

Comparison between Ultra-High-Performance Concrete and Ultra-High-Performance-Glass Concrete

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Abstract : The finely ground waste glass has successfully used by the authors to develop and patent an ecological ultra-high-performance concrete (UHPC), which was named as ultra-high-performance-glass concrete (UHPGC). After the successful development in laboratory, the current research presents a comparison between traditional UHPC and UHPGC produced using large-scale pilot plant mixer, in terms of rheology, mechanical, and durability properties. The rheology of the UHPGCs was improved due to the non-absorptive nature of the glass particles. The mechanical performance of UHPGC was comparable and very close to the traditional UHPC due to the pozzolan reactivity of the amorphous waste glass. The UHPGC has also shown excellent durability: negligible permeability (chloride-ion ≈ 20 Coulombs from the RCPT test), high abrasion resistance (volume loss index less than 1.3), and almost no freeze-thaw deterioration even after 1000 freeze-thaw cycles. The enhancement in the strength and rigidity of the UHPGC mixture can be referred to the inclusions of the glass particles that have very high strength and elastic modulus.

Keywords : ground glass pozzolan, large-scale production, sustainability, ultra-high performance glass concrete

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