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# Code Conforming Wood Design

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## Course Description

**Code Conforming Wood Design** - This presentation is based on a set of new publications summarizing allowable wood use in buildings in accordance with the 2012 IBC. Titled Code Conforming Wood Design (CCWD), the documents feature an overview of the design flexibilities permitted for wood in commercial construction and should not be considered a replacement for the building code. However, it should help engineers, architects and building officials better understand how wood can be used in a variety of applications. The CCWD series includes a comprehensive document summarizing wood use in the IBC. A series of eight smaller documents are specific to different use groups such as assembly, business and educational buildings. Participants can download a complimentary copy of the CCWD at:  
<http://www.awc.org/codes/ccwdindex.html>

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## Objectives

Upon completion, participants will be better able to:

1. Identify building size and use parameters for wood as the primary structural elements.
2. Identify methods specified by the code for establishing fire resistance of wood assemblies and elements, and fire precautions during construction
3. Apply special provisions for design of wood structures that involve compartmentalization and sprinkler systems
4. Apply code provisions for the non-structural use of wood in buildings, such as for finishes, appendages, siding, and trim.

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## CCWD document

- This program is based on the **Code Conforming Wood Design (CCWD) document**
- The **CCWD is intended as a brief yet comprehensive resource for wood design in accordance with the IBC**
- **Download at [www.awc.org](http://www.awc.org)**



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## ICC

- **The International Code Council is a member-focused association.**
- **It is dedicated to developing model codes and standards used in the design, build and compliance process to construct safe, sustainable, affordable and resilient structures.**
- **More info at [iccsafe.org](http://iccsafe.org).**



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## Who...

### History of AWC

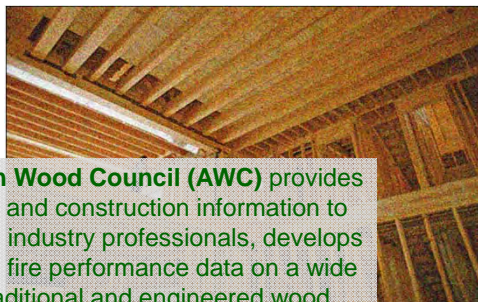
- ❖ 1902 – National Lumber Manufacturers Association
- ❖ 1965 – National Forest Products Association
  - 1991 – American Wood Council – Codes & Engineering
- ❖ 1993 – American Forest & Paper Association
- ❖ **2010 – American Wood Council**



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## About AWC



The **American Wood Council (AWC)** provides wood design and construction information to assist building industry professionals, develops structural and fire performance data on a wide range of traditional and engineered wood products, and engages in long-term research.

## References Standards

### American Wood Council (AWC) Standards

- 2012 National Design Specification® for Wood Construction with 2012 Supplement, AWC NDS-12®
- 2008 Special Design Provisions for Wind and Seismic, AWC SDPWS-08
- 2012 Wood Frame Construction Manual®, AWC WFCM-12®



## American Wood Council



## Referenced Standards

### IBC Chapter 35

- List of referenced standards
  - Agency that writes the standard
  - Identification and title of the standard
  - Effective date
- Conflicts 102.4.2
  - Code applies



## Resources

**NOTICE:** The OSHPD 3 and 3CE amendments are inoperable and are not enforceable provisions of the 2013 California Plumbing Code as of their effective date of January 1, 2014. See the supplement dated December 7, 2013.

The 2013 triennial edition of Title 24, California Code of Regulations (CCR) consists of the following 13 parts:

- Part 1 - California Building Standards Administrative Code
- Part 2 - California Building Code
- Part 2.5 - California Residential Building Code
- Part 3 - California Electrical Code
- Part 4 - California Mechanical Code
- Part 5 - California Plumbing Code
- Part 6 - California Energy Code
- Part 7 - (No longer published in Title 24. See Title 8, CCR)
- Part 8 - California Historical Building Code
- Part 9 - California Fire Code
- Part 10 - California Existing Building Code
- Part 11 - California Green Building Standards Code
- Part 12 - California Reference Standards Code

**Supplements:**  
Part 5, Plumbing Code Supplement Effective December 7, 2013 (PDF)

**Errata:**  
Part 4, Mechanical Code Errata Effective January 1, 2014 (PDF)  
Part 5, Plumbing Code Errata Effective January 1, 2014 (PDF)

2010 Triennial Edition (current code)  
2007 Triennial Edition (previous code)



<http://www.bsc.ca.gov/codes.aspx>

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## CCWD document

- This program is based on the Code Conforming Wood Design (CCWD) document
- The CCWD is intended as a brief yet comprehensive resource for wood design in accordance with the IBC
- Download at [www.awc.org](http://www.awc.org)



