

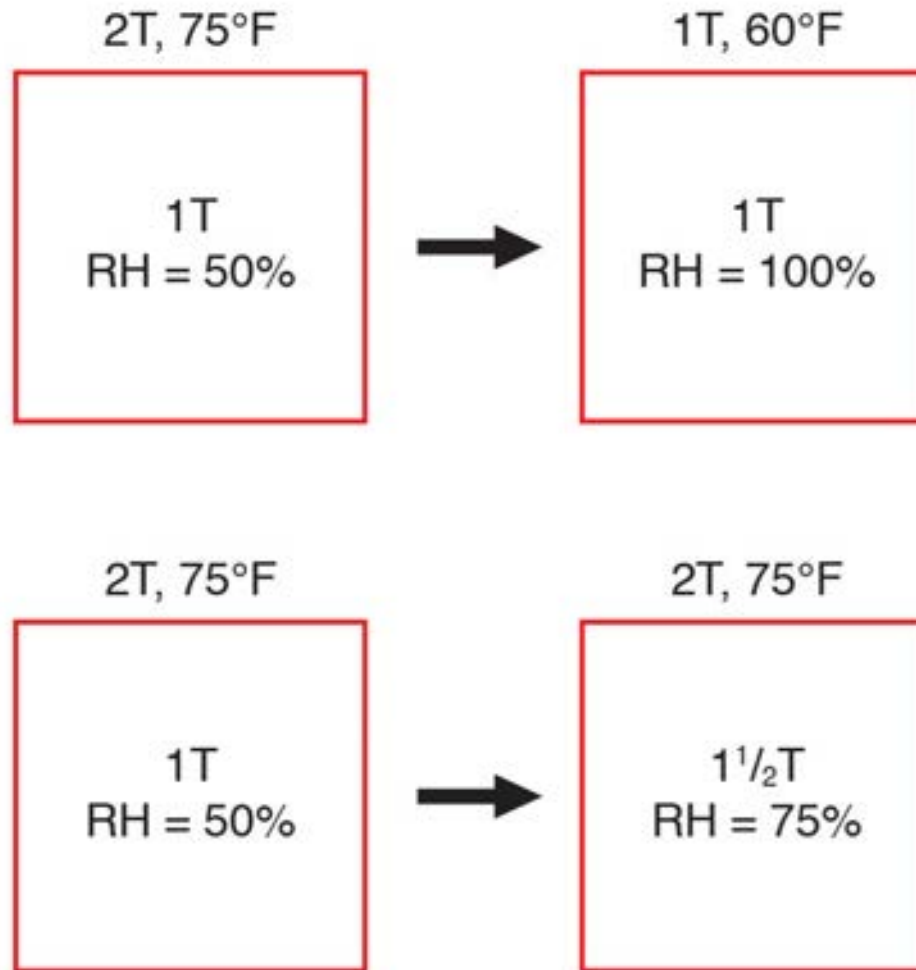
Joseph Lstiburek, Ph.D., P.Eng, ASHRAE Fellow

