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Product Guide Specification

Section 04-72-00-04 architectural cast stone

This specification encompasses basic requirements for Cast Stone, a refined architectural concrete building unit manufactured to simulate natural cut stone. Cast Stone is a masonry product, used as an architectural feature, trim, ornament or facing for buildings or other structures. Cast Stone components are custom-made and unique for each project.

Materials and processes used for manufacturing Cast Stone vary widely according to the aggregates locally available to the manufacturers and the processes and techniques used by the manufacturers to obtain the desired appearance and physical properties. Of paramount importance in molding Cast Stone is the need to employ a properly proportioned mixture of white and/or grey cements, manufactured or natural sands, carefully selected crushed stone or well graded natural gravel and mineral coloring pigments to achieve the desired appearance while maintaining durable physical properties.

Superior Precast Products manufactures cast stone through the use of the Vibrant Dry Tamp Method. Production conforming to this standard will exceed minimum requirements for compressive strength and weathering qualities essential for normal installations as a suitable replacement for natural cut building stones.

It is hoped that this example specification may be helpful to you in understanding the inherent qualities of Cast Stone and its use. This specification should be edited in any way necessary to meet the requirements for each particular project and local building code. Please contact us for any further details.

** It is important to note that in many specifications, architects may require that Precast concrete or architectural Precast concrete be used when what they really require for the application is cast stone. Be sure to specify the use of CAST STONE when that is what is required for the project.*

Part 1 General

1.1. Section Includes - Cast Stone.

- A. Scope - All labor, materials and equipment to provide the Cast Stone shown on architectural drawings and as described in this specification.
 - o Manufacturer shall furnish Cast Stone covered by this specification.
 - o Installing contractor shall unload, store, furnish all anchors, set, patch, clean and seal (optional) the Cast Stone as required.

1.2. Related Sections

- 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 – 07 90 00 – Joint Protection

1.3. References

**Specifier Note: Comply with applicable provisions and recommendations of the following.*

- A. ASTM C 33 – Standard Specification for Concrete Aggregates.
- B. ASTM C 150 - Standard Specification for Portland Cement.
- C. ASTM C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volume Method.
- D. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.
- E. ASTM C 426 – Standard Test Method for Linear Shrinkage of Concrete Masonry Units
- F. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.
- G. ASTM C 666 – Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
- H. ASTM C 1194 - Standard Test Method for Compressive Strength of Architectural Cast Stone.
- I. ASTM C 1195 - Standard Test Method for Absorption of Architectural Cast Stone.
- J. ASTM C 1364 - Standard Specification for Architectural Cast Stone.
- K. Cast Stone Institute[®] Technical Manual (Current Edition)

1.4. Definitions

- A. Cast Stone - a refined architectural concrete building unit manufactured to simulate the color and texture of natural cut stone, used in masonry applications.
 - 1. Dry Cast Concrete Products – manufactured from zero slump concrete.
 - Vibrant Dry Tamp (VDT) casting method: Vibratory ramming of earth moist, zero- slump concrete against a rigid mold until it is densely compacted.

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 manufacturers test results of Cast Stone previously made by the manufacturer.
- D. Shop Drawings: Submit manufacturers 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.

**Specifier Note: Superior Precast is available to assist with the design process for your custom project. To be the most cost-effective, standard profiles or shapes from our catalog can be used. This will reduce time and money spent on detailing the layout and profiles of the job and building the necessary molds for the specific project.*

1.6. Quality Assurance

- A. Manufacturer Qualifications:
 - 1. Manufacturer shall have sufficient plant facilities to produce the shapes, quantities, size and quality of Cast Stone required in accordance with the project schedule.
 - 2. Manufacturer shall be a current producer member of the Cast Stone Institute
 - 3. Manufacturer shall submit a written list of projects similar in scope and at least three (3) years of age, along with owner, architect and contractor references.
 - 4. Products previously produced by the plant and exposed to weather shall exhibit satisfactory appearance
- B. Standards: Comply with the requirements of the Cast Stone Institute® Technical Manual, ASTM C 1364 and the project specifications. Where a conflict may occur, the contract documents shall prevail.

