



ASTM E84-13a (Modified*)
SURFACE BURNING
CHARACTERISTICS OF
BUILDING MATERIALS*

“1" Whisper Foam”

Report No. 101351597SAT-001B

October 28, 2013

*Modified to reflect Flame Spread and Smoke Developed Indices for both ceiling only and floor burning characteristics. A procedure for performing these calculations is not included in the ASTM E84-13a test method.

Prepared For:

Sealed Air Corporation
7665 National Turnpike
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ABSTRACT

Test Material:	"1" Whisper Foam"
Test Standard:	ASTM E 84-13a (Modified) Standard Test Method for SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS (ANSI 2.5, NFPA 255, UBC 8-1, UL 723)
Test Date:	October 22, 2013
Client	Sealed Air Corporation

Calculations Note: See page 6 for an explanation.	Flame Spread Index	Smoke Developed Index
Ceiling Burning Only (Original Position)	10	10
Floor Burning Only	50	95

Note: *Ceiling burning only* are results of the sample in the original position before melting to the floor.

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II. INTRODUCTION

This report describes the results of the ASTM E84-13a Standard Test Method for SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS¹, 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:

ANSI 2.5
NFPA 255
UBC 8-1
UL 723

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. Mineral fiber cement board 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. DESCRIPTION OF TEST SPECIMENS

Date Received:	10/10/2013
Date placed in the conditioning room:	10/10/2013
Conditioning (73°F & 50% R.H.):	12 days
Specimen Width (in):	24
Specimen Length (ft):	24
Specimen Thickness (in):	1.0 (nominal)
Material Weight:	60

Mounting Method:

The sample was self-supporting. The foam side was exposed to the flames.

The specimen consisted of twelve 2-ft. x 2-ft. squared sections of plastic foam insulation with a sheet metal back.

The product was received by our personnel in good condition and given an identification number of SAT1310101352-002.

Explanation of ceiling and floor test results for EPS products.

The practice of separating the Flame Spread and Smoke Developed Indices for floor and ceiling burning is not described in any of the standard test methods. This practice has apparently been established by Underwriters Laboratories even though not included in their UL 723 standard. Due to the acceptance of this practice by the U.S. model building code evaluation services, it has been included in this document.

The Flame Spread Index calculations have been made by determining the maximum flame front progression with the sample in the original position (ceiling calculation) and using that time*distance value to calculate $A_{T(\text{ceiling burning only})}$. The Flame Spread Index given as "Floor Burning Only" has been calculated using the same procedure as for the "Ceiling Burning Only", except that the ceiling portion of the flame front progression has been removed and the floor burning calculations start when the material is not in the original position. The statement, "not in the original position" means that the material has totally melted to the floor and is not in the original horizontal mounting position within the first 4.5 feet of exposure to the flame.

The smoke developed index for each has been calculated by considering the area under the %T*time curve. The "Ceiling Burning Only" index has been calculated using the area under the curve while the sample was still in the original position. The "Floor Burning Only" index has been calculated using the area under the curve after the material has totally melted to the tunnel floor.

The data sheets in Appendix A are actual print-outs of the computerized data system which monitors the ASTM E84 apparatus. These results are based on a 10 minute test with no deviations from the ASTM E 84 calculations.

V. TEST RESULTS & OBSERVATIONS

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
"1" Whisper Foam"		
Ceiling Burning Only (Original Position)	10	10
Floor Burning Only	50	95

VI. 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.
0:19	A steady ignition was observed.
0:20	Melting was observed.
0:21	Flaming drops were observed.
0:25	Floor flames caused by the melted foam on the apparatus floor were observed.
1:02	The specimen was no longer in the original position.
10:00	The test burners were shut off.

After the burners were turned off, a 60+ second after flame was observed.

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

Distance (FEET)	Damage Descriptions
0 - 10	The sample was consumed.
10 - 18	The sample was melted on to the apparatus floor.
18 - 24	The majority of the sample was melted to the floor.

APPENDIX

ASTM E84-13a

DATA SHEETS

TEST RESULTS

FLAMESPREAD INDEX: 50

SMOKE DEVELOPED INDEX: 110

SPECIMEN DATA . . .

