

PROPERTIES OF CAST-CONCRETE PRODUCTS MADE WITH CLEAN-COAL ASH AND BLENDS OF CLEAN-COAL ASH AND CLASS F FLY ASH

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ABSTRACT

Properties of cast-concrete products, blocks, paving stones, and bricks, made with clean-coal ash and blends of clean-coal ash and Class F fly ash, are presented in this paper. Total of fifteen cast-concrete product mixtures consisting of five 8-in. hollow-core block mixtures, five 2-in. solid paving stone mixtures, and five brick mixtures were made. Out of fifteen mixtures, there were three control mixtures, one mixture each for blocks, paving stones, and bricks. Hollow-core blocks, paving stones, and bricks mixtures contained clean-coal ash as a partial replacement of cement (23 to 40% by weight of the total cementitious materials). The two other mixtures for these products also contained Class F fly ash as a partial replacement of fine and coarse aggregates (6 to 8%). The block mixtures were evaluated for compressive strength, absorption, density, and freezing and thawing resistance. Paving stone mixtures were evaluated for compressive strength, absorption, density, freezing and thawing, and abrasion resistance. Brick mixtures were tested for compressive strength, absorption, and density.

Test results indicate that: (1) hollow-core blocks made with up to 45% clean-coal ash and 8% Class F ash satisfied ASTM C 90 requirements; and they can be used for load-bearing structural applications. The percentage weight loss after freezing and thawing testing increased with increase in ash content, and ranged from 0.8 to 6.8%. (2) Paving stone mixtures containing clean-coal ash up to 34% met ASTM C 936 strength requirement of percent weight loss (1%) after freezing and thawing, as well as absorption requirement of 5%; but, did not meet ASTM C 418 abrasion resistance requirement. (3) Bricks made with up to 45% clean-coal ash and 7.5% Class F fly ash met ASTM C 55 requirement, suitable for moderate strength and resistance to freezing and thawing.