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# Substitution of FRTW for untreated lumber and plywood in manufactured wall assemblies

Building construction and life safety codes are concerned with the types of materials used in buildings. The issues in question related to the perceived risk posed by fire in various structures and to persons occupying those structures. The *International Building Code* (IBC) and the *International Residential Code* (IRC), each attempt to reduce property loss and protect life safety by incorporating the performance criteria for fire protection and life safety requirements as addressed in *ASTM E119-07 Standard Test Methods for Fire Tests of Building Construction and Materials*. In general both codes limit the use of combustible materials such as wood, especially in unsprinklered and larger multistory structures. The codes and their referenced standards recognize the benefits of pressure impregnating fire retardants into wood, especially as it relates to flame spread.

One method of evaluating the thermal barrier performance of wall systems uses the individual sum of performance for each component. In this component-additive method (CAM) (Canadian Wood Council 1991, Richardson and Batista 1997), the fire resistance rating of the assembly is taken as the sum of the time for the membrane and the time for the framing. The times assigned to the membranes and the framing in the component-additive method, however, were derived from full-scale testing of assemblies not tests of the components. Eventual wall ratings are then further based on the temperature criteria specified in ASTM E119 (ASTM 2012) and are reported for specific assemblies in listings of fire-rated assemblies.

Holmes *et al* (1980) showed that under the experimental conditions employed in their program, that their large-scale measurements and their previous lab-scale measurements (Eickner 1975) of thermal barrier performance were in general agreement when using the thermal temperature-rise ranges of 250o/325oF (121o/163oC) as established in ASTM E119. Later, using that same a laboratory scale wall-test apparatus, White (1982) directly compared the thermal protection characteristics and thermal barrier performance properties of untreated Southern pine plywood with that of fire retardant-treated (FRT) Southern pine plywood. He found that the thermal barrier protection performance of FRT plywood was significantly better than that of untreated plywood of equal thickness. The time for the thermal temperature-rise ranges of 250o/325oF (121o/163oC) was 11.15 minutes for FR-treated plywood and only 10.17 minutes for similar 5/8th-inch think untreated plywood. In addition, the coefficient of variation was slightly lower for FR-treated plywood.

In summary, based on these results, the one-to-one replacement of untreated plywood and lumber in fire-rated wall assemblies with a long-recognized commercial FR-treatment for plywood and lumber, such as *D-Blaze*®, when limited

to the same thicknesses and grades should be allowed for use in any fire-rated (*i.e.*, IBC- or IRC-listed) wood-frame wall assembly currently allowed to use untreated plywood and/or lumber components.

Respectfully,

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