- C. Mock-up (Optional): Provide full size cast stone units for use in construction of sample wall. The approved mock-up shall become the standard for appearance and workmanship for the project.

**Specifier Note: Mock-ups are optional and will add expense to the project. The scope of the mock-up wall must be clearly specified and will allow the architect to verify color, texture, fit and quality of the cast stone.*

Part 2 Products

2.1 Manufacturer

- A. Superior Precast Products – 1950 Ravine Road Kalamazoo, MI 49004

2.2. Architectural Cast Stone

- A. Comply with ASTM C 1364
B. Casting Method: Vibrant Dry Tamp

**Specifier Note: Choosing the Superior Precast VDT method will allow for the fastest production schedule as a large quantity of pieces can be produced in one day.*

- C. Physical properties: The Cast Stone produced must meet the following:
1. Compressive Strength - ASTM C 1194: 6,500 psi minimum for products at 28 days.
 2. Absorption - ASTM C 1195: 6% maximum by the cold water method
 3. Freeze-thaw – ASTM C 1364: The CPWL shall be less than 5% after 300 cycles of freezing and thawing.
 4. Linear Shrinkage – ASTM C 426: Shrinkage shall not exceed 0.065%.

2.3. Raw Materials

**Specifier Note: Superior Precast Products will choose type and color of Portland cement and aggregates based on the specified color.*

- A. Portland cement: ASTM C 150 – Type I or Type III, white and/or grey according to what is required to match specified color.
B. Coarse aggregates: ASTM C 33 - Limestone
C. Fine aggregates: ASTM C 33 - Manufactured or natural sands
D. Colors: ASTM C 1364 - Inorganic iron oxide pigments
E. Admixtures: ASTM C 1364
F. Water: Must be potable
G. Reinforcing: Galvanized or epoxy coated used when required by ASTM C 1364.

**Specifier Note: Must be specified by engineer where galvanized or epoxy coated reinforcing bar is necessary for safe handling, setting and structural stress.*

2.4. Color And Finish

- A. Color: Color selection can match a sample on file from the Architect, a Superior Precast Products Standard Color, an existing building color or a new material color.
 - 1. Permissible Variation in Color: ASTM C 1364 – Between units of comparable age subjected to similar weathering exposure.
 - a. Total Color Difference: Not greater than 6 units.
 - b. Total Hue Difference: Not greater than 2 units.

**Specifier Note: Superior Precast has a standard color set available. A variety of custom colors are available to be made to match a color for an increase in price.*

- B. 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. (0.8 mm) and the density of such voids shall be less than 3 occurrences per any 1 in. (25 mm) and not obvious under direct daylight illumination at a 5 ft (1.5m) distance.
- C. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 ft (3 m) distance.
- D. 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 (6 m) distance.
- E. The occurrence of crazing or efflorescence shall not constitute a cause for rejection.

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. (38 mm) 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. (600 mm) in one direction shall be reinforced in that direction. Units less than 24 in. (600 mm) in both their length and width dimension shall be non-reinforced unless otherwise specified.

E. Welded wire fabric reinforcing shall not be used in dry cast products.

2.6. Accessories: All anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as galvanized steel, brass or stainless steel Type 302 or 304 sized appropriately for the conditions.

2.7. Curing and Finishing:

A. Cure units in a warm, moist curing chamber approximately 100°F (37.8°C) at 95 percent relative humidity for approximately 24 hours. Additional yard curing at 95 percent relative humidity shall be 350 degree-days (i.e. 7 days @ 50°F (10°C) or 5 days @ 70°F (21°C)) prior to shipping. Form cured units shall be protected from moisture evaporation with curing blankets or curing compounds after casting.

B. Acid –etch exposed surfaces to remove cement film prior to packaging. Suitable washing shall be provided for all exposed surfaces unless otherwise noted.

