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Investigation of the effect of fire retardant impregnation on the properties of nonwoven building materials HoloFiber®

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Abstract

In connection with the need to reduce the consumption of energy resources, nonwoven insulating materials (NIM) are widely used in construction to provide heat and sound insulation of structures. Such materials, unlike mineral-based materials, do not emit small dust particles (from glass or basalt fibers), harmful substances (hydrocarbon vapors, formaldehyde, organic and inorganic binders, etc.). NIM are manufactured by an environmentally friendly promising method of aerodynamic formation of a canvas from synthetic polyester, polypropylene fibers. These fibers have high elasticity and flexibility, which contributes to an increase in the level of physical and mechanical properties of the webs.

One of the main properties of insulating nonwoven materials, in addition to strength, elasticity, vapor permeability, water resistance, good heat and sound insulation properties, is fire resistance and fire safety. Research on increasing the level of these indicators of properties is relevant. As the object of research in this work was selected a nonwoven fabric produced by LLC "Termopol" – HoloFiber® STROY with a surface density of 1000 g/m². Aqueous solutions based on Lefasol F 90003-1 and Foginol-2 were used as fire retardant impregnation. Samples of dry nonwoven fabric were processed by immersion in a container with a liquid solution of an impregnation substance. The solution was impregnated for a specified period of time, depending on the type of fabric, after which the spinning was performed. Further, heat treatment and drying of the material were carried out until complete drying. It was found that as a result of fire-retardant impregnation, the tensile strength of the material HoloFiber® STROY increases.

The study of the flammability of materials was carried out when exposed to an open flame in accordance with GOST R 51032. The indicators of the degree and nature of damage to materials were determined: the limit of combustion propagation on the material, indicators of damage to samples along the length and thickness. It has been experimentally established that the use of aqueous solutions based on Lefasol F 90003-1 and Foginol-2 as a finish increases the fire resistance of the Hollofiber® STROY nonwoven fabric.

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