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Building Science

Adventures In Building Science

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Condensation on Ductwork

Condensation on Ductwork

Ductwork in Vented Attics and Vented Crawlspaces

Vented and Unvented Attics

Vented and Unvented Crawlspace

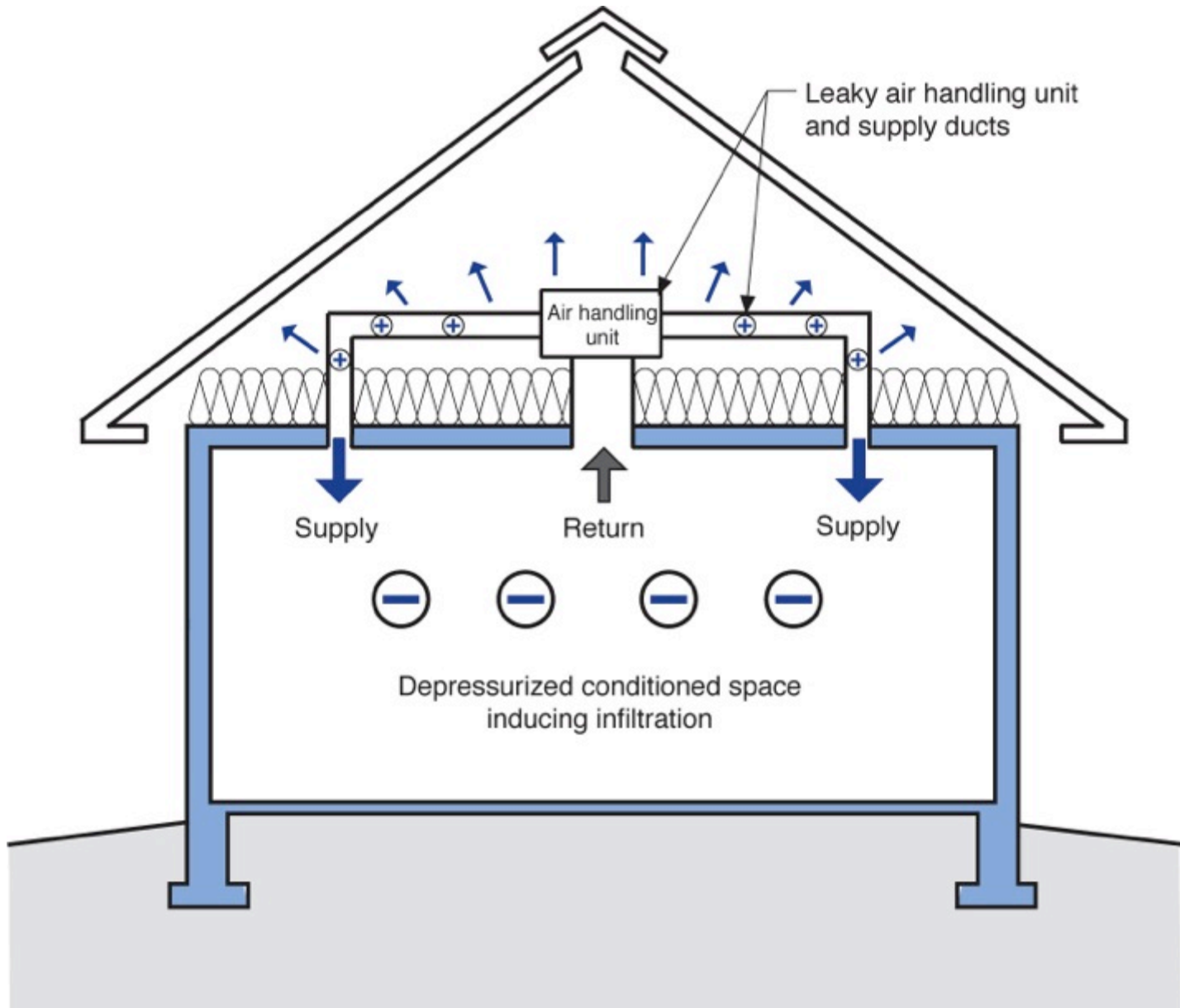
There Is Nothing Wrong With A Vented Attic

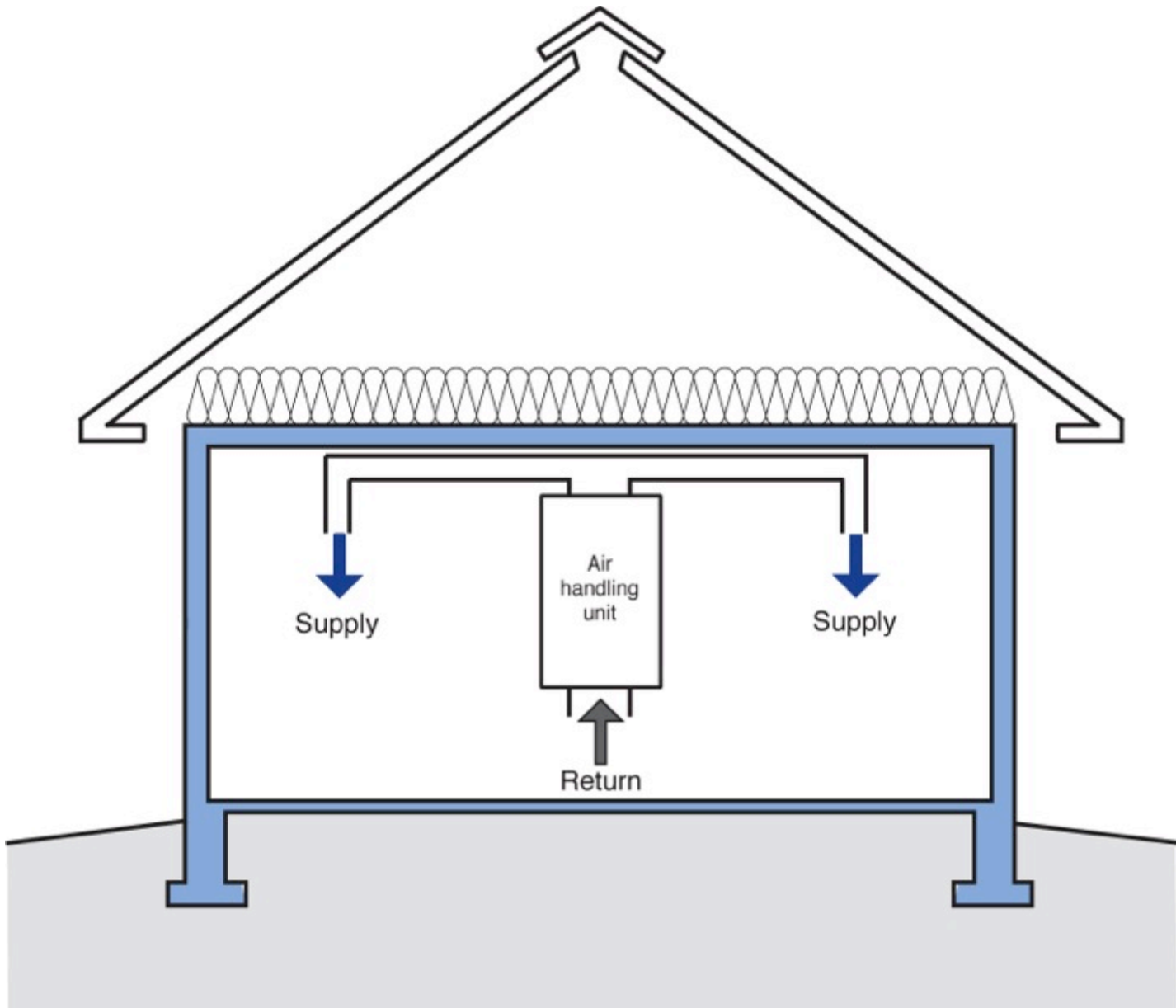
There Is Nothing Wrong With A Vented Attic
But.....

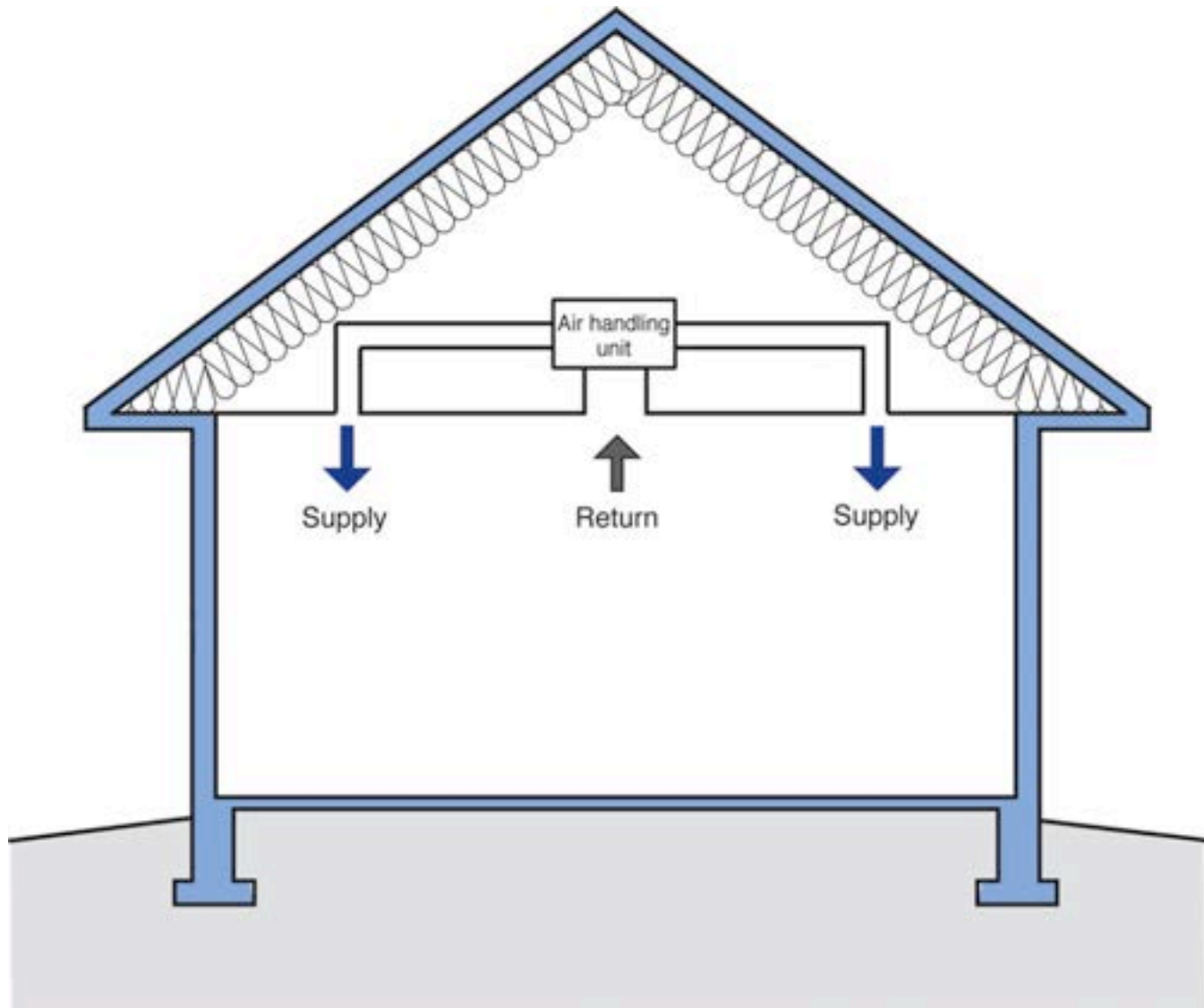
Houses With Vented Attics Suck
Not all the Time.....but.....

