

HIGH TEMPERATURE PERFORMANCE OF SELF-COMPACTING CONCRETE CONTAINING BORON ACTIVE BELITE CEMENT

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Received: 29.09.2020; Revised: 20.01.2021; Accepted: 25.02.2021

Abstract

The boron active belite cement is a cement type different from the Portland Cement due to the presence of B_2O_3 at 3–4%. The prominent properties are low hydration temperature, low early strength, and high final strength for the boron active belite cement concrete. The aim of this study is to observe self-compacting concrete properties, which includes boron active belite cement and silica fume, at the high temperatures. Withal, the cement types were decided as CEM I, CEM II, and boron active belite cement. Some mechanical and durability properties of manufactured samples were also investigated, experimentally. The samples were designed for 0.35 water/binder ratio and 2% hyper plasticizer, while the silica fume is replaced 7.5% for cement. Some rheological properties of self-compacting concrete, such as the experiments of flow diameter, flow time (t_{50}), V-flow time, L-box and J-ring were observed at fresh stage. As high temperature related parameters, the samples were planned to be tested for 100, 200, 300, 400, 600 and 750°C, to acquire the compressive strength, tensile splitting strength, ultrasonic pulse velocity, and the unit weight. All the samples met the mentioned relevant criteria of self-compacting concrete. Withal, the presence of the boron active belite cement was enhanced by the flowability of the fresh concrete. The long time resulting compressive and splitting tensile strengths of the samples, which were produced with boron active belite cement implied greater values, then the CEM I and CEM II ones. The increasing high-temperature, decreased the strengths for all samples, and weight loss for the boron active belite cement used samples.

Keywords: Self-compacting concrete; Boron active belite cement; High temperature.