

Quality Assurance of Mortar Understanding ASTM C 270 Standard Specification for Mortar for Unit Masonry

Field testing of mortar is typically included in project specifications to measure quality control of the project. Typical project specifications reference ASTM C 780 and C 270 when testing mortar.

As you read ASTM C 270, you understand it calls for mortar to be specified one of two ways:

- ▶ Proportion specifications allow the user to choose proportions without mortar testing if all materials meet required specifications.
- ▶ The property specification limits the user and requires lab testing on the mortar. The mortar mixture proportions are converted to a specific volume (volumetric) for use in the field.

If one were to consider the mortar strengths specified in C 270, they must read and understand that the section entitled "Specification Limitations" which includes the following statements:

- C 270 *is not* a specification to determine mortar strengths through field testing.
- The compressive strengths values resulting from field tested mortars do not represent the compressive strengths of mortar as tested in neither the laboratory nor that of the mortar in the wall. Physical properties of field sampled mortar shall not be used to determine the acceptance or rejection of the mortar.
- The required properties of the mortar in Table 2 are for laboratory prepared mortar mixed with a quantity of water to produce a flow of 110 +/- 5%. This quantity of water is not sufficient to produce a mortar with a workable consistency suitable for laying masonry units in the field. Mortar for use in the field must be mixed with the maximum amount of water to satisfy the initial rate of absorption (suction) of the masonry units...The properties of field prepared mortar mixed with the greater quantity of water, prior to being placed in contact with the masonry units, will differ from the property requirements in Table 2. Therefore, the property requirements in Table 2 cannot be used as requirements for quality control of field prepared mortar.

ASTM C 270 Table 2 Property Specification Requirements

Mortar	Type	Average Compressive Strength at 28 days, min. psi	Water Retention, min. %	Air Content, max. %	Aggregate Ratio (Measured in Damp, Loose conditions)
Masonry Cement	M	2500	75	18	Not less than 2 ¼ and not more than 3 ½ the sum of the separate volumes of cementitious materials
	S	1800	75	18	
	N	750	75	20	
	O	350	75	20	
Mortar Cement	M	2500	75	12	
	S	1800	75	12	
	N	750	75	14	
	O	350	75	14	
Cement - Lime	M	2500	75	12	
	S	1800	75	12	
	N	750	75	14	
	O	350	75	14	

Therefore, since less water is likely used for mortar prepared and tested for compressive strength under laboratory conditions than the amount of water used in the preparation of field mortars, the strength specifications of C 270 should not be applied to field prepared mortars for acceptance. It is a common mistake of independent testing laboratories to cast strength specimens with field prepared mortars and try to apply the strength specifications of C 270. ASTM C 270 was developed as a means for laboratory evaluation of mortar components and the strength specifications were never intended to be applied to field prepared mortars in accordance with C 270. Due to field conditions, water contents of the field prepared mortar will inherently vary on projects where quality practices are being followed to promote good workability of the mortar and sound construction of the structure.

It is recommended that the owner, contractor, and testing laboratory meet to discuss proper procedures for testing mortar as outlined by ASTM C 1586 and C 780. By simply following proper procedures and requirements, your next masonry project can proceed much smoother.

By Chris Britt and Joe Diedrich (CEMEX, Inc)

References:

ASTM C 270 Specifications for Mortar for Unit Masonry

ASTM C 780 Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

ASTM C 1586 Standard Guide for Quality Assurance of Mortars

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