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# Building Science

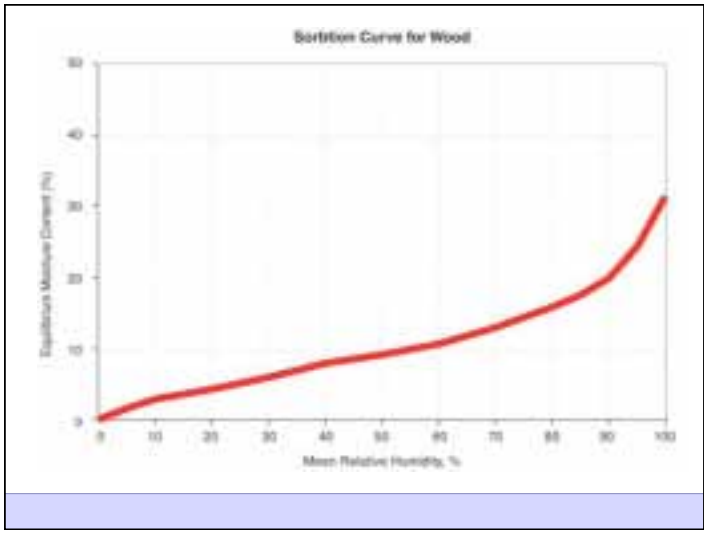
## Progressive Building

presented by www.buildingscience.com

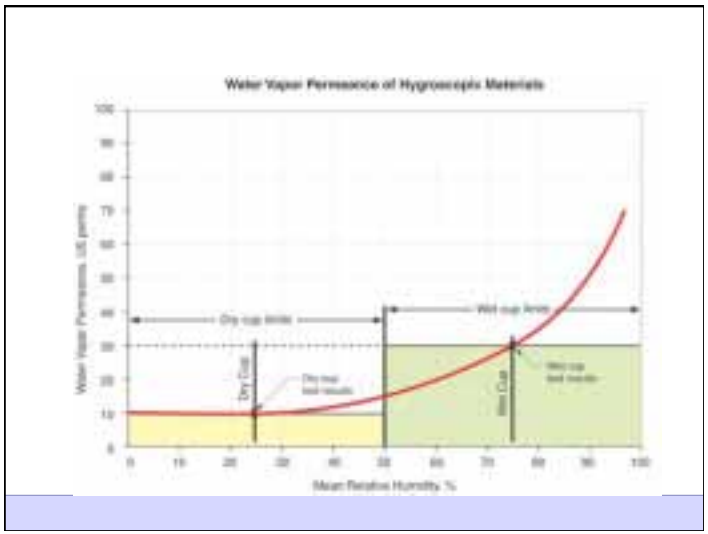
Things are Different

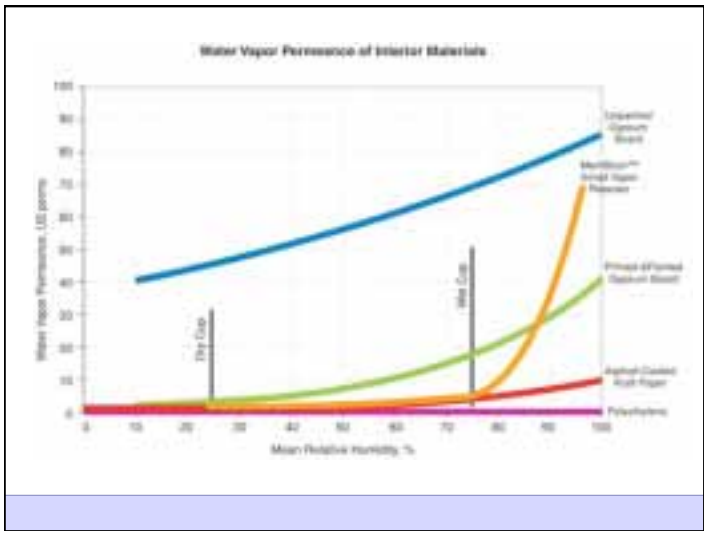
1. Increased Thermal Resistance
3. Permeance of Enclosure Linings
4. Water/Mold Sensitivity of Materials
5. Hygric Buffer Capacity
6. Complex Three-D Airflow Networks

