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ENERGY CONSUMPTION IN DRYING OF FROZEN SPRUCE WOOD

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Abstract

Drying wood requires a significant amount of energy. This includes both thermal energy, necessary to heat-up wood, evaporate the water inside it and cover the insulation and vent losses, as well as electric energy consumed to force air circulation through the stacks. When wood is frozen, both energy consumptions increase; on one hand because frozen water requires a supplementary heat for transformation into liquid and then into gaseous state, and on the other hand, because of the low initial temperature of wood that also increases the drying time. Frozen spruce samples, as well as unfrozen control samples were kiln-dried in a conventional kiln within the same batch. The moisture content and temperature inside the samples was monitored throughout the process. Based on the measured drying time, the energy consumption was estimated to be up to 40% higher in the case of drying wood from frozen state. The paper concludes with some recommendations of interest for the industrial practice regarding which situation should be preferred and adopted when planning timber storage & drying in wintertime.

Key words: energy consumptions, frozen wood, spruce, sustainable drying

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