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**RENDERED TO**

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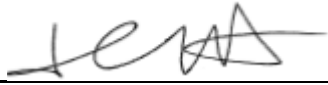
Report of Testing "ALT Hemcrete" for compliance with the applicable requirements of the following criteria: ASTM E84-15b TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS (UL 723, UBC 8-1, NFPA 255)

**TEST REPORT**

### ABSTRACT

Specimen I. D.	“ALT Hemcrete”	
Test Standard:	ASTM E84-15b TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS (UL 723, UBC 8-1, NFPA 255)	
Test Date:	March 15, 2016	
Client:	American Lime Technology	
Test Results:	<b>FLAME SPREAD INDEX</b>	<b>0</b>
	<b>SMOKE DEVELOPED INDEX</b>	<b>0</b>

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Joseph Martinez  
Technician III

Reviewed and approved:



Servando Romo  
Project Engineer



## I. INTRODUCTION

This report describes the results of the ASTM E84-15b TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS a method for determining the comparative surface burning behavior of building materials. This test is applicable to exposed surfaces, such as ceilings or walls, provided that the material or assembly of materials, by its own structural quality or the manner in which it is tested and intended for use, is capable of supporting itself in position or being supported during the test period.

The purpose of the method is to determine the relative burning behavior of the material by observing the flame spread along the specimen. Flame spread and smoke density developed are reported, however, there is not necessarily a relationship between these two measurements.

“The use of supporting materials on the underside of the test specimen may lower the flame spread index from that which might be obtained if the specimen could be tested without such support... This method may not be appropriate for obtaining comparative surface burning behavior of some cellular plastic materials... Testing of materials that melt, drip, or delaminate to such a degree that the continuity of the flame front is destroyed, results in low flame spread indices that do not relate directly to indices obtained by testing materials that remain in place.”

This test method is also published under the following designations:

NFPA 255

UL 723

UBC 8-1

***This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory 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 this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.***

## II. PURPOSE

The ASTM E84 (25 foot tunnel) test method is intended to compare the surface flame spread and smoke developed measurements to those obtained from tests of mineral fiber cement board and select grade red oak flooring. The test specimen surface (18 inches wide and 24 feet long) is exposed to a flaming fire exposure during the 10 minute test duration, while flame spread over its surface and density of the resulting smoke are measured and recorded. Test results are presented as the computed comparisons to the standard calibration materials.

The furnace is considered under calibration when a 10 minute test of red oak decking will pass flame out the end of the tunnel in five minutes, 30 seconds, plus or minus 15 seconds. The fiber cement board which complies with Annex A3 of the ASTM E 84 standard forms the zero point for both flame spread and smoke developed indexes, while the red oak flooring smoke developed index is set as 100.

## III. TEST PROCEDURE

The tests were conducted in accordance with the procedures outlined in the ASTM E84. The specimens are placed directly on the tunnel ledges. As required by the standard, one or more layers of 0.25 inch thick reinforced concrete board are placed on top of the test sample between the sample and the tunnel lid. After the test, the samples are removed from the tunnel, examined and disposed of.

## IV. REVISION SUMMARY

DATE	SUMMARY
March 23, 2016	Original



## V. DESCRIPTION OF TEST SPECIMENS

Date Received:	3/7/2016
Date placed in the conditioning room:	3/7/2016
Conditioning (73°F & 50% R.H.):	8 days
Specimen Width (in):	24
Specimen Length (ft):	24
Specimen Thickness (in):	4
Total Specimen Weight (lbs):	324

### **Specimen Description:**

The specimen was described by the client as “Biocomposite Cementitious Wall System”.

The 24 ft. long test specimen consisted of six 4 ft. long lime coated hemp panels.

The product was received by our personnel in good condition and given an identification number of SAT1603071853-001.

### **Mounting Method:**

The specimen was supported by rods and wire. The specimen was the same on both sides.

## VI. TEST RESULTS & OBSERVATIONS

The test was conducted on March 15, 2016 and witnessed by Tai Olson of American Lime Technology.

The test results, computed on the basis of observed flame front advance and electronic smoke density measurements are presented in the following table.

Test Specimen	Flame Spread Index	Smoke Developed Index
"ALT Hemcrete"	0	0

The data sheets are included in Appendix A. These sheets are actual print-outs of the computerized data system which monitors the tunnel furnace, and contain all calibration and specimen data needed to calculate the test results.

## VII. OBSERVATIONS

During the test, the specimen was observed to behave in the following manner.

Time (min:sec)	Observations
0:00	The test burners were turned on.
0:27	The specimen began to discolor.
2:31	The specimen began to flake.
10:00	The test burners were shut off.

After the test, the specimen was observed to be damaged as follows:

Distance (FEET)	Damage Descriptions
0 – 5	The specimen was observed to be heavily charred and bleached.
5 – 9	The specimen was observed to be charred and heavily discolored.
9 – 24	The specimen was observed to be discolored.

