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Code Check[®] Building Third Edition

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Based on Chapters 1 – 10 of the 2009 International Residential Code[®]

Code Check Building 3rd edition is a condensed guide to the building portions of the 2009 International Residential Code (IRC) for One- & Two-Family Dwellings. The IRC is the most widely used residential building code in the United States. Significant code changes are highlighted in the text and summarized in the table on pages 62–64. By using that table, the book is also applicable in areas using older editions of the IRC. Check with the local building department to determine which code is used in your area, and for local amendments.

Acknowledgments: We deeply appreciate the editorial assistance of Sandra Hyde, PE, and the International Code Council.

REFERENCE DOCUMENTS

The IRC is part of the suite of codes published by the **International Code Council**. It is limited to one- and two-family dwellings and townhouses not more than three stories above grade. It is a prescriptive document containing minimum rules and instructions for conventional construction. These can be exceeded by using the design-based provisions of the International Building Code (IBC), a more comprehensive document containing engineering regulations for structural design. Aspects of a building that exceed the scope of the IRC must be built to the IBC.

For additional information, or to contact the authors, visit www.codecheck.com

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NAVIGATING THIS ELECTRONIC EDITION

This file has bookmarks which can help quickly search for a specific topic; we recommend turning on your bookmarks through the view window. You can also navigate by using the “table of contents” button above and clicking on the page numbers there.

The buttons at the top of the page – table of contents, abbreviations, code changes, and glossary – take you immediately to those pages of the book. The left and right arrows at the upper corners can be used to advance or move forward one page at a time.

Every code number is a hyperlink which will open an ICC E-Codes file in your web browser. The text of each cited code will appear in your browser in a separate window.

Clicking on the code citations in this example from p. 5 opens those codes in a separate window in your browser. Code Changes throughout the text have a small superscript number after the code citation. Each of those superscript numbers is a hyperlink that will take you to the appropriate code change on p. 62–64. Clicking on the superscript “4” takes you to p.62:

- Approved plans & permit card on site _____ [105.7 & 106.3.1]
- Plans to include BWL locations & methods _____ [106.1.1]⁴

After using these buttons or hyperlinks, you can return to the previous place you were visiting by clicking on the “back to previous page” button at the top left.

Each table and figure reference, such as **F27**, is a hyperlink. If the figure or table you are looking for is not on the same page as the text you are viewing, simply click the hyperlink to view it, then click “back to previous page” to return to the page you were on.

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KEY TO USING THIS BOOK

The line for each code rule starts with a checkbox and ends with an IRC code reference in brackets. Exceptions and lists start with a bullet and also end with the code reference in brackets. Changes to the 2009 code are highlighted by printing the reference in a different color; the superscript number refers to the table which begins on page 62 (**p.62**). The following example is from **p.13**:

- Floor or landing min 36 in. deep on each side of door EXC _____ [311.3]
 • Balconies < 60 sq. ft. OK for landing to be < 36 in. deep _____ [311.3X]¹⁹

*These lines give the basic rule that landings at least 36 inches deep are required on each side of a door, and the code reference in the IRC is section 311.3. (In the IRC, the number is actually R311.3. We omit the letter R at the beginning to save space and include more information on each line.) The line that follows (regarding balconies < 60 sq. ft.) is an exception, and its reference is 311.3 Exception. This exception is a new code change, and is explained further on **p.62** as code change #19.*

Tables and Figures are referenced in the code text lines, as in the following example from **p.29**:

- Notching & boring per **F30, T14** _____ [502.8.1]

This line says that the rules for notching & boring joists are found in section 502.8.1 and illustrated in Figure 30, with further explanation in Table 14.

SEQUENCE OF THIS BOOK

This book follows the same basic sequence as the IRC. It begins with the administrative sections in the IRC chapter 1, followed by the planning and nonstructural topics in the IRC chapter 3. The structural sections are arranged “from the ground up,” beginning with foundations (chapter 4), followed by floors (5), wall construction (6), wall coverings (7), roof-ceiling construction (8), roof assemblies (9), and chimneys and fireplaces (10).

ABBREVIATIONS

AAMA = American Architectural Manufacturers Association	L&L = listed & labeled
ACI = American Concrete Institute	lb. = pound(s)
AMI = in accordance with manufacturer's instructions	max = maximum
ASTM = American Society for Testing & Materials	min = minimum
BO = building official	mph = miles per hour
BWL = braced wall line	o.c. = on center
BWP = braced wall panel	PL = property line (lot line)
BUR = built-up roof	PT = pressure treated
cfm = cubic feet per minute	psf = pounds per square foot
CMU = concrete masonry unit	psi = pounds per square inch
EXC = exception to rule will follow in the next line	req = require
FSD = fire separation distance	req'd = required
ft. = foot / feet	req's = requires, requirements
GB = gypsum board	SDC = Seismic Design Category
hr. = hour	SDC D = Seismic Design Categories D ₀ , D ₁ & D ₂ inclusive
IBC = International Building Code	sq. = square, as in sq. ft.
ICF = insulating concrete form	UL = Underwriters Laboratories
in. = inch(es)	WRB = water-resistive barrier
	WSP = wood structural panel

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GLOSSARY

Aspect ratio: The ratio of longest to shortest dimensions, or for wall sections, the ratio of height to length.

Attic: The unfinished space between the ceiling assembly of the top story and the roof assembly.

Attic, habitable¹: A finished or unfinished area meeting minimum room dimension and ceiling height requirements and enclosed by the roof assembly above, knee walls (if applicable) on the sides, and the floor–ceiling assembly below.

Basement: A portion of a building that is partly or completely below grade.

Braced wall line (BWL)²: A straight line through the building plan representing the location of lateral resistance provided by wall bracing.

Braced wall panel (BWP): A full-height section of wall constructed to resist shear forces by application of bracing materials.

Building thermal envelope: The basement walls, exterior walls, floor, roof, and other building elements that enclose conditioned space.

Connector: A device such as a joist hanger, post base, hold-down, mudsill anchor, or hurricane tie used to connect structural components—also see *Fastener*.

Cripple wall: Wood-framed wall extending from the foundation to joists below the first floor. Found in the underfloor area.

Dampproofing: A coating intended to protect against the passage of water vapor through walls or other building elements. It is a lesser degree of protection than waterproofing.

Dead load: The weight of all materials of the building and fixed equipment.

Diaphragm: A horizontal or nearly horizontal system, such as a floor, acting to transmit lateral forces to the vertical resisting elements.

Fastener: Generic category that includes nails, screws, bolts, or anchors—also see *Connector*.

Fire separation distance: The distance measured perpendicular from the building face to the closest interior lot line or to the centerline of a street, alley, or public way.

Grade: The finished ground level adjoining the building at all exterior walls.

Habitable space: Space in a building for living, sleeping, eating, or cooking. Bathrooms, bathroom closets, hallways, storage, or utility areas are not considered habitable space.

Live loads: Loads produced by use and occupancy of the building and not including wind, snow, rain, earthquake, flood, or dead loads.

Monolithic: Concrete cast in one continuous operation with no joints, such as a footing and floor slab or a footing and foundation stem wall.

Perm: The unit of measurement of water vapor transmission through a material, based on the number of grains of water vapor at a given pressure differential. Vapor retarders are rated in perms.

Plain concrete or masonry: Structural concrete or masonry with less reinforcement than the minimum amount specified for reinforced concrete or masonry.

Seismic Design Category (SDC): Classification assigned to buildings based on the occupancy category & severity of earthquake ground motion expected at the site.

Story: That portion of a building that is between the upper surface of one floor and below the upper surface of the next floor above or the roof.

Story above grade: The parts of the building that are entirely above grade, or basements that are more than 6 feet above grade for more than 50% of the total building perimeter or more than 12 feet above ground at any point.

Townhouse³: Single-family dwelling unit constructed in groups of three or more attached units in which each unit extends from foundation to roof and with a yard or public way on at least two sides.

Waterproofing: Materials that protect walls or other building elements from the passage of moisture as either vapor or liquid under hydrostatic pressure.

Wood structural panel (WSP): A panel manufactured from veneers (plywood) or wood strands (OSB) and bonded with waterproof synthetic resins. Wood structural panels must bear a grade stamp (see **F35** on **p.32**) and are used in floors, roof diaphragms, and shear walls.

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PLANNING, PERMITS & INSPECTIONS

Before beginning a building or project, plans must be approved by the local building department and must conform to applicable climatic and geographic design criteria. The plans must include setbacks from the property lines and adjacent slopes.

Plans & Permits

09 IRC

- Scope of code is 1- & 2-family dwellings & townhouses _____ [101.2]
- Approved plans & permit card on site _____ [105.7 & 106.3.1]
- Plans to include BWL locations & methods _____ [106.1.1]⁴
- Alternative materials, design & methods OK when approved by BO _ [104.11]
- Local statutes may req registered design professional to draw plans _ [106.1]
- Site plan or plot plan to be included in construction documents ____ [106.2]
- Permits req'd for new work, additions, repairs & alterations _____ [105.1]
- Permits not req'd for: _____ [105.2]
 - Detached one-story accessory structures (tool sheds) ≤ 200 sq. ft.⁵
 - Fences ≤ 6 ft., sidewalks, driveways, swings & playground equipment
 - Retaining walls ≤ 4 ft. bottom of footing to top of wall & with no surcharge
 - Water tanks on grade $\leq 5,000$ gallons & height/width ratio $\leq 2:1$
 - Painting, tiling, carpeting, cabinets, counters & similar finish work
 - Awnings projecting ≤ 54 in. from exterior wall & supported from wall
 - Decks ≤ 200 sq. ft. & ≤ 30 in. above grade & not attached to dwelling or serving req'd exit door⁶

Required Inspections

09 IRC

- Inspection & approval prior to concealing any work _____ [109.4]
- Foundation forms & steel prior to placing concrete _____ [109.1.1]
- In flood hazard areas, registered design professional req'd to document lowest floor elevation before construction above it _____ [109.1.3]
- Rough plumbing, mechanical & electrical before concealment _____ [109.1.2]
- Frame & masonry after fireblocking & bracing in place _____ [109.1.4]
- Air barrier & insulation inspection (may be 3rd party) _____ [1102.4.2.2]

Required Inspections (cont.)

09 IRC

- Drywall nailing of fire resistance-rated walls prior to taping _____ [109.1.5.1]
- Special inspections as authorized by BO _____ [109.1.5]
- Final inspection _____ [109.1.6]

DESIGN

The IRC assigns a Seismic Design Category (SDC) from A to E, with A the least likely to experience seismic activity and E the most vulnerable. Category D is broken into three subparts, D₀, D₁ & D₂. Buildings in SDC E must be designed to the IBC. The BO can allow a SDC E to be designated as D₂ in some circumstances, such as buildings of "regular shape" with wall bracing continuous in one plane from the foundation to the uppermost story and no cantilevers.

Design Criteria General

09 IRC

- Nonconventional elements designed per IBC _____ [301.1.3]
- Determine climatic & geographic design criteria **T1** _____ [301.2]
- Complete **T1** from maps & BO _____ [T301.2(1)]
- In flood hazard areas, determine design flood elevation _____ [322.1.4]
- BO may req soil tests if expansive, compressible, or questionable ____ [401.4]

TABLE 1

CLIMATIC AND GEOGRAPHIC CONDITIONS [T301.2(1)]

Ground Snow Load	Wind Speed (mph) ^A	Seismic Design Category ^A	Weathering (Concrete) ^B	Frost Line Depth ^A	Termites Hazard ^A	Flood Hazards ^C

A. To be filled in by local building department.

B. Choose negligible, moderate, or severe—affects strength of concrete & grade of CMUs.

C. To reference entry date into National Flood Insurance Program, date of Flood Insurance Study & numbers & dates of currently effective maps.

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Wind Design

09 IRC

- Determine basic wind speed from maps _____ [301.2.1.4 & F301.2(4)]
- If history of damage due to wind speed-up at hills, modify map values to consider topographic effects _____ [301.2.1.5]⁷
- If basic wind speed > 100mph in hurricane-prone region or > 110mph, design per ICC-600, ASCE-7, WFCM, or AISI S230 _____ [301.2.1.1]
- Cladding, covering & fenestration req design for specified pressure loads or per T301.2(2&3) & F301.2(7) _____ [301.2.1]
- Windows in windborne debris regions to ASTM E 1886 & E 1996 impact-resistance standards EXC _____ [301.2.1.2]
 - 1- & 2-story buildings WSP protection precut & predrilled to fit on permanently installed anchors on building _____ [301.2.1.2X]

STRUCTURAL PLANNING

Story Height (also see p.33)

09 IRC

- Wood framing 10 ft. **T18** + 16 in. for height of floor framing EXC _____ [301.3]
 - 12 ft. OK if **T21** increased 10% or **T22** increased 20% _____ [301.3X]⁸
- Engineered design req'd when exceeding above limits _____ [301.3]

Live Loads & Allowable Deflection

09 IRC

- Min uniformly distributed live load per **T2** _____ [301.5]
- Allowable deflection of structural members per **T3** _____ [301.7]

TABLE 2 MIN. UNIFORMLY DISTRIBUTED LIVE LOADS [T301.5]

Use	Live Load (psf)
Attic without storage	10
Attic with limited storage (see p.48)	20
Habitable attics & attics with fixed stairs	30
Sleeping rooms	30
Balconies & decks	40
Rooms other than sleeping rooms	40
Stairs	40 ^A
Concentrated point load on top of handrails or guardrails	200
Guardrail in-fill components	50 ^B

A. Individual treads can be designed for 300 lb. load over a 4 sq. in. area.
B. Horizontally applied load over a 1 sq. ft. area

TABLE 3 ALLOWABLE DEFLECTION [T301.7]

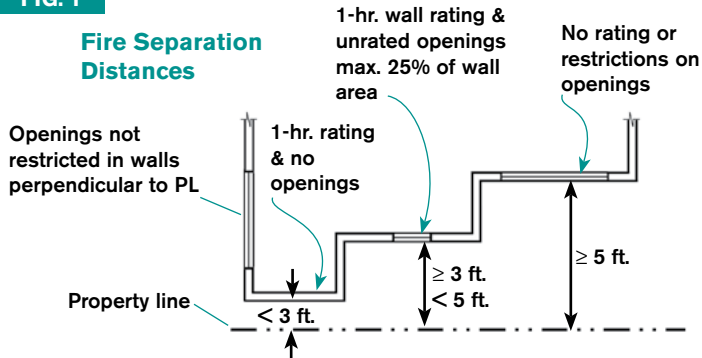
Structural Member	Deflection ^A
Rafters > 3:12 slope & no finished ceiling attached	L/180
Interior walls & partitions	H/180
Floors & plastered ceilings	L/360
Lintels supporting masonry veneer walls	L/600
Other structural members	L/240

A. L = span length, H = span height

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LOCATION ON SITE**Location & Setbacks**

- 1-hr. rated walls req'd when FSD < 5 ft. EXC **F1** _____ [T302.1]
 - Walls & openings perpendicular to line determining FSD **F1** _____ [302.1X1]
 - Accessory structures that are exempt from permit _____ [302.1X3]
- No opening in walls < 3 ft. from PL EXC _____ [T302.1]
 - Foundation vents _____ [302.1X5]
 - Openings perpendicular to line determining FSD **F1** _____ [302.1X1]
- Underside of eaves 1-hr. rated if FSD ≥ 2 ft. to 5 ft. _____ [T302.1]
- No projections (eaves) < 2 ft. of PL EXC _____ [T302.1]
 - Detached garages within 2 ft. of PL eave projections ≤ 4 in. OK _____ [302.1X4]

09 IRC**FIG. 1****Fire Separation Distances****FIRE PROTECTION**

Fire-resistive construction materials such as gypsum board provide passive protection against the rapid spread of a fire. Fireblocking slows the spread of fire in small concealed spaces, and draftstopping accomplishes the same function in larger concealed areas.

Separation between Townhouses**09 IRC**

- Each unit req's its own 1-hr. separation wall to adjacent unit EXC **F2** _____ [302.2]
 - Common 1-hr. wall OK if no plumbing/mechanical in wall cavity _____ [302.2X]⁹
 - Electrical boxes meeting penetration rules OK in common wall **F2** _____ [302.2X]
- Common walls continue in rated parapet to 30 in. above roof EXC _____ [302.2.2]
 - Noncombustible roof deck or GB wrapback for 4 ft. _____ [302.2.2X]
 - Roofs with > 30 in. elevation difference _____ [302.2.2]

FIG. 2**Townhouse Separation Wall**

Electrical boxes fire-rated, steel, protected, or separated by insulation



A 1-hr. rated wall typically has 1 layer of 5/8 in. Type X GB on each side. Walls with staggered studs reduce sound transmission between units.

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FIRE PROTECTION (CONT.)**Separation in Two-Family Dwellings****09 IRC**

- 1-hr. common wall req'd from foundation to underside of roof EXC _____ [302.3]
 - ½-hr. OK if building protected by automatic sprinkler system _____ [302.3X1]
 - Attic separation can be draft stop if ceilings 5/8 in. Type X _____ [302.3X2]

Penetrations of Fire-Resistive Membranes**09 IRC**

- Steel electrical boxes allowed in wall membrane if max 16 sq. in. & aggregate area of openings ≤ 100 sq. in. _____ [302.4.2X1]
- Steel boxes on opposite sides of wall min 24 in. horizontal separation or protected by insulation, fireblocking, or listed putty pads **F2** _____ [302.4.2X1]
- L&L fire-rated boxes allowed in walls AMI **F2** _____ [302.4.2X2]
- Through penetrations req listed firestop penetration system or must be part of approved and tested assembly _____ [302.4.1]

Finish Surfaces & Insulation**09 IRC**

- Wall & ceiling finishes max flame spread index 200, max smoke-developed index 450 in accordance with ASTM E 84 / UL 723 _____ [302.9]
- Insulation & facing max flame spread index 25, max smoke-developed index 450 in accordance with ASTM E 84 / UL 723 EXC _____ [302.10.1]
 - Facing material exempt when in substantial contact with unexposed surface of wall, floor, or ceiling – i.e., not visible in finished job ____ [302.10.1X1]
- Foam plastic max flame spread index 75, max smoke-developed index 450 in accordance with ASTM E 84 / UL 723 _____ [316.3]
- Foam plastic not OK to be exposed to building interior _____ [316.4]
- Foam req's thermal barrier of min ½ in. GB EXC _____ [316.4]
 - In roof assembly separated by WSPs _____ [316.5.2]
 - Alternate lesser covering barriers allowed in crawl spaces & attics entered only for repairs or maintenance _____ [316.5.3&4]

Separation from Garages**09 IRC**

- Min ½ in. GB or equivalent on garage side of walls & ceilings common to house or shared attic space EXC **F3** _____ [T302.6]
 - Min 5/8 in. Type X GB ceiling under habitable room **F3** _____ [T302.6]
- Min ½ in. GB on walls, beams, or other structures that support ceilings providing separation between house & garage _____ [T302.6]
- Garage walls perpendicular to dwelling OK unprotected unless supporting floor/ceiling separations _____ [302.6]
- No direct openings between garage & sleeping rooms _____ [302.5.1]
- Door to house rated 20-minute, 1³/₈ in. solid wood or steel _____ [302.5.1]
- Ducts in garage & penetrating common walls min 26-gage steel ____ [302.5.2]
- No duct openings in garage _____ [302.5.2]
- Seal penetrations of common walls with approved material _____ [302.5.3]
- Sealant does not have to comply with ASTM E 136 ____ [302.5.3 & 302.11#4]
- Detached garages closer than 3 ft. req ½ in. GB on interior side of garage walls facing house _____ [T302.6]¹⁰

GARAGES & CARPORTS**General****09 IRC**

- Floor surfaces approved noncombustible material EXC _____ [309.1&2]
 - Asphalt OK at ground level in carports _____ [309.2X]
 - Floor sloped to a drain or to vehicle entry _____ [309.1&2]
- Carports not open on 2 sides considered a garage _____ [309.2]

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FIG. 3

Fire Separation from Garage

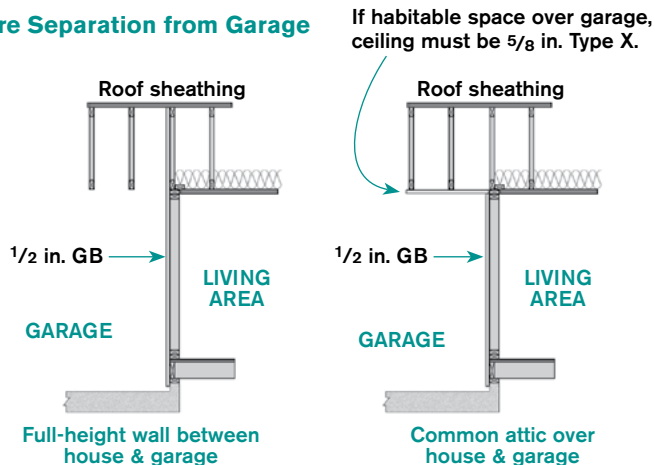


FIG. 4

Fireblocking at Wall/Ceiling

Pipes, vents, ducts, wires & cables req. fireblocking where the wall intersects the ceiling.

If more than 2 NM cables in a single hole are fire-blocked, they must be derated (see p.212).



FIREBLOCKING & DRAFTSTOPPING

Fireblocking - General

09 IRC

- Purpose is to cut off concealed draft openings _____ [302.11]
- Materials can be 2 in. lumber, 2 thicknesses 1 in. lumber, 3/4 in. WSP, 3/4 in. particleboard, 1/2 in. GB, 1/4 in. millboard, mineral wool, or glass fiber batts securely retained in place _____ [302.11.1]
- Unfaced fiberglass must fill entire cavity to height of 16 in. **F6** ___ [302.11.1.2]
- Caulking or other material filling annular space does not have to comply with ASTM E 136 _____ [302.11#4]**

Required Fireblocking Locations

09 IRC

- Req'd locations: _____ [302.11]
 - In walls vertically at ceiling & floor levels, horizontally max 10 ft.
 - Intersections of concealed vertical/horizontal spaces (e.g., soffits) **F5,6,7**
 - Concealed spaces between stair stringers at top & bottom of run
 - Openings around vents, ducts, pipes & cables at ceilings & floors **F4**
 - In space between chimneys & combustible framing
 - In 2-family dwelling cornices at line of unit separation

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FIG. 5

Air Flow through Soffit

Air communicates through soffit to attic or ceiling space above.

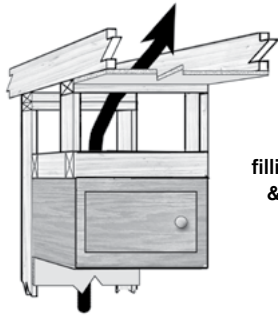


FIG. 6

Soffit Fireblocking Options

Fireblocking achieved by 1, 2, or 3.

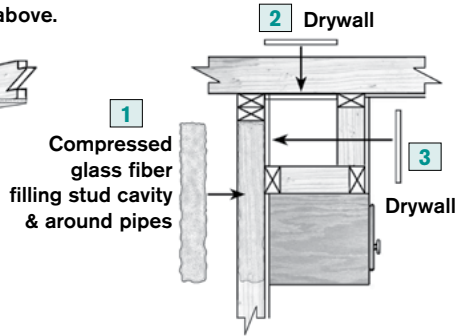
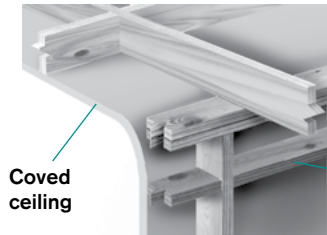


FIG. 7

Coved or Dropped Ceiling



Draftstopping

09 IRC

- Req'd at floor/ceiling assemblies to limit concealed space to 1,000 sq. ft. when using suspended ceiling or open-web trusses ____ [302.12]
- Materials min 1/2 in. GB, 3/8 in. WSP, or equivalent ____ [302.12.1]

FIRE SPRINKLER SYSTEMS

The building section of the IRC tells us when we need to install fire sprinklers. The methods for how we do this are in the plumbing section of the code, which offers the alternative of compliance with NFPA 13D. Such fire sprinklers slow a fire sufficiently to allow occupants to escape from the building; their purpose is to protect the occupants, not the building. Local rules vary on the extent of additions or remodels that trigger a need for compliance. Refer to *Code Check 6th edition* for further information.

