

SPRI White Paper: Rooftop Equipment Attachment

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Wind & Storm Damage



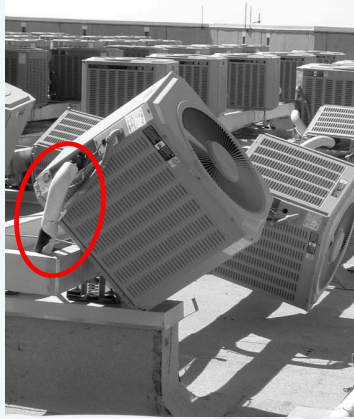
Before High Wind Event



After High Wind Event

2

Wind & Storm Damage



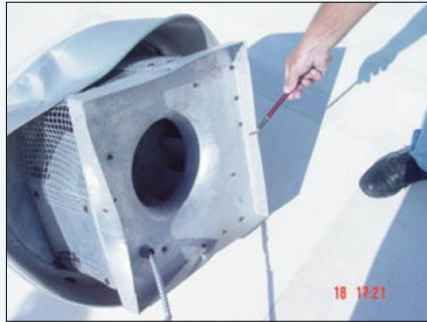
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Who is Doing it Now?

Securing rooftop equipment by contractor or the trade installing the equipment.



Unit held in place with nails

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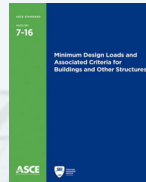
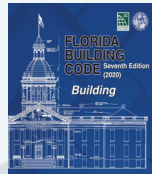
Traditional Installation Methods

- Three broad methods have been used historically for securing rooftop equipment, including:
 - Ballasted
 - Adhered
 - Mechanical Attachment
- Field-fabricated, labor intensive, deferred to the roofing contractor to determine, wind load calculation, and installation method for the application.



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Who Does the Design Professional Turn to for Guidance?

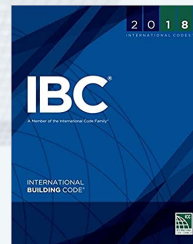


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2018 International Building Code

IBC Chapter 28, Mechanical Systems,
Section 2801.1:

"...International Mechanical Code and the International Fuel Gas Code, shall govern the design, construction, erection and installation of mechanical appliances, equipment..."

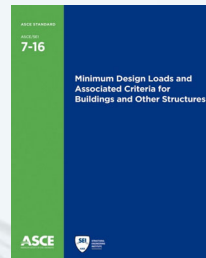


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2018 International Building Code

IBC Chapter 16 Section 1609.1.1

*“Wind loads on every building or structure **shall be determined in accordance with Chapters 26 and 30 of ASCE 7.**”*



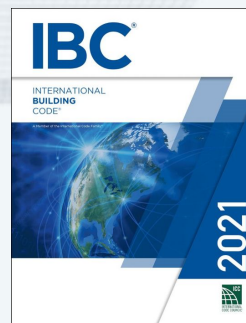
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2018 International Building Code

IBC & IMC 2021 have similar language regarding the design, construction, erection and installation of mechanical equipment used in buildings and structures.

Chapter 16, Section 1609.1.1

*“Wind loads on every building or structure **shall be determined in accordance with Chapters 26 and 30 of ASCE 7.**”*



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International Building Code

- The code provides non-specific guidance for wind and seismic resistance of rooftop equipment.
- Nothing is addressed in Chapter 15, 'Rooftop Structures,' of the IBC



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Traditional Method: Self Ballasted & Ballast

