Florida Building Code Advanced Training: Residential Roofing—Shingles

Florida Building Commission
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, FL 32399-2100
(850) 487-1824
http://www.floridabuilding.org

This presentation reflects roofing provisions of the 2004 *Florida Building Code, Residential*, the 2004 *Florida Building Code, Building*, and the 2004 *Florida Existing Building Code*, as of October, 2005.

There have been several proposed "glitch" modifications to the Codes; check with the official Florida Building Code website, www.floridabuilding.org for complete up-to date information.

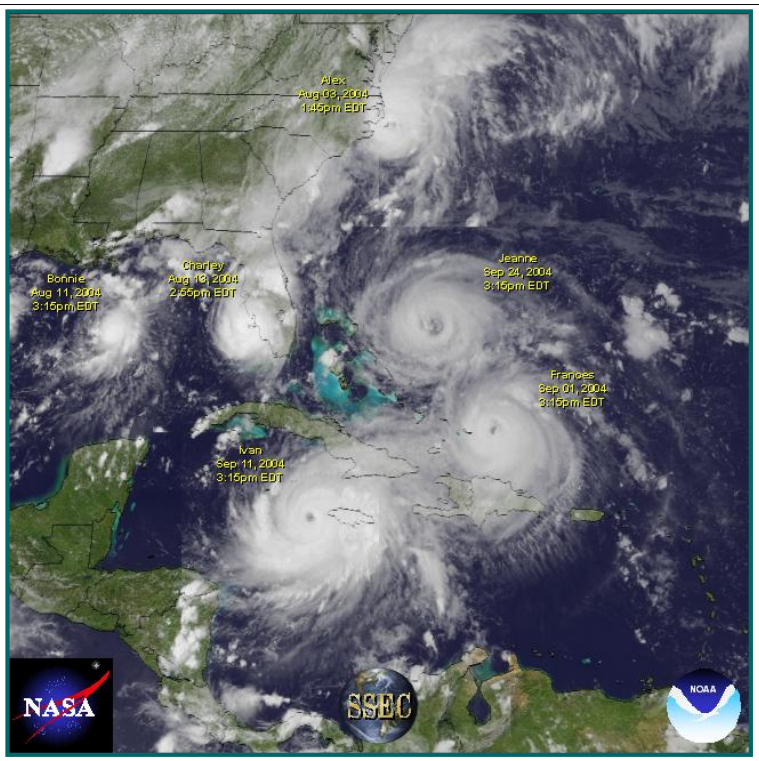
Note:

This module, covering asphalt shingles, is partially adapted from: *Florida Building Code Advanced Training: Roofing*, which was developed with primary input from Ms. Lorraine Ross, President, Intech Consulting, Inc., and *Residential Roofing and Hurricanes*, developed by Building a Safer Florida, Inc. and Kathleen C. Ruppert, University of Florida Energy Extension Service.

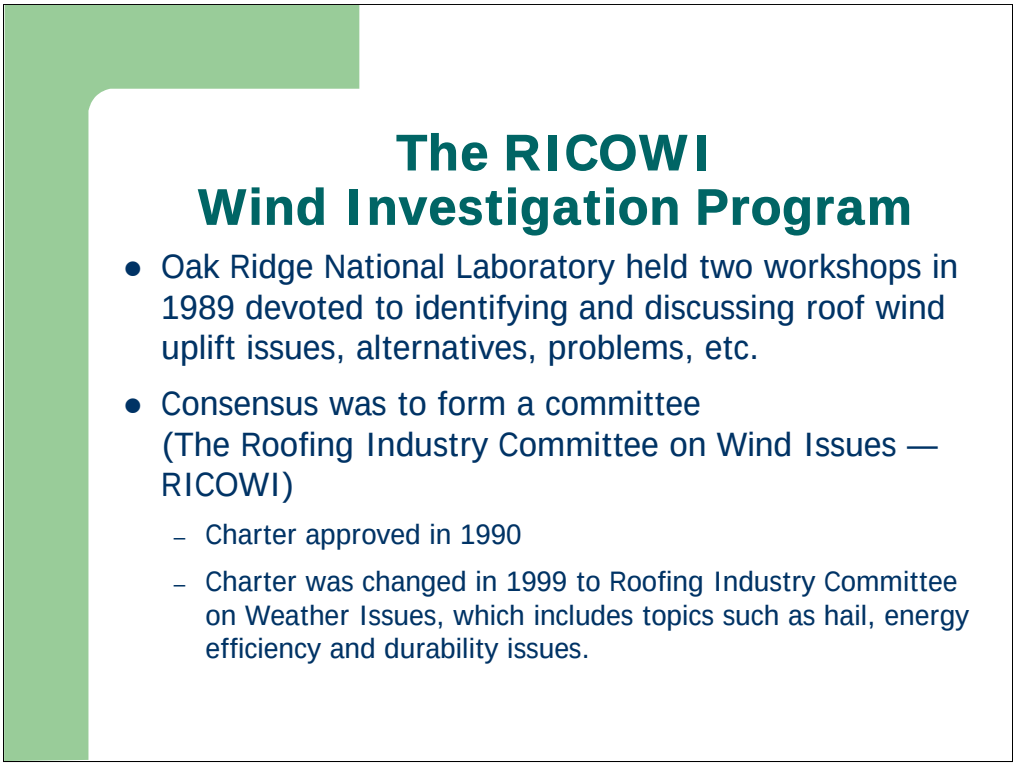
Also, note that course content does not emphasize areas regulated by High-Velocity Hurricane Zone (HVHZ) criteria.

Course Objectives

- Become aware of possible reasons for Roofing Failures in High Wind Conditions
- Understand FBC Roofing Requirements
  - Permits, plans review, inspections, definitions
  - Wind load requirements
  - Weather protection
  - Structural design requirements
  - Performance requirements
  - Roofing—asphalt shingles
  - Florida Existing Building Code
  - Reroofing

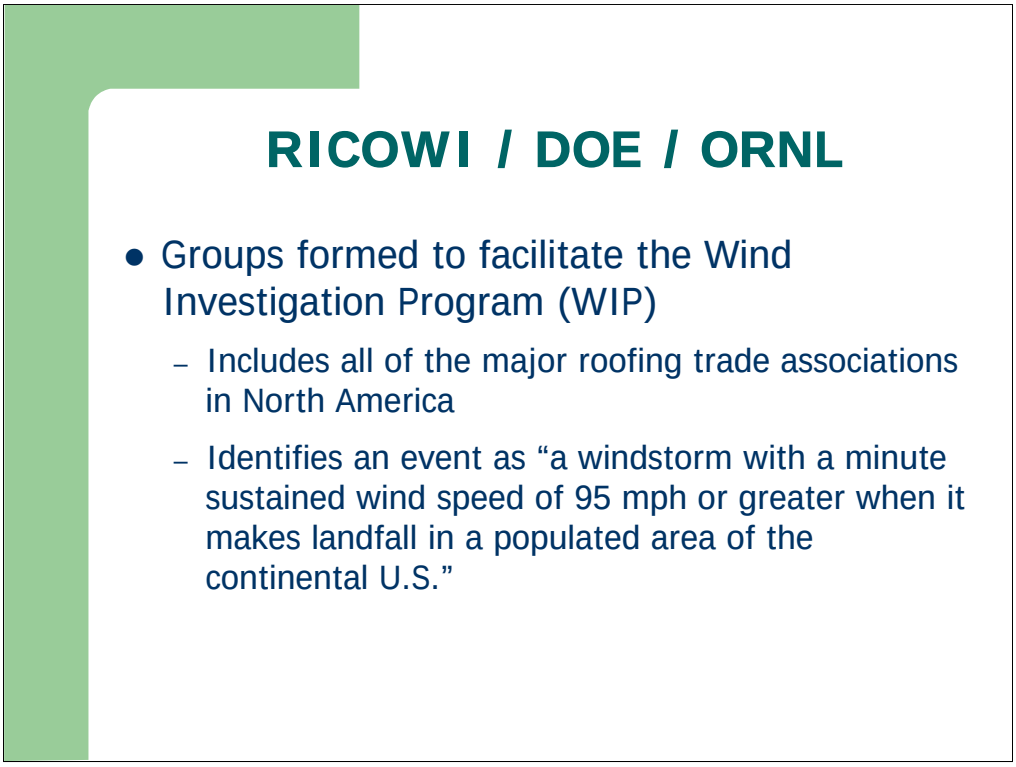


The 2004 Hurricane season was very active; so was 2005. This slide illustrates several reasons why the roofing professional needs to follow the Florida Building Codes while keeping in mind that the codes set *minimum* requirements to safeguard public health, safety, and welfare.



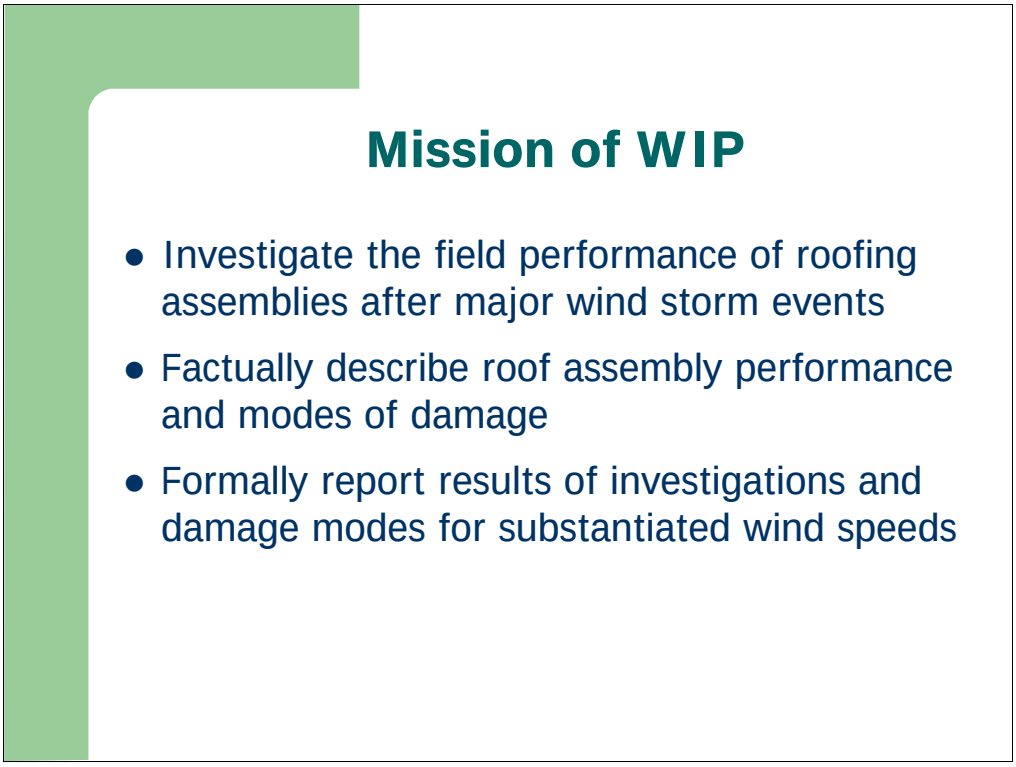
In 1989, Oak Ridge National Laboratory held two workshops devoted to identifying and discussing roof wind uplift issues and alternatives. Discussion of important technical issues included cases of roof wind damage, dynamic testing of roof systems, the importance of sample size for tests, the role of wind tunnels, air retardants and the need for acceptable procedures for ballasted systems.

There was also concern for the general lack of communication within the roofing industry as to what the problems are, what is being done to alleviate them, and how effectively technology transfer is accomplished within the roofing industry and the building community. At the conclusion of the workshops a consensus recommendation was to form a committee to address these matters. The Roofing Industry Committee on Wind Issues (RICOWI) was established and the charter approved October 1990.

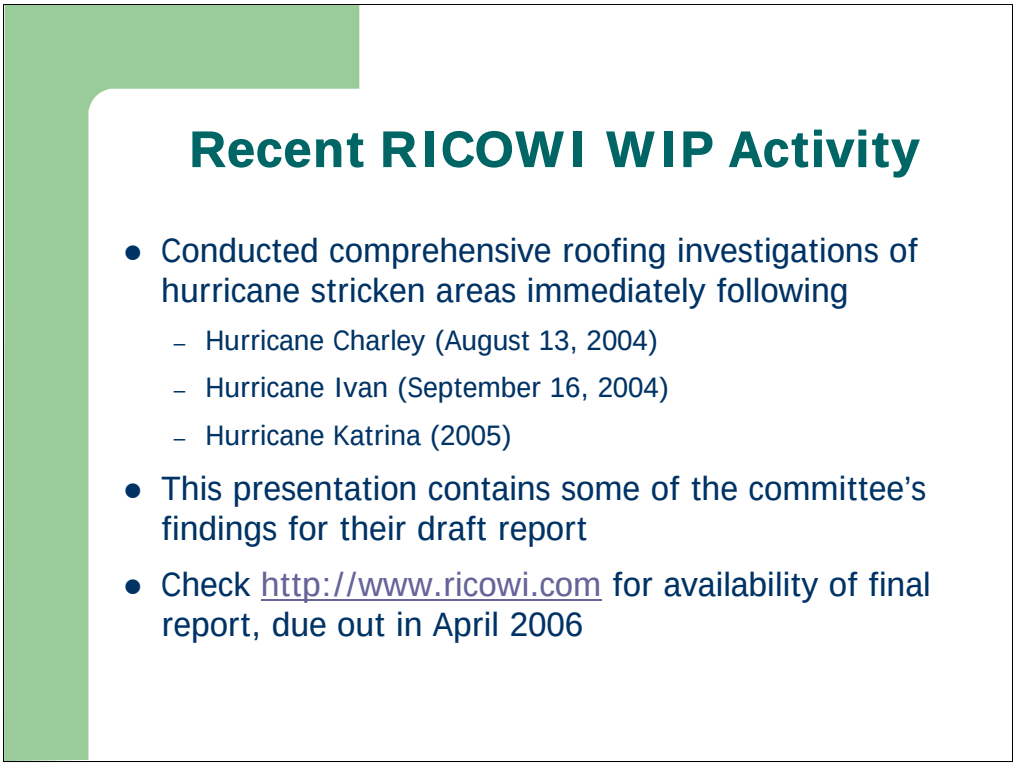


Subsequent to RICOWI's formation, other concerns were raised. For example, the insurance industry conveyed their concern regarding excessive property loss from windstorms. They estimated that from 1984 to 2004 alone, hurricanes and high winds accounted for nearly 64% of catastrophic losses. In August 1992, Hurricane Andrew caused $16 billion in insured losses. A one-month period of hurricanes in 2004 resulted in more than $20 billion in insured losses.

RICOWI and the Department of Energy/Oak Ridge National Laboratory (ORNL) responded to industry involvement by entering into a cooperative Research Development Agreement (CRADA) to facilitate the Wind Investigation Program (WIP). The Program includes all of the major roofing trade associations in North America. The Program identifies an event as a "a windstorm with a 1 minute sustained wind speed of 95 mph or greater when it makes landfall in a populated area of the U.S."

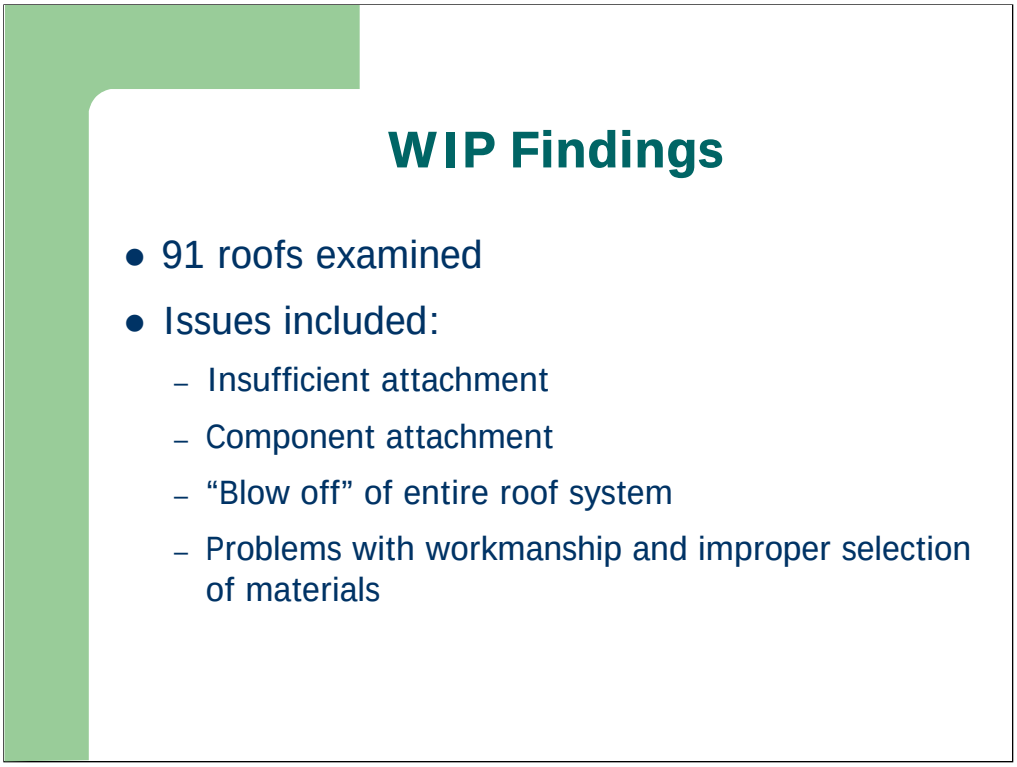


The Wind Investigation Program's (WIP) mission is to investigate the field performance of roofing assemblies after major wind storm events, factually describe roof assembly performance and modes of damage, and formally report results of investigations and damage modes for substantiated wind speeds.



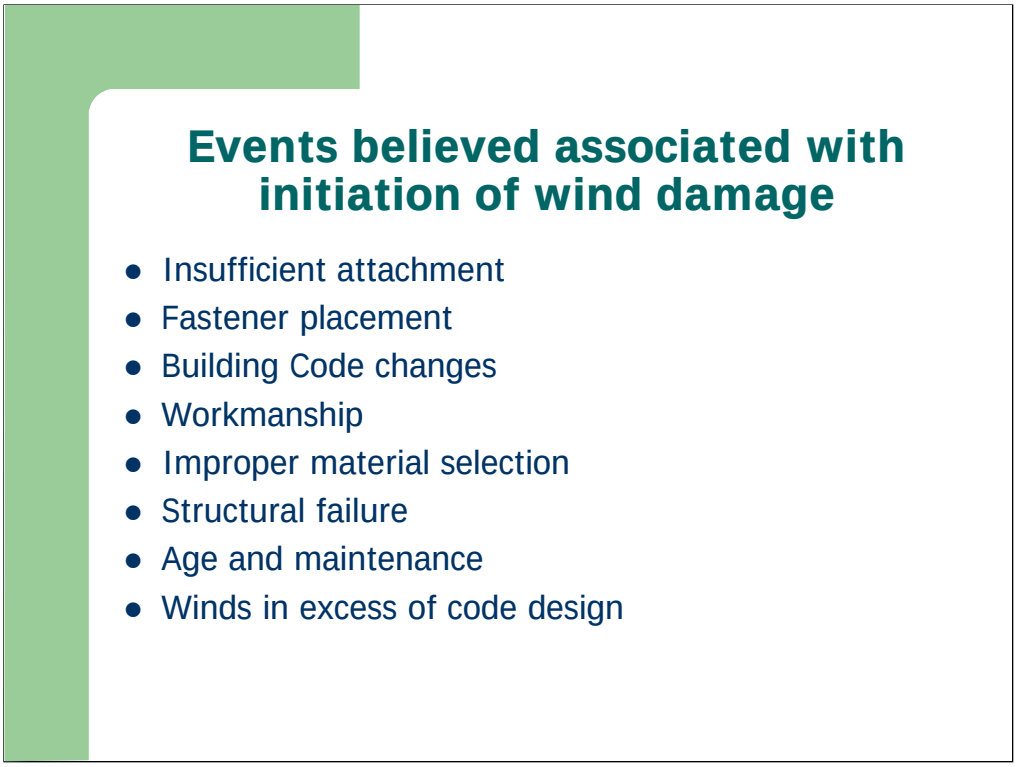
ORNL/Department of Energy facilitated and helped fund the training program for wind investigators and has been working with private industry to accelerate the acceptance of more energy-efficient and durable roofing systems.

In 2004, comprehensive roofing investigations of hurricane-stricken areas were taken following Hurricanes Charley and Ivan. This presentation contains some of the WIP's findings found in a draft of the final report. The method of obtaining a copy of WIP's final report is listed on their web site http://www.ricowi.com. The results of the Hurricane Katrina data will be covered in a future report.



The WIP investigation team reported that wind-related damage conditions on steep slope roofs observed on the 91 roofs ranged from minor to extensive. Damage conditions included insufficient attachment; component detachment; complete displacement (blow-off) of the roof system. Workmanship and improper material selection issues were major factors in observed damages.

The data and the subsequent assessments will hopefully be used by product manufacturers, roofing system designers, roofing contractors and building officials to improve the performance of roofing systems in high winds. The efforts expended by the team members, the financial support from all the contributors and the help of the sponsoring organizations will no doubt be of great benefit to the roofing industry in the future.



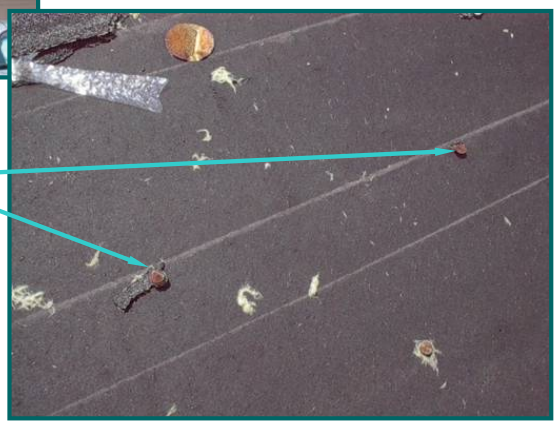
Events believed associated with initiation of wind damage included the following:

- **Insufficient attachment:** Insufficient fastener attachment was commonly observed in both the types and the number of fasteners used. Cases were observed where the fastener was not sufficient, in conjunction with the frequency of placement, to resist the wind forces.
- **Fastener placement**: Examples of roof failure occurred where fasteners and placement patterns were used that would not normally have been specified or prescribed for a particular application.
- **Building Code changes:** It was found that the fastening requirements specified in a later version of the building code were an improvement over those of the earlier code. Insufficient attachment was also prevalent in the securing of substrates and framing members.
- **Workmanship:** The teams observed instances where the construction of the roof covering compromised its performance against the hurricane-force winds. Cases were found of missing or improperly placed fasteners. Other cases were found where the construction of the building's roof covering was not according to the governing code or standard practice at the time of construction.
- **Improper material selection:** Examples were found of roofs where either one component or a combination of components failed to withstand the force of winds. The failure of one component on the roof or used as part of the roof structure was found to influence the performance of other materials. Roofs that were exposed to and survived the hurricane winds were supported by an entire system having the required materials installed according to specification.
- **Structural failure:** Cases were observed in which the structural integrity of the building was breached and the roof failed.
- **Age and maintenance:** In some cases in which similar material types were used, newer roofs performed better in the hurricanes than did older materials. Some of the performance differences between older and newer materials can be attributed to better specified application methods, but in similar roofs with equivalent application methods, it was observed that newer roofs fared better than older ones. Examples were found in which the performance of the roof was weakened by corrosion or deterioration of components.
- **Winds in excess of code design:** In some instances, the roof system failed even though it was constructed according to an appropriate updated specification. These examples were found for both the roof covering and the building's structure.

Lack of proper fasteners

Images courtesy of: RICOWI – Jerry Vandewater

The next several slides depict examples of roof covering failures.



Notice shingle fastening

Images courtesy of: RICOWI – Jerry Vandewater

- Rusty nails
- A lot of nails still in place
- Shingles pulled off

Shingles tore loose from 6 nails placed in seal strip.

Images courtesy of: RICOWI – Joe Wilson

Placing the nails in the seal strip is a less-than-optimal location. All dimensional shingles have nail lines.

By the way...RICOWI WIP investigators did see shingles that worked—especially newer shingles and architectural shingles.

Composite shingle roof—some hip/ridge loss. Nailed with 6 nails per shingle.

Image courtesy of: RICOWI – Joe Wilson

In higher wind areas, newer shingles with six nails had less damage on hips or ridges.

1 month old

10 years old

Neighbors: separated by age

Images courtesy of: RICOWI – Joe Wilson

Hip versus
gable application

Neighbors: design difference

Images courtesy of: RICOWI – Joe Wilson

The hip roof only had minor damage on the hips.

Image courtesy of: Bill Zoeller

Let's look at **roof types**.

Although hip roofs have been reported to have fewer problems, roof damage still occurs.