Required Locations

09 IRC

- Required in new townhouses & 1- & 2-family dwellings EXC ____ [313.1.1&2]¹²
 - Additions or alterations of buildings without automatic sprinklers [313.1X&2X]
- Must protect all areas of dwelling unit EXC ____ [2904.1.1]
 - Attics, crawl spaces, etc. without fuel-fired appliances ____ [2904.1.1X1]
 - Attics, crawl spaces, etc. with fuel-fired appliances req sprinklers directly over appliance, not elsewhere in that space ____ [2904.1.1X1]
 - GB-surfaced closets ≤ 24 sq. ft. with smallest dimension ≤ 3 ft. [2904.1.1X2]
 - Bathrooms ≤ 55 sq. ft ____ [2904.1.1X3]
 - Garages, carports, exterior porches & unheated entries (mud rooms) that are adjacent to an exterior door ____ [2904.1.1X4]

Methods

09 IRC

- May be multipurpose system or stand-alone system ____ [2904.1]
- Comply with IRC 2904 or with NFPA 13D ____ [2904.1]
- Design flow rate, piping & coverage per either of above standards ____ [2904.1]

Inspections

09 IRC

- Preconcealment: req'd areas, clearances, ratings, pipe size & length, listing, manufacturer's instructions & testing ____ [2904.8.1]
- Final: Heads not painted or obstructed, pumps (if applicable) automatically start, no impairments to flow such as added filters, owners manual present & warning sign installed **F8** ____ [2904.8.2]

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FIG. 8

Required Fire Sprinkler Warning Sign

WARNING!

The water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow, decrease the pressure, or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems, and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist.

DO NOT REMOVE THIS SIGN.

SMOKE & CARBON MONOXIDE ALARMS

Smoke Alarms

09 IRC

- Req'd in each sleeping room, outside each sleeping area & on each additional story, including basements & habitable attics **F9** _____ [314.3]
- If split level without intervening door, alarm on upper level sufficient for lower level provided lower level < 1 full story below upper level _____ [314.3]
- Interconnect so activation of 1 sets off all other alarms _____ [314.3]
- Power must be supplied from building wiring with battery backup _____ [314.4]
- NFPA 72 central-station monitored systems allowed [314.2]¹³
- NFPA 72 system must be permanent fixture of property [314.2]¹⁴
- Alterations & additions same rules as new construction EXC _____ [314.3.1]
 - Work only on building exterior does not trigger compliance _____ [314.3.1X1]
 - Interconnection & hardwiring req's waived if no accessible attic or crawl space & no interior finishes removed to allow wiring access [314.4X2]

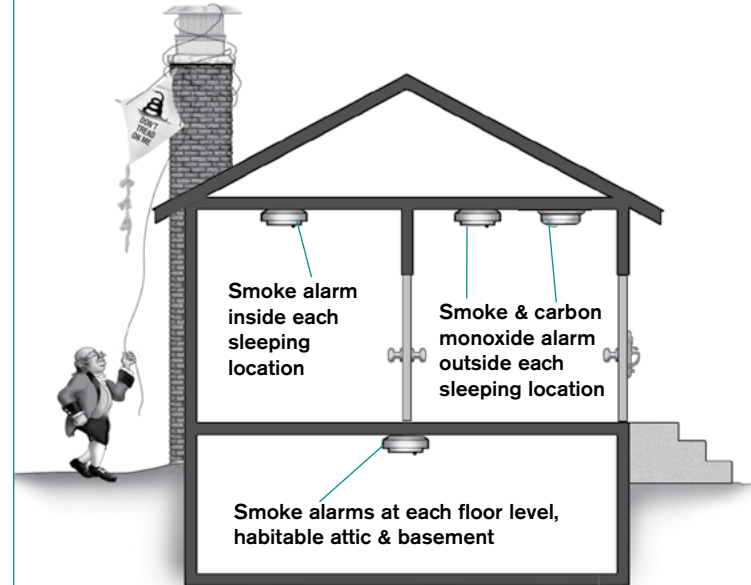
Carbon Monoxide Alarms

09 IRC

- Req'd immediately outside each sleeping room in new dwellings with fuel-fired appliances or with attached garages **F9** _____ [315.1]¹⁵
- Req'd in existing homes when work requiring permit is performed _____ [315.2]¹⁵
- Must comply with UL 2034 & be installed AMI _____ [315.3]¹⁵

FIG. 9

Smoke & Carbon Monoxide Alarm Locations



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HABITABILITY**Room Areas & Ceiling Heights****09 IRC**

- Min area of habitable room 70 sq. ft.—except kitchens _____ [304.2]
- Min horizontal dimension of habitable room 7 ft.—except kitchens _____ [304.3]
- Min ceiling height 7 ft. EXC _____ [305.1]¹⁶
 - Rooms with sloped ceilings min 50% of room min 7 ft. ceiling _____ [305.1X1]
 - Sloped ceiling bathroom min 6 ft. 8 in. at center of req'd clear area in front of fixture _____ [305.1X2]¹⁷
 - Basement areas without habitable space, hallway, laundry, or bathroom 6 ft. 8 in. ceiling OK & beams OK to within 6 ft. 4 in. of floor _____ [305.1.1]
- Portions of room with sloped ceiling < 5 ft. high, or with horizontal furred ceiling < 7 ft. high, do not count toward req'd room area _____ [304.4]

Heat, Light & Ventilation**09 IRC**

- Habitable rooms req heating facilities capable of maintaining 68°F at 3 ft. above floor & 2 ft. from exterior walls (except Hawaii) _____ [303.8]
- Portable space heaters not OK as means of compliance _____ [303.8]
- Habitable rooms req natural ventilation openings to outdoor air \geq 4% of floor area EXC _____ [303.1]
 - Approved mechanical ventilation system installed _____ [303.1X1]
 - Openings to sunroom additions if 40% open or only screened _____ [303.1X3]

ASHRAE 62.2 recommends mechanical ventilation for all kitchens & bathrooms.

Heat, Light & Ventilation (cont.)**09 IRC**

- Habitable rooms req natural light with glazing \geq 8% of floor area EXC _____ [303.1]
 - Mechanically ventilated rooms with artificial light _____ [303.1X2]
- Borrowed light & ventilation OK from adjoining rooms if common opening min 1/2 of wall, min 25 sq. ft. & min 10% interior room area _____ [303.2]

Bathroom Ventilation (also see Code Check Mechanical 4th)**09 IRC**

- Bathroom light from glazed openings min 3 sq. ft. & 1/2 openable EXC [303.3]
 - Glazed openings not req'd if mechanical ventilation direct to outside min 50 CFM intermittent or 20 CFM continuous _____ [303.3X]
- Exhaust ducts to outdoors; not to attic, soffit, or crawl space _____ [1501.1]

ESCAPE & RESCUE OPENINGS**Required Locations & Sizes****09 IRC**

- Req'd in habitable attics, basements & sleeping rooms EXC _____ [310.1]
 - Basements \leq 200 sq. ft. for mechanical equipment only _____ [310.1X]
- Each basement sleeping room _____ [310.1]
- Must open directly to public way or yard or court that opens to same _____ [310.1]
- Max height of windowsill 44 in. above floor _____ [310.1]
- Min net clear area 5.7 sq. ft. EXC _____ [310.1.1]
 - 5.0 sq. ft. OK if grade floor opening (sill \leq 44 in. above grade) _____ [310.1.1X]
- Min net clear height 24 in., min net clear width 20 in. **T4.5** _____ [310.1.2&3]
- Must be openable without keys, tools, or special knowledge _____ [310.1.4]

TABLE 4**BEDROOM WINDOW EGRESS FOR 5.0 SQ. FT. OPENING: GRADE-FLOOR OPENINGS ONLY (IN.)**

Width	20	20 1/2	21	21 1/2	22	22 1/2	23	23 1/2	24	24 1/2	25	25 1/2	26	26 1/2	27	27 1/2	28	28 1/2	29	29 1/2	30
Height	36	35	34 1/2	33 1/2	33	32	31 1/2	31	30	29 1/2	29	28 1/2	28	27 1/2	27	26 1/2	26	25 1/2	25	24 1/2	24

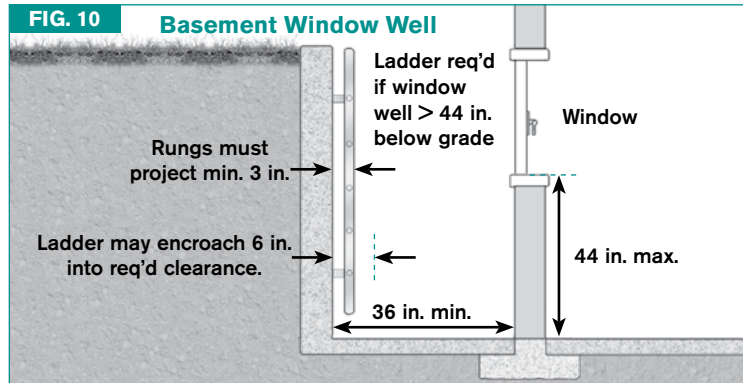
TABLE 5**BEDROOM WINDOW EGRESS: MIN. HEIGHT & WIDTH FOR 5.7 SQ. FT. OPENING SIZE (IN.)**

Width	20	20 1/2	21	21 1/2	22	22 1/2	23	23 1/2	24	24 1/2	25	25 1/2	26	26 1/2	27	27 1/2	28	28 1/2	29	29 1/2	30	30 1/2	31	31 1/2	32	32 1/2	33	33 1/2	34
Height	41	40	39 1/2	38 1/2	37 1/2	36 1/2	35 1/2	35	34 1/2	33 1/2	33	32 1/2	31	31	30 1/2	30	29 1/2	29	28 1/2	28	27 1/2	27	26 1/2	26 1/2	25 1/2	25 1/2	25	24 1/2	24

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Window Wells F10

- Openings with finished sill below adjacent ground req window well ___ [310.1]
- Min horizontal area of window well 9 sq. ft. _____ [310.2]
- Min horizontal dimension opposite opening 3 ft. EXC _____ [310.2]
 - Ladder may encroach 6 in. into req'd dimensions of window well ___ [310.2X]
- Permanent ladder req'd complying with **F10** _____ [310.2.1]

09 IRC**EGRESS****Doors**

- Egress door req'd direct to exterior—not through garage _____ [311.1]
- Egress door side-hinged & min net clear width 32 in. _____ [311.2]¹⁸
- Min clear height of egress door 78 in. top of threshold to stop _____ [311.2]
- OK for interior doors to have other dimensions _____ [311.2]
- Egress doors req keyless operation from interior side _____ [311.2]

09 IRC**Thresholds & Landings at Doors**

- Floor or landing min 36 in. deep on each side of door EXC _____ [311.3]
 - Balconies < 60 sq. ft. OK for landing to be < 36 in. deep _____ [311.3X]¹⁹
 - OK for stair of ≤ 2 risers at exterior door other than req'd egress door provided door does not swing over stair _____ [311.3.2X]
- Min landing width same as door served by landing _____ [311.3]
- Max slope of exterior landings 2% _____ [311.3]
- Max threshold height above landing or floor 1½ in. EXC _____ [311.3.1]
 - 7¾ in. below threshold OK if door not swinging over landing ___ [311.3.1X]
- Storm & screen doors may swing over lower landing _____ [311.3.3]

09 IRC**Spiral Stairways**

- Min width 26 in., all treads identical, min headroom 6 ft. 6 in. _____ [311.7.9.1]
- Min tread depth 7½ in. at 12 in. from center post, max riser 9½ in. [311.7.9.1]

09 IRC**Landings at Stairs**

- Min 36 in. deep landing req'd at top & bottom each stair flight EXC _ [311.7.5]
 - Landing not req'd at top if door not swinging over interior stairs _ [311.7.5X]
- Garage-to-house stair considered interior stair for above rule _____ [311.7.5X]
- Max 12 ft. vertical between landings or floor levels _____ [311.7.5X]

09 IRC

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Stairs: General

09 IRC

- Min width above handrail 36 in. except spiral stairways **F11** _____ [311.7.1]
- Max handrail projection into stairway 4½ in. **F11** _____ [311.7.1]
- Min headroom 6 ft. 8 in. EXC **F11** _____ [311.7.2]
 - Floor openings above stair OK to project 4¾ in. into req'd headroom at the side of a flight of stairs _____ [311.7.2X]²⁰
- Riser height max 7¾ in. , tread depth min 10 in. EXC **F12** ____ [311.7.4.1&2]
 - Tread depth min 11 in. if no nosing projection on treads **F12** ____ [311.7.4.3X]
- Measure rise & run exclusive of carpets, rugs, or runners _____ [311.7.4]²¹
- Tallest riser max ¾ in. more than shortest riser **F12** _____ [311.7.4.1]
- Deepest tread max > ¾ in. deeper than shortest tread **F12** ____ [311.7.4.2]
- Max 2% slope on treads & landings _____ [311.7.6]
- Enclosed accessible space below stairs req's min ½ in. GB _____ [302.7]

Nosings & Risers

09 IRC

- Nosing req'd for solid risers with treads < 11 in. deep **F12** _____ [311.7.4.3]
- Nosing projection min ¾ in., max 1¼ in. **F12** _____ [311.7.4.3]
- Deepest nosing projection max ¾ in. more than shortest **F12** ____ [311.7.4.3]
- Beveling of nosing max ½ in., max nosing radius ⅝ in. _____ [311.7.4.3]
- Risers vertical or sloped from tread above max 30° from vertical ____ [311.7.4.3]
- Open riser treads must prevent passage of 4 in. sphere EXC ____ [311.7.4.3]
 - Openings between adjacent treads in stairs with rise ≤ 30 in. _ [311.7.4.3X]

FIG. 11

Stair Width & Height

Min. 1½ in. between wall & handrail, max. 4½ in. projection from wall

Return to wall

Min. 36 in.

Min. 6 ft. 8 in. headroom clearance

Switch req'd at each floor level if 6 or more risers (303.6.1).

FIG. 12

Stair Rise & Run

Max. radius ⅝ in.

Tread min. 10 in.

Max. 7¾ in.

Nosing projection: min. ¾ in., max. 1¼ in. Largest projection max. ¾ in. more than shortest projection

If no nosing & solid risers, tread min. 11 in.

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Winding Stairs F13**09 IRC**

- Walkline concentric to curvature of stair & measured 12 in. from first clear area on narrow side of winder walking surface _____ [311.7.3]²²
- Min tread depth 10 in. at walkline _____ [311.7.4.2]
- Deepest tread max $\frac{3}{8}$ in. more than shortest measured at walkline [311.7.4.2]
- OK for winder treads to not be within $\frac{3}{8}$ in. of depth of rectangular treads in same flight of stairs _____ [311.7.4.2]²³

FIG. 13**Winding Stairs**

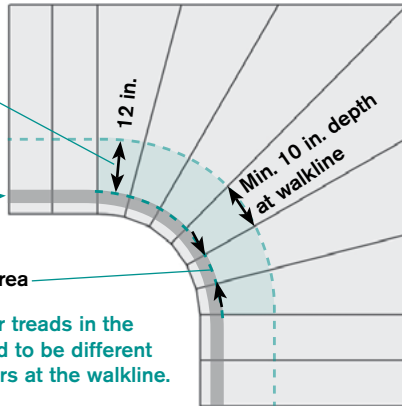
Walkline is concentric to direction of travel & measured 12 in. from point where foot can be placed on narrow side of stairs.

Min. 10 in. tread depth at walkline; deepest tread may not exceed shortest by $> \frac{3}{8}$ in.

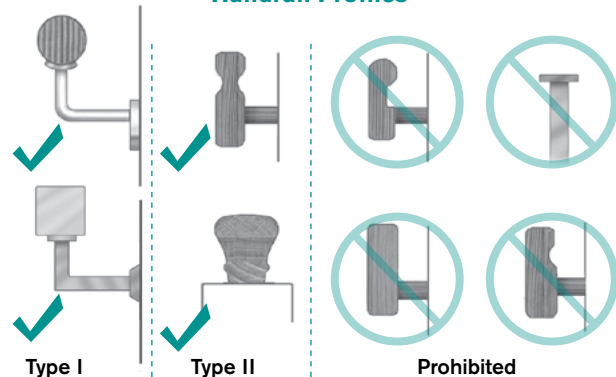
Handrail

Min. 6 in. depth within shaded area

The uniform depth of rectangular treads in the same flight as winders is allowed to be different from the uniform depth of winders at the walkline.

**Handrails****09 IRC**

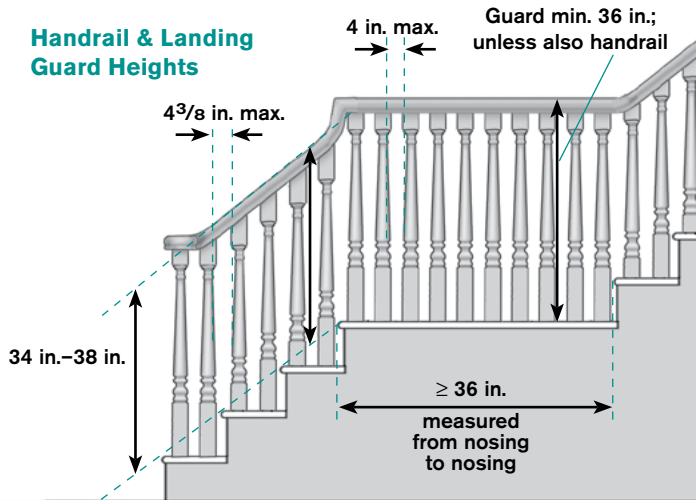
- Req'd on at least one side of flights of stairs with ≥ 4 risers **F11,15** [311.7.7]
- Top 34–38 in. above line connecting nosings **F15** EXC _____ [311.7.7.1]
 - Volute, turnout, or starting easing OK over lowest tread _____ [311.7.7.1X1]
 - Fitting or bending OK to exceed max height at continuous transition between flights, start of flight, or from handrail to guard **F15** [311.7.7.1X2]²⁴
- Ends must return to wall or post or safety terminal **F11,15** _____ [311.7.7.2]
- Min 1 1/2 in. space between wall & handrail **F11** _____ [311.7.7.2]
- Handrail continuous from line above top & bottom nosings EXC _____ [311.7.7.2]
 - May be interrupted by post at landing _____ [311.7.7.2X1]
 - Volute, turnout, or starting easing OK over lowest tread **F15** _____ [311.7.7.2X2]
- Round handrails min 1 1/4 in.–max 2 in. diameter **F14** _____ [311.7.7.3]
- Non-round Type I handrails perimeter 4–6 1/4 in. **F14** _____ [311.7.7.3]
- If perimeter $> 6\frac{1}{4}$ in., finger recess req'd both sides **F14** _____ [311.7.7.3]

FIG. 14**Handrail Profiles**

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Stairway Illumination

- Illumination req'd for stairs & landings _____ [303.6 & 311.7.8]
- Interior stair req's switch at each floor level if ≥ 6 risers **F11** _____ [303.6.1]
- Exterior stair light at top of landing, control inside dwelling EXC _____ [303.6]
 - Lights with automatic controls _____ [303.6.1X]

09 IRC**FIG. 15****Handrail & Landing Guard Heights****SAFETY GLASS**

Safety glass can be laminated or fully tempered. Proper use of safety glass is critical in areas that are subject to human impact. Typical causes of accidents are failure to see the glass, intentional breakage, or slips and falls.

Identification**09 IRC**

- Safety glass req's permanent etched label EXC _____ [308.1]
 - Non-tempered safety glazing OK to provide certificate to BO ____ [308.1X1]
 - Tempered spandrel glass may have removable paper label _____ [308.1X2]
- Glass panes ≤ 1 sq. ft. in multipane assemblies OK for all but 1 to have label that states only "CPSC 16 CFR 1201" or "ANSI Z97.1" _____ [308.1.1]²⁵
- Glazing not in doors or enclosures of tubs or showers OK to have ANSI Z97.1 Category A without a CPSC label _____ [308.3.1X]²⁶

Human Impact Loads & Hazardous Locations**09 IRC**

- Safety glazing req'd in locations per **T6, F16** EXC _____ [308.3&4]
 - Louvered windows & jalousies _____ [308.3X1]
 - Mirrors mounted on continuous backing support (typically vinyl) exempt from requirement to meet impact test standards _____ [308.3X2]
 - Glass unit masonry (glass block) _____ [308.3X3]

Impact Test Categories**09 IRC**

- CPSC Category II req'd for doors or enclosures of wet areas (tubs, showers, spas, hot tubs, saunas, steam rooms, or pools) _____ [308.3.1]
- CPSC Category II or ANSI Z97.1 Category A req'd in non-wet areas EXC _____ [308.3.1]
 - CPSC Category I or ANSI Category B also allowed for lites ≤ 9 sq. ft. in doors or sidelites other than patio doors _____ [308.3.1]

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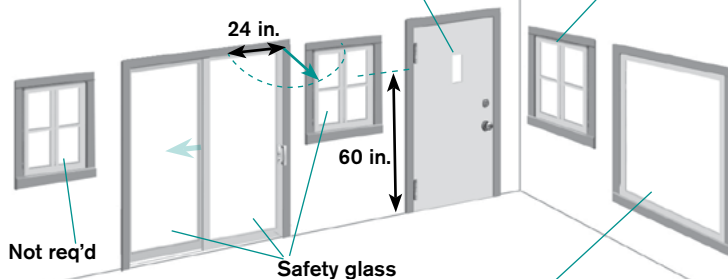
FIG. 16

Safety Glass

Basic zone for sidelites:
within 24 in. radius of door
edge in closed position &
< 60 in. above walking surface

Exempt if a
3 in. sphere
cannot pass

Sidelite
exempt when
perpendicular to door
& on latch side



Safety glass when walk-through hazard exists: all four of (1) > 9 sq. ft., (2) lower edge < 18 in. above walking surface, (3) upper edge > 36 in. above walking surface & (4) within 36 in. horizontal of walking surface

TABLE 6

REQUIRED SAFETY GLAZING LOCATIONS [308.4]

	Location	Exceptions
1	Glazing in doors F16	1. Openings that prevent passage of a 3 in. sphere 2. Decorative glass
2	Sidelites where any part of glass within 24 in. arc of the door in closed position & < 60 in. above floor or standing surface F16	1. Decorative glass 2. When protected by intervening barrier 3. Glass perpendicular to door on latch side 4. When door serves only closet ≤ 3 ft. deep 5. Glass adjacent to fixed side of patio doors

TABLE 6 (cont.)

