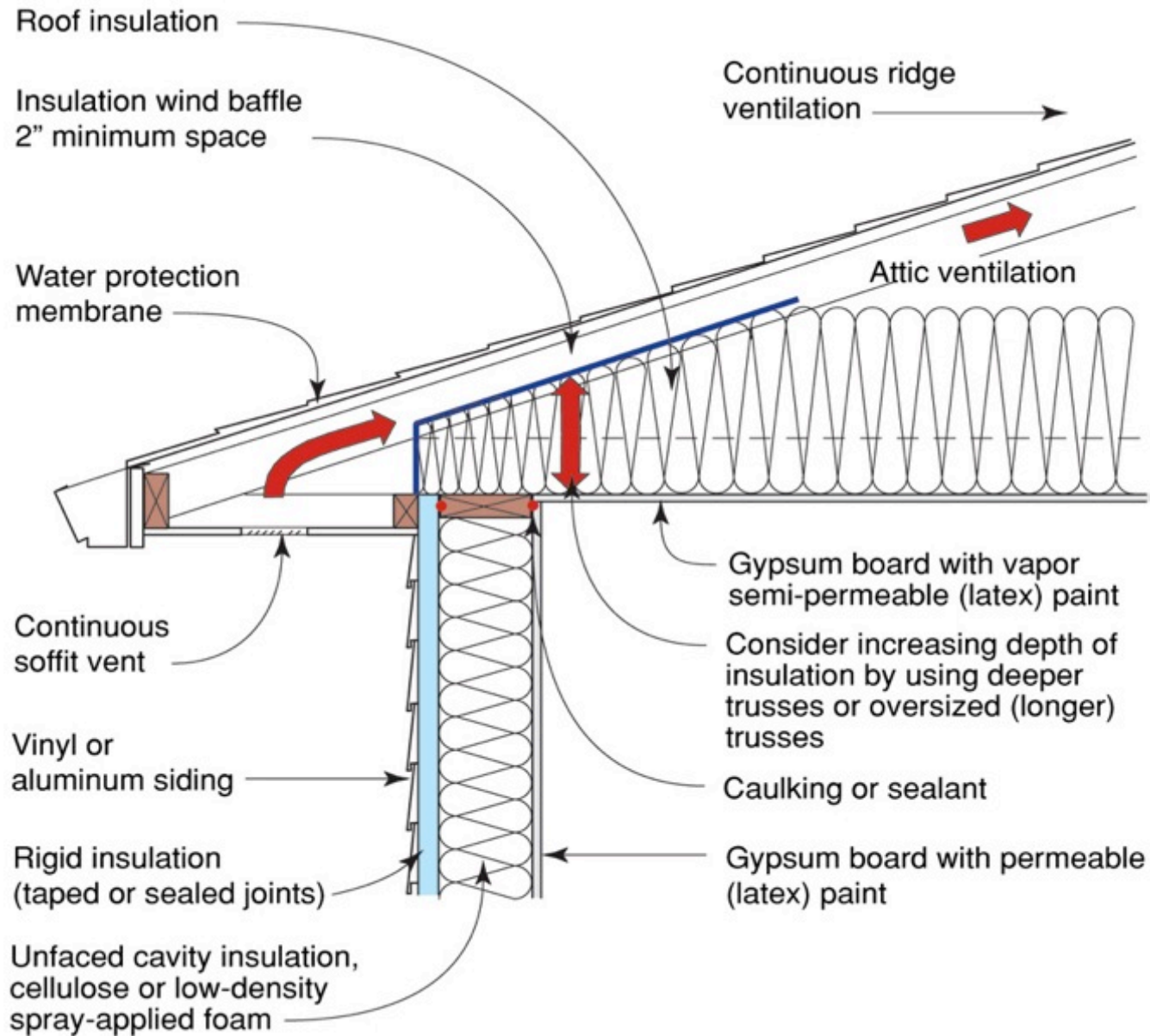


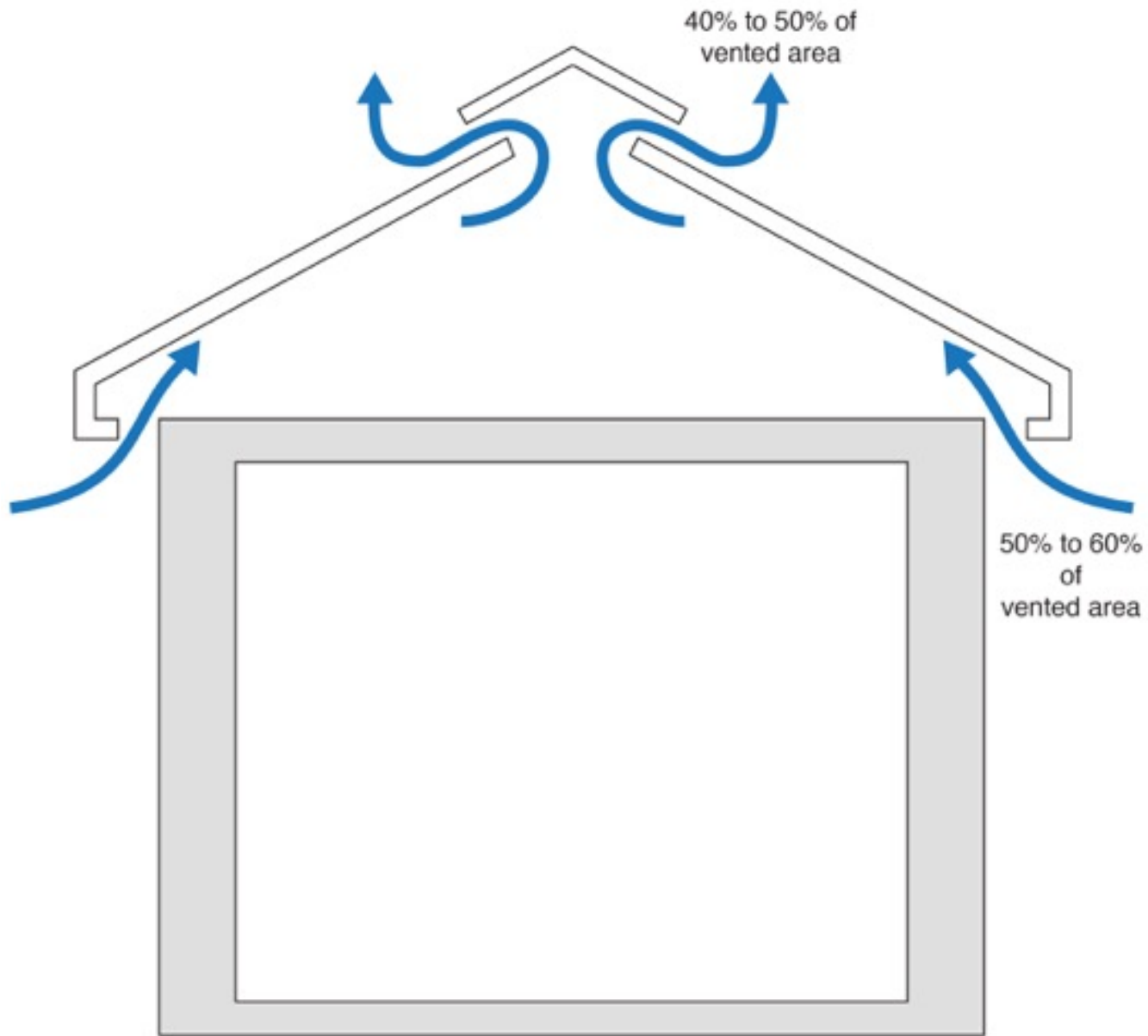
Joseph Lstiburek, Ph.D., P.Eng, ASHRAE Fellow

Building Science

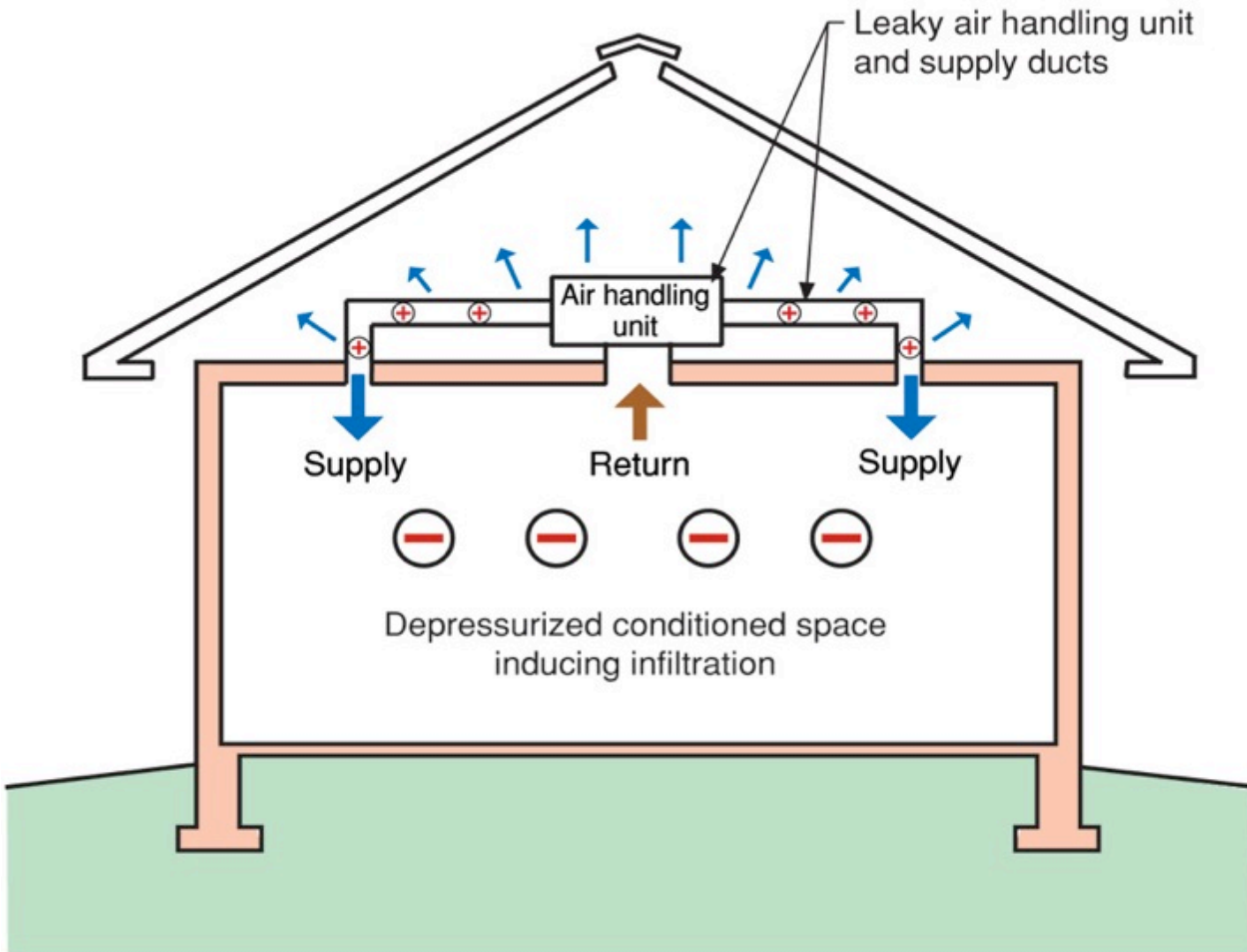
Unvented Roof Assemblies

presented by www.buildingscience.com





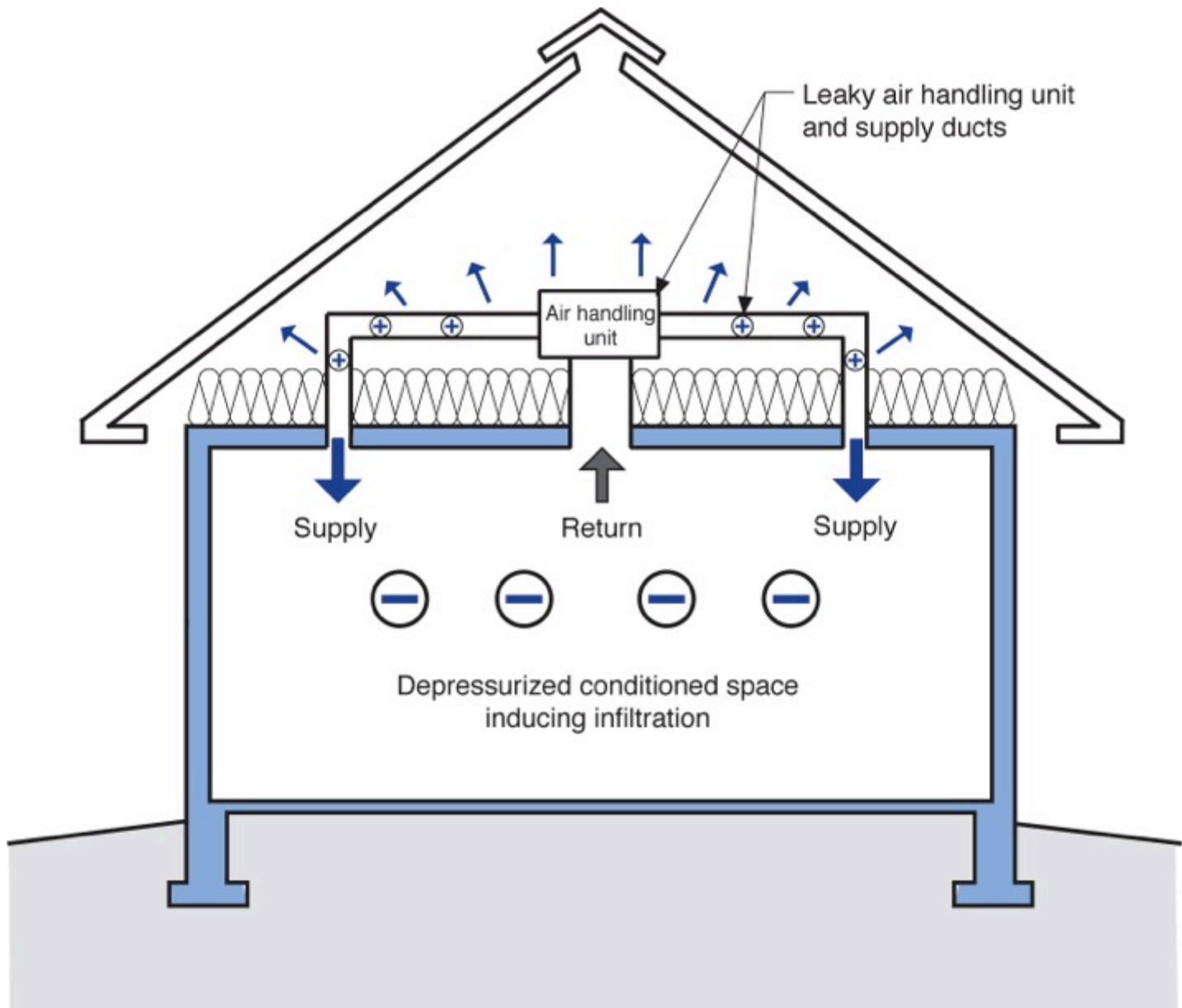


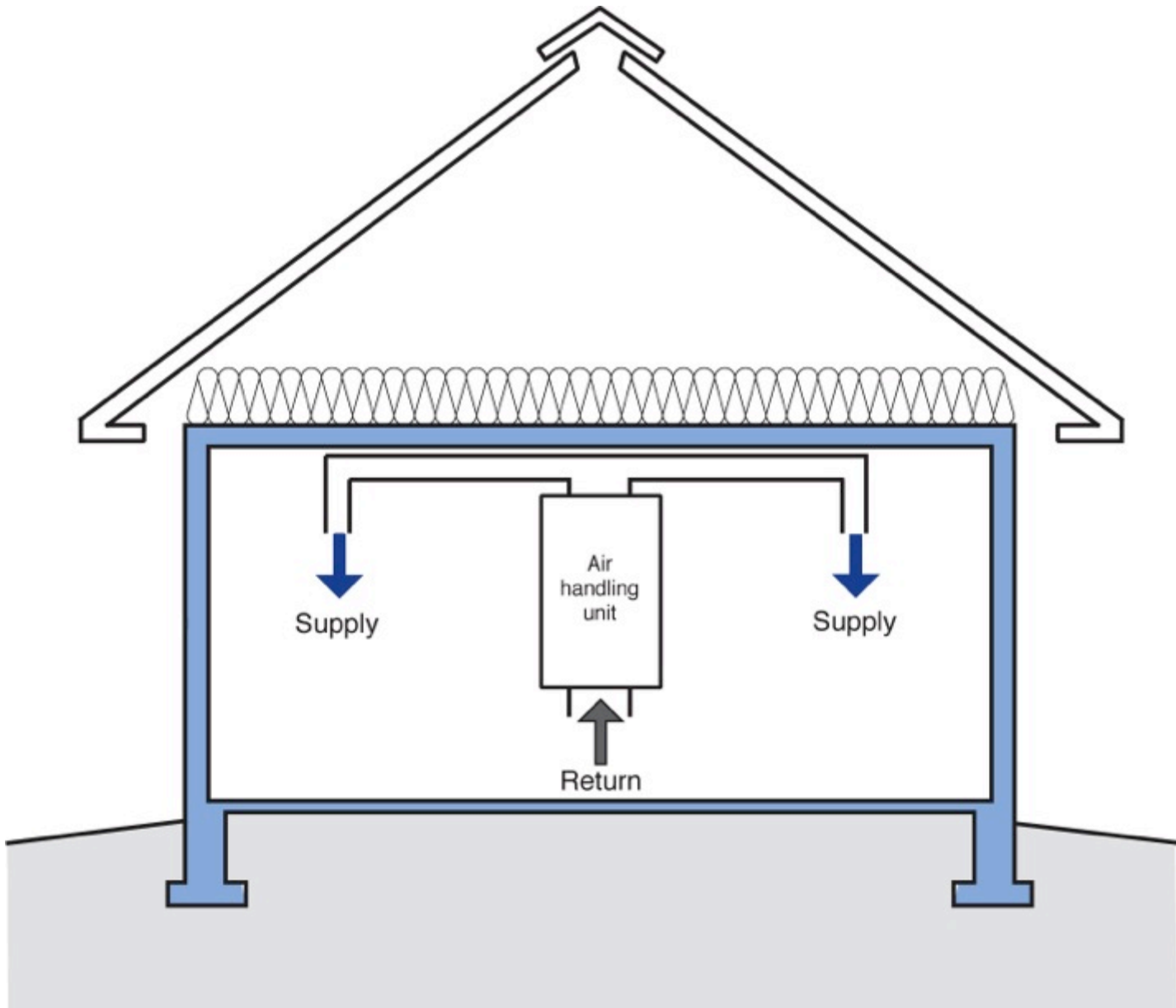


Note: Colored shading depicts the building's thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.

