

Is Your House Drowning?

How did that Happen?

What is H₂O

- Water
- Moisture
- Condensation
- Vapour -- mist / steam / fog
- Ice
- Snow

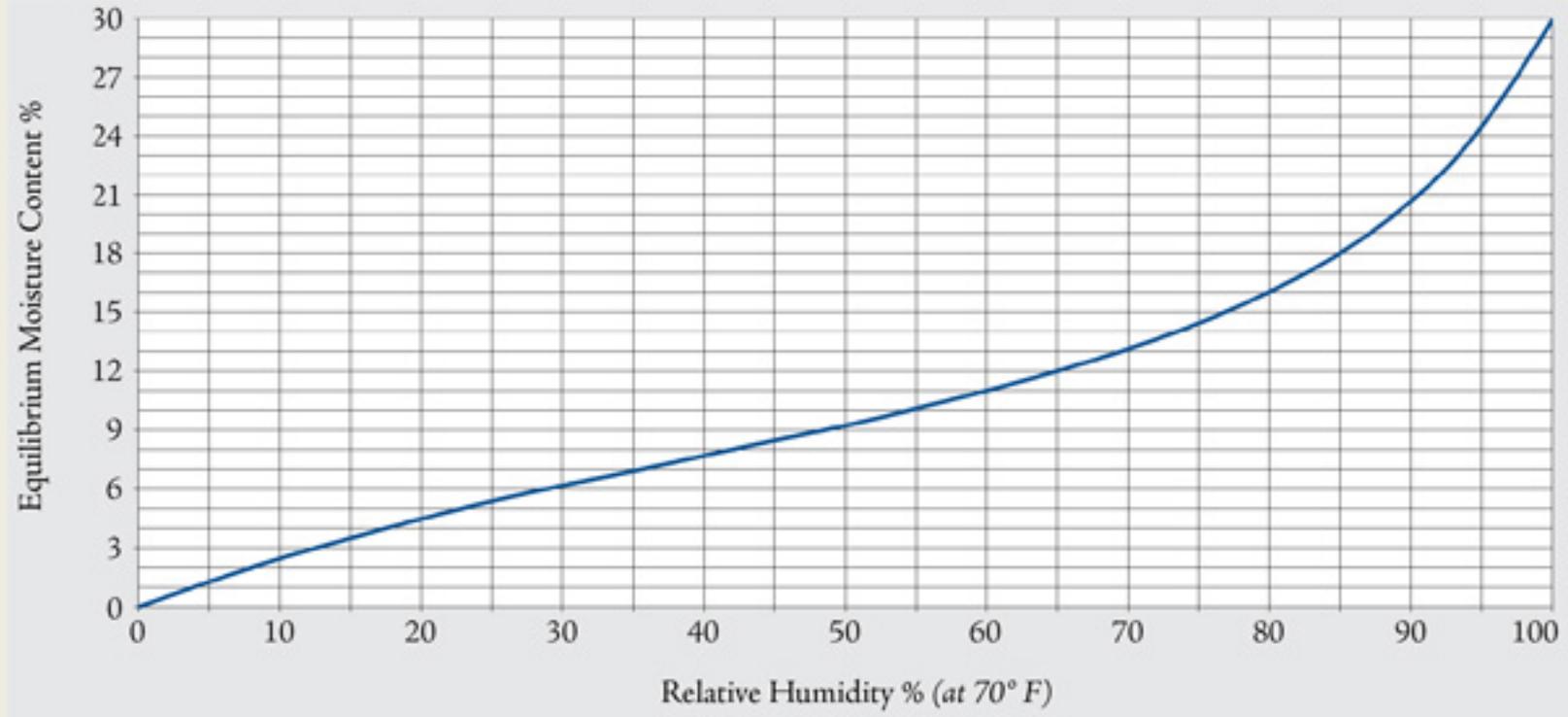
**and it is -- HOT / COLD / HARD / SOFT
TOO MUCH / NOT ENOUGH**

Water is our great and essential FRIEND

- 60% of our body is water
- Rivers for transport and fishing
- Lakes & Oceans for recreation and planet
- Rain cleans the air and water
- Rain allows for agriculture and food
- Water takes away our stress
- Water can be used for power
- Saunas & hot tubs for relaxation and health
- Water is essential for a clean and healthy planet

