SE INSIGHTS
FOR MASONRY DESIGN

Guidelines for specifying Concrete Masonry with F'_m = 2500 psi

INTRODUCTION

Specifying the compressive strength of masonry (f'm) for concrete masonry assemblies requires careful consideration of multiple factors beyond merely indicating a target value. According to the TMS 602 code, achieving the specified f'm involves defining the strength of the concrete masonry units (CMUs), selecting the appropriate mortar type, and specifying the grout strength. This article outlines the key requirements for specifying concrete masonry with a compressive strength of 2500 psi using the Unit Strength Method.

According to the masonry code, **TMS 602 Specification for Masonry Structures** (formerly MSJC), designers can use the Unit Strength Method for determining masonry design strength, F'm. The two components needed to use the Unit Strength Method are block strength and mortar type as shown below in Table 1. A particular F'm can be achieved by either: 1) Using higher strength blocks with lower strength mortar, or 2) Using lower strength blocks with higher strength mortar. Therefore, simply stating a minimum F'm on construction documents does not indicate to contractors what block or mortar should be used. Also, by only specifying F'm, the required strength of grout is left unknown.

F'_m Net area compressive strength of concrete masonry	Type S Mortar	Type N Mortar
	f'cmu Net area compressive strength of ASTM C90 CMU	
1,750 psi	---	2,000 psi
2,000 psi	2,000 psi	2,650 psi
2,250 psi	2,600 psi	3,400 psi
2,500 psi	**3,250 psi**	4,350 psi
2,750 psi	3,900 psi	----
3,000 psi	4,500 psi	----

Table 1. Unit Strength Method Table (TMS 602 Table 2)

See the Block Strength Map for block strength data.

According to the Masonry Materials article, accurately determining the compressive strength of masonry (f'm) requires consideration of three critical components: (1) the specified strength of the concrete masonry units (CMU), (2) the type of mortar used, and (3) the compressive strength of the grout. Based on ASTM C90 testing standards, CMUs typically exhibit a compressive strength of 3,250 psi or greater. Additionally, Type S mortar is the most commonly specified for structural masonry walls due to its superior strength and bonding characteristics, making it ideal for load-bearing walls, exterior walls, and other critical structural

elements. The compressive strength of grout (f'g) must be equal to or greater than the specified masonry compressive strength (F'm), but it should not fall below 2,000 psi, as outlined in masonry codes. Using the Unit Strength Method, the resulting F'm will be 2500; see Table 1. The following is an example of how to specify masonry material strengths in General Notes or Specifications.

MATERIAL NOTES FOR MASONRY - EXAMPLES

MATERIAL NOTES FOR MASONRY	REQUIRED STRENGTH
CMU, ASTM C 90	f'cmu = 3250 PSI (MINIMUM) (NET AREA COMPRESSIVE STRENGTH)
MORTAR, ASTM C-270	TYPE S
GROUT, ASTM C-476	f'g = 2500 PSI (MINIMUM)
MASONRY ASSEMBLY	**F'm = 2500 PSI** **(NET AREA COMPRESSIVE STRENGTH)**

2500 PSI EXAMPLE - TYPICAL MATERIALS - RECOMMENDED

MATERIAL NOTES FOR MASONRY	REQUIRED STRENGTH
CMU, ASTM C 90	f'cmu = 2000 PSI (MINIMUM) (NET AREA COMPRESSIVE STRENGTH)
MORTAR, ASTM C-270	TYPE S
GROUT, ASTM C-476	f'g = 2000 PSI (MINIMUM)
MASONRY ASSEMBLY	**F'm = 2000 PSI** **(NET AREA COMPRESSIVE STRENGTH)**

2000 PSI EXAMPLE

MATERIAL NOTES FOR MASONRY	REQUIRED STRENGTH
CMU, ASTM C 90	f'cmu = 4500 PSI (MINIMUM) (NET AREA COMPRESSIVE STRENGTH)
MORTAR, ASTM C-270	TYPE S
GROUT, ASTM C-476	f'g = 3000 PSI (MINIMUM)
MASONRY ASSEMBLY	**F'm = 3000 PSI** **(NET AREA COMPRESSIVE STRENGTH)**

3000 PSI EXAMPLE

CONCLUSION:

Specifying concrete masonry with a design compressive strength of 2500 psi involves defining the characteristics of the masonry units, selecting the appropriate mortar type, and specifying grout strength in accordance with TMS 602 guidelines. Providing these details ensures that the masonry assembly meets the structural requirements while facilitating proper material selection and construction practices.

REFERENCES

TMS 602, "Specification for Masonry Structures"

ASTM C90, "Standard Specification for Loadbearing Concrete Masonry Units" ASTM C270, "Standard Specification for Mortar for Unit Masonry"

ASTM C476, "Standard Specification for Grout for Masonry"