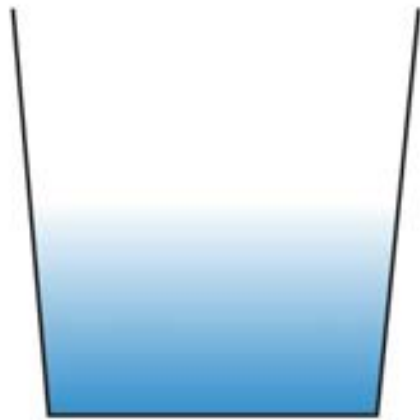
Building Science

Adventures In Building Science

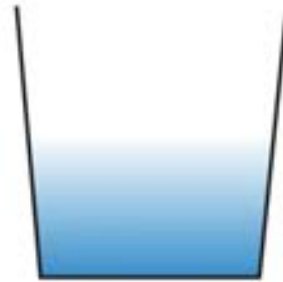
www.buildingscience.com

Vapor Pressure and Relative Humidity





90°F
50% RH



75°F
50% RH



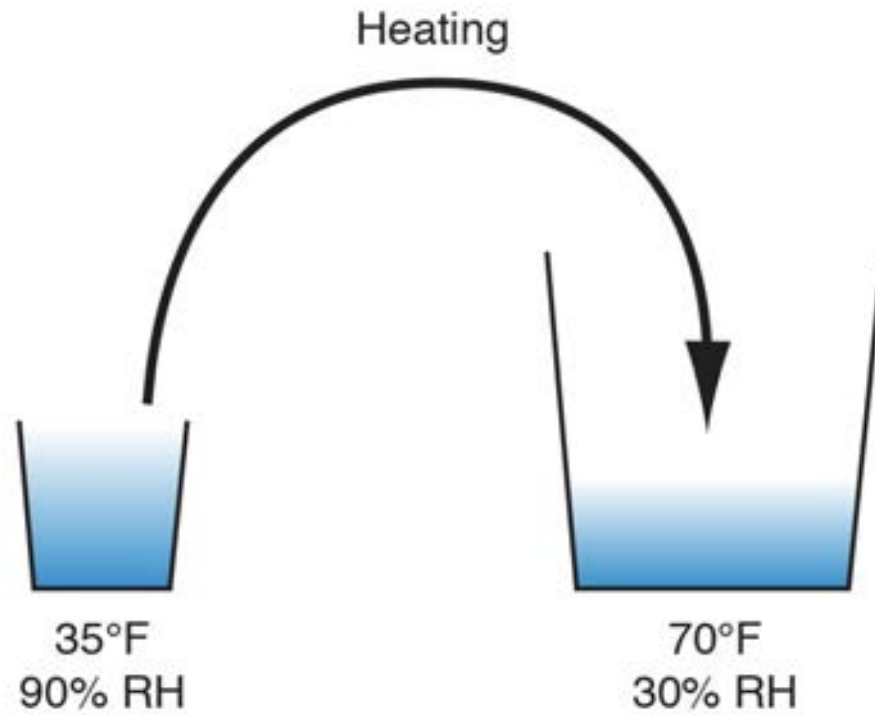
60°F
50% RH

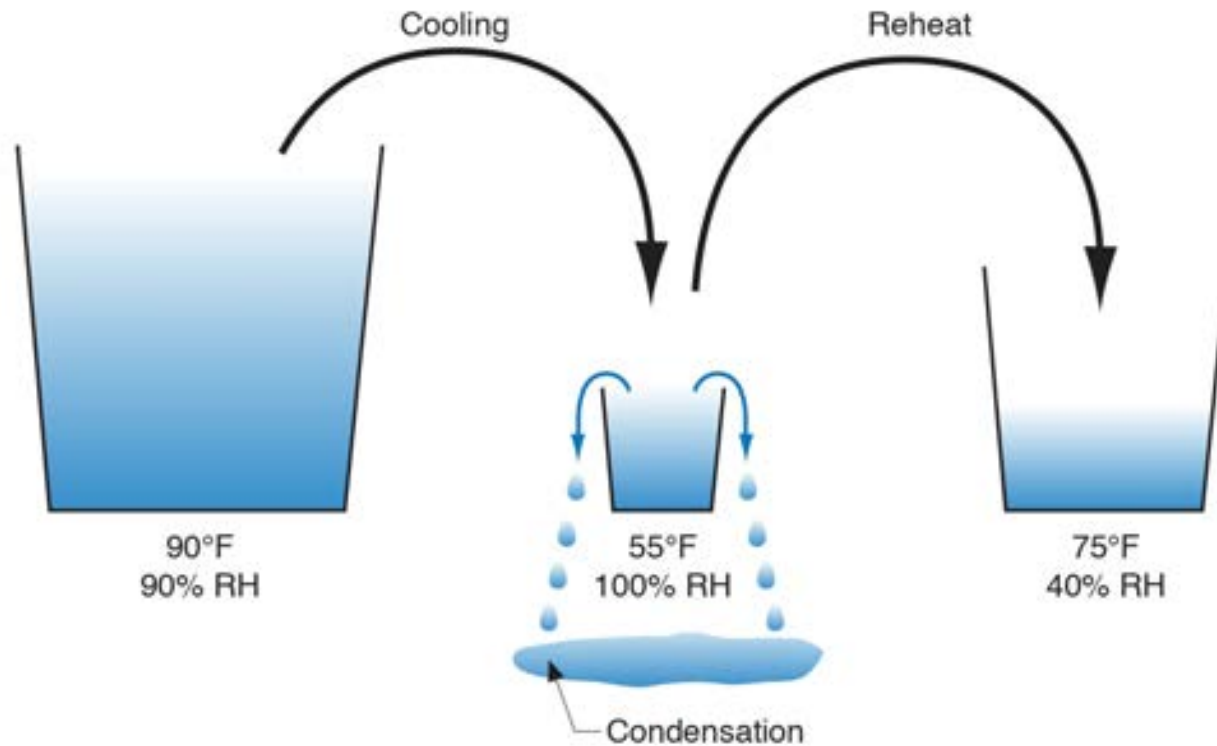


45°F
50% RH



30°F
50% RH







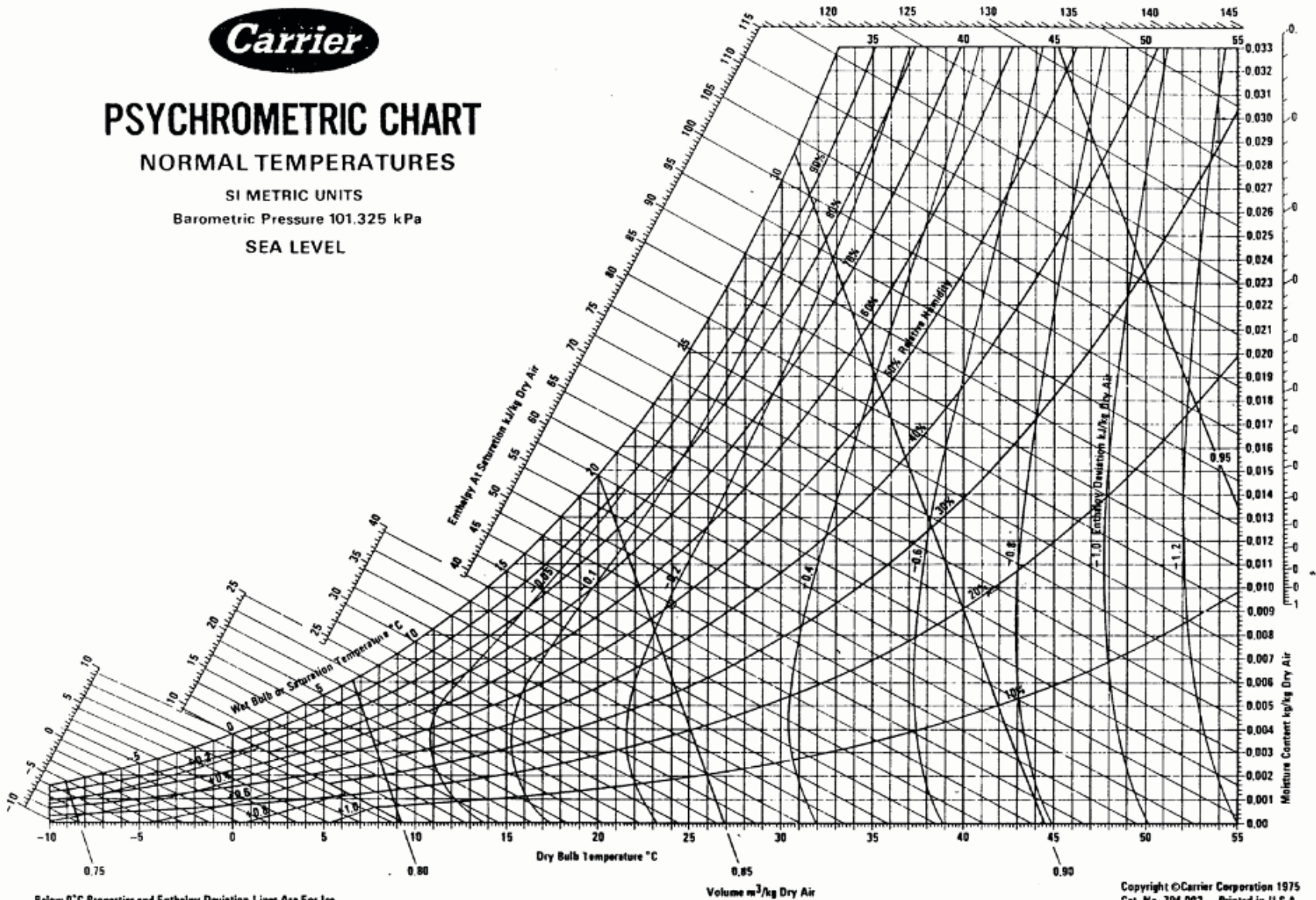
PSYCHROMETRIC CHART

NORMAL TEMPERATURES

SI METRIC UNITS

Barometric Pressure 101.325 kPa

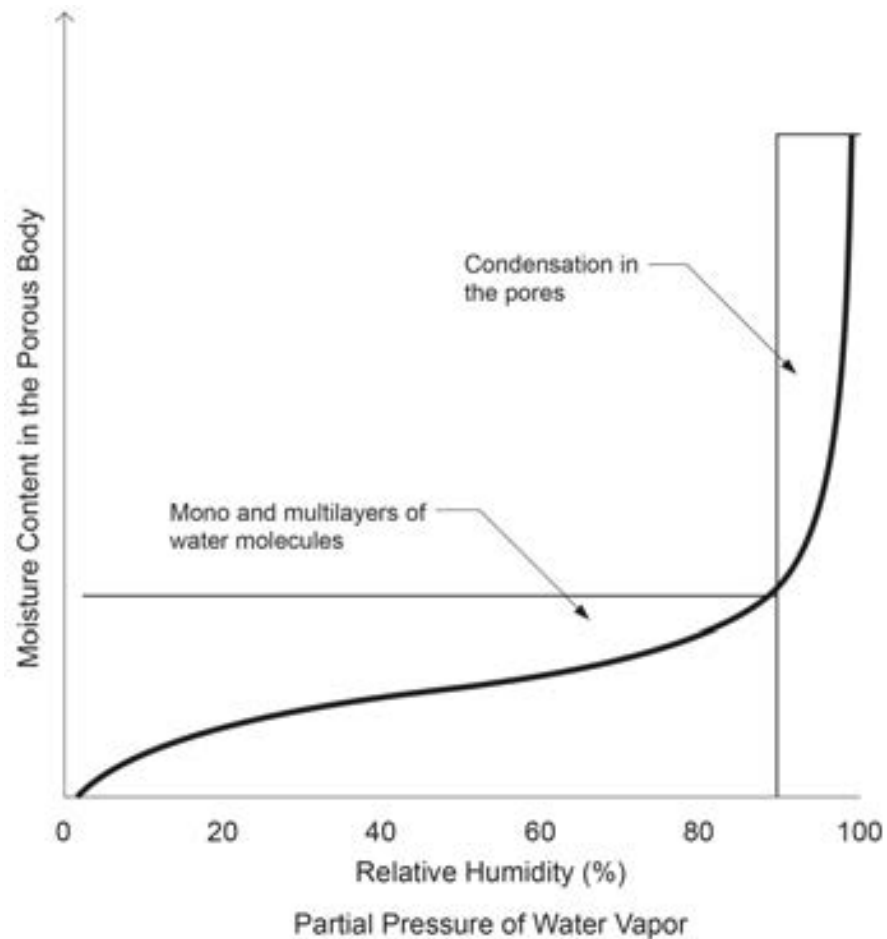
SEA LEVEL



Below 0°C Properties and Enthalpy Deviation Lines Are For Ice

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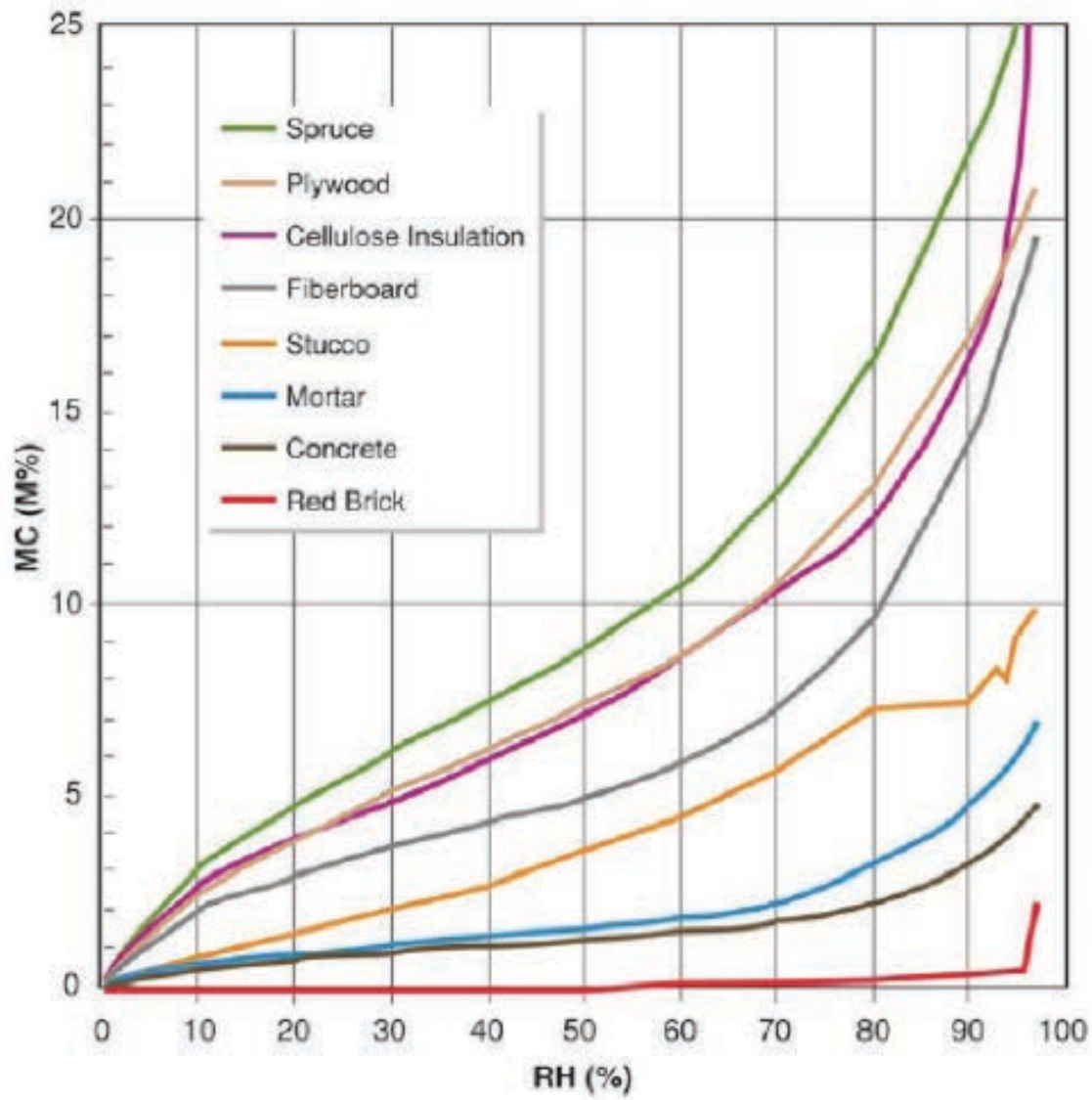
Sorption Isotherms



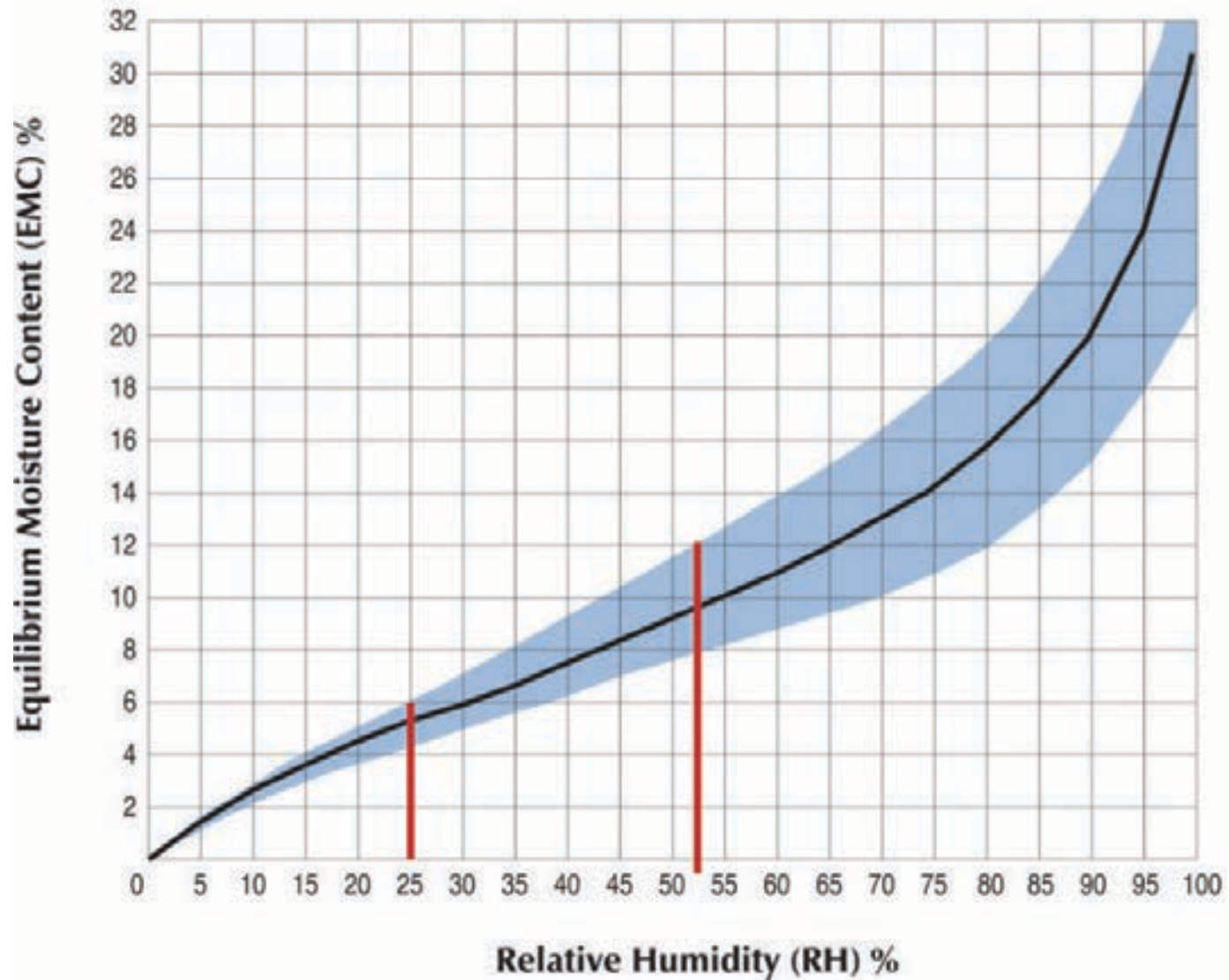
Change in the storage of moisture in a porous building material as the partial pressure of water vapor in the ambient air increases from zero to full saturation value at a given temperature.