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## CCWD Classifications

- Group A, Assembly occupancies
- Group B, Business occupancies
- Group E, Educational occupancies
- Group F, Factory/Industrial occupancies
- Group I, Institutional occupancies
- Group M, Mercantile occupancies
- Group R, Residential occupancies
- Group S, Storage occupancies
- Others (see IBC 303)

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## Occupancy classification

- Structure's purpose not listed
  - Classified as most nearly resembled occupancy
  - Classification Section 302.1 General



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## Occupancy classification--new

- Section 303.1.3- Rooms or spaces used for assembly purposes that are associated with a **Group E occupancy** are not considered separate A occupancies, but can be part of the E occupancy.
- Casinos were added to Group A-2
- R-4 group homes no longer have the IRC as a compliance option (310.6)



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Table 503 Excerpt, Allowable Building Heights and Areas

Group	Height (ft)	Type of Construction				
		Type III		Type IV	Type V	
		A	B	HT	A	B
		65	55	65	50	40
		Stories (S)				
		Area (A)				
A-1	S	3	2	3	2	1
	A	14,000	8,500	15,000	11,500	5,500
A-2	S	3	2	3	2	1
	A	14,000	9,500	15,000	11,500	6,000
A-3	S	3	2	3	2	1
	A	14,000	9,500	15,000	11,500	6,000
A-4	S	3	2	3	2	1
	A	14,000	9,500	15,000	11,500	6,000
A-5	S	UL	UL	UL	UL	UL
	A	UL	UL	UL	UL	UL
B	S	5	3	5	3	2
	A	28,500	19,000	36,000	18,000	9,000
E	S	3	2	3	1	1
	A	23,500	14,500	25,500	18,500	9,500

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## Types of Construction

- IBC Chapter 6
  - Defines types of construction
  - Wood frame construction is typical in Types III, IV, and V



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## Type V Construction

- Permits the use of wood or other approved materials for structural elements.
  - Type VA
  - Type VB



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## Type IV Construction

- **Heavy Timber (HT) has ...**
  - Exterior walls made of noncombustible materials or fire-retardant-treated wood (FRTW).
  - Interior building elements are made of solid or laminated wood without concealed spaces.



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## Type III Construction

- **Requires exterior walls to be noncombustible material or FRTW and have a minimum 2-hour fire-resistance rating (bearing walls).**
  - Type IIIA
  - Type IIIB



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## Type I and II Construction

- **Type I and II construction require building elements constructed of noncombustible materials**



Type I Building



Type I Building

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## Allowable Heights and Areas

- **IBC Chapter 5 contains the general criteria for wood building size**
  - Size thresholds for wood structures are often determined by structural considerations rather than code limitations



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**Table 503 Excerpt, Allowable Building Heights and Areas**

Group	Height (ft)	Type of Construction				
		Type III		Type IV	Type V	
		A	B	HT	A	B
		65	55	65	50	40
		Stories (S)				
		Area (A)				
A-1	S	3	2	3	2	1
	A	14,000	8,500	15,000	11,500	5,500
A-2	S	3	2	3	2	1
	A	14,000	9,500	15,000	11,500	6,000
A-3	S	3	2	3	2	1
	A	14,000	9,500	15,000	11,500	6,000
A-4	S	3	2	3	2	1
	A	14,000	9,500	15,000	11,500	6,000
A-5	S	UL	UL	UL	UL	UL
	A	UL	UL	UL	UL	UL
B	S	5	3	5	3	2
	A	28,500	19,000	36,000	18,000	9,000
E	S	3	2	3	1	1
	A	23,500	14,500	25,500	18,500	9,500

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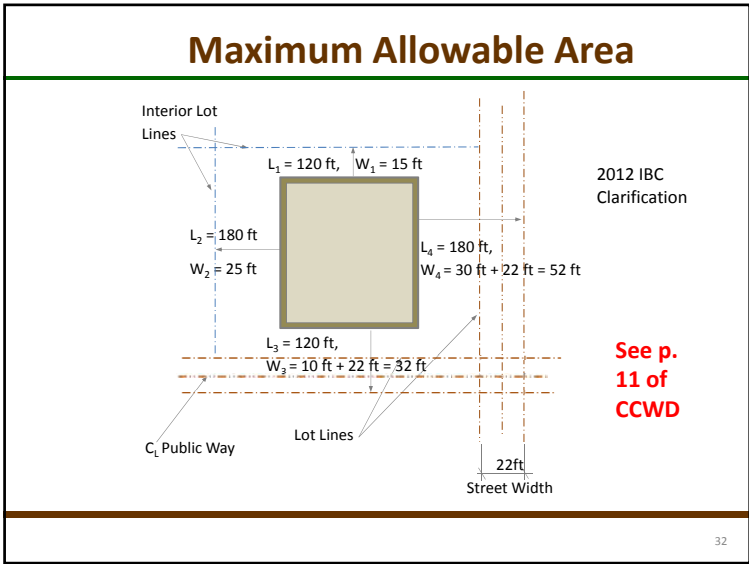
## Maximum Allowable Area

