

UDC Wall Bracing Provisions

Emergency Rule effective date 4/1/2014

A 'How To' guide for use of the new provisions

Summary: Forget what you knew about the previous wall bracing provisions – this method is a different concept. The provisions are generally based on the 2012 IRC Simplified Wall Bracing Provisions. The new prescriptive Tables provide the number of braced wall panels required on a rectangle side (intermittent sheathing method) OR the total length of braced wall panels required on a rectangle side (continuously sheathed method) in wood frame walls parallel to the wind direction being considered.

What hasn't changed? Generally the bracing materials and fastening in Table 321.25-G remain unchanged.

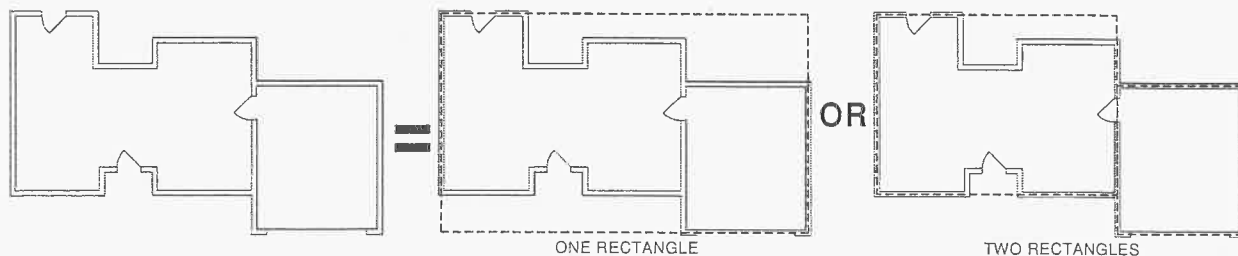
Major Assumptions/Defaults:

- Interior side of exterior walls are sheathed with ½" gypsum board
- 10' wall heights
- Wind Exposure category B
- For the intermittent bracing method roof eave (top of wall) to ridge height is 10'

Starting with the topmost floor level ...

STEP 1: Define the rectangle sides by circumscribing the outermost extents of the building at each floor level with a rectangle. The maximum length of any side of the rectangle is 75' for intermittent bracing and 80' for continuously sheathed bracing. For either method the maximum length to width ratio of the rectangle is 3:1. If the length of the rectangle side exceeds the prescriptive limit of the respective table or the length to width ratio exceeds 3:1 the building must be circumscribed or divided with more than one rectangle or designed by engineering analysis. See examples below from the rules - Figure 321.25-B.

Figure 321.25-B
DEFINING BUILDING SIDES AND LENGTHS WITH A CIRCUMSCRIBED RECTANGLE^{a,b,c}



^aEach floor plan level shall be circumscribed with one or more rectangles around the entire floor plan at the floor level under consideration as shown. When multiple rectangles are used, each side shall be braced as though it were a separate building and the bracing amount added together along the common wall where adjacent rectangles overlap.

^bRectangles shall surround all enclosed plan offsets and projections. Chimneys, partial height projections, and open structures, such as carports and decks, shall be excluded from the rectangle.

^cEach rectangle shall have a maximum rectangle length-to-width ratio of 3:1.

STEP 2: Select the wall bracing method (intermittent or continuous), materials, and panel width (intermittent method) from Table 321.25-G. If using intermittent braced wall panels, in general most of the bracing methods are considered equivalent and the method simply tells you the NUMBER of panels required on a rectangle side. For continuously sheathed bracing the method yields the total LENGTH of braced wall required on a rectangle side.