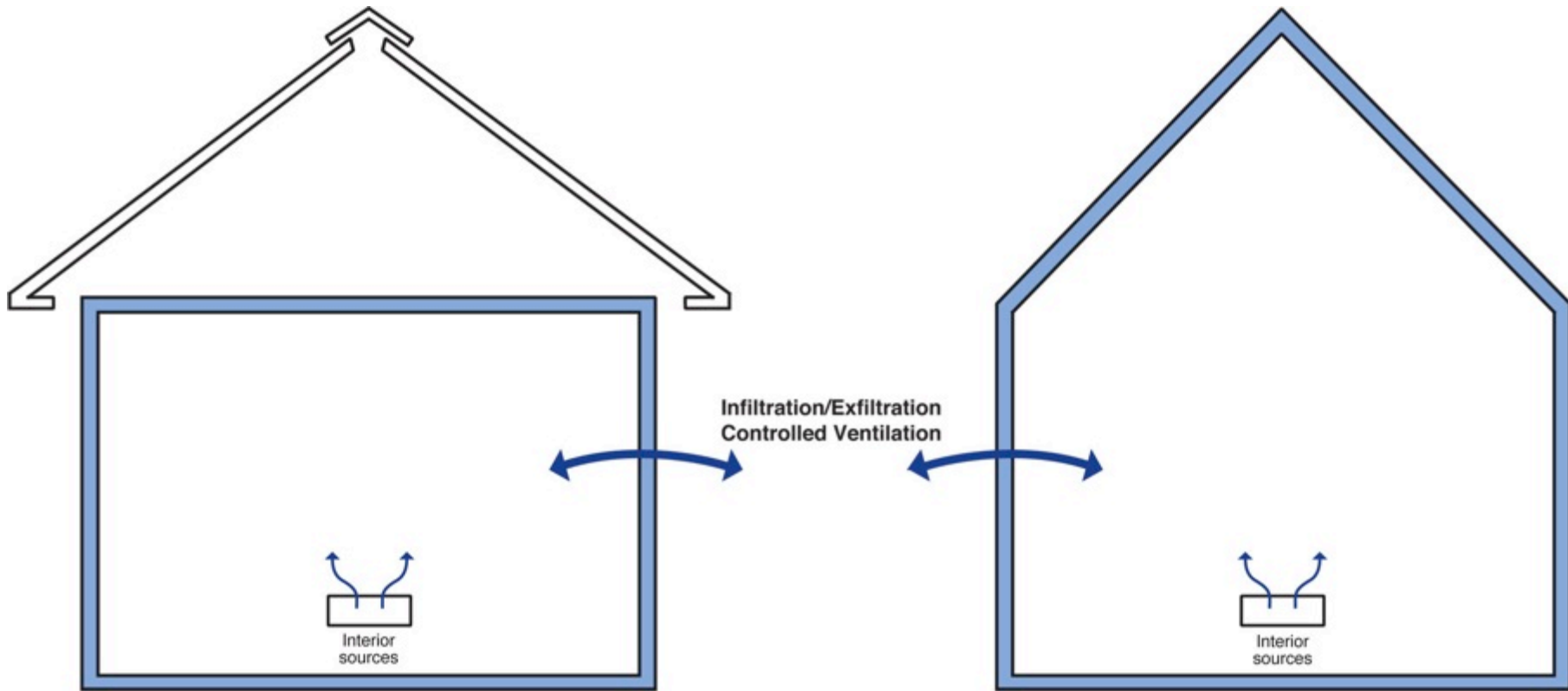




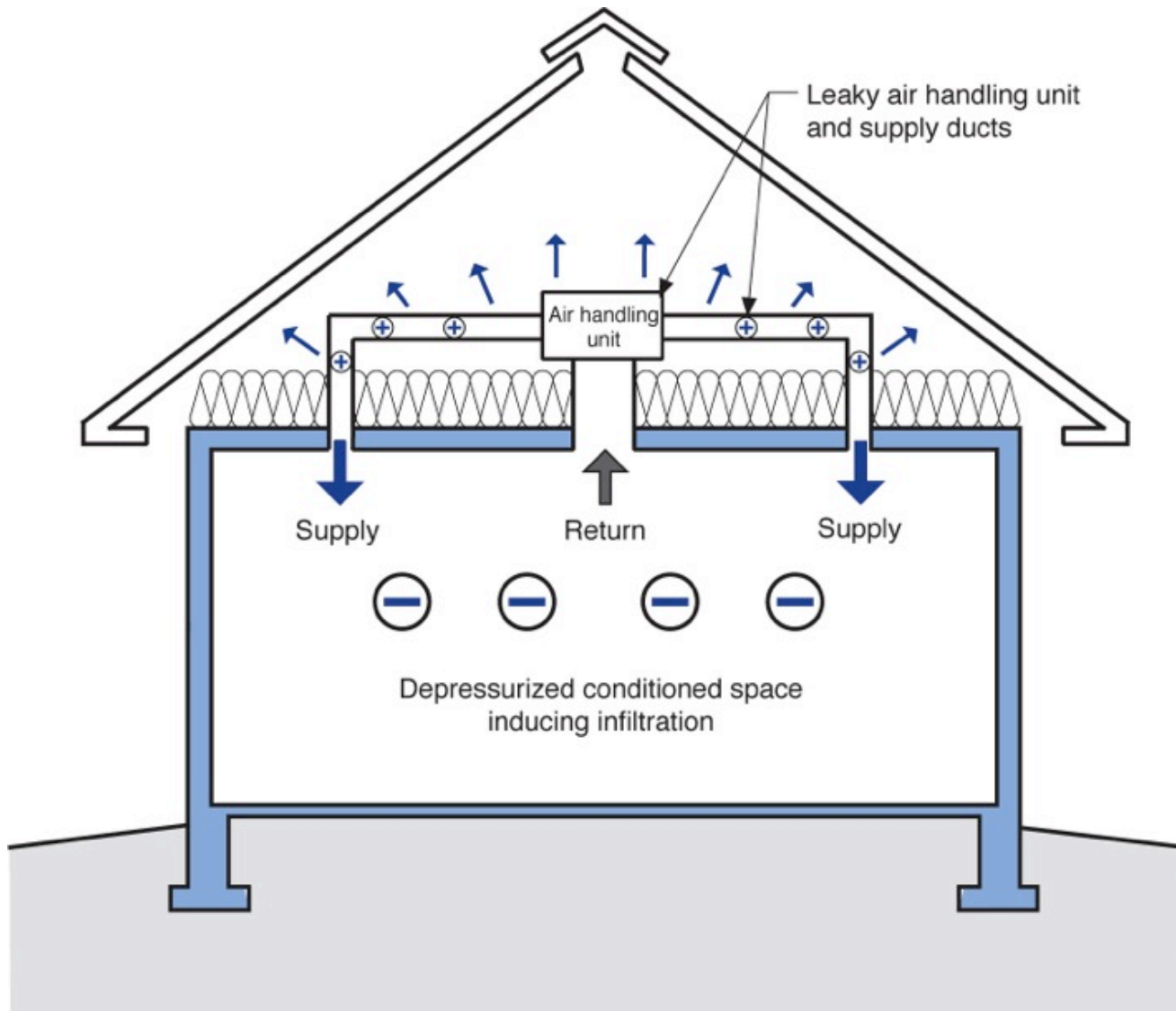


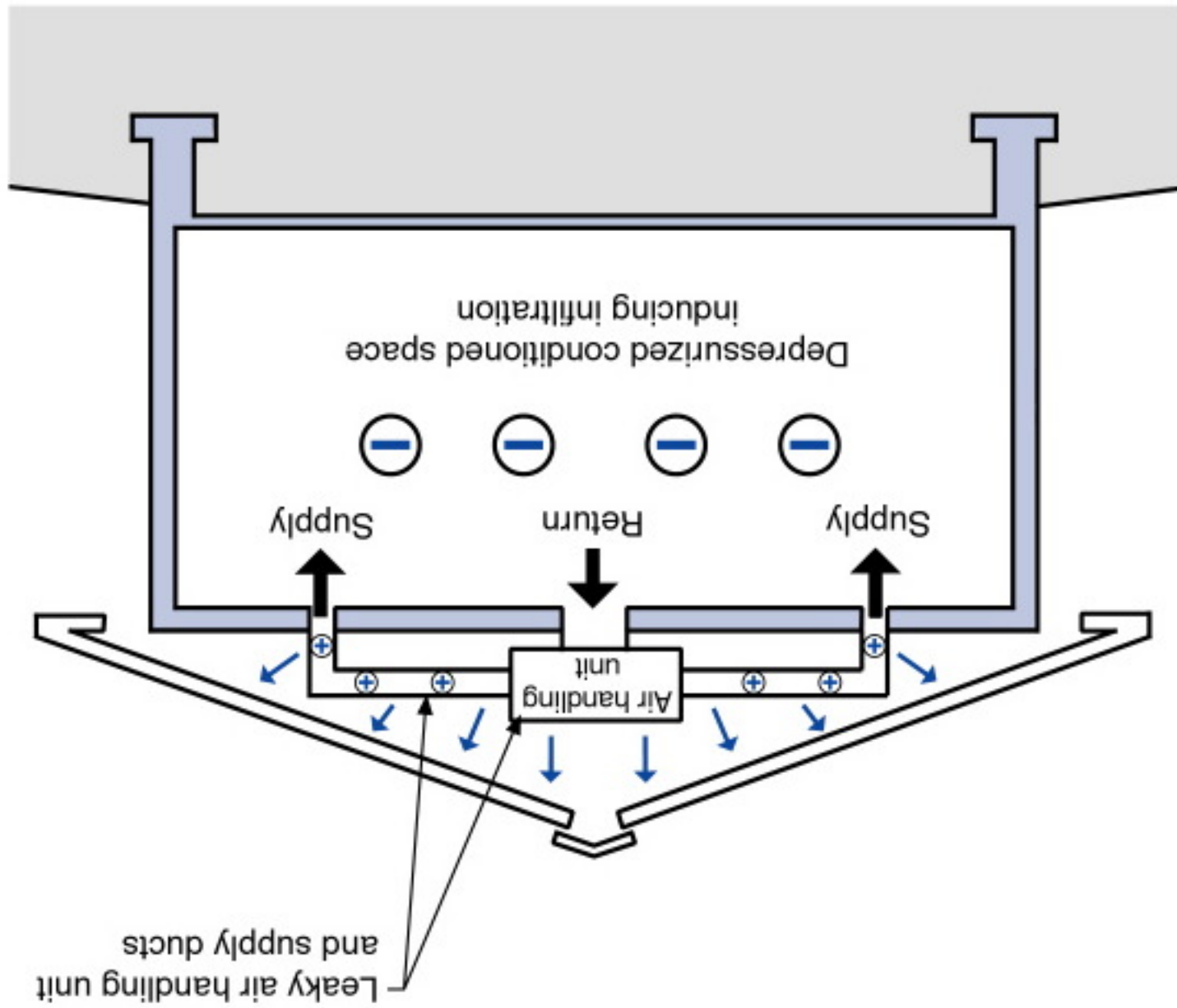


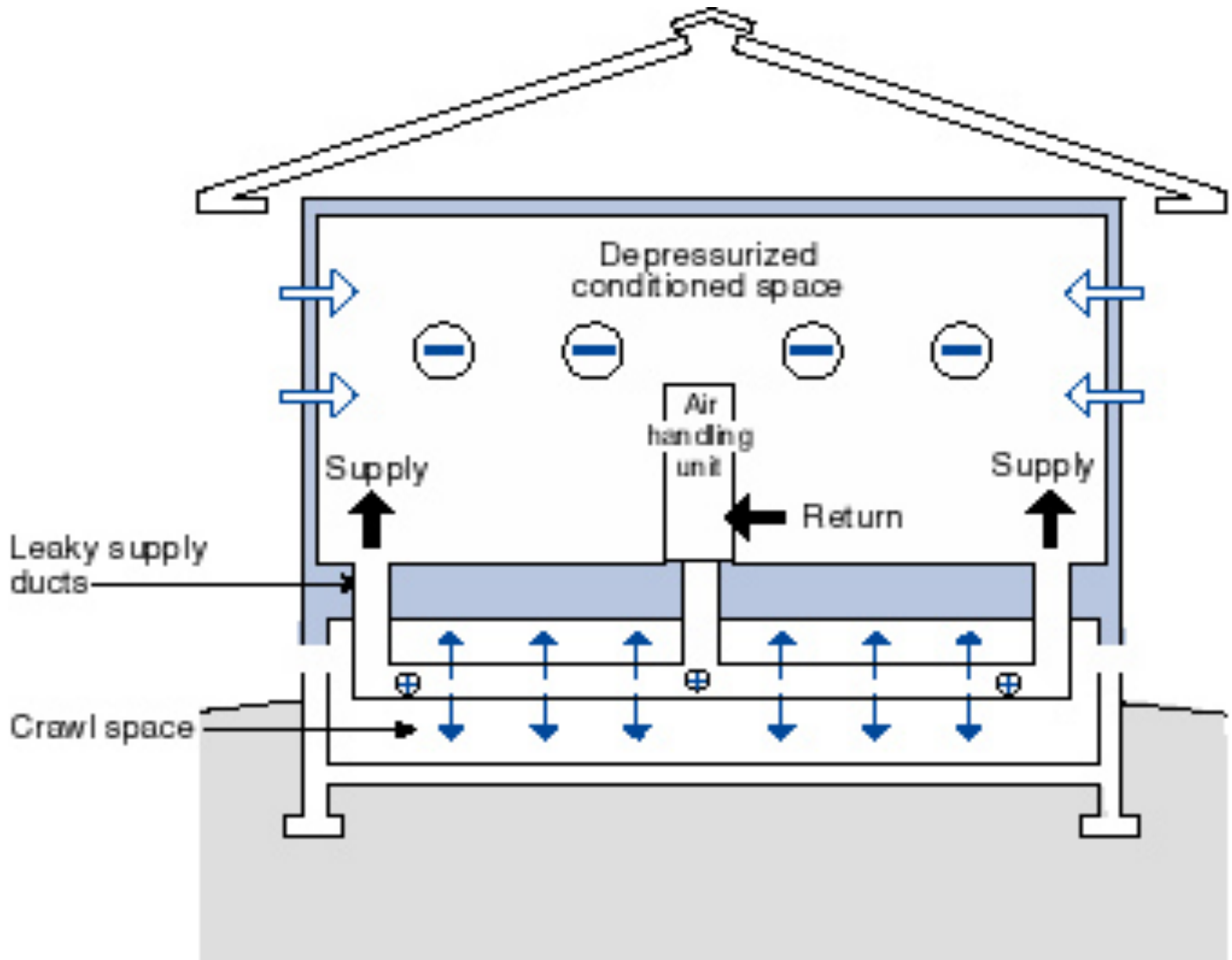




Crawl Spaces









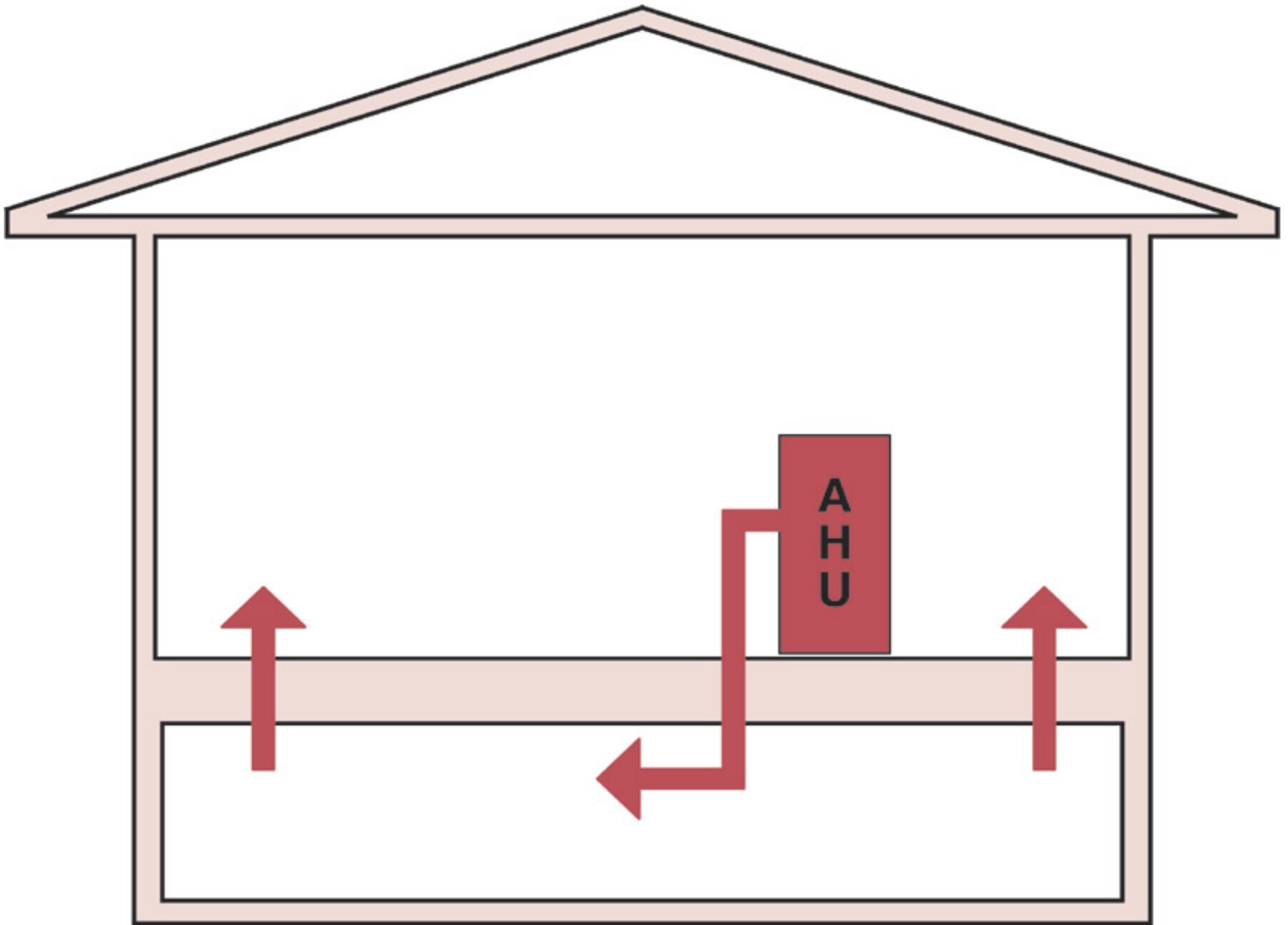
Conditioned Crawlspace Not Unvented
Crawlspace

