

INTRODUCTION

When a fire-retardant material is required for an application, ASTM E84 Class A fire rating has been used as a default in several specifications and applications. Making an informed decision in choosing the right type of material for an application is not only important from the fire safety aspect but also helps with finding alternate classifications when Class A fire retardant material is not required. In this article, we would like to discuss the overview of ASTM E84, the importance of fire rating classification, and the flame spread performance of various commonly known materials.



ASTM E84 Test Chamber

WHAT IS ASTM E84?

ASTM E84, also popularly known as E84 or Tunnel Test is a standard test method for surface burning characteristics of building materials. This test method is intended to provide **only comparative measurements** of surface flame spread and smoke density measurements with that of select grade red oak and fiber cement board surfaces under specific fire exposure conditions.

A test sample that is 20" wide x 24' long is placed on the ledges of a horizontal rectangular tunnel with an opening measuring 17-3/4" wide x 12" tall x 25' long. This sample is exposed to a controlled airflow and flaming fire for a duration of 10 minutes. The distance traveled by the flame front along the surface of the sample and the rate at which the flame advances during the test will be recorded and used for Flame Spread Index calculations. The concentration of smoke the sample emits during the test will be measured using a photometer and a Smoke Developed Index will be calculated.

CLASSIFICATION BASED ON FLAME SPREAD INDEX

ASTM E84 does not include classification criteria for the results obtained from testing. The International Building Code® (IBC), NFPA 101: Life Safety Code® (NFPA 101), and NFPA 5000: Building Construction and Safety Code® (NFPA 5000) all describe a set of classification criteria required for **Interior Wall and Ceiling Finish Materials** based on Flame Spread Index and Smoke Developed Index when tested in accordance with ASTM E84 or UL 723. Refer to IBC-2018 section 803.1.2 for more details.

CLASS	FLAME SPREAD INDEX (FSI)	SMOKE DEVELOPED INDEX (SDI)
A	0-25	0-450
B	26-75	0-450
C	76-200	0-450

FLAME SPREAD PERFORMANCE OF VARIOUS MATERIALS AS PER ASTM E84			
MATERIAL	PRODUCT	FSI	CLASS
Softwood Plywood	23/32" Douglas-fir Plywood	35	B
	15/32" Douglas-fir Plywood	40	B
	3/8" Douglas-fir Plywood	65	B
	1/4" Douglas-fir Plywood	85	C
Oriented Strand Board (OSB)	15/32" OSB	100	C
1" Nominal Solid Wood	1" Douglas-fir	70	B
Fiber Cement Board	1/4" Fiber Cement Board	0	A
STRONGWELL® EXTREN®	1/8" 500 Series	100	C
	1/4" and above 500 Series	50	B
	1/8" and above 525 Series	15	A
	1/8" and above 625 Series	10	A

Note: The above noted classification is for Flame Spread Index (FSI) only and STRONGWELL® EXTREN® products are not rated for Smoke Developed Index (SDI).

References:

1. ASTM E84-21a, "Standard Test Method for Surface Burning Characteristics of Building Materials". <https://www.astm.org/Standards/E84.htm>
2. 2017 American Wood Council, "Design for Code Acceptance". <https://www.awc.org/pdf/codes-standards/publications/dca/AWC-DCA1-FlameSpreadPerformance-1706.pdf>
3. 2018 International Building Code (IBC), Chapter 8: Interior Finishes. <https://codes.iccsafe.org/content/IBC2018/chapter-8-interior-finishes>