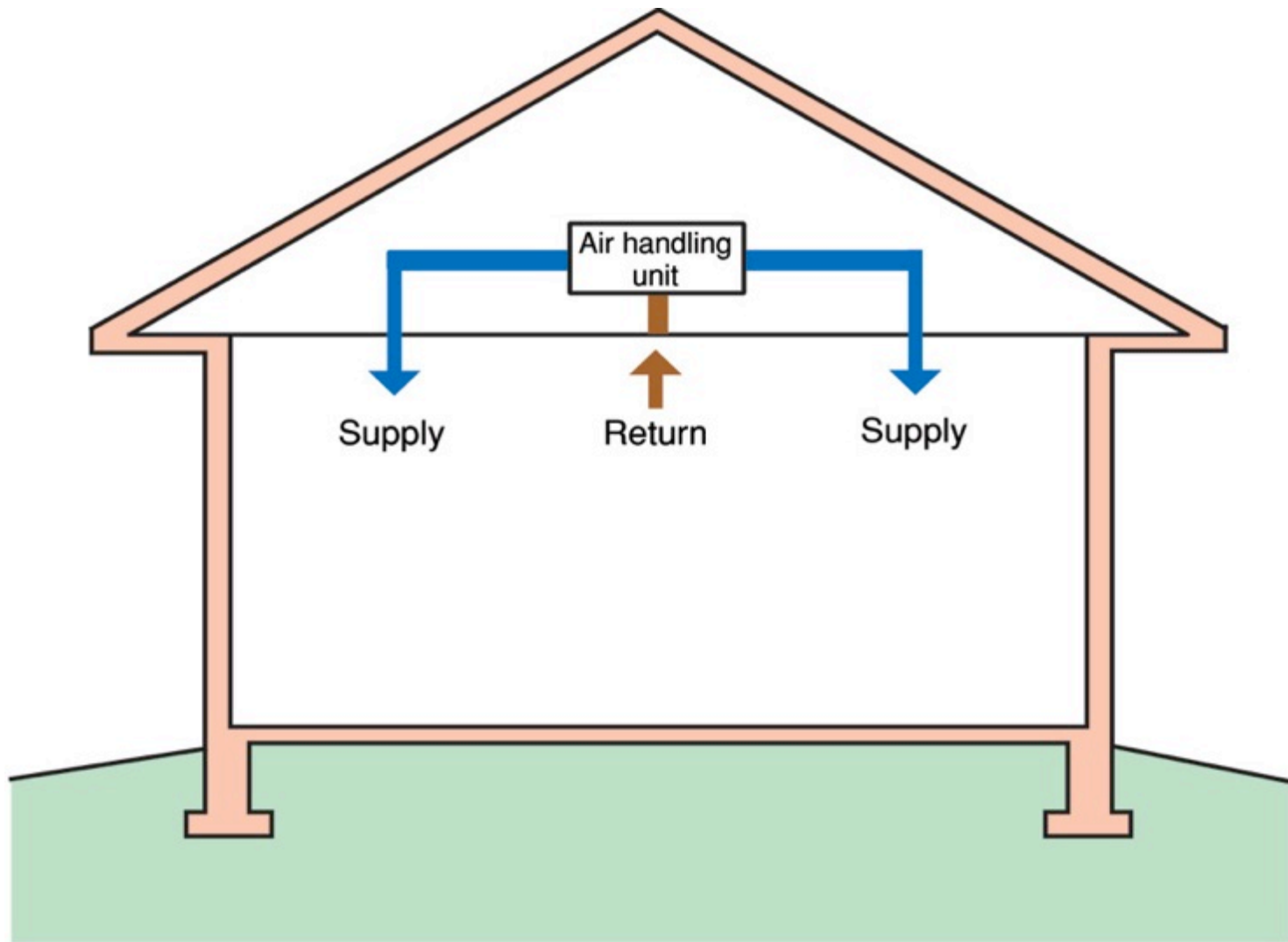




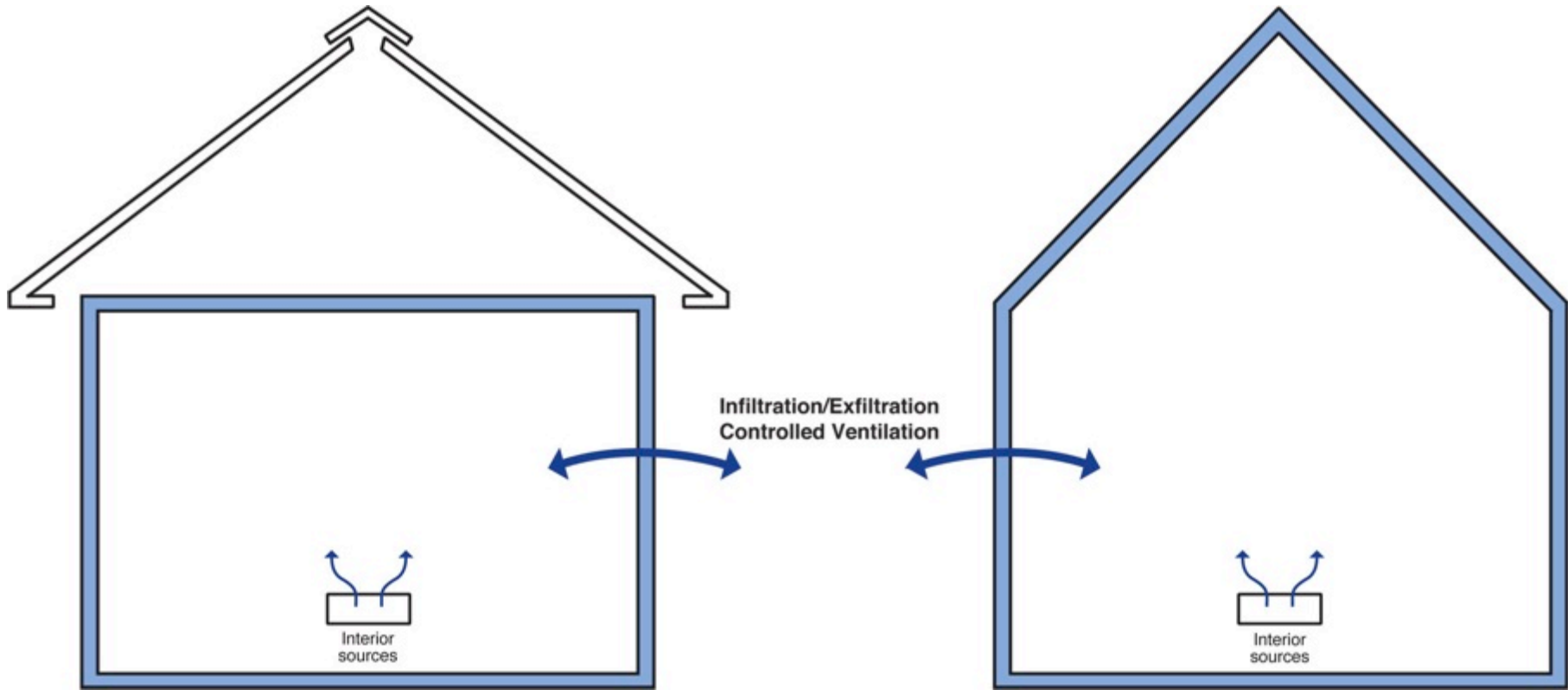


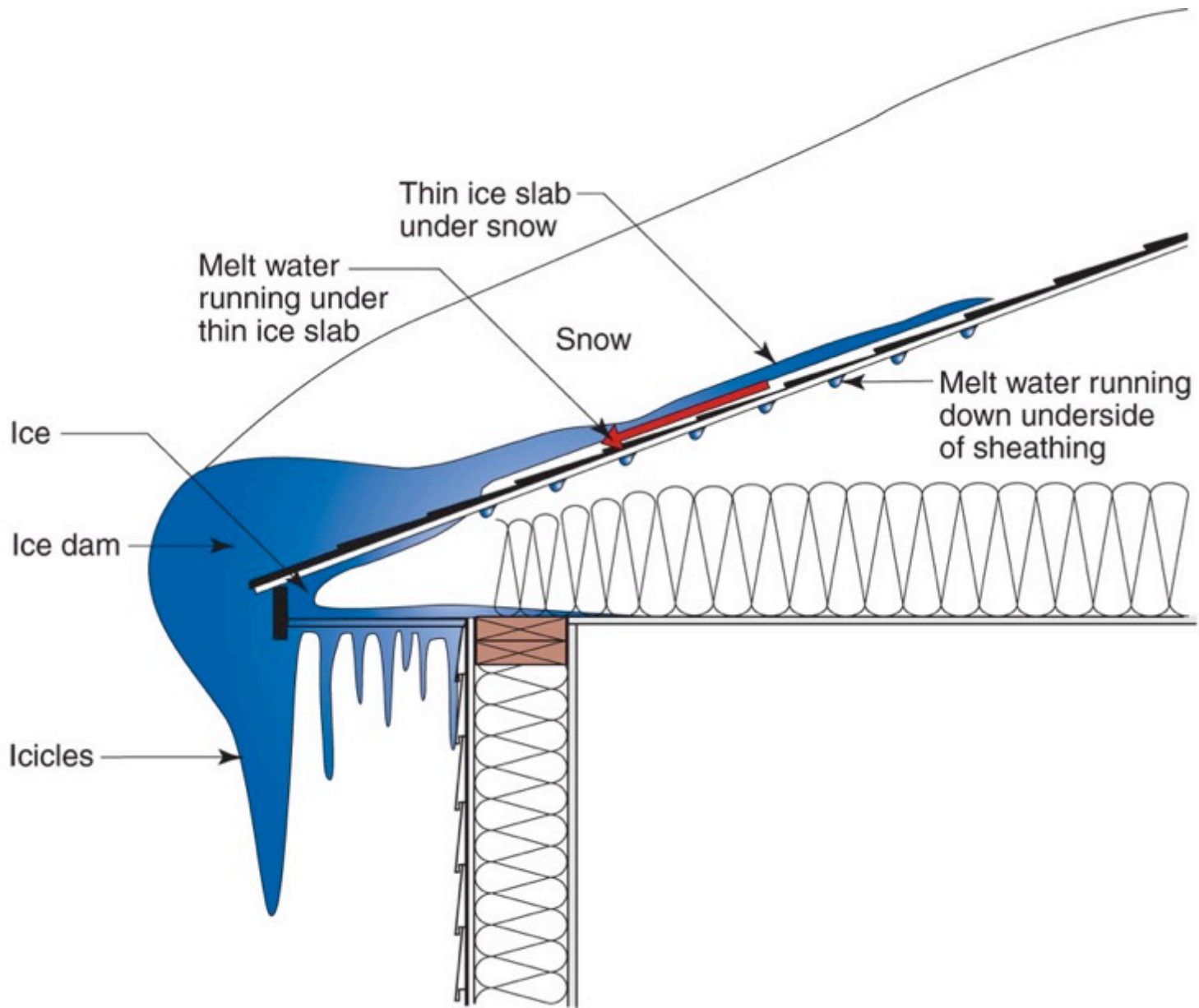




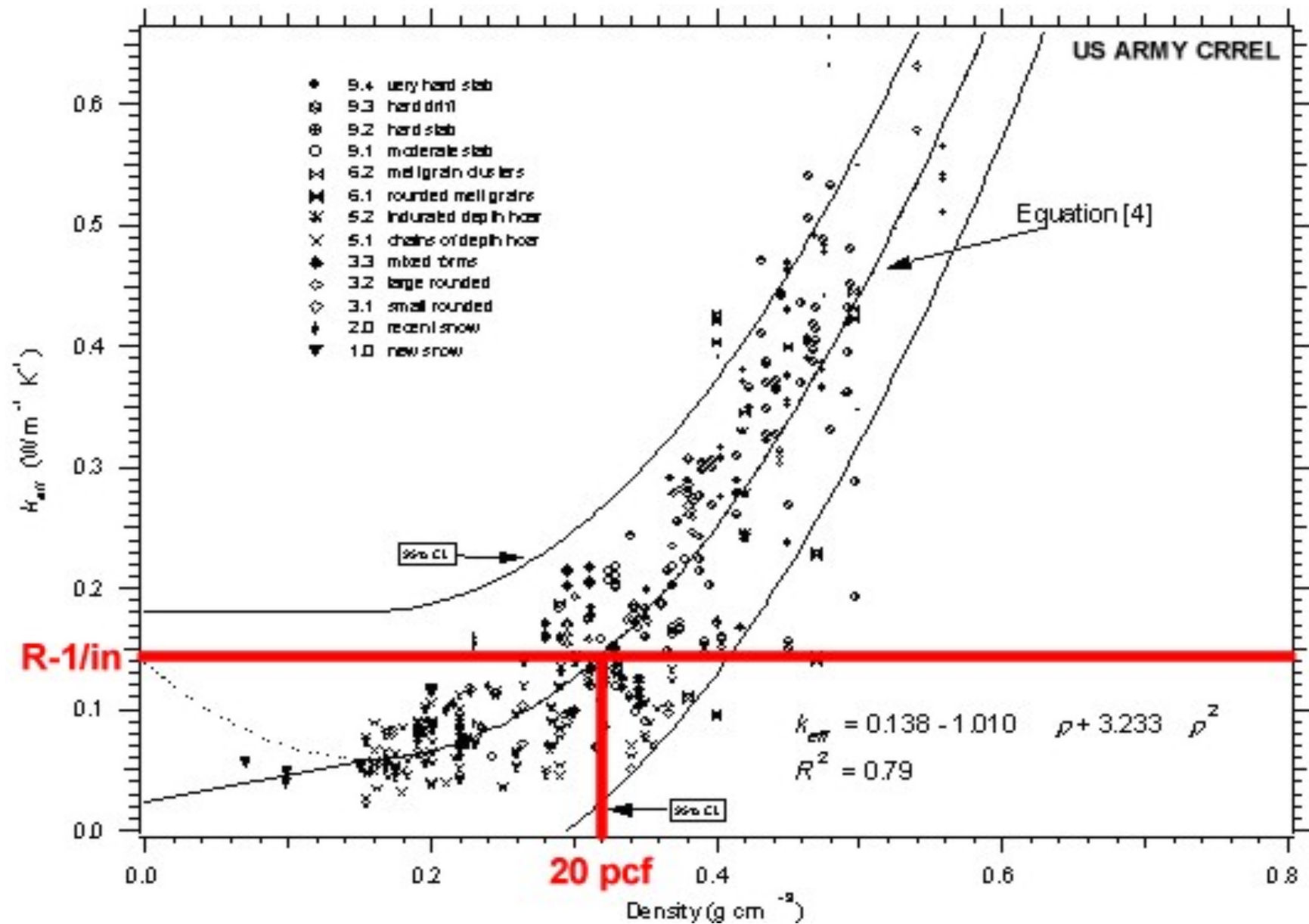


Note: Colored shading depicts the building's thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.

