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COMPRESSIVE STRENGTH AND THERMAL CONDUCTIVITY OF WATER AND AIR CURED PORTLAND CEMENT-FLY ASH-SILICA FUME MORTARS

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Abstract

This paper investigated the compressive strength and thermal conductivity of water and air cured Portland cement-fly ash-silica fume mortars. The results showed that density, compressive strength and thermal conductivity of blended cement mortars with fly ash were lower than Portland cement control. However, blended cement mortars that contained silica fume as replacement cement both in binary and ternary phase were higher than fly ash mixes and tends to increase with increase silica fume used as cement replacement due to increased C-S-H phase formation from pozzolanic reaction and its filler effect. In ternary phase, compressive strength and thermal conductivity of 10FA5SF and 5FA10SF mixes had values higher than Portland cement control while 20FA10SF mixes had values similar to Portland cement control. The density, compressive strength and thermal conductivity of blended cement mortars those cured in saturated lime water were higher than air cured specimens. Moreover, relationships between compressive strength and thermal conductivity as well as density and thermal conductivity were compared. X-ray diffraction traces show that intensity of C-S-H phase increased while intensity of $Ca(OH)_2$ decreased with increased silica fume content due to the increased pozzolanic reaction when compared to the reference FA mix.

Key words: cement, compressive strength, fly ash, silica fume, thermal conductivity

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