Sorption Curve

From M.K. Kumaran, ASTM MNL 18-2nd Edition,
Moisture Control in Buildings, 2009



Moisture Content vs. Relative Humidity



2nd Law of Thermodynamics

Heat Flow Is From Warm To Cold

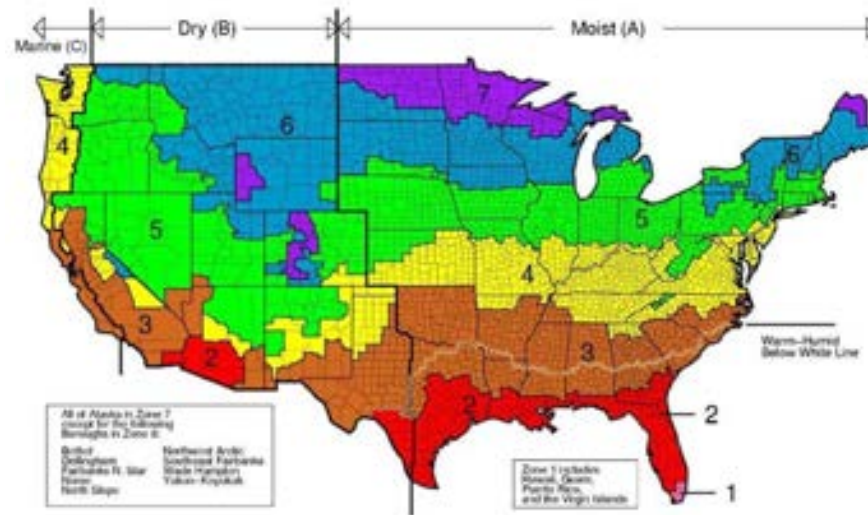
Moisture Flow Is From Warm To Cold

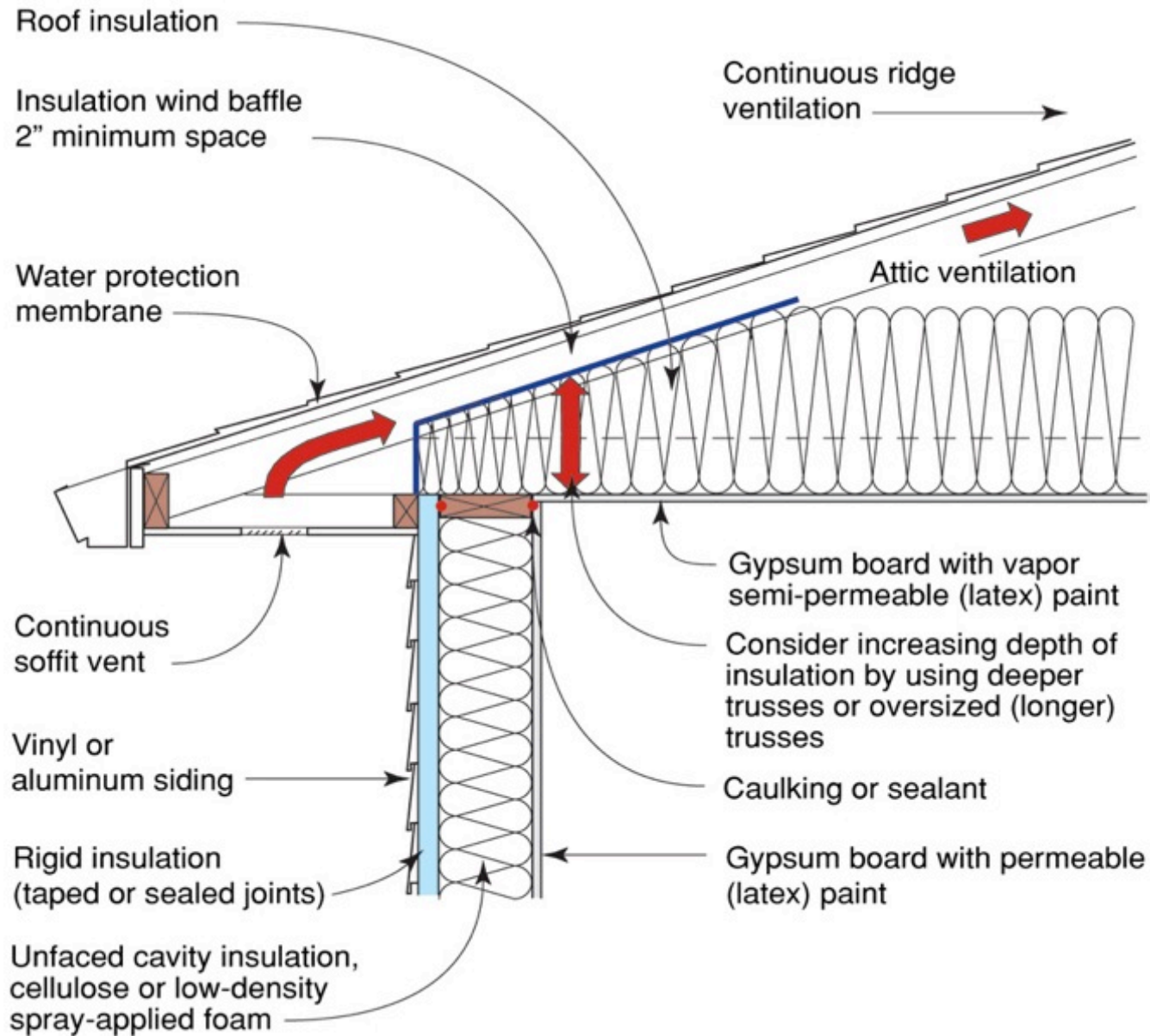
Moisture Flow Is From More To Less

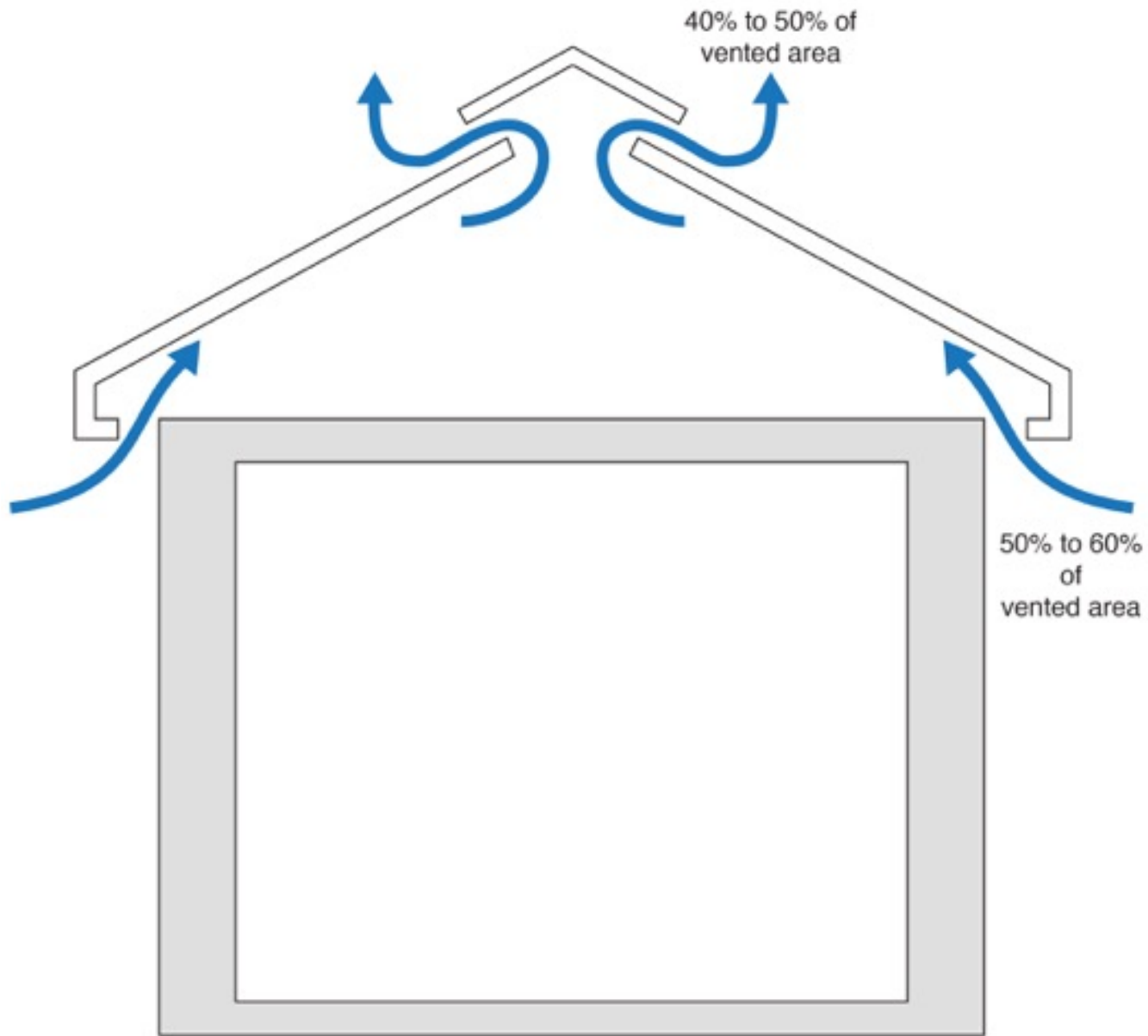
Air Flow Is From A Higher Pressure to a
Lower Pressure

