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Architectural Cast Stone – Versatile, Robust & Sustainable

By Jan Boyer

If it looks like stone and is a manufactured precast concrete product, then it must be Cast Stone. Not true. What you are seeing may be adhered manufactured stone masonry veneer (AMSMV), architectural precast, calcium silicate, or even a natural stone. Each product has its appropriate applications which are dependent upon the project. The following will provide a brief description of Architectural Cast Stone and other related products.

CAST STONE AND OTHER MATERIALS

Architectural Cast Stone is an architectural precast concrete building unit intended to simulate natural cut stone and used in unit masonry applications. As per ASTM C-1364, *Standard Specification for Architectural Cast Stone*, units must comply with a minimum of 6,500 psi compressive strength, less than 6% absorption (ASTM 1194 & 1195) and 5% cumulative percentage weight loss or less at 300 cycles for Freeze Thaw (ASTMC666). These requirements are applicable whether the product is manufactured by dry tamp, wet cast or machine made methods. ASTM C-1364 is referenced in the 2012 International Building Code as the definition for Cast Stone and is therefore a legally binding in jurisdictions that have adopted the building codes. Any other industry specification is for reference only as an industry recommendation.

Cast Stone is made from fine and coarse aggregates, Portland cement, sand, mineral oxide color pigments, chemical admixtures and water. It is distinguished by its fine surface texture and is available in virtually any color. It can be reinforced as needed to increase the structural integrity and is made from molds with precise measurements to make it easy for the mason to install on site. Lifting inserts, anchors, kerfs and drips can be cast into the stone which reduces labor for the mason in the field. Because of these attributes, Cast Stone simulates a variety of types of natural stone including but not limited to limestone, granite, slate, travertine or marble.

Since Cast Stone is a heavy weight product, it is anchored into a wall system, and used as an architectural feature, trim, ornament or veneer on commercial and residential buildings and other structures. Applications for Cast Stone range from the simplest windowsills to the most complicated architectural elements, including use as a masonry veneer product. It is listed under Construction Specifications Institute (CSI) Masterspec in Division 04 72 00.

Architectural Precast is a type of precast concrete that includes components ranging from massive panels to hand set units. Architectural Precast has no ASTM designation but relies on industry standards. A minimum strength of 5,000 psi, absorption of less than 6% is required with no freeze thaw considered. Architectural Precast tends to be made from coarse aggregates, sand, color pigment & Portland cement. The finish may show exposed aggregate and visible bug holes. It is generally specified for architectural panels, columns and large architectural elements and installed as a precast product as opposed to a masonry product. See CSI Division 03 45 00.

Limestone is a natural stone made from sedimentary rock that is formed by accumulation of organic remains (shells or coral), consisting mainly of calcium carbonate. Shapes are achieved by sawing or fracturing the stone, which has a fine grained texture. Grade II Limestone is specified as per ASTM C568 which requires a minimum 4,000 psi, less than 7.5% absorption and no freeze thaw requirement is considered. It is generally used for architectural trim, facing and ornamentation and is not reinforced.

Calcium Silicate masonry units are produced from sand and silica which is mixed with hydrated lime and other elements. The no-slump mixture is then pressed into modular-sized molds and cured in a autoclave. Calcium silicate contains no Portland cement. The units produced can have a variety of textures and are used primarily as architectural veneer facing. Calcium Silicate units must comply with ASTM C73 with MW Grade at 3,500 psi with maximum 14% absorption and SW grade at 5,500 psi with 11.6% maximum absorption. There is no freeze thaw durability requirement and reinforcement is not available.

Adhered Manufactured Stone Masonry Veneer (AMSMV) – is a lightweight man made concrete masonry product which is usually cast into random sizes, in a variety of colors with a natural undressed quarried or cleft stone finish. Sometimes referred to as adhered veneer, AMSMV is generally applied on a residential or lightweight commercial structures for exterior and interior walls, landscape structures, and other structures suitable to receive lightweight adhered units. These simulated stone products are manufactured to meet CSI Division 04 73 00 classification for simulated stone. There are currently no ASTM standard specifications for AMSMV.