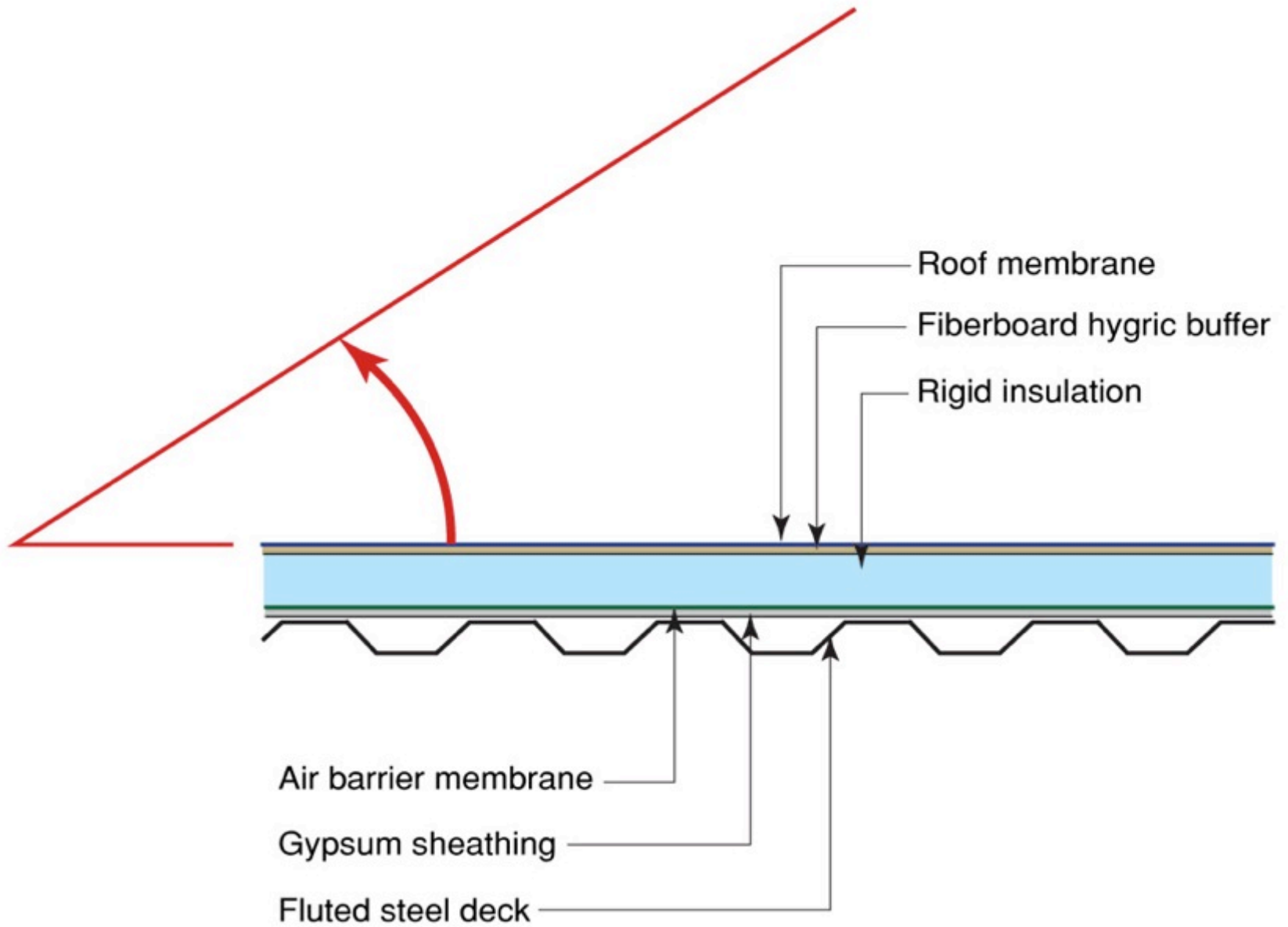


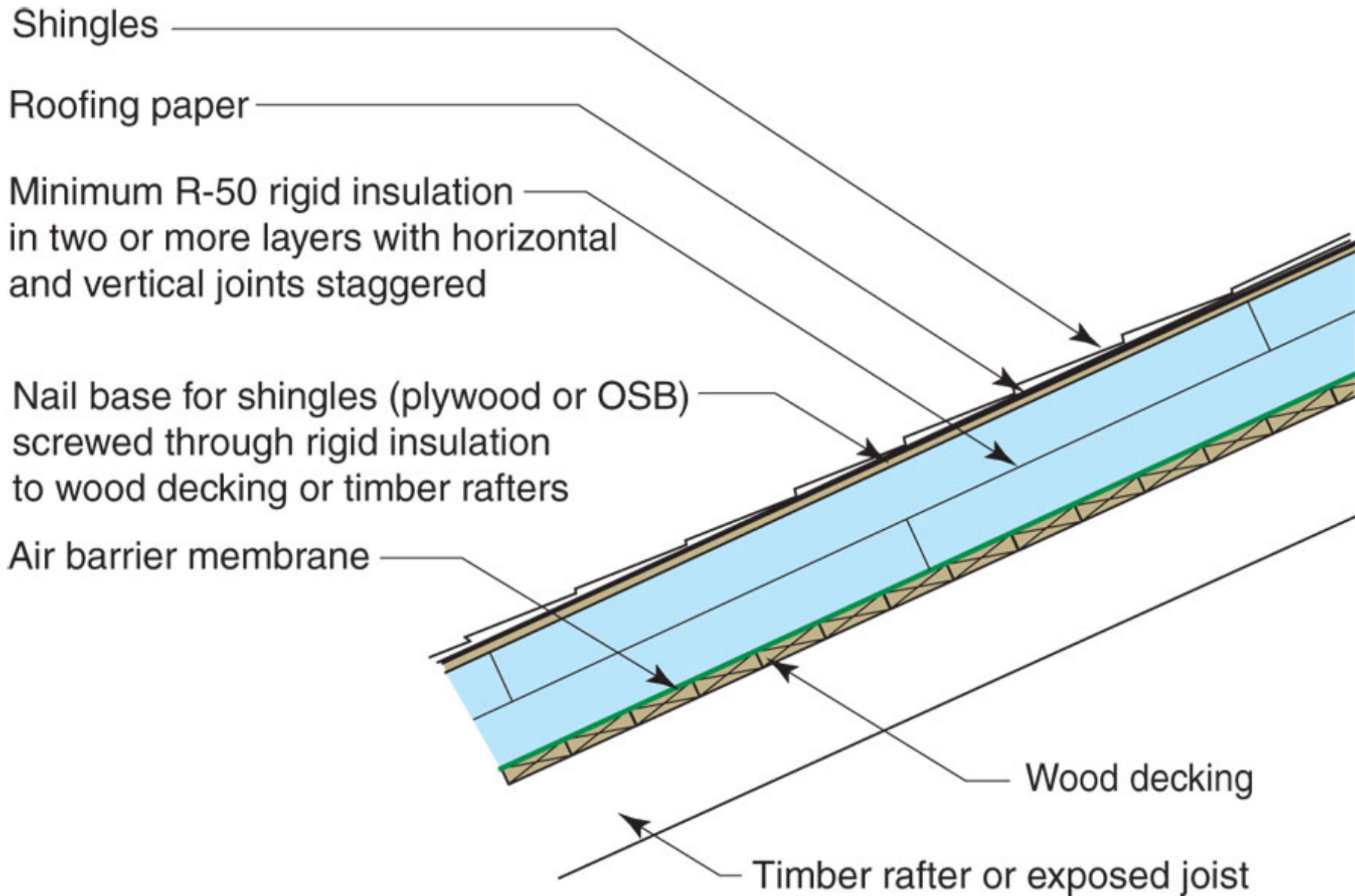


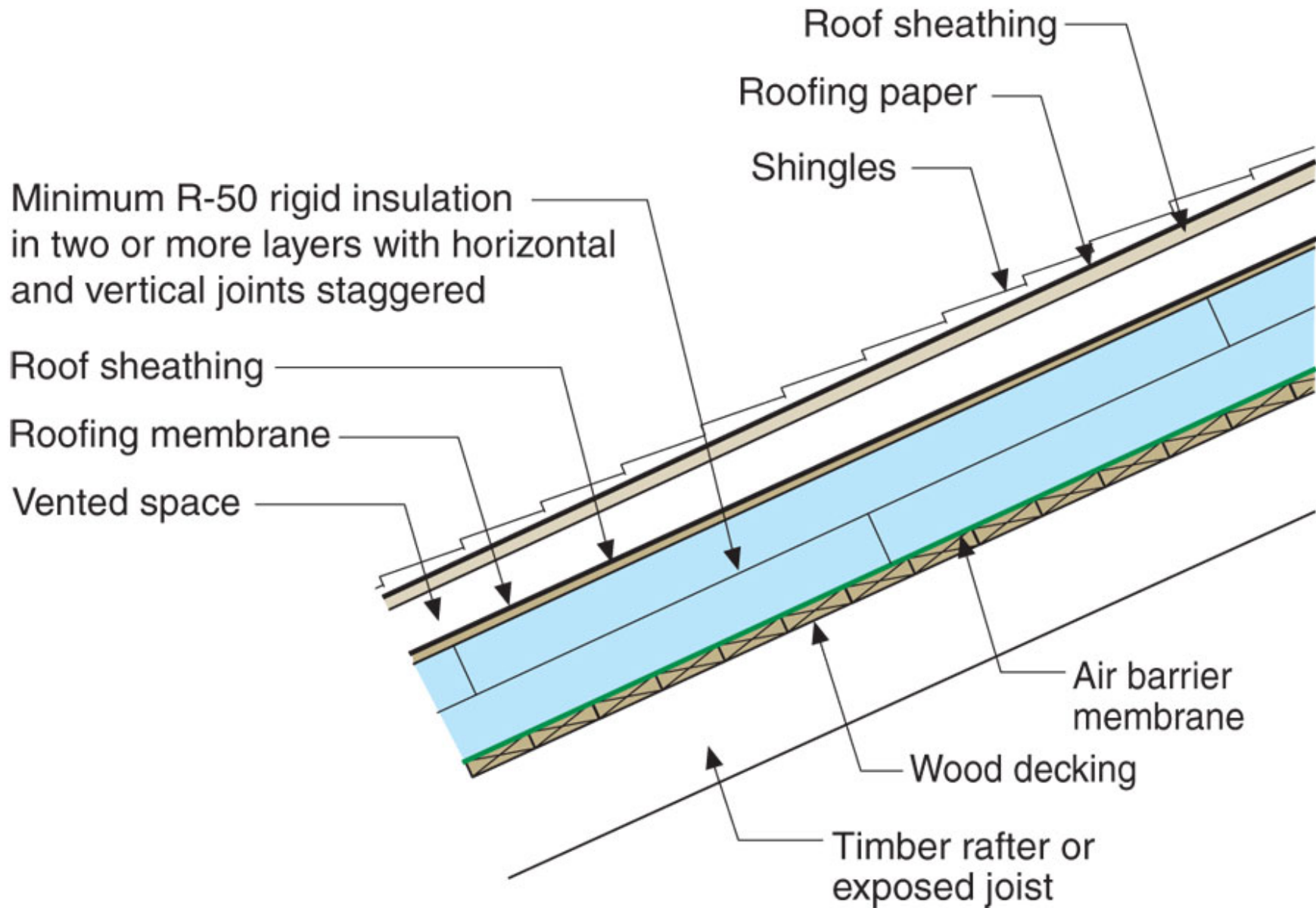


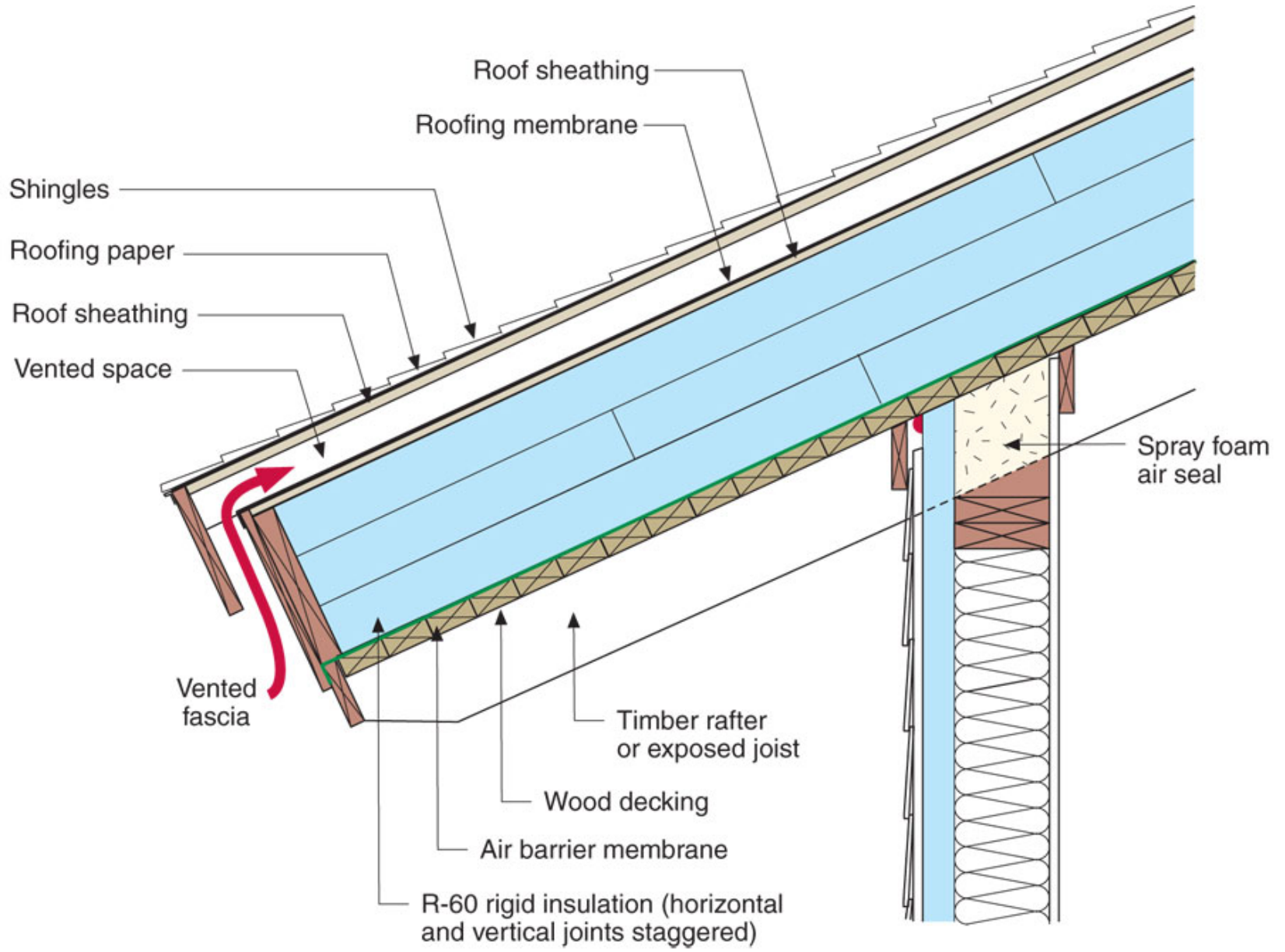


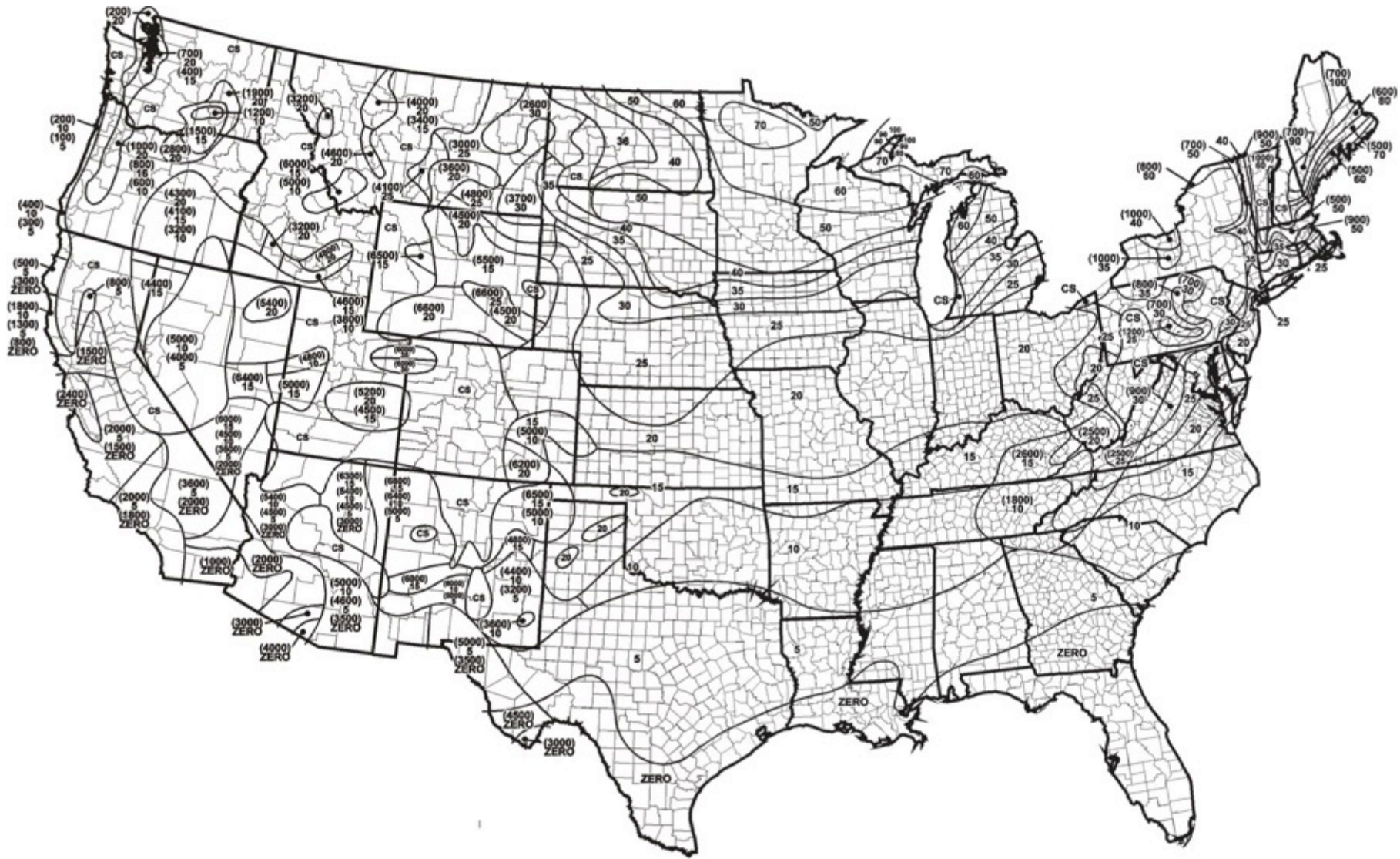


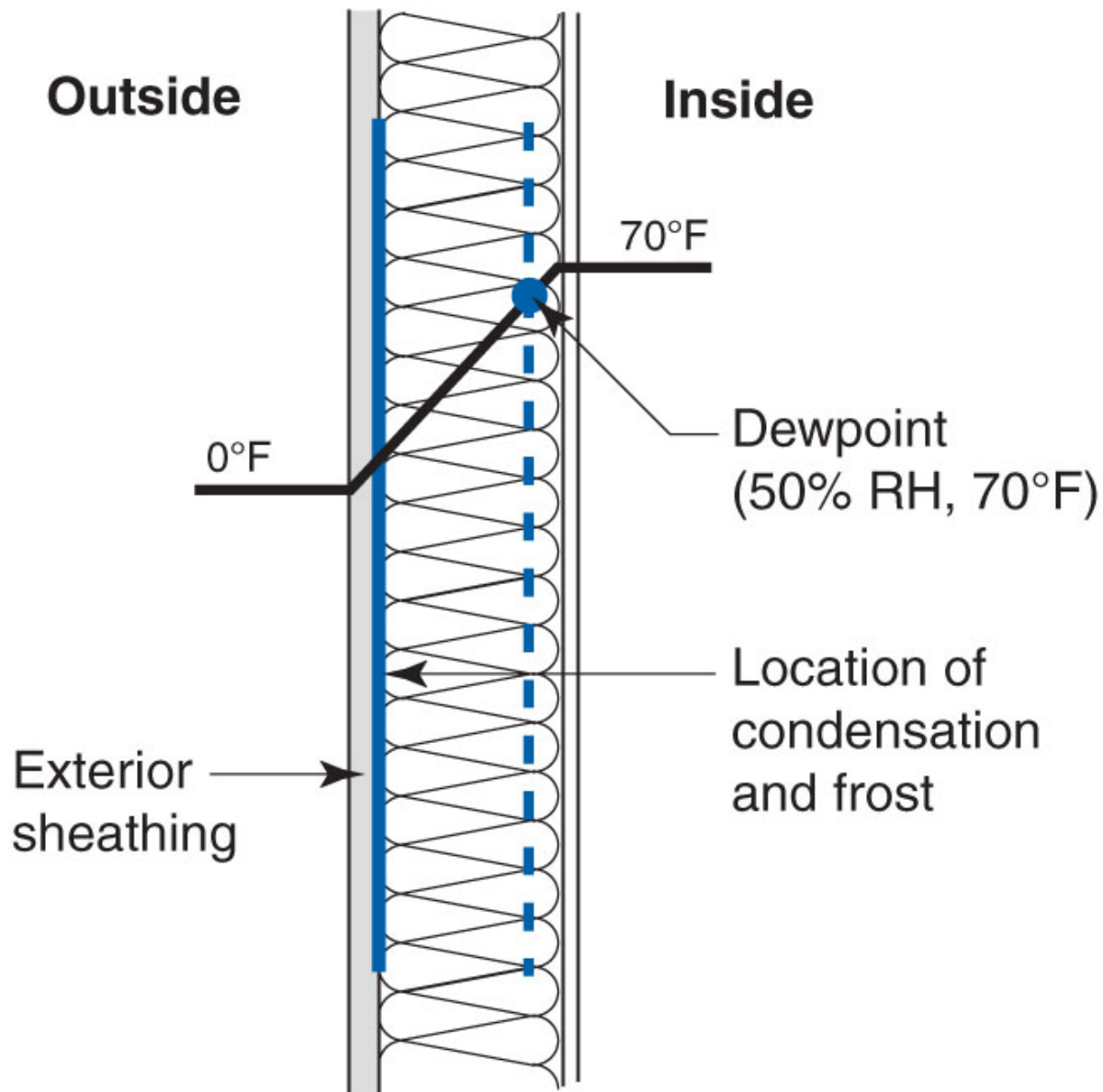




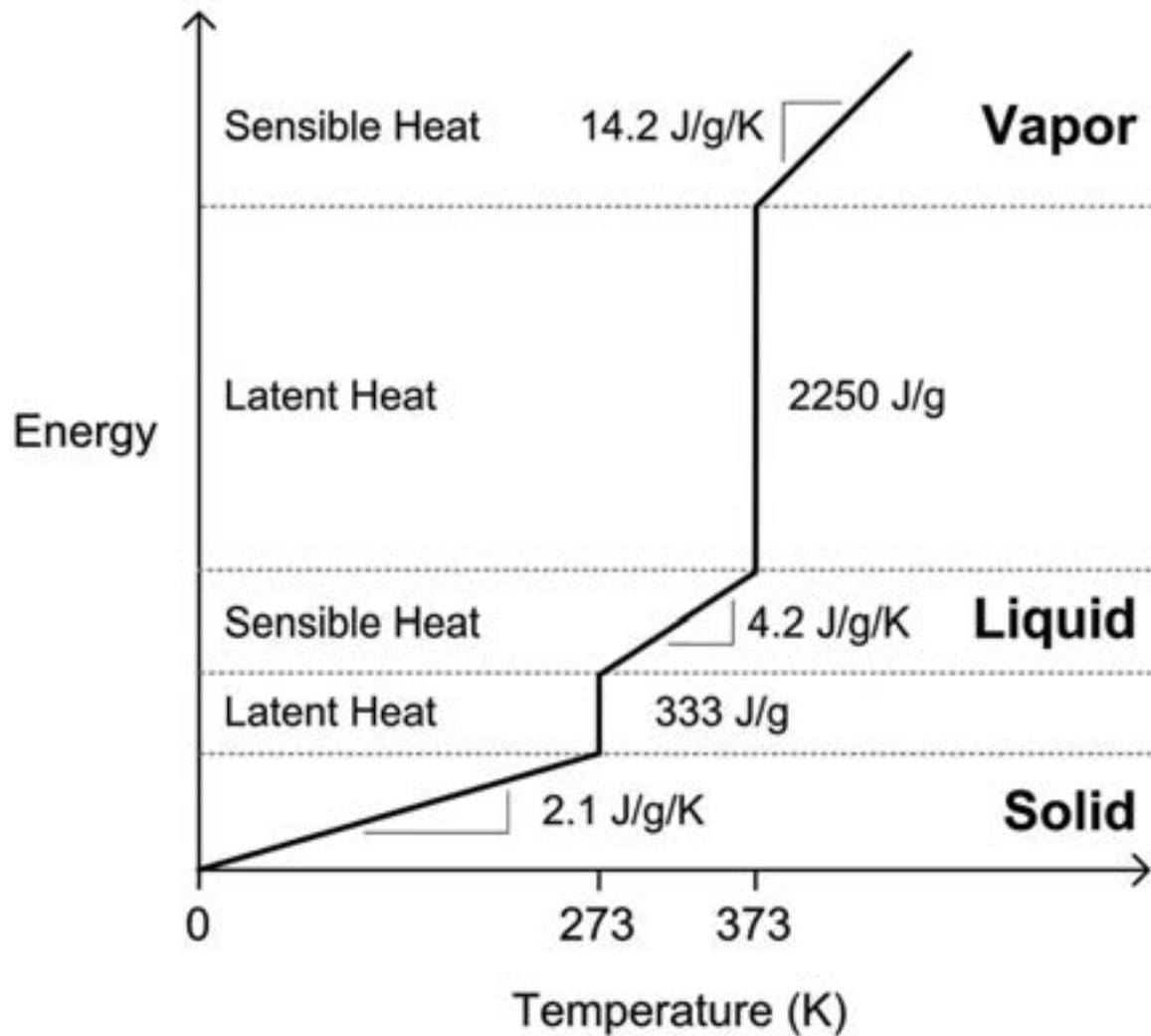






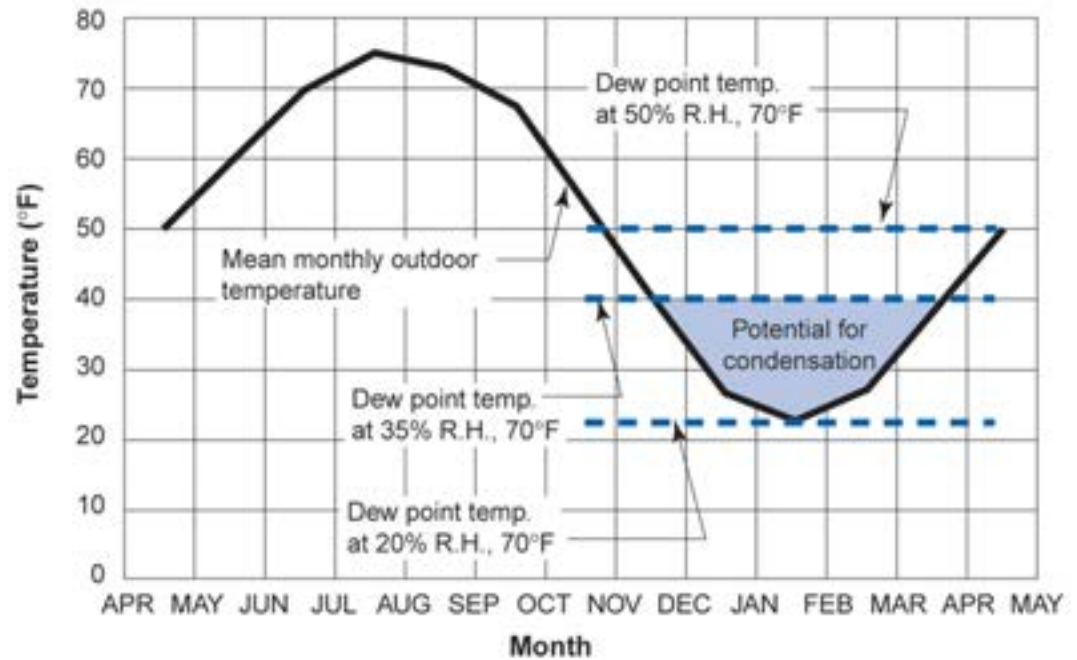
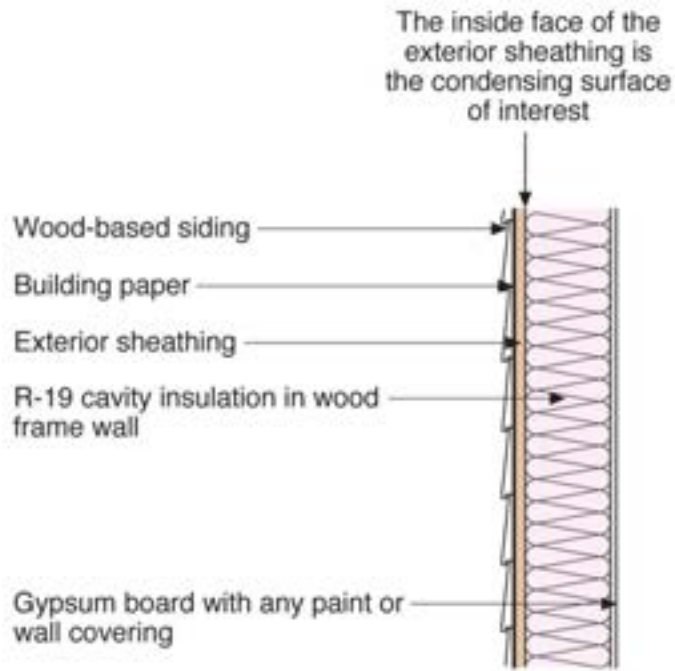


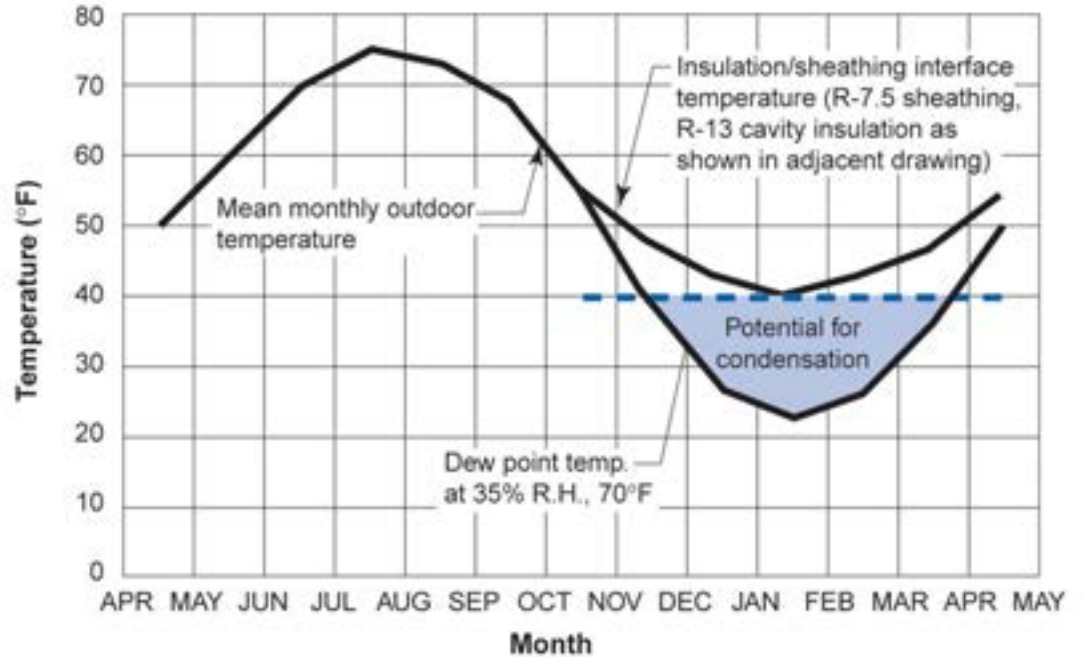
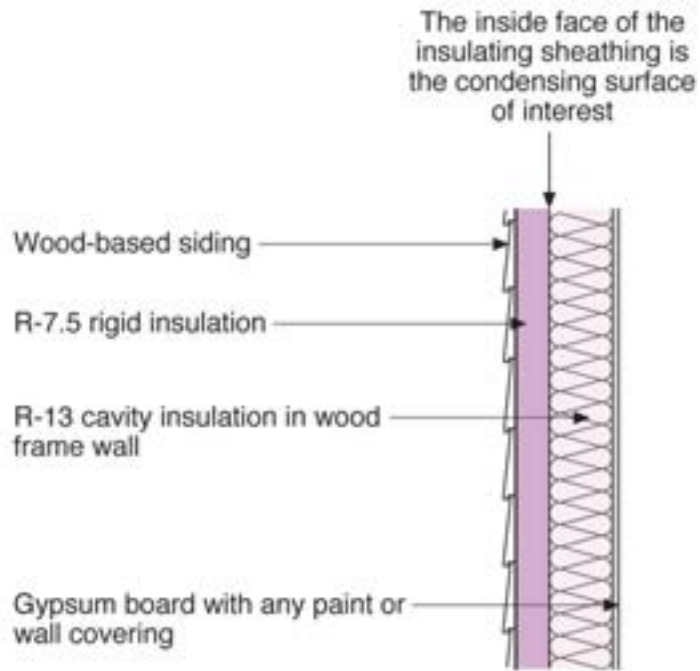




Simple linearized energy-temperature relation for water
 From Straube & Burnett, 2005







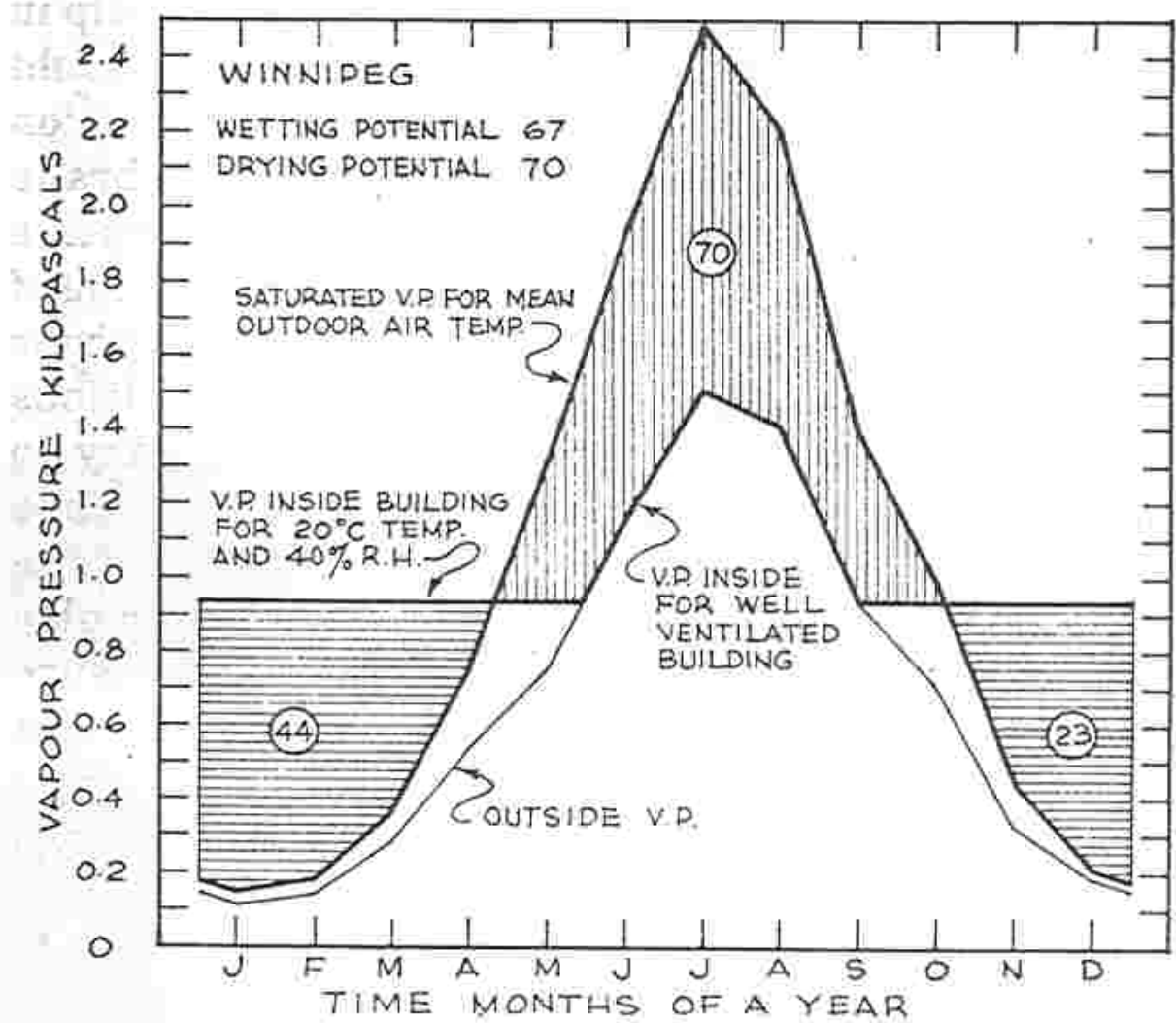
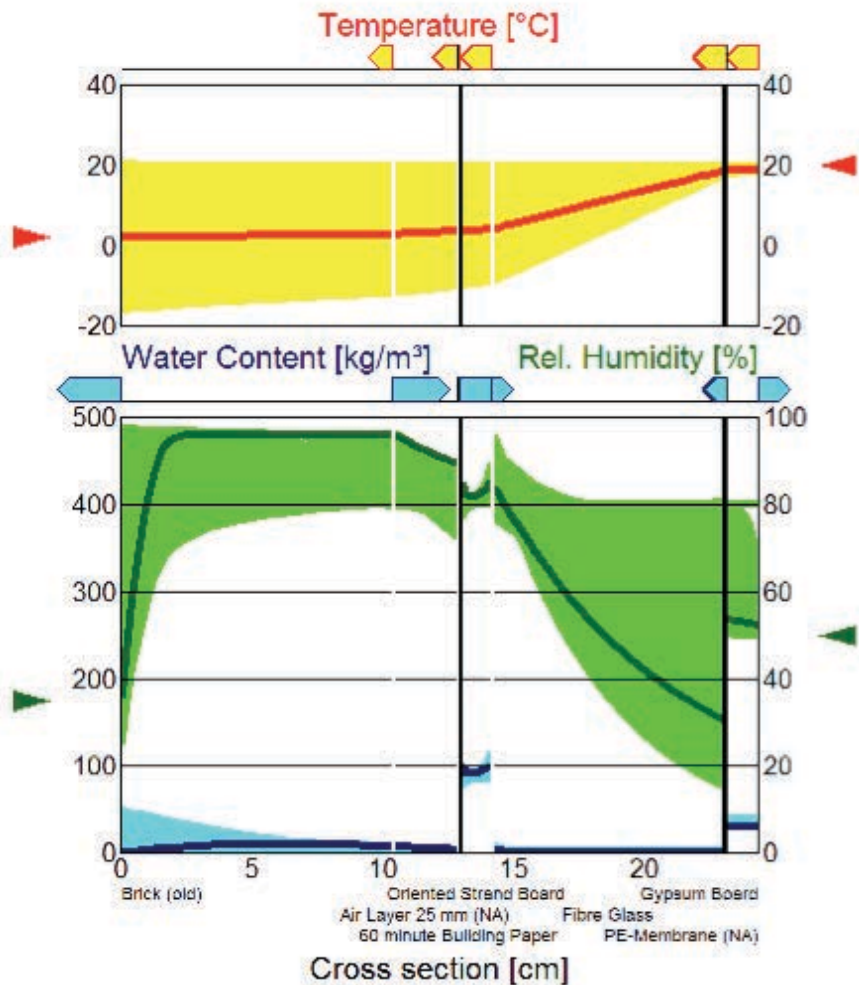


Figure 8-7. Outside vapour pressure, saturated vapour pressure and inside vapour pressure for Winnipeg.



WUFI® 3.3 Pro. IBP
Run

16 Feb
2001

100%

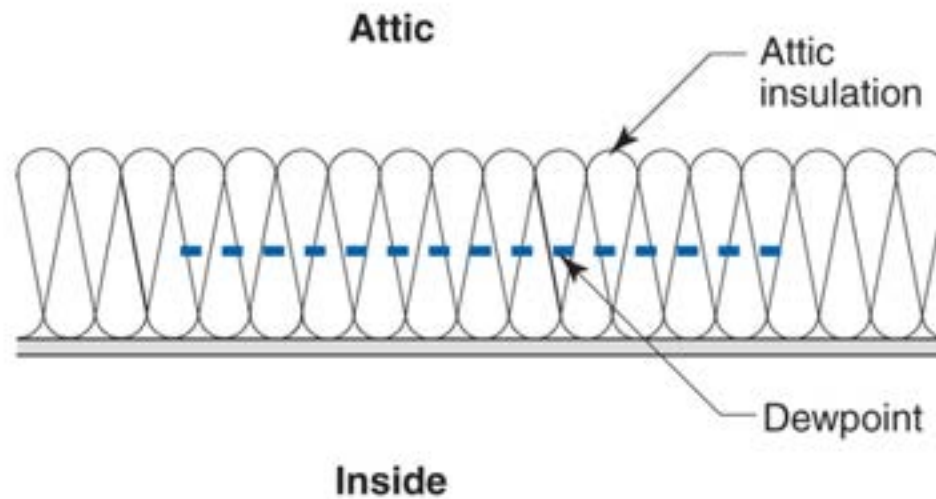
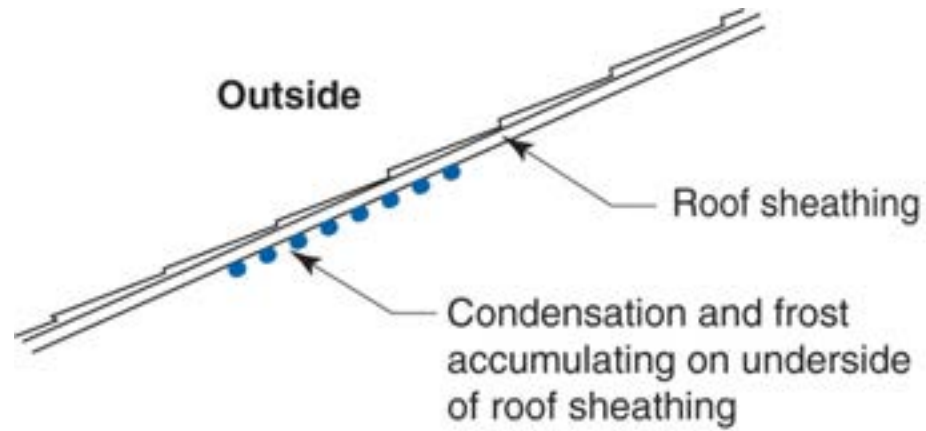
100%

0.00

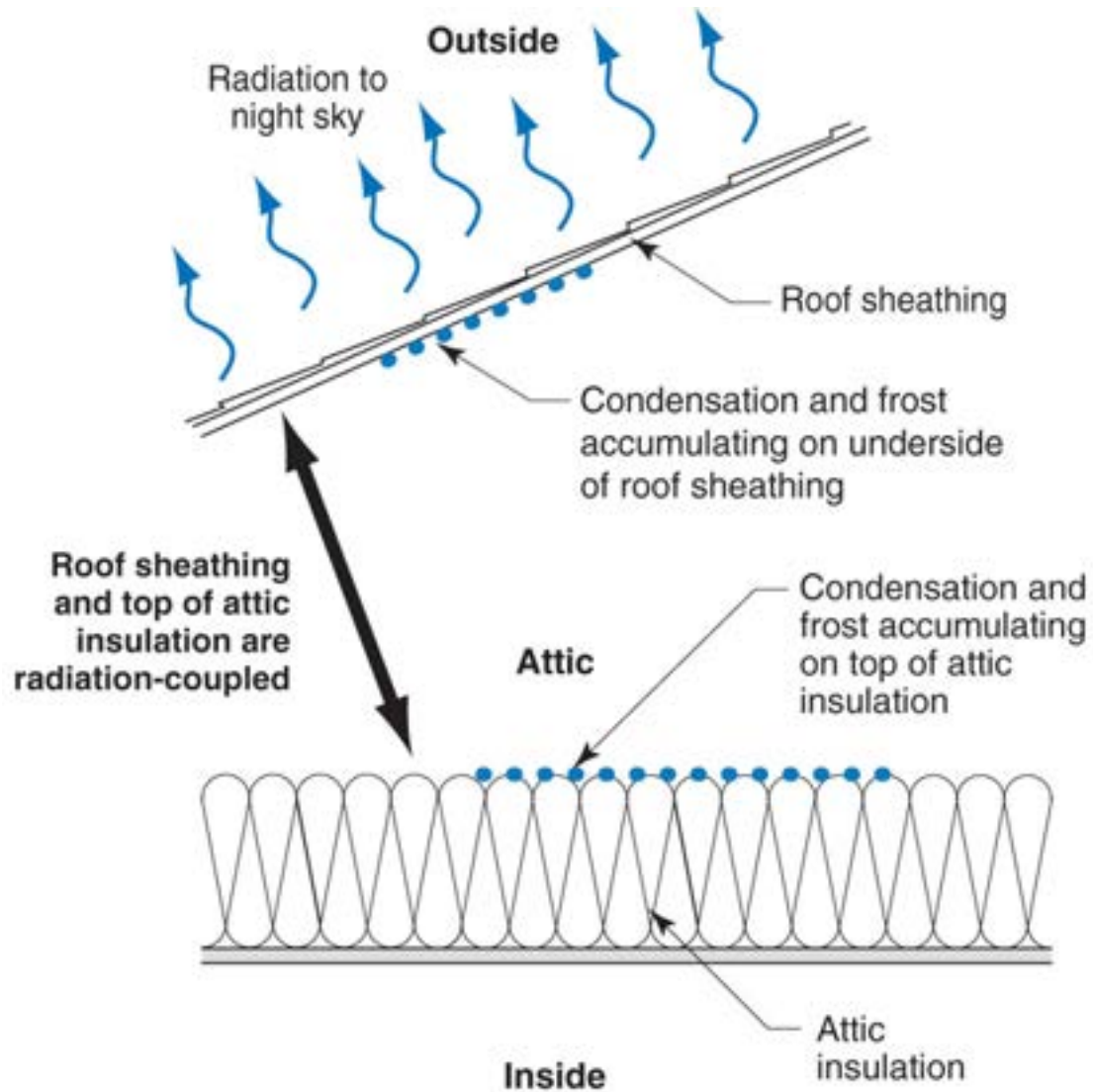
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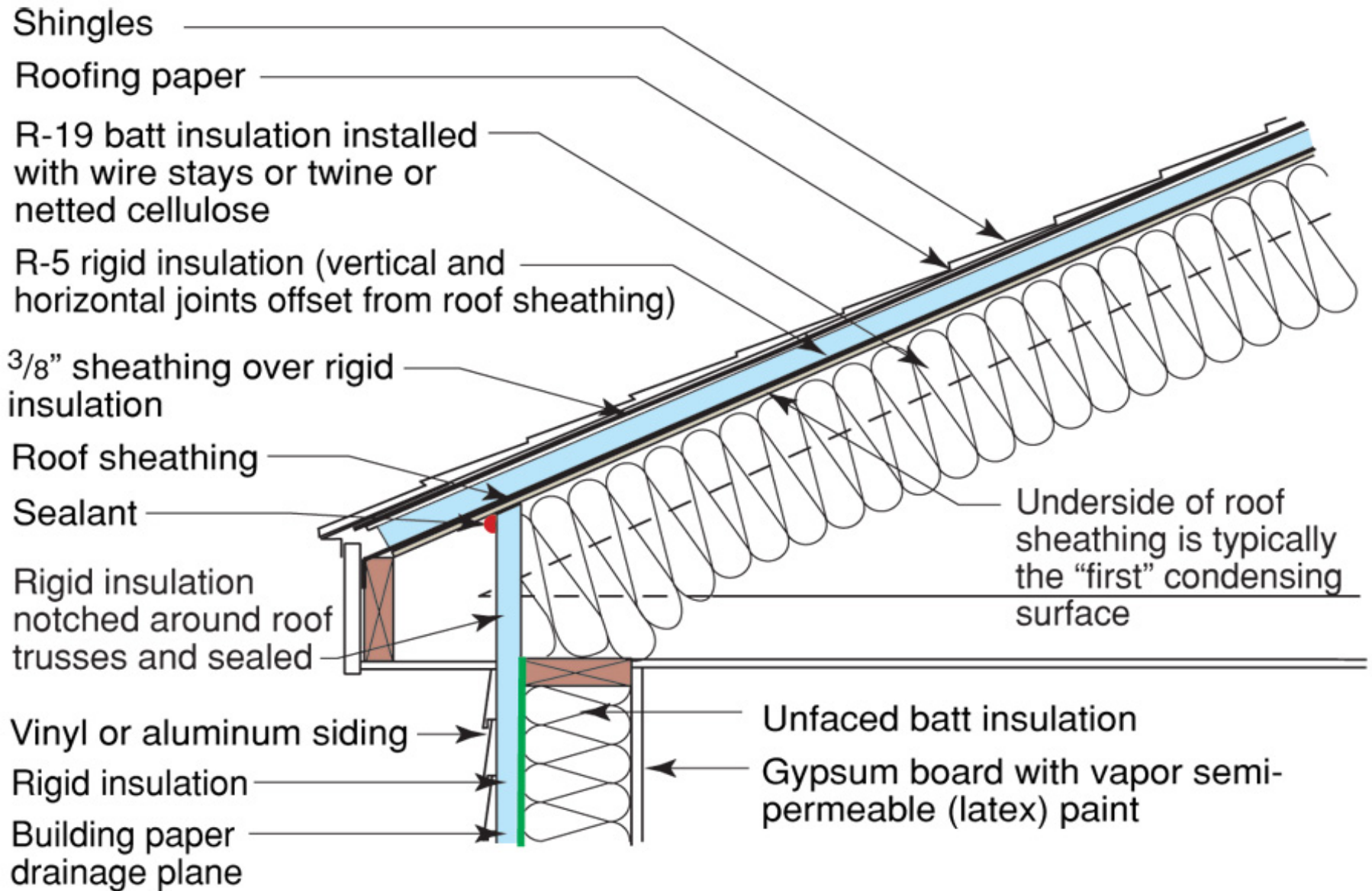
? +<

