

FOR ALL INSPECTORS

C: DIST OFCS  
D/S

The test procedure exposes candidate materials in an insulated rectangular duct or tunnel 17 3/4" wide by 12" deep and 25 feet long. The tunnel is equipped with two gas burners at one end that direct a flame onto the surface of the test material under a controlled air flow. Flame spreads down the surface as the test progresses. Distance of the flame and the rate at which the flame front advances during a 10-minute exposure are used to calculate the flame spread index rating.

To provide standard conditions for each test, the tunnel is calibrated to develop a 4.5 ft. flame on a non-combustible surface (flame spread index = 0) to force the flame to the end of the tunnel in 5.5 minutes when red oak is tested (flame spread index = 100). Relative ratings for interior finish materials from 0 to infinity are assigned by comparison.

#### Wood Products

Lumber, plywood and other wood-based materials exhibit a relatively narrow range of flame spread ratings. Differences result from factors such as density, thickness, surface characteristics and chemical constituents. Flame spread rate is considered nearly independent of material thickness when thickness is 1/4 inch or greater. Additional material mass above this

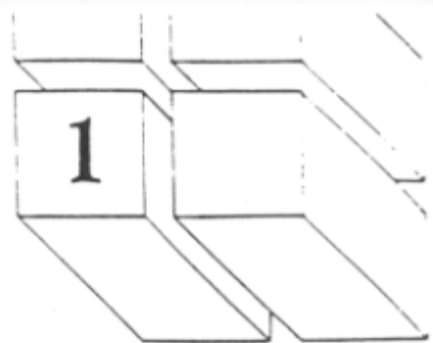
Table 1. Flame Spread Ratings

Material <sup>1</sup>	ASTM E-84 Flame Spread	Source <sup>2</sup>
<b>Lumber</b>		
BIRCH, Yellow	105-110	UL
CEDAR, Pacific Coast Yellow	78	CWC
Western Red	70	HPMA
	73	CWC
COTTONWOOD	115	UL
CYPRESS	145-150	UL
DOUGLAS FIR	70-100	UL
FIR, PACIFIC SILVER (Amabilis)	69	CWC
GUM, Red	140-155	UL
HEMLOCK, West Coast	60-70	UL
MAPLE (flooring)	104	CWC
OAK, Red or White	100	UL
PINE, Eastern White	85	CWC
Idaho White	72	HPMA
Lodgepole	93	CWC
Northern White	120-215	UL
Ponderosa	105-230 <sup>3</sup>	UL
Red	142	CWC
Southern Yellow	130-195	UL
Western White	75	UL
POPLAR	170-185	UL
REDWOOD	65	CRA
	70	UL
SPRUCE, Northern	65	UL
Western	100	UL
WALNUT	130-140	UL
<b>Plywood</b>		
Softwood (Exterior glue)		
CEDAR 3/8"	90-95	APA
DOUGLAS FIR 1/4"	118	CWC
5/16"	115-130	APA
3/8"	95-110	APA
5/8"	95	APA
1/4" w/MDO <sup>4</sup>	140	CWC
3/8" w/MDO <sup>4</sup>	110	APA
3/8" w/HDO <sup>4</sup>	110	APA

STATE FIRE MARSHAL  
BATON ROUGE DISTRICT

DEC 12 1991

2190



Architect: Trott & Bean Architects

Photographer: R. Greg Hursley, Inc.

HEMLOCK 3/8"	80	APA
SOUTHERN PINE 1/4"	95-110	APA
3/8"	95	APA
5/8"	95	APA
REDWOOD 3/8"	102	CRA
5/8"	75	CRA
<b>Hardwood</b>		
LAUAN 11/64"	167	NBS
1/4"	150	HPMA
<b>Particleboard</b>		
1/2"	135	HPMA
1/2" 47 lbs/cu. ft.	156	NBS
5/8" 44 lbs/cu. ft.	153	NBS
3/8" 41.5 lbs/cu.ft.	177	UL
11/16" 41.5 lbs/cu. ft.	155	UL
3/4" 41.5 lbs/cu. ft.	145	UL
<b>Flakeboard</b>		
RED OAK 1-3/16"	108	FPL
1/2" 42-47 lbs/cu. ft. (four types)	71-189	FPL
<b>Shakes</b>		
WESTERN RED CEDAR 1/2"	69	HPMA
<b>Shingles</b>		
WESTERN RED CEDAR 1/2"	49	HPMA

