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Determination of the moisture content of Nordic spruce wood through cone heater experiments and an integral model

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Abstract

The combination of cone heater experiments and an integral model was used to determine the moisture content of Nordic spruce with varying degree of drying. Nine specimens of Nordic spruce were pre-heated to 105°C in a convective oven for durations ranging from 0 days (no drying) and up to 63 days in increments of 7 days. The fuel moisture content was measured by weighting the specimens before and after the pre-heating. A mass loss cone was used to determine the time for piloted ignition of each specimen. A high-flux asymptotic solution from an integral model permitted to determine that the ignition temperature (directly linked to the intercept heat flux) was constant for dry and wet wood pieces.

Furthermore, from this result and the high-flux asymptotic solution, the fuel moisture content of the wet specimen was calculated and found to be very close to the measured value. As a result, one equation is developed that can be used to determine the time to ignition of a piece of wet spruce, and it is suggested that this method can be used for establishing similar equations for other types of moist wood.