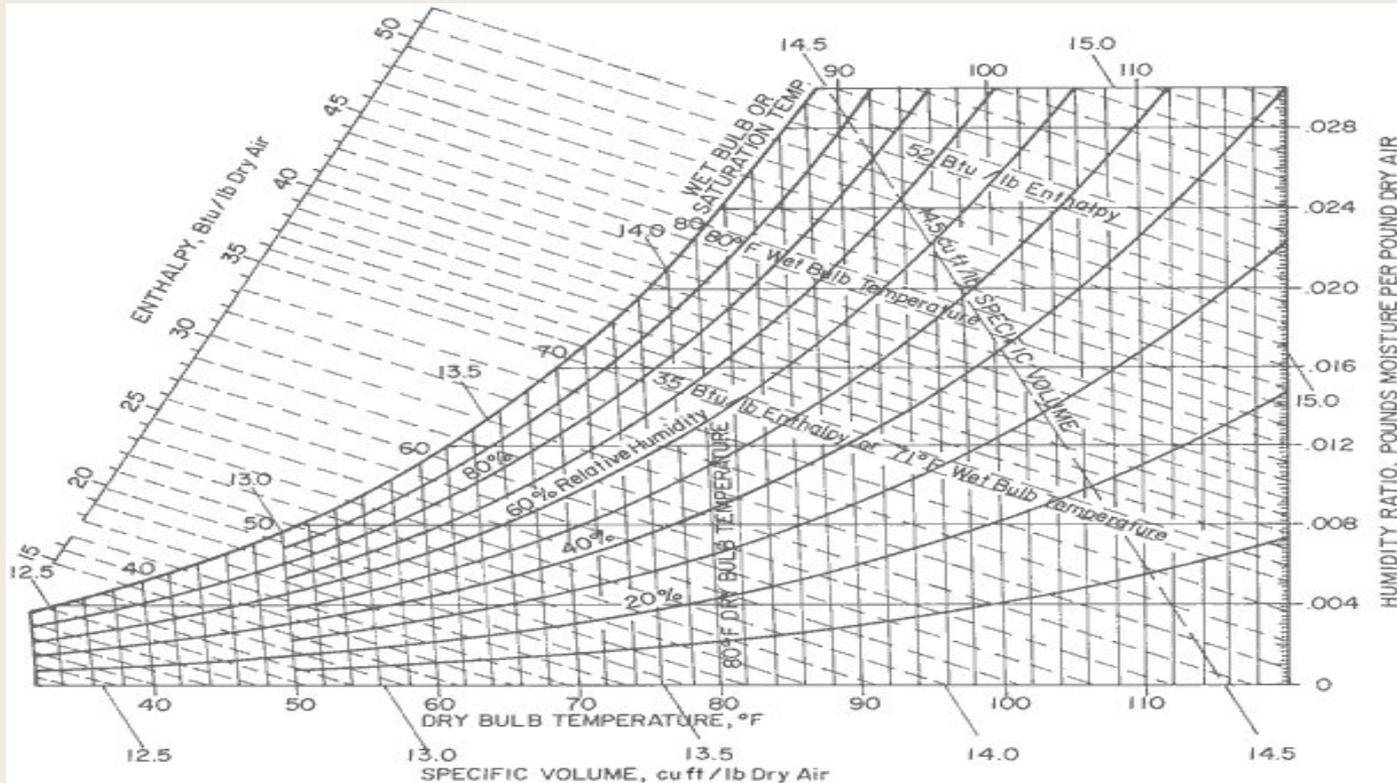


Charts for understanding H₂O



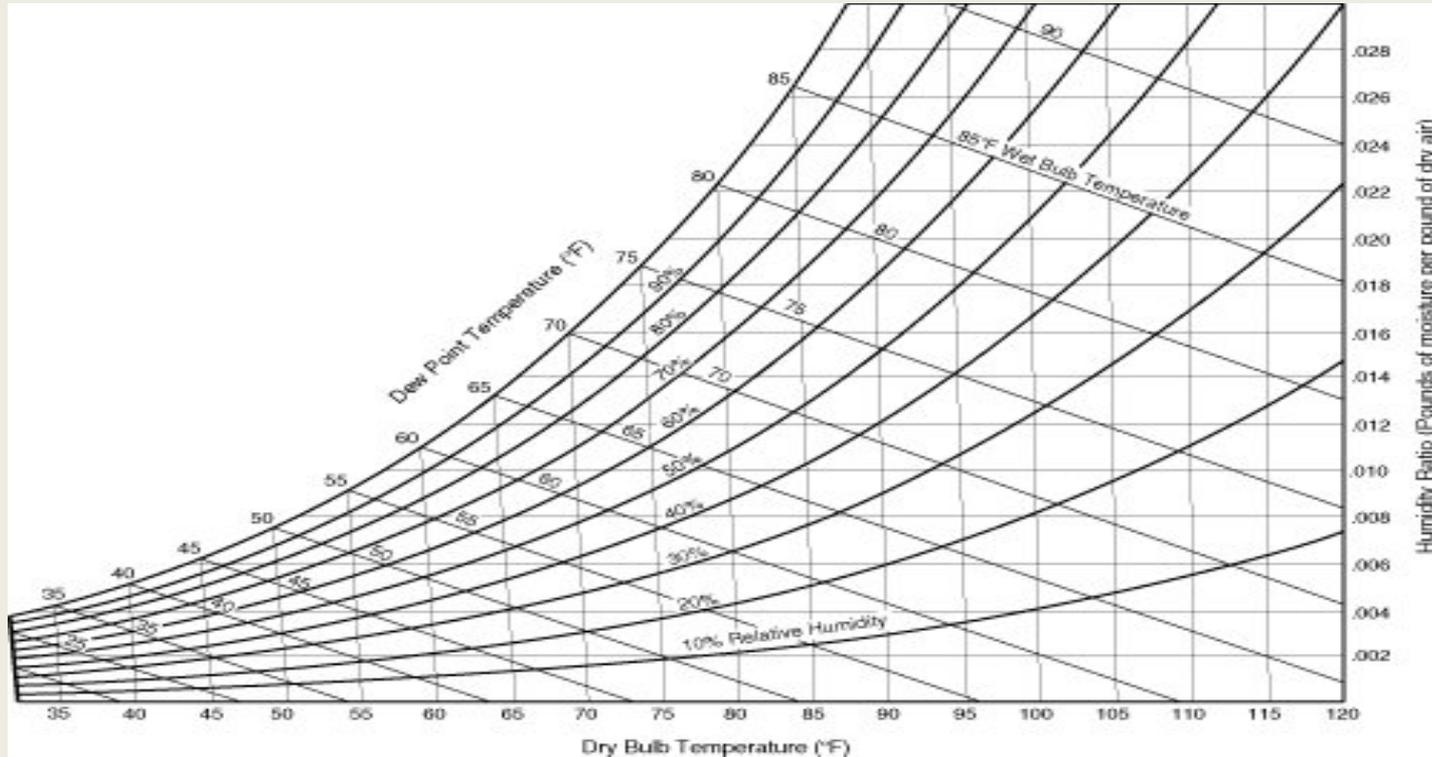
EQUILIBRIUM WOOD MOISTURE CONTENT

Charts for understanding H₂O



FULL PSYCHOMETRIC CHART

Charts for understanding H₂O



RESIDENTIAL PSYCHOMETRIC CHART