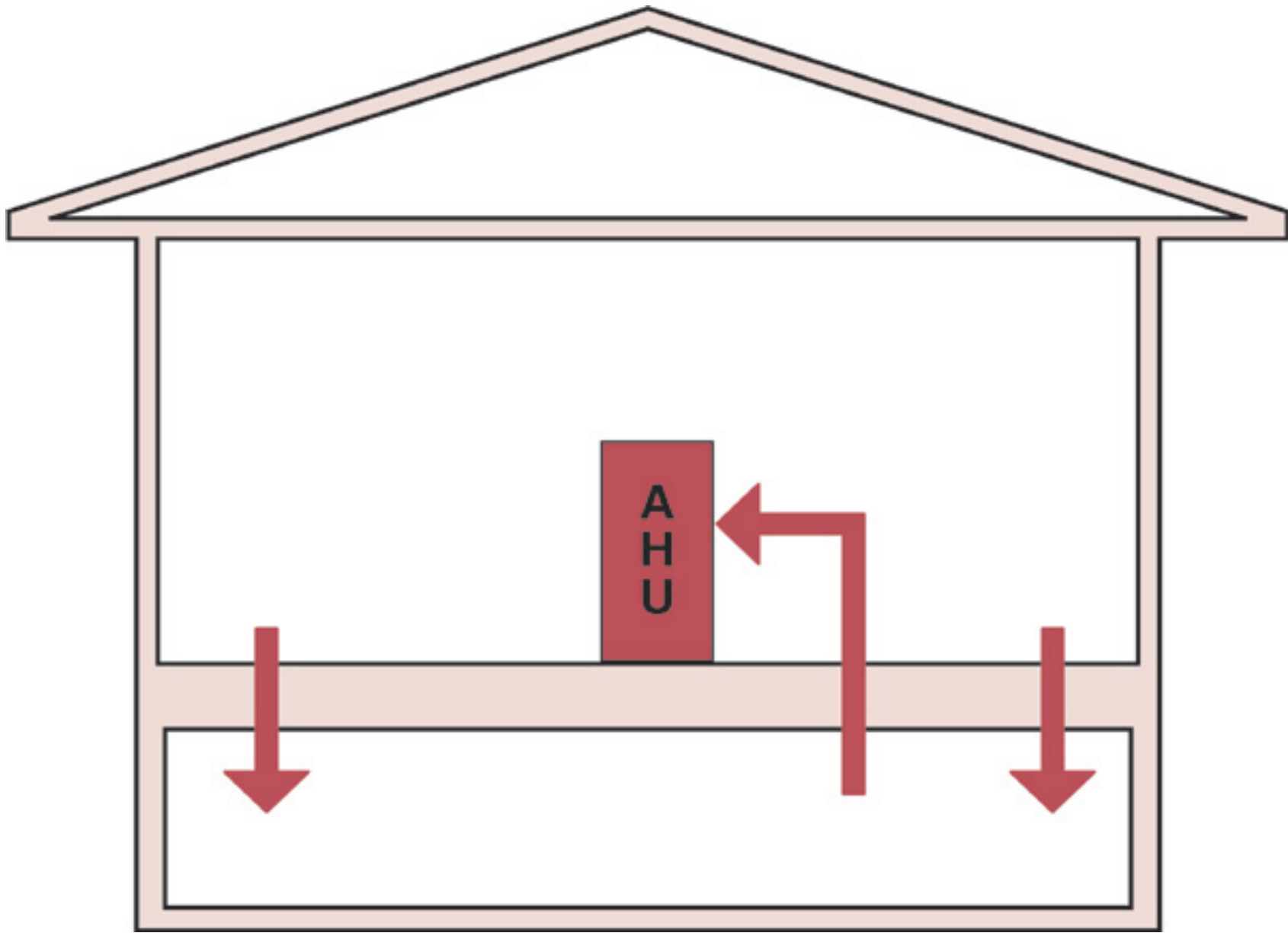
Need Supply Air

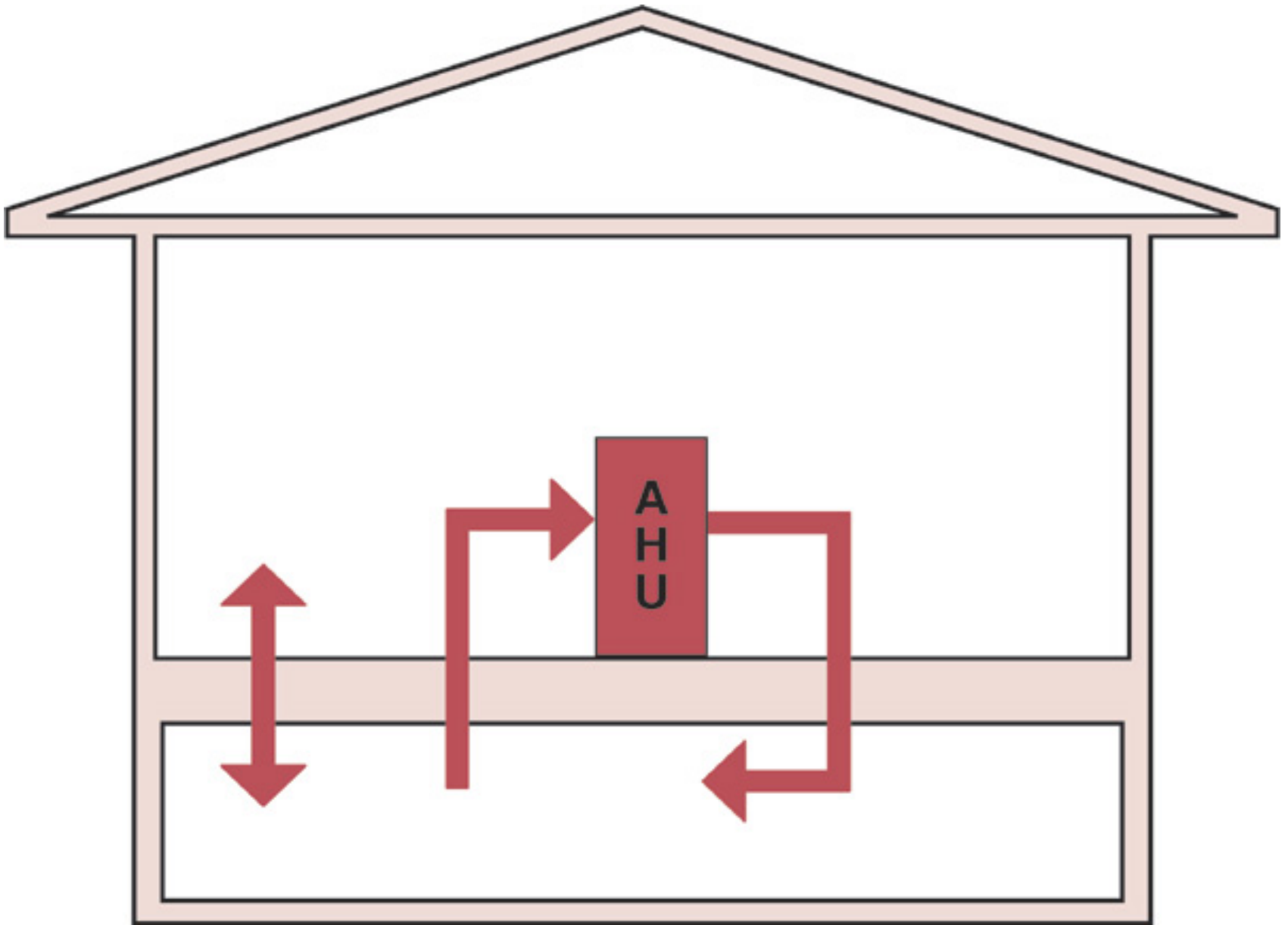
50 cfm/1000 ft² of Crawlspace Area

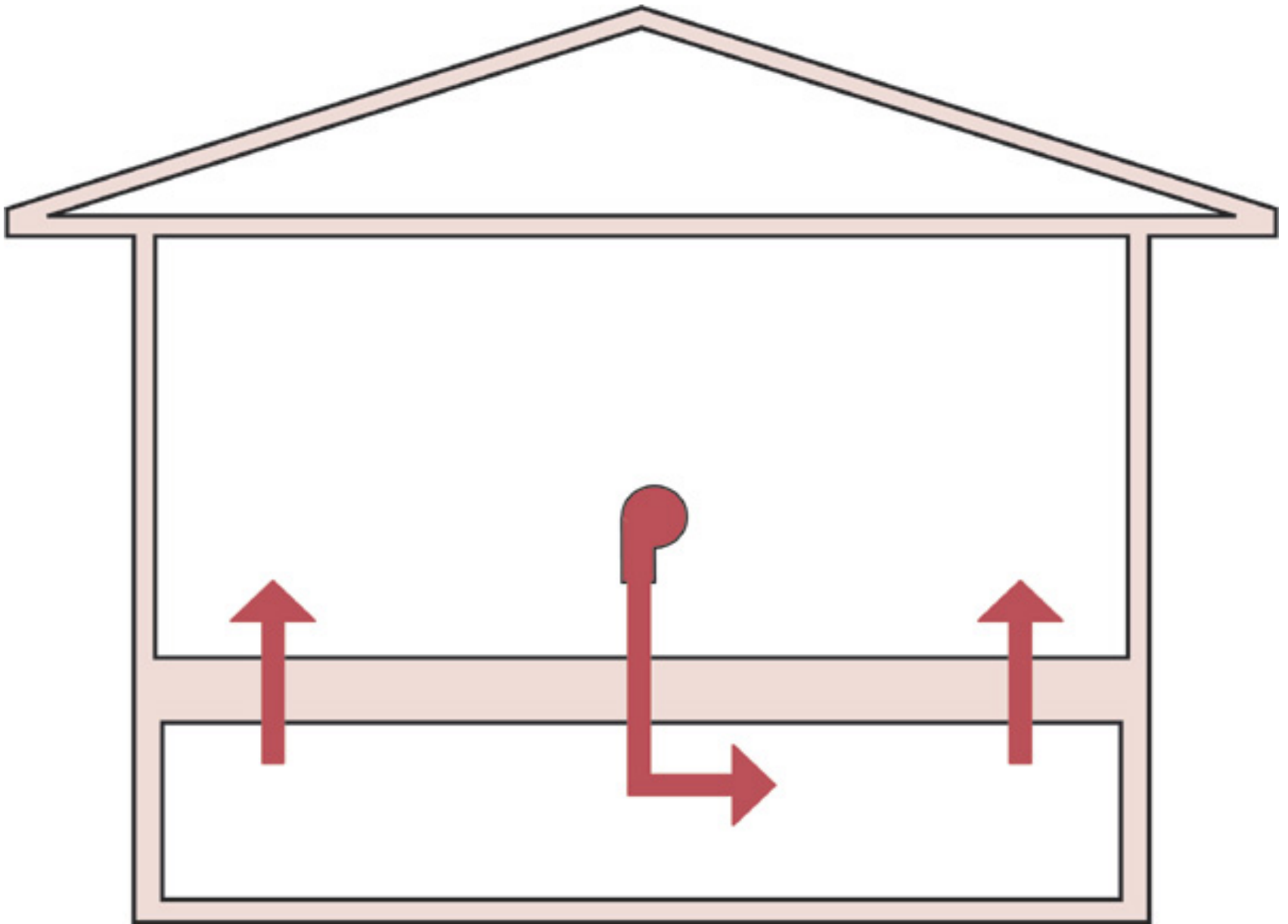
Or

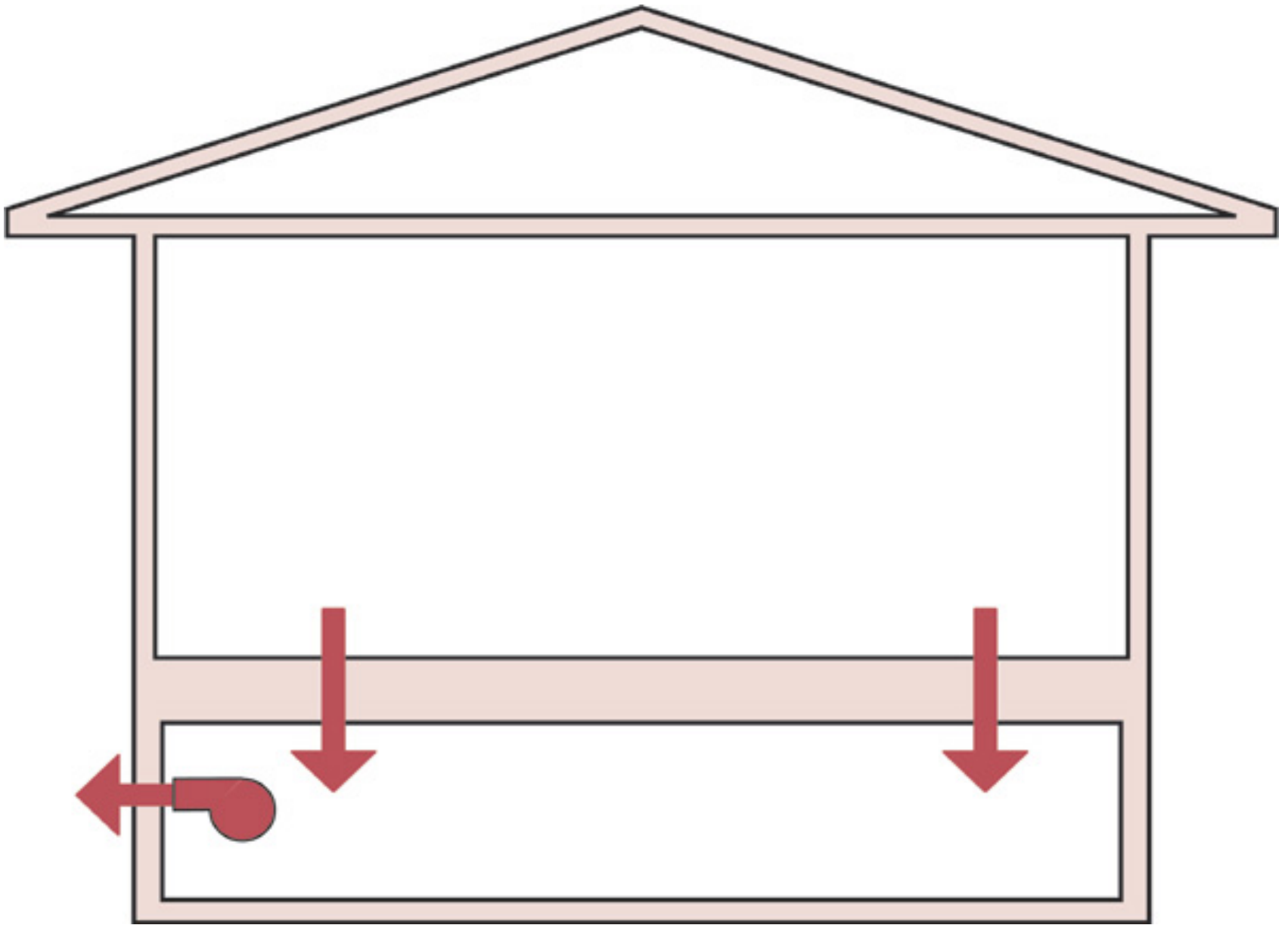
Dehumidification

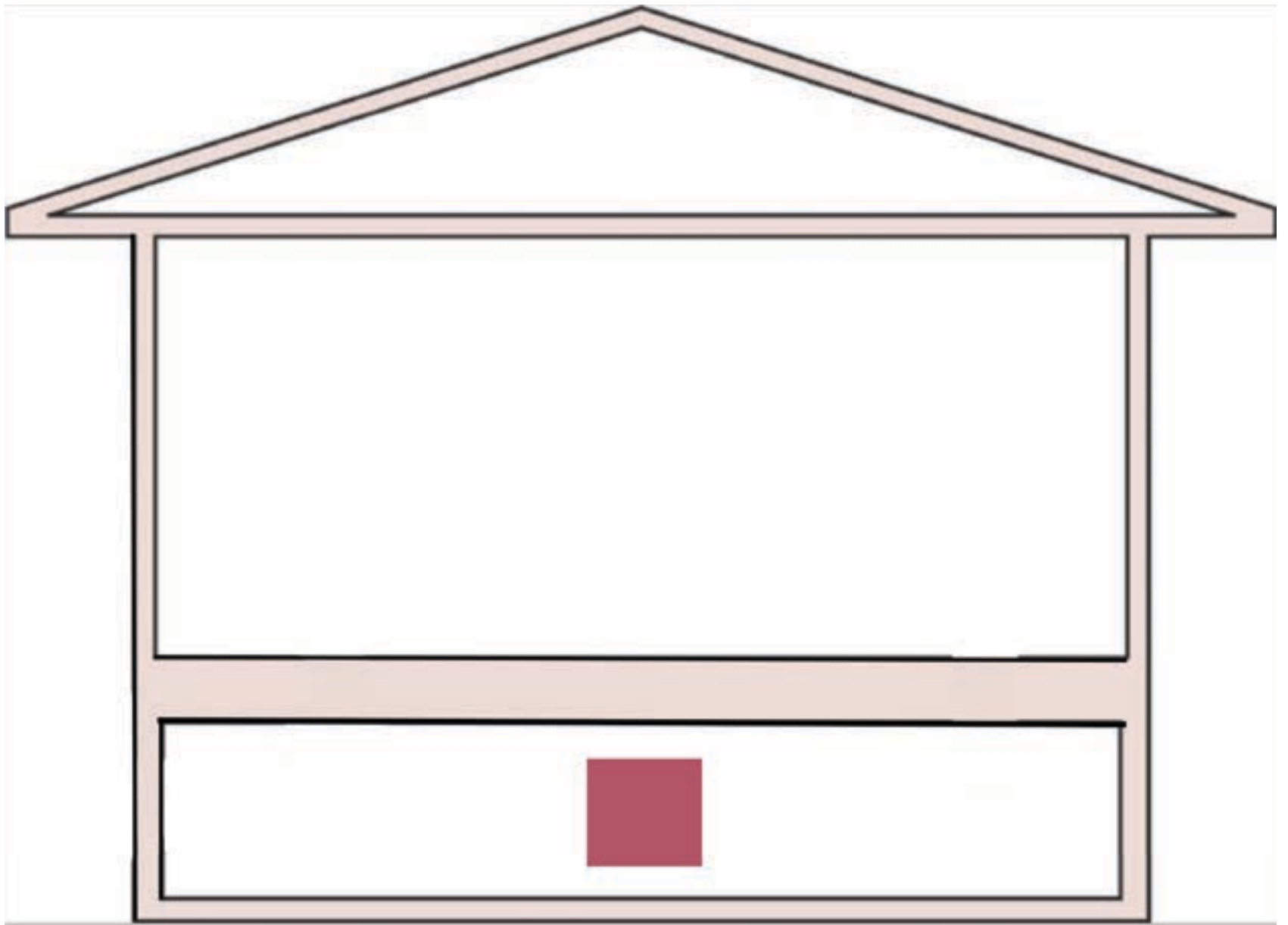


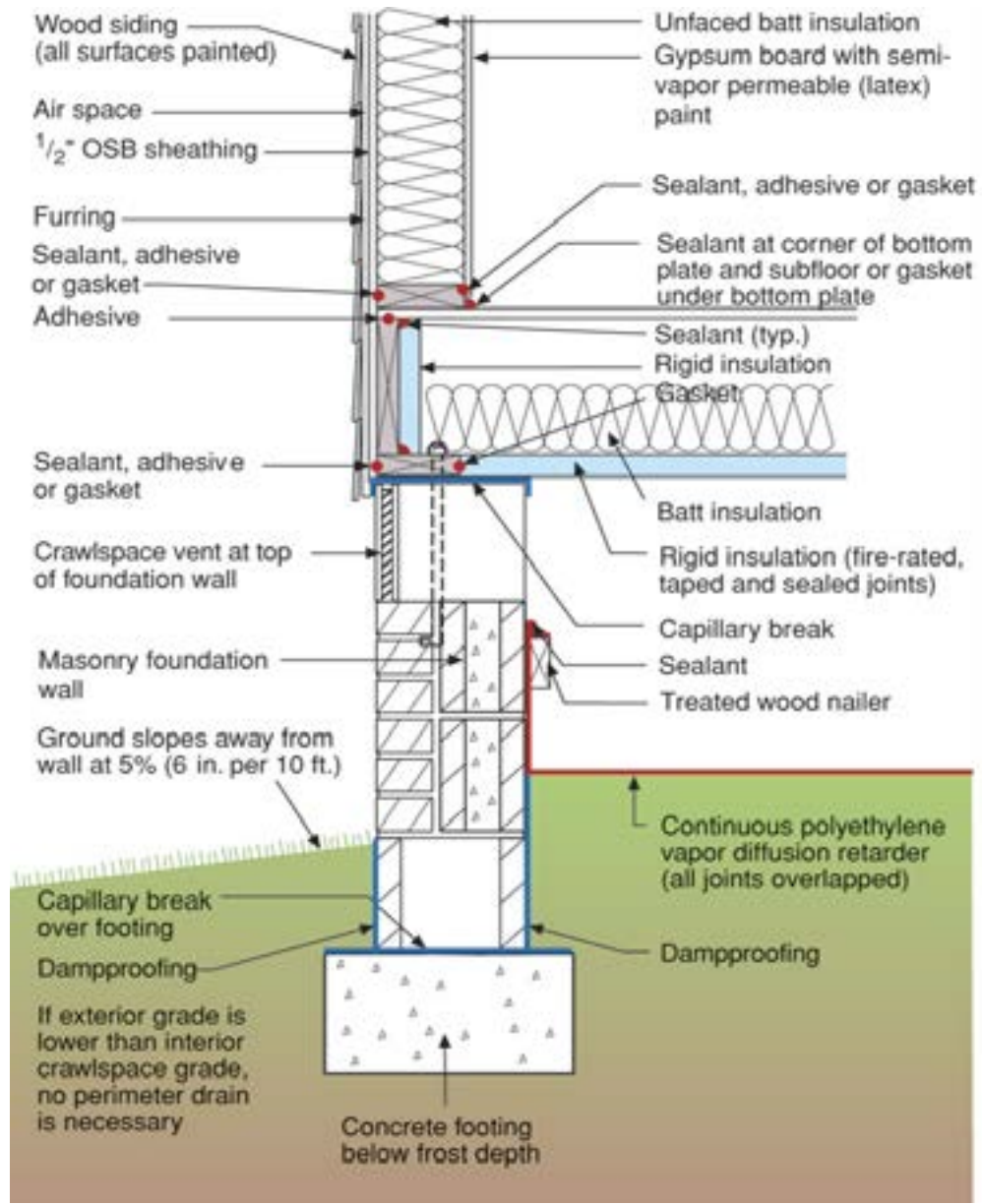


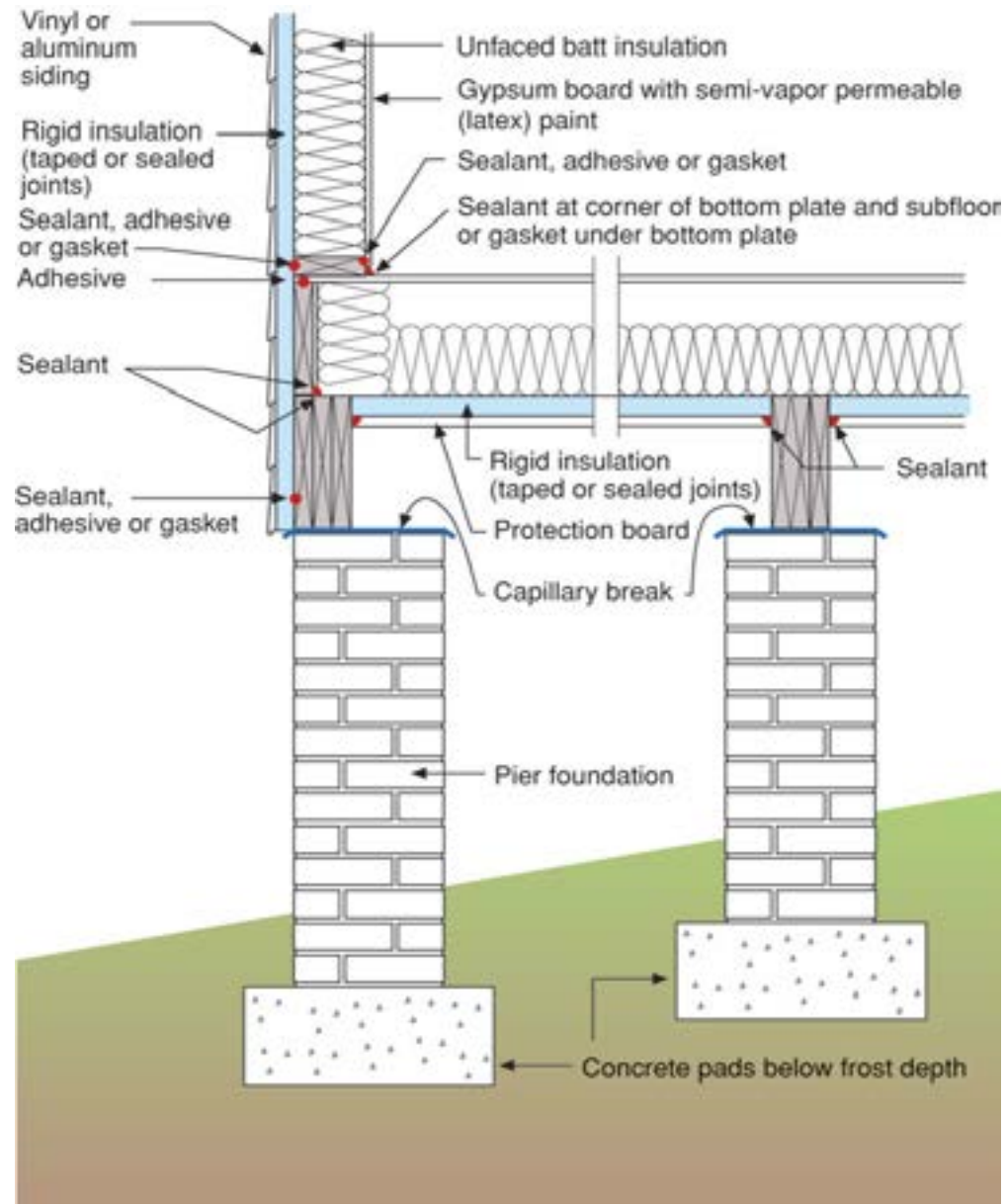
















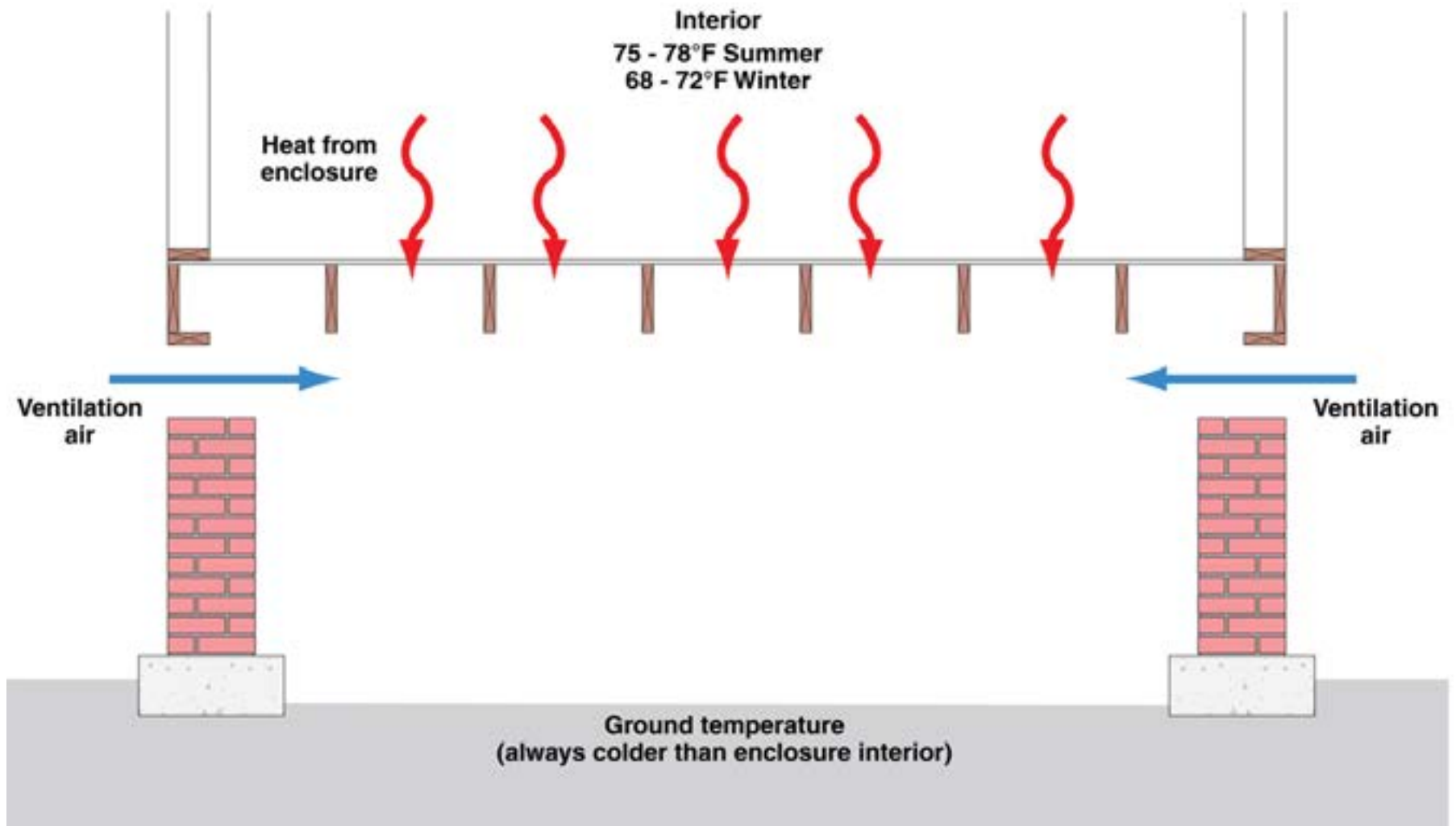