PERFORMANCE

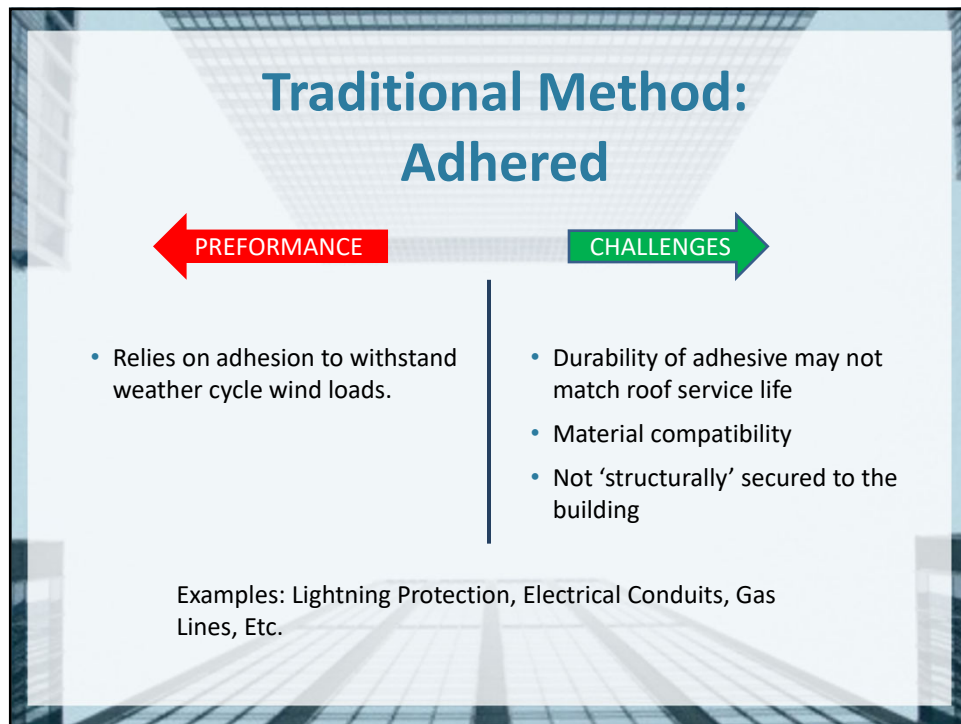
- Relies on the weight of to remain stationary by frictional resistance
- Recommended to include sacrificial layer to protect roof

CHALLENGES

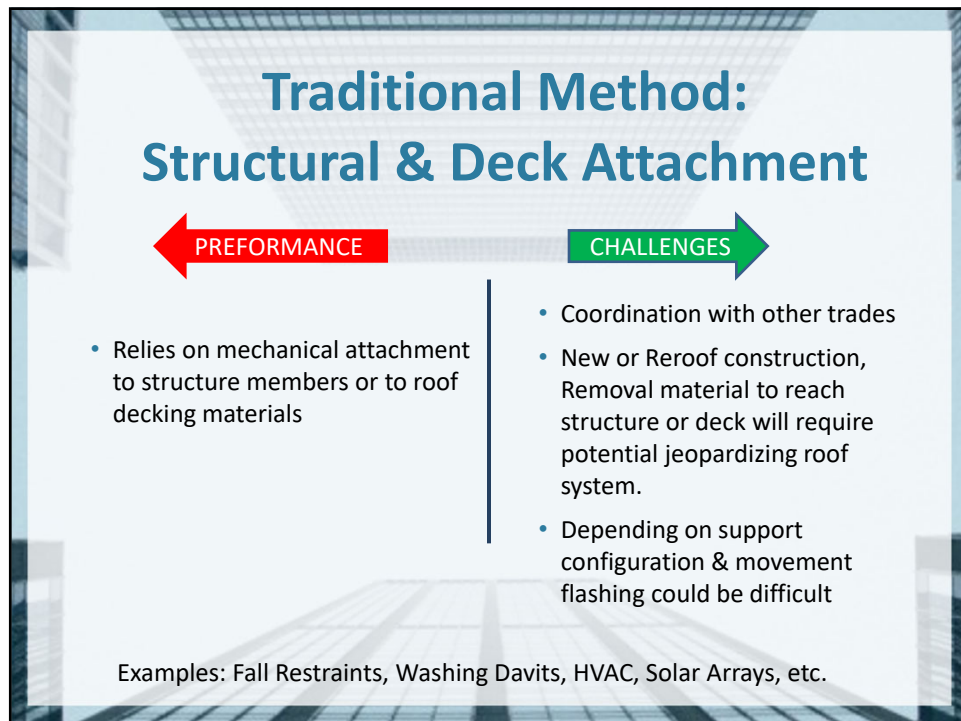
- Low load resistance for lightweight equipment
- Does not meet “positively fastened” requirement of ASCE 7
- Durability of ballast materials may not match roof service life

Examples: Large HVAC, Plumbing, Solar Arrays, Antennas, Satellites, Etc.

