

# CODES AND STANDARDS

updates and discussions related to codes and standards

## 2018 IBC and 2018 IEBC Changes Related to Wood Construction

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Changes to the 2018 *International Building Code* (IBC) and 2018 *International Existing Buildings Code* (IEBC) were approved by the International Code Council (ICC) during their 2015/2016 code development cycle. This article outlines changes to the code requirements for wood construction, the majority of which are changes to the IBC. Only a few changes for exterior balconies involve the IEBC. For this article, all changes noted are to the IBC; any changes to the IEBC will be specifically called out. Accompanying the discussion of each code change is the ICC code change tracking number [colored/bracketed] that can be used to search for more information on the ICC website ([iccsafe.org](http://iccsafe.org)). Appendix A, available in the online version of this article and at [www.awc.org](http://www.awc.org), contains a strikethrough/underline format of changes where it is deemed helpful to understand the code changes mentioned herein.

### Referenced Standards

American Wood Council (AWC) standards, as well as other code referenced standards, are updated [ADM94-16]. The 2018 *National Design Specification*® (NDS®) for *Wood Construction* and the 2018 *Wood Frame Construction Manual for One-and-Two Family Dwellings* were "Approved as Submitted" without modification.

The 2015 *Special Design Provisions for Wind and Seismic* (SDPWS) and 2015 *Permanent Wood*

*Foundation Design Specification* are both still referenced in 2018 IBC.

The following updated APA-The Engineered Wood Association ANSI standards were also included [ADM94-16]:

- ANSI A190.1-2017 *Structural Glued Laminated Timber*
- ANSI/APA PRG-320-2017 *Standard for Performance-Rated Cross-Laminated Timber*
- ANSI/APA PRP 210-2014 *Standard for Performance-Rated Engineered Wood Siding*
- ANSI/APA PRR 410-2016 *Standard for Performance-Rated Engineered Wood Rim Boards*
- ANSI 117-2015 *Standard Specification for Structured Glued Laminated Timber of Softwood Species*

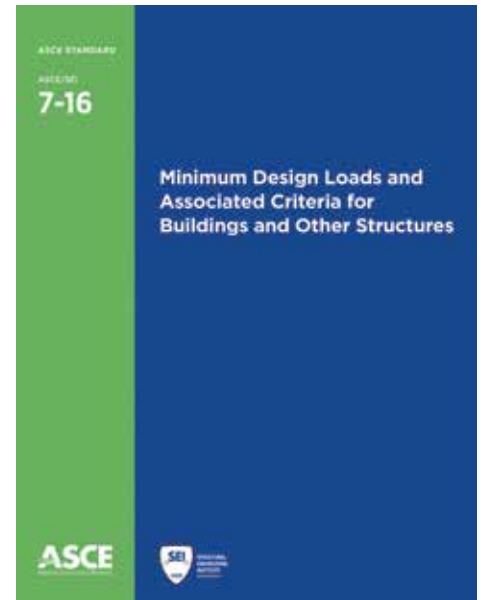
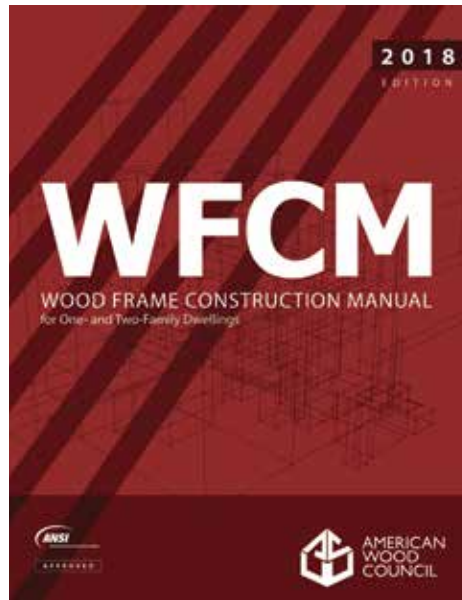
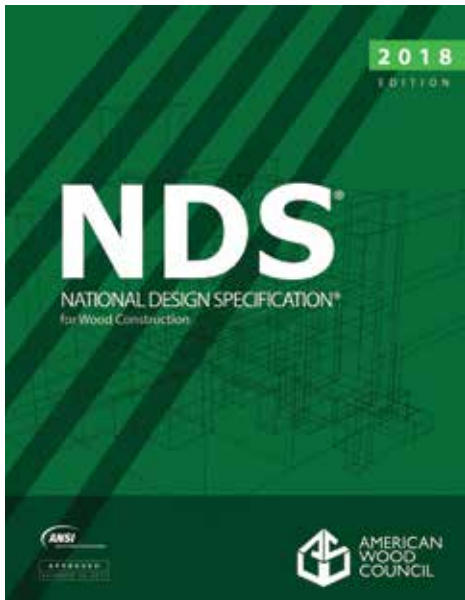
### Approved Agencies

Certification report writing agencies were introduced into the definition of Approved Agency in Section 202. [ADM6-16, Part 1 AMPC1]

### Exterior Balconies

- Clarifies removal of balconies from the scope of IBC Chapter 14 *Exterior Walls* since all balcony provisions were moved to IBC Chapter 7 *Fire and Smoke Protection Features*, IBC 705.2 and 706.5.2 [S1-16 AM]
- Requires that ventilation openings be provided similar to rafter spaces when the floor structure of exterior balconies and decks are enclosed [S7-16 AM]
- Incorporates the requirement from ASCE 7 for design live load of balconies and decks at 1.5 times the live load of the area served by the balcony or deck – not required to exceed 100 psf [S85-16]





- Requires detailing on plans of all impervious moisture barrier system elements (including manufacturer's instructions when applicable) if the impervious moisture barrier option is used in IBC 2304.12.2.5 for wood framing supporting weather-exposed permeable floors, such as concrete or masonry slabs [ADM 77-16]
- Requires inspection of all impervious moisture barrier system elements, or special inspection can be utilized at the option of the code official if the impervious moisture barrier option is used in IBC 2304.12.2.5 for wood framing supporting weather-exposed permeable floors [ADM 87-16]
- Requires the impervious moisture barrier system to have positive drainage of water that infiltrates the permeable floor above the impervious moisture barrier when that option is used in accordance with IBC 2304.12.2.5 [S279-16 AMPC1]
- IEBC Chapter 1 revisions require details in construction documents and inspections for impervious moisture barriers used in exterior balconies [ADM 77-16 AMPC1]. An article on balcony detailing is available at this link: <http://bit.ly/2AtN5k6>.

