

International Conference on Application of Superabsorbent Polymers & Other New Admixtures Towards Smart Concrete

SAP 2019: 3rd International Conference on the Application of Superabsorbent Polymers (SAP) and Other New Admixtures Towards Smart Concrete pp 75-84 | Cite as

Comparative Study of Superabsorbent Polymers and Pre-soaked Pumice as Internal Curing Agents in Rice Husk Ash Based High-Performance Concrete

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Conference paper

First Online: 08 November 2019

Part of the RILEM Bookseries book series (RILEM, volume 24)

Abstract

Utilisation of superabsorbent polymers (SAP) and pre-soaked lightweight aggregates (LWA) as internal curing (IC) agents for the mitigation of autogenous shrinkage and micro-cracking of high strength/high-performance concrete (HSC/HPC) have been well researched and documented in literature. Rice husk ash (RHA) on the other hand has been adjudged to be of good pozzolanic activity and a possible alternative to silica fume (SF) in low water/binder (W/B) concrete production. An experimental comparative study was conducted in the current work to assess the effectiveness of the two known IC-agents on rice husk ash (RHA) based HPC. HPC mixtures of $f_{c,cube28}=60$ MPa minimum target strength produced and internally cured with 0.3% content of SAP by weight of binder (bwob) and varied content of pre-soaked pumice (5 to 10% in steps of 2.5%) by weight of coarse aggregate (bwocg) were cast using 100 mm cubes samples. Thereafter, the samples were cured for 7, 14, 28 and 56 days by water immersion before subjecting them to compressive strength test. The results showed 0.2% bwob SAP HPC (SHPC1) to be the best performed internally cured HPC at the early ages with similar long-term strength values as 5 and 7.5% bwocg saturated pumiced HPC (PHPC1&2). The study thereby recommends SAP content of 0.2% bwob and saturated pumice content up to 7.5% bwocg for use as IC-agent in HPC.

Keywords

Superabsorbent polymers (SAP) Pre-soaked lightweight aggregates (LWA) Rice husk ash (RHA) Compressive strength High-performance concrete (HPC)

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Notes

Acknowledgement

We acknowledge The followings: Covenant University Centre for Research, Innovation and Discovery (CUCRID); Mr. Guillaume Jeanson (Construction Product Manager) SNF Floerger - ZAC de Milieux, 42163 ANDREZIEUX Cedex – FRANCE; the management of Armorsil Manufacturing Incorporation, and Ewekoro Factory of Lafarge Plc Nigeria for the assistance received in materials procurement, use of facilities, softwares and time input in the analysis.

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Cite this paper as:

Olawuyi B.J., Saka R.O., Nduka D.O., Babafemi A.J. (2020) Comparative Study of Superabsorbent Polymers and Pre-soaked Pumice as Internal Curing Agents in Rice Husk Ash Based High-Performance Concrete. In: Boshoff W., Combrinck R., Mechtcherine V., Wyrzykowski M. (eds) 3rd International Conference on the Application of Superabsorbent Polymers (SAP) and Other New Admixtures Towards Smart Concrete. SAP 2019. RILEM Bookseries, vol 24. Springer, Cham

First Online

DOI

https://doi.org/10.1007/978-3-030-33342-3_9

Publisher Name

Springer, Cham

Print ISBN

978-3-030-33341-6

Online ISBN

978-3-030-33342-3

eBook Packages

Springer Nature

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