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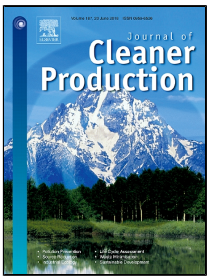

Performance of rendering mortars containing sludge from water treatment plants as fine recycled aggregate

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PII:	S0959-6526(18)31288-5
DOI:	10.1016/j.jclepro.2018.04.246
Reference:	JCLP 12827
To appear in:	*Journal of Cleaner Production*
Received Date:	02 January 2018
Revised Date:	18 April 2018
Accepted Date:	26 April 2018

Please cite this article as: Jairo José de Oliveira Andrade, Matheus Chiaradia Wenzel, Gabriela Holsbach da Rocha, Sérgio Roberto da Silva, Performance of rendering mortars containing sludge from water treatment plants as fine recycled aggregate, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.04.246

Performance of rendering mortars containing sludge from water treatment plants as fine recycled aggregate

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ABSTRACT

The disposal and treatment of certain wastes have been neglected by most industries because of economic factors, and the wastes are disposed of at inappropriate locations. Moreover, the use of finite raw materials and their impact has led to the search for alternative materials that can be reused in the construction industry. The present study investigated the mechanical properties (bond strength, compressive strength, and flexural strength), durability (water absorption), and microstructural analysis of rendering mortars with different levels of replacement (2.5 wt%, 5 wt%, 7.5 wt%, and 10 wt%) of natural sand by water treatment sludge aggregate. The results were statistically analyzed through mathematical models and analysis of variance. It is evident from this study that the inclusion of sludge increases the porosity of the mortars, which influences all the physical and mechanical properties. The bond strength, which is the main property of the rendering mortar, showed satisfactory values (> 0.2 MPa) for mortars with 5% of water treatment sludge, despite having high variability. Furthermore, the microstructural analysis showed the influence of particle characteristics on the performance of the mortars with water treatment sludge. Overall, this study showed that the residue, as a source of fine mortar aggregates, could be considered a feasible and sustainable alternative for use in the construction sector.

Keywords: Sustainability, mortars, water treatment sludge, recycled aggregate, mechanical properties.

1 INTRODUCTION

The production of sludge that originates in water purification processes is increasing worldwide.