

Combined effects of recycled hydrated cement and recycled aggregates on the mechanical properties of concrete

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This paper analyses the mechanical properties of concrete manufactured replacing simultaneously different amounts of cement and natural coarse aggregates with recycled hydrated cement (RHC) and recycled aggregates (RA), respectively. The effect of four variables in the mechanical behavior is analyzed: amount of RHC, maximum RHC particle size, RHC rehydration temperature and percentage of RA. The goal is to determine their optimal combination to maximize the reuse of recycled materials maintaining the performance of the material and minimizing its environmental impact. Results show how RHC and RA can be used simultaneously without significant losses in the mechanical properties of the concrete. The optimum combination of the four parameters considered is: 20% of RA, 5% of RHC replacement with a maximum size of 75 μm and dehydrated at 900 °C. However, the low significance of the amount of RHC and the dehydration temperature suggest that the former may be increased and the later lowered maximizing the reuse of construction and demolition waste and decreasing the energetic cost of the new material. © 2016 Elsevier Ltd

Mechanical behavior of recycled concrete

Recycled aggregates

Recycled hydrated cement

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Cements

Concrete aggregates

Concretes

Demolition

Environmental impact

Hydration

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