



RESIDENTIAL CONSTRUCTION DOORS & WINDOWS

QUICK-CARDS® A UNIQUE QUICK-REFERENCE GUIDE

Based on the 2018 International Residential Code (IRC)

Builder's Book, Inc. BOOKSTORE • PUBLISHER 8001 Canoga Avenue, Canoga Park, CA 91304 1-800-273-7375 • 1-818-887-7828 www.buildersbook.com



EMERGENCY ESCAPE & RESCUE OPENING & MEANS OF EGRESS

EMERGENCY ESCAPE & RESCUE OPENING REQUIRED (Based on IRC R310.1; R310.1.1)

- Basements, habitable attics and every sleeping room must have a minimum of 1 operable emergency escape and rescue opening.
- Where basements contain 1 or more sleeping rooms, an emergency escape and rescue opening is required in each sleeping room.
- Emergency escape and rescue openings must open directly into a public way or to a yard or court that opens to a public way.
- These openings must be operational from the inside of the room without the use of keys, tools or special knowledge.
- Window opening control devices on emergency escape and rescue openings must comply with ASTM F2090.

EMERGENCY ESCAPE & RESCUE OPENING - MINIMUM OPENING AREA (Based on IRC R310.2.1)

The net clear opening dimensions must be obtained by the normal operation of the emergency escape and rescue opening from the inside.

- Net clear opening: 5.7 ft² Min.
- Net clear height of the opening: 24" Min.
- Net clear width of the opening: 20" Min.
- Net clear opening area of grade floor openings or below-grade openings: 5 ft² Min.

EMERGENCY ESCAPE & RESCUE OPENING - WINDOW SILL HEIGHT (Based on IRC R310.2.2)

Where a window is provided as the emergency escape and rescue opening it must comply with the following:

- Sill height: 44" Max. above the floor
- Sill height that is below grade must be provided with a window well.

EMERGENCY ESCAPE & RESCUE OPENING - WINDOW WELLS (Based on IRC R310.2.3)

Window Wells

- Horizontal area of the window well: 9 ft² Min.
- Horizontal projection and width of the window well: 36" Min.
- The area of the window well must allow the emergency escape and rescue opening to be fully opened.

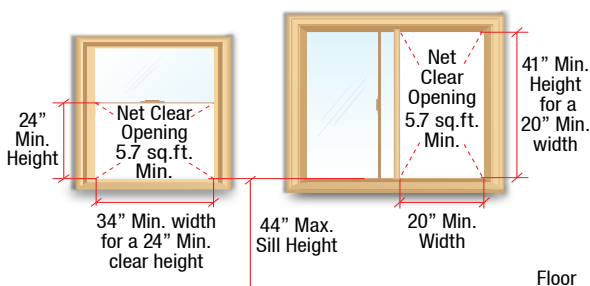
Ladder and Steps

- Window wells with a vertical depth greater than 44" must be equipped with a permanently affixed ladder or steps usable with the window in the fully open position.
- Ladders or steps in this section are not required to comply with Sections R311.7 (Stairways).
- Ladders or rungs inside width: 12" Min.
- Ladders or rungs projection: 3" Min. from the wall.
- Ladders or rungs max. spacing: 18" on center vertically for the full height of the window well.
- Ladder or steps are permitted to encroach a max. of 6" into the required dimensions of the window well.

Drainage

Window wells must be designed for proper drainage by connecting to the building's foundation drainage system or by approved alternative.

WINDOW EGRESS OPENING



EMERGENCY ESCAPE & RESCUE DOORS (Based on IRC R310.3)

- Where a door is provided as the required emergency escape and rescue opening, it must be a side-hinged door or a slider.
 - Where the opening is below the adjacent grade, it must be provided with an area well.
- Door Opening Size**
- The minimum net clear height opening for any door that serves as an emergency and escape rescue opening must comply with Section R310.2.1.

Area Wells

- Area wells width: 36" Min.
- The area well must be sized to allow the emergency escape and rescue door to be fully opened.
- Area wells with a vertical depth greater than 44" must be equipped with a permanently affixed ladder or steps usable with the door in the fully open position.
- Ladders or steps required by this section must not be required to comply with Section R311.7 (Stairways).
- Ladders or rungs inside width: 12" Min.
- Ladders or rungs projection: 3" Min. from the wall.
- Ladders or rungs max. spacing: 18" on center vertically for the full height of the exterior stairwell.
- Area wells must be designed for proper drainage by connecting to the building's foundation drainage system required by Section R405.1 or by an approved alternative method.
- A drainage system for area wells is not required where the foundation is on well-drained soil or sand-gravel mixture soils, Group I Soils, see Table R405.1.
- For foundation drainage reqs. see:
 - Concrete or Masonry Foundations, R405.1
 - Precast Foundations, R405.1
 - Wood Foundations, R405.2
 - Table R405.1 Properties of Soil USCS.
 - United Soil Classification System (USCS)

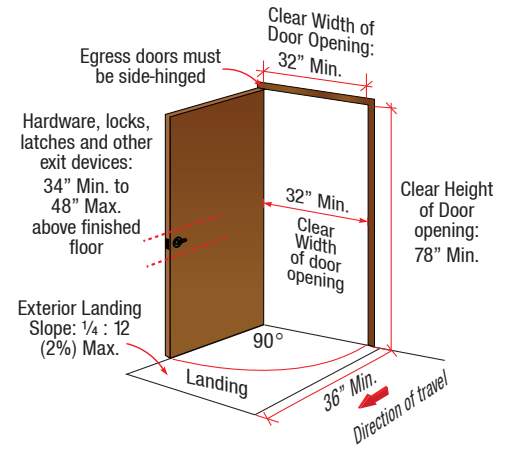
BARS, GRILLES, COVERS & SCREENS (Based on IRC R310.4)

- Where bars, grilles, covers, screens or similar devices are placed over emergency escape and rescue openings, area wells, or window wells, the minimum net clear opening size must comply with Sections R310.2.1 through R310.2.3.
- Bars, grilles, covers, screens and similar devices must be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that required for the normal operation of the escape and rescue opening.