**Table 321.25-G
BRACING METHODS^a**

Method	Minimum Brace Material Thickness or Size	Maximum Nominal Wall Height ^b	Minimum Braced Wall Panel Width or Brace Angle	Connection Criteria	
				Minimum Fasteners	Maximum Spacing
Intermittent Bracing Methods					
LIB ^c Let-in bracing	1x4 wood brace (or approved metal brace installed per manufacturer instructions)	10'	45° angle and maximum 16" o.c. stud spacing ^b	2-8d common nails or 3-8d box nails (2-1/2" long x 0.113" diameter)	Per stud and top and bottom plates ^c
DWB Diagonal wood boards	3/4" (1" nominal) for maximum 24" o.c. stud spacing	10'	48"	2-8d box nails (2-1/2" long x 0.113" diameter) or 2 - 1-3/4" long 16 gage staples	Per stud and top and bottom plates ^c
WSP Wood structural panel	3/8" for maximum 16" o.c. stud spacing; 7/16" for maximum 24" o.c. stud spacing	10'	48"	6d common nail or 8d box nail (2-1/2" long x 0.113" diameter) or 7/16" crown 16 gage staples, 1-1/4" long	6" edges, 12" field (nails) 3" edges, 6" field (staples)
SFB Structural fiberboard sheathing	1/2" for maximum 16" o.c. stud spacing	10'	48"	1-1/2" long x 0.120" diameter galvanized roofing nails or 1" crown 16 gage staples, 1-1/4" long	3" edges, 6" field
GB Gypsum board (installed on both sides of wall)	1/2" for maximum 24" o.c. stud spacing	10'	96"	5d cooler nails, or #6 screws	7" edges, 7" field (including top and bottom plates)
PCP Portland cement plaster	3/4" for maximum 16" o.c. stud spacing	10'	48"	1-1/2" long, 11 gage, 7/16" diameter head nails or 7/8" long, 16 gage staples	6" o.c. on all framing members
Continuous Sheathed Bracing Methods					
CS-WSP ^d Continuous sheathed WSP	3/8" for maximum 16" o.c. stud spacing; 7/16" for maximum 24" o.c. stud spacing	12'	Refer to Table 321.25-H	Same as WSP	Same as WSP
CS-SFB ^d Continuous	1/2" for maximum 16" o.c. stud			Same as SFB	Same as SFB

sheathed SFB	spacing				
Narrow Panel Bracing					
PF Portal frame	7/16"	12'	Refer to Figure 321.25-A	Refer to Figure 321.25-A	Refer to Figure 321.25-A

^aThe interior side of all exterior walls shall be sheathed minimum ½" gypsum wall board. All edges of panel-type wall bracing, except horizontal joints in GB bracing, shall be attached to framing or blocking.

^bThe actual measured wall height shall include stud height and thickness of top and bottom plates. The actual wall height shall be permitted to exceed the listed nominal values by not more than 4 inches. Tabulated bracing amounts in s. SPS 321.25 (8) (c) are based on a 10-foot nominal wall height for all bracing methods and shall be permitted to be adjusted to other nominal wall heights not exceeding 12 feet in accordance with footnotes to Table 321.25-I or Table 321.25-J.

^cMethod LIB may not be permitted for walls supporting a roof and two floors. Two LIB braces installed at a 60° angle from horizontal shall be permitted to be substituted for each 45° angle LIB brace.




^dBracing methods CS-WSP and CS-SFB shall have sheathing installed on all sheathable surfaces above, below, and between wall openings.

^eShall be attached to the top and bottom plates and any intermediate studs, in one continuous length.

STEP 3: DETERMINE NUMBER OF PANELS OR REQUIRED TOTAL LENGTH OF BRACING REQUIRED USING ONE OF THE FOLLOWING METHODS

- A) Intermittent braced wall panels. Determine the NUMBER of braced panels required on each rectangle side using Table 321.25-I based on the length of the perpendicular side. NOTE a minimum of 2 braced wall panels is required on each rectangle side.

Table 321.25-I
REQUIRED NUMBER OF INTERMITTENT BRACED WALL PANELS
ON EXTERIOR WALLS PARALLEL TO EACH RECTANGLE SIDE
AT EACH FLOOR LEVEL^{a,b,c,d,e,f,g,h}

Wall Supporting:		Required Number of Brace Panels on a Building Side		
		Length of Perpendicular Side (feet)		
		≤25'	50'	75'
Roof and ceiling only		1	2	3
One floor, roof and ceiling		2	4	6
Two floors, roof and ceiling		3	6	9

^aInterpolation shall be permitted. Extrapolation is prohibited.

^bTable applies to wind exposure category B. For wind exposure category C or D, multiply number of braced wall panels required by 1.3 or 1.6, respectively.

Wind exposure category B is comprised of urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.