**Section 506**  
**Allowable building area per story**  
 $A_a = \{A_t + [A_t \times I_f] + [A_t \times I_s]\}$  (Equation 5-1, base equation) Frontage Sprinkler

$I_f = (F / P - 0.25) \times W / 30$  (Equation 5-2, factor for open frontage)

$W = (L_1 \times w_1 + L_2 \times w_2 + L_3 \times w_3 \dots) / F$  (Equation 5-3, weighted average for the width of the open space)  
 (w = 20' min. & 30' max unless public way) **NEW EQ.**


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## Sprinkler system increases

- When a building is equipped throughout with an NFPA 13-compliant automatic sprinkler system (Section 903.3.1.1), the allowable floor area is permitted to be increased:
- $I_s$ 
  - Single-story building – 3x
  - Multistory building – 2x




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### Exception

- In addition to the area increase, Section 504.2 also permits the Table 503 building heights to be increased:
  - 20 feet
  - 1 story above grade.

NFPA 13




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### Exception

504.2 Automatic sprinkler system increase. Where a building is equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, the value specified in Table 503 for maximum *building height* is increased by 20 feet (6096 mm) and the maximum number of *stories* is increased by one. These increases are permitted in addition to the *building area* increase in accordance with Sections 506.2 and 506.3. For Group R buildings equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.2, the value specified in Table 503 for maximum *building height* is increased by 20 feet (6096 mm) and the maximum number of *stories* is increased by one, but shall not exceed 60 feet (18 288 mm) or four *stories*, respectively.

NFPA 13

NFPA 13R





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### Exception CBC

504.2 Automatic sprinkler system increase. Where a building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, the value specified in Table 503 for maximum building height is increased by 20 feet (6096 mm) and the maximum number of stories is increased by one. Increases are permitted in addition to the building area increase in accordance with Section 506.2. In other than Group A, E, H, I, L and R occupancies, high-rise buildings, and other applications listed in Section 1.11 regulated by the Office of the State Fire Marshal, these increases are permitted in addition to the area increase in accordance with Section 506.3. For Group R-2 buildings of Type VA construction equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, the value specified in Table 503 for maximum building height is increased by 20 feet (6096 mm) and the maximum number of stories is increased by one, but shall not exceed 60 feet (18 288 mm) or four stories, respectively, these increases are permitted in addition to the area increase in accordance with Section 506.3.

NFPA 13

NFPA 13

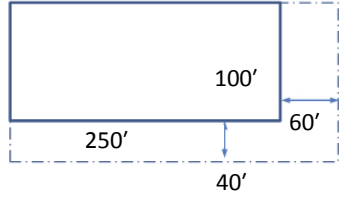
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### Allowable Building Area Calculation

**Given:** Single-story Type VB grade school  
 Provided with an NFPA 13-compliant automatic sprinkler system throughout and located on lot as shown.

**Determine:** Maximum allowable building area

(see pg. 12 of CCWD)



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## Allowable Building Area Calculation

$$A_f = 9,500$$

$$F = 250 + 100 = 350$$

$$P = (250 + 100 + 250 + 350) = 700$$

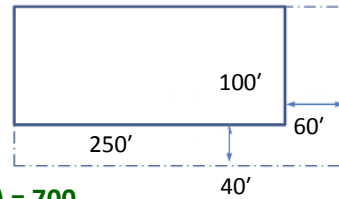
$$W = (0 + 250(30) + 100(30) + 0)/30 = 30$$

$$I_f = [(350/700) - 0.25] \times 30/30 = 0.25 \text{ frontage}$$

$$I_s = 300\% \text{ sprinklers}$$

$$A_a = 9,500 + (9,500 \times 0.25) + (9,500 \times 3) = 40,375 \text{ sf}$$

$$\text{Actual Area} = 250 \times 100 = 25,000 \text{ sf}$$



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## Chapter 9 Area Limits for Nonsprinklered Buildings

- Many occupancies have floor area limits allowed by Chapter 5 that are greater than those permitted in Chapter 9 for nonsprinklered buildings.
- These same thresholds apply to all construction types, not just wood. The allowable area per story can exceed allowable fire areas and a sprinkler system may be required.

