SPRI Wind Design Seminar
Rooftop Equipment & Internal Pressures

SPRI
SINGLE PLY ROOFING INDUSTRY

SPRI White Paper:
Rooftop Equipment Attachment

Wind & Storm Damage

Before High Wind Event

After High Wind Event

Wind & Storm Damage

Who is Doing it Now?

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

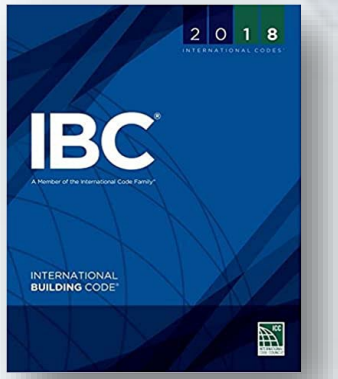
Unit held in place with nails

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.

Who Does the Design Professional Turn to for Guidance?



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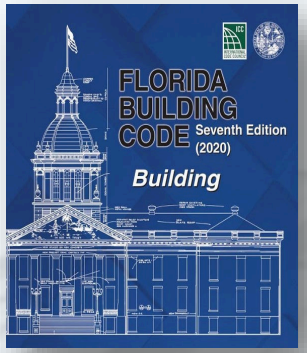
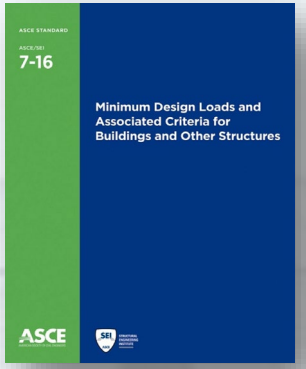
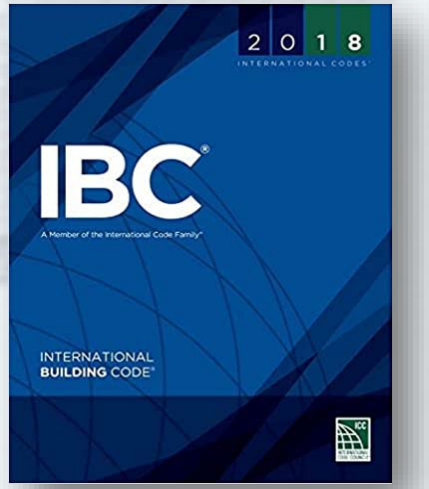