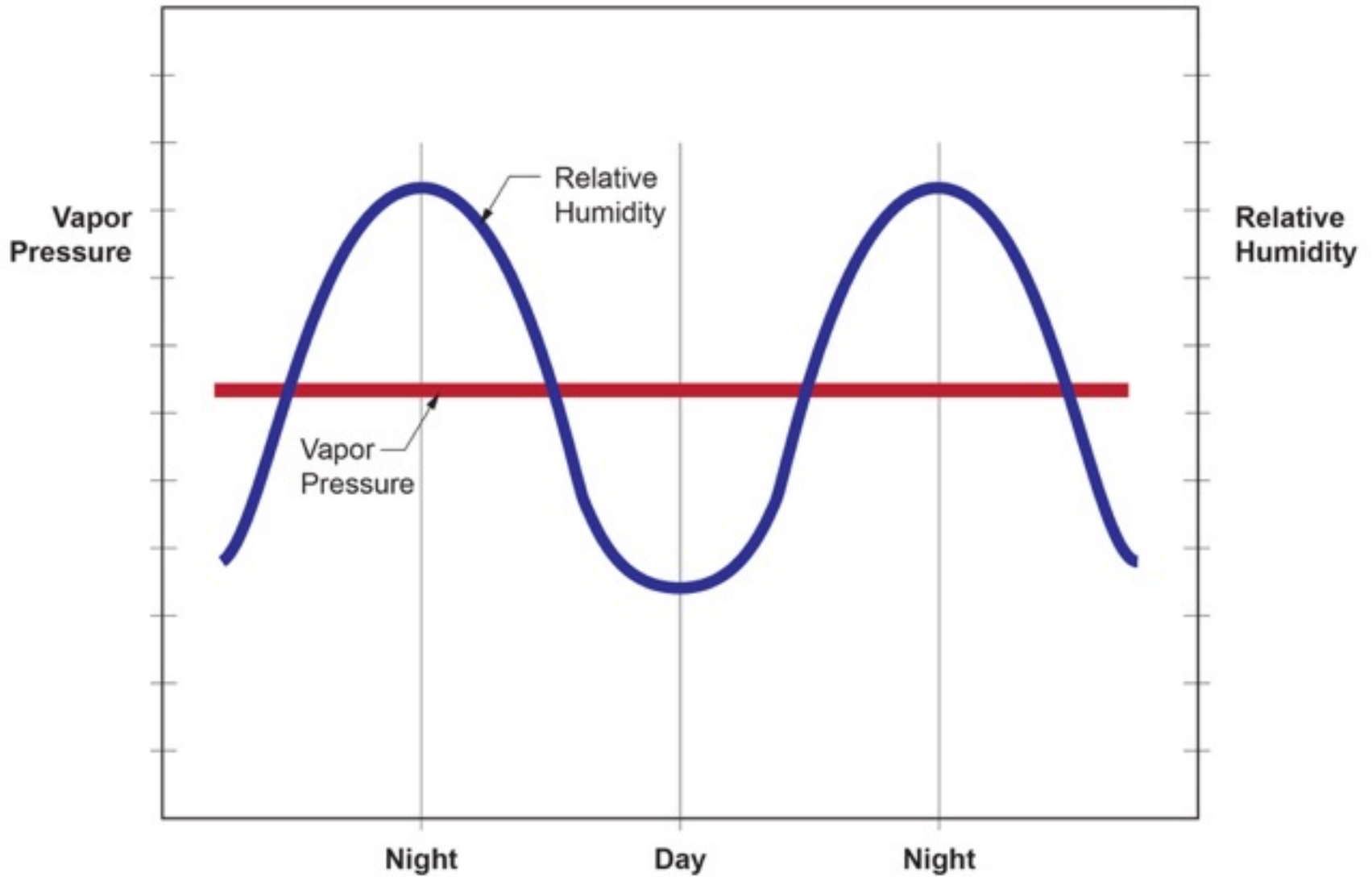
Gravity Acts Down



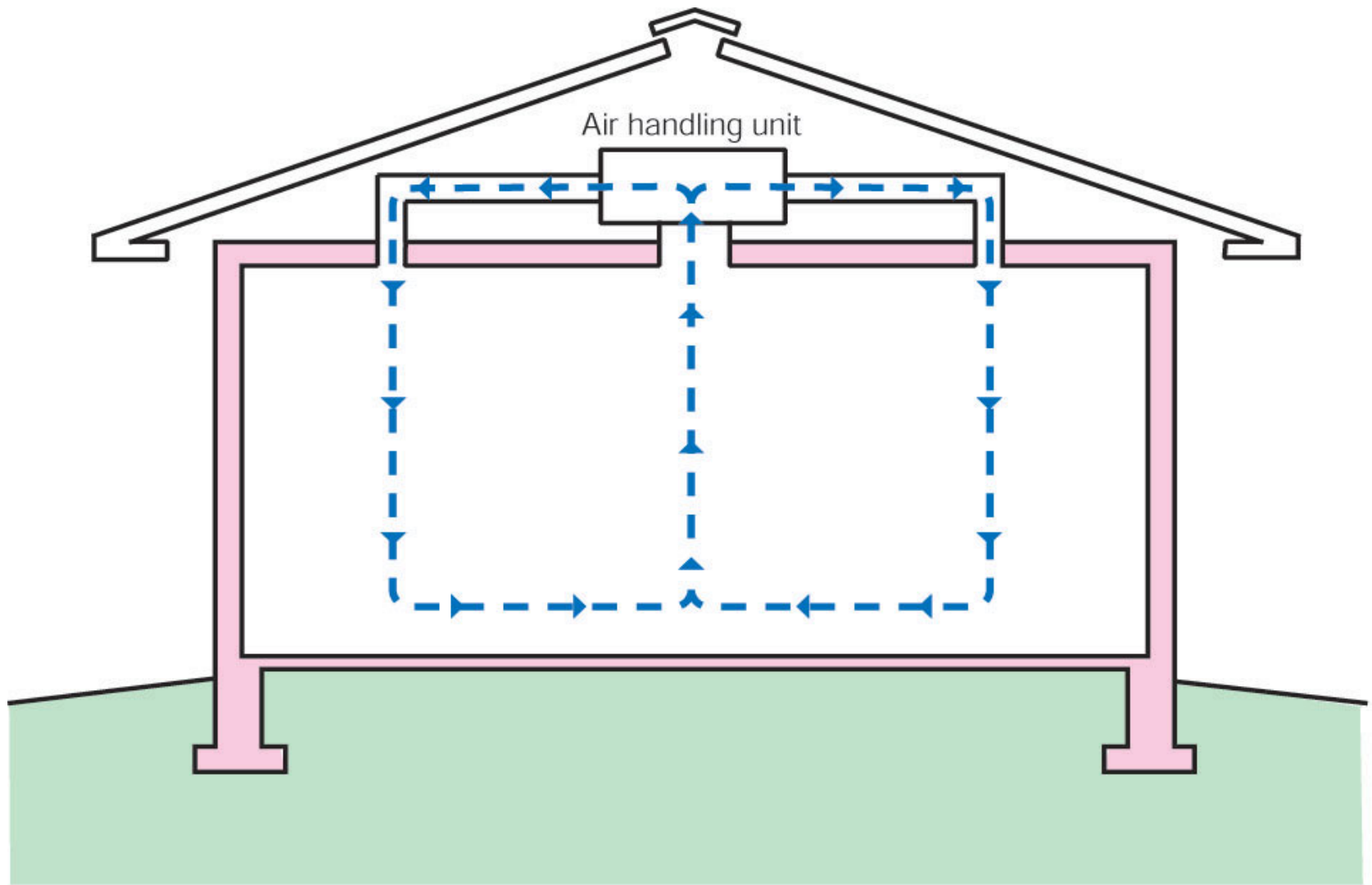




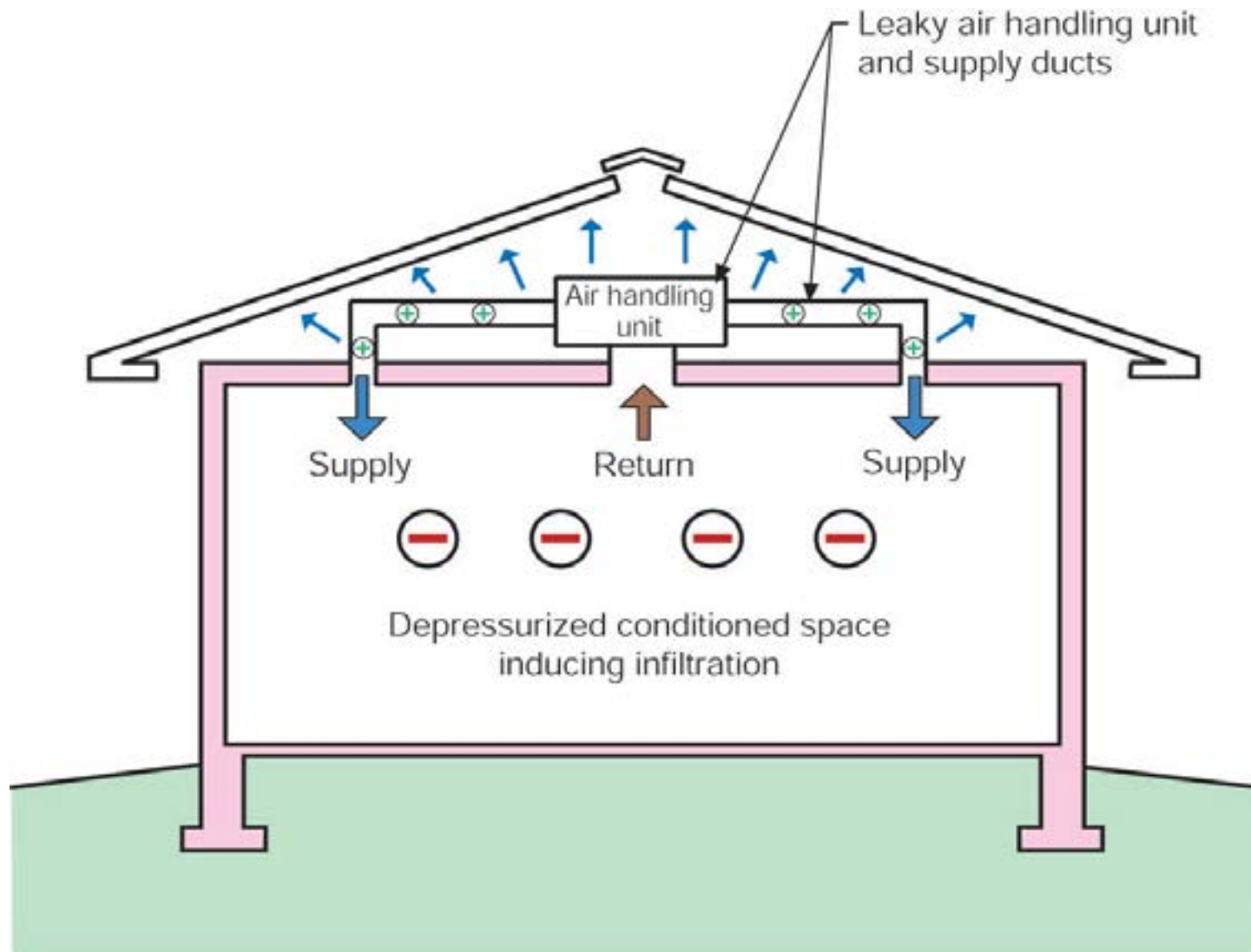




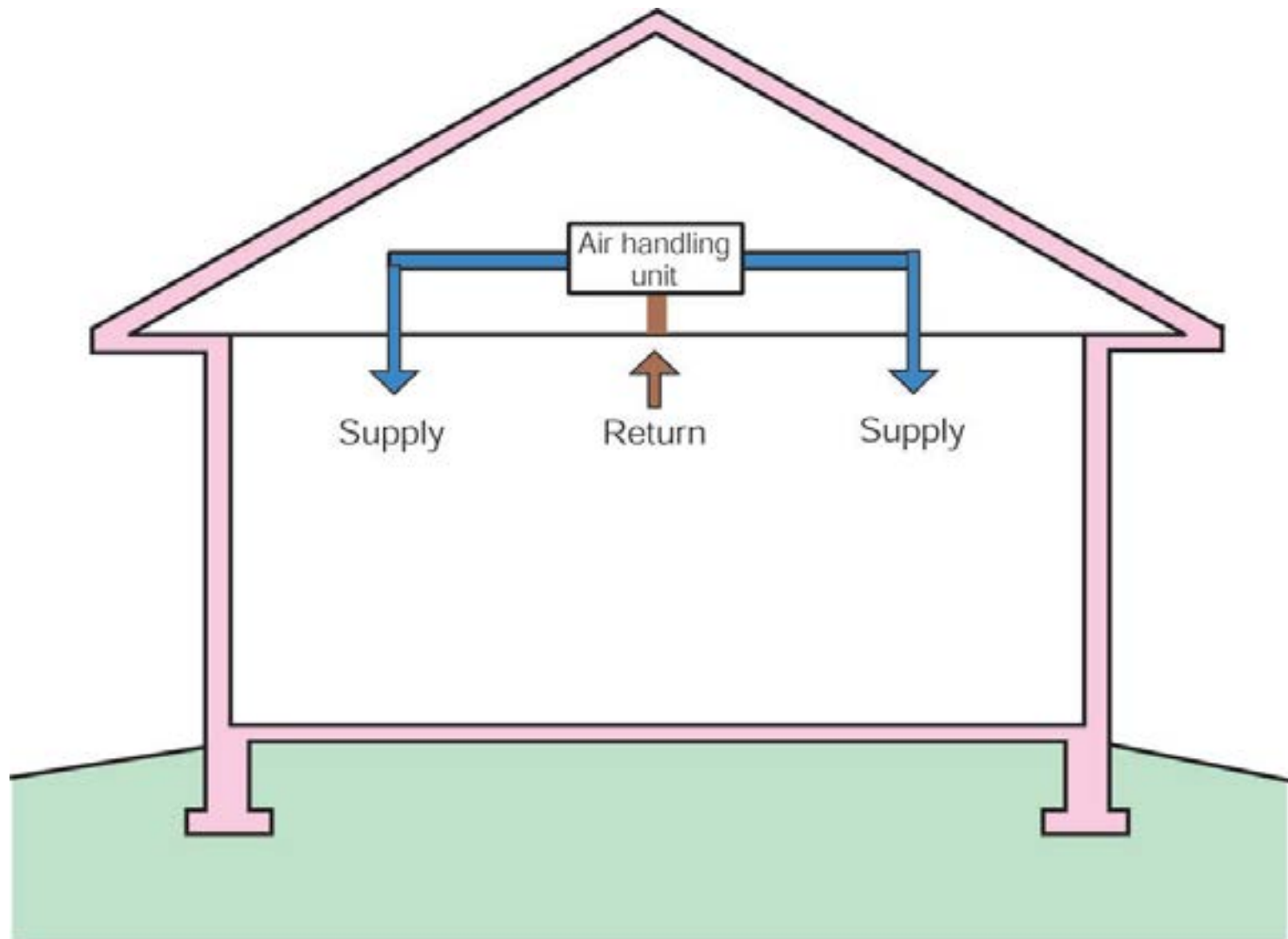




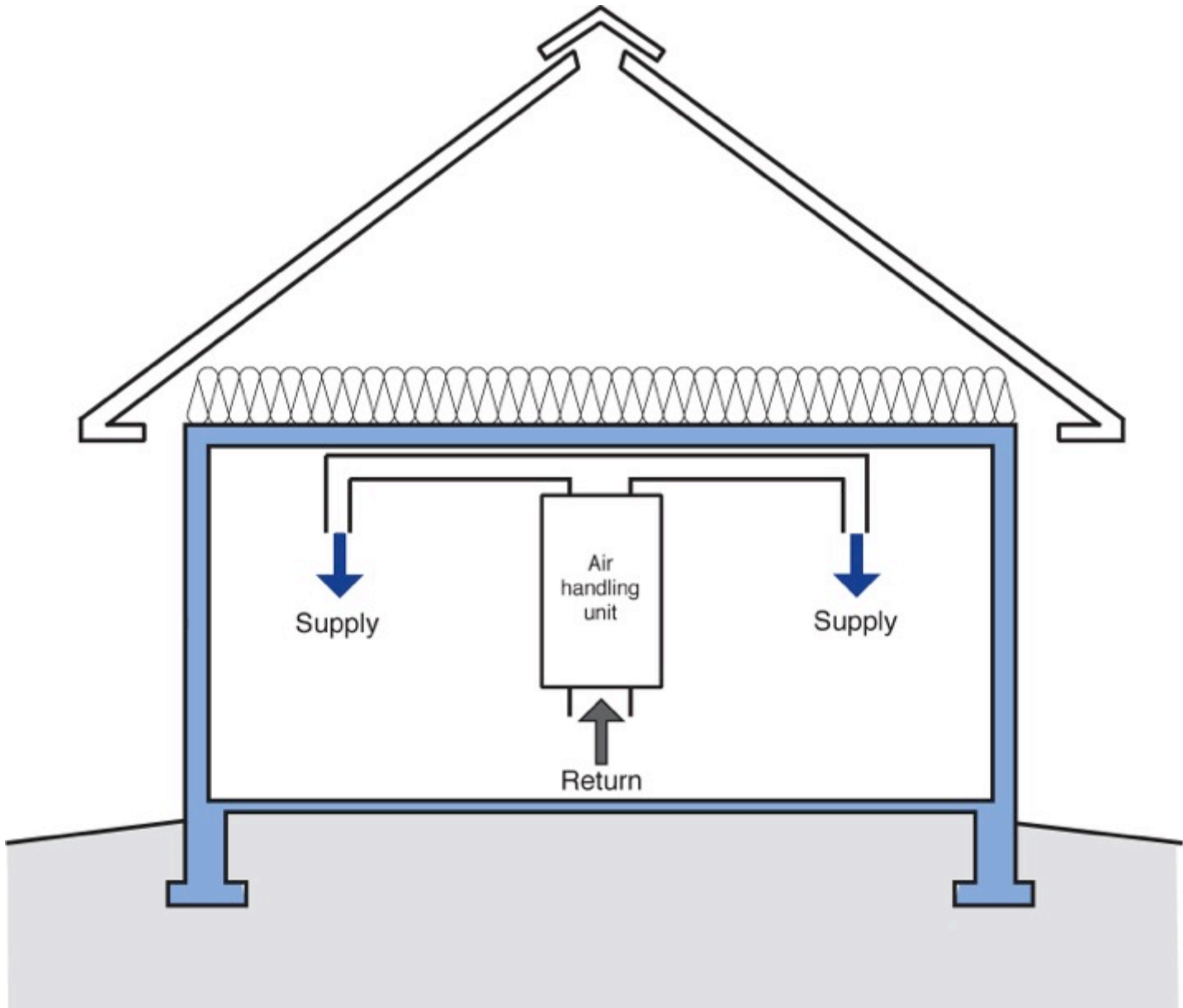
Note: Colored shading depicts the building's thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.

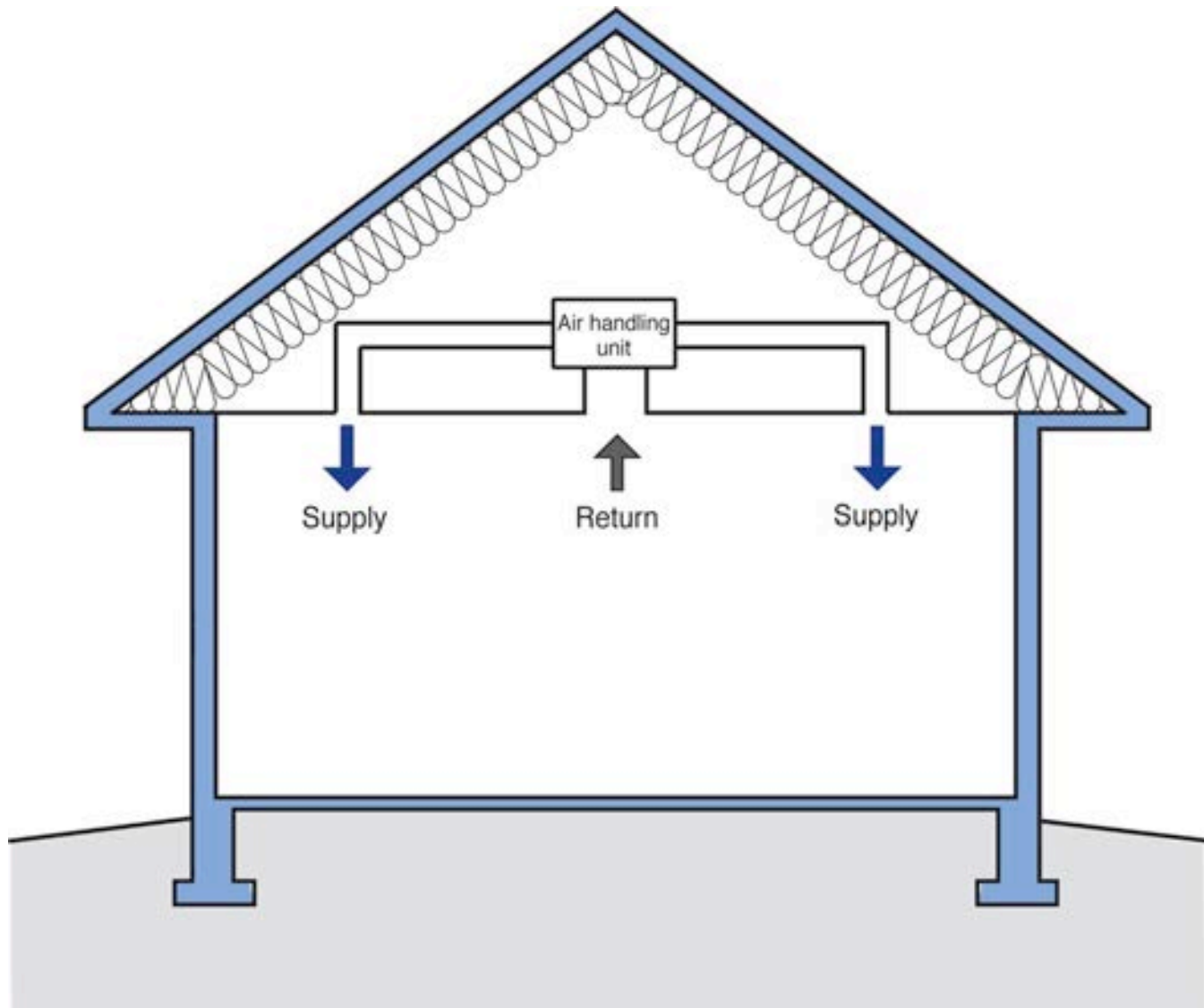


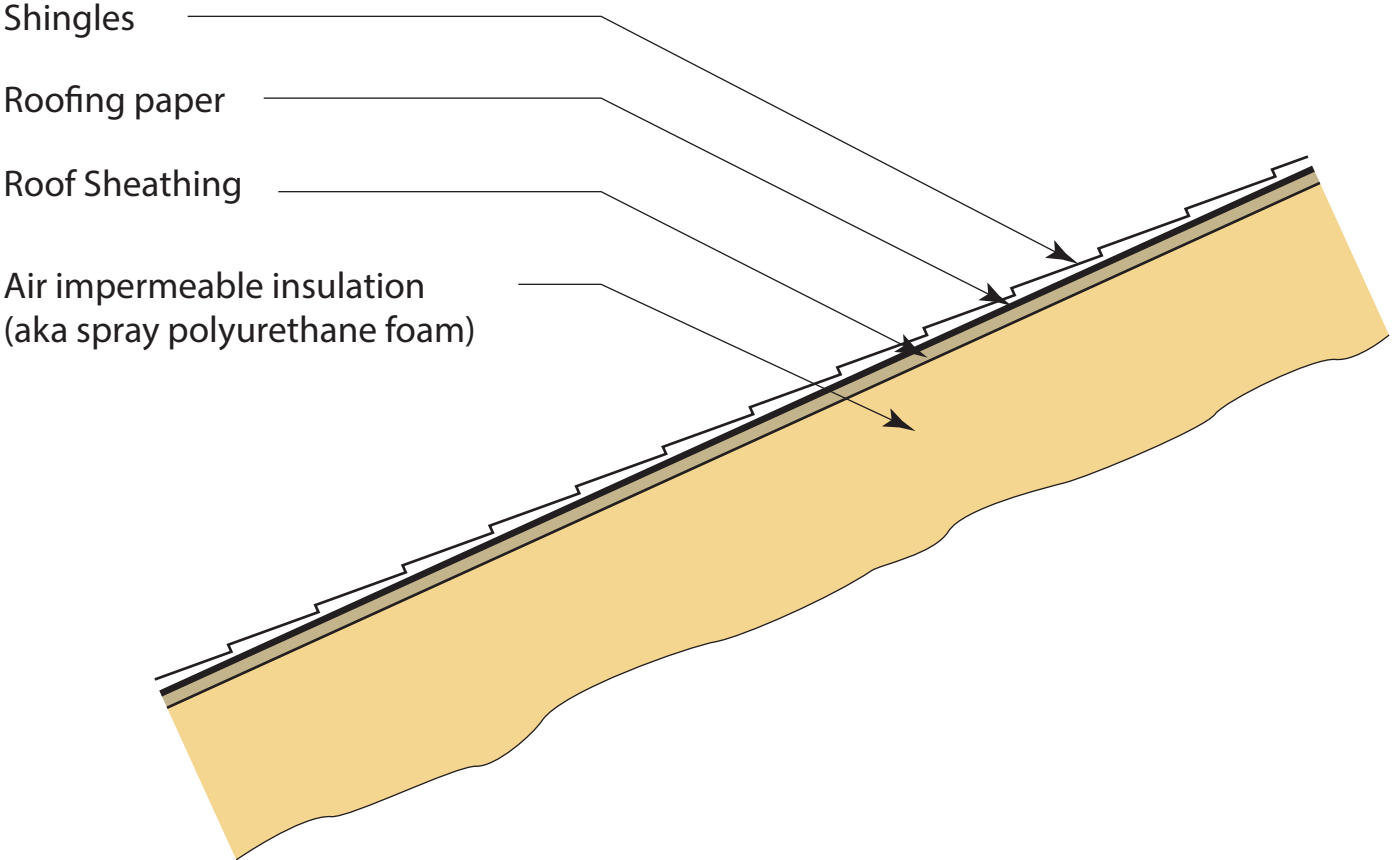
Note: Colored shading depicts the building's thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.

