

# USE OF CONSTRUCTION MATERIAL WHICH MADE ON THE BASE OF EXPANDED VERMICULITE AND ITS ADVANTAGES

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## Abstract

This scientific article provides information on the advantages of using vermiculite and products derived from it, which are becoming more and more important in the building materials industry, and the expected results during their use.

**Keywords:** Vermiculite, filler, Vermiculite plates, heat insulating material, construction, fire safety.

## Introduction

According to the decision of the President of the Republic of Uzbekistan dated May 23, 2019 "On additional measures for the rapid development of the construction materials industry" No. PQ-4335, on the production and export of competitive products in our Republic Systematic work is being carried out to deepen structural changes in the building materials industry aimed at ensuring stable growth, as well as modernization of enterprises, technical and technological updating. Today, there are many types of materials that provide heat and sound insulation. It can be mineral wool, expanded clay and in some cases foam. Another modern material used to decorate buildings is vermiculite. Vermiculite is a silicate rock, a close relative of mica, which is distinguished by a higher content of water molecules in the crystal lattice. In its natural state, the stone has a high density and hardness, but it is easily stratified.

A temperature above 1350 degrees is required to melt vermiculite. However, only when heated to 900-1000 degrees, interesting changes occur with the mineral: it splits into thin plates, which become larger and increase in size by 20-25 times. As a result, vermiculite breaks into particles in the form of very porous, worm-like plates. Expanded vermiculite is produced on the basis of GOST and has the following characteristics: Total capacity,  $\text{kg/m}^3$  - 90-200 (depending on fraction); thermal conductivity 25 °C,  $\text{Wt/MK}$ -0,053-0,0698; melting temperature; 1350 °C Application temperature from; 260 to + 1250 °C. Sound absorption at 1000 Hz.

The density of the expanded vermiculite is very low ( $60\text{-}130 \text{ kg/m}^3$ ), much lower than water ( $1000 \text{ kg/m}^3$ ) and its air-filled structure allows the material to be used as an excellent heat insulator. The advantages of the material as an insulation, the main advantage of expanded vermiculite is its low thermal conductivity, which is only 0,046-0,056  $\text{Wt/m}^\circ\text{C}$ , depending on the fraction, and is comparable to the same parameter of mineral wool or foam. In addition, many of its other features are quite good. It works well from plus 900 to minus 200 degrees.



The material does not burn, even melted vermiculite does not emit harmful substances into the air, for this it must be heated to a high temperature of 1000 °C. Therefore, it is used to organize the passage of stove and fireplace pipes through roofs and ceilings.

Vermiculite granules, despite their softness and porosity, are very resistant to load and vibration. The material does not react with alkalis, acids and other aggressive substances used in construction, does not disintegrate under their influence. Vermiculite retains its properties throughout its life. Vermiculite does not contain harmful substances, it is not a toxic material. There are 3 ways to use vermiculite in construction: as a filler; for a special construction mixture; for the production of plates and other building elements.



**Picture 2. Use of expanded vermiculite in hollow products**

In the case of ceilings and roofing structures under vermiculite, a vapor barrier is laid on the subfloor or lining, and a waterproofing membrane is closed on top of it. The voids formed during the construction of frame walls or brick well walls are filled with vermiculite. will be done. It is also used to fill the gaps of hollow wall blocks.



**Picture 3. Golden colored expanded vermiculite and vermiculite boards based on the basis of expanded vermiculite**

Structures insulated with vermiculite perfectly absorb both impact and air noise. The sound absorption coefficient of the material is 0,56-0,8 and depends on the size of the fraction. Not



only mass vermiculite, but also construction plates produced on its basis have the ability to suppress sound waves.

Vermiculite boards have become popular for their properties, including fire safety. It's no secret that the requirements for fire safety regulations increase over time. This is especially true for crowded places like supermarkets, medical facilities, schools, etc. Ready boards based on vermiculite, characterized by high heat resistance, are mainly used for fire protection of various designs: metal fireplaces and stoves; engineering communications; equipments.

They cover escape routes and buildings with high requirements for fire safety. Vermiculite boards are a modern material with many advantages, which allows it to be used in various fields of activity. The main advantage of this material is its high resistance to high temperature and open flame. It is a completely environmentally friendly material of natural origin, which undergoes only the firing process from the moment of extraction to the stage of readiness. Vermiculite is absolutely harmless to the environment and the human body, alternative materials with similar properties cannot "boast". With all this, vermiculite boards have unrivaled fire resistance. For example, depending on the thickness, vermiculite slabs have the following characteristics.

Vermiculite boards are superior to other fireproofing materials in terms of fire resistance. In addition, they have excellent heat retention and sound insulation properties. Vermiculite plates are used for fire protection of reinforced concrete, steel and wooden structures, as well as cable tracks. Vermiculite material in wall structures is used as a means of preventing overheating of buildings in hot climates, and in northern regions for heat storage, insulation of cooling chambers and vaults of Marten furnaces, as well as sound insulation of test chambers of aircraft and automobile engines.

Vermiculite is available in the form of discrete fractions, the size of which does not exceed 4 mm (in the form of filling). On their basis, building plates of the 500 air defense type with a thickness of about 20-60 mm and dimensions of 600x600 mm (1200x600 mm) are produced. In the assortment of this material, the following five standard sizes of vermiculite products can be distinguished: 1200x600x20 mm, 900x600x20 mm, 600x600x20 mm, 600x300x20 mm and another atypical size 300x300x20 mm.

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