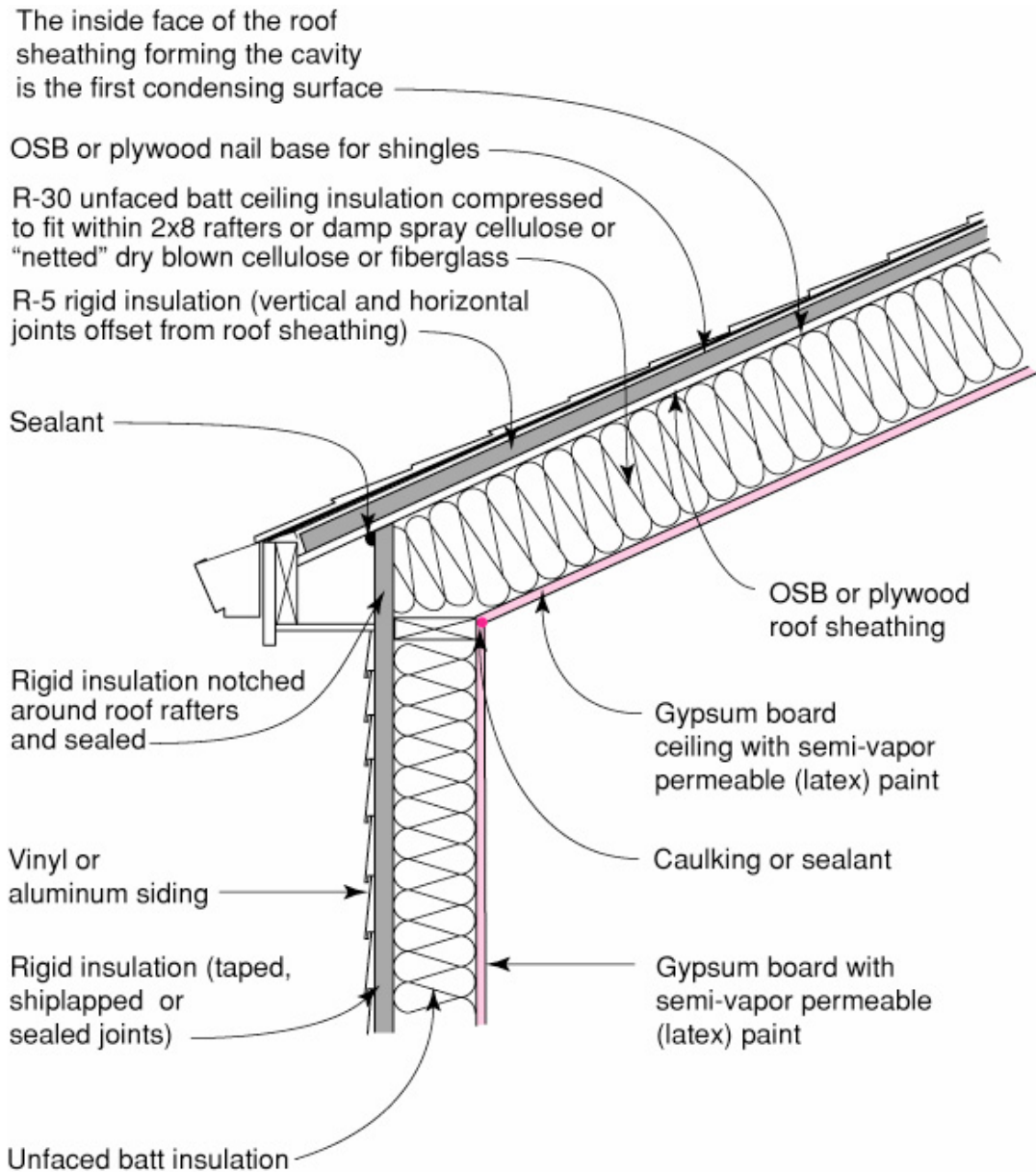
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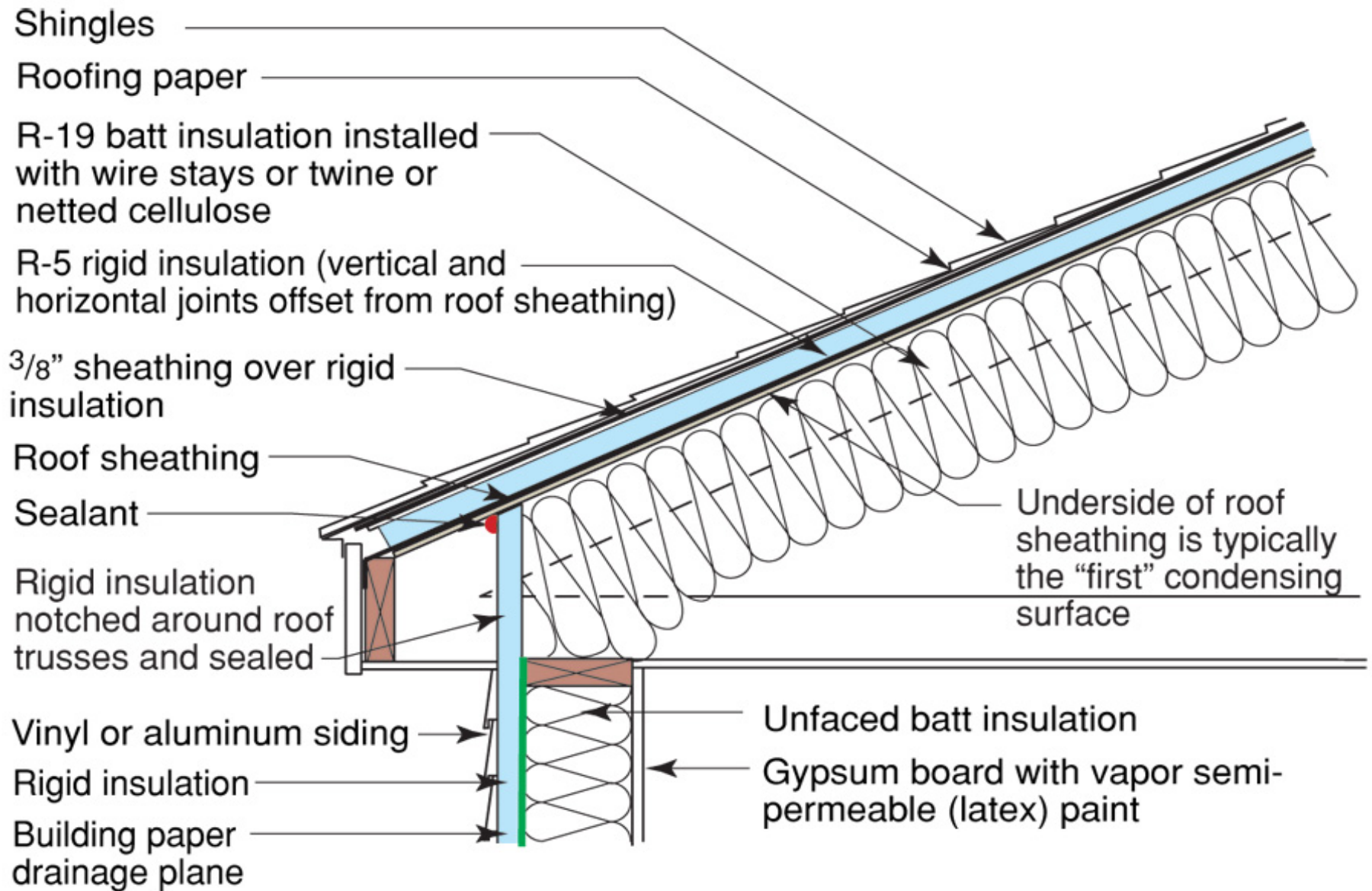