Water can be our enemy

- Rain ending our BBQ party

Anything that has so many names,

- Hail storms

changes form so frequently and

- Floods

requires charts this complicated

- Drowning

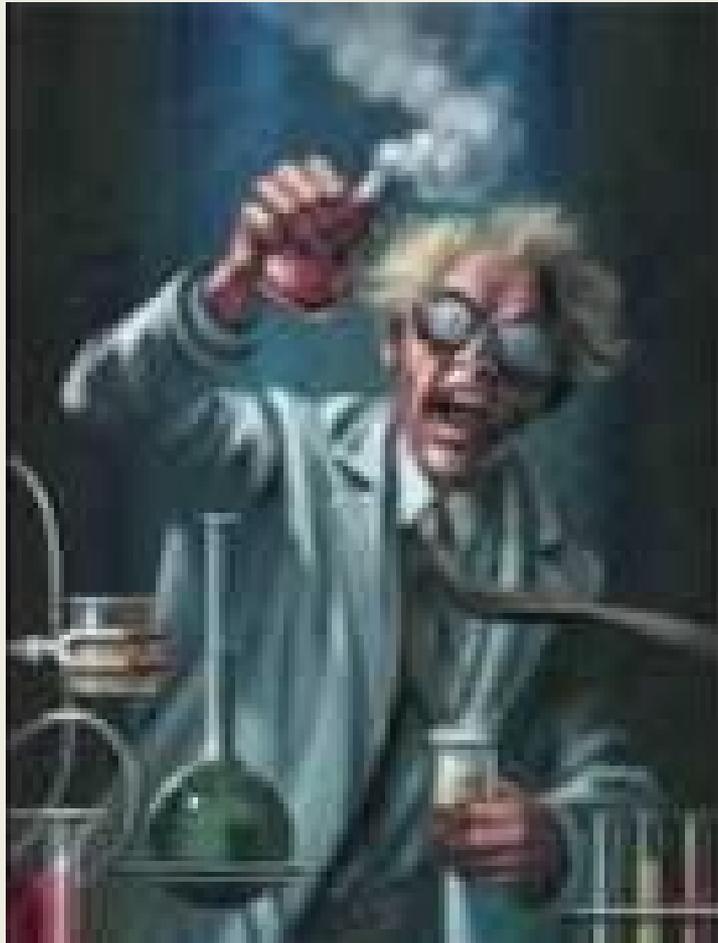
- Melting permafrost sinking our houses

must be dangerous.

