

Section 04 22 23 - Architectural Masonry Units

Reference Guide for Specifiers, Architects and Suppliers of Watershed Materials' Masonry Products

This document is intended to aid design professionals in the drafting of project-specific specifications covering Watershed Materials' masonry units; it is drafted using the SectionFormat™ of the Construction Specifications Institute. The six digit section number cited is per Construction Specifications Institute (CSI) Masterformat™ 2004. This guide specification is based upon The Masonry Society (TMS) standard TMS 602, a CSI-format, three-part specification as adapted by the American Concrete Institute (ACI), and incorporated by reference in the California Building Code (CBC). For further assistance in specifying products described in this document, please contact: Watershed Materials, LLC. (707) 225-1364. www.watershedmaterials.com.

Section 04 22 23 - Architectural Block - Concrete Masonry Unit

PART 1: GENERAL

- This section includes:
 - Structural Architectural Masonry Units
- Related Sections:
 - Section 04 05 13 – Masonry Mortar
 - Section 04 05 16 – Masonry Grout
 - Section 04 05 19 – Masonry Anchors and Reinforcement
 - Section 04 05 23 – Masonry Accessories
 - Section 05 12 23 – Structural Steel
 - Section 05 50 00 – Metal Fabrications
 - Section 07 19 00 – Water Repellents (post-applied)
 - Section 07 90 00 – Joint Protection

1.1. References to Applicable Standards and Specifications:

- American Society for Testing and Materials (ASTM):
 - ASTM C140/140M - 14: Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
 - ASTM C150/150M-12: Standard Specification for Portland Cement
 - ASTM C989/989M-13: Standard Test Method for Slag Cement for Use in Concrete and Mortars
 - ASTM C426-10 - Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units
 - ASTM C476-10 - Standard Specification for Grout for Masonry
 - ASTM C270-12a - Standard Specification for Mortar for Unit Masonry
- The Masonry Society (TMS), American Concrete Institute (ACI), American Society of Civil Engineers (ASCE), Masonry Standards Joint Committee (MSJC):
 - TMS 402-11/ACI 530/ASCE 5-11 - "Building Code Requirements for Masonry Structures and Commentary"
 - TMS 602-11/ACI 530.1/ASCE 6-11 - "Specification for Masonry Structures"
- National Concrete Masonry Association (NCMA) TEK 8-1A: "Maintenance of Concrete Masonry Walls"
- United States Green Building Council (USGBC) LEED reference guide

1.2. Submittals

1.2.1. Samples for color and texture selection

- Initial Selection - From standard selection of architectural samples.
- Verification - From three full-sized units showing full range of colors and textures or three 8-x16" face shells showing full range of colors and textures.

[*For additional information on submittals refer to Section 01 33 00 – Submittal Procedures]

1.2.2. Test reports

- The purchaser or authorized representative shall be accorded proper facilities to inspect and sample masonry units at the place of manufacture from the lots ready for delivery.
- Units shall be sampled and tested in accordance with ASTM C140/140M-14, ASTM C90-14 and ASTM C426-10 (if applicable):
 - Compressive strength requirements: units must be tested in accordance with ASTM C90-14 and have a minimum net area compressive strength of 1,900 pounds-per-square-inch (psi) for an average of 3 units, with no individual unit having a net area compressive strength of less than 1,700 psi. If higher design strengths are desired, notes should be included within the CMU specification regarding the required unit strength or $f'm$ (specified compressive strength of the masonry assemblage).
 - Absorption requirements: following ASTM C90-14, lightweight units must have absorption values not exceeding 18 pounds-per-cubic-foot (pcf) for an average of 3 units, with no individual unit exceeding 20 pcf. Medium-weight units must have absorption values not exceeding 15 pcf for an average of 3 units, with no individual unit exceeding 17 pcf. Normal-weight units must have absorption values not exceeding 13 pcf for an average of 3 units, with no individual unit exceeding 15 pcf.
 - Linear shrinkage requirements (where applicable): following ASTM C426-10, linear drying shrinkage for an average of 3 units is limited to a maximum of 0.065%.
- If a sample fails to conform to the specified requirements, the manufacturer shall be permitted to remove units from the shipment. A new sample shall be selected by the purchaser from remaining units from the shipment with a similar configuration and dimension and tested at the expense of the manufacturer. If the second sample meet the specified requirements, the remaining portion of the shipment represented by the sample meet the specified requirements.