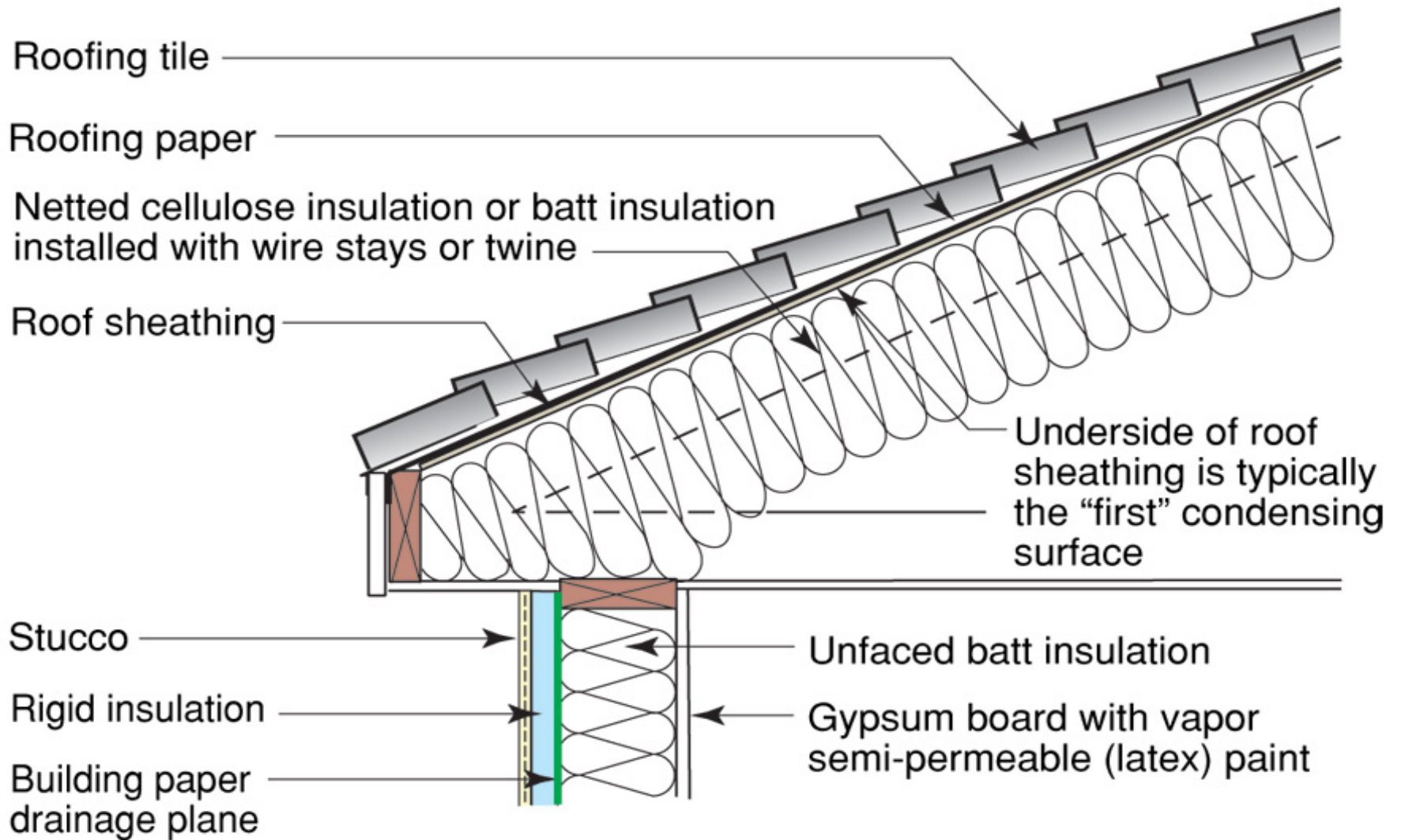








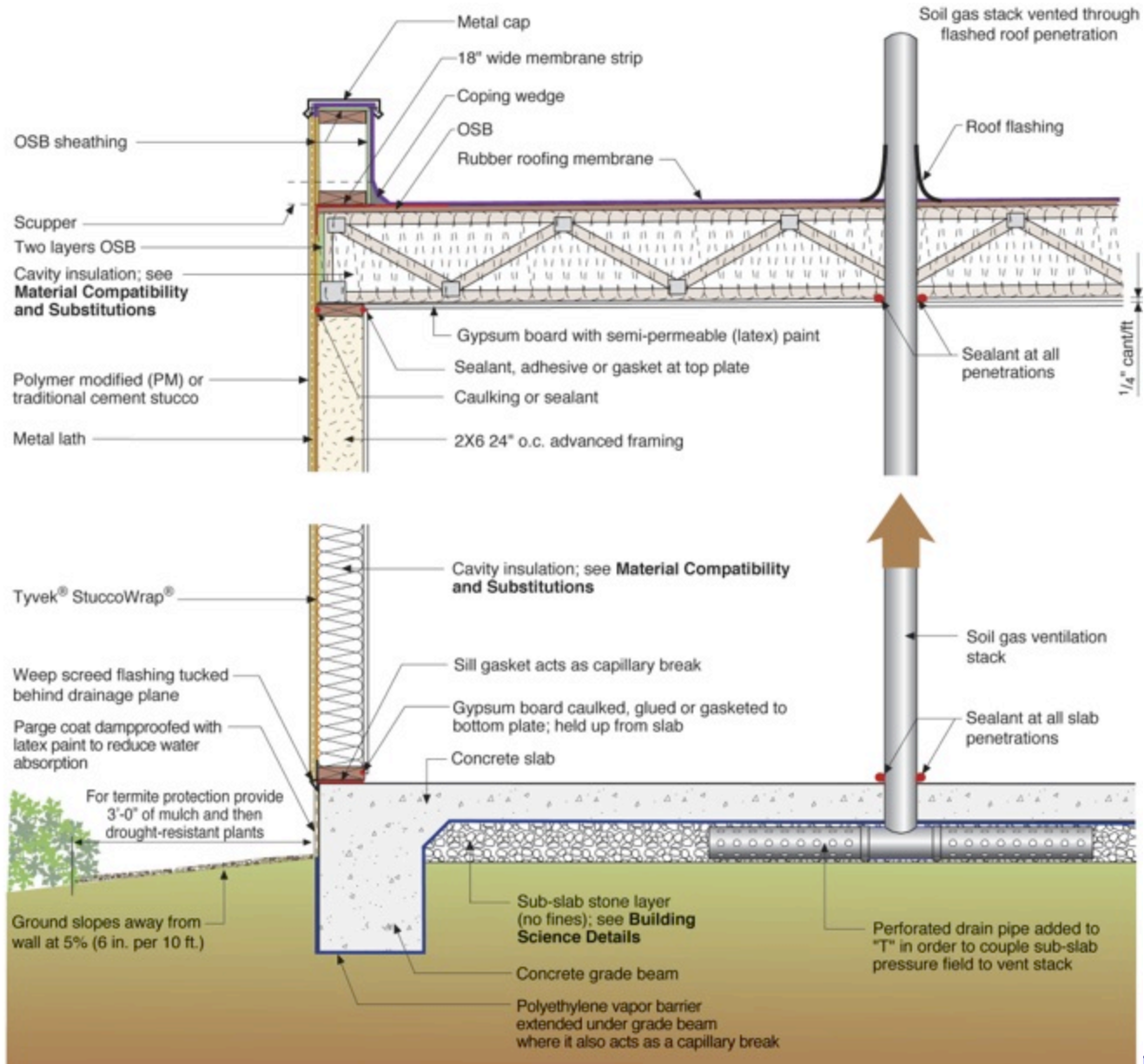


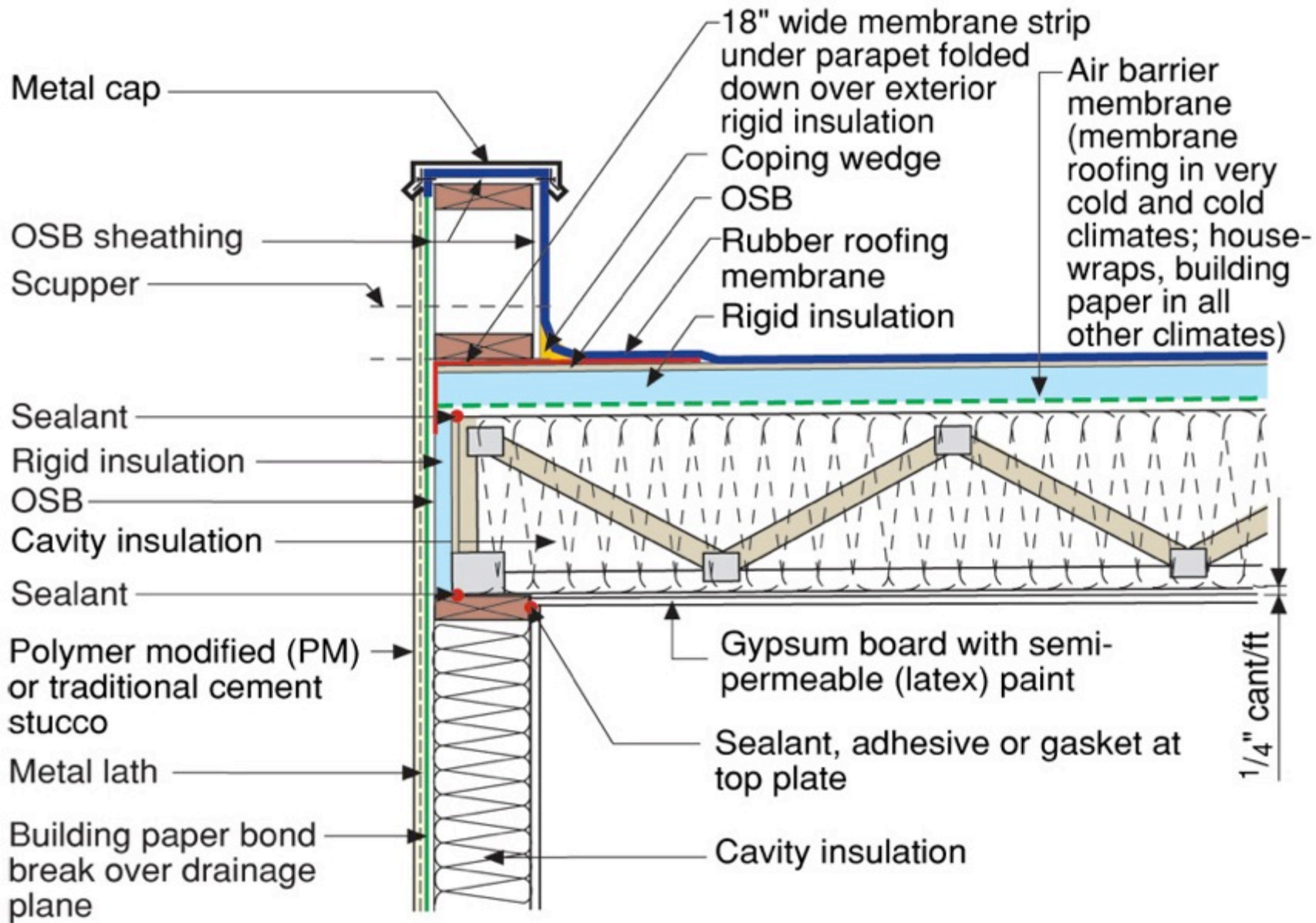


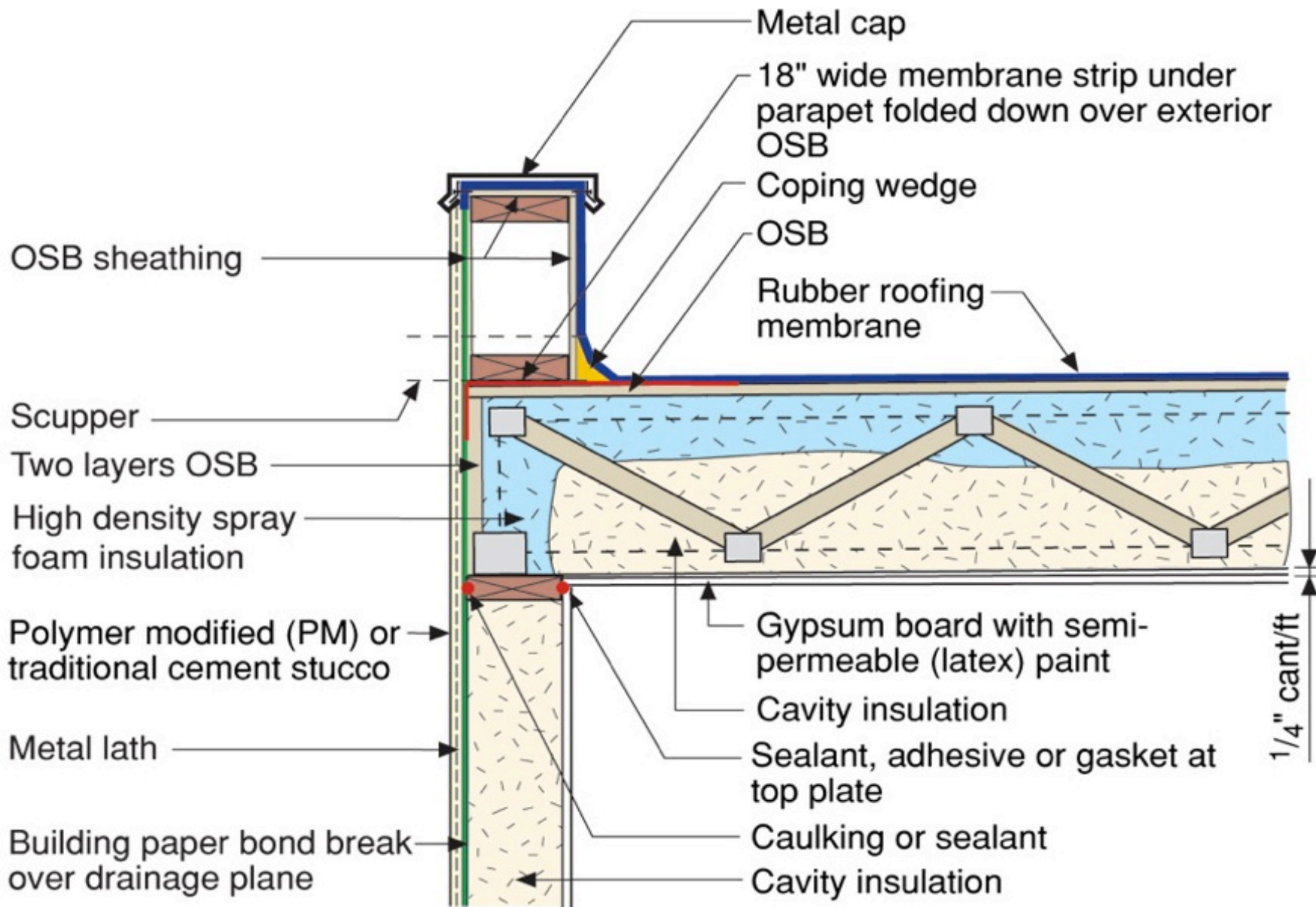




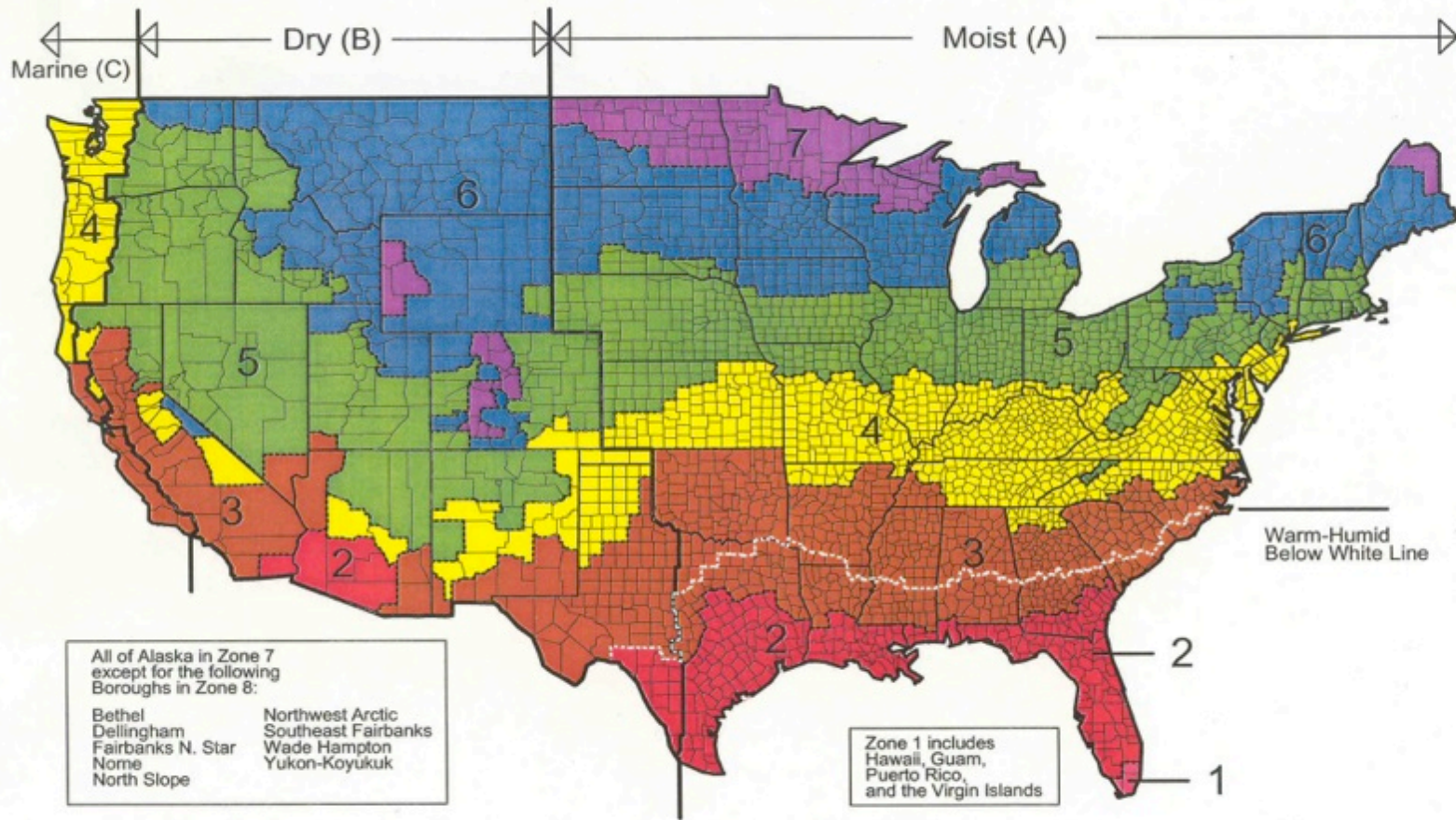




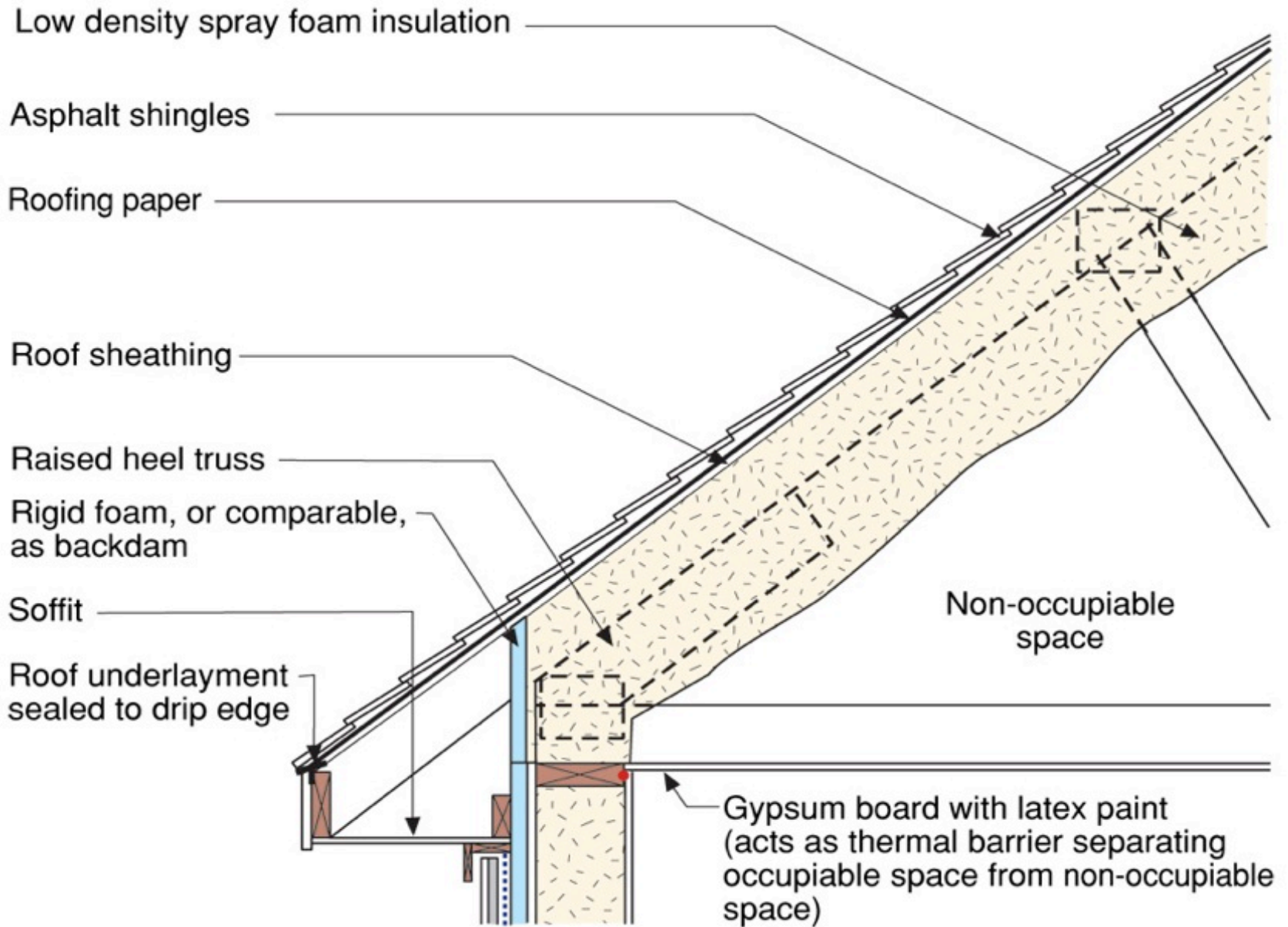




Map of DOE's Proposed Climate Zones



March 24, 2003

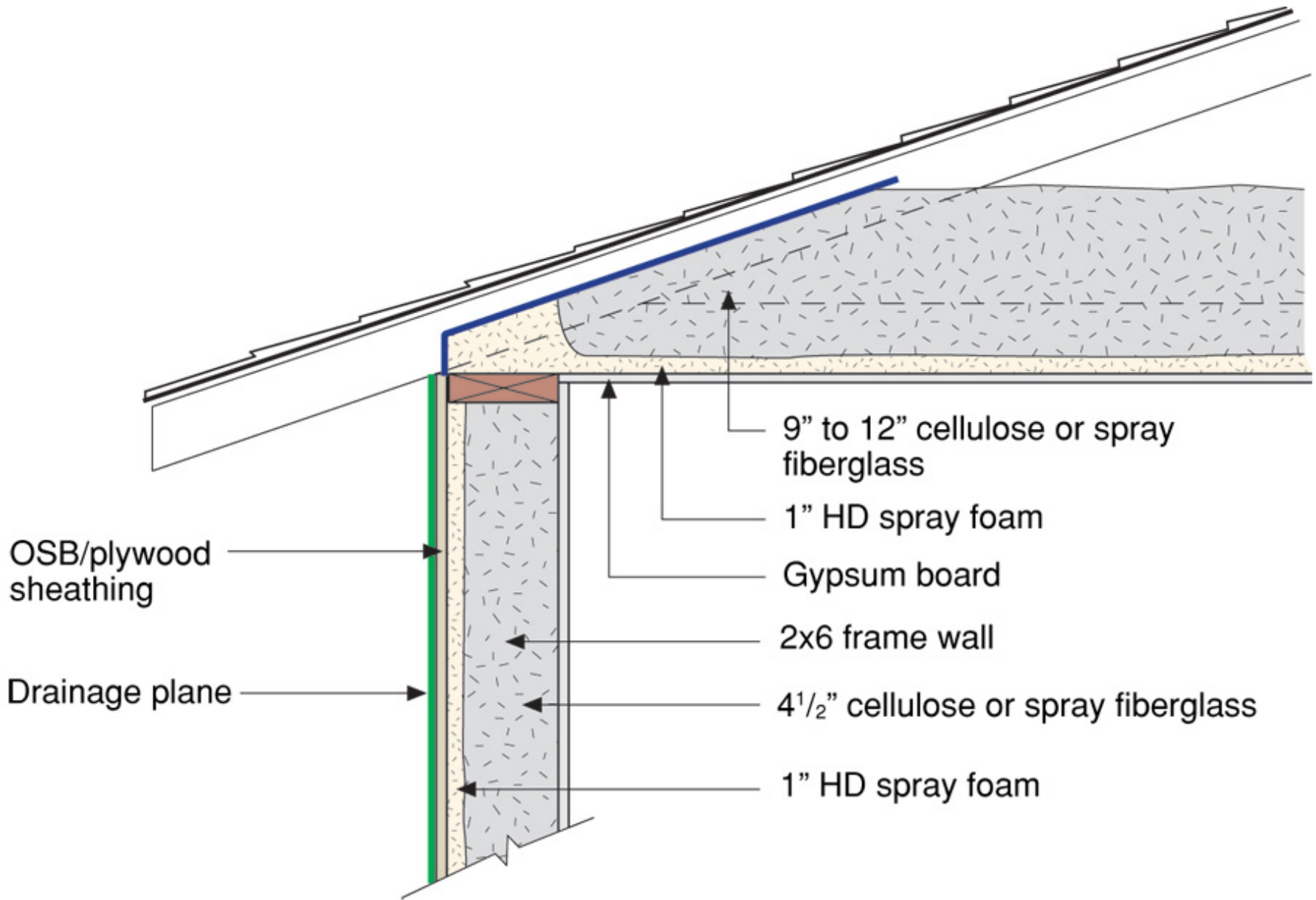


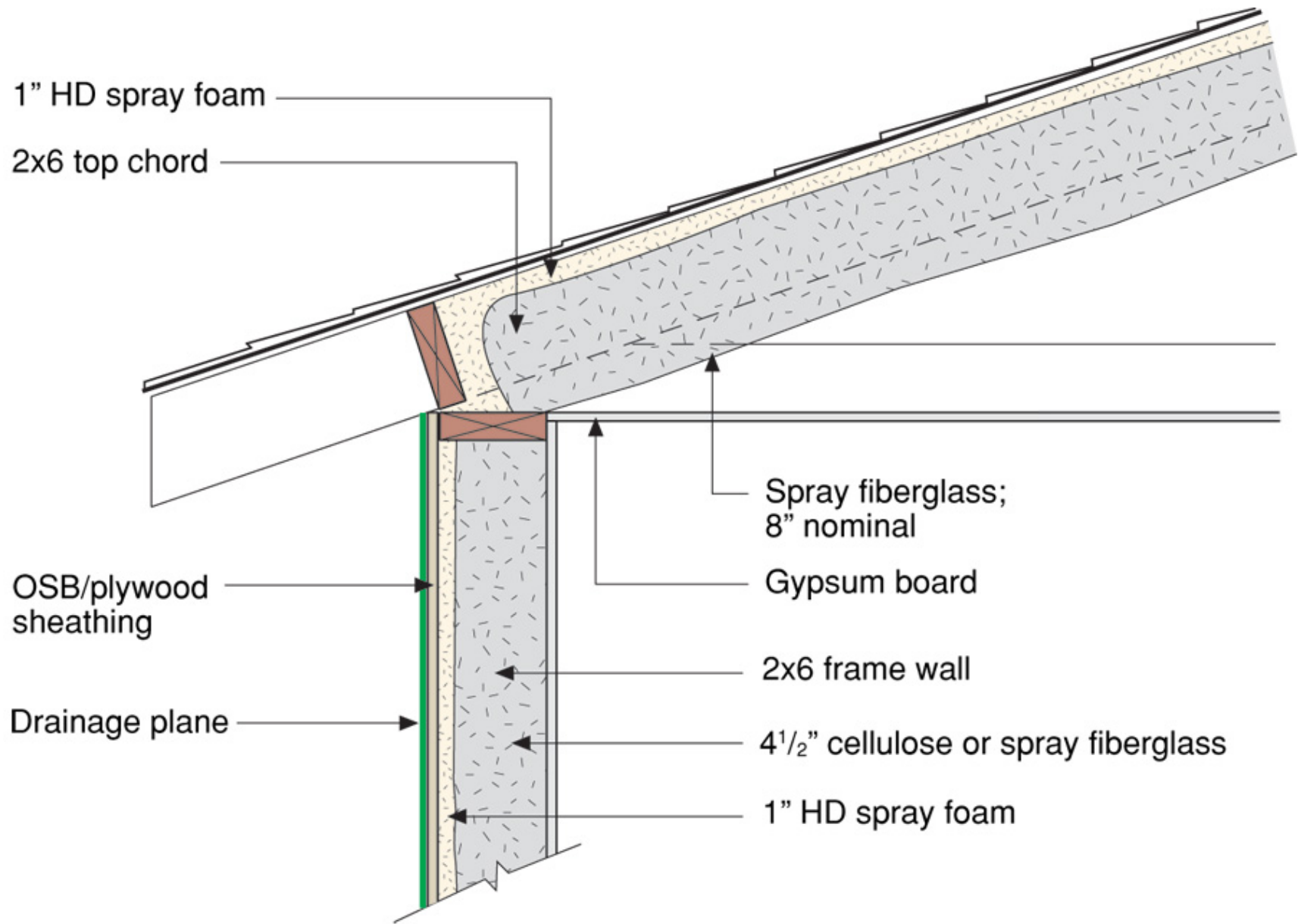


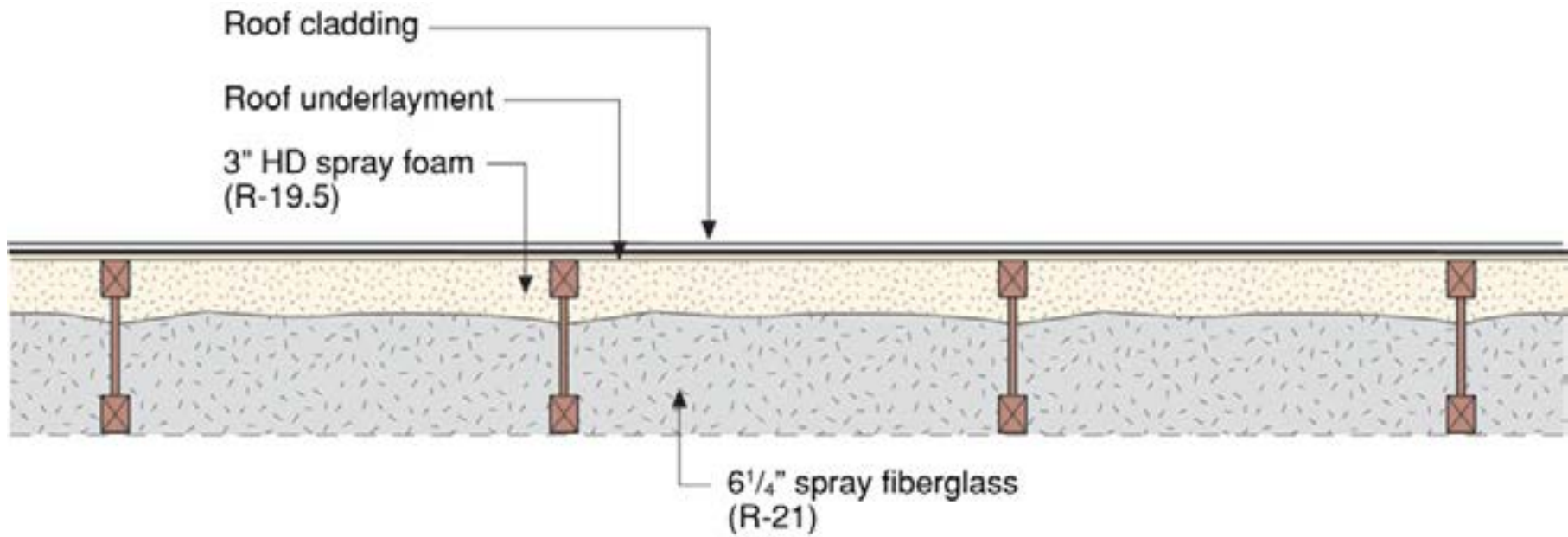










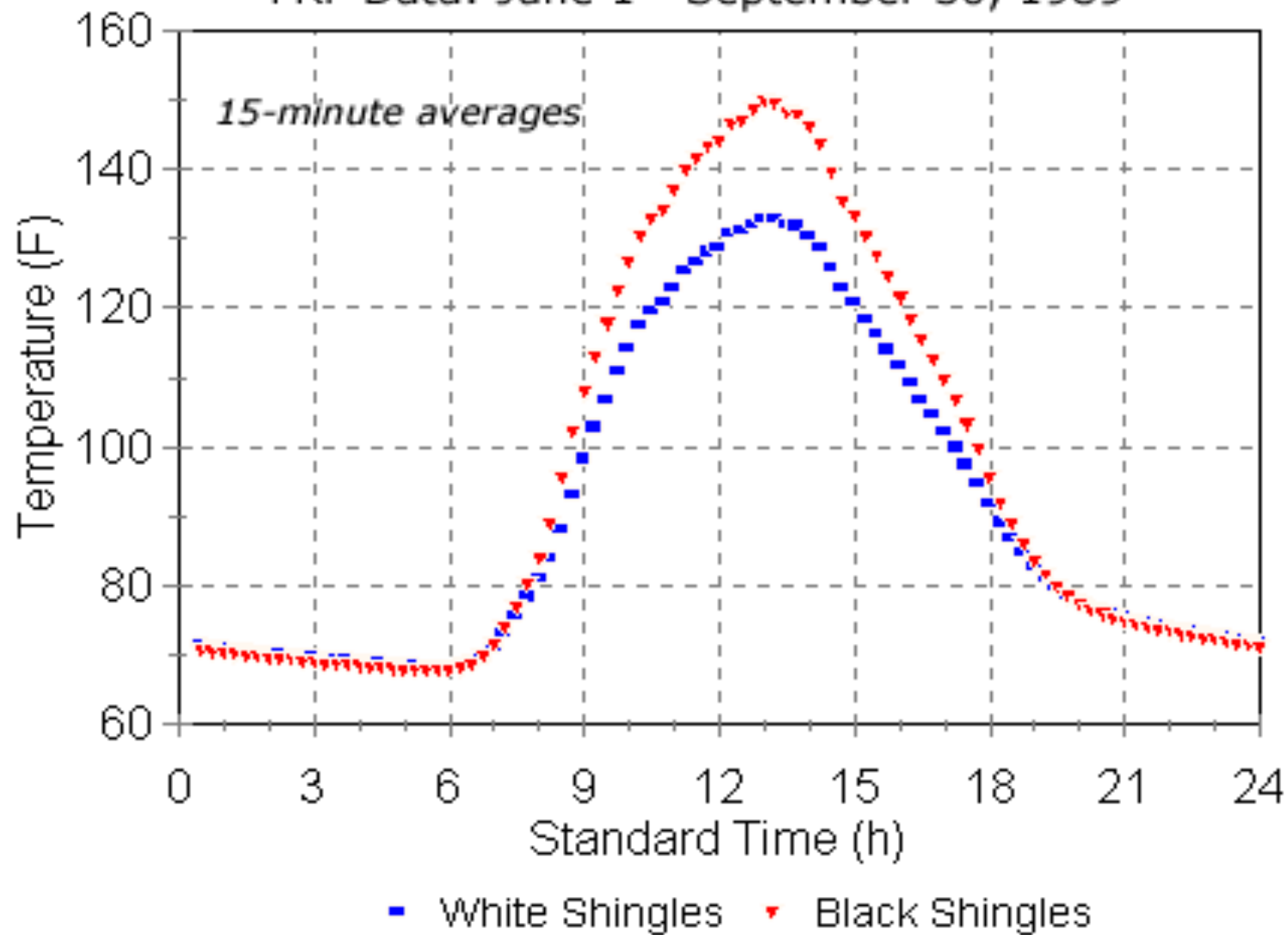




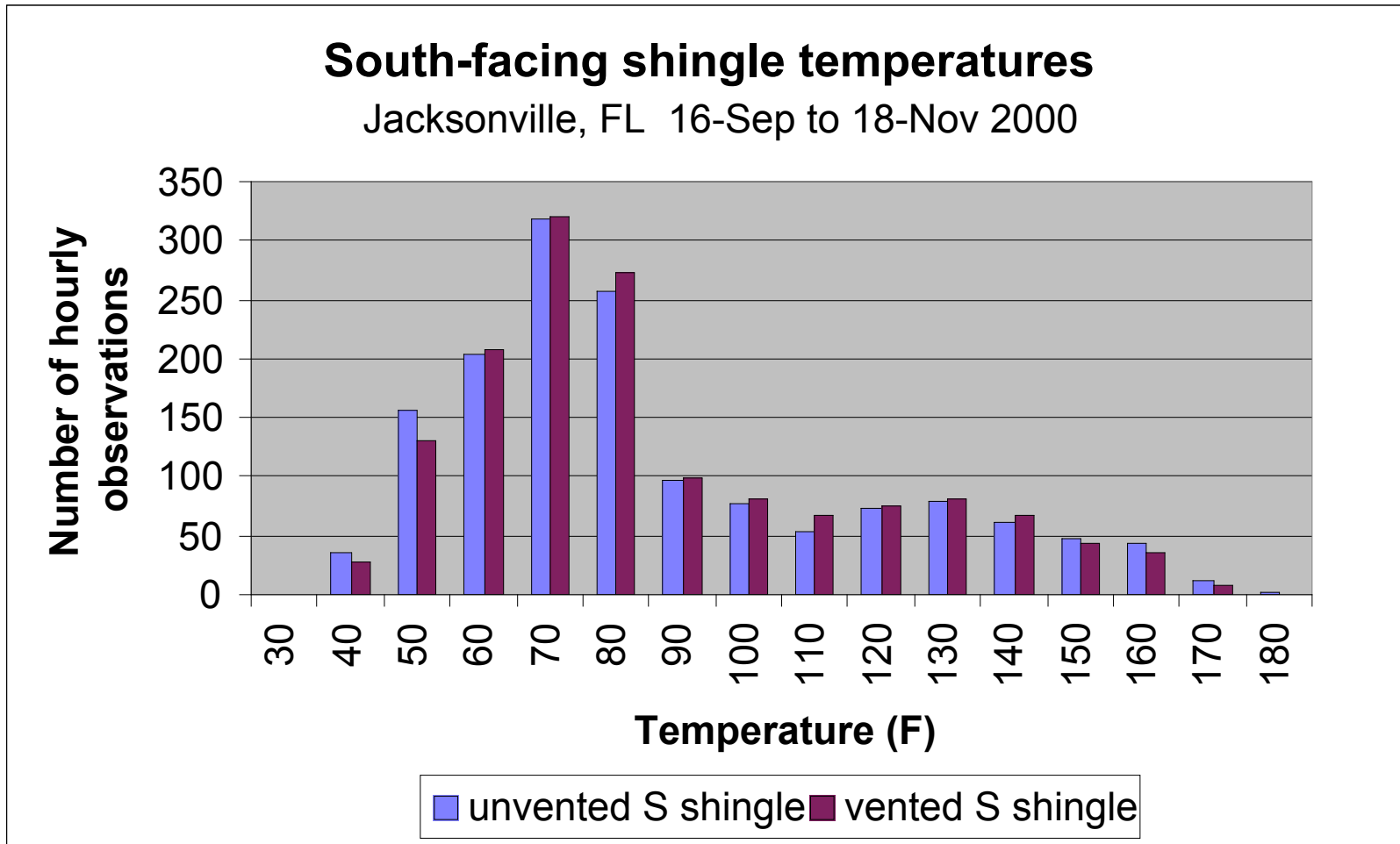




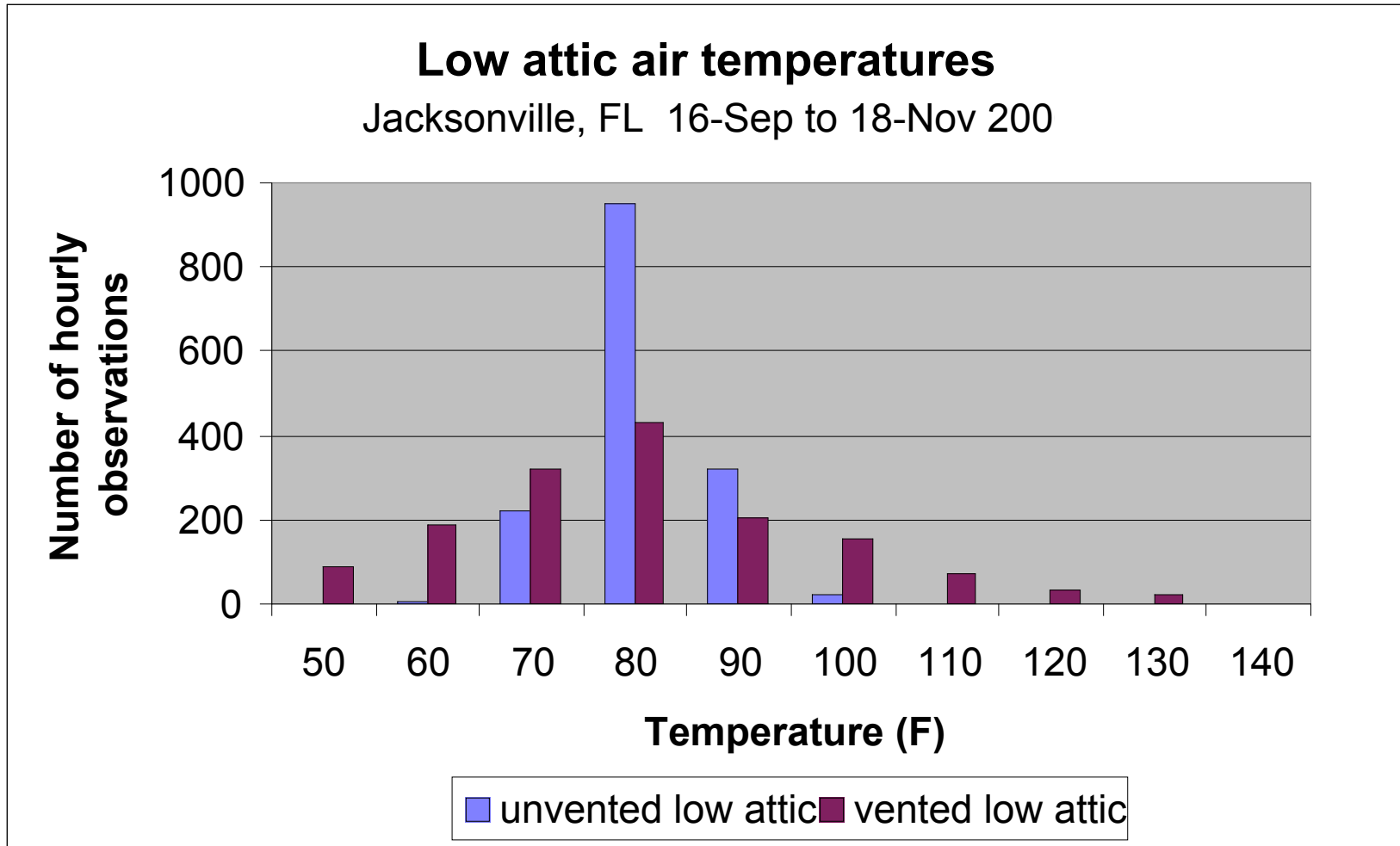
FRF Data: June 1 - September 30, 1989



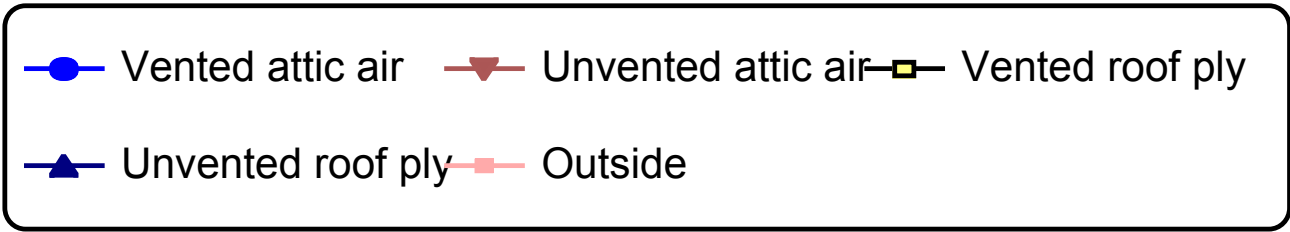
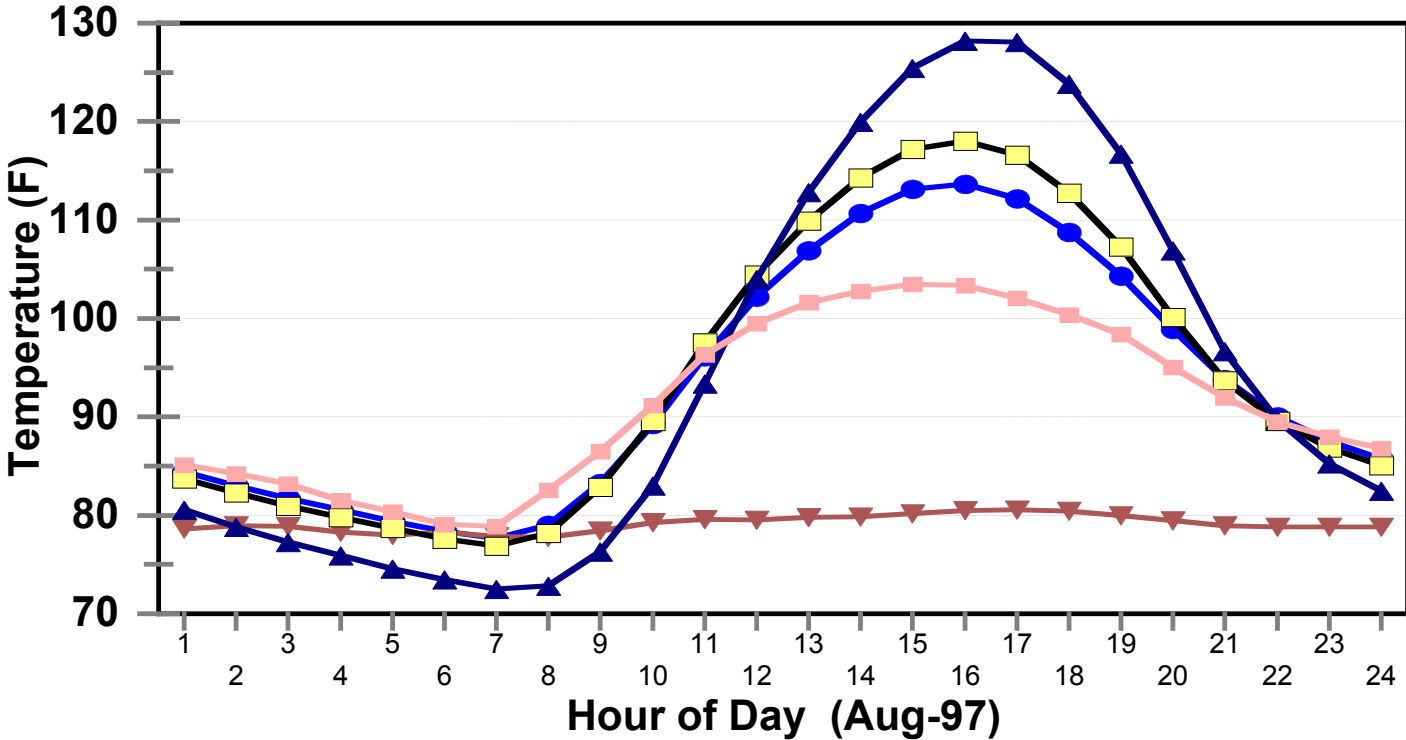
Vented vs. unvented shingle temperatures



Vented vs. unvented attic air temperatures

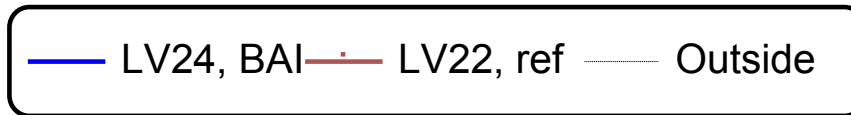
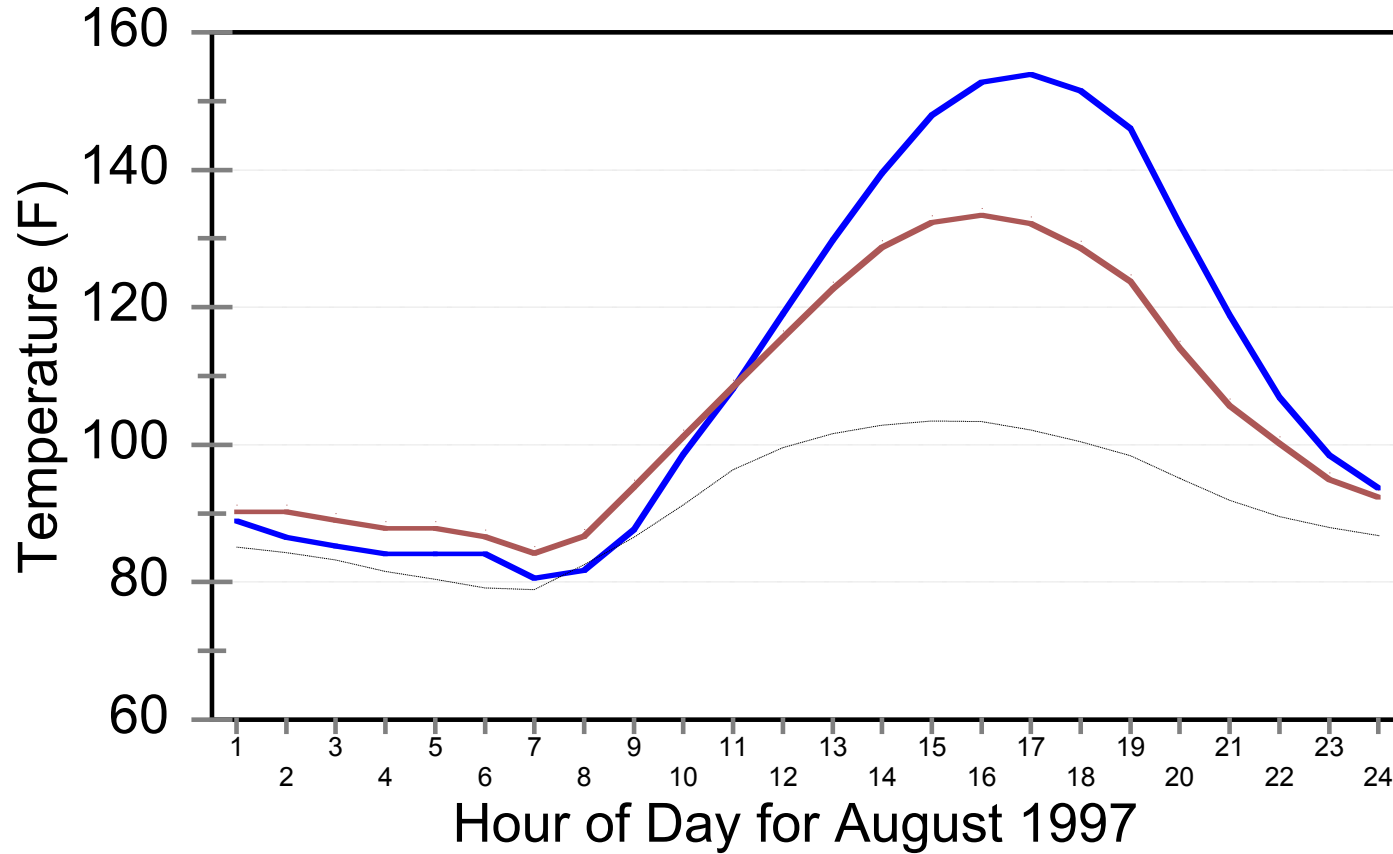


