

## INSPECTION AND ACCEPTANCE

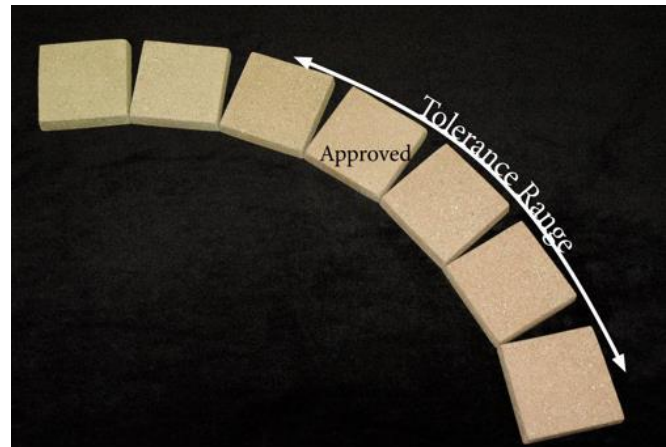
One key to the success of any masonry project is the careful selection and inspection of the cast stone elements. This Technical Bulletin focuses on the inspection and acceptance of cast stone prior to installation. The on-site inspector should be familiar with the project's contract documents, as well as the applicable reference standards. Test reports showing compliance with ASTM C1364, as well as the range of approved sample, should be on file.

On-site inspection and acceptance of cast stone should be performed at time of delivery. Before installation, check the color and texture of the approved sample against the delivered product. The cast stone should approximate the color and texture of the approved sample when viewed under typical lighting conditions and show no obvious imperfections other than minimal color and texture variations from a 20 foot distance. The cast stone should be dry when inspected for color as dampness will darken the surface color and make it appear blotchy. Furthermore, do not evaluate the texture under sunlight that is skimming across the surface parallel to the plane of the face as this will unfairly accentuate minor irregularities.

Cast stones are produced using naturally occurring materials. Minor variations in color and texture should be expected within limits of the approved range of samples. As per ASTM C 1364 Standard for Architectural Cast Stone, color and hue variations are tested as per ASTM D 2244. The permissible variations for color are defined as not greater than 6 units and the hue difference as not greater than 2 units from the approved sample or between units of comparable age subjected to similar weathering. In general expect color variation to be similar to natural cut limestone.



Some projects will show more color variation than others. Units containing gray cement will show more light-dark variations than those containing white cement. Colors, which require high amounts of integral pigments such as reds and browns, will vary more than earth tone shades such as buff. Special mixes containing contrasting and multi-colored aggregates may be subject to extreme color deviations when compared to homogeneous facing mixes.



Variations in color within the same stone may be caused by efflorescence or free lime migrating to the outer surface. This can usually be remedied by proper cleaning. Staining, mortar smears or uneven washing can also cause color variations. These variations are not necessarily inherent in the cast stone but as a result of installation or post construction cleaning. In such instances, the manufacturer should be consulted for recommended treatment of these variations.

Touch and repair is perhaps the greatest source of dissatisfaction with finished installations. When months have elapsed between the date of manufacture and the date of repairs, differences in color may exist between properly repaired areas and the remainder of the stone. It is a mistake to expect an instant color match at the time of the repair since this will usually cause dark patches later on. These areas should be left alone as they will blend in over time through curing and natural weathering.

To this point this Technical Bulletin has been focused on the aesthetic properties. In addition to color and texture, the inspector and/or mason should be familiar with the dimensional requirements of the installation as they pertain to joint sizes and interfaces with other materials. The cast stone should be true in shape, free of large cracks and ragged edges and within the tolerances specified in the contract documents.

Common deficiencies which are typically not acceptable of high quality cast stone include:

- Bug holes or air voids on the finished surfaces
- Ragged or chipped edges on formed edges
- Stains on exposed faces from foreign substances
- Twist, warp, out of square or bow exceeding tolerances
- Out of plane or pie shaped joints, or large or small joints out of tolerance.
- Areas of rough texture or smoothness not matching sample from 20 feet
- Backup concrete bleeding through exposed faces
- Visible cracks exceeding 0.007"
- Reinforcing shadows or exposure on face
- Rust on surface caused by staining, reinforcement or iron pyrites.
- Form marks or local depressions in excess of 0.030".

Building owners and their representatives will often apply some wishful thinking when viewing and touching a small 12" sample and then trying to imagine the way an entire facade will look. Wherever possible, an investment should be made in mockup panels and/or sample units. The sample units should demonstrate a variety of shapes and casting configurations and include vertically cast surfaces if they are specified.

Careful quality control of cast stone units by the manufacturer, combined with qualified ongoing inspection and acceptance at the job site ensures that all parties are satisfied with the completed project. Once the project is completed, little can be done to correct the appearance of the cast stone.

This Technical Bulletin addresses generally accepted practices, methods and general details for the use of Architectural Cast Stone. This document is designed **only as a guide** and is **not** intended for any specific application or project. It is the responsibility of design and construction professionals to determine the applicability and appropriate application of any detail to a specific project based on professional judgment, specific project conditions, manufacturer's recommendations and solid understanding of product characteristics. The Cast Stone Institute makes no express or implied warranty or guarantee of the techniques or construction methods identified herein. Technical references shall be made to the edition of the International Building Codes for the location of the structure, the latest edition of the TMS 402/406 Masonry Standards document and TMS 404, 504, 604 Standards for Design, Fabrication and Installation of Architectural Cast Stone.

The Cast Stone Institute (CSI) is a not-for-profit organization created to advance the design, manufacture and use of Architectural Cast Stone. To further this goal, the CSI continually disseminates information to targeted construction industry audiences through presentations, programs and technical publications.