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# BASALT FIBER MATERIALS AND THEIR APPLICATION IN MODERN CONSTRUCTION INDUSTRY

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***Abtract.*** *The article analyzes basalt fiber materials and their application in the modern construction industry.*

***Keywords:*** *building, construction, new types of building materials, basalt fiber material, basalt reinforcement, heat-insulating material, basalt thermal insulators.*

## INTRODUCTION

Today, buildings and structures around the world are being built in a quality, versatile, energy-efficient way using innovative, new types of building materials. In particular, in recent years in developed countries, many construction products are used, such as aerated concrete, foam concrete, heat-insulating materials. The world experience is used in our country as well. Urban standards have been developed for the use of thermal insulation materials in the construction of buildings and structures. Two types of heat-insulating materials are widely used in our country: glass and basalt fiber.

Demand for this building material is growing every year. If we look at the figures, in 2016 the country produced 12.1 thousand tons of heat-insulating material, and by 2019 this figure was 13.5 thousand tons.

## MATERIALS AND METHODS

In order to provide not only the local but also the world market with this type of products, to build new industrial enterprises in this area, the Association "Uzpromstroymateriallari" is implementing many major investment projects in cooperation with regional administrations and commercial banks.

Basalt-based heat insulators are made of basalt fibers. Basalt heat insulators not only save heat, but also make soundproof and fireproof. The product does not require special care: it is chemically resistant and designed for long-term use.

Basalt is the most common useful rock on Earth, and as a natural rock it is dark gray or black in color, and sometimes green in color, indicating that it is secondaryly altered. Basalt has many advantages, the most important of which are:

- can be used to protect buildings from street noise due to its high noise absorption;
- has a high vapor permeability, which allows it to be used in various production technologies;
- has high temperature resistance and can be used in the construction of thermal devices;
- environmentally safe and therefore has no impact on human health;
- high strength compared to other building materials, steel fittings;
- retains heat well, so buildings can be widely used as heat-insulating building materials;
- can be used in buildings made of flammable materials due to its fire resistance;
- does not electrolyte due to its mineral content;
- Lifetime service life is continuous.
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For information: In December 2017, a basalt plant for the production of basalt fiber and fittings was launched in Jizzakh and established by the joint venture MEGA INVEST INDUSTRIAL.

**RESULTS AND DISCUSSION**

This is the first plant in Uzbekistan to produce basalt fittings. The area of the plant, which employs 200 people, is 10,000 square meters. The production capacity is 3,000 tons of basalt fiber per year. Since February 2018, the plant has produced 720 tons of fittings.

80% of basalt fiber is used for the production of fittings, the remaining 20% is used for the construction of other products needed for construction. The investment in the basalt plant amounted to $ 54 million.

Two of the three existing basalt deposits in Uzbekistan are located in the Jizzakh region, where the plant was built. "The production of high-quality basalt fittings with unquestionably innovative features corresponds to these features with their own characteristics."

Basalt reinforcement is actively used in modern construction and has unique properties - 4 times lighter and 3 times stronger than steel reinforcement. Basalt fittings do not absorb moisture, do not corrode, do not conduct electricity and have a very low thermal conductivity.

Innovative development of the construction materials industry should cover all aspects of the production of building materials. In particular, the development of human capital, focusing on increasing the number of employees who actively disseminate innovations in enterprises is an urgent task.

**There are many areas where thermal insulation can be used:**

• Roof insulation;
• Insulation between floors and floors;
• Insulation of building facades;
• Insulation of ventilation ducts;
• Insulation of ceilings and walls of kindergartens;
• Insulation of the middle of the rooms;
• Insulation of cooling walls;
• Thermal insulation of sandwich panels;
• Industrial equipment, etc.

The main advantages of basalt-based heat insulators:

• Excellent thermal insulation;
• Belonging to a class of non-combustible materials (NG);
• Soundproofing;
• be able to serve for more than 50 years;
• Quick to install, easy to cut and easy to assemble;
• Resistant to mold and bacteria;
• Environmental and hygienic safety.

Advantages and disadvantages of the material

**The advantages of using basalt fiber materials are determined by their properties, including:**

• non-flammable (high melting point - 1114 degrees);

• absence of harmful smoke and fumes when heated to a critical temperature (basalt is a natural stone and is neutralized or not used at all during the production of phenol-formaldehyde resin in certified materials);

• vapor permeability (0.3 - 0.6 mg / m * h * Pa);

• hydrophobicity (basalt insulation does not absorb moisture from the air);

• no contraction;

• vibration resistance;

• increase the range of applications of wide-density, fire-resistant material;

• resistance to acid-base environment;

• high strength (slabs with a capacity of 80 kPa are produced, their deformation during compression does not exceed 10%, such material can be used for external insulation of exploited flat roofs);

• good soundproofing (due to the soft fibrous structure of basalt fiber wool);

• excellent thermal insulation (from 0.034 to 0.048 W / m * S);

• small dead weight and thickness (basalt insulation does not load protected structures).

In certain circumstances, some of the advantages seem to be disadvantages. For example, according to European standards, construction is made of vapor-proof materials. And for wooden architecture, brick, foam and aerated concrete construction, by contrast, it is important that the vapor permeability of the insulation is higher than the same performance of the walls.

In addition, hydrophobicity only spreads to moisture in the air. If water falls on the surface of rock wool, it is successfully absorbed.

**CONCLUSIONS**

The same goes for condensate. Therefore, if a dew point can occur, the basalt insulation should be insulated with a vapor-proof film near the wall.

Disadvantages also include high dusting during operation, poor adhesion to the adhesive, and the need to use expensive vapor-permeable paints. In addition, the release of formaldehyde vapors should be expected when cheap material modifications are used.

In short, the production of modern new types of building materials to ensure their competitiveness, filling the market of building materials with all kinds of materials, modernization of enterprises of the construction materials industry, technical and technological re-equipment in the Republic. being increased.

***List of used literature***

**1.** Shevchenko V.P., Tokunov S.G., Gulamova D.D., Kim R.B., Turdiev D.Sh. Obtaining and research of properties of basalt fiber based on natural raw materials of Uzbekistan, Chemistry and chemical technology, Tashkent, 2011, No. 2, pp. 10-12.

**2.** V. Fiore, T. Scalici, G. Di Bella, A. Valenza, A review on basalt fiber and its composites, Composites Part B: Engineering, Volume 74, 2015, pp. 74-94, https://doi.org/10.1016/j.compositesb.2014.12.034.

**3.** J. Sim, C. Park, D.Y. Moon. Characteristics of basalt fiber as a reinforcing material for concrete structures. Compos Part B, 36 (2005), pp. 504-512.