Wind exposure category C is comprised of flat, open country and grasslands with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet extending more than 1,500 feet from the building site in any quadrant. This exposure also applies to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet.

Wind exposure category D is comprised of flat, unobstructed areas exposed to wind flowing over open water for a distance of at least 1 mile. This exposure applies only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 1,500 feet or 10 times the height of the building or structure, whichever is greater.

^cTabulated values are based on a nominal wall height of 10 feet. For nominal wall heights other than 10 feet and not more than 12 feet, multiply the required number of brace panels by the following factors: 0.9 for 8 feet, 0.95 for 9 feet, 1.15 for 11 feet, or 1.3 for 12 feet.

^dTabulated values are based on a roof eave-to-ridge height of 10 feet. For roof eave-to-ridge heights other than 10 feet, multiply the required number of brace panels by the following factors for each floor level support condition:

- Roof only – 0.7 for 5 feet, 1.3 for 15 feet, or 1.6 for 20 feet
- Roof + 1 Floor – 0.85 for 5 feet, 1.15 for 15 feet, or 1.3 for 20 feet
- Roof + 2 Floors – 0.9 for 5 feet or 1.1 for 15 feet.

^eWhere minimum ½" gypsum wall board is not included on the interior side of the wall, multiply the number of braced wall panels by 1.7 for LIB bracing or 1.4 for all other bracing methods.





^fAdjustments in footnotes b-d apply cumulatively. Fractions of panels shall be rounded to the nearest one-half braced wall panel.

^gThe following braced wall panel conditions shall be permitted to be counted as one-half a braced wall panel toward meeting the required number of panels: (1) one 60 degree LIB; (2) one 48" GB or one 96" GB with gypsum wall board on one side; (3) one 36" WSP, SFB, or PCP braced wall panel for wall heights not more than 9 feet; (4) a 48" WSP or SFB braced wall panel where there is no more than one unblocked horizontal joint; or (5) one PF brace panel complying with Figure 321.25-A.

OR

- B) Continuously Sheathed braced walls. Determine the TOTAL LENGTH of braced wall panels on each rectangle side using Table 321.25-J based on the length of the perpendicular side.

Table 321.25-J
REQUIRED LENGTH OF CONTINUOUS BRACING ON EXTERIOR WALLS
PARALLEL TO EACH RECTANGLE SIDE AT EACH FLOOR LEVEL^{a,b,c,d,e}

Eave-to-Ridge Height (feet)	Wall Supporting: ^e		Required Length (feet) of Bracing on Any Side of Rectangle							
			Length of perpendicular side (feet) ^e							
			10	20	30	40	50	60	70	80
10	Roof and ceiling only		2.0	3.5	5.0	6.0	7.5	9.0	10.5	12.0
	One floor, roof and ceiling		3.5	6.5	9.0	12.0	14.5	17.0	19.8	22.6
	Two floors, roof and ceiling		5.0	9.5	13.5	17.5	21.5	25.5	29.2	33.4
15	Roof and ceiling only		2.6	4.6	6.5	7.8	9.8	11.7	13.7	15.7

	One floor, roof and ceiling		4.0	7.5	10.4	13.8	16.7	19.6	22.9	26.2
	Two floors, roof and ceiling		5.5	10.5	14.9	19.3	23.7	27.5	32.1	36.7
20	Roof and ceiling only		2.9	5.2	7.3	8.8	11.1	13.2	15.4	17.6
	One floor, roof and ceiling		4.5	8.5	11.8	15.6	18.9	22.1	25.8	29.5
	Two floors, roof and ceiling		6.2	11.9	16.8	21.8	27.3	31.1	36.3	41.5

^aInterpolation shall be permitted; extrapolation shall be prohibited.

^bTable applies to wind exposure category B. For wind exposure category C or D, multiply number of braced wall panels required by 1.3 or 1.6, respectively. Wind exposure categories are as defined in Table 321.25-I footnote b.

^cTabulated values are based on a nominal wall height of 10 feet. For nominal wall heights other than 10 feet, multiply the required length of bracing by the following factors: 0.90 for 8 feet, 0.95 for 9 feet, 1.05 for 11 feet, or 1.10 for 12 feet.

