ADDENDUM
DECK IGNITION TESTING

November 2021

The Ability of the Current ASTM Test Method to Evaluate the Performance of Deck Assemblies Under Realistic Wildfire Conditions[1] report (IBHS 2020) described our findings on the vulnerability of decks, and provided a list of proposed changes to the current California Office of the State Fire Marshal Standard SFM-7A-4A and the related ASTM E2632 test methods. The current standard test methods are unable to accurately assess the performance of deck assemblies because of the specified dimensions of the test deck, the absence of wind during the test, and not taking into account the entire deck assembly. In some cases, the methods unfairly benefit decks constructed with solid wood deck boards.

Explicitly evaluating the entire deck assembly (deck boards and joists) rather than just the walking surface is important when the goal is to develop a realistic examination of a deck's vulnerability to wildfire.

Previous testing by IBHS used metal and wood substructures (joists and posts) with both wood and plastic composite walking surfaces. In this test series, we used the same methodology to evaluate two metal walking surfaces, referred to here as *Type 1* and *Type 2*. The walking surfaces were installed and tested on southern yellow pine (SYP) and steel joist substructures.

The Type 1 walking surface was aluminum and marketed as a waterproof product. The installation instructions for this product specified that there be no spacing between the boards. These deck boards are engineered to properly address water drainage and expansion due to heat. The Type 2 walking surface was also an aluminum product; however, installation instructions called for spacing between deck boards.

The graph in Figure 1 shows the variation of wall temperature with the different decks.

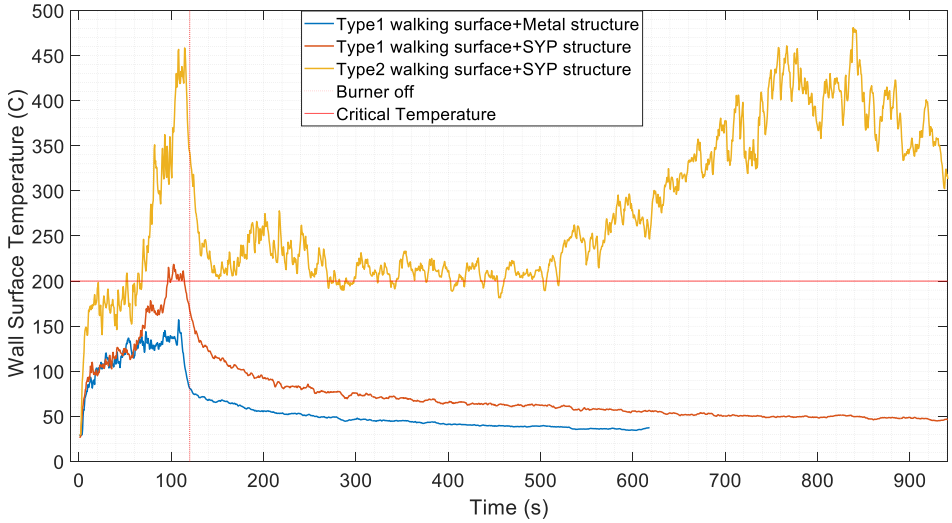

Figure 1. Wall surface temperature over time for the deck assemblies evaluated in this series of experiments. 200°C was selected as the critical, not-to-exceed, wall surface temperature.

[1] https://ibhs.org/wildfire/evaluation-of-deck-testing-methods/

The data series in blue is the baseline since both walking surface and joist consisted of noncombustible materials. The data series in red is for an SYP sub-structure and Type 1 walking surface with no gap between the boards. Given the selection of 200°C as the not-to-exceed critical wall temperature, the Type 2 walking surface with SYP joists was the most vulnerable deck assembly of those evaluated.

Figure 2 shows the Type 1 walking surface and SYP deck assembly after the test. The walking surface was deformed as a result of exposure to the heat from the burner flames. Because the airflow between the deck boards is limited, the fire barely got into the flaming phase and for the most part smoldering combustion was consuming the joist.

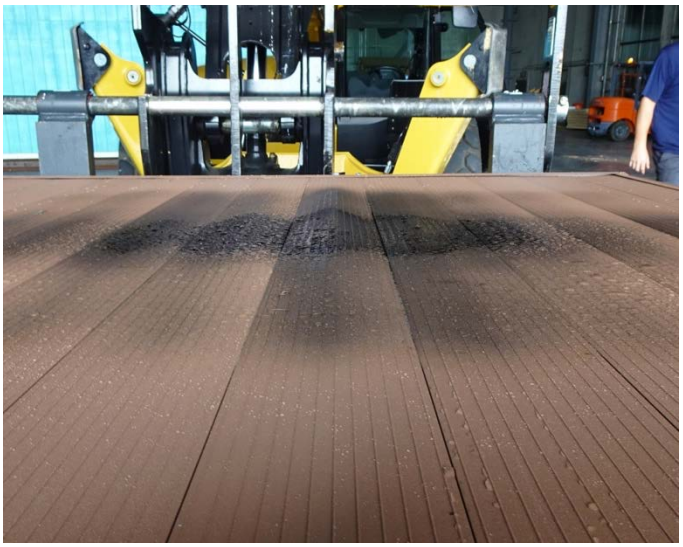

Figure 2. Deck assembly with Type 1 walking surface and SYP after the test

Figure 3. Deck assembly with Type 2 walking surface and SYP at the last stages of the test

The yellow curve in Figure 1 shows results for the Type 2 walking surface over SYP deck. The Type 2 walking surface was similar to common wood and composite decks with a 0.125-inch (1/8-in) gap between boards. After ignition of the substructure, this gap allowed the fire enough fuel and oxygen to consume the entire deck (as shown in Figure 3).

Figure 4 shows the status of decks during the experiment from two views. The intensity of the fire between walking surfaces Type 1 and Type 2 is notably different. For the Type 1 walking surface the fire is in a smoldering phase while for Type 2, the flame length is estimated to be at least 2 feet.

(a) SYP structure and Type 1 walking surface

(b) SYP structure and Type 2 walking surface

Figure 4. Comparison of Type 1 (a) and Type 2 (b) walking surfaces installed over SYP substructure

The results of these tests confirmed the previous findings that the contribution of joists in the fire was significant and the entire deck assembly should be included in the specifications provided in a standard test method. This research also indicates that using Type 1 deck boards (with no gap required) could be an inexpensive strategy to reduce the vulnerability of decks.