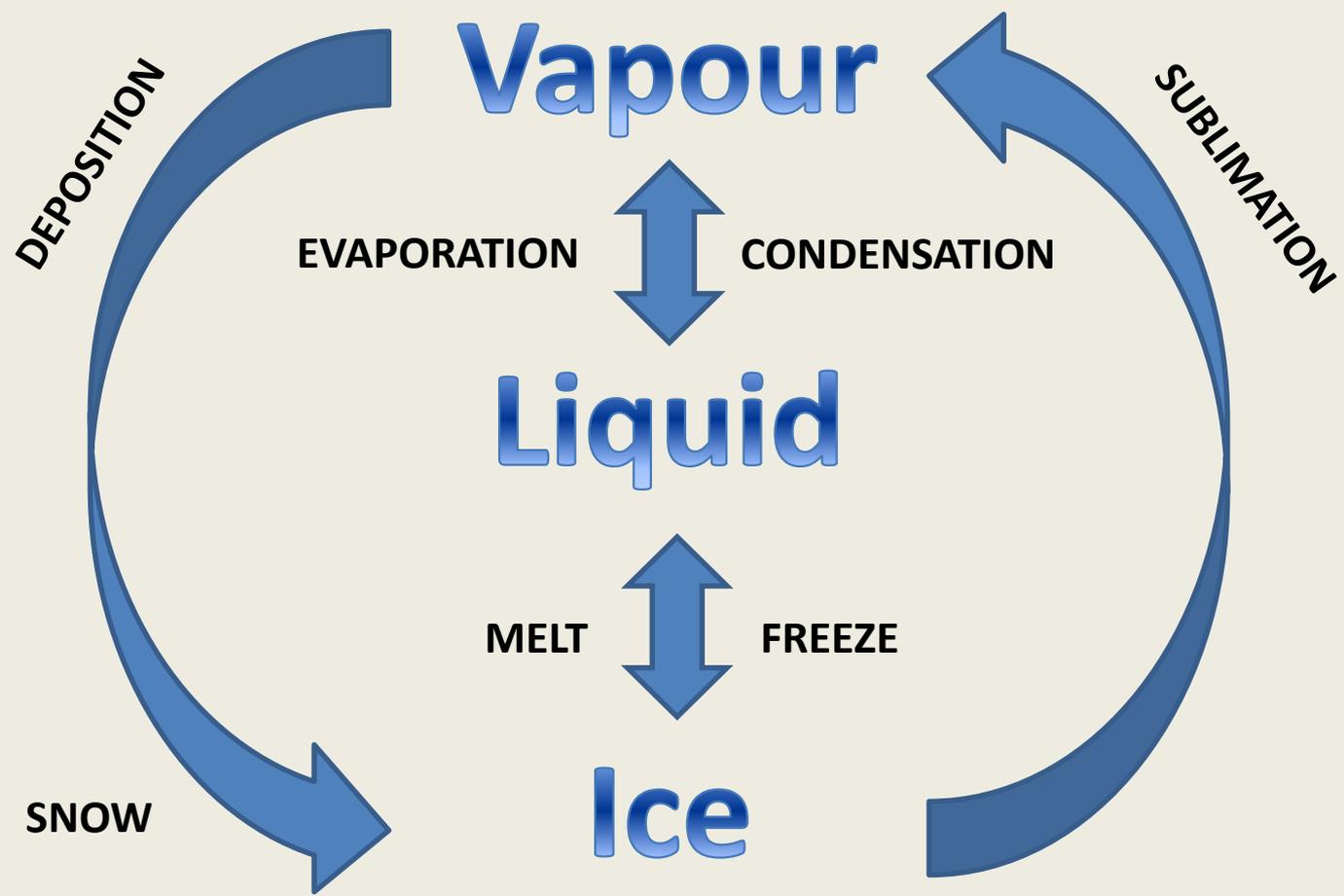
- Rot destroying our houses

- Mould destroying our health

Some science about H₂O



IT'S ALL H₂O – Phase Changes



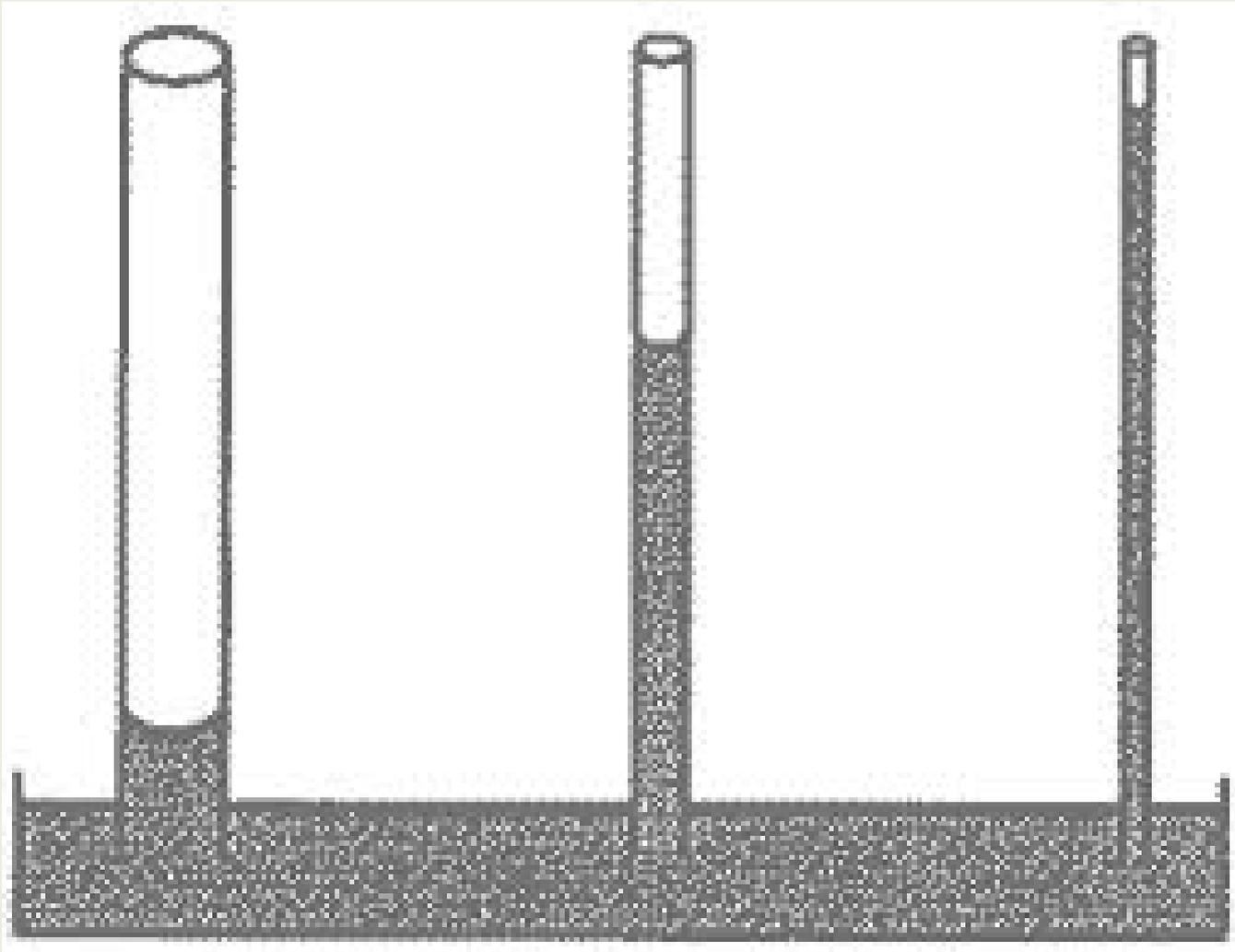
Surface Tension



Surface Tension



Capillary Action



