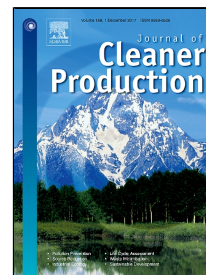


Accepted Manuscript

Green concrete composite incorporating fly ash with high strength and fracture toughness

Grzegorz Ludwik Golewski



PII: S0959-6526(17)32358-2
DOI: 10.1016/j.jclepro.2017.10.065
Reference: JCLP 10857
To appear in: *Journal of Cleaner Production*

Received Date: 04 April 2017
Revised Date: 18 September 2017
Accepted Date: 07 October 2017

Please cite this article as: Grzegorz Ludwik Golewski, Green concrete composite incorporating fly ash with high strength and fracture toughness, *Journal of Cleaner Production* (2017), doi: 10.1016/j.jclepro.2017.10.065

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6345 words

Green concrete composite incorporating fly ash with high strength and fracture toughness

Grzegorz Ludwik Golewski

Faculty of Civil Engineering and Architecture, Department of Structural Engineering, Lublin University of Technology, Nadbystrzycka 40 str., 20-618 Lublin, Poland

Abstract

Nowadays green buildings are a necessary component of securing sustainability, whereas concrete composites with the addition of siliceous fly ash (FA) can certainly be included in the sustainable and green concrete. Effective promotion of green concrete incorporating FA is required in order to minimize the environment threat due to FA waste disposal and reduce cement consumption.

In this paper, effects of FA addition on the compressive strength f_{cm} and fracture toughness of plain concrete are presented. Fracture toughness tests were carried out according to Mode I (tension at bending) following the RILEM Draft Recommendations. The critical values of stress intensity factors, K_{Ic}^S have been determined.

To assess mechanics parameters compressive strength tests and fracture toughness tests were conducted and the results were evaluated comparing with reference concrete. In modified concretes, cement was replaced by FA by its weight. Three test groups were constituted with the replacement percentages as: 0% (FA-00), 20% (FA-20) and 30% (FA-30). During the tests, the effect of age of concretes modified with the additive of FA on analysed parameters was determined. The experiments were carried out after: 3, 7, 28, 90, 180 and 365 days of curing.

Based on the obtained results it can be concluded that, it is possible to make green concrete containing FA with high compressive strength and fracture toughness. The properties of composites with the additive of FA depend on the age of the concrete during tests. 20%

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