### Special Inspection and Structural Observation

- For structural observation, modifies the wind trigger from 110 mph to 130 mph for Risk Categories III or IV to match the current factored level of wind forces [S133-16]
- Clarifies the main wind force-resisting system fastening exception to special inspection in wood frame construction (based on nail spacing for sheathing exceeding 4 inches on center) at the panel edges. [S145-16 AM]

### Other Changes

- Clarifies the definition of Light-frame Construction by removing "method of construction" from the definition [G2-16 AM]
- Revises Table 1604.3 Deflection Limits in footnote "d" to recognize different wood products' creep behavior; specifically – seasoned lumber, structural glued laminated timber, prefabricated wood I-joists, SCL, cross-laminated timber and wood structural panels [S63-16 AM and S67-16]; includes correlating change to add roof live load to the load combination
- Clarifies that hardboard siding used structurally must conform to ANSI A135.6 and be identified by a label containing the approval agency [S258-16]
- Creates consistency with *International Residential Code* (IRC) wood structural panel roof sheathing nail size by inclusion of 8d common nail and adds the Roof Sheathing Ring Shank Nail (RSRS-01) to Table 2304.10.1 as options for roof sheathing attachment [S272-16]
- Corrects the 10d common nail length, removes redundant requirements for stud nailing, creates consistency with the IRC for roof sheathing attachment, and adds an option for deformed shank nail roof sheathing attachment [S273-16]
- Adds a reference to IBC 2304.9 for lumber decking in IBC 2304.11 for heavy timber [S276-16]
- Adds an alternative fastening schedule for the construction of mechanically laminated decking made from 2-inch nominal dimension lumber to IBC 2304.9.3.2 [S281-16]
- Corrects the staple description for stapled fiberboard shear walls in Table 2306.3(2) [S286-16]

- Updates Table 2308.4.1.1(2) for Southern Pine No. 2 in lieu of Southern Pine No. 1 for interior bearing wall girder and header spans, and includes the dropped and raised header distinction for spans [S288-16]
- Updates Table 2308.4.1.1(1) with Southern Pine No. 2 in lieu of Southern Pine No. 1 for exterior bearing wall girder and header spans and includes the dropped and raised header distinction for spans [S289-16]
- Adds prescriptive framing and connection requirements to IBC 2308.5.5.1 for single member (single ply) headers, consistent with the IRC, and coordinates code charging language with existing connection tables [S292-16]
- Updates references to current AWPA section numbering for preservative treatment used in permanent wood foundations and for wood shakes [S40-16]
- Clarifies that the minimum 5 psf horizontal live load applies to firewalls [S55-16 AM]
- Clarifies IBC 1615.1 regarding the applicability of structural integrity provisions in high rise buildings and precludes misinterpretation regarding frame buildings [S126-16]
- Revises IBC 1810.4.1.5 to require the removal of timber piles when a substantial and sudden change in rate of pile penetration occurs during driving [S233-16]
- Clarifies the IBC 2304.12.2.2 treated wood exception for posts supported on pedestals [S278-16 AM]
- Modifies IBC equations 23-1 and 23-2 for deflection of diaphragms and shear walls fastened by staples to be consistent with AWC SDPWS equations for nailed diaphragms and shear walls [S282-16 and S284-16]
- Clarifies in IBC 2308.2.3 that buildings with slab-on-grade floors can exceed a floor live load of 40 psf and still use the

conventional wood frame construction provisions of IBC 2308 [S287-16]

## Fire Retardant Treated Wood (FRTW)

- The approved modifications to IBC 2303.2.2 clarify that the “other means during manufacture” subsection is not intended to permit surface-protected products as outright replacements for fire retardant treated wood (FRTW), given the requirement for chemical impregnation into the wood. The modifications also preclude interpreting IBC 2303.2.2 as a ban or prohibition on surface-coated products. As has been the case for some time, wood products protected by surface treatments can be evaluated and approved by using the provisions of IBC 104.11 [S262-16 AM].
- Clarifies in IBC 2303.2.4 that FRTW must have the original product grade stamp in addition to the fire-retardant treatment labeling [S265-16]

## ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures

IBC changes regarding ASCE 7-16 are likely to lead to some confusion for designers and code officials. While the purpose of this article is to outline IBC changes that were approved, a few instances where changes were defeated are specifically noted below to allow for discussion of code paths to compliance with load provisions.

- Updates reference to ASCE 7-16 [ADM94-16]
- Updates IBC wind and seismic load provisions to agree with updated criteria in ASCE 7-16 [S56-16 AM and S114-16 AM]
- Updates references in Chapter 18 seismic provisions to coordinate with ASCE 7-16 [S166-16]
- A proposal to update IBC snow load provisions to agree with updated criteria in ASCE 7-16 was defeated during online voting [S103-16 AMPC1 Defeated]. Therefore, the IBC allows three paths rather than one:
  - 1) Use the IBC to determine snow loads (Figure 1608.2 or Table 1608.2 for Alaska),
  - 2) Use IBC 1608.2, which references ASCE 7-16, and use the new tables for the western US and New Hampshire, or

- 3) Use IBC 1608.2 to go to ASCE 7-16 which states that if an area is not in the new tables or exceeds the elevation limit (still a case study area), to then reference state produced maps which have greater detail for the western US and New Hampshire.
- A proposal removing LRFD and ASD load combinations based on reference to ASCE 7-16 was also defeated during online voting [S78-16 AM AMPC1 Defeated].
  - On-line voting disapproved reference to ASCE 7-16 in IBC 1611 [S110-16 AMPC1 Defeated]. This has created a difference in requirements for secondary drains. ASCE 7-16 bases minimum requirements on a 15 min/100-yr event. IBC still uses the 1 hr/100-yr event for both primary and secondary minimum drain flow.

