

ASTM E162-02a
Surface Flammability of Materials Using a
Radiant Heat Energy Source

5958FR VHB foam tape with foil
Lot# 6325-113

Project No. 3117723SAT-003

March 12, 2007

Prepared for:

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ABSTRACT

Specimens submitted for testing by 3M Company and identified as "5958FR VHB foam tape with foil Lot# 6325-113" were tested in accordance with the ASTM E 162-02a Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source with the following results:

AVERAGE FLAME SPREAD INDEX = 0

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This report contains a total of nine pages.



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March 12, 2007

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INTRODUCTION¹

This method provides a laboratory test procedure for measuring and comparing the surface flammability of materials when exposed to a prescribed level of radiant heat energy. It is intended for measurements on materials whose surfaces may be exposed to fire. The test is made on specimens of small size (6 by 18 in) that are representative, to the extent possible, of the material or assembly being evaluated.

This standard should be used solely to measure and describe the properties of materials, products, or systems in response to heat and flame under controlled laboratory conditions and should not be considered or used for the description, appraisal, or regulation of the fire hazard of materials, products, or systems under actual fire conditions.

The rate at which flames will travel along surfaces depends upon the physical and thermal properties of the material, the specimen mounting and orientation, the type and level of fire or heat exposure, the availability of air, and the properties of the surrounding enclosure.

TEST PROCEDURE

This test method of measuring surface flammability of materials employs a radiant heat source consisting of a 12 by 18 inch (300 by 460 mm) panel in front of which an inclined 6 by 18 inch (150 by 460 mm) specimen of the material is placed. The orientation of the specimen is such that ignition is forced near its upper edge (closest to the radiant heat source) and the flame front progresses downward (to lower heat flux).

Prior to the test the specimens are conditioned for 24 hours at 60°C and then conditioned to equilibrium at an ambient temperature of 23±3°C and a relative humidity of 50±5%. A minimum of four specimens are evaluated.

Located above the test specimen is a stack through which the smoke and heat emitted by the specimen passes. Inside the stack the exhaust passes over a series of thermocouples which are used to calculate a measure of the amount of heat evolved.

¹ The introduction and test procedures are abstracted, in part, from American Society for Testing and Materials, E162-02a Standard Test Method for SURFACE FLAMMABILITY OF MATERIALS USING A RADIANT HEAT ENERGY SOURCE.

The frame holding the specimen in place bears markings at 3 inch intervals from 0 to 15 inches. To perform a test, the gas is ignited at the face of the panel and the panel black-body temperature is adjusted and equilibrated to $670\pm 4^{\circ}\text{C}$ and the specimen is placed in front of the panel at the prescribed distance and angle. A pilot ignition source is placed at the zero distance point on the specimen and the times at which the flame front crosses each of the 3" markings is noted. The temperature increase due to the burning specimen is also recorded.

A constant value, β , peculiar to each individual test apparatus is determined as the mean stack thermocouple temperature rise for unit heat input rate of a calibration burner and expressed as degrees Celsius per kilowatt.

The flame spread index, I_s , flame spread factor, F_s , and the heat evolution factor, Q , are calculated as follows:

$$I_s = F_s Q$$

$$Q = CT/\beta$$

$$F_s = 1 + 1/(t_3-t_0) + 1/(t_6-t_3) + 1/(t_9-t_6) + 1/(t_{12}-t_9) + 1/(t_{15}-t_{12})$$

where:

C = arbitrary constant = 5.7

T = the observed maximum stack temperature - baseline temperature ($^{\circ}\text{C}$)

β = $35.8^{\circ}\text{C}/\text{kW}$

t_0 = 0

$t_{1...15}$ = times at which each distance increment is reached (min.)

All flame fronts, however temporary, are taken into account. If flame spreads from any of the 3 inch marks to the next in 3 seconds or less, this is noted as "Flashing."

Materials that have a tendency to exhibit rapid running or dripping of flaming material, either separately or in conjunction with a general flame front advance, due to melting and the steep inclination of the specimen during test, are noted as "Running (or Dripping) of Flaming Materials."

TEST SPECIMEN

The specimen consisted of a steel plate with foam tape with foil. The specimens with dimensions of 6 in. x 18 in. x 0.157 in. thick were conditioned by pre-drying at 60°C for 24 hours and then conditioning to 23±3°C and 50±5% R.H. to equilibrium.

Specimens submitted by: 3M Company

Date received: February 12, 2007 (This specimen was received in good condition.)

Date tested: March 7, 2007

Specimen I D: 5958FR VHB foam tape with foil Lot# 6325-113

Description of specimen: Foam tape with foil

Environmental conditions: 75°F and 46% r.h.

This test witnessed by: No witnesses

Specimen preparation and mounting method: The specimen was prepared by the client and was subjected to the standard conditioning and mounting methods.

TEST RESULTS & GENERAL OBSERVATIONS

Times in min:sec

Specimen	1	2	3	4
Blisters	none	none	none	none
Flame Out	none	none	none	none
Char Length (in.)	none	none	none	none

SUMMARY OF ASTM E162 TEST RESULTS

Client : 3M
Project No.: 3117723SAT-003
Specimen I.D.: 5958FR VHB foam tape with foil
Lot # 6325-113

	Specimen 1	Specimen 2	Specimen 3	Specimen 4
Time to Ignition (sec):	0	0	0	0
Baseline Temperature (C):	184	184	184	184
Maximum Temperature (C):	184	184	184	184
Temperature Rise (C):	0	0	0	0
Time to 3 Inches (min):	0.00	0.00	0.00	0.00
Time to 6 Inches (min):	0.00	0.00	0.00	0.00
Time to 9 Inches (min):	0.00	0.00	0.00	0.00
Time to 12 Inches (min):	0.00	0.00	0.00	0.00
Time to 15 Inches (min):	0.00	0.00	0.00	0.00
Time to Flaming Runs (min):	0.00	0.00	0.00	0.00
Time to Flaming Drips (min):	0.00	0.00	0.00	0.00
Total Exposure Time (min):	15.00	15.00	15.00	15.00
Beta:	35.8	35.8	35.8	35.8
Heat Evolution Factor, Q:	0.00	0.00	0.00	0.00
Flame Spread Factor, Fs:	1.00	1.00	1.00	1.00
Flame Spread Index, Is:	0.00	0.00	0.00	0.00
Average Flame Spread Index:	0.00	<i>Results as calculated</i>		
Average Flame Spread Index:	0	<i>Rounded to the nearest multiple of 5</i>		

APPENDIX

FLAME SPREAD-TIME GRAPHS

Client : 3M
Project No.: 3117723SAT-003

