

STATE OF WISCONSIN  
Department of Safety and Professional Services

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IN THE MATTER OF RULE-MAKING	:	ORDER OF THE
PROCEEDINGS BEFORE THE	:	DEPARTMENT OF SAFETY AND
DEPARTMENT OF SAFETY AND	:	PROFESSIONAL SERVICES,
PROFESSIONAL SERVICES	:	ADOPTING EMERGENCY RULES

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The statement of scope for this rule, SS #139-13, was approved by the Governor on October 28, 2013, published in Register #695 on November 14, 2013, and approved by the Department on November 26, 2013. This emergency rule was approved by the Governor on January 28, 2014.

ORDER

An order of the Department of Safety and Professional Services to amend SPS 321.02 (1) (c), 321.23, Table 321.25–A, 321.25 (7) (d) and (8) (a) (Note), and 320 to 325 Appendix – Minimum Fastener Schedule Table; and to repeal and recreate SPS 321.25 (8) (b) to (h) and (9), relating to wall bracing for one- and two-family dwellings.

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FINDING OF EMERGENCY

The Department of Safety and Professional Services finds that an emergency exists and that this rule is necessary for the immediate preservation of the public peace, health, safety, or welfare. A statement of facts constituting the emergency is as follows.

Some building designers 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.

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ANALYSIS

**Statutes interpreted:**

Sections 101.63 (intro.) and (1) (intro.) and (5).

**Statutory authority:**

Sections 227.24 (1) (a), 227.11 (2) (a), and 101.63 (intro.) and (1) (intro.).

**Explanation of agency authority:**

Section 227.24 (1) (a) of the Statutes authorizes the Department to promulgate rules as emergency rules if preservation of the public peace, health, safety, or welfare necessitates putting

the rules into effect prior to the time they would take effect if the agency complied with the otherwise applicable procedures in chapter 227.

Section 227.11 (2) (a) authorizes the Department to promulgate rules interpreting any statute that is enforced or administered by the Department, if the rule is considered necessary to effectuate the purpose of the statute.

Sections 101.63 (intro.) and (1) (intro.) require the Department to adopt rules which establish standards for the construction and inspection of one- and two-family dwellings and components thereof. No set of rules may be adopted that has not taken into account the costs of specific code provisions to home buyers in relationship to the benefits derived from the provisions.

**Related statute or rule:**

Various other statutes and rules promulgated by the Department address construction and inspection of public buildings and places of employment, and some of those rules likewise address designing those structures to withstand wind loads.

**Plain language analysis:**

These rule revisions clarify and simplify the prescriptive methods in chapter SPS 321 for designing wall bracing for one- and two-family homes, to adequately withstand wind loads.

**Summary of, and comparison with, existing or proposed federal regulation:**

An Internet-based search of the *Code of Federal Regulations* (CFR) and the *Federal Register* did not find any federal regulations relating to the rule revisions herein for one- and two-family dwellings – other than the preemptive construction, installation, and safety standards for manufactured homes in 24 CFR Parts 3280 and 3285.

**Comparison with rules in adjacent states:**

**Illinois:** An Internet-based search did not reveal the existence of a statewide one- and two-family dwelling code. Dwelling regulation appears to be left up to the individual local units of government.

**Iowa:** An Internet-based search did not reveal the existence of a statewide one- and two-family dwelling code. Dwelling regulation appears to be left up to the individual local units of government.

**Michigan:** An Internet-based search revealed a mandatory, statewide one- and two-family dwelling code. The Residential Construction Code under the Construction Code Commission’s General Rules, in section 408.305, contains the state amendments to the 2009 International Residential Code (IRC) developed by the International Code Council, and includes wall-bracing requirements that are similar to the requirements which are replaced by the rule revisions contained herein.

**Minnesota:** An Internet-based search revealed a mandatory, statewide one- and two-family dwelling code. The Minnesota Department of Labor and Industry, in Chapter 1309, adopts the 2006 IRC, chapters 2-10 and 43. Chapters 2-10 contain the general construction provisions of the IRC, which include wall-bracing requirements that are similar to the requirements which are replaced by the rule revisions contained herein.

**Summary of factual data and analytical methodologies:**

The Department received input during several meetings with the Dwelling Code Council. The makeup of this Council is established under section 15.407 (10) of the Statutes and consists of members who are appointed by the Governor. The Council includes representatives of several types of small businesses. Through this Council, the Department was able to gather information on the potential impacts of the rule revisions contained herein.

**Analysis and supporting documents used to determine effect on small business or in preparation of economic impact analysis:**

The rule revisions do not significantly impact small business because they clarify and simplify current requirements rather than impose new restrictions.

