GIPS BOGLAYICHALAR ASOSIDA ENERGIYA SAMARALI VA EKOLOGIK QURILISH MATERIALLARINI ISHLAB CHIQARISHDA INNOVATSIYANING MUHIMLIGI

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ВАЖНОСТЬ ИННОВАЦИИ В ПРОИЗВОДСТВЕ ЭНЕРГОЭФФЕКТИВНЫХ И ЭКОЛОГИЧНЫХ СТРОИТЕЛЬНЫХ МАТЕРИАЛОВ НА ОСНОВЕ ГИПСОВЫХ ВЯЖУЩИХ

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THE IMPORTANCE OF INNOVATION IN THE PRODUCTION OF ENERGY-EFFICIENT AND ENVIRONMENTAL BUILDING MATERIALS BASED ON GYPSUM BINDERS

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Annotation: Development of energy-efficient and environmentally friendly building materials based on composite gypsum binders in the creation of new industries for the production of energy-efficient and environmentally friendly building materials

and products, structures associated with the use of new building technologies, i.e. innovations that require significant investment.

Key words: gypsum, chemical composition, constructing buildings, products, Global Innovation, industry, developing.

The action strategy for the development of the new Uzbekistan for 2022-2026 identifies the most important tasks, such as “taking measures to increase by 20 percent the energy efficiency of the economy by 2026 and reduce the emission of harmful gases into the atmosphere by 20 percent through the introduction of green economy technologies” in all spheres ... "[1]. For the implementation of such large-scale tasks, including the development of energy-efficient and environmentally friendly building materials based on composite gypsum binders with a predetermined set of properties, it is considered one of the most necessary.

In the modern construction of Uzbekistan, the share of materials, products and structures is growing, the use of which will save energy resources, improve environmental performance, and raise standards of social protection. Such requirements are fully met by the issues of construction and products based on gypsum raw materials produced in the republic: dry building mixtures, drywall and dry fiber, etc. The extraction and processing of gypsum raw materials in Uzbekistan is only 0.3 million tons, 13 kg / person per capita. The production and consumption of gypsum materials is only 7.2 million m^2, which is much higher than the use of gypsum materials in developed countries.

On the territory of Uzbekistan, 8 types of gypsum raw materials are being studied.

In terms of raw materials, Uzbekistan is a leader in the production of building materials among the republics of Central Asia. The reserves of natural gypsum raw materials for the production of building materials, products and structures amount to 79 million tons, the service life is 254 years. According to the Committee of Geology and Mineral Resources of the Republic of Uzbekistan. and other sources [2]

Approximately the amount of natural gypsum raw materials is available in the Ferghana Valley, Bukhara, Kashkadarya, Surkhandarya, Samarkand regions. Gancha district is located in Jizzakh, Syrdarya regions and Karakalpakstan. Mamazhrattinskoye - Bukhara region - 46.2 million tons and Zaraylikkuchok - Samarkand region - Samarkand region - 18.9 million tons. Thus, surface raw materials are quite common and quite ubiquitous.

The chemical composition of Bukhara and Samarkand gypsum is given in the table. Most of the gypsum raw materials have a high content of two-wheel sulfate - CaSO4 * 2H2O.

[1] Decree of the President of the Republic of Uzbekistan No. UP-60 "On the

Development Strategy of the new Uzbekistan for 2022-2026" dated January 28, 2022

Table 1

The chemical composition of gypsum stone

Content, %							
CaO	MgO	SO_3	H_2O	R_2O_3	O2	Insoluble residue	$CaSO4*H_2O$
Zirabulak-Kungurtau-Samarkand region							
30,97-32,92	0,0-1,32	41,26-46,6	18,44-20,82	0-1,42	-	0,2-7,24	95,0-98,0
Mamajurganty-Bukhara region							
31,84-32,85	0-0,62	40,68-46,31	20,69-21,24	-	0,1-1,48	0-2,4	90,04-99,57

Currently, gypsum binders (grades G6 - G7) are used in a fairly large volume for decorative purposes, in particular, finishing material, carving on ganch and alabaster, molding and traction, cornices, as well as stalactites. Anhydrite binders are currently not produced. The climatic conditions of Uzbekistan favor the use of such gypsum materials.

JSC "Uzstroymaterialy" since 2002 began work on attracting investments to organize the production of gypsum boards with the world-famous German company "Knauf", which bought a controlling stake in OJSC "Bukharagips". Since 2005, Knauf has been actively developing the gypsum industry in Uzbekistan. The investment obligations of the foreign investor include the modernization of quarry equipment, the organization of the production of high-quality building gypsum, dry mixes, and in the future, in addition to the above obligations, the organization of the production of complete Knauf systems.

There are 15 enterprises operating in the republic with a capacity of about 38 million m^2 of drywall per year. This year, it is planned to launch the production of drywall by the Knauf company in Bukhara with a capacity of 20 million m^2 per year.