Capillary Action



Moisture Drivers

Gravity



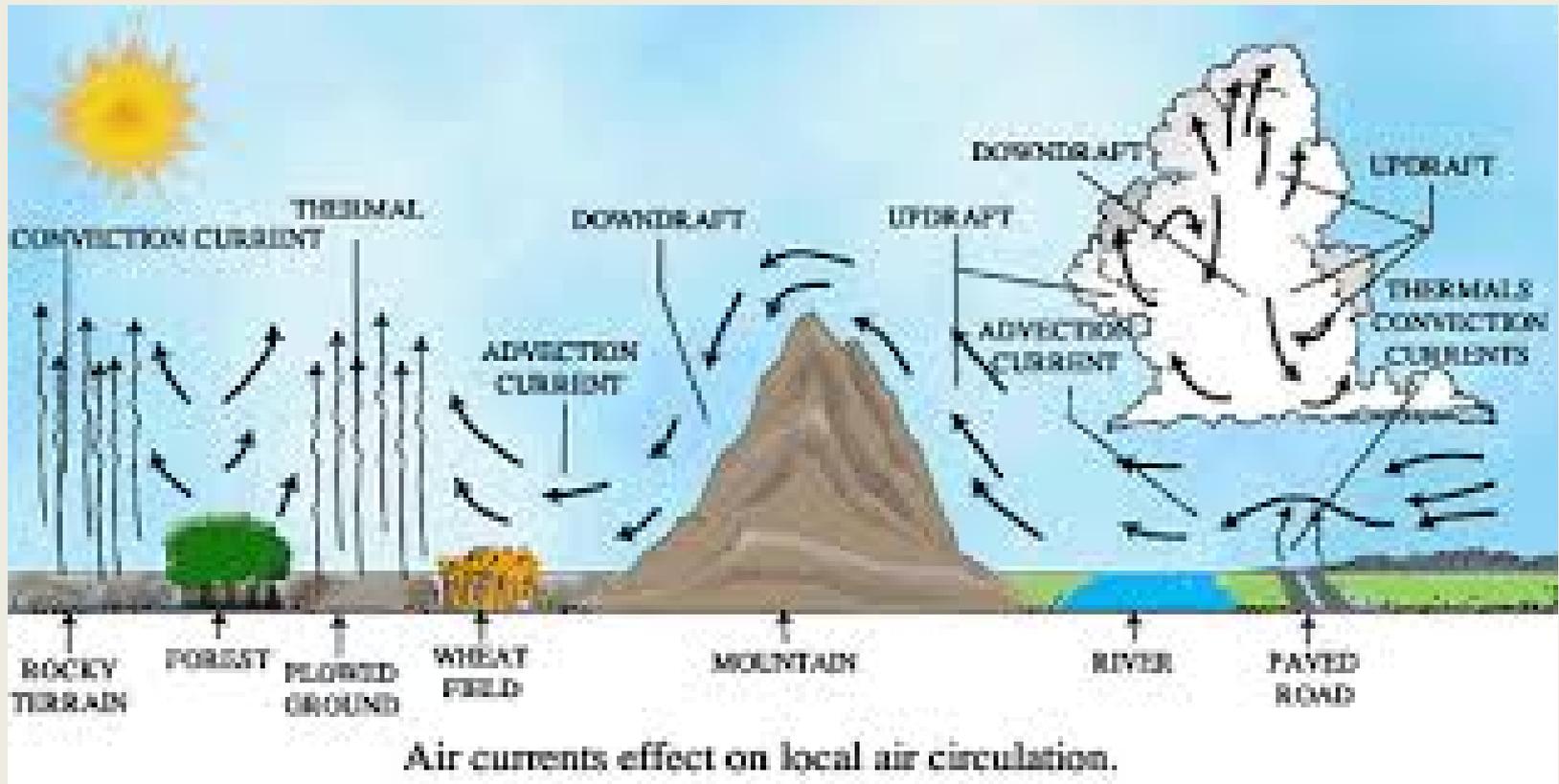
Moisture Drivers

Gravity

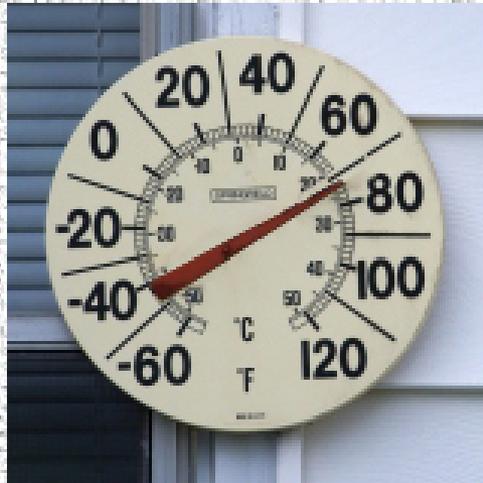


Moisture Drivers

Air Currents



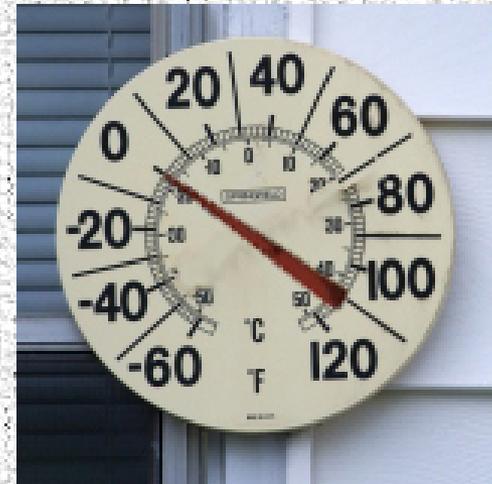
Thermal Drive