**Fiscal Estimate:**

The Department estimates that these rule revisions will have positive rather than negative fiscal impacts.

**Effect on small business:**

These rule revisions do not have an economic impact on small businesses, as defined in section 227.114 (1) of the Statutes. The Department’s Regulatory Review Coordinator may be contacted by e-mail at Tom.Engels@wisconsin.gov, or by calling (608) 266-8608.

**Agency contact person:**

Sam Rockweiler, Rules Coordinator, at the Department of Safety and Professional Services, Division of Policy Development, 1400 East Washington Avenue, Room 151, P.O. Box 8935, Madison, WI, 53708-8935; or at telephone (608) 266-0797; or e-mail at [sam.rockweiler@wi.gov](mailto:sam.rockweiler@wi.gov).

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TEXT OF RULE

SECTION 1. SPS 321.02 (1) (c) is amended to read:

**SPS 321.02 (1) (c) Wind loads.** 1. Dwellings shall be designed and constructed to withstand a horizontal and uplift pressure of 20 pounds per square foot acting over the surface area, except wind loads may be determined in accordance with ASCE 7–05, *Minimum Design Loads for Buildings and Other Structures*.

2. No wind load reduction may be permitted for the shielding effect of other buildings.

3. Compliance with the prescriptive construction requirements of this chapter shall be deemed to be compliance with this paragraph.








SECTION 2. SPS 321.23 is amended to read:

**SPS 321.23 Wall design. (1) LIVE AND DEAD LOADS.** All walls shall support all superimposed vertical dead loads and live loads from floors and roofs.

**(2) HORIZONTAL WIND LOAD.** Walls shall be designed to withstand a horizontal wind pressure of at least 20 pounds per square foot applied to the vertical projection of that portion of the dwelling above grade. No wind load reduction shall be permitted for the shielding effect of other buildings. Walls shall comply with the design requirements of s. SPS 321.02. Compliance with the prescriptive construction requirements of s. SPS 321.25 shall be deemed to be compliance with this section.

SECTION 3. SPS Table 321.25–A is amended to read:

**Table 321.25–A  
SIZE, HEIGHT AND SPACING OF WOOD STUDS<sup>a</sup>  
(Partial Table)**

Stud Size (inches)	Laterally Unsupported Stud Height <sup>a</sup> (feet)	Bearing Walls				Nonbearing Walls	
		Maximum Spacing When Supporting Roof and Ceiling Only (inches)	Maximum Spacing When Supporting One Floor, Roof and Ceiling (inches)	Maximum Spacing When Supporting Two Floors, Roof and Ceiling (inches)	Maximum Spacing When Supporting One Floor Only (inches)	Laterally Unsupported Stud Height <sup>a</sup> (feet)	Maximum Spacing (inches)
2x4	10 <u>12</u>	 24	 16	 -	 24	14	24
2x6	<del>10</del> <u>12</u>	 24	 24	16	 24	20	24

SECTION 4. SPS 321.25 (7) (d) and (8) (a) (Note) are amended to read:

**SPS 321.25 (7) (d)** Cripple walls with a stud height of 14 inches or greater shall be braced in accordance with sub. (8) ~~or (9)~~.

**(8) (a) Note:** Acceptable engineering wall bracing practices include any of the following:

1. The provisions under ~~s.~~ section R602.10 or R602.12 of the International Residential Code (IRC) – 2009 2012.

2. Design in accordance with the engineering basis of the 2012 IRC bracing provisions as described in Crandell, J. and Martin, Z., “The Story Behind the 2009 IRC Wall Bracing Provisions (Part 2: New Wind Bracing Requirements),” Wood Design Focus, Forest Products Society, Peachtree Corners, GA, Spring 2009.

3. Bracing manufacturer installation instructions and code-compliance data.

SECTION 5. SPS 321.25 (8) (b) to (h) and (9) are repealed and recreated to read:

**SPS 321.25 (8) (b) Bracing materials and methods.** Wall bracing shall use the materials and methods listed in Table 321.25–G or approved alternatives capable of providing the required wind load resistance as determined in accordance with s. SPS 321.02 (1) (c). Alternative bracing methods that are an approved as equivalent to one of the bracing methods listed in Table 321.25–G shall be permitted to use the requirements for that bracing method contained herein.

