COMMERCIAL TESTING COMPANY
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Standard Method of Test for
Surface Flammability of Materials
Using a Radiant Heat Energy Source

ASTM E 162–09

Contra Vision® Performance Perforated Window Film

Report Number 10–12006

Test Number 4179–1529
December 1, 2010

Contra Vision North America, Inc.
Atlanta, Georgia

Commercial Testing Company

(Authorized Signature)

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INTRODUCTION

This report is a presentation of test results on a material submitted by Contra Vision North America, Inc., Atlanta, Georgia. The test was conducted in accordance with the ASTM International fire test response standard E 162–09, *Surface Flammability of Materials Using a Radiant Heat Energy Source*. The method provides a laboratory procedure for measuring and comparing surface flammability of materials when exposed to a prescribed level of radiant heat energy. It is intended for research and development only and should not be used as a basis of ratings for building codes.

This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire–hazard or fire–risk assessment of materials, products, or assemblies under actual fire conditions.

No consideration is made for results that may be obtained if the material being evaluated were tested in combination with other materials.

PURPOSE

Surface flammability is measured using a vertically mounted propane gas and air fueled radiant heat energy source and a 6-inch by 18-inch test specimen. The specimen orientation is at an inverted angle of 30° to the vertical surface of the radiant panel with ignition forced near its upper edge and the flame progressing downward. A pilot burner, fueled with an acetylene–air mixture, impinges on the specimen near its top edge and provides ignition. A factor derived from the rate of progress of the flame front, and another derived from the rate of heat liberated by the material being tested, are combined to provide the final test result, the Radian Panel Index.

TEST PROCEDURE

A minimum of four specimens with a maximum thickness of one inch is pre–conditioned for 24 hours in a circulating air oven maintained at 60°C. The dry specimens are then conditioned to equilibrium in an atmosphere with the temperature maintained between 21 and 23°C and the relative humidity at 50 ± 5 percent. The conditioned specimens are wrapped with aluminum foil with only the face exposed, placed in a specimen holder, and backed with 13 mm thick inorganic millboard. When necessary, a 25 mm hexagonal wire mesh is placed across the face of the mounted specimens to maintain its integrity during testing.

The radiant heat energy panel is ignited and allowed to preheat at least 1.5 hours prior to of testing. Stack temperature measurements in the range of 180 to 230°C indicate proper operating conditions. The thermal output of the radiant panel is verified to be within the specified operating range of 670 ± 4°C by measurements made on a 10–inch diameter area in the center of the panel using a Honeywell radiation pyrometer. Periodic calibration using a special burner fueled with methane gas provides data (ß factor) necessary for calculation of the final test result. The pilot burner is adjusted to give a flame approximately two to three inches in length. The prepared specimen is placed on the supporting framework in front of the panel and the timer started simultaneously. The time that the flame front on the surface of the specimen arrives at each 76 mm mark, and the maximum temperature rise measured in the exhaust stack thermopile, are recorded during a 15–minute test exposure.

CALCULATIONS

Test results are calculated and expressed as the Radiant Panel Index, *Is*. The Radiant Panel Index is the product of the Flame Spread Factor, *Fs*,, a factor derived from the rate of progress of the flame front, and the Heat Evolution Factor, *Q*, a factor relating to the rate of heat liberation by the material. The Flame Spread Factor is calculated as:

$$F_s = 1 + \frac{1}{t_3 - t_0} + \frac{1}{t_6 - t_3} + \frac{1}{t_9 - t_6} + \frac{1}{t_{12} - t_9} + \frac{1}{t_{15} - t_{12}}$$

Where:

F_S = flame spread factor
t_X = time until arrival of the flame at the 76 mm distance marks

If there are any segments of the curve where the slope increases, the increase is eliminated by segmenting the curve from the previous to the succeeding point, thus becoming a "skip point." These points are treated in the formula *Fs* by dropping the terms involving single curve points and replacing them with the single term *K/(Tf – Tb)* where *K* is an integer related to the number of skip points, *Tf* is the time at the first curve point after the skip, and *Tb* is the time at the last curve point before a skip point.