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## Some Sprinkler Trade-offs

- Reductions in corridor ratings and corridor opening protection
- Flexibility in means of egress (travel distance to exits, number and separation of exits, common path of travel)
- Reductions in dwelling unit separations
- Alternate to emergency escape openings
- Alternate to certain fire and smoke damper requirements
- Interior finish flexibility
- Other trade-offs



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## Total Building Area

- 506.4 Single Occupancy Buildings three or more stories above grade have a total building area of the allowable building area per story ( $A_a$ ) multiplied by **three**.




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### Building Area – four or more stories

**For buildings of four stories or more,**

$$A_{\text{total building area}} = 3 \times A_{\text{allowable area per story}}$$



If the allowable area per story is 37,500, then the maximum allowable area per story for a 4-story building of **equal** floor areas is:  
 $(37,500 \times 3) / 4 = 28,125$  sq. ft. per floor

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### CCWD Building Area Tables (at end of CCWD)

Group E Nonsprinklered Buildings <sup>a, b, c</sup>						
# of stories	% frontage	Maximum floor area per story (sq. ft.)				
		IIIA	IIIB	IV	VA	VB
1	0-25	23,500	14,500	25,500	12,120	9,500
	50	29,370	25,370	31,870	22,500	11,870
	100	41,120	33,250	44,620	32,370	16,620
2	0-25	23,500	14,500	25,500	NP	NP
	50	29,370	18,120	31,870	NP	NP
	100	41,120	25,370	44,620	NP	NP
3	0-25	23,500	NP	25,500	NP	NP
	50	29,370	NP	31,870	NP	NP
	100	41,120	NP	44,620	NP	NP

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### Total Building Area


- **506.4 Exception: A single-story basement does not need to be included in the total allowable building area, when the basement does not exceed the area permitted for a single story**



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### Mixed Occupancy

- **Section 508.3 Nonseparated occupancies**
- **Section 508.4 Separated occupancies**
  - Fire Barriers and/or horizontal assemblies

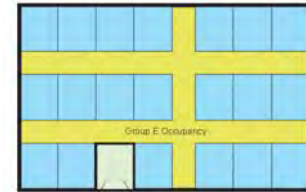


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## Incidental Uses

Section 509 Incidental uses (no longer part of mixed occupancies in the 2012 IBC) **NEW**

- Both single-occupancy or mixed-occupancy
- Incidental uses – ancillary functions
- NOT considered as separate and distinct occupancy
- Floor area limitation retained
- Table 509 ALL need to comply with 509.



- Chemistry Lab/Classroom
- Separated from remainder of building by minimum 1-hour fire barriers, air
- Provided with automatic sprinkler system
- Classified as a portion of Group E
- Limited to 10% of story's floor area

School laboratory regulated as incidental use

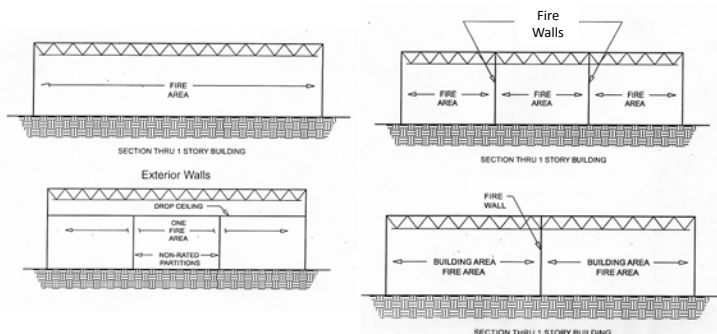
## Incidental Uses

TABLE 509 INCIDENTAL USES

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15 psf and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery room	1 hour or provide automatic sprinkler system
Hydrogen cutoff rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms	2 hours and automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic sprinkler system
Laboratories and vocational shops, not classified as Group H, located in a Group E or I-2 occupancy	1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
Group I-3 cells equipped with padded surfaces	1 hour
Waste and linen collection rooms located in either Group I-2 occupancies or ambulatory care facilities	1 hour
Waste and linen collection rooms over 100 square feet	1 hour or provide automatic sprinkler system
Stationary storage battery systems having a liquid electrolyte capacity of more than 50 gallons for flooded lead-acid, nickel cadmium or VRLA, or more than 1,000 pounds for lithium-ion and lithium metal polymer used for facility standby power, emergency power or uninterruptible power supplies	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.

