CEMENTLESS POROUS CONCRETE

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Summary: *Introduction. Characteristic of the resulting air-mechanical foam. Effect of a sealing compound type on the properties of the foam. Influence of the material composition of molding masses on the properties of alkali-silicate compositions. Effect of filler type on the properties of alkali-silicate compositions. 3 tables. Characterization foam concrete on the basis of the combined filler. Characterization of the studied of alkali-silicate compositions. Conclusion.*

Keywords: *Foam concrete, cementless porous concrete, alkali-silicate composition, ash hydroremoval, ratio between the sealing compound and powder component, multiplicity of foam, low expansion foam, foam density, average density, diameter of the spread, microspheres, filler type, blowing agent.*

1. Introduction

Cellular concrete technology combines high demands for raw components with the ability to use a wide variety of materials, including technogenic origin. As a binder for the cellular concrete used: Portland cement (non-autoclaved technology); alkali-siliceous astringent (autoclave technology). The high cost of Portland cement, the technical complexity of autoclaving necessitate the use of alternative cementless binders.

Purpose of work - research the effect of the material compound of the molding material on the formation of a cellular structure of alkali-silicate compositions.

The object of study - foam concrete from alkali-silicate binder based on waste heat power engineering. For the formation of the porous structure of materials used foaming agents of various origins: synthetic - powder labeled «F1» and Protein Foam Concentrate "Unipor."

2. Effect of a sealing compound type on the properties of the foam

Comparative characteristics of the foams at a mixing of different composition (water, liquid glass) - with synthetic foam concentrate «F1», shows that foams based on liquid glass are characterized by greater density and less resistance. The above features are due to a mixing high density (Table 1).

Table 1 - Effect of a mixing type on the properties of the foam

Liquid mixing	Foam Density, kg / m3	Multiplicity of foam	During from the time of mixing, minute	Liquid outflow, %	Foam shrinkage, %
Water	85	12	10	29	8
			30	50	23
			50	60	38
			70	67	48
Liquid glass	210	5	10	15	20
			30	48	52
			50	69	72
			70	79	82

3. Influence of the material composition of molding masses on the properties of alkali-silicate compositions

Foaming suspensions of different material composition (Table 2) shows the dependence porization from the physical properties of filler and a ratio between sealing compound and powder component (S / P). With the increase in the share of liquid glass increases the mobility of the molding mixture, grow and the average density of foam concrete. The optimum concentration of the foaming agent depends on the type of filler. Alkali-silicate composition containing various excipients, characterized by a wide interval of indicators properties.

Table 2 - Effect of the material composition of molded masses on the properties of alkali-silicate compositions

Type of filler	S/P	The diameter of the spread mass, mm	The average density, kg / m3
Ash hydroremoval	1,35	55	720
	1,10	50	500
	0,85	45	463
Microspheres	1,25	55	400
	1,00	50	375
	0,80	45	350

4. Effect of filler type on the properties of alkali-silicate compositions

The combination of materials is predetermined the need to obtain foam concrete with lower density and heightened strength values. Fillers different values of average density and particle sizes; determines the rheological properties of the compositions, affects the character of porization and hardening molding compounds.

A result of studies is revealed preferred combination of fillers, %: ash hydroremoval - 80; microsphere - 20 (Table 3).

Table 3 - Effect of filler type on the properties of alkali-silicate compositions

Composition of the filler, %		Average density kg / m3	Compressive strength (MPa) / aged, days (samples size 20x20x20 mm)		
Ash of hydroremoval	Microspheres		3	7	28
100	–	530	4,4	6,2	9,6
–	100	415	1,8	2,5	3,3
80	20	450	5,3	8,1	8,5
50	50	438	3,3	4,3	4,5

Foam concrete based the combined filler is characterized by fine, uniformly distributed porosity, low density and heightened strength values.

5. Conclusion

Expanding opportunities for the optimization of the rheological properties of molding compounds ensures the formation of sustainable foam with petty closed and uniformly distributed porosity.

The availability of the raw material base, low power consumption of technological processes and high characteristics of materials demonstrate the advisability of producing cementless porous concrete.

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