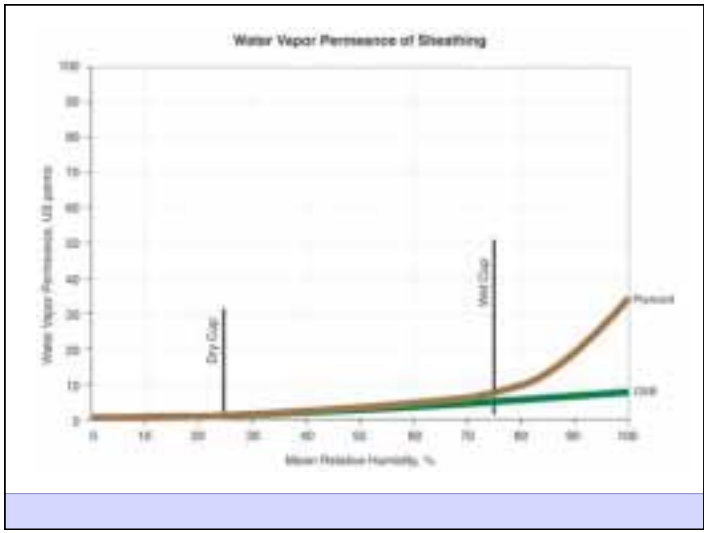
Rate - Storage

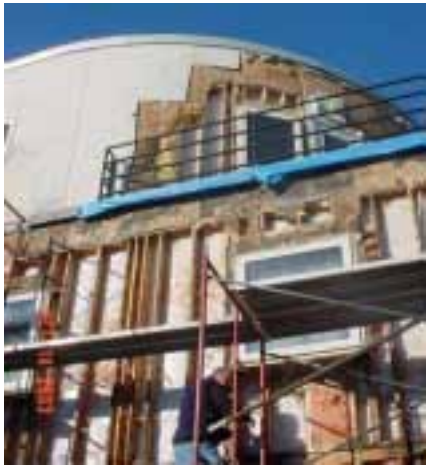




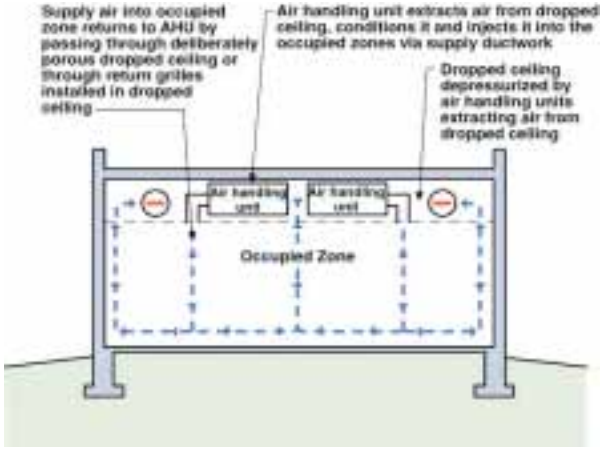


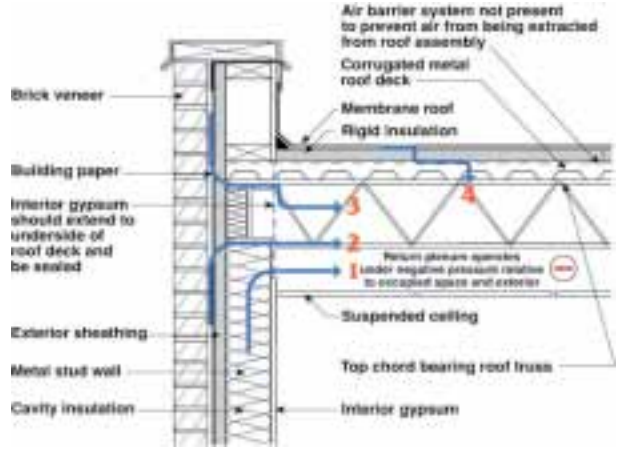



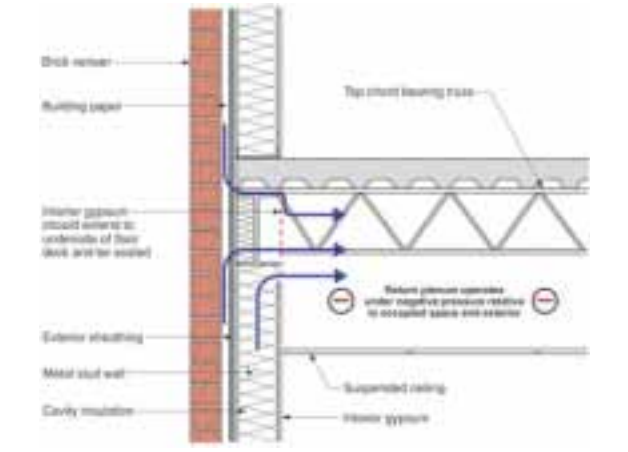

Water Vapor Permeance of Sheathing
Dry Cup
Wet Cup
Mean Relative Humidity, %

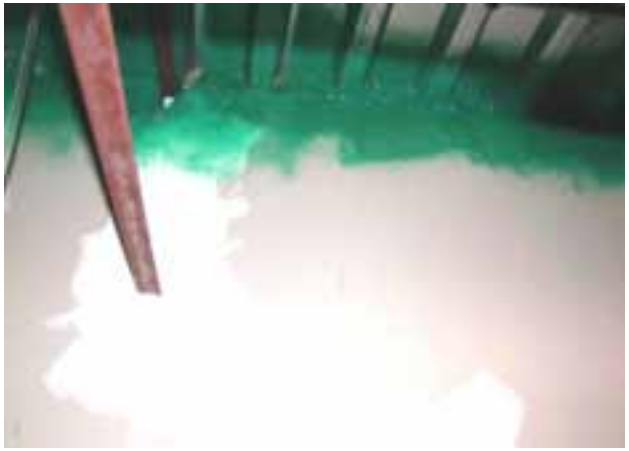


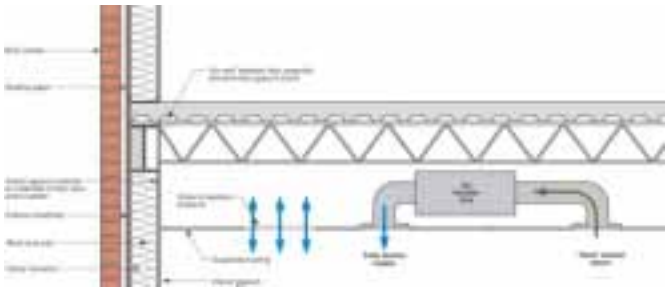

PARR LUMBER
DUPONT
Tyvek

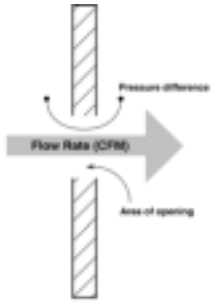

Supply air into occupied zone returns to AHU by passing through deliberately porous dropped ceiling or through return grilles installed in dropped ceiling
Air handling unit extracts air from dropped ceiling, conditions it and injects it into the occupied zones via supply ductwork
Dropped ceiling depressurized by air handling units extracting air from dropped ceiling
Air handling unit
Air handling unit
Occupied Zone


Air barrier system not present to prevent air from being extracted from roof assembly
Corrugated metal roof deck
Membrane roof
Rigid insulation
Brick veneer
Building paper
Interior gypsum should extend to underside of roof deck and be sealed
Exterior sheathing
Metal stud wall
Cavity insulation
Suspended ceiling
Top chord bearing roof truss
Interior gypsum



