

## The Influence of Complex Additive on Strength and Proper Deformations of Alkali-Activated Slag Cements

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**Abstract.** The peculiarity of alkali-activated slag cements (further, AASC's) is increased proper deformations, which can cause increased cracking and reduced durability of structure. The paper is devoted to manage AASC's proper deformations. The main task was to determine the composition of complex additives (further, CA's) in system «ordinary portland cement (further, OPC) clinker - mineral compound of different anionic type - surfactant» in presence of sodium metasilicate (further, MS) to affect on hydrated AASC performance while ensuring effective structure of artificial stone by criterion of shrinkage deformations. Comparative analysis of hydrated cement systems "OPC clinker - MS", "OPC clinker - mineral compound - MS" and "OPC clinker - mineral compound - MS - surfactant" showed that the greatest effect on reduction of proper deformations occurs when the mineral compounds relate to electrolytes, i.e.  $\text{Na}_2\text{SO}_4$  and  $\text{NaNO}_3$ . Hydrated system is characterized by expansion (+0,062 mm/m) in presence of  $\text{Na}_2\text{SO}_4$ . Almost no shrinkage is supplied by application of  $\text{NaNO}_3$  (-0,062 mm/m). The obtained CA's were tested in AASC. CA in the system "OPC clinker -  $\text{NaNO}_3$  - surfactant" provides the initial setting 43 min, the end - 65 min with accelerated strength. Investigated AASC can be classified as non-shrinking cement. This phenomena is ensured by increasing density, homogeneity and monolithicity of hydrosilicate formations, as well as due to formation of hydroaluminosilicate structures with different morphology by inclusion of nitrate anions.