Hip roofs are believed to be less prone to damage than gable roofs because:

- They slope in four directions
- The sloping faces enhance the performance of the roofing material
- They generate less uplift and are structurally better braced
- They laterally brace the primary roof trusses, or rafters, and support the top of the end walls of the home against lateral wind forces
- They eliminate the hinge formed between a gable end and a gable-end wall

Image courtesy of: Bill Zoeller

An example of gable roof damage

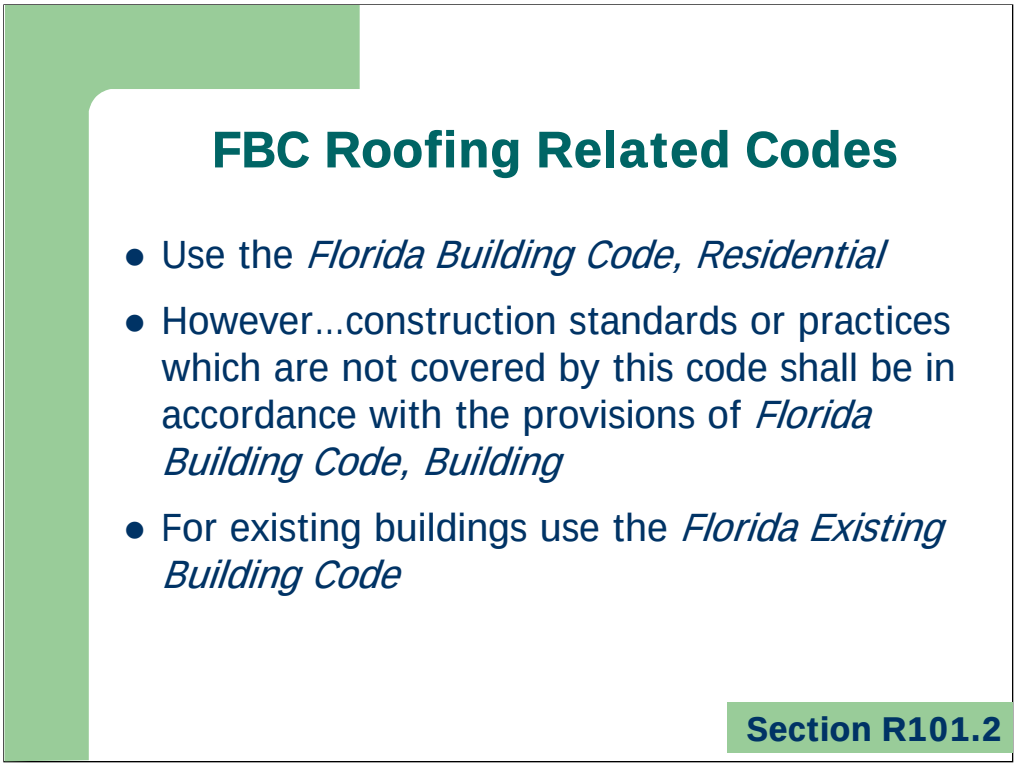
Wood-frame gable ends of roofs can be failure-prone, except when properly braced. In many instances gable-end failure seems primarily attributable to poor or non-existent bracing between gable-ends and the rest of the structure. The use of structural outlookers rather than ladder-type framing can also help. These generally cantilevered 2×4s oriented edge-wise at roof sheathing joints extend outward from the first interior trusses or rafter over "dropped" gable-end wall framing. Secondary bracing installed between trusses can also increase lateral support.

In addition, the nailing pattern used on roof sheathing needs to be designed for both shear and uplift loads.

Wind-borne debris

Image courtesy of RICOWI – Joe Wilson

Keep in mind that wind-borne debris is an important consideration in both the design and construction of a structure.



CHAPTER 1 ADMINISTRATION

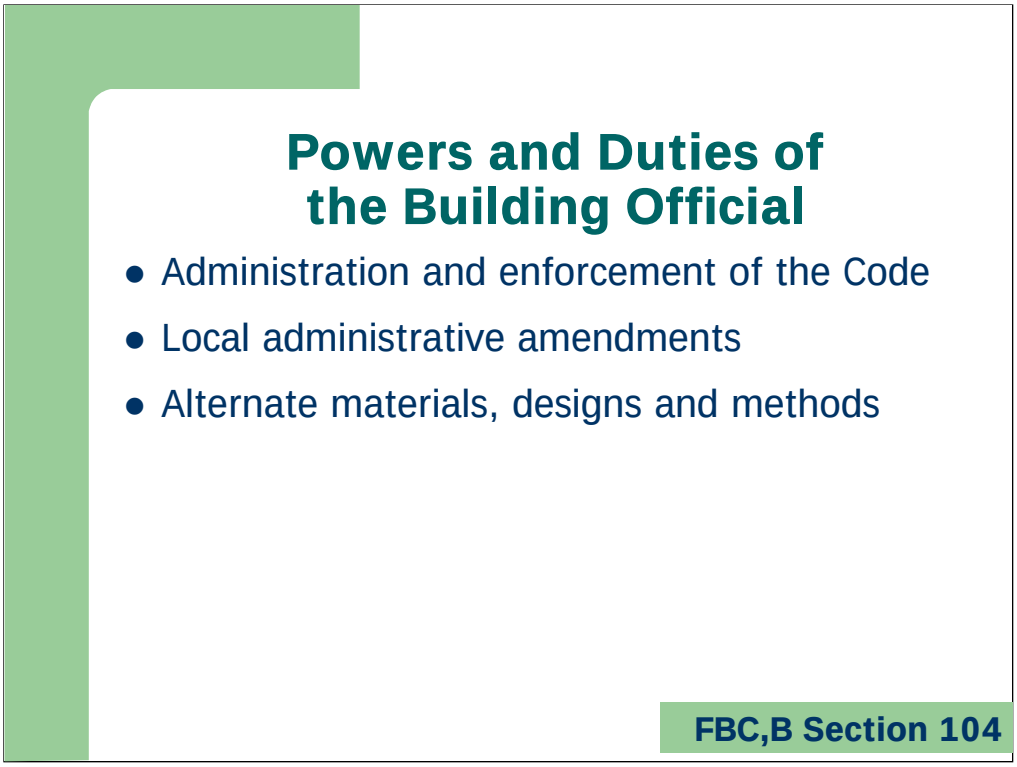
SECTION R101 TITLE, SCOPE AND PURPOSE

R101.2 Scope. The provisions of the *Florida Building Code, Residential* shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories in height with a separate means of egress and their accessory structures. Construction standards or practices which are not covered by this code shall be in accordance with the provisions of *Florida Building Code, Building*.

Exception: Existing buildings undergoing repair, alteration or additions, and change of occupancy shall comply with the *Florida Existing Building Code.*

R101.2.1 The provisions of Chapter 1, *Florida Building Code, Building* shall govern the administration and enforcement of the *Florida Building Code, Residential.*

Note:
It is very important to understand the sentence that has been underlined for emphasis.

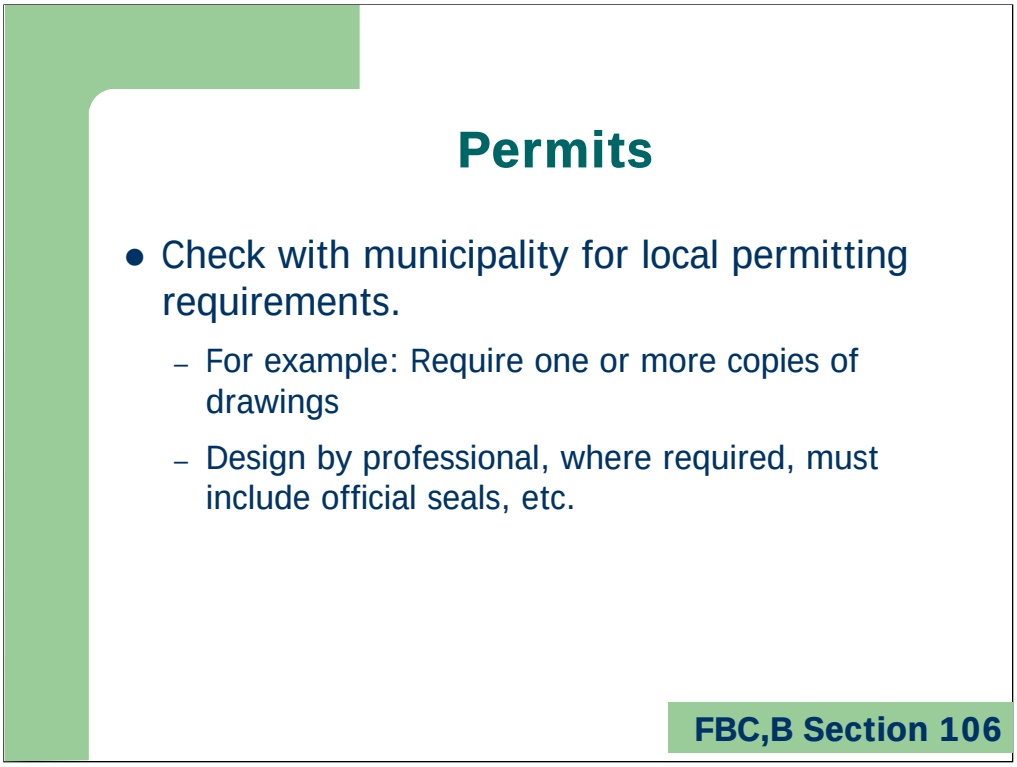


CHAPTER 1 ADMINISTRATION

SECTION 104 DUTIES AND POWERS OF BUILDING OFFICIAL

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. When alternate life safety systems are designed, the *SFPE Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings*, or other methods approved by the building official may be used. The building official shall require that sufficient evidence or proof be submitted to substantiate any claim made regarding the alternative.

Note:
Also be aware of local amendments and declaratory statements.



CHAPTER 1 ADMINISTRATION

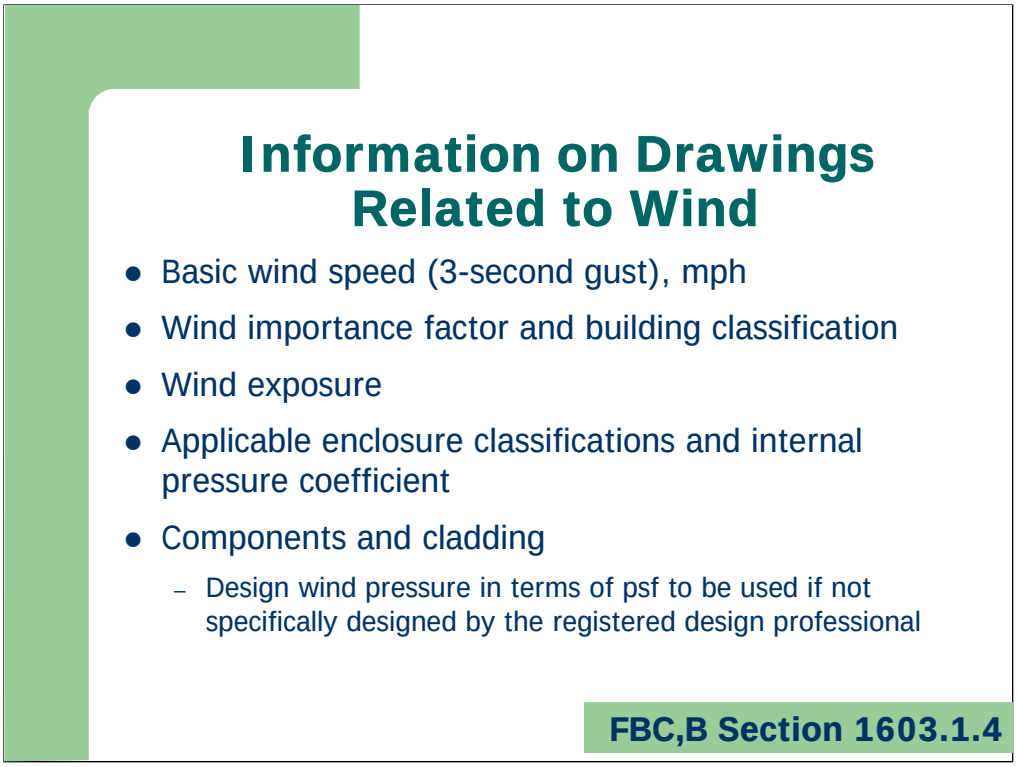
SECTION 106 CONSTRUCTION DOCUMENTS

106.1 Submittal documents. Construction documents, special inspection and structural observation programs, and other data shall be submitted in one or more sets with each application for a permit. The construction documents shall be prepared by a design professional where required by the statutes. Where special conditions exist, the building official is authorized to require additional construction documents to be prepared by a design professional.

Exception: The building official is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that review of construction documents is not necessary to obtain compliance with this code.

If the design professional is an architect or engineer legally registered under the laws of this state regulating the practice of architecture as provided for in Chapter 481, Florida Statutes, Part I, or engineering as provided for in Chapter 471, Florida Statutes, then he or she shall affix his or her official seal to said drawings, specifications and accompanying data, as required by Florida Statute. If the design professional is a landscape architect registered under the laws of this state regulating the practice of landscape architecture as provided for in Chapter 481, Florida Statutes, Part II, then he or she shall affix his or her seal to said drawings, specifications and accompanying data as defined in Section 481.303(6)(a)(b)(c)(d), FS.

Note:
Check local permitting requirements on number of copies of documents to be submitted.

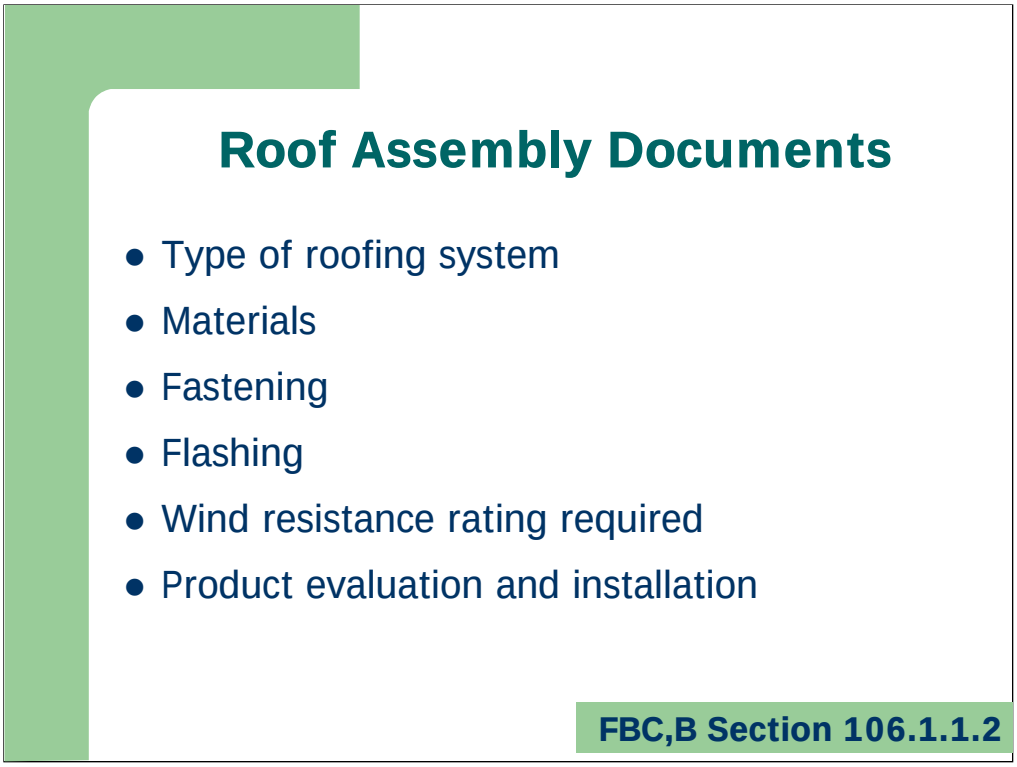


CHAPTER 16: STRUCTURAL DESIGN

SECTION 1603 CONSTRUCTION DOCUMENTS

1603.1.4 Wind design data. The following information related to wind loads shall be shown, regardless of whether wind loads govern the design of the lateral-force-resisting system of the building:

1. Basic wind speed (3-second gust), miles per hour (km/hr).
2. Wind importance factor, I_W , and building classification from Table 1604.5 or Table 6-1, ASCE 7 and building classification in Table 1-1, ASCE 7.
3. Wind exposure, if more than one wind exposure is utilized, the wind exposure and applicable wind direction shall be indicated.
4. The applicable enclosure classifications and, if designing with ASCE 7, internal pressure coefficient.
5. Components and cladding. The design wind pressures in terms of psf (kN/m^2) to be used for the design of exterior component and cladding materials not specifically designed by the registered design professional.

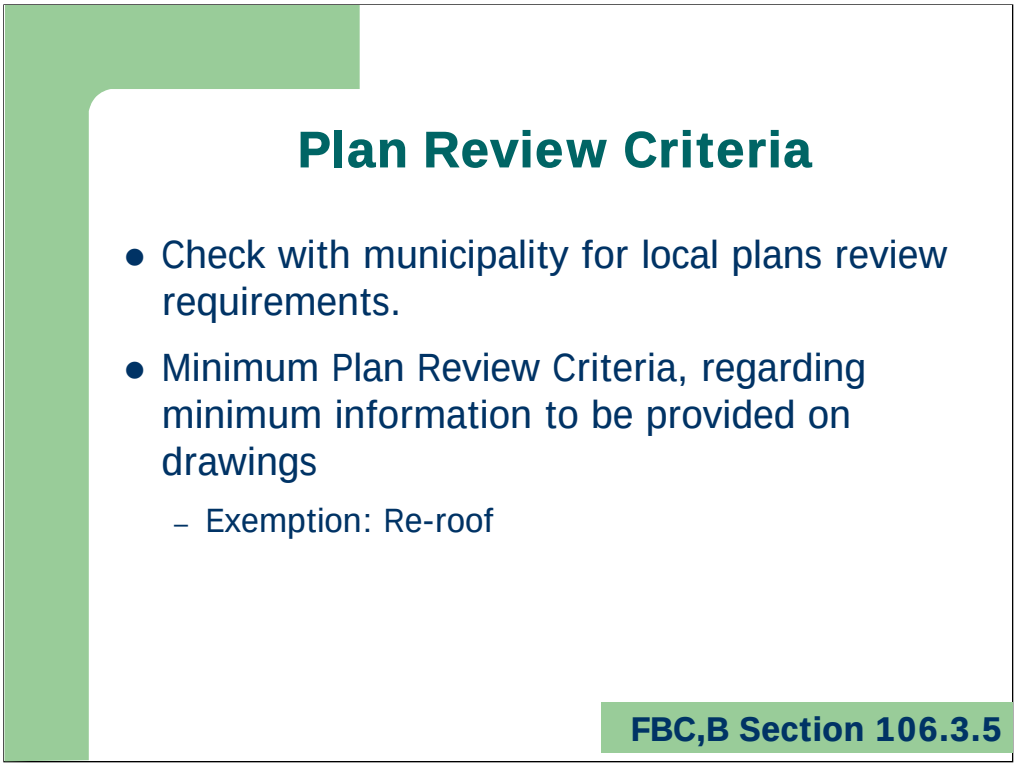


CHAPTER 1: ADMINISTRATION

SECTION 106 CONSTRUCTION DOCUMENTS

106.1.1 Information on construction documents.

106.1.1.2 For roof assemblies required by the code, the construction documents shall illustrate, describe, and delineate the type of roofing system, materials, fastening requirements, flashing requirements and wind resistance rating that are required to be installed. Product evaluation and installation shall indicate compliance with the wind criteria required for the specific site or a statement by an architect or engineer for the specific site must be submitted with the construction documents.



CHAPTER 1: ADMINISTRATION

SECTION 106 CONSTRUCTION DOCUMENTS

106.3 Examination of documents.

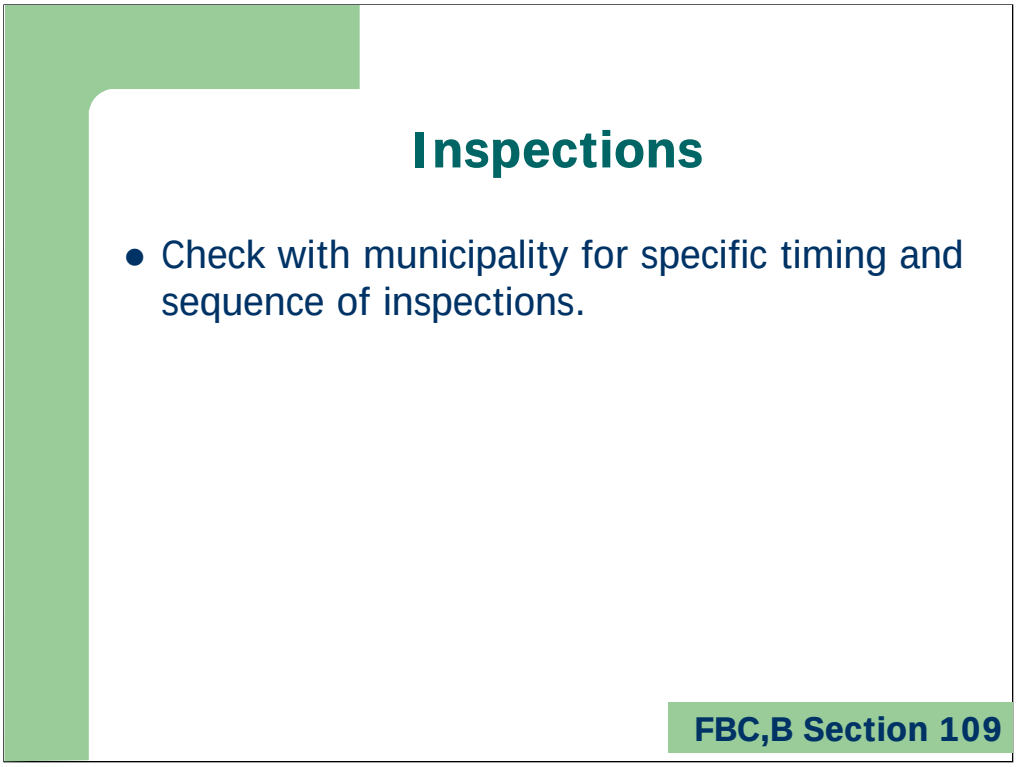
106.3.5 Minimum plan review criteria for buildings. The examination of the documents by the building official shall include the following minimum criteria and documents; a floor plan; site plan; foundation plan; floor/roof framing plan or truss layout; and all exterior elevations…

Residential (one- and two-family)

Exemptions. Plans examination by the building official shall not be required for the following work:

1. …
2. Reroofs

Note:
See actual code language for more details.

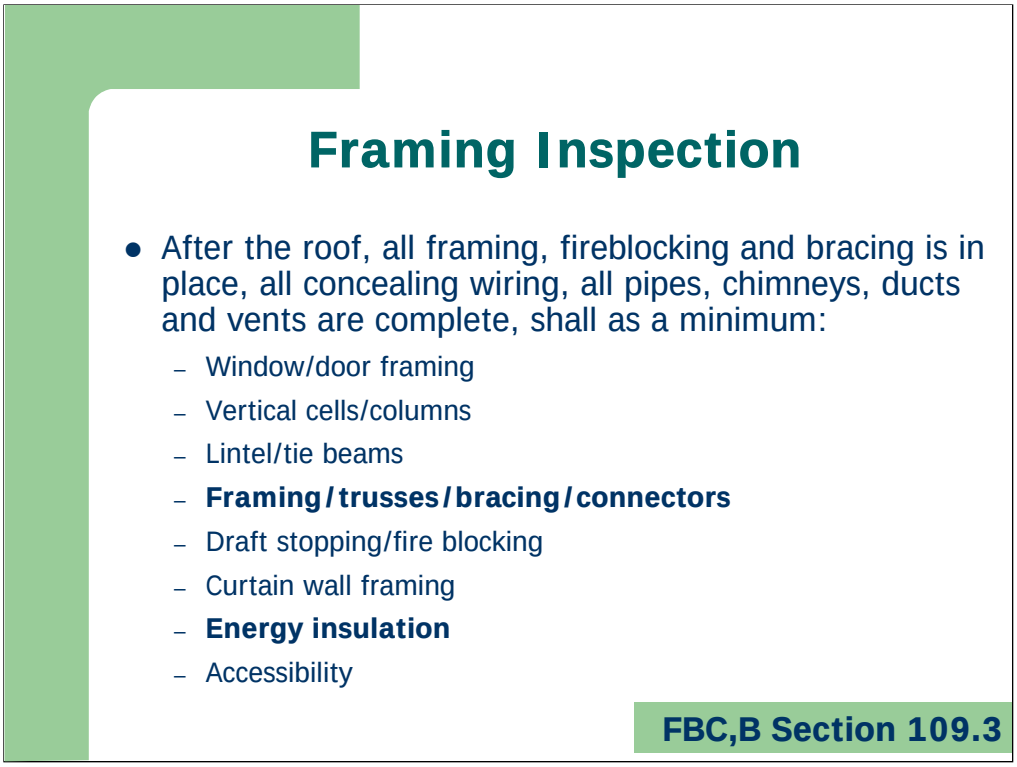


CHAPTER 1: ADMINISTRATION

SECTION 109 INSPECTIONS

109.3 Required inspections. The building official upon notification from the permit holder or his agent shall make the following inspections, and shall either release that portion of the construction or shall notify the permit holder or his agent of any violations which must be corrected in order to comply with the technical codes. The building official shall determine the timing and sequencing of when inspections occur and what elements are inspected at each inspection.

Note:
Framing, Sheathing, and Roofing Inspection covered in more detail over next few slides.



