

Performance of plain and blended cements exposed to high sulphate concentrations

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Abstract: The sulphate resistance of plain (ASTM C150 Type I and Type V) cements and cements blended with silica fume, fly ash, blast furnace slag or Superpozz, a new generation of supplementary cementing materials, exposed to sodium sulphate solutions was evaluated in this study. Cement mortar specimens were exposed to sulphate concentrations of up to 25 000 ppm. The sulphate resistance of the selected cements was evaluated by visual examination and measuring expansion and reduction in the compressive strength. Morphological changes in cements, due to sulphate exposure, were evaluated by scanning electron microscopy. The mineralogical changes in cements exposed to a solution with 15 000 ppm sulphate were evaluated. Cracks were noted in Type I and silica fume cement mortar specimens exposed to a sulphate concentration of 15 000 ppm or more. In Type V cement, the sulphate tolerance was 25 000 ppm. Cracks were not noted in the blast furnace slag, fly ash, and Superpozz cement mortar specimens exposed to 25 000 ppm sulphate solution. It is suggested to use Type V cement or Type I cement blended with fly ash, blast furnace slag or Superpozz in sulphate-bearing environments.