

Limiting flame spread rates in large compartments with visible timber ceilings

Exposed timber ceilings in large open floor plans introduces risks of rapid ceiling flame spread. In Europe, the problem is commonly addressed by complying to prescriptive rules for reaction-to-fire classification of linings, evaluated by EN 13823 (SBI-test), characterizing the material's contribution to a fire in its initial phase. Nevertheless, a severe fire can lead to high fire exposure to the ceiling, at which the reducing effect of treatments on fire spread is unknown.

Objectives

The project aims to assess the effectiveness of treatments (clear coating or impregnation) to reduce the risk of rapid flame spread. We also aim to assess if the reducing performance is correlated to the performance in the SBI-test results.

Method

Eight tests in $18 \times 2.3 \times 2.2$ m3 compartments were performed, six of which had exposed timber surfaces with a clear coating or impregnation and two served as untreated timber and non-combustible reference tests. A fire source (3 - 3.7 MW) burnt during ten minutes with flame impingement on the ceiling. Indicators for fire spread was temperature development throughout the compartment, external flaming, times to tenability limits and final char depths. The results from the large-scale tests we compared to results from the SBI-tests retrieved by the product suppliers or performed separately if non-existent.

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Results

Flame spread was clearly reduced by the treatments, all complying to B,s1,d0-classification, with indicators showing closer agreement to that of untreated timber close to the fire source and the non-combustible ceiling at longer distances, where exposure is smaller. Due to interaction between moveable fuel and ceiling, it is therefore important not to consider the fire treated materials as incombustible in fire safety design. Correlation between the indicators for flame spread and the performance in the SBI-tests was poor. We propose that addressing the ceiling spread problem requires an additional indicative test with more severe exposure than the SBI test setup.

RESEARCH GROUP

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