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The Effects of Quenching on the Mechanical Properties of Wet Wood II.

The most appropriate condition for evaluation of the mechanical properties of wood in an unstable state

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Abstract: To study the optimum experiment conditions for determining the mechanical properties of wood which is in an unstable state due to temperature changes, the fluidity ($1-E_t/E_0$) in stress relaxation, the modulus of elasticity (MOE) and the bending strength of wood were examined. The results obtained are as follows :
1) The fluidity ($1-E_t/E_o$) was independent of initial deformation in stress relaxation.
2) The stress relaxation process of water-swollen wood that was immersed in water at 80°C for 3 days was almost the same as that immersed for 0.5 days. Mechanical properties of wood are therefore not affected by hydrolysis or thermal decomposition if the temperature is below 80°C.
3) A change of stress relaxation was determined in 0.5~3 min after the wood was rapidly exposed to high temperature. As a result, the best condition to evaluate the degree of instability of wood is 0.5~3 minutes after a temperature change.
4) When wood was quenched and returned to the initial temperature quickly, the relative relaxation modulus did not change in comparison with control specimens that were in a stable state for a long time, because of the memory function of wood as a high molecular material.

5) The bending strength of wood decreased under the unstable state.

Keywords: stress relaxation, unstable state, bending strength, quenching

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