SIGNIFICANCE OF MICROSILICA AS ACTIVE MINERAL ADDITIVE IN LOW WATER DEMANDING CEMENTS.

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Abstract. *This article talks about low water requiring cements, which is practiced in scientific laboratories of leading scientific centers and higher educational institutions engaged in the research of mineral binders and materials based on them in the world, reducing the release of carbon dioxide gas into the environment during cement production, the use of local raw materials and industrial waste in cement production, chemical additives and mechanical a lot of scientific and research work is being carried out on the effective use of activation. In this regard, it is important to develop optimal compositions of energy-efficient building materials, low-water-demanding binders that allow the economy of Portland cement clinker in cement production, using local raw materials and man-made waste, as well as surfactants, in the scientific research conducted in this regard.*

Аннотация. *В данной статье говорится о низкой водопотребности цементов, что практикуется в научных лабораториях ведущих научных центров и высших учебных заведениях мира, занимающихся исследованием минеральных вяжущих веществ и материалов на их основе, снижая выбросы углекислого газа в окружающую среду при Производство цемента, использование местного сырья и промышленных отходов в производстве цемента, химических добавок и механических. Ведется большая научно-исследовательская работа по эффективному использованию активации. В связи с этим актуальна разработка оптимальных составов энергоэффективных строительных материалов, маловодотребовательных вяжущих, позволяющих экономить портландцементный клинкер в производстве цемента, используя местное сырье и техногенные отходы, а также поверхностно-активные вещества. , в научных исследованиях, проводимых в этом отношении.*

Annotatsiya. *Ushbu maqolada dunyoning yetakchi ilmiy markazlari va oliy o'quv yurtlari ilmiy laboratoriyalarida mineral bog'lovchi moddalar va ular asosidagi materiallarni tadqiq qilish, atrof-muhitga karbonat angidrid gazining chiqishini kamaytirish bilan shug'ullanuvchi sementlarning kam suv talab etiladiganligi haqida so'z boradi. sement ishlab chiqarish, sement ishlab chiqarishda mahalliy xomashyo va sanoat chiqindilaridan foydalanish, kimyoviy qo'shimchalar va mexanika faollashtirishdan samarali foydalanish bo'yicha ko'plab ilmiy-tadqiqot ishlari olib borilmoqda. Shu munosabat bilan mahalliy xomashyo va texnogen chiqindilar, shuningdek sirt faol moddalardan foydalangan holda sement ishlab chiqarishda portlend tsement klinkeri tejamkorligini ta'minlash imkonini beruvchi energiya tejamkor qurilish materiallari, suvni kam talab qiluvchi bog'lovchilarning optimal kompozitsiyalarini ishlab chiqish muhim ahamiyatga ega. , bu borada olib borilgan ilmiy tadqiqotlarda.*

Keywords: *microsilica, low water demanding cement, mechanical character.*

Ключевые слова: *микрокремнезем, вяжущие низкое водопотребности, механик характер.*

Kalit so'zlar: *mikrokremnezyom, kam suv talabchan sement, mexanik xarakter.*

Introduction. One of the most common methods of changing the structure of cement is the introduction of highly active microadditives based on active amorphous oxides, which are included in composites - microsilica, metakaolin, etc. [1, 768-b].

In the initial research work discussed by Kokubu, partial replacement of cement with high quality fly ash was found to give good results.That is, when pure Portland cement was used to obtain the same 28-day strength concrete, when the large aggregates of cement were replaced with fly ash, the water content per unit volume was reduced relative to the volume of concrete.

The increase in long-term durability of fly ash concrete is mainly attributed to its smooth, spherical particles, as well as an increase in the proportion of paste. When Uchikawa reviewed the rheological studies of concrete with fly ash, particles of fly ash larger than 45 μm are unsuitable for mixing, but can be used after grinding it in a mill [2, 349 - b].

Methods. A comparative study of microsilica from 18 sources showed significant variations in material composition and properties. One of the microsilicas studied contains 23% SiO2 and a specific surface area of 7500 cm2/g. The same study showed that most glass-derived microsilica accounts for 98-99.5% of the total diffraction intensity and is located at 0.405 nm, which is considered glassy. The most common crystalline substances are KS1, quartz, metal and iron silicide. [2, 364-b].