The Radiant Panel Index is calculated as $Is = FsQ$ and the Heat Evolution Factor as $Q = CT/ß$ where:

- C = arbitrary constant 5.7
- T = observed maximum stack temperature rise in °C between the specimen and that for a similar curve of fiber-reinforced cement board
- $ß$ = mean stack temperature rise for unit heat input rate in °C/kW, a constant for a particular test instrument

Only sustained flame fronts, i.e., when a flame front advances from the igniting burner to the first 3-inch or subsequent marks at a rate that so that at least 3 seconds have passed since it reached the mark, are taken into account for calculating the Flame Spread Factor, *Fs*. Flashing, i.e., a flame front with a duration of 3 seconds or less, shall be reported but not used for calculation of the Flame Spread Factor, *Fs*. If flashing occurs, the fact shall be mentioned in parentheses following the Radiant Panel Index, *Is*, and reported in the form, for example, *Is* = 100 (Flashing to X inches).

MATERIAL TESTED

Identification: Contra Vision® Performance Perforated Window Film
Type Material: Self–Adhering Vinyl
Thickness: 0.008 inch
Color: White on Black

TEST DATA

Specimen	1	2	3	4
Flame Spread Factor, *Fs*	1.52	1.50	1.49	1.47
Temperature Rise, °C	11.7	10.6	10.6	9.4
Heat Evolution Factor, *Q*	1.98	1.79	1.79	1.60
Flaming Drippings	None	None	None	None
Test Duration, m:s	15:00	15:00	15:00	15:00
Radiant Panel Index, *Is*	3.00	2.67	2.66	2.35

TEST RESULT

The test result, *Is*, is rounded to the nearest multiple of five as required by Section 13.1.7 of the Standard. Graphic presentation of individual test data is included at the end of this report.