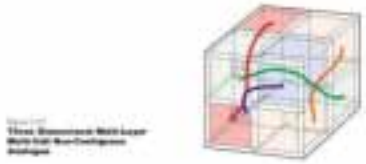


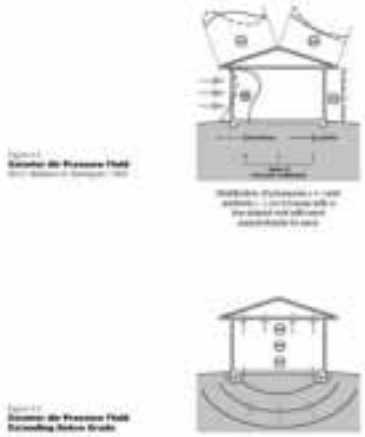


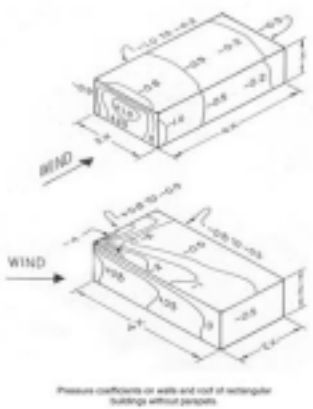


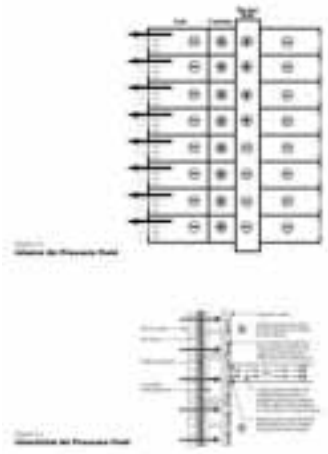

Air Flow

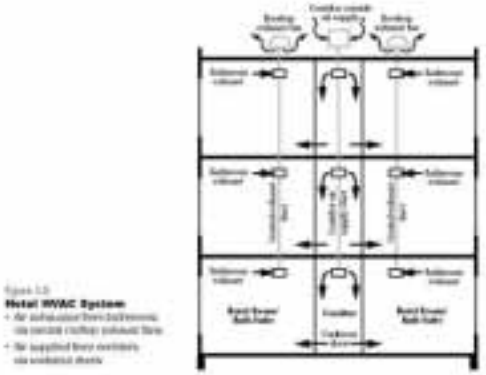
- Air flow depends on size of hole
- Air flow depends on pressure difference
  Flow = Area x $\sqrt{\Delta P}$ x Coefficient
- Air flows from higher pressure to lower pressure

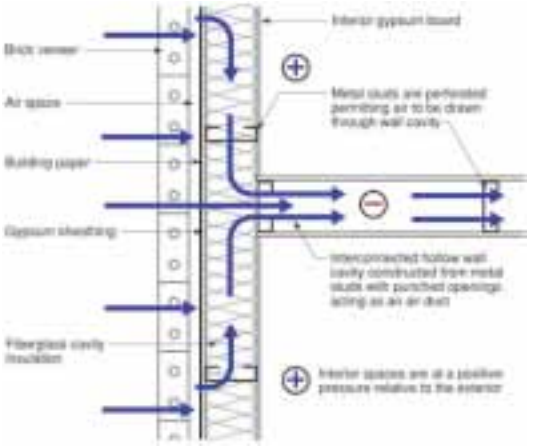


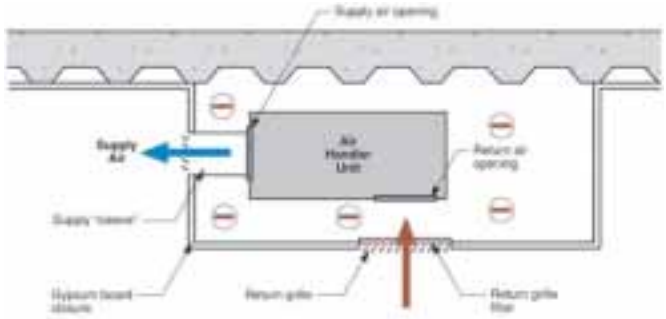


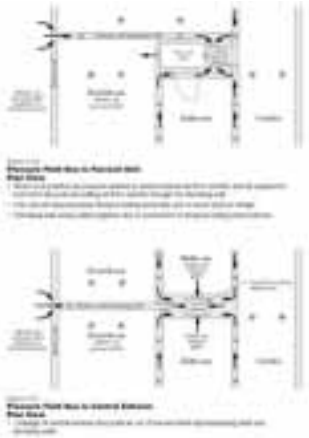




Definition of a Problem

People
Pollutant (hot, wet, UV, ozone)
Path
Pressure

If You Want To Find The Pollutant Source
Look For the Hot Spot or the Wet Spot or the

Spot That Sees Ultra-Violet Light or the Spot That is Sensitive to Ozone

Arrhanius Equation of Free Energy: Every 10 degree Kelvin rise in temperature yields a doubling of available energy for reactions to

occur

The Principle Damage Functions Result in the Breakdown of Materials

Breakdown Products are Often Gaseous and Particulate

They are Typically Transported by Air