

Aspects Concerning the Use of Recycled Concrete Aggregates

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Abstract : Natural aggregates (gravel and crushed) are essential non-renewable resources which are used for infrastructure works and civil engineering. In European Union member states from Southeast Europe, it is estimated that the construction industry will grow by 4.2% thereafter complicating aggregate supply management. In addition, a significant additional problem that can be associated to the aggregates industry is wasting potential resources through waste dumping of inert waste, especially waste from construction and demolition activities. In 2012, in Romania, less than 10% of construction and demolition waste (including concrete) are valorized, while the European Union requires that by 2020 this proportion should be at least 70% (Directive 2008/98/EC on waste, transposed into Romanian legislation by Law 211/2011). Depending on the efficiency of waste processing and the quality of recycled aggregate concrete (RCA) obtained, poor quality aggregate can be used as foundation material for roads and at the high quality for new concrete on construction. To obtain good quality concrete using recycled aggregate is necessary to meet the minimum requirements defined by the rules for the manufacture of concrete with natural aggregate. Properties of recycled aggregate (density, granulosity, granule shape, water absorption, weight loss to Los Angeles test, attached mortar content etc.) are the basis for concrete quality; also establishing appropriate proportions between components and the concrete production methods are extremely important for its quality. This paper presents a study on the use of recycled aggregates, from a concrete of specified class, to acquire new cement concrete with different percentages of recycled aggregates. To achieve recycled aggregates several batches of concrete class C16/20, C25/30 and C35/45 were made, the compositions calculation being made according NE012/2007 CP012/2007. Tests for producing recycled aggregate was carried out using concrete samples of the established three classes after 28 days of storage under the above conditions. Cubes with 150mm side were crushed in a first stage with a jaw crusher Liebherr type set at 50 mm nominally. The resulting material was separated by sieving on granulometric sorts and 10-50 sort was used for preliminary tests of crushing in the second stage with a jaw crusher BB 200 Retsch model, respectively a hammer crusher Buffalo Shuttle WA-12-H model. It was highlighted the influence of the type of crusher used to obtain recycled aggregates on granulometry and granule shape and the influence of the attached mortar on the density, water absorption, behavior to the Los Angeles test etc. The proportion of attached mortar was determined and correlated with provenance concrete class of the recycled aggregates and their granulometric sort. The aim to characterize the recycled aggregates is their valorification in new concrete used in construction. In this regard have been made a series of concrete in which the recycled aggregate content was varied from 0 to 100%. The new concrete were characterized by point of view of the change in the density and compressive strength with the proportion of recycled aggregates. It has been shown that an increase in recycled aggregate content not necessarily mean a reduction in compressive strength, quality of the aggregate having a decisive role.

Keywords : recycled concrete aggregate, characteristics, recycled aggregate concrete, properties

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