
Double Stud XL Span Tables

60 Cell Modules
16" Rafter Spacing
7/16" OSB

Roof Pitch 0-7 Degree

Interior Wind Zone 1, page 2

Edge Wind Zone 2, page 3

Edge Wind Zone 3, page 4

Roof Pitch 7-27 Degree

Interior Wind Zone 1, page 5

Edge Wind Zone 2, page 6

Edge Wind Zone 3, page 7

Roof Pitch 27-45 Degree

Interior Wind Zone 1, page 8

Edge Wind Zone 2, page 9

Edge Wind Zone 3, page 10

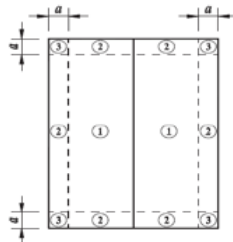
**Table 146: Zilla® Double Stud XL – 16" Rafter Spacing, 7/16" OSB, 48" Continuous Rail Spans
Maximum Module Size 66" x 41"- Typical 60 Cell Module**

Roof Pitch ≤ 7°						
Interior Wind Zone 1						
Exposure	Basic Wind Speed	0 psf Snow Load	10 psf Snow Load	20 psf Snow Load	30 psf Snow Load	40 psf Snow Load
B (urban/ suburban)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
C (rural)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
D (flat, unobstructed areas / shorelines)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard

Tabulated values are based upon the following:

- Building height is less than or equal to 30 feet.
- Residential gable roofs with roof slope less than or equal to 7 degrees.
- Maximum photovoltaic module size is 66 inches long by 41 inches wide.
- Standard Zilla Double Stud XL spaced at 48" OC assumes photovoltaic modules supported by two continuous rails spanning a maximum of 48" parallel to the short side of the module.
- Standard Zilla Double Stud XL design pertains only to the Double Stud XL connection. Design of rails attached to the Double Stud XL and existing structure are outside the scope of this design.
- Photovoltaic modules are parallel with the roof slope.
- Loads per ASCE 7-10 Minimum Design Loads for Buildings and Other Structures.
- ASCE 7-10 Wind Exposure Categories:
 - Exposure B = Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.
 - Exposure C = Open terrain with scattered obstructions having heights generally less than 30 ft. Includes flat open country and grasslands.
 - Exposure D = Flat, unobstructed areas and water surfaces. This category includes smooth mud flats, salt flats, and unbroken ice.
- ASCE 7-10 Wind Load Parameters:
 - Risk Category II
 - Topographic Factor (K_{zt}) = 1.0 [*Note: This value has been set to 1.0 under the assumption that the system is NOT located on the upper half of a hill or ridge or near the crest of an escarpment.]
 - Directionality Factor (K_d) = 0.85
- The snow load indicated in the tables is the snow load applied to the modules.
- Edge Wind Zone is defined by ASCE 7-10 as a with a being equal to: 10 percent of least horizontal dimension or $0.4h$ (h = height of building), whichever is smaller, but not less than either 4 percent of least horizontal dimension or 3 feet.

Wind Zones for Gable Roofs with $\theta \leq 7^\circ$:



For installations that do not conform to the assumptions listed above contact Zilla for a more complete engineering analysis.

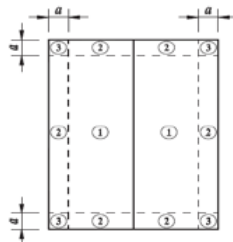
**Table 147: Zilla® Double Stud XL – 16” Rafter Spacing, 7/16” OSB, 48” Continuous Rail Spans
Maximum Module Size 66” x 41”- Typical 60 Cell Module**

Roof Pitch ≤ 7°						
Edge Wind Zone 2						
Exposure	Basic Wind Speed	0 psf Snow Load	10 psf Snow Load	20 psf Snow Load	30 psf Snow Load	40 psf Snow Load
B (urban/ suburban)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
C (rural)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
D (flat, unobstructed areas / shorelines)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	custom	custom	custom	custom	custom

Tabulated values are based upon the following:

