



# CONTRACTOR'S ALERT – 2020.1

## HOW TO APPLY THE UNIT STRENGTH TABLE



One of the quality assurance requirements for masonry construction is verification of the compressive strength to assure that the installed product conforms to the design. The International Building Code (IBC) and California Building Code (CBC) both defer to TMS 602 for the procedure to verify compliance.

**2105.1 General.** A quality assurance program shall be used to ensure that the constructed masonry is in compliance with the approved construction documents.

The quality assurance program shall comply with the inspection and testing requirements of Chapter 17 and TMS 602.

The TMS 602 Quality Assurance (QA) provisions are divided into three categories. QA Level 1 includes veneer, glass block and partition walls and these generally do not require compressive strength verification. QA Levels 2 and 3 require at least preconstruction compressive strength verification. One method to verify compressive strength of masonry is to construct and test masonry prism specimens and the other is to use the conservative Unit Strength Table contained in TMS 602. This Contractor Alert is focused on the correct interpretation and use of the Unit Strength Table.

The Unit Strength Table is based on three individual components used in a hollow unit concrete masonry assembly: the concrete masonry units, mortar and grout. Since any deformed reinforcement or joint reinforcement is not considered in compressive strength determination, the steel is not considered.

TMS 602-16, Table 2 – Compressive strength of masonry based on the compressive strength of concrete masonry units and type of mortar used in construction		
Column 1	Column 2	Column 3
Net area compressive strength of concrete masonry, psi (MPa) <sup>1</sup>	Net area compressive strength of ASTM C90 concrete masonry units, psi (MPa)	
	Type M or S Mortar	Type N Mortar
1,750 (12.07)	---	2,000 (13.79)
2,000 (13.79)	2,000 (13.79)	2,650 (18.27)
2,250 (15.51)	2,600 (17.93)	3,400 (23.44)
2,500 (17.25)	3,250 (22.41)	4,350 (28.96)
2,750 (18.96)	3,900 (26.89)	---
3,000 (20.69)	4,500 (31.03)	---

<sup>1</sup> For units of less than 4 in. (102 mm) nominal height, use 85 percent of the values listed

The Unit Strength table contains three columns. The first column lists various strengths which are predetermined by the designer.

There are two important things to remember when using the Unit Strength Table.

- The table does not contain any property (minimum compressive strength) requirements. Mortar that complies with ASTM C270 property or proportion is satisfactory
- The grout strength must be at least equal to the design value listed in column 1

Two examples are provided to explain how the tables are applied from a contractor's perspective.

**Example 1:** The designer has specified a required system strength (Column 1) of 2,000 psi using Type N mortar. Column 3 requires masonry units that are at least 2,650 psi.

The units are tested at 2,820 psi and Type N mortar (Column 3) conforming to the proportion requirements of ASTM C270 (no mortar testing required) is provided. Since 2,820 psi exceeds the required 2,650 psi, the system strength is verified.

**Example 2:** The designer has specified a required system strength (Column 1) of 2,500 psi using Type S mortar. Column 2 requires masonry units that are at least 3,250 psi.

The units are tested at 3,780 psi and Type S mortar (Column 2) conforming to the proportion requirements of ASTM C270 (no mortar testing required) is provided. Since 3,780 psi exceeds the required 3,250 psi, the system strength is verified.

**Note:** Using the Unit Strength Table is a conservative approach. Using the Prism Test method with same materials cited in the above examples will verify a system strength greater than the values shown in the table. Normally, Prism testing is used when masonry design values are 2,500 psi and greater.

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