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TEST REPORT

ASTM E84-05

**SURFACE BURNING
CHARACTERISTICS
OF BUILDING MATERIALS**

Report No. 3097371SAT-001

ASTRO SAFE - DUCT LINER

May 15, 2006

Prepared for:

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ABSTRACT

Test Specimen: **ASTRO SAFE - DUCT LINER**

Test Standard: **ASTM E8405**

Test Date: **May 15, 2006**

Test Sponsor: **Innovative Energy, Inc.**

Test Results:

FLAME SPREAD INDEX	=	5
SMOKE DEVELOPED INDEX	=	30
	=	

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Eric G. Hutchinson
Project Manager

May 15, 2006

Reviewed and approved:



C. Anthony Peñaloza
Flammability Testing Team Leader

May 15, 2006

I INTRODUCTION

This report describes the results of the ASTM E84-05 Standard Test Method 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:

ANSI 2.5
NFPA 255
UBC 8-1 (42-1)
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 E84-05 (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 DESCRIPTION OF TEST SPECIMEN

Specimen Identification:	ASTRO SAFE - DUCT LINER
Date Received:	5/8/2006
Date Prepared:	5/8/2006
Conditioning (73°F & 50% R.H.):	7 days
Specimen Width (in):	24
Specimen Length (ft):	24
Specimen Thickness:	0.962-in.
Material Weight:	N/A oz./sq. yd
Total Specimen Weight:	55.60-lbs.
Adhesive or coating application rate:	N/A

Mounting Method:

The specimen was self-supporting and was placed directly on the inner ledges of the tunnel.

Specimen Description:

The test specimen was described by the client as the "SCRIM FOIL FACING WITH HILOFT NONWOVEN POLYESTER BACKING." The specimen consisted of (3) 8-ft. long x 24-in. wide x 0.962-in. thick, nonwoven polyester duct liner with a foil facer adhered to 0.025-in. thick, sheet metal using 3M™ Fastbond 30-NF Contact Adhesive. The duct liner was also secured to the sheet metal using insulation pins and slip down washers. These samples were prepared by the client at their facility. The nonwoven polyester duct liner was a nominal 1-in. thick. The specimen was identified by the client as "Astro Safe - Duct Liner".

IV TEST PROCEDURE

The tests were conducted in accordance with the procedures outlined in the American Society for Testing and Materials ASTM E84-05. The self-supporting specimens were placed directly on the tunnel ledges. As required by the standard, one or more layers of 0.25 inch thick reinforced concrete board was placed on top of the test sample between the sample and the tunnel lid. After the tests, the samples were removed from the tunnel, examined and disposed of.

The test was conducted on 5/15/2006, and witnessed by Jim Kouns of Innovative Energy, Inc..

V TEST RESULTS

The test results, computed on the basis of observed flame front advance and electronic smoke density measurements are presented in the following table. In recognition of possible variations and limitations of the test method, the results are computed to the nearest number divisible by five, as outlined in the test method for smoke developed index results greater than 200 the calculated value is rounded to the nearest 50 points.

While no longer a part of this standard test method, the Fuel Contributed Value has been computed, and may be found on the computer printout sheet in the Appendix.

Test Specimen	Flame Spread Index	Smoke Developed Index
Mineral Fiber Cement Board	0	0
Red Oak Flooring	85	75
ASTRO SAFE - DUCT LINER	5	30

The data sheets are included in the Appendix. These sheets are actual print-outs of the computerized data system which monitors the ASTM E84-05 apparatus, and contain all calibration and specimen data needed to calculate the test results.

VI OBSERVATIONS

During the test, the specimen was observed to behave in the following manner: The nonwoven polyester duct liner ignited at 5:43 (min:sec.). Flaming drops began to fall from the specimen at 5:44 (min:sec.). The test continued for the 10:00 duration.

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

The sheet metal substrate was warped from 0-ft. - 7-ft. The foil facer was discolored from 0-ft. - 8-ft. Light discoloration was observed to the foil facer from 8-ft. - 24-ft. The nonwoven polyester duct liner was consumed from 0-ft. - 22-ft. The nonwoven polyester duct liner was melted from 22-ft. - 24-ft.

APPENDIX

ASTM E84-05 Data Sheets

ASTM E84 DATASHEETS

Client: INNOVATIVE ENERGY, INC.

Date: 5/15/06

Time: 09:05 AM

Test Number: 3

Project Number: 3097371SAT-001

Operator: EH/TA

Specimen ID: "ASTRO SAFE - DUCT LINER, SCRIM FOIL FACING WITH HILOFT
NONWOVEN POLYESTER BACKING". THE SPECIMEN WAS
SELF-SUPPORTING. THE TEST WAS WITNESSED BY JIM KOUNS FROM
INNOVATIVE ENERGY.

TEST RESULTS

FLAMESPREAD INDEX: 5

SMOKE DEVELOPED INDEX: 30

SPECIMEN DATA . . .

Time to Ignition (sec): 343

Time to Max FS (sec): 520

Maximum FS (feet): 3.8

Time to 980 °F (sec): Never Reached

Max Temperature (°F): 544

Time to Max Temperature (sec): 467

Total Fuel Burned (cubic feet): 50.76

FS*Time Area (ft*min): 13.7

Smoke Area (%A*min): 18.4

Fuel Area (°F*min): 5081.8

Fuel Contributed Value: 0

Unrounded FSI: 7.1

CALIBRATION DATA . . .

Time to Ignition of Last Red Oak (sec): 44

Red Oak Smoke Area (%A*min): 62.50

Red Oak Fuel Area (°F*min): 8972

Glass Fiber Board Fuel Area (°F*min): 5065