

FURNITURE BONDED JOINTS DESIGNED FOR OUTDOOR USE

INTRODUCING AND GOALS

This research deals with the relation between the strength of free adhesive films in tension and properties of bonded joints intended for exterior use. Adhesive joints and adhesive films will be evaluated considering mechanical properties, depending on the material and adhesive used. Goals of this work is to determine the influence of surface preparation on the properties of bonded joints, the influence of climatic load on the strength of free adhesive films and the properties of bonded joints and to find the relationship between their properties.

MATERIAL AND METHODS

Due to the use of furniture joints in exterior, one-component polyurethane adhesive with D4 resistance, MUF adhesive and neutral silicone will be used for testing. Individual adhesives will be applied to a polyester foil to form free adhesive films and to various wood species such as imitation of bonded furniture panels. Domestic solid wood, namely oak, acacia and larch, will be used for the samples. After that mechanical tests will then be performed on these samples. The shear tensile strength of the individual samples will be tested to determine the strength of the bonded joint. The samples will be subjected to tensile stress acting parallel to the axis of the test specimens until the bonding will be broken; the site where the glued joint will be broken will be investigated as well. The test will be conducted on the INSTRON 3365 (Figure 2) connected to the Instron Bluehill software. The three-point bending test will be tested to determine the flexural strength of the bonded joints. Testing will also take place on the INSTRON 3365 machine. The impact strength of the individual samples will be also tested to determine the breaking force required to break the bonded joint. The samples will be subjected to an impact (force concentrated to a very short time), in which the glued joint will be broken. The result will be the absorbed energy needed for this violation. Testing will be performed on an Instron CEAST 9050 (Charpy hammer) (Figure 1).



Figure 1 Instron CEAST 9050 (Charpy hammer)

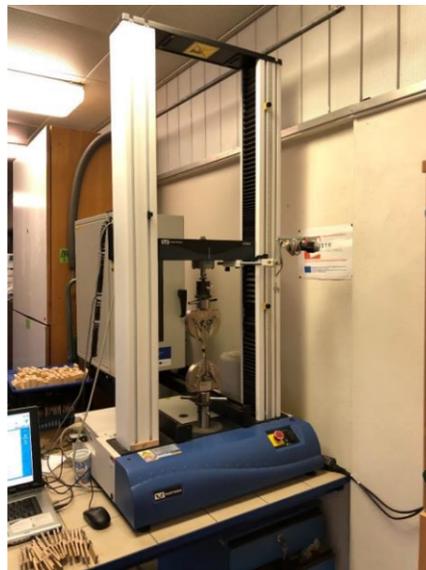


Figure 2 INSTRON 3365



Figure 3 Memmert HPP 108 - climatic chamber



Figure 4 VENTICELL 111 - hot air dryer

Finally, the selected adhesives will be tested in the form of free adhesive films. There the strength and elongation of free adhesive films will be tested to determine the mechanical properties, i.e., the strength limit, the modulus of elasticity and the elongation limit of the adhesive films. The test will be carried out on 60 x 10 mm samples using a tensile load on the INSTRON 3365 tearing unit (Figure 2). Adhesive films and glued samples bonded by different types of adhesive and on different wood species will be tested under normal climatic conditions and using the artificial aging process using cyclic loading. This will be achieved by alternating climatic conditions (higher relative air humidity and higher air temperature with low relative humidity) using the Memmert HPP 108 climatic chamber (Figure 3) and the VENTICELL 111 hot air dryer (Figure 4). The samples will also be tested considering surface preparation using conventional surface preparation and surface treatment using plasma.

CONCLUSION

The aim of this work will be to determine the shear tensile strength, three-point bending strength and impact strength of bonded joints, depending on the type of adhesive used, bonded wood, climatic load and surface preparation. The shear strength, flexural strength and elasticity of the glued joint will be analyzed using the reference samples on which these mechanical tests will be performed to determine the properties of the individual adhesives in the joint. The individual adhesive films will be subjected to a test to determine the mechanical properties of free adhesive films by tensile loading.

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