Vented and Unvented Roofs

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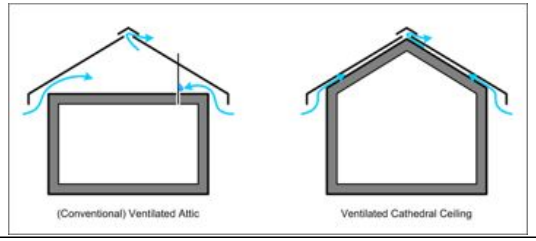
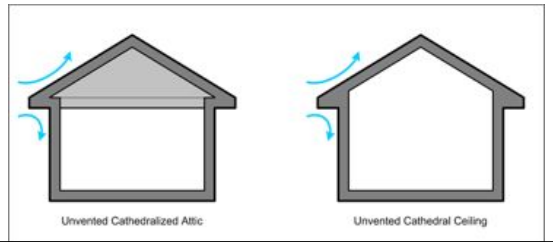
Pitched Roof Types

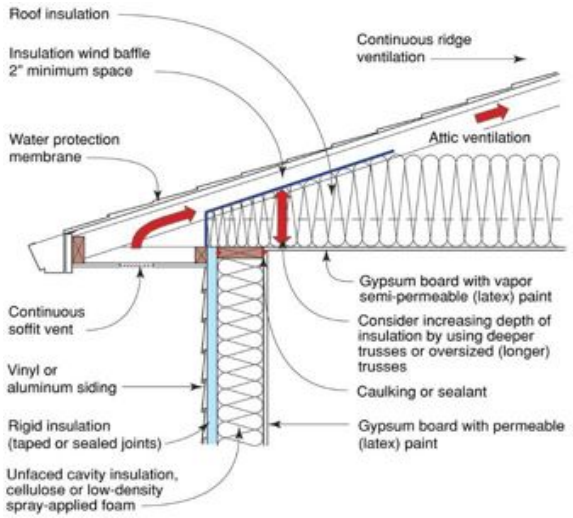
- Vented Attic
  - Insulation/air barrier at ceiling plane
- Cathedral Ceiling
  - Insulation/air barrier at roof plane



Pitched Roof Types

- Unvented Cathedralized Attic
  - As cathedral but no venting above insulation
- Unvented Cathedral





Condesation forms on nails first (coldest) then sheathing (cold) framing (warmest)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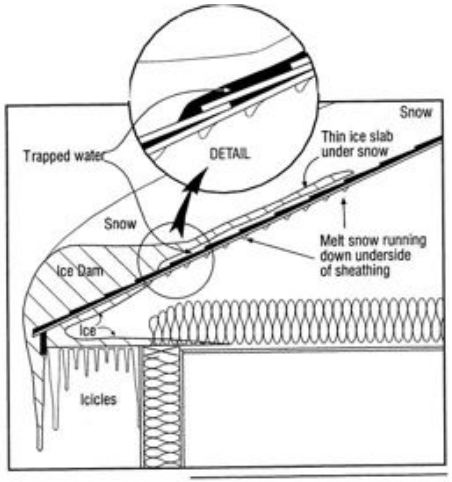

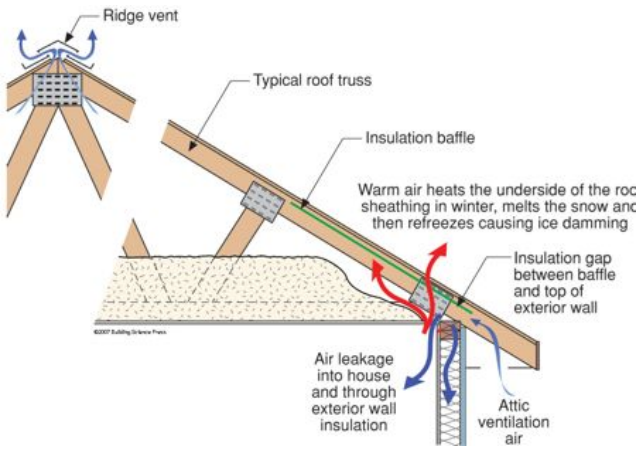

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Ventilation: Ice Damming

- Ventilation to remove solar heating (800-1000 W/m^2) requires very high flows
- Ventilation to remove heat loss through good insulation (1-5 W/m^2) requires very little airflow

