

## Basics in Grout Design

As members of ASTM C-12 committee on mortars and grouts we have been interested in some misconceptions regarding the function, design, and placement of masonry core fill grout. First of all grout is not simply 2,500 psi concrete, nor is it just high strength mortar. ASTM C- 476 states that grout is constituted of cement, sand, and pea stone. Fly Ash and Slag cements may be used as a cement replacement, (both are pozzalonic). The use of air entraining agents is strictly forbidden at this time, the fear being the reduction in bond between the rebar and grout mixture. Lime may be used if less than 1/10 part of the cementitious material. Water reducing admixtures are not encouraged and can only be used with the written consent of the architect or structural engineer, the fear being an increase in shrinkage from the masonry units and rebar. This is why grout needs to be re-constituted or vibrated after placing.

The function of grout is to add rigidity to the wall, to increase the overall flexural capacity, and to carry the moment of inertia to the footing. Grout may be placed using two methods, low lift and high lift. Either method chosen by the contractor is acceptable, and depends on job site conditions. Typically low lift grouting is done in 4' heights, and is done as the wall is erected. High lift may be done in 24' heights and is usually pumped daily. When either method is chosen the proper technique is to leave the grout 1-1/2" to 2" below the top of the block of the last course, creating a key way in order "lock" the grouting lifts together at their cold joints. The sloughing or filling each course of block is not recommended due the high number cold joints. Additionally the use of high strength mortar should not be considered as acceptable for two reasons; first ASTM C-270 clearly states that a mortar of a higher strength shall not be substituted when a weaker mortar is specified. Higher strength mortars affect the overall performance of a masonry wall assemblage, increasing shrinkage cracking between units and not allowing for proper thermal movement of the wall. The second reason is the possible higher entrained air content and the increase in shrinkage of the mortar after the initial water loss due to the absorption of the masonry unit.