EMERGENCY ESCAPE & RESCUE OPENINGS UNDER DECKS & PORCHES (Based on IRC R310.2.4)

Emergency escape and rescue openings installed under decks and porches must be fully openable and provide a path not less than 36" in height to a yard or court.

EGRESS DOOR



MEANS OF EGRESS (Based on IRC R311.1)

- Dwellings must be provided with a means of egress.
- The means of egress must provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the required egress door without requiring travel through a garage.
- The required egress door must open directly into a public way or to a yard or court that opens to a public way.

EGRESS DOORS (Based on IRC R311.2)

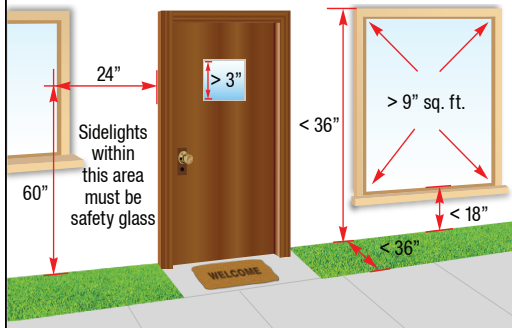
- A minimum of one egress door must be provided for each dwelling unit.
- The egress door must be side-hinged.
- Clear width of egress door: 32" Min. measured between the face of the door and the stop, with the door open 90°
- Clear height of door opening: 78" Min. measured from the top of the threshold to the bottom of the stop.
- Egress doors must be readily openable from inside the dwelling without the use of a key or special knowledge or effort.
- Other doors (non-egress doors) are not required to comply with these minimum dimensions.

FLOORS & LANDINGS AT EXTERIOR DOORS (Based on IRC R311.3)

- There must be a landing or floor on each side of each exterior door.
- The width of each landing must be at least as wide as the width of the door served.
- Landing dimension: 36" Min. measured in the direction of travel.
- Exterior landing slope: 1/4 unit vertical in 12 units horizontal (1/4:12) (2%) Max.
- Landings or finished floors at required egress door must be not more than 1 1/2" lower than the top of the threshold.
- Where exterior landings or floors serving the required egress door are not at grade, they must be provided with access to grade by means of a ramp (R311.8) or a stairway (R311.7).
- Doors other than the required egress door must be provided with landings or floors not more than 7 3/4" below the top of the threshold.
- A top landing is not required where a stairway of 2 risers Max. is located on the exterior side of the door, provided that the door does not swing over the stairway.
- Storm and screen doors are permitted to swing over exterior stairs and landings.

WINDOW AREA & GLAZING

WINDOW GLAZING AREA



Note: Safety glazing is required if all of the illustrated conditions exist. Safety glazing is required within 2 ft. of door frame.

HABITABLE ROOMS (Based on IRC R303.1)

- Habitable rooms must have an aggregate glazing area of not less than 8% of the floor area of such rooms.
- Natural ventilation must be through windows, skylights, doors, louvers or other approved openings to the outdoor air.
- Such openings must be provided with ready access or must otherwise be readily controllable by the building occupants.
- Openable area to the outdoors: min. 4% of the floor area being ventilated.

ADJOINING ROOMS (Based on IRC R303.2)

An adjoining room is where not less than 1/2 of the area of the common wall is open and unobstructed and provides an opening of not less than 1/10 of the floor area of the interior room and not less than 25 sq. ft.

BATHROOMS (Based on IRC R303.3)

Bathrooms, water closet compartments and similar rooms must be provided with aggregate glazing area in windows of not less than 3 ft², 1/2 of which must be openable.

TERM ALERT!

- Fenestration:** Products classified as either vertical fenestration or skylights and sloped glazing, installed in such a manner as to preserve the weather-resistant barrier of the wall or roof in which they are installed. Fenestration includes products with glass or other transparent or translucent materials.
- Glazing Area:** The interior surface area of all glazed fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Includes the area of glazed fenestration assemblies in walls bounding conditioned basements.

GLAZING IDENTIFICATION

(Based on IRC R308.1 - R308.1.1)

- Each pane of glazing installed in hazardous locations must be provided with a manufacturer's designation specifying who applied the designation, the type of glass and the safety glazing standard with which it complies.
- Identification must be visible in the final installation.
- Designation must be acid etched, sandblasted, ceramic-fired, laser etched, embossed or be of a type that once applied cannot be removed without being destroyed.
- A label is permitted in lieu of the mfr. designation.
- Multipane assemblies having individual panes not exceeding 1 ft² in exposed area must have a min. of one pane in the assembly complying with the glazing identification.
- Other panes in the assembly must be labeled "CPSC 16 CFR 1201" or "ANSI Z97.1"

LOUVERED WINDOWS OR JALOUSIES

(Based on IRC R308.2)

- Regular, float, wired or patterned glass in jalousies and louvered windows must not be less than nominal 3/16" thick and not more than 48" in length.
- Exposed glass edges must be smooth.
- Wired glass with wire exposed on longitudinal edges must not be used in jalousies or louvered windows.

HUMAN IMPACT LOADS (Based on IRC R308.3)

Individual glazed areas, including glass mirrors in hazardous locations must pass these test requirements:

- Where required by other sections, glazing must be tested in accordance with CPSC 16 CFR 1201.
- Glazing must comply with test criteria for Category II unless otherwise indicated in Table R308.3.1(1).

GLAZING & HAZARDOUS LOCATIONS

(Based on IRC R308.4 - R308.4.7)

All of the locations specified below are considered to be specific hazardous locations for the purposes of glazing.

Glazing in Doors

- Glazing in fixed and operable panels of swinging, sliding and bifold doors.
- Glazing in an individual fixed or operable panel adjacent to a door is considered a hazardous location where the bottom exposed edge of the glazing is less than 60" above the floor or walking surface and it meets either of the following conditions:
 - Where the glazing is within 24" of either side of the door in the plane of the door in a closed position.
 - Where the glazing is on a wall less than 180° from the plane of the door in a closed position and within 24" of the hinge side of an in-swinging door.