HOT



TEMP

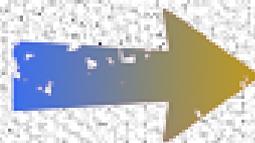


COLD

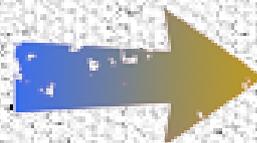
Concentration Drive



WET

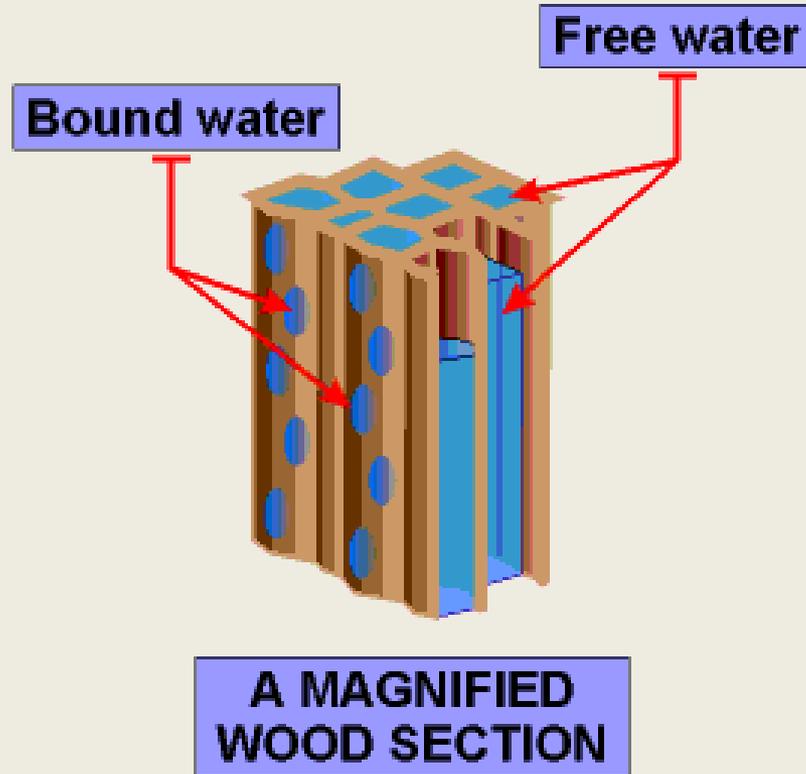


HUMIDITY



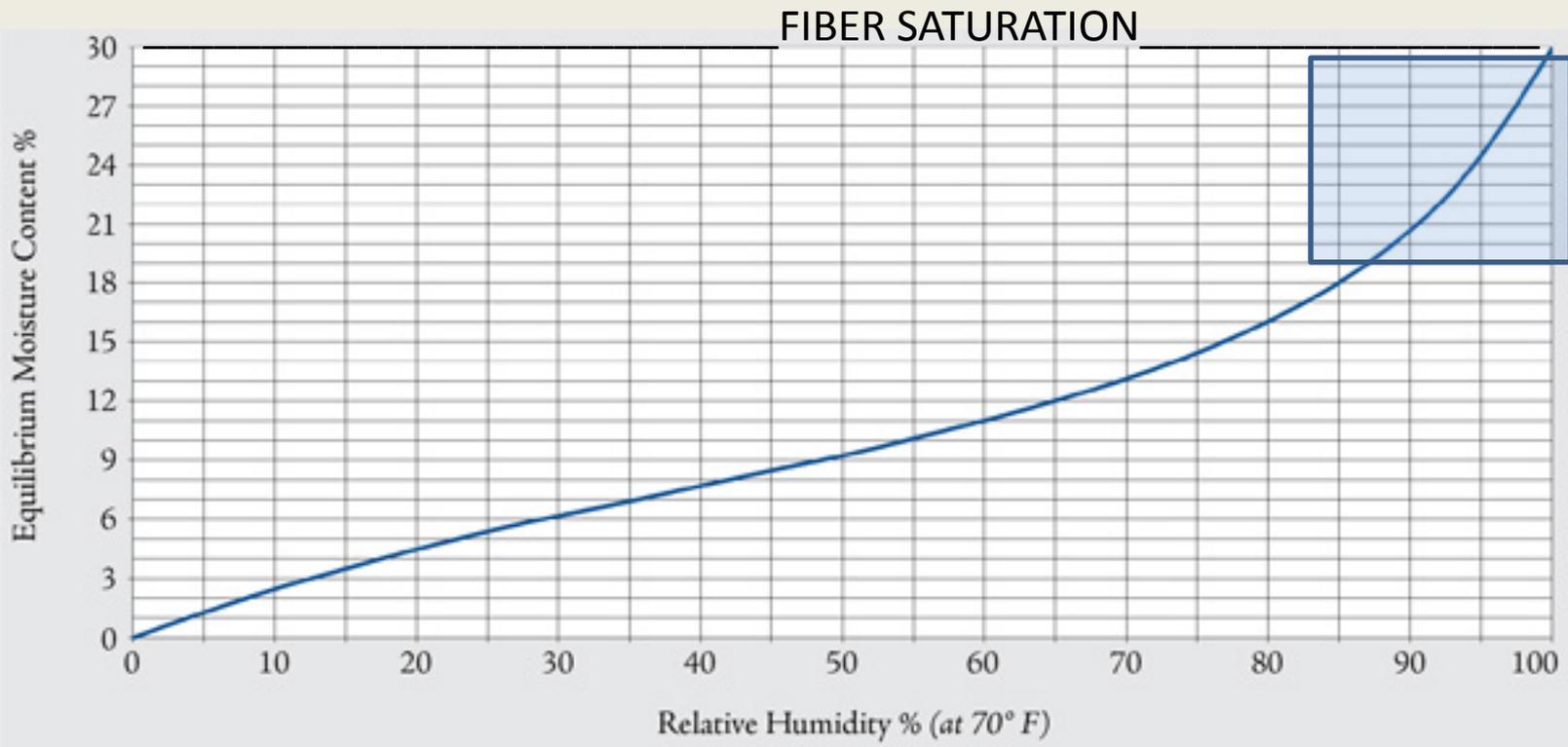
DRY

Fiber Saturation Point in Wood Cells