CHAPTER 1: ADMINISTRATION

SECTION 109 INSPECTIONS

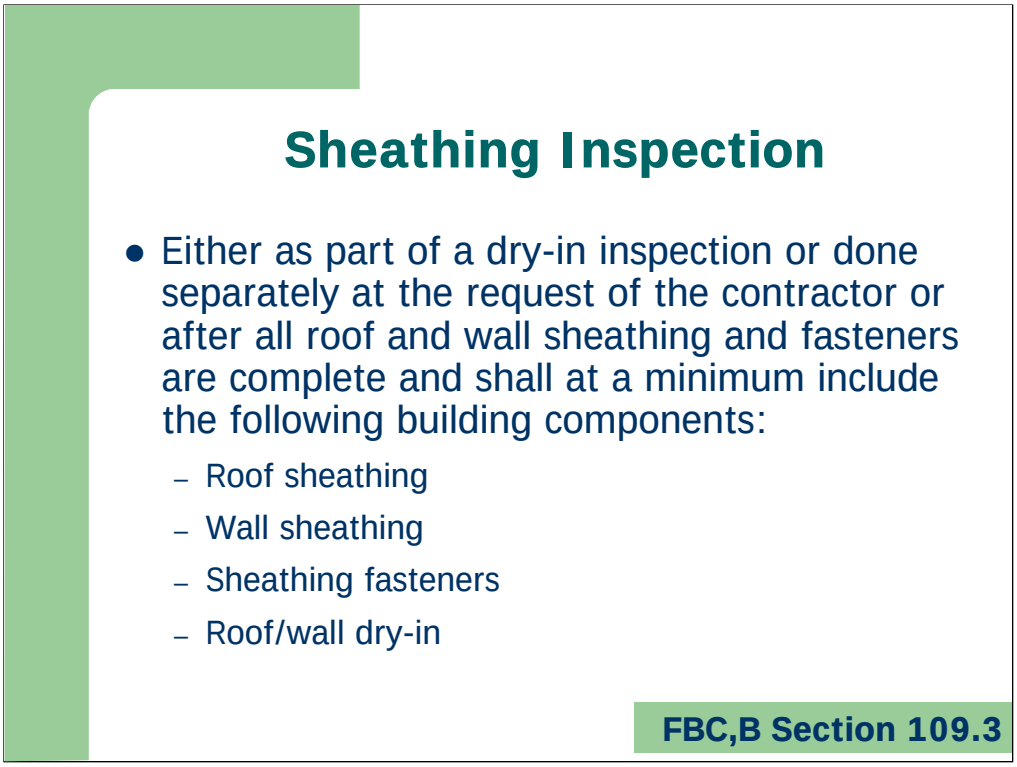
Part of Section 109.3

109.3 Required inspections. The building official upon notification from the permit holder or his or her agent shall make the following inspections, and shall either release that portion of the construction or shall notify the permit holder or his or her agent of any violations which must be corrected in order to comply with the technical codes. The building official shall determine the timing and sequencing of when inspections occur and what elements are inspected at each inspection.

2. Framing inspection:

   To be made after the roof, all framing, fireblocking and bracing is in place, all concealing wiring, all pipes, chimneys, ducts and vents are complete and shall at a minimum include the following building components:

   - window/door framing
   - vertical cells/columns
   - lintel/tie beams
   - framing/trusses/bracing/connectors
   - draft stopping/fire blocking
   - curtain wall framing
   - energy insulation
   - accessibility



CHAPTER 1: ADMINISTRATION

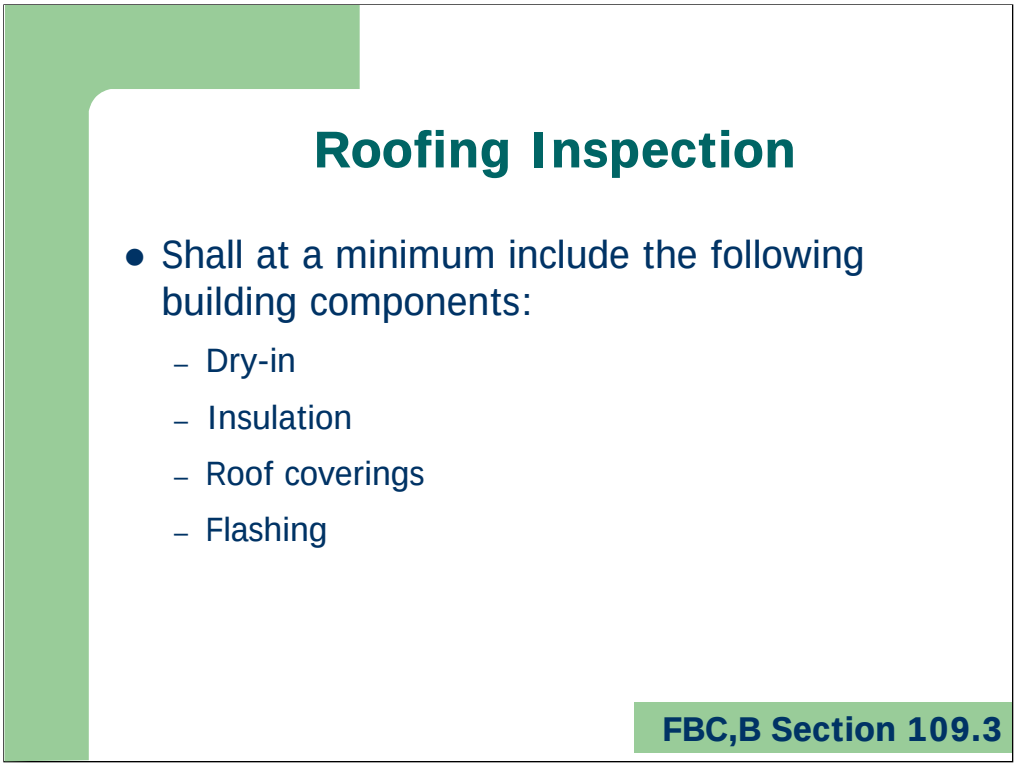
SECTION 109 INSPECTIONS

Part of Section 109.3

109.3 Required inspections. The building official upon notification from the permit holder or his or her agent shall make the following inspections, and shall either release that portion of the construction or shall notify the permit holder or his or her agent of any violations which must be corrected in order to comply with the technical codes. The building official shall determine the timing and sequencing of when inspections occur and what elements are inspected at each inspection.

3. Sheathing inspection:

   To be made either as part of a dry-in inspection or done separately at the request of the contractor after all roof and wall sheathing and fasteners are complete and shall at a minimum include the following building components:
   - roof sheathing
   - wall sheathing
   - sheathing fasteners
   - roof/wall dry-in



CHAPTER 1: ADMINISTRATION

SECTION 109 INSPECTIONS

Part of Section 109.3

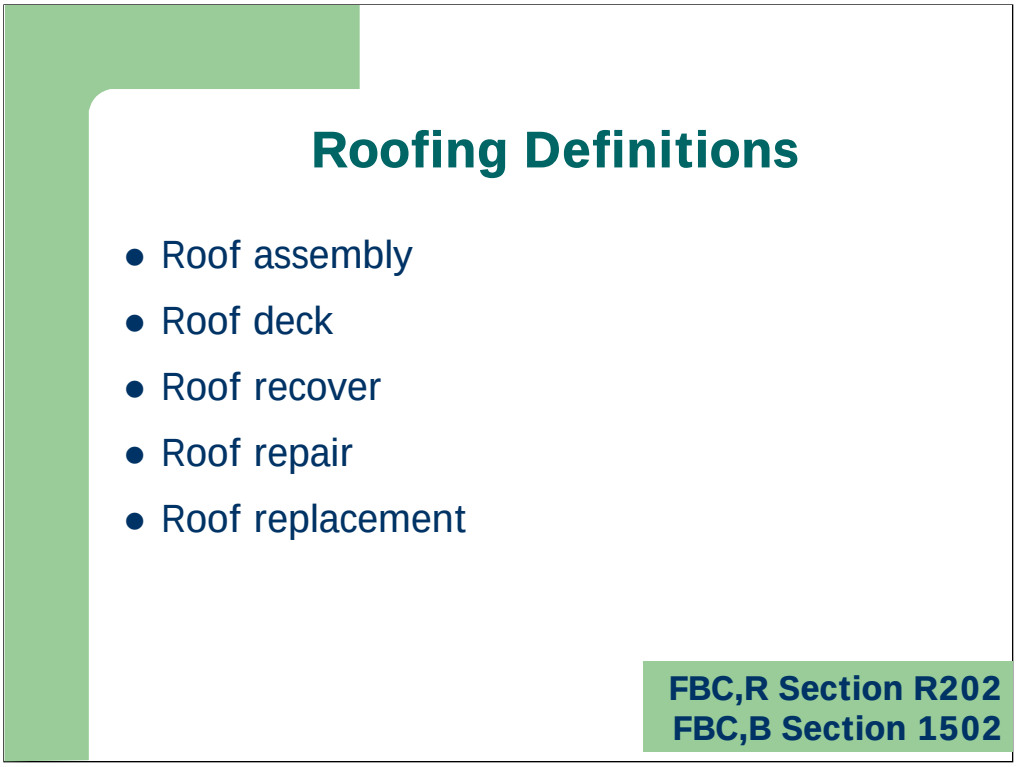
109.3 Required inspections. The building official upon notification from the permit holder or his or her agent shall make the following inspections, and shall either release that portion of the construction or shall notify the permit holder or his or her agent of any violations which must be corrected in order to comply with the technical codes. The building official shall determine the timing and sequencing of when inspections occur and what elements are inspected at each inspection.

4. Roofing inspection:

   Shall at a minimum include the following building components:
   - dry-in
   - insulation
   - roof coverings
   - flashings

5. Final inspection:

   To be made after the building is completed and ready for occupancy.



CHAPTER 2: DEFINITIONS

SECTION R202 DEFINITIONS

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof deck, vapor retarder, substrate or thermal barrier, insulation, vapor retarder, and roof covering.

ROOF DECK. The flat or sloped surface not including its supporting members or vertical supports.

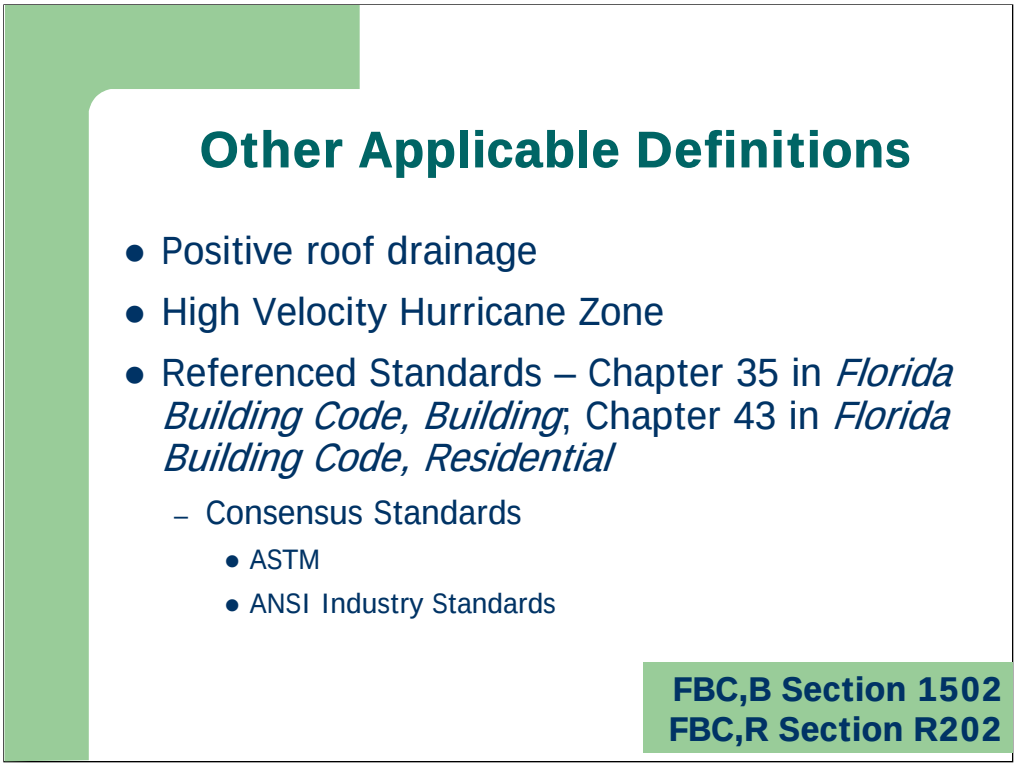
ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

FLORIDA BUILDING CODE, BUILDING

SECTION 1502

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate, and installing a new roof covering.



OTHER APPLICABLE DEFINITIONS

POSITIVE ROOF DRAINAGE. The drainage condition in which consideration has been made for all loading deflections of the roof deck, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.

FLORIDA BUILDING CODE, BUILDING

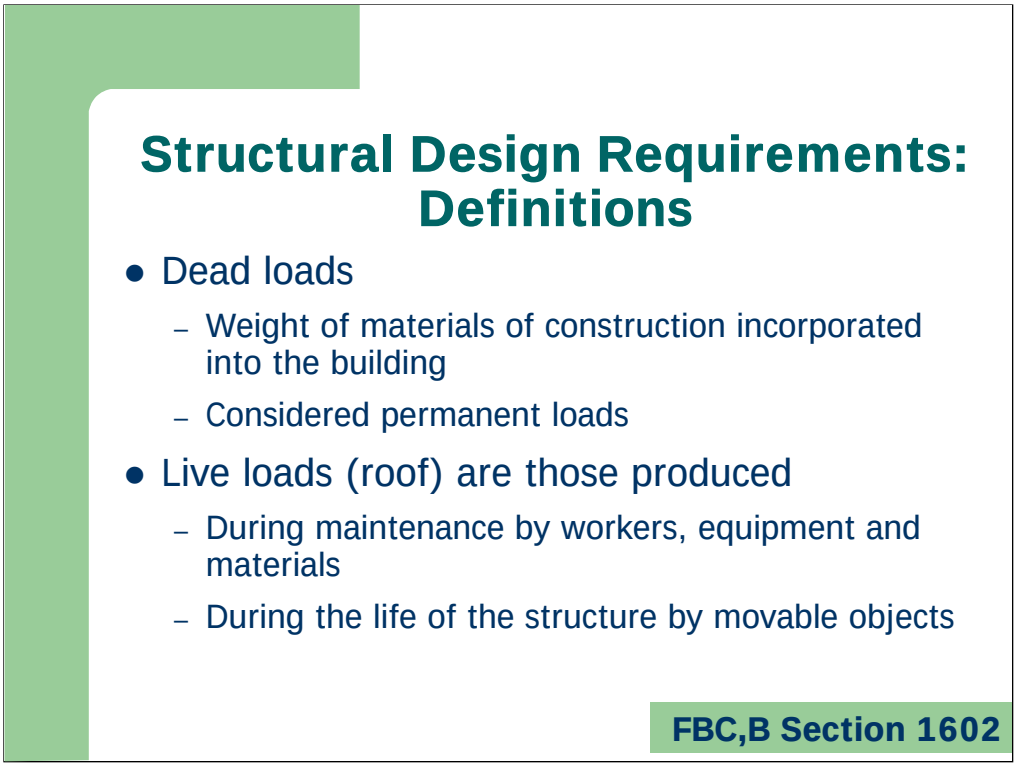
HIGH VELOCITY HURRICANE ZONE. This zone consists of Broward and Dade counties.

REFERENCED STANDARDS. Listed in Chapter 35 of *Florida Building Code, Building* and in Chapter 43 of *Florida Building Code, Residential*.

CONSENSUS STANDARDS

- ASTM (American Society for Testing and Materials, now known as ASTM International)
- ANSI (American National Standards Institute)

INDUSTRY STANDARDS



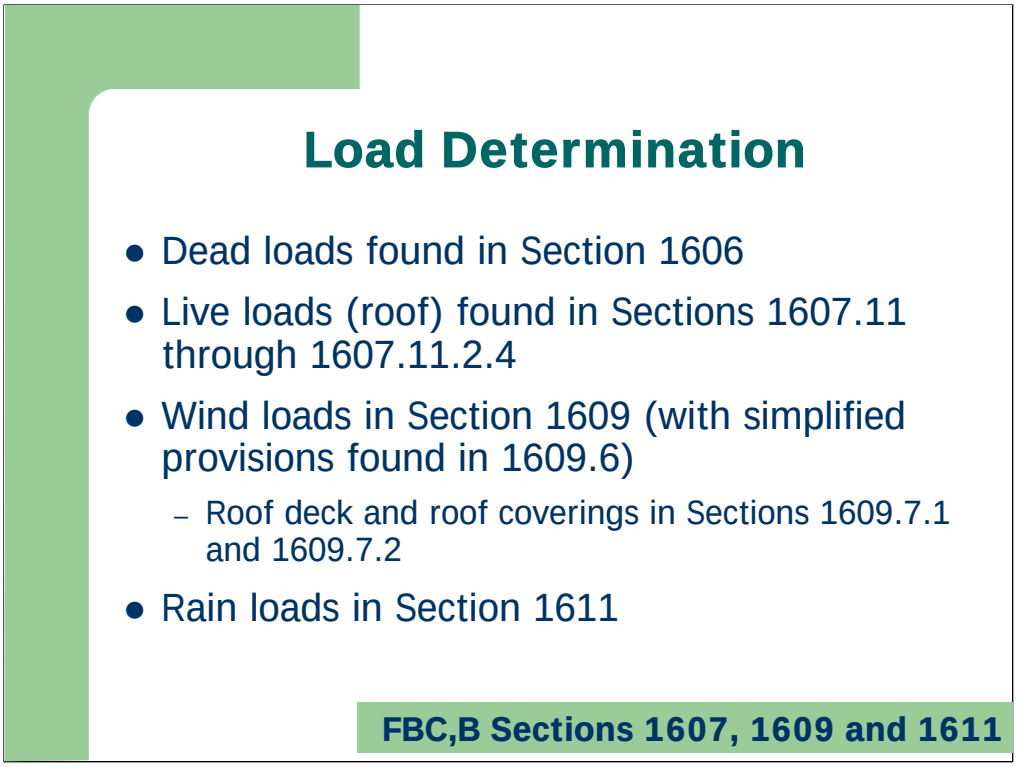
CHAPTER 16: STRUCTURAL DESIGN

SECTION 1602 DEFINITIONS

1602.1 Definitions.

DEAD LOADS. The weight of materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding and other similarly incorporated architectural and structural items, and fixed service equipment, including the weight of cranes. All dead loads are considered permanent loads.

LIVE LOADS (ROOF). Those loads produced (1) during maintenance by workers, equipment and materials; and (2) during the life of the structure by movable objects such as planters and by people.



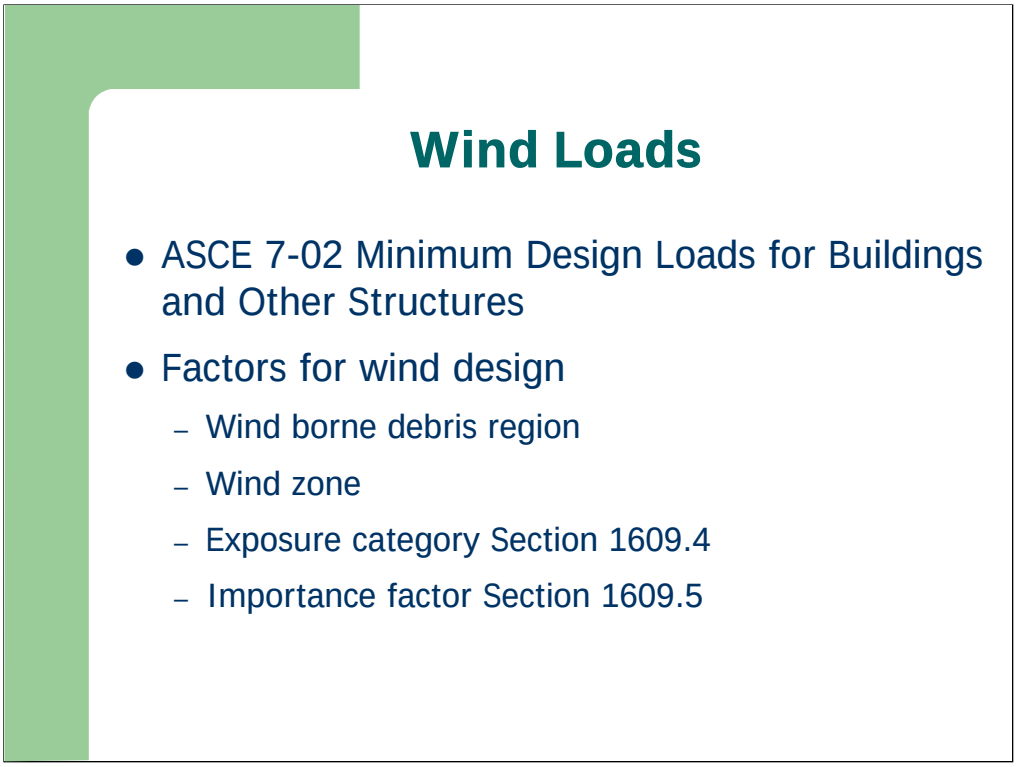
CHAPTER 16: STRUCTURAL DESIGN

SECTION 1606 DEAD LOADS

SECTION 1607 LIVE LOADS

SECTION 1609 WIND LOADS

SECTION 1611 RAIN LOADS



CHAPTER 16: STRUCTURAL LOADS

ASCE 7-02 Minimum Design Loads for Buildings and Other Structures (American Society of Civil Engineers)

1609.4 Exposure Category.

A factor that accounts for the characteristics of the ground surface irregularities found at the building site. Exposure categories found in Florida:

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 B shall be assumed unless the site meets the definition of another type exposure.

Exposure C. Means, except in the high velocity hurricane zone, that area which lies within 1500 feet of the coastal construction control line, or within 1500 feet of the mean high tide line, whichever is less. On barrier islands, exposure category C shall be applicable in the coastal building zone set forth in s. 161.55(5), Florida Statutes.

1609.5 Importance Factor.

Importance factor, I_w—A factor that accounts for the degree of hazard to human life and damage to property.

Category	Wind (mph)
1	94 – 121
2	122 – 140
3	141 – 165
4	166 – 197
5	198 +

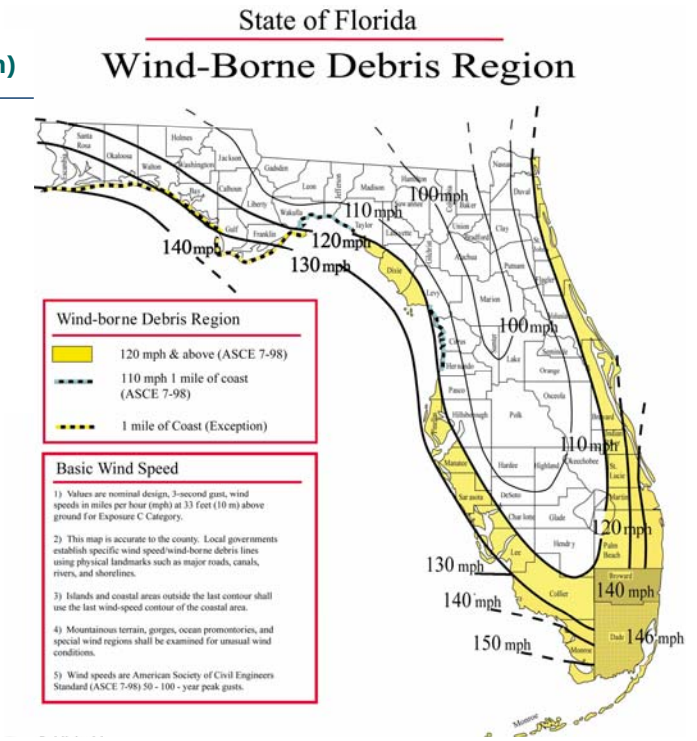


Figure 1609 *State of Florida Wind-borne Debris Region and Basic Wind Speed* map.

The Florida map indicates the basic design wind speeds and the wind borne debris regions and is accurate to the county.

1609.2 Definitions. (Specific to the provisions of 1609)

WIND-BORNE DEBRIS REGION

1. Areas within one mile (1.6 km) of the coastal mean high water line where the basic wind speed is 110 mph (49 m/s) or greater.
2. Areas where the basic wind speed is 120 mph (53 m/s) or greater except from the eastern border of Franklin County to the Florida-Alabama line where the region includes areas only within 1 mile of the coast.

1609.3 Basic Wind Speed.

The basic wind speed in miles per hour, for the development of wind loads, shall be determined from Figure 1609. Basic wind speed for the special wind regions indicated, near mountainous terrain and near gorges shall be in accordance with local jurisdiction requirements. The exact location of wind speed lines shall be established by local ordinance using recognized physical landmarks such as major roads, canals, rivers, and lake shores, wherever possible.

- Wind speeds are clocked above most buildings.
- What's felt on the ground usually is not as strong as the maximum sustained winds measured by the National Hurricane Center.
- Here are projected sustained wind speeds at various heights in a suburban area during a Category 2 hurricane.

