

EDITORIAL

Is it Time to Re-Think the C-1 and C-9 Organization of Standards Committees Related to the Paste Fraction of Concrete?

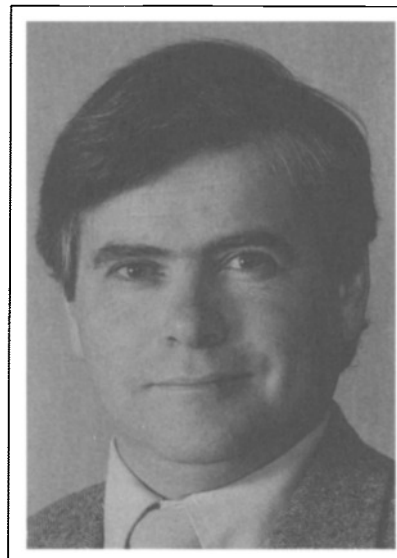
By the time this issue is printed, the Canadian Standards Association (CSA) committees for Portland Cement (A5), Blended Cement (A362), and Supplementary Cementing Materials (A23.5) will have held a joint meeting in St. Johns, Newfoundland to discuss the possibility of their amalgamation. As I write this, I have no idea of the outcome of this meeting, but I sense there now is strong support for such a move, whereas a few years ago, it would have been declared heresy. But enough talk of standards from the Great White North; I think this is a concept that should be discussed by both the ASTM C-1 and C-9 committees. I tried to stir the pot a bit with this idea in the hallways at last December's committee week. (What else was there to do at the Dallas airport?)

The rationale for change is that the composition of hydraulic cement concrete has changed over the last several decades. The matrix of most concretes is no longer composed solely of portland cement and water. While I am not aware of any recent surveys, my informal enquiries have indicated that approximately 50 to 60% of concretes in the United States contain fly ash, ground granulated blast furnace slag, silica fume, or natural pozzolan. (In Canada, this value is likely greater than 70%.) Furthermore, it is likely that 70 to 80% of all concrete in the United States contains one or more chemical admixtures.

So what's the problem with the existing committee structures?

The problems are not as immediately apparent with standards for portland cements (ASTM C 150^a) and blended cements (ASTM C 595 and C 1157^b) which are governed by Committee C-1. However, the mineral admixtures specifications are under Committee C-9 jurisdiction: C 618, Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete; C 989, Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars; and C 1240, Silica Fume for Use in Hydraulic Cement Concrete and Mortar. The constant problem faced by these standards committees are how to develop performance tests for mineral admixtures that are only used as partial replacements for portland cement, that is, the portland cement fraction of paste and mortar tests is out of their jurisdiction.

Since, in the majority of cases, the matrix of concrete is composed of not just one of these materials, all of these standards (including those for chemical admixtures) run into problems when individual performance standards are being considered. For example, what's the use of a performance test for a false set of portland cement alone when the fly ash and water-



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reducing admixtures added at the ready-mix plant will influence the false setting tendencies of the concrete? What I am trying to say (somewhat clumsily) is that the current standards for the individual constituent materials are not meeting the needs of the concrete industry. These standards were originally designed as manufacturing standards for the various materials, and they continue to serve that purpose. But in a world of more complex concrete mixtures, these manufacturing standards have become more remote from the user's need for system performance.

The current trend away from prescriptive tests towards performance tests in manufacturing standards for these materials, which are only constituents of a final product (concrete, for those of you who are lost), is a mistake. The performance tests on individual materials are of limited use in the final product and they complicate the compliance for the manufacturers. It's faster and cheaper for a cement producer to comply with a C₃A limit for sulfate resistance than it is to cast either C 452 or C 1012^c mortar bars and wait for them to expand.

So why don't we leave the manufacturing standards alone, and form a new set of performance standards that evaluate the properties of the total constituents of the concrete matrix? (that is, the paste fraction.)

To accomplish this, the mineral and chemical admixture subcommittees would have to move from C-9 to C-1. As well, C-1 would have to undergo some changes and expand its scope to cover these new additions.

While there are many details that need to be addressed, the concept would be to develop standards that better meet the needs of the users of the final product, even if it requires the breaking down of historic barriers.

There will be those who say, "Why not go a step further and only test concretes?" While we are concerned about concrete performance, testing concretes adds cost, involves larger volumes of materials, and introduces another set of variables. Can you imagine having to pay for and use graded standard coarse aggregates from Ottawa, Illinois? Therefore, testing the paste fraction or a standard mortar including the paste fraction still makes sense, but we need to have standards that test the entire paste fraction.

^aC 150—Specification for Portland Cement.

^bC 595—Specification for Blended Hydraulic Cements.

^cC 1157—Standard Performance Specification for Blended Hydraulic Cement.

C 595—Specification for Blended Hydraulic Cements.

C 452—Test Method for Potential Expansion of Portland Cement Mortars Exposed to Sulfate.

C 1012—Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.

This would allow more relevant tests for the fresh state (for example, setting times); the hardened state (for example, strength development, soundness, heat of hydration, shrinkage); durability (for example, sulfate resistance, alkali-aggregate attack, chlorine binding potential (which is not currently being addressed)).

It may be that there are drawbacks to my suggested approach. I would encourage discussion in time for the next issue. (I have

made my glass house. Let's see who will throw stones.) But I think we need to address some of the shortcomings in our current standards in order to stay competitive. Who knows, perhaps C-1 and C-9 can use this concept to revolutionize cement and concrete standards around the world.

—R. D. Hooton, *Editor-in-Chief*