

A Study on the Influence of Internal Sulfate on the Properties of Self-Compacting Concrete

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Abstract : The internal sulfate attack is considered as a very important problem of concrete manufacture in Iraq and Middle East countries. Sulfate drastically influences the properties of concrete. This experimental study is aimed at investigating the effect of internal sulfates on fresh and some of the hardened properties of self compacting concrete (SCC) made from locally available materials. Tests were conducted on five mixes, with five SO₃ levels (3.9, 5, 6, 7 and 8) (% by wt. of cement). The last four SO₃ levels are outside the limits of the Iraqi specifications (IQS NO.45/1984). The results indicated that sulfate passively influenced the fresh properties such as decreased workability, and effect on hardened properties of the self compacting concrete. Also, the result indicated the optimum SO₃ content which gives maximum strength and little tendency to expanding, which showed up at a content equal to 5% (by wt of cement), is more than acceptable limits of Iraqi specifications. Further increase in sulfates content in concrete after this optimum value showed a considerable reduction in mechanical properties of self-compacting concrete, and increment in expansion of concrete. The percentages of reduction in compressive strength, splitting tensile strength, flexural strength, static modulus of elasticity and ultrasonic pulse velocity at their later age were ranged between 10.89-36.14%, 12.90-33.33%, 7.98-36.35%, 16.36 -38.37% and 1.03-10.88% respectively.

Keywords : self-compacting concrete, sulfate attack, internal sulfate attack, fresh properties, harden properties, optimum SO₃ content

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