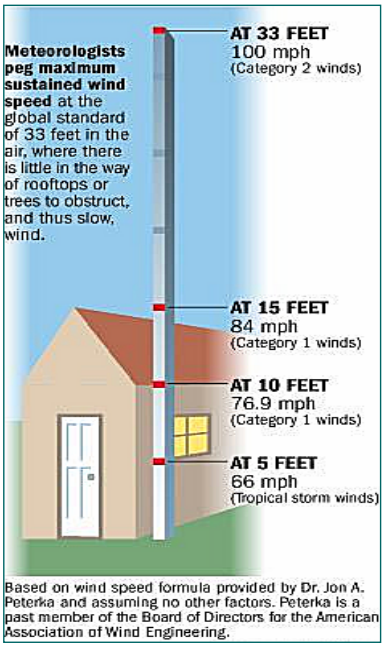
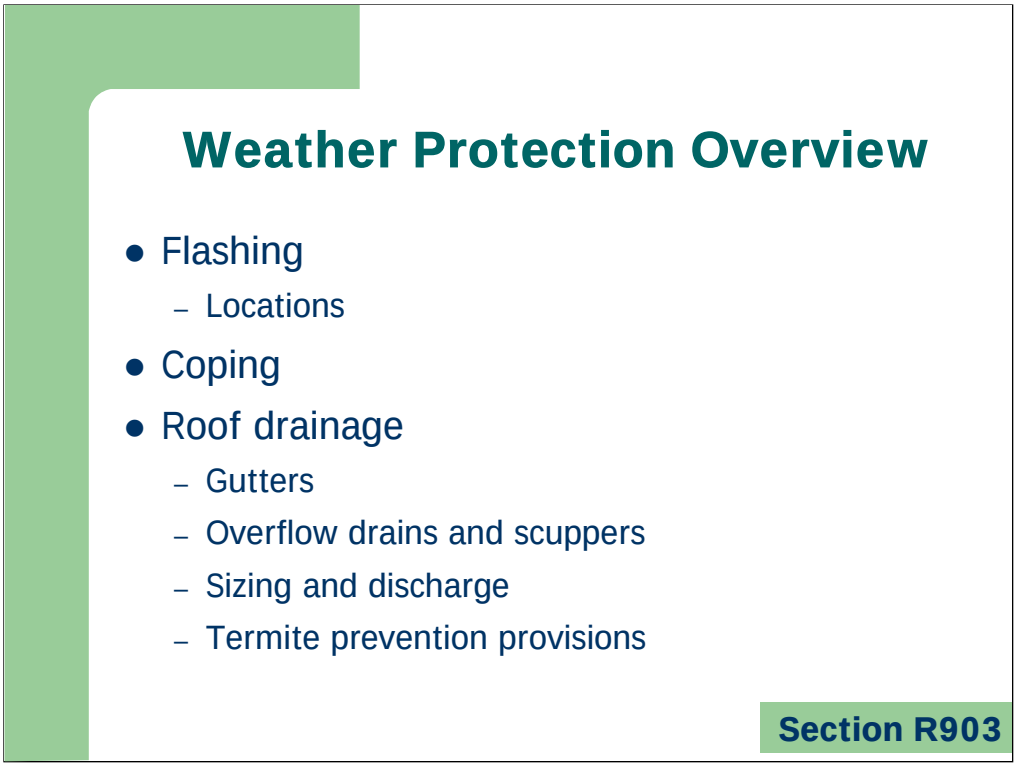


Image from: *Why Roofs Failed: a* Palm Beach Post *Special Report*. December 19, 2004.

Note height at which wind speed is determined.



CHAPTER 9: ROOF ASSEMBLIES

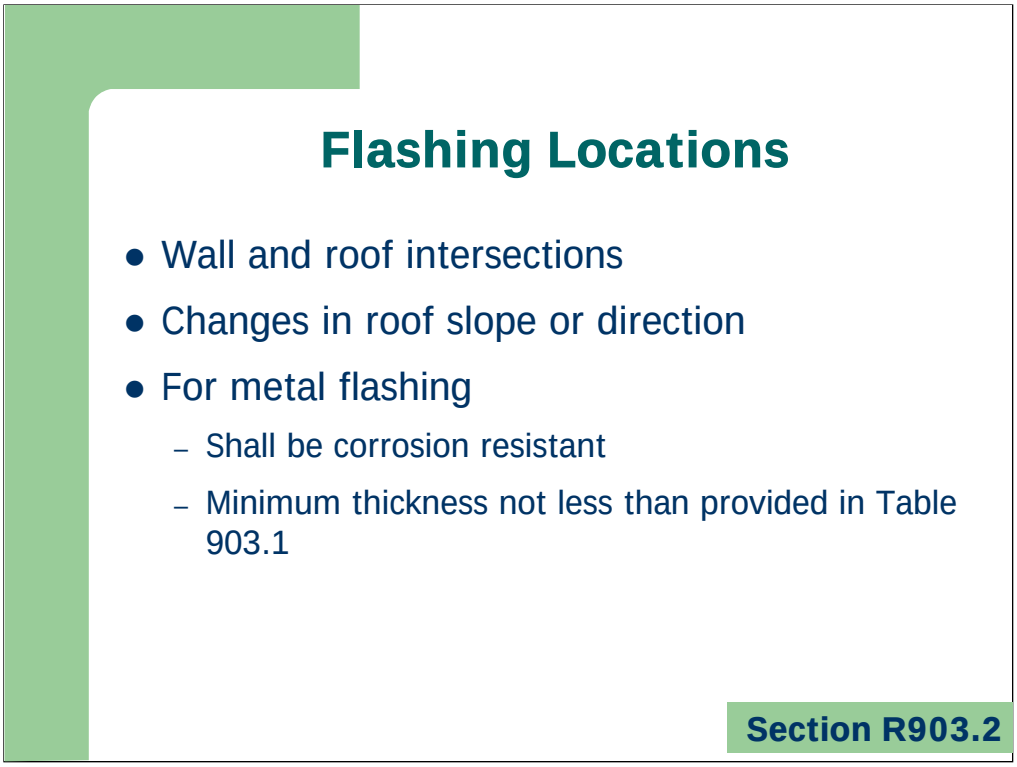
SECTION R903 WEATHER PROTECTION

R903.1 General. Roof decks shall be covered with approved roof coverings secured to the building or structure in accordance with the provisions of this chapter. Roof assemblies shall be designed and installed in accordance with this code and the approved manufacturer's installation instructions such that the roof assembly shall serve to protect the building or structure.

Flashing

- Components used to weatherproof or seal roof system edges at perimeters, penetrations, walls, expansion joints, valley, drains and other places where the roof covering is interrupted or terminated
  - For example, membrane base flashing covers the edge of the field membrane, and cap flashings or counterflashings shield the upper edges of the base flashing

Roof problems, such as leaks or wind blow-off, rarely occur in the field of the roof. Vulnerable areas for water intrusion must be protected and this is accomplished through proper installation of flashing, installed to prevent moisture entering the wall through joints in coping, through moisture permeable material, at intersections with the roof plane, or at parapet wall extensions.



CHAPTER 9: ROOF ASSEMBLIES

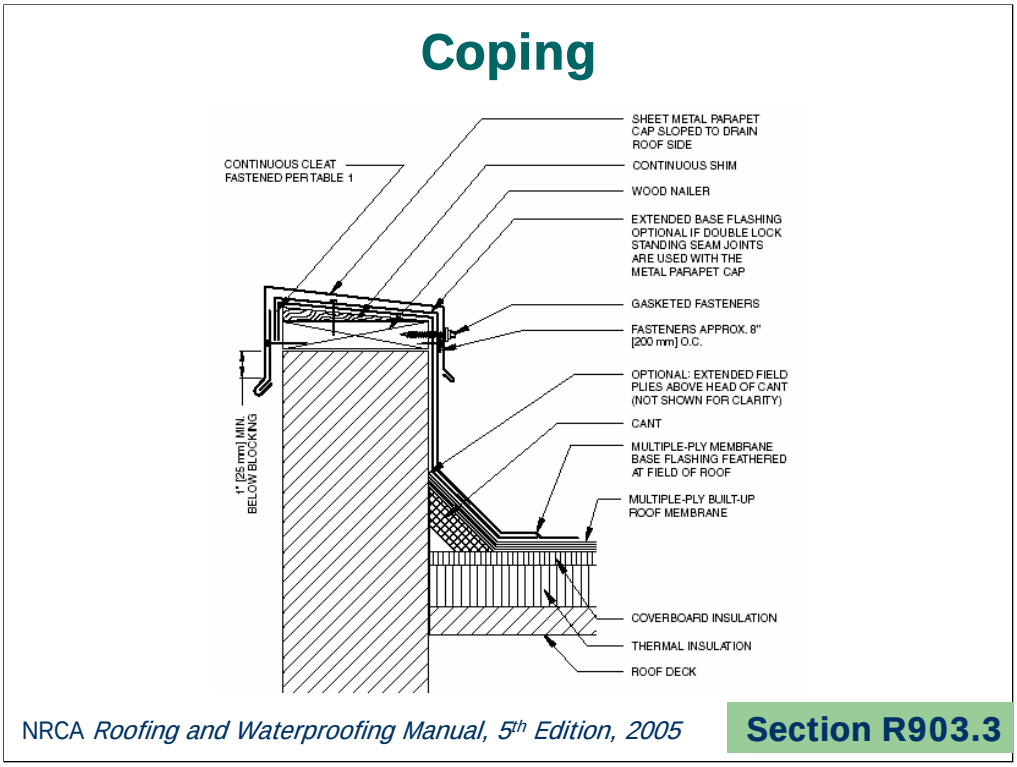
SECTION R903 WEATHER PROTECTION

R903.2 Flashing. Flashings shall be installed in such a manner so as to prevent moisture entering the wall and roof through joints in copings, through moisture permeable materials, and at intersections with parapet walls and other penetrations through the roof plane.

R903.2.1 Locations. Flashings shall be installed at wall and roof intersections; wherever there is a change in roof slope or direction; this requirement does not apply to hip and ridge junctions, and around roof openings. Where flashing is of metal, the metal shall be corrosion resistant with a thickness not less than provided in Table 903.1.

TABLE 903.1 METAL FLASHING MATERIAL

Material	Minimum thickness (inches)	Gage	Weight (lbs per sq ft)
Copper			1 (16 oz)
Aluminum	0.024		
Stainless steel		28	
Galvanized steel	0.0179	26 (zinc coated G90)	
Aluminum zinc coated steel	0.0179	26 (AZ50 alum zinc)	
Zinc alloy	0.027		
Lead			2.5 (40 oz)
Painted terne			1.25 (20 oz)

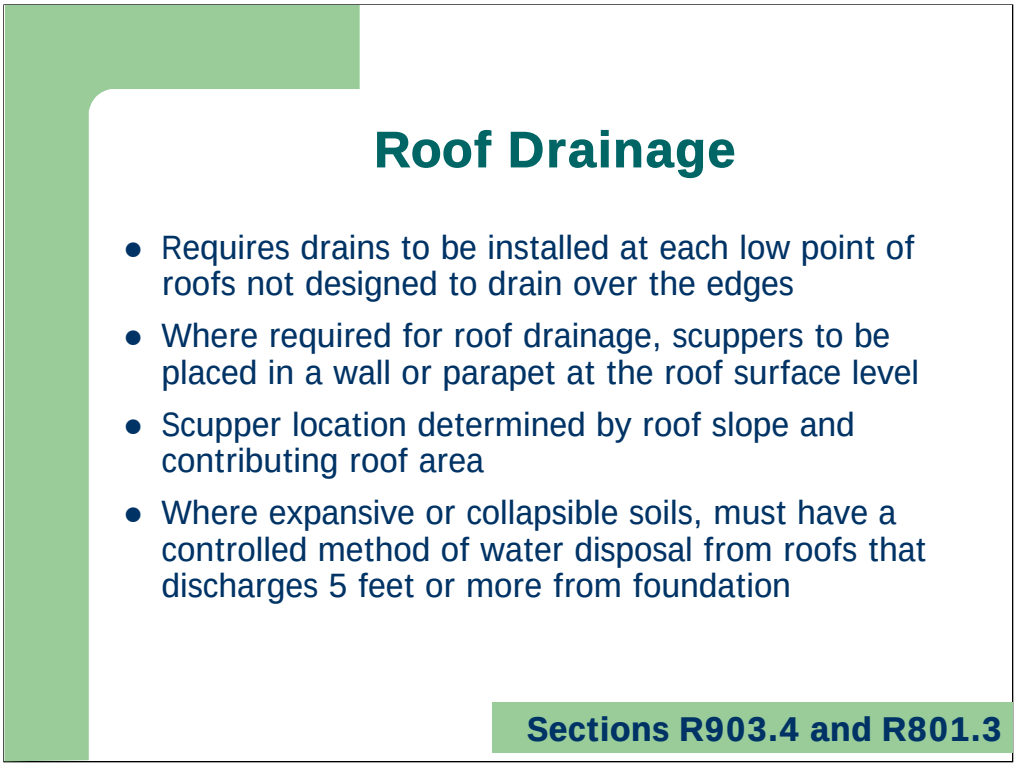


This slide illustrates one type of coping construction.

CHAPTER 9: ROOF ASSEMBLIES

SECTION R903 WEATHER PROTECTION

R903.3 Coping. Parapet walls shall be properly coped or sealed with noncombustible, weatherproof materials of a width no less than the thickness of the parapet wall.



CHAPTER 9: ROOF ASSEMBLIES

SECTION R903 WEATHER PROTECTION

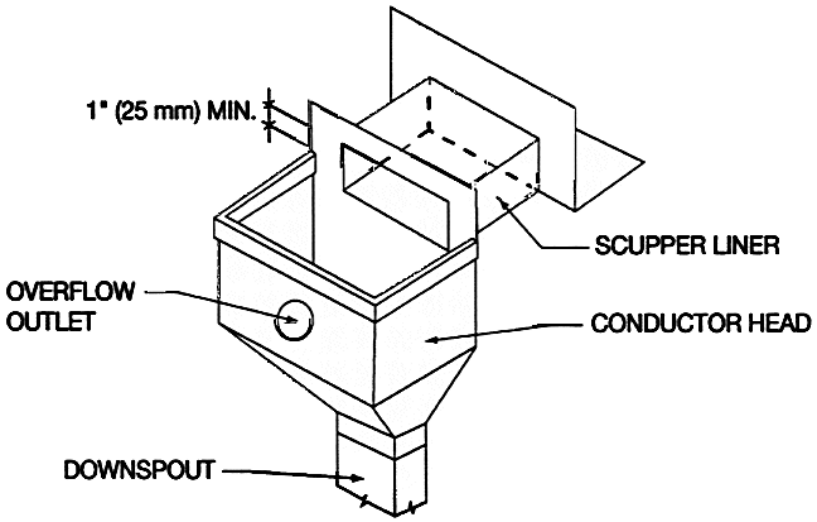
R903.4 Roof drainage. Unless roofs are sloped to drain over roof edges, roof drains shall be installed at each low point of the roof. Where required for roof drainage, scuppers shall be placed level with the roof surface in a wall or parapet. The scupper shall be located as determined by the roof slope and contributing roof area.

CHAPTER 8: ROOF-CEILING CONSTRUCTION

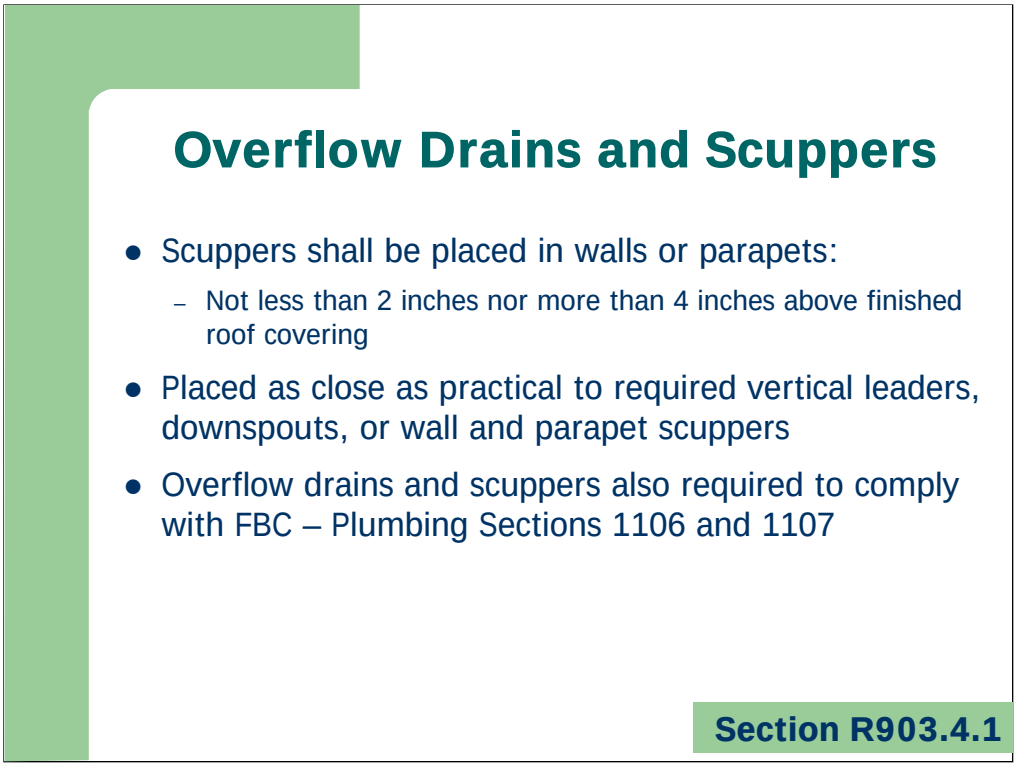
SECTION R801 GENERAL

R801.3 Roof drainage. In areas where expansive or collapsible soils are known to exist, all dwellings shall have a controlled method of water disposal from roofs that will collect and discharge all roof drainage to the ground surface at least 5 feet (1524 mm) from foundation walls or to an approved drainage system.

Scupper – Through Wall



NRCA *Roofing and Waterproofing Manual, 5th Edition, 2006 Update*

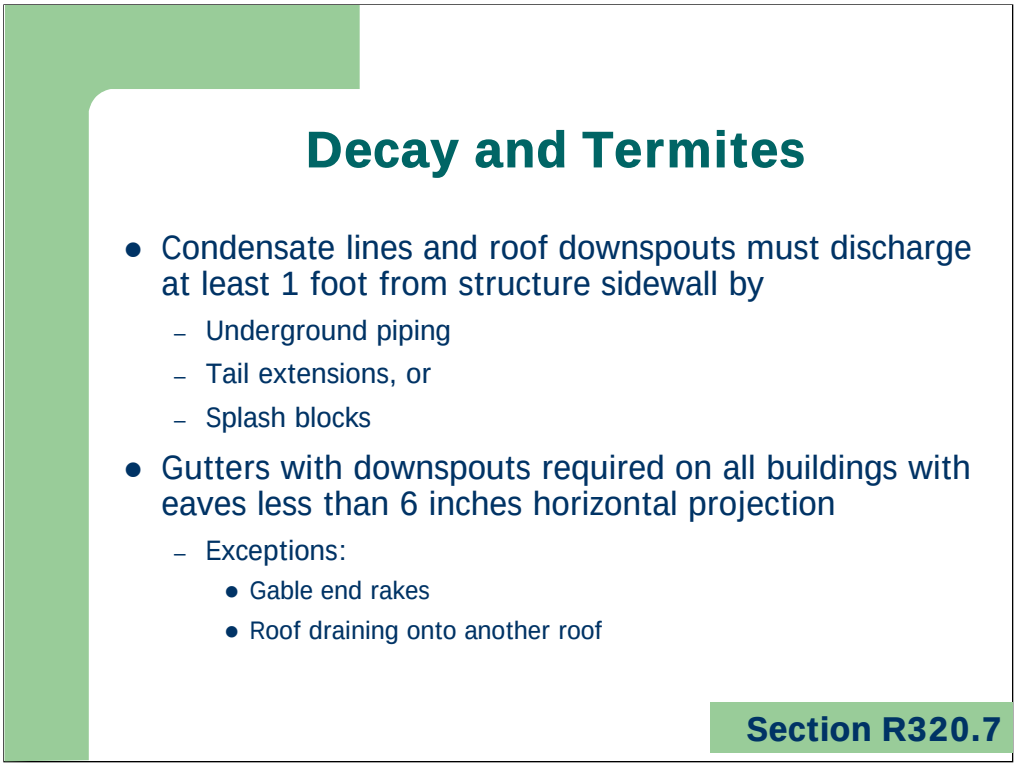


CHAPTER 9: ROOF ASSEMBLIES

SECTION R903 WEATHER PROTECTION

R903.4.1 When other means of drainage of overflow water is not provided, overflow scuppers shall be placed in walls or parapets not less than 2 inches (51 mm) nor more than 4 inches (102 mm) above the finished roof covering and shall be located as close as practical to required vertical leaders or downspouts or wall and parapet scuppers. An overflow scupper shall be sized in accordance with the *Florida Building Code, Plumbing.*

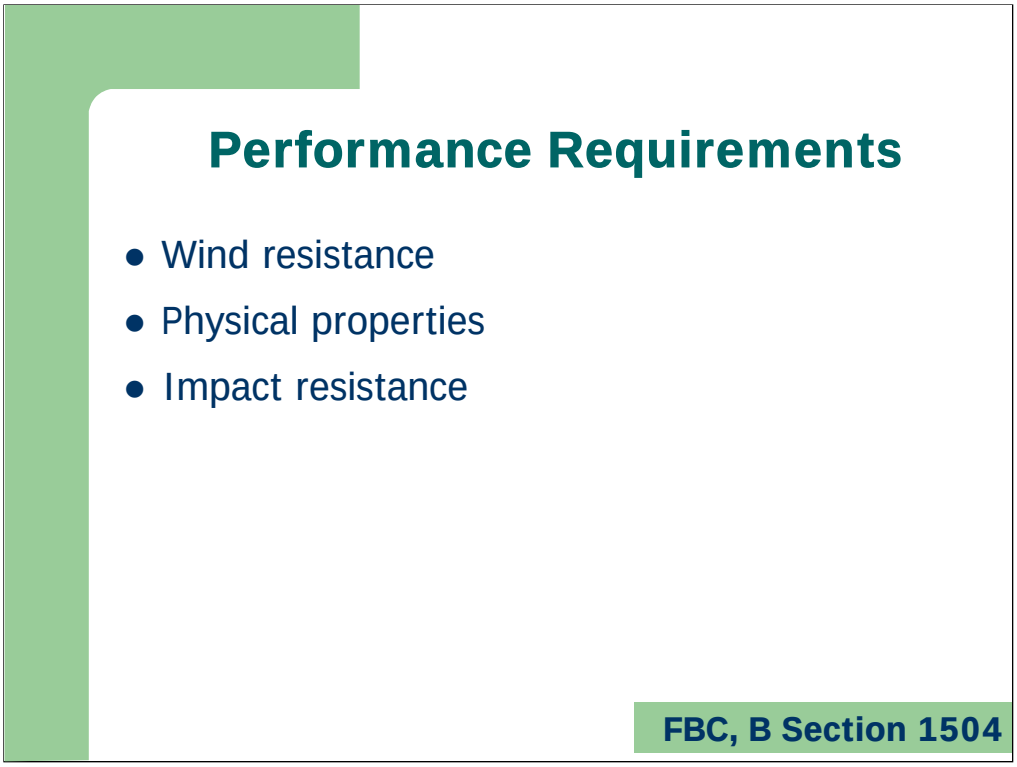
Note:
Applicable where roof drains are required.



CHAPTER 3: BUILDING PLANNING

SECTION R320 PROTECTION AGAINST TERMITES

R320.7 Protection against decay and termites. Condensate lines and roof downspouts shall discharge at least 1 foot (305 mm) away from the structure sidewall, whether by underground piping, tail extensions, or splash blocks. Gutters with downspouts are required on all buildings with eaves of less than 6 inches (152 mm) horizontal projection except for gable end rakes or on a roof above another roof.

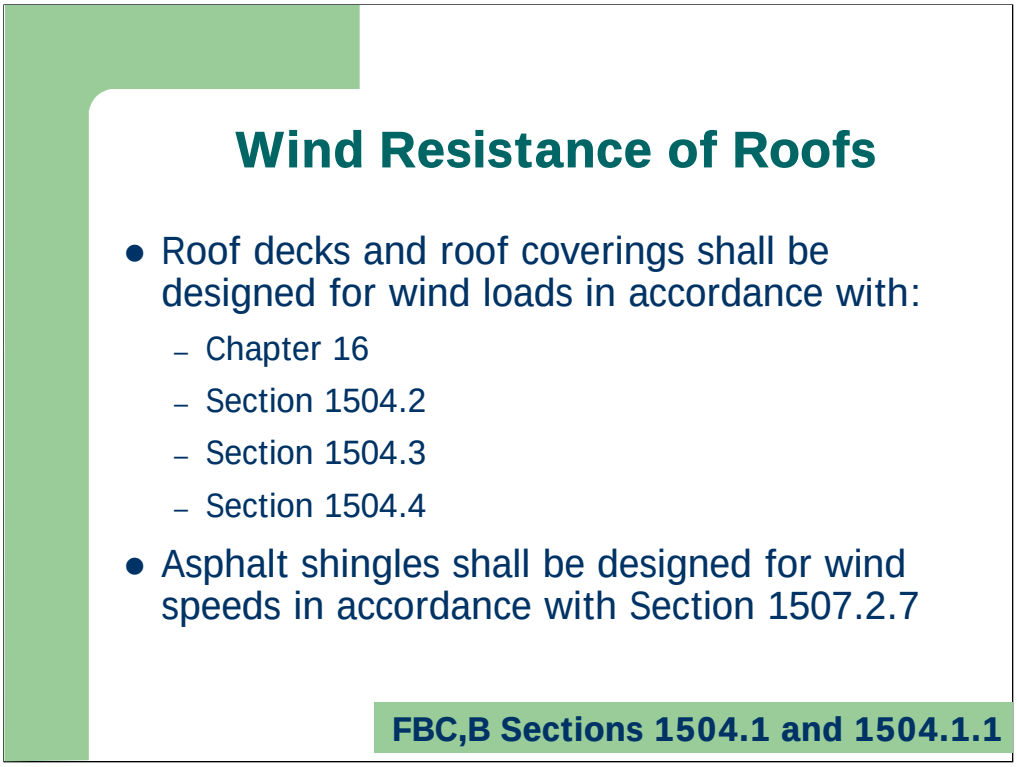


CHAPTER 15: ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

SECTION 1504 PERFORMANCE REQUIREMENTS

ASTM is a not-for-profit organization that provides a forum for the development and publication of voluntary consensus standards for materials, products, systems and services. It develops standard test methods, specifications, practices, guides, classifications, and terminology covering subjects such as metals, paints, plastics, textiles, petroleum, construction, energy, the environment, consumer products, medical services and devices, computerized systems, electronics, and many others. ASTM Headquarters has no technical research or testing facilities; such work is done voluntarily by the ASTM members located throughout the world (source: http://www.astm.org/cgi-bin/SoftCart.exe/FAQ/index.html?E+mystore).

