

Revised 8/2024

[NOTE TO SPECIFIER: PLEASE ENABLE VIEWING OF HIDDEN TEXT. Notes are interspersed throughout to offer explanations, guidance, and background information.]

Abbreviations used in notes:

CBC: 2022 California Building Code

TMS 402: TMS 402, 2016 Building Code Requirements for Masonry Structures and Commentary

TMS 602: TMS 602, 2016 Specification for Masonry Structures

DSA: Indicates portions of the California Building Code (CBC) modified and adopted by DSA-SS and OSHPD 1 and 4.

This guide specification is based upon TMS 602, an adapted CSI-format, three-part specification incorporated by reference in the CBC.

Notes appearing in green are related to sustainable design.

Replace the term “Design Professional” with the identity of the design professional as defined in the General and Supplementary Conditions.

SECTION 04 22 00.13 – CONCRETE UNIT ANCHORED VENEER MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Division 01 Sections, Drawings, General Conditions, Supplementary Conditions, Special Conditions, and Quality Control apply to this section. *If desired, reference specific sections in 1.2 C below.*

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units (CMUs).
 - 2. Mortar.
 - 3. Masonry joint reinforcement.
 - 4. Ties and anchors.
 - 5. Embedded flashing.
 - 6. Control joint materials.
- B. Products installed, but not furnished, under this Section:

Edit the following as needed

1. Section 05 50 00 Metal Fabrication for steel lintels and shelf angles for unit masonry.
2. Section 07 62 00 Sheet Metal Flashing and Trim.

C. Related Requirements:

Edit the following list as needed.

1. Section 04 05 13 Masonry Mortaring.
2. Section 04 05 16 Masonry Grouting.
3. Section 04 05 19 Masonry Anchorage and Reinforcing.
4. Section 04 05 23 Masonry Accessories.
5. Section 04 22 00 Concrete Unit Masonry.
6. Section 04 22 23.23 Prefaced Concrete Unit Masonry for Spectra Glaze glazed masonry units.
7. Section 07 19 00 Water Repellents for application to unit masonry assemblies.
8. Section 07 62 00 Sheet Metal Flashing and Trim for exposed sheet metal flashing.
9. Section 07 84 13 Penetration Firestopping for firestopping at openings in masonry walls.
10. Section 07 84 43 Fire-Resistive Joint Sealants for fire-resistive joint systems at heads of masonry walls.
11. Section 07 92 00 Joint Sealants for sealing control and expansion joints in unit masonry.
12. Section 32 14 13.13 Interlocking Precast Unit Paving.

1.3 REFERENCES

A. TMS 602 2016 Specification for Masonry Structures.

B. ASTM International (latest versions):

1. ASTM A82/A82M Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A951/A951M Standard Specification for Masonry Joint Reinforcement.
4. ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
5. ASTM C90 Standard Specification for Loadbearing Concrete Masonry Units.
6. ASTM C150/C150M Standard Specification for Portland Cement.
7. ASTM C270 Standard Specification for Mortar for Unit Masonry.
8. ASTM C595/C595M Standard Specification for Blended Hydraulic Cements.
9. ASTM C920 Standard Specification for Elastomeric Joint Sealants.
10. ASTM D226 Standard Specification for Asphalt-saturated Organic Felt Used in Roofing and Waterproofing.

1.4 QUALITY ASSURANCE

- A. Sample Panels: Construct an approximate [Width:] wide by [Height:] high panel for representation of completed masonry, joint tooling, design details, and workmanship. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.

If it is desirable to demonstrate particular units or areas of critical detailing, specify them in the following, otherwise delete it.

- 1. Install the following in the sample panel:
 - a. [Specify units]
 - b. [Specify details or conditions]

It is typically good practice to conduct preinstallation meetings to provide opportunity to clarify critical details, schedules, specification intent, inspections etc. If the work under this section is of a minor nature, the following may be deleted.

- B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".

1.5 SUBMITTALS

- A. Obtain written acceptance of submittals prior to use of the following:
 - 1. Submit mix designs and test reports:
 - a. Preblended mortar:
 - 1) Mix design indicating types and proportions of materials according to proportion specification of ASTM C270, or
 - 2) Mix designs and mortar tests performed in accordance with the property specification of ASTM C270.
 - 2. Submit material certificates for each of the following certifying compliance:
 - a. Concrete masonry units.
 - b. Elastomeric joint sealants.

For samples required below, state quantity of each.

- B. Samples for Verification: For each face design, color, and texture of the following:
 - 1. Concrete masonry units.

Include the following if colored mortar is specified.

- 2. Mortar, for color selection or confirmation.

