

Information for users of

AIA MasterSpec 042000

And its applicability in Southern California, related to mortar types and corresponding use of unit strength tables.

2013 California Building Code

Requirements applicable to Southern California:

1. Seismic Design Category (SDC) in the region is at least 'D', except for a thin strip adjacent to the Colorado River.
2. TMS 402-11/ACI 530-11/ASCE 5-11, as referenced in the California Building Code, Section 1.18.4.4 *Seismic Design Category D requirements* – 1.18.4.4.2.2 *Material requirements* – Participating elements shall be designed and specified with Type S or Type M cement-lime mortar or mortar cement mortar.

MasterSpec® - Evaluations

Page 042000 – E16, **Mortar Type:**

Discusses mortar types M, S, N, and O, and their selection as a complicated process with type applicability to a variety of conditions: reinforced, unreinforced, above grade, below grade, exposed to exterior or earth, loadbearing, non-loadbearing, as veneers, etc.

For Southern California, it's really simple: default to Type S or use Type M in higher strength walls. Per TMS 402 noted above, Type S is the minimum to be used for structural elements in SDC D and above, and since it is neither practical nor prudent to have multiple mortar types in use on a project, Type S is always used unless Type M is specified.

MasterSpec 042000

2.2 PERFORMANCE REQUIREMENTS

Recommended: Use in lieu of 2.4 Concrete Masonry Units E.1 Unit Compressive Strength.

Since all concrete masonry in building structures is engineered ("analytical method" in MasterSpec notes), the design strength of masonry, f'_m , is determined by the structural engineer, and is typically shown on S.1, or similar.

2.2 A. Therefore, it is recommended to incorporate this article to simplify the specifications. Better yet, coordinate with structural documents and add to this a reference to the location of the structural design strength. Now the only needed reference to strengths is the verification method, a choice between:

2.2 A.1. Unit strength method (TMS 602 Table 2 for cmu) – recommended for basic design strength (f'_m) of 1500 net psi. Prescribes the cmu unit strength based on f'_m and mortar type. Since Type S is used in the Southern California SDCs, the cmu strength is 1900 net psi according to the table.

OR

2.2 A.2. Prism test method – recommended for higher strength concrete masonry walls. The unit strength tables referenced above are conservative, so cmu strengths in Table 2 are higher (and more expensive) than actually needed to achieve the specified strength of masonry, f'_m . Therefore, use of this verification method for higher design strengths can be more cost-effective. Prescribing cmu strength is not necessary, and is, in fact, counter-productive for the prism test method.

2.4 CONCRETE MASONRY UNITS

2.4 E. 1. Unit Compressive Strength: ManuSpec specifier notes indicate to delete this subparagraph if retaining 2.2 PERFORMANCE REQUIREMENTS Article. The notes also instruct to delete it if the cmu strength is 1900 net psi per ASTM C90.

The options shown in MasterSpec are 2150, 2800, and 3050.

The first and last are derived from TMS 602 Table 2 for Type **N** mortar which, as discussed above in code requirements, is NOT allowed in the SDC for Southern California; thus, any callout of values from Table 2 for Type N mortar is invalid.

The middle option, 2800, is applicable to Type M or S mortar and an f'_m of 2000, but is well above the actual cmu strength needed to achieve the f'_m . As noted for 2.2 PERFORMANCE REQUIREMENTS, the prism test verification method is likely a better option than specifying the cmu strength at this value.

2.4 E. 2. Density Classification: This is also inherent in the structural engineer's design and typically called out in the structural specification, so this may also be deleted. If it is desired to have a default "backup" density specified, it is recommended to use Medium Weight for building structures in Southern California, but also indicate "unless otherwise specified". Most structural cmu sizes, colors, and textures are provided in Medium Weight as it is the optimum classification for decreased load weight, cost, and labor cost in this region.

2.17 MORTAR AND GROUT MIXES

2.17 C. 1 through 5 is much more complicated than it needs to be for Southern California:

1. Below grade or in contact with earth: MasterSpec: Type M; ASTM C270, Table X1.1 recommends Type S.
Use the mortar type needed for all structural elements in the building, either Type S or Type M.
2. Reinforced masonry: MasterSpec: M, S, or N.
Use the mortar type needed for all structural elements in the building, either Type S or Type M. In Southern California, all masonry walls are reinforced. Type N not allowed for structural elements.
3. Parge coats: n/a to cmu spec.
4. Exterior, above-grade; interior, default mortar: MasterSpec: Type N.
As Type N is not allowed for structural elements, use Type S as the default to avoid multiple mortar types on a project in a region where Type S is typical to preclude inadvertent use of Type N in a structural element.
5. Interior non-loadbearing partitions: MasterSpec: Type N or Type O.
See 4. above.

Recommendations:

Default mortar to Type S. Defer to structural specification; indicate Type M only if required by structural design.

Use Table 2 (unit strength method of verification) *when the design value, f'_m is 1500 net psi*; the corresponding cmu strength is then 1900 net psi.

Use prism test method for design values, f'_m of 2000 net psi and above. Do not specify cmu strength.

Use MasterSpec Article 2.2 PERFORMANCE REQUIREMENTS, and delete 2.4 CONCRETE MASONRY UNITS, E. CMUs: ASTM C 90, 1. Unit Compressive Strength. Use 2.4 E. 2. Density Classification as a default only.

Commentary to AIA MasterSpec 042000 for informational purposes. For questions or comments, please contact your Angelus Block Co., Inc. representative.