For SI: 1 square foot = 0.0929 m<sup>2</sup>; 1 pound per square inch (psi) = 6.89 kPa; 1 British thermal unit (Btu) per hour = 0.293 watts; 1 horsepower = 746 watts; 1 gallon = 3.785 L.

## Fire walls create separate buildings (706.1)




## Fire walls create separate buildings (706.1)

- In Type V construction, fire walls may be wood frame
- In Types III and IV construction, fire walls must be of noncombustible materials in accordance with Section 706.3.

### Unlimited Area Buildings

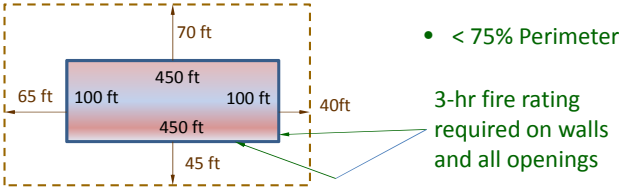
- Section 507 has provisions for unlimited area Group B, F, M, and S building up to two stories in height
- There are unlimited area provisions for Groups A, E, and mixed use buildings as well



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### Unlimited Area Buildings

- In most cases, 60 feet of open perimeter is required on all sides, and sprinklers
- The open perimeter can be reduced somewhat per Section 507.5; it requires rated exterior walls at reduced perimeter frontage




- < 75% Perimeter
- 3-hr fire rating required on walls and all openings

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### Stacked Buildings

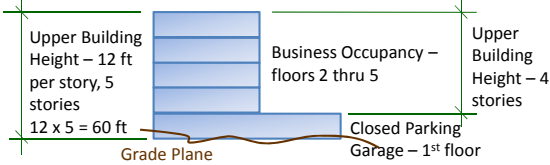
- Buildings of different types of construction and occupancy are allowed to be built on top of each other. They are commonly referred to as pedestal buildings.
- See several options in the subsection of Section 510.



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### Building Height – Stacked Buildings (510.2)

- **Building Height – in feet**
  - Upper building height (feet) is measured from grade plane
- **Building Height – stories**
  - Upper building height (stories) – measured from top of lower building



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### Fire Resistance-Table 601

**Table 601 Fire-resistance Rating Requirements For Building Elements (hr)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A <sup>d</sup>	B	A <sup>d</sup>	B	HT	A <sup>d</sup>	B
Primary structural frame <sup>e</sup> (see Section 202)	3 <sup>a</sup>	2 <sup>a</sup>	1	0	1	0	HT	1	0
Bearing walls, Exterior <sup>f,g</sup>	3	2	1	0	2	2	2	1	0
Interior	3 <sup>a</sup>	2 <sup>a</sup>	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions, Exterior	See Table 602								
Nonbearing walls and partitions, Interior <sup>e</sup>	0	0	0	0	0	0	See Section 602.4.6	0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and associated secondary members (see Section 202)	1-1/2 <sup>b</sup>	1 <sup>b,c</sup>	1 <sup>b,c</sup>	0 <sup>c</sup>	1 <sup>b,c</sup>	0	HT	1 <sup>b,c</sup>	0

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### Fire Resistance-Table 602

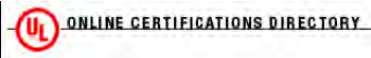

**TABLE 602  
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE<sup>a, b</sup>**

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H <sup>1</sup>	OCCUPANCY GROUP F-1, M, S-1 <sup>2</sup>	OCCUPANCY GROUP A, B, E, F-2, I, R, S, 2 <sup>3</sup> , U <sup>3</sup>
X < 5 <sup>c</sup>	All	3	2	1
5 ≤ X < 10	IA	3	2	1
	Others	2	1	1
10 ≤ X < 30	IA, IB	2	1	1 <sup>d</sup>
	IIB, VB	1	0	0
	Others	1	1	1 <sup>d</sup>
X ≥ 30	All	0	0	0

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### Fire resistance-tested assemblies (703.2)

- Tested to the ASTM E 119 or UL 263 standard
- Choose listed assemblies from fire-resistance publications or directories

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### Fire resistance-alternative methods

- 703.3 contains five alternative methods to determine fire resistance:
  - Fire resistive designs in approved sources
  - Prescriptive designs per Section 721
  - Calculation per 722
  - Engineering analysis based on a comparison of tested building elements, components or assemblies
  - Alternative protection methods per 104.11

Based criteria specified in ASTM E 119 or UL 263.

