

## Utilization of Waste Glass Powder in Mortar

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**Abstract :** This paper examines the mechanical strength of different binders including pure ordinary Portland cement (OPC) and others having OPC supplemented by two maximum sizes of waste glass powder (GP) of 75- $\mu\text{m}$  and 150 $\mu\text{m}$ . Chemical analysis of the GPs using PCEDX test analysis has revealed it silica ( $\text{SiO}_2$ ) content % is 86.883 and Calcium oxide (CaO) is 12.203% while there are traces of other impurities. Furthermore, the specific gravity of GP was measured. The experiments have been conducted on 63 specimens mortar made with standard sand with 20%, 25%, and 30% of GP levels of substituting OPC. The specimens are tested at 3, 7 and 28 days for compressive strength and flexural strength. The specimens made with maximum GP size of 75- $\mu\text{m}$  have outperformed the control OPC mortar at 28 days test age than size 150- $\mu\text{m}$  at various replacement levels. In addition to that, the mechanical strengths were evaluated compressive strength and flexural strength tests were conducted for GPs. The findings from this study indicated that the mortars modified with GP 75 $\mu\text{m}$  and replacement ratio of 20% showed an improvement in compressive strength and flexural strength compared to the control mortar at the 28 days of curing with significant development between 7 and 28 days. Mortar with GP size 75- $\mu\text{m}$  containing 30% & 20% replacement of cement have exhibited the highest flexural strength among all mortar mixtures. The improvement in the mechanical strength of the mortars modified with GP can be attributed to the pozzolanic property of GPs, which leads to a more densified microstructure and improved interfacial bonding between sand and cement paste matrix in mortars.

**Keywords :** glass powder, pozzolana, compressive strength, flexural strength, mortar

**Conference Title :** ICSMCS 2023 : International Conference on Smart Materials for Civil Structures

**Conference Location :** Istanbul, Türkiye

**Conference Dates :** December 18-19, 2023