



Influence Of Surface Additives On Strength Indicators Of Cement Systems

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ABSTRACT

In the state predostavlena, v issledovaniy yavilos ustanovlenные vliyaniya dobavok poverxnostno - aktivnyx veshchestv na prochnostnyye pokazateli tsementnyx sistem. Definitions were made on cement of various mineralogical composition, svejemolotom and lejalom and on tsementno-peschannyx solutions and betonax.

KEYWORDS

Additives, cement, water-cement ratio, freshly ground, cement-sand mortars and concretes.

INTRODUCTION

The purpose of the research in this section was to establish the effect of surfactant additives on the strength characteristics of cement systems. The determinations were carried out on cements of various mineralogical composition, freshly ground and buried, and on cement-sand mortars and concretes.

For the control samples and with additives, the same plasticity was selected, while the water-cement ratio than for various additives fluctuated within certain limits.

The ultimate strength in compression, bending and elastic modulus were determined for mortar samples on beams 4x4x16 cm and cubes 7.07x 7.07x 7.07 cm, and for concretes on cubes 10x10x10cm and 20x 20x20cm. It is known that in a number of cases when using mylonft there is some lack of strength at the initial stage. A decrease in the strength of products on hydrophobic cements was observed only on freshly ground cements when molding samples with a high water-cement ratio. Therefore, a large number of comparative tests of the strength of samples on hydrophobic-plasticized and control

cements were carried out. The tables below show the results of these tests.

Table reduced to the results of tests of ordinary cement

(I-B and I D and cement with a high content of C3C (3-C and 5-I).

As follows from the data in the table, cement mortars with OP with a decrease in the water-cement ratio (with different plasticity) are characterized by increased compressive and flexural strengths in comparison with the control indicators at all test periods up to a year. In this case, the optimal dosage of OP is in the range of 0.15-0.30%, the strength of the samples on such cement samples increases by 10-12% compared to the control.

Mortars with OP additives, made at the same water-cement ratio as the control ones, are characterized by a shortage of strength (about 5%) in the initial hardening period (3 days) and equalization of the strength values to 28-day hardening (cement ID).

The addition of mylonft, in spite of a decrease in the water-cement ratio, in some cases yields a 5-8% shortfall in strength compared to the control ones even after 360 days of hardening. The greatest increase in strength is achieved when using a synthetic fatty acid of the C7-C9 fraction. The introduction of this additive increases the strength of samples at 3 days of age by 50%, at 28 days of age by 35% and 360 days of age - by 25%.

Table the results of tests of laboratory-salted cements and solutions based on these cements are presented. The addition of oxidized petrolatum causes in all cases an increase in the strength of the cement and when tested at 3,7 and 28 days of age, despite the increase in the normal density of the cement paste, the increase in strength is explained in this case. First of all, an increase in the specific surface of cements when grinding them with OP additives. The

introduction of oxidized petrolatum in an amount of 0.25% increased the plasticity of the solutions (increasing the value of the slump of the cone), did not reduce the strength parameters even with water-cement ratios the same as those adopted for the control compositions.

The results of testing solutions on slag Portland cements and clinker cements are given in table. Cement consumption in solutions with oxidized petrolatum decreased slightly in comparison with the control. Samples were subjected to normal air and water storage. As follows from the data carried out, in most cases the addition of oxidized petrolatum increased the strength of the solutions in comparison with the control. The combined addition of oxidized petrolatum and SNV somewhat lowers the strength of solutions at all test periods. Particularly interesting results were obtained when testing samples of air storage.

Samples of the composition 1: 6 on Portland cement with oxidized petrolatum showed strength at 3 days of age by 57%, at 7 days of age at 100.28 days at 59 and 90 days of age, 62% higher than that of the samples on the control cement. The significant difference in strength between rigid control compositions and compositions with OP additives is explained by the difference in fluid loss rate, i.e. in the rate of drying, samples during air storage. The increased water retention capacity of solutions with OP additives provides a more intensive set of strength of solutions under conditions of air storage. This property of cements with surfactant additives is especially important for hydraulic engineering.

Table the results of physical and mechanical tests of solutions of compositions 1: 3 and 1: 6 on slag Portland cements with various additives of OP and SNV, as well as OP and SSB are given. In addition, the oxidized petrolatum was diluted with machine oil and

sulfite-alcohol stillage and in this form was introduced directly during mixing. Solutions were prepared with a cone draft of 2 and 4 cm.

As follows from the results of these tests, oxidized petrolatum causes negligible air entrainment, equal to 1-1.15% for fatty systems and 5-7% for lean solutions. The strength of lean solutions with additives of OP on the 7th day at 37-52 and on the 28th day is 15-20% higher than that of the control.

The combined addition of OP and SNV reduces the strength of mortars in fatty systems by 16-22% and decreases their strength by 25-33% in lean cement mortars. The combined addition of OP and CER acts similarly to a mixture of OP

and CER. A mixture of oxidized petrolatum with machine oil, introduced into solutions when replaced, showed an increase in strength by 7 days by 52% and at 28 days of age by 34%, compared with the control, in a mixture of OP and sulfite-alcohol stillage, respectively, by 65-50%.

The influence of the addition of oxidized petrolatum on the strength indicators was also tested in concretes / table 33/.

The composition of concrete was calculated using the absolute volume method, taking into account the restrictions adopted by GOST in relation to the consumption of cement, B and aggregates.

Results of testing cement and mortars with oxidized petrolatum additives (composition 1: 3)

Table 1.

Type of cement	Fineness of grinding residues on sieves,%		Normal consistency of cement paste	Uniformity in the volume distribution of the mixture			Curing time of the mixture		Testing of cement according to GOST 31108-2016		
	900 holes	4900 holes		water	in steam	boiling	Beginning	the end	Temporary increase in compressive strength kg / cm ²		
									3	7	28
No additive	0,365	7,48	22	w	s	b	2 ²⁰	4 ¹⁰	218	297	
	0,365	5 7,48 5	22	w	s	b	2 ²⁰	4 ¹⁰	218	297	
With additive OP-0,15	0,176	2.1	25	w	s	b	2 ⁵⁵	4 ⁵⁵	242	349	
	0,176	2.1	25	w	s	b	2 ⁵⁵	4 ⁵⁵	242	349	
With additive OP - 0,25	0,15	1,45	25	w	s	b	2 ⁴³	5 ²⁵	303	400	
	0,15	1,45	25	w	s	b	2 ⁴³	5 ²⁵	303	400	
With additive OP - 0,10 SNV - 0,015	0,15	2,0	25	w	s	b	3 ²	5 ⁴⁰	287	411	

Table continuation

temporary resistance to bending depending on age kg / cm ²			subsidence of the cone cm	$\frac{W}{S}$	bulk density of the mixture is kg / dm ³	limit state of compressive strength kg / cm ²					
						Samples stored in normal condition			Samples stored in aqueous state		
3	7	28				3	72	28	7	28	
15,7	17,7		4,5	0,54	2,13	76	84	165	102	197	
15,7	17,7		4,0	0,58	2,23	49	130	171	130	191	
14,8	19,2		5,5	0,545	2,10	53	76	168	98	145	
14,8	19,2		5,5	0,53	2,16	68	104	162	112	192	
18,5	22,5		5,5	0,545	2,09	72	86	1447	102	187	
18,5	22,5		6	0,53	2,15	75	121	170	104	193	
18,2	1,7		6	0,53	2,15	61	96	151	103	185	

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