

Effect of surface treatments on natural cork: surface energy, adhesion and acoustic insulation

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Abstract— Cork is one of the finest natural materials with high acoustic insulation properties due to its porous structure. In addition, cork presents high water resistance due to its hydrophobic nature. In many applications, cork panels need to be bonded to other materials for manufacturing composite materials or agglomerated cork sheets. In this case, its lack of wettability becomes an important disadvantage. This paper aims to improve the wettability of cork by silanization, atmospheric plasma treatment, and vacuum plasma treatment. The processing conditions of the three treatments were optimized. The surface characterization was performed by surface energy, roughness, and attenuated total reflectance-Fourier transform infrared spectroscopy measurements. Pull-off adherence and peel tests were carried out to evaluate the performance of the treatments with an epoxy adhesive. Plasma treatment of cork plates could be a useful tool to enhance adhesion properties in the manufacturing process of cork sandwich panels or other applications where it could be joined to any material.

Index Terms—

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