

CURING TEMPERATURE EFFECTS ON STRENGTH AND DURABILITY OF HIGH-PERFORMANCE CONCRETE

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ABSTRACT

This research was carried out to investigate the effects of curing temperature on strength and durability of high-performance concrete systems. Two different concrete mixtures were proportioned to have the 28-day compressive strength of 86 MPa (12,500 psi). The first mixture (12.5 P) contained 20% Class C fly ash and 5% silica fume and the other mixture (12.5 E) contained 30% Class C and 20% Class F fly ash by total weight of cementitious materials. Two types of curing, standard moist curing and a Variable Temperature Curing Environment (VTCE), were used. For each concrete mixture, compressive strength, chloride-ion penetration resistance, air and water permeabilities, sulfate resistance, and alkali-silica reaction were evaluated. In general, concrete specimens cured in the VTCE produced slightly higher early-age strength than moist-cured specimens. The chloride-ion penetration was rated to be "low" for Mix 12.5 E and "very low" for Mix 12.5 P in accordance with ASTM C 1202 at 56 days. Both mixtures exhibited high resistance to sulfate attack. No alkali-silica reaction occurred in either mixture.