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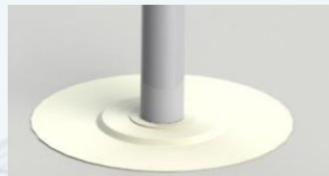
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Alternative Approaches

Engineered Attachment Method	Waterproofing
Mechanically attached to roof deck with proper fasteners	<ul style="list-style-type: none"> • Same flashing system as existing roof • Compression seal and membrane flashing • Option for approved liquid flashing products
Heat Welded to existing roof membrane	<ul style="list-style-type: none"> • Non-applicable • No fastener penetrations



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Important Considerations

It is critical to determine the overall project requirements, including code, wind and seismic loads (tensile, shear, and compression) as well as differential movement when evaluating the attachment type and performance.

- Know building codes
- Determine wind and seismic forces
- Evaluate existing roof system
- Investigate roof warranty terms
- Research membrane compatibility

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Wind & Storm Damage



18,000-lbs Air Handling Unit Winds < 90 mph

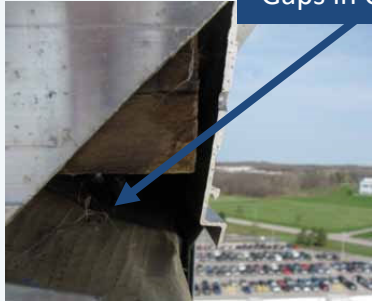
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SPRI White Paper: Internal Pressures

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Air Infiltration Membrane Not Turned Down Face

Gaps in Construction



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Air Infiltration from 4" gap