REQUIRED SAFETY GLAZING LOCATIONS [308.4]

	Location	Exceptions
3	Walk-through hazard: > 9 sq. ft. & lowest edge < 18 in. from walking surface & upper edge > 36 in. above walking surface & ≤ 3 ft. horizontal from walking surface F16	1. Decorative glass 2. When protected by min 1 1/2 in. high horizontal rail, 34–38 in. above walking surface with rail able to resist 50 lb. force without contacting glass 3. Outboard panes ≥ 25 ft. above grade, roof, or other surface below
4	Railings, including infill	None
5	Enclosures or walls facing tubs, showers, hot tubs, whirlpools, saunas & steam rooms where glass < 60 in. above standing or walking surface	1. Walls > 60 in. away from water's edge & facing unenclosed tubs, whirlpools, or hot tubs ²⁷
6	Glass < 60 in. above walking surface & < 60 in. horizontally from edge of pools, hot tubs & spas	None
7	Glass adjacent to stairways, landings & ramps within 36 in. horizontally of walking surface & < 60 in. above walking surface	1. When protected by min 1 1/2 in. high horizontal rail 34–38 in. above walking surface with rail able to resist 50 lb. force without contacting glass 2. When > 18 in. horizontally from a railing meeting req's of an open-stair guard 3. When solid vertical surfaces installed 34–36 in. above walking surface & top of solid surface resists same loads as a guard
8	Glass within 60 in. horizontally of bottom tread of stair in any direction when glass < 60 in. above nose of tread	Same as exceptions 2 & 3 to item 7

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SKYLIGHTS**Identification & Materials****09 IRC**

- Skylight = glazing at $\geq 15^\circ$ from vertical _____ [308.6.1]
- May be laminated, fully tempered, heat-strengthened or wired glass or approved plastics _____ [308.6.2]
- Unit skylights req labeling from approved independent laboratory [308.6.9]

Installation**09 IRC**

- Screens req'd under tempered or heat-strengthened glass EXC [308.6.3]
 - Glass ≤ 16 sq. ft. & highest point ≤ 12 ft. above walking surface [308.6.5]
 - Glass > 16 sq. ft. & max 30° from vertical & highest point 10 ft. [308.6.5]
 - Sloped areas ≤ 20 ft. above grade in greenhouses _____ [308.6.6]
- Screen capable of supporting 2x glass weight & max 1 in. mesh_ [308.6.7]
- Unit skylights min 4 in. curb in roof with $< 3:12$ slope or AMI ___ [308.6.8]

GUARDS**Location & Height****09 IRC**

- Open-sided walking surfaces including stairs & landings > 30 in. above lower floor or grade within 36 in. horizontally **F17** _____ [312.1]²⁸
- Min 36 in. above walking surface or adjacent fixed seating EXC ___ [312.2]²⁹
 - Guard on open side of stair min 34 in. high _____ [312.2X1]
 - Handrail as guard 34–38 in. above line connecting nosings **F15** [312.2X2]

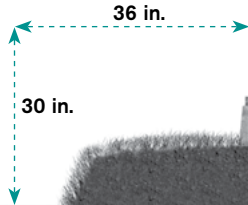
Openings**09 IRC**

- Openings must prevent passage of 4 in. sphere **F15,17** EXC _____ [312.3]
 - 6 in. at triangular opening of riser, tread & bottom rail **F15** _____ [312.3X1]
 - $4\frac{3}{8}$ in. at open sides of stairs **F15** _____ [312.3X2]
- Open risers in stairs must prevent passage of 4 in. sphere _____ [311.7.4.3]

FIG. 17**Guards**

Must restrict the passage of a 4 in. sphere

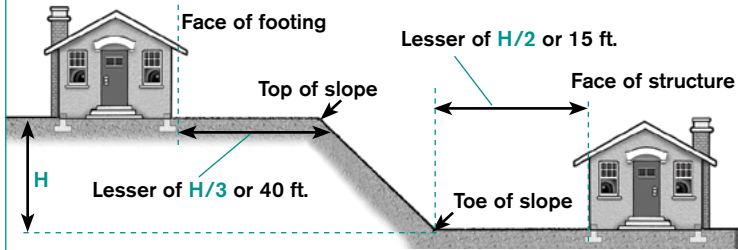
Guard req'd when walking surface or fixed seating > 30 in. above any point within 36 in.

**HILLSIDE CONSTRUCTION****Construction Adjacent to Slopes****09 IRC**

- Setback & clearance to slopes $> 1:3$ (vertical to horizontal) **F18** ___ [403.1.7]
- Setback & clearance to slopes $> 1:1$ (vertical to horizontal) **F19** _ [403.1.7.1]
- Measure height from top of retaining walls at toe of slope **F18,19** _ [403.1.7.1]
- BO may approve alternate setbacks per engineering investigation [403.1.7.4]

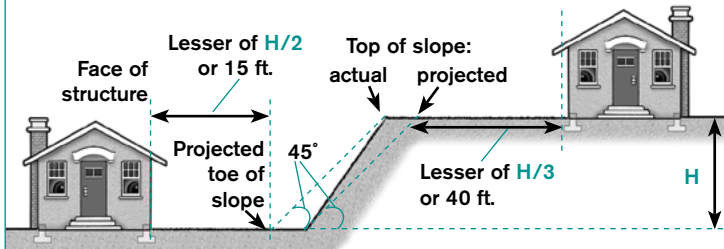
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FIG. 18 Minimum Clearances from Slopes > 1:3



Foundation footings must not be too close to the top or toe of the slope.

FIG. 19 Minimum Clearances from Slopes > 1:1



Assume a 45° angle of repose for the measurement of the slope top & toe.

SOILS

Soils

09 IRC

- BO may req soil tests if expansive, compressible, or questionable ___ [401.4]
- BO may allow **T7** in lieu of complete geotechnical evaluation ___ [401.4.1]
- Expansive soils per IBC ___ [403.1.8]
- Compressible or shifting soils removed to stable level ___ [401.4.2]
- Filled soils layered & compacted per accepted engineering practice ___ [401.2]

Retaining Walls

09 IRC

- Design req'd for retaining walls without lateral support & retaining > 24 in. unbalanced backfill ___ [404.4]
- Design for safety factor of 1.5 against lateral sliding & overturning ___ [404.4]

TABLE 7 PRESUMPTIVE LOAD-BEARING VALUES OF SOILS

Class of Material	Load-Bearing Pressure (psf)
Crystalline bedrock	12,000
Sedimentary & foliated rock	4,000
Sandy gravel &/or gravel	3,000
Sand, silty sand, clayey sand, silty gravel & clayey gravel	2,000
Clay, sandy clay, silty clay, clayey silt, silt & sandy silt	1,500

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GRADING & DRAINAGE**Grading F20**

- Grade surface to storm drain or other approved collection point _____ [401.3]
- Grade away from foundation min 6 in. fall within 1st 10 ft. EXC _____ [401.3]
 - Use swale if physical barrier or lot line prohibits 6 in. fall in 10 ft. _____ [401.3X]
- Hardscape within 10 ft. min 2% slope from building _____ [401.3X]

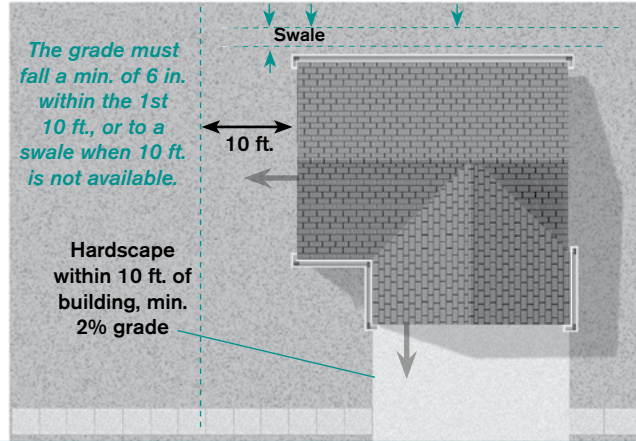
09 IRC**Drainage**

- Top of foundation min elevation above drainage inlet or street gutter 12 in. + 2% slope _____ [403.1.7.3]
- If water does not readily drain from site, crawl space on same level as outside grade or install approved drainage system _____ [408.6]
- Roof drain must discharge min 5 ft. from footing or to approved drain system if soils expansive or collapsible _____ [801.3]

09 IRC**TABLE 8****MIN. WIDTH (IN.) OF CONCRETE OR MASONRY FOOTINGS [T403.1]**

Construction Type	No. of Stories	Load Bearing Value of Soil ^A (psf)			
		1,500	2,000	3,000	≥ 4,000
Conventional light-frame construction	1	12	12	12	12
	2	15	12	12	12
	3	23	17	12	12
4 in. brick veneer over frame or 8 in. hollow-concrete masonry	1	12	12	12	12
	2	21	16	12	12
	3	32	24	16	12
8 in. solid or fully grouted masonry	1	16	12	12	12
	2	29	21	14	12
	3	42	32	21	16

A. See T7 for vertical load-bearing values of different soil types.

FIG. 20**Site Grading****FOOTINGS****General****09 IRC**

- Footings supported on undisturbed soil or engineered fill _____ [403.1]
- Placement in soils min 12 in. below undisturbed ground surface _____ [403.1.4]
- Extend below frost line or be frost protected _____ [403.1.4.1]
- Min width for concrete or masonry footings per T8 _____ [403.1.1]
- Min thickness 6 in. F21 _____ [403.1.1]
- Projection past foundation min 2 in., max = footing thickness F21 _____ [403.1.1]
- Top surface of all footings level F33 _____ [403.1.5]
- Bottom surface of footings max 10% slope (step when > 10%) _____ [403.1.5]

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Frost-Protected Shallow Foundations**09 IRC**

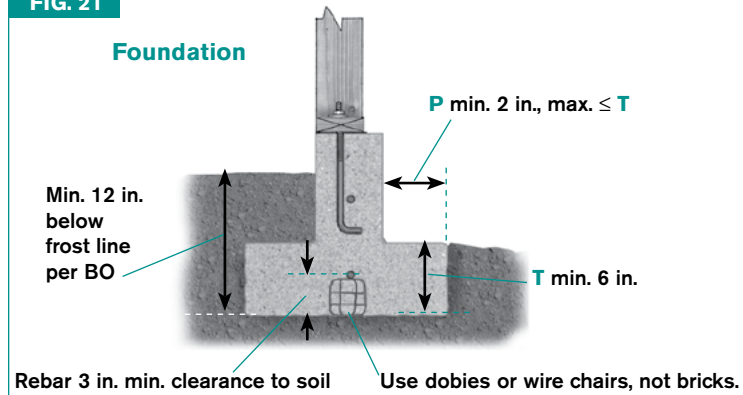
- If monthly mean building temp maintained at 64°F, footing not req'd to extend below frost line if protected by insulation _____ [403.3]
- If unheated slab abuts frost-protected foundation, provide insulation under slab & between slab & protected foundation _____ [403.3.1.1]

SDC D Footings**09 IRC**

- Continuous footings req'd at braced wall lines _____ [403.1.2]
- Bottom reinforcement min 3 in. clear from bottom of footing EXC__ [403.1.3]
 - Plain concrete footings allowed 1- & 2-family dwellings with studs [403.1.3X]
- Joint between stem wall & footing min #4 vertical bar at 4 ft. o.c. __ [403.1.3]
- Footing min 12 in. below top of slab at interior bearing walls _____ [403.1.4.2]

SDC D Footing Reinforcement**09 IRC**

- Foundations with stem walls req #4 bar top & bottom **F21** _____ [403.1.3.1]
- Slab with footings min #4 bar top & bottom EXC **F24** _____ [403.1.3.2]
 - Monolithic slab 1 #5 bar OK in middle 1/3 of footing depth **F24** [403.1.3.2X]

FIG. 21**CONCRETE**

Designs in accordance with standards from the American Concrete Institute (ACI 318 or 332) or the Portland Cement Association (PCA 100) are acceptable as alternatives to the methods prescribed by the IRC.

Mixing & Strength**09 IRC**

- Min 2,500 psi in SDC A, B, or C _____ [404.1.2.3.1]
- Min 3,000 psi in SDC D _____ [404.1.2.3.1]
- Min compressive strength also to comply with **T9** _____ [402.2]
- Air-entrained concrete req'd if moderate or severe weathering **T9** _____ [402.2]
- Max slump 6 in. for concrete in removable forms _____ [404.1.2.3.4]
- Thoroughly work concrete around rebar & into corners _____ [404.1.2.3.5]
- Slump of concrete in stay-in-place forms (ICF) > 6 in. _____ [404.1.2.3.4]
- Vibrate concrete in stay-in-place forms (ICF) _____ [404.1.2.3.5]

TABLE 9**MIN. COMPRESSIVE STRENGTH OF CONCRETE AT 28 DAYS (PSI) [T402.2]**

Type or Location of Concrete Construction	Weathering Potential		
	Negligible	Moderate	Severe
Basement walls, foundations & other concrete not exposed to weather	2,500	2,500	2,500 ^A
Basement slabs & interior slabs on grade, except garage floor slabs	2,500	2,500	2,500 ^A
Basement & foundation walls, exterior walls & other vertical concrete exposed to weather	2,500	3,000 ^B	3,000 ^B
Porches, carport slabs & steps exposed to weather & garage floor slabs	2,500	3,000 ^{B,C}	3,500 ^{B,C}

A. Must be air-entrained if exposed to freeze-thaw during construction.

B. Air-entrainment req'd. Air content between 5% & 7% by volume of concrete.

C. Garage floor slab air-entrainment may be reduced to 3% if strength increased to 4,000 psi.

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Forms

- 09 IRC**
- Size per approved plans & tables _____ [404.1.1.&2]
 - Pipe penetrations sleeved _____ [2603.5]
 - Excavation free of debris & roots _____ [408.5]
 - Wood beam connections min 1/2 in. air space 3 sides _____ [317.1.#4]
 - Forms to resist deformation during concrete placement _____ [404.1.2.3.6]
 - Remove all wood forms used for placing concrete _____ [408.5]
 - Foundation wall min 6 in. above finished grade EXC _____ [404.1.6]
 - 4 in. OK if masonry veneer is used _____ [404.1.6]
 - Concrete wall cold joints req reinforcement at max 24 in. o.c. _[404.1.2.3.7.8]

Reinforcement Methods**09 IRC**

- Secure with tie wire, dobies, etc., to prevent displacement____[404.1.2.3.7.4]
- Min reinforcement cover per **T10** _____[404.1.2.3.7.4]
- Splices lapped min 20 in. #4 bar, 25 in. #5 bar, 30 in. #6 bar_[404.1.2.3.7.5]

TABLE 10**REINFORCING STEEL COVER [404.1.2.3.7.4]**

Foundation Surface	Min. Cover
Concrete cast against & permanently exposed to earth	3 in.
Concrete exposed to earth or weather after forms removed	1 1/2 in. ^A
Not exposed to weather (e.g., top of slab)	3/4 in.
Concrete in stay-in-place forms (ICF)	3/4 in.
A. 2 in. cover req'd for #6 or larger bars	

ANCHORING TO FOUNDATION**General****09 IRC**

- All wood sole plates at monolithic slab exterior walls & braced walls, & all wood sill plates req bolts to foundation _____ [403.1.6]
 - Bolts min 7 in. into concrete or grouted CMU cell **F21,24** _____ [403.1.6]
 - Bolts min 1/2 in. diameter, nut & washer on each bolt **F21,24** _____ [403.1.6]
 - Bolt distance from end of plate min 7 diameters, max 12 in. _____ [403.1.6]
 - Max spacing 6 ft. o.c. & min 2 bolts per plate EXC _____ [403.1.6]
 - Walls ≤ 24 in. connecting offset braced walls 1 bolt in center 1/3 [403.1.6X2]
 - Wall section ≤ 12 in. connecting offset braced walls no bolt OK [403.1.6X2]
- (WSP sheathing must be continuous through the offset to allow the above exceptions)*
- Interior bearing wall sole plates on slab that are not part of BWP
OK to use other types of approved fasteners _____ [403.1.6]

SDC C Townhouses & SDC C & D 1- & 2-Family**09 IRC**

- Plate washers or anchor straps needed for full length of BWLs ____ [403.1.6.1]
- Slotted plate washers permitted if standard washer also used _____[602.11.1.]³⁰
- Interior braced wall plates on continuous foundation req bolts _____ [403.1.6.1]
- Interior bearing wall sole plates req anchor bolts _____ [403.1.6.1]
- Max anchor bolt spacing 4 ft. o.c. if > 2 stories in height _____ [403.1.6.1]

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BASEMENTS

The IRC contains extensive prescriptive requirements for ICF foundations and walls, and these are not included in this book. When using such a system, we advise consulting with the form manufacturer. The IRC provides design tables for masonry foundation walls based on soils type, height of unbalanced backfill, thickness of CMUs, and amount of reinforcement. A combined version of those tables is available at www.codecheck.com/ccb3/tables.

Foundation Walls**09 IRC**

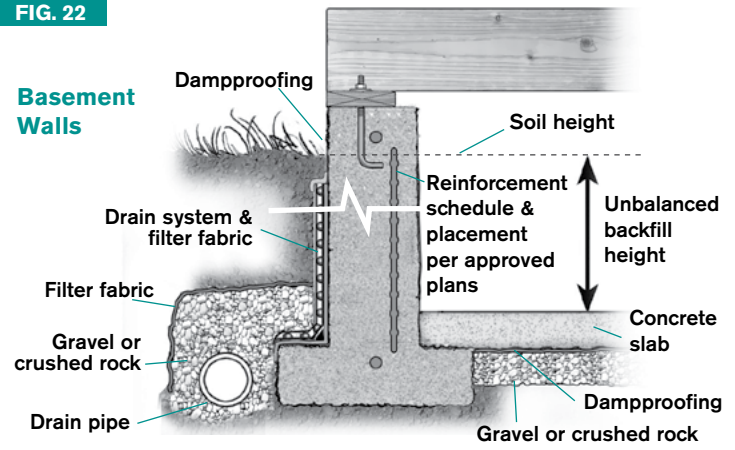
- Design with accepted engineering practice if hydrostatic pressure exists or if supporting > 48 in. unbalanced backfill without lateral support at top _____ [404.1.3]
- Min thickness \geq walls supported above EXC _____ [404.1.5]
 - 8 in. masonry walls OK to support veneered walls \leq 20 ft. _____ [404.1.5.1]
 - Concrete foundation with shelf for veneer based on reduced thickness portion of wall _____ [404.1.5.2]

SDC C & D**09 IRC**

- Plain concrete or masonry OK if complying with following: ____ [404.1.4.1&2]
 - Min wall thickness for plain concrete 7½ in., plain masonry 8 in.
 - Max height 8 ft., max unbalanced backfill 4 ft.
 - Min vertical reinforcement 4 ft. o.c. #4 bars concrete, #3 bars masonry
- Reinforced masonry per tables _____ [404.1.4.1]
- Min 2 #4 bars in upper 12 in. of reinforced masonry walls _____ [404.1.4.1]
- Reinforced concrete per tables _____ [404.1.4.2]³¹

Waterproofing & Dampproofing**09 IRC**

- If high water table exists, waterproofing req'd to finished grade _____ [406.2]
- Waterproofing membranes lapped & sealed _____ [406.2]
- Dampproofing req'd for foundations retaining earth & enclosing interior spaces & floors below grade _____ [406.1]
- Parge CMUs prior to dampproofing EXC _____ [406.1]
 - When dampproofing material approved for direct application ____ [406.1X]
- Drainage systems req'd **F22** _____ [405.1]
- Drains to extend 1 ft. past footing, 6 in. above & req filter fabric **F22**__ [405.1]

FIG. 22

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CONCRETE MASONRY UNITS (CMUs)

General

09 IRC

- 6 in. block OK only for 1 story to 9 ft. + 6 ft. of gable _____ [606.2.1]
- Min 8 in. block if > 1 story or > 9 ft. _____ [606.2.1]
- Lateral support req'd vertically &/or horizontally per **T11** _____ [606.9]
- Horizontal lateral support by cross walls, pilasters, buttresses, or structural frame, vertical lateral support by floors & roofs _____ [606.9]
- Anchor walls to floor & roof systems **F23** _____ [606.11]
- Beam supports min bearing 3 in. _____ [606.14]
- Joist support min bearing 1 1/2 in. on 3 in. nominal ledger with bolt min 4 in. embedment _____ [606.14.1]

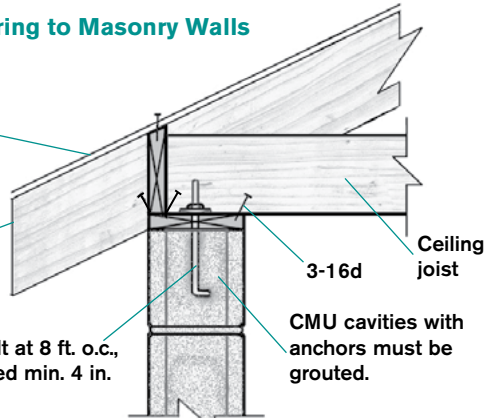
FIG. 23

Anchoring to Masonry Walls

Sheathing nailed
per **T28**

Rafter

1/2 in. bolt at 8 ft. o.c.,
embedded min. 4 in.



3-16d
CMU cavities with
anchors must be
grouted.

IRC Figure R606.11(1) also shows other anchoring methods.

Reinforcement

09 IRC

- All reinforcing bars fully embedded in mortar or grout _____ [606.13]
- 3/4 in. min reinforcement cover; 2 in. if exposed to weather or soil ____ [606.13]
- If construction stopped for ≥ 1 hr. in grouted masonry walls, all tiers stop at same elevation & grout within 1/2 in. of top _____ [609.1.2]
- Reinforcement held in position top & bottom & at 200 bar diameters [609.4.1]
- Grout poured in lifts max 8 ft. high & if total > 8 ft., special inspections req'd & grout placed in lifts ≤ 5 ft. _____ [609.4.1]

SDC C & D

09 IRC

- Min vertical reinforcement #4 bars at 48 in. o.c. _____ [606.12.2.2.3]
- Vertical reinforcement within 16 in. of end of walls _____ [606.12.2.2.3]
- SDC D max spacing vertical & horizontal reinforcement = smaller of 1/3 length, 1/3 height, or 48 in. ____ [606.12.3.2.1]

TABLE 11 MASONRY WALL LATERAL SUPPORT SPACING [606.9]

Construction	Max. Length to Thickness or Height to Thickness Ratio
Bearing walls – solid or solid grouted	20
All other bearing walls	18
Nonbearing exterior walls	18
Nonbearing interior walls	36

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CONCRETE SLABS

Concrete Slabs on Ground

09 IRC

- Min 3½ in. thick **F24** _____ [506.1]
- Excavation free of debris & roots _____ [506.2]
- Max fill 24 in. clean sand/gravel or 8 in. earth _____ [506.2.1]
- Below grade slabs req min 4 in. base course **F24** _____ [506.2.2]
- Min 6 mil poly or approved vapor retarder req'd EXC **F22,24** _____ [506.2.3]
 - Detached garages & unheated accessory structures _____ [506.2.3X1]³²
 - Unheated storage rooms ≤ 70 sq. ft. & carports _____ [506.2.3X2]
 - Driveways & other unenclosed flatwork _____ [506.2.3X3]
 - Where approved by BO based on local site conditions _____ [506.2.3X4]
- Dobbies or other support req'd to hold reinforcement in place between center & upper third of slab during concrete placement **F24** _____ [506.2.4]

UNDERFLOOR AREA (CRAWL SPACES)

General

09 IRC

- Remove all vegetation & organic material _____ [408.5]
- Wood forms must be completely stripped off foundation _____ [408.5]

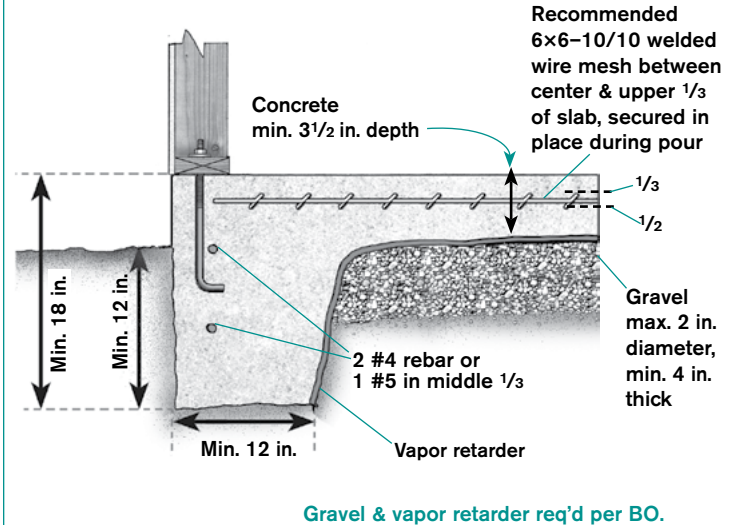
Access Openings

09 IRC

- Through-floor openings min 18 in. × 24 in. _____ [408.4]
- Perimeter wall openings min 16 in. high × 24 in. wide **F25** _____ [408.4]
- If access below grade, provide full-depth access well with min 16 in. × 24 in. footprint **F25** _____ [408.4]
- Through-wall openings not OK under a door _____ [408.4]
- Opening large enough to remove underfloor mechanical equipment _____ [408.4]

