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Unvented Roof Assemblies

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Attics

Classic vented attic

Unvented attic with vapor diffusion port

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May 9, 2016
Note: Colored shading depicts the building’s thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.
Shingles  
Roofing paper  
Minimum R-50 rigid insulation in two or more layers with horizontal and vertical joints staggered  
Nail base for shingles (plywood or OSB) screwed through rigid insulation to wood decking or timber rafters  
Air barrier membrane  
Wood decking  
Timber rafter or exposed joist
Minimum R-50 rigid insulation in two or more layers with horizontal and vertical joints staggered.

Roof sheathing
Roofing paper
Shingles

Air barrier membrane
Wood decking
Timber rafter or exposed joist

Outside

Inside

70°F
Dewpoint (50% RH, 70°F)

Location of condensation and frost

Exterior sheathing
Simple linearized energy-temperature relation for water
From Straube & Burnett, 2005
Figure 8-1. Outside vapour pressure, saturated vapour pressure and inside vapour pressure for Winnipeg.
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Shingles
Roofing paper
R-19 batt insulation installed with wire stays or twine or netted cellulose
R-5 rigid insulation (vertical and horizontal joints offset from roof sheathing)
3/8” sheathing over rigid insulation
Roof sheathing
Sealant
Rigid insulation notched around roof trusses and sealed
Vinyl or aluminum siding
Rigid insulation
Building paper drainage plane
Underside of roof sheathing is typically the "first" condensing surface
Unfaced batt insulation
Gypsum board with vapor semi-permeable (latex) paint

The inside face of the roof sheathing forming the cavity is the first condensing surface
OSB or plywood nail base for shingles
R-30 unfaced batt ceiling insulation compressed to fit within 2x6 rafters oromp spray cellulose or "netted" dry blown cellulose or fiberglass
R-5 rigid insulation (vertical and horizontal joints offset from roof sheathing)

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Shingles
Roofing paper
R-19 batt insulation installed with wire stays or twine or netted cellulose
R-5 rigid insulation (vertical and horizontal joints offset from roof sheathing)
3/8” sheathing over rigid insulation
Sealant
Rigid insulation notched around roof trusses and sealed
Vinyl or aluminum siding
Rigid insulation
Building paper drainage plane
Unfaced batt insulation
Gypsum board with vapor semi-permeable (latex) paint

Underside of roof sheathing is typically the “first” condensing surface

Roofing tile
Roofing paper
Netted cellulose insulation or batt insulation installed with wire stays or twine
Roof sheathing

Stucco
Rigid insulation
Building paper drainage plane
Unfaced batt insulation
Gypsum board with vapor semi-permeable (latex) paint

Underside of roof sheathing is typically the “first” condensing surface
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Vented vs. unvented shingle temperatures

South-facing shingle temperatures
Jacksonville, FL 16-Sep to 18-Nov 2000
Vented vs. unvented attic air temperatures

Low attic air temperatures
Jacksonville, FL 16-Sep to 18-Nov 2000

Average Temperatures
Vented and Unvented Attics, Aug-97

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Roof Shingle Temperature

FSEC 3.0: Orlando, 1-Aug

Bottom of Roof Plywood Temperature

FSEC 3.0: Orlando, 1-Aug
New roofing system
- Fully adhered membrane
- Roof sheathing
- Two layers of rigid insulation (joints staggered and offset)

- Fully adhered membrane air barrier
- Gypsum sheathing
- Fluted metal deck
Note: Colored shading depicts the building’s thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.
It's OK to guess. Call it engineering judgement.
“a reasonable degree of engineering and scientific certainty”
Avoid “wag’s”
It's OK to guess. Call it engineering judgement.
“a reasonable degree of engineering and scientific certainty”
Avoid “wag’s”
Use “swag’s”