## Fire Protection

- Clarifies in IBC 704 that the protection of “gang studs” and built-up columns in the walls of lightweight construction can be provided by the membranes of the rated walls in which they are located [FS7-15 AM]
- Reduces existing requirements in Table 705.2 on the location of building projections, such as roof overhangs [FS13-15 AS]
- Relocates Chapter 14 Exterior Walls fire-related provisions for balconies, projections, and bay and oriel windows to Chapter 7 Fire and Smoke Protection Features [FS15-15 AM]
- Revises IBC 706.2 to allow  $\frac{3}{4}$ -inch plywood to run continuously through double fire-walls in high seismic areas (Seismic Design Categories D and F) [FS29-15 AMPC1]
- Clarifies sprinkler, fire partition, and draft-stopping requirements in IBC 708 and 718 for multifamily structures; one change gives clear criteria for the sprinkler protection of attics without draftstopping [FS42-15 AMPC1]
- Corrects certain prescriptive fire-resistance rated I-joist assembly description errors in Table 721.1(3) [FS129-15 AS and FS130-15 AS]
- Adds direct code references in IBC 803.11 to ASTM E 2579-13 and E 2404 for the mounting of laminate products, facings, and veneers with a wood substrate during testing [FS135-15 AS and FS136-15 AS]
- Revises IBC 803.3 to require that cross-laminated timber and heavy timber elements be subject to the normal flame spread limitations for exits similar to other materials in exit enclosures; a previous exception for heavy timber elements within exit

enclosures is inappropriate for exposed mass timber elements that make up entire wall and ceiling sections [FS132-15 AS]

- Clarifies that fire officials can require round-the-clock fire watch for construction that exceeds 40 feet above grade [F329-16]
- Cleans up language permitting the use of FRTW sheathing in exterior walls of Type III and IV construction which is sometimes misinterpreted [G175-15 AS]
- Releases FRTW and CLT exterior walls from having an assembly minimum thickness in favor of simply requiring a minimum actual thickness solely for the CLT [G184-15 AS]; includes errata to the 2018 IBC as follows (*errata shown “as written” using strikethrough/underline text*):

602.4.1 *Fire-retardant-treated wood in exterior walls.*

Fire-retardant-treated wood framing complying with Section 2303.2 shall be permitted within exterior wall assemblies ~~not less than 6 inches in thickness~~ with a 2-hour rating or less.

602.4.2 *Cross-laminated timber in exterior walls.*

Cross-laminated timber complying with Section 2303.1.4 shall be permitted within exterior wall assemblies not less than ~~6~~ 4 inches in thickness with a 2-hour rating or less, provided the exterior surface of the cross-laminated timber is protected by one the following:

- 1) Fire-retardant-treated wood sheathing complying with Section 2303.2 and not less than  $\frac{1}{2}$ -inch thick;
- 2) Gypsum board not less than  $\frac{1}{2}$ -inch thick; or
- 3) A noncombustible material.

## Heavy Timber and Mass Timber

- Makes clear that SCL should be considered equivalent to heavy timber and clarifies the appropriate distinctions between nominal, net finished, and actual dimensions for heavy timber, glulam, SCL, and CLT [G178-15 AS]
- Reorganizes heavy timber provisions aiding clear application of Type IV (heavy timber) construction requirements while also providing for separate application of code provisions that allow or specify the use of “heavy timber” elements outside of Type IV construction; moves certain heavy timber provisions from Chapter 6 to Chapter 23 and introduces a new table



of minimum dimensions based on location within the building structure and loading condition [G179-15 AS; G180-15 AS] (Due to the extensive nature of these changes, the strikethrough/underline format is not shown in Appendix A. However, a summary of relocated sections is shown. The changes can be viewed on the ICC website.)

## Construction Type

- Permits the use of roofs for various occupancies without classifying the building as one containing an additional story, thus assuring continued flexibility for buildings

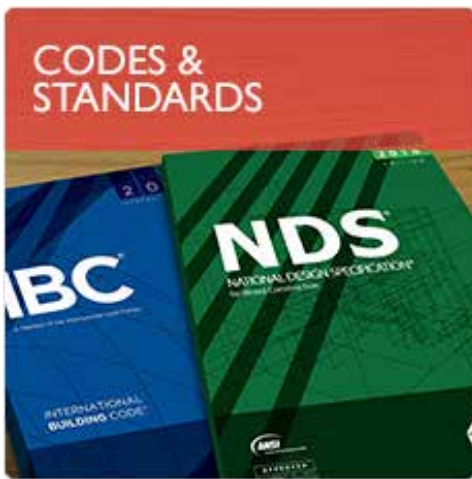
of wood construction types [G24-15 AMPC2]

- Permits performance-based alternatives for sound transmission design of floor assemblies using comparative engineering analysis [G190-15 AS]

## Conclusion

The 2018 IBC and 2018 IEBC are both available from ICC ([www.iccsafe.org](http://www.iccsafe.org)) and represent the state-of-the-art codes for design and construction of buildings outside the scope of the *International Residential Code*. These codes reference the latest wood standards such as the 2018 NDS and include

other important changes to requirements for wood construction. In some situations, a building designer may want to use a more current code provision or consensus standard that is recognized in the building code adopted by a jurisdiction. In those cases, building officials, in accordance with Section 104.11 of the *International Building Code*, are permitted to accept designs prepared in accordance with newer consensus reference standards. IBC 104.11 allows a jurisdiction to approve new technologies in materials and building construction, provided documentation supplied to the jurisdiction is found to assure equivalency in quality, strength, durability, and safety.■



On behalf of the industry it represents, AWC is committed to ensuring a resilient, safe, and sustainable built environment. To achieve these objectives, AWC contributes to the development of sound public policies, codes, and regulations which allow for the appropriate and responsible manufacture and use of wood products. We support the utilization of wood products by developing and disseminating consensus standards, comprehensive technical guidelines, and tools for wood design and construction, as well as providing education regarding their application.