*SPECIFIERS NOTE According to Section 2105- Quality Assurance of the the 2001 California Building Code (CBC), strength testing may be conducted utilizing one of the following methods, in addition to the unit strength method described in ASTM C90-14:

- Masonry prism testing- In prism tests, an assemblage of the concrete masonry unit, mortar, and grout is tested for compressive strength (see subsection 2105.3.2 of the CBC for more details).
- Masonry prism test record- Verification of compressive strength by masonry prism strength test records (see subsection 2105.3.3 of the CBC for more information).

1.3. Quality assurance

- Construct a masonry "mockup" wall to provide a representation of the masonry to be constructed on the project, as described in project documents. Construct masonry in accordance with requirements of TMS 402-08, ACI 530-08, ASCE 5-08.

1.4. Delivery, storage and handling

- Evaluate delivered architectural masonry units for acceptance based on the requirements for chippage and dimensional tolerances put forth in ASTM C90-14, Sections 6 and 7.
- Deliver, store and handle architectural masonry units so as to prevent damage and discoloration.
- Store architectural masonry units off the ground, single-stacked, wrapped with waterproof material to permit air circulation around units while preventing excess moisture accumulation.

1.5. Site conditions

1.5.1. Environmental Requirements

- Comply with requirements contained in TMS 602-08, ACI 530.1-08 and ASCE 5-08.

1.5.2. Protection of Masonry

- Cover partially-completed masonry, tops of walls, projections and sills with waterproof sheeting when construction is not in progress to prevent excessive moisture ingress.

1.5.3. Stain Prevention

- Prevent grout, mortar and other materials from staining the exposed face of the masonry.

PART 2: PRODUCTS

2.1. Watershed Materials' Manufactured Architectural Masonry Units

2.1.1. Manufacturer:

- Watershed Materials, LLC. Napa, California. 707-225-1364. www.watershedmaterials.com

2.2. Materials

2.2.1. Architectural Masonry Units

- Texture: [*specify standard face or burnished*].
- Color: [*specify from range of colors available from manufacturer*].
- Type: [*specify 4", 6" or 8" height*], [*specify Double open-ended bond beam (DOEBB) vs. standard*].
- Density Classification: [*specify Lightweight (<105 pcf), medium weight (105-125 pcf) or normal weight (>125 pcf)*].
- Dimensional Tolerances: comply with ASTM C90-14.

2.2.2. Mortar for unit masonry

- Comply with ASTM C91/91M-12, ASTM C270-12a.

2.2.3. Grout

- Comply with ASTM C476-10.

2.2.4. Flashing materials

- Refer to Section 04 05 23 – "Masonry Accessories."

2.2.5. Water repellent admixtures/efflorescence control

- If specified, an integral polymeric water-repellent admixture will be added during the manufacture of masonry units. Dosage rates shall be determined according to manufacturer recommendations.

2.2.6. Topical sealers

- If specified, topical, proven water-repellent sealers shall be used.

2.2.7. Masonry cleaners

- Proven masonry cleaners shall be used.

PART 3: EXECUTION

3.1. General

- Construct masonry in accordance with requirements described in TMS 402-08, ACI 530-08 and ASCE 5-08.

3.2. Examination

- All masonry work shall be performed under the direct supervision of a "Certified Structural Mason," employed by a "Certified Mason Contractor," as recognized by the Masonry Education Foundation (MEF).
- The Mason Contractor shall submit credentials from the MEF to the project designer for review and approval prior to beginning masonry work.
- Prior to beginning masonry work, the Certified Mason Contractor is responsible for the following:
 - Examine surfaces that will support masonry work to assure completion to proper lines and grades.
 - Verify that foundations are constructed to meet tolerances described in ACI 117.
 - Verify that reinforcing dowels are positioned in accordance with project drawings and applicable codes.
 - Verify that other utilities and building elements interfacing with masonry are properly located.
 - Notify the project designer, general contractor or owner's representative, in writing, of any unsatisfactory conditions, which shall be corrected before beginning masonry work.

