

impact method [2]. The aim of the research was to assess the usefulness of the test results carried out according to the EN ISO 11343 standard for the evaluation of the resistance to dynamic loads of the adhesively bonded structures. The results of experimental tests and numerical calculations show that the impact strength of adhesive joints determined according to EN ISO 11343 is correlated with the tensile strength of adhesives (adhesives with higher strength are characterized by greater impact strength) and does not depend on the stiffness of the adhesive, which significantly affects the impact strength of block and lap connections. The test results largely depend on the properties of the material from which the adhesively bonded adherends are made (Young's modulus, yield point and strengthening modulus) and the thickness of the sheets. In the adhesive layer of the adhesive joint loaded according to EN ISO 11343, practically only normal stresses occur, of which, perpendicular to the joint surface, are close to the maximum principal stresses. Therefore, the results of such tests are of limited use for the analysis of the dynamic load resistance of adhesively bonded structures, where the joints are usually subjected to shear loads.

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ACEX186

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Preparation of Sintered Light Termoperlites for Application in Construction

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The state of energy production and consumption in Ukraine has always determined the political situation and economic growth of a country. Today, energy independence is a matter of national security and sustainable economic development. Ukraine imports about 50% of its total energy needs due to limited energy resources.

To reduce energy dependence, the Ukrainian government has taken certain steps in the last decade and is striving to increase the share of renewable and alternative energy. In addition, another effective method is to reduce the energy consumption ratio. Given that the majority of energy production currently involves burning fossil fuels, which will eventually run out, there has been a growing interest in energy conservation in recent years. Today, the world's total primary energy consumption has reached approximately 85% from fossil fuels such as coal, oil, and natural gas [1, 2]. Approximately 50% of this consumption is spent directly on buildings. Thus, it is

important to reduce energy consumption, especially in buildings, which will have a positive impact on economic growth in the short and long term.

As for materials, globally, approximately 10 billion tons of structural materials are produced annually. This volume of production is responsible for 16% of global energy consumption and carbon emissions, with cement production alone accounting for almost 5%. So, summarizing the above, the development of alternative thermal insulation construction materials is a relevant and important task [3-6].

Thus, the research objective was to study the relationship between the material composition and the manufacturing method, as well as to determine the physical and mechanical properties of the thermopercelite composite, such as thermal conductivity, porosity, water adsorption, compressive strength and so on.

The following ingredients were used to prepare the compositions: swollen perlite with a fraction of 1.8...2.2 mm (Fogosh deposit), sieved on laboratory sieves, liquid sodium silicate glass as a binder, and plasticizer. So, five compositions of the composite were prepared.

The research focuses on the study of the interaction of components and influence on the properties of the composite. According to the results of the experiments, the properties of five perlite compositions were determined. It was found that water absorption, as well as porosity, has a linear dependence on the density of the composites and ranges from $W_i \sim 137\%$ to 75% . The total porosity for thermopercelite, depending on the composition, is in the range of 65 to 60%.

The durability tests were carried out in several stages: freezing, thawing, and heating. After every tenth cycle, samples were taken to determine their thermal conductivity under standard conditions. The results show that the range of thermal conductivity is 0,096 to 0,136 (W/mK).

According to the obtained results, the compressive strength of the composite increases almost linearly with an increase in the binder content up to composition No. 3, and then no significant increase in strength is observed. The highest value is 23 MPa for the sample of No. 5.

The obtained strength values make it possible to use this material in construction since the widely used ceramic brick of the M150 brand has a compressive strength of 15 MPa. Compared to other alternative materials, such as those used by the authors of [9], the strength of the geopolymer filled with perlite was only 2.3 MPa, and that filled with vermiculite was 3.75 MPa. That is, the obtained strength values are higher than the average values obtained by other authors [3,5,7]. Mechanical properties correlate with the porosity of the material and its density.

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ACEX191

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Geopolymers Based on Fly Ash and Metakaolin with The Addition of Diatomite Fume

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Geopolymers are modern, environmentally friendly, and inorganic aluminosilicate materials that, through their high mechanical properties, are used in construction industries. They are considered as an alternative to Portland cement, especially for the most demanding applications due to their compressive strength properties. To increase their mechanical properties, various types of additives are tested as reinforcements. The main goal of the article is to show the possibility of using diatomite fume in geopolymeric materials for reinforcement. However, some prior works have been made with this additive, the authors of the previous works used a diatomite with a large size of the particle, not a diatomite fume. In the presented research, geopolymer composites based on fly ash and sand or metakaolin and sand with 1% and 3% addition of diatomite fume with a grain size of 0-0.063 mm were prepared. The synthesis of the geopolymer composite with these fine elements has also an additional advantage in the management of material that was previously considered a waste fraction during diatom mining. The diatomite additive was investigated in the delivery conditions as well as after calcination at 850 °C. Characteristic transformations related to temperature treatment are presented. The following research methods have been applied: physical properties, including density and particle analysis, thermal properties – thermal conductivity, mechanical properties - compressive strength and microstructure - scanning electron microscopy. The results show potential for the addition of diatomite fume and the possibility of using a new material for construction.