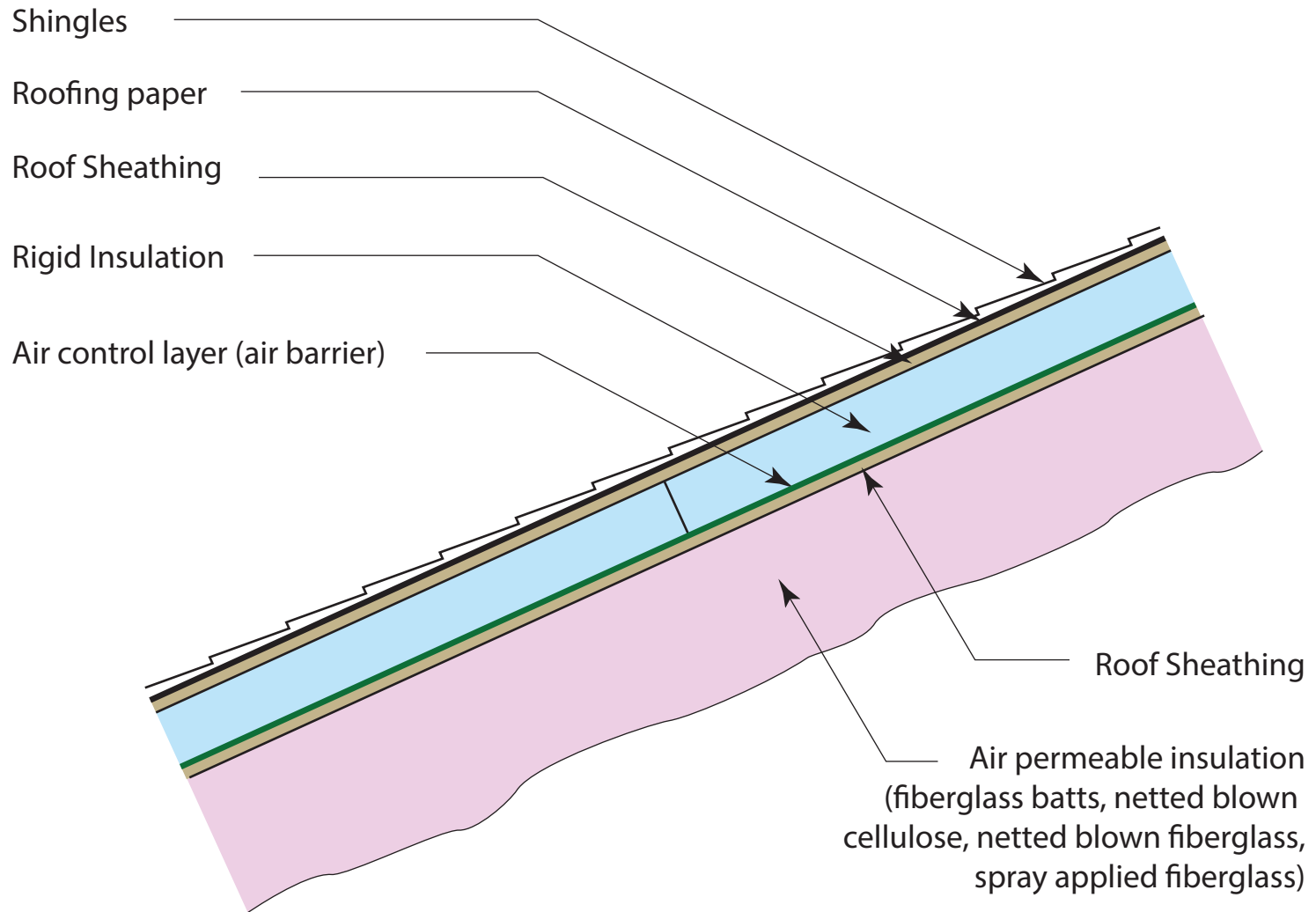


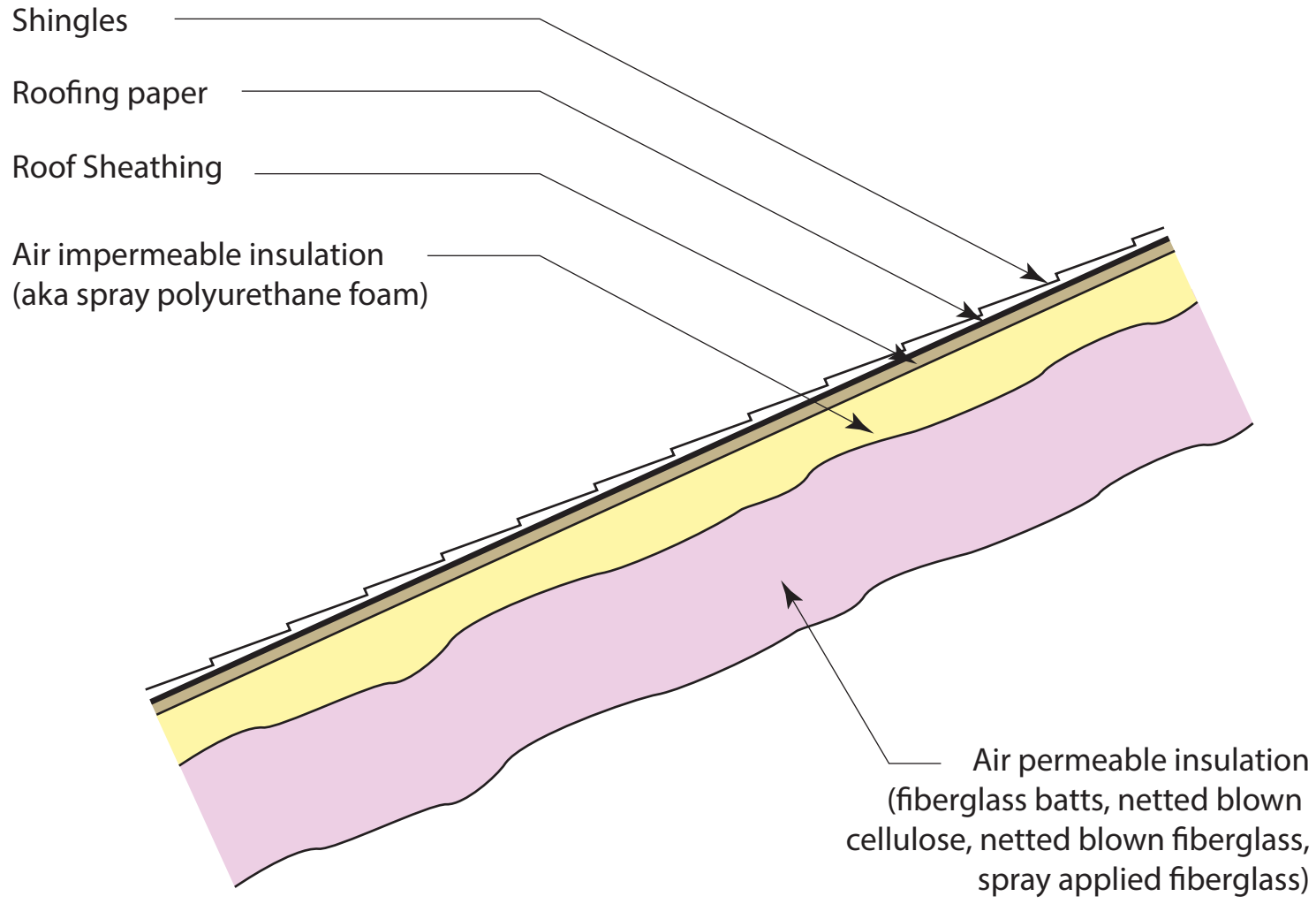
Note: Colored shading depicts the building's thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.

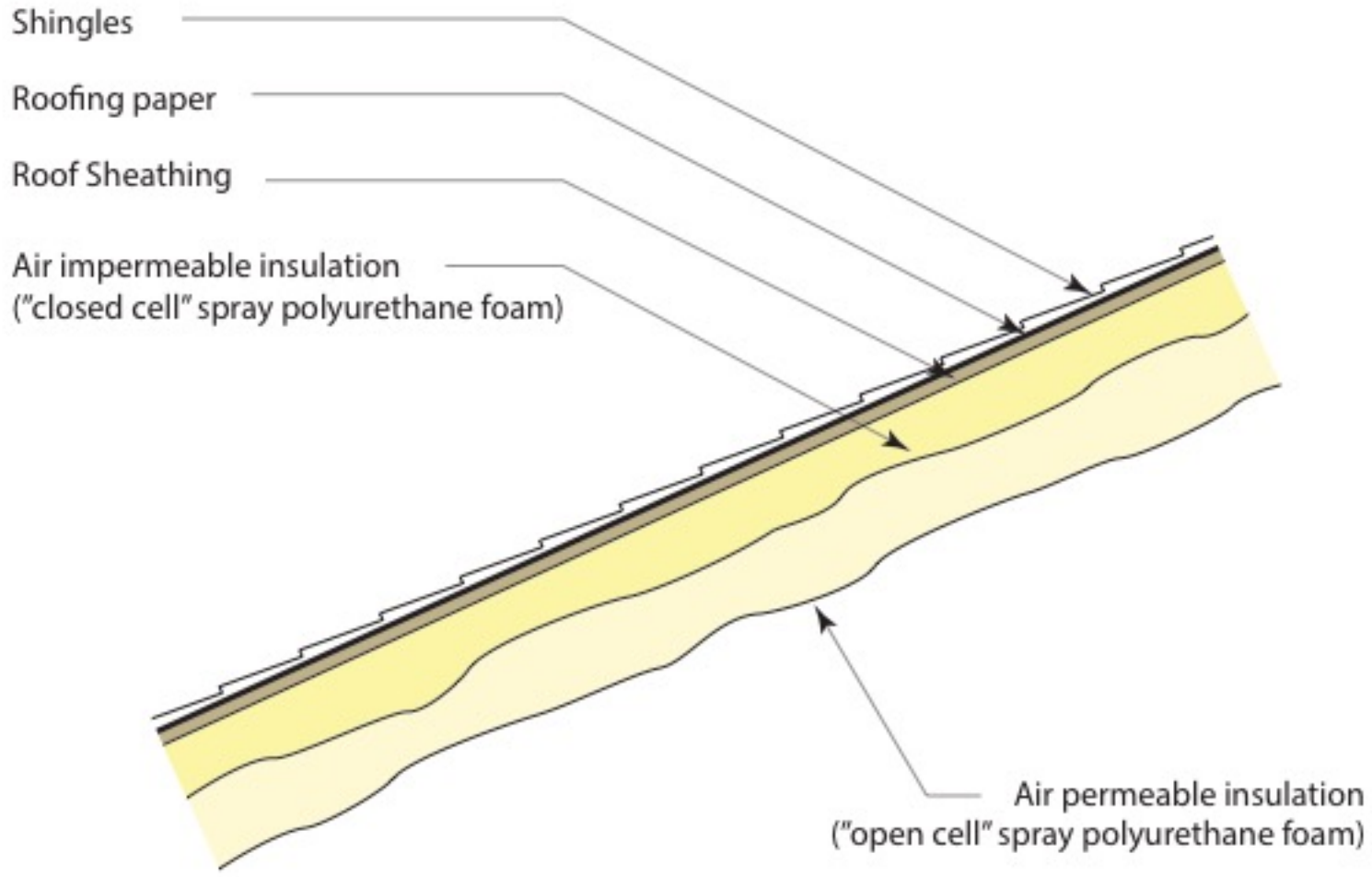
















Sweating Ducts

Sweating Ducts

Light Colored Roofs

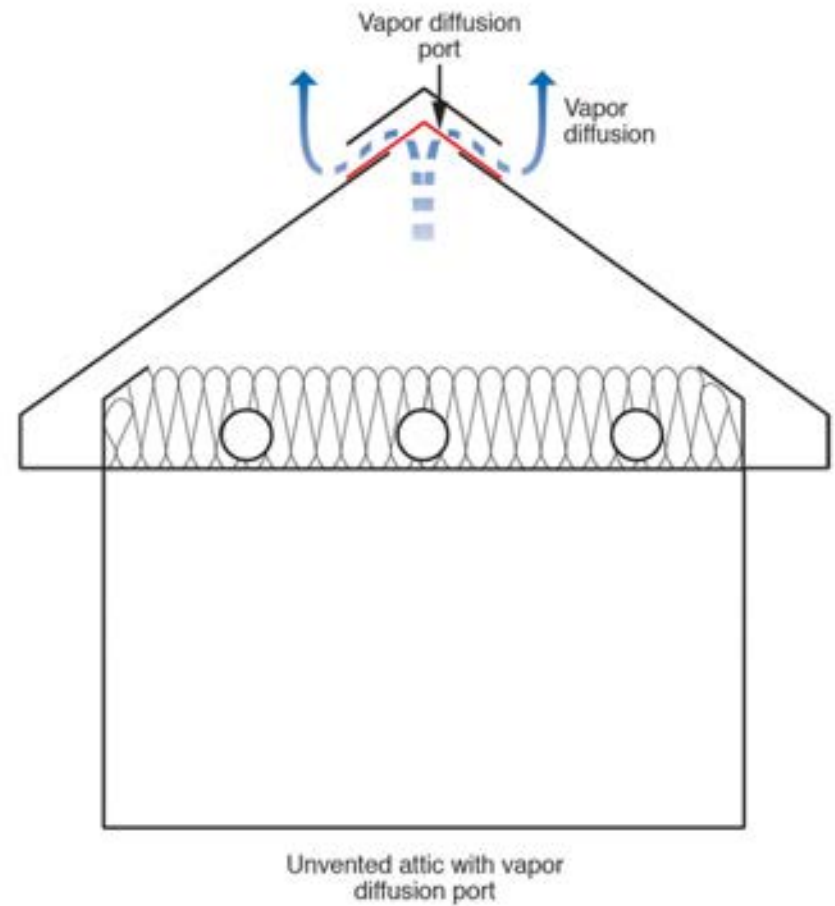
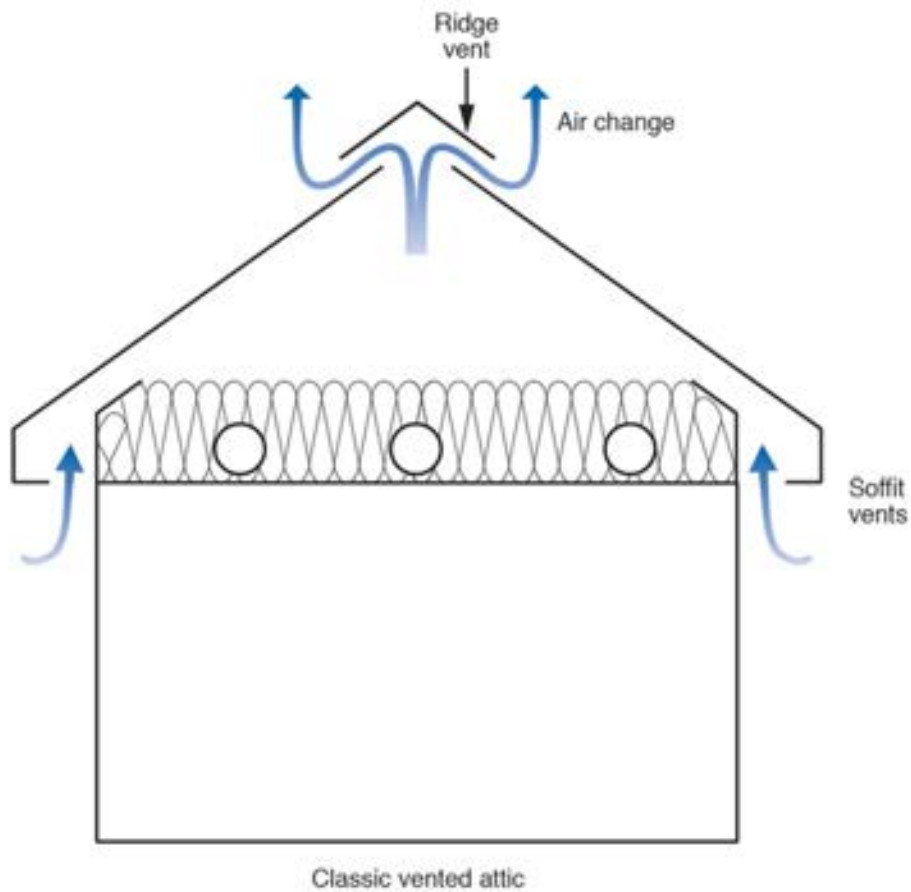
Cool Roofs