The influence of rheotechnological parameters such as the type of low water-demanding cements, the amount of constituent components, the specific surface area, water demand on the bond strength is presented in Table 1.

Table 1: Mechanical characteristics and compositions of LWDC.

№	Composition of material %				Superplasticizer	Softness level M2/kg	Water requirement	Heat treatment R_c, kg/sm^2		Compressive strength of the sample hardened in natural conditions, R_c, kg/sm^2				LWDM
	Climker (%)	Barkhan sand, (%)	Microsilica, (%)	Gypsum stone (%)	JK-02%	M^2/kg		1 day		28 day		90 day		R_c (MPa)
								R_c (MPa)	R_b (MPa)	R_c (MPa)	R_b (MPa)	R_c (MPa)	R_b (MPa)	
1	95	-	-	5	-	3000	25	50.9	4.3	48.4	4.8	51.5	5.8	500
2	75	20	-	5	-	3000	26	40	4,2	38,7	4,1	40,6	4,5	400
3	70	25	-	5	-	3000	24	39	3,7	38,6	3,9	40	4,0	400
4	65	30	-	5	-	5500	24,6	38,3	4,3	37,4	4,1	50,9	4,4	500
5	65	25	5	4	1,0	6000	17	54,4	6,7	69	6,1	81,9	7,2	800
6	65	25	5	4	0,8	6500	18,5	55	7,1	68,7	7,4	82	7,8	800

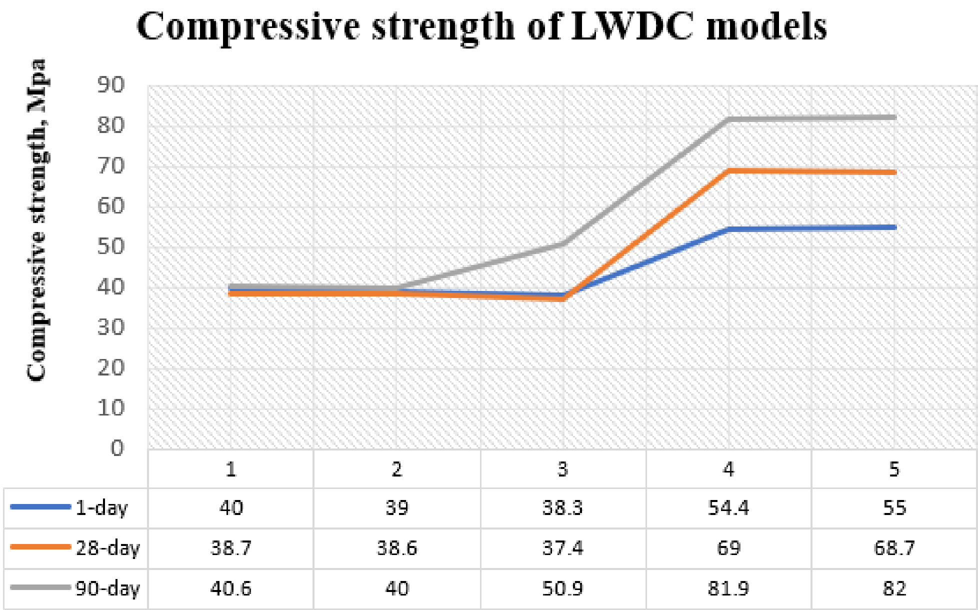

Figure 1: Compressive strength of LWDC.

Figure 1 illustrates the compressive strength of LWDC, which can be seen to be superior in comparison with ordinary Portland cement.

Tratteberg used microsilica as an admixture for cement and showed significant puzzolanic activity, mainly within 7–14 days of mixing with water, and found a probability correlation of about 1.1 between CH and reactant and Ca/Si. Some additional studies have shown that puzzolane reactions occur within a few hours, and at the same time the initial stage of alite hydration is accelerated.

X-ray phase analyzes show that the Ca/Si ratio decreases significantly with increasing microsilica content in C-S-H. For a cement product containing 30% crystalline slag surrounding the clinker grains, Regur et al found this ratio to be 1.70, while for a cement containing 25% slag and 5% microsilica it was 1.43. A similar decrease was observed for cements containing granular slag or fly ash. That is, the ratio of Ca/Si for cement paste hardened for 200 days is 1.3 and 0.9, respectively, this value is 13 and 28% in percentage. Uchikawa found a Ca/Si value of 1.43, with aluminum in large amounts, 0.33% Na20 and 0.32% K2O, and microsilica 10%. [2, 365-b].