**Fiber Saturation \approx 30% Moisture Content
By weight**

Equilibrium Moisture Content vs Relative Humidity



19% to 28% MC is the primary SHRINKAGE zone for wood

LIVING WITH H₂O



FLOWING WATER -- SHINGLES



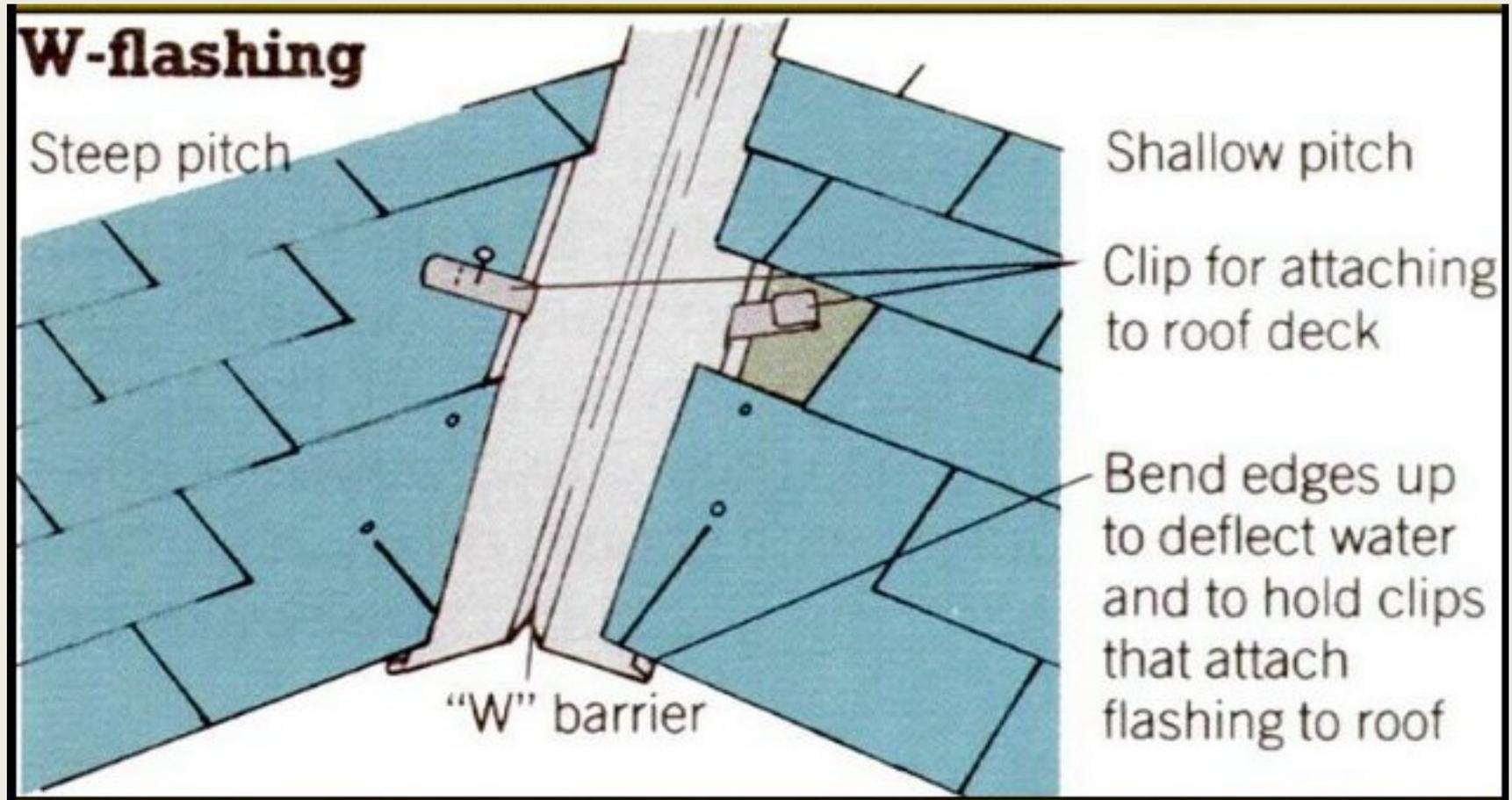