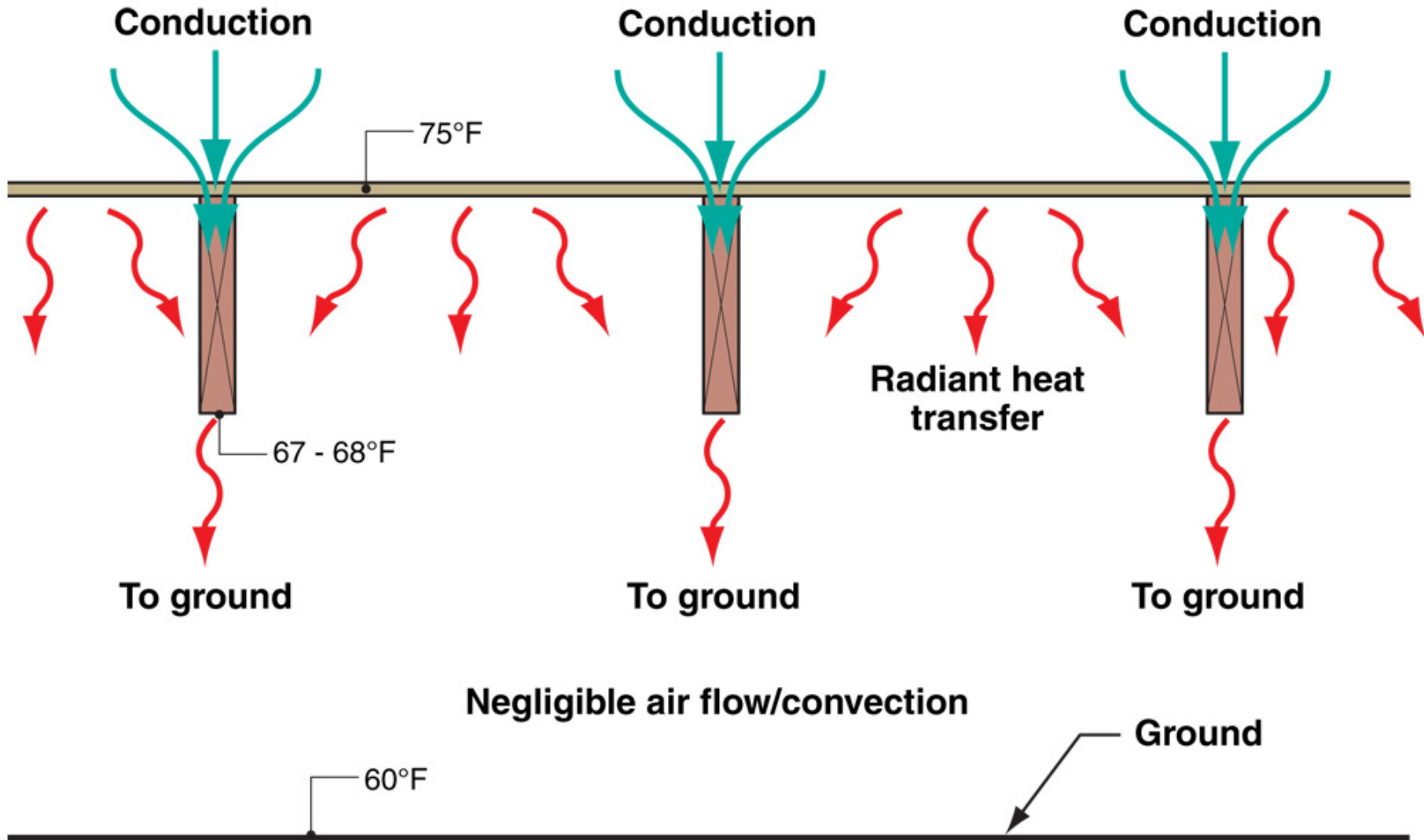


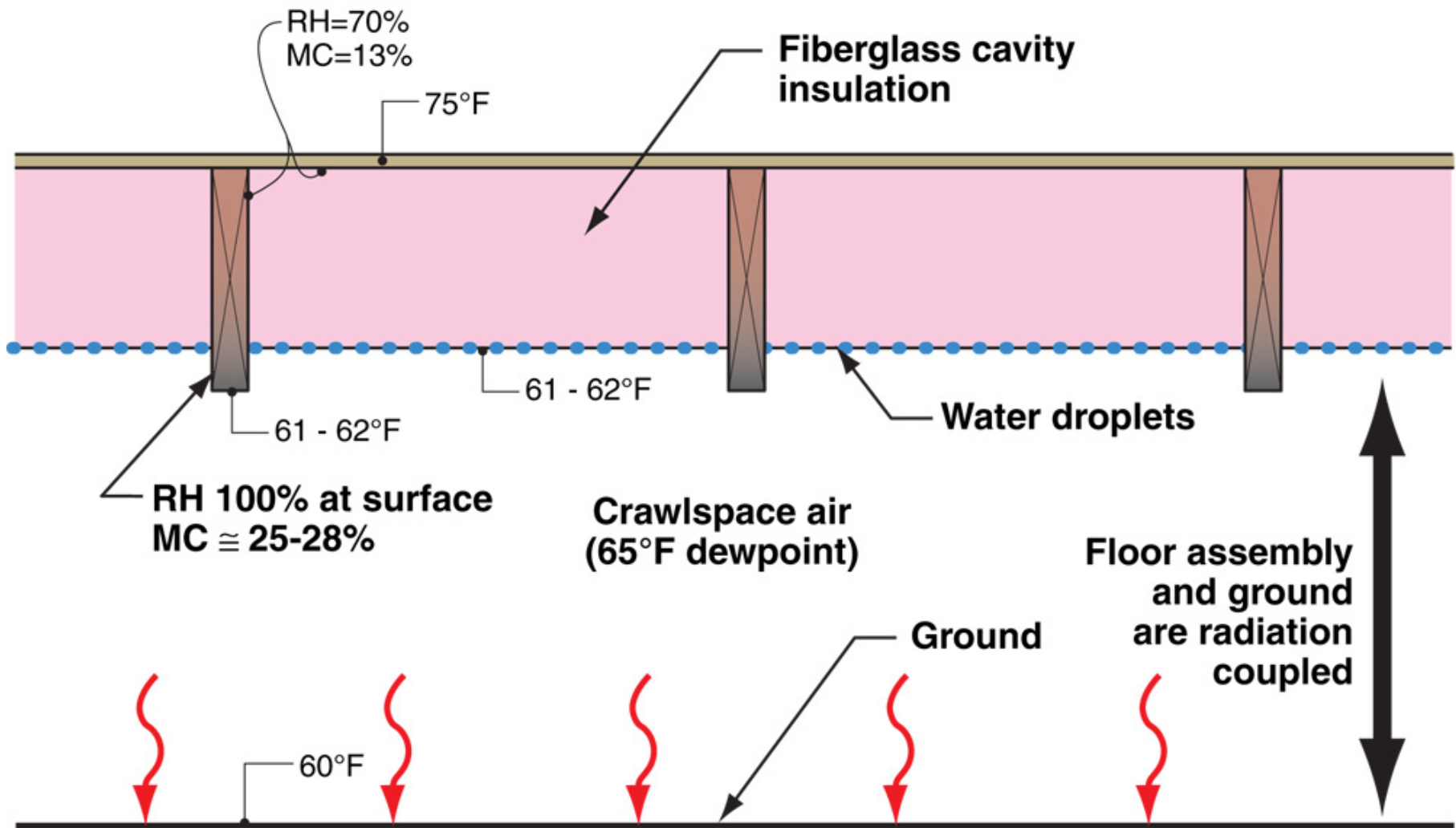


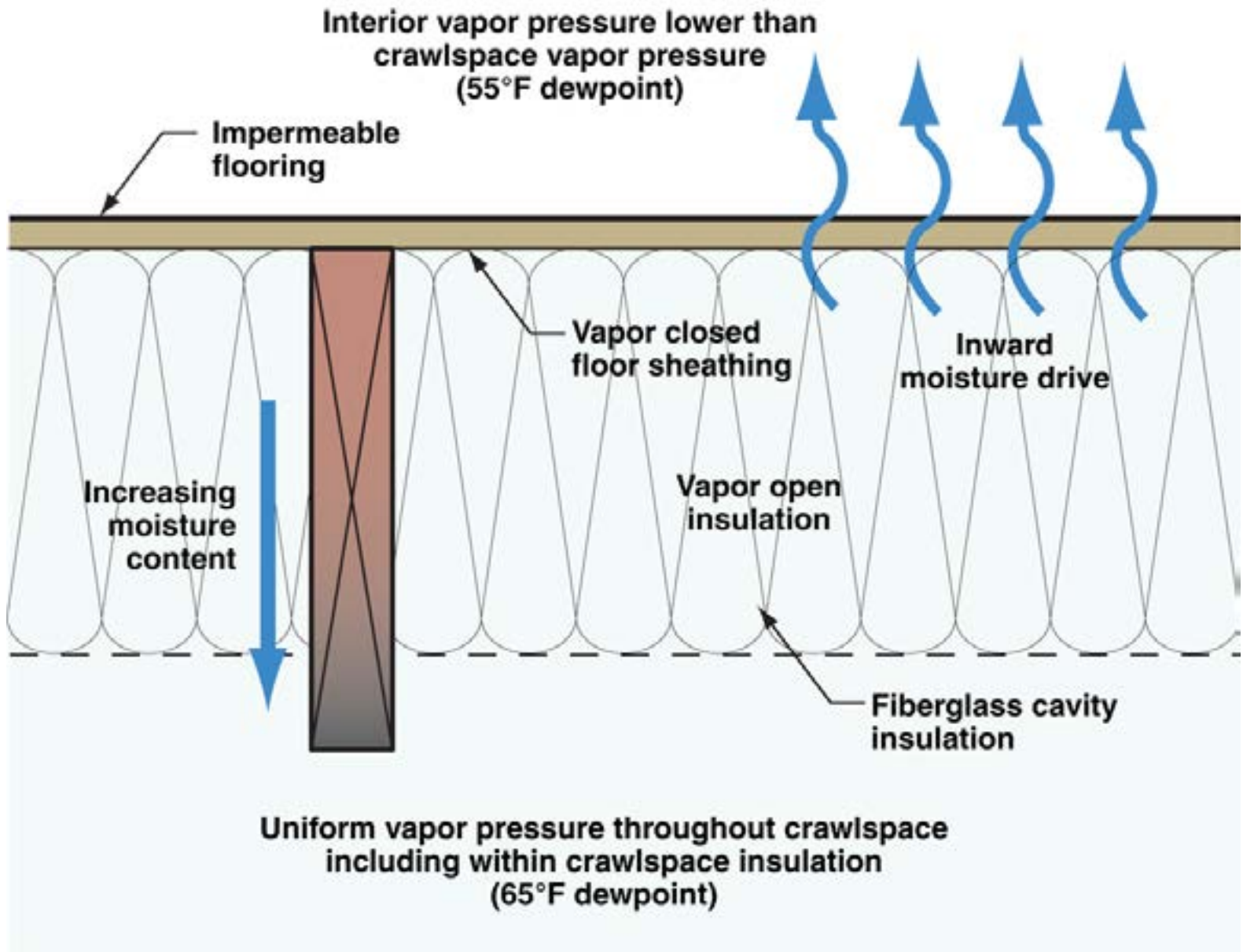
















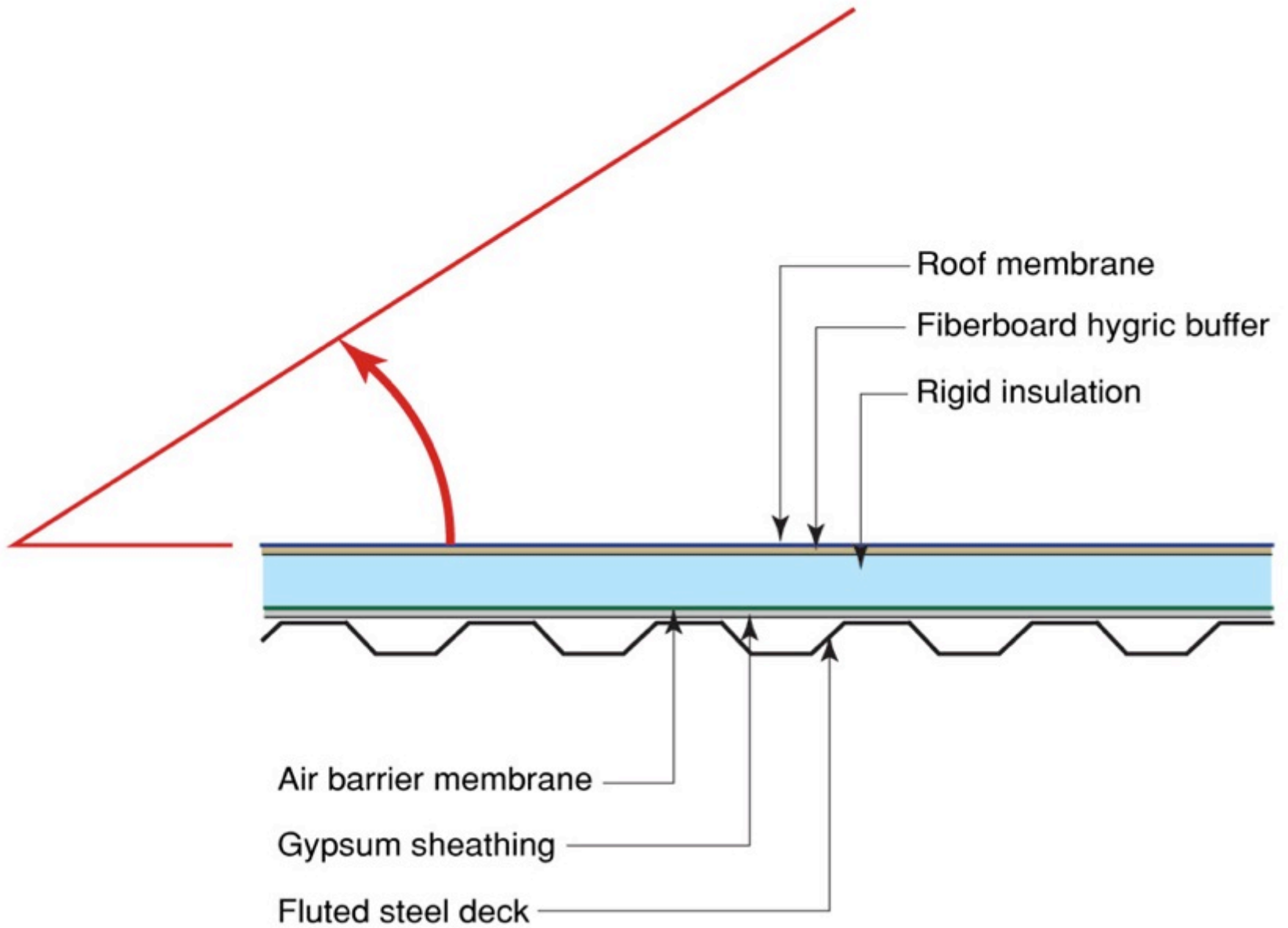
Back to Ducts....

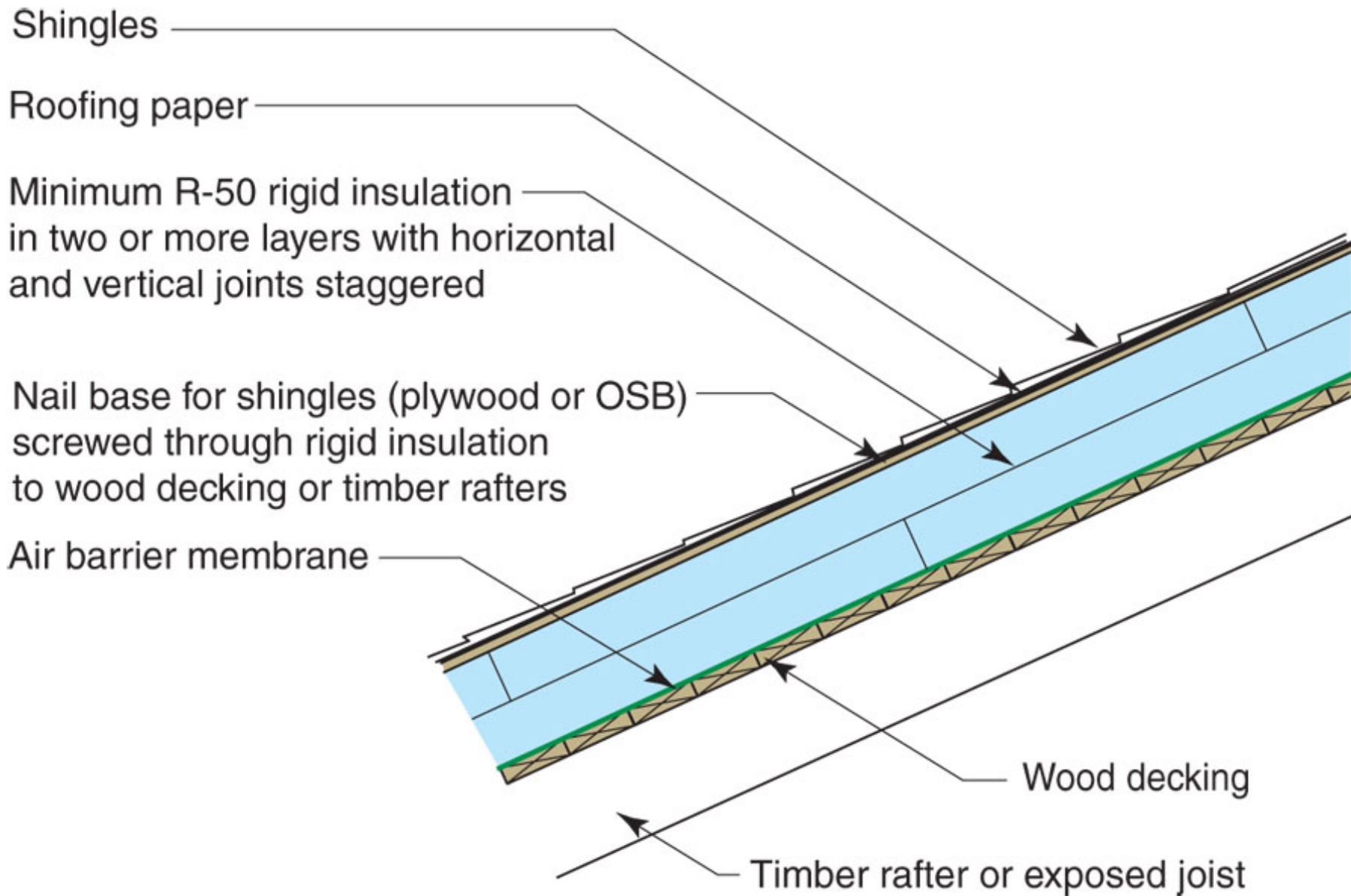


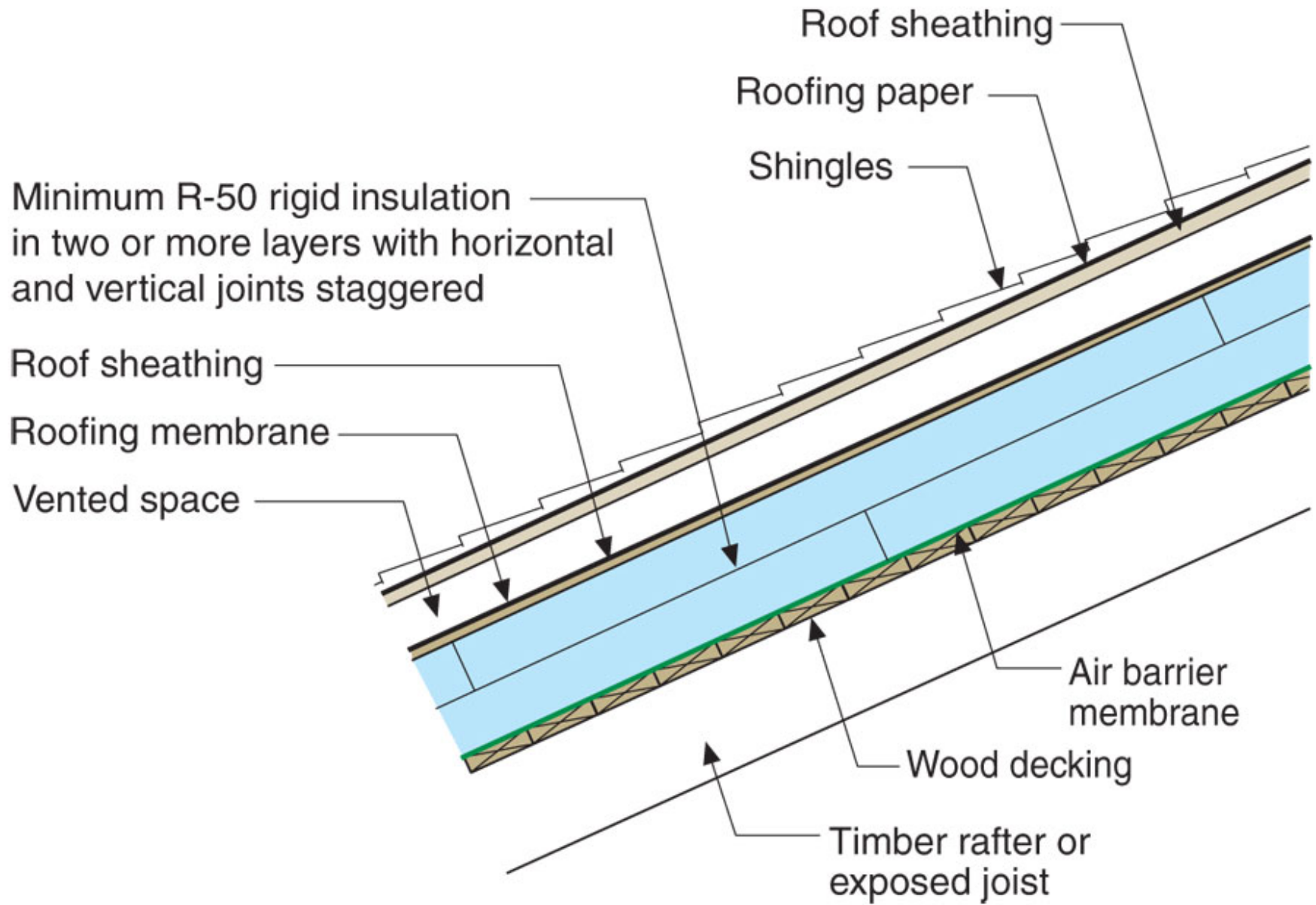


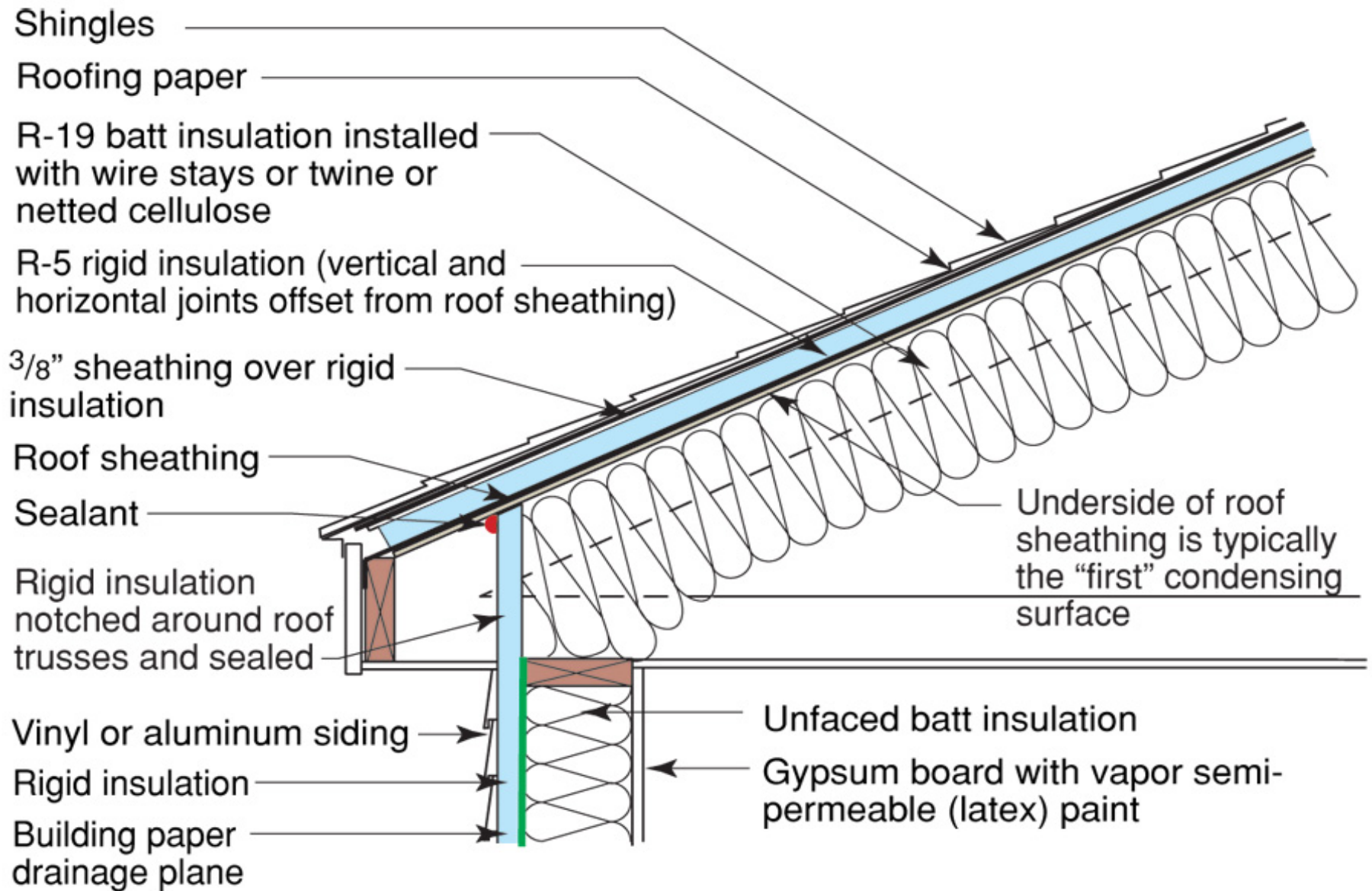


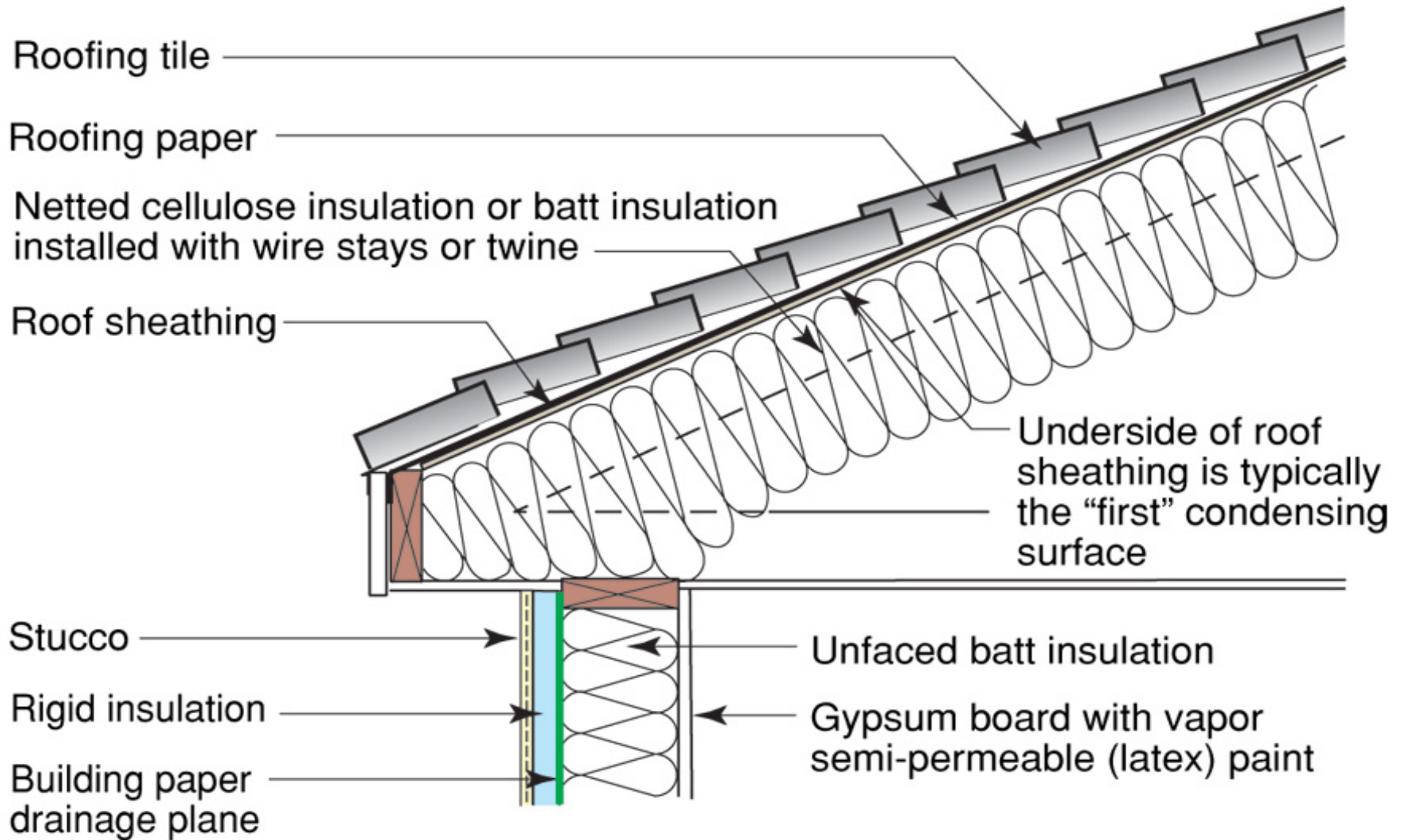
Not Easy To Put Them Inside....







