

INFLUENCE OF DIFFERENT TYPES OF SUPERPLASTICIZERS ON ONE-PART ALKALI-ACTIVATED SLAG MORTARS

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This paper presents an experimental study carried out to investigate the influence of different types of superplasticizers on the fresh and hardened properties of one-part alkali-activated slag mortars. Three different admixtures were added to the mixes at the level of 1.3% by binder mass. In particular, sulphonated polymer-based, polycarboxylates-based and lignosulfonates-based high-range water reducers were used. In addition, a hardening accelerator was added to the mixes up to 1.0% respect to binder mass. Ground granulated blast furnace slag (according to EN 15167-1) as precursor and sodium metasilicate pentahydrate: potassium hydroxide : sodium carbonate = 7:3:1 in powder form as activator were used to produce different mortars with the dosage of activator between 2% and 16 % vs binder mass. The water was adjusted in order to attain the same workability at the end of the mixing procedure, equal to 160 mm \pm 10 mm by means of a flow table. The specimens were cured in climatic chamber at 20°C and R.H. 60%. The effectiveness of the admixtures has been investigated in terms of percentage of water reduction, workability loss over time and compressive strength.

The experimental data show that all superplasticizers provides a reduction in mixing water. The admixtures are influenced by the presence of the activator. In fact, the water reduction, at the same initial workability, is maximum in mortars manufactured without activators. However, the ability of water reducers is not influenced by the activator/precursor. Moreover, results indicated that as consequence of superplasticizer addition, the pot-life of reference mortars manufactured without superplasticizer (60 minutes) is extended up to 160 minutes. The addition of high-range water reducers does not delay the development of 1-day compressive strength. On the other hand, it causes a little reduction of mechanical properties at 7 and 28 days respect to the reference mortars, regardless of superplasticizers employed. Finally, the use of hardening accelerator admixture does not determine a reduction in workability loss over time while no improving was detected on the mechanical strength at early and long ages.