Properties Comparison Chart

	PSI	Maximum Absorption	ASTM Designation	Durability Freeze Thaw	Reinforced
Cast Stone	6,500	6%	C-1364	5% loss or less @300 cycles	Yes
Architectural Precast	5,000	6%	None	None	Yes
Limestone Grade II	4,000	7.5%	C568	None	No
Calcium Silicate	Grade MW 3,500 Grade SW 5,500 (assuming average density of 129 lbs/cf)	14% 11.6%	C73	None	No
AMSMV	1,800 - 2,000	22% (UBC Standard 15-5)	None	None	No

SUSTAINABLE BENEFITS OF ARCHITECTURAL CAST STONE

An important part of construction today is the sustainability or “green” component of the building. Each product used in the building contributes to the overall impact on the environment. The following are just some of the sustainable attributes of Cast Stone.

- The durability of Cast Stone enhances the longevity of the building which provides economic benefit to the owner and the community.
- Cast Stone can also contain recycled materials, such as recycled glass or other recycled aggregates, coloring pigments made from post-consumer recycled materials, synthetic fibrous reinforcement made from 100% post-consumer recycled materials and steel reinforcement with high recycled content.
- Cast Stone is manufactured and delivered to the job-site in the exact quantities needed for the project, with almost no construction waste as a result. Any waste that is produced may be crushed and used as recycled aggregate or fill.
- Requires minimal to no maintenance or repair which also contributes to the life cycle cost of the building and conserves resources.
- Numerous Cast Stone production locations throughout the USA help to meet code and rating system requirements for locally produced product.
- The high thermal mass properties of Cast Stone help optimize the energy performance of a building and mitigate temperature swings.
- The high Solar Reflective Index (SRI) of Cast Stone helps reduce heat retention and urban heat island effect. Typically manufactured with white Portland cement, Cast Stone provides an assumed SRI of 86 for a non-pigmented mix.
- Low Volatile Organic Compounds (VOC) emissions support indoor air quality strategies.
- As a masonry product, it can be installed using local skilled mason labor.

ABOUT THE CAST STONE INSTITUTE®

As a non-profit trade association, the Cast Stone Institute ® was formed in 1927 for the purpose of improving the quality of Cast Stone and disseminating information regarding its use. Institute Technical Specifications, Bulletins, Details and related materials are available for free download from the website www.caststone.org.

The most important valuable resource to Specifiers is our Certified Producer Members who adhere to the high standards for quality and are bound by a strict code of ethics. Members must provide testing of product every 500 cubic ft. for compression and absorption as well as independent laboratory test results every six months to confirm their product meets the Institute standard specification and ASTM C1364. They must also have a current compliant Freeze Thaw test.

These are tests mandated by ASTM C1364 and our members comply with these strict regulations and provide proof of compliance to the Institute every six months. Since the products that go into the mix design for Cast Stone come from the earth, there can be variances in sands, aggregates, etc... Testing assures the Producer Member, the specifier and owner that they are indeed producing Cast Stone to specifications. Without this testing, there is no way to assure quality Cast Stone production.

Cast Stone Institute certification differs from others in that they certify that not only the processes are in place to make quality product but that the product itself is meeting specifications. All Certified Cast Stone Institute Producer Members provide a 10 year Limited Product Warranty for the Cast Stone they supply on projects.

CONCLUSION

The use of Architectural Cast Stone allows an architect to design a masonry building and put his signature on it by creating detailed architectural elements that can be easily and affordably manufactured by a Certified Cast Stone Institute Producer Member.

Historic structures can be restored by using Cast Stone to replicate the original stone on the building for numerous applications including detailed ornamentation. The mason is the craftsman who puts the pieces of the puzzle together to make a beautiful structure that will enhance the community for decades to come.

For more information, log onto www.caststone.org.

Author: Jan Boyer is the Executive Director of the Cast Stone Institute since 2006. She serves on the Board of Directors for The Masonry Society and the Masonry Alliance for Codes & Standards. Involved in the masonry industry for over 14 years, she is also affiliated with the Concrete Joint Sustainability Initiative. She can be reached at jboyer@caststone.org or by calling 717-272-3744.