Other standards found in the roofing industry are from testing entities such as Factory Mutual Global (FM) and Underwriters Laboratories (UL). Some insurance companies rely on FM and UL requirements for insurance-rating purposes. These requirements have had a strong effect on the construction of roof systems, especially in the areas of reduction of the risk of fire, wind and other physical damage.



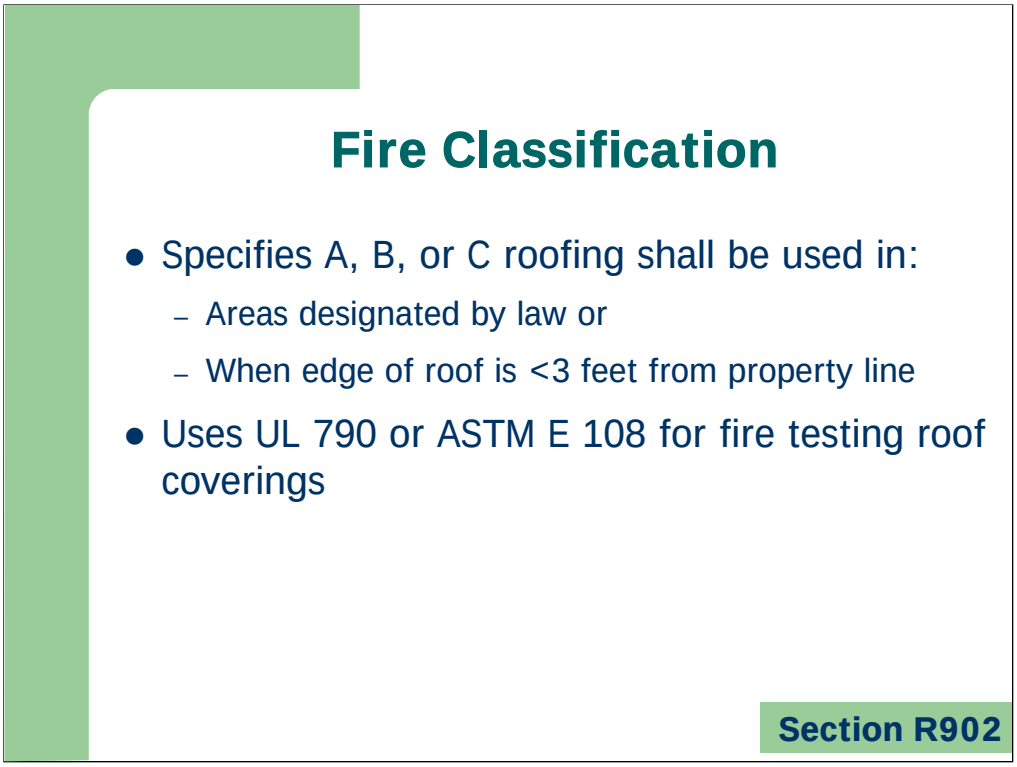
CHAPTER 15: ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

SECTION 1504 PERFORMANCE REQUIREMENTS

1504.1 Wind resistance of roofs. Roof decks and roof coverings shall be designed for wind loads in accordance with Chapter 16 and 1504.2, 1504.3, and 1504.4.

1504.1.1 Wind resistance of asphalt shingles. Asphalt shingles shall be designed for wind speeds in accordance with Section 1507.2.7.

Note:
Florida Building Code, Building **Section 1507.2.7 and** ***Florida Building Code, Residential*** **Section R905.2.6, discussed later in this presentation, are basically the same.**



CHAPTER 9: ROOF ASSEMBLIES

SECTION R902 ROOF CLASSIFICATION

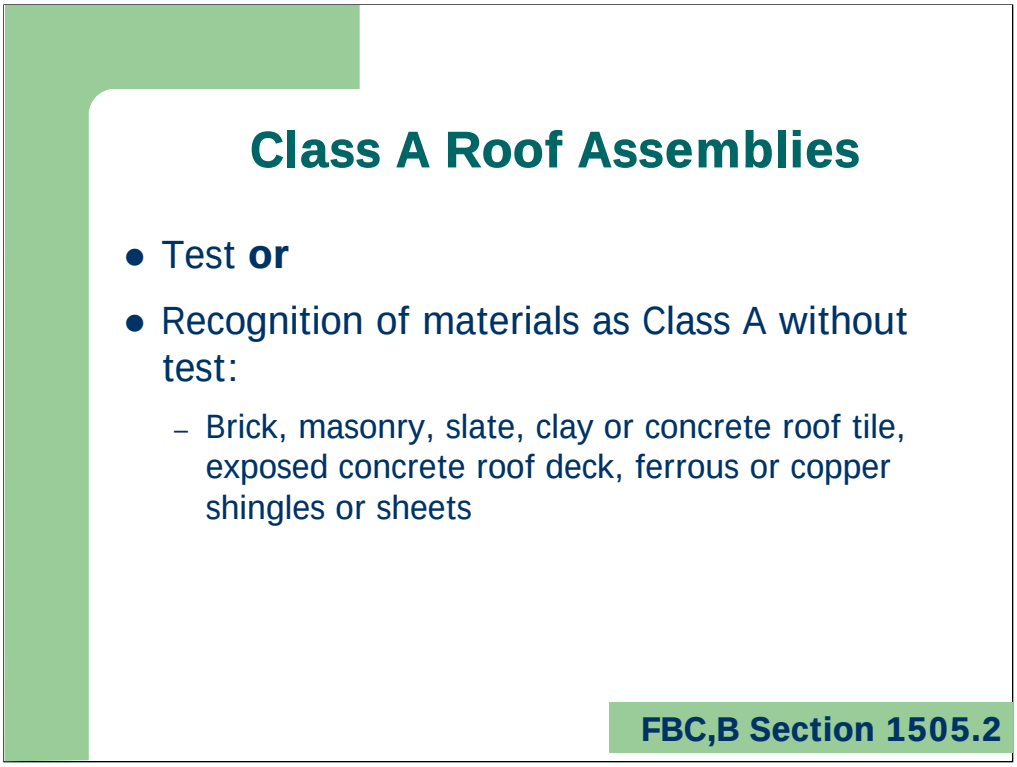
R902.1 Roofing covering materials. Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in areas designated by law as requiring their use or when the edge of the roof is less than 3 feet (914 mm) from a property line. Classes A, B and C roofing required to be listed by this section shall be tested in accordance with UL 790 or ASTM E 108.

Exception: Brick, masonry, slate, clay or concrete roof tile; ferrous and copper shingles and shakes; and exposed concrete roof deck are considered to meet Class A roof covering provisions without testing. Metal sheets and shingles are considered to meet Class B roof covering provisions without testing.

UL 790 Standard for Tests for Fire Resistance of Roof Covering Materials

ASTM E 108 Test Methods for Fire Tests of Roofing Coverings

Note:
See *Florida Building Code, Building* Section 1505 for more information.

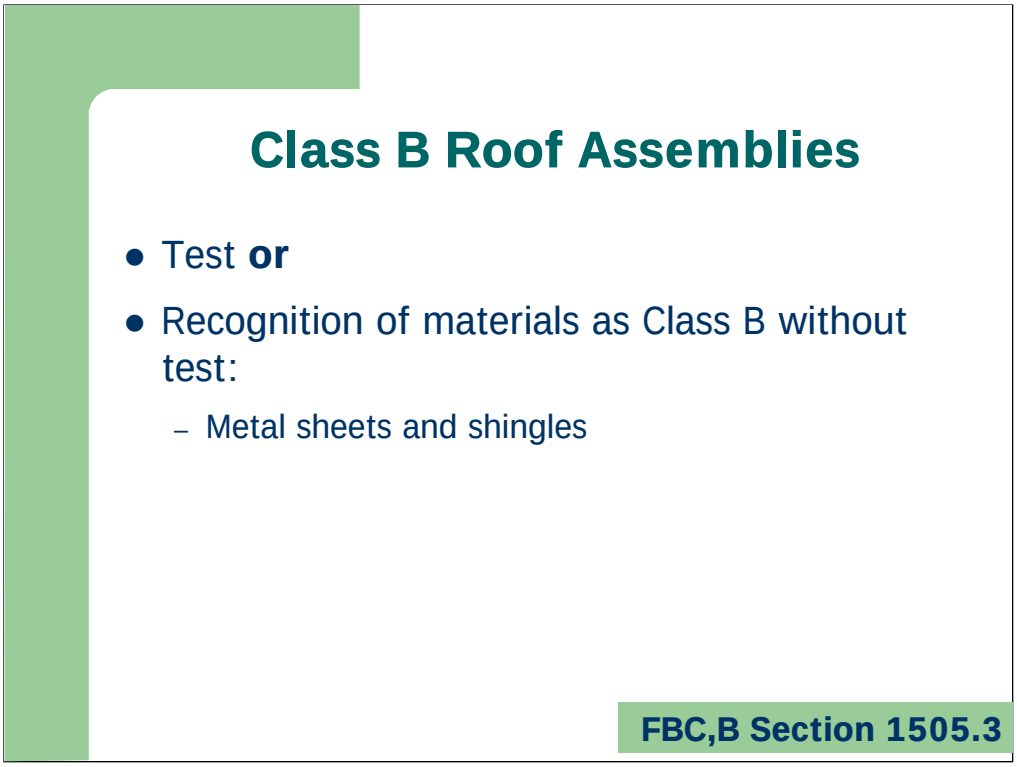


CHAPTER 15: ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

SECTION 1505 FIRE CLASSIFICATION

1505.2 Class A roof assemblies. Class A roof assemblies are those that are effective against severe fire test exposure. Class A roof assemblies and roof coverings shall be listed and identified as Class A by an approved testing agency. Class A roof assemblies shall be permitted for use in buildings or structures of all types of construction.

Exception: Class A roof assemblies include those with coverings of brick, masonry, slate, clay or concrete roof tile, exposed concrete roof deck, ferrous or copper shingles or sheets.



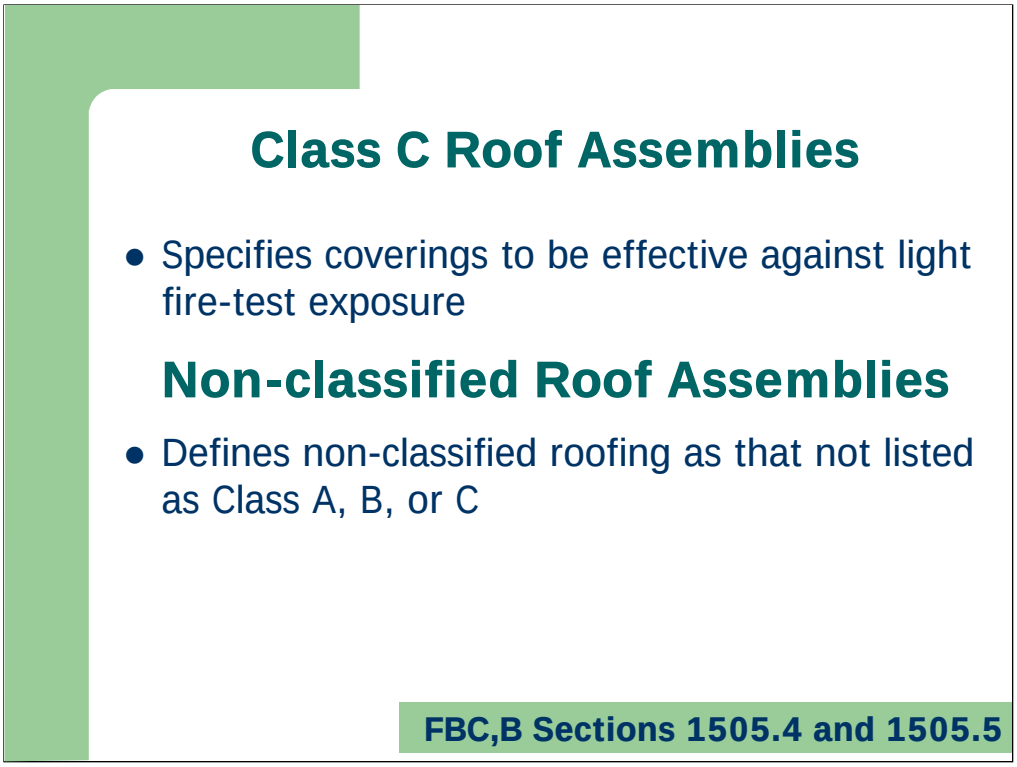
CHAPTER 15: ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

SECTION 1505 FIRE CLASSIFICATION

1505.3 Class B roof assemblies. Class B roof assemblies are those that are effective against moderate fire-test exposure. Class B roof assemblies and roof coverings shall be listed and identified as Class B by an approved testing agency.

Exception: Class B roof assemblies include those with coverings of metal sheets and shingles.

Note:
Specifies coverings to be effective against moderate fire test exposure.

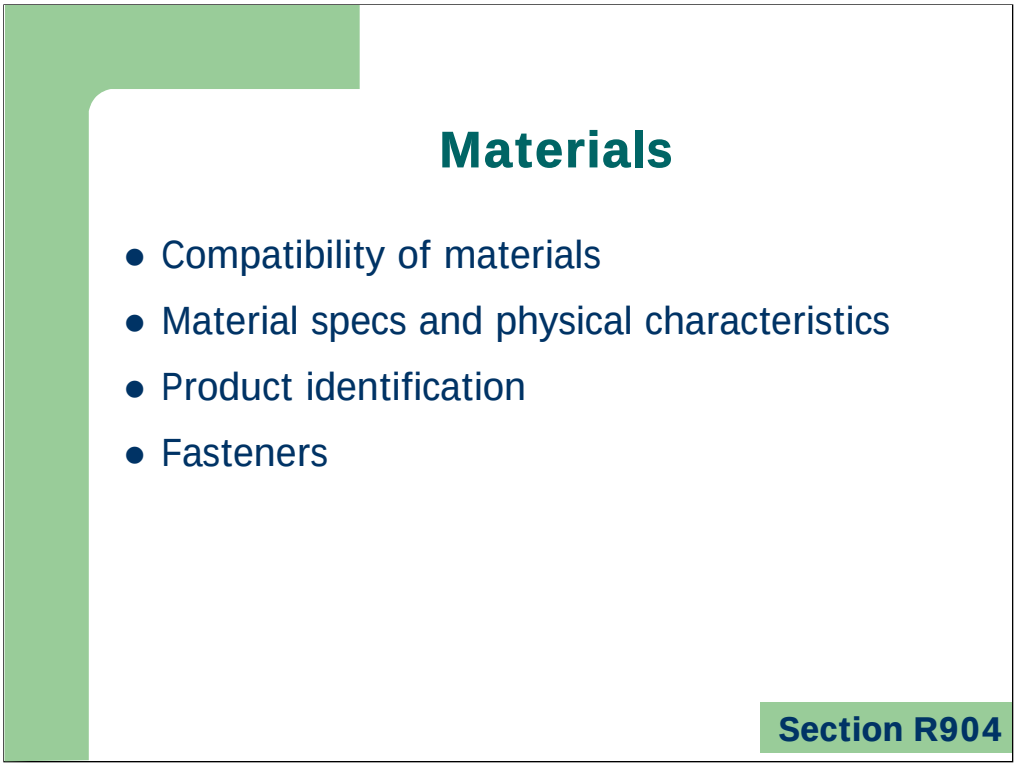


CHAPTER 15: ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

SECTION 1505 FIRE CLASSIFICATION

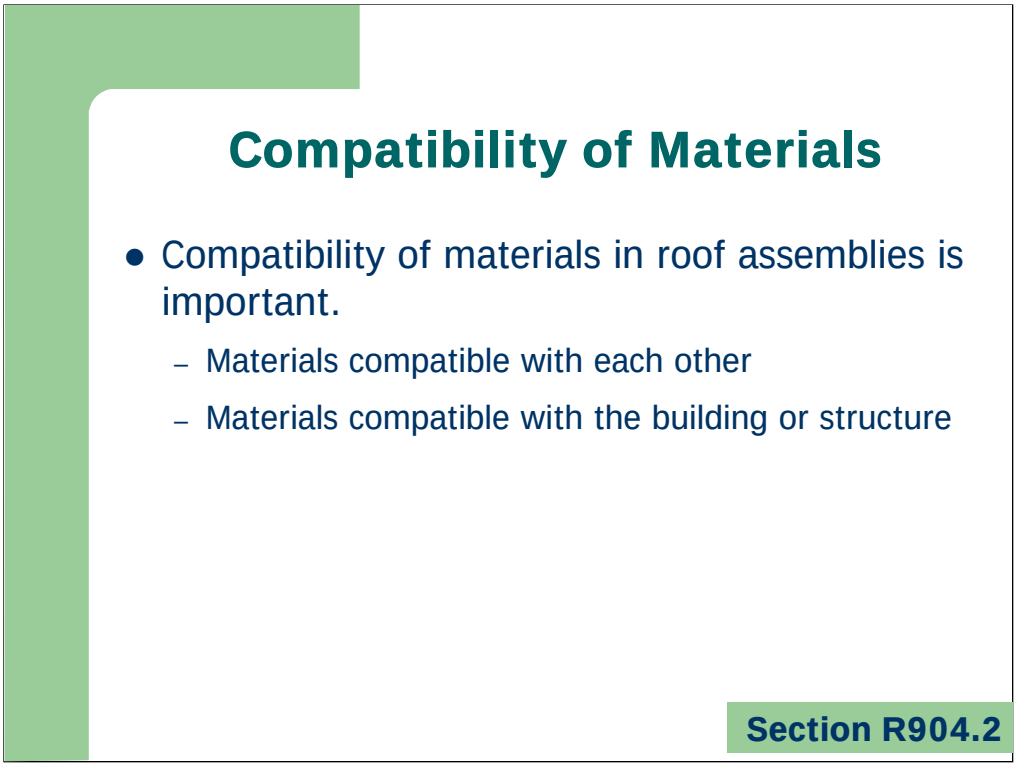
1505.4 Class C roof assemblies. Class C roof assemblies are those that are effective against light fire test exposure. Class C roof assemblies and roof coverings shall be listed and identified as Class C by an approved testing agency.

1505.5 Nonclassified roofing. Nonclassified roofing is approved material that is not listed as a Class A, B or C roof covering.



CHAPTER 9: ROOF ASSEMBLIES

SECTION R904 MATERIALS



CHAPTER 9: ROOF ASSEMBLIES

SECTION R904 MATERIALS

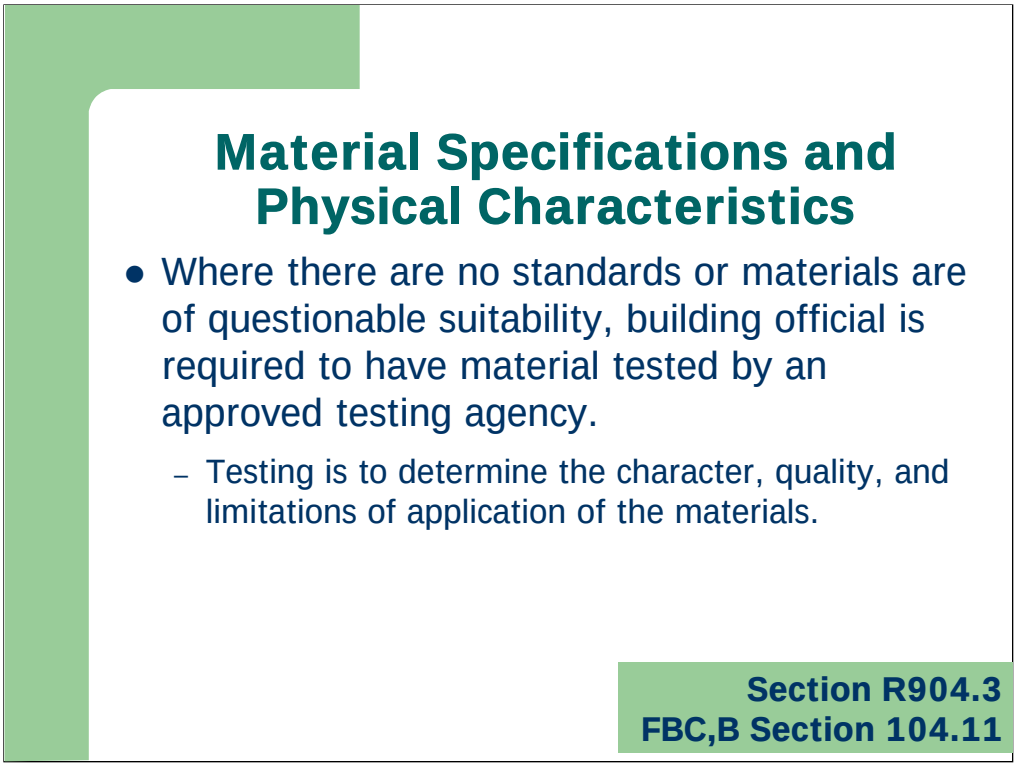
R904.2 Compatibility of materials. Roof assemblies shall be of materials that are compatible with each other and with the building or structure to which the materials are applied.

CHAPTER 9: ROOF ASSEMBLIES

SECTION R904 MATERIALS

R904.3 Material specifications and physical characteristics. Roof covering materials shall conform to the applicable standards listed in this chapter. …

…continued



…continued

CHAPTER 9: ROOF ASSEMBLIES

SECTION R904 MATERIALS

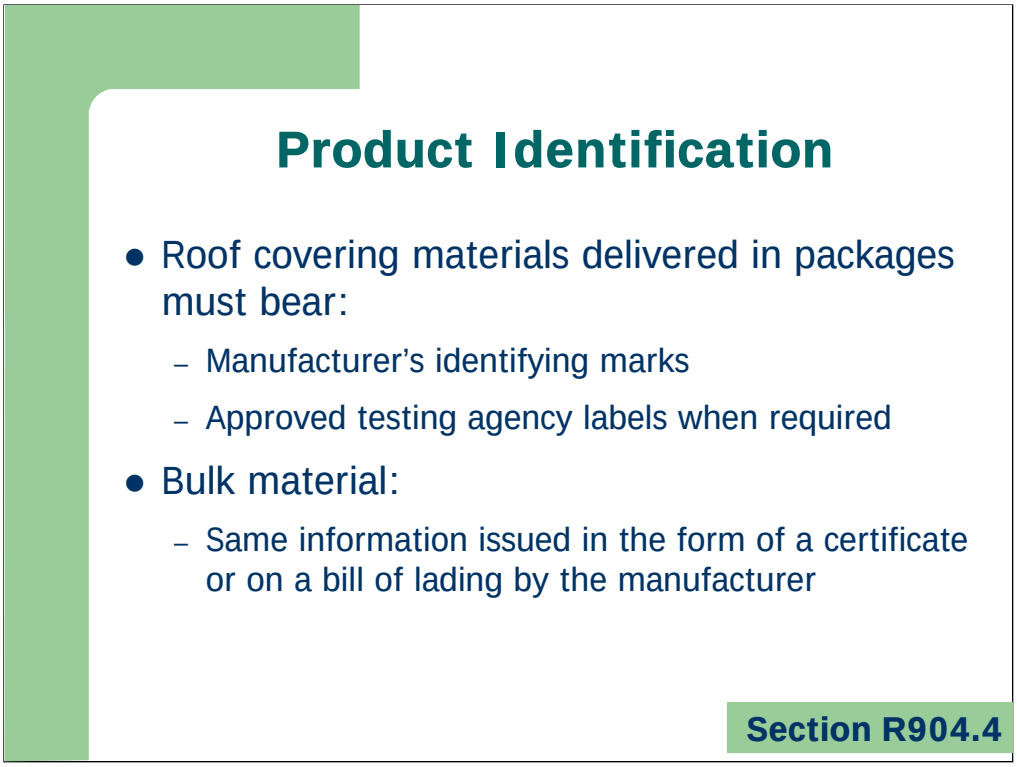
R904.3 Material specifications and physical characteristics. …In the absence of applicable standards or where materials are of questionable suitability, testing by an approved testing agency shall be required by the building official to determine the character, quality and limitations of application of the materials.