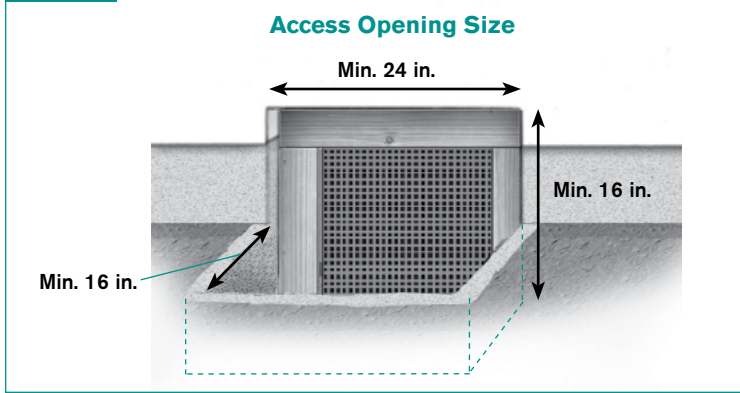
FIG. 24

Monolithic Slab with Footings (403.1)



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FIG. 25

**Ventilation****09 IRC**

- Openings min 1 sq. ft. per 150 sq. ft. of underfloor area EXC _____ [408.1]
 - Reduction to 1 sq. ft. per 1,500 sq. ft. OK with Class I vapor retarder [408.1]
- One vent opening within 3 ft. each corner _____ [408.1]
- Openings may be perforated sheet metal, expanded plates, cast-iron grill, or corrosion-resistant wire with min 1/8 in. mesh _____ [408.2]
- OK to omit ventilation openings if Class I vapor retarder on soils with 6 in. overlaps & 6 in. lapped & sealed to stem wall & one of following: [408.3]
 - Continuous exhaust 1 cfm/50 sq. ft. & perimeter insulated
 - Conditioned air supply 1 cfm/50 sq. ft. & return to common area through duct or air-transfer opening & perimeter insulated
 - When underfloor used as plenum in compliance with mechanical code

UNDERFLOOR FRAMING**General****09 IRC**

- Wood naturally durable against decay = heartwood of redwood, cedar, black locust & black walnut _____ [202]
- Wood in ground contact or embedded in concrete req's specific rating of PT for ground contact _____ [317.1.2]
- Basement furring strips PT, naturally durable, or on vapor retarder _ [317.1#7]
- Fasteners for preservative-treated wood hot-dipped zinc-coated, stainless steel, silicon bronze, or copper _____ [317.3.1]
- Connector coatings for preservative-treated wood AMI _____ [317.3.1]

Sills**09 IRC**

- Sills < 8 in. from exposed ground PT or naturally durable wood _____ [317.1]
- Sills & sleepers on slabs PT or separated by moisture barrier _____ [317.1]
- Min 2x4 nominal size _____ [404.3]

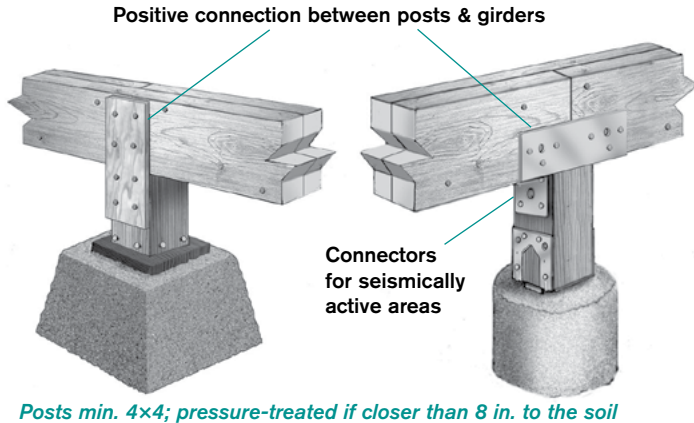
Posts & Columns**09 IRC**

- Crawl space & basement wood columns PT or naturally durable EXC_ [317.1.4]
 - Basement with pedestal ≥ 1 in. above concrete floor or 6 in. above earth that is covered with impervious moisture barrier _____ [317.1.4X1]
 - Crawl space pier ≥ 8 in. above earth & vapor retarder **F26** _____ [317.1.4X2]
- Steel columns painted or treated to protect against corrosion _____ [407.2]
- Steel columns min 3 in. diameter, wood columns min 4x4 **F26** _____ [407.3]
- Bottom of columns req restraint to prevent lateral displacement EXC_ [407.3]
 - SDC A, B & C if on pier & in area enclosed by foundation _____ [407.3X]
- Height of masonry piers max 10x their least dimension _____ [606.6]
- Masonry piers req reinforcement EXC _____ [F606.11(2&3)]
 - Unfilled piers limited to 4x least dimension allowed only in SDC A & B & top 4 in. req's fill _____ [606.6]

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FIG. 26

Post-Beam Connections



Girders

09 IRC

- Built-up girder spans per **T12, 13** _____ [502.5]
- Built-up girders req 10d nails 32 in. o.c. each layer at top & bottom & staggered & 2 nails at ends at each splice **F26** _____ [T602.3(1)]
- End bearing min 3 in. on concrete or masonry, 1½ in. on wood or metal _____ [502.6]
- Positive connection req'd between posts & girders **F26** _____ [502.9]
- Max offset one joist depth from bearing wall above **F29** _____ [502.4]
- Notching & boring per **F30, T14** _____ [502.8.1]

TABLE 12

ALLOWABLE GIRDER & HEADER SPANS IN INTERIOR BEARING WALLS [T502.5(2)]

No. of Floors Supported	Min. Size	Building Width ^A					
		20 ft.		28 ft.		36 ft.	
		Span ^B	NJ ^C	Span ^B	NJ ^C	Span ^B	NJ ^C
1	2-2x4	3-1	1	2-8	1	2-5	1
	2-2x6	4-6	1	3-11	1	3-6	1
	2-2x8	5-9	1	5-0	2	4-5	2
	2-2x10	7-0	2	6-1	2	5-5	2
	2-2x12	8-1	2	7-0	2	6-3	2
	3-2x8	7-2	1	6-3	1	5-7	2
	3-2x10	8-9	1	7-7	2	6-9	2
2	2-2x4	2-2	1	1-10	1	1-7	1
	2-2x6	3-2	2	2-9	2	2-5	2
	2-2x8	4-1	2	3-6	2	3-2	2
	2-2x10	4-11	2	4-3	2	3-10	3
	2-2x12	5-9	2	5-0	3	4-5	3
	3-2x8	5-1	2	4-5	2	3-11	2
	3-2x10	6-2	2	5-4	2	4-10	2
3-2x12	7-2	2	6-3	2	5-7	3	

A. Based on built-up #2 grade Douglas fir-larch, hem-fir, southern pine, and spruce-pine fir lumber.

Building widths are measured perpendicular to the ridge.

B. Spans are given in feet & inches (ft.-in.).

C. NJ = number of jack studs under each end. If the number is 1, the header is permitted to be supported by framing anchors attached to full-length wall studs & the header.

Click [here](#) to view the American Wood Council recommended amendments to Header and Girder Spans and the Joist and Rafter Span tables to address changes to Southern Pine design values for #2 and lower grades of 2x4 visually-graded lumber.

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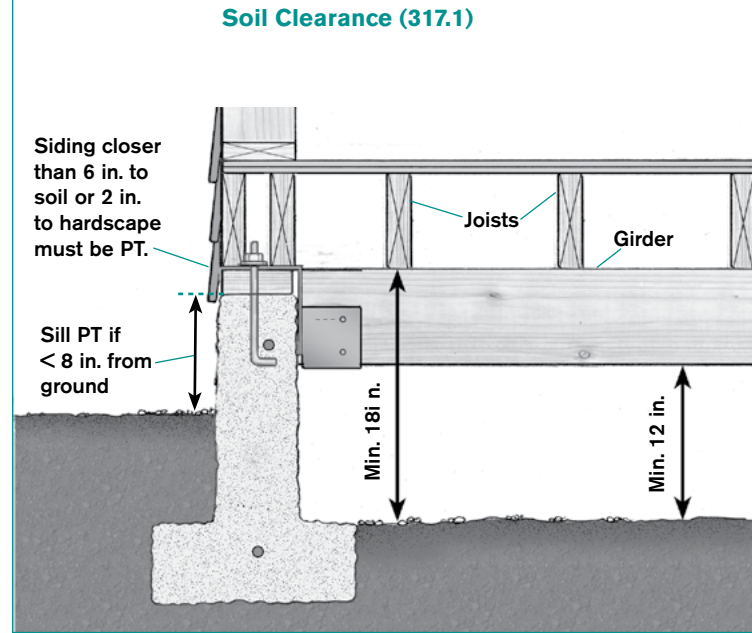
TABLE 13		ALLOWABLE GIRDER & HEADER SPANS IN EXTERIOR BEARING WALLS [T502.5(1)]					
Support	Min. Size	Building Width ^A					
		20 ft.		28 ft.		36 ft.	
		Span ^B	NJ ^C	Span ^B	NJ ^C	Span ^B	NJ ^C
Roof & Ceiling	2-2x4	3-6	1	3-2	1	2-10	1
	2-2x6	5-5	1	4-8	1	4-2	1
	2-2x8	6-10	1	5-11	2	5-4	2
	2-2x10	8-5	2	7-3	2	6-6	2
	2-2x12	9-9	2	8-5	2	7-6	2
Roof, Ceiling & 1 Center-Bearing Floor	2-2x4	3-1	1	2-9	1	2-5	1
	2-2x6	4-6	1	4-0	1	3-7	2
	2-2x8	5-9	2	5-0	2	4-6	2
	2-2x10	7-0	2	6-2	2	5-6	2
Roof, Ceiling & 1 Clear-Span Floor	2-2x12	8-1	2	7-1	2	6-5	2
	2-2x4	2-8	1	2-4	1	2-1	1
	2-2x6	3-11	1	3-5	2	3-0	2
	2-2x8	5-0	2	4-4	2	3-10	2
Roof, Ceiling & 2 Center-Bearing Floors	2-2x10	6-1	2	5-3	2	4-8	2
	2-2x12	7-1	2	6-1	3	5-5	3
	2-2x4	2-7	1	2-3	1	2-0	1
	2-2x6	3-9	2	3-3	2	2-11	2
	2-2x8	4-9	2	4-2	2	3-9	2
	2-2x10	5-9	2	5-1	2	4-7	3
	2-2x12	6-8	2	5-10	3	5-3	3

A. Based on built-up #2 grade Douglas fir-larch, hem-fir, southern pine, and spruce-pine fir lumber & a 30 lb. ground snow load. Building widths are measured perpendicular to the ridge.

B. Spans are given in feet & inches (ft.-in.).

C. NJ = number of jack studs under each end. If the number is 1, the header is permitted to be supported by framing anchors attached to full-length wall studs & the header.

FIG. 27



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Joists

- Joists & subfloor min 18 in. above earth if not PT or naturally durable _ [317.1]
- Girders min 12 in. above earth if not PT or naturally durable _____ [317.1]
- Size & span for sleeping areas & attics with stairs per **T15** _____ [502.3.1]
- Size & span for all other areas per **T16** _____ [502.3.2]
- Cantilevers see IRC T502.3.3.(1) _____ [502.3.3]
- Double joists under parallel bearing walls **F31** _____ [502.4]
- Bearing min 3 in. on concrete or masonry,
1 1/2 in. on wood or metal EXC _____ [502.6]
 - On 1x4 ribbon strip & nailed to adjacent stud (balloon frame) _____ [502.6]
 - Into side of wood girder on hangers or 2x2 ledger _____ [502.6.2]
- Min lap across girder 3 in. & min 3-10d face nails **F28** _____ [502.6.1]
- Notching & boring per **F30, T14** _____ [502.8.1]

Joist Blocking & Bridging

- Joists blocked or attached to rim joists at all ends _____ [502.7]
- Blocking min 2x material & full depth of joist _____ [502.7]
- Blocking also req'd at intermediate supports in SDC D _____ [502.7X2]
- Joists > 2x12 req bridging at max 8 ft. intervals _____ [502.7.1]

Framing at Openings

- Combustible framing min 2 in. from masonry chimneys _____ [1003.18]
- Double headers & trimmers spanning > 4 ft. _____ [502.10]
- Double trimmers for openings > 3 ft. from trimmer bearing points ____ [502.10]
- Header joists > 6 ft. must be hung with hardware _____ [502.10]
- Tail joists > 12 ft. hung with hardware or on 2x2 ledgers _____ [502.10]

09 IRC

FIG. 28

Joist Lap

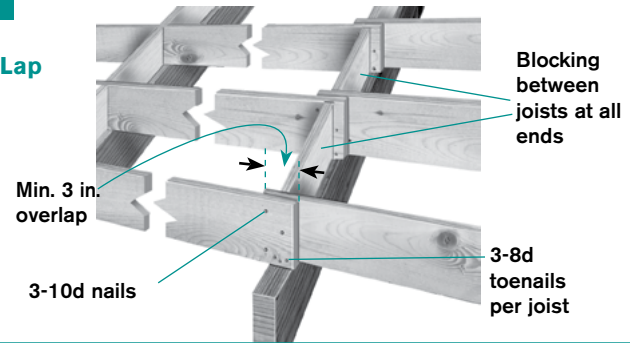
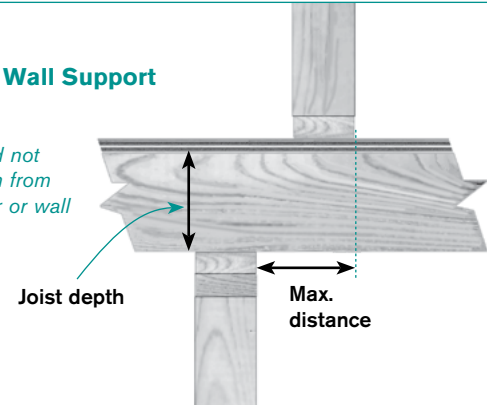


FIG. 29

Bearing Wall Support

Bearing walls should not offset > 1 joist depth from the supporting girder or wall below the floor.



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TABLE 14		NOTCHING & BORING JOISTS [502.8.1]		
Nominal ^A Dimension Joist or Girder	Max. Diameter Bored Hole	Max. Notch Length	Max. Notch Depth Outer 1/3	Max. Notch Depth End Notch
6	1 ³ / ₄ in.	1 ³ / ₄ in.	7/8 in.	1 ³ / ₈ in.
8	2 ³ / ₈ in.	2 ³ / ₈ in.	1 ³ / ₁₆ in.	1 ⁷ / ₈ in.
10	3 ¹ / ₁₆ in.	3 ¹ / ₁₆ in.	1 ¹ / ₂ in.	2 ³ / ₈ in.
12	3 ³ / ₄ in.	3 ³ / ₄ in.	1 ⁷ / ₈ in.	2 ⁷ / ₈ in.

A. Table numbers based on actual dimensions: typically 5¹/₂, 7¹/₄, 9¹/₄ & 11¹/₄

FIG. 30

Notching & Boring Joists & Girders

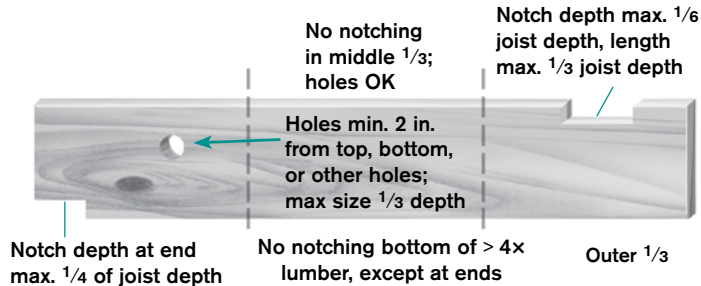


TABLE 15		JOISTS SPANS FOR 30 LB. LIVE LOAD [T502.3.1(1)]				
Size	Douglas Fir-larch #2 Spacing o.c.			Southern Pine #2 Spacing o.c.		
	12	16	24	12	16	24
2x6	11-10	10-9	9-1	11-10	10-9	9-4
2x8	15-7	14-1	11-6	15-7	14-2	12-4
2x10	19-10	17-2	14-1	19-10	18-0	14-8
2x12	23-0	19-11	16-3	24-2	21-1	17-2

Measurements given in feet & inches (ft.-in.).
Dead load = 10 psf

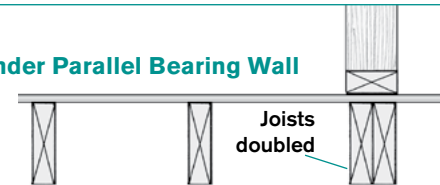
TABLE 16 JOISTS SPANS FOR 40 LB. LIVE LOAD [T502.3.1(2)]

Size	Douglas Fir-Larch #2 Spacing o.c.			Southern Pine #2 Spacing o.c.		
	12	16	24	12	16	24
2x6	10-9	9-9	8-1	10-9	9-9	8-6
2x8	14-2	12-7	10-3	14-2	12-10	11-0
2x10	17-9	15-5	12-7	18-0	16-1	13-1
2x12	20-7	17-10	14-7	21-9	18-10	15-5

Measurements given in feet & inches (ft.-in.).
Dead load = 10 psf

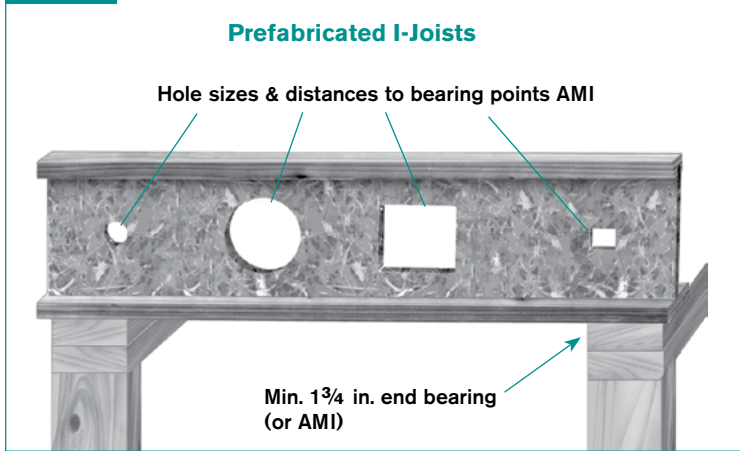
FIG. 31

Double Joists under Parallel Bearing Wall



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FIG. 32



Manufactured Lumber & Floor Trusses

09 IRC

- Cuts, notches & holes only where specified by manufacturer or registered design professional **F32,34** _____ [502.8.2]
- Point loads & other installation details AMI **F34** _____ [502.7.1X]
- Blocking, bridging & other lateral support AMI _____ [502.7.1X]
- Truss drawings to include bracing requirements _____ [502.11.2]
- No truss alterations without approval of registered design professional _____ [502.11.3]

CRIPPLE WALLS

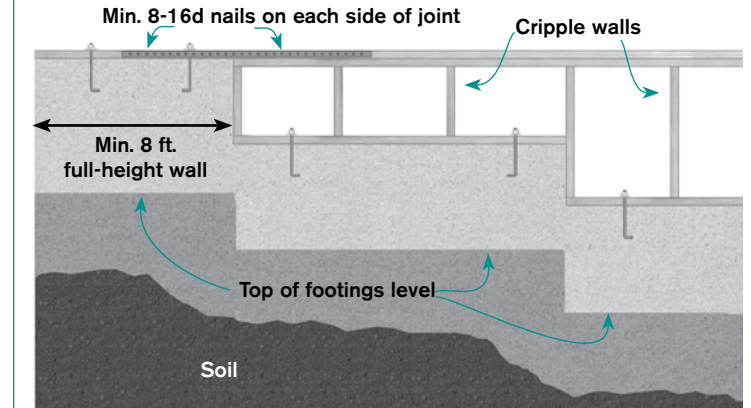
Cripple Walls

09 IRC

- No smaller than size of studding above cripple wall _____ [602.9]
- If < 14 in. high, solid WSP sheathing or solid blocking req'd _____ [602.9]
- If > 4 ft. high, size as if additional story _____ [602.9]
- SDC A–D, bracing length 1.15× req'd length of wall above **T21** _____ [602.10.9]
- Max spacing between BWP's 18 ft. _____ [602.10.9]
- SDC D if interior BWL not over continuous foundation, parallel exterior BWL lengths must be increased 1.5× req'd length of **T21,22** _____ [602.10.9.1]
- Can be redesignated as 1st story for bracing purposes _____ [602.10.9.2]

FIG. 33

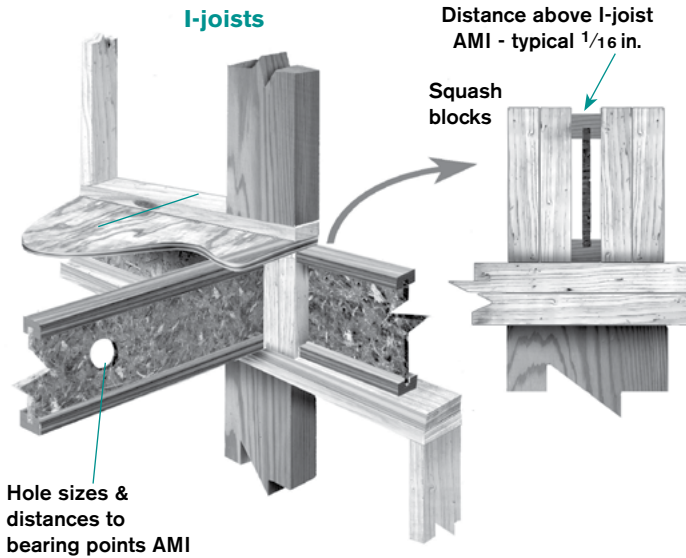
Stepped Foundation in SDC D



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FIG. 34

Manufactured I-joists



WOOD STRUCTURAL PANELS

WSP Sheathing

09 IRC

- WSP sheathing used for structural purposes req's grade stamp from approved agency **F35** _____ [503.2.1 & 803.2.1]
- Allowable spans & loads per **T17** _____ [503.2.2 & 803.2.2]
- Install in accordance with **T28** _____ [503.2.3 & 803.2.3]

FIG. 35

Wood Structural Panel Grade Mark

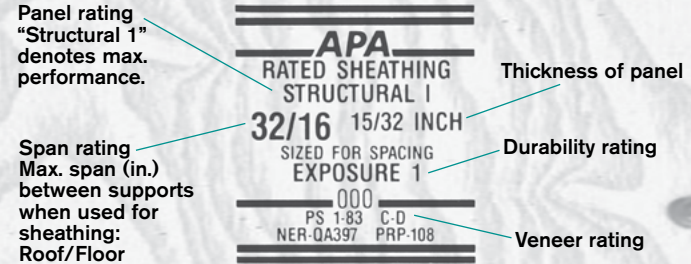


TABLE 17

WOOD STRUCTURAL PANEL SUBFLOOR & ROOF SHEATHING SPANS & LOADS^{A,B} [T503.2.1.1(1)]

Span Rating	Thick-ness (in.)	Allowable Live Load (psf)		Max. Subfloor Span	Max. Span (Roof)		Roof Live Load
		16 in.	24 in.		Edge Support	No Edge Support	
16/0	$\frac{3}{8}$	30	–	0	16	16	30
20/0	$\frac{3}{8}$	50	–	0	20	20	30
24/0	$\frac{3}{8}$	100	30	0	24	20	30
24/16	$\frac{7}{16}$	100	40	16	24	24	40
32/16	$\frac{15}{32}, \frac{1}{2}$	180	70	16	32	28	30
40/20	$\frac{19}{32}, \frac{5}{8}$	305	130	20	40	32	30
48/24	$\frac{23}{32}, \frac{3}{4}$	–	175	24	48	36	35
60/32	$\frac{7}{8}$	–	305	32	60	48	35

A. Based on 10 psf dead load; if more than 10 psf, then the live load should be reduced accordingly.

B. Panels continuous over min. 2 spans with strength axis perpendicular to supports.

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WALL FRAMING

The building frame must be capable of supporting the dead loads—the weight of the building and its fixed equipment—and the live loads—the weight of its occupants and furnishings. In addition, the frame must be capable of transmitting lateral loads (from wind or earthquakes) through the vertical support elements to the foundation.