^dWhere minimum ½" gypsum wall board interior finish is not provided, the required bracing amount for the affected rectangle side shall be multiplied by 1.40.

^ePerpendicular sides to the front and rear sides are the left and right sides. Perpendicular sides to the left and right sides are the front and rear sides. See Figure 321.25-B.

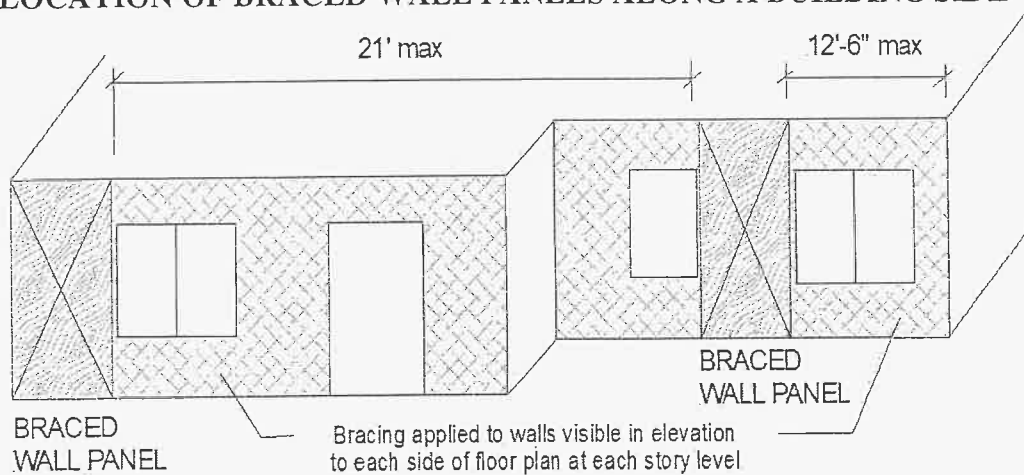
STEP 4: If required, apply any adjustment factors (adjustments may decrease or increase the required bracing amount) per the footnotes to the respective Table for the method used (intermittent or continuous). For example wall heights taller than 10' and wind exposure category C or D would both increase the bracing amount. Absence of interior ½" gypsum board sheathing increases the required bracing amount.

STEP 5: Repeat steps 2 through 4 considering wind in the perpendicular direction.

STEP 6: Determine the minimum required width of braced wall panels. For intermittent bracing method the minimum length of braced wall panel is given in Table 321.25-G. For continuously sheathed bracing method the minimum width is determined using Table 321.25-H dependent on the maximum opening height adjacent to the panel and the wall height. **PF (Portal Frame) Method:** Portal Frame narrow panel bracing may be used with either the intermittent or continuously sheathed bracing methods. For Intermittent bracing, per Table 321.25-I footnote 'h', each PF panel (16-24" wide per Figure 321.25-A) counts as ½ of a braced wall panel when determining compliance with Table 321.25-I. For Continuously Sheathed bracing, the actual length of each PF panel (16-24" wide per Figure 321.15-A) in feet, counts toward the required total length of bracing required.

STEP 7: Check that the location of braced wall panels meets Figure 321.25-C. A braced wall panel must start within 12 ½' from the end of the rectangle side and braced panels must be spaced a maximum of 21' edge to edge along the rectangle side. For intermittent or continuous methods, each PF panel meeting the minimum required width of Fig. 321.25-A counts as a braced wall panel when evaluating compliance with Fig. 321.25-C.

FIGURE 321.25-C
LOCATION OF BRACED WALL PANELS ALONG A BUILDING SIDE^a



^aContinuous sheathing shall be applied to all surfaces of the wall, including areas between brace panels and above and below wall openings.

STEP 8: Repeat steps 1 through 7 for additional floor levels.

Frequently Asked Questions UDC Wall Bracing Emergency Rules

1. What was the emergency necessitating the emergency rule provisions for wall bracing?

Some building designers, home builders, and regulatory officials performing permitting, plan review and inspections, find the current rules for wall bracing for one- and two-family dwellings are too difficult to understand and apply, which results in unnecessary costs and delays in home building. Promulgating revisions to the rules through the emergency rule process is needed in order to avoid these costs and delays as soon as possible. In addition, the report that the Dwelling Code Council is required to complete by July 1, 2014, under section 101.62 (4) of the Statutes is expected to include recommendations to clarify and simplify these rules through the emergency rule process.