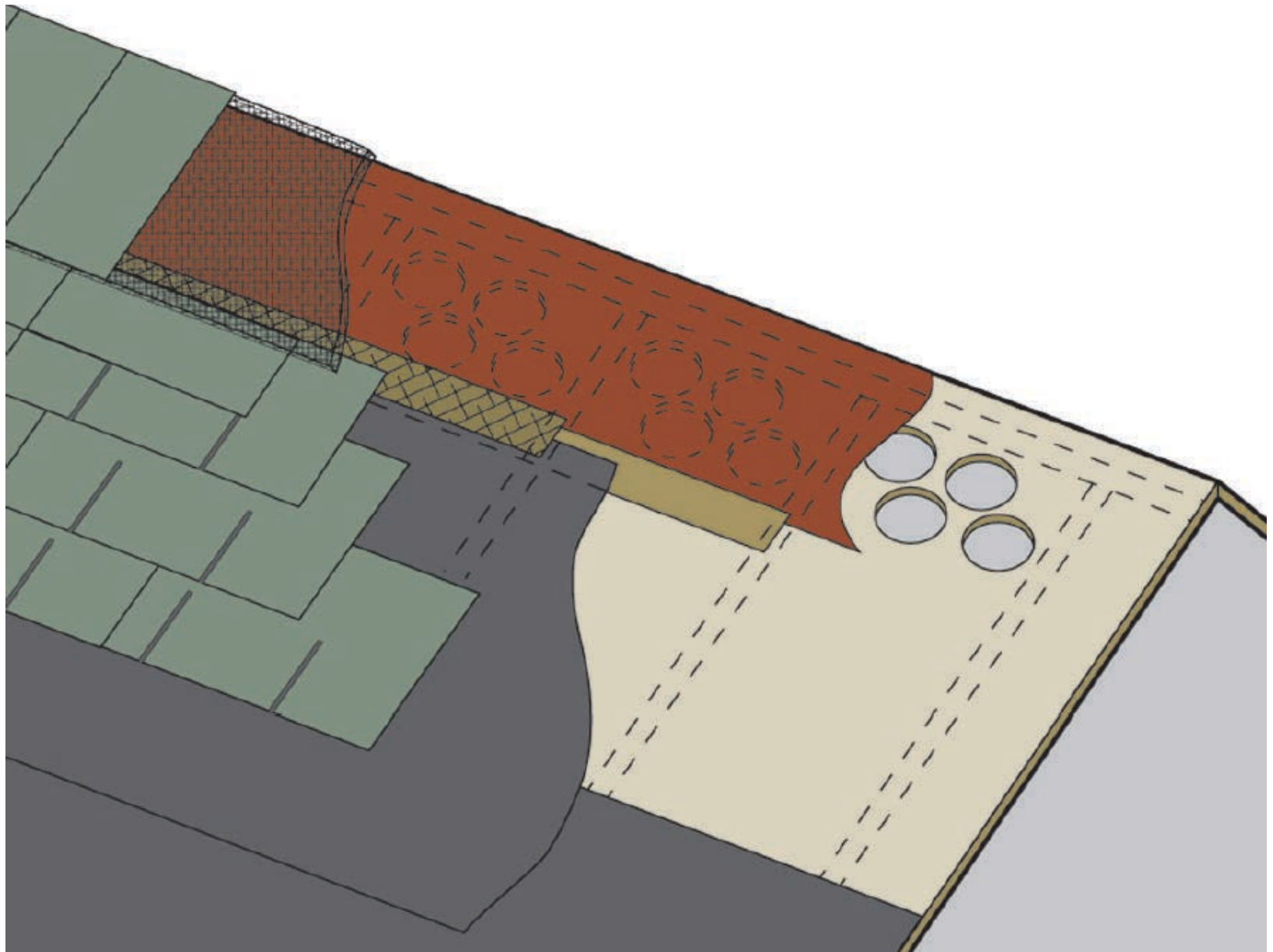
Radiant Barriers

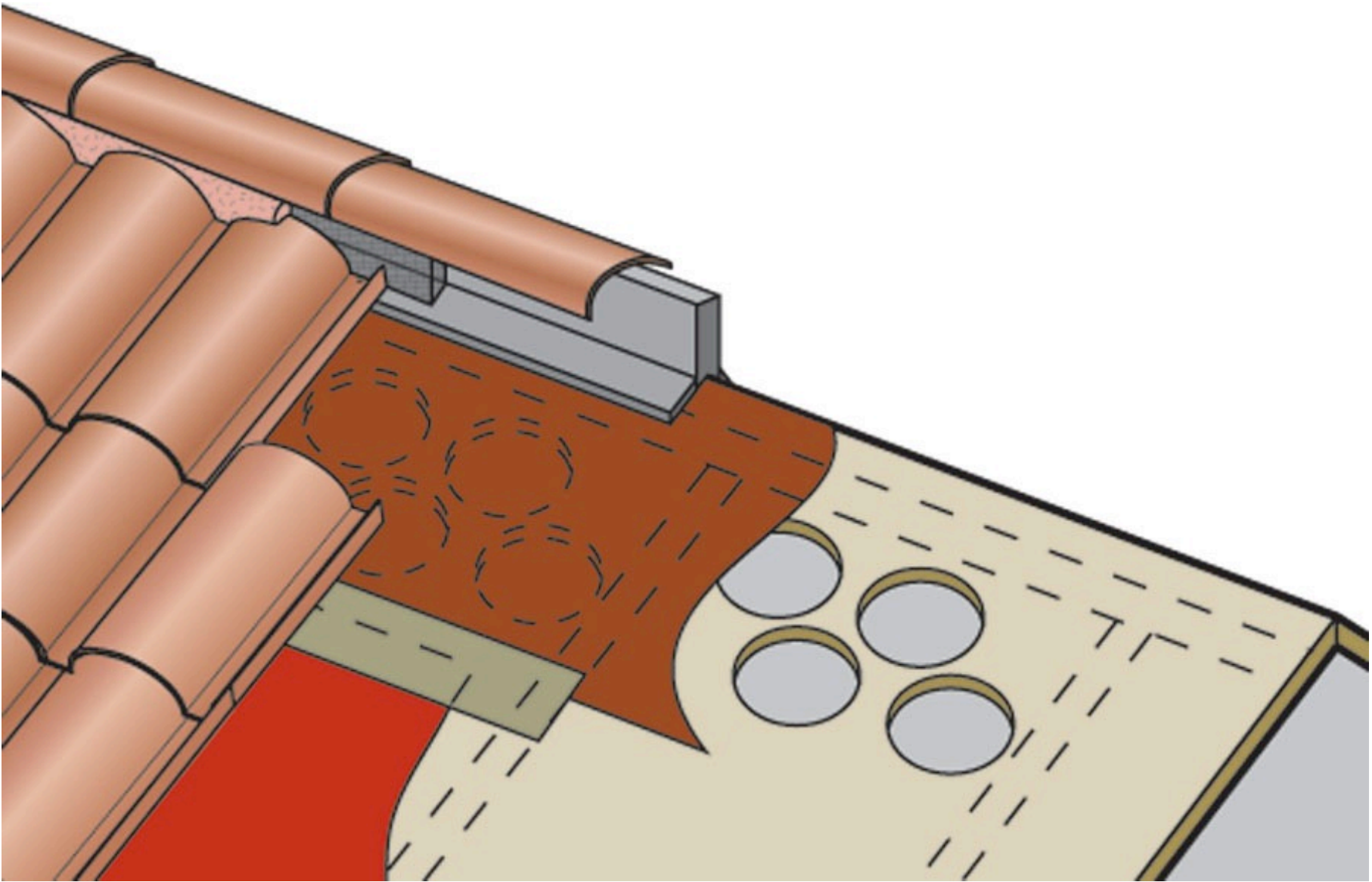
ACCA Manual J, S and D

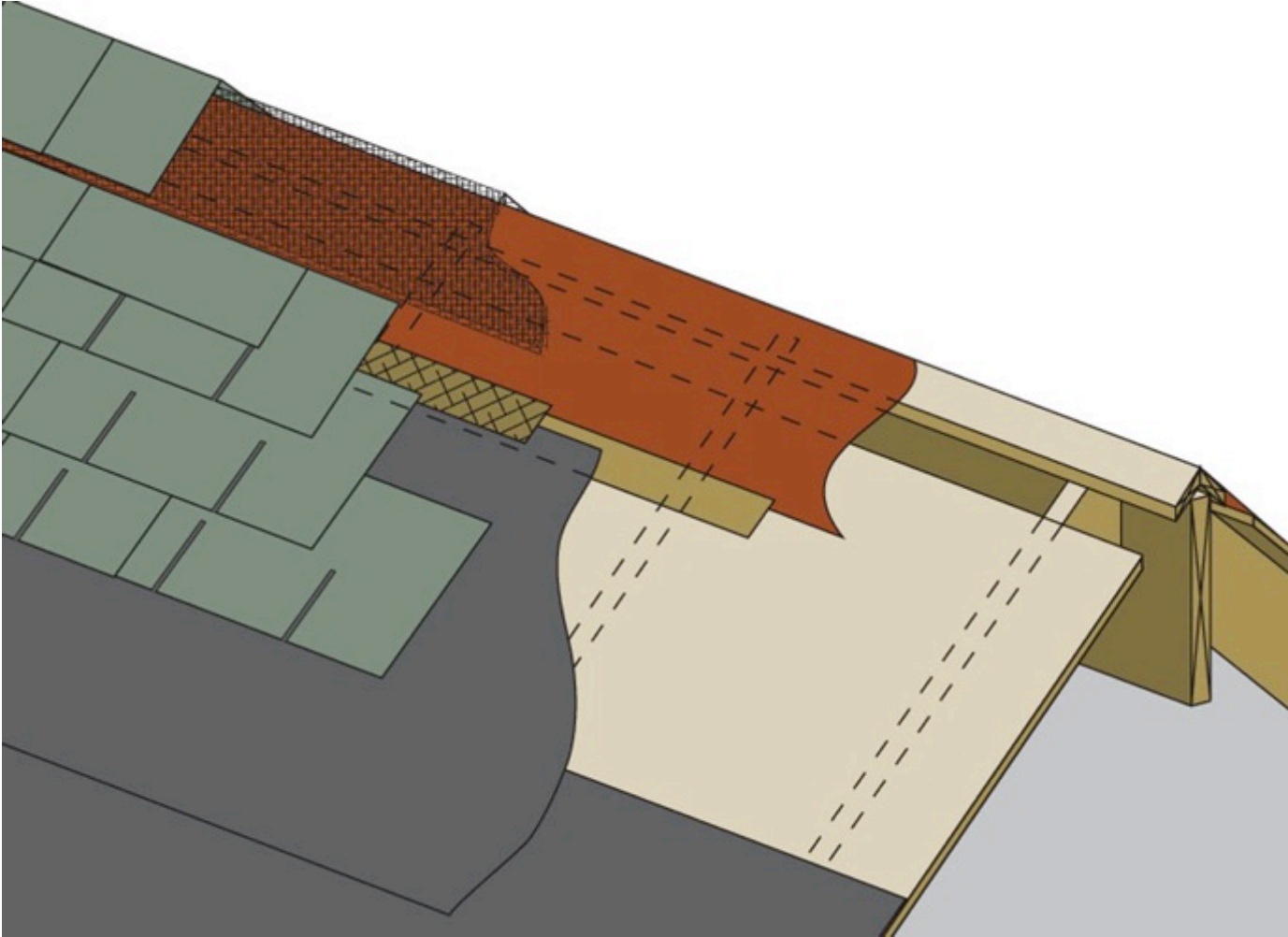
ASHRAE 62.2

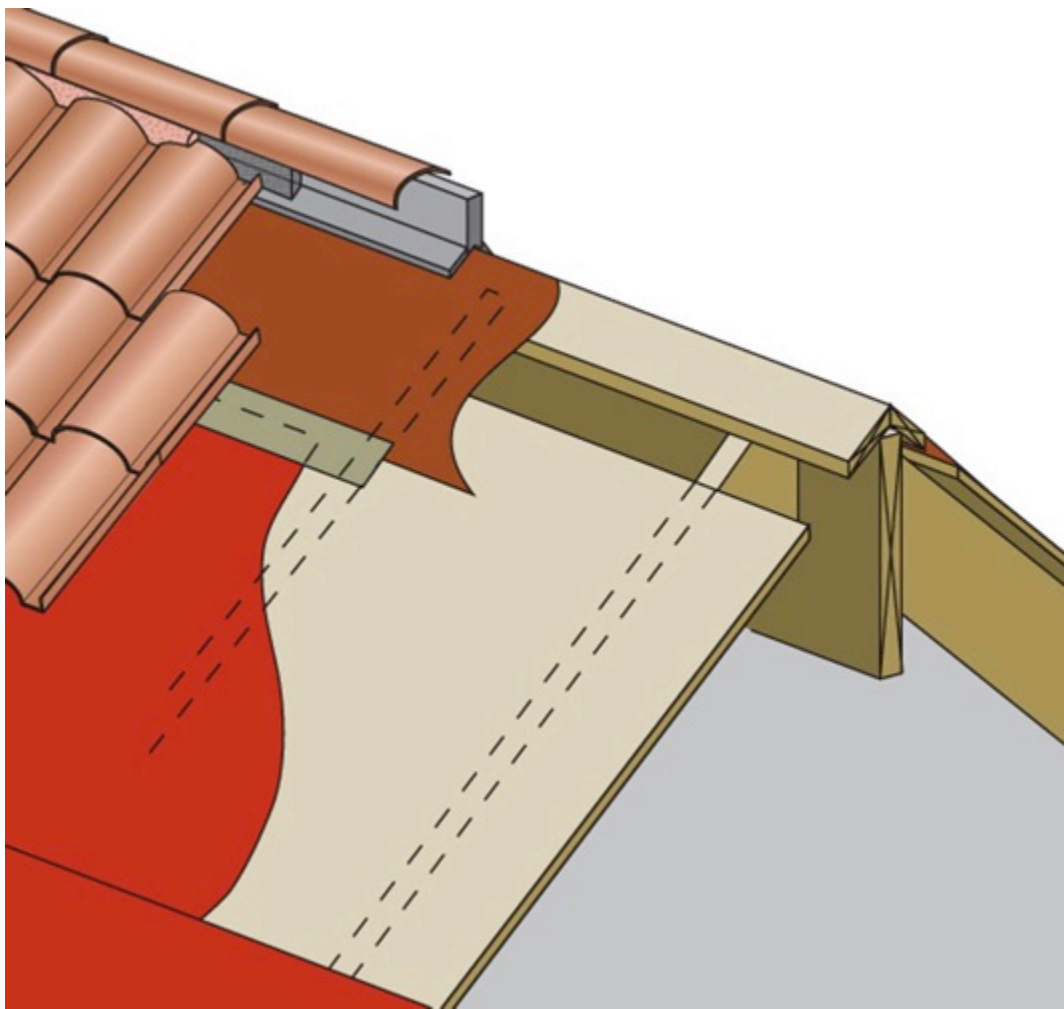
Ductwork Attic Dehumidification System













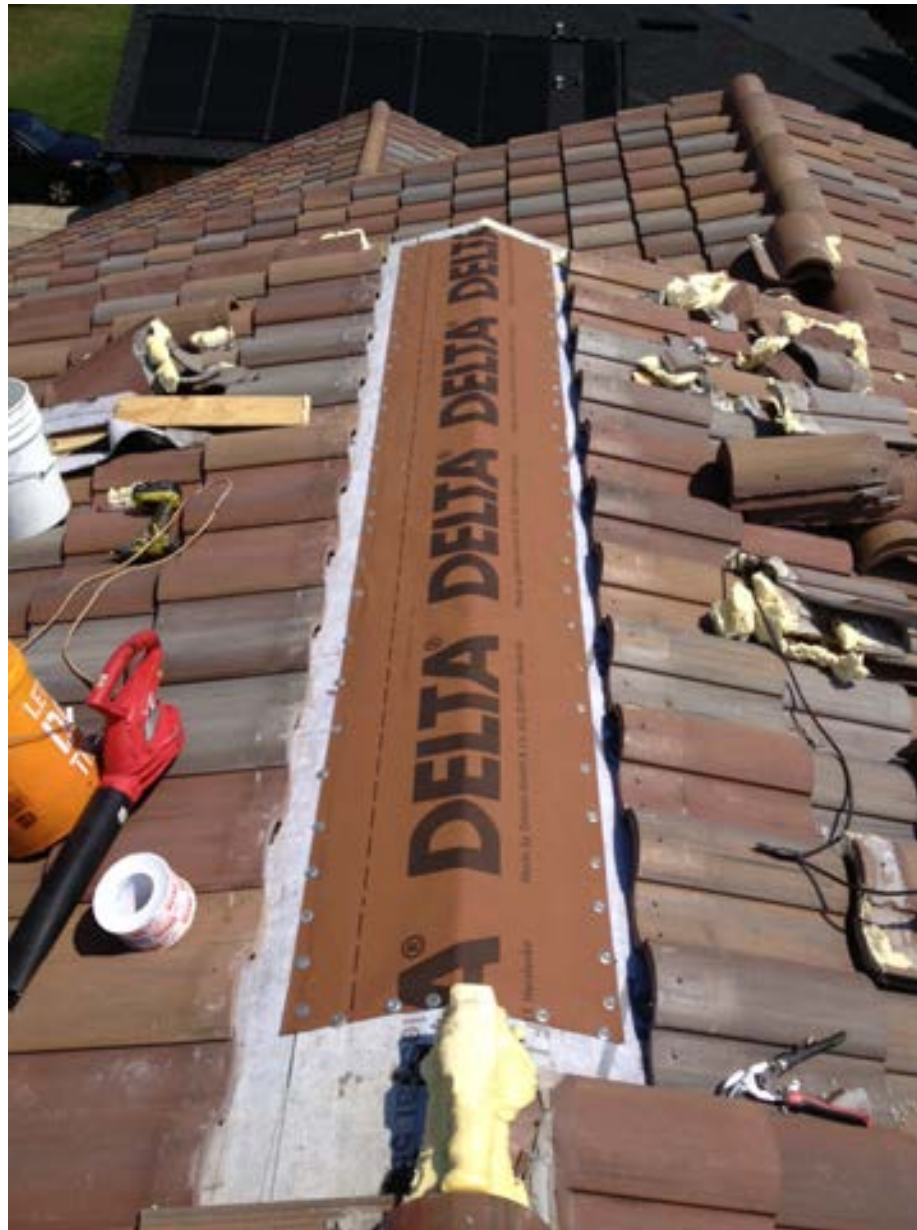