[www.awc.org](http://www.awc.org)

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## Appendix A: 2018 IBC and 2018 IEBC Changes Related to Wood Construction – Strikethrough/Underline Format

ICC Code Change Tracking Number	Strikethrough/Underline Text
ADM6-16 AMPC1	<p><b>SECTION 202 DEFINITIONS</b>  <b>APPROVED AGENCY.</b> An established and recognized agency that is regularly engaged in conducting tests, or furnishing inspection services, <del>or furnishing product certification,</del> where such agency has been approved by the building official.</p>
ADM 77-16 AMPC1	<p><b><u>IBC 107.2.5 Exterior balcony and elevated walking surfaces.</u></b> Where balcony or other elevated walking surfaces are exposed to water from direct or blowing rain, snow, or irrigation, and the structural framing is protected by an impervious moisture barrier, the construction documents shall include details for all elements of the impervious moisture barrier system. The construction documents shall include manufacturer’s installation instructions.</p> <p><b><u>IEBC 106.2.5 Exterior balcony and elevated walking surfaces.</u></b> Where the scope of work involves a balcony or other elevated walking surfaces exposed to water from direct or blowing rain, snow, or irrigation, and the structural framing is protected by an impervious moisture barrier, the construction documents shall include details for all elements of the impervious moisture barrier system. The construction documents shall include manufacturer’s installation instructions.</p>
ADM 87-16 AMPC 1,2	<p><b><u>IBC 110.3.6 Weather exposed balcony and walking surface waterproofing.</u></b> Where balcony or other elevated walking surfaces are exposed to water from direct or blowing rain, snow, or irrigation, and the structural framing is protected by an impervious moisture barrier, all elements of the impervious moisture barrier system shall be not be concealed until inspected and approved.</p> <p><b><u>Exception:</u></b> Where special inspections are provided in accordance with Section 1705.1.1, Item 3.</p> <p><b><u>IEBC 109.3.6 Weather exposed balcony and walking surface waterproofing.</u></b> Where the scope of work involves a balcony or other elevated walking surfaces exposed to water from direct or blowing rain, snow, or irrigation, and the structural framing is protected by an impervious moisture barrier, all elements of the impervious moisture barrier system shall be not be concealed until inspected and approved.</p> <p><b><u>Exception:</u></b> Where special inspections are provided in accordance with IBC Section 1705.1.1, Item 3.</p>
F329-16	<p><b><u>3304.5.1 (IBC 3314.1) Fire watch during combustibile construction.</u></b> Where required by the fire code official, a fire watch shall be provided during non-working hours for construction that exceeds 40 feet in height above the lowest adjacent grade.</p>

FS7-15 AM	<p><b>704.2 Column protection.</b> Where columns are required to have protection to achieve a fire-resistance rating, the entire column shall be provided individual encasement protection by protecting it on all sides for the full column height, including connections to other structural members, with materials having the required fire-resistance rating. Where the column extends through a ceiling, the encasement protection shall be continuous from the top of the foundation or floor/ceiling assembly below through the ceiling space to the top of the column.</p> <p><b>Exception:</b> Columns that meet the limitations of Section 704.4.1.</p> <p><b>704.4.1 Light-frame construction.</b> Studs, columns, and boundary elements that are integral elements in load-bearing walls of light-frame construction, and are located entirely between the top and bottom plates or tracks shall be permitted to have required fire-resistance ratings provided by the membrane protection provided for the load-bearing wall.</p>											
FS13-15	<table border="1"> <thead> <tr> <th data-bbox="390 483 695 602"><b>Fire Separation Distance – FSD (feet)</b></th> <th data-bbox="695 483 1058 602"><b>Minimum Distance From Line Used to Determine FSD</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="390 602 695 654">0 feet to <u>less than 2</u></td> <td data-bbox="695 602 1058 654">Projections not permitted</td> </tr> <tr> <td data-bbox="390 654 695 706">2 to <u>less than 3</u></td> <td data-bbox="695 654 1058 706">24 inches</td> </tr> <tr> <td data-bbox="390 706 695 854">3 to less than <del>3</del> <u>5</u></td> <td data-bbox="695 706 1058 854">24 inches plus 8 inches for every foot of FSD beyond 3 feet or fraction thereof</td> </tr> <tr> <td data-bbox="390 854 695 906"><del>3</del> feet <u>5</u> or greater</td> <td data-bbox="695 854 1058 906"><del>20</del> feet <u>40</u> inches</td> </tr> </tbody> </table>	<b>Fire Separation Distance – FSD (feet)</b>	<b>Minimum Distance From Line Used to Determine FSD</b>	0 feet to <u>less than 2</u>	Projections not permitted	2 to <u>less than 3</u>	24 inches	3 to less than <del>3</del> <u>5</u>	24 inches plus 8 inches for every foot of FSD beyond 3 feet or fraction thereof	<del>3</del> feet <u>5</u> or greater	<del>20</del> feet <u>40</u> inches	
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<del>3</del> feet <u>5</u> or greater	<del>20</del> feet <u>40</u> inches											
FS29-15 AMPC1	<p><b>706.2 Structural stability.</b> Fire walls shall be designed and constructed to allow collapse of the structure on either side without collapse of the wall under fire conditions. Fire walls designed and constructed in accordance with NFPA 221 shall be deemed to comply with this section.</p> <p><b>Exception:</b> In SDC D through F, where double fire walls are used in accordance with NFPA 221, floor and roof sheathing not exceeding <math>\frac{3}{4}</math> inch thickness shall be permitted to be continuous through the wall assemblies of light frame construction.</p>											
FS132-15	<p><b>803.3 Heavy timber exemption.</b> Exposed portions of building elements complying with the requirements for buildings of heavy timber construction in Section 602.4 or Section 2304.11 shall not be subject to interior finish requirements except in interior exit stairways, interior exit ramps, and exit passageways.</p>											

