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## **FIRE PERFORMANCE EVALUATION IN ACCORDANCE WITH ASTM E84-23d, *STANDARD TEST METHOD FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS***

**MATERIAL ID: *HempWood***

**FINAL REPORT  
Consisting of 10 Pages**

**SwRI® Project No.: 01.28400.02.023  
Test Date: April 17, 2024  
Report Date: May 3, 2024**

**Prepared for:**

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## EXECUTIVE SUMMARY

This report presents the test results for a specimen submitted by Fibonacci LLC, located in Murray, Kentucky, and tested at Southwest Research Institute's (SwRI's) Fire Technology Department, located in San Antonio, Texas. The test was conducted in accordance with the procedure outlined in ASTM E84-23d, *Standard Test Method for Surface Burning Characteristics of Building Materials*. The results for Flame Spread Index (FSI) and Smoke Developed Index (SDI) are presented below in Table i.

**Table i. Classification and Summary of Test Results.**

<b>Classification per Section 803.1.2 of International Building Code</b>		
<b>Rating</b>	<b>FSI</b>	<b>SDI</b>
<b>A</b>	0 – 25	0 – 450
<b>B</b>	26 – 75	0 – 450
<b>C</b>	76 – 200	0 – 450
<b>Test Results</b>		
<b>Material ID</b>	<b>FSI</b>	<b>SDI</b>
<i>HempWood</i>	75	450

## INTRODUCTION

This report describes a fire performance evaluation conducted for Fibonacci LLC in accordance with ASTM E84-23d, *Standard Test Method for Surface Burning Characteristics of Building Materials*. Testing was conducted at the Fire Technology Department of Southwest Research Institute (SwRI), located in San Antonio, Texas.

This standard should be used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions and should not be used to describe or appraise the fire-hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of the test may be used as elements of a fire-hazard assessment or a fire-risk assessment, which takes into account all of the factors that are pertinent to an assessment of the fire hazard or fire risk of a particular end use.

The results apply specifically to the specimens tested, in the manner tested, and not to the entire production of these or similar materials, nor to the performance when used in combination with other materials.

## SAMPLE DESCRIPTION

SwRI received the deck boards on March 8 and 13, 2024, and the adhesive on March 6, 2024. Per the client's request, the material was to be prepared on gypsum substrate using the provided Divergent Adhesives – TimberFlex AF Modified Silane Wood Flooring Adhesive. The substrate was first cleaned of any dust and/ or other contaminants prior to application. Using a ¼” notched trowel the adhesive was spread onto the substrate and the material was lightly pressed onto the coated panels and left to cure overnight. Once cured the prepared samples were then placed in a controlled environment maintained at an ambient temperature of 23 °C ± 3 °C and a relative humidity of 50% ± 5% where they were conditioned until constant mass was achieved on April 17, 2024. Table 1 below describes the material tested.

**Table 1. Sample Description.**

<b>Material ID</b>	<i>HempWood</i>
<b>Sample Description</b>	Engineered Flooring
<b>Nominal Tested Dimensions*</b>	7,315 × 610 × 32 mm**
<b>Color</b>	Natural
<b>Adhesive</b>	Divergent Adhesives – TimberFlex AF Modified Silane Wood Flooring Adhesive (1/4” thick)
<b>Substrate Requested</b>	Gypsum (16 mm thick)

\*Assessed by SwRI personnel.

## TEST PROCEDURE AND SETUP

This test procedure exposes a material in a horizontal, rectangular apparatus that is 25 ft × 17<sup>-3/4</sup> in × 12 in (L × W × H). The apparatus is equipped with two gas burners at one end that direct a flame onto the surface of the material under a controlled airflow. As the test progresses, the possibility of flame spread along the surface of the material may occur. The distance of flame travel and the rate at which the flame front advances during the 10 min exposure determines the calculated flame spread index. The smoke developed measurement is calculated based on a photometer system consisting of a white light source and photocell mounted in the apparatus. The output of the photoelectric cell is proportional to the smoke, soot particulate, and other effluent passing between the light source and photocell. The samples were mounted end-to-end in the furnace, and a cement board was placed on the unexposed side of the specimen to protect the furnace lid assembly.

