

Performance of plain and blended cements exposed to varying concentrations of sodium sulphate

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Abstract: This study was conducted to evaluate the performance of plain and blended cements exposed to varying concentrations of sodium sulphate for up to 24 months. Four types of cements, namely Type I, Type V, Type I with silica fume, and Type I with fly ash, were evaluated. Cement mortar specimens were exposed to six sulphate concentrations, namely 0, 1, 1.5, 2, 2.5 and 4%. The sulphate attack was evaluated by visual inspection and change in length. The results indicated that the intensity of sulphate attack is a function of (a) cement type; (b) sulphate concentration, and (c) exposure period. Expansive cracking was the main mode of failure of mortar specimens exposed to sodium sulphate solution. Among plain and blended cements, sulphate resistance of Type I cement mortar specimens was very low, even at low concentration of sodium sulphate. Type V, Type I blended with silica fume, and Type I blended with fly ash cements performed better than Type I cement. Among the blended cements, the sulphate resistance of fly ash cement mortar specimens was better than that of silica fume cement mortar specimens. This can be attributed to the reduction in Ca(OH)_2 and C3A due to a higher replacement (20%) of cement, which are essential for the formation of the secondary ettringite.