Results and discussion. The authors showed that the new generation binders are a combination of cement clinker, silica-containing mineral substances (building sand, granular blast furnace slag, coal combustion fly ash, etc.) and a number of water-soluble organic substances. These include microparticles around hydration active particles of clinker minerals and other amorphous siliceous substances, their interaction with the dispersion medium. an example is the process of perfectly wetting the surface of the powder [3]. As a result, it is necessary to reduce the amount of water to obtain a dough of normal consistency. The maximum approximation of a portion of the dispersed phase to the volume unit creates special conditions for the occurrence of chemical and physicochemical processes [4]. In such conditions, the distance between the particles is minimal, as the particles of the dispersed phase are densely packed, and the empty space is filled. Ultrafine particles of the mineral additive interact with the hydrolysis of the alite phase - Ca (ON) 2, which leads to the formation of a dense structure and the synthesis of additional parts of low-base calcium hydrosilicates.

The authors show that the slow initial hydration of low-water-requiring cement promotes the formation of a cement stone structure that reflects the interlocking of multiple formations characteristic of low-base calcium hydrosilicates. At the same time, the reliable adhesion and binding of fine-fiber calcium hydrosilicates is achieved due to the maximum convergence of the solid phase with a low amount of dispersion medium. Microsilica low water demanding cement stone, especially with active silicate additives, has a much higher resistance to sulfate compared to ordinary cement stone. It is considered to be due to the formation of putzsolane reaction between SiO2 and lime and the decrease of their content over time.

Thus, the developed modern low-water cements differ significantly from traditional portland cements and can be the basis for creating a range of cements in terms of phase formation, structure formation, hardening kinetics, high density and sulfate resistance.

Superplasticizers are also called strong water demand reducers. The significant reduction in the w/c ratio they cause allows the production of high-strength concretes, especially if they contain microsilica. On the other hand, the use of superplasticizers at normal w/c makes it possible to obtain cast concretes that can be self-leveling and can be laid by such methods. Generally, admixtures that have a large effect on s/ts occur because they can be used in high concentrations (more than 1% by weight of cement) and do not cause additional retardation or air entrainment. Additives that reduce w/c when used in the same concentrations are the same as the level of water reduction achieved [2, page 419].

The reason for this is that the low amount of microsilica in the cement can lead to a decrease in the volume of free water in the system due to the interaction of microsilica with calcium hydroxide. As a result, the contacts of water bound by adsorption around the particles are weakened. In addition, a small amount of microsilicate is still not enough to obtain a continuous environment with a special complex, [5]

Further progress in concrete and reinforced concrete technology today is rightly associated with the development and introduction of complex chemical additives. Basically, we are talking about chemical control of concrete properties and technology. The introduction of small amounts of various chemical additives into the composition of the concrete mixture allows to change its rheological properties, strength and performance indicators of concrete and reinforced concrete in a wide range, [6]. The main purpose of this article is to determine the influence of concrete deformation characteristics on the basis of comparative results on the characteristics of concrete with superplasticizers, in order to correctly predict these characteristics and, if necessary, change them in the right direction. Obviously, the amount of mixing water should be increased to ensure good mobility of the mortar without the use of a superplasticizer. This solution primarily causes a loss of compressive strength at the age of 28 days, as well as an increase in the capillary porosity of the hardened solution due to the evaporation of excess water, which ultimately reduces its frost resistance, [7]. based on our research, we can say that the madrasa complex was started in the 19th century and completed at the beginning of the 20th century, we can see from the photos of 1872 that the madrasa had one floor before (photo 2);

Conclusion. It was determined that the change in the amount of microsilica in barkhan sand is a parameter that significantly affects the activity of LWDC. It was determined that there are effective aspects in obtaining, properties and production technologies of LWDCs based on barkhan sand microsilica additives. Based on the results of the analysis of the strength diagrams of the optimization of the composition of LWDC and finely ground cements, it was found that the most influencing factor on the strength of the binder is the amount of silica sand.

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