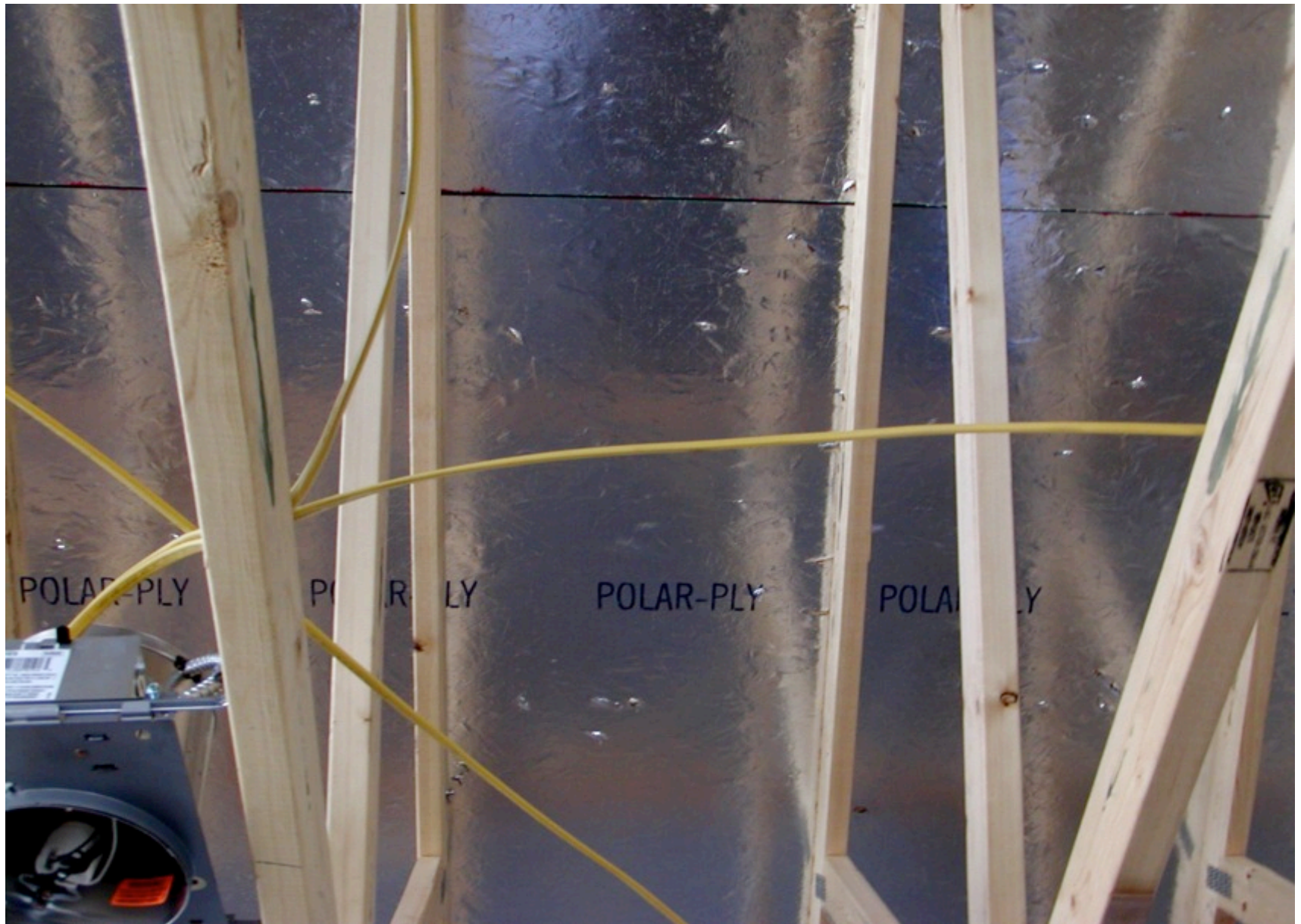










































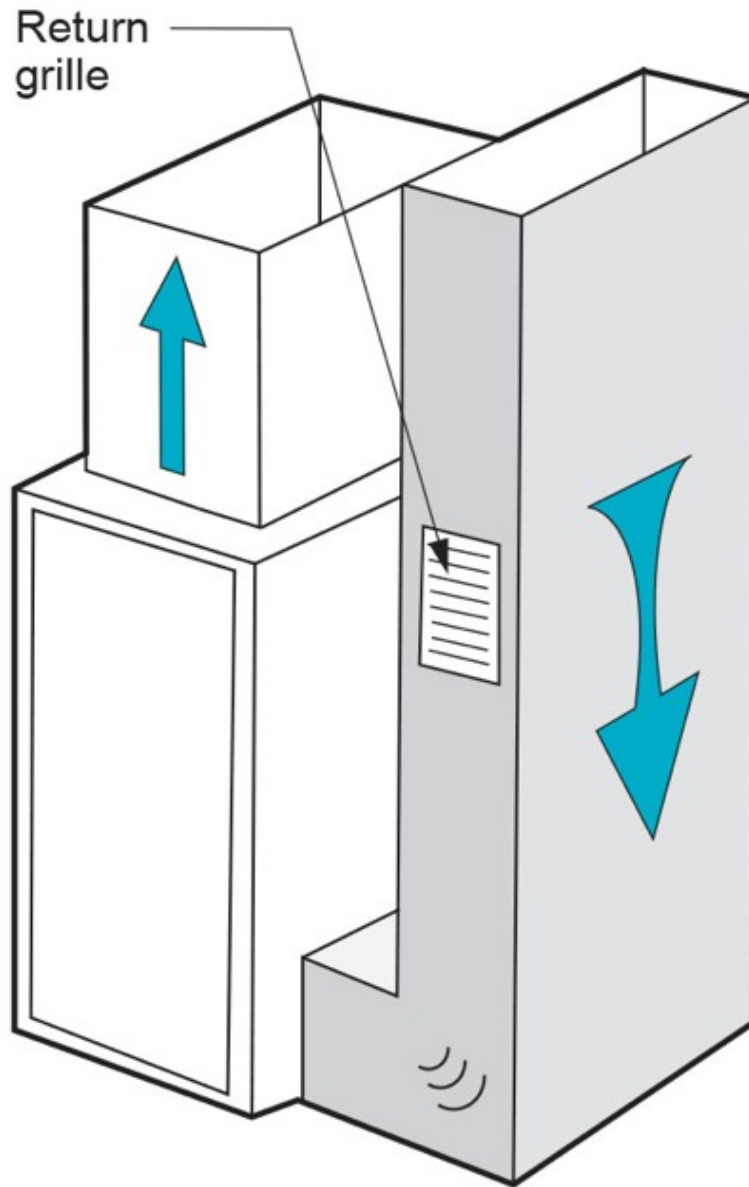


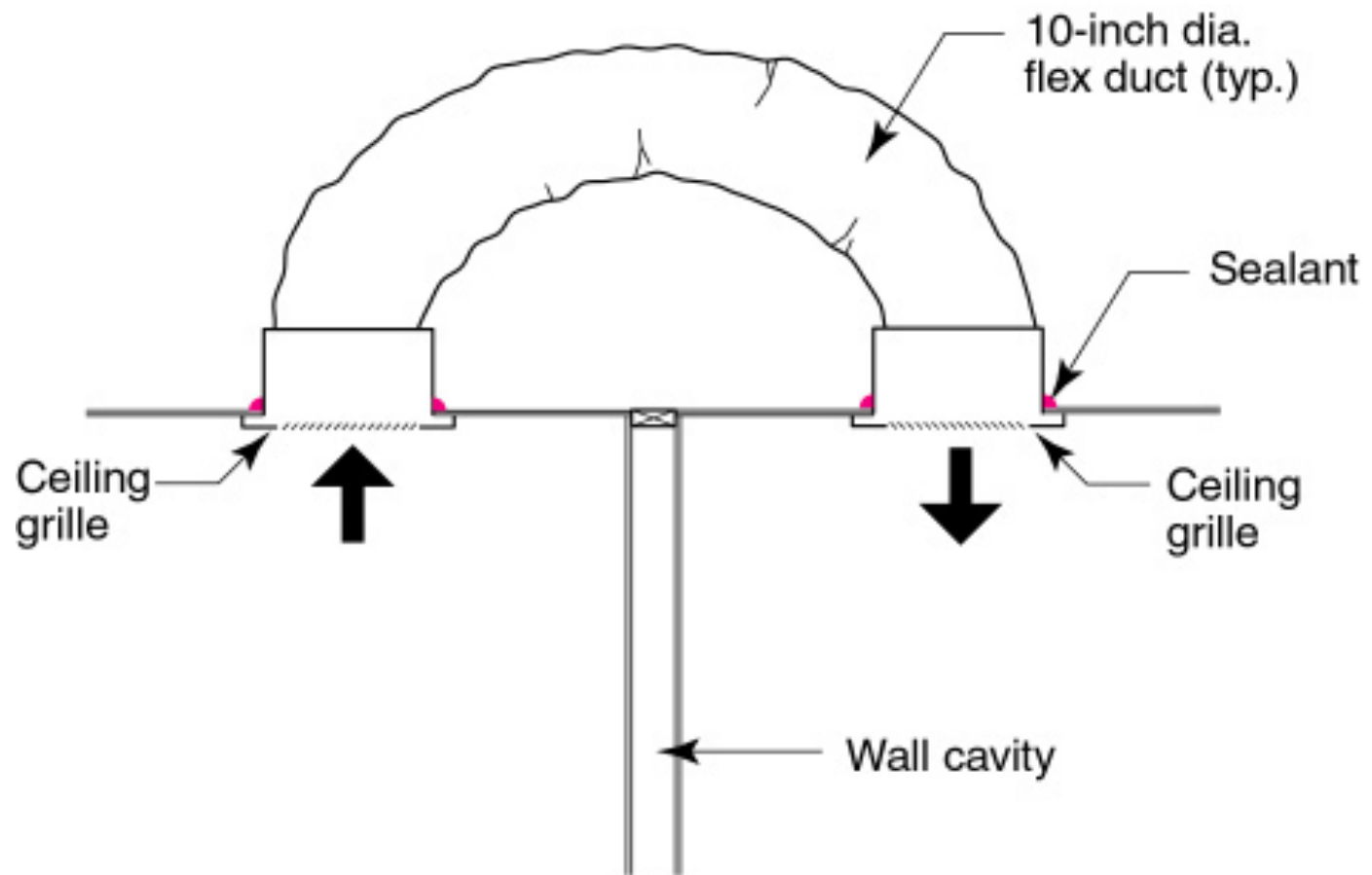


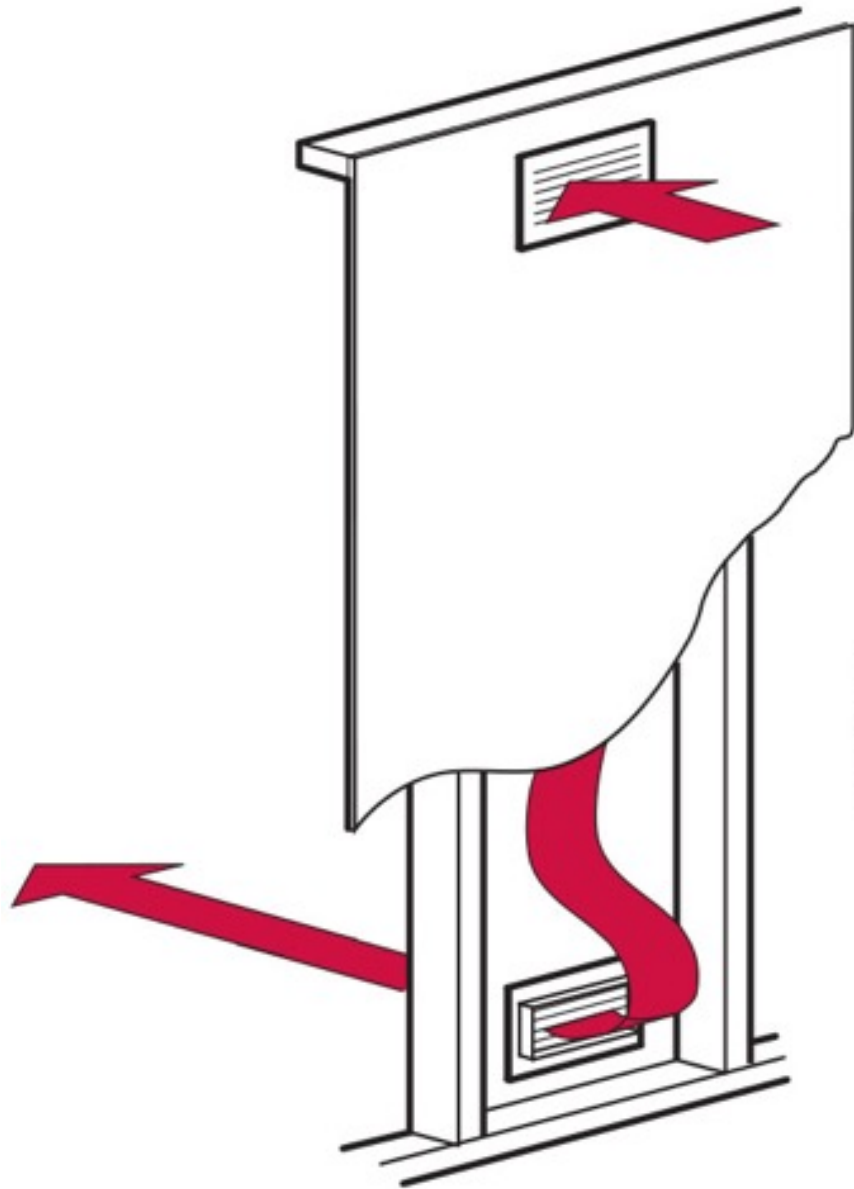








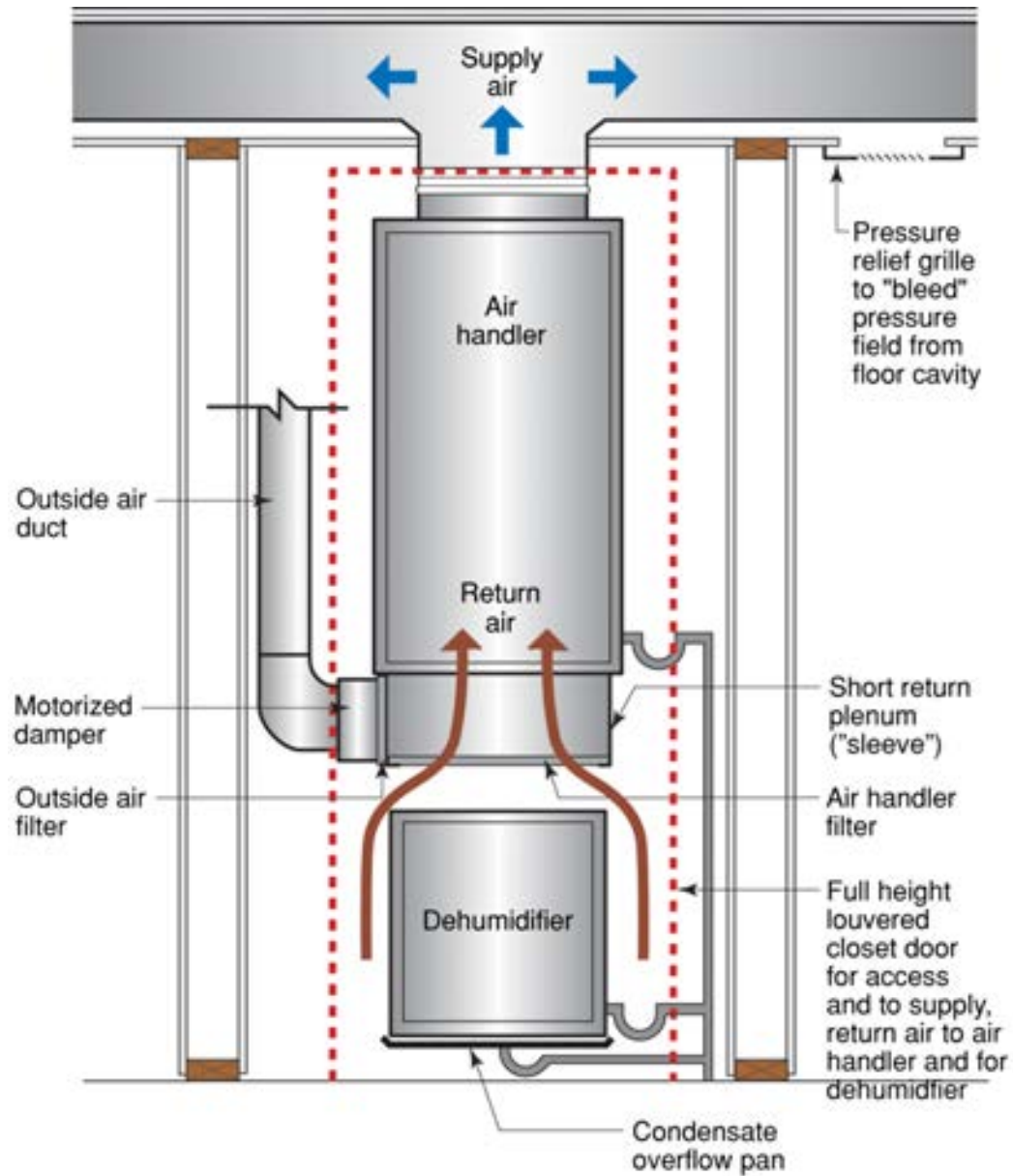




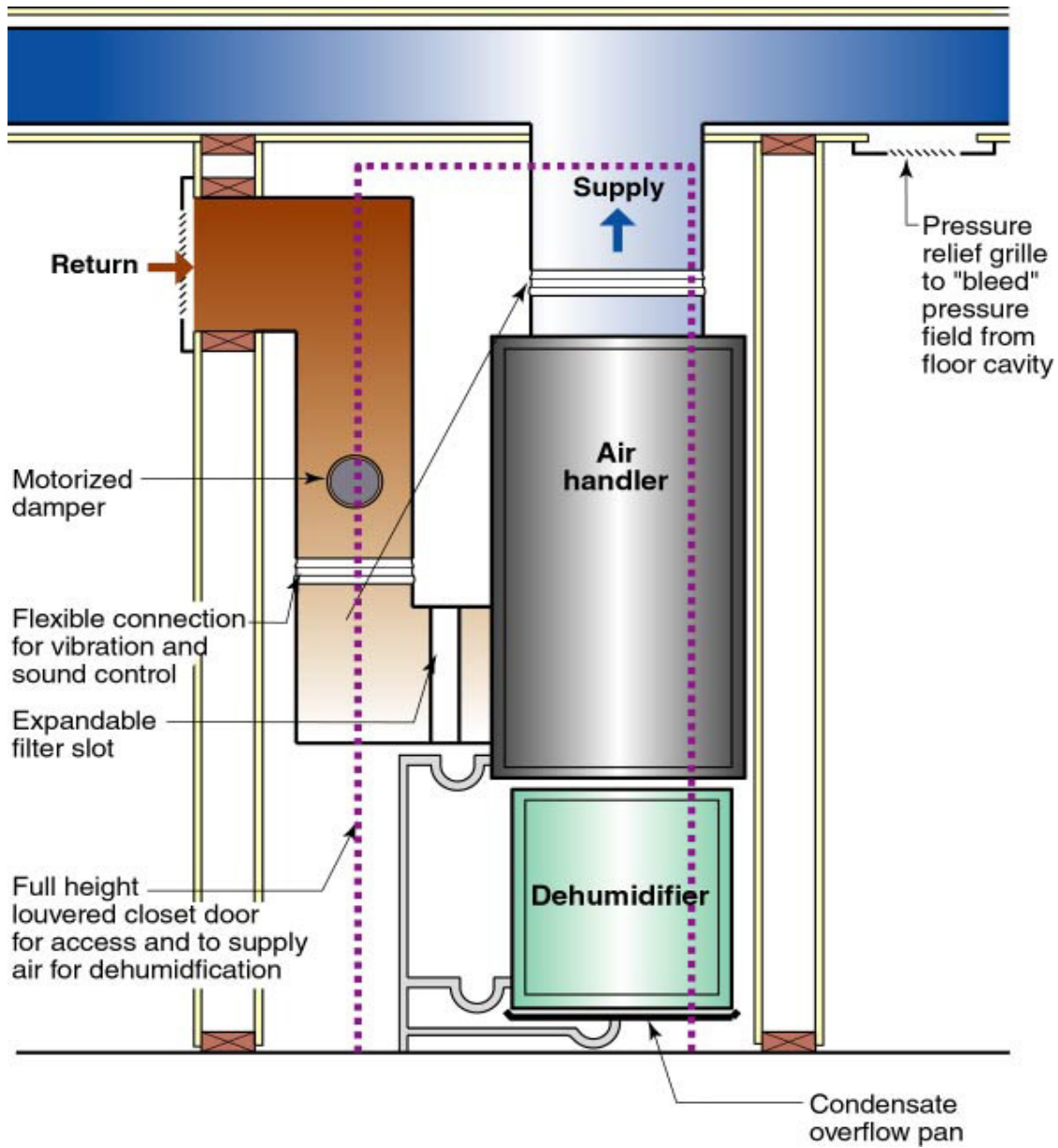
Cavity is sealed tight,
drywall glued to studs and
