

Optimization of glass powder content in self-compacting concrete as partial replacement of cement

Athraa younis Khudair, Mahmoud Khashaa Mohammed and Sheelan Mahmoud. Hama

The main aim of the present work is to investigate the fresh and hardened properties of self-compacting concrete by utilization recycled glass powder as partial replacement material for cement and to specify the optimum percent from performance and sustainability point of views. In this study, five mixes were designed with different percentage of grinded glass powder used as cement replacement at 0%, 10%, 20%, 30%, and 40% by weight. Slump flow diameter, time needed to achieve a flow diameter of 500 mm, sieve segregation resistance and L-box height ratio were utilized to examine the rheological properties of the produced self-compacting concrete. For the main mechanical properties, compressive strength at 7, 28, 56 days, splitting tensile, and flexural strengths test at 28 day were conducted. The test results illustrate that the increase in the partial replacement of cement by glass powder led to keep flow ability and caused small decrease in T500 mm time. However, there was slight decrease in the passing ability and better performance in segregation resistance compared to the mix without glass powder. The mechanical properties of the produced mixes increased up to the replacement level of 30%. However, the optimization results using Minitab 18 statistical software deduced that the optimum percent is 24% to achieve optimum performance in terms tested properties and evaluated sustainability aspects.