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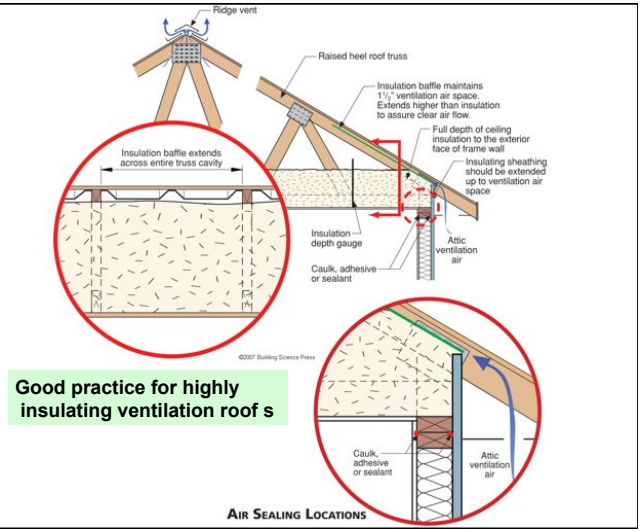
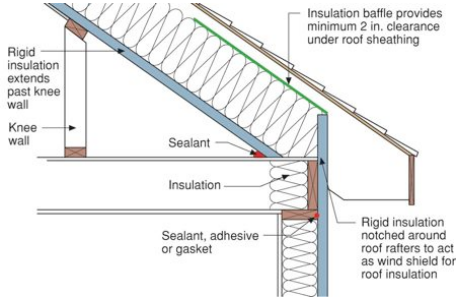


Good practice for highly insulating ventilation roof s



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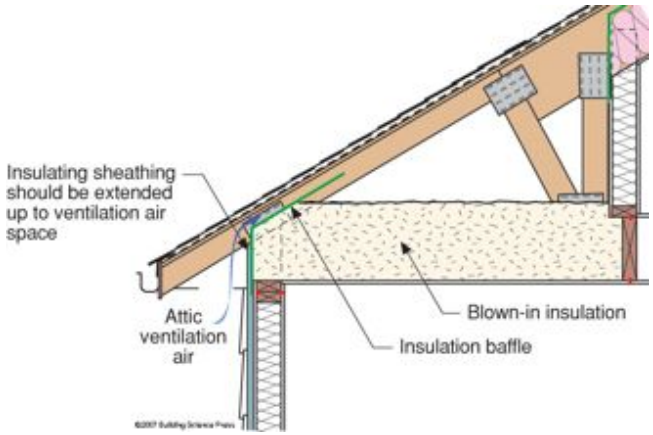

Vented Attics

- Air leakage thru ceiling is a problem in colder climates
  - Ducts are a disaster
- Condensation and heat gain on ducts in warm climates
- Modern roofs often hard to vent

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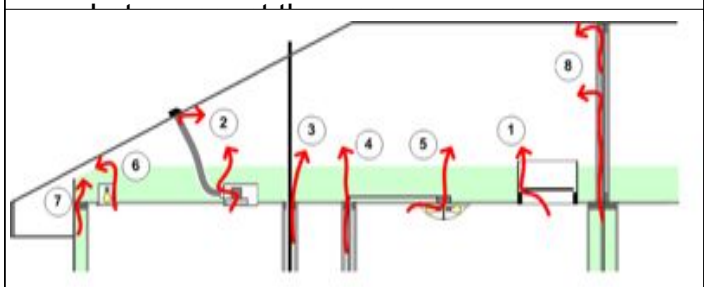
How do I leak?



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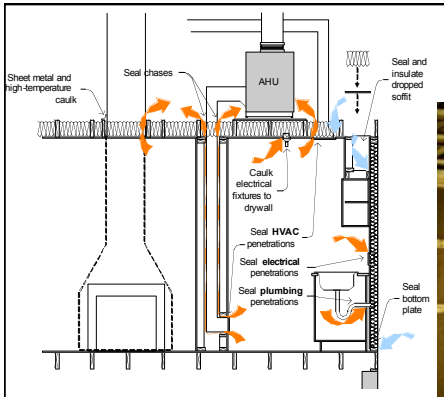
Air sealing

Big Air Leakage Points



- Ductwork
- Partitions
- Dropped soffits
- Cabinetry
- Ceiling lights
- Rimjoists
- Plumbing stacks
- Attic hatch