Stud Walls

09 IRC

- Stud size & spacing per **T18** EXC _____ [602.3.1]
 - > 10 ft. stud height OK within limits of T602.3.1 _____ [602.3.1X2]
- Story height max 10 ft. plus height of floor frame ≤ 16 in. EXC _____ [301.3]
 - 12 ft. + floor frame height OK per story if bracing increased by 1.10 for wind **T21** or 1.20 for seismic **T22** _____ [301.3X1]
- End-jointed lumber OK if identified by grade mark _____ [602.1.1]
- Studs req full bearing on plate at least equal to stud width _____ [602.3.4]
- Studs continuous from sole plate to top plate EXC _____ [602.3]
 - Jack studs, trimmer studs & cripple studs _____ [602.3X]

Notching & Boring

09 IRC

- Notch depth 25% max in bearing wall, 40% in nonbearing wall **F36** _____ [602.6]
- Bored holes min 5/8 in. from face of stud _____ [602.6]
- Boring 40% max in bearing wall, 60% nonbearing EXC **F36** _____ [602.6]
 - 2 successive doubled bearing studs 60% OK **F36** _____ [602.6]

Corners

09 IRC

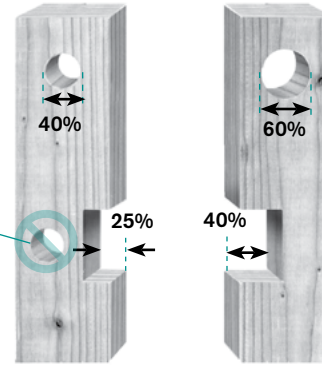
- 3 studs at corners **F37** EXC _____ [F602.3(2)]
 - 2 studs OK with devices as backing to secure face materials _____ [F602.3(2)]
- Lap plates at corners _____ [602.3.2]

FIG. 36

Notching & Boring Studs

No holes in notched area

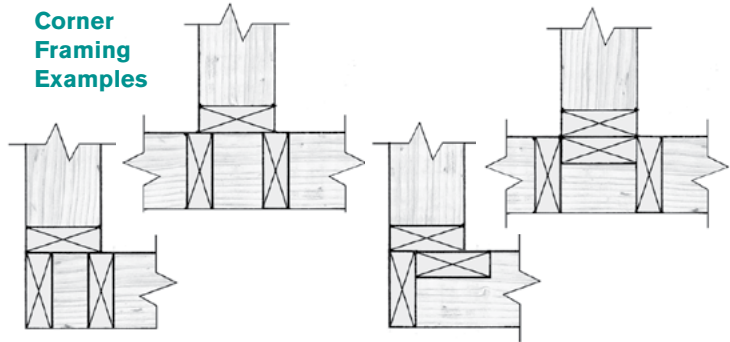
Bearing



A 60% hole is OK on bearing walls if the studs are doubled & the holes do not pass through > 2 parallel studs.

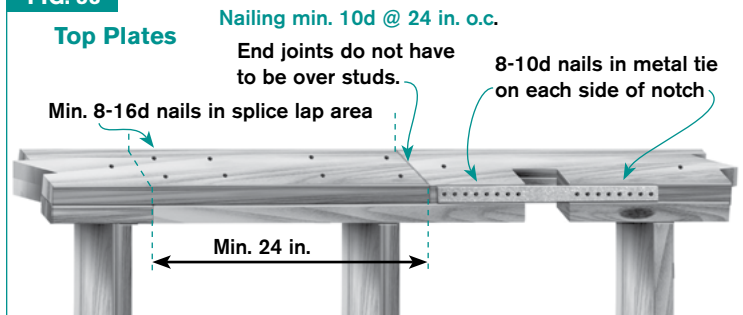
FIG. 37

Corner Framing Examples



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FIG. 38

**Top Plates & Headers****09 IRC**

- Double top plates req'd EXC _____ [602.3.2]
 - Single plate OK with metal tie at joints & joists or rafters centered over studs with max. tolerance of 1 in. _____ [602.3.2X]
- Plates at least same width as studs _____ [602.3.2]
- End joints offset min 24 in., need not occur over studs **F38** _____ [602.3.2]
- Nailing 10d max 24 in. o.c. **F38, T28** _____ [602.3.2]
- Min. 8 16d nails in lapped area of end joints **F38, T28** _____ [602.3.2]
- Min 1/2 in. strap 6 in. past cuts or holes > 50% of top plate width **F38** EXC _____ [602.6.1]
 - Not req'd if entire side of wall with notch/hole covered with WSP [602.6.1X]
- Strap secured with min 8-10d nails each side of notch/hole **F38** _ [602.6.1]³³
- Nonbearing walls do not req headers at openings _____ [602.7.2]
- Built-up headers at bearing walls see **T12,13** _____ [602.7]

TABLE 18 STUD SIZE, HEIGHT, NOTCHING & BORING [602.3(5)]**Bearing Wall Studs ≤ 10 ft. High Between Supports Perpendicular to Wall^A**

	2x4	3x4	2x6
Supporting roof + ceiling	24 in. o.c.	24 in. o.c.	24 in. o.c.
Supporting 1 floor + roof + ceiling	16 in. o.c.	24 in. o.c.	24 in. o.c.
Supporting 2 floors + roof + ceiling	n/a	16 in. o.c.	16 in. o.c.
Max. notch depth	7/8 in.	7/8 in.	1 ³ / ₈ in.
Max. diameter bored hole	1 ³ / ₈ in.	1 ³ / ₈ in.	2 ³ / ₁₆ in.
Max. diameter bored hole doubled studs	2 in.	2 in.	3 ¹ / ₄ in.

Nonbearing Walls

Max. laterally unsupported stud height	2x3 ^B	2x4	3x4	2x6
	10 ft.	14 ft.	14 ft.	20 ft.
Max. notch depth	1 in.	1 ³ / ₈ in.	1 ³ / ₈ in.	2 ³ / ₁₆ in.
Max. diameter bored hole	1 1/2 in.	2 in.	2 in.	3 1/4 in.

A. See Table 602.3.1 for stud walls > 10 ft. in height.

B. 2x3s max. 16 in. o.c. & not in exterior walls, other sizes max. 24 in. o.c.

WALLS OTHER THAN WOOD FRAME

The IRC contains extensive prescriptive requirements and tables for cold-formed steel framing. These are based on *AISI S230, Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings*, 2007 edition. In the latest edition and the IRC, the scope was expanded to include 3-story dwellings.

The IRC also has extensive sections on ICF (Insulating Concrete Form) foundation and wall structures. These methods should not be considered as an alternative to conventional foundations; they should be integrated into an overall “green” building design. Another new method—Structural Insulated Panel Wall Construction—was added to the 2009 IRC. Through the prescriptive inclusion of this method the project drawings are not required to bear the stamp of a design professional unless required by state law (as in California) or by the local jurisdiction. The U.S. Department of Housing & Urban Development has a *free downloadable design guide* for this method.

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WALL BRACING

Wall bracing resists the forces imposed by winds and earthquakes. The type and amount of bracing must be adequate to resist whatever is the stronger of those two forces at the building site. The horizontal elements such as floors, ceilings, and roofs collect lateral forces and must be properly connected to the walls to transmit those forces to the braced elements. When the prescriptive limits are not adequate, designs per the IBC or the reference documents at the beginning of this book should be used.

Bracing: General

- Comply with prescriptive IRC bracing or IBC or documents _____ [602.10] 09 IRC
- Referenced in 301 (listed in introduction of this book) _____ [602.10]
- Bracing length greater of req'd amount for seismic or wind EXC [602.10.1.2]
 - 1- & 2-family in SDC C req's bracing only for wind _____ [602.10X]³⁴

Braced Wall Lines (BWLs)

- BWL distance measured to perpendicular BWL or exterior walls or projection of same EXC _____ [602.10.1] 09 IRC
 - Angled corners with diagonal ≤ 8 ft. included in BWL per **F39** [602.10.1.3]³⁵

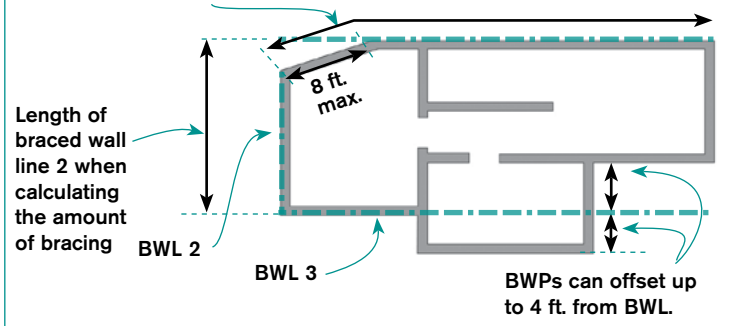
Braced Wall Panel (BWP) Locations

- BWPs may offset ≤ 4 ft. from braced wall line **F39** _____ [602.10.1.4]³⁶ 09 IRC
- BWP max 25 ft. o.c., max 12.5 ft. total from ends of BWL **F40** [602.10.1.4]³⁷
- SDC D BWP must start at corners EXC _____ [602.10.1.4.1]³⁸
 - Start 8 ft. from corner OK if 2 ft. wide WSPs attached each side of corner **F40** _____ [602.10.1.4.1X1]
 - WSP at 8 ft. begins with min 1,800 lb. hold-down **F40** _____ [602.10.1.4.1X2]
- Min. total length of bracing 48 in. in any BWL _____ [602.10.1.2]
- Length where wind is determining factor based upon spacing _____ [602.10.1.2]³⁹
- SDC D spacing between BWLs max 25 ft. EXC _____ [602.10.1.5]⁴⁰
 - 35 ft. allowed to accommodate 1 room ≤ 900 sq. ft. _____ [602.10.1.5X]
 - 35 ft. allowed with increased bracing & fastening _____ [602.10.1.5X]

FIG. 39

Braced Wall Lines

BWL 1: Use this length when calculating amount of bracing.



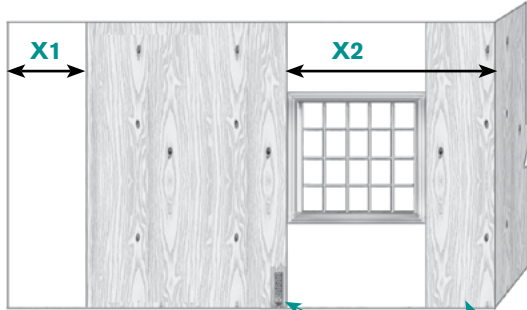
Bracing Methods

- Acceptable methods include intermittent bracing methods **T19** & continuous sheathing (CS) methods _____ [602.10.1.1]⁴¹ 09 IRC
- Mixed bracing methods allowed story to story _____ [602.10.1.1]⁴²
- Mixed bracing methods OK in different BWL of same story _____ [602.10.1.1]⁴²
- Mixed bracing methods in same BWL only in SDC A, B & C _____ [602.10.1.1]⁴²
- Methods DWB, WSP, SFB, PBS & PCP req GB on interior side of wall unless bracing length multiplied by factor of 1.5 EXC **T19** _____ [602.10.2.1X3]⁴³
 - Approved interior finish with shear capacity = to GB _____ [602.10.2.1X2]
- SDC C & D adhesive not OK to fasten GB _____ [602.10.2.2]

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FIG. 40

Braced Wall Panel Distances from Corners

SDC A, B & C: $X1 + X2$ max. 12.5 ft.

SDC D: $X2$ allowed to be 8 ft. if max.
1,800 lb. hold-down at start of WSP bracing
or 2 ft. bracing each side of corner.

Panel does not
count toward req'd
amount of bracing
at wall line.

TABLE 19

INTERMITTENT BRACING METHODS [T602.10.2]

Abbreviation	Bracing Method
ABW	Alternate braced wall
DWB	Diagonal wood boards
GB	Gypsum board
HPS	Hardboard panel siding
LIB	Let-in bracing ^A
PBS	Particleboard sheathing
PCP	Portland cement plaster
PFG	Portal frame at garage
PFH	Portal frame with hold-downs
SFB	Structural fiberboard sheathing
WSP	Wood structural panels

A. Let-in bracing has few allowable applications & is not recommended.

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FIG. 41

Portal Frame with Hold-Downs



Inside Wall

The construction methods for Alternate Braced Walls (ABW) and Portal Frames with Hold-Downs (PFH) are specified in the IRC.

Manufactured assemblies meeting the same load values can be used under the provision for alternate materials, design & methods. Follow all installation instructions when using these wall assemblies.



Outside Wall

Portal Frame with Hold-Downs (PFHs) F41

09 IRC

- May substitute for 4 ft. sections of bracing req'd by **T21,22** ____ [602.10.3.3]
- Use only below full-length headers _____ [602.10.3.3]
- $\frac{5}{8}$ in. anchor bolt & 2 embedded-type hold-down straps req'd _ [602.10.3.3]
- Min 16 in. wide for single story, 24 in. 1st story of 2-story _____ [602.10.3.3]

Braced Wall Panel (BWP) Lengths

09 IRC

- Min length each BWP 48 in. (96 in. for GB) EXC _____ [602.10.3]
 - ABW can replace 4 ft. bracing lengths of other methods ____ [602.10.3X2]
 - Each PFH replaces 4 ft. lengths next to openings with headers [602.10.3X3]
 - PFG either side of garage door opening in SDC A, B & C __ [602.10.3X3]⁴⁴
 - SDC A, B & C BWPs between 36 in. & 48 in. methods DWB, WSP, SFB, PBS, PCP & HPS can count if adjusted per **T20** ____ [602.10.3X4]⁴⁵
- None of above reductions allowed if wall has masonry veneer in SDC D **T25** _____ [T602.10.1.2(3) & 602.12]⁴⁶
- Min bracing length per wind tables **T21** _____ [T602.10.1.2(1)]⁴⁷
- Min bracing length per seismic tables **T22** _____ [T602.10.1.2(2)]⁴⁸

TABLE 20 BWPs < 48 IN. WIDE IN SDC A, B & C [T602.10.3]

Actual Length (in.)	Assigned Value ^A (in.)		
	8 ft. wall height	9 ft. wall height	10 ft. wall height
48	48	48	48
42	36	36	n/a
36	27	n/a	n/a

A. Interpolation of table values is allowed.

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Alternate Braced Wall Panels (ABWs)

09 IRC

- May substitute for 4 ft. sections of bracing req'd by **T21,22** ____ [602.10.3.2]
- Max height, min length & hold-down force per T602.10.3.2 ____ [602.10.3.2]

Portal Frame at Garage Door Openings in SDC A, B & C

09 IRC

- Allowed only in single story or supporting one story + roof ____ [602.10.3.4]
- Counts as 1.5× its width for bracing for **T21** ____ [602.10.3.4]
- Constructed with following provisions: ____ [602.10.3.4]
 - Min width 24 in., max height 10 ft.
 - Min 7/16 in. sheathing extends over solid or glulam garage header
 - Sheathing nailed with 8d @ 3 in. o.c.
 - Min 1,000 lb. strap header to inner studs on opposite side from sheathing
 - BWP directly on foundation with min of two ½ in. bolts with plate washers
 - If panel on only one side of header, jack stud on other side req's 1,000 lb. straps to header & foundation

TABLE 21		BRACING BASED ON WIND SPEED ^A [T602.10.1.2(1)]			
Story Location	Min. Total Length of BWP at each BWL (ft.)				
	BWL Spacing (ft.)	Method GB (double-sided)	Methods DWB, WSP, SFB, PCP & HPS	Continuous Sheathing	
	10	3.5	2.0	1.5	
	20	6.0	3.5	3.0	
	30	8.5	5.0	4.5	
	40	11.5	6.5	5.5	
	50	14.0	8.0	7.0	
	60	16.5	9.5	8.0	
	10	6.5	3.5	3.0	
	20	11.5	6.5	5.5	
	30	16.5	9.5	8.0	
	40	21.5	12.5	10.5	
	50	26.5	15.0	13.0	
	60	31.5	18.0	15.5	
	10	9.0	5.5	4.5	
	20	17.0	10.0	8.5	
	30	24.5	14.0	12.0	
	40	32.0	18.0	15.5	
	50	39.0	22.5	19.0	
	60	46.5	26.5	22.5	

A. Table based on wind speed ≤ 85 mph, exposure category B, 30 ft. mean roof height, 10 ft. eave-to-ridge height, 10 ft. wall height & 2 BWLs; see full code tables for situations beyond these limits.

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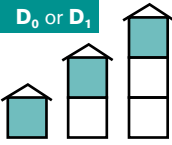


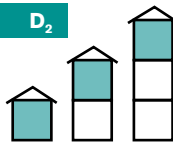
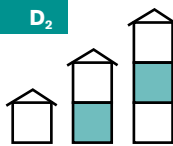
TABLE 22 SDC & Story Location	BRACING BASED ON SEISMIC DESIGN CATEGORY ^A [T602.10.1.2(2)]			
	Min. Total Length of BWP at each BWL (ft.)			
	BWL length (ft.)	Method GB (double- sided)	Methods DWB, WSP, SFB, PCP & HPS	Continuous Sheathing
 D₀ or D₁	10	3.0	2.0	1.7
	20	6.0	4.0	3.4
	30	9.0	6.0	5.1
	40	12.0	8.0	6.8
	50	15.0	10.0	8.5
 D₀ or D₁	10	6.0	4.5	3.8
	20	12.0	9.0	7.7
	30	18.0	13.5	11.5
	40	24.0	18.0	15.3
	50	30.0	22.5	19.1
 D₀ or D₁	10	8.5	6.0	5.1
	20	17.0	12.0	10.2
	30	25.5	18.0	15.3
	40	34.0	24.0	20.4
	50	42.5	30.0	25.5

TABLE 22 (Cont.) SDC & Story Location	BRACING BASED ON SEISMIC DESIGN CATEGORY ^A [T602.10.1.2(2)]			
	Min. Total Length of BWP at each BWL (ft.)			
	BWL length (ft.)	Method GB (double- sided)	Methods DWB, WSP, SFB, PCP & HPS	Continuous Sheathing
 D₂	10	4.0	2.5	2.1
	20	8.0	5.0	4.3
	30	12.0	7.5	6.4
	40	16.0	10.0	8.5
	50	20.0	12.5	10.6
 D₂	10	7.5	5.5	4.7
	20	15.0	11.0	9.4
	30	22.5	16.5	14.0
	40	30.0	22.0	18.7
	50	37.5	27.5	23.4

A. Table based on 10 ft. wall height, 10 psf floor dead load, 15 psf roof/ceiling dead load & BWL spacing ≤ 25 ft.

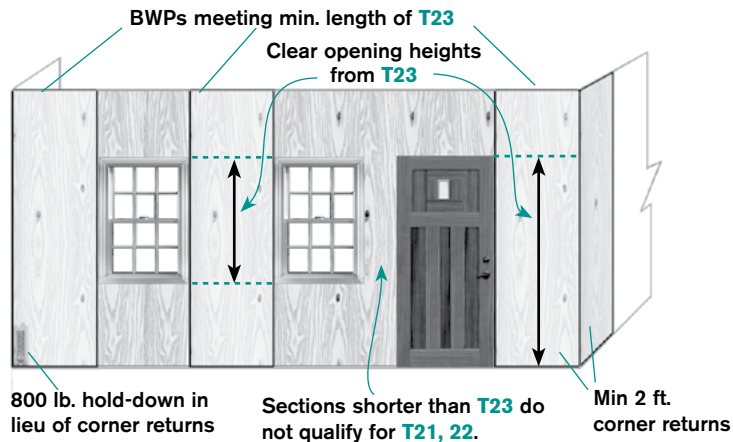
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Continuous Sheathing (CS)**09 IRC**

- All BWLs on exterior walls on same story CS EXC _____ [602.10.4.4]⁴⁹
 - SDC A, B & C with basic wind speed < 100mph OK to use other methods on other BWLs on same story _____ [602.10.4X1]⁴⁹
- CS req's WSP on all sheathable surfaces of BWL, including those above & below openings & gable end walls _____ [602.10.4.1]
- CS methods: _____ [T602.10.4.1]⁵⁰
 - CS-WSP: min $\frac{3}{8}$ in. WSP, nailing 6d, 6 in. o.c. edges, 12 in. o.c. field
 - CS-G: same as CS-WSP & adjacent to garage & supporting roof only
 - CS-PF: max 4 panels in BWL, header lengths max 22 ft.
- CS length based on adjacent clear opening height **F42, T23** _____ [602.10.4.2]

Continuous Sheathing (CS) (cont.)**09 IRC**

- CS panels max 25 ft. o.c. & BWL ends min 2 ft. return EXC _____ [602.10.4.4]⁵¹
 - 800 lb. hold-down at end OK in lieu of 2 ft. return **F42** _____ [602.10.4.4]
 - 1st BWP 12.5 ft. from end in SDC A, B & C or 8 ft. in SDC D & full-height 2 ft. BWP at both sides of corners or 800 lb. hold-down at BWP closest to each side of corner _____ [602.10.4.4X]

FIG. 42 Braced Wall Panels with Continuous Sheathing**TABLE 23****LENGTH REQUIREMENTS FOR CONTINUOUS SHEATHING BWPs^A [T602.10.4.2]**

Method	Adjacent Clear Opening Height (in.)	8 ft. Wall Height	9 ft. Wall Height	10 ft. Wall Height
CS-WSP	64	24	27	30
	68	26	27	30
	72	28	27	30
	76	29	30	30
	80	31	33	30
	84	35	36	33
	88	39	39	36
	92	44	42	39
	96	48	45	42
	100	–	48	45
	104	–	51	48
	108	–	54	51
	112	–	–	54
	116	–	–	57
	120	–	–	60
CS-G	≤ 120	24	27	30
CS-PF	≤ 120	16	18	20

A. Interpolation of table values allowed.

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Panel Joints in Braced Wall Panels (BWPs)

09 IRC

- Vertical joints fastened on common studs, horizontal joints fastened on common blocking min 1 1/2 in. thick EXC _____ [602.10.8]
 - Blocking on horizontal joints not req'd if BWP length doubled_ [602.10.8X2]
 - Method GB installed horizontally does not req blocking _____ [602.10.8X3]

BALCONIES & DECKS

Balconies

09 IRC

- Landings, balconies & decks positively anchored or self-supporting [311.5.1]
- Attachment not with toenails or means subject to withdrawal _____ [311.5.1]
- Where positive connection not verifiable during construction, decks must be self-supporting _____ [502.2.2]
- Deck ledger attachment with min 1/2 in. lag screws or bolts **T24** [502.2.2.1]⁵²
- Lag screws & bolts hot-dipped galvanized or stainless steel _____ [502.2.2.1]
- Lag screws & bolts req washers **F43** _____ [502.2.2.1]
- Lag screws & bolts 2 in. from top & bottom, staggered _____ [502.2.2.1.1]
- Alternative connections to accepted engineering practice: girders not on ledgers & ledgers not supported on masonry veneer _____ [502.2.2.2]
- Lateral connection can be done with horizontal hold-downs _____ [502.2.2.3]⁵³

Click [here](#) to view the American Wood Council Deck Construction Guide

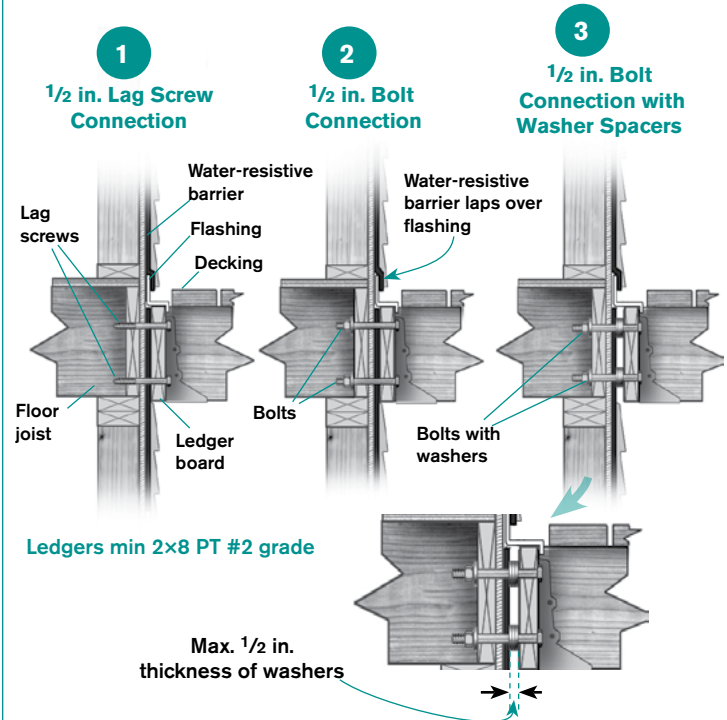
TABLE 24 DECK LEDGER ATTACHMENT & DETAILS [T502.2.2.1]

Joist Span (ft.)	≤ 6	≤ 8	≤ 10	≤ 12	≤ 14	≤ 16	≤ 18
Connection Details	On-center Fastener Spacing (in.)						
1/2 in. lag screw F43 - 1	30	23	18	15	13	11	10
1/2 in. bolt F43 - 2	36	36	34	29	24	21	19
1/2 in. bolt with spacer washers F43 - 3	36	36	29	24	21	18	16

Note: Designs based on max. 15/32 in. sheathing, southern pine or hemlock fir ledger, and 2 in. nominal band joist. Min. 1×9½ laminated veneer lumber can substitute for band joist.