Glazing in Windows

- Glazing in an individual fixed or operable panel that meets all of the following conditions must be considered to be a hazardous location:
 - Exposed area of an individual pane is larger than 9 ft²
 - Bottom edge of the glazing is less than 18" above the floor.
 - The top edge of the glazing is more than 36" above the floor.
- One or more walking surfaces within 36", measured horizontally and in a straight line, of the glazing.

Note: For exceptions, see IRC R308.4

SCREENS (Based on IRC R308.6.3 & R308.6.7)

- The screen and its fastenings must be capable of supporting twice the weight of the glazing, be firmly and substantially fastened to the framing members, and have a mesh opening of not more than 1" x 1".
- For fully tempered or heat-strengthened glass, a retaining screen must be installed below the glass.

MIN. CATEGORY CLASSIFICATION OF GLAZING USING CPSC 16 CFR 1201 (Based on IRC Table R308.3.1(1))

Exposed Surface Area of One Side of One Lite	Glazing in Storm or Combination Doors (Category Class)	Glazing in Doors (Category Class)	Glazed Panels Regulated by Sec. R308.4.3 (Category Class)	Glazed Panels Regulated by Sec. R308.4.2 (Category Class)	Glazing in Doors and Enclosures Regulated by Sec. R308.4.5 (Category Class)	Sliding Glass Doors Patio Type (Category Class)
9 ft ² or less	I	I	NR	I	II	II
More than 9 ft ²	II	II	II	II	II	II

MIN. CATEGORY CLASSIFICATION OF GLAZING USING ANSI Z97.1 (Based on IRC Table R308.3.1(2))

Exposed Surface Area of One Side of One Lite	Glazed Panels Regulated by Sec. R308.4.3 (Category Class)	Glazed Panels Regulated by Sec. R308.4.2 (Category Class)	Doors & Enclosures Regulated by Sec. R308.4.5 (Category Class)
9 ft ² or less	No requirement	B	A
More than 9 ft ²	A	A	A

NFRC LABEL

NFRC WINDOW LABEL

World's Best Window Co.
Millennium 2000®
Vinyl Clad Wood Frame
Double Glazing - Argon Fill - Low E
Product Type: Vertical Slider

ENERGY PERFORMANCE RATINGS	
U-Factor (U.S./I-P)	Solar Heat Gain Coefficient
0.30	0.30

ADDITIONAL PERFORMANCE RATINGS	
Visible Transmittance	Air Leakage (U.S./I-P)
0.51	0.2

Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined by a third party of environmental conditions and specific product use. NFRC does not warrant any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined by a third party of environmental conditions and specific product use. NFRC does not warrant any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information.

NFRC DOOR LABEL

World's Best Door Co.
Entrance Door
CPD4000-000
Insulated Steel Wood Edge Door

Product Description	U-Factor (U.S./I-P) Solar Heat Gain Coefficient (SHGC)			
	1/4 Lite 24 1/8" x 36 1/8"	1/2 Lite 24 1/8" x 48 1/8"	3/4 Lite 24 1/8" x 72 1/8"	Full Lite 24 1/8" x 96 1/8"
24 1/8" x 36 1/8" Wood	0.23	0.30	0.36	0.40
24 1/8" x 36 1/8" Glass	0.21	0.24	0.26	0.28
24 1/8" x 36 1/8" Fiberglass	0.23	0.28	0.33	0.36
24 1/8" x 36 1/8" Steel	0.23	0.28	0.34	0.40
36 1/8" x 48 1/8" Steel	0.21	0.25	0.27	0.29
Flush-Embedded	U-Factor: 0.19	SHGC: 0.04		

Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined by a third party of environmental conditions and specific product use. NFRC does not warrant any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined by a third party of environmental conditions and specific product use. NFRC does not warrant any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information.

U-FACTOR

U-Factor measures how well a product can keep heat from escaping from the inside of a room.

- Window U-factor range: 0.20 - 1.20
- Door U-Factor Range: 0.00 - 2.00
- The lower the number, the better a product is at keeping heat in.

SOLAR HEAT GAIN COEFFICIENT (SHGC)

Solar Heat Gain Coefficient measures how well a product can resist unwanted heat gain in windows and unwanted direct/indirect solar radiation in doors.

- Window SHGC range: 0 - 1
- Door SHGC range: 0 - 1
- Look for low numbers for cooling and high numbers for heating.

VISIBLE TRANSMITTANCE (VT)

Visible Transmittance measures how well a product is designed to effectively light a home with daylight.

- VT range: 0 - 1
- The higher the number, the more natural light is let in.

AIR LEAKAGE (AL)

Air Leakage measures how much air will enter a room through a product.

- Air leakage range: 0.1 - 0.3
- The lower the AL, the better a product is at keeping air out.

CONDENSATION RESISTANCE (CR)

Condensation Resistance measures how well a product resists the formation of condensation.

- CR range: 1 - 100
- Optional Rating and label
- The higher the number the better condensation resistance.

INFO YOU MUST KNOW!

The National Fenestration Rating Council (NFRC) is a non-profit organization that administers a uniform, independent rating and labeling system for the energy performance of windows, doors, skylights and attachment products.

EXTERIOR DOORS & WINDOWS – PERFORMANCE

GENERAL (Based on IRC R609.1)

- Windows and doors must be installed and flashed according with the fenestration manufacturer's written instructions.
- Window and door openings must be flashed. See Sec. R703.4.
- Written installation instructions must be provided by the fenestration manufacturer for each window or door.

PERFORMANCE (Based on IRC R609.2)

- Exterior windows and doors must be capable of resisting the design wind loads specified in Table R301.2(2) adjusted for height and exposure according to Table R301.2(3) or determined according with ASCE 7 using the allowable stress design load combinations of ASCE.
- For exterior windows and doors tested in accordance with Sections R609.3 and R609.5, required design wind pressures determined from ASCE 7 using the ultimate strength design (USD) are permitted to be multiplied by 0.6.
- Design wind loads for exterior glazing not part of a labeled assembly are permitted to be determined by IBC Chpt. 24.

