

**Effect of elevated temperatures on the residual capacity of rubberized RC columns containing waste glass powder**

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**Abstract**

Recycling waste materials like crumb rubber (CR) and waste glass powder (WGP) instead of using traditional construction materials in civil infrastructure and buildings is a big step toward green concrete, sustainable development, and natural resource conservation. A novel efficient solution of partially replacing sand and cement in concrete with CR and WGP, respectively, was used to analyze the load-carrying capacity and structural response of reinforced concrete (RC) short columns exposed to temperatures of 25 °C, 400 °C, and 600 °C. CR replaced 5% of natural sand by volume in concrete, whereas WGP replaced cement by weight at 10% and 20%. Four concrete mixes containing separate and combined wastes were created. Twelve cast columns were tested under axial loading. Experimental results demonstrated that CR reduces concrete mix workability, compressive strength, and tensile strength, while WGP increases them for replacement levels up to 10%. A 5% CR with 10% WGP increased column capacity by 14.7% at ambient temperature. Temperature decreases column capacity. Increasing CR and heating temperatures reduced column residual capacity. The column capacity decreased by 1%, 4.6%, and 3.7% at 25°C, 400°C, and 600°C, respectively, with 5% CR and 20% WGP compared to the control column at the same temperature. CR and WGP amounts had less effect on column capacity reduction than temperature. Analytical formulae from international standards CSA A23.3, ACI 318-14, and previously known equations were used to predict the capacity of rubberized RC columns containing WGP and being exposed to elevated temperatures, and various statistical tests were used to compare these predictions and select the best one.