**Table 321.25–G  
BRACING METHODS<sup>a</sup>**

Method	Minimum Brace Material Thickness or Size	Maximum Nominal Wall Height <sup>b</sup>	Minimum Braced Wall Panel Width or Brace Angle	Connection Criteria	
				Minimum Fasteners	Maximum Spacing
Intermittent Bracing Methods					
LIB <sup>c</sup> Let-in bracing	1x4 wood brace (or approved metal brace installed per manufacturer instructions)	10'	45° angle and maximum 16" o.c. stud spacing <sup>b</sup>	2-8d common nails or 3-8d box nails (2-1/2" long x 0.113" diameter)	Per stud and top and bottom plates <sup>c</sup>
DWB Diagonal wood boards	¾" (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 <sup>c</sup>
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	½" 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)	½" 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	¾" for maximum 16" o.c. stud	10'	48"	1-1/2" long, 11 gage, 7/16" diameter	6" o.c. on all framing

cement plaster	spacing			head nails or 7/8" long, 16 gage staples	members
<b>Continuous Sheathed Bracing Methods</b>					
CS-WSP <sup>d</sup> 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 <sup>d</sup> Continuous sheathed SFB	1/2" for maximum 16" o.c. stud spacing			Same as SFB	Same as SFB
<b>Narrow Panel Bracing</b>					
PF Portal frame	7/16"	12'	Refer to Figure 321.25-A	Refer to Figure 321.25-A	Refer to Figure 321.25-A

<sup>a</sup>The interior side of all exterior walls shall be sheathed minimum 1/2" gypsum wall board. All edges of panel-type wall bracing, except horizontal joints in GB bracing, shall be attached to framing or blocking.

<sup>b</sup>The 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.

<sup>c</sup>Method 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.

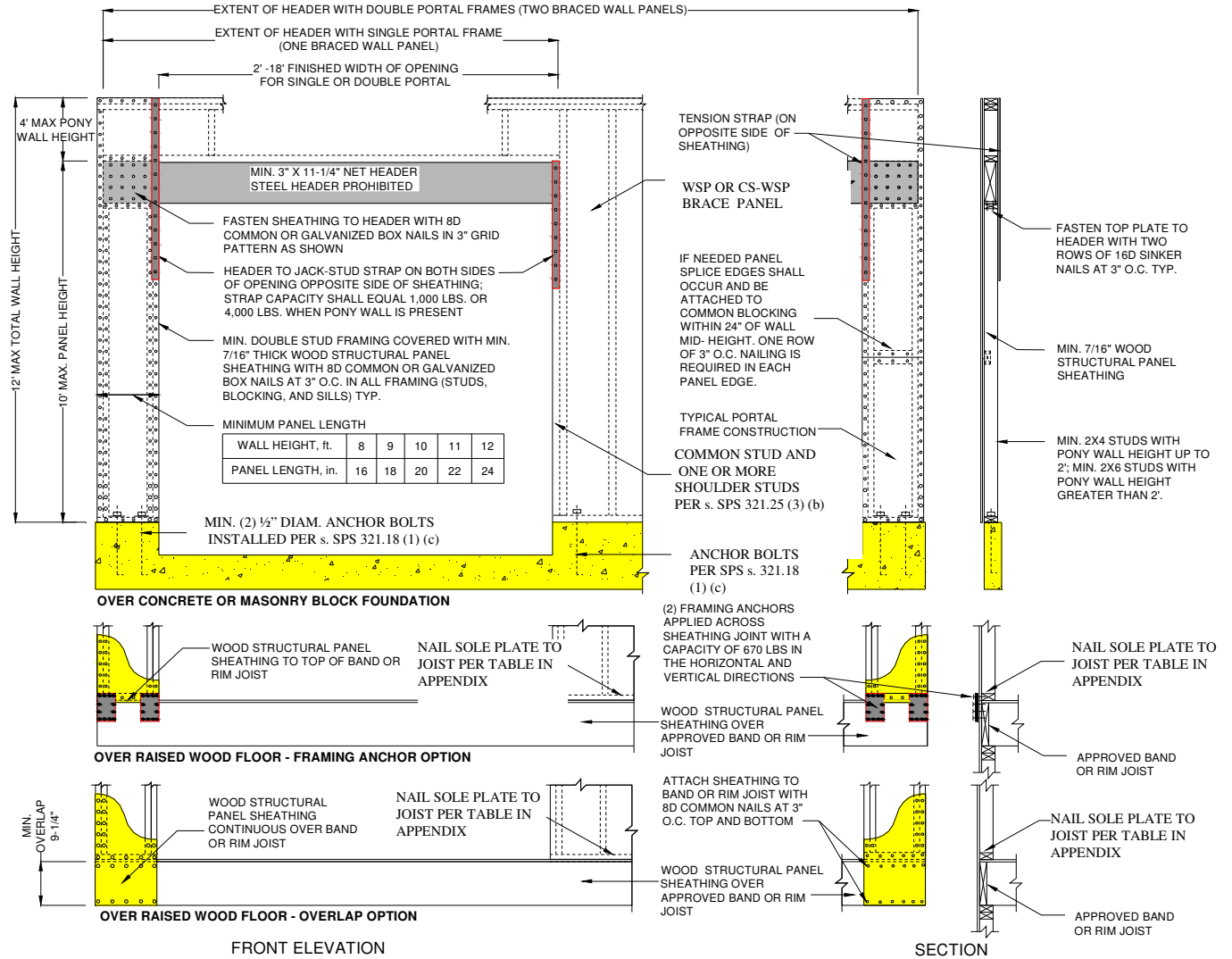
<sup>d</sup>Bracing methods CS-WSP and CS-SFB shall have sheathing installed on all sheathable surfaces above, below, and between wall openings.

