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Chemical and Physical-Mechanical Properties, Deficiencies and Ways to Overcome these Deficiencies of Silicate Brick

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Summary:

As a result of experimental studies, the factors influencing the mechanical strength of the product were identified, and their influence was studied.

Keywords: silicate brick, physical-mechanical, lime, physicochemical, hollow brick.

In recent years, due to the need to meet the demand for construction materials, the development and industrial implementation of technology for the production of silicate bricks with improved operational properties, which allows to obtain them relatively cheaply and in a short time on the basis of common raw materials. remains one of the most pressing issues.

Silicate brick-building material is similar to ordinary baked brick in terms of appearance and size. The composition is mainly made of a mixture of quartz sand (90-92%) and slaked lime (8-10%), not from healthy soil. Silicate bricks, not baked in jars, are pressed at high pressure (up to 200 atm.) And then solidified in autoclaves at a pressure of 175 °C in steam at a pressure of 8 atm. Color - light gray, size 250x120x88(mm), density 2780-2800(kg/m³). Like ordinary bricks, it is used only to restore the load-bearing walls and columns of buildings. Silicate bricks are smooth and beautiful and do not require polishing.

In the study of physico-mechanical, decorative-technical and operational features of silicate bricks, modern physicochemical research methods were used and the following results were obtained. According to them, the average compressive strength of brick samples is 50.07 MPa.

1 Table
The limit of mechanical strength of hollow silicate brick to compression.

No	Sample dimensions, mm	Press rate, kG	Mechanical resistance to compression limit, MPa	The limit of mechanical strength to compression average value, MPa
1	250x120x88	166400	31,50	30,00
2	250x120x88	156200	27,50	
3	250x120x88	157300	28,00	
4	250x120x88	159800	28,50	
5	250x120x88	159700	29,00	
6	250x120x88	165600	31,00	
7	250x120x88	166600	31,50	
8	250x120x88	166100	30,00	

2 Table
The limit of mechanical strength of hollow silicate brick against bending.

№	Sample resolution, mm	Pressure index, kg	The limit of mechanical strength with respect to bending, MPa	The average value of the limit of mechanical strength relative to bending, MPa
1	250x120x88	780,00	21,06	19,47
2	250x120x88	635,18	17,15	
3	250x120x88	674,81	18,22	
4	250x120x88	710,37	19,18	
5	250x120x88	708,88	19,14	
6	250x120x88	790,00	21,33	
7	250x120x88	692,59	18,70	

One of the important properties of the specimens in the experiments is its limit of mechanical strength against friction, and according to the test results given in Table 3, its average value is 0.49 g / cm².

3 Table
The limit of mechanical strength of hollow silicate brick against friction.

№	Sample resolution, mm	Mechanical strength limit against friction, g / cm ²	The average value of the limit of mechanical strength with respect to friction, g / cm ²
1	250x120x88	0,81	0.85
2	250x120x88	0,82	
3	250x120x88	0,81	
4	250x120x88	0,90	
5	250x120x88	0,88	
6	250x120x88	0,87	
7	250x120x88	0,86	
8	250x120x88	0,89	

The physical properties of the samples were averages of the results obtained in Table 4 for the study of their water absorption, frost resistance and density, indicating that these properties meet the requirements of the relevant State standards.

4 Table
Physical properties of hollow bricks.

№	Indicators	The average values obtained
1	Number of bricks taken from 1 batch, pcs	8
2	The color of the brick	Light Grey
3	Brick size, mm	250x120x88
4	Density, kg/m ³	2780-2800
5	Water absorption, %	9.0
6	Frost Resistance, cycle	35

Lime-slag and lime-ash types of silicate bricks are also produced, which differ from ordinary silicate bricks by their low density and good thermal insulation properties. Therefore, along with quartz sand, chemical industry ashes and metallurgical slag are also used. Silicate brick belongs to the group of autoclaved binding materials and is widely used in the assembly of wall columns of civil and industrial buildings. However, it should not be used near the foundations of buildings, pots, high temperatures, acidic and aggressive groundwater.

Silicate brick is an environmentally friendly product, which has the following advantages over clay soil brick in terms of technical and economic performance. It takes 15-18 hours to produce one brick, and more than 5-6 days to produce clay bricks. This leads to a doubling of labor, energy consumption and a 15-40% reduction in body cost. However,



silicate bricks have lower fire resistance, chemical resistance, frost resistance, resistance to aqueous environment, and higher thermal conductivity and density. The use of silicate brick in a humid environment leads to a decrease in its strength. Silicate bricks are produced in the following sizes 250 * 120 * 65 mm, 250 * 120 * 88 mm. Production of high quality and lime-sand, lime-ash and colored silicate bricks in accordance with the requirements of consumers is based on standard requirements.

