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ARCHITECTURAL CAST STONE – WHAT YOU SHOULD KNOW NOW

By Jan Boyer, Executive Director, Cast Stone Institute

NEW -- ARCHITECTURAL CAST STONE STANDARDS – Include Installation!

Recognizing that appropriate and accurate specification, fabrication and installation of Cast Stone is essential, the Cast Stone Institute is proud to announce the development of new, easy to read standards. The Institute does not just make industry recommendations – we work within recognized reference standards to assure the highest quality Cast Stone for a project.

In order to create reference standards for Architectural Cast Stone, the Cast Stone Institute (CSI) worked through The Masonry Society (TMS) beginning in 2011 to assist in the development of Standards for Architectural Cast Stone including Standards for Design (TMS 404), Fabrication (TMS 504) and Installation (TMS 604). These new Standards were finalized on October 10, 2016 by vote of The Masonry Society Board of Directors after a rigorous ANSI certification process. The process began with the Cast Stone Committee, a technical committee operating under TMS. It is a balanced committee requiring input from architects, engineers, cast stone producers, masons, industry experts, professors and others who were charged with the drafting, balloting and maintaining a new standard for the production, design and construction of architectural cast stone products using the ANSI consensus procedures of The Masonry Society. It was decided by the Cast Stone Committee and affirmed by the TMS Technical Committee to have **all three standards in one standalone book so that each party – the designer, fabricator, and mason - would understand their role and responsibilities.**

These standards became legally binding and supersede other industry based technical specifications, including but not limited to Masterspec and any other industry recommendation, as of October 10, 2016. **These new Architectural Cast Stone Standards were adopted by the International Code Council (ICC) into the 2018 version of the International Building Codes (IBC).** This means that for the first time there are now accurate legal documents governing the design, fabrication and installation of cast stone. These standards supplement the legally adopted building code enforced in the geographic area.

What does this mean for the Mason Contractor (TMS 604)?

Masons now have a reference for the installation of architectural cast stone!

The standard is very easy to read and has commentary for each section explaining the intent.

Included in the Installation Section is information about:

- Scope of Work
- Submittals
- Materials
- Quality Assurance (pre and post construction)
- Site Tolerances – joint thickness, grout spacing, variations from level & plumb, etc...

- Construction – general and hot/cold weather condition recommendations
- Cleaning and Repair
- Inspection

What does this mean for Architectural Cast Stone Fabrication (TMS 504)?

This defines minimum requirements for the production based on ASTM C 1364-16e1 the Standard Specification for Architectural Cast Stone.

A few things to note regarding the latest ASTM requirements:

- The boiling test option for absorption testing as per ASTM C1195 was removed and only the cold water test is valid.
- It specifically states that the method of production is to be chosen by the manufacturer and not the specifier. Cast Stone can be produced in dry tamp, wet cast or machine made methods. No matter what the method, the Cast Stone produced MUST comply with all of the testing minimums in order to be compliant with the specification. Therefore any method of production will provide quality cast stone.

There are circumstances where the production by one method would be more beneficial for a specific project and the manufacturer is the best person to make that determination. Just as the specifier knows what they need to comply with various building codes and standards and how the cast stone is intended to function on the wall, so also does the manufacturer know how best to produce the Cast Stone to meet these performance criteria. For more guidance on this issue, reference the Cast Stone Institute Technical Bulletin # 54 which is available for free download at www.caststone.org under the Technical Icon.

Included in the fabrication section of the new standard, in addition to ASTM references are topics such as: Shop Drawings, Maximum Unit Dimensions, Reinforcement, Anchors, Corrosion Protection and Delivery.

What Does this Mean for the Architectural Cast Stone Designer (TMS 404)?

This standard governs the design of non-structural cast stone such as veneer, cladding, sills, banding, etc... with minimum requirements that should not be reduced below the minimum threshold. It does not cover the design of structural cast stone.

Included in the Design Section is information about:

- Contract Documents
- Project Drawings
- Design Loads
- Analysis & Design
- Details of Reinforcement
- Quality Assurance

Copies of the new TMS 404-504-604 can be purchased through The Masonry Society at masonrysociety.org directly under Publications.

HOW DOES CAST STONE DIFFER FROM RELATED MATERIALS?

If it looks like stone and is a manufactured product, then it must be cast stone. Not true. It could be Adhered Manufactured Stone Masonry Veneer (AMSMV), architectural precast, calcium silicate, or even a natural stone. On many construction documents today, there is confusion in both terminology and physical properties when a material is called out. Each product has its appropriate applications dependent upon the project. **It is very important to note that these products may not be interchanged by anyone but the original specifier as they function quite differently on the wall.** Each product has its own performance characteristics that require different engineering.