<sup>e</sup>Shall be attached to the top and bottom plates and any intermediate studs, in one continuous length.

**Table 321.25-H  
MINIMUM WIDTHS OF METHOD CS-WSP AND CS-SFB BRACED WALL PANELS**

Maximum Opening Height Adjacent to Braced Wall Panel	Minimum Length of Braced Wall Panel (inches)			
	8' Tall Wall	9' Tall Wall	10' Tall Wall	12' Tall Wall
Up to 5' – 4"	24	27	30	36
Up to 6' – 8"	32	30	30	36
Up to 8'	48	41	38	36
Up to 9'	-	54	46	41
Up to 10'	-	-	60	48
Up to 12'	-	-	-	72

**Figure 321.25-A  
METHOD PF – PORTAL FRAME BRACE CONSTRUCTION**



(c) *Bracing amount.* Bracing methods and materials complying with Table 321.25–G shall be applied to exterior walls in accordance with all of the following requirements:

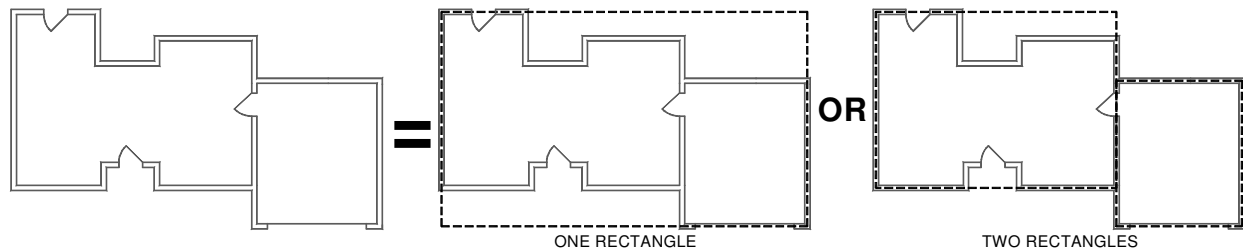
1. For the purpose of determining bracing amounts, the outermost extents of the building plan at each floor level shall be circumscribed with a rectangle to define the overall length of each building side as shown in Figure 321.25–B.
2. In no case may the amount of bracing be less than two braced wall panels on exterior walls parallel to each rectangle side for each floor level of the building.
3. Where used, the number of intermittent brace panels applied to walls parallel to each rectangle side shall comply with Table 321.25–I.
4. Where used, the total length of continuous sheathed brace panels applied to walls parallel to each building side shall comply with Table 321.25–J.

5. The location of brace panels applied to walls parallel to each building side shall comply with Figure 321.25–C.

6. The interior side of exterior walls shall be sheathed with minimum ½” gypsum board interior finish unless otherwise permitted to be excluded by this subsection.

7. Balloon-frame walls shall have a maximum height of two floors unless constructed in accordance with an approved design. Wall framing shall be continuous from the lowest floor to the wall top plate at the roof. All edges of sheathing shall be supported on and fastened to blocking or framing. Braced wall panels may not be required on the balloon-frame wall portion provided the bracing amount and brace spacing requirement are satisfied for the building side. Where brace panels must be located on the balloon-frame wall portion to satisfy bracing requirements for the building side containing the balloon-frame wall portion, brace wall panels shall extend to the full height of the balloon-frame wall.

**Figure 321.25–B**  
**DEFINING BUILDING SIDES AND LENGTHS WITH A CIRCUMSCRIBED**  
**RECTANGLE<sup>a,b,c</sup>**



<sup>a</sup>Each 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.


<sup>b</sup>Rectangles 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.

<sup>c</sup>Each rectangle shall have a maximum rectangle length-to-width ratio of 3:1.

