

CONCRETE MASONRY UNIT (CMU) BLOCK SAMPLING AND TESTING

Sampling and testing of CMU block is not always required, however, when it is there is often confusion as to how much material should be sampled and how long the testing will take.

Typically, when sampling and testing of CMU block is required by the project plans and specifications, the sampling and testing is performed per the requirements of ASTM C90 which references ASTM C140 and C426.

Sampling

ASTM C90 requires that the purchaser or authorized representative be accorded proper facilities to inspect and sample the units at the place of manufacture from the lots ready for delivery. In addition, ASTM C90 states that materials shall be sampled and tested in accordance with ASTM C140.

ASTM C140 and C426 outline the following in regards to sampling:

- Full-size CMU shall be selected by the purchaser or authorized representative
- The selected specimens shall be of similar configuration and dimension
- Specimens shall be representative of the whole lot (a "lot" is defined below) of units from which they are selected

The term "lot" refers to any number of CMU of any configuration or dimension manufactured by the producer using the same materials, concrete mix design, manufacturing process, and curing method. As only the manufacturer knows this information, it is the manufacturer's responsibility to state whether or not all material is from the same lot. If the manufacturer is unable to state this then each size and type of CMU should be sampled. The table below presents how many units should be sampled depending on lot size or unit quantities.

Sampling Requirements Per Lot or Size/Type When Lot Cannot be Verified					
Lot Size/Unit Quantities	Area Determination	Compressive Strength	Absorption, Weight Class, Dimensions	Linear Shrinkage	Total Units
10,000 units or fraction thereof	1 unit	3 units	3 units	3 units	10
More than 10,000 and less than 100,000 units	2 units	6 units	6 units	6 units	20
For every 50,000 units over 100,000 or fraction thereof	1 unit	3 units	3 units	3 units	10

In the event that not all physical requirements need to be verified, the number of units sampled can be reduced accordingly. For instance, if linear shrinkage testing is not required and there are fewer than 10,000 units to the lot, three fewer samples can be taken and therefore only seven samples are required for testing.

Testing

ASTM C90 specifies the physical requirements for loadbearing concrete masonry units. Specifically, the following physical requirements are presented:

- Minimum thickness of face shells and webs
- Minimum net area compressive strength
- Maximum water absorption
- Weight classification requirements
- Maximum amount of linear shrinkage

The specifics of how to perform the above testing are provided in ASTM C140 and C426. Generally speaking, the material is required to be completely submerged in water and then dried using ovens. The quantity of material received and availability of oven space will affect how quickly testing can be completed, however some guidelines for testing turnaround time are presented below:

Approximate Test Turnaround Times		
Test	Turnaround Time	Comments
Area Determination	4 days	Units must be saturated for minimum of 24 hrs and then oven-dried for a minimum of 24 hrs or until loss of moisture weight is less than 0.2%
Compressive Strength	4 days	Area of units must be determined prior to testing
Absorption, Weight Class, Dimensions	4 days	Units must be saturated for minimum of 24 hrs and then oven-dried for a minimum of 24 hrs or until loss of moisture weight is less than 0.2%
Linear Shrinkage	21 days	Samples must be prepared, submerged in water for a minimum of 48 hrs, initially oven-dried for 5 days, subsequently oven-dried in 48 hr increments for a minimum of 6 days until length change is less than 0.002% or less over 6 days of drying and average weight loss over 48 hrs of drying is 0.2% or less

In order for sufficient time to complete all testing and to take into account limitations in oven space, we recommend that 45-days be allowed for completion of all testing

PLEASE NOTE: The requirements for your project, based on the plans and specifications or the applicable building code may require a different testing protocol. Twining strongly suggests that you verify the above sampling and testing requirements. We will not be responsible for any damages or delays caused by utilization of this information.