

C – 24: Superplasticizers

High range water-reducing (HRWR) admixtures, commonly called superplasticizers, are manufactured in both normal set and retarding formulations. Although they are definitely not "magic potions", when used properly these admixtures can impart tremendous increases in workability (generally measured in terms of slump) while decreasing or at least maintaining the reference water-cement ratio.

As with most products that have survived and prospered in the marketplace, HRWR admixtures have improved in performance since their introduction to North America some (30) years ago. As compared to the first generation products, the second and third generation formulations have improved "pot life" (slump maintenance) and strengths. It is not uncommon to see water reductions of 35% to 40% when compared to reference concrete and compressive strengths of 100 MPa and higher. In fact, when compressive strengths of 40 MPa and higher are desired, it is generally advisable to use a HRWR admixture alone or in combination with a normal set, retarding or accelerating admixture depending on job requirements.


HRWR admixtures' performance is greatly enhanced when added at the end of the charging cycle after the cement has been "wetted". In fact, delayed additions of 5, 10, 15 and even 30 minutes after the cement first comes into contact with water allows for even better water reduction and higher ultimate strengths. A practical example of this would be where a partial dose of HRWR admixture is added on the back end of the

load at a ready-mix plant and a further addition is made at the job-site.

Increased strengths (compressive, flexural and tensile bond) and reduced permeability are two of the foremost benefits of HRWR admixtures. One example of a real-life contractor benefit is derived from the improved cohesiveness of a properly proportioned concrete mix incorporating a HRWR admixture. Most specifiers have recognized this fact and allow lift heights to be increased to 2.1 meters and the free fall of concrete to as much as 4.6 meters in wall placements. These benefits translate into substantial dollar savings for the contractor.

As consultants to ready-mix and precast producers, we need to understand the capabilities and limitations of the particular HRWR admixtures used in our market. By understanding how they impact the overall performance of the mix, and in particular how well a particular HRWR admixture reacts with our cement, we are in the best position to offer value to our customer.

Whether these products are used to make flowing concrete (defined by ASTM as slumps of 190 mm or more) to facilitate placement or to dramatically reduce the w/c in order to achieve high early strengths in a precast operation, they play an important role in expanding the designer's horizons, the contractor's ease of placement and the owner's flexibility.

For more information on superplasticizer admixtures visit www.aximconcrete.com 

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