FIG. 43

Deck Ledger



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MASONRY VENEER**Bracing in SDC C****09 IRC**

- 1st of 2 stories & 1st or 2nd of 3 stories, multiply **T21** BWP by 1.5 [T602.12.1]⁵⁴

Bracing in SDC D**09 IRC**

- Cripple walls not allowed _____ [602.12]
- Bracing amount per **T25** for both interior & exterior walls _____ [602.12.1.1]⁵⁵
- BWP must begin within 8 ft. of end of BWL _____ [602.12.1.2]
- Max spacing of BWPs 25 ft. o.c. _____ [602.12.1.2]
- BWP min $\frac{7}{16}$ in. with nailing max 4 in. o.c. edges, 12 in. o.c. field [602.12.1.3]
- Hold-downs req'd per **T25** _____ [602.12.1.3]

Masonry Veneer Height & Support**09 IRC**

- SDC A, B & C max thickness 5 in., max height 30 ft. + 8 ft. gable [T703.7(1)]
- SDC D₀ & D₁ max thickness 4 in., max height 20 ft. + 8 ft. gable [T703.7(2)]
- SDC D₂ max thickness 3 in., max height 20 ft. + 8 ft. gable _____ [T703.7(2)]
- Not OK to support additional loads on masonry veneer _____ [703.7.3]
- Steel angle support min 4 in. deep x 6 in. vertical x $\frac{5}{16}$ in. thick [703.7.2.1]
- Framing behind steel angle support min doubled 2x4s 16 in. o.c. [703.7.2.1]
- Steel lintels min 4 in. bearing & protected with shop coat primer [703.7.3]⁵⁶
- Steel angles or lintels max deflection L/600 _____ [703.7.2]

TABLE 25**SDC D MASONRY VENEER WALL BRACING****[T602.12(2)]**

SDC	No. of Stories	Story	Min. Length of BWPs ^A	Hold-Down Force ^B
D ₀	1	1	35	n/a
	2	Top	35	1900
	2	Bottom	45	3200
	3	Top	40	1900
	3	Middle	45	3500
	3	Bottom	60	3500
D ₁	1	1	45	2100
	2	Top	45	2100
	2	Bottom	45	3700
	3	Top	45	2100
	3	Middle	45	3700
	3	Bottom	60	3700
D ₂	1	1	55	2300
	2	Top	55	2300
	2	Bottom	55	3900

A. Length = percentage of total BWL.

B. Hold-down force in middle & bottom story is cumulative when BWPs align with those in story above.

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Masonry Veneer Attachment & Flashing **F44** **09 IRC**

- Ties min 1½ in. embedded in veneer mortar, min 5/8 in. from face _____ [703.7.4]
- Min 1 in. air space req'd behind veneer _____ [703.7.4.2]
- Max 1 in. air space for ties, max 4½ in. for metal strand tie wires _____ [703.7.4]
- Ties max 24 in. o.c. vertical & horizontal _____ [703.7.4.1]
- Max supported wall area of each tie 2.67 sq. ft. EXC _____ [703.7.4.1]
 - SDC D each tie max 2 sq. ft. supported wall area _____ [703.7.4.1X]
- Flashing req'd beneath first course above ground _____ [703.7.5]
- Flashing req'd at all other points of support such as lintels _____ [703.7.5]
- Weepholes req'd immediately above flashing at max 33 in. o.c. _____ [703.7.6]
- Weepholes min 3/16 in. diameter _____ [703.7.6]
- Adhered masonry AMI _____ [703.12]

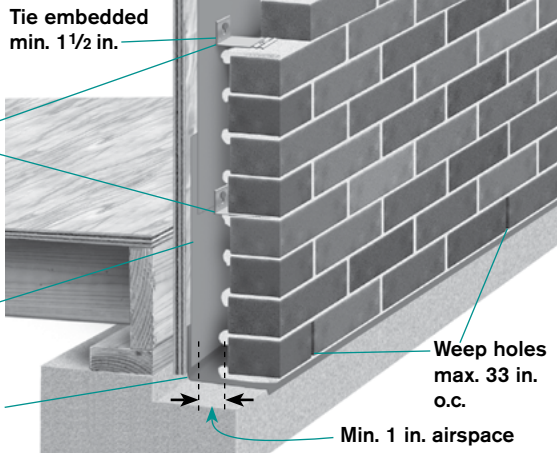
FIG. 44

Masonry Veneer

Metal ties
max. 24 in.
vertical,
max. 24 in.
horizontal

Water-resistant
barrier

Flashing
sloped to drain



EXTERIOR WALL COVERS

General

09 IRC

- Exterior sheathing must be dry before installing exterior cover _____ [701.2]
- Wall coverings must resist wind loads _____ [703.1.2]⁵⁷
- All fasteners corrosion-resistant _____ [703.4]
- Exterior wall construction must prevent water accumulation in wall _ [703.1.1]
- WRB req'd behind all exterior veneers EXC _____ [703.1.1]
 - Concrete or masonry walls with proper flashing _____ [703.1.1X]
- WRB min No. 15 asphalt felt complying with ASTM D 226 _____ [703.2]
- WRB req'd over studs or sheathing at all exterior walls _____ [703.2]
- Install WRB shingle fashion min 2 in. horizontal lap, 6 in. at vertical joints _____ [703.2]

Flashings

09 IRC

- Install shingle fashion to prevent moisture entry into wall cavities or to structural framing components _____ [703.8]
- Flashings must extend to exterior _____ [703.8]
- Self-adhered flashing must comply with AAMA 711 (Note: caulking used with assembly must be compatible with self-adhered flashing) _____ [703.8]
- Req'd locations of flashing: _____ [703.8]
 - Exterior door & window openings **F47**
 - Intersections of chimneys with frame or stucco walls
 - Under & at ends of masonry, wood, or metal copings & sills
 - Continuously above all projecting wood trim
 - Where porches, decks, or stairs attach to a wood-framed wall or floor **F43**
 - At wall & roof intersections **F56**
 - At built-in gutters

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Exterior Insulation Finish Systems (EIFS)

09 IRC

- Barrier EIFS systems to comply with ASTM E 2568 _____ [703.9.1]⁵⁸
- EIFS with drainage also to comply with ASTM E 2568 _____ [703.9.2]⁵⁸
- Drainage-type EIFS req's WRB between EIFS & sheathing _____ [703.9.2.2]
- Drainage-type EIFS end min 6 in. above finished ground level _____ [703.9.4.1]
- Decorative trim not OK to face-nail through EIFS _____ [703.9.4.2]

Stucco

09 IRC

- Must comply with ASTM C 926 & ASTM C 1063 **T27** _____ [703.6]
- Lath fastener spacing max 6 in. _____ [703.6.1]
- Min 3-coat system over metal or wire lath, 2-coat over masonry _____ [703.6.2]
- Proportions per **T26** _____ [T702.1 (3)]⁵⁹
- Intervals between coats **T26** _____ [703.6.5]⁶⁰
- Maintain moist min 48 hr. before subsequent coats _____ [703.6.4]

The IRC typically references only specific sections of other standards, such that the entire standard does not apply. That is not the case with ASTM C 926 & C 1063—those standards apply in their entirety. All of the items in T27 are mandatory.

TABLE 26

3-COAT STUCCO (VERTICAL SURFACES) [703.6]

Coat	Thickness	Lime-to-Cement Volume Ratio	Sand-to-Cement Volume Ratio ^A	Interval before Next Coat ^B
Scratch	3/8 in.	3/4 to 1 1/2 ^C	2 1/2 to 4	Min. 7 days
Brown	3/8 in.	3/4 to 1 1/2 ^C	3 to 5 ^D	Min. 48 hrs.
Finish	1/8 in.	3/4 to 2	1 1/2 to 3	Min. 7 days

A. Ratio of sand to combined volume of cement & lime.

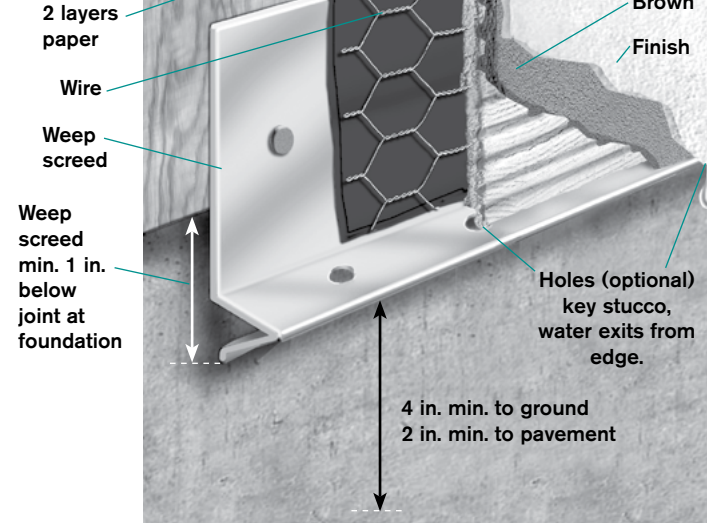
B. ASTM C 926 allows lesser curing times depending on climate.

C. Max. 3/4 unless over absorbent surface (scratch of 2-coat system over CMU).

D. Same or greater proportion of sand in 2nd coat as used in 1st coat.

FIG. 45

Weep Screenshot



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FIG. 46

Stucco Soffit

Casing bead of vertical surface min. 1/4 in. below bead on horizontal surface so as to form drip edge

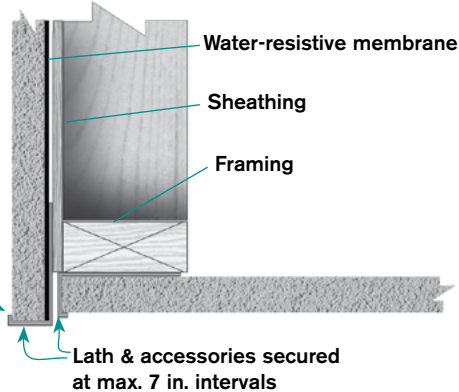


TABLE 27

SELECTED ASTM C 926 & ASTM C 1063 REQUIREMENTS

C 926	Summary of Requirement
7.1.5	Install each coat without interruption or cold joints.
8.1	Continuously hydrate between coats.
8.1	Time between coats depends on climatic & job conditions.
12.3.2	Apply when ambient temperature > 40°F.
A2.2.3	Vertical-to-horizontal intersections req casing beads both surfaces, with vertical 1/4 in. below horizontal to provide drip edge. Horizontal casing bead held back min. 1/4 in. F46 .
A2.3.1.2	Control joints to be included in plans & specifications.

(table continues in next column)

TABLE 27

SELECTED ASTM C 926 & ASTM C 1063 REQUIREMENTS (CONT.)

C 1063	Summary of Requirement
7.10.1.4	Lath stopped & tied each side of control joints.
7.10.1.5	Ceilings (soffits) req casing bead at intersections to walls or columns (no cornerite).
7.10.1.6	Load-bearing walls req casing bead or similar (no cornerite) at wall ends abutting structural walls or columns.
7.10.2.1	Lath must attach to framing members, not just to sheathing.
7.10.2.2	Diamond-mesh lath to horizontal framing with min 1 1/2 in. nails.
7.11.1.1	Flanges of accessories secured at max. 7 in. intervals.
7.11.2	Install corner beads, corner reinforcement, or wrap lath around corners for min 1 support.
7.11.3	Casing beads to isolate nonload-bearing members from load-bearing.
7.11.4	Control joint separation spacing min 1/8 in.
7.11.4.1	Control joints to delineate areas not > 144 sq. ft.
7.11.4.2	Max 18 ft. distance between control joints.
7.11.4.2	Max 2 1/2 to 1 ratio of length to width between control joints.
7.11.4.2	Control joint req'd where ceiling framing or furring changes direction.
7.11.4.4	Wall or partition height door frames considered control joints.
7.11.5	Weep screed req'd at bottom of all steel or wood framed walls F45 .
7.11.5	Bottom edge of weep screed min. 1 in. below joint between foundation & framing F46 .
7.11.5	Nose of screed min. 4 in. above earth or 2 in. above paving F45 .

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Wood Panel Siding

- Vertical joints must be over framing members or WSP _____ [703.3.1]
- Vertical joints shiplapped or covered with batten _____ [703.3.1]
- Horizontal joints over solid blocking or over wood or WSP _____ [703.3.1]
- Horizontal joints lapped 1 in., shiplapped, or Z-bar flashing _____ [703.3.1]

Horizontal Lap Siding

- Install AMI _____ [703.3.2]⁶¹
- In lieu of manufacturer instructions, lap 1 in. or ½ in. if rabbeted, vertical joints at ends caulked or flashed _____ [703.3.2]

Fiber Cement Lap Siding

- Must conform to ASTM C 1186 _____ [703.10.2]⁶²
- Min lap 1 ¼ in., vertical joints sealed, flashed with H-section, located over flashing, or installed over other barrier _____ [703.10.2]
- Nail heads can be concealed or exposed AMI _____ [703.10.2]

Wood Shakes & Shingles

- WRB req'd over sheathing behind shingles or shakes _____ [703.5.1]
- Weather exposure < ½ of shingle length for single course _____ [703.5.2]
- 2 fasteners per shake or shingle _____ [703.5.3]
- Bottom course doubled, other courses single or double _____ [703.5.4]

Vinyl Siding

- Siding & accessories labeled for conformity to ASTM D 3679 _____ [703.11.1]
- Install AMI _____ [703.11.1]
- Soffit panels individually fastened to supports or AMI _____ [703.11.1.1]⁶³
- When installed over foam plastic sheathing, min 1 ¼ in. fastener penetration into wood framing EXC _____ [703.11.2.1]⁶⁴
 - AMI if instructions specific for basic wind speed _____ [703.11.2X&3]
- Adjust design wind pressure by 0.39 if basic wind speed > 90mph; 0.27 if no GB on interior side _____ [703.11.2.2]⁶⁵

09 IRC

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TABLE 28		FASTENER SCHEDULE [T602.3(1)]	
Connection	Fastener ^A	Method	
FLOORS			
Built-up girders & beams, 2 in. lumber layers	10d	32 in. o.c. top & bottom staggered + 2 @ ends & splices	
Joist to sill or girder	3-8d	toe nail	
Ledger strip supporting joists or rafters	3-16d	at each joist or rafter	
Rim joist to top plate	8d at 6 in. o.c.	toe nail	
WALLS			
Built-up corner studs	10d	24 in. o.c.	
Built-up header, two pieces with ½ in. spacer	16d	16 in. o.c. along each edge	
Continuous header to stud	4-8d	toe nail	
Double studs or double top plates	10d at 24 in. o.c.	face nail	
Double top plate splice lap area (min 48 in.)	8-16d	face nail each side	
Sole plate to joist or blocking	16d at 16 in. o.c.	typical face nail	
Sole plate to joist or blocking	3-16d at 16 in. o.c.	BWPs	
Stud to sole plate	3-8d or 2-16d	toe nail	
Top or sole plate to stud	2-16d	end nail	
Top plate laps & intersections	2-10d	face nail	

(table continues on next page)

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TABLE 28 FASTENER SCHEDULE (CONT.) [T602.3(1)]

Connection	Fastener ^A	Method
ROOF & CEILING CONSTRUCTION		
Blocking between joists or rafters to top plates	3-8d	toe nail
Ceiling joists to plate	3-8d	toe nail
Ceiling joists, laps over partitions	3-10d	face nail
Ceiling joists to parallel rafters	depends upon rafter slope	See IRC T802.5.1(9)
Collar tie to rafter	3-10d	face nail
Rafter tie to rafter	depends upon rafter slope	See IRC T802.5.1(9)
Rafter to plate	2-16d	toe nail
Rafter to ridge, valley, or hip rafters	4-16d 3-16d	toe nail face nail
WOOD STRUCTURAL PANELS		
Roof sheathing up to 1 in.	8d common	6 in. o.c. edges, 12 in. o.c. field
Wood structural panels, subfloor & wall sheathing up to 1/2 in.	6d common	6 in. o.c. edges, 12 in. o.c. field
Wood structural panels, subfloor & wall sheathing 19/32–1 in.	8d common	6 in. o.c. edges, 12 in. o.c. field
1 1/8 in. subfloor	10d common	6 in. o.c. edges, 12 in. o.c. field

A. Common or box nails unless otherwise noted

INTERIOR WALL SURFACES

Gypsum wallboard installed for fire-resistance or shear values should be inspected prior to taping. In areas subject to direct moisture, cement boards are typically used. Water-resistant gypsum board is not rated for such areas.

Gypsum Board**09 IRC**

- Protect from adverse weather during construction _____ [701.2]
- Do not install interior GB where exposed to weather or water _____ [702.3.5]
- Install only after all rough inspections complete _____ [109.1.2]
- Edges & ends over framing unless perpendicular to framing _____ [702.3.5]
- Fastening per **T29** _____ [702.3.5]
- GB ceiling diaphragms perpendicular to framing members & ends of adjacent courses of GB not on same joist _____ [702.3.7]

TABLE 29 FASTENING SCHEDULE FOR GB^A [T702.3.5]

Location	Orientation to framing	Max. frame spacing	Nails	Screws
Ceilings ^B	Perpendicular	24 in.	7	12
Ceilings ^B	Either	16 in.	7	12
Walls	Either	24 in.	8	12
Walls	Either	16 in.	8	16

A. For either 1/2 in. or 5/8 in. GB

B. Type X GB on garage ceiling beneath habitable space must be perpendicular to framing & fastened max 6 in. o.c. with 1 7/8 in. nails or equivalent screws.

Water-Resistant Gypsum Backing Board (Greenboard) 09 IRC

- No 1/2 in. greenboard on ceilings > 12 in. o.c. framing _____ [702.3.8]
- No 5/8 in. greenboard on ceilings > 16 in. o.c. framing _____ [702.3.8]
- Not allowed over vapor retarder in tub or shower _____ [702.3.8]
- May be used as backer for adhesive applications of tile in areas where there is no direct exposure to water or high humidity _____ [702.3.8.1]

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INTERIOR WALL SURFACES (CONT.)

Cement Board

09 IRC

- Fiber-cement, fiber-mat reinforced cement, glass mat gypsum backers, or fiber-reinforced gypsum backers in compliance with ASTM C 1288, C 1325, C 1178, or C 1278 OK as backer for shower & tub tile if installed AMI _____ [702.4.2]

WINDOWS & EXTERIOR DOORS

Performance & Labeling

09 IRC

- Window & door openings installed & flashed AMI **F47** _____ [612.1]⁶⁶
- Written installation instructions req'd for each window & door _____ [612.1]⁶⁶
- Must be designed for wind loads _____ [612.5]
- Windows & sliding doors req labeling from approved agency to indicate compliance with AAMA standards _____ [612.6]
- Window & glass door assemblies must be anchored AMI _____ [612.10.1]
- Anchor direct or with frame clip to wood frame structure _____ [612.10.2.2]

Child Fall Prevention

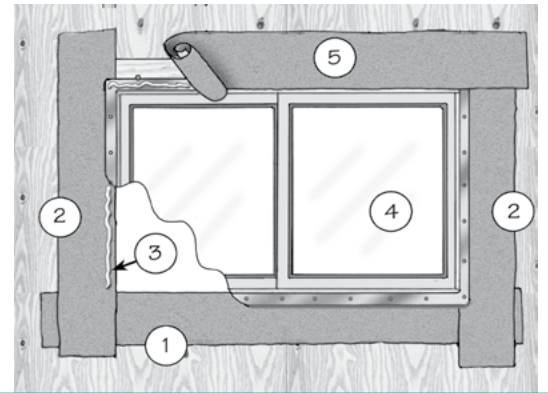
09 IRC

- Openable windows > 72 in. above finished grade or surface below req lowest clear part of opening min 24 in. above floor EXC _____ [612.2]
 - Windows that will not allow 4 in. sphere in fully open position _____ [612.2X1]
 - Openings with window fall prevention devices per ASTM F 2090 _____ [612.2X3]
 - Approved window-opening limiting devices _____ [612.2X4]
- Window-opening limiting devices must prevent passage of 4 in. sphere when installed AMI _____ [612.4.1]
- Window-opening limiting devices req release mechanisms max 15 lb. force & operable without tools or special knowledge _____ [612.4.2]
- Window-opening limiting devices may not reduce net clear area req'd for escape & rescue **T4.5** _____ [612.4.2]

FIG. 47

Window Flashing

The window flashing essentially extends the window flange. WRB is integrated shingle fashion to the flange. Numbers indicate flashing & caulking sequence.



ROOF & CEILING FRAMING

An attic with limited storage is one that is provided with an entrance opening, no insulation above the joists or bottom truss chord, and where a 24 in. wide by 42 in. high rectangle parallel to the rafters or trusses would fit within the openings of the attic framing.