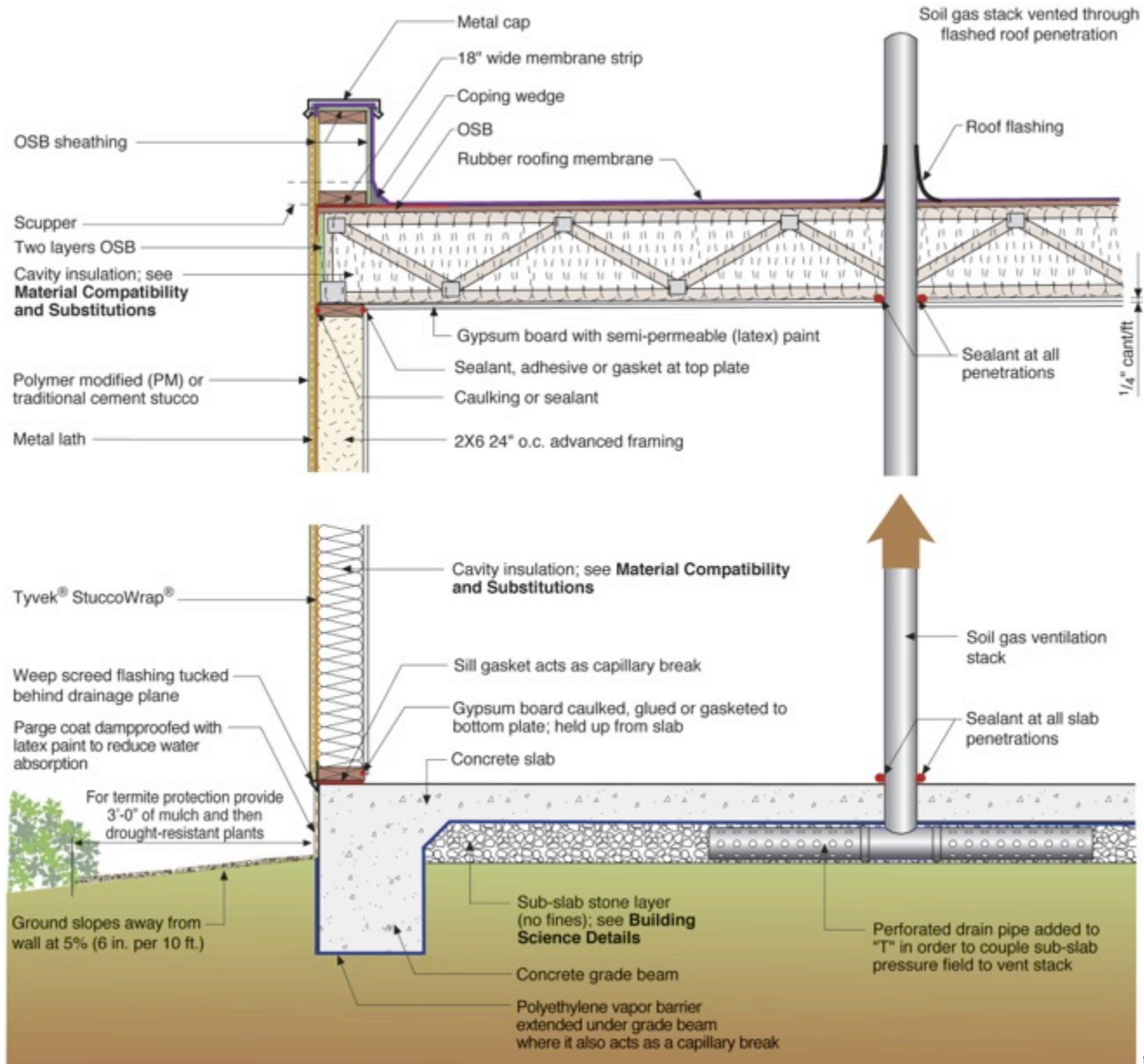


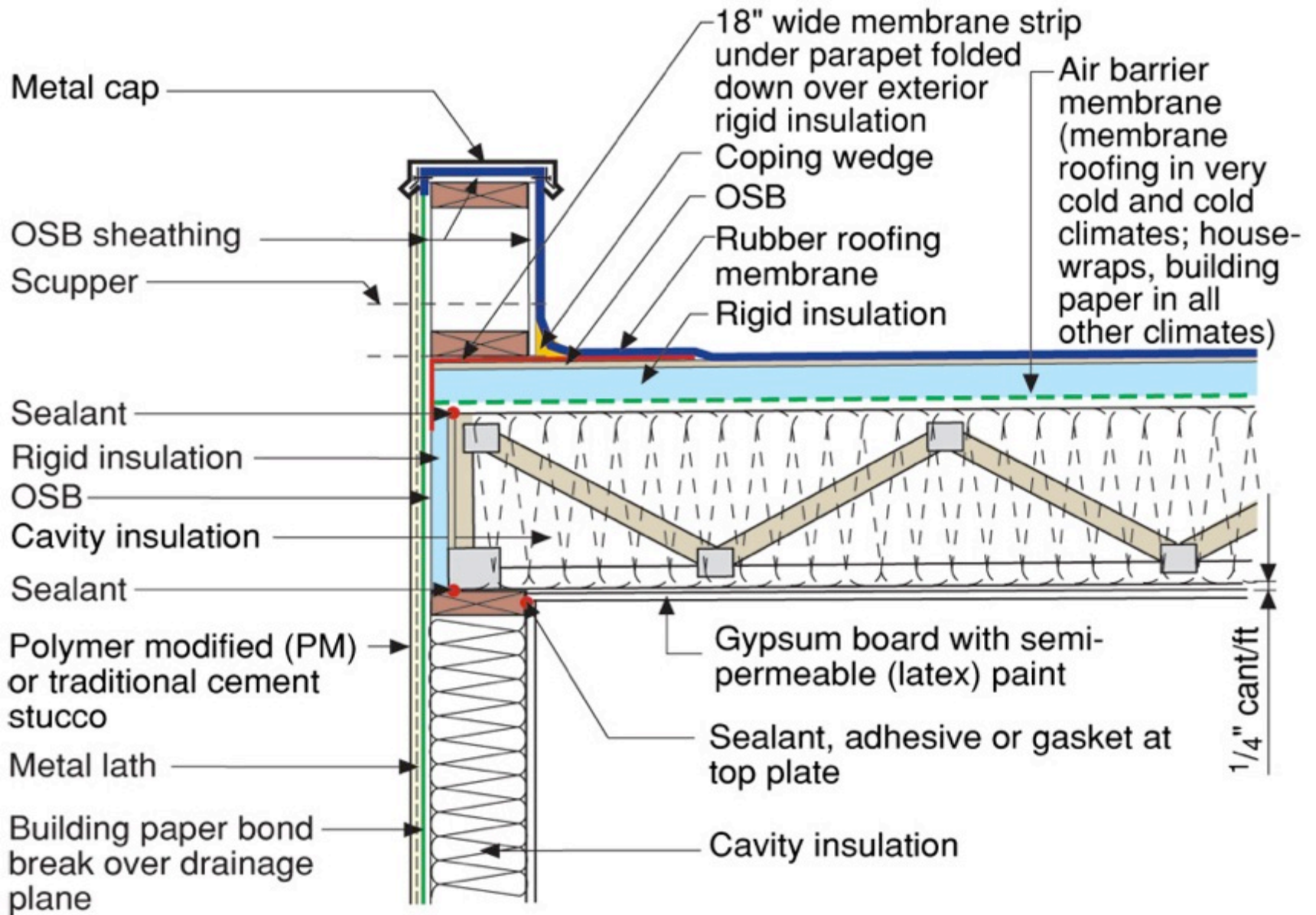


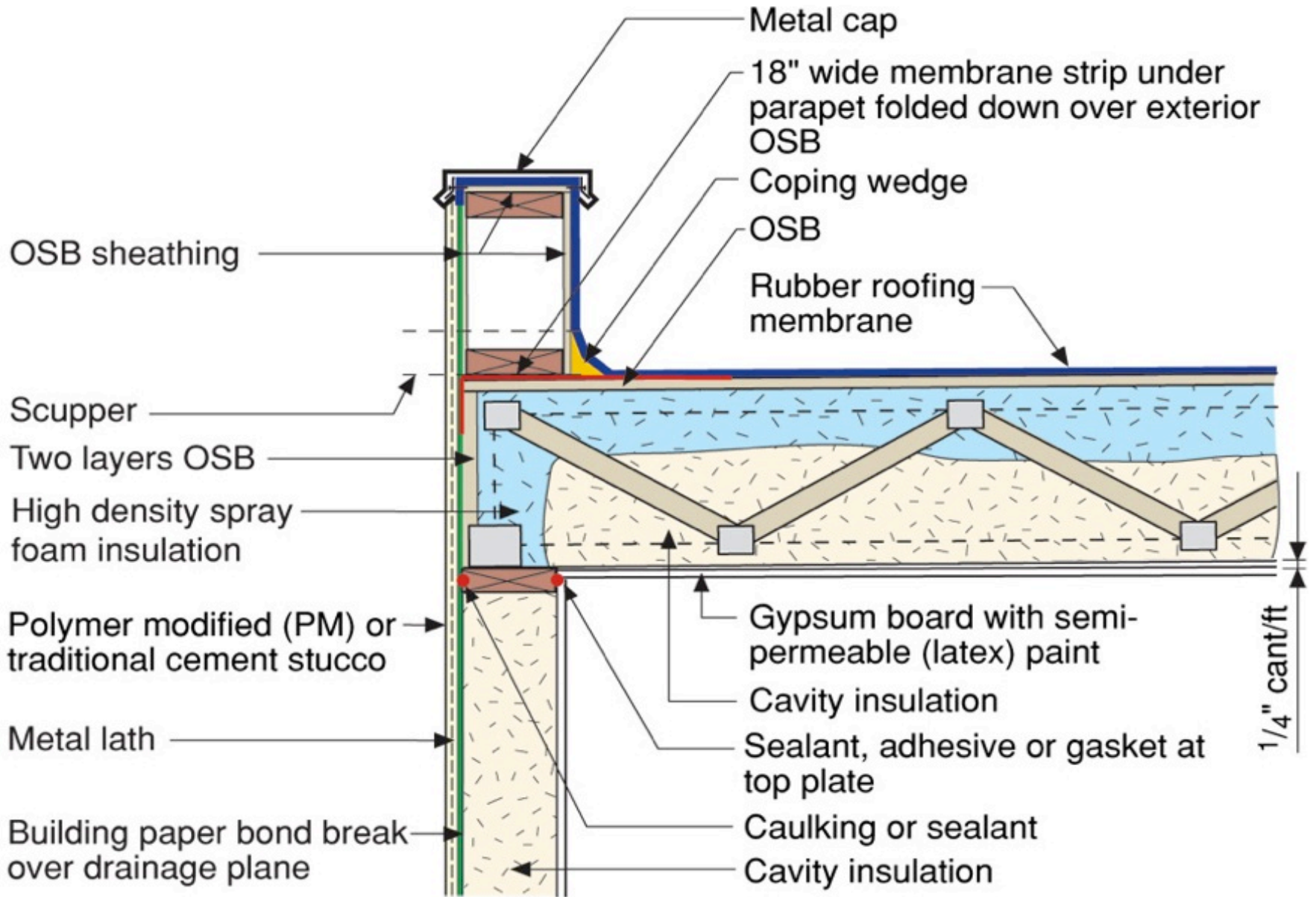


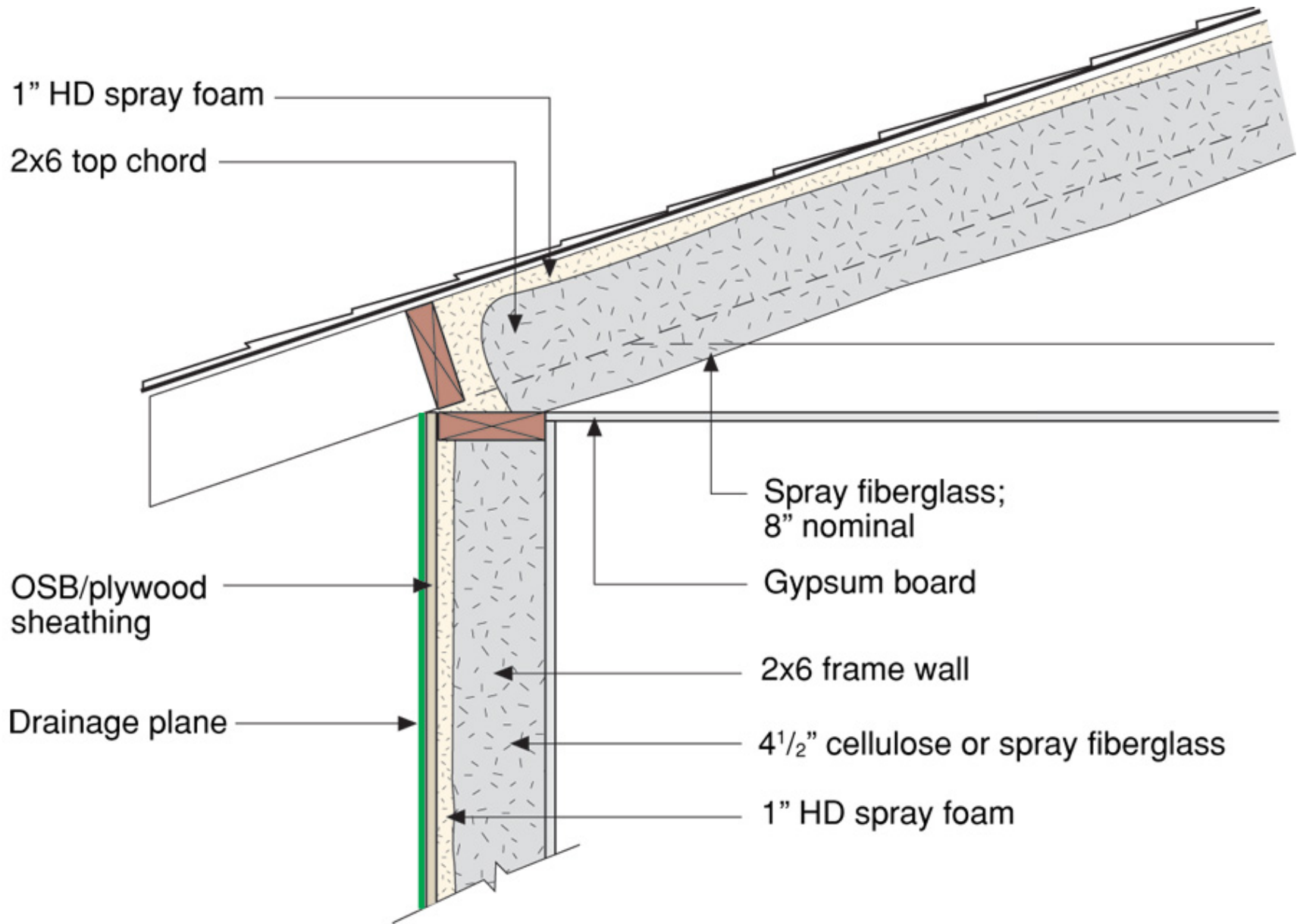


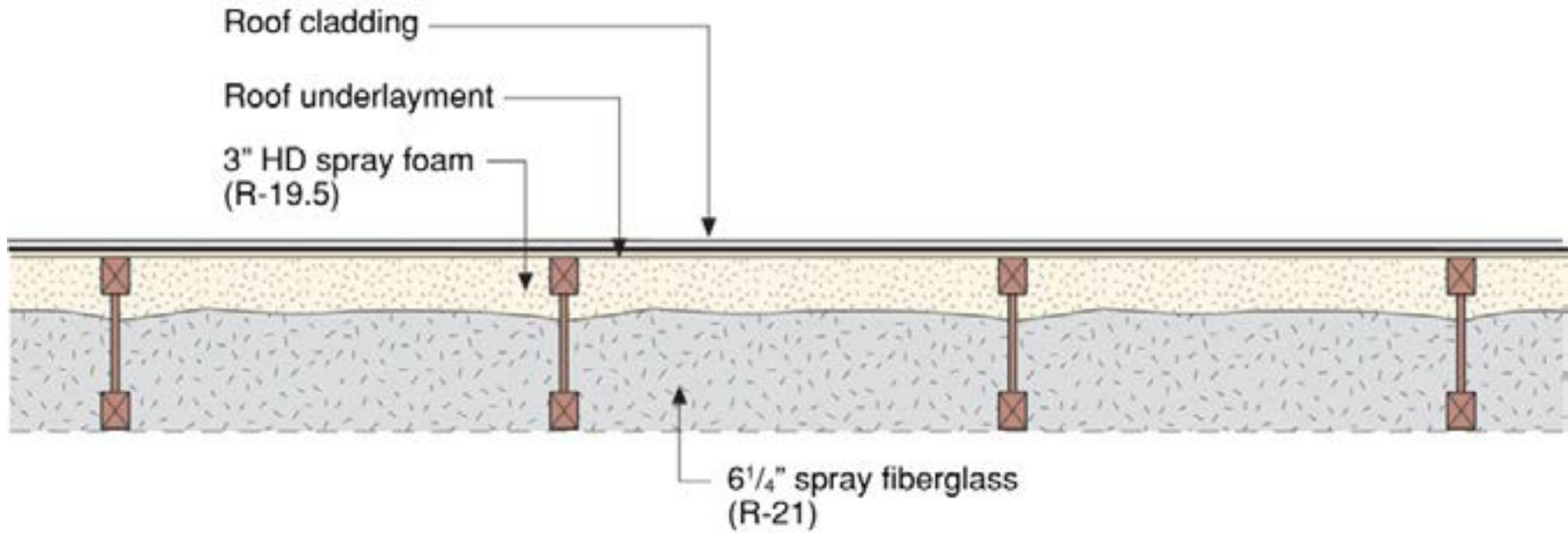


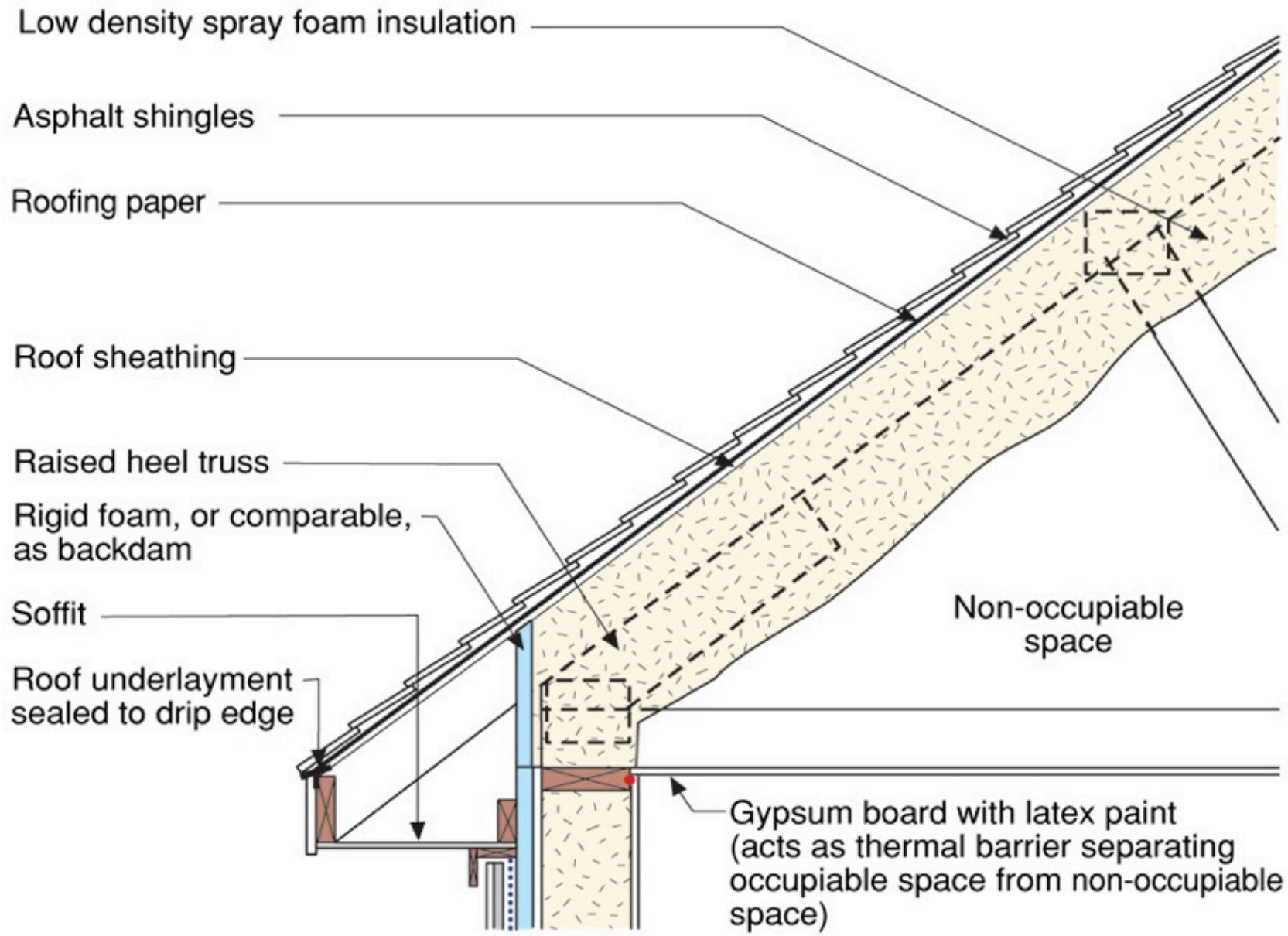












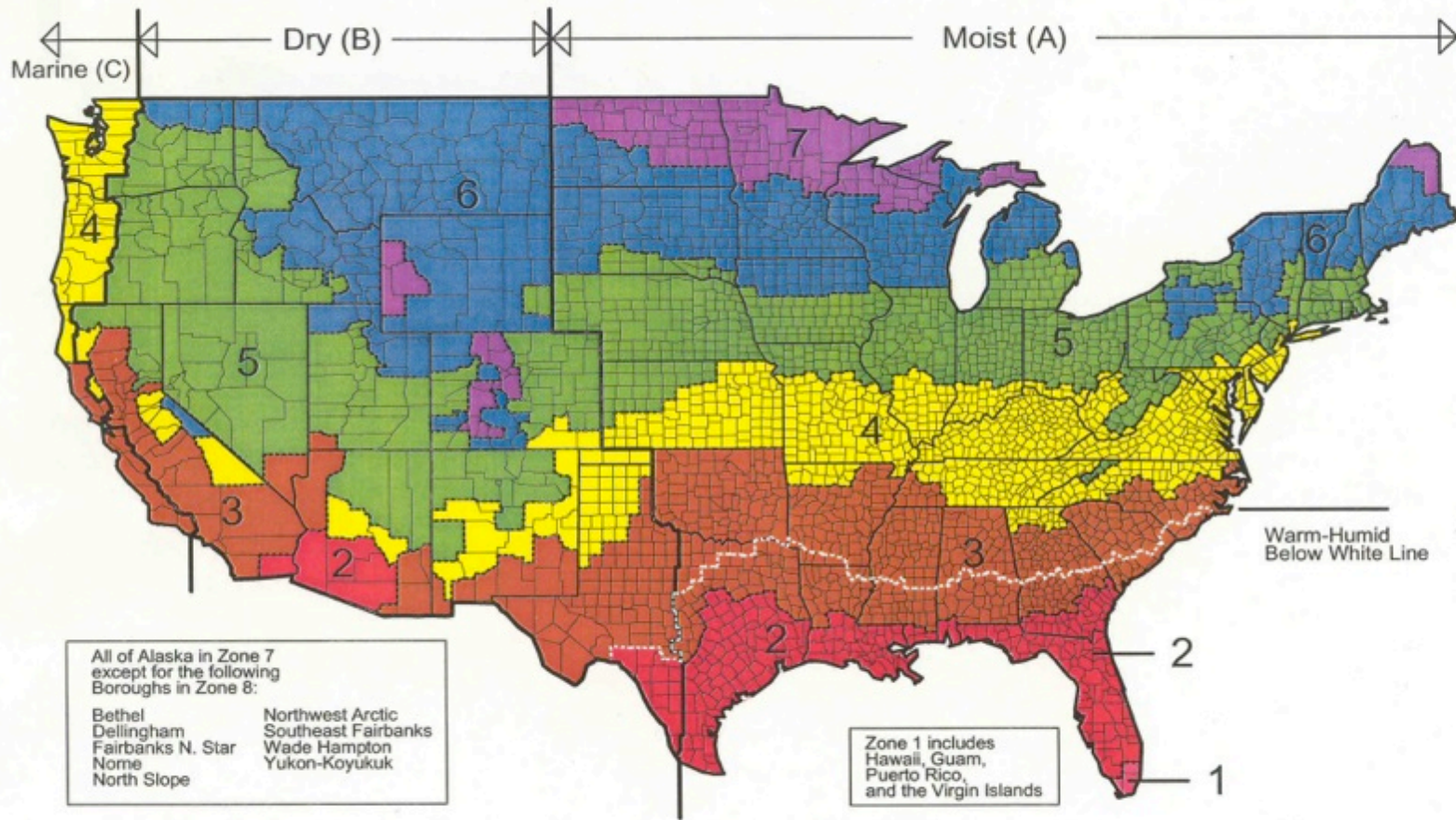






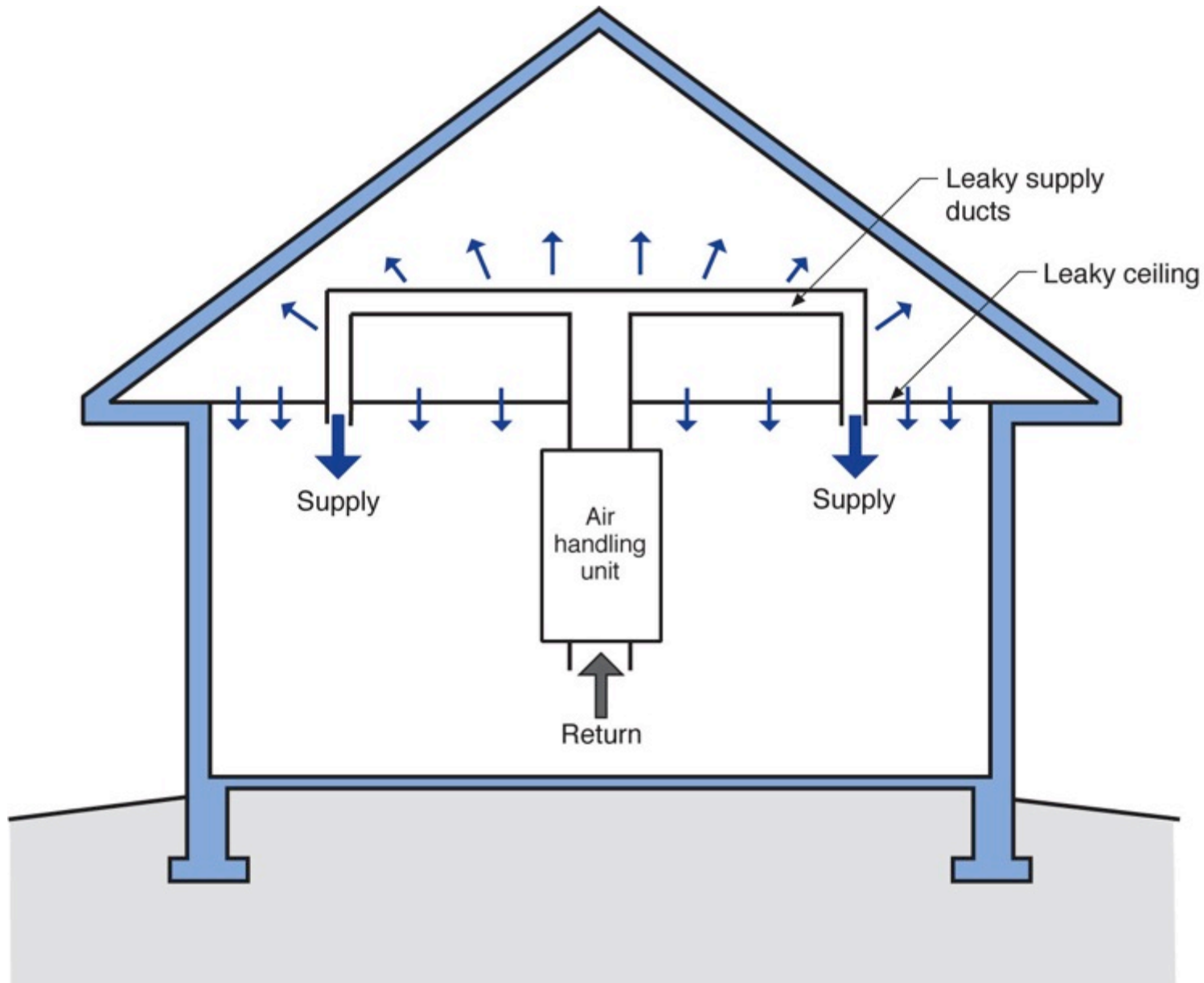


Map of DOE's Proposed Climate Zones



March 24, 2003

Conditioned Attics Not Unvented Attics





Conditioned Attics Not Unvented Attics
Need Supply Air

Conditioned Attics Not Unvented Attics
Need Supply Air
50 cfm/1000 ft² of Attic

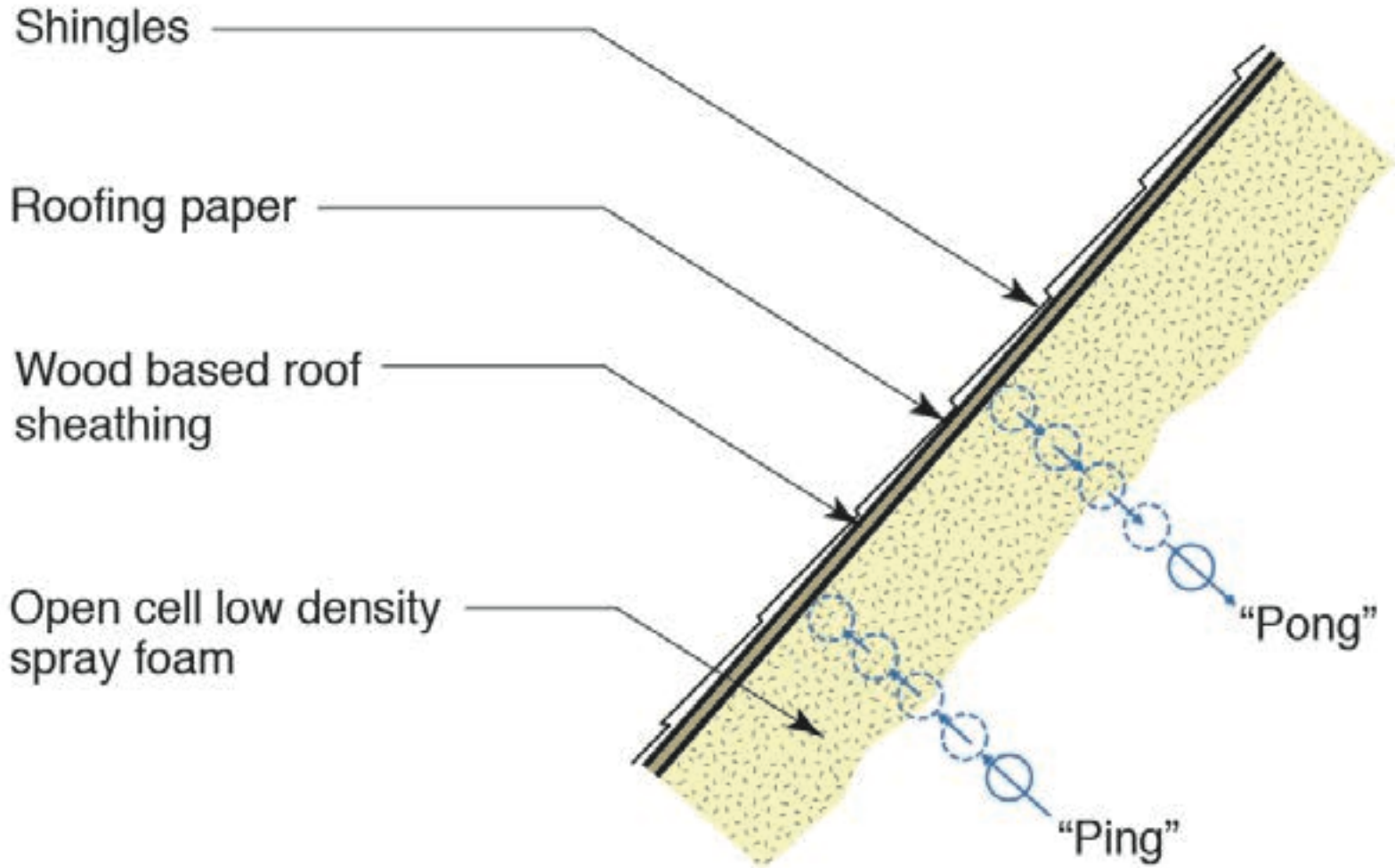
Conditioned Attics Not Unvented Attics
Need Supply Air
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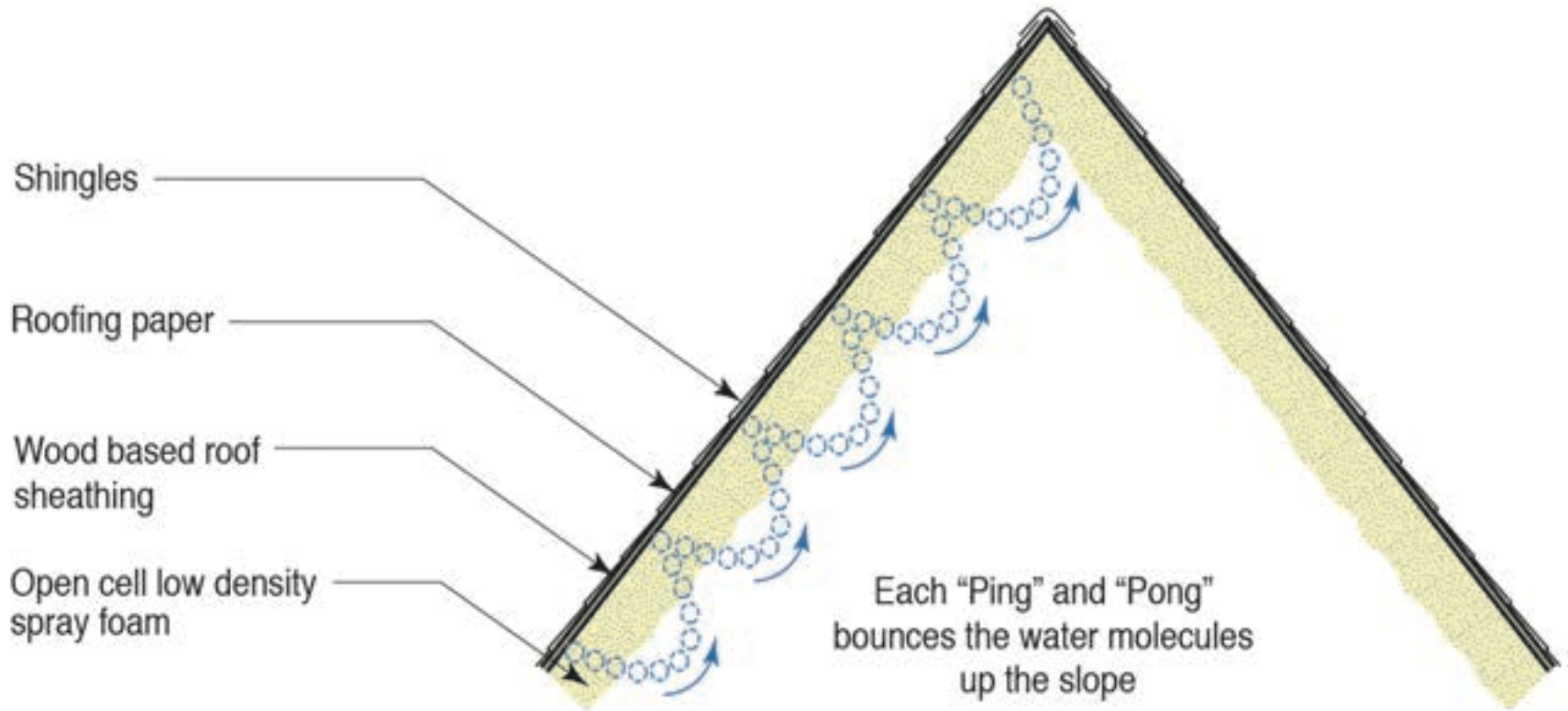
Or