FOOTNOTES for Table 1

- 1 Thickness of material tested is one-inch nominal except where otherwise indicated.
- 2 Sources: APA - American Plywood Association, Research Report 128, Revised, August 1979  
 CRA - California Redwood Association, Data Sheet 2D2-7L, 1984  
 CWC - Canadian Wood Council, CWC Data File FP-6, Fire Protective Design  
 FPL - USDA Forest Products Laboratory, Research Papers FPL 315 and FPL 407  
 HPMA - Hardwood Plywood Manufacturers Association, Test Reports, 202, 203, 335, 337, 592 and 596  
 NBS - National Bureau of Standards, Technical Note 879 and 945  
 UL - Underwriter's Laboratory, UL 527, May 1971, Test Report 64S197
- 3 Average of 18 tests was 154 with three values over 200.
- 4 HDO - High Density Overlay  
 MDO - Medium Density Overlay

thickness does not significantly affect heat absorption or charring depth during the 10-minute flame spread test.

Flame spread ratings for lumber of a number of species, and for plywood, particleboard, flakeboard and shakes and shingles are listed in Table 1. All ratings are based on the ASTM E-84 test method.

Some wood products are commercially available with factory applied transparent, paint, vinyl overlay, or paper overlay finishes. Flame spread ratings for a number of different factory finished products are listed in Table 2. Although finish composition and finish thickness may affect flame spread, factory finished wall panels are commonly tested and labeled to identify the flame spread classification of the finished product.

As can be seen from the listed ratings, most wood products have a flame spread rating less than 200, making them acceptable for a wide range of interior finishes. In addition to the products listed in Tables 1 and 2, many proprietary wood-based interior finish materials are available with assigned flame spread values. Fire retardant treatments for wood panel products can reduce flame spread performance to an index rating of 15 or less.

2191

tion in this publication. However, the National Forest Products Association and the Companies or Associations identified, do not assume responsibility for the accuracy of the ratings reported or their acceptance for use.

Copyright 1985  
National Forest Products Association

**Table 2.**  
**Flame Spread Ratings of Factory Finished Products**

Material		ASTM E-84 Flame Spread <sup>1</sup>
<b>PARTICLEBOARD</b>		
1/32"	Factory Finish Printed	116-178
	Paper Overlay	159-176
	Vinyl Overlay	180
1/4"	Vinyl Overlay	127
3/8"	Vinyl Overlay	130
1/2"	Paper Overlay	175
5/8"	Vinyl Overlay	100
<b>MEDIUM DENSITY FIBERBOARD (MDF)</b>		
3/16"	Factory Finish Printed	167
1/4"	Vinyl Overlay	121
<b>HARDBOARD</b>		
1/8"	Factory Finish Printed	158-194
	Paper Overlay	155-166
	Vinyl Overlay	164
3/16"	Vinyl Overlay	148
<b>FLAKEBOARD</b>		
3/16"	Aromatic Cedar	156
<b>HARDWOOD PLYWOOD</b>		
Alder	5/32" Factory Finished	155
Aspen	1/4" Factory Finished	196
Birch	1/4" Factory Finished	115-185
	3/16" Factory Finished	170-190
Cherry	5/32" Factory Finished	160-195
	1/4" Factory Finished	160
Elm	1/4" Factory Finished	130-145
Hickory	1/4" Factory Finished	140
Lauan	1/4" Factory Finished Printed	99-141
	1/4" Vinyl Overlay	120
	3.6 mm Factory Finished Printed	123-191
	3.6 mm Vinyl Overlay	108-158
Maple	3.6 mm Paper Overlay	132-190
	1/4" Factory Finished	155
Oak	1/4" Factory Finished	125-185
Pecan	1/4" Factory Finished	145-150
Pine	1/4" Factory Finished	120-140
Walnut	1/4" Factory Finished	138-160

<sup>1</sup>Source: Hardwood Plywood Manufacturers Association Test Records



National Forest Products Association  
Forest Industries Building  
1619 Massachusetts Avenue, N.W.  
Washington, D.C. 20036

Cover photograph, courtesy California Redwood Association.

