. or less, within the plane of adjacent units.

- C. Joints, plus – 1/16 in., minus – 1/8 in.

### **3.3 JOINTING**

- A. Joint size:
  - 1. At stone/brick joints 3/8 in.
  - 2. At stone/stone joints in vertical position ¼ in. (3/8 in. optional)
  - 3. Stone/stone joints exposed on top 3/8 in.
- B. Joint Materials:
  - 1. Mortar, Type N, ASTM C 270
  - 2. Manufacturer Optional - Dry-Block Mortar Admixture to be added to the mortar mix on site by the mason contractor. The Dry-Block Mortar Admixture must be incorporated into the project mortar specification, either in Section 04 20 00, Unit Masonry, or in a separate Section 04 06 00, Mortar.
  - 3. Use a full bed of mortar at all bed joints.
  - 4. Flush vertical joints full with mortar.
  - 5. Leave all joints with exposed tops or under relieving angles open for sealant.
  - 6. Leave head joints in copings and projecting components open for sealant.
- C. Location of joints:
  - 1. As shown on shop drawings.
  - 2. At control and expansion joints unless otherwise shown.

### **3.4 SETTING**

- A. Drench units with clean water prior to setting when IRA > 30. Check with manufacturer.
- B. Do not use pry bars or other equipment in a manner that could damage Cast Stone components.
- C. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
- D.. Set units in a full bed of mortar, unless otherwise detailed.
- E. Rake mortar joints ¾ in. in for pointing.
- F. Remove excess mortar from unit faces immediately after setting.
- G. Tuck point unit joints to a slight concave profile.

### **3.5 JOINT PROTECTION**

- A. Comply with requirements of Section 07 90 00.
- B. Prime ends of units, insert properly sized backing rod, and install required sealant.
- C. Provide sealant joints at following locations and as indicated on the drawings.
  - 1. Cast stone components with exposed tops.
  - 2. Joints at relieving angles.
  - 3. Control and expansion joints

### **3.6 REPAIR AND CLEANING**

- A. Repair chips with touchup materials furnished by manufacturer.
- B. Saturate units to be cleaned prior to applying an approved masonry cleaner. Never use a power washer, muratic acid, sandblasting, to clean units. Harsh cleaners or methods could damage or discolor units.
- C. Consult with manufacturer for appropriate cleaners.
- D. After selection of proper cleaning solution, test a small area of stone (approx.. 4 ft. by 4 ft.). Test on each color of stone on the project. Let test area dry for 4 or more days and have approved by Architect before cleaning the entire stone area.

### **3.7 INSPECTION AND ACCEPTANCE**

- A. Inspect in accordance with Cast Stone Institute Technical Bulletin #36.

Specifier Notes: The following is optional. Delete if not required. Consult Indiana Cast Stone for additional information regarding the use of a water repellent.

### **3.8 WATER REPELLENT**

- A. Apply water repellent in accordance with Cast Stone Institute Technical Bulletin #35 or water repellent manufacturer's directions.
- B. Do not field apply water repellent until repair, cleaning, inspection and acceptance is completed.

**END OF SECTION**