Accepted Manuscript

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PII: S0958-9465(18)30224-5

DOI: 10.1016/j.cemconcomp.2017.09.020

Reference: CECO 3008

To appear in: *Cement and Concrete Composites*

Received Date: 30 September 2015

Revised Date: 8 September 2017

Accepted Date: 12 September 2017

Please cite this article as: P. Hlaváček, R. Šulc, V. Šmilauer, C. Rößler, R. Snop, Ternary binder made of CFBC fly ash, conventional fly ash, and calcium hydroxide: Phase and strength evolution, *Cement and Concrete Composites* (2018), doi: 10.1016/j.cemconcomp.2017.09.020.

Ternary binder made of CFBC fly ash, conventional fly ash, and calcium hydroxide: Phase and strength evolution

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Abstract

Coal combustion products present a source of aluminosilicate materials for further utilization. The ternary binder studied here is such an example, consisting of circulating fluidized bed combustion (CFBC) fly ash, conventional fly ash and $Ca(OH)_2$ activator. The paste yields a compressive strength of 32 MPa after 28 days of standard sealed curing. Volumetric evolution of crystalline and amorphous phases during hydration is quantified using XRD analysis, differential thermal gravimetry, porosimetry and electron microscopy. A micromechanical model is applied to interpret the evolution of compressive strength due to the growing proportions of C-S-H and ettringite in the system. This opens the way for further optimization and utilization of this ternary binder.

Keywords: CFBC fly ash, phase evolution, XRD, DTG, mechanical properties, micromechanical simulations

Highlights

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