FS135-15	<p><b>803.11 Laminated products factory produced with a wood substrate.</b> Laminated products factory produced with a wood substrate shall comply with one of the following:</p> <ol style="list-style-type: none"> <li>1. The laminated product shall meet the criteria of Section 803.1.1.1 when tested in accordance with NFPA 286 using the product-mounting system, including adhesive, of actual use, as described in Section 5.8 of NFPA 286.</li> <li>2. The laminated product shall have a Class A, B, or C flame spread index and smoke-developed index, based on the requirements of Table 803.13, in accordance with ASTM E84 or UL 723. Test specimen preparation and mounting shall be in accordance with ASTM E2579.</li> </ol> <p><b>Add new standard(s) as follows:</b> ASTM E 2579-13 Standard Practice for Specimen Preparation and Mounting of Wood Products to Assess Surface Burning</p>
FS136-15	<p><b>803.12 Facings or wood veneers intended to be applied on site over a wood substrate.</b> Facings or veneers intended to be applied on site over a wood substrate shall comply with one of the following:</p> <ol style="list-style-type: none"> <li>1. The facing or veneer shall meet the criteria of Section 803.1.1.1 when tested in accordance with NFPA 286 using the product-mounting system, including adhesive, as described in Section 5.9 of NFPA 286.</li> <li>2. The facing or veneer shall have a Class A, B or C flame spread index and smoke-developed index, based on the requirements of Table 803.13, in accordance with ASTM E84 or UL 723. Test specimen preparation and mounting shall be in accordance with ASTM E2404.</li> </ol>
G2-16 AM	<p><b>SECTION 202 DEFINITIONS</b></p> <p><b>CONVENTIONAL LIGHT-FRAME CONSTRUCTION.</b> A type <u>method</u> of construction whose primary structural elements are formed by a system of repetitive wood-framing members. See Section 2308 for conventional light-frame construction provisions.</p> <p><b>LIGHT-FRAME CONSTRUCTION.</b> A type <u>method</u> of construction whose vertical and horizontal structural elements are primarily formed by a system of repetitive wood or cold-formed steel framing members.</p>
G24-15 AMPC2	<p><b>302.1 Occupancy classification.</b> Occupancy classification is the formal designation of the primary purpose of the building, structure or portion thereof. Structures shall be classified into one or more of the occupancy groups listed in this section based on the nature of the hazards and risks to building occupants generally associated with the intended purpose of the building or structure. An area, <del>302.1 General.</del> Structures or portions of structures shall be classified with respect to occupancy in one or more of the groups listed in this section. A room or space that is intended to be occupied at different times for different purposes shall comply with all applicable requirements that are applicable to each of the purposes for which the room or space will be occupied associated with such potential multipurpose. Structures with multiple occupancies or uses occupancy groups shall comply with Section 508. Where a structure is proposed for a purpose that is not specifically provided for in this code listed in this section, such structure shall be classified in the group that the occupancy it most nearly resembles, according to based on the fire safety and relative hazard involved. Occupied roofs shall be classified in the group that the occupancy most nearly resembles, according to the fire safety and relative hazard involved and shall comply with Section 503.1.4.</p> <ol style="list-style-type: none"> <li>1. Assembly (see Section 303): Groups A-1, A-2, A-3, A-4 and A-5.</li> <li>2. Business (see Section 304): Group B.</li> </ol>

	<p>3. Educational (see Section 305): Group E.  4. Factory and Industrial (see Section 306): Groups F-1 and F-2.  5. High Hazard (see Section 307): Groups H-1, H-2, H-3, H-4 and H-5.  6. Institutional (see Section 308): Groups I-1, I-2, I-3 and I-4.  7. Mercantile (see Section 309): Group M.  8. Residential (see Section 310): Groups R-1, R-2, R-3 and R-4.  9. Storage (see Section 311): Groups S-1 and S-2.  10. Utility and Miscellaneous (see Section 312): Group U.</p> <p><b>503.1.4 Occupied roofs.</b> <u>A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506.</u></p> <p>Exceptions:</p> <ol style="list-style-type: none"> <li>1. The occupancy located on an occupied roof shall not be limited to the occupancies allowed on the story immediately below the roof where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and occupant notification in accordance with Section 907.5 is provided in the area of the occupied roof.</li> <li>2. Assembly occupancies shall be permitted on roofs of open parking garages <u>spaces</u> of Type I or Type II construction, in accordance with the exception to Section 903.2.1.6.</li> </ol> <p><b>503.1.4.1 Enclosures over occupied roof areas.</b> <u>Elements or structures enclosing the occupied roof areas shall not extend more than 48 inches above the surface of the occupied roof.</u>  <u><b>Exception:</b> Penthouses constructed in accordance with Section 1510.2 and towers, domes, spires, and cupolas constructed in accordance with Section 1510.5</u></p>
G175-15	<p><b>602.3 Type III.</b> Type III construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of any material permitted by this code. <i>Fire-retardant-treated wood framing and sheathing</i> complying with Section 2303.2 shall be permitted within <i>exterior wall</i> assemblies of a 2-hour rating or less.</p>
G178-15 and G184-15	<p><b>602.4 Type IV.</b> Type IV construction (Heavy Timber, HF) is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid <del>or</del> <u>wood</u>, laminated wood <u>or structural composite lumber (SCL)</u> without concealed spaces. The <u>minimum dimensions for permitted materials including solid timber, glued-laminated timber, structural composite lumber (SCL), and cross-laminated timber and details of Type IV construction shall comply with the provisions of this section and Section 2304.11.</u> Exterior walls complying with Section 602.4.1 or 602.4.2 shall be permitted. <u>Interior walls and partitions not less than 1-hour fire-resistance rating or heavy timber complying with Section 2304.11.2.2 shall be permitted.</u></p> <p><b>602.4.1 Fire-retardant-treated wood in exterior walls.</b> Fire-retardant-treated wood framing and sheathing complying with Section 2303.2 shall be permitted within exterior wall assemblies with a 2-hour rating or less.</p>