## TEST RESULTS

Testing was conducted on April 17, 2024, for the material identified as *HempWood*. The results for Flame Spread Index and Smoke Developed Index are presented below in Table 2. Detailed test results can be found in Appendix A and photographic documentation is provided in Appendix B. The ASTM E84 standard does not contain a performance criteria, however; the two model building codes (International Building Code®, Chapter 8 *Interior Finishes*, Section 803 *Wall and Ceiling Finishes*; NFPA 5000, Chapter 10 *Interior Finish*, Section 10.2.3.3, *Interior Wall and Ceiling Finish Materials Tested in Accordance with ASTM E84 or UL 723*.) classify materials based on the Flame Spread and Smoke Developed indices, however, there is not necessarily a relationship between these two measurements.

**Table 2. Classification and Summary of Test Results.**

Classification per Section 803.1.2 of IBC		
Rating	FSI	SDI
A	0 – 25	0 – 450
B	26 – 75	0 – 450
C	76 – 200	0 – 450
Test Results		
Material ID	FSI	SDI
<i>HempWood</i>	75	450

**APPENDIX A**  
**TEST RESULTS**  
**(CONSISTING OF 2 PAGES)**

**TEST RESULTS**

Rounded FSI:	75
Rounded SDI:	450

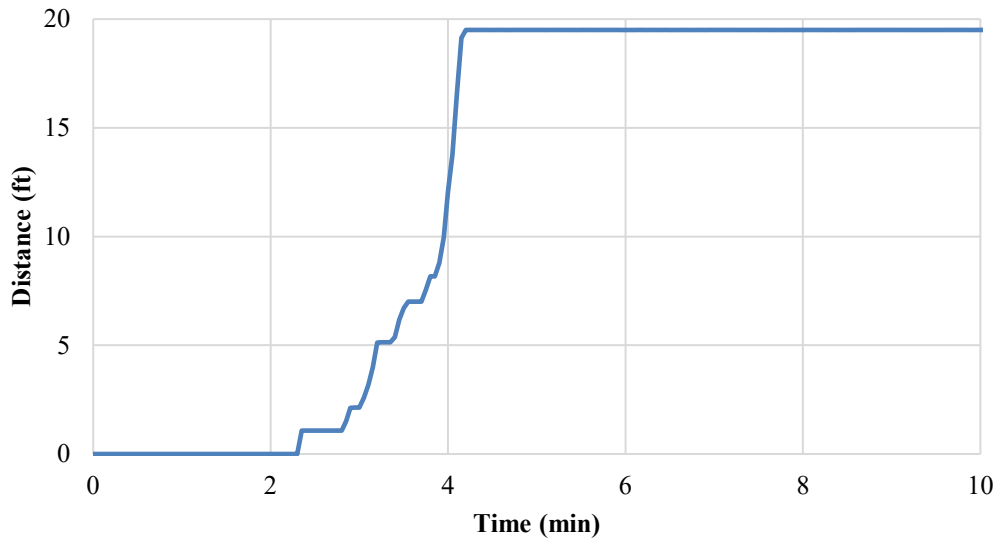
**TEST DATA**

Unrounded FSI:	73
Unrounded SDI:	468
FS*Time Area (ft*Min):	127.46
Smoke Area (%*Min):	485.55
Fuel Area (°F*Min):	8190.47

