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ANSI/SPRI Standards

- ANSI/SPRI WD-1 Design Standard Practices for Roofing Assemblies
- ANSI/SPRI RP-4*
- ANSI/SPRI RP-14
- ANSI/SPRI IA-1
- ANSI/SPRI FX-1

*referenced in the International Building Code

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ANSI/SPRI WD-1 - Wind Design Standard Practice for Roofing Assemblies

Document assists in verifying the process to meet the building code associated to uplift pressures for roofing:

ASCE 7 Calculations (PSF) ≤ Tested Assembly (PSF)

Includes rational analysis methods for determining enhancement of perimeter and corner fastening (if necessary)

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Select an appropriate roofing system

Assemblies are tested by following

- ANSI/FM 4474
- UL 580
- UL 1897

Consider a Factored Tested Load Capacity

- Tested load capacity ÷ safety factor (1.0 to 2.0)

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Rationale Analysis Method for Perimeters and Corners of Adhered Assemblies

Rationale analysis method can be used when:

- Insulation secured with fasteners / adhesive ribbons
- The tested wind uplift was determined using equipment of sufficient size to allow side-by-side positioning of three full size boards (12'x24' testing table)
- Securement pattern can be converted to a sqft area
- The tested wind uplift load capacity (not factored) of the system selected must be greater than the corner design load

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Rationale Analysis Method for Adhered Assemblies with Mechanically Attached Insulation

Mechanically attached insulation

Increase fasteners per the following formula

$$F_n = (F_t \times L_d)/L_t$$

Where:

- F_n = fasteners to meet design load
- F_t = Number of fasteners used to achieve tested load
- L_d = Design load for perimeter or corner
- L_t = Factored tested load capacity

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Adhered assembly with mechanically attached insulation

Building Height, ft.	Field Design Load, psf	Perimeter Design Load, psf	Corner Design Load, psf
60	**-25.6**	**-42.9**	**-64.6**

Roof Assembly "Tested Load Capacity" is 75psf

Factored load = 75psf ÷ 2 = 37.5psf

System uses 2-inch foam plastic insulation mechanically attached to the deck using 1 fastener every 4 ft² [8 fasteners per 4'x8' size board]

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Adhered assembly with mechanically attached insulation

Fn = (Ft x Ld)/Lt

Perimeter

- $F_n = (F_t \times L_d)/L_t$
- F_n = (8 fasteners x 42.9 psf) ÷ 37.5 psf
- = 9 fasteners per board

Corner

- $F_n = (F_t \times L_d)/L_t$
- F_n = (8 fasteners x 64.6 psf) ÷ 37.5 psf
- = 14 fasteners per board

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Rational Analysis Method—Adhered Membrane with Ribbon/Bead Adhesive Attached Insulation/Substrates

Ribbons/beads of an adhesive spacing equation:

Rn = Rt/(Ld/Lt):

Where:

- Rn = the ribbon spacing to meet the calculated design load, inches (cm).
- Rt = the ribbon spacing used to achieve the tested load capacity, inches (cm).
- Ld = the calculated design load for the perimeter or corner area of a roof, psf.
- Lt = the Factored Tested Load Capacity, psf.

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Rationale Analysis Method for Perimeters and Corners of Mechanically Attached Assemblies

Rationale Analysis method for mechanically attached assemblies when:

- For linearly-attached (rows) assemblies the test chamber used must be of sufficient size to allow positioning of at least three attachment rows on the test frame. The minimum frame width shall be 8 feet.

- For spot attached assemblies the test chamber used must be of sufficient size to allow positioning of a minimum of nine attachment locations on the test frame. The minimum frame width shall be 8 feet.

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Rationale Analysis Method for Mechanically Attached Systems

Increase the number of fasteners to resist the greater wind loads at the perimeter and corner using the following formula:

$$IA_n = (L_t \times IA_t)/L_d:$$

Where:

- IA_n = Max. area of membrane held in place to meet design load
- L_t = The factored load
- IA_t = Area of membrane held in place by one fastener for the tested assembly (fastener row spacing x fastener spacing along the row)
- L_d = the calculated design load for the perimeter or corner

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