Today, there are more than 40 enterprises for the production of dry building mixtures in the republic, which produce about 20 types of products with a total capacity of 185.5 thousand tons per year.

When designing and constructing buildings and structures in seismic areas, it is necessary to comply with the general principles for ensuring seismic resistance and their main structural schemes, taking into account the building materials used, in particular gypsum materials, products and structures. One of the principles that provides a reduction in seismic load is achieved by reducing the mass of the structure,

through the use of lighter and more efficient building materials and the choice of a structural scheme with optimal dynamic stiffness and attenuation.

Currently, effective earthquake-resistant building materials are load-bearing or enclosing lightweight wall materials.

Gypsum partitions are produced in small quantities for use as non-load-bearing internal walls (interroom and inter-apartment partitions, as well as partitions separating living quarters from corridors, halls, etc.) in rooms with normal temperature and humidity conditions and a non-aggressive environment .

Partitions of greater length are made of separate sections (no more than 6 m) and vertical load-bearing reinforcement elements (made of metal, concrete and other materials) securely connected to the load-bearing structural elements of the structure. Partitions are attached to each other and to the structures of buildings using metal joints. Such gypsum structures are designed for seismic regions of 7-9 points [4].

Today, the construction market of the republic is saturated with almost all types of domestic and imported building materials. If the share of exchange sales of building materials as a whole over the past few years has remained approximately at the same level, then the volume of their sales in absolute terms, as well as their range, is constantly growing. The volume of sales of building gypsum and other types of building materials has significantly increased on the exchange market.

Taking into account the need for building materials in large volumes at a relatively low cost, rising energy prices and, as a result, the transportation of materials from the manufacturer to the consumer, researchers should increase their attention to the use of local raw materials, direct their efforts to create installations not ¬high capacity, which will reduce the service radius of this enterprise and potentially increase the efficiency and competitiveness of the development. This approach is especially important for the conditions of Uzbekistan, since about 60% of the country's population are rural residents.

In the conditions of the modern increase in prices for energy carriers, when assessing the efficiency of the production of building materials, their energy intensity becomes the main criterion. Comparison of energy consumption for the production of some binders given in Table. 2 and 3 shows that the energy intensity of gypsum binders is much less than the energy intensity of lime and cement.

Similar calculations for binders made in Germany are presented in Table. 2.

Table 2

The main indicators of specific energy consumption in the production of binders

Astringent	Consumption per 1 ton of binder		
	Raw materials, t	Fuel, kg fuel equivalent	email energy, kWh
Portland cement M 400	1,6	150	108
Lump lime	1,7	125	15
Building gypsum	1,25	40	2,5

Table 3

Relative energy costs for obtaining binders

Binder	Energy costs,%
Cement	100
Quicklime	95
Slaked lime	75
Gypsum binder	2
Anhydrite binder	10

It should be noted that the calculation of energy intensity does not take into account the costs of extraction and preparation of raw materials, which require appropriate arrangement of quarries, providing them with energy, equipment and workers. Thus, in the US cement industry, up to 10% of all labor costs for the production of cement are energy and labor costs necessary to transport raw materials to the place of manufacture of binders.

Table 4

Average specific energy consumption for the production of small-format wall materials (including material preparation)

wall building material	Energy consumption	
	J/1000 pcs.	%
Brick	8,84	100
Silicate brick	3,59	41
Hollow brick made of lightweight concrete on Portland cement	2,8	32

Aerated concrete brick	2,8	32
Wall gypsum stone:		
with natural drying	2,65	30
with artificial drying	5,5	62

Of particular interest are data on energy consumption for the production of wall materials using various binders (Table 4).

In the Republic of Uzbekistan, large-scale measures are being taken to modernize, technically and technologically upgrade the construction industry, reduce the energy and resource intensity of building materials production, and widely introduce resource- and energy-saving technologies into the construction industry.

In the resolution of the above head of state, special attention is paid to improving the quality of human capital, which is an important factor determining the level of a country's competitiveness in the international arena and innovative development. That is why the main goal of the strategy is the development of human capital, and its main task is to enter Uzbekistan into the top 50 leading countries of the world according to the Global Innovation Index by 2030.

In conclusion, it is necessary to dwell on the importance of innovation in the field of creating new industries for the production of building materials and products, gypsum-based structures, as well as those associated with the use of new building technologies, i.e. innovations that require significant investment.

On the basis of advanced foreign experience, the ministry seeks to introduce innovations in all areas. Specialists assist in finding investors, give advice on all matters related to innovation. In a word, today innovative activity in Uzbekistan is not limited only to the creation of innovations, but also implies the adoption of the necessary measures for the even wider use of best practices, the creation of modern conditions for ensuring the prosperous life of our people, and raising the status of our Motherland in the world.

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