- Building height is less than or equal to 30 feet.
- Residential gable roofs with roof slope less than or equal to 7 degrees.
- Maximum photovoltaic module size is 66 inches long by 41 inches wide.
- Standard Zilla Double Stud XL spaced at 48" OC assumes photovoltaic modules supported by two continuous rails spanning a maximum of 48" parallel to the short side of the module.
- Standard Zilla Double Stud XL design pertains only to the Double Stud XL connection. Design of rails attached to the Double Stud XL and existing structure are outside the scope of this design.
- Photovoltaic modules are parallel with the roof slope.
- Loads per ASCE 7-10 Minimum Design Loads for Buildings and Other Structures.
- ASCE 7-10 Wind Exposure Categories:
 - Exposure B = Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.
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- ASCE 7-10 Wind Load Parameters:
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 - Topographic Factor (K_{zt}) = 1.0 [*Note: This value has been set to 1.0 under the assumption that the system is NOT located on the upper half of a hill or ridge or near the crest of an escarpment.]
 - Directionality Factor (K_d) = 0.85
- The snow load indicated in the tables is the snow load applied to the modules.
- Edge Wind Zone is defined by ASCE 7-10 as a with a being equal to: 10 percent of least horizontal dimension or $0.4h$ (h = height of building), whichever is smaller, but not less than either 4 percent of least horizontal dimension or 3 feet.

Wind Zones for Gable Roofs with $\theta \leq 7^\circ$:



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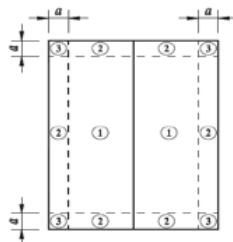
**Table 148: Zilla® Double Stud XL – 16” Rafter Spacing, 7/16” OSB, 48” Continuous Rail Spans
Maximum Module Size 66” x 41”- Typical 60 Cell Module**

Roof Pitch ≤ 7°						
Edge Wind Zone 3						
Exposure	Basic Wind Speed	0 psf Snow Load	10 psf Snow Load	20 psf Snow Load	30 psf Snow Load	40 psf Snow Load
B (urban/ suburban)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
C (rural)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	custom	custom	custom	custom	custom
	120 mph	custom	custom	custom	custom	custom
D (flat, unobstructed areas / shorelines)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	custom	custom	custom	custom	custom
	110 mph	custom	custom	custom	custom	custom
	120 mph	custom	custom	custom	custom	custom

Tabulated values are based upon the following:

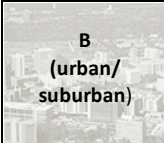
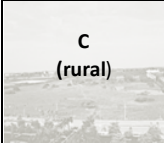
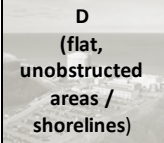
- Building height is less than or equal to 30 feet.
- Residential gable roofs with roof slope less than or equal to 7 degrees.
- Maximum photovoltaic module size is 66 inches long by 41 inches wide.
- Standard Zilla Double Stud XL spaced at 48" OC assumes photovoltaic modules supported by two continuous rails spanning a maximum of 48" parallel to the short side of the module.
- Standard Zilla Double Stud XL design pertains only to the Double Stud XL connection. Design of rails attached to the Double Stud XL and existing structure are outside the scope of this design.
- Photovoltaic modules are parallel with the roof slope.
- Loads per ASCE 7-10 Minimum Design Loads for Buildings and Other Structures.
- ASCE 7-10 Wind Exposure Categories:
 - Exposure B = Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.
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 - Exposure D = Flat, unobstructed areas and water surfaces. This category includes smooth mud flats, salt flats, and unbroken ice.
- ASCE 7-10 Wind Load Parameters:
 - Risk Category II
 - Topographic Factor (K_{zt}) = 1.0 [*Note: This value has been set to 1.0 under the assumption that the system is NOT located on the upper half of a hill or ridge or near the crest of an escarpment.]
 - Directionality Factor (K_d) = 0.85
- The snow load indicated in the tables is the snow load applied to the modules.
- Edge Wind Zone is defined by ASCE 7-10 as **a** with **a** being equal to: 10 percent of least horizontal dimension or 0.4h (h = height of building), whichever is smaller, but not less than either 4 percent of least horizontal dimension or 3 feet.