	<p><b>602.4.2 Cross-laminated timber in exterior walls.</b> Cross-laminated timber complying with Section 2303.1.4 shall be permitted within exterior wall assemblies not less than 4 inches in thickness with a 2-hour rating or less, provided the exterior surface of the cross-laminated timber is protected by one the following:</p> <ol style="list-style-type: none"> <li>1. Fire-retardant-treated wood sheathing complying with Section 2303.2 and not less than <math>1\frac{5}{32}</math> inch thick.</li> <li>2. Gypsum board not less than <math>\frac{1}{2}</math> inch thick.</li> <li>3. A noncombustible material.</li> </ol>																																																		
G179-15 AS and G180-15 AS	<table border="1"> <thead> <tr> <th data-bbox="380 342 648 396">2018 IBC</th> <th data-bbox="648 342 940 396">2015 IBC</th> <th data-bbox="940 342 1604 396">Provision</th> </tr> </thead> <tbody> <tr> <td data-bbox="380 396 648 449">602.4</td> <td data-bbox="648 396 940 449">602.4</td> <td data-bbox="940 396 1604 449">Type IV construction</td> </tr> <tr> <td data-bbox="380 449 648 524">602.4.1, 602.4.2</td> <td data-bbox="648 449 940 524">602.4.1</td> <td data-bbox="940 449 1604 524">Wall assembly thickness</td> </tr> <tr> <td data-bbox="380 524 648 578">602.4.3</td> <td data-bbox="648 524 940 578">602.4.9</td> <td data-bbox="940 524 1604 578">Exterior structural members</td> </tr> <tr> <td data-bbox="380 578 648 631">2304.11</td> <td data-bbox="648 578 940 631">2304.11</td> <td data-bbox="940 578 1604 631">Heavy timber construction</td> </tr> <tr> <td data-bbox="380 631 648 685">Table 2304.11</td> <td data-bbox="648 631 940 685">Table 602.4</td> <td data-bbox="940 631 1604 685">Minimum dimensions</td> </tr> <tr> <td data-bbox="380 685 648 738">2304.11.1</td> <td data-bbox="648 685 940 738">New</td> <td data-bbox="940 685 1604 738">Details of heavy timber structural members</td> </tr> <tr> <td data-bbox="380 738 648 792">2304.11.1.1</td> <td data-bbox="648 738 940 792">602.4.3, 2304.11.1</td> <td data-bbox="940 738 1604 792">Columns</td> </tr> <tr> <td data-bbox="380 792 648 846">2304.11.1.2</td> <td data-bbox="648 792 940 846">602.4.4, 2304.11.2</td> <td data-bbox="940 792 1604 846">Floor framing</td> </tr> <tr> <td data-bbox="380 846 648 899">2304.11.1.3</td> <td data-bbox="648 846 940 899">602.4.5, 2304.11.3</td> <td data-bbox="940 846 1604 899">Roof framing</td> </tr> <tr> <td data-bbox="380 899 648 953">2304.11.2.1</td> <td data-bbox="648 899 940 953">602.4.8.2</td> <td data-bbox="940 899 1604 953">Exterior walls</td> </tr> <tr> <td data-bbox="380 953 648 1006">2304.11.2.2</td> <td data-bbox="648 953 940 1006">602.4.8.1</td> <td data-bbox="940 953 1604 1006">Partitions and interior walls</td> </tr> <tr> <td data-bbox="380 1006 648 1060">2304.11.3</td> <td data-bbox="648 1006 940 1060">602.4.6</td> <td data-bbox="940 1006 1604 1060">Floors</td> </tr> <tr> <td data-bbox="380 1060 648 1114">2304.11.3.1</td> <td data-bbox="648 1060 940 1114">602.4.6.2</td> <td data-bbox="940 1060 1604 1114">CLT floors</td> </tr> <tr> <td data-bbox="380 1114 648 1183">2304.11.3.2</td> <td data-bbox="648 1114 940 1183">602.4.6.1, 2304.11.4</td> <td data-bbox="940 1114 1604 1183">Sawn or glued-laminated plank floors</td> </tr> <tr> <td data-bbox="380 1183 648 1235">2304.11.4</td> <td data-bbox="648 1183 940 1235">2304.11.5</td> <td data-bbox="940 1183 1604 1235">Roof decks</td> </tr> </tbody> </table>	2018 IBC	2015 IBC	Provision	602.4	602.4	Type IV construction	602.4.1, 602.4.2	602.4.1	Wall assembly thickness	602.4.3	602.4.9	Exterior structural members	2304.11	2304.11	Heavy timber construction	Table 2304.11	Table 602.4	Minimum dimensions	2304.11.1	New	Details of heavy timber structural members	2304.11.1.1	602.4.3, 2304.11.1	Columns	2304.11.1.2	602.4.4, 2304.11.2	Floor framing	2304.11.1.3	602.4.5, 2304.11.3	Roof framing	2304.11.2.1	602.4.8.2	Exterior walls	2304.11.2.2	602.4.8.1	Partitions and interior walls	2304.11.3	602.4.6	Floors	2304.11.3.1	602.4.6.2	CLT floors	2304.11.3.2	602.4.6.1, 2304.11.4	Sawn or glued-laminated plank floors	2304.11.4	2304.11.5	Roof decks		
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G190-15	<p><b>1206.2 Air-borne sound.</b> Walls, partitions and floor-ceiling assemblies separating dwelling units and sleeping units from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for air-borne noise when tested in accordance with ASTM E90. Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed,</p>																																																		

	lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.  <b>1206.3 Structure-borne sound.</b> Floor-ceiling assemblies between dwelling units and sleeping units or between a dwelling unit or sleeping unit and a public or service area within the structure shall have an impact insulation class rating of not less than 50, or not less than 45 if field tested, when tested in accordance with ASTM E -492. <u>Alternatively, the impact insulation class of floor-ceiling assemblies shall be established by engineering analysis based on a comparison of floor-ceiling assemblies having impact insulation class ratings as determined by the test procedures set forth in ASTM E492.</u>
S1-16 AM	<b>1401.1 Scope.</b> The provisions of this chapter shall establish the minimum requirements for exterior walls; exterior wall coverings; exterior wall openings; exterior windows and doors; <u>and architectural trim. balconies and similar projections; and bay and oriel windows.</u>
S7-16 AMPC1	<b>IBC 2304.12.2.6 Ventilation required beneath balcony or elevated walking surfaces.</b> <u>Enclosed framing in exterior balconies and elevated walking surfaces that are exposed to rain, snow, or drainage from irrigation, shall be provided with openings that provide a net free cross ventilation area not less than <math>\frac{1}{150}</math> of the area of each separate space.</u>
S55-16 AM	<b>1607.15.2 Fire walls.</b> <u>In order to meet the structural stability requirements of Section 706.2 where the structure on either side of the wall has collapsed, fire walls and their supports shall be designed to withstand a minimum horizontal allowable stress load of 5 psf.</u>
S67-16 and S63-16 AM	<b>Table 1604.3 Footnote d.</b> <u>The deflection limit for the D+(L+L<sub>r</sub>) load combination only applies to the deflection due to the creep component of long-term dead load deflection plus the short-term live load deflection. For <del>wood</del> <u>lumber, structural glued laminated timber, prefabricated wood I-joists, and structural composite lumber members that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection shall be permitted to be estimated as the immediate dead load deflection resulting from 0.5 D. For <del>wood structural</del> <u>lumber and glued laminated timber members installed or used at all other moisture conditions or cross laminated timber and wood structural panels that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection is permitted to be estimated as the immediate dead load deflection resulting from D. The value of 0.5 D shall not be used in combination with ANSI/AWC NDS provisions for long-term loading.</u></u></u>
S85-16	IBC Table 1607.1 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L <sub>0</sub> , AND MINIMUM CONCENTRATED LIVE LOADS 5. Balconies and decks <u>1.5 times the live load for the area served. Not required to exceed 100 psf Same as occupancy served</u>
S133-16 AM	<b>1704.6.1 Structural observations for structures.</b> <u>Structural observations shall be provided for those structures where one or more of the following conditions exist:</u> <u>1. The structure is classified as Risk Category IV.</u> <u>2. The structure is a high-rise building.</u> <u>3. The structure has an occupant load of more than 1000.</u>

	<p>3. <del>When so designated</del> Such observation is required by the registered design professional responsible for the structural design.</p> <p>4. <del>When such</del> Such observation is specifically required by the building official.</p> <p><b>1704.6.1 1704.6.2 Structural observations for seismic resistance.</b> Structural observations shall be provided for those structures assigned to Seismic Design Category D, E or F where one or more of the following conditions exist:</p> <ol style="list-style-type: none"> <li>1. The structure is classified as Risk Category III or IV.</li> <li>2. The height of the structure is greater than 75 feet (22 860 mm) above the base as defined in ASCE 7.</li> <li>2. The structure is assigned to Seismic Design Category E, is classified as Risk Category I or II, and is greater than two stories above grade plane.</li> <li>3. <del>When so designated by the registered design professional responsible for the structural design.</del></li> <li>4. <del>When such observation is specifically required by the building official.</del></li> </ol> <p><b>1704.6.2 1704.6.3 Structural observations for wind requirements resistance.</b> Structural observations shall be provided for those structures sited where <math>V_{asd\ ult}</math> as determined in accordance with Section 1609.3.1 exceeds 110 mph is 130mph or greater, where one or more of the following conditions exist:</p> <ol style="list-style-type: none"> <li>1. The <del>and the</del> structure is classified as Risk Category III or IV.</li> <li>2. The building height is greater than 75 feet (22 860 mm).</li> <li>3. <del>When so designated by the registered design professional responsible for the structural design.</del></li> <li>4. <del>When such observation is specifically required by the building official.</del></li> </ol>
S145-16 AM	<p><b>1705.11.1 Structural wood.</b> Continuous special inspection is required during field gluing operations of elements of the main wind force-resisting system. Periodic special inspection is required for nailing, bolting, anchoring and other fastening of elements of the main wind force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and hold-downs.</p> <p><b>Exception:</b> Special inspections are not required for wood shear walls, shear panels and diaphragms, including nailing, bolting, anchoring and other fastening to other elements of the main wind force-resisting system, where the <del>specified fastener spacing of the sheathing at panel edges</del> is more than 4 inches on center.</p>
S262-16 AM	<p><b>2303.2.2 Other means during manufacture.</b> For wood products <del>impregnated with chemicals</del> by other means during manufacture, the treatment shall be an integral part of the manufacturing process of the wood product. The treatment shall provide permanent protection to all surfaces of the wood product. <del>The use of paints, coatings, stains or other surface treatment are not an approved method of protection as required in this section.</del></p>
S278-16 AM	<p><b>2304.12.2.2 Posts or columns.</b> Posts or columns supporting permanent structures and supported by a concrete or masonry slab or footing that is in direct contact with the earth shall be of naturally durable or preservative-treated wood.</p> <p><del>Exception: Posts or columns that are not exposed to the weather are supported by concrete piers or metal pedestals projected at least 1 inch (25 mm) above the slab or deck and 8 inches (203 mm) above exposed earth, and are separated by an impervious moisture barrier.</del></p>

