WASTE – FREE PRODUCTION OF GAS SILICATE BLOCKS

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Autoclaved aerated concrete (AAC) masonry products are very popular in the construction market and are currently widely used. However, the production of such masonry products inevitably generates two types of waste: “off cut” of non-autoclaved aerated concrete (ACW) which are formed by trimming the mass from the molds before hydrothermal treatment and autoclaved aerated concrete, which remain on the mold base after autoclaving (AACW) [1–3]. It is known that about 3–5% of the latter waste is generated and recovery of it is not fully resolved [1, 3]. Therefore the aim of the study was to investigate the possibility of using AACW as an admixture in the production of new AAC – gas silicate blocks.

The following composition of the mixture (AC0) was chosen: cement – 17.5, lime – 12.5, gypsum – 2.5, sand slurry – 50.0, ACW slurry – 20, aluminum paste – 0.11. The water/solids ratio was equal to 0.8. The sand in the forming mixture was replaced by 6.25 % (AC1), 12.5 % (AC2) and 18.75 % (AC3) of AACW during research. All required amount of raw materials was weighed at the beginning of mixing. First, required quantities of sand and ACW slurries were mixed with water together. Second, Portland cement, lime, gypsum and AACW were added. Finally, aluminum paste suspension was placed. The samples were hardened in a laboratory autoclave with a saturated water vapor temperature of 190 °C and an isothermal holding time of 11 h.

The dependency of mechanical properties, porosity, pore size distribution, and mineralogical composition of the AAC samples on composition of forming mass were determinate. Samples were analyzed by XRD, STA, optical microscopy and SEM analysis. The obtained research results are presented in the Table 1.

Table 1. Mechanical properties of AAC samples

	Blowing height, %	**Density, kg/m^3**	**Compressive strength, MPa**
AC0	28	540	2.20
AC1	28	546	2.25
AC2	29	535	2.50
AC3	30	530	1.80

According to obtained results, samples in which 12.5 % of the sand is replaced by AACW have the highest mechanical strength and sufficient density. Changes in mineralogical composition (increasing amount of tobermorite), among other factors, affect the increase in the compressive strength of the samples. AACW can be used successfully in the production of new AAC because the technological process does not change, and the values of compression strength and other properties are close or even better than the values of the samples without additives.

References

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