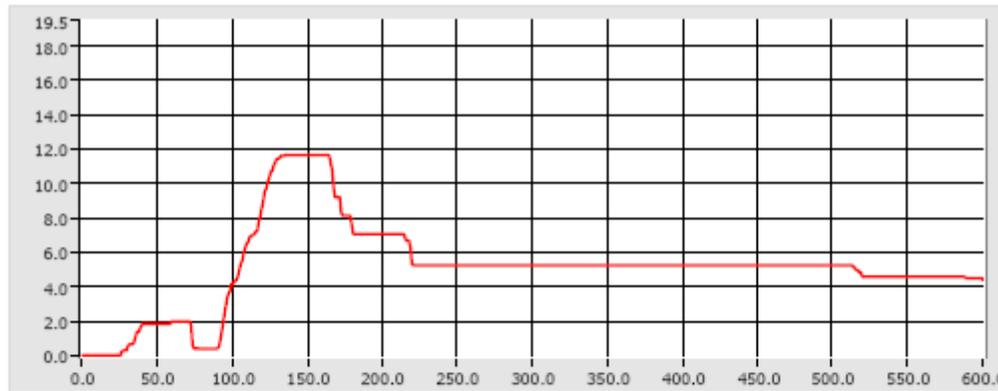
Time to Ignition (sec): 19
Time to Max FS (sec): 133
Maximum FS (feet): 11.6
Time to 980 F (sec): Never Reached
Time to End of Tunnel (sec): Never Reached
Max Temperature (F): 691
Time to Max Temperature (sec): 142
Total Fuel Burned (cubic feet): 45.96

FS*Time Area (ft*min): 97.3
Smoke Area (%A*min): 91.9
Unrounded FSI: 50.1

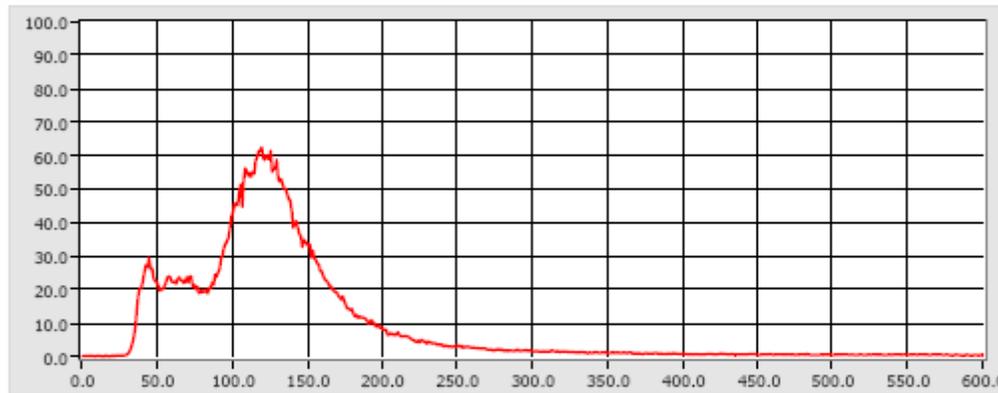
CALIBRATION DATA . . .

Time to Ignition of Last Red Oak (Sec): 56.0
Red Oak Smoke Area (%A*min): 84.5

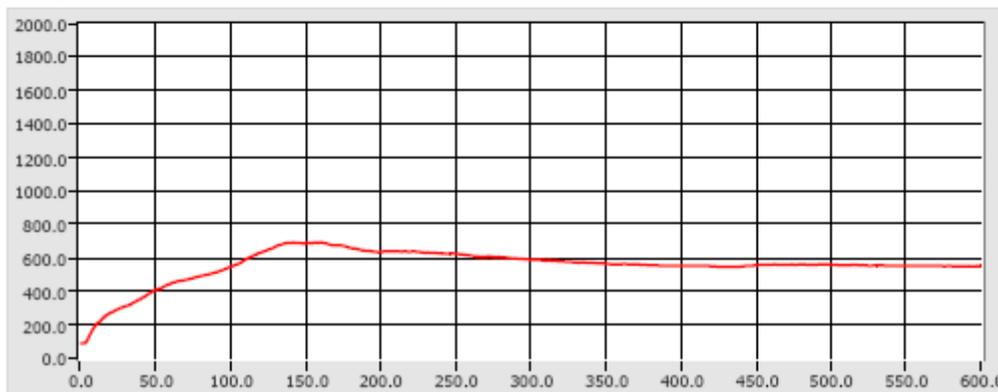
FLAME SPREAD (ft)



Smoke (%A)



Temperature (°F)



Time (sec)

600