**APPENDIX A**  
**ASTM E84**  
**DATA SHEETS**

## TEST RESULTS

**FLAMESPREAD INDEX: 0**

**SMOKE DEVELOPED INDEX: 0**

## SPECIMEN DATA . . .

Time to Ignition (sec): 0

Time to Max FS (sec): 0

Maximum FS (feet): 0.0

Time to 980 F (sec): Never Reached

Time to End of Tunnel (sec): Never Reached

Max Temperature (F): 549

Time to Max Temperature (sec): 588

Total Fuel Burned (cubic feet): 48.28

FS\*Time Area (ft\*min): 0.2

Smoke Area (%A\*min): 0.7

Unrounded FSI: 0.1

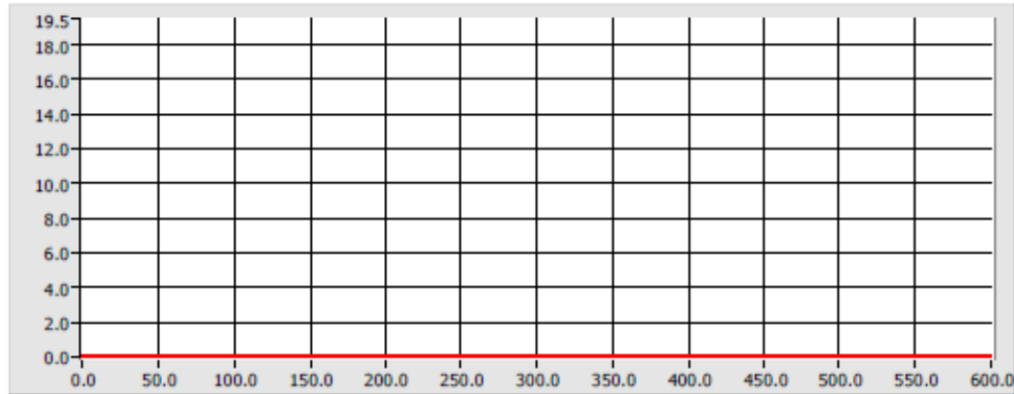
## CALIBRATION DATA . . .

Time to Ignition of Last Red Oak (Sec): 40.0

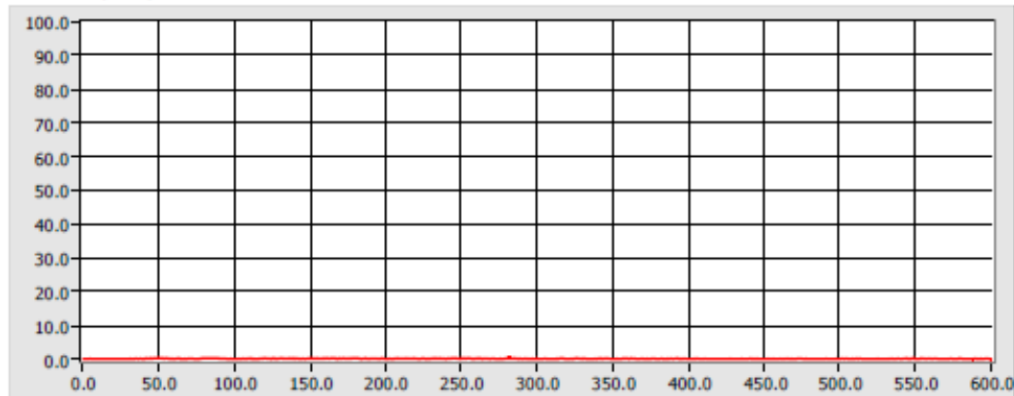
Red Oak Smoke Area (%A\*min): 64.9



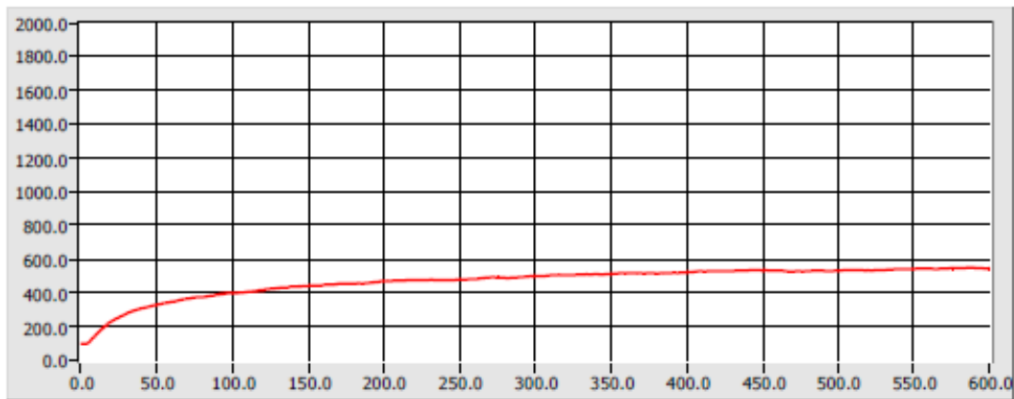
FLAME SPREAD (ft)



Smoke (%A)



Temperature (°F)



Time (sec)

600