1.6 SUSTAINABLE DESIGN SUBMITTALS

The EPDs and HPDs for Angelus Block CMU cover the great majority of specified CMU and all core product lines. If this specification includes CMU with special aggregate blends or other characteristics not included in Angelus Block publications, please consult your Representative to review applicability of the EPD.

Carbon impacts for Angelus Block CMU, optimized and now branded as CarbonKind™, are substantially less than industry baselines. See user notes under PART 2 – PRODUCTS.

- A. Environmental Product Declaration (EPD) meeting the following criteria:
 - 1. Type III third party verified.
 - 2. Specific to product and plant location.
- B. Health Product Declaration (HPD) for specified products meeting the following criteria:
 - 1. Ingredients reported to 100 ppm.
 - 2. Conforming to Health Product Declaration® Open Standard Version 2.2 or later.

See notes for recycled content in Paragraph 2.2 A.2.c.

- C. Recycled Content
 - 1. Manufacturer's certification of type and percentages of recycled content.
- D. Manufacturing and Material Source Locations: Include in manufacturer's certification for CMU supplied under this Section:
 - 1. Location of CMU production plant.
 - 2. Locations of raw material sources for ingredients.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect all materials of this section to maintain quality and physical requirements.
- B. Store all masonry units on the jobsite so that they are protected from rain, stored off-ground and kept free of contamination.
- C. Store SPEC MIX preblended mortar mix in manufacturer's original, unopened, undamaged containers with identification labels intact, covered and protected from weather, or in a SPEC MIX dispensing silo.

1.8 FIELD CONDITIONS

- A. Cover top of unfinished masonry work to protect it from the weather.

Cold-weather and hot-weather masonry construction is addressed in TMS 602 Article 1.8 C and 1.8 D. Include and modify below as necessary.

- B. Implement cold-weather procedures in accordance with TMS 602 when ambient temperature falls below 40°F (4°C).
- C. Implement hot-weather procedures in accordance with TMS 602 when ambient temperature exceeds 100°F (38°C), or exceeds 90°F(32°C) with a wind velocity greater than 8 mph.

PART 2 -PRODUCTS

Note: we often see specifications for a product covered by an ASTM standard also list its raw material constituents, along with their respective ASTM standards. This is not only redundant, but also not recommended as it may be unnecessarily limiting. For example, CMU may be made with C150 Portland cement, or with C595 blended cement. By stating presumed CMU ingredient ASTMs, specifically C150, the project has limited itself from an eco-friendlier product with equal or better characteristics.

Angelus Block is first in our region to move to a blended cement that reduces CO₂ impact, resulting in CarbonKind™. It is a low impact CMU with substantial reductions in CO₂e. The average impacts as shown in Angelus Block Medium Weight EPDs are **42% and 61% less**, respectively, than the Carbon Leadership Forum's 2021 Material Baselines for Typical and Baseline CMU values, and **21% less** than CLF's 2023 Material Baselines Appendices.

TMS 602, Specification for Masonry Structures, is included by reference in the CBC. It does not list sub-ASTMs, simply stating the ASTM standard specific to the material discussed. Each ASTM standard lists within its allowed ingredients and their respective ASTMs.

It is recommended throughout that specific criterion of strength, weights, types, etc. are centralized in the structural specifications commonly found in the S-1 sheet. This avoids conflicts and minimizes the chances for errors.

2.1 MANUFACTURER

- A. Basis of design concrete masonry units:
 - 1. Angelus Block Co., Inc.
 - a. Sun Valley, CA (818) 767-8576
 - b. Orange, CA (714) 637-8594
 - c. Fontana, CA (909) 350-0244
 - d. Gardena, CA (310) 323-8841
 - e. Oxnard, CA (805) 485-1137
 - f. Indio, CA (760) 347-3245
 - g. Bakersfield, CA (661) 858-2848
- B. Preblended mortar:
 - 1. SPEC MIX Preblended Mortar Mix, by E-Z Mix, Inc.
 - a. Sun Valley, CA (818) 768-0568
 - b. Rialto, CA (909) 874-7686

2.2 CONCRETE MASONRY UNITS

- 1. Basis of design: CarbonKind concrete masonry units by Angelus Block Co., Inc.

The majority of structural design is based on the Medium Weight classification. Other weight categories are Normal Weight (heaviest) and Lightweight (most expensive). This attribute should be stated on the S-1 sheet.

It is common to call out colors and textures on elevation drawings or legend tables within the drawings set, it may be helpful to also coordinate and list them here, BUT ONLY IF UPDATED AND SYNCHRONIZED WITH DRAWING CALLOUTS. Otherwise, delete, or indicate as in drawings. Examples of Color: Sandstone, Warm Gray. Examples of Texture: Precision, Split Face, Burnished, and Shotblast. If compatible mortar color other than natural gray is intended, specify in paragraph 2.3 A.

