

PROPERTIES OF COMPOSITE GYPSUM BINDERS WITH BINARY FILLER AND SUPERPLASTICIZER C-3

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Abstract: The article presents the results of studies on the influence of superplasticizing C-3 additives on the properties of composite gypsum binders with binary fillers of natural origin, consisting of basalt and limestone fillers. It has been established that a mixture of mineral additives and superplasticizer C-3 helps to increase the degree of filling of the binder without reducing the strength of gypsum stone from 12 to 15% when basalt and limestone are used as fillers, from 13 to 21 and from 10 to 25% when introducing basalt filler together with the original or washed quartz sand, respectively.

Keywords: gypsum binders, binary filler, superplasticizer S-3, basalt filler, control composition.

The use of chemical additives makes it possible to widely change the properties of gypsum binder and the structure of gypsum stone based on them, increases the shelf life of binders and increases the durability of products [1-4]. However, quite often an improvement in one or another property of gypsum binders leads to a change in other properties and not always for the better. Thus, slowing down the setting time almost always leads to an irreversible decrease in strength. Increasing strength indicators does not always allow maintaining optimal setting times. Therefore, when solving the problem of regulating the properties of gypsum binders, one should obviously proceed from what properties of gypsum should be decisive [5,6]. As is known, gypsum binders can be used in two main directions: - in the production of prefabricated products; - when receiving dry mixtures for finishing work.

Based on this, the main directions in which the properties of the gypsum binder should be adjusted are increasing the strength and water resistance of the gypsum stone, and slowing down the setting time of the binder without reducing the strength of the gypsum stone.

This article presents the results of studies on the influence of superplasticizer C-3 on the properties of composite gypsum binders with binary fillers of natural origin (basalt + limestone). Superplasticizer C -3 was added to the binder composition in dry form in an amount of 0.5%.

The results obtained showed that the use of C-3 in compositions with a binary filler makes it possible to increase the strength of gypsum stone: by 10% in the case of using a superplasticizer together with basalt filler (6%) and limestone (6%), by 15% with the introduction of C-3 with additions of basalt filler (8%) and original quartz sand (5%), by 25% - in compositions with additions of basalt filler (5%) and washed quartz sand (5%). At the same time, complex modification with mineral and chemical additives makes it possible to increase the degree of filling of the gypsum binder without reducing the strength of the gypsum stone.

Thus, the combined introduction of C-3 additives, basalt filler and limestone made it possible to increase the amount of filler to 10%, limestone to 15%, thereby increasing the degree of filling of the composition with mineral additives from 12 (control composition) to 25%. In a composition containing basalt filler and initial quartz sand, in the presence of the C-3 additive, it is possible to

increase the proportion of fillers to 11 and 10%, respectively, which makes it possible to increase their total amount from 13 (control composition) to 21%. The research results are shown in Table 1. The combined introduction of a superplasticizer, basalt filler additives and washed quartz sand makes it possible to increase their content in the binder composition to 10 and 15%, respectively, increasing the degree of filling of the composition to 25% (for the control composition 10%).

Table 1

Compositions and properties of composite gypsum binders with superplasticizer S-3

No. p.p. _	Composition composition, %						Ultimate compressive strength, %
	gypsum	Basalt. Fill _	Known nope	Ref. Sq. sand	Laundered. Sq. sand	S-3	
1	88	6	6	-	-	-	100(counter)
2	88	6	6	-	-	0.5	110
3	75	10	15	-	-	0.5	103
4	87	8	-	5	-	-	100(counter)
5	87	8	-	5	-	0.5	110
6	79	eleven	-	10	-	0.5	102
7	90	5			5	-	100(counter)
8	90	5			5	0.5	125
9	75	10			15	0.5	100

* - control compositions of composite gypsum binders were adopted based on research results obtained in [7,8]

Based on the analysis of the experiments performed, the following conclusions were made:

- superplasticizer S-3 in gypsum compositions with the addition of basalt filler and limestone can increase the strength of gypsum stone by 10%; its increase by 15% is observed in the case of using the C-3 additive in combination with the filler and the original quartz sand, by 25% when introducing the filler and washed quartz sand;

- a mixture of mineral additives and superplasticizer C-3 helps to increase the degree of filling of the binder without reducing the strength of the gypsum stone: from 12 to 15% when basalt and limestone are used as fillers, from 13 to 21 and from 10 to 25% when introducing basalt filler together with original or washed quartz sand, respectively.

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