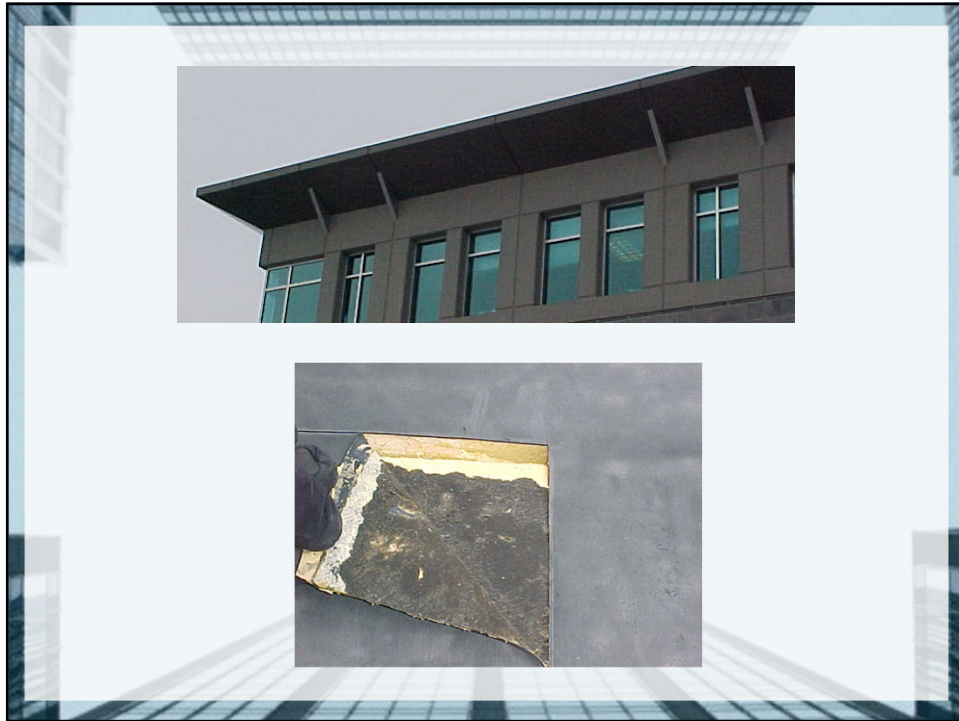


4-inch-wide gap



5.3 MPH air infiltration

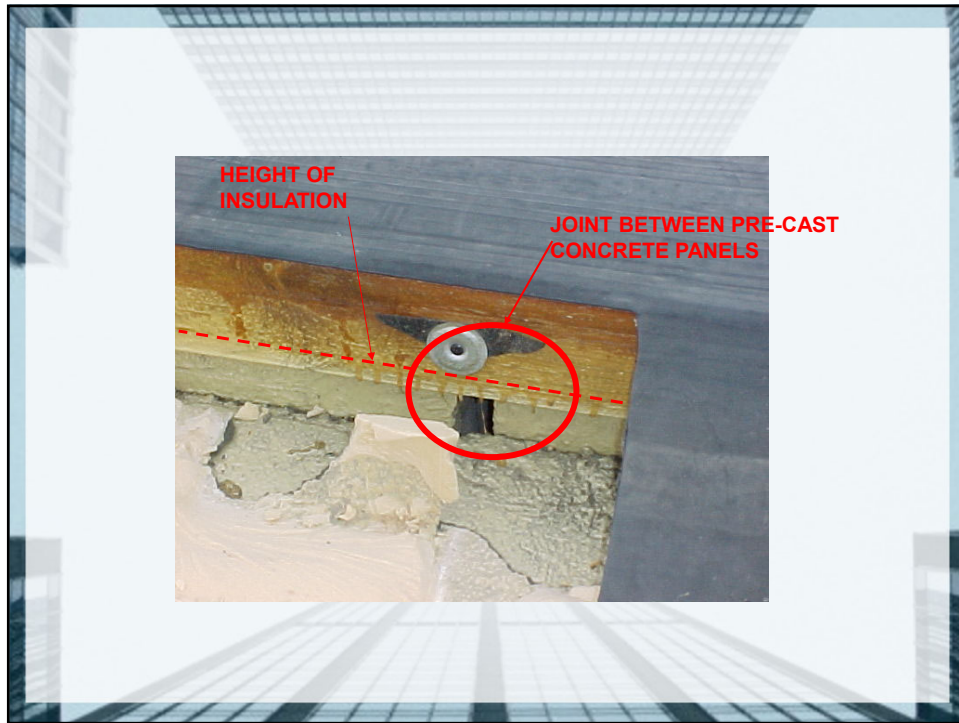
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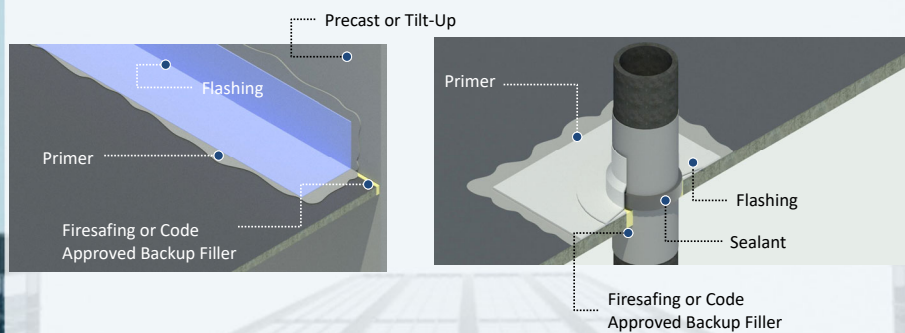
Interior Air Pressure



Billowing Membrane

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Sealing the Deck to Internal Air Migration



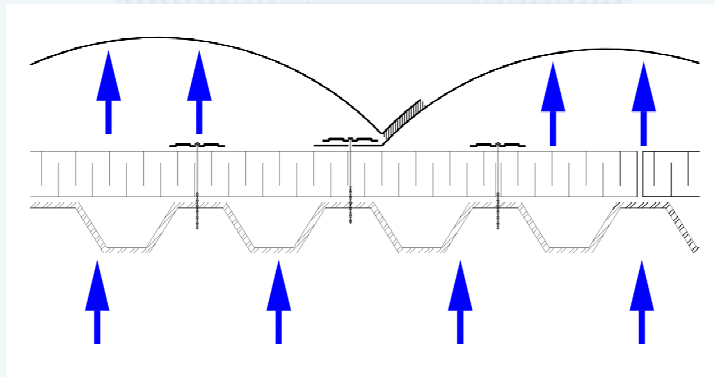
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Sealing Deck to Internal Air Migration



“Peel & Stick” Vapor/Air
Barrier directly to deck

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ANSI/FM 4474 Testing

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