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ACOUSTIC STUDIES OF CONCRETES CONTAINING INDUSTRIAL CO-PRODUCTS: NEW EXPERIMENTAL APPROACHES

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ABSTRACT

The present study contributes to knowledge of building acoustics and, particularly, the damping effects of concretes pumpable and self-compacting (produced with two cement types: CEM I 52.5 R y CEM II 42.5 R) that employ two industrial co-products as aggregates. Firstly, electric arc furnace slags (EAFS), from the steel-making industry, in partial substitution of sand and coarse natural aggregates. Secondly, sawdust (sawing of Radiata pinewood), from the lumber industry, was used in 20% of partial substitution of limestone sand (0-4 mm) for concrete masonry units. Test results on different types of concrete were that the partial substitution of both coarse and fine aggregates by steel-making slags and sawdust showed no improvement over the acoustic performance of concrete made with natural aggregates. Nevertheless, it will be of some value, in so far as all those concretes met current regulations on noise insulation and will therefore, in all likelihood, be compliant with future standards. In addition, a novelty and proper acoustic facility has been designed and built that comprised a set of two mobile chambers, of small-to-medium size, suitable for testing 450×650×25 mm specimens that would replicate slab components with 160 mm of thicknesses. This is explained based on the reduced internal damping from EAFS, because of the higher porosity of EAFS; an effect that is not compensated by the heavier density of EAFS rather than natural aggregates.

KEYWORDS: Building; noise insulation; concrete; acoustic chambers; damping.

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