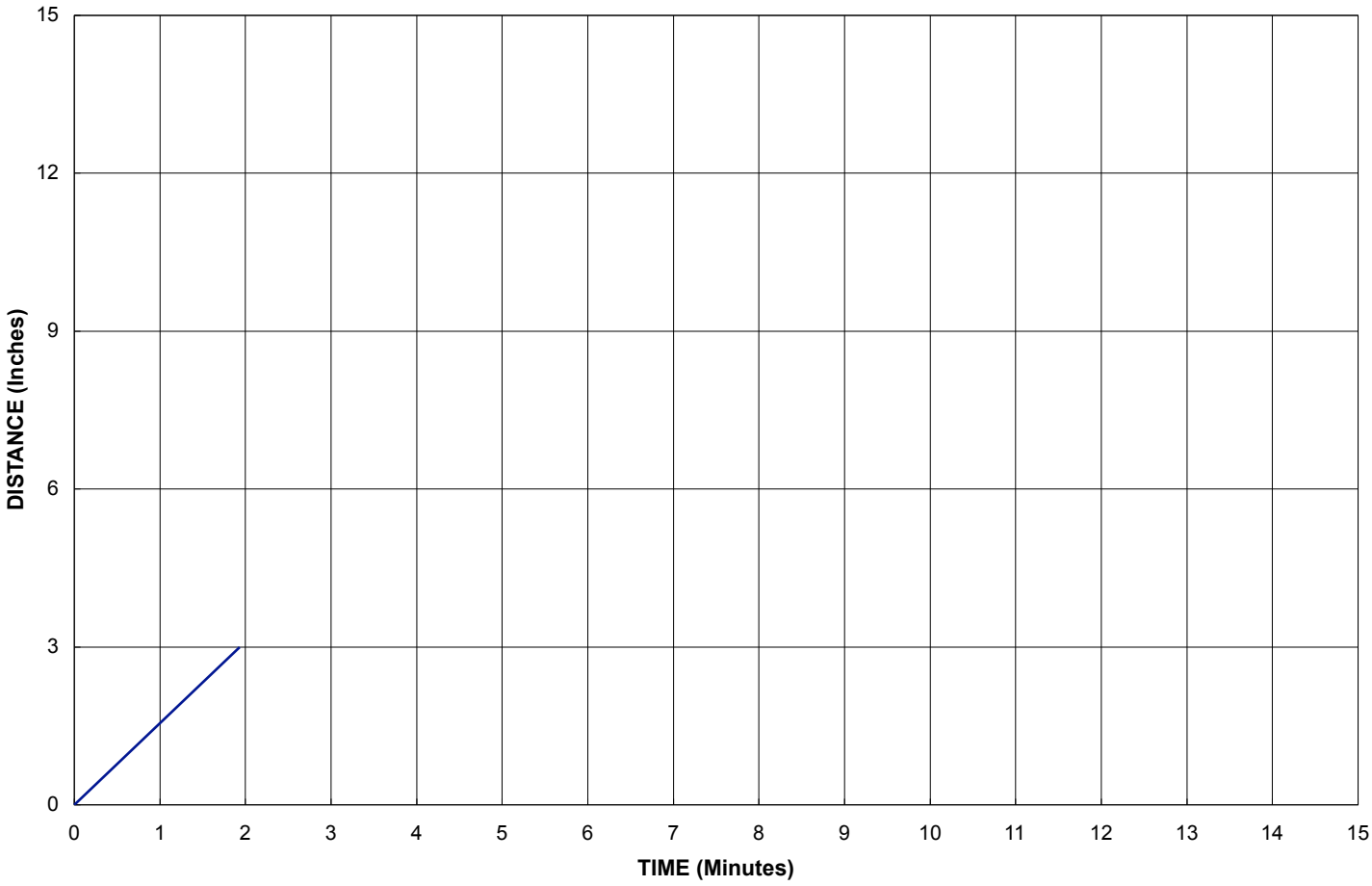
Specimen	1	2	3	4	Average
Radiant Panel Index, *Is*	3.00	2.67	2.66	2.35	**5**

Note: For testing, the sample was adhered to cement board using the self–adhering properties of the material.

E 162 Radiant Panel

Client: Contra Vision North America, Inc.
Test Number: 4179-1529
Date: December 1, 2010
Specimen Number: 1

Flame Spread Factor, Fs: 1.52
Temperature Rise, °C: 11.7
Heat Evolution Factor, Q: 1.98
Radiant Panel Index, Is: 3.00