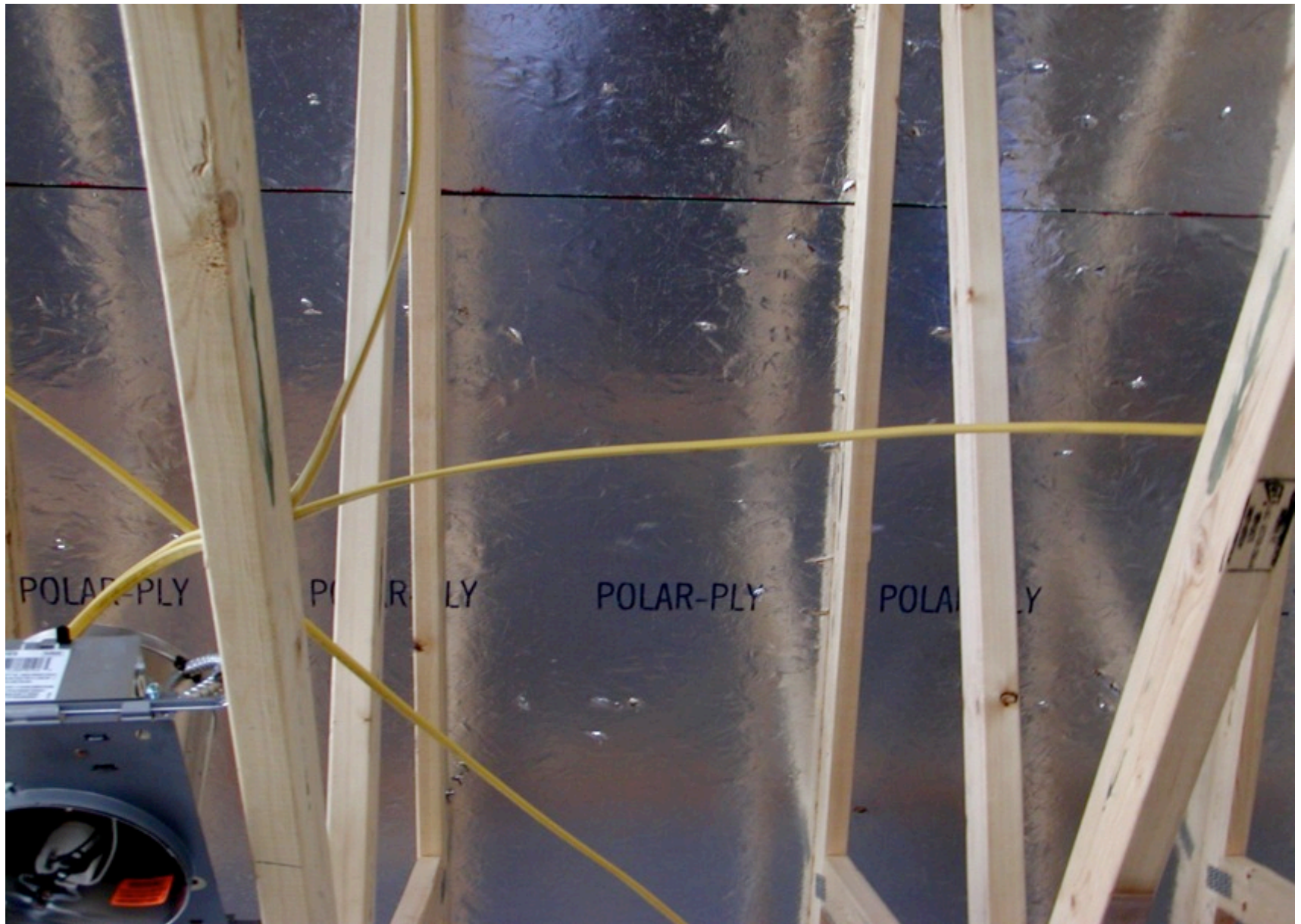
Average Temperatures Vented and Unvented Attics, Aug-97



Hourly Maximim Roof Deck Temperature

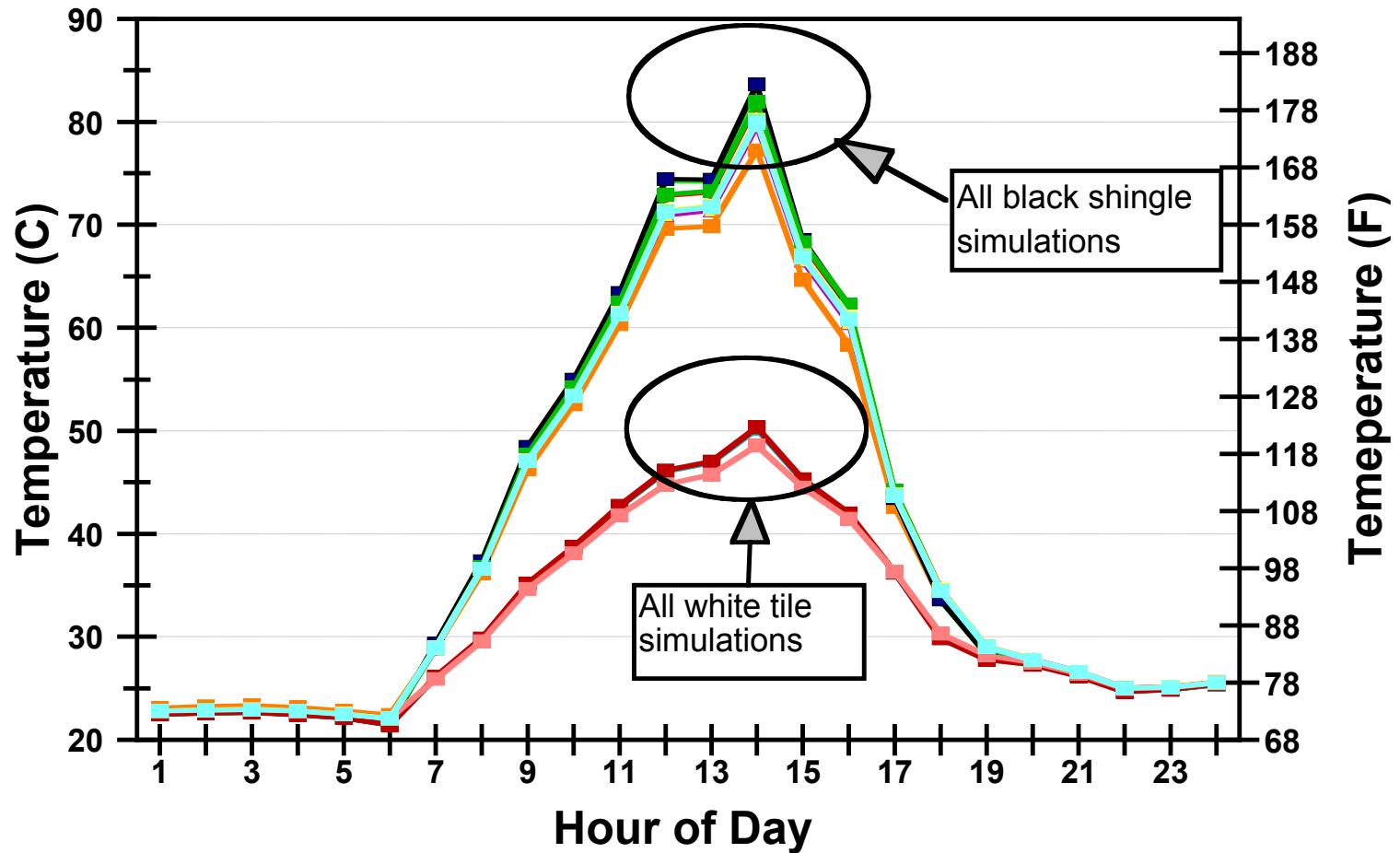
LV24 and LV22





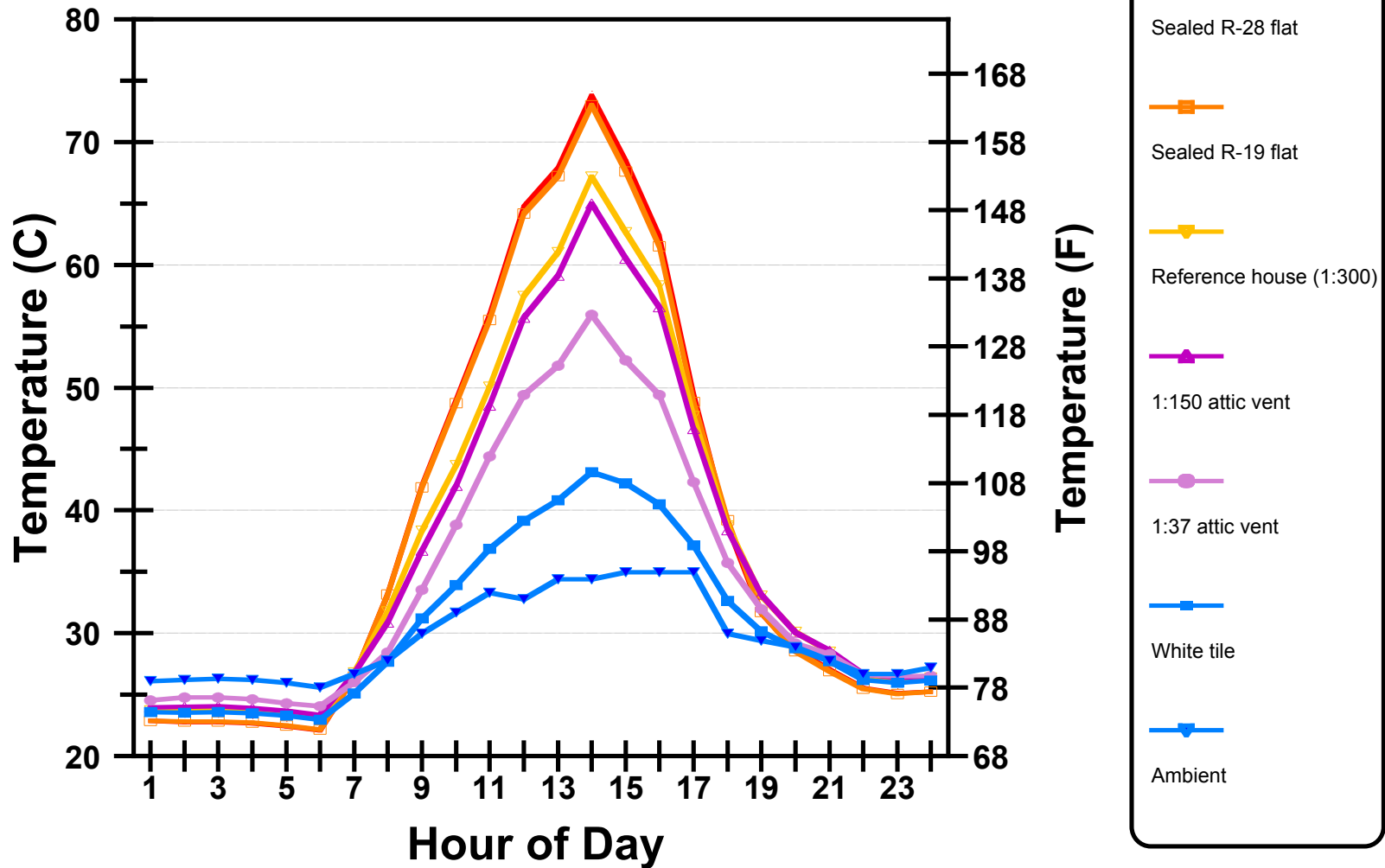
Roof Shingle Temperature

FSEC 3.0: Orlando, 1-Aug



Bottom of Roof Plywood Temperature

FSEC 3.0: Orlando, 1-Aug



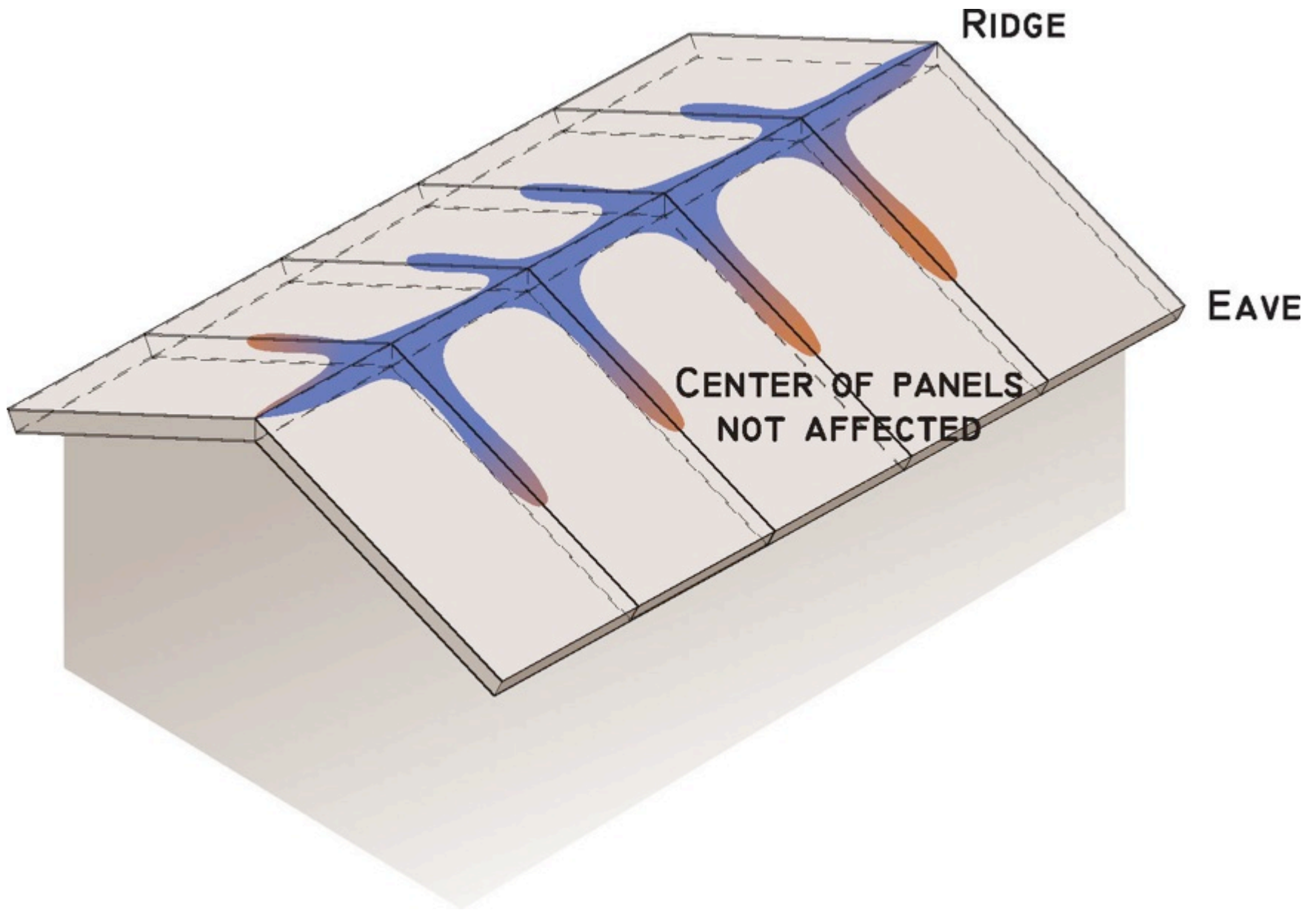
















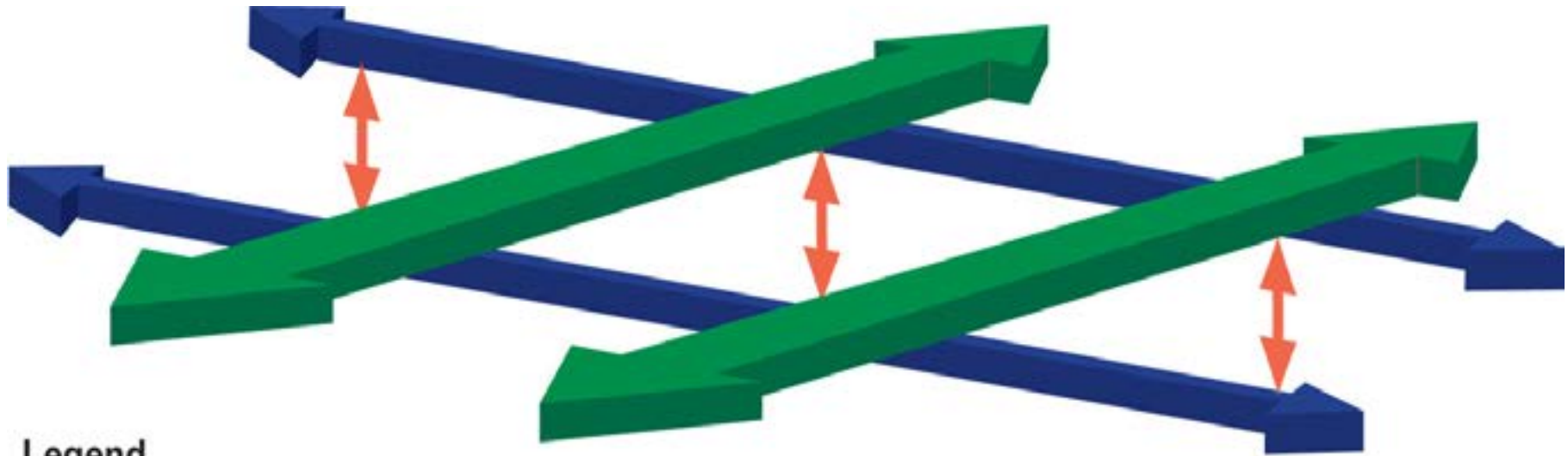






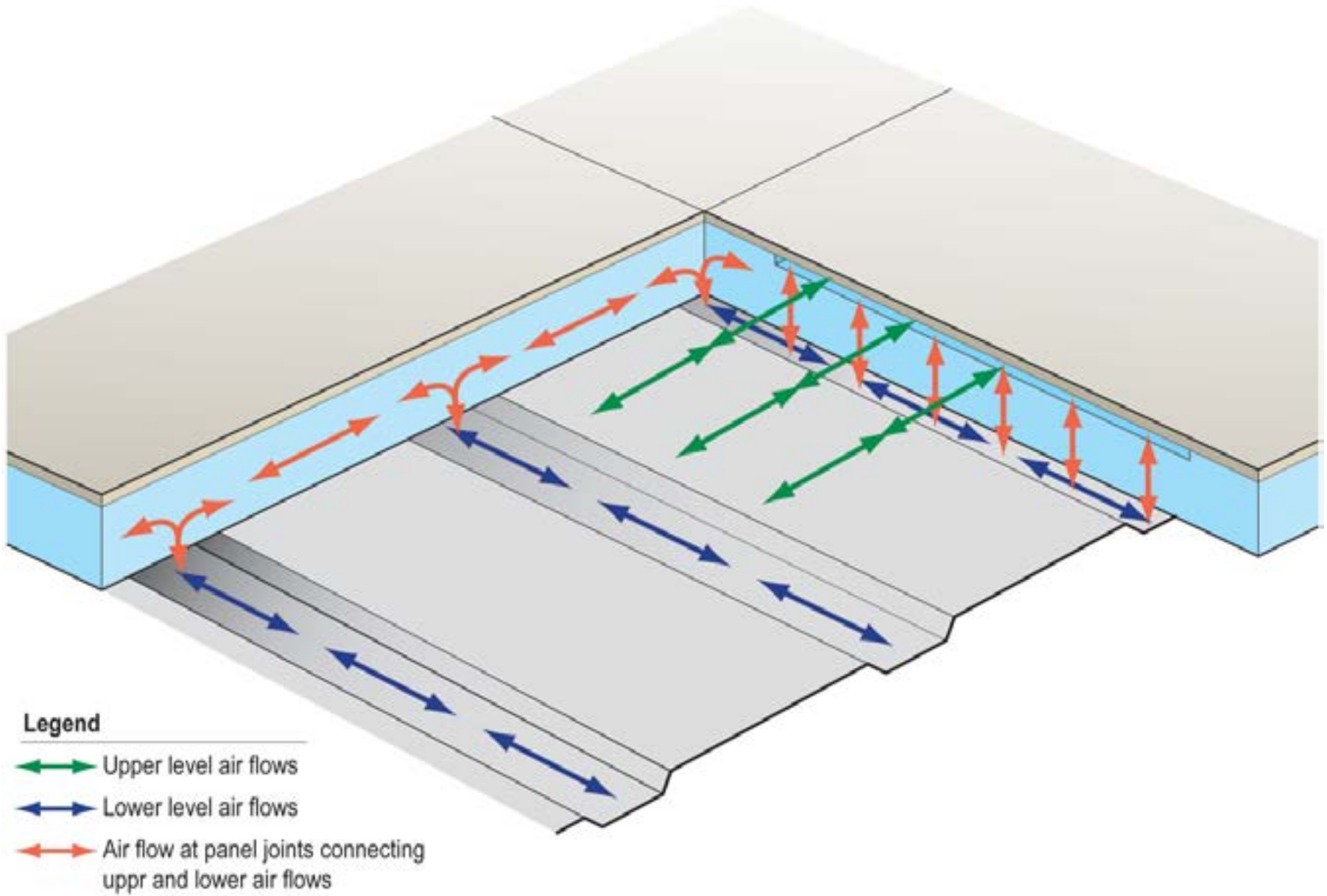


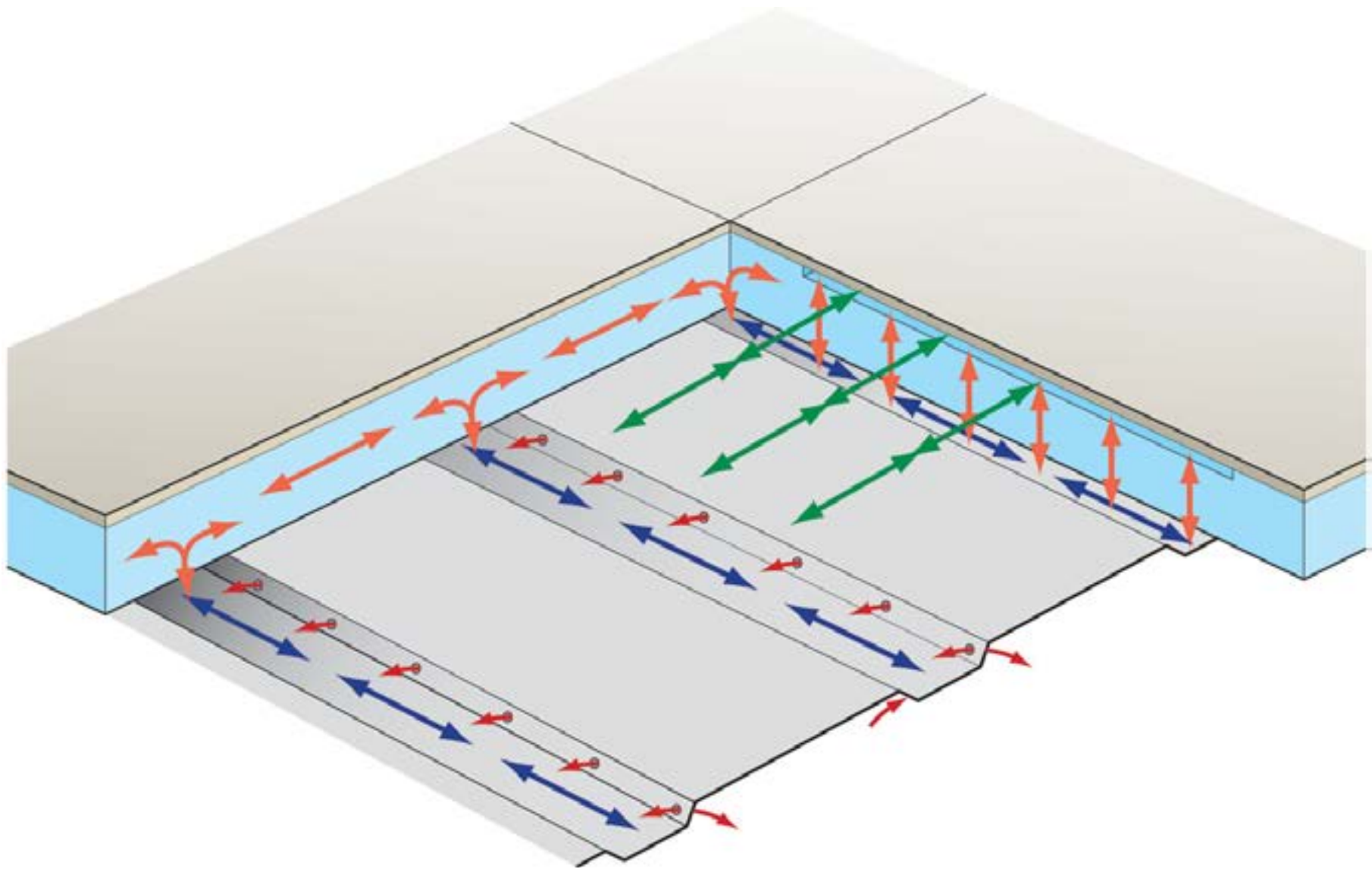




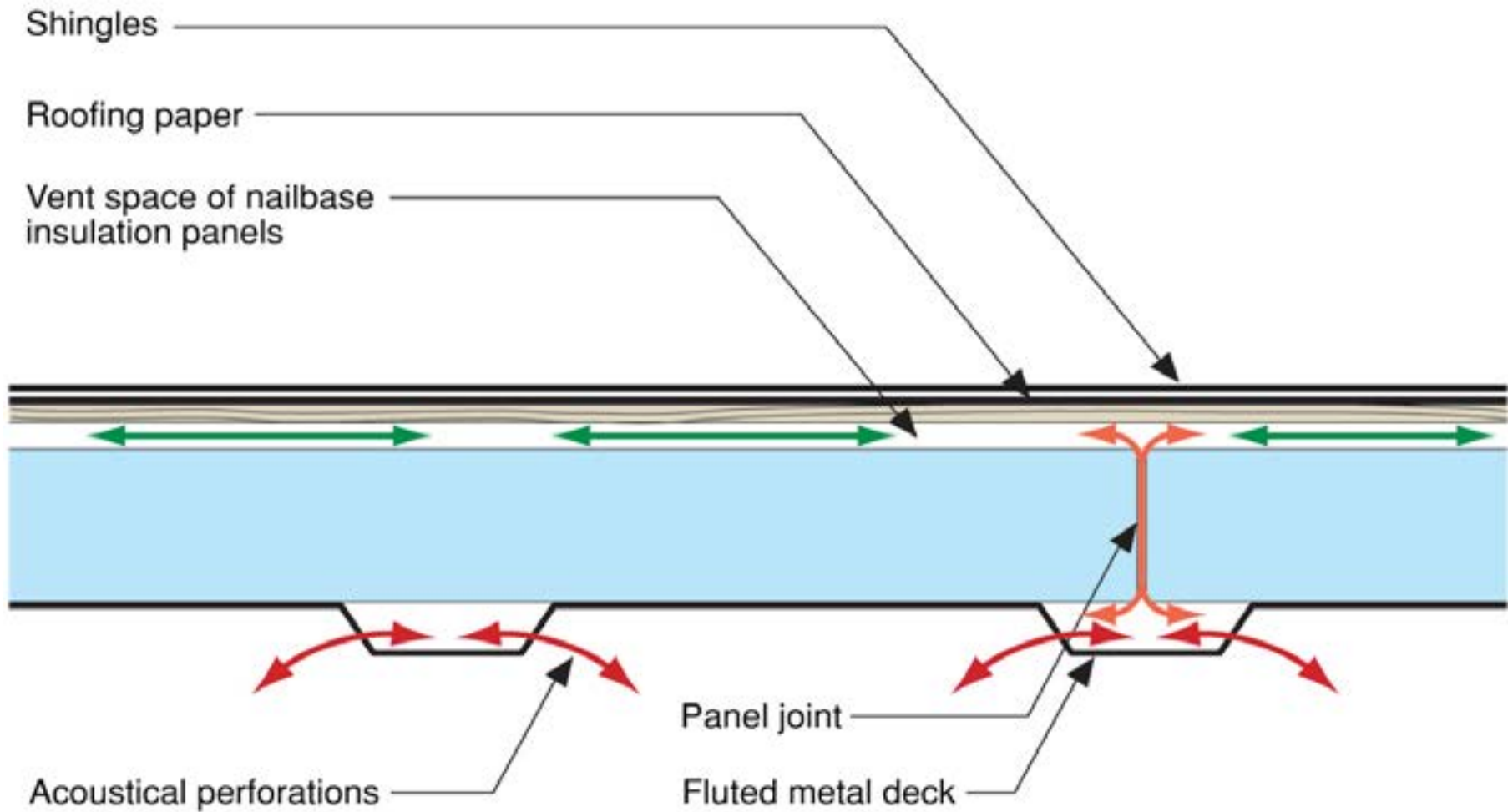
Legend

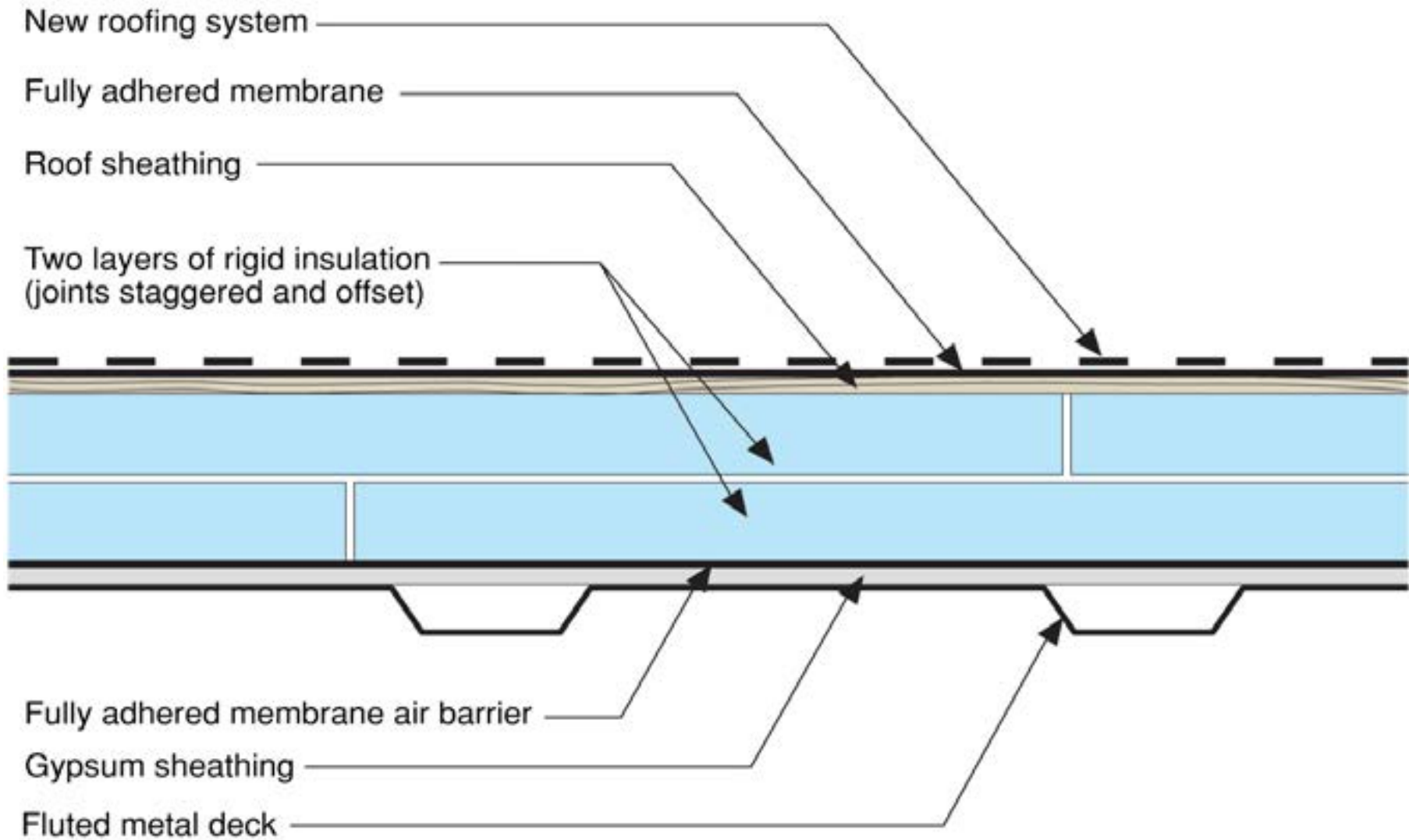
- ↔ Upper level air flows
- ↔ Lower level air flows
- ↕ Air flow at panel joints