TESTING & LABELING (Based on IRC R609.3)

- Exterior windows and sliding doors: tested by approved independent laboratory and bear a label identifying manufacturer, performance characteristics and approved inspection agency indicating compliance with AAMA/WDMA/CSA 101/I.S.2/A440.
- Exterior side-hinged doors: tested and labeled according to AAMA/WDMA/CSA 101/I.S.2/A440 or AMD 100 or comply with Sec. R609.5.

WINDBORNE DEBRIS PROTECTION

(Based on IRC R609.6)

- Protection of exterior windows, glass doors and doors with glass in buildings located in windborne debris regions must comply with Section R301.2.1.2.
- Fenestration must be tested by an approved independent laboratory, listed by an approved entity and bear a label identifying the manufacturer, performance characteristics and an approved inspection agency to indicate compliance with ASTM E1886 and ASTM E1996 or AAMA 506.

ANCHORAGE METHODS (Based on IRC R609.7)

These methods apply only to anchorage of window and glass door assemblies to the main force-resisting system.

- Window and glass door assemblies must be anchored according to published manufacturer's recommendations.
- Substitute anchoring systems used for substrates not specified must provide equal or greater anchoring performance.
- Products must be anchored according to the min. reqs. in figs. R609.7.2(1), (2), (3), (4), (5), (6), (7), (8).

MASONRY, CONCRETE OR OTHER STRUCTURAL SUBSTRATE

(Based on IRC R609.7.2.1)

- Where the wood shim or buck thickness is less than 1½", window and glass door assemblies must be anchored through the jamb, or by jamb clip and anchors must be embedded directly into the masonry, concrete or other substantial substrate material.
- Anchors must adequately transfer load from the window or door frame into the rough opening substrate. See Figures R609.7.2(1) and R609.7.2(2).
- Where the wood shim or buck thickness is 1½" or more, the buck is securely fastened to the masonry, concrete or other substantial substrate and the buck extends beyond the interior face of the window or door frame, window and glass door assemblies must be anchored through the jamb, or by jamb clip, or through the flange to the secured wood buck.
- Anchors must be embedded into the secured wood buck to adequately transfer load from the window or door frame assembly. See figures R609.7.2(3), (4) and (5).

WOOD OR OTHER APPROVED FRAMING MATERIAL (Based on IRC R609.7.2.2)

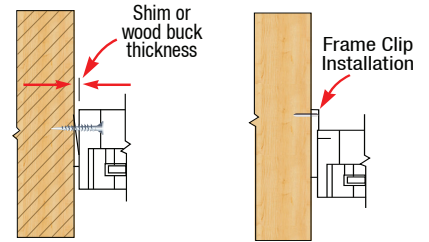
- Where the framing material is wood or other approved framing material, window and glass door assemblies must be anchored through the frame, or by frame clip, or through the flange.
- Anchors must be embedded into the frame construction to adequately transfer load. See Figures R609.7.2(6), R609.7.2(7) and R609.7.2(8).

MULLIONS (Based on IRC R609.8)

Mullions must:

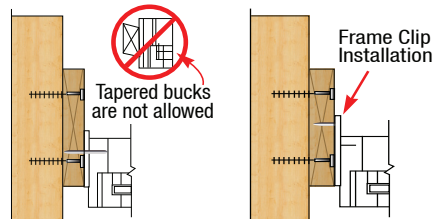
- be tested by an approved testing laboratory in accordance with AAMA 450, or be engineered according to accepted engineering practice.
- be designed to transfer design pressure loads applied by the window and door assemblies to the rough opening substrate.
- be capable of resisting the design pressure loads applied by the window and door assemblies to be supported without deflecting more than L/175, where L is the span of the mullion in inches.
- be capable of resisting a load of 1.5 times the design pressure loads applied by the window and door assemblies to be supported without exceeding the appropriate material stress levels.
- If tested by an approved laboratory, the 1.5 times the design pressure load must be sustained for 10 seconds, and the permanent deformation must not exceed 0.4% of the mullion span after the 1.5 times design pressure load is removed.

ANCHORAGE DETAILS



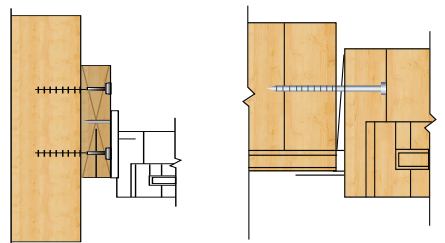
THROUGH THE FRAME
Fig. R609.7.2(1)

FRAME CLIP
Fig. R609.7.2(2)



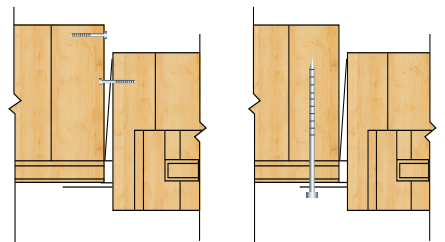
THROUGH THE FRAME
Fig. R609.7.2(3)

FRAME CLIP
Fig. R609.7.2(4)



THROUGH THE FLANGE
Fig. R609.7.2(5)

THROUGH THE FLANGE
Fig. R609.7.2(6)



FRAME CLIP
Fig. R609.7.2(7)

THROUGH THE FLANGE
Fig. R609.7.2(8)

COMPONENT & CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FT LOCATED IN EXPOSURE B (ASD) (psf) (Based on IRC Table R301.2(2))