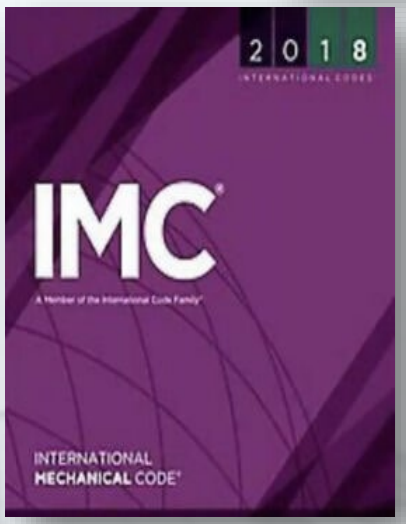


2018 International Building Code

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…**"*

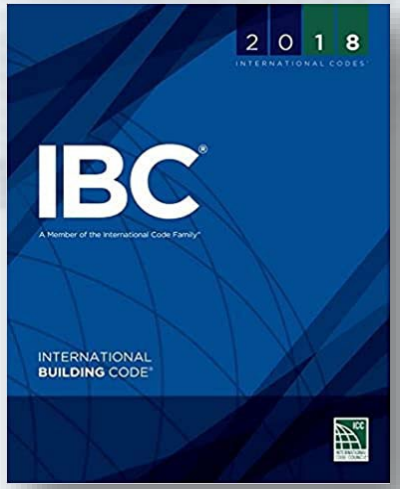


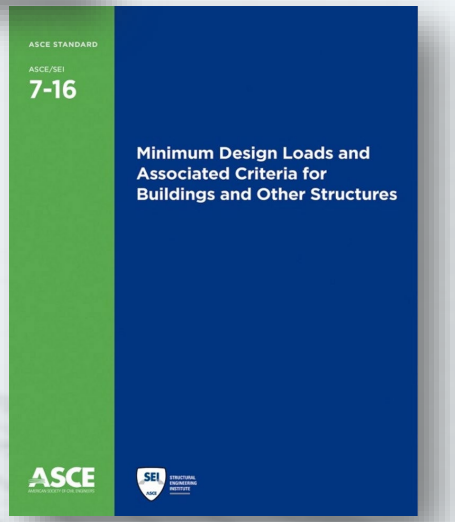


2018 International Building Code

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."***



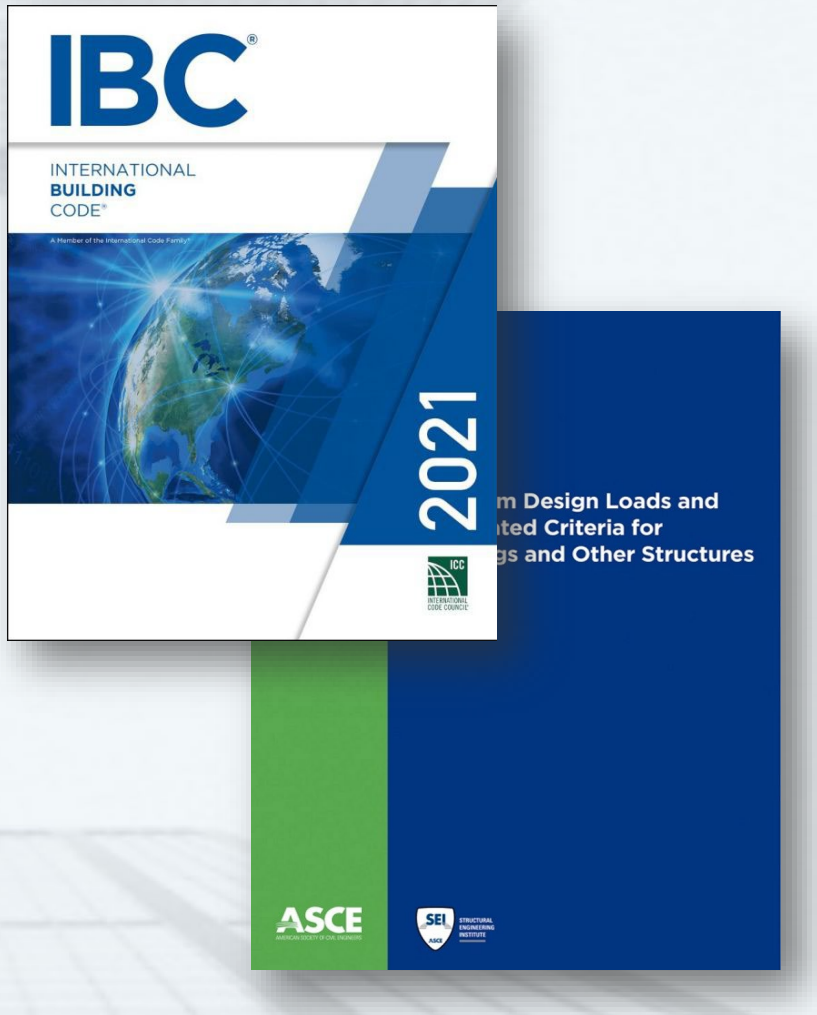


2018 International Building Code

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."



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

Traditional Method: Self Ballasted & Ballast

PREFORMANCE

- 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, Plumping, Solar Arrays, Antennas, Satellites, Etc.

Traditional Method: Adhered

PREFORMANCE

- Relies on adhesion to withstand weather cycle wind loads.

CHALLENGES

- Durability of adhesive may not match roof service life
- Material compatibility
- Not ‘structurally’ secured to the building

Examples: Lightning Protection, Electrical Conduits, Gas Lines, Etc.

Traditional Method: Structural & Deck Attachment

PREFORMANCE

- Relies on mechanical attachment to structure members or to roof decking materials

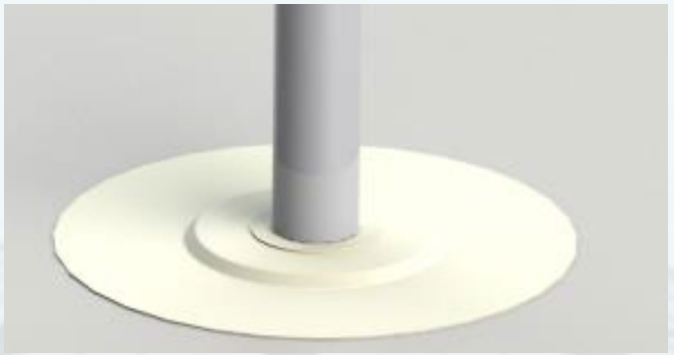
CHALLENGES

- Coordination with other trades
- New or Reroof construction, Removal material to reach structure or deck will require potential jeopardizing roof system.
- Depending on support configuration & movement flashing could be difficult

Examples: Fall Restraints, Washing Davits, HVAC, Solar Arrays, etc.

Alternative Approaches

Engineered Attachment Method	Waterproofing
Mechanically attached to roof deck with proper fasteners	• Same flashing system as existing roof • Compression seal and membrane flashing • Option for approved liquid flashing products
Heat Welded to existing roof membrane	• Non-applicable • No fastener penetrations



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

Wind & Storm Damage

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

Please send to info@spri.org