

Standard Specifications

SECTION 04720 governs the specifications for the manufacturing processes used to produce architectural cast stone. Christopher Stuart Cast Stone complies with the following specifications.

SECTION 04720 ARCHITECTURAL CAST STONE

This section covers architectural Cast Stone as manufactured by Christopher Stuart Cast Stone, Ltd. Cast stone is a highly refined architectural precast concrete product manufactured to simulate natural cut stone and is applied to unit masonry applications. Cast Stone is a masonry product, used as an architectural feature, trim, ornament or facing for buildings or other structures.

Christopher Stuart Cast Stone, Ltd., uses the Vibrant Dry Tamp Casting Method. This casting method uses carefully graded aggregates and less water than architectural precast concrete using the Wet Casting Method. The benefits include a fine grained texture and the total absence of bug holes. The benefits result in a cast stone product that closely resembles natural cut stone.

PART 1 - GENERAL

1.1. SECTION INCLUDES - Architectural Cast Stone.

Scope - All labor, materials and equipment to provide the Cast Stone shown on architectural drawings and as described in this specification.

Manufacturer shall furnish Cast Stone covered by this specification.

Installing contractor shall unload, store, furnish all anchors, set, patch, clean and seal (optional) the Cast Stone as required.

1.2. RELATED SECTIONS

Section – 01 33 00 – Submittal Procedures

Section – 04 05 13 – Masonry Mortaring

Section – 04 05 16 – Masonry Grouting.

Section – 04 05 19 – Masonry Anchorage and Reinforcing

Section – 07 90 00 – Joint Protection

1.3. REFERENCES

ACI 318 – Building Code Requirements for Reinforced Concrete.

ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Reinforced Concrete.

ASTM C 33 – Standard Specification for Concrete Aggregates.

ASTM C 150 - Standard Specification for Portland Cement.

ASTM C 270 - Standard Specification for Mortar for Unit Masonry.

ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.

ASTM 642 – Standard Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete.

ASTM C 979 - Standard Specification for Coloring Pigments for Integrally Pigmented Concrete.

ASTM C 989 – Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete.

ASTM C 1194 - Standard Test Method for Compressive Strength of Architectural Cast Stone.

ASTM C 1195 - Standard Test Method for Absorption of Architectural Cast Stone.

ASTM C 1364 - Standard Specification for Architectural Cast Stone.

ASTM D 2244 – Standard Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

Cast Stone Institute® Technical Manual (Current Edition)

1.4. DEFINITIONS

Cast Stone: a refined architectural concrete stone product manufactured to simulate natural cut stone, used in unit masonry applications.

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

Christopher Stuart Cast Stone Comply with Section 01 33 00 – Submittal Procedures.

Samples: Submitted samples are representative of the general range of finish and color proposed for the project.

Test results: Christopher Stuart Cast Stone, Ltd. certifies that its products shall meet or exceed the specified performance characteristics.

Shop Drawings: Shop drawing shall include 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.

1.6. QUALITY ASSURANCE

Manufacturer Qualifications: Christopher Stuart Cast Stone, Ltd. Has plant facilities sufficient to produce the shapes, quantities and size of Cast Stone required in accordance with the project schedule.

Standards: Christopher Stuart Cast Stone, Ltd. finished products comply with the requirements of the Cast Stone Institute® Technical Manual and the project specifications. Where a conflict may occur, the contract documents shall prevail.

PART 2 - PRODUCTS

2.1. ARCHITECTURAL CAST STONE

Comply with ASTM C 1364

Physical properties: Provide the following:

Compressive Strength - ASTM C 1194: 6,500 psi (45 Mpa) minimum for products at 28 days.

Absorption - ASTM C 1195: 6% maximum by the cold water method, or 10% maximum by the boiling method for products at 28 days.

Air Content – ASTM-C 173 or C 231, for wet cast product shall be 4-8% for units exposed to freeze-thaw environments. Air entrainment is not required for VDT products.

Freeze-Thaw – ASTM C 1364: The CPWL shall be less than 5% after 300 cycles of freezing and thawing.

Linear Shrinkage – ASTM E 426: Shrinkage shall not exceed 0.0065%

2.2. RAW MATERIALS

Portland cement: Type I or Type III, white and/or grey, ASTM C 150.

Coarse aggregates: Granite, quartz or limestone, ASTM C 33, except for gradation, and are optional for the VDT casting method.