Wind Zones for Gable Roofs with $\theta \leq 7^\circ$:



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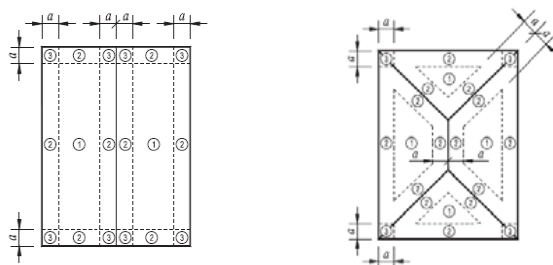
Table 149: Zilla® Double Stud XL – 16” Rafter Spacing, 7/16” OSB, 48” Continuous Rail Spans
Maximum Module Size 66” x 41”- Typical 60 Cell Module

7° < Roof Pitch ≤ 27°						
Interior Wind Zone 1						
Exposure	Basic Wind Speed	0 psf Snow Load	10 psf Snow Load	20 psf Snow Load	30 psf Snow Load	40 psf Snow Load
 B (urban/ suburban)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
 C (rural)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
 D (flat, unobstructed areas / shorelines)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard

Tabulated values are based upon the following:

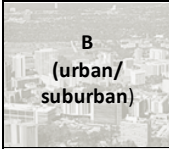
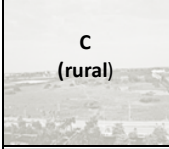
- Building height is less than or equal to 30 feet.
- Residential gable/hip roofs with roof slope greater than 7 degrees and less than or equal to 27 degrees.
- Maximum photovoltaic module size is 66 inches long by 41 inches wide.
- Standard Zilla Double Stud XL spaced at 48" OC assumes photovoltaic modules supported by two continuous rails spanning a maximum of 48" parallel to the short side of the module.
- Standard Zilla Double Stud XL design pertains only to the Double Stud XL connection. Design of rails attached to the Double Stud XL and existing structure are outside the scope of this design.
- Photovoltaic modules are parallel with the roof slope.
- Loads per ASCE 7-10 Minimum Design Loads for Buildings and Other Structures.
- ASCE 7-10 Wind Exposure Categories:
 - Exposure B = Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.
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- ASCE 7-10 Wind Load Parameters:
 - Risk Category II
 - Topographic Factor (K_{zt}) = 1.0 [*Note: This value has been set to 1.0 under the assumption that the system is NOT located on the upper half of a hill or ridge or near the crest of an escarpment.]
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- The snow load indicated in the tables is the snow load applied to the modules.
- Edge Wind Zone is defined by ASCE 7-10 as a with a being equal to: 10 percent of least horizontal dimension or $0.4h$ (h = height of building), whichever is smaller, but not less than either 4 percent of least horizontal dimension or 3 feet.
- Edge Wind Zone 3 shall be treated as Zone 2 for $\theta \leq 25^\circ$.

Wind Zones for Gable/Hip Roofs with $7^\circ < \theta \leq 27^\circ$:



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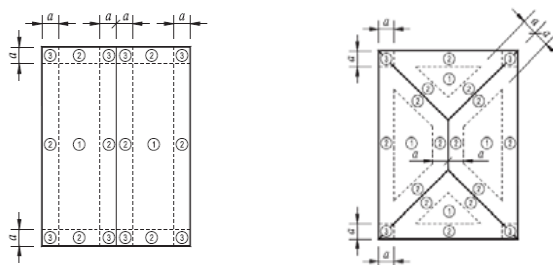
**Table 150: Zilla® Double Stud XL – 16” Rafter Spacing, 7/16” OSB, 48” Continuous Rail Spans
Maximum Module Size 66” x 41”- Typical 60 Cell Module**

7° < Roof Pitch ≤ 27°						
Edge Wind Zone 2						
Exposure	Basic Wind Speed	0 psf Snow Load	10 psf Snow Load	20 psf Snow Load	30 psf Snow Load	40 psf Snow Load
 B (urban/ suburban)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
 C (rural)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
 D (flat, unobstructed areas / shorelines)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	custom	custom	custom	custom	custom

Tabulated values are based upon the following:

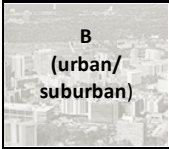
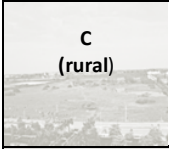
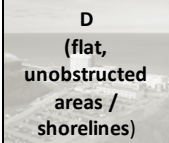
- Building height is less than or equal to 30 feet.
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- Edge Wind Zone 3 shall be treated as Zone 2 for $\theta \leq 25^\circ$.

