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Enhancing of the thermo-physical properties of the insulating non-woven using a polyurethane (PU) coating: An Experimental study of the effect of coating thickness

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Based on their properties, nonwoven textile are promising insulation solution for buildings. However, the major disadvantage is their flammability and also their low mechanical property. The main purpose of this research is to improve physical, thermal and fire properties of nonwoven made from reclaimed fibers, by using two types of polyurethane aqueous dispersion coating (paste and foam termed here as PUF and PUP). To achieve this, needle punched nonwoven (100% acrylic, 100% polyester) were used. The effect of type and thickness of coating on thermal conductivity, air permeability, tensile strength, elasticity, flammability test and sound absorption coefficient were analyzed. According to the experimental results, it can be concluded that the PU (PUF and PUP) coating enhanced the barrier and tensile properties of coated nonwoven. Moreover, the coating has a great effect on the thermal conductivity and the air permeability. It has been observed the thermal conductivity and the air permeability decreases with the increase in coating thickness of the nonwoven for both coating. On the basis of a detailed analysis, the relationships between the measured parameters and coating thickness were compiled. The results of this study provide an effective solution for buildings insulation; indeed, these alternative materials will contribute to the cost advantage as well as the green building initiative.

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