Zone	Effective Wind Area (feet ²)	Ultimate Design Wind Speed V_{ult} (mph)																		
		110		115		120		130		140		150		160		170		180		
		+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	
Wall	4	10	13.1	-14.0	14.3	-15.0	15.5	-16.0	18.2	-19.0	21.2	-22.0	24.3	-26.0	27.7	-30.0	31.2	-33.0	35.0	-37.9
	4	20	12.5	-13.0	13.6	-14.0	14.8	-16.0	17.4	-19.0	20.0	-22.0	23.2	-25.0	26.4	-28.0	29.7	-32.0	33.4	-36.4
	4	50	11.7	-12.0	12.8	-14.0	13.9	-15.0	16.3	-17.0	19.0	-20.0	21.7	-23.0	24.7	-27.0	27.9	-30.0	31.3	-34.3
	4	100	11.1	-12.0	12.1	-13.0	13.2	-14.0	15.5	-17.0	18.0	-19.0	20.6	-22.0	23.5	-25.0	26.5	-29.0	29.8	-32.7
	4	500	10.0	-10.0	10.6	-11.0	11.6	-12.0	13.6	-15.0	15.8	-17.0	18.1	-20.0	20.6	-22.0	23.2	-25.0	26.1	-29.0
	5	10	13.0	-17.0	14.3	-19.0	15.5	-20.0	18.2	-24.0	21.2	-28.0	24.3	-32.0	27.7	-37.0	31.2	-41.0	35.0	-46.8
	5	20	12.5	-16.0	13.6	-17.0	14.8	-19.0	17.4	-22.0	20.2	-26.0	23.2	-30.0	26.4	-34.0	29.7	-39.0	33.4	-43.7
	5	50	11.7	-14.0	12.8	-16.0	13.9	-17.0	16.3	-20.0	19.0	-23.0	21.7	-27.0	24.7	-31.0	27.9	-35.0	31.3	-39.5
	5	100	11.1	-13.0	12.1	-14.0	13.2	-16.0	15.5	-19.0	18.0	-22.0	20.6	-25.0	23.5	-28.0	26.5	-32.0	29.8	-36.4
	5	500	10.0	-10.0	10.6	-11.0	11.6	-12.0	13.6	-15.0	15.8	-17.0	18.1	-20.0	20.6	-22.0	23.2	-25.0	26.1	-29.0

Note: This is an abridged table. For complete table see 2018 International Residential Code Table R301.2(2).

HEIGHT & EXPOSURE ADJUSTMENT COEFFICIENTS FOR TABLE R301.2(2)

(Based on IRC Table R301.2(3))

Mean Roof Height	Exposure		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.09	1.49	1.74
45	1.12	1.53	1.78
50	1.16	1.56	1.81
55	1.19	1.59	1.84
60	1.22	1.62	1.87

FRAMING DOORS & WINDOWS

WOOD WALL FRAMING – DESIGN & CONSTRUCTION (Based on IRC R602.2; 602.3; 602.3.1)

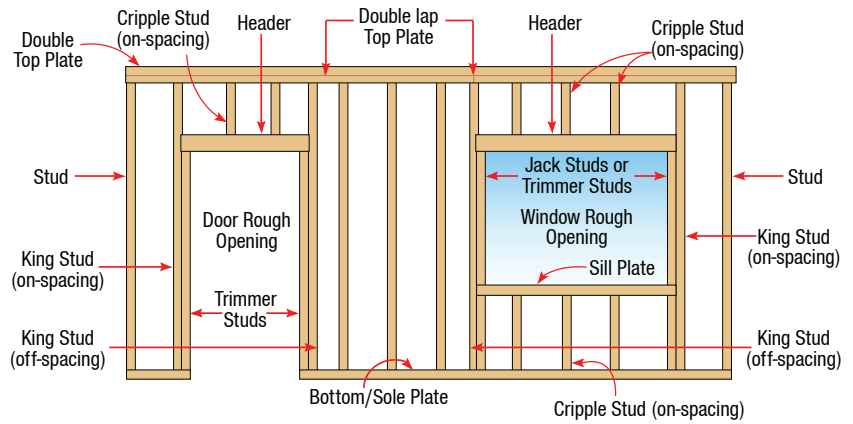
- Studs must be a minimum No. 3, standard or stud grade lumber.
- Exterior walls of wood-frame construction must be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3(2), or in accordance with AWC NDS.
- Components of exterior walls must be fastened according to Tables R602.3(1) through R602.3(4).
- Wall sheathing must be fastened directly to framing members.
- Studs must be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall.
- The support must be a foundation or floor, ceiling or roof diaphragm or must be designed according to accepted engineering practice.
- For size, height and spacing of studs see Tables R602.3(1) & (5).

FASTENING SCHEDULE – WALL (Based on IRC Table R602.3(1))

Description of Building Elements	Number and Type of Fastener	Spacing and Location
Stud to stud (not at braced wall panels)	16d common (3 1/2" x 0.162")	24" o.c. face nail
	10d box (3" x 0.128"); or 3" x 0.131" nails	16" o.c. face nail
Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)	16d box (3 1/2" x 0.135"); or 3" x 0.131" nails	12" o.c. face nail
	16d common (3 1/2" x 0.162")	16" o.c. face nail
Built-up header (2" to 2" header with 1/2" spacer)	16d common (3 1/2" x 0.162")	16" o.c. each edge face nail
	16d box (3 1/2" x 0.135")	12" o.c. each edge face nail
Continuous header to stud	5-8d box (2 1/2" x 0.113"); or 4-8d common (2 1/2" x 0.131"); or 4-10d box (3" x 0.128")	Toe nail
Top plate to top plate	16d common (3 1/2" x 0.162")	16" o.c. face nail
	10d box (3" x 0.128"); or 3" x 0.131" nails	12" o.c. face nail
Double top plate splice	8-16d common (3 1/2" x 0.162"); or 12-16d box (3 1/2" x 0.135"); or 12-10d box (3" x 0.128"); or 12-3" x 0.131" nails	Face nail on each side of end joint (24" Min. lap splice length each side of end joint)
Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)	16d common (3 1/2" x 0.162")	16" o.c. face nail
	16d box (3 1/2" x 0.135"); or 3" x 0.131" nails	12" o.c. face nail
Bottom plate to joist, rim joist, band joist or blocking (at braced wall panel)	3-16d box (3 1/2" x 0.135"); or 2-16d common (3 1/2" x 0.162"); or 4-3" x 0.131" nails	3 each 16" o.c. face nail 2 each 16" o.c. face nail 4 each 16" o.c. face nail
Top or bottom plate to stud	4-8d box (2 1/2" x 0.113"); or 3-16d box (3 1/2" x 0.135"); or 4-8d common (2 1/2" x 0.131"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails	Toe nail
	3-16d box (3 1/2" x 0.135"); or 2-16d common (3 1/2" x 0.162"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	End nail
Top plates, laps at corners and intersections	3-10d box (3" x 0.128"); or 2-16d common (3 1/2" x 0.162"); or 3-3" x 0.131" nails	Face nail
1" brace to each stud and plate	3-8d box (2 1/2" x 0.113"); or 2-8d common (2 1/2" x 0.131"); or 2-10d box (3" x 0.128"); or 2 staples 1 3/4"	Face nail
1" x 6" sheathing to each bearing	3-8d box (2 1/2" x 0.113"); or 2-8d common (2 1/2" x 0.131"); or 2-10d box (3" x 0.128"); or 2 staples, 1" crown, 16 ga., 1 3/4" long	Face nail

Note: This is an abridged table. For complete table see 2018 IRC Table R602.3(1).

