



ASTM E-84-09  
TEST FOR SURFACE BURNING  
CHARACTERISTICS OF  
BUILDING MATERIALS

“Flat Metal Pieces”

Report No. 3191590SAT-001A

October 27, 2009

Prepared For:  
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### ABSTRACT

|                |  |   |
|----------------|--|---|
| Test Material: | "Flat Metal Pieces"  |   |
| Test Standard: | ASTM E – 84 TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS (NFPA 255, UBC 8-1, UL 723) |   |
| Test Date:     | 10/26/09   |   |
| Test Sponsor:  | Gray Metal South   |   |
| Test Results:  | FLAME SPREAD INDEX   | 0 |
|                | SMOKE DEVELOPED INDEX  | 0 |

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Teodoro Alvarado Jr  
Tunnel Operator

Date: October 27, 2009

Reviewed and approved



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Miguel Zamarripa  
Project Manager

Date: October 27, 2009



## **I. INTRODUCTION**

This report describes the results of the ASTM E-84 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  
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 E-84 (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 SPECIMENS

Specimen Identification: **“Flat Metal Pieces”**  
Date Received: 10/7/2009  
Date Prepared: 10/7/2009  
Conditioning (73°F & 50% r.h.): 19 days  
Specimen Width (in): 20-in.  
Specimen Length (ft): 24  
Specimen Thickness: 0.1900  
Material Weight: N/A  
Total Specimen Weight: 22  
Adhesive or coating application rate: N/A

#### Mounting Method:

The specimen was supported with rods.

#### Specimen Description:

The test specimen was described by the client as the **“Flat Metal Pieces”**. The specimen consisted of (10) 5-ft. long x 10-in. wide x 0.1900-in. thick, metal panels. The samples were received in good condition. The specimen was identified by the client as **“Flat Metal Pieces”**.

### IV. 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.

*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           |                    | 100                   |
| <b>“Flat Metal Pieces”</b> | 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.

## **V. OBSERVATIONS**

During the test, the specimen was observed to behave in the following manner: The specimen ignited at 1:06 (min:sec.). The test continued for the 10:00 duration.

After the test the specimen was observed to be damaged as follows:  
The sample was consumed from 0-ft. – 4.5-ft. and no visible damage was observed from 4.5-ft. – 24-ft.



**APPENDIX**  
ASTM E-84-09  
DATA SHEETS



Client: GRAY METAL SOUTH

Date: 10-26-09

Project Number: 3191590SAT-001A

Test Number: 1

Operator: TA/AM

Specimen ID: "FLAT PIECES OF METAL". THE SPECIMEN WAS SUPPORTED BY RODS.

## TEST RESULTS

**FLAMESPREAD INDEX: 0**

**SMOKE DEVELOPED INDEX: 0**

## SPECIMEN DATA . . .

Time to Ignition (sec): 66

Time to Max FS (sec): 560

Maximum FS (feet): 0.9

Time to 980 F (sec): Never Reached

Time to End of Tunnel (sec): Never Reached

Max Temperature (F): 558

Time to Max Temperature (sec): 554

Total Fuel Burned (cubic feet): 48.72

FS\*Time Area (ft\*min): 1.2

Smoke Area (%A\*min): 0.4

Unrounded FSI: 0.6

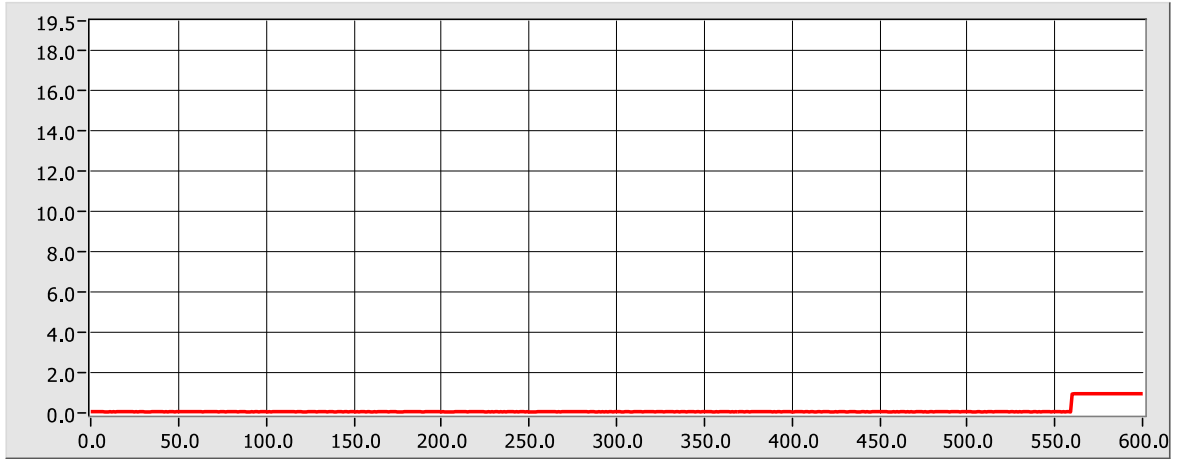
## CALIBRATION DATA . . .