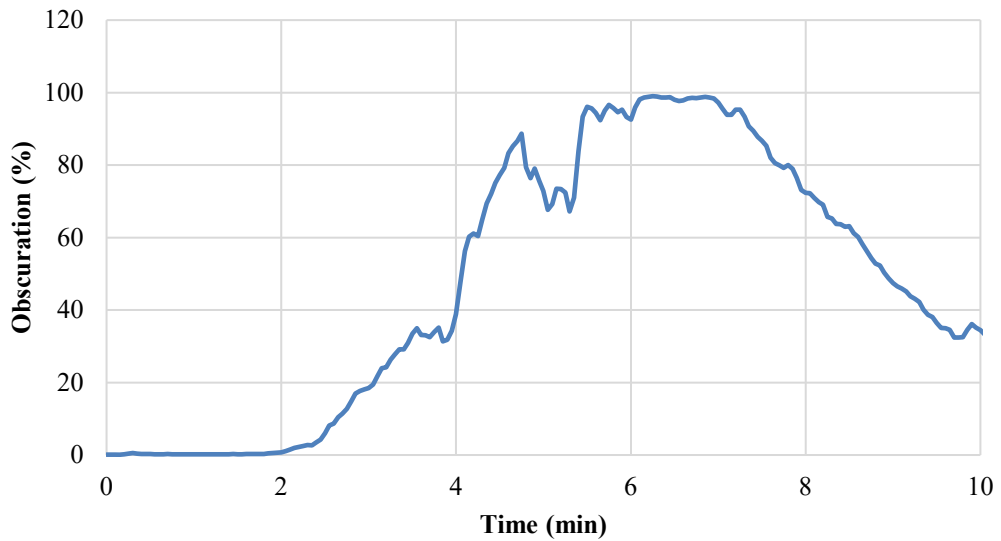
**OBSERVATIONS DURING TEST**

Ignition Time (min: s):	01:48
Maximum Flame Front Advance (ft):	20
Time to Maximum Advance (min: s):	04:30
Maximum Temp. at Exposed TC (°F):	1431
Time to Maximum Temp. (min: s):	10:2
Dripping (min: s):	None
Flaming on Floor (min: s):	04:06
After-flame Top (min: s):	10:00+
After-flame Floor (min: s):	10:00+
Sagging (min: s):	None
Delamination (min: s):	None
Shrinkage (min: s):	None
Fallout (min: s):	04:06
Charring (min: s):	01:08
Melting (min: s):	None
Blistering (min: s):	00:46
Flashing (min: s):	01:38
Cracking (min: s):	00:46

## Flame Spread



## Smoke Developed

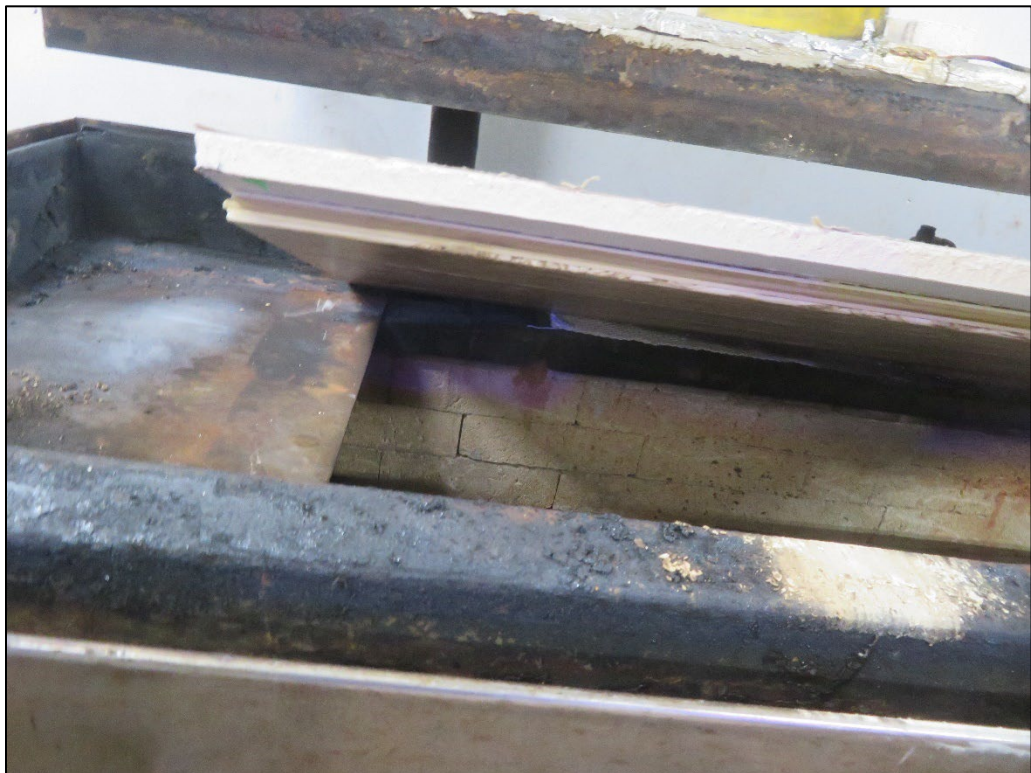


**APPENDIX B**  
**PHOTOGRAPHIC DOCUMENTATION**  
**(CONSISTING OF 2 PAGES)**





**Figure B-1. Exposed Side of the Material Before Exposure.**



**Figure B-2. Front panel of the material (burner end). Confirmation that the front panel end was not exposed to the ignition source directly; instead, a few inches laid on the metal panel shown.**



**Figure B-3. Exposed Side of the Material After Exposure.**