Fire Research Programme –

Update February 2022

The small-scale radiant panel experiments have now been completed and results have been published in two conference papers. The objective of this work package has been to understand the impact of orientation (wall and ceiling), lamella thickness (40 mm vs. 20 mm), glue regime (edge-glued vs. not), and adhesive type (standard polyurethane vs. modified polyurethane) between supplier products. A series of 72 experiments were carried out in which 200 mm square CLT samples were exposed to 50 kW/m2 for 60 minutes. Analysis of the results show there is no statistical difference in final char depth between suppliers for same configuration. However, some differences were identified between suppliers when considering the steady-phase mass loss rate. The reason for the variations included the sample densities, edge-gluing procedure and adhesive adopted.

The experimental work investigating representative office building enclosures has also been completed and a paper that provides the results has been submitted to a peer-reviewed journal. This work has been carried out to examine the charring and self-extinction characteristics for large, exposed CLT ceiling configurations when considering adhesive type (standard polyurethane vs. modified polyurethane) and the effect of a transverse beam. The experiments exposed four different ceiling configurations to a fire generated by an array of propane gas burners. Measurements were made of the radiant flux to ceiling and floor, in-depth CLT temperatures, timber mass loss rate, final char depth and slab deflections. Calculations indicated that the initial involvement of exposed CLT slabs delivered a peak heat release rate that was three times larger than the case in which the ceiling slabs were fully encapsulated. Local glue-line integrity failure char fall-off events were observed near the burner array in the case of the standard polyurethane adhesive exposed CLT slabs. In all three exposed CLT experiments the ceilings auto extinguished once the burners were turned off.

Currently work involving residential-scale compartments is in progress. The aim of this research is to determine how many of layers of encapsulation material are necessary to get CLT self-extinction after the room contents have been consumed. The work is varying the number of layers between zero and three, and whether these layers are applied to the ceiling and/or the walls. Results so far have shown that only exposing the CLT on the ceiling allows self-extinction to occur. However, where both the ceiling and one wall become exposed then the CLT continues to burn. Further lining configurations are planned to identify situations in which self-extinction takes place. Findings will be published once the experiments have been completed and the results analysed.
Further work is being planned to examine the performance of encapsulated CLT joints and junctions. This will involve carrying out indicative furnace tests on representative configurations with different encapsulation details. It is hoped this work will start in the next few months subject to test furnace availability.

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