Wind Zones for Gable/Hip Roofs with $7^\circ < \theta \leq 27^\circ$:



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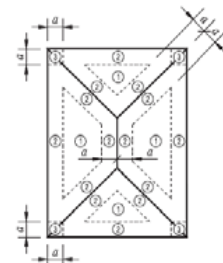
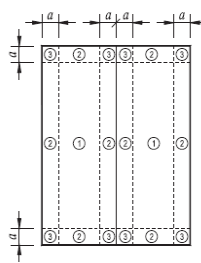
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Maximum Module Size 66" x 41"- Typical 60 Cell Module**

7° < Roof Pitch ≤ 27°						
Edge Wind Zone 3						
Exposure	Basic Wind Speed	0 psf Snow Load	10 psf Snow Load	20 psf Snow Load	30 psf Snow Load	40 psf Snow Load
 B (urban/ suburban)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
 C (rural)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	custom	custom	custom	custom	custom
	120 mph	custom	custom	custom	custom	custom
 D (flat, unobstructed areas / shorelines)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	custom	custom	custom	custom	custom
	110 mph	custom	custom	custom	custom	custom
	120 mph	custom	custom	custom	custom	custom

Tabulated values are based upon the following:

- Building height is less than or equal to 30 feet.
- Residential gable/hip roofs with roof slope greater than 7 degrees and less than or equal to 27 degrees.
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- Photovoltaic modules are parallel with the roof slope.
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- ASCE 7-10 Wind Exposure Categories:
 - Exposure B = Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.
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- ASCE 7-10 Wind Load Parameters:
 - Risk Category II
 - Topographic Factor (K_{zt}) = 1.0 [*Note: This value has been set to 1.0 under the assumption that the system is NOT located on the upper half of a hill or ridge or near the crest of an escarpment.]
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- Edge Wind Zone 3 shall be treated as Zone 2 for $\theta \leq 25^\circ$.

Wind Zones for Gable/Hip Roofs with $7^\circ < \theta \leq 27^\circ$:



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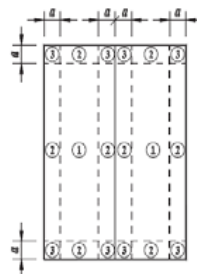
**Table 152: Zilla® Double Stud XL – 16” Rafter Spacing, 7/16” OSB, 48” Continuous Rail Spans
Maximum Module Size 66” x 41”- Typical 60 Cell Module**

27° < Roof Pitch ≤ 45°						
Interior Wind Zone 1						
Exposure	Basic Wind Speed	0 psf Snow Load	10 psf Snow Load	20 psf Snow Load	30 psf Snow Load	40 psf Snow Load
B (urban/ suburban)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
C (rural)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
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	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard

Tabulated values are based upon the following:

- Building height is less than or equal to 30 feet.
- Residential gable roofs with roof slope greater than 27 degrees and less than or equal to 45 degrees.
- Maximum photovoltaic module size is 66 inches long by 41 inches wide.
- Standard Zilla Double Stud XL spaced at 48" OC assumes photovoltaic modules supported by two continuous rails spanning a maximum of 48" parallel to the short side of the module.
- Standard Zilla Double Stud XL design pertains only to the Double Stud XL connection. Design of rails attached to the Double Stud XL and existing structure are outside the scope of this design.
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Wind Zones for Gable Roofs with $27^\circ < \theta \leq 45^\circ$:



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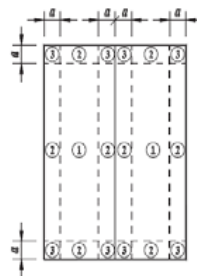
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Maximum Module Size 66” x 41”- Typical 60 Cell Module**

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Edge Wind Zone 2						
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B (urban/ suburban)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
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	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
C (rural)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
D (flat, unobstructed areas / shorelines)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard

Tabulated values are based upon the following:

