

Influence of Ultrafine Steel Slag Powder Content Upon Cement Mortar

*Abstract*— Steel slag (Electric Arc Furnace Steel Slag) is a by-product left over from the conversion of iron to steel in steel industries. This paper reports the results of an experimental study on partial replacement of ordinary Portland cement (OPC) with steel slags powder produced in Libya (Libyan Iron and Steel Company‎). The effects of various replacement ratios of ultrafine steel slag powder to Portland cement (i.e., 10%, 20%, 30%, 40%, and 50%) on the workability, mechanical, physical and chemical properties were studied. The fineness of steel slag powder was standardized by using a 63 μm sieve. The properties of cement pastes and mortars with ultrafine steel slag powder were tested including water requirement of normal consistency, setting time, soundness, fluidity, dry bulk density, total porosity, water absorption capacity. compressive and flexural strength. The results showed that for cement pastes with ultrafine steel slag powder, the normal consistency water requirement were increased significantly. Both the initial setting time and final setting time were also accelerated than that of the control sample. The partial replacement of cement by ultrafine steel slag powder decreases the compressive and flexural strength, but increases the fluidity which improves the workability of the mortar. The results showed that the optimum content of ultrafine steel slag powder as a replacement of OPC was 10%.

*Index Terms—*Steel Slag powder, CO2 reduction, Sustainability, Cement industry, waste management.