TALLINN UNIVERSITY OF TECHNOLOGY
SCHOOL OF ENGINEERING
Department's title

INFLUENCE OF FACE VENEER THICKNESS ON COMBUSTION PROPERTIES OF FIRE RETARDANT TREATED PLYWOOD

PINNASPOONI PAKSUSE MÕJU TULETÕKKEAINEGA TÖÖDELDUD VINEERI PÕLEMISOMADUSTELE

MASTER THESIS

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SUMMARY

This research aimed to create a better understanding on how fire-retardant treated birch plywood behaves during combustion, specifically focusing on the impact of face veneer thicknesses and fire retardant concentrations on combustion behaviour and penetration.

Industrially manufactured core plywood panels were overlaid with laboratory-made face veneers of three thicknesses (1,0 mm, 1,5 mm and 2,6 mm), treated with Palonot F1-10 fire retardant of two different concentrations (100 % by wt. and 70 % by wt.). Fire-retardant treated and reference samples were tested according to the cone calorimeter (ISO 5660-1) reaction to fire test and the results were analysed and compared. Additionally, large scale Single Burning Item (EN 13823) reaction to fire tests were conducted to obtain preliminary data on the potential fire class ratings of the tested products. The penetration depth of fire retardant was determined by applying a reagent on the cross section of the FR-treated panels, which changes colour as it comes in contact with the FR chemical.

The results indicate that increasing face veneer thickness generally improves fire performance, with the 2,6 mm face veneer thickness treated with undiluted solution performing best in various parameters. Higher concentrations of fire retardant also enhanced combustion behaviour and consistency of results. The 1,5 mm face veneer thickness showed promising results in terms of initial suppression of heat release rate, possibly due to a higher concentration of fire retardant closer to the surface. The results indicate that the diluted fire retardant solution managed to penetrate the material deeper in some cases, possibly due to reduced viscosity of the chemical. However, the increased penetration did not improve fire performance.

In summary, the study found that increasing face veneer thickness improved fire performance and fire retardant penetration depth in surface-treated plywood. It appears that thinner face veneers encounter barriers in penetration due to bond line restrictions, whereas in case of thicker face veneers, the penetration is limited by the inherent characteristics of the wood material itself. Although the diluted fire retardant solution showed higher penetration in some cases, this deeper penetration did not enhance fire performance.