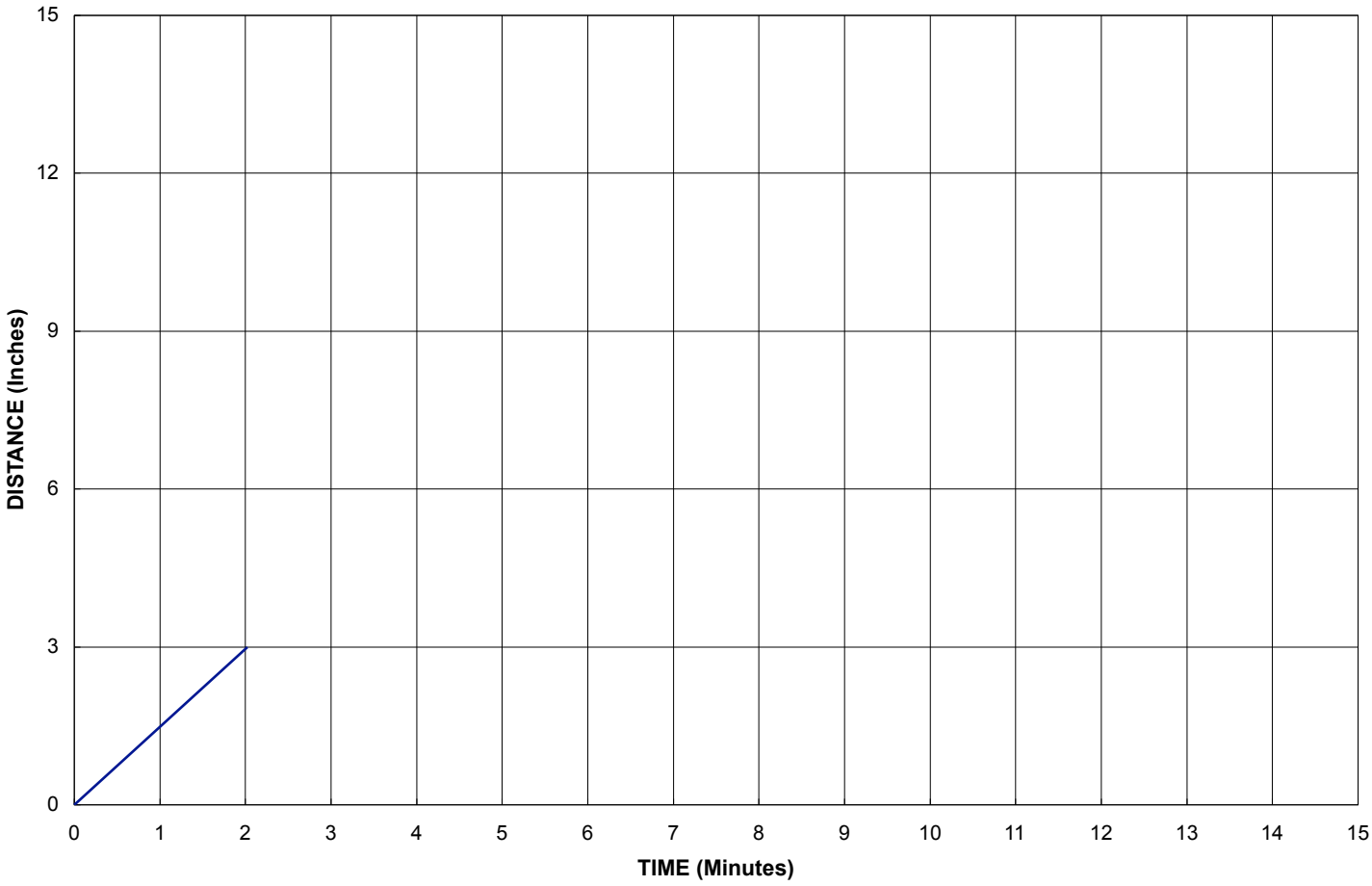


Skip Points Location: No Skip Points

E 162 Radiant Panel

Client: Contra Vision North America, Inc.
Test Number: 4179-1529
Date: December 1, 2010
Specimen Number: 2

Flame Spread Factor, Fs: 1.50
Temperature Rise, °C: 10.6
Heat Evolution Factor, Q: 1.79
Radiant Panel Index, Is: 2.67

