EFFECT OF THE CHEMICAL ADMIXTURE "SIKA 43-36" ON THE PROPERTIES OF PORTLAND CEMENT

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ANNOTATION

This paper presents the results of a study on the effect of the chemical admixture "Sika 43-36" on the physical and mechanical properties of portland cement CEM I 42.5N produced by "AKKERMAN CEMENT" which was used as a binder for lightweight concrete based on foamed glass aggregate. The influence of the admixture on water demand, workability, setting time, and strength characteristics of the cement was investigated.

For the experimental study, portland cement CEM I 42.5N manufactured by **"AKKERMAN CEMENT"** was selected. The chemical admixture "Sika 43-36" was added in amounts ranging from 0,1% to 1,0% by weight of cement.

To determine the optimal dosage of the chemical admixture, the mini slump test method was employed. Since the admixture was used in liquid form, its concentration was first determined using a moisture analyzer. The results showed that the concentration of the admixture was **36,33%**.

Figure 1. Determination of the concentration of the chemical admixture using a moisture analyzer

Initially, the amount of water relative to the mass of portland cement was determined and was found to be **35 g**. The test was continued until the spread diameter of the cement paste reached **6 cm**.

Subsequently, when the concentration of the chemical admixture was added in the range of **0,1-0,7% by weight of portland cement**, the spread of the cement paste increased from **21,05 cm to 23,5 cm**. However, when the dosage was increased to **0,8-1,0%**, a reduction in the spread diameter was observed.

The results obtained for determining the optimal dosage of the chemical admixture **"Sika 43-36"** are presented in **table 1**.

Table 1.

Results of determining the optimal dosage of the chemical admixture "Sika 43-36"

№	Portland cement, g	Water, g	Chemical admixture (liquid), g	Chemical admixture (concentration), %	Spread diameter, cm
1	100	35	0	0	6
2	100	34,825	0,175	0,1	21,05
3	100	34,65	0,35	0,2	21,35
4	100	34,475	0,525	0,3	21,55
5	100	34,3	0,7	0,4	21,6
6	100	34,125	0,875	0,5	21,7
7	100	33,95	1,05	0,6	22,5
8	100	33,775	1,225	0,7	23,5
9	100	33,6	1,4	0,8	20,1
10	100	33,425	1,575	0,9	19,7
11	100	33,25	1,75	1,0	19,6

As can be seen from **table 1**, the results indicate that an addition of **0,7% of the chemical admixture "Sika 43-36" by weight of portland cement** represents the optimal dosage for the cement paste composition.

Figure 2. Determination of the optimal dosage of the chemical admixture "Sika 43-36" using the mini-slump test

The study shows that the addition of **0,7% of the chemical admixture "Sika 43-36"** reduces the water demand of portland cement by up to **49%**, delays the initial setting time by **10 minutes**, and shortens the final setting time by **25 minutes**.

The results of determining the effect of **Sika 43-36** on the water demand of portland cement are presented in t**able 2**.

Table 2.

Results of determining the effect of the chemical admixture "Sika 43-36" on the water demand of portland cement paste

№	Portland cement, g	Water, g	Chemical admixture (liquid), g	Chemical admixture (concentration), %	Water demand, %
1	100	35	0	0	100
2	100	21,525	1,225	0,7	65
3	100	19,775	1,225	0,7	60
4	100	18,025	1,225	0,7	55
5	100	17,675	1,225	0,7	54
6	100	17,325	1,225	0,7	53
7	100	16,975	1,225	0,7	52
8	100	16,625	1,225	0,7	51

Based on the optimal dosage of the chemical admixture determined from **tables 1 and 2 (0,7%)**, which reduces the water demand of portland cement by **49%**, its effect on the setting time of portland cement was investigated (**table 3**).

Table 3.

Results of determining the effect of the chemical admixture "Sika 43-36" on the setting time of portland cement paste

№	Portland cement, g	Dosage of chemical admixture, %	Water demand, %	Setting time	
				Initial setting time, min	Final setting time, min
1	400	-	100	165	275
2	400	0,7	51	175	250

The effect of the optimal dosage of the chemical admixture on the strength of cement stone was investigated. The results of the strength tests (**table 4**) show that when **0,7% of Sika 43-36** is added and the water demand is reduced by **49%**, the compressive strength of the cement stone after **3 days** increases by **38,65%** compared to cement without the admixture R_{28}^{s}, and after **28 days**, the strength increases by **42,88%**.

Table 4.

Results of determining the effect of the chemical admixture “Sika 43-36” on the strength of Portland cement

№	Portland cement, g	Dosage of chemical admixture, %	Water demand, %	Strength, MPa R^s_{28}		
				3	7	28
1	400	-	100	43,05	49,663	56,61
2	400	0,7	51	59,69	65,907	80,89

Literature

1. H.A. Akramov, Sh.T. Rahimov, H.N. Nuritdinov, M.T. Turopov. Technology of Concrete Fillers. Textbook. Tashkent, 2011.
2. B.A. Askarov, L.M. Botvina. Porous Aggregates from Local Raw Materials and Lightweight Concrete Based on Them. Monograph. Tashkent: Fan, 1990.
3. U.A. G‘aziev, D.Sh. Qodirova. Additives for Concrete and Mixtures. Tashkent, 2015.
4. N.A. Samig‘ov. Energy- and Resource-Saving Construction Materials and Technologies. Tashkent, 2016.
5. GOST 31108-202