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ECM2017.0319 Investigation of the Fire Hazard Characteristics of Wood Using Infrared Thermography

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Wildfires cause significant material and economic damage to the territories. Numerous theoretical and experimental investigations conducted to study the effect of fires do not explain the mechanism of fire transition to the wooden constructions, their ignition and subsequent combustion.

The development of chemical industry led to the development of means such as fire retardants which prevent partially or completely the ignition of treated surfaces. On the market there are a lot of such means which have the different technical parameters and a different degree of toxicity.

In this work the effect of fire front on the surface of wood samples (pine, aspen and larch) was studied to estimate the effect of fire retardant treatment "FUKAM". Infrared thermography was used as a diagnostic method. The surface temperature distribution was obtained for the test wood samples after exposure to a fire front that was modeled using pine needles. The ignition probability was estimated for the chosen experimental parameters for each kind of wood.

In the infrared region the sample surface characteristics were recorded using a thermal imager JADE J530SB with a 2.5–2.7 micron optical filter that allowed a temperature to be measured in the range of 500–850 K. In order to record a temperature in the range of 293 - 550 K, the recording was conducted without a filter.

The maximum temperature that was reached on the surface of the samples without a coating was: 820 K for pine, 800 K for aspen, and 410 K for larch and with a coating was 456 K for pine, 506 K for aspen, and 471 K for larch. The nonuniformly laid FF layer was likely to influence on the difference in the temperature values for the larch samples. Fire-retardant treatment "FUKAM" could also influence on the sample heating.

The fire hazard characteristics of wood after fire retardant treatment showed a significant reduction in the surface temperature and the resistance to fire for the chosen parameters of the experiment compared to the same untreated samples.