Dehumidification

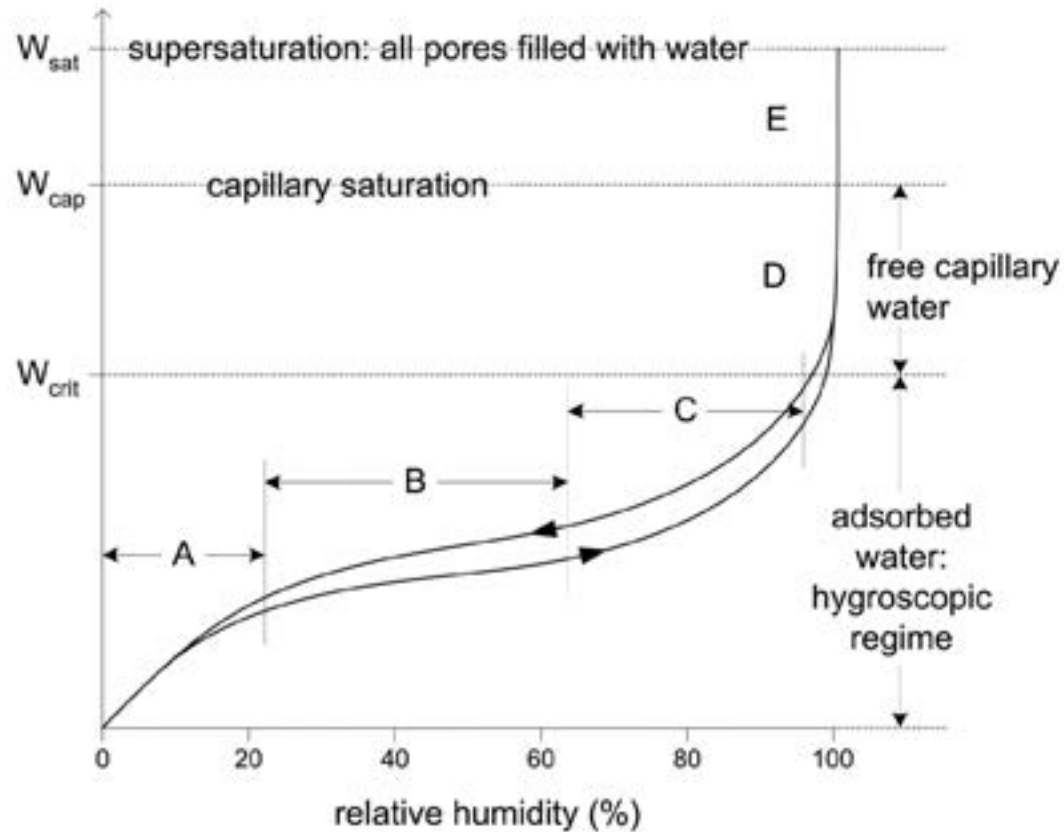
Low-Density Open-Cell Foam Is The Problem











- A: Single-layer of adsorbed molecules
- B: Multiple layers of adsorbed molecules
- C: Interconnected layers (internal capillary condensation)
- D: Free water in Pores, capillary suction
- E: Supersaturated Regime

Regimes of moisture storage in a hygroscopic porous material
 From Straube & Burnett, 2005

SIP Failures

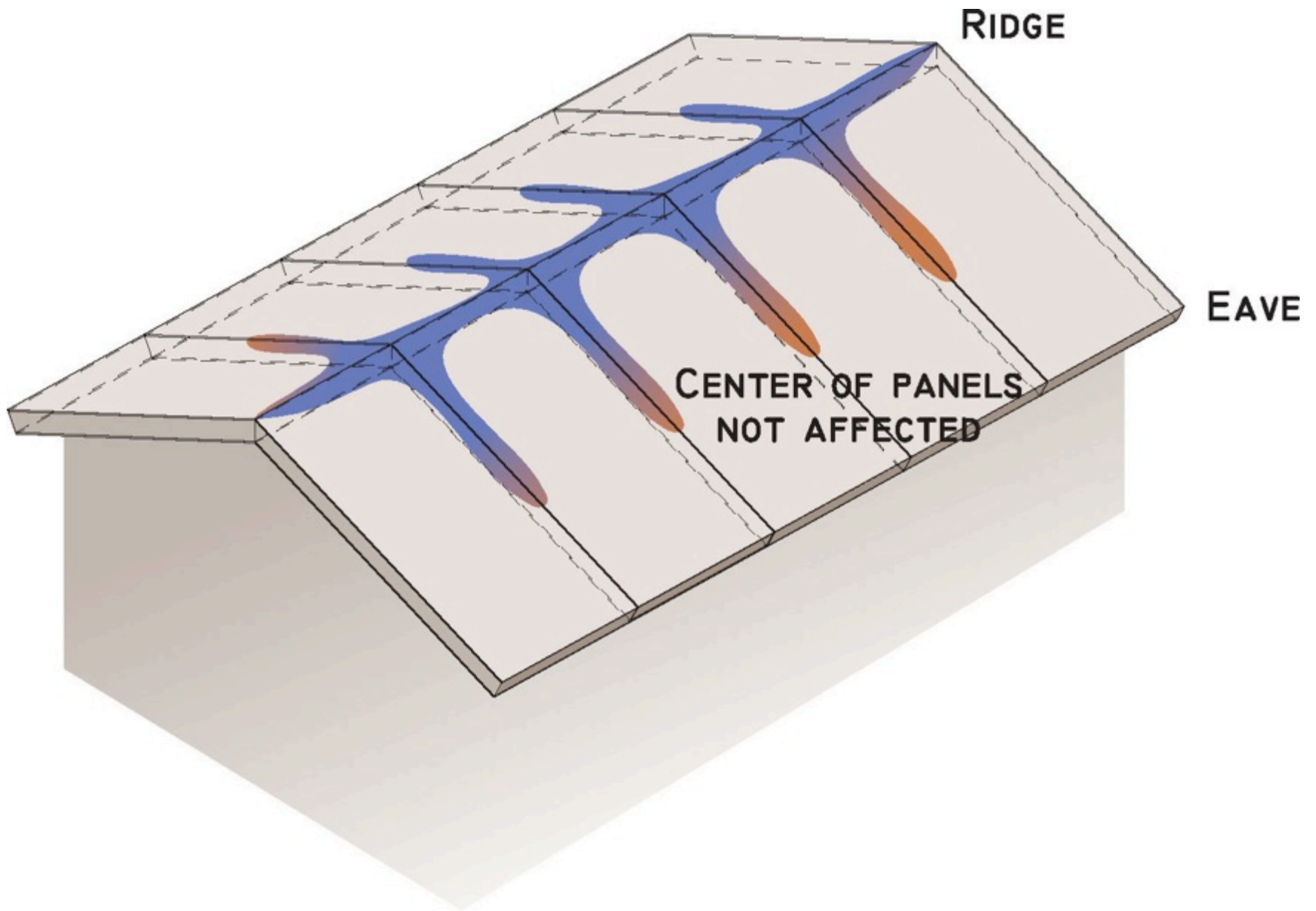














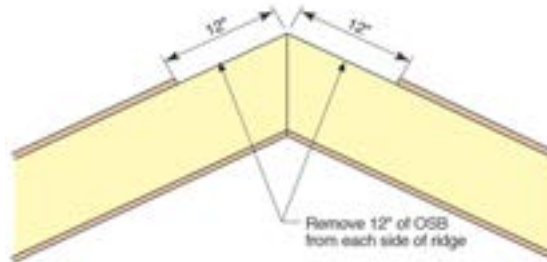






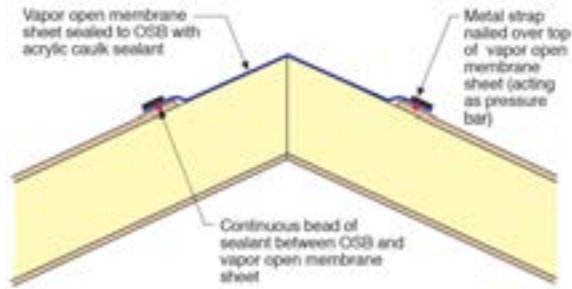
Step 1

- Remove strip of OSB from each side of ridge



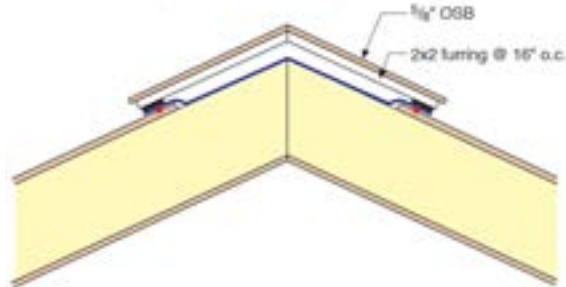
Step 2

- 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



















An Oops....That Became A Gift....