This section is tied back to the Duties and Powers of Building Officials section:

CHAPTER 1: ADMINISTRATION

SECTION 104 DUTIES AND POWERS OF BUILDING OFFICAL

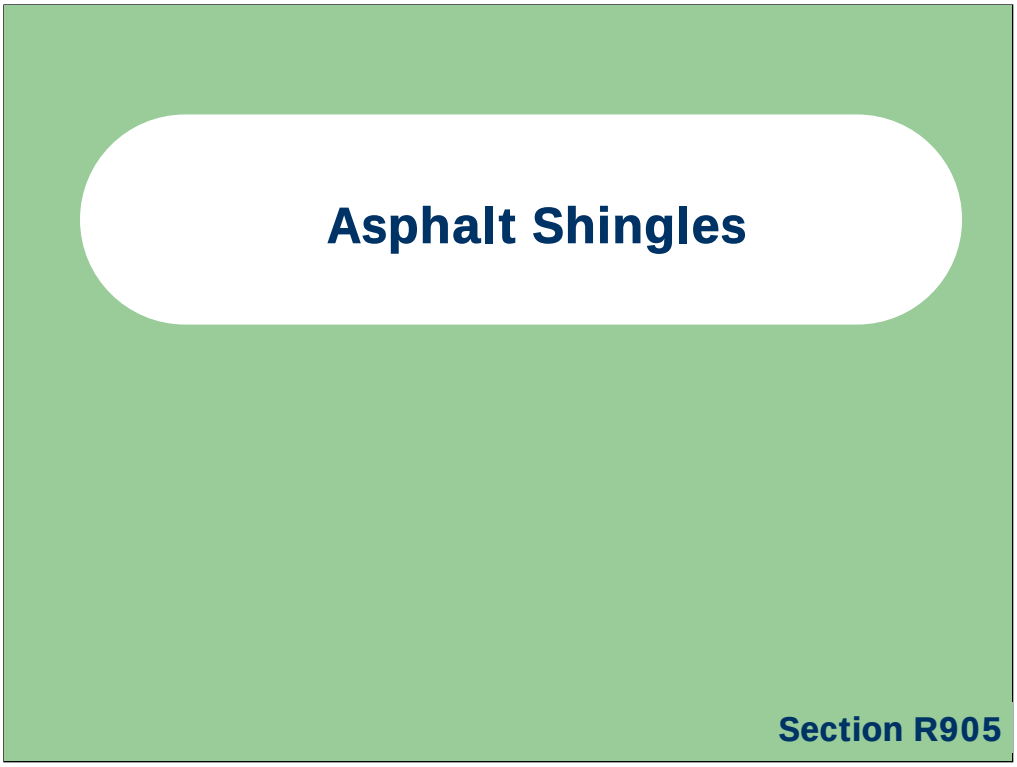
104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. When alternate life safety systems are designed, the *SFPE Engineering Guide to Performance-Based Fire Protection Analysis and Design of Buildings*, or other methods approved by the building official may be used. The building official shall require that sufficient evidence or proof be submitted to substantiate any claim made regarding the alternative.



CHAPTER 9: ROOF ASSEMBLIES

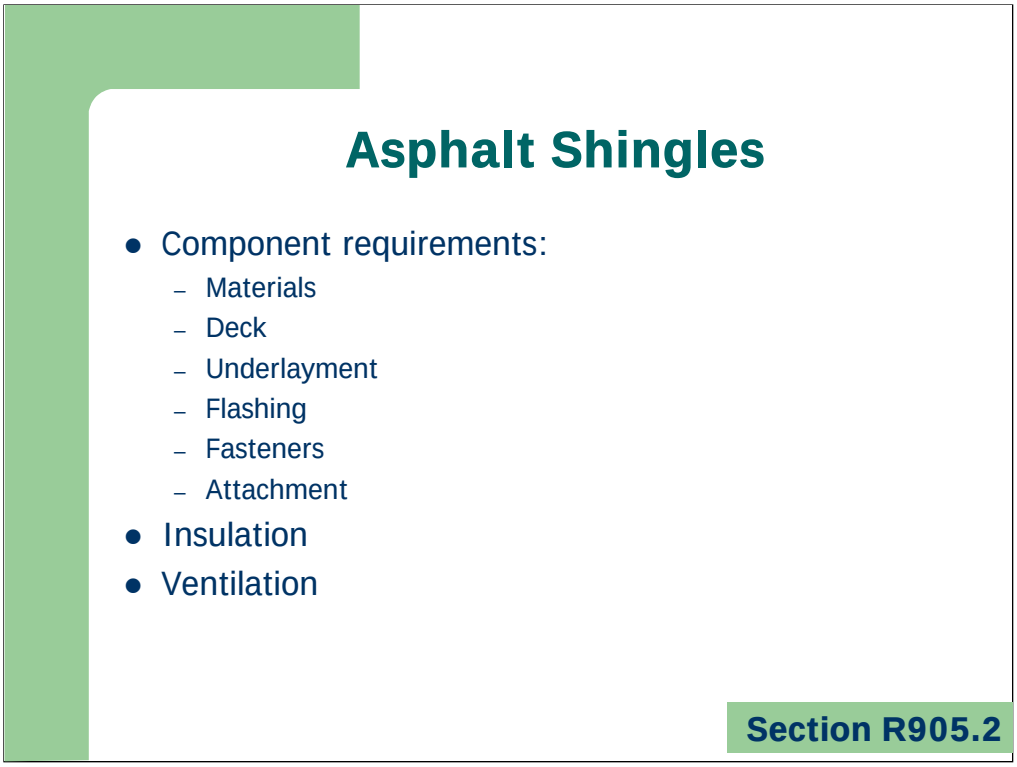
SECTION R904 MATERIALS

R904.4 Product identification. Roof covering materials shall be delivered in packages bearing the manufacturer's identifying marks and approved testing agency labels when required. Bulk shipments of materials shall be accompanied with the same information issued in the form of a certificate or on a bill of lading by the manufacturer.



CHAPTER 9: ROOF ASSEMBLIES

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

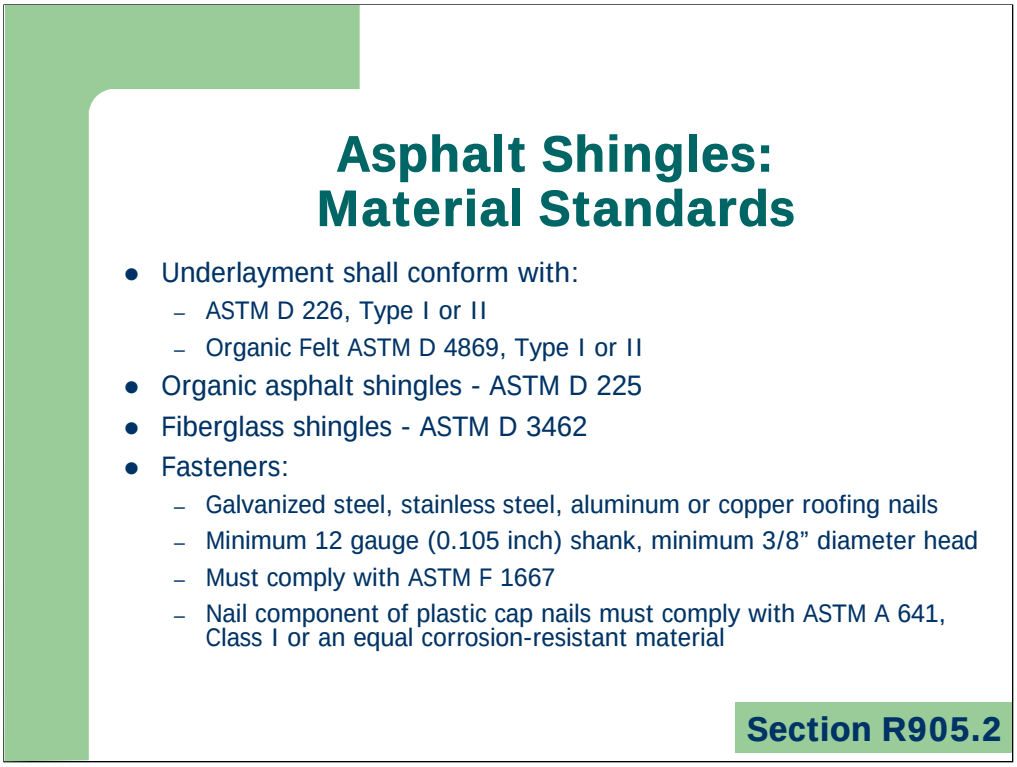


CHAPTER 9: ROOF ASSEMBLIES

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

R905.1 Roof covering applications. Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions.

R905.2 Asphalt shingles. The installation of asphalt shingles shall comply with the provisions of this section.



CHAPTER 9: ROOF ASSEMBLIES

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

R905.2 Asphalt shingles.

R905.2.3 Underlayment. Unless otherwise noted, required underlayment shall conform with ASTM D 226, Type I or Type II, or ASTM D 4869, Type I or Type II. Self-adhering polymer modified bitumen sheet shall comply with ASTM D 1970.

R905.2.4 Asphalt Shingles. Asphalt shingles shall have self-seal strips or be interlocking, and comply with ASTM D 225 or ASTM D 3462.

R905.2.5 Fasteners. Fasteners for asphalt shingles shall be galvanized steel, stainless steel, aluminum or copper roofing nails, minimum 12 gauge [0.105 inch (2.67 mm)] shank with a minimum 3/8 inch (9.5 mm) diameter head, ASTM F 1667, of a length to penetrate through the roofing materials and a minimum of ¾ inch (19.1 mm) into the roof sheathing. Where the roof sheathing is less than ¾ inch (19.1 mm) thick, the fasteners shall penetrate through the sheathing. Fasteners shall comply with ASTM F 1667.

R905.2.5.1 The nail component of plastic cap nails shall meet ASTM A 641, Class I or an equal corrosion resistance by coating, electro galvanization, mechanical galvanization, hot dipped galvanization, stainless steel, nonferrous metal and alloys or other suitable corrosion-resistant material.

ASTM D 226 Specification for Asphalt-Saturated Organic Felt Used on Roofing and Waterproofing

ASTM D 4869 Specification for Asphalt-Saturated Organic Felt Shingle Underlayment Used in Roofing

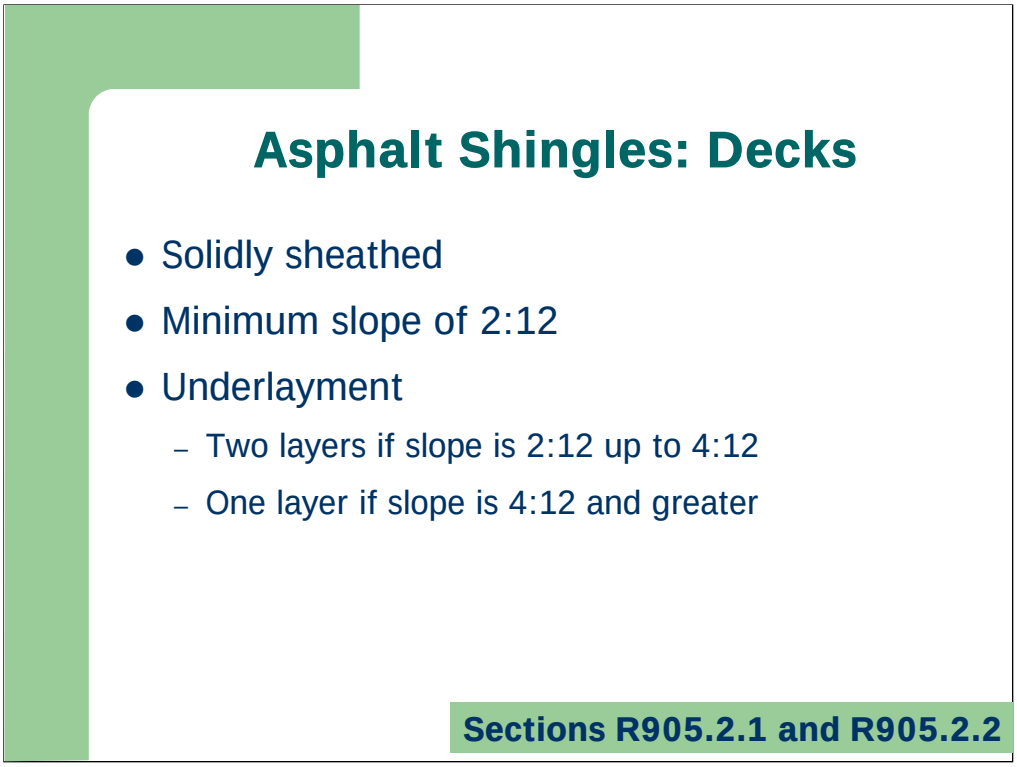
ASTM D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

ASTM D 225 Specification for Asphalt Shingles (organic felt) Surfaced with mineral granules

ASTM D 3462 Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules

ASTM F 1667 Standard Specification for Driven Fasteners - Nails, Spikes and Staples

ASTM A 641 Class I Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire



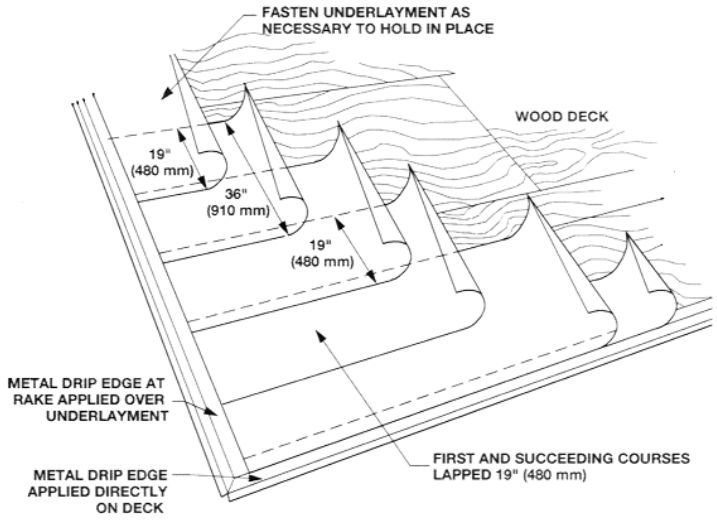
CHAPTER 9: ROOF ASSEMBLIES

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

R905.2.1 Sheathing requirements. Asphalt shingles shall be fastened to solidly sheathed decks.

R905.2.2 Slope. Asphalt shingles shall only be used on roof slopes of two units vertical in 12 units horizontal (2:12) or greater. For roof slopes from two units vertical in 12 units horizontal (2:12) up to four units vertical in 12 units horizontal (4:12), double underlayment application is required in accordance with Section R905.2.7.

Underlayment – Double Layer
(slope 2:12 up to 4:12)



NRCA *Roofing and Waterproofing Manual, 5th Edition, 2003*

CHAPTER 9: ROOF ASSEMBLIES

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

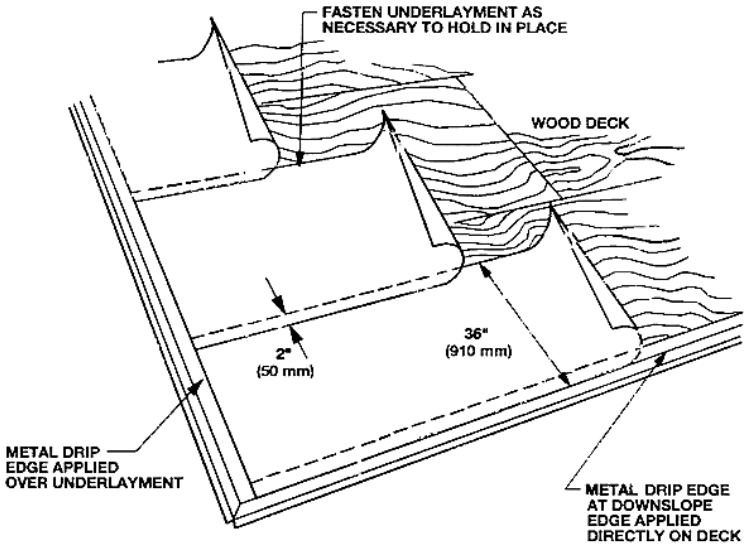
R905.2.7 Underlayment application. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), up to four units vertical in 12 units horizontal (33-percent slope), underlayment shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel with and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened sufficiently to hold in place…

…continued

Notes:
Typically, the number of fasteners to be used depends upon when the asphalt shingles will be applied and the weather forecast for that period. Usually the roof contractor will use 12" o.c. along the edge and 18" staggered in the field. Forecasts of rainy windy weather occurring before the shingles are installed will require more fasteners so that the underlayment will remain in place. Remember that underlayment is meant to be a temporary weather protection for the roof until the final roof covering is placed.

R905.2.8.6 Drip edge. Drip edge shall be provided at eaves and gables of shingle roofs, and overlapped a minimum of 2 inches (51 mm). Eave drip edges shall extend ¼ inch (6.4 mm) below sheathing and extend back on the roof a minimum of 2 inches (51 mm). Drip edge shall be mechanically fastened a maximum of 12 inches (305 mm) on center. Drip edge at eaves shall be permitted to be installed either over or under the underlayment. If installed over the underlayment, there shall be a minimum 2 inch (51 mm) width of roof cement installed over the drip edge flange.

Underlayment – Single Layer
(Slopes 4:12 and greater)



NRCA *Roofing and Waterproofing Manual, 5th Edition, 2003*

CHAPTER 9: ROOF ASSEMBLIES

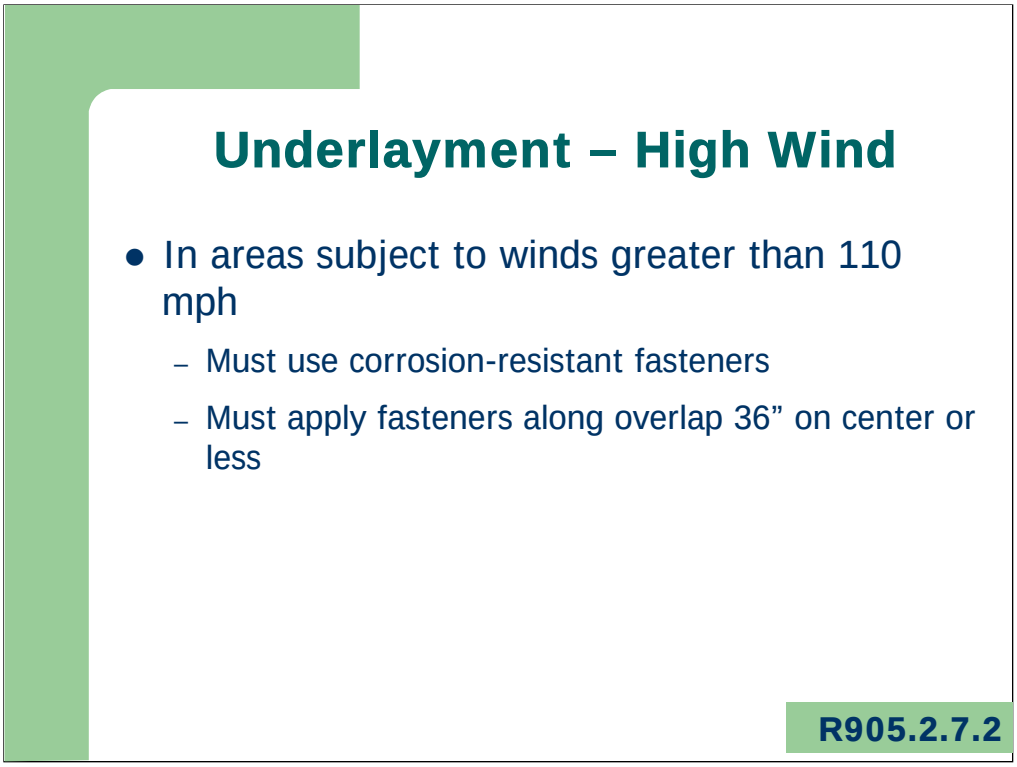
SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

…continued

R905.2.7 Underlayment application. ... For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater, underlayment shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened sufficiently to hold in place. End laps shall be offset by 6 feet (1829 mm).

Notes:
Typically, the number of fasteners to be used depends upon when the asphalt shingles will be applied and the weather forecast for that period. Usually the roof contractor will use 12" o.c. along the edge and 18" staggered in the field. Forecasts of rainy windy weather occurring before the shingles are installed will require more fasteners so that the underlayment will remain in place. Remember that underlayment is meant to be a temporary weather protection for the roof until the final roof covering is placed.

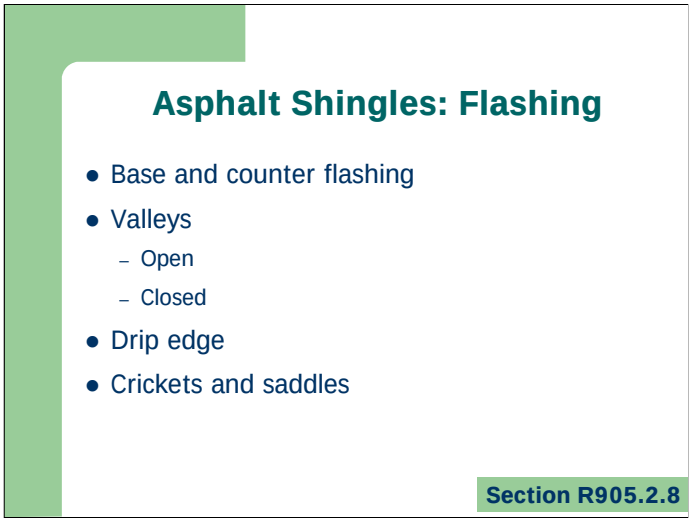
R905.2.8.6 Drip edge. Drip edge shall be provided at eaves and gables of shingle roofs, and overlapped a minimum of 2 inches (51 mm). Eave drip edges shall extend 1/4 inch (6.4 mm) below sheathing and extend back on the roof a minimum of 2 inches (51 mm). Drip edge shall be mechanically fastened a maximum of 12 inches (305 mm) on center. Drip edge at eaves shall be permitted to be installed either over or under the underlayment. If installed over the underlayment, there shall be a minimum 2 inch (51 mm) width of roof cement installed over the drip edge flange.



CHAPTER 9: ROOF ASSEMBLIES

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

R905.2.7.2 Underlayment and high wind. Underlayment applied in areas subject to high winds [greater than 110 mph (177km/h) per Figure R301.2 (4)] shall be applied with corrosion-resistant fasteners in accordance with manufacturer’s installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.



CHAPTER 9: ROOF ASSEMBLIES

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

R905.2.8 Flashings. Flashing for asphalt shingles shall comply with this section.

R905.2.8.1 Base and counter flashing. Base and counter flashing shall be installed in accordance with manufacturer's installation instructions, or a continuous metal "L" flashing shall be set in approved flashing cement and set flush to base of wall and over the underlayment. Both horizontal and vertical metal flanges shall be fastened 6 inches (152 mm) on center with approved fasteners. All laps shall be a minimum of 4 inches (102 mm) fully sealed in approved flashing cement. Flashing shall start at the lower portion of roof to ensure water-shedding capabilities of all metal laps. The entire edge of the horizontal flange shall be sealed covering all nail penetrations with approved flashing cement and membrane. Shingles shall overlap the horizontal flange and shall be set in approved flashing cement.

Base flashing shall be of either corrosion-resistant metal provided in Section R905.2.8.1 or mineral surface roll roofing weighing a minimum of 77 pounds per 100 square feet (3.76 kg/m^2). Counter flashing shall be corrosion-resistant metal with a minimum thickness provided in Table 903.1.

R905.2.8.2 Valleys. Valley linings shall be installed in accordance with manufacturer's installation instructions before applying shingles. Valley linings of the following types shall be permitted:

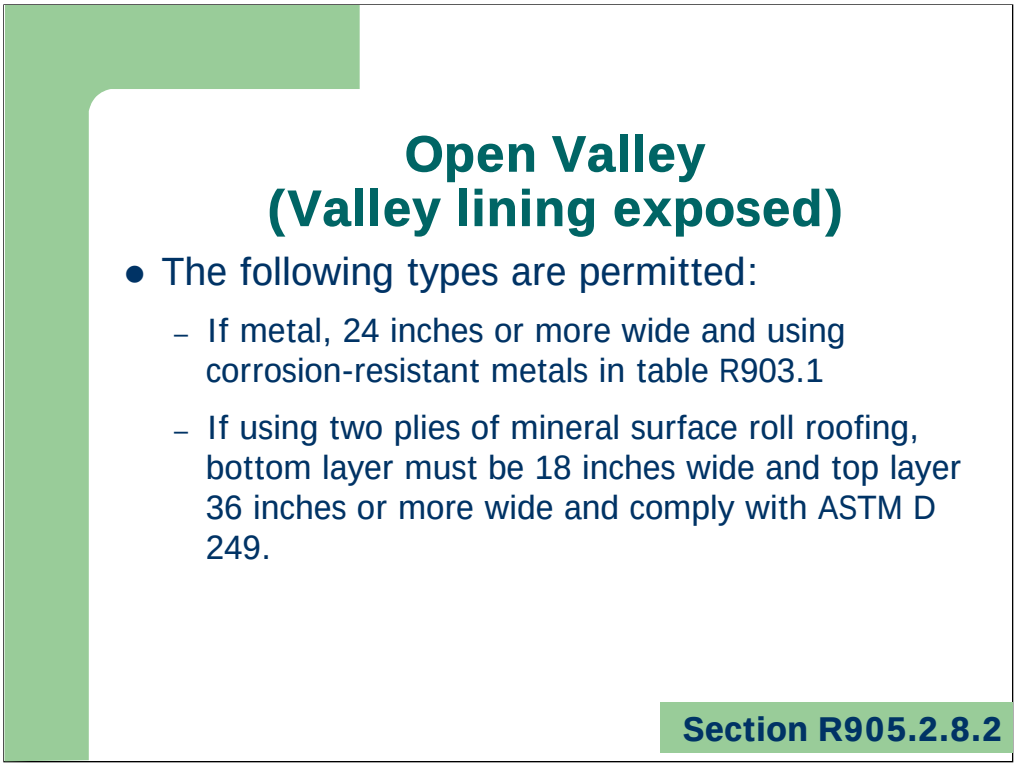
1. For open valley (valley lining exposed) lined with metal, the valley lining shall be at least 24 inches (610 mm) wide and of any of the corrosion-resistant metals in Table R903.1.
2. For open valleys, valley lining of two plies of mineral surface roll roofing, complying with ASTM D 249, shall be permitted. The bottom layer shall be 18 inches (457 mm) and the top layer a minimum of 36 inches (914 mm) wide.
3. For closed valleys (valley covered with shingles), valley lining of one ply of smooth roll roofing complying with ASTM D 224 Type II or Type III and at least 36 inches (914 mm) wide or valley lining as described in Items 1 and 2 above shall be permitted. Specialty underlayment complying with ASTM D 1970 may be used in lieu of the lining material.

