FLAME-SPREAD RATINGS & SMOKE-DEVELOPED INDICES: CONFORMANCE WITH MODEL BUILDING CODES

Western softwood products used as interior finishes on walls and ceilings are required to have assigned flame-spread ratings meeting fire safety regulations in building codes. Western lumber species are well suited for these interior finish applications and often outperform other species and wood-based products in fire safety ratings.

Western species tested for flame-spread have earned ratings favorable for applications requiring low flame-spread ratings. All tested Western species fall into Class B or Class C classifications, as shown in Table A. The low ratings for these species provide an advantage over other species and wood products used in the same applications. (See Table B for other species and products.)

The numerical scale for flame spread in the fire codes is based on a noncombustible cement board as 0 (zero) and combustible red oak as 100.

The smoke-developed indices are a relative measure of the amount of visible smoke created when a substance burns. This is a visual measurement, different from smoke toxicity, but recognized by the codes as a life safety issue. The numerical scale for smoke-developed values is also based on 0 for noncombustible cement board and 100 for red oak.

ASTM E-84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, was developed to rate building products for flame-spread characteristics. The Steiner Tunnel Test (ASTM E-84) is used to develop the actual burning and flame-spread data.

TABLE A

Western Softwoods	Flame-Spread Rating	Flame-Spread Class	Smoke-Developed Index	Source
Alaska Yellow Cedar	50	B	115	HPVA
Douglas Fir	70	B	80	HPVA
Engelmann Spruce	55	B	35	HPVA
Hem-Fir[1]	60	B	70	HPVA
Idaho White Pine	82	C	83	W
Incense Cedar	40	B	150	HPVA
Lodgepole Pine	75	B	140	HPVA
Pacific Silver Fir	69	B	58	CWC
Ponderosa Pine	55	B	135	HPVA
Port Orford Cedar	60	B	150	HPVA
Sitka Spruce	74	B	74	CWC
Sugar Pine	45	B	110	HPVA
Redwood	45	B	65	HPVA
West Coast Hemlock	73	B	80	W
Western Larch	45	B	20	HPVA
Western Red Cedar	65	B	150	HPVA
White Fir	40	B	80	HPVA

W Weyerhaeuser Fire Technology Unit, 1988.

HPVA Hardwood Plywood & Veneer Association,1995, 2000, 2001, 2008, 2013-2016.

CWC "Wood and Fire Safety" by the Canadian Wood Council, 1991.

[1] The Hem-Fir species group for Western softwoods is comprised of Western hemlock (Tsuga heterophylla), Pacific silver fir (Abies amabilis), White fir (Abies concolor), California red fir (Abies magnifica), Noble fir (Abies procera) and Grand fir (Abies grandis). When lumber is from a single species, refer to the specific species index.

Code Requirements

The International Building Code, Section 803, lists the following classification rating ranges:

		Example Building Locations:
0–25	flame-spread—Class A	Enclosed vertical exits
26–75	flame-spread—Class B	Exit access corridors
76–200	flame-spread—Class C	Other rooms and areas

The model building codes require a smoke-developed index of 450 or less for most construction applications.

Designers should consult their locally applicable codes for flame-spread and smoke-developed requirements for specific use, areas and occupancies. When a species does not carry a flame-spread classification appropriate to a desired application, designers may be able to use an intumescent finish or fire-retardant treatment to improve the flame-spread classification and satisfy local building codes.

FLAME-SPREAD RATINGS

WWPA®

Fire Retardant Coatings

Flame-spread indices may be reduced through applications of fire-retardant coatings. The effectiveness and degree of surface flammability reduction varies. Please refer to the finish/coating proprietor for specific flame-spread reduction indices.

Additional Information

Technical information on Western lumber products manufactured by WWPA mills is available on the Association's web site at **www.wwpa.org**. The site features sections on lumber grades, design values, specifications, special products and properties of Western lumber.

A list of WWPA producing mills is available on the web site in the Online Lumber Buyers Guide. For a full description of technical publications available for purchase and a printable order form, go to the WWPA site and click on the Publications tab.

TABLE B

Other Wood Products	Flame-Spread Rating	Flame-Spread Class	Smoke-Developed Index	Source
Birch 1/4" Plywood – MDF Core	120	C	200	HPVA
Douglas Fir 3/8" Plywood[2]	65	B	60	HPVA
Douglas Fir 15/32" Plywood[2]	40	B	50	HPVA
Eastern White Pine Solid Wood	70	B	110	HPVA
Oak 1/4" Plywood – Poplar Veneer Core	140	C	60	HPVA
Red Pine Solid Wood	115	C	65	Exova
Southern Yellow Pine Solid Wood	70	B	165	HPVA
SYP 11/32" Plywood[2]	75	B	115	HPVA
Walnut Solid Wood	75	B	125	HPVA
Yellow Poplar Solid Wood	125	C	125	HPVA

Source for Other Wood Products and Factory Applied Finish flame-spread ratings is provided in American Wood Council's publication *Design for Code Acceptance DCA1: Flame Spread Performance of Wood Products Used for Interior Finish.*

[2] Exterior Glue.

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