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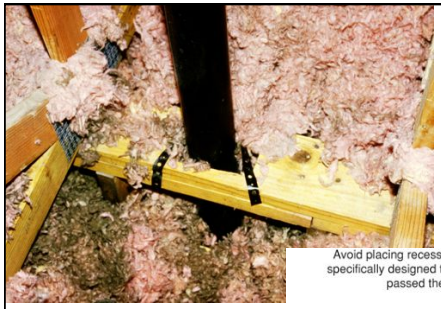
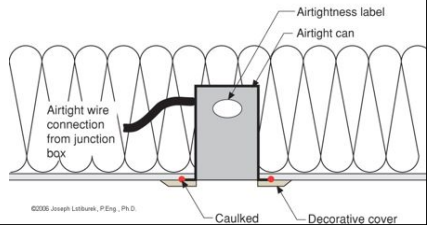
Airflow Control No. 24/79



Avoid placing recessed lights in insulated ceilings unless they are specifically designed to be airtight. Install IC-rated fixtures that have passed the ASTM E-283 test for air leakage.



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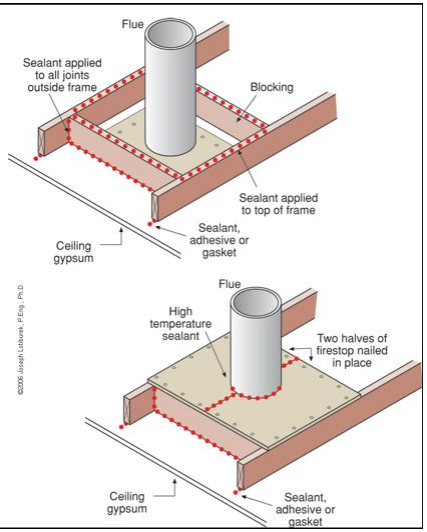

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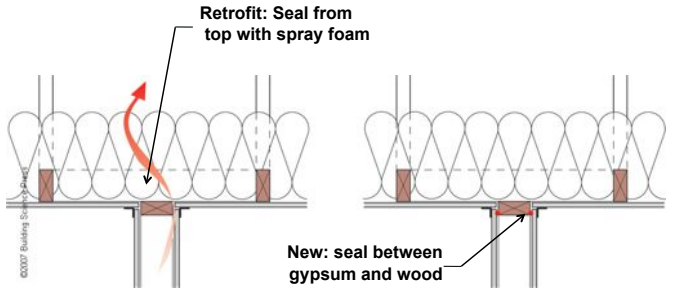
Partition leaks (1/8”x 100 ft)



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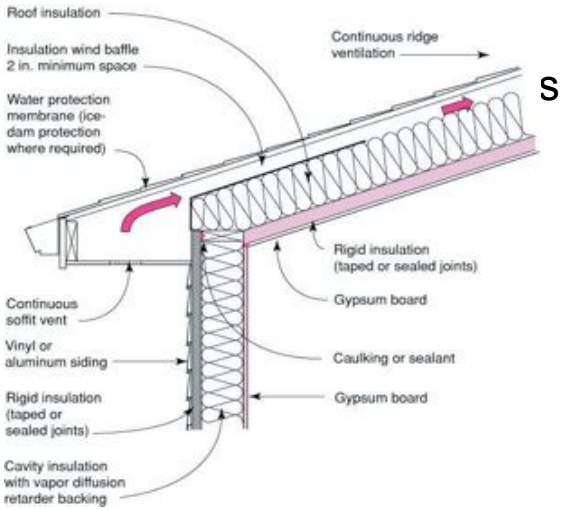

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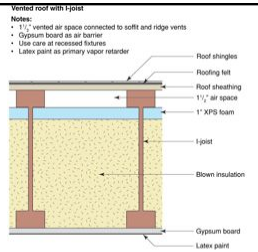
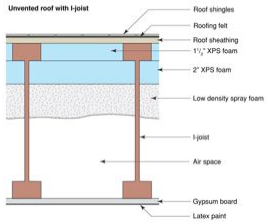
Simple Vented roof
Air leaks!
Ventilation path?



