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ABSTRACT

Wood is a material widely used in the construction industry, both for structural elements (beams) and non-structural (decoration, furniture, ...). This is mainly due to two characteristics of wood: its cost and the good relationship between density and mechanical qualities. However, wood has important disadvantages, mainly its behaviour in fire, a factor that can be potentially dangerous in a fire scenario.

This work studies properties of different products that, once they have been applied to wood by the method of impregnation in a vacuum atmosphere, could increase its fireproof characteristics. The studied products include different inorganic borates, phosphates, and silicates. The procedure consists on removing the present air contained in wood cells and then adding a water-dissolution of the mentioned products. Specifically, the study focuses on three key areas:

1. Impregnation procedure: in order to improve cost and maximize efficiency, the procedure must take into account parameters such as which vacuum pressure level is reached, dissolution temperature, and time of impregnation.
2. Flame retardants: As mentioned, we use inorganic borates, silicates, and phosphates. Once the method of impregnation has been defined it is also important to know the physical appearance produced as it can be a key issue when the wood is used as a visual element.
3. Comparison of flame retardants: After setting the above aspects, the dripping test and LOI test help us determine the fireproof properties of each element, and let us know if the combination of them can help us achieve better results.

The results of the study have allowed us to see that the combination of these products creates a synergistic effect that greatly increases the protection against fire.