General

09 IRC

- Lumber req's grade mark or agency approval certificate _____ [802.1]
- Conventional framing provisions apply to roof slopes $\geq 1:3$ _____ [802.2]
- Each rafter or joist min 1½ in. end bearing on wood, 3 in. on masonry [802.6]
- Cutting, boring & notching dimensional lumber per **T14, F30** _____ [802.7.1]
- Cutting, boring & notching of engineered wood products AMI **F32** _____ [802.7.2]
- Fastening per **T28** _____ [802.2]
- > 5:1 dimension ratio rafters or joists req blocking at bearing points _____ [802.8]
- > 6:1 dimension ratio rafters or joists req solid blocking, diagonal bridging, or 1x3 backer at max 8 ft. intervals _____ [802.8.1]

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Ceiling Joists

- Spans per **T30,31** EXC _____ [802.4]
 - Use **T15** for attics with fixed stairs _____ [502.3.1]
- 3 in. lap over partitions or butted & toenailed to bearing member _____ [802.3.2]
- Butted joists acting as rafter restraint req ties _____ [802.3.2]

09 IRC

TABLE 30		CEILING JOIST SPANS: ATTICS WITHOUT STORAGE 10 LB. LIVE LOAD [T802.4(1)]							
		Douglas Fir-Larch #2 Spacing o.c.				Southern Pine #2 Spacing o.c.			
Size		12 in.	16 in.	19.2 in.	24 in.	12 in.	16 in.	19.2 in.	24 in.
2×4		12-5	11-3	10-7	9-10	12-5	11-3	10-7	9-10
2×6		19-6	17-8	16-7	14-10	19-6	17-8	16-8	15-6
2×8		25-8	23-0	21-0	18-9	25-8	23-4	21-11	20-1
2×10		> 26	> 26	25-8	22-11	> 26	> 26	> 26	23-11

Measurements given in feet & inches (ft.-in.).
Dead load = 5 psf

TABLE 31		CEILING JOIST SPANS: UNINHABITABLE ATTICS WITH LIMITED STORAGE, 20 LB. LIVE LOAD [T802.4(2)]							
		Douglas Fir-Larch #2 Spacing o.c.				Southern Pine #2 Spacing o.c.			
Size		12 in.	16 in.	19.2 in.	24 in.	12 in.	16 in.	19.2 in.	24 in.
2×4		9-10	8-9	8-0	7-2	9-10	8-11	8-5	7-8
2×6		14-10	12-10	11-9	10-6	15-6	13-6	12-3	11-0
2×8		18-9	16-3	14-10	13-3	20-1	17-5	15-10	14-2
2×10		22-11	19-10	18-2	16-3	23-11	20-9	18-11	16-11

Measurements given in feet & inches (ft.-in.).
Dead load = 10 psf

Rafters

- Roofs < 3:12 slope design ridges, valleys & hips as beams _____ [802.3]
- Rafter horizontal spans per **T33,34** EXC _____ [802.5]
 - Rafter span can be measured from purlin support _____ [802.5.1]
- Purlins ≥ dimension of rafters they support _____ [802.5.1]
- Purlin supports (kickers) min 2×4, max spacing 4 ft. o.c. _____ [802.5.1]
- Purlin supports min 45° from horizontal _____ [802.5.1]
- Ridge min 1× material & full depth of cut rafter ends _____ [802.3]
- Valleys & hip rafters min 2× material & full depth of cut rafter ends _____ [802.3]
- Hip & valley rafters adequate to support load: max deflection L/180 _____ [802.3]

09 IRC**Openings**

- Single trimmer OK for single header within 3 ft. of trimmer bearing _____ [802.9]
- Doubled header & trimmer joists req'd if header > 4 ft. _____ [802.9]
- Hangers req'd for header-trimmer connections if header > 6 ft. _____ [802.9]
- Hangers or ledger strips req'd at header for tail joists > 12 ft. _____ [802.9]

09 IRC**Roof Sheathing**

- Lumber sheathing min 5/8 in. net thickness at 24 in. o.c. supports _____ [T803.1]
- Min 1 1/2 in. net thickness at > 24 in. o.c. supports _____ [T803.1]
- Spaced lumber sheathing not allowed in SDC D₂ _____ [803.1]
- WSP req's grade mark from approved agency **F35** _____ [803.2.1]
- WSP spans per **T17** _____ [803.2.2]
- WSP sheathing OK to be permanently exposed on underside (such as eaves) if identified as Exposure 1 _____ [803.2.1.1]
- Fire-retardant-treated plywood req's grade mark from approved agency & derived values & fastening req's approved method _____ [803.2.1.2]

09 IRC

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FIG. 48

Rafter Ties & Collar Ties

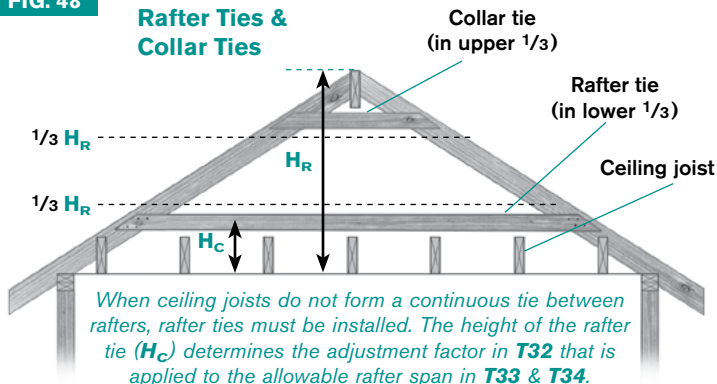


TABLE 32

RAFTER SPAN ADJUSTMENT FACTORS [T802.5.1]
(SEE F48)

H_C / H_R	Adjustment	H_C / H_R	Adjustment
1/3	0.67	1/5	0.83
1/4	0.76	1/6	0.90

Rafter Ties & Collar Ties

- Rafter ties req'd if joists not tied to parallel rafters _____ [802.3.1]
- Rafter ties min 2x4 & located in lower 1/3 of attic **F48** _____ [802.3.1]
- Span tables must be adjusted per **T32** if $H_C + H_R > 0.133$ **F48** _____ [802.3.1]
- Rafter tie & ceiling joist nailing to rafters min 3-16d (more nails req'd per T802.5.1(9) as spacing increased & slope decreased) _____ [802.3.1]
- Collar ties to resist wind uplift req'd in upper 1/3 of attic **F48** _____ [802.3.1]
- Collar ties min 1x4 max spacing 4 ft. o.c. _____ [802.3.1]

09 IRC

TABLE 33

RAFTER HORIZONTAL SPANS^{A,B} [T802.5.1(1)]
10 LB. DEAD LOAD, 20 LB. LIVE LOAD^C

Size	Douglas Fir-Larch #2 Spacing o.c.				Southern Pine #2 Spacing o.c.			
	12 in.	16 in.	19.2 in.	24 in.	12 in.	16 in.	19.2 in.	24 in.
2x4	10-10	9-10	8-11	8-0	10-10	9-10	9-3	8-7
2x6	16-7	14-4	13-1	11-9	17-0	15-1	13-9	12-3
2x8	21-0	18-2	16-7	14-10	22-5	19-5	17-9	15-10
2x10	25-8	22-3	20-3	18-2	> 26	23-2	21-2	18-11
2x12	> 26	25-9	23-6	21-0	> 26	> 26	24-10	22-2

A. Measurements given in feet & inches (ft.-in.) before **T32** adjustment factor.

B. Ceiling not attached to rafters, deflection max L/180.

C. Loads here typical for asphalt shingles with no snow load; check with local BO for snow load & applicable table for your area.

TABLE 34

RAFTER HORIZONTAL SPANS^{A,B} [T802.5.1(3)]
20 LB. DEAD LOAD, 30 PSF SNOW LOAD^C

Size	Douglas Fir-Larch #2 Spacing o.c.				Southern Pine #2 Spacing o.c.			
	12 in.	16 in.	19.2 in.	24 in.	12 in.	16 in.	19.2 in.	24 in.
2x4	8-5	7-3	6-8	5-11	9-0	7-10	7-1	6-4
2x6	12-4	10-8	9-9	8-8	12-11	11-2	10-2	9-2
2x8	15-7	13-6	12-4	11-0	16-8	14-5	13-2	11-9
2x10	19-1	16-6	15-1	13-6	19-11	17-3	15-9	14-1
2x12	22-1	19-2	17-6	15-7	23-4	20-2	18-5	16-6

A. Measurements given in feet & inches (ft.-in.) before **T32** adjustment factor.

B. Ceiling not attached to rafters, deflection max. L/180.

C. Loads here would be typical for slate with 30 psf snow load; check with local BO for snow load & applicable table for your area.

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TRUSSES

Most roof trusses have two bearing points and do not bear weight on interior walls. The outside members are chords, and the interior members are the web (F49). Trusses must not be cut or altered from their original design and must be installed in accordance with instructions included in the truss shipment. Because of possible seasonal truss movement, connections to interior walls are made with hardware that allows vertical movement (F50). Web bracing must be installed in accordance with the plans or *BCSI 1-06, Guide to Good Practice for Handling, Installing and Bracing Metal Plate Connected Wood Trusses*. It is published by the Structural Building Components Association and the Truss Plate Institute. Loads should not be added to trusses other than those for which they are designed. Alterations cannot be made without the written concurrence of a registered design professional.

Roof Trusses

09 IRC

- Design drawings must be approved by BO prior to installation ___ [802.10.1]
- Design drawings must be included with truss shipment at jobsite _ [802.10.1]
- Design drawing must include following information: _____ [802.10.1]
 - Slope or depth, span & spacing
 - Location of all joints
 - Req'd bearing widths
 - Design loads, including top chord live & dead loads, bottom chord live & dead loads, concentrated loads & wind and earthquake loads
 - Adjustments to connector design values for conditions of use
 - Each reaction force & direction
 - Joint connector type & description
 - Lumber size, species & grade for each member
 - Connection requirements
 - Calculated deflection ratio
 - Max axial compression forces (for design of lateral bracing)
 - Req'd permanent bracing locations
- Where not otherwise specified, bracing per BCSI 1-06 _____ [802.10.3]

Trusses (cont.)

09 IRC

- Consult BCSI 1-06 for handling procedures & temporary bracing_ [802.10.3]
- No alterations without approval of registered design professional _ [802.10.4]
- No added loads (such as HVAC) without verification of capacity ___ [802.10.4]
- Bearing point connectors min uplift rating 175 lb. F51 _____ [802.10.5]

FIG. 49

Typical
Fink
Truss

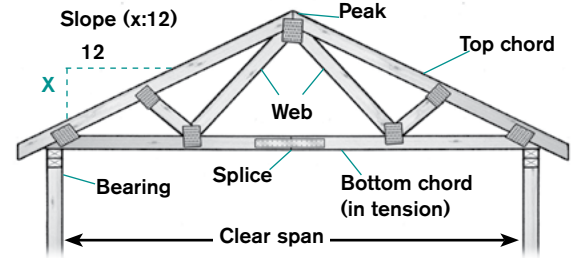
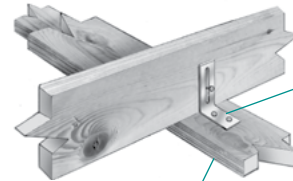


FIG. 50

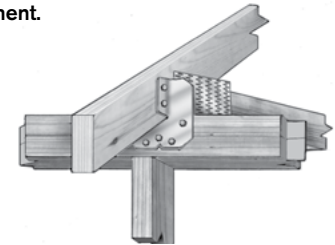
Slotted L Clip



L clip allows
seasonal
vertical
movement.

FIG. 51

Truss Connector



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ATTICS**Access****09 IRC**

- Access req'd if attic area > 30 sq. ft. & > 30 in. high measured from top of ceiling framing to underside of roof framing _____ [807.1]⁶⁷
- Rough-framed opening min 22 in. x 30 in. & readily accessible _____ [807.1]
- Attic opening in wall min 22 in. wide x 30 in. high _____ [807.1]⁶⁸
- Attic opening in ceiling min 30 in. headroom at some point above opening measured from bottom of ceiling framing _____ [807.1]
- Opening must be large enough to remove mechanical equipment _ [1305.1.3]

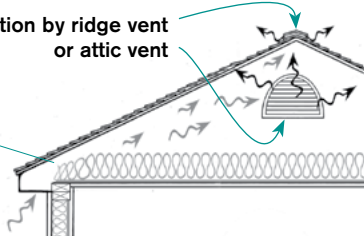
Ventilation**09 IRC**

- Vent each enclosed attic & rafter bay _____ [806.1]
- Openings least dimension 1/16 in., max dimension 1/4 in. _____ [806.1]⁶⁹
- Openings > 1/4 in. protected with screening 1/16–1/4 in. _____ [806.1]⁶⁹
- Total area of ventilation 1/150 of vented space EXC _____ [806.2]
 - Reduction to 1/300 OK if 50–80% of venting provided by openings in upper portion of space min 3 ft. above eave or cornice vents & balance from eave or cornice **F52** _____ [806.2]
 - Reduction to 1/300 OK if Class I or II vapor retarder on warm-in-winter side of ceiling _____ [806.2]⁷⁰
- Min 1 in. space between insulation & sheathing at eave/cornice vents [806.3]

FIG. 52**Attic Ventilation**

Insulation held back to allow 1 in. air space. Use baffles with loose insulation.

Ventilation by ridge vent or attic vent

**Unvented Attic Assemblies****09 IRC**

- OK between top-story ceiling & roof if all 5 of following are met: ____ [806.4]⁷¹
 1. Unvented space completely within building thermal envelope
 2. No vapor retarders on ceiling side of unvented attic assembly
 3. If wood shingles or shakes, 1/4 in. air space beneath them
 4. In climate zones 5, 6, 7 & 8 air-impermeable insulation must act as vapor retarder or have vapor retarder installed on underside
 - 5.1 Air-impermeable insulation contacting underside of roof sheathing
 - 5.2 Air-permeable insulation under roof sheathing with air-impermeable above meeting R-value of **T35**
 - 5.3 Air-impermeable insulation meeting **T35** under roof sheathing with air-permeable insulation under air-impermeable insulation

TABLE 35**MIN. INSULATION FOR CONDENSATE CONTROL [T806.4]^A**

Climate Zone	Rigid Board on Air-Impermeable Insulation R-Value
2B & 3B tile roof	None required
1, 2A, 2B, 3A, 3B, 3C	R-5
4C	R-10
4A, 4B	R-15
5	R-20
6	R-25
7	R-30
8 (Alaska)	R-35

A. These values only for condensation control in unvented attic assemblies & do not supersede energy code requirements.

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ROOFS

General

09 IRC

- Roof materials must be installed AMI _____ [903.1 & 904.1]
- Materials req conformity to recognized standards _____ [904.3]
- Materials req identification & test agency labels _____ [904.4]
- Materials must resist design wind loads per T301.2(2) & (3) _____ [905.1]
- Consider hail exposure in material selection _____ [903.5]

Fire Ratings

09 IRC

- Class A, B or C req'd per local laws or if < 3 ft. of PL _____ [902.1]
- Roof decks with masonry, brick, or concrete considered Class A _ [902.1X1]
- Copper or ferrous metal sheets or shingles & concrete or clay roof tile & slate over noncombustible deck considered Class A _____ [902.1X2]
- Fire-retardant-treated wood roofs req test agency label each bundle _ [902.2]

Flashing & Drainage

09 IRC

- Flashing req'd to prevent moisture entry to roof & walls _____ [903.2]
- Flashing req'd at wall & roof intersections, changes of roof slope or direction & around roof openings _____ [903.2.1]
- Metal flashing corrosion-resistant min 26-gage galvanized steel ___ [903.2.1]
- Crickets req'd on ridge side of penetrations > 30 in. wide _____ [903.2.2]
- Parapet walls req noncombustible coping \geq thickness of parapet ____ [903.3]
- Drains at each low point of roof unless designed to run over edges ___ [903.4]
- Overflow drains req'd with inlets 2 in. above low points of roof ____ [903.4.1]
- Overflow can be scupper in parapet wall _____ [903.4.1]
- Size of roof drains & leaders to comply with plumbing code _____ [903.4.1]
- Overflow drains must discharge separately from main roof drains ___ [903.4.1]

Ice Barriers

09 IRC

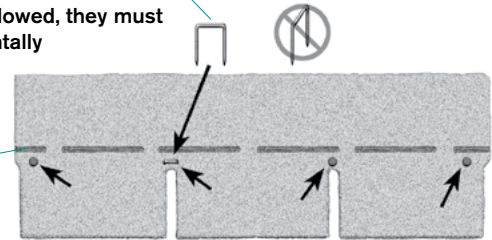
- In areas with history of ice forming along eaves causing backup of water, ice barrier req'd for asphalt shingles, metal roof shingles, mineral-surfaced roll roofing, slate and slate shingles & wood shingles and shakes EXC _____ [905.2.7.1]
 - Detached accessory structures with no conditioned area _____ [905.2.7.1X]
 - Ice barrier = 2 layers underlayment cemented together or self-adhering polymer sheet to 24 in. inside exterior wall line _____ [905.2.7.1]
- Code citations above are for asphalt shingles; citations for ice barriers with other roofing types are within subsections for those roofs.*

FIG. 53

Asphalt Shingle Nail Zone

Staples are allowed as an alternate to nails only AMI & with an ICC evaluation report. When allowed, they must be fastened horizontally

Nails 1 in. inset from ends



Staples or nails centered between keyline & adhesive strip

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Asphalt Shingles

09 IRC

- Roof deck req's solid sheathing **T17** _____ [905.2.1]
- Min slope 2:12, double underlayment if < 4:12 _____ [905.2.2]
- Underlayment for slopes < 4:12 installed shingle fashion, 19 in. starter strip & successive 36 in. wide sheets lapped 19 in. _____ [905.2.7]
- Underlayment for slopes \geq 4:12 lapped min 2 in., end laps 6 in. & end laps offset by 6 ft. _____ [905.2.7]
- Underlayment min ASTM D 226 Type I felt _____ [905.2.3]
- Fastener penetration min $\frac{3}{4}$ in. or through if sheathing < $\frac{3}{4}$ in. **F54** _____ [905.2.5]
- Fasteners AMI & min 4 per strip or 2 per individual shingle **F53** _____ [905.2.6]
- Drip flashing below underlayment, rake flashing above **F55** _____ [905.2.8.1]
- Wall & pipe jack flashings AMI _____ [905.2.8.4]
- Sidewall step flashing min 4 in. high & 4 in. wide, length AMI **F56** _____ [905.2.8.3]
- Sidewall flashings must terminate in kickout flashing **F56** _____ [905.2.8.3]⁷²
- Valley linings AMI; typical open valley req's metal 24 in. wide or 2 plies rolled mineral roofing, bottom layer 18 in., top layer 36 in. _____ [905.2.8.2]
- Closed valleys req min 1 layer 36 in. wide roll mineral roofing or self-adhering modified bitumen as underlayment _____ [905.2.8.2]

FIG. 54

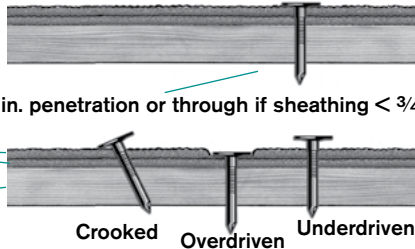
Asphalt Shingle Nailing Method

Nails should penetrate through sheathing that is less than $\frac{3}{4}$ in.

Min. $\frac{3}{4}$ in. penetration or through if sheathing < $\frac{3}{4}$ in.

Asphalt shingles

Decking



Crooked

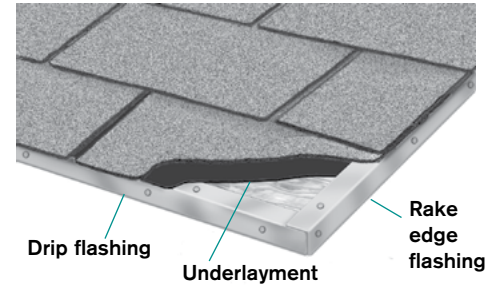
Overdriven

Underdriven

FIG. 55

Roof Edge Flashing

Underlayment laps over the drip flashing; rake edge flashing laps over the underlayment.



Drip flashing

Underlayment

Rake edge flashing

FIG. 56

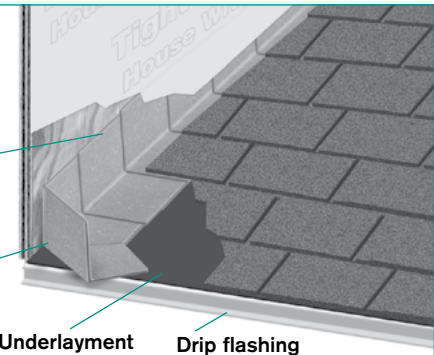
Kickout Flashing

Step flashing

Kickout flashing

Underlayment

Drip flashing



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Clay & Concrete Tile

Note: The Tile Roofing Institute publishes installation manuals for cold & snow regions, for moderate climate regions & for Florida. Manufacturer's requirements are typically more stringent than the IRC for membranes & underlayment.

- Application AMI based on climate, slope, underlayment & tile type _ [905.3.7]
- Min slope 2½:12, double underlayment if < 4:12 _____ [905.3.2]
- Roof-to-wall flashings min 26-gage corrosion-resistant metal _____ [905.3.8]
- Valley flashing min 11 in. each way from centerline **F57** _____ [905.3.8]

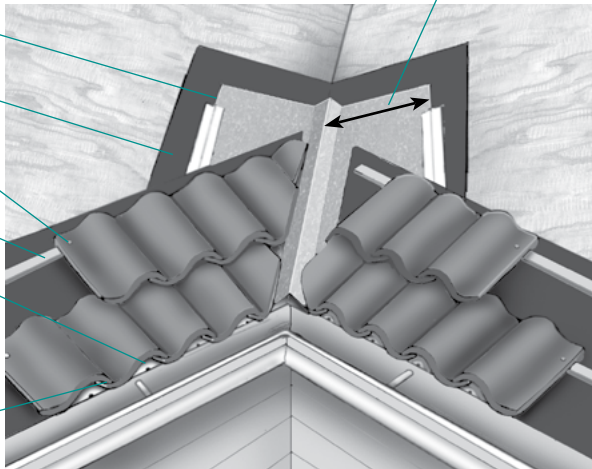
09 IRC

FIG. 57

Tile Roof Valley

Min. 11 in.

- Valley
- Valley tape (optional)
- Nail
- Nailer
- Raised bird stop establishes proper slope.
- Tile headlap min. 3 in.



Metal Roof Panels

- Deck solid sheathing unless roofing AMI for spaced supports _ [905.10.1]
- Min slope 3:12 for lapped nonsoldered seam without lap sealant _____ [905.10.2]
- Min slope ½:12 (4%) with lap sealant installed AMI _____ [905.10.2]
- Min slope for standing seam ¼:12 (2%) _____ [905.10.2]
- Materials req'd to be corrosion resistant _____ [905.10.3]
- Fasteners AMI; if not specified, use the following: _____ [905.10.4]
 - Galvanized or stainless steel fasteners for steel roofs
 - Copper, brass, bronze, or 300 series stainless for copper roofs
- Underlayment AMI _____ [905.10.5]

09 IRC

Slate Roofing

- Min slope 4:12, sheathing solid _____ [905.6.1&2]
- Underlayment AMI (ASTM D 226 or D 4869 Type I or II) _____ [905.6.3]
- Min headlap 4 in. if < 8:12 slope, 3 in. if ≥ 8:12 & < 20:12 _____ [905.6.5]

09 IRC

Roll Roofing

- Mineral-surface roll roofing only on solid sheathing _____ [905.5.1]
- Mineral-surface roll roofing AMI & min 1:12 slope (8%) _____ [905.5.2&5]

09 IRC

Low-Slope Roofs

- Note: In three of the code citations below, the letter X substitutes for the specific code number of the roofing material as follows: BUR = 9, modified bitumen = 11, EPDM = 12, PVC = 13, sprayed polyurethane foam = 14
- Min slope ¼ in. per ft. (2% slope) EXC _____ [905.X.1]
 - Coal tar BUR OK at ⅛ in. per ft. (1% slope) _____ [905.9.1]
 - Install in compliance with applicable ASTM standards _____ [905.X.2]
 - Install AMI _____ [905.X.3]

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Wood Shingles

- Bundles to include label of approved grading bureau _____ [905.7.7]
- Min slope 3:12, sheathing solid or spaced _____ [905.7.1&2]
- Underlayment, if installed, min ASTM D 226 Type I _____ [905.7.3]
- Sidelap min 1 1/2 in., no aligned keyways any 3 adjacent courses **F58** _____ [905.7.5]
- Keyways min 1/4 in. max 3/8 in. **F58** _____ [905.7.5]
- Exposure per shingle grade & length **T36** _____ [905.7.5]
- 2 fasteners per shingle, min fastener penetration 1/2 in. **F58** _____ [905.7.5]
- Fasteners max 3/4 in. from edge & 1 in. above exposure line **F58** [905.7.5]

09 IRC

FIG. 58

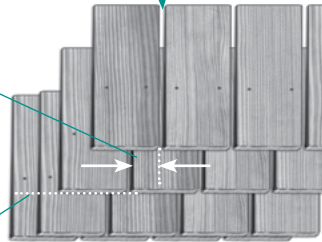
Wood Shingle Application

Shingle keyways:
min. 1/4 in., max. 3/8 in.

Adjacent keyways min. sidelap 1 1/2 in.

2 fasteners per shingle.
No aligned keyways any
3 successive courses.