Unvented roof for more complex roof lines



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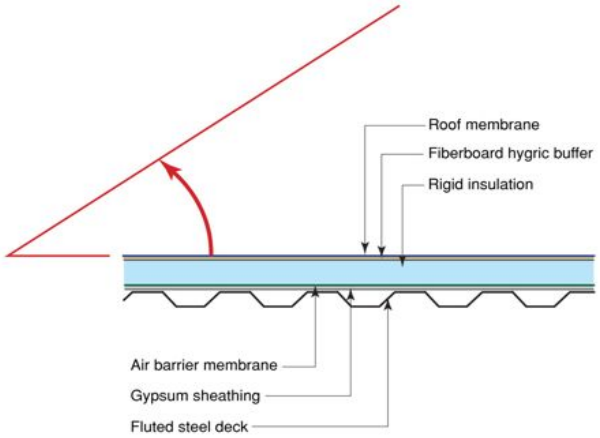
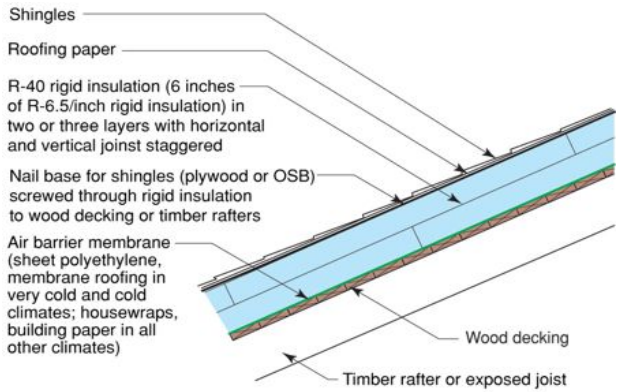
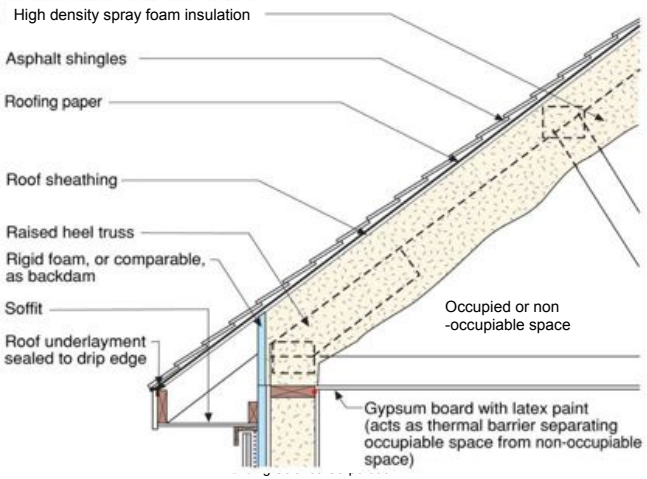
Hard to Vent

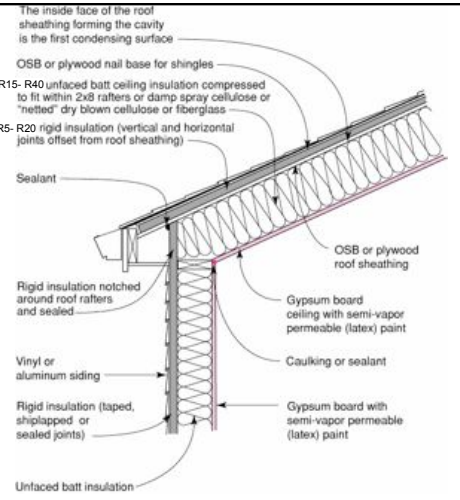
Unvented Cathedralized Attics

- Move air and insulation control from ceiling plane to roof plane
- Allows attic space to be used
- Or HVAC into conditioned space
  - Saves lots of energy, reduce problems with comfort, extends life of equipment
- Avoids wind blown rain, snow, and burning wildfire embers



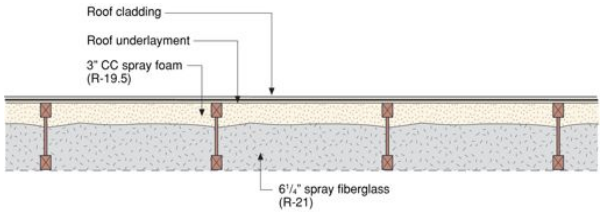






Airflow Control No. 36/79

R40+ roof, fire protection



Cold Climate Solution

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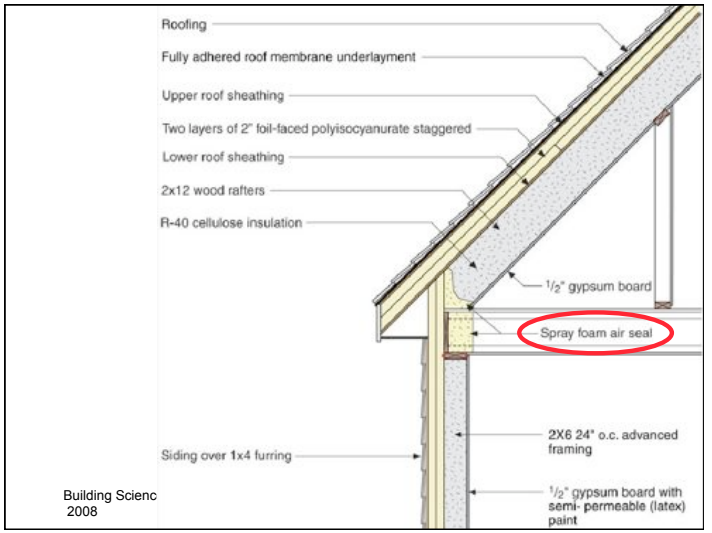