DOOR & WINDOW FRAMING



SINGLE MEMBER HEADERS (Based on IRC R602.7.1)

Single headers must be framed with a single flat 2" nominal member or wall plate not less in width than the wall studs on the top and bottom of the header and face nailed to the top and bottom of the header with 10d box nails (3" x 0.128") spaced 12" on center.

SUPPORTS FOR HEADERS (Based on IRC R602.7.5)

- Headers must be supported on each end with one or more jack studs or with approved framing anchors.
- The full-height stud adjacent to each end of the header must be end nailed to each end of the header with four-16d nails (3.5" x 0.135").
- For the min. number of full-height studs at each end of a header, see Table R602.7.5

MIN. NUMBER OF FULL-HEIGHT STUDS AT EACH END OF HEADERS IN EXTERIOR WALLS (Based on IRC Table R602.7.5)

Max. Header Span (feet)	Ultimate Design Wind Speed and Exposure Category	
	< 140 mph, Exposure B or < 130 mph, Exposure C	≤ 115 mph, Exposure B
4	1	1
6	2	1
8	2	1
10	3	2
12	3	2
14	3	2
16	4	2
18	4	2

TOP PLATE (Based on IRC R602.3.2)

- Wood stud walls must be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions.
- End joints in top plates must be offset 24" Min.
- Joints in plates do not need to occur over studs.
- Min. plate thickness: 2" nominal
- Min. plate width: not less than the stud width.

BEARING STUDS (Based on IRC R602.3.3)

Where joists, trusses or rafters are spaced more than 16" on center and the bearing studs below are spaced 24" on center, such members must bear within 5" of the studs beneath.

BOTTOM (SOLE) PLATE (Based on IRC R602.3.4)

Studs must have full bearing on a nominal 2-by or larger plate or sill having a width not less than to the width of the studs.

INTERIOR WALLS (Based on IRC R602.4; R602.5)

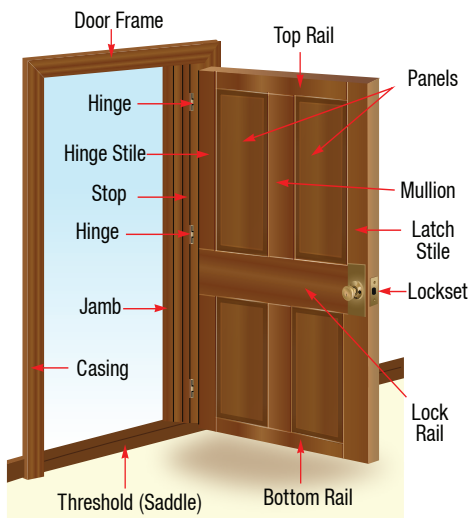
- Interior load-bearing walls must be constructed, framed and fireblocked as specified for exterior walls.
- Interior nonbearing walls are permitted to be constructed with 2" x 3" studs spaced 24" on center or, where not part of a braced wall line, 2" x 4" flat studs spaced at 16" on center.
- Interior nonbearing walls must be capped with not less than a single top plate.
- Interior nonbearing walls must be fireblocked in accordance with Section R602.8.

SIZE, HEIGHT & SPACING OF WOOD STUDS (Based on IRC Table R602.3(5))

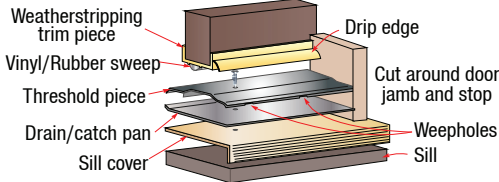
Stud Size (inches)	Bearing Walls				Nonbearing Walls		
	Laterally unsupported stud height (feet)	Max. spacing where supporting a roof-ceiling assembly or a habitable attic assembly, only (inches)	Max. spacing where supporting one floor, plus a roof-ceiling assembly or a habitable attic assembly (inches)	Max. spacing where supporting two floors, plus a roof-ceiling assembly or a habitable attic assembly (inches)	Max. spacing where supporting one floor height (inches)	Laterally unsupported stud height (feet)	Max. spacing (inches)
2 x 3	–	–	–	–	–	10	16
2 x 4	10	24	16	–	24	14	24
3 x 4	10	24	24	16	24	14	24
2 x 5	10	24	24	–	24	16	24
2 x 6	10	24	24	16	24	20	24

DOORS – COMPONENTS, TYPES & INSTALLATION

PARTS OF DOORS



DOOR THRESHOLD



TERM ALERT!

- ★ **Pre-hung Door:** this door comes already hanging in its own frame. It is a fully self-contained unit, complete with a door slab, hinges and outer frame that fits into a prepared doorway. Note: Comes weathertight and gap free
- ★ **Slab Door:** this is a door and nothing else; no hinges, knobs or frame. It is up to the buyer to attach it to an existing door frame or to create a door frame.

INSTALLING DOORS



INSTALLING A PRE-HUNG DOOR

Step 1: Ordering

- When ordering: specify the wall's overall thickness; choose either a right- or left-hand swinging door and choose whether you want the manufacturer to drill the holes in the door for the locksets.

Step 2: Trim the Door Opening

- Trim any excess drywall around the doorway to make sure the new door will hang plumb.

Step 3: Check the Floor- It must be level

- Mark for any shims that are needed under the level.

Step 4: Determine Location for Shims

- Determine location for shims

Step 5: Cut Door

- Cut the door to the appropriate length.

