

Mechanical Strengths of Self-Compacting Mortars Prepared with the Pozzolanic Cement in Aggressive Environments

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Abstract : The objective of this research is to study the physical and mechanical properties and durability of self-compacting mortars prepared by substituting a part of cement up to a percentage of 30% pozzolan according to different Blaine specific surface area ($SSB_1=7000 \text{ cm}^2/\text{g}$ and $SSB=9000 \text{ cm}^2/\text{g}$). Order to evaluate durability, mortars were subjected to chemical attacks in various aggressive environments, a solution of a mixture of nitric acid and ammonium nitrate ($\text{HNO}_3 + \text{NH}_4\text{NO}_3$) and a magnesium sulfate salt solution (MgSO_4) with a concentration of 10%, for a period of one month. This study is complemented by a comparative study of the durability of mortars elaborated with sulphate resistant cement (SRC). The results show that these mortars develop long-term, mechanical and chemical resistance better than mortars based Portland cement with 5% gypsum (CEM 1) and SRC. We found that the mass losses are lowest in mortars elaborated with pozzolanic cement (30% substitution with SSB_2) in both of chemical attack solutions (3.28% in the solution acid and 1.16% in the salt solution) and the compressive strength gains of 14.68% and 8.5% respectively in the two media. This is due to the action of pozzolan which fixes portlandite to form hydrated calcium silicate (CSH) from the hydration of tricalcic silicate (C_3S).

Keywords : aggressive environments, durability, mechanical strengths, pozzolanic cement, self-compacting mortar

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