R905.2.8.6.6 Drip edge. Drip edge shall be provided at eaves and gables of shingle roofs, and overlapped a minimum of 2 inches (51 mm). Eave drip edges shall extend ¼ inch (6.4 mm) below sheathing and extend back on the roof a minimum of 2 inches (51 mm). Drip edge shall be mechanically fastened a maximum of 12 inches (305 mm) on center. Drip edge at eaves shall be permitted to be installed either over or under the underlayment. If installed over the underlayment, there shall be a minimum 2 inch (51 mm) width of roof cement installed over the drip edge flange.

R905.2.8.3 Crickets and saddles. A cricket or saddle shall be installed on the ridge side of any chimney greater than 30 inches (762 mm) wide. Cricket or saddle coverings shall be sheet metal or of the same material as the roof covering.

ASTM D 224 Specification for Smooth-Surfaced Asphalt Roll Roofing (Organic Felt)
ASTM D 249 Standard Specification for Asphalt Roll Roofing (Organic Felt) Surfaced with Mineral Granules
ASTM D 1970 Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

Note:
Table R903.1 is in the Notes section of an earlier slide.



CHAPTER 9: ROOF ASSEMBLIES

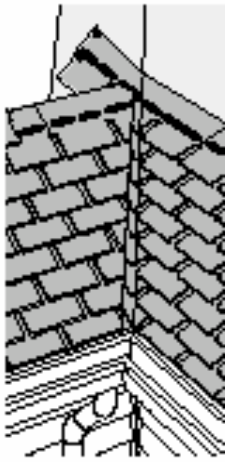
SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

Open valleys are typically lined with sheet metal. A metal valley is constructed by installing typically 8 feet or 10 feet (2.4 m or 3 m) lengths of corrosion-resistant metal through the valley. Asphalt shingles are lapped onto either side of the valley metal, leaving a clear space between the roofing material to channel water runoff down the valley.

R905.2.8.2 Valleys. Valley linings shall be installed in accordance with manufacturer's installation instructions before applying asphalt shingles. Valley linings of the following types shall be permitted.

1. For open valley (valley lining exposed) lined with metal, the valley lining shall be at least 24 inches (610 mm) wide and of any of the corrosion-resistant metals in Table R903.1.
2. For open valleys, valley lining of two plies of mineral surface roll roofing, complying with ASTM D 249, shall be permitted. The bottom layer shall be 18 inches (457 mm) and the top layer a minimum of 36 inches (914 mm) wide.
3. For closed valleys (valley covered with shingles), valley lining of one ply of smooth roll roofing complying with ASTM D 224 Type II or Type III and at least 36 inches (914 mm) wide or valley lining as described in Items 1 and 2 above shall be permitted. Specialty underlayment complying with ASTM D 1970 may be used in lieu of the lining material.

Closed Cut Valley



NRCA *Roofing and Waterproofing Manual, 5th Edition, 2003*

CHAPTER 9: ROOF ASSEMBLIES

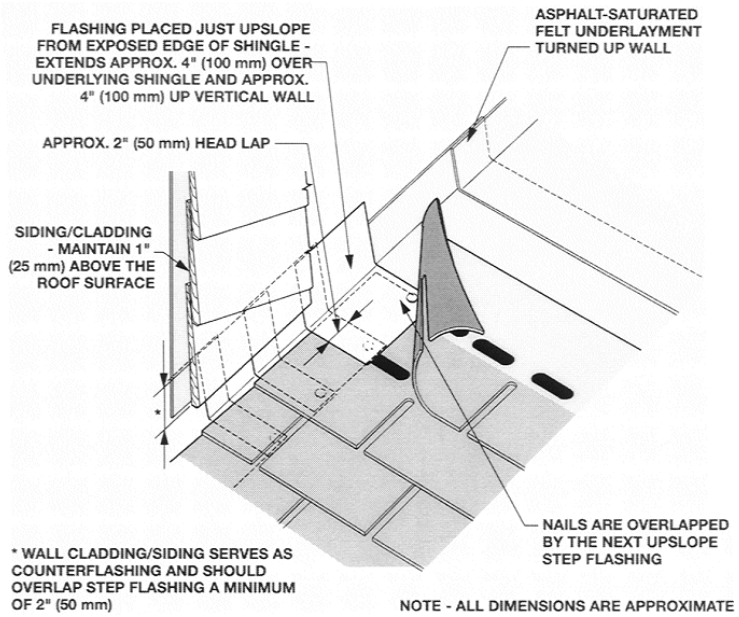
SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

In closed-cut valleys, shingles on one side of the valley are installed across the valley and shingles from the other side are cut about 2 inches (50 mm) off the center line of the valley and may be sealed with asphalt roof cement.

R905.2.8.2 Valleys. Valley linings shall be installed in accordance with manufacturer's installation instructions before applying asphalt shingles. Valley linings of the following types shall be permitted.

1. For open valley (valley lining exposed) lined with metal, the valley lining shall be at least 24 inches (610 mm) wide and of any of the corrosion-resistant metals in Table R903.1.
2. For open valleys, valley lining of two plies of mineral surface roll roofing, complying with ASTM D 249, shall be permitted. The bottom layer shall be 18 inches (457 mm) and the top layer a minimum of 36 inches (914 mm) wide.
3. For closed valleys (valley covered with shingles), valley lining of one ply of smooth roll roofing complying with ASTM D 224 Type II or Type III and at least 36 inches (914 mm) wide or valley lining as described in Items 1 and 2 above shall be permitted. Specialty underlayment complying with ASTM D 1970 may be used in lieu of the lining material.

Metal Step Flashing



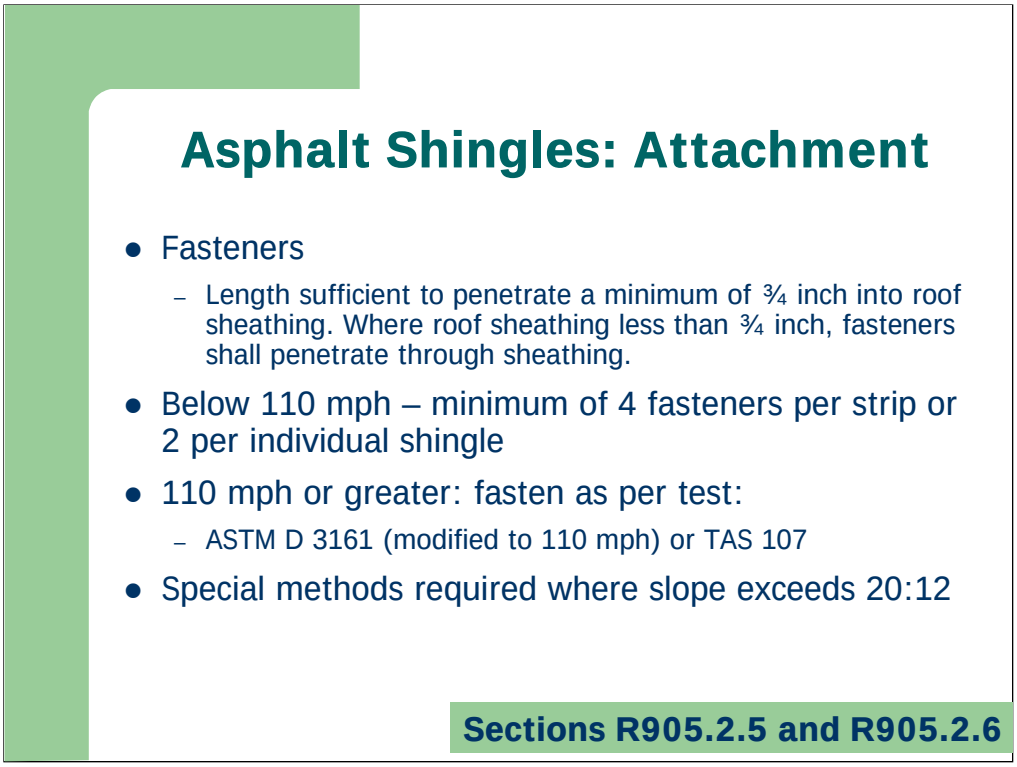
NRCA *Roofing and Waterproofing Manual, 5th Edition, 2003*

CHAPTER 9: ROOF ASSEMBLIES

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

R905.2.8.4 Sidewall flashing. Flashing against a vertical sidewall shall be by the step-flashing method.

R905.2.8.5 Other flashing. Flashing against a vertical front wall, as well as soil stack, vent pipe and chimney flashing, shall be applied according to asphalt shingle manufacturer's printed instructions.



CHAPTER 9: ROOF ASSEMBLIES

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

R905.2.5 Fasteners. …of a length to penetrate through the roofing materials and a minimum of ¾ inch (19.1 mm) into the roof sheathing. Where the roof sheathing is less than ¾ inch (19.1 mm) thick, the fasteners shall penetrate through the sheathing…

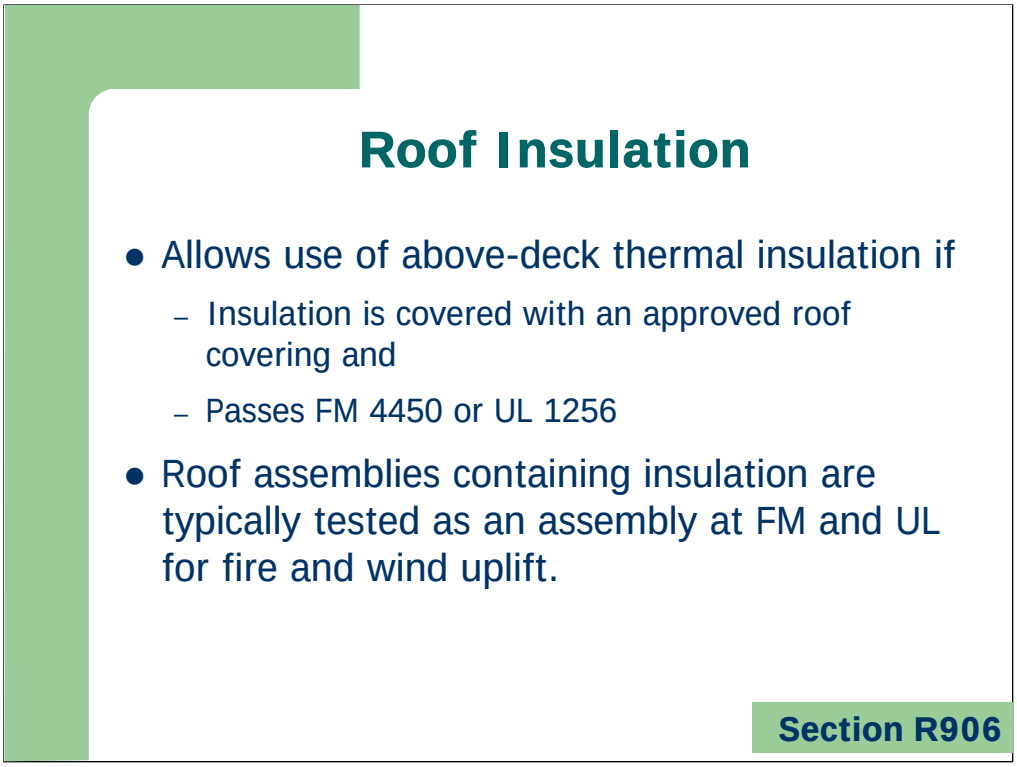
R905.2.6 Attachment. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer. For normal application, asphalt shingles shall be secured to the roof with not less than four fasteners per strip shingle or two fasteners per individual shingle. Where the roof slope exceeds 20 units vertical in 12 units horizontal (20:12), special methods of fastening are required. For roofs located where the basic wind speed per Figure R301.2(4) is 110 mph (177 km/h) or greater, special methods of fastening are required. Special fastening methods shall be tested in accordance with ASTM D 3161, modified to use a wind speed of 110 mph (177 km/h), or TAS107.

Shingles classified using ASTM D 3161 are acceptable for use in wind zones less than 110 mph. Shingles classified using ASTM D 3161 or TAS107 modified to use a wind speed of 110 mph or TAS107 are acceptable for use in all cases where special fastening is required.

ASTM D 3161 Standard Test Method for Wind Resistance of Asphalt Shingles (Fan-included method) Modified to 110 mph

TAS 107 Test procedure

Notes:
Installers should refer to wrapper packages for nail placement.
FBC modifies ASTM D 3161 to 110 mph.
Fan induced method.
Requires test specimen to withstand 110 mph for two hours.



CHAPTER 9: ROOF ASSEMBLIES

SECTION R906 ROOF INSULATION

R906.1 General. The use of above deck thermal insulation shall be permitted provided such insulation is covered with an approved roof covering and passes FM 4450 or UL 1256.

Note that in the *Florida Building Code, Building* Section 1508.1 there is an

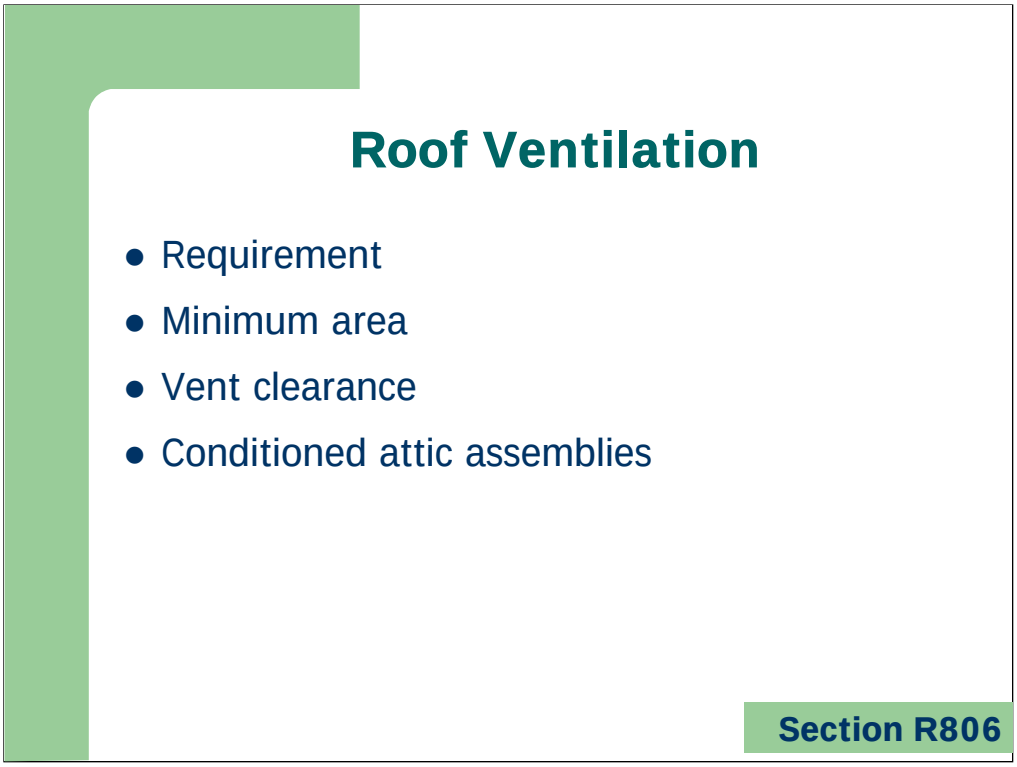
Exception: Foam plastic roof insulation shall conform to the material and installation requirements of Chapter 26.

…and an additional section

1508.1.1 Cellulosic fiberboard. Cellulosic fiberboard roof insulation shall conform to the material and installation requirements of Chapter 23.

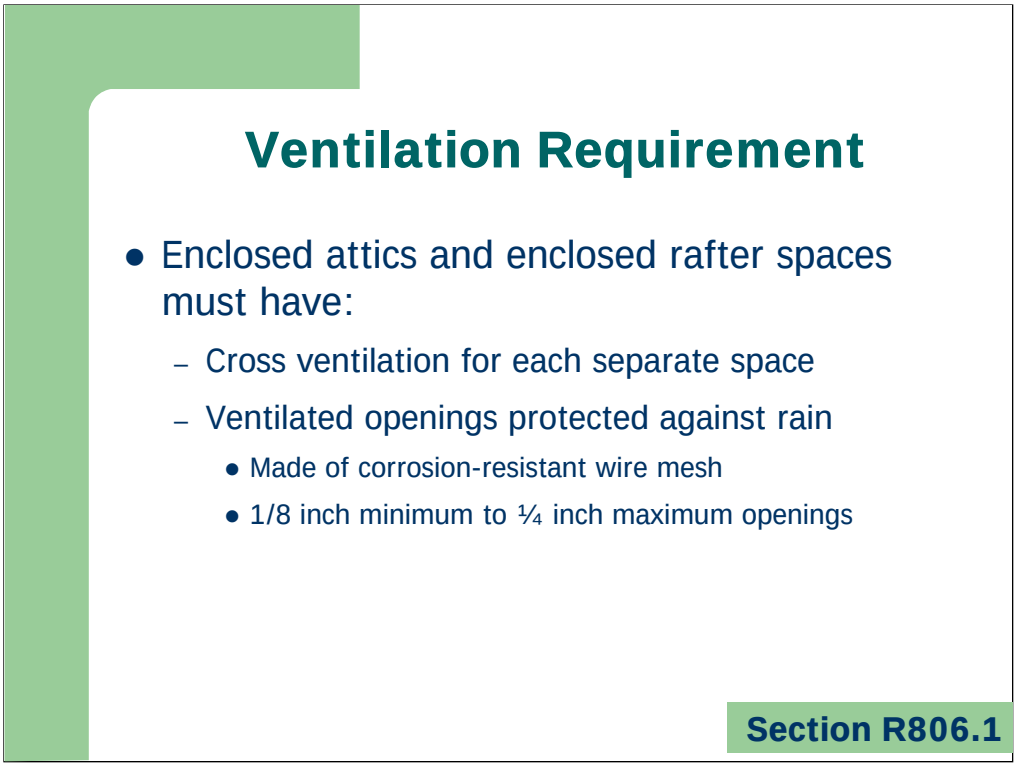
FM 4450 Approval Standard for Class 1 Insulated Steel Roof Decks

UL 1256 Standard for Fire Test of Roof Deck Constructions



CHAPTER 8: ROOF-CEILING CONSTRUCTION

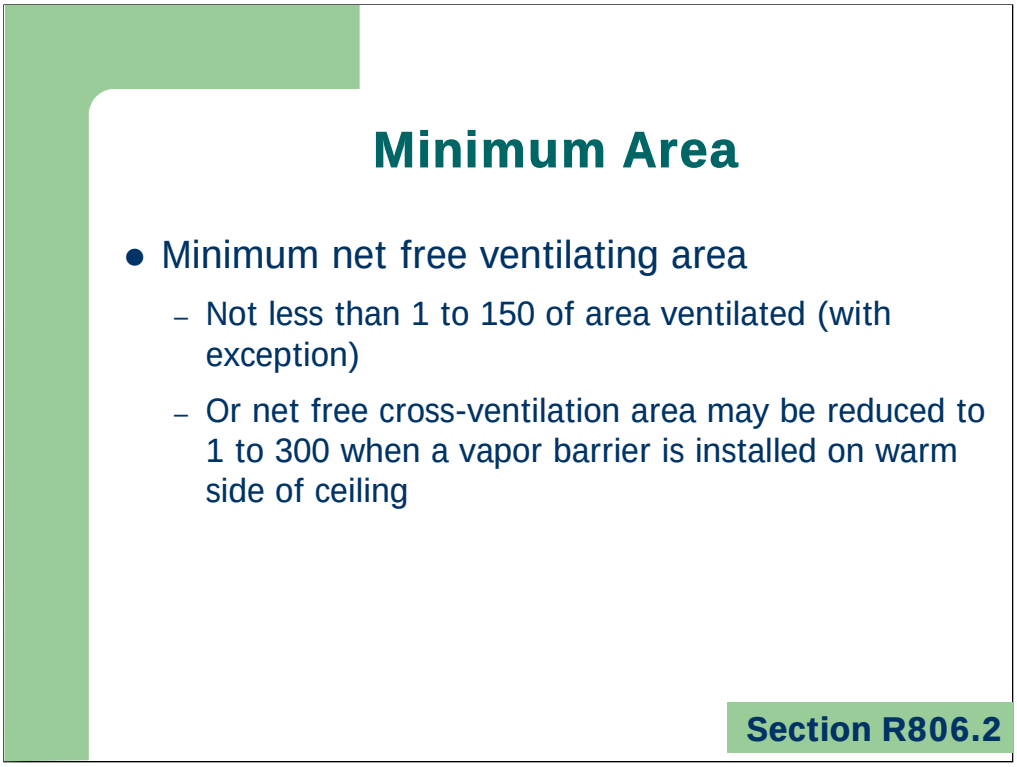
SECTION R806 ROOF VENTILATION



CHAPTER 8: ROOF-CEILING CONSTRUCTION

SECTION R806 ROOF VENTILATION

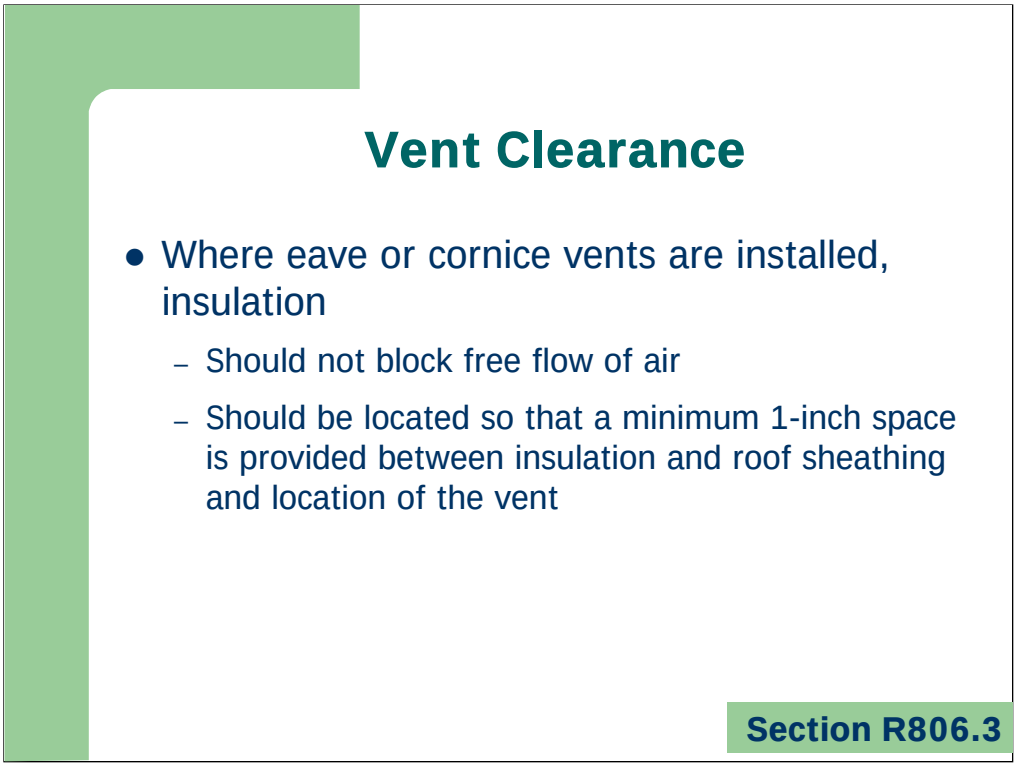
R806.1 Ventilation required. Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain. Ventilating openings shall be provided with corrosion-resistant wire mesh, with 1/8 inch (3.2 mm) minimum to ¼ inch (6.4 mm) maximum openings.



CHAPTER 8: ROOF-CEILING CONSTRUCTION

SECTION R806 ROOF VENTILATION

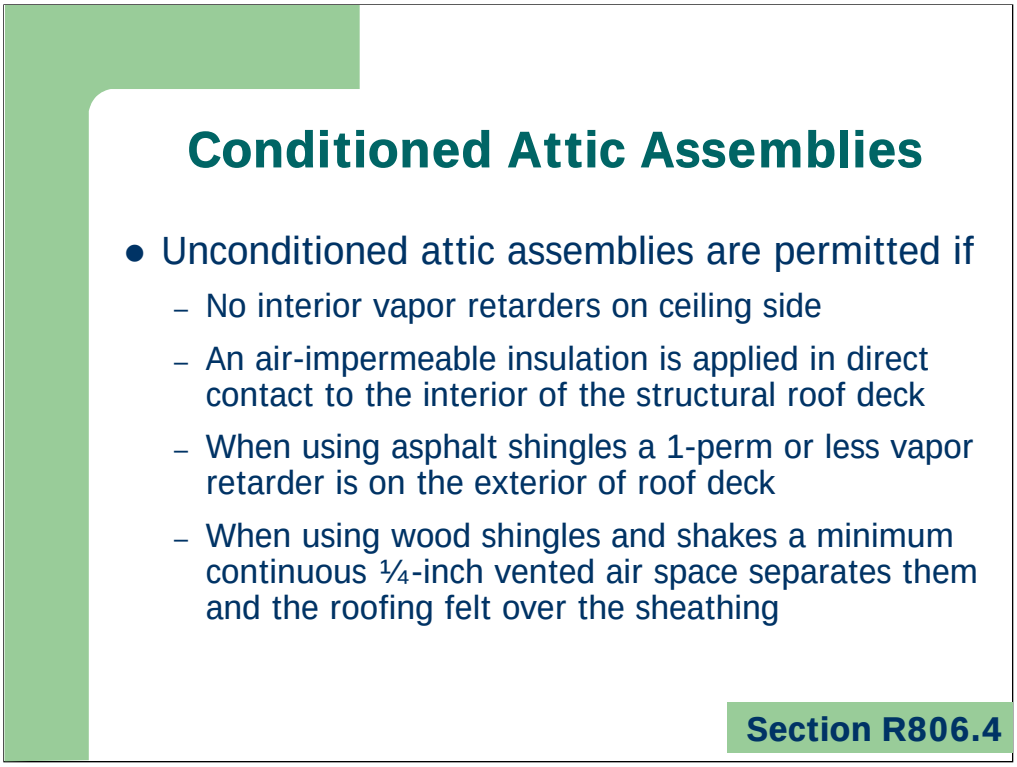
R806.2 Minimum area. The total net free ventilating area shall not be less than 1 to 150 of the area of the space ventilated except that the total area is permitted to be reduced to 1 to 300, provided at least 50 percent and not more than 80 percent of the required ventilating area is provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents. As an alternative, the net free cross-ventilation area may be reduced to 1 to 300 when a vapor barrier having a transmission rate not exceeding 1 perm (57.4 mg/s • m 2 • Pa) is installed on the warm side of the ceiling.