Step 6: Remove Packing Material

- Remove the plug that comes on the pre-hung door, as well as the temporary trim on the bottom of the door.

Step 7: Attach Shim to Doorway

- Tack one nail on a shim in the doorway to get started.

Step 8: Position the Door

- Place the door inside the opening.
- Position the door so it is plumb.
- The door must be able to swing open.
- Center the door in the rough opening and fasten it.
- Use a piece of drywall to act as a spacer against the trimmer studs and adjust the unit until it is flush with the future wall surface on both sides.

Step 9: Secure Jam

- Secure the jamb with nails along its length.

Step 10: Check and Adjust Door Opening

- Use a straight edge to check the door opening, ensuring that it has room to open and close.
- With the door closed, place a shim by the bottom hinge to accommodate any adjustments.

Step 11: Check Top Gap Above Door

- Also, check the door again to make sure it is level.

Step 12: Nail Door in Place

- Check the center shim and gap; make sure the door is plumb.
- Nail the door in place, from the jambs through the shims.

Step 13: Fill Nail Holes

- Use a nail set to set the nails beneath the wood to create a smooth finish.
- Fill the holes with spackle.


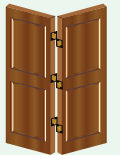




Step 14: Open and Close Door

- Check the door to make sure it opens and shuts properly.

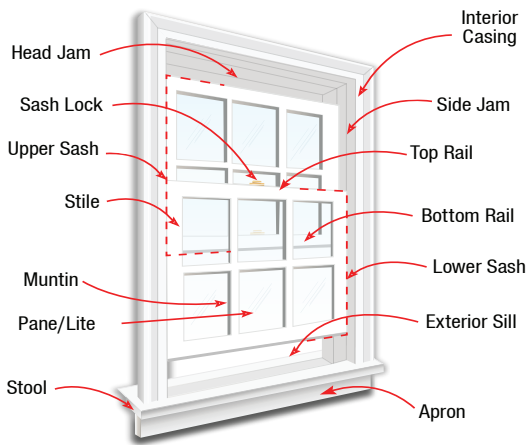
Step 15: Make Adjustments

- Place a level on the vertical surface to check that the door is plumb. Adjust the door as needed.

TYPES OF DOORS

TYPE OF DOOR	DESCRIPTION	HOW IT WORKS	WHERE TO USE
 <p>Hinged Doors</p>	<ul style="list-style-type: none"> The most common door type. Typically consists of either a solid wooden panel door or a hollow-cored door affixed to a door jamb with 2 or more hinges. Hinged doors swing either inwards or outwards but there are hinges that allow them to swing both ways. 	<ul style="list-style-type: none"> Works on a force being applied to the free, outer edge of the door pushing or pulling the door open, allowing it to swing on its hinges up to 180° to create an opening and allow people to pass through the doorway. Requires clearance space to allow it to swing open freely. 	<ul style="list-style-type: none"> front entry doors rear entry doors interior doors wardrobe doors
 <p>Bi-fold Doors</p>	<ul style="list-style-type: none"> consists of 2 panels attached by hinges, which folds in the middle when opened. requires less space to operate than a hinged door does; it takes up half as much room when it's fully opened and has smaller swing arc. 	<ul style="list-style-type: none"> A small, recessed handle or pull is installed in the middle of the door, allowing it to be easily opened from the middle hinge. Pulling or pushing the door bends the hinges in the middle of the door, folding the door in the middle which then opens it the rest of the way. 	<ul style="list-style-type: none"> wardrobe doors room dividers panoramic door backyard, deck, back garden leading door
 <p>French Doors</p>	<ul style="list-style-type: none"> A hinged door, usually found in pairs, that consists of light wooden joinery framing large panels of glass or other transparent material. Allows plenty of light into a room, and provides a nice, unobstructed view to the outside. Also referred to as French windows. 	<ul style="list-style-type: none"> Works the same as other hinged doors. Typically outside facing Typically inward swinging. 	<ul style="list-style-type: none"> typically used as exterior doors that lead to gardens, porch or balconies. also used as interior doors leading to dining rooms or master bedroom.
 <p>Dutch Doors (Stable Doors)</p>	<ul style="list-style-type: none"> A hinged door that is split horizontally in the centre, allowing the top and bottom halves to open and close independently of each other. 	<ul style="list-style-type: none"> The door is usually split along the centre, though the upper panel can be less than half of the door too. Hinges are affixed to both the upper and lower halves, usually a pair on each. Main lock is attached to the lower panel. The upper panel usually has a hook or bolt to allow it to be either propped open or locked closed. Can be turned into a regular hinged door by locking the panels. 	<ul style="list-style-type: none"> farmhouse doors stables doors servicing kitchens
 <p>Stacker Doors</p>	<ul style="list-style-type: none"> Looks like sliding doors, but contain more moving panels. Because the panels stack, they require less space than hinged doors and even bi-fold doors. Also known as stacked doors. 	<ul style="list-style-type: none"> Consist of long and relatively narrow panels which slide on a wide rail with several channels to keep them separated. Stops connect to the inside edges of the panels to allow them to engage the next panel in sequence when opening and to push it back when closing. 	<ul style="list-style-type: none"> shower screens wardrobe doors viewing doors
 <p>Sliding Doors</p>	<ul style="list-style-type: none"> Consists of a fixed panel attached to two hangers on rollers which slide along a track. The panel slides back and forth to create a door opening. Ideal for small spaces; they require a small amount of space. 	<ul style="list-style-type: none"> Works by sliding a door panel along a set of horizontal rails. Since the weight of the door is suspended on the rollers attached to the top of the door, weight is a major factor. If the door is too heavy, it will be difficult to open and may bend off the track. 	<ul style="list-style-type: none"> interior doors for rooms hallways showers wardrobes closets

WINDOW COMPONENTS – SINGLE HUNG WINDOW



OPERABLE TYPES OF WINDOWS

Single Hung Windows

- Composed of 2 sashes– a fixed upper sash and a sliding lower sash. Opens vertically.