3.3. Preparation

3.3.1. Establish lines, levels and coursing

- Protect lines from disturbance.
- Use non-corrosive materials in contact with masonry.

3.3.2. Surface preparation

- Prior to placing masonry units, remove loose aggregate or any other materials that would prevent mortar from bonding to the foundation.

3.3.3. Layout

- Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns and offsets. Where possible, avoid using units cut to less than half size, particularly at corners and jambs.

3.4. Construction

3.4.1. Coursing and bonding

- Place masonry units to lines and levels indicated on project drawings.
- Maintain masonry coursing and horizontal joints of uniform width and thickness.
- Place masonry units in running bond pattern unless otherwise noted on project drawings.
- Course one masonry unit and one mortar joint to equal 8 inches (203 mm), 6 inches (152mm) or 4 inches (102 mm) for 8", 6" and 4" masonry units, respectively.

3.4.2. Mixing and placing mortar

- Mix mortar in accordance with the requirements of ASTM C270-12a.
- Discard mortar not used within 2-1/2 hours of initial mixing.
- Construct 3/8 inch (9.4 mm) bed and head joints with the minimum depth of masonry unit face shell, unless otherwise indicated on Project Drawings.
- Construct bed joint at starting course on foundation not less than 1/4 inch (7 mm) and not more than 3/4 inch (19 mm).
- Use tuck-pointing procedures as specified in ASTM C270-12a to fill voids in below grade and exposed masonry.
- Tool head and bed joints with a concave profile for all masonry exposed to exterior weather conditions unless alternate joint treatments are specified.
- Remove masonry protrusions extending 1/2 inch (12.5 mm) or more into cells or cavities to be grouted.

3.4.3. Placing masonry units

- Do not install masonry units that are cracked, broken or chipped in excess of tolerances noted in ASTM C90-14, Section 7.2.1.
- When possible, orient masonry units so that small chips, cracks and minor imperfections are not visible on exposed side of walls as noted in ASTM C90-14, Section 7.2.
- Pull colored masonry units from at least three (3) different pallets for proper blending and appearance.
- Clean units of surface dirt and contaminants before placing in contact with mortar.
- Vertical cells to be grouted must be aligned and have unobstructed openings for grout.
- Remove excess mortar before it hardens and place units such that mortar does not run down the face of the wall or smear into the masonry face.

3.4.4. Adjustments

- Do not shift or tap masonry units after mortar has taken initial set.
- Where adjustments must be made, remove mortar and replace.
- Protect wall cavities during construction to prevent excessive moisture ingress.
- When beginning work each day, clean masonry surfaces that are to receive mortar and remove any loose masonry units and mortar.

3.5. Tolerances

- Comply with construction tolerances described in MSJC Specification (ACI 530.1/ASCE 6/TMS 602).

3.6. Anchorage and reinforcing

- Refer to Section 04 05 19.

3.7. Control and expansion joints

- Refer to Section 04 05 23 13.

3.8. Joint sealers

- Refer to Section 07 90 00.

3.9. Grout placement

- Refer to Section 04 05 16.

3.10. Cleaning and water repellents

3.10.1. In-progress cleaning

- Clean masonry units as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

3.10.2. Final cleaning

- Clean exposed architectural masonry with approved cleaners, as per manufacturer's recommendations. Clean masonry before installing windows, doors, finished flooring, metal fixtures, hardware, light fixtures, roofing materials and other non-masonry items.

3.10.3. Water-repellent sealer application (if applicable)

- All surfaces shall be clean, dry, and free of scale, mud, or efflorescence, and cracks shall be filled prior to application of water-repellent coating. Apply water-repellent coating to wall surfaces in strict accordance with manufacturer directions. Protect adjacent surfaces and work from damage and staining throughout application of the water-repellent sealer.

3.11. Field quality control

- Refer to Section 01 45 16.

END OF SECTION 04 22 23

The reference guide contained within is intended to be used only as a "Guide." The user accepts all responsibility for project specifications. Watershed Materials LLC bears no responsibility for errors or omissions of any portions of the project specifications.