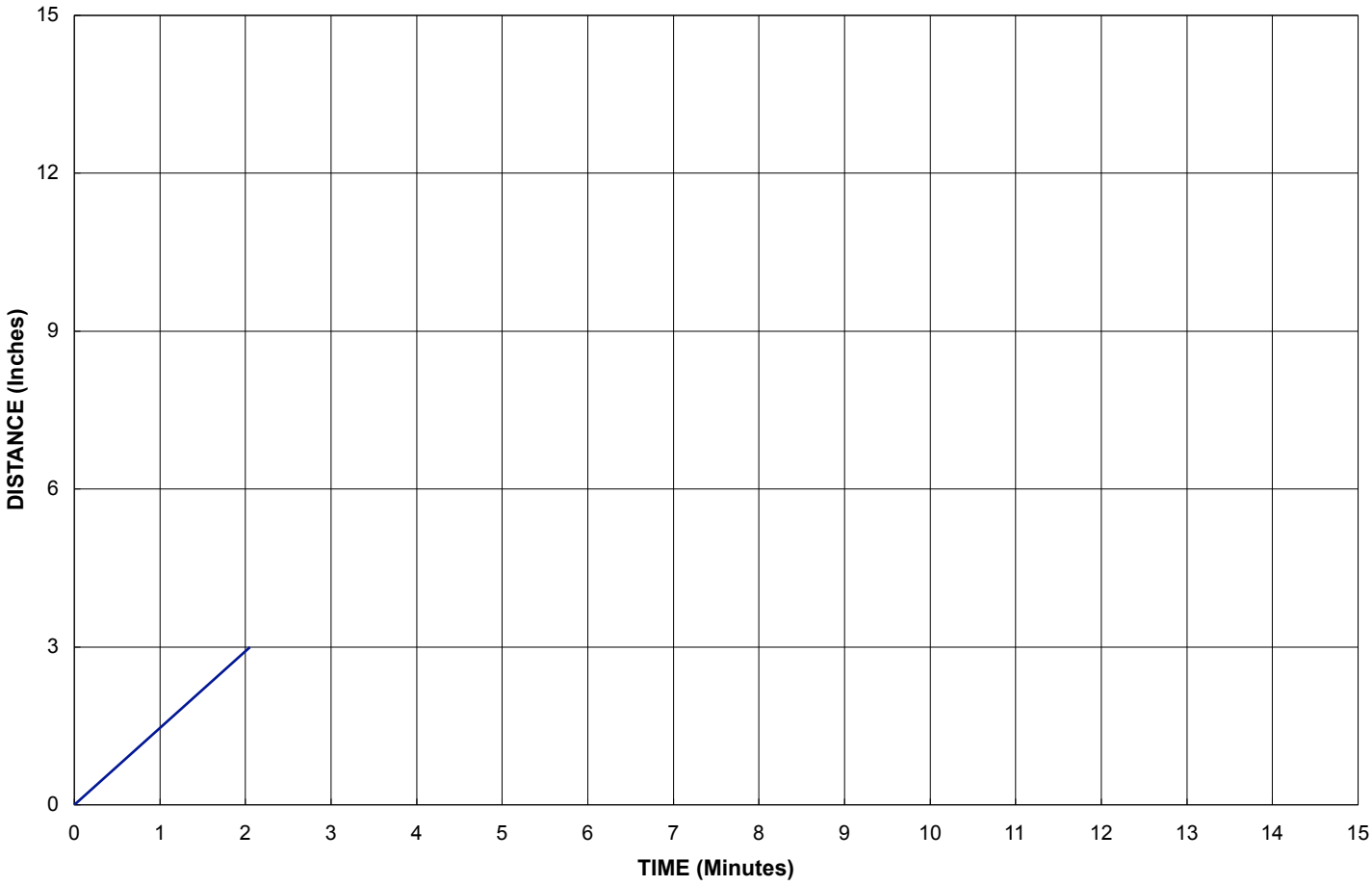


Skip Points Location: No Skip Points

E 162 Radiant Panel

Client: Contra Vision North America, Inc.
Test Number: 4179-1529
Date: December 1, 2010
Specimen Number: 3

Flame Spread Factor, Fs: 1.49
Temperature Rise, °C: 10.6
Heat Evolution Factor, Q: 1.79
Radiant Panel Index, Is: 2.66

