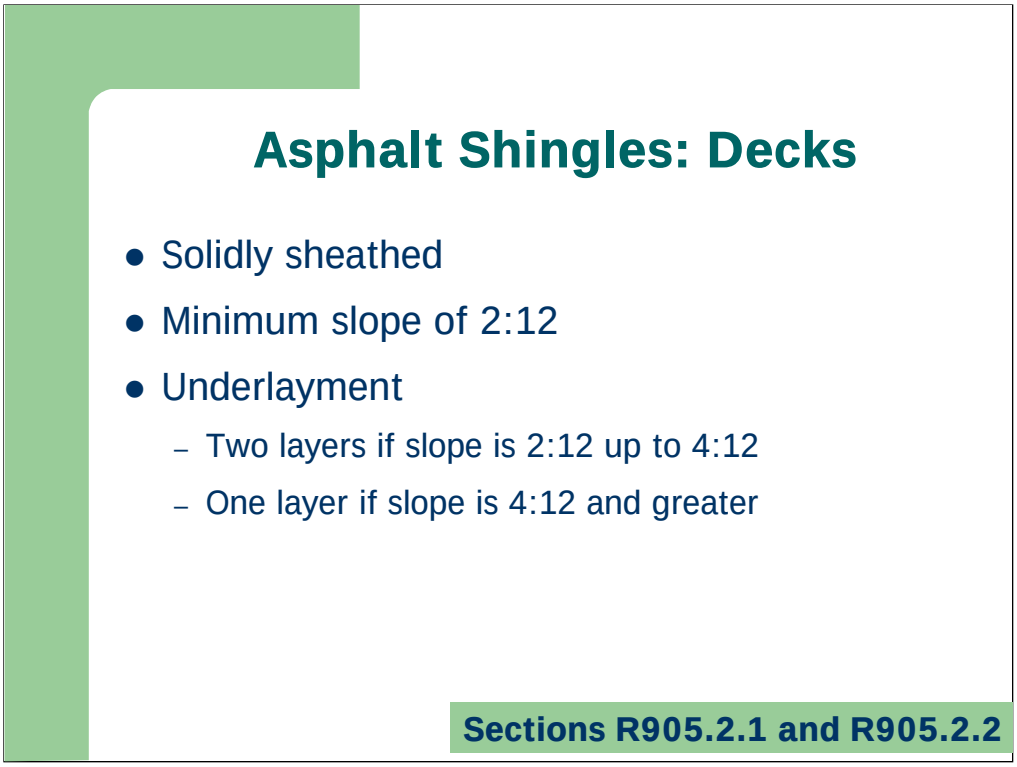
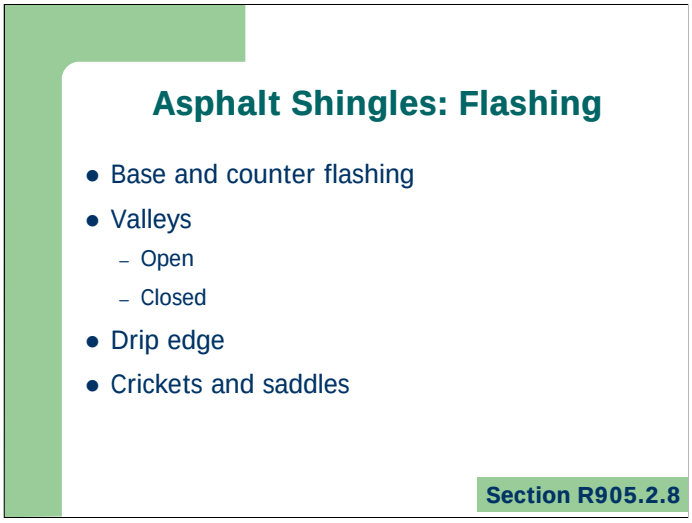


CHAPTER 9: ROOF ASSEMBLIES

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.



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.

Minimum Roof Slopes Required by Roofing Material

JANUARY 23, 2020

The design and construction of roof assemblies for residential structures are found in Chapter 9 of the International Residential Code (IRC). As for buildings subject to the International Building Code (IBC), the roof assembly requirements are found in Chapter 15.

To see what the difference is between the IRC and IBC, check out this **POST** explaining what buildings and structures are subject to the IRC verses the IBC.

In this post we will look at the requirements in Chapter 9 of the International Residential Code (IRC), specifically Section R905 which regulates roof covering materials.

There are many different types of roof covering materials used in residential construction. Roof covering materials provide weather protection and Chapter 9 regulates the minimum required slope for each type of roof covering material since part of the performance of a roof covering material is based on the slope of the roof surface.