CHAPTER 8: ROOF-CEILING CONSTRUCTION

SECTION R806 ROOF VENTILATION

R806.3 Vent clearance. Where eave or cornice vents are installed, insulation shall not block the free flow of air. A minimum of a 1-inch (25.4 mm) space shall be provided between the insulation and the roof sheathing at the location of the vent.

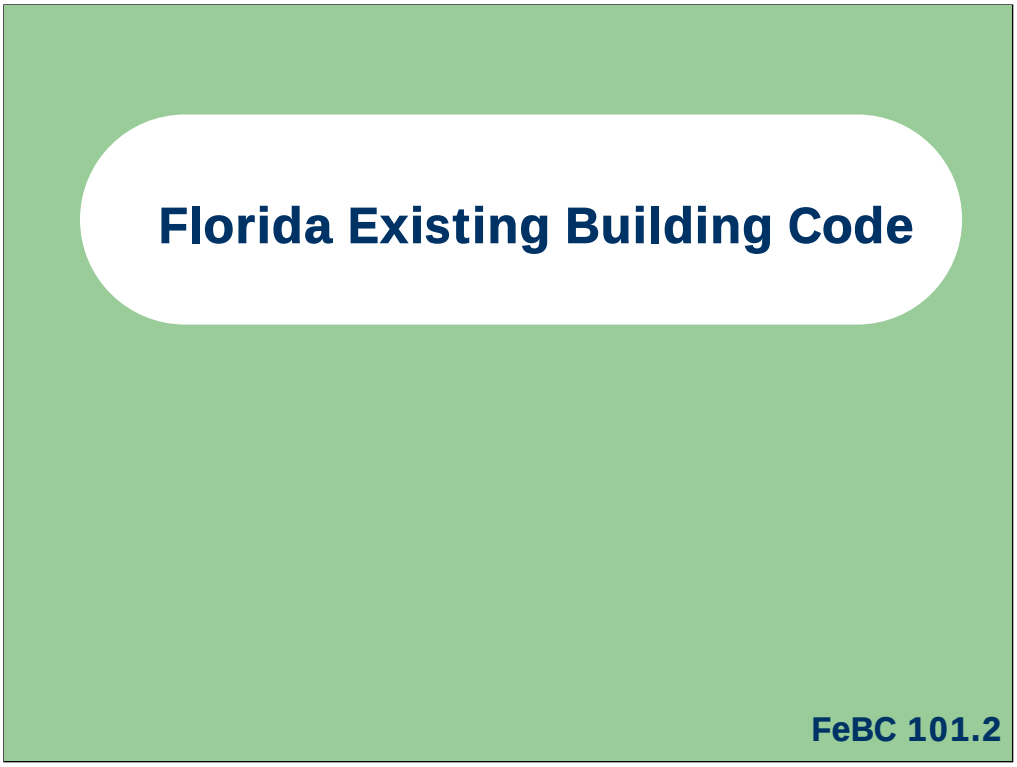


CHAPTER 8: ROOF-CEILING CONSTRUCTION

SECTION R806 ROOF VENTILATION

R806.4 Conditioned attic assemblies. Unvented conditioned attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) are permitted under the following conditions:

1. No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.
2. An air-impermeable insulation is applied in direct contact to the underside/interior of the structural roof deck. "Air-impermeable" shall be defined by ASTM E 283.
3. Shingles shall be installed as shown:
   a. For asphalt roofing shingles: A 1-perm (57.4 mg/s • m^2 • Pa) or less vapor retarder (determined using Procedure B of ASTM E 96) is placed to the exterior of the structural roof deck; i.e. just above the roof structural sheathing.
   b. For wood shingles and shakes: A minimum continuous ¼-inch (6 mm) vented air space separates the shingles/shakes and the roofing felt placed over the structural sheathing.

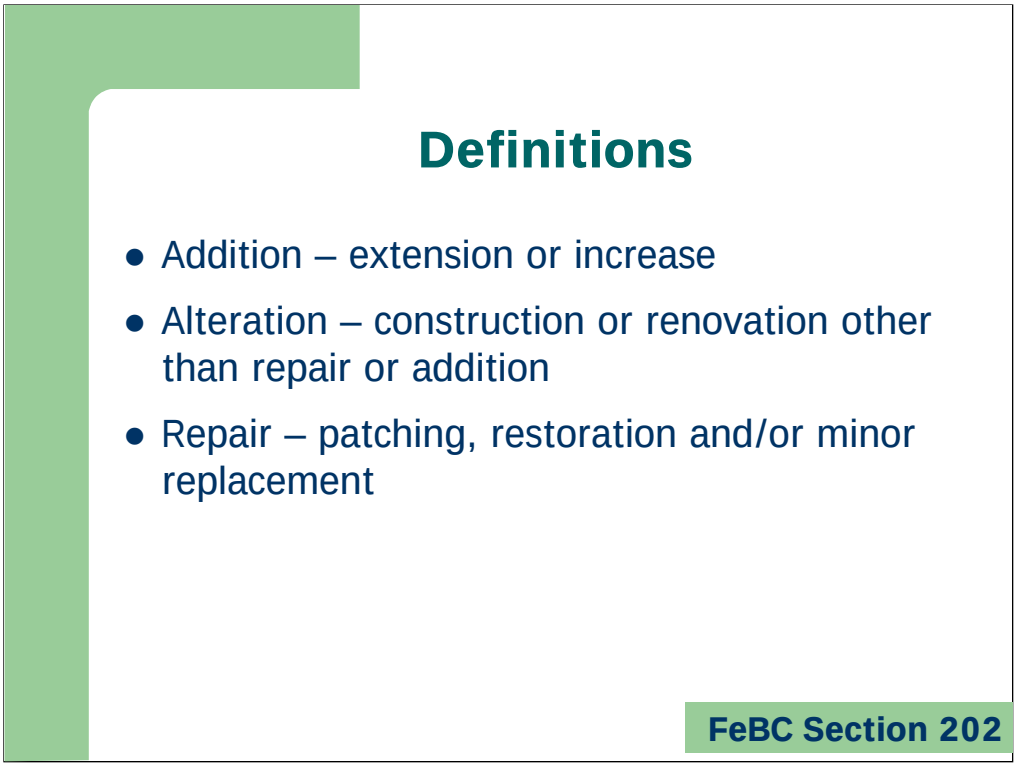


CHAPTER 1: ADMINISTRATION

SECTION 101 GENERAL

101.2 Scope. The provisions of the *Florida Existing Building Code* shall apply to the repair, alteration, change of occupancy, addition, and relocation of existing buildings. A building or portion of a building that has not been previously occupied or used for its intended purpose shall comply with the provisions of the *Florida Building Code* for new construction. Repairs, alterations, change of occupancy, existing buildings to which additions are made, historic buildings, and relocated buildings complying with the provisions of the *Florida Building Code , Building;* the *Florida Building Code, Plumbing;* the *Florida Building Code, Mechanical;* the *Florida Building Code, Fuel Gas;* the *Florida Building Code, Residential;* and the *Florida Fire Prevention Code* as applicable shall be considered in compliance with the provisions of this code.

Exception: For the purpose of public educational facilities and state licensed facilities, see Chapter 4, Special Occupancy, of the *Florida Building Code, Building.*



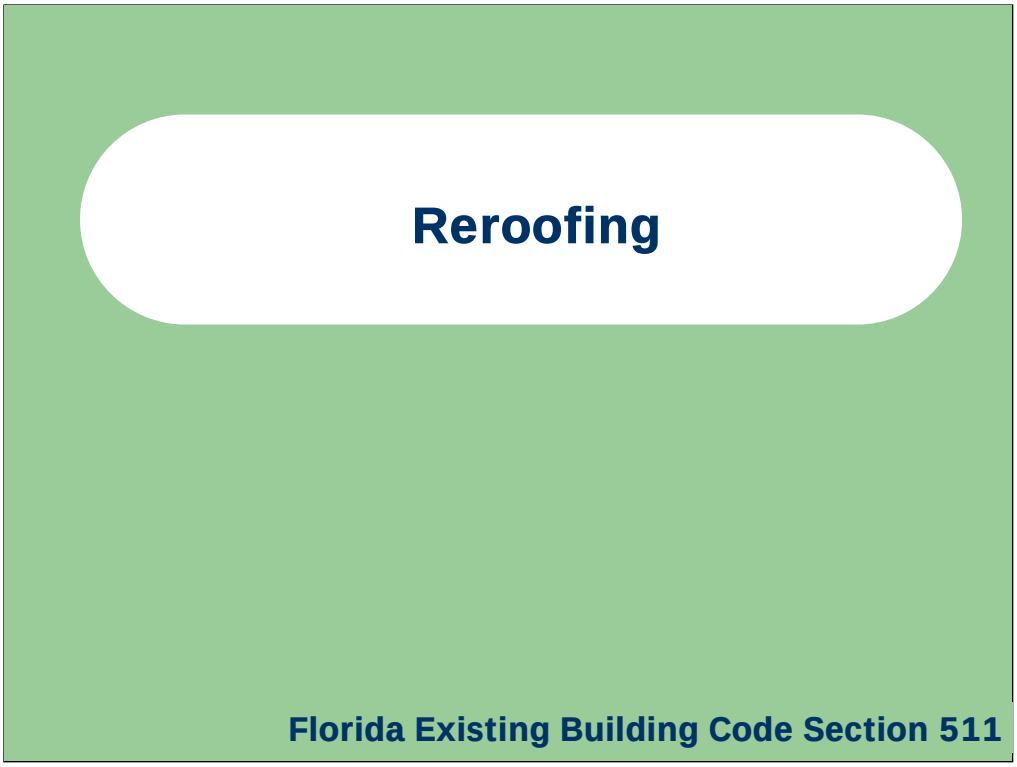
CHAPTER 2: DEFINITIONS

SECTION 202 GENERAL DEFINITIONS

ADDITION. An extension or increase in floor area, number of stories, or height of a building or structure.

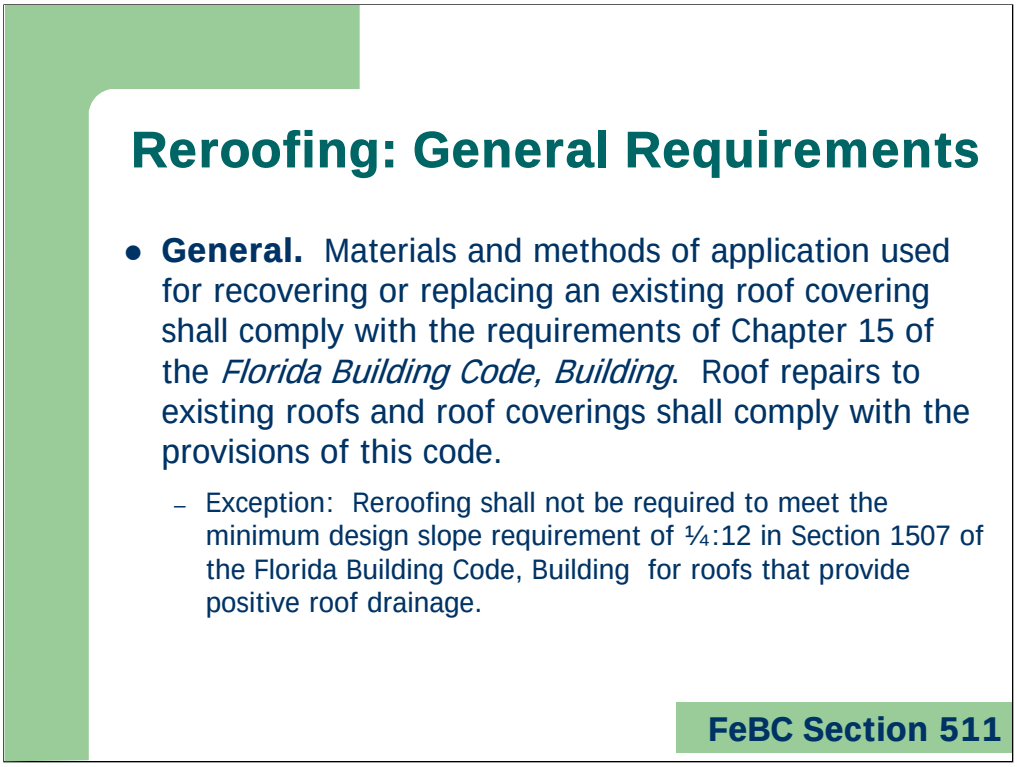
ALTERATION. Any construction or renovation to an existing structure other than repair or addition. Alterations are classified as Level 1, Level 2, and Level 3.

REPAIR. The patching, restoration and/or minor replacement of materials, elements, components, equipment and/or fixtures for the purposes of maintaining such materials, elements, components, equipment and/or fixtures in good or sound condition.



CHAPTER 5: ALTERATIONS—LEVEL 1

SECTION 511 REROOFING



CHAPTER 5: ALTERATIONS—LEVEL 1

SECTION 511 REROOFING

511.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15 of the *Florida Building Code, Building*. Roof repairs to existing roofs and roof coverings shall comply with the provisions of this code.

Exception: Reroofing shall not be required to meet the minimum design slope requirement of ¼ :12 in Section 1507 of the *Florida Building Code, Building* for roofs that provide positive roof drainage (high-velocity hurricane zones shall comply with Sections 1515.2.2.1 and 1515.2.2.2 of the *Florida Building Code, Building*).

FLORIDA BUILDING CODE, RESIDENTIAL

CHAPTER 2: DEFINITIONS

POSITIVE ROOF DRAINAGE. The drainage condition in which consideration has been made for all loading deflections of the roof deck, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.

ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

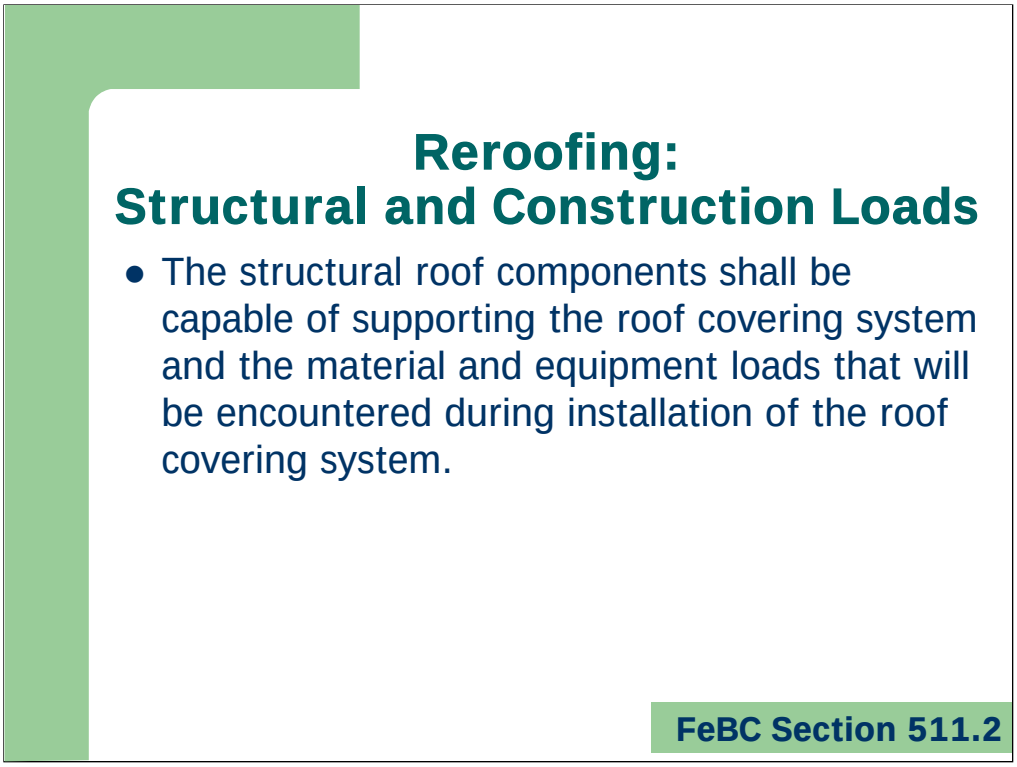
FLORIDA BUILDING CODE, BUILDING

CHAPTER 15: ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

SECTION 1502 DEFINITIONS

REROOFING. The process of recovering or replacing an existing roof covering. (See "Roof Recover" and "Roof Replacement.")

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.



CHAPTER 5: ALTERATIONS—LEVEL 1

SECTION 511 REROOFING

511.2 Structural and construction loads. The structural roof components shall be capable of supporting the roof covering system and the material and equipment loads that will be encountered during installation of the roof covering system.

CHAPTER 5: ALTERATIONS—LEVEL 1

SECTION 511 REROOFING

511.3 Recovering versus replacement. New roof coverings shall not be installed without first removing existing roof coverings where any of the following conditions occur.

1. When the old roofing is water-soaked or deteriorated to the point that it is not suitable as a base for additional roofing.
2. When blisters exist in any roofing, unless blisters are cut or scraped open and nailed down before applying additional roofing.
3. When the existing roof surface is gravel or the like, the gravel shall be thoroughly removed or all loose gravel removed and approved base material installed before applying additional roofing.
4. When existing roof is slate or the like.
5. When sheathing or supports are deteriorated to the point that the roof structural system is not substantial enough to support recovering.
6. When existing roof has two or more applications of any type roofing material. Conformance with this item shall make replacement mandatory.

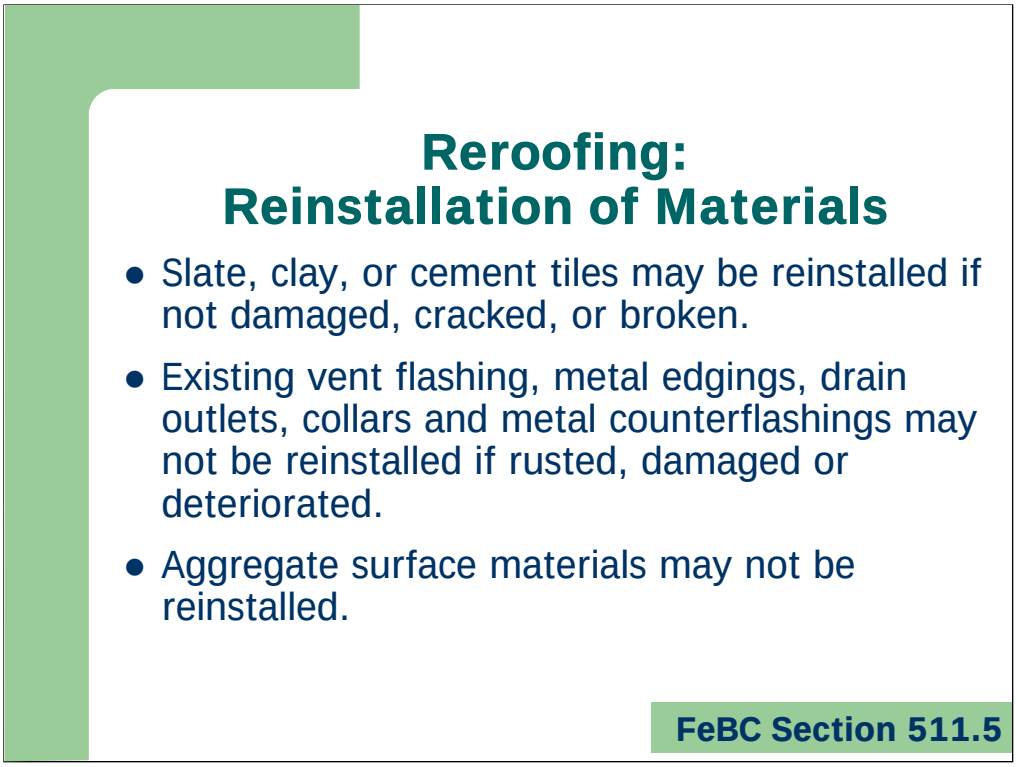
Exceptions:

1. Building and structures located within the high-velocity hurricane zone shall comply with the provisions of Sections 1512 through 1525 of the *Florida Building Code, Building.*
2. When the structural deck is concrete and the existing roof is firmly attached to the deck, then the roof shall be removed down to a minimum of three plies of moisture-free felts.
3. When otherwise approved by the building official.
4. Wood shingles or shakes shall not be placed over more than one application of wood or asphalt shingles. Wood shingles or shakes may be placed over existing shakes when installed in accordance with Cedar Shake and Shingle Bureau recommendations.

CHAPTER 5: ALTERATIONS—LEVEL 1

SECTION 511 REROOFING

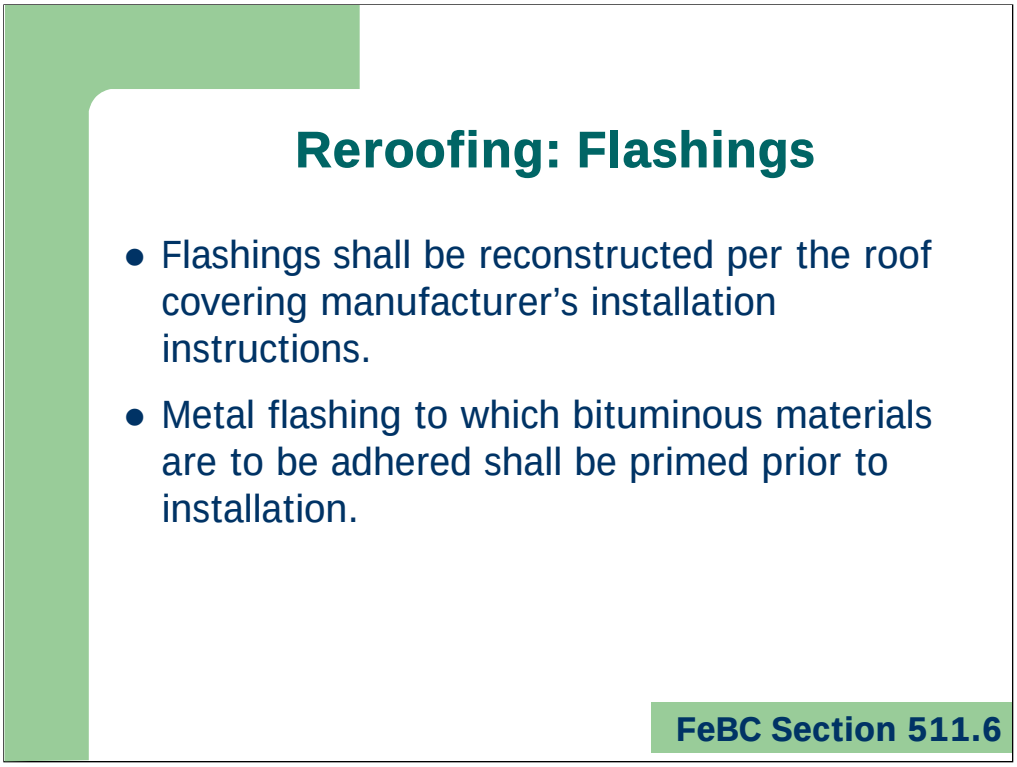
511.4 Roof recoverings. Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other approved materials securely fastened in place.



CHAPTER 5: ALTERATIONS—LEVEL 1

SECTION 511 REROOFING

511.5 Reinstallation of materials. Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Existing vent flashing, metal edgings, drain outlets, collars and metal counterflashings shall not be reinstalled where rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled (high-velocity hurricane zones shall comply with Sections 1512 through 1525 of the *Florida Building Code, Building*).



CHAPTER 5: ALTERATIONS—LEVEL 1

SECTION 511 REROOFING

511.6 Flashings. Flashings shall be reconstructed in accordance with roof covering manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation (high-velocity hurricane zones shall comply with Sections 1512 through 1525 of the *Florida Building Code, Building*).

Reliable Roof Performance Results From:

- Proper roof design
- Quality materials
- Excellent workmanship
- Effective building code enforcement
- Roof maintenance

Acknowledgements:

- Florida Roofing, Sheet Metal and Air Conditioning Contractors Association (FRSA): www.floridaroof.com
- National Roofing Contractors Association (NRCA): www.nrca.net
- Asphalt Roofing Manufacturers Association (ARMA): www.asphaltroofing.org
- Roofing Industry Committee on Weather Issues (RICOWI): www.ricowi.com
- SPRI (Sheet membrane and component suppliers to the commercial roofing industry): www.spri.org
- Metal Roofing Alliance: www.metalroofing.org
- Factory Mutual Global: www.fmglobal.com