Exposure line



Wood Shakes

- Bundles to include label of approved grading bureau _____ [905.8.9]
- Min slope 3:12, sheathing solid or spaced _____ [905.8.1&2]
- Interlayment min No. 30 felt (ASTM D 226, Type II) _____ [905.8.4&7]
- Interlayment strips 18 in. wide & no felt exposed to sun _____ [905.8.7]
- Sidelap min 1 1/2 in., keyways min 3/8 in., max 5/8 in. **F59** _____ [905.8.6]⁷³
- Exposure per shake grade & length **T37** _____ [905.8.6]
- Max exposure standard #1 grade shake 10 in. at 4:12 slope _____ [905.8.6]
- 2 fasteners per shake, ≤ 2 in. above exposure line,
1 in. from edge **F59** _____ [905.8.6]

09 IRC

For further information on cedar shakes & shingles, see www.cedarbureau.org.

FIG. 59

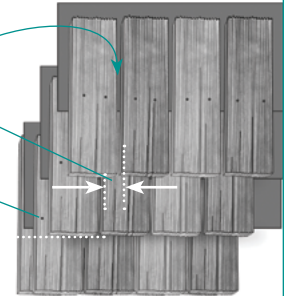
Wood Shakes Application

Shake keyways: min. 3/8–5/8 in.

Adjacent course keyways offset min. 1 1/2 in.

2 fasteners per shake:
1 in. from edge &
≤ 2 in. above exposure line

No felt exposed to sunlight.



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TABLE 36		WOOD SHINGLE WEATHER EXPOSURE [T905.7.5]	
Shingle Length (in.)	Grade & Label Color	Exposure (in.)	
		3:12 slope to < 4:12	4:12 slope or steeper
16	No. 1 – blue	3 ³ / ₄	5
	No. 2 – red	3 ¹ / ₂	4
18	No. 1 – blue	4 ¹ / ₄	5 ¹ / ₂
	No. 2 – red	4	4 ¹ / ₂
24	No. 1 – blue	5 ³ / ₄	7 ¹ / ₂
	No. 2 – red	5 ¹ / ₂	6 ¹ / ₂

TABLE 37		WOOD SHAKE WEATHER EXPOSURE [T905.8.6]	
Material	Length (in.)	Grade	Exposure ^A (in.)
Naturally durable wood (cedar)	18	No. 1	7 ¹ / ₂
	24	No. 1	10
PT taper-sawn Southern Pine	18	No. 1	7 ¹ / ₂
	24	No. 1	10
	18	No. 2	5 ¹ / ₂
Taper-sawn naturally durable wood (cedar)	24	No. 2	7 ¹ / ₂
	18	No. 1	7 ¹ / ₂
	24	No. 1	10
	18	No. 2	5 ¹ / ₂
	24	No. 2	7 ¹ / ₂

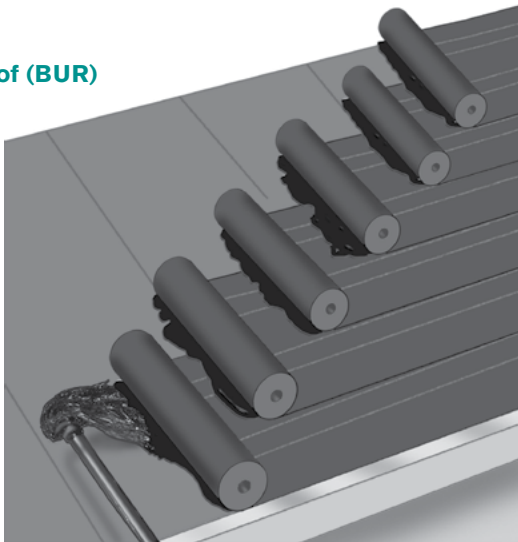
A. Assumes a 4:12 or greater slope.

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FIG. 60

3-Ply Built-Up Roof (BUR)

Inter-ply bitumen must be installed in a continuous firmly bonded film with no voids between the plies of material. Approximately 25 lb. of asphalt per square is req'd. The temperature must be maintained at the proper range for the specific type of asphalt.

**NRCA Recommendations & ASTM Requirements for BUR F60**

- Store rolls on ends not sides to prevent deformation
- Protect water-based materials from freezing prior to installation
- Protect insulation from moisture
- Do not install roofing while ice, rain, or snow are present
- Use cant strips to limit bends to 45° at horizontal-to-vertical intersections
- Sample temperature (typical 350°F to 425°F for Type I asphalt)
- Aggregate must be clean & dry to adhere to hot bitumen

Reroofing**09 IRC**

- Same requirements as for new roofs EXC _____ [907.1]
 - Low slope OK < 2% if providing positive drainage _____ [907.1X]
- Remove all existing layers of old roofing if 2 or more layers present of any type of roofing _____ [907.3]
- Metal or tile OK over existing shake roof _____ [907.3X2]
- Sprayed polyurethane foam new protective coat OK over old _____ [907.3X3]
- Prime flashings prior to application of bituminous materials _____ [907.6]

MASONRY FIREPLACES & CHIMNEYS

Masonry fireplaces are declining in popularity due to energy and environmental issues, and because of the rising popularity of gas-burning appliances that provide an aesthetically pleasing alternative. The heat generated by a masonry fireplace typically does not offset the amount of heated indoor air that is required to maintain the fire, and as a result the codes require outdoor combustion air to be brought into the fireplace. Many jurisdictions restrict the construction of new fireplaces. More information on gas-burning fireplaces can be found in other books in the Code Check series.

Masonry Fireplace & Chimney Construction**09 IRC**

- Footing min 12 in. thick & 6 in. beyond sides _____ [1001.2 & 1003.2]
- Footing min 12 in. below finished grade _____ [1001.2 & 1003.2]
- Framing min 2 in. clearance from chimney & front & sides of fireplace & 4 in. from back of fireplace EXC _____ [1001.11 & 1003.18]
 - Combustible trim, siding, flooring & sheathing can touch if 12 in. from firebox or flue liner _____ [1001.11X3 & 1003.18X3]
- Combustible trim cannot overlap chimney corners > 1 in. _____ [1003.18X3]
- Clear air space not filled except for fireblocking _____ [1001.11 & 1003.18]
- Chimneys not to support loads other than their own weight _____ [1003.8]

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SDC D Reinforcement

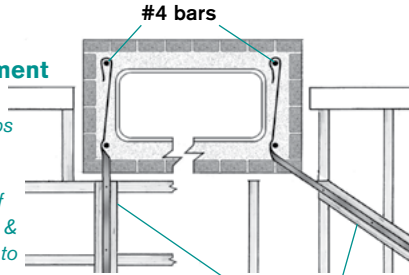
- Min 4 #4 vertical bars **F61** _____ [1001.3.1 & 1003.3.1]
- If > 40 in. wide, 2 additional bars req'd _____ [1001.3.1 & 1003.3.1]
- Min ¼ in. horizontal ties 18 in. o.c. around vertical bars [1001.3.2 & 1003.3.2]
- Horizontal ties req'd at each bend in vertical bars ____ [1001.3.2 & 1003.3.2]
- Grout must enclose rebar & not bond with flue liner __ [1001.3.1 & 1003.3.1]
- Anchor at each floor, ceiling, or roof > 6 ft. above grade EXC _____ [1001.4 & 1003.4]
 - Chimneys completely inside exterior walls _____ [1001.4 & 1003.4]
- Anchor straps hooked around outer bars **F61** _____ [1001.4.1 & 1003.4.1]
- Fasten each strap to min 4 joists with 2 ½ in. bolts **F61** _____ [1001.4.1 & 1003.4.1]

09 IRC

FIG. 61

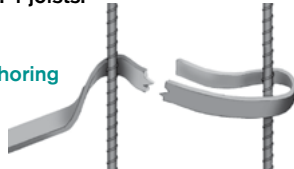
Chimney Reinforcement

Anchor straps must hook around the outer bars of the chimney & be fastened to the framing with min. of 2 bolts, min. ½-in. diameter.



2x4 ties must cross min. 4 joists.

Chimney anchoring detail



Min. of 4 #4 vertical bars for chimneys up to 40 in. wide. Wider chimneys req at least 2 additional bars.

Flues

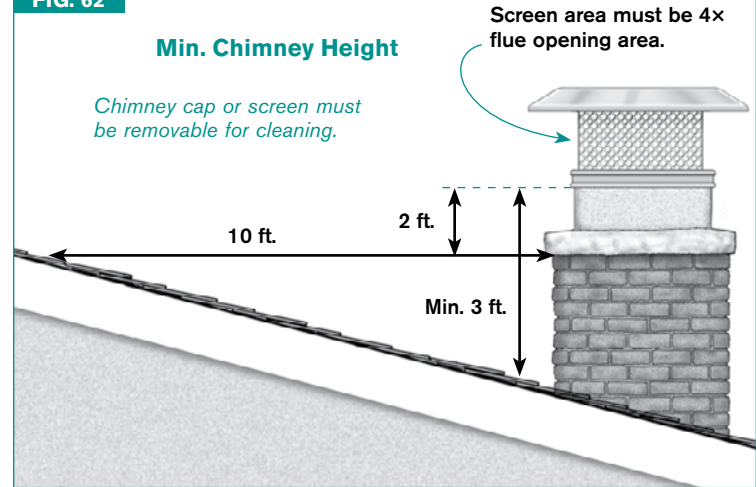
- Design for proper draft _____ [1003.15]
- Terminate min 3 ft. above roof & 2 ft. above building within 10 ft. **F62** [1003.9]
- Spark arresters net free area min 4x flue opening size **F62** _____ [1003.9.1]
- Spark arrester screening mesh > 3/8 in. & < 1/2 in. _____ [1003.9.1]
- Spark arrester removable for cleaning **F62** _____ [1003.9.1]

09 IRC

FIG. 62

Min. Chimney Height

Chimney cap or screen must be removable for cleaning.



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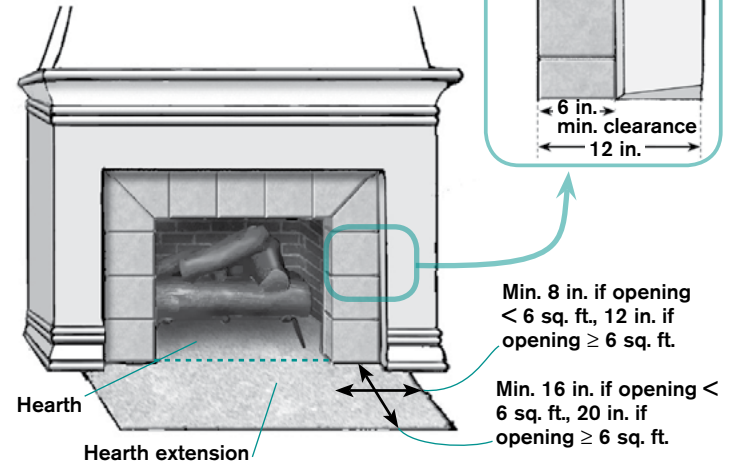
Masonry Fireplaces

09 IRC

- Firebrick-lined firebox walls min 8 in. thick including liner _____ [1001.5]
- Min depth 20 in. EXC _____ [1001.6]
 - Rumford fireplaces 12 in. deep for $\frac{1}{3}$ width of opening _____ [1001.6X]
- Throat min 8 in. above fireplace opening & min 4 in. deep _____ [1001.6]
- Masonry over opening req's lintel with min 4 in. bearing each side _____ [1001.7]
- Operable damper req'd min 8 in. above fireplace opening _____ [1001.7.1]
- Smoke chamber parged smooth with refractory mortar _____ [1001.8]⁷⁴
- Hearth & extension reinforced to carry their own weight _____ [1001.9]
- Remove all combustible material from under hearth & extension _____ [1001.9]
- Min hearth thickness of 4 in., min thickness of extension 2 in. EXC _____ [1001.9.1&2]
 - $\frac{3}{8}$ in. thick noncombustible extension OK if bottom of fireplace opening \geq 8 in. above extension _____ [1001.9.2X]
- If opening < 6 sq. ft., extension depth min 16 in. front, 8 in. side **F63** _____ [1001.10]
- If opening \geq 6 sq. ft., extension depth min 20 in. front, 12 in. side **F63** _____ [1001.10]
- No combustible material within 6 in. of opening _____ [1001.11X4]
- Combustible material < 12 in. from opening limited to projection of $\frac{1}{8}$ in. for each inch distance from opening _____ [1001.11X4]
- All combustion air from exterior air supply _____ [1006.1]
- Exterior air intake no higher than elevation of firebox _____ [1006.2]
- Intake not from garage or basement, screen over opening _____ [1006.2]

FIG. 63

Masonry Fireplace Clearances



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FACTORY-BUILT FIREPLACES & CHIMNEYS

Factory-Built Fireplaces & Chimneys

09 IRC

- Must be L&L & installed AMI _____ [1004.1 & 1005.1]
- Must be listed to UL 127 _____ [1004.1 & 1005.4]
- Hearth extensions AMI & distinguishable from surrounding floor ____ [1004.2]
- Decorative shrouds only if specifically L&L & AMI _____ [1004.3 & 1005.2]
- Combustion air ducts must be L&L for specific fireplace & AMI ____ [1006.1.1]
- Firestop spacer AMI per UL 127 where passing through ceilings ____ [1005.4]
- Insulation shield per UL 127 if passing through loose-fill in attic ____ [1005.4]

FINAL INSPECTION REMINDERS

Final Inspection

09 IRC

- Address numbers visible from street _____ [319.1]
- Min 4 in. high Arabic numerals, min ½ in. stroke width _____ [319.1]
- Fire department signoff on automatic sprinklers prior to issuance of Certificate of Occupancy _____ [local]
- Smoke & CO alarms provided with battery backups & functional ____ [314&315]
- Finish surfaces affecting stairs or landing completed _____ [109.1.6]
- Grading to provide req'd slopes & clearances; 6 in. siding to soil, 2 in. siding to hardscape **F27** _____ [317.1#5]⁷⁵

Benjamin Franklin was chosen as the main character for our Code Check illustrations for a number of reasons. The “First American’s” insatiable curiosity, scientific genius, and civic mindfulness drove him to study fire safety, safe exiting, public sanitation, improved heating methods, and, of course, electricity.

Franklin made major contributions to each of the four main disciplines of building inspection: building, plumbing, mechanical, and electrical. Franklin’s first attempt to safeguard the public through building codes came in 1735 with his call for minimum standards in the design of fireplace hearths, hearth extensions, and combustible material clearance. The principles Franklin proposed are codified in all the modern building codes, which prescribe these clearances in detail.

In 1736, Franklin organized the first volunteer fire department in Philadelphia, which still remains the model for our modern fire departments. He also understood the importance of building design in slowing the spread of a fire and was proud that his final home—built after his return from France in 1785—did not have concealed spaces where fire could spread. Thus, by judicious use of plaster, Franklin anticipated the fireblocking rules in today’s codes. He also took an interest in designing stairways that were the proper pitch. Building and plumbing codes exist to safeguard persons and property. At Code Check, we feel that purpose to be a continuation of the work of Benjamin Franklin. His ideas are still alive in today’s building codes and are carried on by code-making organizations and the people who practice those codes.



In 1736, after an extensive fire in Philadelphia, Benjamin Franklin created the first fire department—a fire brigade named The Union Fire Company.

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TABLE 38

SIGNIFICANT CHANGES IN THE 2009 IRC CODE CYCLE

#	Page	Code	Description	#	Page	Code	Description
1	4	202	New definition of <i>habitable attic</i> not to be considered as a story.	17	12	305.1X2	2006 IRC req'd 6 ft. 8 in. clearance above the fixture; 2009 IRC allows fixtures under sloped ceilings such as below stairs.
2	4	202	Braced wall line redefined as a straight line drawn through building plan, rather than as series of braced wall panels.	18	13	311.2	2009 IRC specifies clear width rather than 3 ft. 0 in. door.
3	4	202	A townhouse in the 2006 IRC req'd <i>open space</i> on at least 2 sides. In the 2009 IRC, townhouses req a <i>yard or public way</i> on at least 2 sides.	19	13	311.3X	Personal viewing balconies OK to have < 36 in. deep landing.
4	5	106.1.1	BO may req plans to include braced wall lines & methods.	20	14	311.7.2X	New allowance for floors to project over edge of stairwell opening.
5	5	105.2	Size increased from 120 to 200 sq. ft. for accessory structures not requiring permits.	21	14	311.7.4	Stair dimensions exclusive of carpeting or rugs.
6	5	105.2	No decks were exempt in 2006 IRC.	22	15	311.7.3	Walkline in 2006 IRC was measured from narrow side of tread; new measurement is from beginning of first walkable surface on narrow side.
7	6	301.2.1.5	New consideration of topographic wind speed-up.	23	15	311.7.4.2	Clarification that winder treads do not req dimensional uniformity with rectangular treads in same flight.
8	6	301.3X	Increase in bracing for 12 ft. story height reduced to 10% when wind load determines bracing amount.	24	15	311.7.7.1X2	Handrail can exceed 38 in. height at transition fittings.
9	7	302.2X	2006 IRC req'd 2-hr. wall between townhouse units.	25	16	308.1.1	New recognition of ANSI Z97.1 designation as alternate to CPSC designation.
10	8	T302.6	Detached garages < 3 ft. from dwelling req same protection as attached garage (introduced in 2006 IRC).	26	16	308.3.1X	Glazing with only an ANSI designation now allowed except in wet areas such as tubs & showers.
11	9	302.11#4	Clarification that fireblocking does not need to comply with ASTM E136 firecaulking standard.	27	17	308.4#5X	Clarification that glass facing a tub exempt at 60 in.
12	10	313	Automatic fire sprinklers now req'd.	28	18	312.1	Height measurement above grade now extends 36 in. horizontally.
13	11	314.2	Alarm must be monitored at central station to qualify.	29	18	312.2	Height of guard to be measured from top of fixed seating.
14	11	314.2	Central-station alarm must be owner's property or must supplement other installed alarms.	30	22	602.11.1	Slotted washers permitted for anchor bolts when supplemented with standard washers (introduced in 2006).
15	11	315	Carbon monoxide alarms now req'd.	31	23	404.1.4.2	Reinforcement tables for concrete walls now combined with ICF tables.
16	12	305.1	2006 IRC allowed 4 ft. o.c. beams to project 6 in. into req'd ceiling height.	32	25	506.2.3X1	Attached garages now req vapor retarder under slab.

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TABLE 38

SIGNIFICANT CHANGES IN THE 2009 IRC CODE CYCLE (CONT.)

#	Page	Code	Description
33	34	602.6.1	Nailing reduced from 8-16d to 8-10d (to avoid splits).
34	35	602.10X	No longer req'd to calculate seismic bracing for SDC A, B, or C except townhouses in SDC C.
35	35	602.10.1.3	New methodology for measurements of angled corners.
36	35	602.10.1.4	Though each exterior wall needs bracing, the braced wall line is not necessarily at the exterior wall.
37	35	602.10.1.4	2006 IRC allowed the braced wall lines to begin 12.5 ft. from each end in SDC A-C. In the 2009 IRC, 12.5 ft. is the max combined distance from the 2 ends for intermittent bracing.
38	35	602.10.1.4.1	The hold-down in this section was referred to as a tie-down in the 2006 IRC.
39	35	602.10.1.2	Spacing of braced wall lines included in wind tables & could be as much as 60 ft.
40	35	602.10.1.5	2006 IRC allowed 25 ft. spacing with exceptions allowing ≤ 35 ft.
41	35	602.10.1.1	The term " <i>intermittent bracing</i> " is new & distinguishes all of its bracing methods as one type in contrast to the continuous sheathing method.
42	35	602.10.1.1	2006 IRC did not address mixed bracing methods.
43	35	602.10.2.1X3	New rule explicit that values assigned to these bracing methods also rely on the value of the interior gypsum board.
44	37	602.10.3X3	Method PFG is new in 2009 IRC.
45	37	602.10.3X4	2006 IRC did not assign any value to sections of bracing < 48 in.

#	Page	Code	Description
46	37	602.12	2006 IRC did not specifically prohibit substituted lengths for bracing walls with masonry veneer.
47	37	602.10.1.2	New separate table for wind bracing based upon spacing of braced walls not on their length.
48	37	602.10.1.2	2006 IRC had a multiplier for continuous sheathing method & 2009 IRC gives it a separate column in wind & seismic tables.
49	40	602.10.4	The section on CS has been completely rewritten. In the 2006 IRC, CS req'd application on all exterior & interior braced walls.
50	40	602.10.4.1	The 3 methods for CS are reformatted & the table of CS length requirements has been modified.
51	40	602.10.4.4	New alternatives to 2 ft. returns at corners for CS.
52	41	502.2.2.1	New table & specifications for deck ledger connection.
53	41	502.2.2.3	New alternative lateral load connection with 2 horizontal hold-downs, min. 1500 lb. each.
54	42	602.12.1	Relocated from 2006 IRC T703.7(1) to chapter 6 in 2009 IRC.
55	42	602.12.1.1	The 2009 IRC does not allow any braced wall panel to be < 4 ft. wide; substitutions with CS or ABW are not OK.
56	42	703.7.3	Steel lintels req shop coat of paint or other corrosion protection.
57	43	703.1.2	Wind resistance must be considered in selection & application of wall coverings.
58	44	703.9	Recognition of both drainable & non-drainable EIFS.
59	44	T702.1(3)	Table on stucco proportions revised & includes blended cements & requirements from ASTM C 926.

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TABLE 38

SIGNIFICANT CHANGES IN THE 2009 IRC CODE CYCLE (CONT.)

#	Page	Code	Description
60	44	703.6.5	Curing times were relocated from table to code text to clarify their application to exterior plaster.
61	46	703.3.2	Lap siding manufacturer instructions are allowed to differ from specifications in code section.
62	46	703.10.2	Fiber-cement siding now req'd to meet ASTM C 1186.
63	46	703.11.1.1	Backing or nailing strips req'd for soffits with vinyl siding or as specified by manufacturer.
64	46	703.11.2.1	Min. fastener penetration to improve performance in high wind conditions.
65	46	703.11.2.2	New wind performance requirements for vinyl siding.
66	48	612.1	Doors as well as windows must be installed & flashed AMI.
67	52	807.1	Clarification on how attic height is measured.
68	52	807.1	Clarification on size of opening when it is in a wall.
69	52	806.1	¹ / ₁₆ in. openings now allowed for attic ventilation.
70	52	806.2	Class I & II vapor retarder designations replace 2006 IRC perm ratings for vapor retarders.
71	52	806.4	Conditioned attic assemblies now unvented attic assemblies; new table clarifies insulation methods for condensation control.
72	54	905.2.8.3	Kickout flashings req'd at low end of roof/sidewall intersections.
73	56	905.8.6	Min. keyway space for all types of shakes increased to ³ / ₈ in.
74	60	1001.8	Smooth parging of smoke chamber req'd to minimize turbulence.
75	61	317.1#5	Clearance of non-PT wood to hardscape now specified.

ALTERNATIVE CODES

When engineered design is required, the design must comply with the International Building Code (IBC). It is not uncommon to have a building where some or all of the structural provisions are done to the IBC and the nonstructural provisions are in accordance with the IRC.

Within their own limitations and those of the IRC, the following standards can be used as a substitute for the IRC wood framing and steel framing provisions:

The American Forest and Paper Association publishes the *Wood Frame Construction Manual for One- and Two-Family Dwellings (WFCM)*, which can be used as an alternative to IRC designs for wood framing.

The American Iron and Steel Institute (AISI) publishes the *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings (AISI S230)*, which can be used as an alternative to the IRC.

The following standards are source material. Information from them is extracted into the codes, and in some cases these source references can be used directly:

The American Concrete Institute (ACI) publishes two documents that supplement the prescriptive rules of the IRC. These are *ACI 318—Building Codes for Structural Concrete* and *ACI 530—Building Code Requirements for Masonry Structures*.

The Truss Plate Institute publishes *TPI 1—National Design Standard for Metal Plate Connected Wood Truss Construction*, which is mandatory for metal-plate-connected truss design. TPI also contributes to *BCSI 2006 - Guide to Good Practice for Handling, Installing & Bracing of Metal-Plate-Connected Wood Trusses*, an essential job site tool that is available as a free download.

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