When the roof surface has less of a slope, water drainage tends to be slow so the potential of water intrusion increases since there is a greater potential for water to backup under the roofing material.

Therefore each type of roofing material has a minimum slope requirement that must be maintained to decrease the potential of water intrusion. The steeper the roof slope, the less potential for water to backup however the roofing materials established in Chapter 9 must meet to minimum slope requirements.

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Roof Pitch or Roof Slope ?

First off lets get some terminology out of the way.

When referring to roofs should we use the term “Pitch” or “Slope”?

Both these terms work interchangeably and can mean the same thing however since we are referencing the code related to roofs, the code uses the term “Slope”.

You will see these examples as we go though explaining the topic of roof slopes as referenced in the code.

Requirements for Roof Coverings – (Section R905)

Now lets get into the minimum roof slope requirements based on the different types of roof covering material.

Section R905 regulates many different types of roof covering material. Here is a list of the roofing materials regulated by the code:

1. Asphalt Shingles
2. Clay and Concrete Tile
3. Metal Roof Shingles
4. Mineral-Surfaced Roll Roofing
5. Slate and Slate-type Shingles
6. Wood Shingles
7. Wood Shakes
8. Built-Up Roofs
9. Metal Roof Panels
10. Modified Bitumen Roofing
11. Thermoset and Thermoplastic Single-ply Roofing
12. Sprayed Polyurethane Foam Roofing
13. Liquid-applied Roofing
14. Photovoltaic (PV) Modules/Shingles

Now let us look at the minimum roof pitch (roof slope) required for each type of roofing material regulated in the IRC.

Asphalt Shingles

Minimum Roof Slope (Roof Pitch) | R905.2.2

Asphalt shingles can only be installed on roof slopes of 2:12 or greater. This means for every 12 horizontal units, the roof must rise a minimum of 2 vertical units.

Also if Asphalt shingles are installed on a roof slope of 2:12 to 4:12, it shall be provided with a double underlayment application.

Clay and Concrete Tile

Minimum Roof Slope (Roof Pitch) | R905.3.2

Clay and concrete roof tiles can only be installed on roof slopes of 2-1/2:12 or greater. This means for every 12 horizontal units, the roof must rise a minimum of two and one-half vertical units.

Also if Clay and Concrete roof tiles are installed on a roof slope of 2-1/2:12 to 4:12, it shall be provided with a double underlayment application.

Metal Roof Shingles

Minimum Roof Slope (Roof Pitch) | R905.4.2

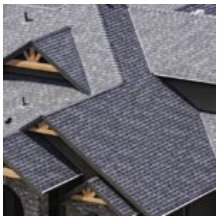
Metal roof shingles can only be installed on roof slopes of 3:12 or greater (25% slope). This means for every 12 horizontal units, the roof must rise a minimum of 3 vertical units.

Mineral-Surfaced Roll Roofing

Minimum Roof Slope (Roof Pitch) | R905.5.2

Mineral-Surfaced Roll Roofing can only be installed on roof slopes of 1:12 or greater (8% Slope). This means for every 12 horizontal units, the roof must rise a minimum of 1 vertical unit.

Slate Shingles



How Much Does a Roof Inspection Cost & What's Included?

The Benefits of Building a Detached Garage

Minimum Roof Slope (Roof Pitch) | R905.6.2

Slate Shingles can only be installed on roof slopes of 4:12 or greater (33% Slope). This means for every 12 horizontal units, the roof must rise a minimum of 4 vertical units.

Wood Shingles

Minimum Roof Slope (Roof Pitch) | R905.7.2

Wood shingles can only be installed on roof slopes of 3:12 or greater (25% slope). This means for every 12 horizontal units, the roof must rise a minimum of 3 vertical units.

Wood Shakes

Minimum Roof Slope (Roof Pitch) | R905.8.2

Wood shakes can only be installed on roof slopes of 3:12 or greater (25% slope). This means for every 12 horizontal units, the roof must rise a minimum of 3 vertical units.

Built-Up Roofs

Minimum Roof Slope (Roof Pitch) | R905.9.1

Built-Up Roofs must have a design roof slope of 1/4:12 or greater (2% slope). This means for every 12 horizontal units, the roof must rise a minimum of one-fourth vertical unit.

Coal-tar Built-up roofs however can have a design roof slope of 1/8:12 (1% percent), but no less. This means for every 12 horizontal units, the roof must rise a minimum of one-eighth vertical unit.

Metal Roof Panels

Minimum Roof Slope (Roof Pitch) | R905.10.2

The minimum roof slope for metal roof panels depend on 3 different scenarios.