Fine aggregates: Manufactured or natural sands, ASTM C 33, except for gradation.

Colors: Inorganic iron oxide pigments, ASTM C 979 except that carbon black pigments shall not be used.

Admixtures: Comply with the following:

ASTM C 494/C 495M Types A - G for water reducing, retarding, accelerating and high range admixtures.

Other admixtures: 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.

ASTM C 6.18 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.

ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.

Linear Shrinkage – ASTM E 426: Shrinkage shall not exceed .065%

Water: Potable
Reinforcing bars:

ASTM A 615/A 615M. Galvanized or epoxy coated.

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.

2.3. COLOR AND FINISH

Christopher Stuart Cast Stone, Ltd. shall supply color samples to architect for approval.

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.2 (25 mm²) and not obvious under direct daylight illumination at a 5 ft (1.5m) distance.

Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 ft (3 m) distance.

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

Total color difference – not greater than 6 units.

Total hue difference – not greater than 2 units.

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.

The occurrence of crazing or efflorescence shall not constitute a cause for rejection.

2.4. REINFORCING

Reinforce the units as required by the drawings and for safe handling and structural stress.

Minimum reinforcing shall be 0.25 percent of the cross section area.

Reinforcement shall be non-corrosive 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.

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.

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

2.5. CURING

Cure units in a warm curing chamber approximately 100°F (37.8°C) at 95 percent relative humidity for approximately 12 hours, or in a 95 percent moist environment at a minimum 70°F (21.1°C) for 16 hours after casting. Additional 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.

2.6. MANUFACTURING TOLERANCES

Cross section dimensions shall not deviate by more than $\pm 1/8$ in. (3 mm) from approved dimensions.

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). Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.

Warp, bow or twist of units shall not exceed length/ 360 or $\pm 1/8$ in. (3 mm), whichever is greater.

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.

2.7. PRODUCTION QUALITY CONTROL

Testing.

Mix Designs and Products have been tested in accordance with ASTM C 1194 & C 1195. The subsequent results exceeded minimum performance standards.

New and existing mix designs shall be tested for strength and absorption compliance prior to producing units.

2.8. DELIVERY, STORAGE AND HANDLING

Production units shall be identified with marks as shown on the shop drawings.

Product shall be packed to protect them from staining or damage during shipping and storage.

Provide an itemized list of product to support the bill of lading.

3. PART 3 - EXECUTION

3.1. EXAMINATION

Installing contractor shall check Cast Stone materials for fit and finish prior to installation. Do not set unacceptable units.

3.2. SETTING TOLERANCES

Comply with Cast Stone Institute® Technical Manual.

Set stones 1/8 in. (3 mm) or less, within the plane of adjacent units.

Joints, plus - 1/16 in. (1.5 mm), minus - 1/8 in. (3 mm).

3.3. JOINTING

Joint size:

At stone/brick joints 3/8 in. (9.5 mm).

At stone/stone joints in vertical position 1/4 in. (6 mm) (3/8 in. (9.5 mm) optional).

Stone/stone joints exposed on top 3/8 in. (9.5 mm).

Joint materials:

Mortar, Type N, ASTM C 270.

Use a full bed of mortar at all bed joints.

Flush vertical joints full with mortar.

Leave all joints with exposed tops or under relieving angles open for sealant.

Leave head joints in copings and projecting components open for sealant.

Location of joints:

As shown on shop drawings.

At control and expansion joints unless otherwise shown.

3.4. SETTING

Drench units with clean water prior to setting.

Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

Set units in full bed of mortar, unless otherwise detailed.

Rake mortar joints 3/4 in. (18 mm) in. for pointing.

Remove excess mortar from unit faces immediately after setting.

Tuck point unit joints to a slight concave profile.

3.5. JOINT PROTECTION

Comply with requirements of Section 07 90 00.

Prime ends of units, insert properly sized backing rod and install required sealant.

3.6. REPAIR AND CLEANING

Repair chips with touchup materials furnished by Christopher Stuart Cast Stone, Ltd.

Saturate units to be cleaned prior to applying an approved masonry cleaner.

Consult with manufacturer for appropriate cleaners

3.7. INSPECTION AND ACCEPTANCE

Inspect finished installation according to Bulletin #36.

Do not field apply water repellent until repair, cleaning, inspection and acceptance is completed.

END OF SECTION