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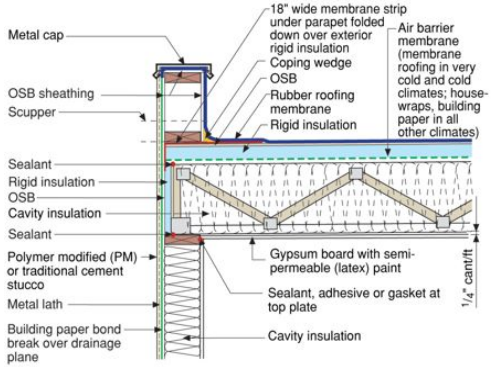
Low Slope Roofs



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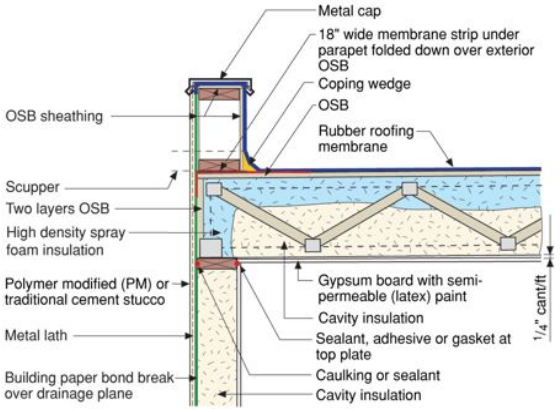

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US Code: IRC R806.4

- "Cathedralized attics" explicitly allowed
  - Require air impermeable insulation in contact
- No additional vapor control needed in Zones 1-4
- Insulation needs to be
  - Zone 4 Marine, Zones 5 and higher need retarder
  - All of Canada

Roof Temperatures

- Shingle life is affected by high temperatures
- Ventilation does little to cool shingles!
  - Extensive field research
- Roof color has big effect
- Orientation has a big effect

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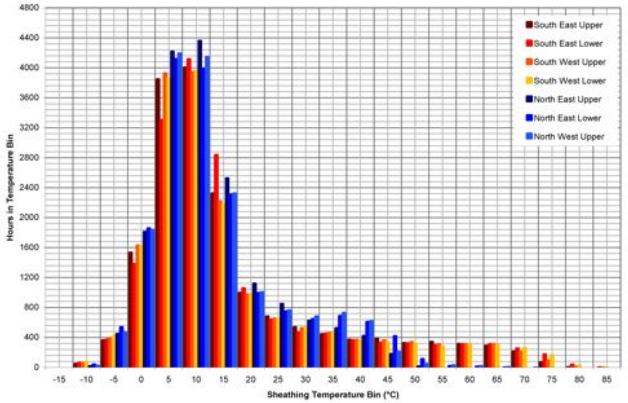
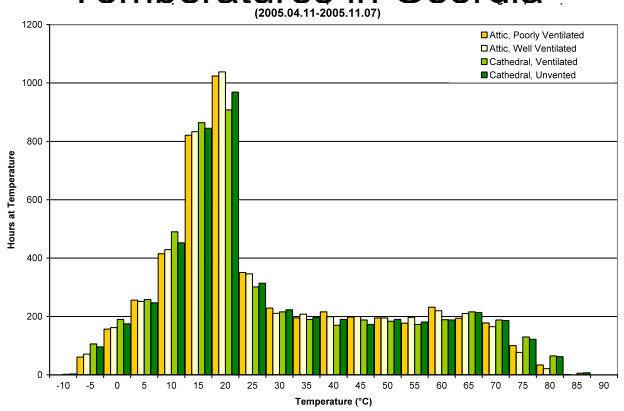
Temperatures in Vancouver



Temperatures in Georgia



Large Vent Areas= Cooling

Conclusions

- Highly ventilated open attic is with R60+ of low cost fibrous insulation is best
  - Requires exceptional air sealing of ceiling
  - No duct work!
- Unvented roofs provide more options
  - Airtightness is again *critical* to success
  - Practically means spray foam or full adhered membrane under rigid insulation
- Venting does not cool shingles

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