Time to Ignition of Last Red Oak (Sec): 50.0

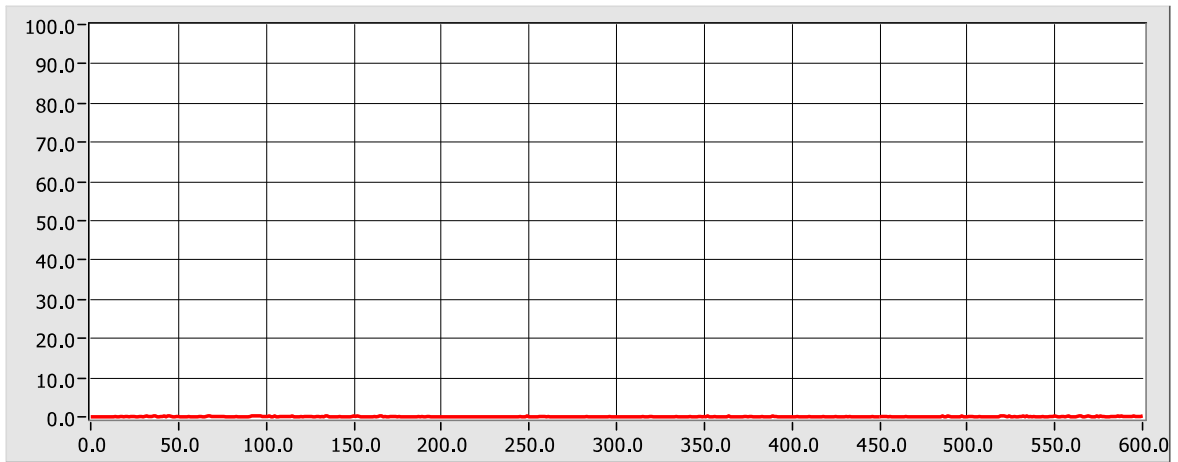
Red Oak Smoke Area (%A\*min): 108.9



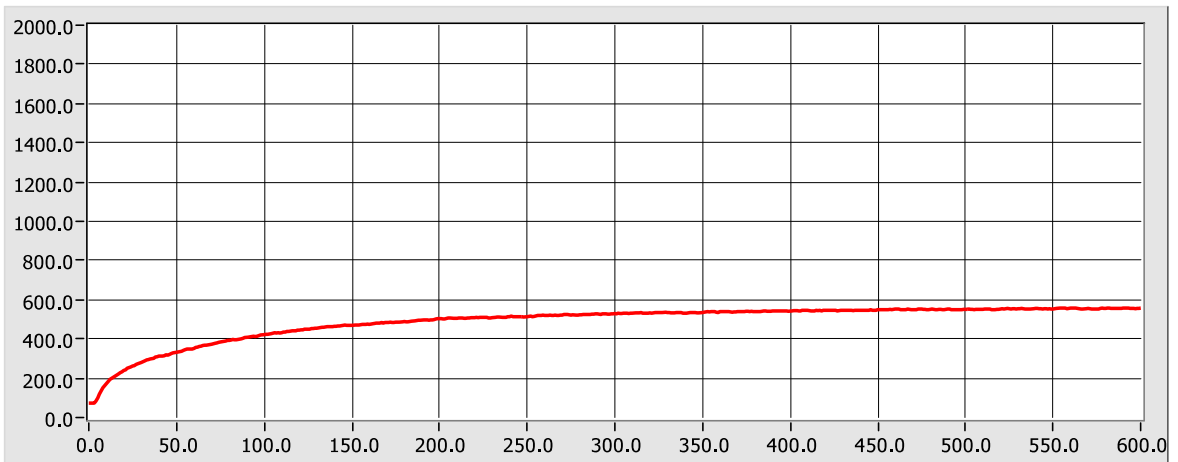
### FLAME SPREAD (ft)



### Smoke (%A)



### Temperature (°F)



Time (sec)

600