2. Color(s) and texture(s):
 - a. [Color] [Texture]

In addition to the Sustainable Design Submittals in Article 1.6, which report the “as-is” state of submitted CMU, you may include specified green characteristics here. However, before doing so, please consult with your Angelus Block Representative to ensure the specified CMU will meet all other intended characteristics, including aesthetics.

3. Sustainable Characteristics:

See discussion for paragraph 1.6.

- a. Concrete masonry units shall be included in a current Type III Environmental Product Declaration.
- b. Concrete masonry units shall have an associated Health Product Declaration.

Regional material criteria “within 500 miles” under the 2022 California Green Building Standards Code (CALGreen) is a certainty with Angelus Block CMU. *Everything* – raw materials and production – is well within 500 miles of our service region and sourced within California.

LEED v4 changes applicability, definition, and distance. Current language stipulates *ALL* raw material sources and production locations must be within 100 miles of the project, without any calculations for portions of raw materials. It’s all or nothing. Many product mix designs incorporate aggregates which simply are not available within 100 miles of the metroplex regions. Therefore, if this project is seeking certification under LEED v4, please consult your Representative before stating this as a required characteristic. Otherwise, it may be included for CALGreen as follows.

- c. Obtain CMU produced, and with raw materials sourced, within 500 miles of the project site.

2.3 MORTAR MATERIALS

Mortar may instead be included in their respective specification Section: 04 05 13 Masonry Mortaring. If so, replace details below with a reference to the appropriate Section.

Preblended mortar below provides greater quality control and consistency than field-mixed. SPEC MIX meets both proportion and properties requirements of ASTM C270 and meets ASTM C1714 for preblended dry mortar mix for unit masonry. C1714 5.2.1 defaults to property requirements of C270.

NOTE TO USERS OF SPEC GENERATION SERVICES: Some may discuss mortar types M, S, N, and O, and their applicability to a variety of conditions. This is problematic for projects in California under the 2022 CBC, and by reference, TMS 402.

Most of California is in Seismic Design Category D, for which “participating elements,” or structural elements, must utilize either Type S or Type M mortar ONLY (TMS 402 7.4.4.2.2). Therefore, to eliminate multiple mortar types on the project if work includes structural and veneer construction, the pragmatic default mortar for our region is Type S, unless Type M is specified by structural design.

Mortar type (i.e., Type S, Type M) should be stated in the S-1 sheet.

- A. SPEC MIX Masonry Mortar preblended factory mix conforming to ASTM C270 and ASTM C1714/C1714M. Mortar Type as specified in S-1. (or, if a separate Section is included for mortar, append the foregoing with ", in accordance with Section 04 05 13 Masonry Mortaring", and delete the following color specification)

Natural gray is often used, including use with pigmented CMU. If compatible mortar colors are desired, specify here. Consult your Angelus representative or https://www.angelusblock.com/colors_and_textures.cfm Select a Special Order Medium Weight color chart, then click on any color swatch to see available textures for that color and recommended mortar color(s). For stock colors (Sandstone, Spice, and Harvest), specify the stock mortar color, "Medium Tan". SPECIFY HERE ONLY IF UPDATED AND SYNCHRONIZED WITH DRAWING CALLOUTS. Otherwise, delete.

- 1. Natural gray color.

B. Water: Potable.

C. Admixtures:

- 1. Do not use admixtures except as specified herein, or as approved by the Design Professional and the Building Official.

2.4 REINFORCEMENT AND METAL ACCESSORIES

The following items may instead be included in their respective specification Sections: 04 05 19 Masonry Anchorage, 04 05 23 Masonry Accessories. If so, replace details below with a reference to the appropriate Section.

Items below are typically used. Revise as required by structural design.

- 1. Provide metal reinforcement and accessories conforming to TMS 602 Article 2.4 and TMS 402 Article 6.1.4 (if separate sections are included for these items, append the foregoing with ", in accordance with Section 04 05 19 Masonry Anchorage and Reinforcing and Section 04 05 23 Masonry Accessories", and delete the remainder of this article).

A continuous water-resistive barrier is required where the backing is constructed of studs.

2.5 WATER-RESISTIVE BARRIER

- A. Provide No. 15 asphalt felt, complying with ASTM D226 for Type 1.

2.6 FLASHING MATERIALS

- A. Provide metal flashing in accordance with Section 07 62 00 Sheet Metal Flashing and Trim.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Provide masonry accessories conforming to TMS 602 Article 2.5.

2.8 MASONRY CLEANER

- A. Use potable water and detergents to clean masonry unless otherwise approved.
- B. Do not use acid or caustic solutions unless otherwise approved.

2.9 MIXING

- A. Mortar:
 - 1. Mix SPEC MIX Masonry Mortar preblended factory mix per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to the start of masonry installation, verify all conditions pertinent to the performance of work in this Section are acceptable in accordance with TMS 602 Article 3.1.

