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The Impact of Alumina Cement on Properties of Portland Cement Slurries and Mortars

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Abstract : The addition of a small amount of alumina cement to Portland cement results in immediate setting, a rapid increase in the compressive strength and a clear increase of the adhesion to concrete substrate. This phenomenon is used, among others, for the production of liquid floor self-levelling compounds. Alumina cement is several times more expensive than Portland cement and is a component having a significant impact on prices of products manufactured with its use. For the production of liquid floor self-levelling compounds, low-alumina cement containing approximately 40% Al₂O₃is normally used. The aim of the study was to determine the impact of Portland cement with the addition of alumina cement on the basic physical and mechanical properties of cement slurries and mortars. CEM I 42.5R and three types of alumina cement containing 40%, 50% and 70% of Al₂O₃ were used for the tests. Mixes containing 4%, 6%, 8%, 10% and 12% of different varieties of alumina cement were prepared; for which, the time of initial and final setting, compressive and flexural strength and adhesion to concrete substrate were determined. The analysis of the obtained test results showed that a similar immediate setting effect and clearly better adhesion strength can be obtained using the addition of 6% of high-alumina cement than 12% of low-alumina cement. As the prices of these cements are similar, this can give significant financial savings in the production of liquid floor self-levelling compounds.

Keywords : alumina cement, immediate setting, compression strength, adhesion to substrate
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