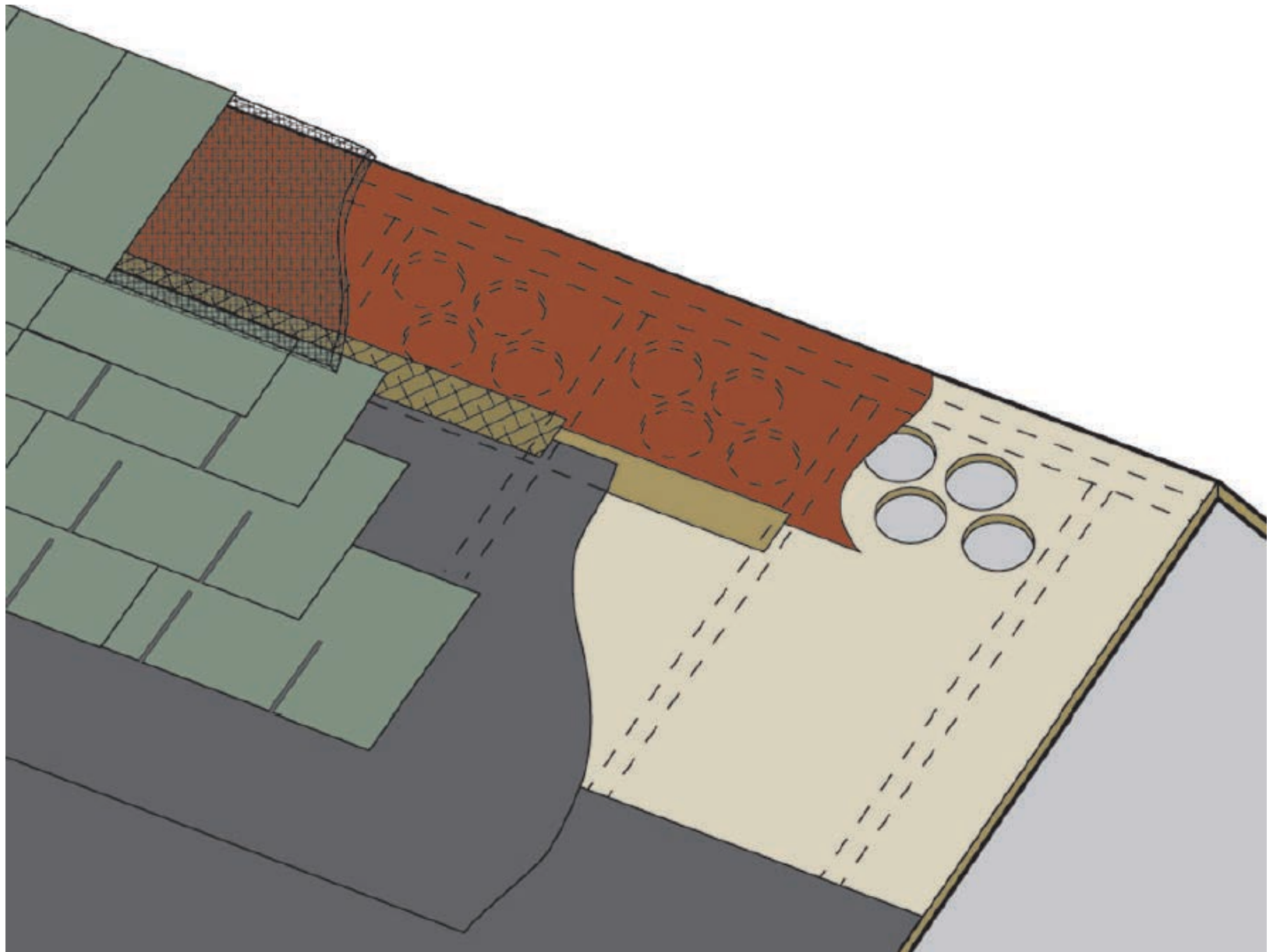


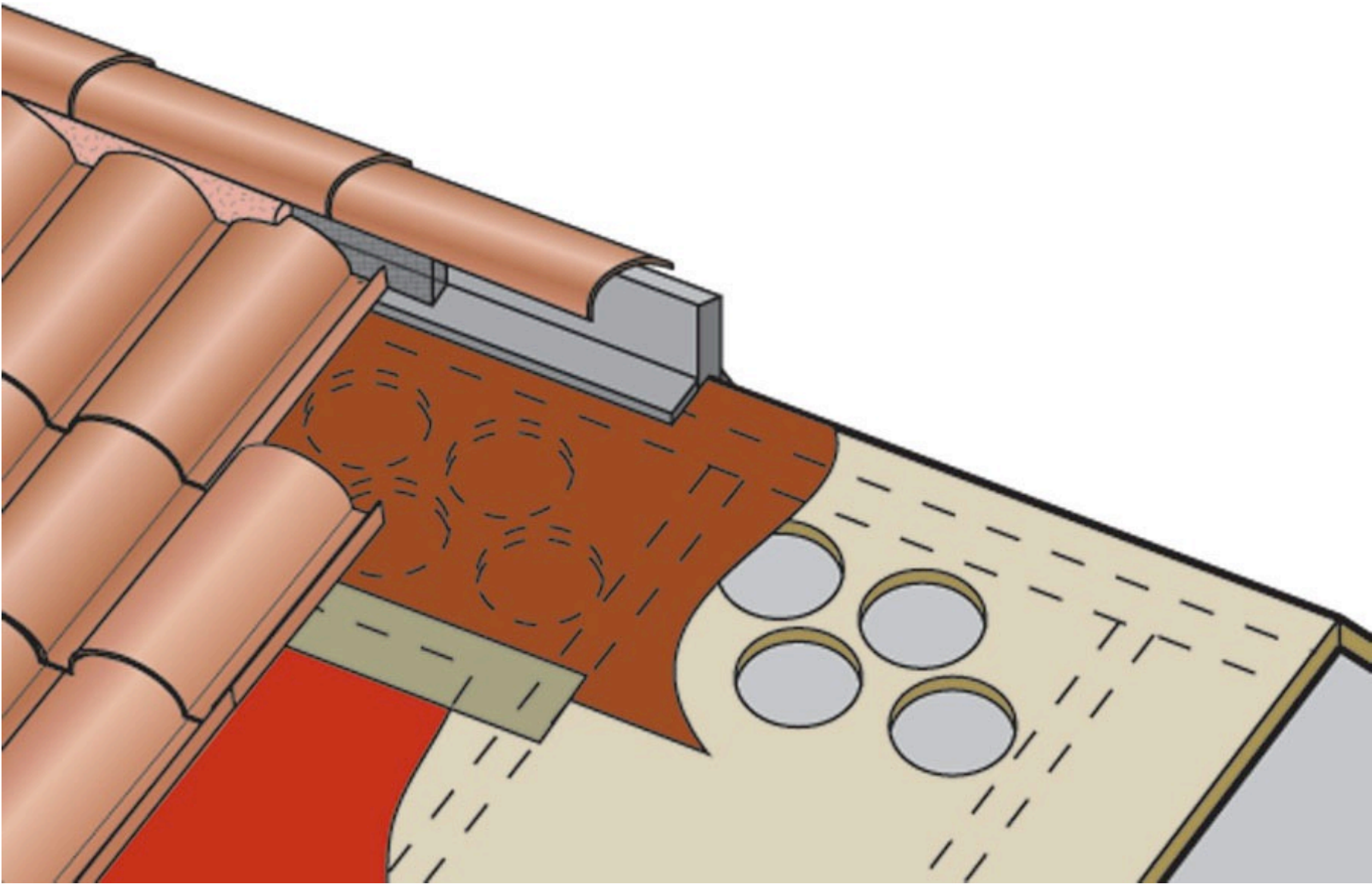
Failures Lead To Success

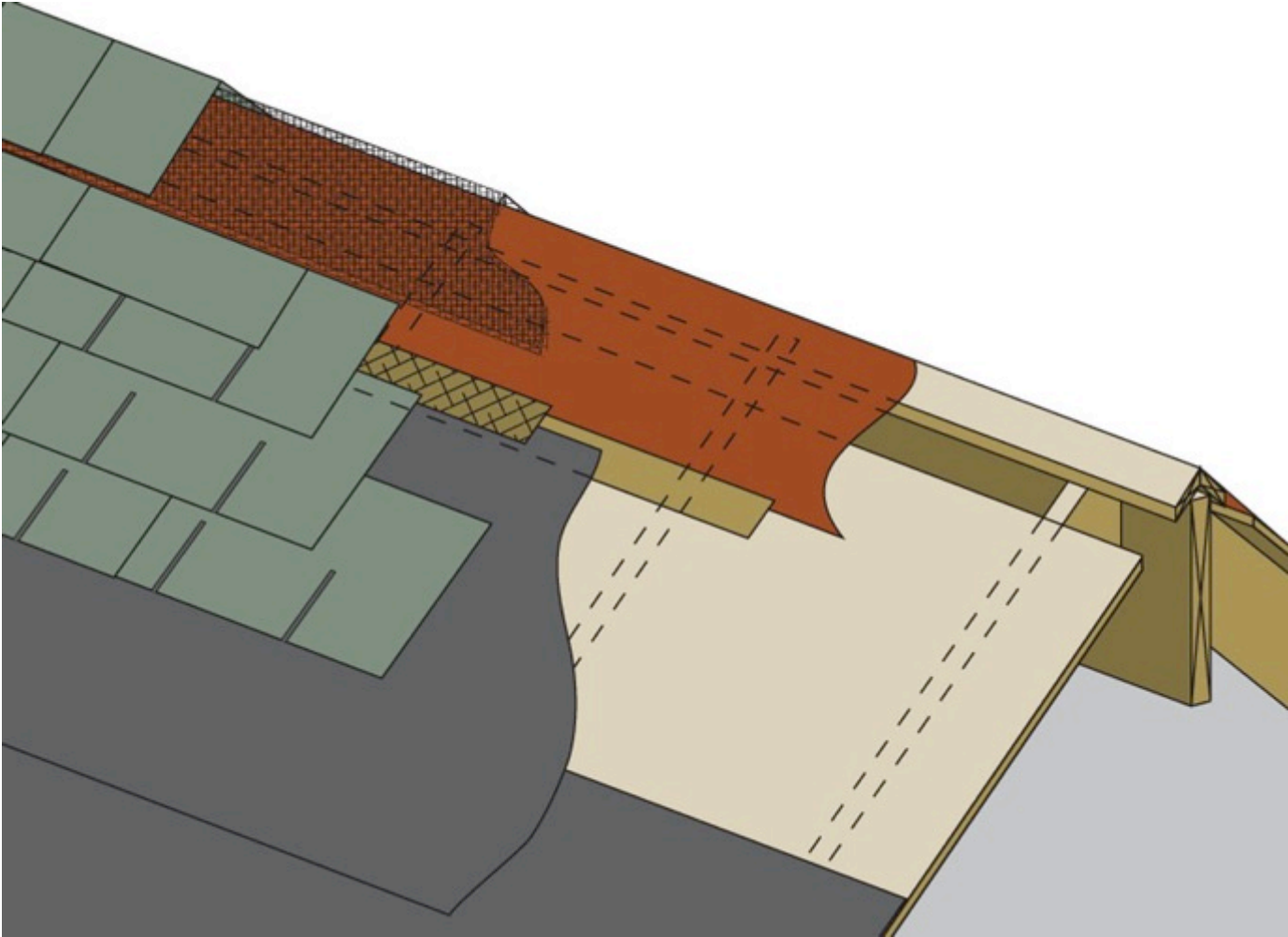


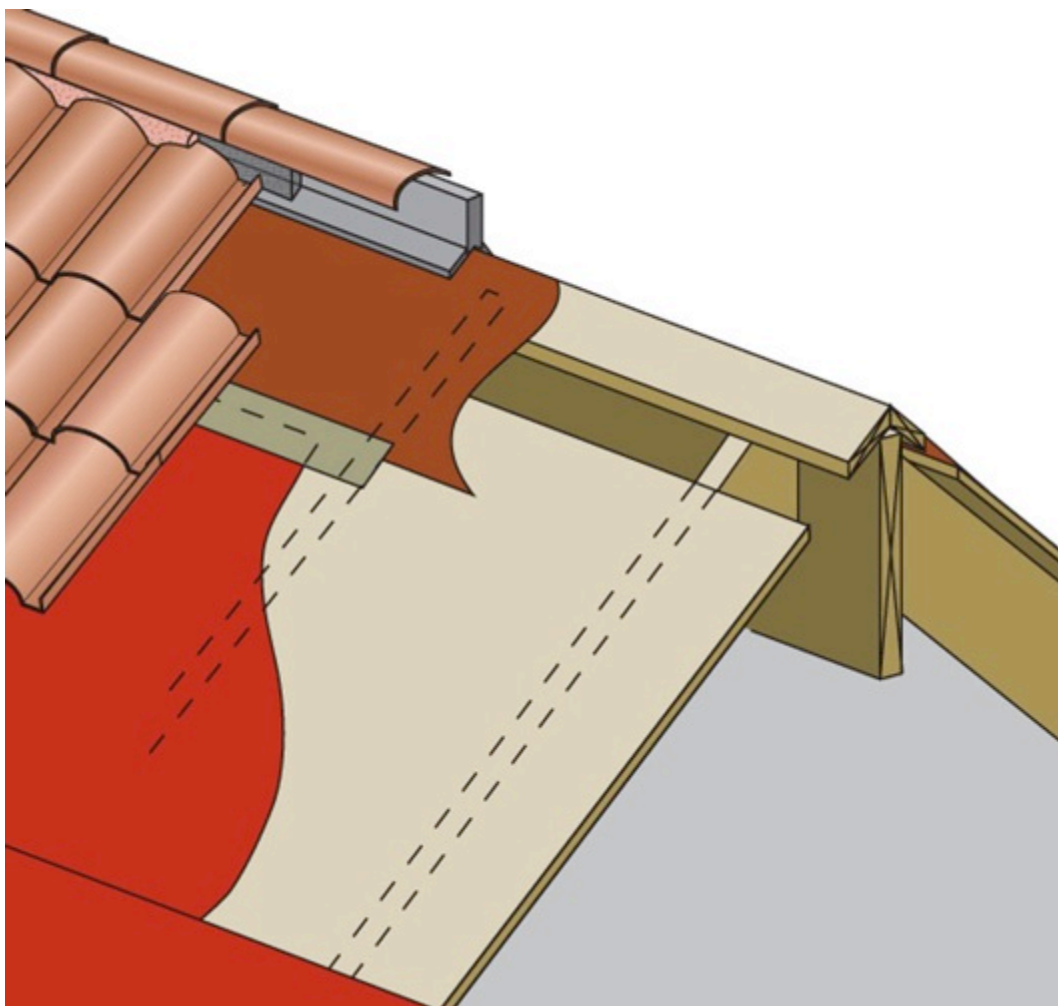


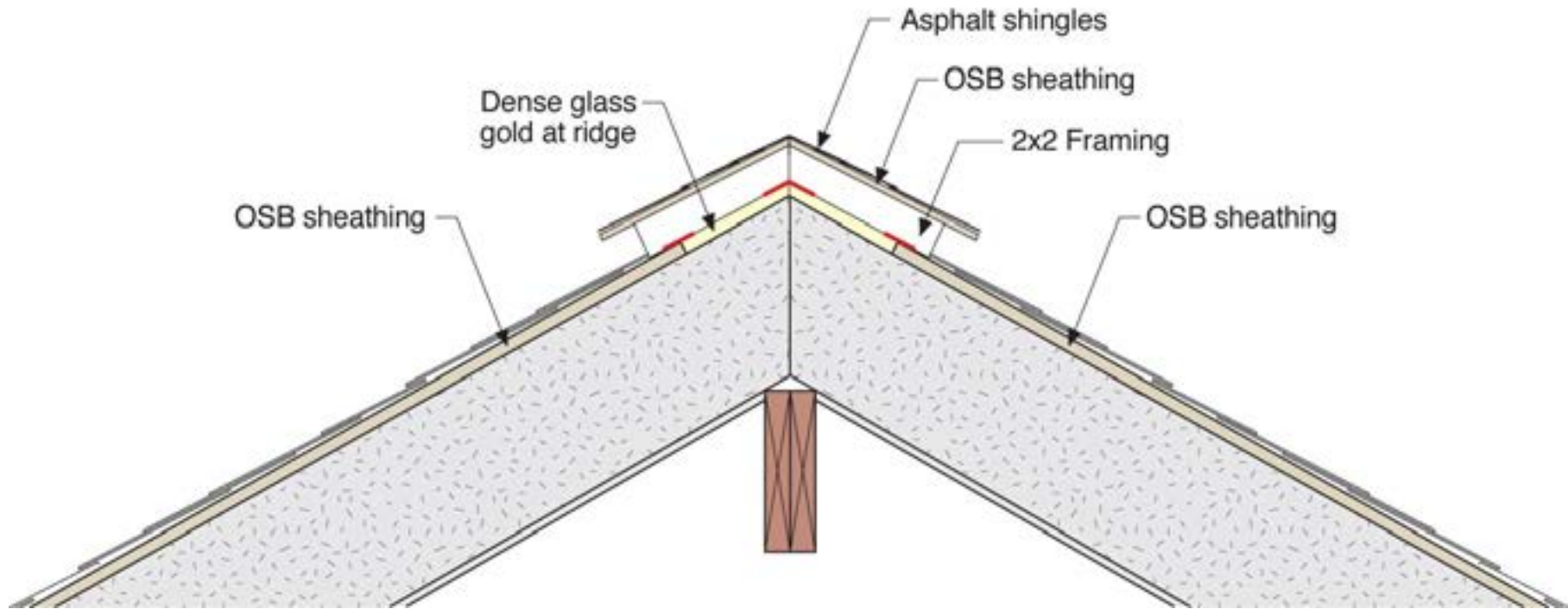




















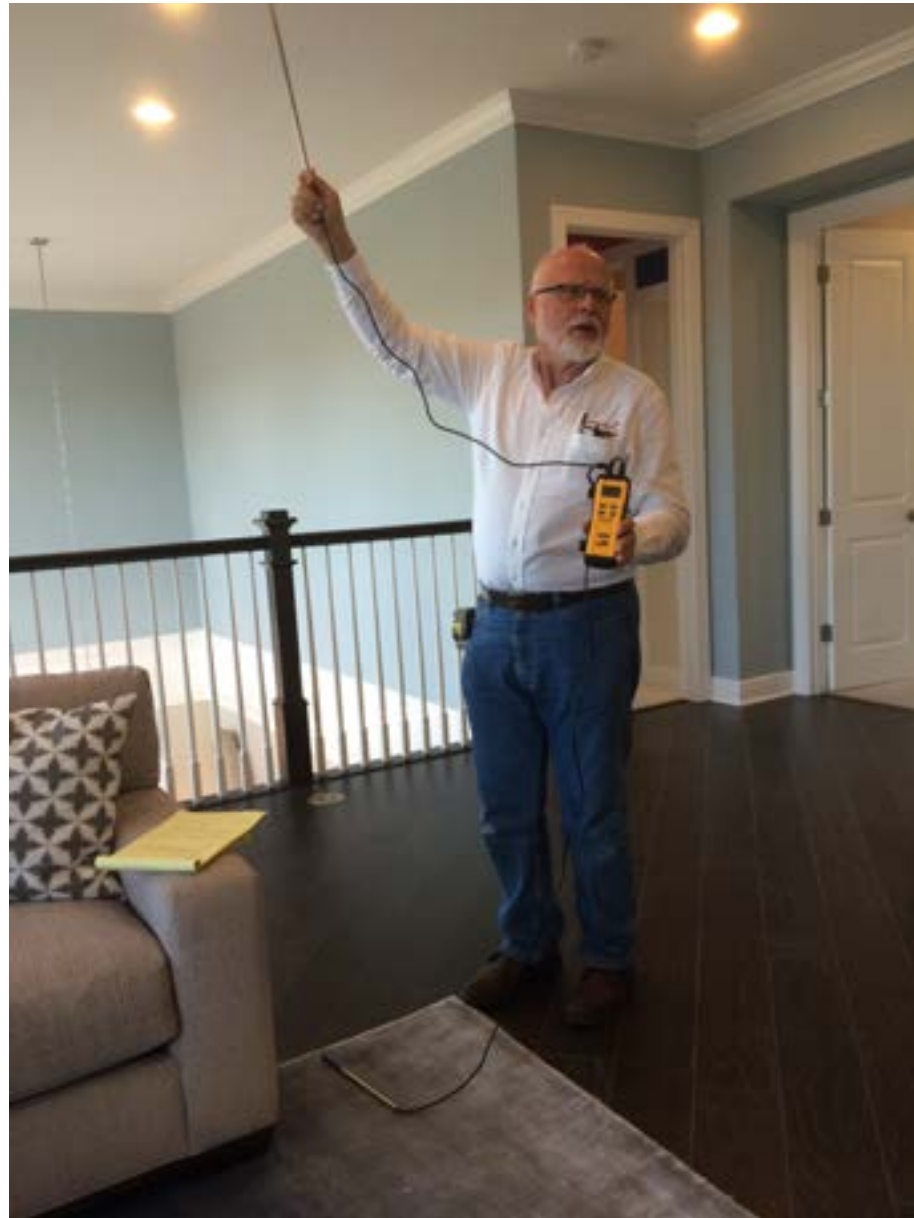








Hygric Buoyancy





Ratios

1:150

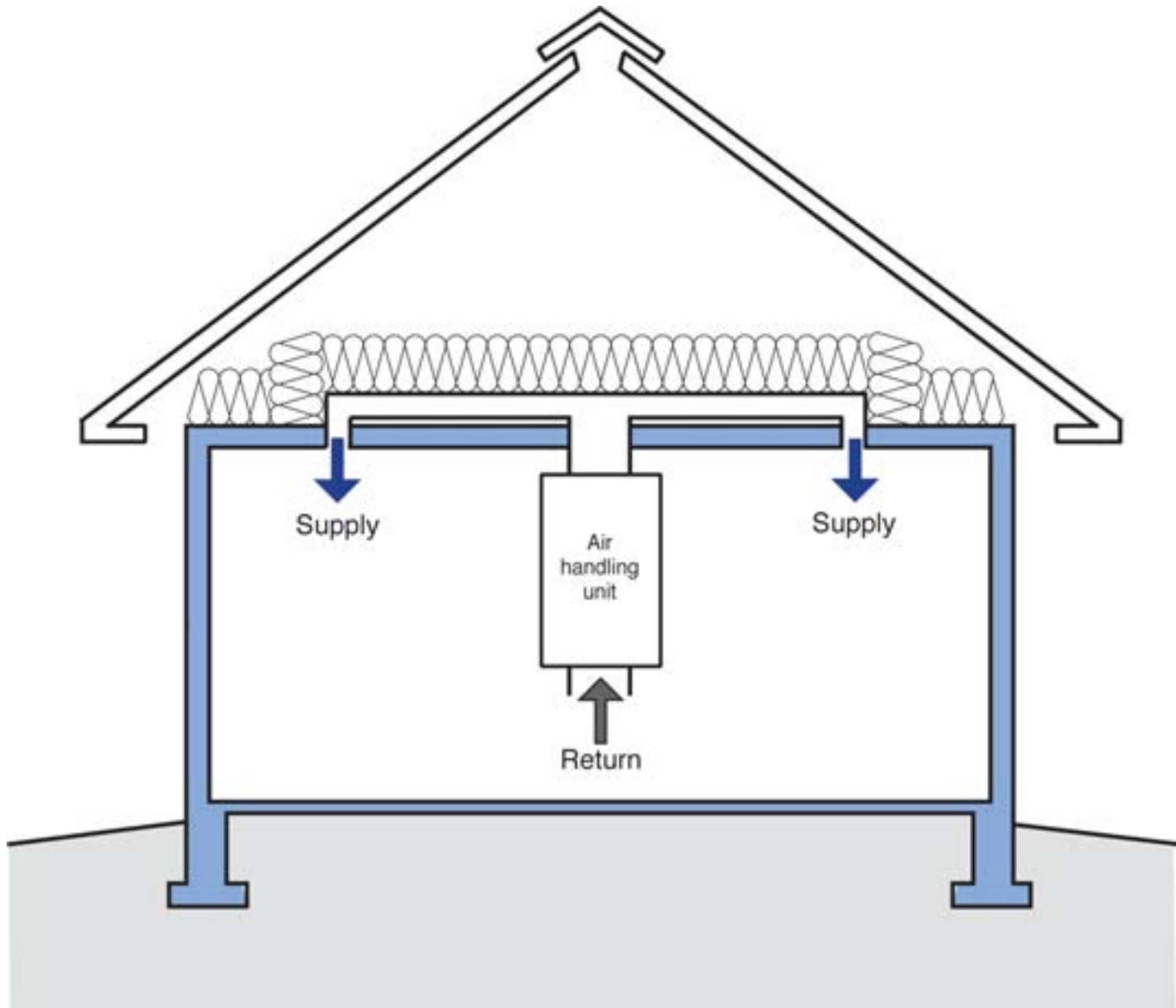
1:300

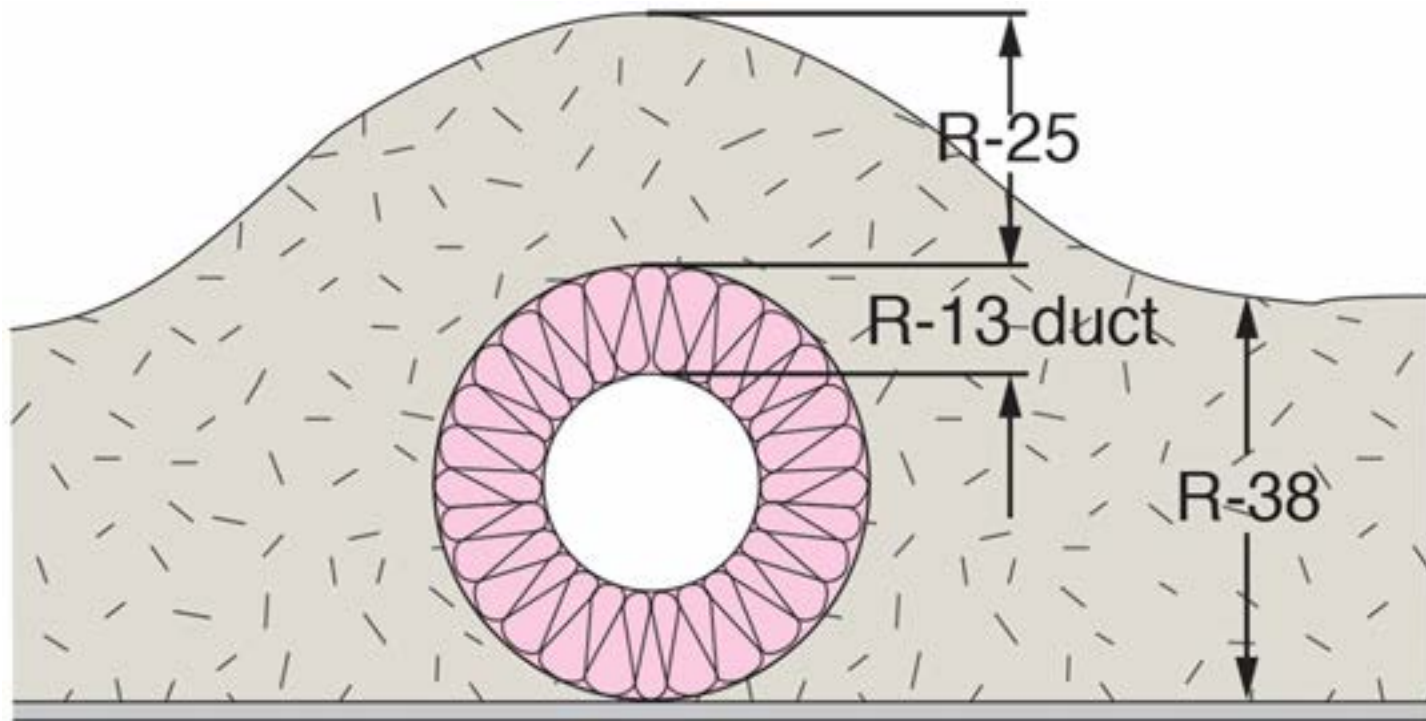
1:600

Conditioned Attics Not Unvented Attics
Need Supply Air
50 cfm/1000 ft² of Attic

Or
Dehumidification

Burying Ducts

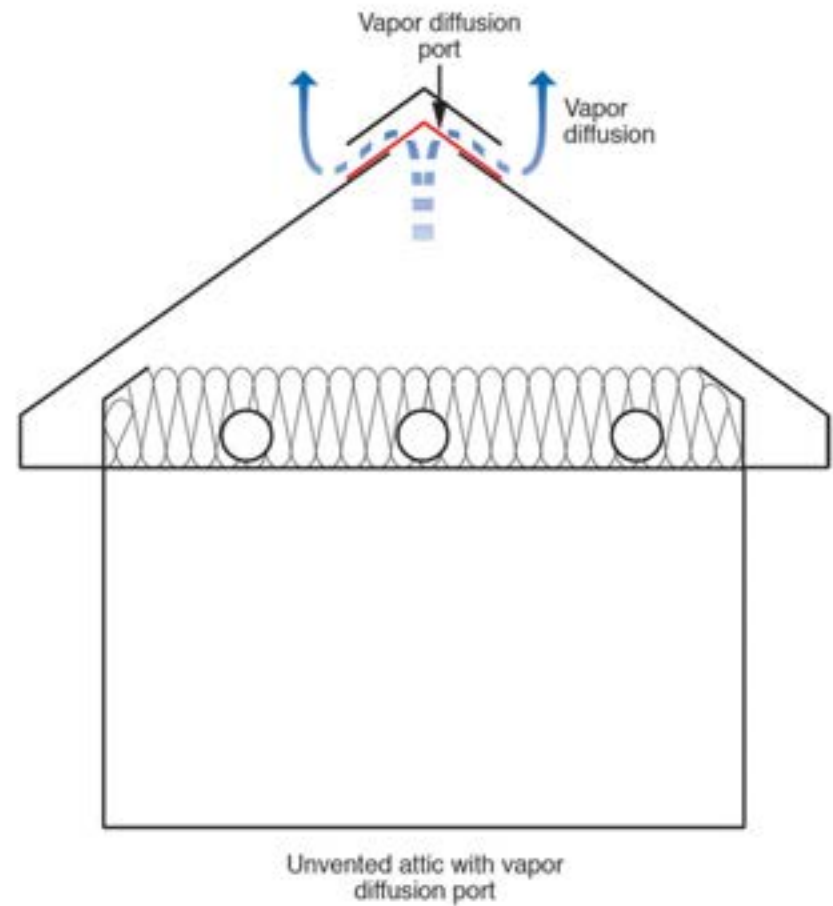
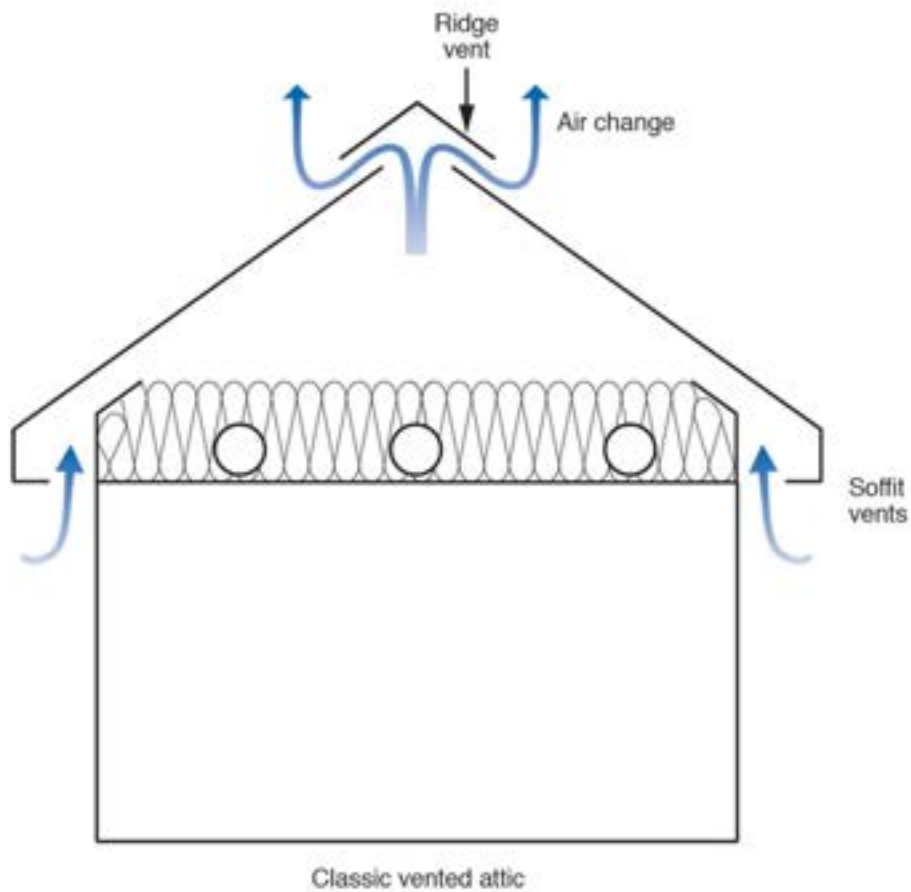