	<p><u>Exception: Posts or columns that meet all of the following:</u></p> <ol style="list-style-type: none"> <li><u>1. Are not exposed to the weather, or are protected by a roof, eave, overhang, or other covering if exposed to the weather,</u></li> <li><u>2. Are supported by concrete piers or metal pedestals projecting not less than 1 inch above the slab or deck and are separated from the concrete pier by an impervious moisture barrier,</u></li> <li><u>3. Are located not less than 8 inches above exposed earth.</u></li> </ol>																										
S279-16 AMPC1	<p><b>IBC 2304.12.2.5 Supporting members for permeable floors and roofs.</b> Wood structural members that support moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, shall be of naturally durable or preservative-treated wood unless separated from such floors or roofs by an impervious moisture barrier. <u>The impervious moisture barrier system protecting the structure supporting floors shall provide positive drainage of water that infiltrates the moisture-permeable floor topping.</u></p>																										
S281-16	<p><b>2304.9.3.2 Nailing.</b> The length of nails connecting laminations shall be not less than two and one-half times the net thickness of each lamination. Where decking supports are 48 inches on center or less, side nails shall be installed not more than 30 inches on center alternating between top and bottom edges, and staggered one-third of the spacing in adjacent laminations. Where supports are spaced more than 48 inches on center, side nails shall be installed not more than 18 inches on center alternating between top and bottom edges and staggered one-third of the spacing in adjacent laminations. <u>For mechanically laminated decking constructed with laminations of 2-inch nominal thickness, nailing in accordance with Table 2304.9.3.2 shall be permitted. Two side nails shall be installed at each end of butt-jointed pieces.</u></p> <p>Laminations shall be toenailed to supports with 20d or larger common nails. Where the supports are 48 inches on center or less, alternate laminations shall be toenailed to alternate supports; where supports are spaced more than 48 inches on center, alternate laminations shall be toenailed to every support. <u>For mechanically laminated decking constructed with laminations of 2-inch nominal thickness, toenailing at supports in accordance with Table 2304.9.3.2 shall be permitted.</u></p> <p><b>Table 2304.9.3.2 Fastening Schedule for Mechanically Laminated Decking Using Laminations of 2-inch Nominal Thickness</b> (new table below without underlining for clarity)</p> <table border="1" data-bbox="417 1110 1436 1484"> <thead> <tr> <th rowspan="2">Minimum Nail Size (Length x Diameter) (inches)</th> <th colspan="2">Maximum Spacing Between Face Nails<sup>a,b</sup> (inches)</th> <th rowspan="2">Number of Toenails into Supports<sup>c</sup></th> </tr> <tr> <th>Decking Supports ≤ 48 inches o.c.</th> <th>Decking Supports &gt; 48 inches o.c.</th> </tr> </thead> <tbody> <tr> <td>4 x 0.192</td> <td>30</td> <td>18</td> <td>1</td> </tr> <tr> <td>4 x 0.162</td> <td>24</td> <td>14</td> <td>2</td> </tr> <tr> <td>4 x 0.148</td> <td>22</td> <td>13</td> <td>2</td> </tr> <tr> <td>3½ x 0.162</td> <td>20</td> <td>12</td> <td>2</td> </tr> <tr> <td>3½ x 0.148</td> <td>19</td> <td>11</td> <td>2</td> </tr> </tbody> </table>	Minimum Nail Size (Length x Diameter) (inches)	Maximum Spacing Between Face Nails <sup>a,b</sup> (inches)		Number of Toenails into Supports <sup>c</sup>	Decking Supports ≤ 48 inches o.c.	Decking Supports > 48 inches o.c.	4 x 0.192	30	18	1	4 x 0.162	24	14	2	4 x 0.148	22	13	2	3½ x 0.162	20	12	2	3½ x 0.148	19	11	2
Minimum Nail Size (Length x Diameter) (inches)	Maximum Spacing Between Face Nails <sup>a,b</sup> (inches)		Number of Toenails into Supports <sup>c</sup>																								
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3½ x 0.148	19	11	2																								

3½ x 0.135	17	10	2
3 x 0.148	11	7	2
3 x 0.128	9	5	2
2¾ x 0.148	10	6	2
2¾ x 0.131	9	6	3
2¾ x 0.120	8	5	3

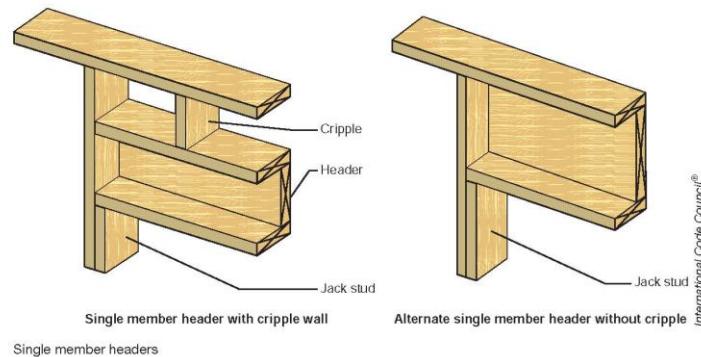
- Nails shall be driven perpendicular to the lamination face, alternating between top and bottom edges.
- Where nails penetrate through two laminations and into the third, they shall be staggered one-third of the spacing in adjacent laminations. Otherwise, nails shall be staggered one-half of the spacing in adjacent laminations.
- Where supports are 48 inches on center or less, alternate laminations shall be toenailed to alternate supports; where supports are spaced more than 48 inches on center, alternate laminations shall be toenailed to every support.

S292-16

**2308.5.5.1 Openings in exterior bearing walls.** Headers shall be provided over each opening in exterior bearing walls. The size and spans in Table 2308.4.1.1(1) are permitted to be used for one- and two-family dwellings. Headers for other buildings shall be designed in accordance with Section 2301.2, Item 1 or 2. Headers shall be of two or more pieces of nominal 2-inch framing lumber set on edge as shall be permitted by in accordance with Table 2308.4.1.1(1) and nailed together in accordance with Table 2304.10.1 or of solid lumber of equivalent size.

Single member headers of nominal 2-inch thickness shall be framed with a single flat 2-inch-nominal member or wall plate not less in width than the wall studs on the top and bottom of the header in accordance with Figures 2308.5.5.1(1) and 2308.5.5.1(2) and face nailed to the top and bottom of the header with 10d box nails [3 inches x 0.128 inches] spaced 12 inches on center.

Wall studs shall support the ends of the header in accordance with Table 2308.4.1.1(1). Each end of a lintel or header shall have a bearing length of not less than 1½ inches for the full width of the lintel.



**FIGURE 2308.5.5.1(1) Single Member Header in Exterior Bearing Wall and FIGURE 2308.5.5.1(2) Alternative Single Member Header Without Cripple**