

Influence of the Quality of the Recycled Aggregates in Concrete Pavement

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Abstract : The environmental impact has become a global concern during the last decades. Several alternatives have been proposed and studied to minimize this impact in different areas. The reuse of aggregates from old concretes to manufacture new ones not only can reduce this impact but is also a way to optimize the resource management. The effect of the origin of the reused aggregates from two different origin materials in recycled concrete pavement is studied here. Using the dosing applied by a pavement company, coarse aggregates in the 6.3-25 mm fraction are replaced by recycled aggregates with two different origins: old concrete pavements with similar origin strength to the one of the control concrete, and precast concrete pipes with smaller strengths than the one of the control concrete. The replacement percentages tested are 30%, 40% and 50% in both cases. The compressive strength tests are performed after 7, 14, 28 and 90 curing days, the flexural strength tests and the elasticity modulus tests after 28 and 90 curing days. Results show that the influence of the quality of the origin concrete in the mechanical properties of recycled concretes is not despicable. Concretes with up to a 50% of recycled aggregates from the concrete pavement have similar compressive strengths to the ones of the control concrete and slightly smaller flexural strengths that, however, in all cases exceed the minimum of 5MPa after 28 curing days established by the Chilean regulation for pavement concretes. On the other hand, concretes with recycled aggregates from precast concrete pipes show significantly lower compressive strengths after 28 curing days. The differences with the compressive strength of the control concrete increase with the percentage of replacement, reaching a 13% reduction when 50% of the aggregates are replaced. The flexural strength also suffers significant reductions that increase with the percentage of replacement, only obeying the Chilean regulation when 30% of the aggregates are recycled after 28 curing days. Nevertheless, after 90 curing days, all series obey the regulation requirements. Results show, not only the importance of the quality of the origin concrete, but also the significance of the curing days, that may allow the use of less quality recycled material without important strength losses.

Keywords : flexural strength of recycled concrete., mechanical properties of recycled concrete, recycled aggregates, recycled concrete pavements

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