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STUDY OF THE EFFECT OF SIKAMENT RMC-519 AND SIKA RETARDER SUPERPLASTICIZERS ON CONCRETE PROPERTIES

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ABSTRACT

In this article was studied the physical and mechanical properties of concrete with superplasticizers of Sikament RMC-519 and Sika Retarder, as well as the results of laboratory studies were given in the form of the table and graphs.

Keywords: Superplasticizer, chemical additive, strength, Portland cement, surfactant, water/cement ratio.

INTRODUCTION

Concrete is one of the most widely used materials in modern construction. Various additives are used to improve the properties of concrete.

Chemical additives are one of the mandatory components of the concrete mixture, such as binders, fillers, and water. The most commonly used type of chemical additives in construction is a superplasticizer. Additives allow you to control the technological parameters of concrete, improve its rheological and operational properties.

The use of additives reduces costs in construction and allows you to control its properties when preparing the concrete mixture.

When superplasticizers “Sikament RMC-519” and “Sika Retarder” are applied to the concrete mixture, they slow down its hardening, prevent the concrete mixture from pouring and stratifying before it is delivered to the construction site, and slow down the hydration process. “Sikament RMC-519” and “Sika Retarder” are high-quality superplasticizers that are effective in the production of concrete in hot climates. The use of “Sikament RMC-519” and “Sika Retarder” superplasticizers allows you to reduce the water-cement ratio of the concrete mixture, increase the workability of the concrete, and reduce the porosity of the concrete.

Reducing the water-cement ratio in concrete mixtures is relevant, because if more water is added to the concrete mixture than the norm, the more pores there will be in the hardened concrete structure. These pores reduce the strength and frost resistance of concrete. This is

due to the fact that in winter, if water enters the pores and freezes (water expands by about 9%), the overall structure will be damaged.

In the initial stage, primary hydrosilicate is formed, followed by secondary and tertiary hydrosilicates. First, an increase in the rate of heat release is observed, then an induction period occurs within 15-25 minutes of its retention. In the second stage, calcium hydrosilicates with a transitional composition are formed, the reaction rate is very low - the induction period. It can last for several hours. It is assumed that if the first two stages are affected by the addition, then the hydration will also be affected. In the third stage, the reaction proceeds actively, reaching a maximum rate at the end of the stage. In the fourth stage, the heat release rate gradually decreases, while hydration continues. In the fifth stage, hydration products are formed in small quantities, and the stage is concentrated by diffusion. Table 1 below presents the properties of Portland cement and slag Portland cement.

Table 1. Properties of Portland cement and slag Portland cement

№	Cement type	Water quantity %	Normal thickness mm	Spreadability cm	Beginning of the hardening period	End of the freezing period
1	**ПЦ400Д20**	27	**7**	7	127	360
2	**ШПЦ400**	27	6,5	7	122	360

We determined the beginning and end of the setting period by adding superplasticizers “Sikament RMC-519” and “Sika Retarder” at 0.5-
1-1.5-2% to PC-400D20 Portland cement and PC-400 slag Portland cement, reducing the water-cement ratio to 0.22. The results are presented in Tables 2-3 below.

Table 2.

№	Cement type	Additional name	S/C %	Additional amount %	Start of solidification period minutes	End of solidification period minutes
1.	ПЦ400Д20	Sikament RMC-519	0,27	0	127	360
2.			0,26	0,5	66	238
3.			0,24	1	73	242
4.			0,23	1,5	98	269
5.			0,22	2	113	312
6.	ПЦ400Д20	Sika Retarder	0,27	0	127	360
7.			0,26	0,5	73	241
8.			0,24	1	85	287
9.			0,23	1,5	94	302
10.			0,22	2	134	347

When the superplasticizer “Sikament RMC-519” was added to the Portland cement paste at a rate of up to 2% by weight of cement, the setting time was slowed down to 199 minutes. When the superplasticizer “Sika Retarder” was added at a rate of up to 2% by weight of Portland cement, the setting time was slowed down to 213 minutes.

Table 3. Effect of the superplasticizers “Sikament RMC-519” and “Sika Retarder” on the setting time of slag Portland cement by reducing the water-cement ratio.

№	Sement type	Qo‘shimcha name	C/Ц %	Qo‘shimcha amount %	Qotish start time minute	Qotish expiration minute
1.	ШПЦ400	Sikament RMC-519	0,27	0	134	360
2.			0,26	0,5	62	262
3.			0,24	1	69	293
4.			0,23	1,5	84	306
5.			0,22	2	119	398
6.	ШПЦ400	Sika Retarder	0,27	0	126	365
7.			0,26	0,5	62	262
8.			0,24	1	69	293
9.			0,23	1,5	84	306
10.			0,22	2	115	392

When the superplasticizer “Sikament RMC-519” was added to the slag Portland cement paste at a rate of 2% relative to the mass of cement, the setting time was slowed down to 279 minutes. When the superplasticizer “Sika Retarder” was added at a rate of 2% relative to the mass of slag Portland cement, the setting time was slowed down to 277 minutes.

In conclusion, when we added 2% of the chemical additive to the composition of ПЦ400Д20 Portland cement and ШПЦ400 slag Portland cement, the setting time was slowed down, and as a result of the experiments, when we applied the superplasticizer “Sikament RMC-519” to ШПЦ400 slag Portland cement, the setting time was slowed down to 279 minutes, which gave a good effect. This allows for the high-quality delivery of concrete in hot climates.

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