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"Gheorghe Asachi" Technical University of Iasi, Romania

RE-USE OF INDUSTRIAL WASTES IN CEMENT BOUND MIXTURES FOR ROAD CONSTRUCTION

Marco Pasetto[1]*, Nicola Baldo[2]

[1]Department of Civil, Environmental and Architectural Engineering of the University of Padua, Via Marzolo 9, Padua, 35131, Italy
[2]Chemistry, Physics and Environment Department of the University of Udine, Via del Cotonificio 114, Udine, 33100, Italy

Abstract

The paper describes the main results from a study of cement bound mixtures for road foundations with the aggregate matrix consisting of industrial wastes, i.e. foundry sands (FS), electric arc furnace (EAF) steel slags and bottom ash from municipal solid waste incineration (MSWI), combined in five different proportions. The laboratory investigation involved a preliminary analysis of the chemical, leaching, physical and mechanical properties of the industrial wastes, followed by a mechanical characterization of the cement bound mixtures. The mix design was conducted in terms of Proctor, compression and indirect tensile tests. Lastly the dynamic elastic modulus of the mixtures was investigated through ultrasonic tests, at different seasoning times. The results were entirely satisfactory for all the mixtures, especially for the one composed of 50% foundry sand, 10% bottom ash and 40% steel slag, with a compression strength of up to 5.28 MPa at 7 days and a corresponding indirect tensile strength of 0.498 MPa. The results met the main national Specifications, thus demonstrating the feasibility of recycling industrial by-products as substitutes for conventional natural aggregates in the production of hydraulically bound mixtures for road foundations.

Key words: bottom ash, cement bound mixtures, foundry sand, road foundations, steel slag

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* Author to whom all correspondence should be addressed: e-mail: marco.pasetto@unipd.it; Phone: +39 049 8275569; Fax: +39 049 8275604