Double Hung Windows

- Composed of 2 sashes– both upper and lower sashes can be lowered and raised.
- Opens vertically. Can be tilted.
- They provide good ventilation and insulation.
- Easier to clean than single hung windows.
- Works well with window screens.

Sliding Windows

- Sliding windows have two sections, usually made from single windows, one of the sections slides horizontally over top of the other to open or close.
- Typically used in homes with short walls because they don't take up as much vertical space.
- Normally installed near the upper portion of a wall.

Hinged/Casement Windows

- Are built with a hinge in their construction.
- They swing out to the side or up to open.
- Offers a less obstructed view.
- Good insulators.
- Are particularly effective at ventilating a space.

Awning Windows

- Are built with a hinge in their construction.
- They function like hinged or casement windows.
- Ideal for climates with a lot of rain because the window creates a water-resistant awning when opened up.

Hopper Windows

- Open up from the top and usually crank open to tip down and into a building.
- Great for compact spaces and spaces that are close to the ground. Ex. basements & bathrooms.

Jalousie/Louvered Windows

- Jalousie windows are split into many different slats of metal or glass that open like a set of blinds.
- Used in warmer climates. • Poor insulation.

FIXED/NON-OPERABLE TYPES OF WINDOWS

Bay Windows

- A window that projects out of a house composed of 3 different windows: a center picture window and two angled windows. These are all framed together with a supported floor on the bottom of them that juts out the exterior of the home.
- They enhance view, create more floor space, bring in more natural light and create a bench or nook.

Bow Windows

- A window that projects out of a house, similar to a bay window, but with more window panels and a curved structure that creates a rounded appearance on the outside of the home.
- Less floor/shelf space than bay windows.

Garden Windows

- Essentially a box made from windows that jut out of the side of your home.
- Used in kitchen windows, usually above the sink.

Picture Windows

- Typically larger windows that don't have any breaks. They provide unobstructed views.
- Are a good option for letting more light into a home and for framing a view.

Transom Windows

- Transom windows are decorative accents added to homes to help break up the space or to create interesting features.
- Often installed above doors; sometimes installed above other windows. Typically a semicircle shape.

Skylight Windows

- A skylight is essentially a window for your roof and it installs similarly to a roof vent.
- Typically remain closed and simply serve the main purpose of bringing additional light into a home.

Glass Block Windows

- Glass block windows are typically just accents added to a section of the home to add light flow but maintain privacy. Typically frosted or with designs built into the glass.

INSTALLING WINDOWS

Step 1:

- Use a level to mark the outline of the rough opening.
- Cut through siding and sheathing.
- Hold window level in the opening.
- Mark its perimeter from the outside.
- Cut sheathing along the new mark.

Step 2:

- Apply a moisture barrier along the top, bottom and sides of opening.
- Behind siding but in front of sheathing.
- Fold back and staple to trimmer studs.
- Trim off any excess.

Step 3:

- Place and adjust a pair of wooden shims at the base of the rough opening.
- Attach to bottom of frame.
- Cut shims flush with front edge of exterior wall.

Step 4:

- Center window in the opening.
- Drive a nail part-way at one of the top corners.
- Make sure it's level.
- Adjust shims as necessary.

Step 5:

- Follow the manufacturer's installation instructions for attaching windows, flashing and caulking.
- Nail on outside trim.

Step 6:

- From the inside:
- shim the window until snug.
- Nail through window jam and each set of shims into the trimmer studs.
- Fill gaps with insulation.
- Trim off excess material.
- Install interior trim.

INFO YOU MUST KNOW!

Although window types are usually categorized as either operable or fixed all windows can be made operable.

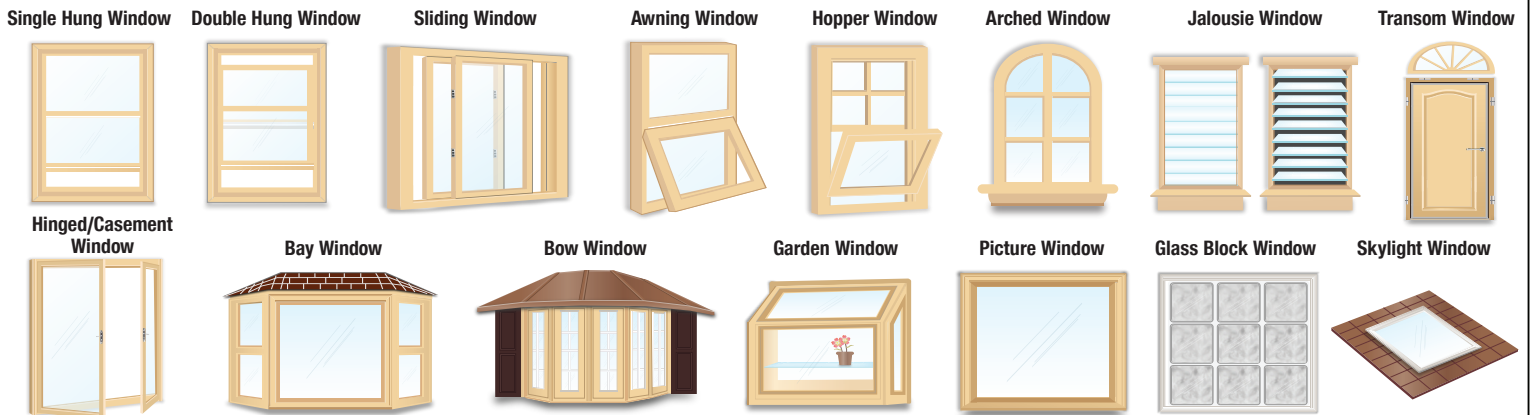
OTHER TYPES OF WINDOWS

Egress Windows

- Egress windows are large windows designed for safety.
- These windows are designed to be used as emergency exits to climb out of when a problem, such as a fire, keeps you from using a door.
- Egress windows are typically installed in basements.
- Must comply with egress opening requirements.

Storm Windows

- Storm windows are exterior windows that install right in the same frame as current windows.
- They don't replace existing windows, instead they add another layer of protection from the elements.
- They are flat panels with no breaks, making them highly effective at preventing drafts and heat loss.



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