3.2 PREPARATION

- A. Clean and prepare reinforcement, anchor bolts, and foundation, and construct grout spaces in accordance with TMS 602 Article 3.2. Do not wet units before laying, unless otherwise required. Wet cutting is permitted.
- B. Provide cleanouts in accordance with TMS 602 Article 3.2 F.

3.3 INSTALLATION

- A. Select and arrange units for exposed masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- B. Construct masonry veneer in compliance with TMS 402 and TMS 602.

- C. Cut units as required to fit; use motor-driven masonry saw. Install cut units with cut surfaces edges concealed as much as possible.
- D. Lay dry units only, unless otherwise approved.
- E. Select and arrange units for exposed masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- F. All masonry shall be laid true, level, plumb, and in accordance with the drawings.

Running bond is the typical pattern. If stack bond or another pattern is to be used, edit the following item, or refer to drawings.

- G. Lay exposed masonry in running bond unless otherwise indicated in Project Drawings.

3.4 MASONRY JOINT REINFORCEMENT, TIES, AND ANCHORS

- A. Embed joint reinforcement, ties, and anchors in mortar and extend into the veneer a minimum 1 1/2 in., with minimum 5/8 in. cover to outside face.

Select from the table to fill in the values for B and C below:

Anchor spacing.	
Max. area:	2-pc. Adjustable – 2.67 ft ² ; Others – 3.5 ²
	Seismic Design Category D – Reduce to 75 percent of above.
	High winds areas (>40 psf ≤ 55 psf) – Reduce to 70 percent of above.
Max. horiz:	32 in. for running bond, not to exceed max area above.
	High winds areas (>40 psf ≤ 55 psf) – 18 in.
Max. vert:	25 in., not to exceed max area above.
	Other than running bond – 18 in.

- B. Place ties and anchors
 - 1. Provide at least one anchor for each [] square feet of wall area
 - 2. Space anchors at a maximum [] in. horizontally and [] in. vertically.
- C. Place single wire joint reinforcement at maximum spacing of [] in. on center vertically. Mechanically attach anchors to the joint reinforcement with clips or hooks.

3.5 WATER-RESISTIVE BARRIER

- A. Attach No. 15 asphalt felt to the studs or sheathing, incorporating flashing as shown on the drawings.

3.6 CONTROL AND EXPANSION JOINTS

- A. Construct control joints as detailed in the drawings as masonry progresses.

Include the following article for Field Quality Control if any of the following are true:

- Under CBC: The structure is classified as Risk Category IV (CBC 1705.4.1).
- Under DSA: The structure is classified as Risk Category II, II, or IV (CBC 1705A4.1).

3.7 FIELD QUALITY CONTROL

The Statement of Special Inspections per CBC Section 1705.4 / 1705A.4 should specify tests, if any, required during construction.

- A. Cooperate with owner's agent as needed to facilitate sampling and inspections in accordance with TMS 602 and the Statement of Special Inspections.

3.8 POINTING, AND CLEANING

- A. Point and tool holes in mortar joints to produce a uniform, tight joint.
- B. During construction, minimize any mortar or grout stains on the wall. Immediately remove any staining or soiling that occurs.
 1. For precision or textured units, except as noted below, clean masonry by dry brushing before tooling joints.
 2. For burnished, glazed, or pre-finished concrete masonry units, immediately remove any green mortar smears or soiling with a damp sponge.

Always utilize the mildest method possible to clean the masonry. Note that efflorescence is common to products containing cementitious and aggregate materials and is typical to new construction. The darker the unit color, of course, the more visible it is. Typical cleaning removes it.

Also note darker colors can be more sensitive to aggressive cleaning methods. It is important to test the proposed cleaning procedure prior to its implementation.

- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry surfaces of stains, efflorescence, mortar or grout droppings, and debris. Specify preferred cleaner below and edit as necessary.
 1. Use appropriate masonry cleaner as tested on the sample panel and as approved by the Design Professional, strictly following manufacturer's recommendations.
 2. Do not use acids.
- D. At completion of masonry work, remove all scaffolding and equipment used during construction, and remove all debris, refuse, and surplus masonry material from the site.
 1. Comply with Construction Waste Management plan.

An application of water repellent is a critical component of the masonry wall and may be included here for emphasis, coordinated with Section 07 19 00 Water Repellents. Otherwise, remove the following.

3.9 WATER REPELLENT APPLICATION

- A. Cleaning shall be complete and accepted by the Design Professional, and wall surfaces shall be thoroughly dry.
- B. Apply water repellent in strict accordance with Section 07 19 00 and the water repellent manufacturer's instructions.

END OF SECTION