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## Prescriptive assembly

- Fire resistance of certain wood assemblies is prescribed in Section 721 based on testing using ASTM E 119 or UL 263

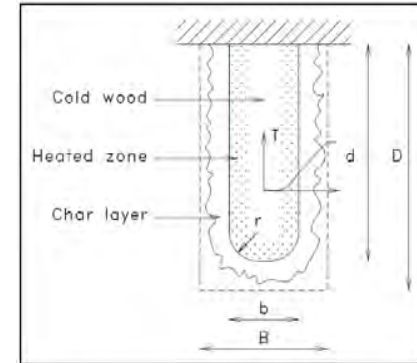
DCA 3  
<http://www.awc.org/codes/dcaindex.php>



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## Calculated resistance

- 722.1 - Fire resistance of exposed wood members may be calculated using the provisions of Chapter 16 of the National Design Specification® (NDS®).

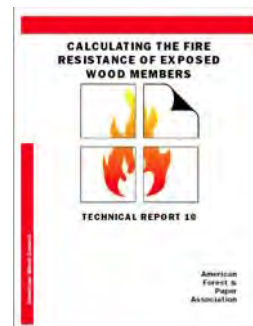


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## Calculated resistance

- AWC's Technical Report No. 10 (TR10), Calculating the Fire Resistance of Exposed Wood Members contains explanations and examples of the method.

<http://www.awc.org/publications/TR/index.php>



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## Calculated Resistance

- Fire resistance of wood frame assemblies also may be calculated based on the known fire resistance of the components, using the provisions of Section 722.6.

DCA 4- Component Additive Method (CAM)  
<http://www.awc.org/codes/dcaindex.php>




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### Wood in Noncombustible Construction

- Types I and II construction require the use of noncombustible materials
- Section 603 specifies 25 applications where combustible materials are permitted



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### Fire-Retardant-Treated Wood (FRTW)

- There are many additional applications for fire-retardant-treated wood (FRTW) in **Type I and II construction**
  - Nonbearing partitions  $\leq$  2 hours FRR.
  - Roof construction, including structural framework, (except for Type IA construction)
    - 3 stories or more
    - lowest roof member is less than 20 feet measured vertically from the upper floor. (Table 601 footnote b)

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### Fire-Retardant-Treated Wood (FRTW)


- May be used in exterior walls of Type III and IV construction (602.3, 602.4).



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### Heavy Timber (HT)


- Permitted in roof construction as an alternative to 1-hour or less fire-resistance rated noncombustible construction (all construction types except IA) (Table 601 footnote c)



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## Wood Interior Finish

- Wood materials may be used as interior finish in almost all occupancies (Table 803.9)



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### Wood Interior Finish Classification System – Nonsprinklered Buildings

ASTM E 84 or UL 723

Nonsprinklered Buildings: Minimum Interior Finish Classification by Occupancy (see Table 803.9 for full table)			
Location	Minimum Interior Finish Classification		
	A <sup>b</sup>	B	C
Exit enclosures and exit passageways <sup>c</sup>	A, B, E, I, M, R-1, R-4	F, S, R-2	R-3
Corridors	A <sup>d</sup> , I-2, I-3, I-4	B, E, M, S, I-1, R-1, R-2, R-4	F, R-3
Enclosed spaces and rooms		I, A-1, A-2, R-4	A-3, A-4, A-5, B, E, F, M, S, R-1, R-2, R-3
Flame spread	(0-25)	(26-75)	(76-100)

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### Wood Interior Finish Classification System – Sprinklered Buildings


Sprinklered Buildings: Minimum Interior Finish Classification by Occupancy <sup>a, b</sup> (see Table 803.9 for full table)			
Location	Minimum Interior Finish Classification		
	A	B <sup>c</sup>	C
Exit enclosures and exit passageways <sup>d</sup>	I-3	A, B, E, M, R-1, R-4, I-1, I-2, I-4	F, R-2, R-3, S
Corridors	I-3	A, I-2, I-4	B, E, F, M, R, S, I-1
Enclosed spaces and rooms		I-2, I-4	A, B, E, F, M, R, S, I-1, I-3

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## Wood Interior Finish

### 803.1

- Class C - wood species
- Class B - some, such as cedar, west coast hemlock, Idaho white pine, redwood, and spruce
- Class A - wood boards and panels when pressure treated with a fire-retardant chemical.