The construction of new buildings on the basis of special coloring pigments is the basis for the production of different types of silicate bricks. There is a number of data in the scientific literature that focus on the production of colored silicate bricks. These data discuss the applicable colorants and methods of their use.

Silicate brick is a composition of sand and lime obtained by hydrothermal treatment of the molded mass in an autoclave. At present, Uzbekistan produces more ceramic bricks without gaps. However, it should be noted that the raw material resources for ceramic baked bricks in Uzbekistan are practically depleted, as a very large area of clay soils is occupied by cotton and other agricultural crops.

In the Republic of Karakalpakstan, as well as in Navoi, Bukhara and Khorezm regions, the reserves of barkhan sand are unlimited [10], while the production of building materials with the effective use of barkhan sand is a modern requirement, while there is a significant shortage of other raw materials.

The use of industrially produced silicate bricks in construction works is characterized by low bonding strength due to the very smooth surface of the bricks when laying the walls on their basis. Therefore, it is noted that buildings made of silicate bricks do not meet the requirements set out in the construction regulations No. 01-03-1996 for seismically active zones.

In order to eliminate these shortcomings, practical research was carried out at the Urgench Building Materials Plant in 1990-1998, and at the "Koshkopir Silicate Brick Plant" in 2005-2013 for the production of hollow silicate bricks with 11 and 8 holes. test specimens of hollow silicate brick were obtained. However, due to the roughness and sharp edges of the sand particles in the mass of this type of brick, the molding tool was quickly destroyed and out of order, and its frequent replacement was considered inefficient. There is a number of data in the scientific literature that focus on the production of colored silicate bricks. These data discuss the applicable colorants and methods of their use.

One of the main problems in the production of hollow silicate bricks, which have improved quality and insulation properties, is the rapid wear and tear of the molding plates. There are a number of resources available to address this issue. These sources focus on issues such as pressing devices, their operating principles and ways to increase the efficiency of the pressing process, the mechanism of decomposition of pressing plates. However, these sources pay little attention to the roughness of the sand grains and their reduction. In our analysis, there is almost no information about this.

In addition, a number of practical steps have been taken to develop, improve and widely apply the technology of obtaining silicate bricks on an industrial scale. In particular,

1. It was noted that in the system of "lime-sand" in the production of silicate bricks it is possible to reduce the degree of roughness of barkhan sand by applying the method of mechanical activation. Scientifically based methodological principles of obtaining solid silicate bricks in an autoclave with high technical and operational properties by purposefully changing the kinetics and mechanism of interaction of components in the process of hydration of the raw material composition in the autoclave developed.
2. Studies have shown that the silicate brick facilitates the molding process by adding local sandy loam soils subjected to wind erosion (5-6%), and the roughness of the composition is reduced by 2-3 times. According to the results of the experiment, lightweight brick samples (1 brick sample -3.8-4.1 kg); mechanical strength - 29.5-30.50 kg / cm²; density 2750-2800 kg / m³; color - gray; a product with a water permeability of 9-11% was obtained.
3. As a result of experimental research, the factors influencing the mechanical strength of the product were identified and their effects were studied. The mechanical strength of the product is positive depending on the fineness of the binder used (surface area 6820 cm³ / g) and the amount of binder, the shape of the applied sand grains with a round flat surface and the moisture content of the mold 6% the result can be achieved.
4. On the basis of common raw materials - barkhan sands the technological scheme of production and technological regulations of production of low-cost building materials which can fully meet the requirements of seismic tolerance to the building code No. 01-03-1996 is developed. The results of the laboratory tests were tested at the "Koshkopir Silicate Brick Plant" LLC and the relevant act was issued and recognized as a cost-effective development.



REFERENCES

- 1)Bojenov P.I. Technology of autoclave materials. L. : Stroyizdat, 1988. - 367 p.
- 2) Krasnyy I.M. Dense lime-sand and cement-sand autoclaved concrete. 1998 112-p
- 3) R.A.Rakhimov Silicate materials"
- 4) . Gulnova L.G., Torchinskaya S.A., Skatinsky V.I. Colored silicate materials and autoclaved products. -Kiev: Gosstroyizdat, 1957.116 p.
- 5) Trotsko T.T., Baranovsky V.B. Colored silicate brick. -Kiev: Bud1velnik, 1977.87 p.
- 6) Madaminov D.Q. Creating a scientific basis for the production of small silicate bricks. Dissertation for an academic degree. Urgench 2015



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