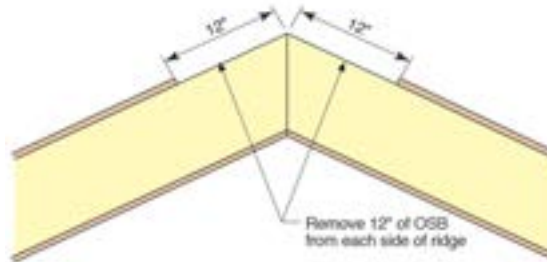






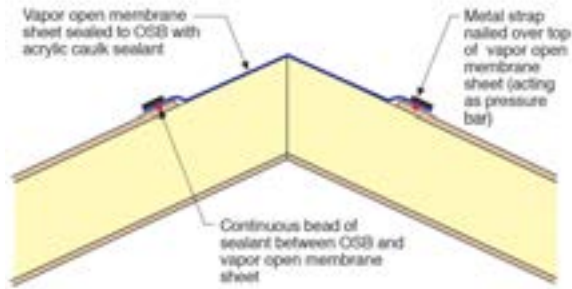
Step 1

- Remove strip of OSB from each side of ridge



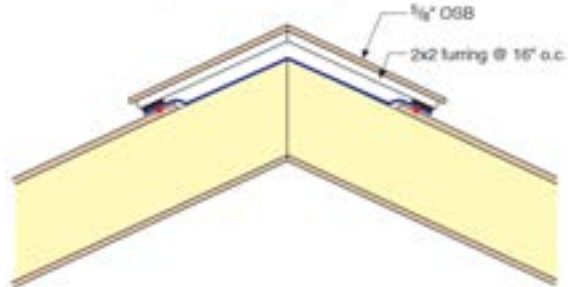
Step 2

- Create air seal with strip of vapor open membrane (tape seams)
- Vapor open membrane sheet sealed to OSB with acrylic caulk sealant
- Hold vapor open membrane sheet in place with metal strapping



Step 3

- Construct wood ridge vent with 2x2 furring

















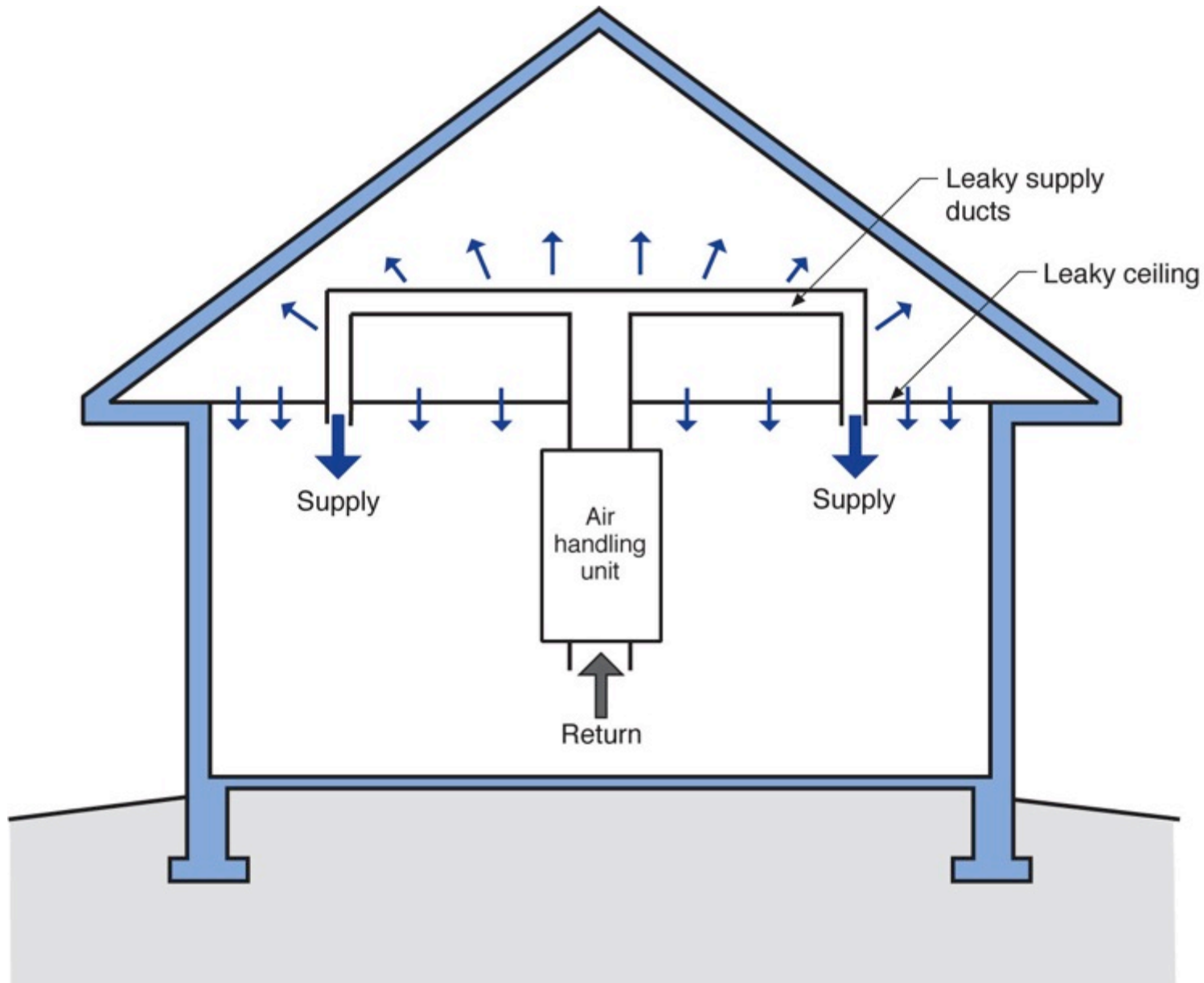




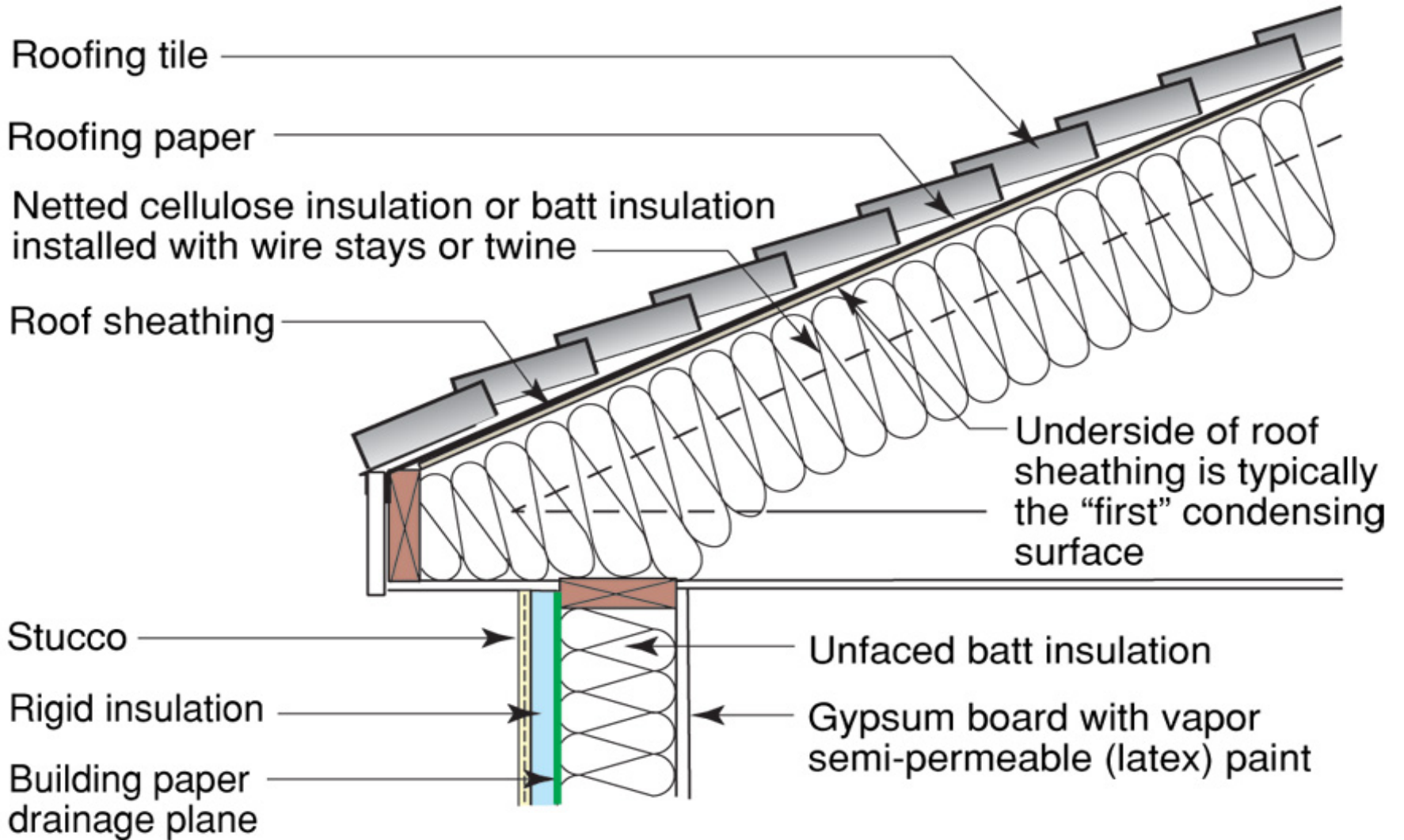


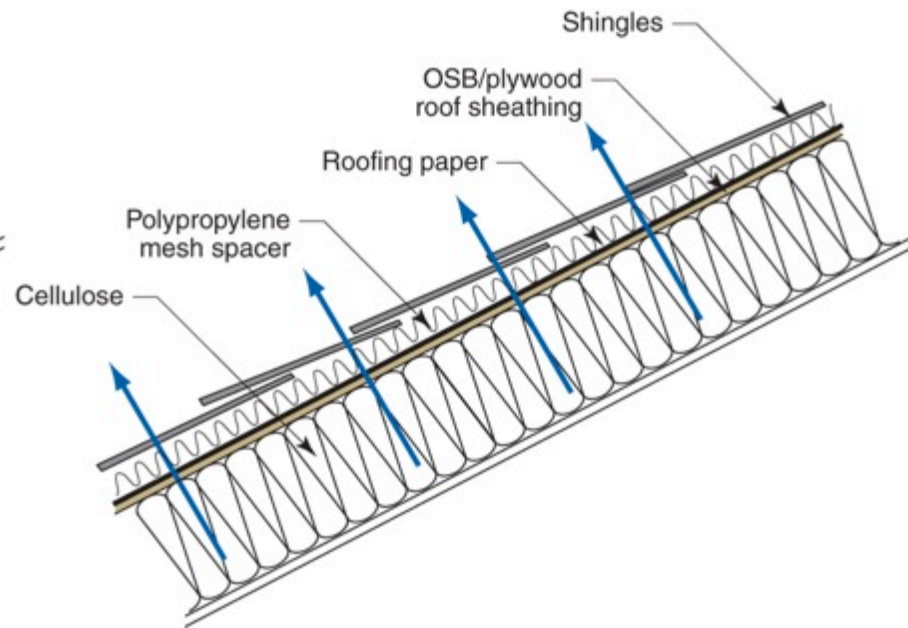
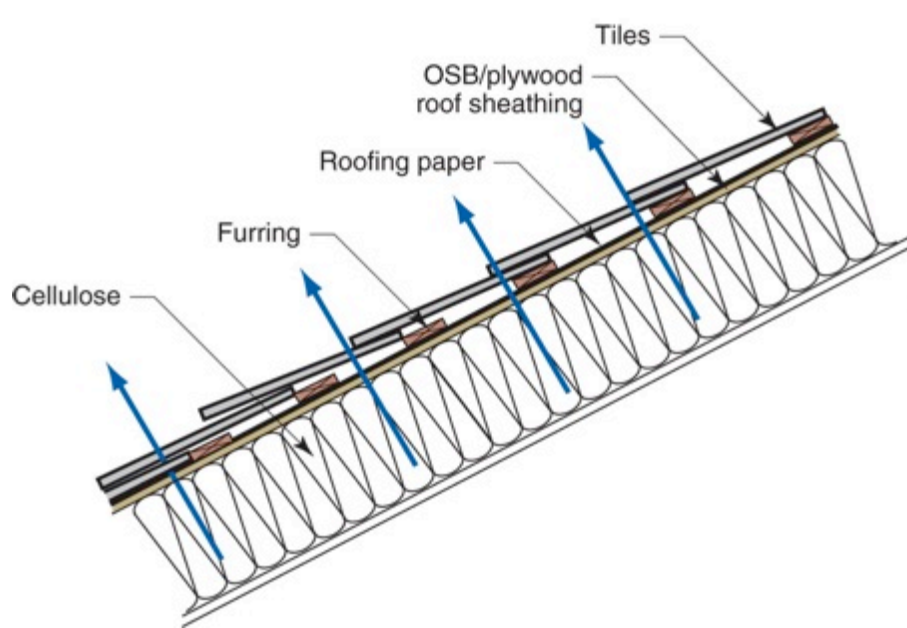