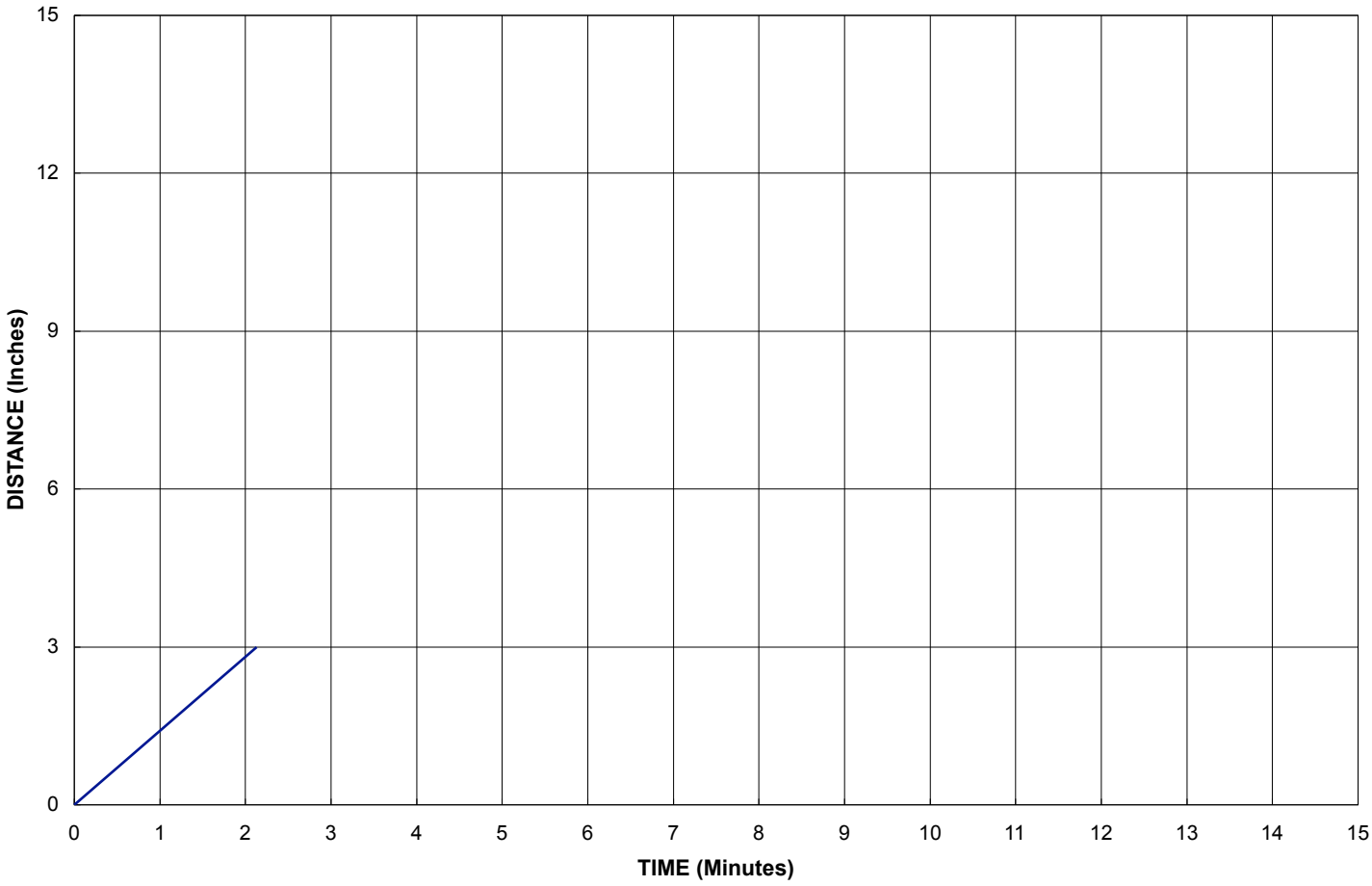


Skip Points Location: No Skip Points

E 162 Radiant Panel

Client: Contra Vision North America, Inc.
Test Number: 4179-1529
Date: December 1, 2010
Specimen Number: 4

Flame Spread Factor, Fs: 1.47
Temperature Rise, °C: 9.4
Heat Evolution Factor, Q: 1.60
Radiant Panel Index, Is: 2.35



Skip Points Location: No Skip Points