Note the chart below for a snapshot of the minimum requirements for each material:

CHART FROM AIA PPT – PHYSICAL PROPERTIES

As noted in the chart, it is clear that the minimum requirements for each product vary and should be taken into account when/if any changes are to be recommended for any reason. Also note that architectural precast is tested in cylinders and not 2” cubes as required for cast stone. There is no correlation between cubes and cylinders so be sure that the producer of the cast stone is providing accurate test methods and compliant test data.

ABOUT THE CAST STONE INSTITUTE® (logo) (Home page of website)

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

WHAT DOES IT TAKE TO BE CSI CERTIFIED?

Prior to admission, each potential Producer Member must submit to a rigorous examination of product quality, safety, testing (including freeze thaw), meticulous record keeping and financial viability of the company. Once certified, they undergo the recertification process every other year with unannounced inspections and test data reporting every six months in addition to numerous other requirements.

Testing requirements The following two tests must be performed for every 500 cubic feet of cast stone produced and passing reports available for review for at least the most recent six months. These tests can be performed in house or by independent testing laboratory. Each test must also be performed at least every six months by a qualified independent testing laboratory that has successfully passed the CSI Testing Technician Training Course. **Note that this required**

testing is completed on 2 inch cube samples and NOT by cylinders as per ASTM requirements.

- Compressive Strength must be at least 6,500 psi at 28 days (ASTM C1194).
- Absorption must be less than 6% at 28 days (ASTM C1195).

A passing Freeze Thaw test, ASTM C666, by a qualified independent testing laboratory should be available for each mix design. This test measures product weight loss after 300 cycles of rapid freezing and thawing in a wet environment with cumulative percentage mass loss less than 5% required for passing. Freeze Thaw testing shows durability of the Cast Stone over time and it a good indicator of quality Cast Stone Production.

These are tests mandated by ASTM C1364 and our members comply with these strict regulations and provide proof to the Institute of this compliant test data 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.**

Warranty

Continuing to lead the industry, the Cast Stone Institute Producer Members adopted language for a 10 year Limited Product Warranty in 2011. CSI Institute Producer Members are aware of the evolving environment for products in the marketplace that demand sustainability, durability and useable service life. This warranty demonstrates that CSI Producer Members embrace these principles and produce product that will stand the test of time. This document is available on the Cast Stone Institute website, www.caststone.org, directly from the Home Page.

Other important quality checks

1. Cast Stone should be reinforced in accordance with ASTM C1364 and shop drawings should show the size and location of all reinforcing. Reinforcing covered by less than 1 and 1/2" of cast stone must be corrosion resistant (galvanized or epoxy coated).
2. All aggregates should comply with applicable portions of ASTM C33 to ensure that organic contamination and Alkali-Silica Reaction (ASR) are avoided.
3. Aggregates should be sieve tested every month to ensure continuity of mix design.
4. All materials used should comply with ASTM C1364 and the documents referenced within it. For example, carbon black or other pigments that do not meet the testing requirements of ASTM C979 may result in weakening the cast stone or fading over time.
5. The manufacturer should submit a list of projects similar in scope and at least 3 years of age along with owner, architect and contractor references. Field visits are recommended.

To ensure that the product is completely equal, download the Or Equal Guidelines directly from the Cast Stone Institute homepage www.caststone.org

CONCLUSIONS

What does all of this mean for the specification of cast stone?

- New Architectural Cast Stone Standards will assist the mason, designer and fabricator to properly specify and construct buildings using cast stone.

- All Architectural Cast Stone must meet ASTM C1364-16e1 including test data and freeze thaw durability.
- Related materials function differently on the wall, therefore should not be interchanged except by the original designer.
- Certified Cast Stone Institute Producer Members are required to comply with ASTM C1364 and provide the test data to back this up.
- The 10-year Warranty provided by Cast Stone Institute® Producer Members.

Properly manufactured, designed and installed, cast stone can result in an architectural project of enduring beauty to be enjoyed for decades. When specifying cast stone on a project, be sure to call out for a Cast Stone Institute Producer Member and all parties need to hold to that specification. This provides owners the quality cast stone the project deserves.

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

Jan Boyer has been the Executive Director of the Cast Stone Institute since 2006. She currently serves on the Board of Directors for the Masonry Alliance for Codes and Standards (MACS) as Board Secretary and serves on several administrative committees for The Masonry Society. She also sits on the ASTM C27 Committee under which Architectural Cast Stone falls. She can be reached at jboyer@caststone.org.