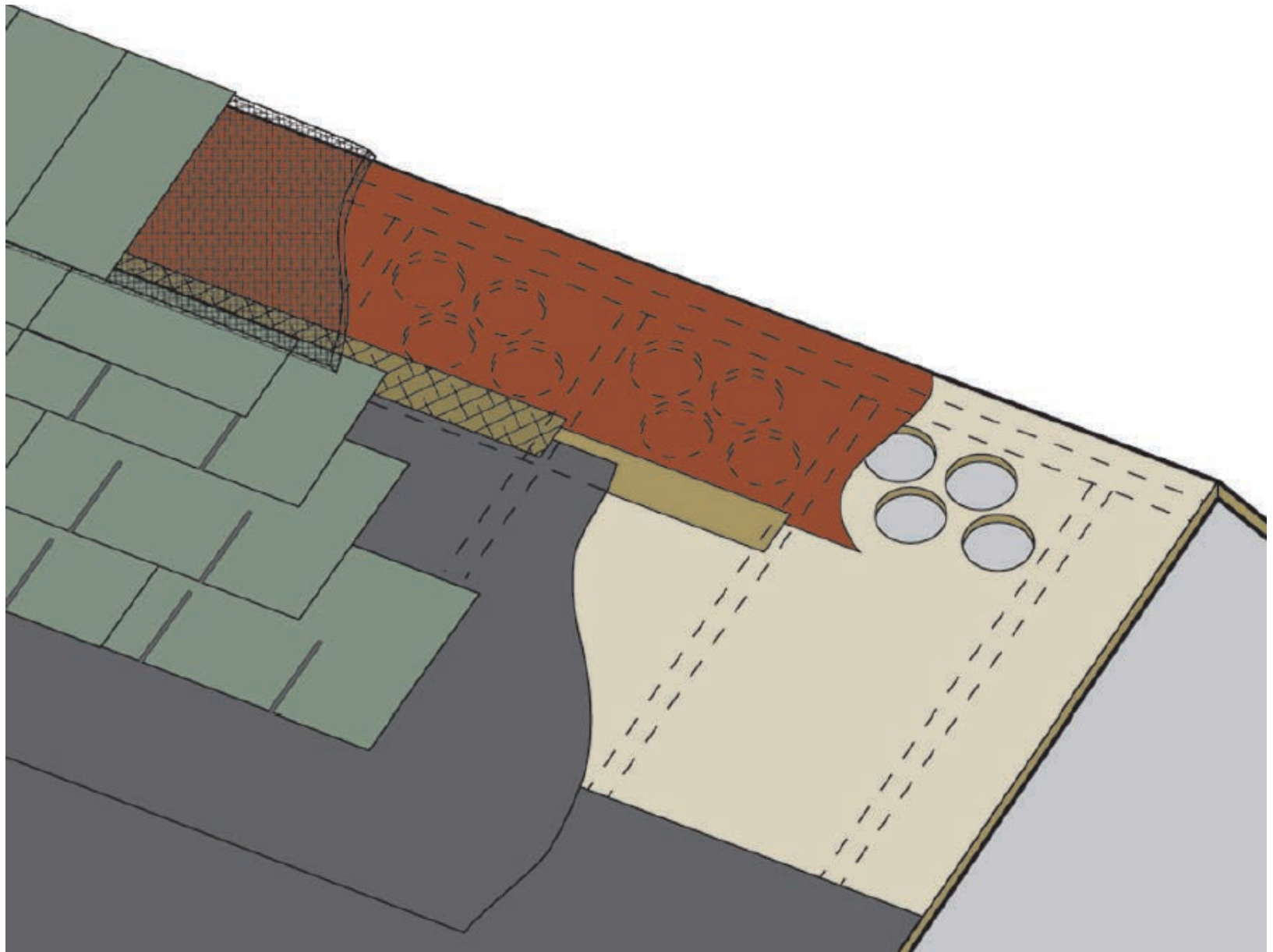


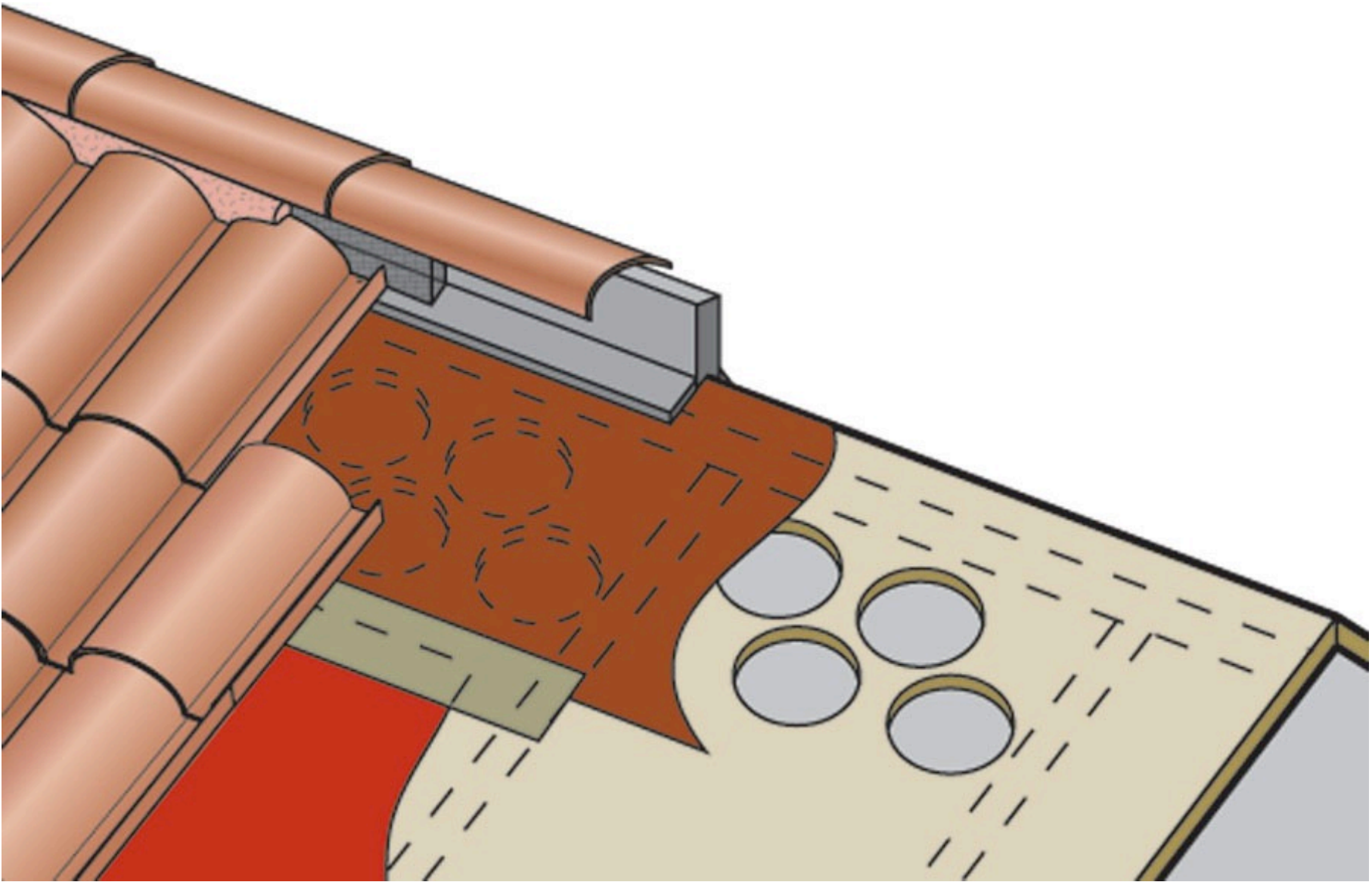


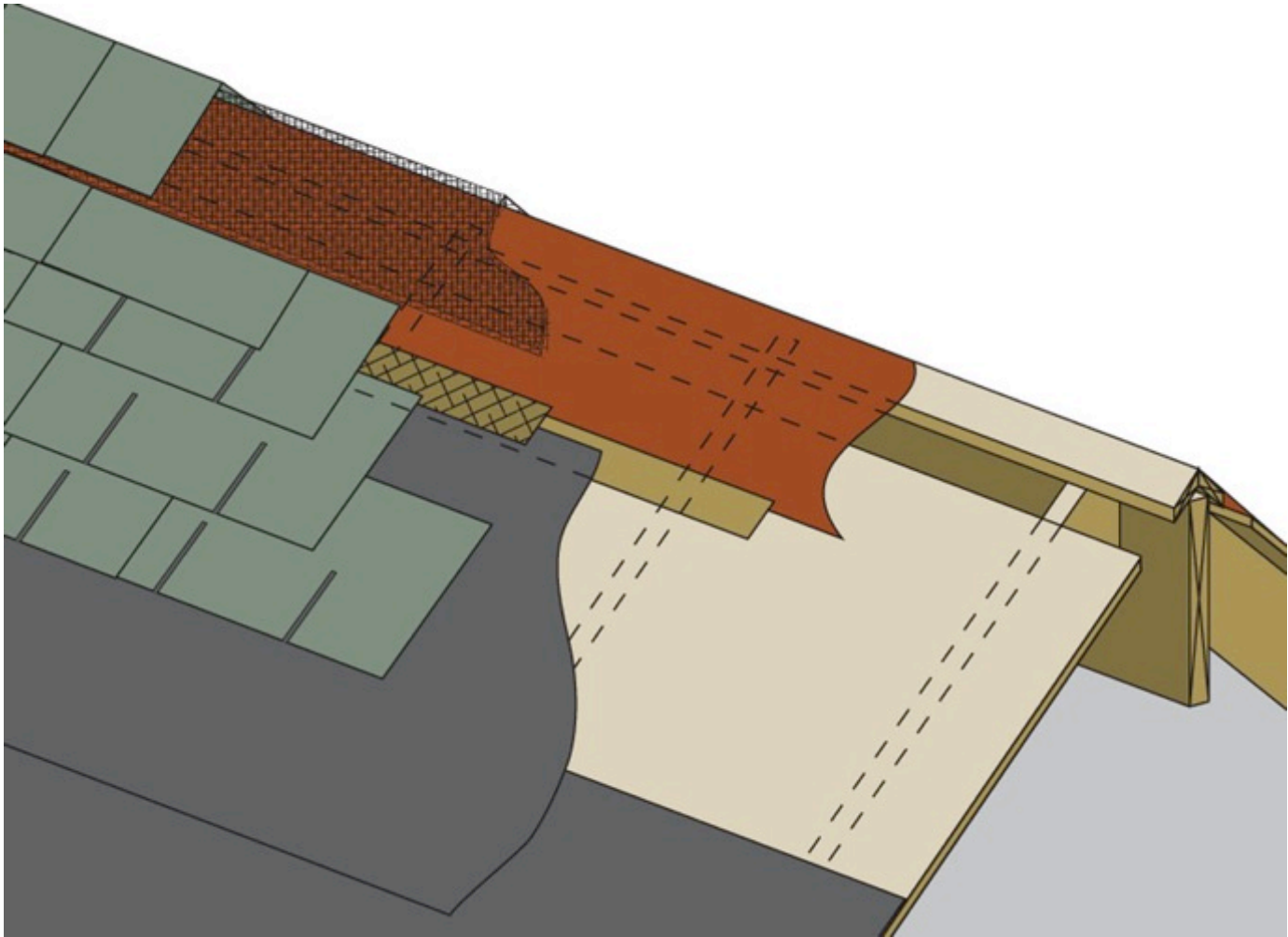


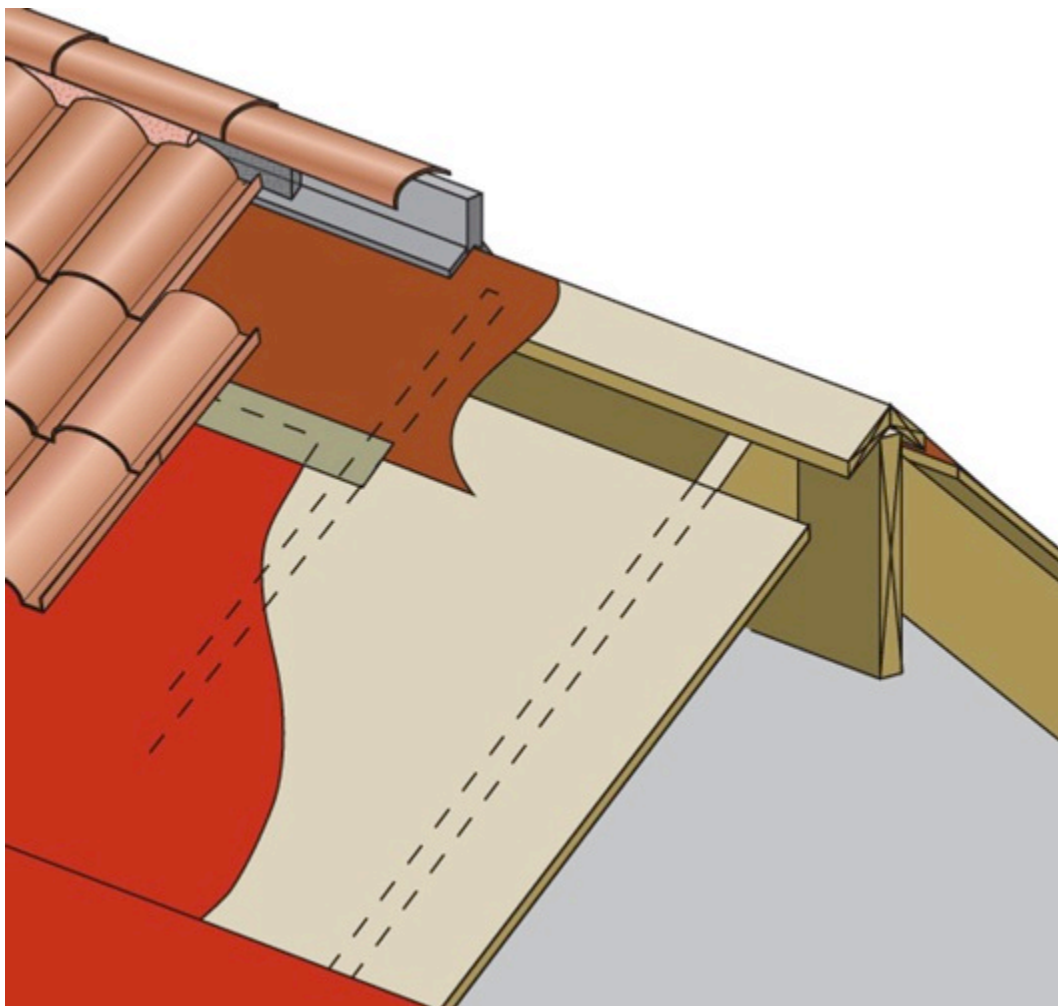


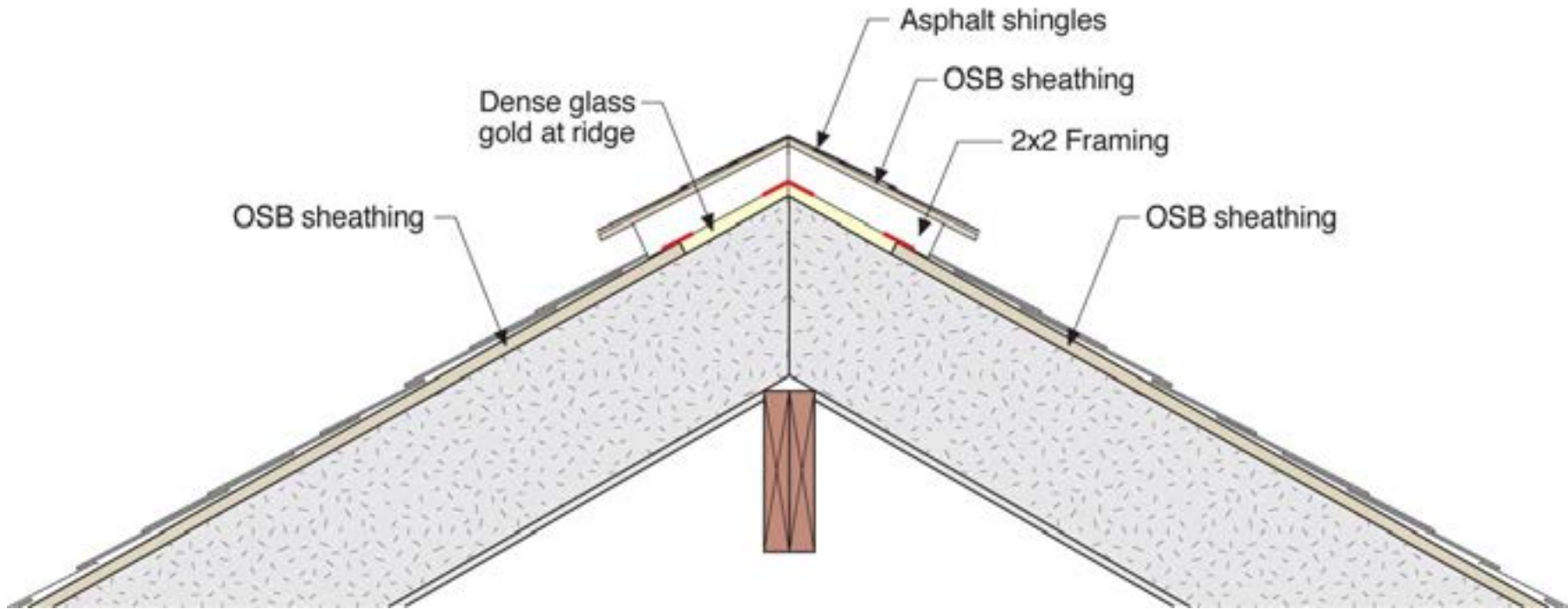


















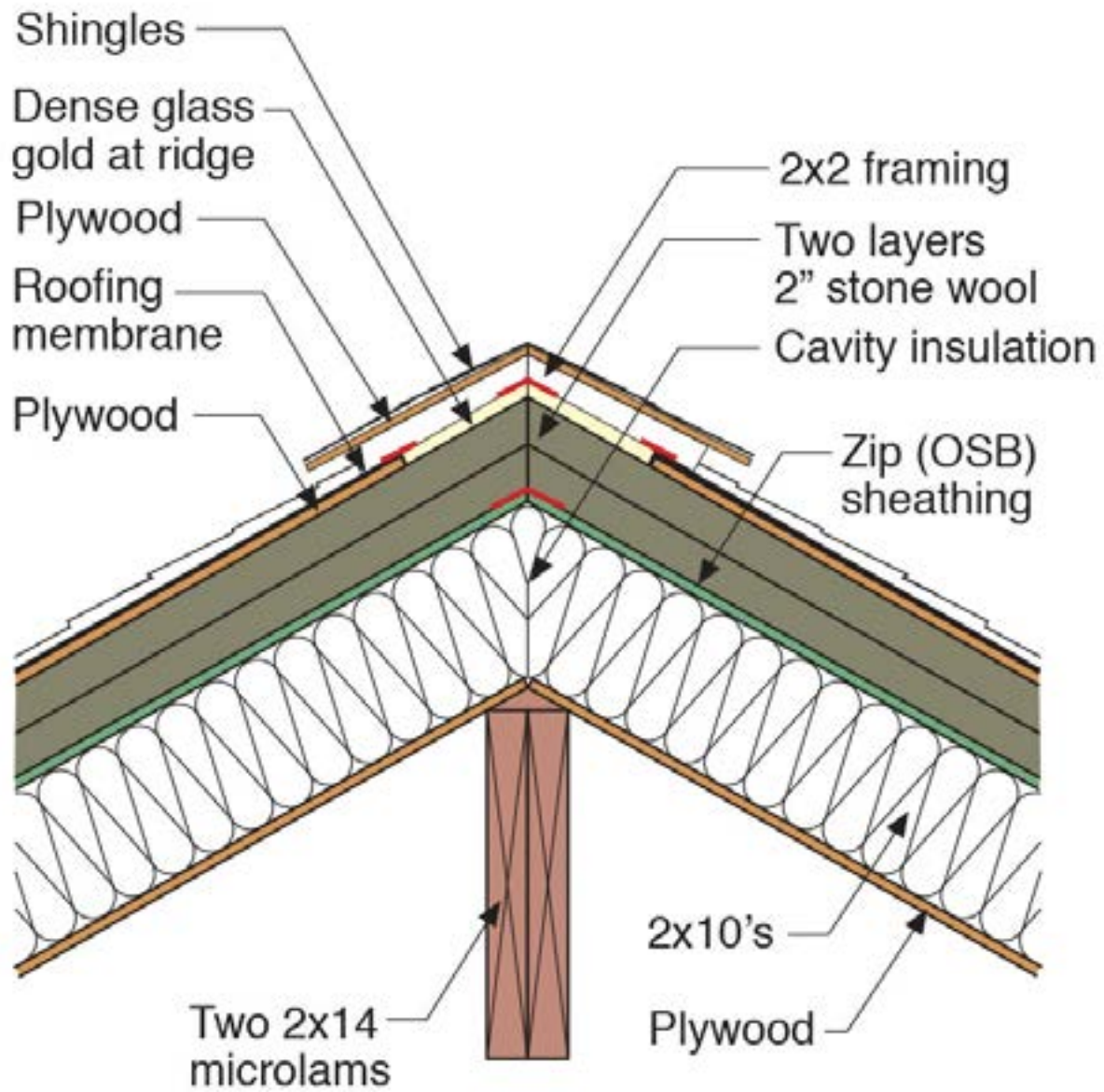


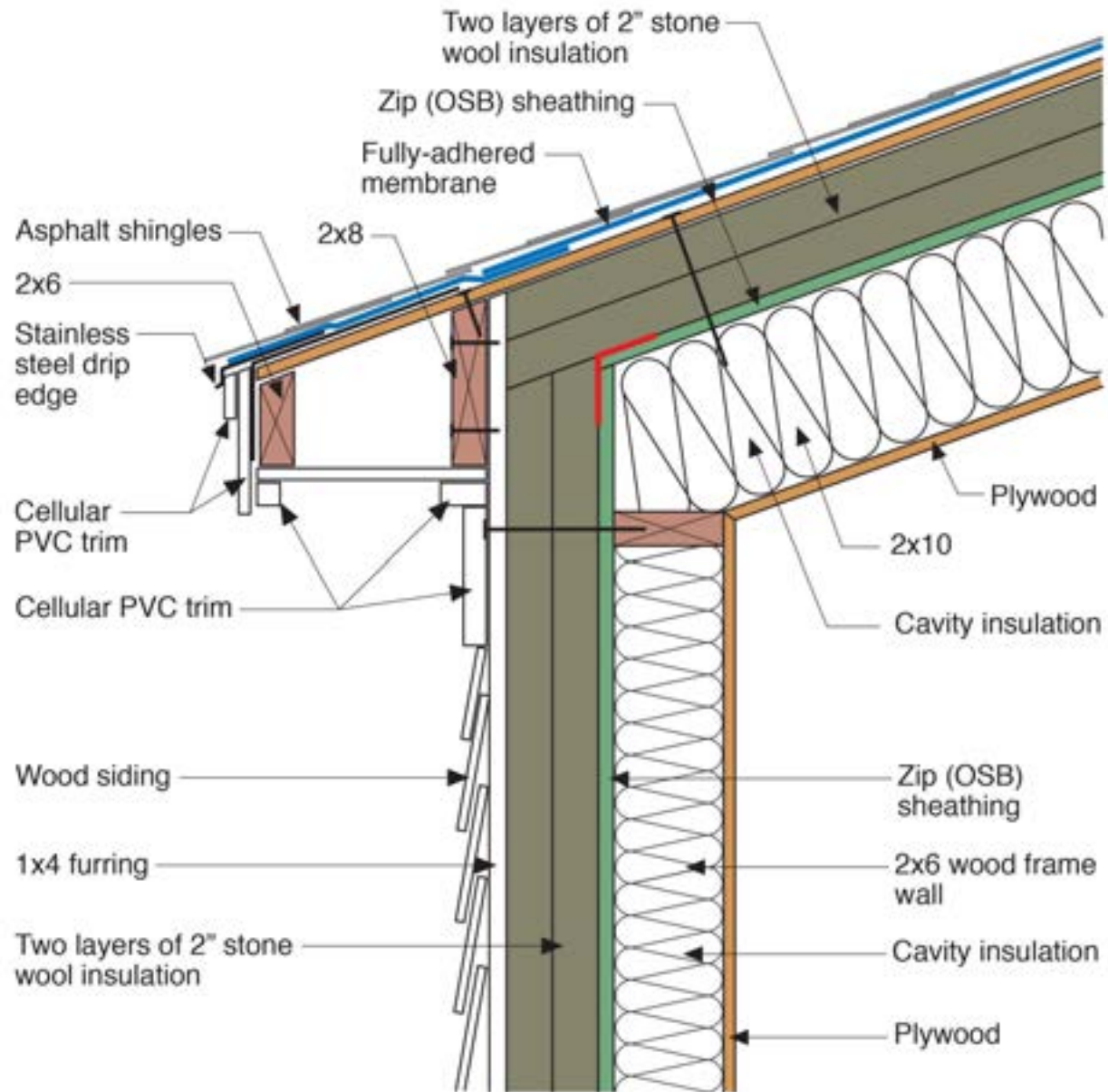










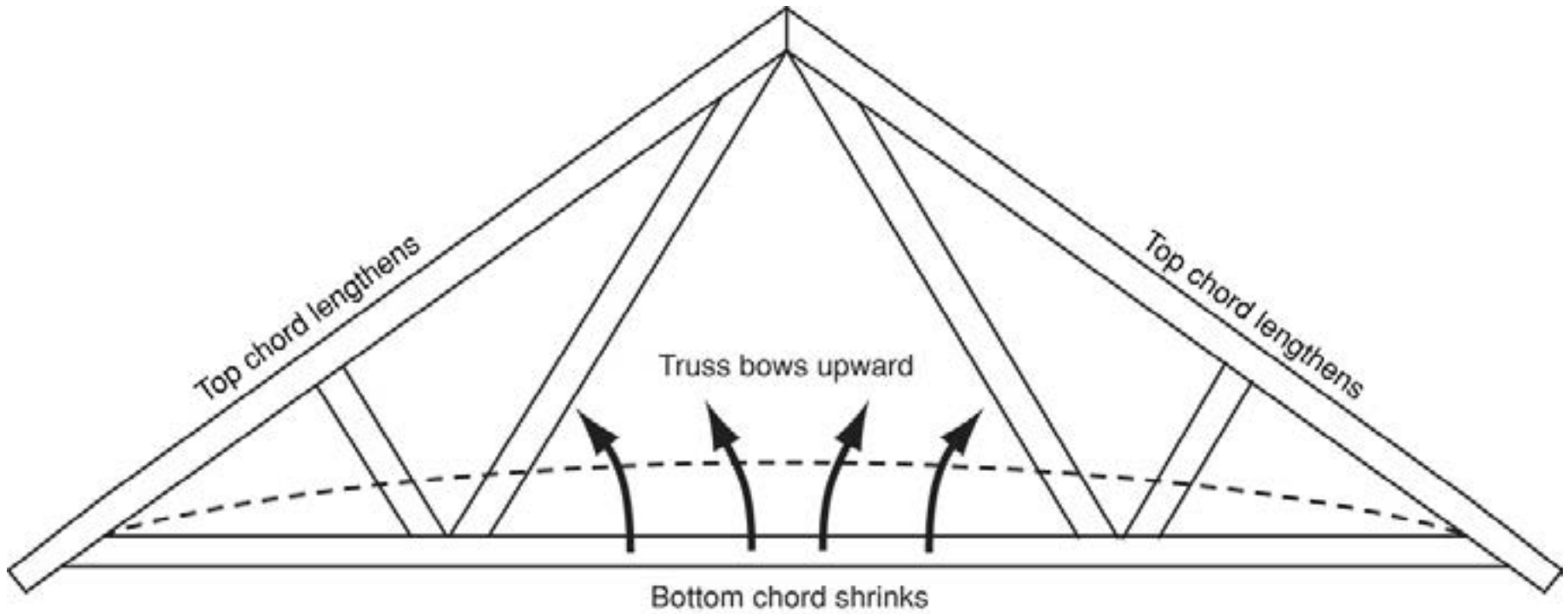


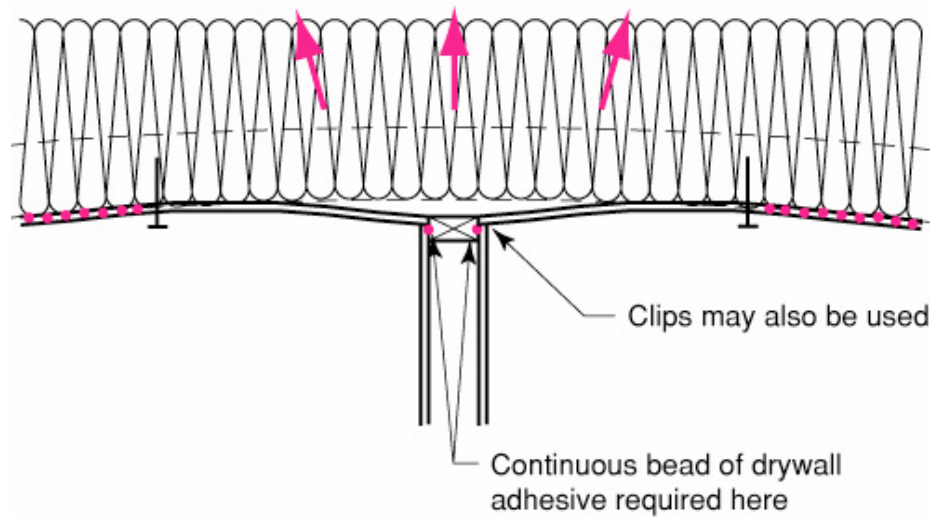
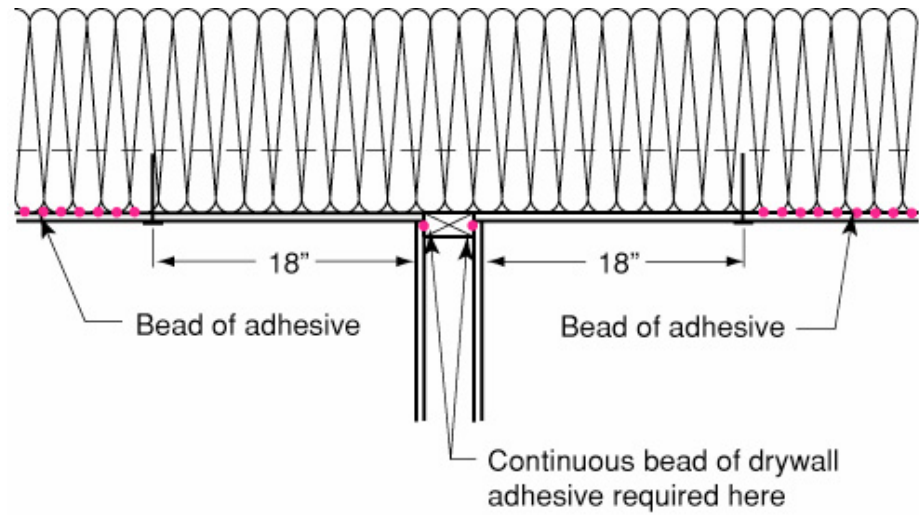


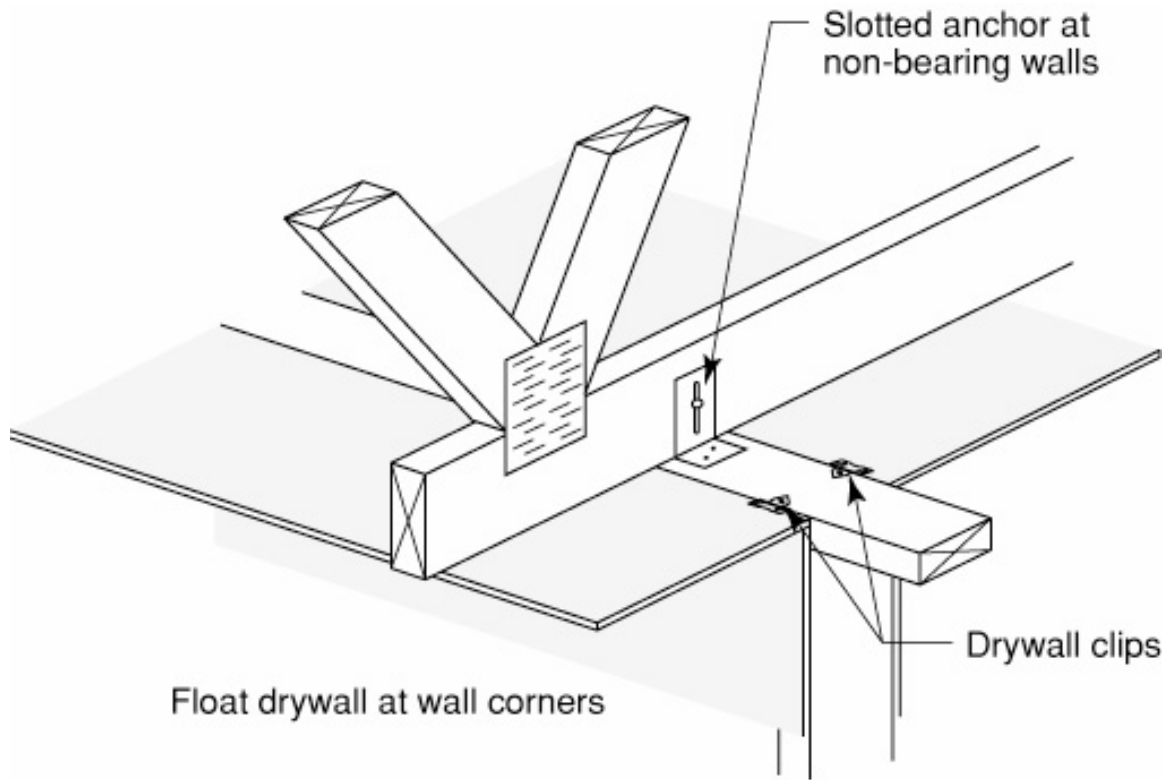


















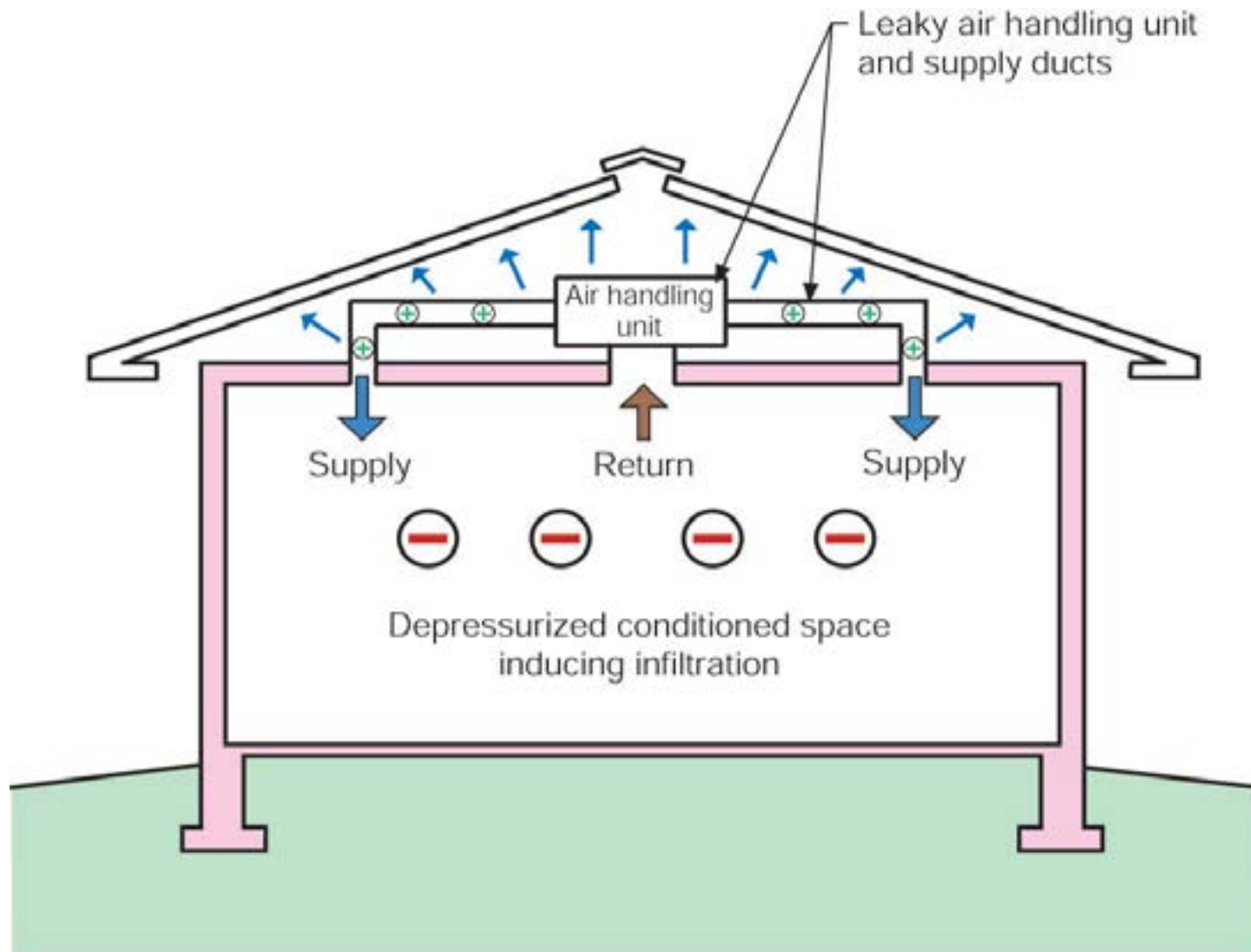




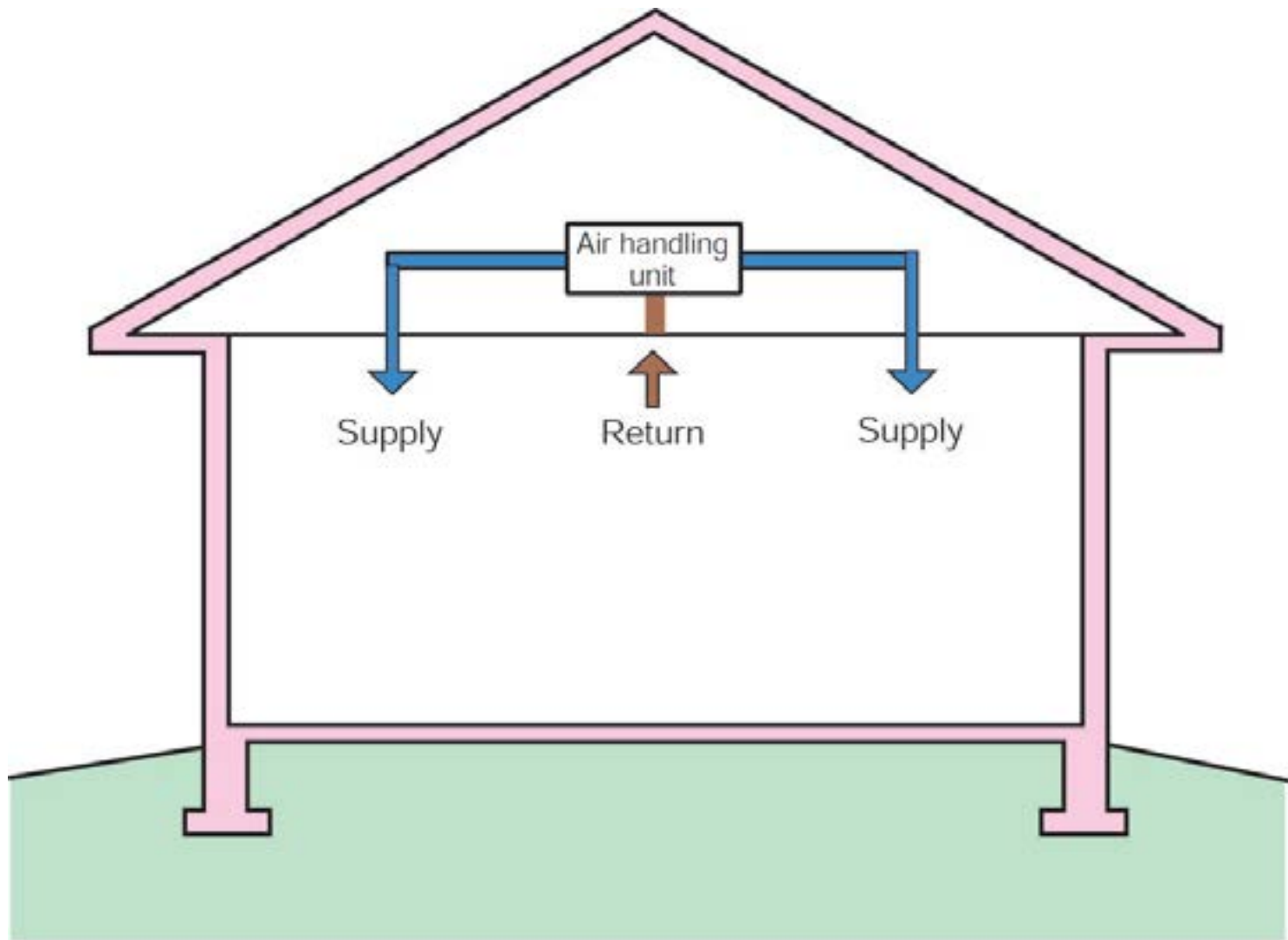








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It's OK to guess. Call it engineering judgement.

“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”









