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## **Experimental evaluation of steel, glass and polypropylene fiber reinforced shotcretes for tunnel lining**

Luigi Coppola<sup>1</sup>, Alessandra Buoso<sup>1</sup> and Franco D'Alessandro

<sup>1</sup>University of Bergamo, Department of Engineering, Bergamo, Italy  
<sup>2</sup>BASF CC, Treviso, Italy

The present paper deals with the use of different types of fiber to reinforce shotcrete for tunnel linings. Experimental investigations were performed on steel (SF), glass (GF) and polypropylene fibers (PF) reinforced concretes and shotcrete (manufactured with a silicate based set-accelerating admixture) in order to compare rheological and mechanical behaviour of fiber reinforced mixtures with respect to plain concrete (without fibers: PL). Moreover, the influence of the dosage of a silicate based set-accelerating admixture was evaluated. Tests were carried out directly in the job-site. No influence of fibers was observed on rheological properties. Shotcrete rebound was not affected by the type of fiber, but it seems to be closely related to the dosage of set-accelerating admixture. The mechanical properties were strongly influenced by both the casting method (casting for concretes and spraying for shotcrete) and the dosage of set-accelerating admixture rather than the type and dosage of fibers used. Furthermore, the test results indicate that the punching shear strength of FR mixtures is lower than that of steel mesh reinforced shotcrete. The punching shear strength is strictly dependent on matrix quality. The addition of set-accelerating admixture penalized the mechanical properties and consequently it reduced the fiber-matrix bond. On the contrary, steel mesh represents a continuous reinforcement and the poor quality of the cement matrix doesn't influence in a significance manner values the punching shear strength.

**Keywords :**shotcrete, fiber, mechanical properties, set-accelerating admixture

*Corresponding Author:* luigi.coppola@unibg.it