

Determination of Properties of Finishing and Heat Insulation Materials on External Walls

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Annotation

In this article, the average density of thermal insulation materials and thermal conductivity coefficient of exterior walls of buildings are considered.

Today, the construction of energy-efficient houses, the use of environmentally friendly materials in construction is one of the global issues. It is no secret that natural gas and oil reserves are decreasing. Conservation of natural resources, their rational use is the impetus for conducting various researches in the field of construction. In addition, in our republic, the use of local energy-saving building materials in housing construction is considered convenient in every way.

Construction of many new residential buildings, industrial enterprises, agricultural products processing and storage enterprises in our republic increases the demand for modern, energy-saving heat-saving, light and cheap construction materials. Production of such construction materials and products using local raw materials and secondary resources is one of the urgent tasks. In the decision of the President of the Republic of Uzbekistan dated May 23, 2019 No. PQ-4335 "On additional measures for rapid development in the construction materials industry". During the meeting of the President with industry experts, instructions were given to reduce costs by introducing energy-saving technologies in the building materials industry. In 2019-2025, the production of aerated concrete blocks is set to increase by 7 times. [1]

Vermiculite concrete. Multiplied vermiculite - natural rock vermiculite is obtained by baking and multiplying at a temperature of 900-11000C. Due to the fact that the volume of such fillers increases 10-20 times during heat treatment, the pile density is very small. The average density of expanded vermiculite is from 80 to 400 kg/m³, depending on the size of the granular particles, and the thermal conductivity is from 0.05 to 0.9 W/m0S. Expanded vermiculite grains are divided into 2 fractions according to their size: small - from 0.15-0.25 to 3 mm and large - from 3 to 10-15 mm. Expanded vermiculite by volume weight is divided into the following brands: 100, 150, 200, 250 and 300. Expanded vermiculite grains have a large deformation: they are slightly compressed, as a result, vermiculite becomes denser. Accordingly, expanded vermiculite at rest, as a rule, does not sink in heat-insulating building structures. Vermiculite volume weight and grain strength depend on its cooking and cooling conditions: when vermiculite is heated to 700-800 0C, the grain strength decreases. Expanded vermiculite is a heat-insulating material characterized by its high porosity, lightness and certain temperature resistance.

Aerated concrete is a type of cellular concrete, a building material, an artificial stone with uniformly distributed spherical closed pores with a diameter of 1-3 mm. In the preparation of aerated concrete products, cement, quartz sand, special gas-generating additives are added, and in some cases, gypsum, lime, industrial waste ash and slag are added to the mixture. Aluminum powder produced in 4 different types (GOST - 5494-71) is used as a gas generating substance in aerated concrete and gas silicate concrete. In the production of aerated concrete, PAK-3 or PAK-4 gas generators are used, which contain 82% active aluminum and have a softness level of 5000-6000 cm²/g. The amount of aluminum powder is 0.25-0.6 kg/m³, depending on the density of aerated concrete. [2]

In the production of aerated concrete, the mixture is prepared in a very liquid state (water hardness ratio is in the range of 0.4-0.43) and the mixture is prepared with a high rotation of the shafts in the mixer (about 1000 rpm). In such conditions, the mixture prepared in 1-2 minutes is formed in the desired thickness. The amount of additives is as follows for aluminum powder D600: from 0.06 to 0.07% of the weight of dry components, PAV of the powder - 5%, and the remaining amount of additives was taken by the weight of cement. Polystyrene concrete. Waste polystyrene foam is one of the products that provide heat and noise insulation in construction. The use of this product in the construction industry not only solves environmental problems, but also ensures high profitability of the processing industry.

Scientific studies were carried out in the processing of binders and foam plastic waste and in the division of the interior of the building into rooms. Polystyrene waste is collected, processed, crushed and mixed into binders, but a homogeneous block is not obtained.

Thermal insulation materials. Table 1

Materials types	Average density, kg/m ³	Compressive strength, МПа	Calculated thermal conductivity, Вт/м* ⁰ С
Polystyrene concrete	270-500	0,75	0,10
Vermiculite concrete	300-500	0,85	0,11
Aerated concrete	500-700	0,95	0,13

Decorative materials used for walls. Table 2

Types of materials	Average density kg/m ³
Travertine	2100
Marble	2500
Granite	2650

Ceramic tile	1950
Artificial marble	2700

Due to the low cost of raw materials in the production of polystyrene blocks, the cost of the product is low compared to other similar products. Also, the advantage of polystyrene product is its ability to keep hot and cold well. Basically, these blocks can be used in the construction of non-load-bearing walls to separate the interior rooms of the building. With the production of polystyrene blocks, it is possible to save the environment and obtain cheap building material through the processing of waste.

The results of the study were that we kept the crushed pods in water for 24 hours and got the result. In order to reduce the time of storage in water, we used an air vacuum (air was sucked from the container with the pods and water was added), as a result, a pod with a weighted size was obtained in 30 minutes. Mechanical processing of polystyrene products is cost-free and harmless to the environment. Construction gypsum begins to harden in 3 minutes after mixing with water. Such a short time in the preparation of polystyrene blocks accelerates the production scale, after the mixture is ready, it is poured into corrosion-resistant molds. In this process, the inside of the mold is covered with moisture-proof paper. Papers increase the block's exposure to moisture. In the process of preparing the mixture due to the different volumetric mass of binders and crushed polystyrene in the production of polystyrene blocks, the problem of polystyrene granules floating on the surface of the mixture appeared. To solve this problem, it is necessary to form a mass of the same composition and pour it into molds. Due to this, the polystyrene granules were soaked in water, and as a result, when mixed with plaster or cement, the expected result was achieved.



a) b) c)

Figure 1. Examples of determining the properties of heat-insulating materials. a) polystyrene concrete. b) vermiculite concrete. c) aerated concrete.

After the polystyrene block samples obtained in the experiment were dried, the light weight (270-500 kg/m³), compressive strength showed satisfactory results. In the course of the work, the manual immersion of polystyrene granules in water reduced the efficiency.

In short, by using the above modern materials, it is possible to reduce the construction time of high-quality buildings, to achieve great results in a short period of time, to achieve economically cheaper buildings and structures, to ensure the extension of the life of the building, and at the same time to meet the internal and external requirements of the building. provides optimal options for completion.

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