1. Lapped, nonsoldered-seam metal roofs without applied lap sealant must have a minimum roof slope of 3:12 (25% slope). This means for every 12 horizontal units, the roof must rise a minimum of 3 vertical units.

2. Lapped, nonsoldered-seam metal roofs with applied lap sealant must have a minimum roof slope of 1/2:12 (4% slope). This means for every 12 horizontal units, the roof must rise a minimum of one-half vertical unit.

3. Standing-seam roof systems must have a minimum roof slope of 1/4:12 (2% slope). This means for every 12 horizontal units, the roof must rise a minimum of one-quarter vertical unit.

Modified Bitumen Roofing

Minimum Roof Slope (Roof Pitch) | R905.11.1

Modified bitumen membrane roofs must have a design roof slope of 1/4:12 or greater (2% slope). This means for every 12 horizontal units, the roof must rise a minimum of one-fourth vertical unit.

Thermoset Single-ply Roofing

Minimum Roof Slope (Roof Pitch) | R905.12.1

Thermoset Single-ply membrane roofs must have a design roof slope of 1/4:12 or greater (2% slope). This means for every 12 horizontal units, the roof must rise a minimum of one-fourth vertical unit.

Thermoplastic Single-ply Roofing

Minimum Roof Slope (Roof Pitch) | R905.13.1

Thermoplastic Single-ply membrane roofs must have a design roof slope of 1/4:12 or greater (2% slope). This means for every 12 horizontal units, the roof must rise a minimum of one-fourth vertical unit.

Sprayed Polyurethane Foam Roofing

Minimum Roof Slope (Roof Pitch) | R905.14.1

Sprayed Polyurethane Foam roofs must have a design roof slope of 1/4:12 or greater (2% slope). This means for every 12 horizontal units, the roof must rise a minimum of one-fourth vertical unit.

Liquid-Applied Roofing

Minimum Roof Slope (Roof Pitch) | R905.15.1

Liquid-applied roofing must have a design roof slope of 1/4:12 or greater (2% slope). This means for every 12 horizontal units, the roof must rise a minimum of one-fourth vertical unit.

Photovoltaic Shingles

Minimum Roof Slope (Roof Pitch) | R905.16.2

Photovoltaic shingles can only be installed on roof slopes of 2:12 or greater. This means for every 12 horizontal units, the roof must rise a minimum of 2 vertical units.

Summary

Therefore if you are installing a specific roofing material that is regulated by the International Residential Code (IRC), make sure the pitch of the roof has the minimum required roof slope for that type of roofing material being used.

Let us recap on the minimum roof pitch required for each type of roofing material:

1. Asphalt Shingles require a minimum roof pitch of 2:12 or greater.
2. Clay and Concrete Tile requires a minimum roof pitch of 2-1/2:12 or greater.
3. Metal Roof Shingles require a minimum roof pitch of 3:12 or greater.
4. Mineral-Surfaced Roll Roofing requires a minimum roof pitch of 1:12 or greater.
5. Slate and Slate-type Shingles require a minimum roof pitch of 4:12 or greater.

6. Wood Shingles require a minimum roof pitch of 3:12 or greater.
7. Wood Shakes require a minimum roof pitch of 3:12 or greater.
8. Built-Up Roofs require a minimum roof pitch of 1/4:12 or greater.
9. Coal-tar Built-up roofs can be installed on a roof pitch of 1/8:12 or greater.
10. Metal Roof Panels:
    1. Lapped, nonsoldered-seam metal roofs without applied lap sealant must have a minimum roof slope of 3:12.
    2. Lapped, nonsoldered-seam metal roofs with applied lap sealant must have a minimum roof slope of 1/2:12.
    3. Standing-seam roof systems must have a minimum roof slope of 1/4:12.
11. Modified Bitumen Roofing requires a minimum roof pitch of 1/4:12 or greater.
12. Thermoset and Thermoplastic Single-ply Roofing requires a minimum roof pitch of 1/4:12 or greater.
13. Sprayed Polyurethane Foam Roofing requires a minimum roof pitch of 1/4:12 or greater.
14. Liquid-applied Roofing requires a minimum roof pitch of 1/4:12 or greater.
15. Photovoltaic (PV) Modules/Shingles require a minimum roof pitch of 2:12 or greater.

Reference Source – 2015 International Residential Code – [Buy on Amazon]

Tagged Pitch of Roof, Roof Slope

PREVIOUS
What is the Difference Between the IBC and IRC?

NEXT
Residential Guardrail Height Requirements