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Use of PCC for innovative refurbishment solutions

Abstract

Polymer-modified cement concrete (PCC) combines cement with polymers to enhance durability, adhesion, impermeability, and workability. By incorporating polymer dispersions or powders into cementitious mixtures, the microstructure of the binder matrix is significantly improved.

Fig. 1 Examples of regulation of PCC

Basics Of PCC

Polymer-Modified Cement Concrete (PCC) belongs to the broader family of polymer concretes, which also includes Polymer Concrete (PC), made entirely with polymer binders, and Polymer-Impregnated Concrete (PIC), where hardened concrete is impregnated with monomers or polymers. In PCC, polymers are incorporated into the cement paste, typically replacing part of the binder phase

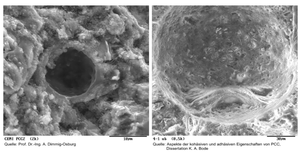
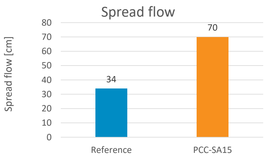


Fig. 2 polymeric films in the pore structure of modified mortar or concrete

Experimental Program

The fresh properties were determined at 20 °C. Therefore, the slump of the flow-table test, the air void content and the moulded density were investigated.



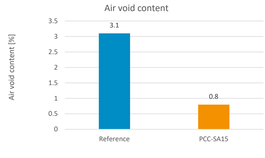
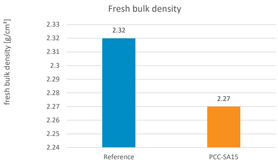
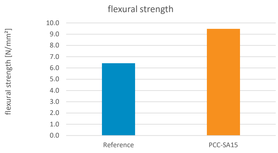
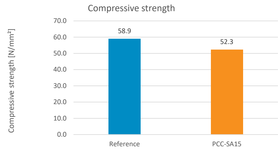


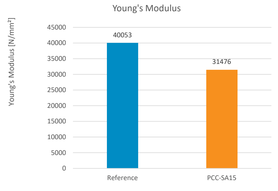
Fig. 3 Spread flow test of PCC



Compressive strength, flexural strength and Young's modulus were examined in order to measure the mechanical properties of the hardened concrete.







Conclusion

The polymer modification of cement concrete leads to improved flexural strength and durability but reduces on the other side the compressive strength and modulus of elasticity.

Fig. 4# carbonatization depth of PCC vs. Ref. concrete

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