**Table 321.25–I**  
**REQUIRED NUMBER OF INTERMITTENT BRACED WALL PANELS**  
**ON EXTERIOR WALLS PARALLEL TO EACH RECTANGLE SIDE**  
**AT EACH FLOOR LEVEL<sup>a,b,c,d,e,f,g,h</sup>**

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
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<sup>a</sup>Interpolation shall be permitted. Extrapolation is prohibited.

<sup>b</sup>Table 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.

<sup>c</sup>Tabulated 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.

<sup>d</sup>Tabulated 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.






<sup>e</sup>Where 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.

<sup>f</sup>Adjustments in footnotes b-d apply cumulatively. Fractions of panels shall be rounded to the nearest one-half braced wall panel.

<sup>g</sup>The 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.

**Table 321.25–J**  
**REQUIRED LENGTH OF CONTINUOUS BRACING ON EXTERIOR WALLS**  
**PARALLEL TO EACH RECTANGLE SIDE AT EACH FLOOR LEVEL<sup>a,b,c,d,e</sup>**

Eave-to-Ridge Height (feet)	Wall Supporting: <sup>e</sup>		Required Length (feet) of Bracing on Any Side of Rectangle							
			Length of perpendicular side (feet) <sup>e</sup>							
			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

<sup>a</sup>Interpolation shall be permitted; extrapolation shall be prohibited.

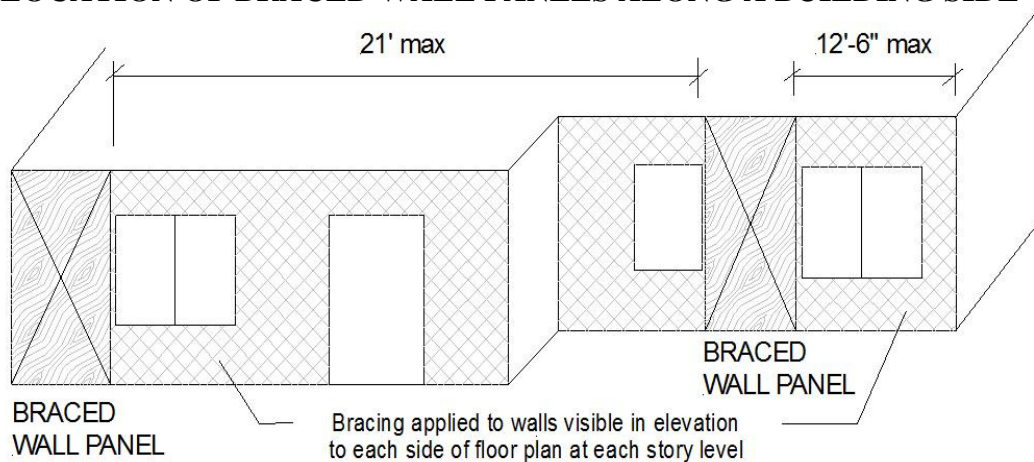
<sup>b</sup>Table applies to wind exposure category B. For wind exposure category C or D, multiply number of braced wall panels required by 1.3 or 1.6, respectively. Wind exposure categories are as defined in Table 321.25-I footnote b.

<sup>c</sup>Tabulated 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.

<sup>d</sup>Where minimum 1/2" gypsum wall board interior finish is not provided, the required bracing amount for the affected rectangle side shall be multiplied by 1.40.

<sup>e</sup>Perpendicular 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.

**FIGURE 321.25-C  
LOCATION OF BRACED WALL PANELS ALONG A BUILDING SIDE<sup>a</sup>**



<sup>a</sup>Continuous sheathing shall be applied to all surfaces of the wall, including areas between brace panels and above and below wall openings.

SECTION 6. SPS 320 to 325 Appendix, Minimum Fastener Schedule Table is amended to read:

**CHAPTERS SPS 320–325 Appendix  
MINIMUM FASTENER SCHEDULE TABLE  
(Partial Table)**

Other interior and exterior panel products and finishes installed per manufacturer requirements.  
For engineered connectors, use manufacturer's specified fasteners.

Description of Building Materials/Connection	Number and Type of Fastener <sup>1 2 3</sup>
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**Wall Framing**

Sole plate to joist or blocking, face nail

2-16d at 16"o.c.

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SECTION 7. EFFECTIVE DATE. This emergency rule shall take effect on April 1, 2014, as provided in s. 227.24 (1) (c.), Stats.

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(END OF TEXT OF RULE)  
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Dated \_\_\_\_\_

Agency \_\_\_\_\_

Dave Ross, Secretary of the  
Department of Safety and  
Professional Services