

Flame Spread Index for Wood Products

Fire Safety of Wood Products
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Numerous flame-spread tests are used, but the most common one cited by building codes is ASTM E 84, the 25-foot tunnel test. This test method involves the use of a 20-inch by 25-foot specimen exposed horizontally to a furnace operating under forced draft conditions. The two results of this test are the flame spread index and smoke developed index.

In the past, select grade red oak flooring was used as a standard and was given a flame spread index of 100. Today, red oak flooring still has an index around 100 but is no longer used in the calculation of the flame spread index. The smoke developed index is still based on red oak flooring having a value of 100. The indexes are also based on inorganic reinforced cement board having a value of zero.

For regulatory purposes, interior finish materials are classified according to their flame spread. The classes are 0-25 for Class A or I, 26-75 for Class B or II, and 76-200 for Class C or III. For regulatory purposes, the requirement for smoke developed index is usually 450 or less.

This list of ASTM E 84 flame spread indexes and smoke developed indexes for untreated wood products was prepared from the literature. The Forest Products Laboratory (FPL) does not have an ASTM E 84 test furnace. Results from the 8-foot tunnel (ASTM E 286) of the FPL are not comparable or equivalent to ASTM E 84 test results. A list of commercial testing laboratories with the 25-foot tunnel is available from the Fire Safety of Wood Products Research Work Unit (608-264-5669).

The flame spread index may depend on density, thickness, chemical composition, and surface characteristics. Finishes on the wood may affect the flame spread index depending on the thickness and composition of the finish. Changes in the procedures for calculating the flame spread index have also affected the numbers. Species identification on this list are the names given in the references. Exact identification of the species may not have been possible.

Fire-retardant treatments can be used to reduce the flame spread index of wood to 25 or less. Lists of the fire-retardant coatings and pressure treaters are also available from the Fire Safety of Wood Products Research Work Unit.

Building code officials may require building materials to be stamped with the flame spread classification of an approved testing agency. Users should consult the manufacturer as to the availability of their product with an approved stamp.

<u>Lumber (1-in. nominal thickness)</u>	<u>FSI</u>	<u>SDI</u>
Azobe/Bongossi	0	5-10
Birch, yellow	105-110	-
Box, brush (Lophostemon confortus), 17mm	45	373
Cedar:		
Eastern red, 1/2 in.	110	-
Pacific coast yellow	78	90
Western red	73	98
Western red (Thuja plicata), 17mm	69	137
Western red	70	213
Western red, nitrocellulose base, lacquer finish	71	226
Western red, linseed oil base, stain finish	71	235
Western red. polyurethane varnish	70	218
Cottonwood	115	-
Cypress	145-150	-
Cypress pine (Callitris glaucophylla), 17mm	51	184
Douglas fir	70-100	-
Douglas fir (Pseudotsuga menziesii), 17mm	69	54
Eucalyptus:		
Blackbutt (E. pilularis), 17mm	48	68
Jarrah (E. magenata)	42	-
Jarrah (E. marginata). 17mm	26	20
Karri (E. diversicolor)	45	-
Victorian ash (E. delegatensis), 17mm	51	43
Fir, Pacific silver (Amabilis)	69	-
Greenheart	40,46	230,304
Gum, red	140-155	-
Hemlock. West coast	60-75	-
Maple (flooring)	104	157
Oak. red or white	100	-
Pine:		
White	73	-
Eastern white	85	122
Idaho white	72	123
Idaho. white, linseed oil base finish	70	125
Idaho. white, nitrocellulose base, lacquer finish	72	108
Idaho, white, polyurethane varnish finish	73	175
Lodgepole	93	210
Northern white	120-215	-
Ponderosa	105-230	-
Red	142	229
Southern yellow	130-195	-
Western white	75	-
Radiata (Pinus radiata), 17mm	85	122
Radiata (Pinus radiata)	77	206
Poplar	170-185	-
Redwood	70	75-115
Redwood, 3/8-in. nominal	95	95-110

<u>Species</u>	<u>Material Form</u>	<u>(Pre 1976)</u>	<u>(Post- 1976)</u>
Birch, Yellow	Lumber (1")	105-110	-
Cedar, Western Red	Lumber	70	-
Cedar, Western Red	Lumber	73	-
Cottonwood	Lumber (1")	115	-
Cypress	Lumber (1")	145-150	-
Douglas Fir	Lumber (1")	70-100	-
Eucalyptus diversicolor (Karri)	Lumber	69	-
Eucalyptus magenata (Jarrah)	Lumber	51	-
Greenheart	Lumber	64	-
Greenheart	Lumber	54	-
Gum, Red	Lumber (1")	140-155	-
Hemlock, West Coast	Lumber (1")	60-75	-
Lauan	Plywood (3/16")	155	-
Maple, Hard	Lumber	104	-
Oak, Red or White	Lumber (1")	100	-
Pine, Eastern White	Lumber	85	-
Pine, Idaho White	Lumber	72	-
Pine, Northern White	Lumber (1")	120-215	-
Pine, Ponderosa	Lumber (1")	154	-
Pine, Southern Yellow	Lumber (1")	130-195	-
Pine, Western White	Lumber (1")	75	-
Poplar	Lumber (1")	170-185	-
Redwood	Lumber (1")	70	-
Redwood	Plywood (3/8")	95	-
Spruce, Northern	Lumber (1")	65	-
Spruce, Western	Lumber (1")	100	-
Teak	Lumber	76	-
Walnut	Lumber (1")	130-140	-