plates on both sides

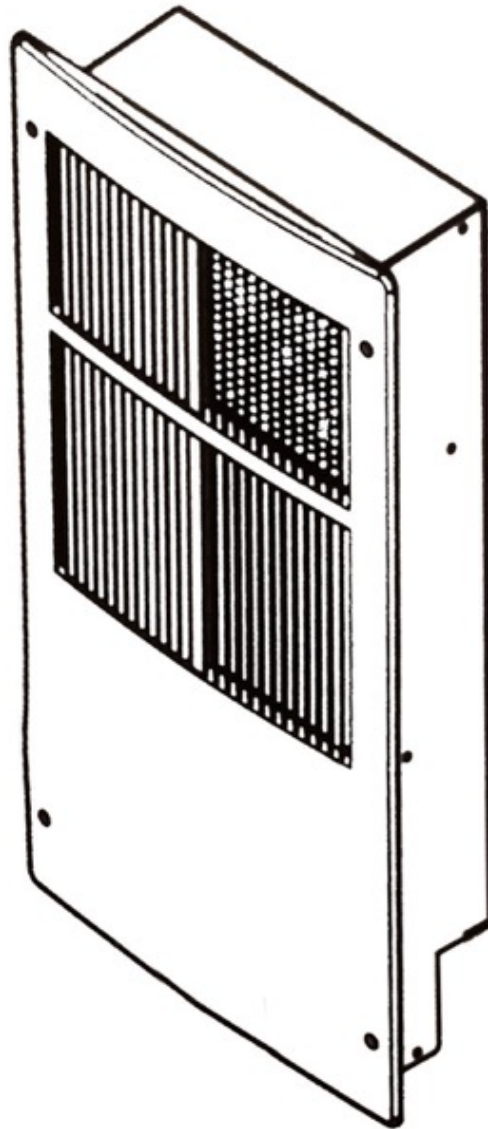












ASHRAE Standard 62.2

0.03 cfm/ft² plus 7.5 cfm/occupant

IRC/IMC

0.01 cfm/ft² plus 7.5 cfm/occupant

30 percent credit for balanced/distributed

2500 ft² 3 bedroom (occupancy 4)

ASHRAE 75 cfm + 30 cfm = 105 cfm

IRC/IMC 25 cfm + 30 cfm = 55 cfm (or 38.5 cfm)