2192

TABLE II

FLAME SPREAD CLASSIFICATIONS  
OF NATURAL WOOD SPECIES

AWI	AUGUST 1, 1950
WOOD SPECIES	FLAME SPREAD CLASSIFICATION [FSC]
BIRCH, YELLOW	105-110
CEDAR, EASTERN RED	110
CEDAR, PACIFIC COAST YELLOW	73-78
CEDAR, WESTERN RED	70
CHERRY	76
COTTONWOOD	115
CYPRESS	145-150
CYPRESS, BALD	144
ELM	76
FIR, AMABILIS	45-74
FIR, DOUGLAS	70-100
GUM, RED	140-155
HEMLOCK, WEST COAST	60-75
MAPLE	109-113
MAPLE, HARD	104
OAK, RED	100
OAK, WHITE	77-100
PECAN	84
PINE, CANADIAN WHITE	63-69
PINE, EASTERN WHITE	85
PINE, IDAHO WHITE	72
PINE, LODGEPOLE	65-110
PINE, NORTHERN WHITE	120-215
PINE, PONDEROSA	105-230
PINE, RED	127-134
PINE, SOUTHERN YELLOW	129-195
PINE, WESTERN WHITE	75
POPLAR, YELLOW	170-185
REDWOOD	70-95
SPRUCE, CANADIAN	57-67
SPRUCE, NORTHERN	65
SPRUCE, WESTERN	100
WALNUT	101
WALNUT, BLACK	131-138

## LAMINATED PLASTIC NOTE

Laminated plastics applied to partitions have also come into prevalent use as an interior finish material. When this plastic application exceeds 1/25th of an inch in thickness, it is subject to regulation by the model codes. A review of the available literature on several manufacturers' products indicates that these laminated plastics in general have flame spread classifications less than 200. In some cases the flame spread ratings even fall into the Class A or I flame spread category of 25 or less. In virtually all cases the smoke development rating does not exceed 450.

The flame spread classification of laminates can be materially affected by the substrate to which the material is applied. Where flame spread classifications are assigned by model codes, in general it is assumed that a noncombustible substrate is used. Further information regarding the application of Laminated Plastics as interior finish should be obtained directly from the Model Code involved.

## SPRINKLERED VS. NONSPRINKLERED

In all the Model Codes except the National Building Code, increases in the flame spread classifications of interior finish materials are permitted when automatic sprinklers are installed throughout the building. The general rule allows the flame spread classification to be increased by one category, i.e., Class A to Class B or Class I to Class II, where automatic sprinkler protection is provided. However, certain Use Areas do not permit an increase in flame spread classifications of interior finish materials. The tables which follow should be consulted for this information. Automatic sprinklers have been shown to reduce the hazard of fire and the rate of fire development so that the requirements for fire retardant treatment of interior finish materials are not as critical. The Model Codes generally acknowledge this fact and provide incentives for installing automatic sprinklers by reducing the economic impact of other fire protection features such as reducing requirements of Interior Finish flame spread classifications. It should be noted that the flame spread classification is not allowed to exceed 200 even when automatic sprinkler protection is provided.

## SUMMARY

Interior Finish and Trim is regulated by all five Model Codes by establishing maximum flame spread classifications for various building Use Groups and Use Area applications. All Model Codes, except the National Building Code, also establish a maximum smoke development rating for Interior Finish materials. Generally the Model Codes permit the relaxation of Interior Finish flame spread classification requirements when automatic sprinklers are installed.

Interior Finish materials and Trim are considered finished surfaces when on walls and ceilings only. Trim is generally less regulated than other Interior Finishes. The Model Codes do not regulate fixed or movable furniture nor cabinetry and casework whether free-standing or attached to a wall surface. They also do not regulate Interior Finish materials which have a thickness of 1/28th of an inch or less unless they pose an unusual hazard.

Interior Finish flame spread classifications are determined by the Steiner Tunnel Test (ASTM E-84) which is referenced by all Model Codes. This test is well accepted within the industry as the standard for establishing flame spread classifications of materials.

Interior Finish flame spread classifications are relative numbers based on the fire performance of two well known materials, asbestos cement board and red oak. These materials are used to judge the fire performance characteristics of other interior finish materials to assess a relative rather than absolute level of hazard.

This document represents the evaluation of the latest available editions of the five national Model Codes that regulate Interior Finish in buildings. Code Consultants Incorporated has reviewed, interpreted and documented the requirements of these five model codes which establish regulations for Interior Finish materials. This documentation represents Code Consultants Incorporated's interpretation and knowledge in the application of the subject codes and of Interior Finish and Trim in buildings.