



## COMMERCIAL TESTING COMPANY

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Standard Method of Test for  
Surface Burning Characteristics of Building Materials

ASTM E 84-97

### Basics

Report Number 111857

Test Number 2832-5980  
August 15, 1997

General Felt Industries  
Dalton, Georgia

Commercial Testing Company

## INTRODUCTION

This report is a presentation of results of a surface flammability test on a material submitted by General Felt Industries of Dalton, Georgia. The test was conducted in accordance with the American Society for Test and Materials fire test response standard E 84-97, Surface Burning Characteristics of Building Materials, sometimes referred to as the Steiner tunnel test. This test is applicable to exposed surfaces such as walls and ceilings. The test is conducted with the specimen in the ceiling position with the surface to be evaluated exposed face down to the ignition source. The method, which is similar to NFPA No. 255 and UL No. 723, is an American National (ANSI) Standard and has been approved for use by agencies of the Department of Defense for listing in the DoD *Index of Specifications and Standards*.

This standard should be used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled 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 the test may be used as elements of a fire-hazard assessment or a fire-risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard or fire risk of a particular end use.

## PURPOSE

The purpose of the test is to determine the comparative surface burning behavior of a material by observing the flame spread along the surface of the specimen. It is intended to provide comparative measurements of surface flame spread and smoke development of materials with that of select grade red oak and inorganic fiber reinforced cement (GRC) board under specific fire exposure conditions. The test exposes a nominal 25-foot long by 18-inch wide test specimen to a controlled air flow and flaming fire adjusted to spread the flame along the entire length of a red oak specimen in 5.50 minutes. During the 10-minute test duration, flamespread over the specimen surface and density of the resulting smoke are measured and recorded. Test results are calculated relative to red oak, which has an arbitrary rating of 100, and GRC board, which has a rating of 0. The test results are expressed as Flame Spread Index and Smoke Developed Index. The Flame Spread Index is defined in ASTM E 176 as "a number or classification indicating a comparative measure derived from observations made during the progress of the boundary of a zone of flame under defined test conditions." The Smoke Developed Index, a term specific to ASTM E 84, is defined as "a number or classification indicating a comparative measure derived from smoke obscuration data collected during the test for surface burning characteristics." There is not necessarily a relationship between the two measurements.

The method does not provide for measurement of heat transmission through the surface tested, the effect of aggravated flame spread behavior of an assembly resulting from the proximity of combustible walls and ceilings, or classifying a material as noncombustible solely by means of a Flame Spread Index.

The zero reference and other parameters critical to furnace operation are verified on the day of the test by conducting a 10-minute test using 1/4-inch GRC board. Periodic tests using NOFMA certified 23/32inch select grade red oak flooring provide data for the 100 reference.

## TEST SAMPLE

The test sample, selected by the client, was identified as **Basics**, a needlepunch fabric with a total weight of 15.2 ounces per square yard. The test sample was further identified as being color Arctic Blue and was taken from Roll Number 71214. Three test panels, each measuring 2 feet wide by 8 feet in length, were prepared by adhering the material to a 1/4-inch thick GRC board using Sairmix 7 High Temperature Bonding Mortar. The adhesive was applied to the back of the material, the material placed onto the smooth side of the GRC board, and rolled with a 100-pound roller. After dead stacking overnight, the prepared test

samples were transferred to storage racks and conditioned to equilibrium in an atmosphere with the temperature maintained at 71 ± 24F and the relative humidity at 50 ± 5 percent. This method of sample preparation is described in Appendix X1 of the E 84 standard, Guide to Mounting Methods, Section XI-10 for heavy textile materials.

### TEST RESULTS

The test results, calculated on the basis of observed flame propagation and the integrated area under the recorded smoke density curve, are presented below. In recognition of possible variations due to limitations of the test method, the results are rounded to the nearest number divisible by five. Flame spread and smoke development data are presented graphically at the end of this report.

Test Specimen	Flame Spread Index	Smoke Developed Index
GRC Board	0	0
Red Oak Flooring	100	100
Basics	15	30

### OBSERVATIONS

Specimen ignition over the burners occurred at 0.28 minutes. Surface flame spread was observed to a maximum distance of 5.90 feet beyond the zero point at 8.44 minutes. The maximum temperature recorded during the test was 637°F.

### CLASSIFICATION

The Flame Spread Index and Smoke Developed Index values obtained by the ASTM E 84 test are frequently used by code officials and regulatory agencies in the acceptance of interior finish materials for various applications. The most widely accepted classification system is the National Fire Protection Association publication NFPA 101 *Life Safety Code*, where:

<b>Class A</b>	0 - 25 Flame Spread Index	0 - 450 Smoke Developed Index
<b>Class B</b>	26 - 75 Flame Spread Index	0 - 450 Smoke Developed Index
<b>Class C</b>	76 - 200 Flame Spread Index	0 - 450 Smoke Developed Index

Class A, B, and C correspond to Type 1, II, and III respectively in other codes such as BOCA and ICBO. They do not preclude a material being otherwise classified by the authority of jurisdiction.

.....ASTM E 84 TEST DATA.....

Client: General Felt Industries

Test Number: 2832-5990

Material Tested: Basics

Date Tested: August 15, 1997

Test Results:

Time to Ignition = 0.28 minutes

Maximum Flamespread Distance = 5.90 feet

Time Maximum Spread = 8.44 minutes

Flame Spread Index = 15

Smoke Developed Index = 30