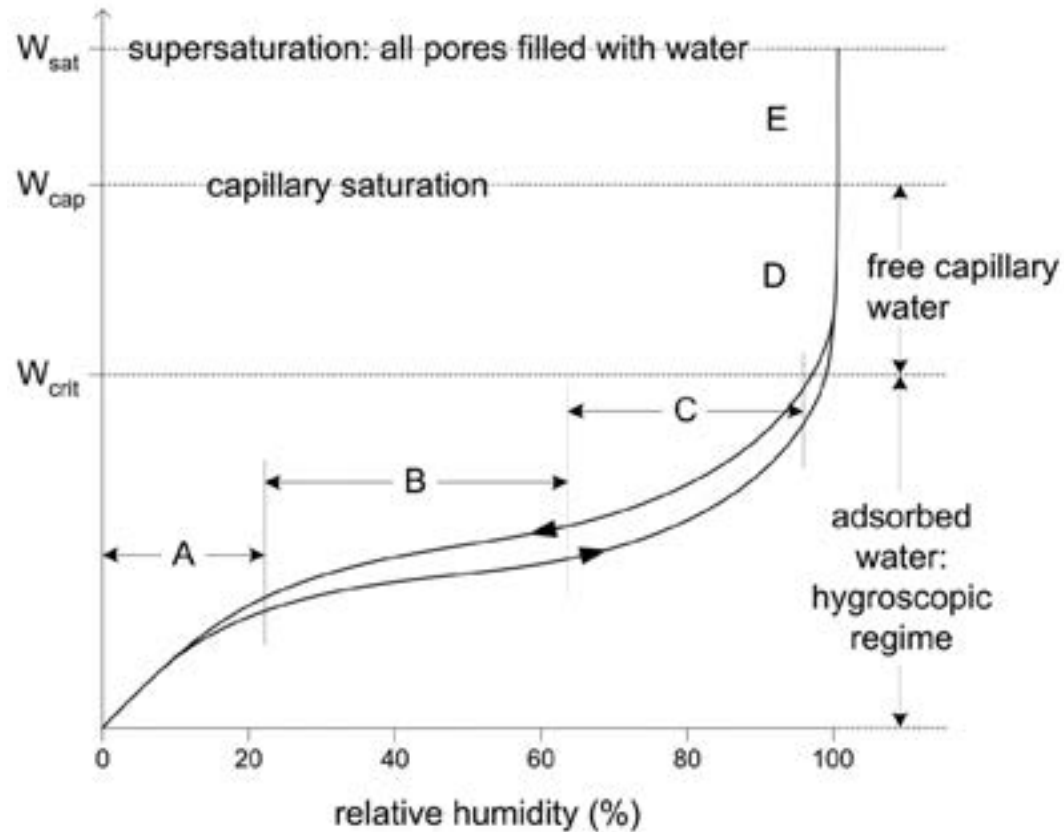






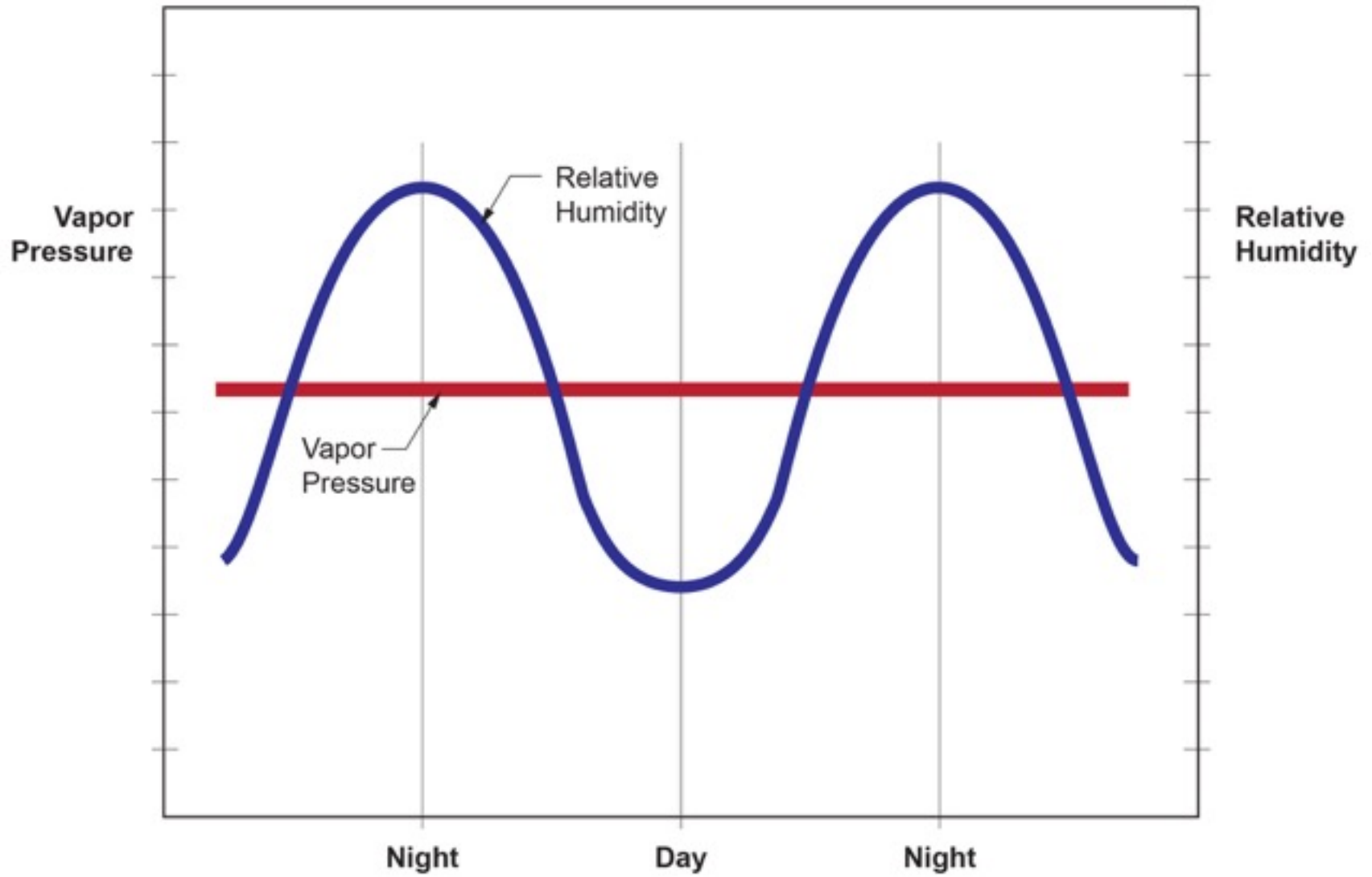


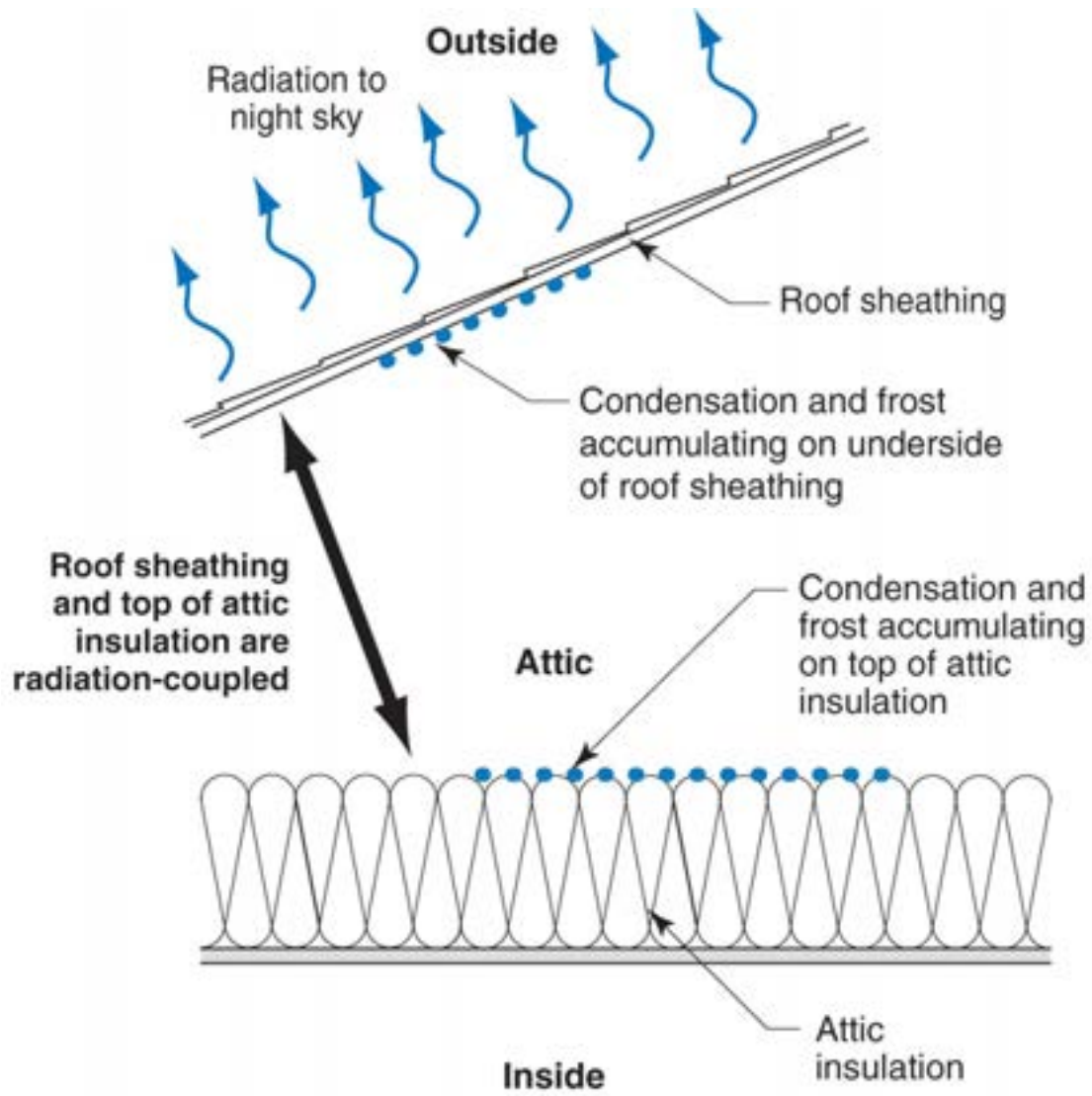
Vancouver Mold



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- E: Supersaturated Regime

Regimes of moisture storage in a hygroscopic porous material
 From Straube & Burnett, 2005





Where It Started.....



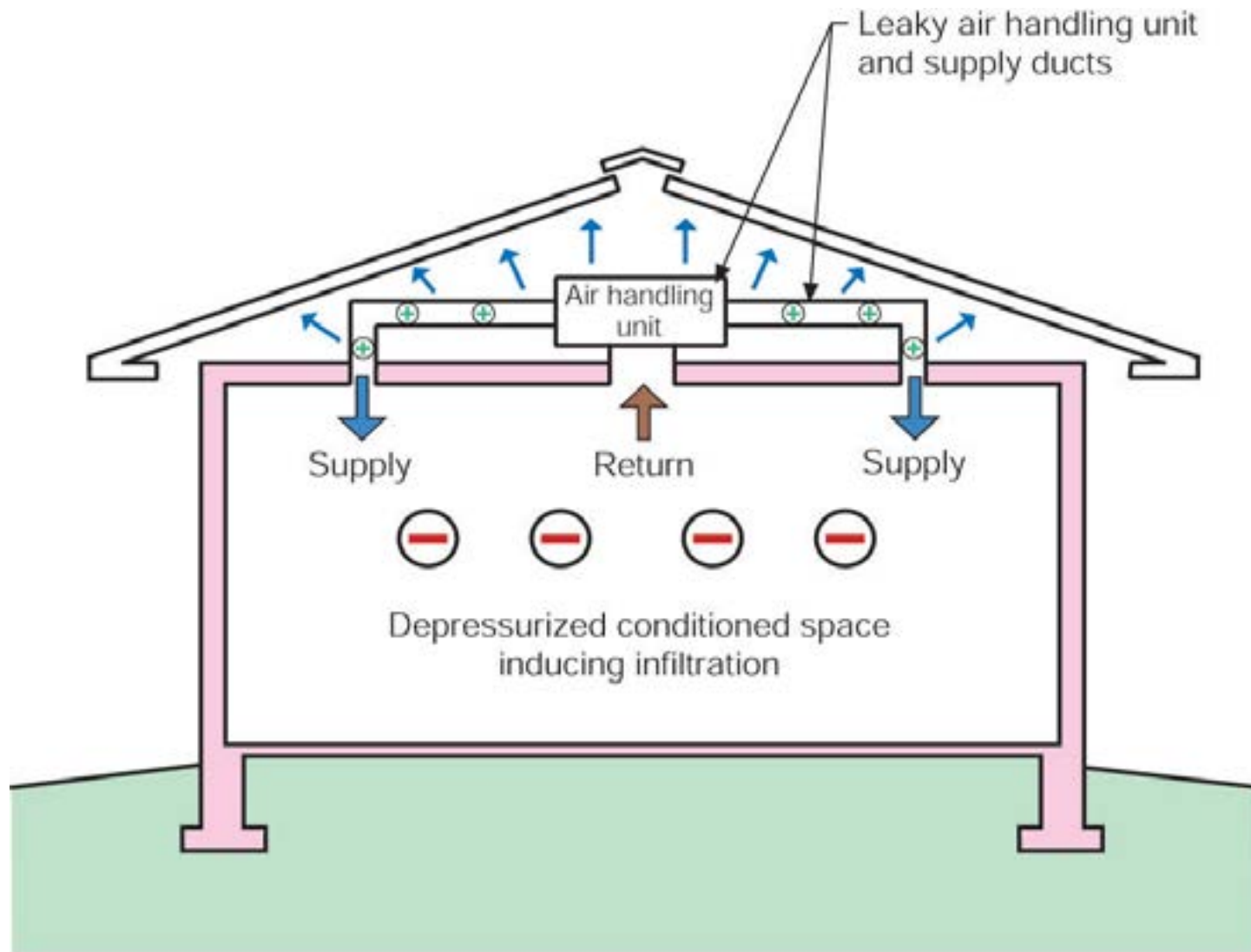




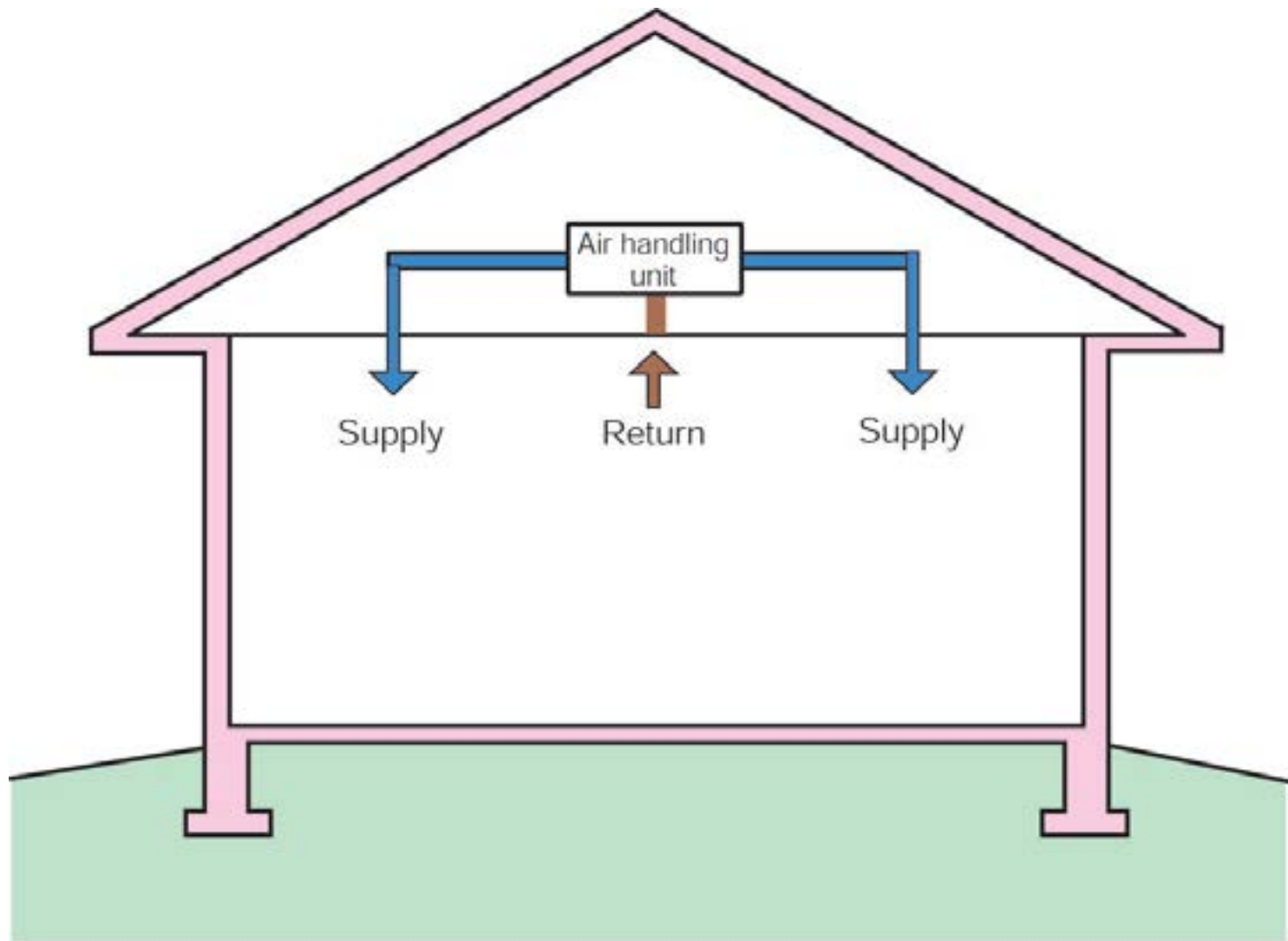








Note: Colored shading depicts the building's thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.



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