DISCUSSION

"Quality Control of Mortars: Cubes vs. Cylinders" - S. Schmidt, M. L. Brown, and R. D. Tate

Question (J. H. Matthys, University of Texas at Arlington):

The paper mentions in the curing process submerging all specimens (cubes and cylinders) for all mortar types in lime-saturated water for approximately 21 to 27 days. ASTM C-780-87 and ASTM C-1142 (Ready Mix Mortar) only stipulate moist room curing. In my experience lime saturated water curing is not typically used in addressing either C-780 or C-270 test requirements. Thus I would suppose that the 0.85 relationship of cylinders to cubes mentioned in C-780 is based on non-lime cured specimens. Do you think that saturated lime water curing could potentially give a different relationship for cylinders to cubes as compared to normal moist curing?

You presented data on two ready mix mortars: (1) ready mixed portland cement lime mortar, and (2) ready mixed masonry cement mortar. There are several manufacturers of ready mix mortar additives. Was the same manufacturer's additive used in both mixes reported? What was the design life of these ready mix mortars - i.e., 24 hour mortar, 36 hour mortar, etc.?

Previous work conducted on ready mix mortars by Matthys, etc. (ASTM STP 992), indicated potentially significant changes in ready mix mortar properties depending on when specimens were constructed with respect to initial mortar mixing, i.e., suspension time of mortar. A suspension time of zero would mean the specimens were made immediately after initial mortar mixing. A suspension time of 12 hours would mean the specimens were made 12 hours after initial mixing. For the data in your paper what was the suspension time for the ready mix mortar? Do you have or know of any data with respect to cubes versus cylinders for various suspension times of ready mix mortars?

Closure (M. L. Brown):

It is interesting that virtually the same relationship was determined between cylinders and cubes for ASTM C-780 using moist-cured specimens as indicated by Dr. Matthys and this study using lime-water submerged specimens (0.85 and 0.83, respectively). This seems to indicate that no difference in strength development should be expected between lime-water submerged and moist-cured specimens.

Since it is difficult and expensive for producers and users of products such as mortar and concrete to maintain a moist cure room for everyday quality control, it is important to know how these mortars perform when cured in lime-water baths, which would be easier and more economical.

The ready mix mortar additive used for the masonry cement mortar was different from the additive used for the portland cement/lime mortar. Both additives were produced by the same manufacturer. The additive used for the portland cement/lime mortar mixture contained a retarder and air entraining agent, whereas the masonry cement mortar additive contained only a retarding agent (the masonry cement already contained an air-entraining agent). Both the ready mixed masonry cement and the portland cement/lime mortars were designed to have 36 hour working times.

All of the cube and cylinder specimens were molded immediately after mixing. Only a limited amount of data has been published investigating the influence of delayed molding of ready mix mortar specimens on the relationship between cylinder and cube strengths (Matthys, ASTM STP 992). However, specimens have been molded in the past at various time delays by jobsite quality control inspectors and testing laboratories. The outcome of such samplings has not been made available to the authors of this study for comment or comparison.