CONCRETE CHATS

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Supplementary Cementitious Materials

Supplementary Cementitious Materials (SCMs) are used to replace a portion of the Portland cement in a concrete mixture to improve properties of fresh and hardened concrete. They can also help make concrete mixtures more cost effective. In fresh concrete SCMs can help lower the heat of hydration which reduces the risk of thermal cracking during concrete setting. This also lengthens the set time, allowing a longer period for finishing operations. In hardened concrete, SCMs contribute to increased strength gain, reduced permeability, and increased resistance to sulfate attack as well as other adverse chemical reactions. Since SCMs are most often pozzolanic materials, they react with the Calcium Hydroxide (CH) byproduct of cement hydration to form additional calcium silicate hydrate (CSH) which is the other byproduct of hydration and the primary binding agent. It's the additional CSH gel that provides increased longer-term strength gain as well as the reduction in permeability. Commonly used SCMs are listed below.

Fly Ash: Fly Ash is a byproduct of coal burning power plants and is categorized as Type C or Type F depending on the kind of coal used at the plants. Type C has some hydraulic reactivity in addition to the pozzolanic reactivity mentioned above. Type F does not have hydraulic reactivity. Portland cement replacement values up to 25% are not uncommon and higher values can sometimes be used.

Slag: Ground Granulated Blast Furnace Slag is a byproduct of iron production. Slag has both hydraulic and pozzolanic reactivity and frequently offers higher Portland cement replacement values than fly ash. On the installation side, challenges with workability of concrete mixtures with high slag content have been observed.

Silica Fume: Silica Fume is a byproduct of silicon alloy production. It is much finer than other SCMs and special care is required for dust control and proper handling. Silica fume can also pose workability challenges. It is frequently used in Mass Concrete mixtures for increased strength, increased impermeability and control of the heat of hydration.

Other SCMs including natural pozzolans, calcined clays, harvested fly ash, and ground glass among others, are available in various markets. As many of these require additional processing before being used in concrete widespread use has been limited due to cost. However, recent years have seen renewed interest in using these materials as SCMs as the supply of Fly Ash, Slag, and Silica Fume has been adversely impacted from the closing of coal fired power plants and other types of manufacturing facilities.

QuicTip Products - BoMetals Inc. products are suitable for use in all concrete mixtures regardless of the cement type. For additional information contact-us.

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