2.8. Manufacturing Tolerances

- A. Cross section dimensions shall not deviate by more than $\pm 1/8$ in. (3 mm) from approved dimensions.
- B. Length of units shall not deviate by more than length/ 360 or $\pm 1/8$ in. (3 mm), whichever is greater, not to exceed $\pm 1/4$ in. (6 mm).
 - o 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. (3 mm), whichever is greater.
- D. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features – On formed sides of unit, 1/8 in. (3 mm), on unformed sides of unit, 3/8 in. (9 mm) maximum deviation.

2.9. Production Quality Control

- A. Testing.
 - 1. Test compressive strength and absorption from specimens selected at random from plant production.
 - 2. Samples shall be taken and tested from every 500 (14 m³) cubic feet of product produced.
 - 3. Perform tests in accordance ASTM C 1364
 - 4. New and existing mix designs shall be tested for strength and absorption compliance prior to producing units.

Part 3 Delivery, Storage And Handling

3.1. Plant Packaging

- 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 products.

3.2. Shipment

- A. Delivery
 - 1. Cast Stone units shall be delivered secured to shipping pallets and protected from damage and discoloration.
 - 2. Each piece will be individually numbered to match shop drawings.
- B. Storage
 - 1. Store cast stone units in accordance with manufacturer's instructions
 - 2. Store cast stone units on pallets with waterproof covers.
 - 3. Prevent contact with dirt.
- C. Handling:
 - 1. Protect cast stone units during handling and installation to prevent chipping, cracking and other damage.
- D. Scheduling: Schedule and coordinate production and delivery of cast stone to optimize on-site inventory and to avoid delay of work.

3.3. Examination

- A. Installing contractor shall visual inspect Cast Stone materials for fit and finish prior to installation. Do not set unacceptable units.

3.4. Setting Tolerances

- A. Comply with Cast Stone Institute® Technical Manual.
- B. Set stones 1/8 in. (3 mm) or less, within the plane of adjacent units.
- C. Joints, plus - 1/16 in. (1.5 mm), minus - 1/8 in. (3 mm).

3.5. Jointing

- A. Joint size:
 - 1. At stone/brick joints 3/8 in. (9.5 mm).
 - 2. At stone/stone joints in vertical position 1/4 in. (6 mm) (3/8 in. (9.5 mm) optional).
 - 3. Stone/stone joints exposed on top 3/8 in. (9.5 mm).
- B. Joint materials:
 - 1. Mortar, Type N, ASTM C 270.
 - 2. Use a full bed of mortar at all bed joints.
 - 3. Flush vertical joints full with mortar.
 - 4. Leave all joints with exposed tops or under relieving angles open for sealant.
 - 5. 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.

3.6. Setting

- A. Drench units with clean water prior to setting.
- B. Do not use any equipment in a manner that could damage the cast stone.
- C. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
- D. Set units in full bed of mortar, unless otherwise detailed.
- E. Fill vertical joints with mortar.
- F. Make joints 3/8 inch (9mm) unless otherwise detailed on the drawings.
- G. Leave head joints in copings and similar components open for sealant.
- H. Rake mortar joints 3/4 in. (18 mm) in. for pointing.
- I. Remove excess mortar from unit faces immediately after setting.
- J. Tuck point unit joints to a slight concave profile.

3.7. 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 locations indicated on drawings.

3.8. Repair and Cleaning

- A. Repair: Repair chips or other surface damage with touchup materials furnished by manufacturer and in accordance with manufacturer's instructions.
- B. Cleaning:
 - 1. Clean exposed cast stone after mortar is thoroughly set and cured

2. Saturate units to be cleaned with water prior to applying an approved masonry cleaner.
3. Consult with manufacturer for appropriate cleaners and for cleaning instructions.
4. Remove cleaner promptly by rinsing thoroughly with clear water.

3.9. Inspection and Acceptance

- A. Inspect finished installation according to Bulletin #36.
- B. Do not field apply water repellent until repair, cleaning, inspection and acceptance is completed.