

# Evaluation of mortars with combined use of fine recycled aggregates and waste crumb rubber

- Letelier V.<sup>a</sup>
- Bustamante M.<sup>a</sup>,
- Muñoz P.<sup>b, c</sup>,
- Rivas S.<sup>a</sup>,
- Ortega J.M.<sup>d</sup>

## Abstract

The use of secondary materials from waste or debris is a strategy that has been considered a starting point for the successful transition to the circular economy model. Globally, waste from concrete debris like disused tires is highly concerning, not only due to the magnitude of the existing volumes, which are increasing exponentially, but also to the environmental problems that their elimination causes. In the search for new, more ecological construction materials that can reduce the environmental impact produced by industry and the management of its waste, several studies are being conducted that incorporate and replace two or more wastes to prepare cement-based material so as to maximize the environmental benefits. Thus, alternatives are being sought that can reduce the extraction of natural resources, such as river sand. This study analyzed the use of two wastes as a replacement for natural sand in mortars, separately and in combination: fine recycled concrete aggregates (FRCA) in replacement percentages of 0%, 15% and 30% in weight, and crumb rubber in replacement percentages of 0%, 10% and 15% in volume. Mortars were characterized in terms of their physical and mechanical properties and durability. The results obtained reveal that the use of crumb rubber (CR) reduced the mechanical performance of the series. However, used in combination with FRCA, which presented a good mechanical performance, managed to decrease the mechanical results, where together with the excellent thermal behavior of the samples with CR, mortar mixtures were obtained as an alternative for the recycling of waste tires and the disposal of concrete aggregate waste. © 2021 Elsevier Ltd

## Author keywords

Crumbed rubber; Fine recycled concretes aggregates; Mechanical properties; Sustainable mortar