2. I am very comfortable using and complying with the current UDC Wall Bracing provisions. May I continue to use this method after the effective date of the Emergency Rules?

No, while the design wind pressure remains unchanged at 20 psf the new provisions are based on the 2012 IRC Simplified Wall Bracing Method. The 2012 IRC Simplified Method (and prior 2009 IRC Wall Bracing Provisions) is the result of an Ad Hoc Wall Bracing Committee established by ICC. This committee developed a rational design

approach for wall bracing taking into consideration recent research and large scale testing by APA – The Engineered Wood Association, Simpson Strong Tie, and National Association of Home Builders as well as several conventional wood frame whole house tests. In some cases the emergency rules may require slightly more bracing and the bracing to be distributed in different locations than what was required under the previous UDC wall bracing provisions while at the same time providing a simplified approach and greater flexibility to achieve code compliance.

3. When reviewing plans and processing permit applications how does one determine which rules to apply?

The 'code applies' date is the date upon which a valid permit application is received by the authority having jurisdiction. If received prior to the effective date the current wall bracing provisions OR the simplified method in the emergency rules may be used. If received after the effective date of the emergency rules the emergency rules shall be used to determine compliance with the wall bracing requirements.

Wall Bracing Compliance Worksheet

Complete this worksheet or provide equivalent information on the plans submitted with the permit application.

Sketch and dimension the building plan and the wall bracing rectangle(s) per 321.25(8)(c)1. and Figure 321.25-B. Provide and label additional sketches if the building plan/rectangles change at different floor levels.

Indicate applicable Wall Bracing Method for each level (see Table 321.25-G), each labeled rectangle if more than one [see 321.25(8)(c)], and amount of bracing (# of braced panels or length of braced wall required) per the respective table (provide additional worksheets for additional rectangles as needed):

Rectangle: _____ Wall Ht. = _____ Eave to Ridge Ht. = _____ Max. Opening Ht. = _____ Wind Exp. = _____

Walls Supporting:	Intermittent method (LIB, DWB, WSP, SFB, GB, PCP) and # of panels per Table 321.25-I Min. panel width (Table 321.25-G) = _____		Continuous method (CS-WSP, CS-SFB) and total length required per Table 321.25-J Min. panel width (Table 321.25-H) = _____		PF Method (see Figure 321.25-A). Indicate number of PF panels 16-24" wide provided. Min. PF width (Fig. 321.25-A) = _____	
	Long side	Short side	Long side	Short side	Long side	Short side
Roof and ceiling only						
One floor, roof and ceiling						
Two floors, roof and ceiling						

Rectangle: _____ Wall Ht. = _____ Eave to Ridge Ht. = _____ Max. Opening Ht. = _____ Wind Exp. = _____

Walls Supporting:	Intermittent method (LIB, DWB, WSP, SFB, GB, PCP) and # of panels per Table 321.25-I Min. panel width (Table 321.25-G) = _____		Continuous method (CS-WSP, CS-SFB) and total length required per Table 321.25-H Min. panel width (Table 321.25-H) = _____		PF Method (see Figure 321.25-A). Indicate number of PF panels 16-24" wide provided. Min. PF width (Fig. 321.25-A) = _____	
	Long side	Short side	Long side	Short Side	Long side	Short side
Roof and ceiling only						
One floor, roof and ceiling						
Two floors, roof and ceiling						

PF Method: For Intermittent bracing, per Table 321.25-I footnote 'h', each PF panel (16-24" wide per Figure 321.25-A) counts as 1/2 of a braced wall panel when determining compliance with Table 321.25-I. For Continuously Sheathed bracing, the actual length of each PF panel (16-24" wide per Figure 321.25-A) in feet counts toward the required total length of bracing required. For intermittent or continuous methods, each PF panel meeting min. required width of Fig. 321.25-A counts as a braced wall panel when evaluating panel spacing per Fig. 321.25-C.

Indicate location of required braced wall panels determined above on each rectangle side as required by Figure 321.25-C.