**Design for Code Acceptance**

**Flame Spread Performance of Wood Products**

This test evaluates the flame spread performance of wood products. The test is conducted in a chamber where a flame is applied to the surface of the wood product. The test results are used to determine the flame spread index (FSI) of the wood product. The FSI is a measure of the rate at which the flame spreads across the surface of the wood product. The FSI is determined by comparing the flame spread performance of the wood product to that of a standard wood product. The FSI is used to classify wood products into three classes: Class A, Class B, and Class C. Class A wood products have an FSI of 0-25, Class B wood products have an FSI of 26-75, and Class C wood products have an FSI of 76-100.

DCA 1  
<http://www.awc.org/codes/dcaindex.php>

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### Wood Interior Finish

#### Exceptions:

- Traditional wood floor covering (804.1)
- Exposed portions of Type IV structural members (803.3)



81

### Wood Interior Trim

- Trim is required to meet a Class C classification (806.5)
- Combustible trim, excluding handrails and guards, cannot exceed 10 percent of the wall or ceiling area to which it is attached (806.5)



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### Windows and doors

- Exterior openings are required to be protected with fire protection rated window or door assemblies when the exterior wall is within given distances of a lot line (705.8).



85

### Windows and Doors

- Unlimited amounts of unprotected openings are permitted by Table 705.8
  - Exterior walls  $\geq$  30 feet from lot line, or
  - $\geq$  10 feet from the lot line (Type IIB or VB construction)
- No unprotected openings are permitted in the exterior wall
  - Within 5 feet of the lot line (nonsprinklered buildings)
- No openings
  - $<$  3 feet from the lot line

86

## Windows and doors

- **Interior wood door assemblies (Sections 706 through 710) required to be fire-protection rated:**
  - Wall assembly requires a fire resistance rating and opening protection.



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## Wood siding

- **Wood shingles as a weather covering are required to be a minimum  $\frac{3}{8}$ -inch thick and wood siding without sheathing is required to be  $\frac{1}{2}$ -inch thick (Table 1405.2).**



90

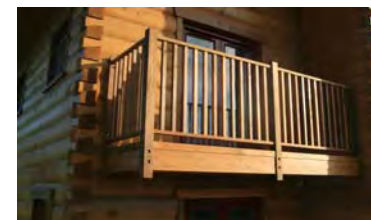
## Wood veneer

- **Type I, II, III or IV construction wood exterior wood veneer is allowed up to 40 feet above grade (60 feet if FRTW) (Section 1406)**
  - veneer is 1-inch nominal thickness
  - $\frac{7}{16}$ -inch exterior hardboard siding
  - or  $\frac{3}{8}$ -inch exterior-type wood structural panels or particleboard

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## Wood Balconies


- **Exterior balconies (Section 1406.3)**
  - Type IV construction or
  - Wood construction that provides a fire-resistance rating equal to the floor rating required by Table 601.



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### Open Exterior Stairs and Ramps


- **Open exterior exit stairs and ramps (Sections 1009.9 and 1010.8)**
  - Wood - building is of Type IV and V construction
  - ≤ six stories



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### Wood roof covering

- **Roof assemblies and coverings are divided into classifications by testing to the ASTM E 108 or UL 790 standard (1505).**



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### Wood roof covering

- **Table 1505.1 requires a minimum Class B roof covering for all types of construction**
  - except Types IIB, IIIB and VB (Class C materials)
- **No. 1 cedar or redwood shakes and No. 1 shingles**
  - Two-story buildings
  - ≤ 6,000 sq. ft. of roof area
  - 10 ft. of frontage width on all sides

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### Table 1505.1 – Minimum Roof Covering Classification

IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
B	B	B	C <sup>c</sup>	B	C <sup>c</sup>	B	B	C <sup>c</sup>

*UNO - International Wildland-Urban Interface Code*

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### Wood projections – limits

- In Types III, IV, and V construction, projections of **any material are permitted**, per the limitations of Section 705.2.3.
- Combustible projections located where protection of some openings is required or within five feet of the lot line must be one of the following:
  - Minimum 1-hour fire-resistance-rated construction,
  - Type IV construction,
  - FRTW

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### Wood projections - limits

- No projections permitted with less than 2 feet FSD

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### Wood projections - limits

- 2 feet to less than 5 feet fire separation distance

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### Wood projections - limits

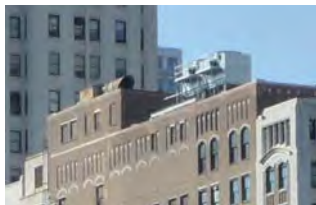
- 5 feet FSD to a FSD where Table 705.8 allows the area of unprotected openings to be unlimited