- Building height is less than or equal to 30 feet.
- Residential gable roofs with roof slope greater than 27 degrees and less than or equal to 45 degrees.
- Maximum photovoltaic module size is 66 inches long by 41 inches wide.
- Standard Zilla Double Stud XL spaced at 48" OC assumes photovoltaic modules supported by two continuous rails spanning a maximum of 48" parallel to the short side of the module.
- Standard Zilla Double Stud XL design pertains only to the Double Stud XL connection. Design of rails attached to the Double Stud XL and existing structure are outside the scope of this design.
- Photovoltaic modules are parallel with the roof slope.
- Loads per ASCE 7-10 Minimum Design Loads for Buildings and Other Structures.
- ASCE 7-10 Wind Exposure Categories:
 - Exposure B = Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.
 - Exposure C = Open terrain with scattered obstructions having heights generally less than 30 ft. Includes flat open country and grasslands.
 - Exposure D = Flat, unobstructed areas and water surfaces. This category includes smooth mud flats, salt flats, and unbroken ice.
- ASCE 7-10 Wind Load Parameters:
 - Risk Category II
 - Topographic Factor (K_{zt}) = 1.0 [*Note: This value has been set to 1.0 under the assumption that the system is NOT located on the upper half of a hill or ridge or near the crest of an escarpment.]
 - Directionality Factor (K_d) = 0.85
- The snow load indicated in the tables is the snow load applied to the modules.
- Edge Wind Zone is defined by ASCE 7-10 as a with a being equal to: 10 percent of least horizontal dimension or $0.4h$ (h = height of building), whichever is smaller, but not less than either 4 percent of least horizontal dimension or 3 feet.

Wind Zones for Gable Roofs with $27^\circ < \theta \leq 45^\circ$:



For installations that do not conform to the assumptions listed above contact Zilla for a more complete engineering analysis.

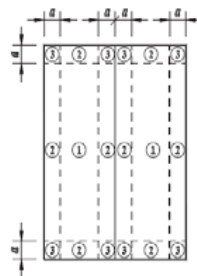
Table 154: Zilla® Double Stud XL – 16” Rafter Spacing, 7/16” OSB, 48” Continuous Rail Spans
Maximum Module Size 66” x 41” - Typical 60 Cell Module

27° < Roof Pitch ≤ 45°						
Edge Wind Zone 3						
Exposure	Basic Wind Speed	0 psf Snow Load	10 psf Snow Load	20 psf Snow Load	30 psf Snow Load	40 psf Snow Load
B (urban/ suburban)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
C (rural)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard
D (flat, unobstructed areas / shorelines)	85 mph	standard	standard	standard	standard	standard
	90 mph	standard	standard	standard	standard	standard
	100 mph	standard	standard	standard	standard	standard
	110 mph	standard	standard	standard	standard	standard
	120 mph	standard	standard	standard	standard	standard

Tabulated values are based upon the following:

- Building height is less than or equal to 30 feet.
- Residential gable roofs with roof slope greater than 27 degrees and less than or equal to 45 degrees.
- Maximum photovoltaic module size is 66 inches long by 41 inches wide.
- Standard Zilla Double Stud XL spaced at 48" OC assumes photovoltaic modules supported by two continuous rails spanning a maximum of 48" parallel to the short side of the module.
- Standard Zilla Double Stud XL design pertains only to the Double Stud XL connection. Design of rails attached to the Double Stud XL and existing structure are outside the scope of this design.
- Photovoltaic modules are parallel with the roof slope.
- Loads per ASCE 7-10 Minimum Design Loads for Buildings and Other Structures.
- ASCE 7-10 Wind Exposure Categories:
 - Exposure B = Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.
 - Exposure C = Open terrain with scattered obstructions having heights generally less than 30 ft. Includes flat open country and grasslands.
 - Exposure D = Flat, unobstructed areas and water surfaces. This category includes smooth mud flats, salt flats, and unbroken ice.
- ASCE 7-10 Wind Load Parameters:
 - Risk Category II
 - Topographic Factor (K_{zt}) = 1.0 [*Note: This value has been set to 1.0 under the assumption that the system is NOT located on the upper half of a hill or ridge or near the crest of an escarpment.]
 - Directionality Factor (K_d) = 0.85
- The snow load indicated in the tables is the snow load applied to the modules.
- Edge Wind Zone is defined by ASCE 7-10 as a with a being equal to: 10 percent of least horizontal dimension or $0.4h$ (h = height of building), whichever is smaller, but not less than either 4 percent of least horizontal dimension or 3 feet.

Wind Zones for Gable Roofs with $27^\circ < \theta \leq 45^\circ$:



For installations that do not conform to the assumptions listed above contact Zilla for a more complete engineering analysis.