

## Effect of Pozzolanic Additives on the Strength Development of High Performance Concrete

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**Abstract :** The aim of this research is to estimate effect of pozzolanic substitutes and their combination on the hydration heat and final strength of high performance concrete. Ternary cementitious systems with different ratios of ordinary Portland cement, silica fume and calcined clay were investigated. Local illite clay was calcined at temperature 700oC in rotary furnace for 20 min. It has been well recognized that the use of pozzolanic materials such as silica fume or calcined clay are recommended for high performance concrete for reduction of porosity, increasing density and as a consequence raising the chemical durability of the concrete. It has been found, that silica fume has a superior influence on the strength development of concrete, but calcined clay increase density and decrease size of dominating pores. Additionally it was found that the rates of pozzolanic reaction and calcium hydroxide consumption in the silica fume-blended cement pastes are higher than in the illite clay-blended cement pastes, it strongly depends from the amount of pozzolanic substitutes which are used. If the pozzolanic reaction is dominating then amount of Ca(OH)<sub>2</sub> is decreasing. The identity and the amount of the phases present were determined from the thermal analysis (DTA) data. The hydration temperature of blended cement pastes was measured during the first 24 hours. Fresh and hardened concrete properties were tested. Compressive strength was determined and differential thermal analysis (DTA) was conducted of specimens at the age of 3, 14, 28 and 56 days.

**Keywords :** high performance concrete, pozzolanic additives, silica fume, ternary systems

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