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### Wood Rooftop Structures

- **Wood penthouses of FRTW may be placed on:**
  - Type I construction two stories or less above grade plane
  - Type II construction with the penthouse at least 5 feet from the lot line
  - See Section 1509



105

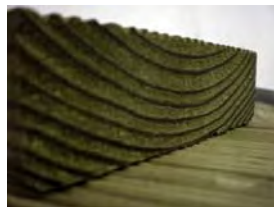
### Wood Rooftop Structures

- **Type III, IV and VA**
  - penthouse Type IV construction or FRTW
  - 20 feet or more from the lot line (1509.2.5 exception 3).
- **Type III, IV and V (see limitations in Section 1509.5)**
  - Wood towers, spires, domes and cupolas are permitted on buildings of.

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### Wood in Locations Subject to Decay or Termites

- **Wood must be naturally durable wood species or preservative-treated wood using water-borne preservatives, in accordance with AWPA U1 (2303.1.8).**
- **Location are listed in Section 2304.11**



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### Precautions during construction



- **During construction, one portable fire extinguisher must be placed at (3309):**
  - Each stairway on all floor levels with combustible materials,
  - Each storage or construction shed and where special hazards exist



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### Precautions during construction


- **During construction, when a building height reaches 50 feet or four stories**
  - a minimum of one temporary lighted stairway must be provided unless a permanent stairway is available for use at all times (3310).

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### Precautions during construction



- **When standpipes are required for the building, a minimum of one standpipe must be available during construction for fire department use (3311).**
  - The standpipe is installed before the construction is 40 feet above fire department access.



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### Precautions during construction

- **Sprinkler system must be tested and approved (commissioned) before the certificate of occupancy is awarded (3312).**

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### Precautions during construction

- **Additional requirements for fire safety during construction are contained in the IFC.**

  - Temporary heating equipment must be listed and labeled (IFC 3303).
  - Smoking is prohibited except in approved areas with posted signage (IFC 3304).
  - A fire watch must be maintained with qualified personnel if required by the fire code official (IFC 3304).

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### Precautions during construction


- Welding operations must follow the provisions of IFC Chapter 35. Electrical wiring must follow the provisions of NFPA 70 (IFC 3304).
- The owner must designate a fire prevention superintendent responsible for the fire prevention program during construction (IFC 3308).
- An accessible emergency phone must be provided in an approved location at the construction site (IFC 3309).



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### Precautions during construction

- Fire-fighting vehicle access must be provided within 100 feet of temporary or permanent fire department connections (IFC 3310).
- An approved water supply for fire protection must be available when combustible material is at the construction site (IFC 3312).
- Requirements for safeguards during roofing operations (IFC 3317).



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### American Wood Council Standards

American Wood Council Standards <a href="http://www.awc.org">www.awc.org</a>	
2012 NDS*	2012 National Design Specification® (NDS) for Wood Construction with 2012 Supplement
SDPWS-2008	2008 Special Design Provisions for Wind and Seismic
2012 WFCM	2012 Wood Frame Construction Manual for One- and Two-family Dwellings
2007 PWF	2007 ANSI/AF&PA Permanent Wood Foundation Design Specification
	2012 ANSI/AF&PA Span Tables for Joists and Rafters
WCD No. 4-2003	2003 ANSI/AF&PA Wood Construction Data—Plank and Beam Framing for Residential Buildings

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### Design for Code Acceptance

❖ The Design for Code Acceptance documents can be downloaded for free at [www.awc.org/Codes/dcaindex.html](http://www.awc.org/Codes/dcaindex.html)

American Wood Council Design Documents	
DCA 1	DCA 1 - Flame Spread Performance of Wood Products
DCA 2	DCA 2 - Design of Fire-Resistive Exposed Wood Members
DCA 3	DCA 3 - Fire Rated Wood Floor and Wall Assemblies
DCA 4	DCA 4 - CAM for Calculating and Demonstrating Assembly Fire Endurance
DCA 5	DCA 5 - Post-Frame Buildings
DCA 6	DCA 6 - Prescriptive Residential Deck Construction Guide - 2009 IRC Version with May 2013 Addendum

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## Resources

### ALLOWABLE USE OF WOOD IBC 2009 & 2012



<http://www.awc.org/codes/ccwdindex.html>

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## Questions?

This concludes The American Institute of Architects Continuing Education Systems Course



American Wood Council

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