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Water absorption methods for fine recycled concrete aggregates

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Abstract

When recycling concrete as aggregates, an important part to investigate is to use the fraction of fine recycled concrete aggregates (FRCA) as it constitutes 40-60% of the crushed concrete. If the FRCA is to be recycled in concrete and mortar it is necessary to know the properties of the FRCA to guarantee a sufficient performance of the new concrete, and especially the morphology and water absorption are of major importance. This study investigates (FRCA) and methods for measuring water absorption.

FRCA has a significantly higher water absorption than natural fine aggregates and the attached mortar in the FRCA often add binding properties, this makes standard test difficult to implement. The standard testing procedure of water absorption measurement for FRCA can, therefore have low reproducibility and reliability, due to the assessment of the saturated-surface-dry state indicates a reliance on the test operator and the different properties of the recycled and natural aggregates.

In order to investigate methods for measuring water absorption, the FRCA’s properties were characterized and the standard test method, EN 1097-6, was analyzed and compared with two proposed methods as an alternative. The proposed methods are an evaporative method, where the drying kinetics is measured of an initially water-saturated powder layer and a method with sodium hexamethaphosphate as particle dispersant, which combines the standard test method by pycnometer with a hydrostatic scale test. The FRCA were obtained from three demolition sites in the area around Copenhagen. The morphology of the FRCA was studied in microscope. The comparison of the three methods for measurement of water absorption indicates that measurements by the two alternative methods give more cohesion and reliable results for FRCA than the standard method.

Keywords: Concrete, Recycled concrete aggregates, Fine aggregates, Water absorption