GRAVITY

WIND DRIVEN

CAPILARY

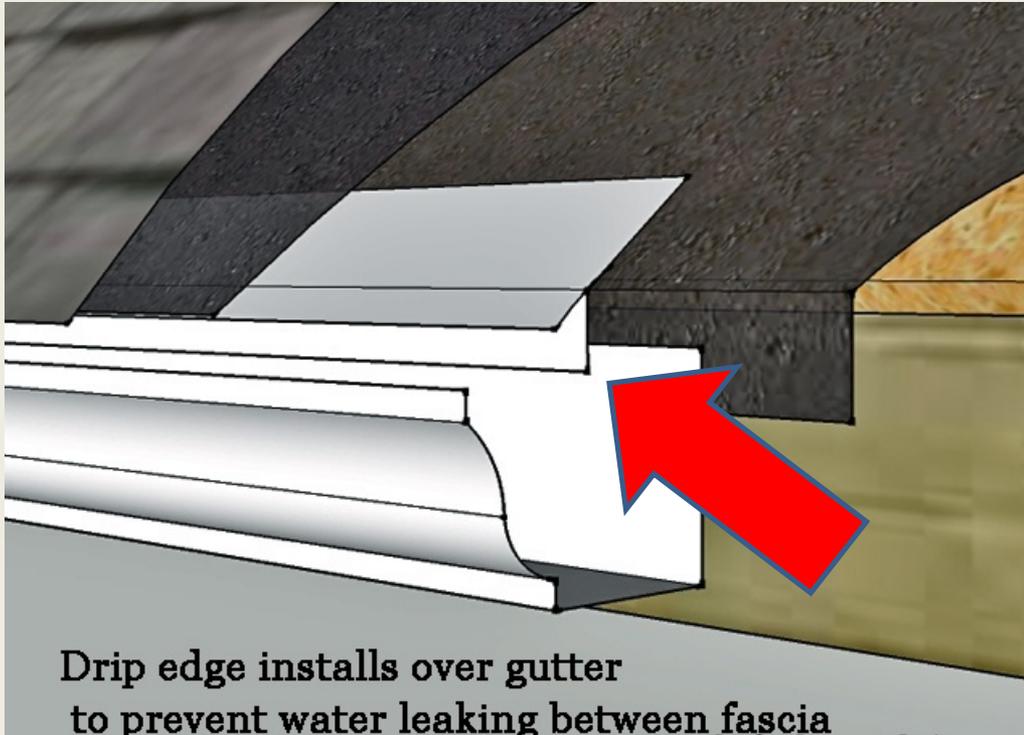
GRAVITY

FLOWING WATER VALLEY FLASHINGS

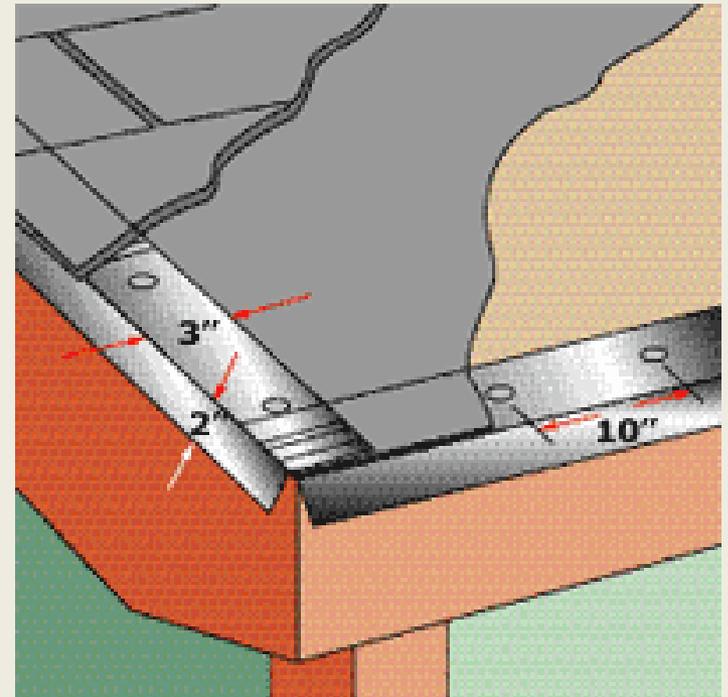


helping gravity to beat capillary and wind drive

FLOWING WATER – Roof Drip Edge



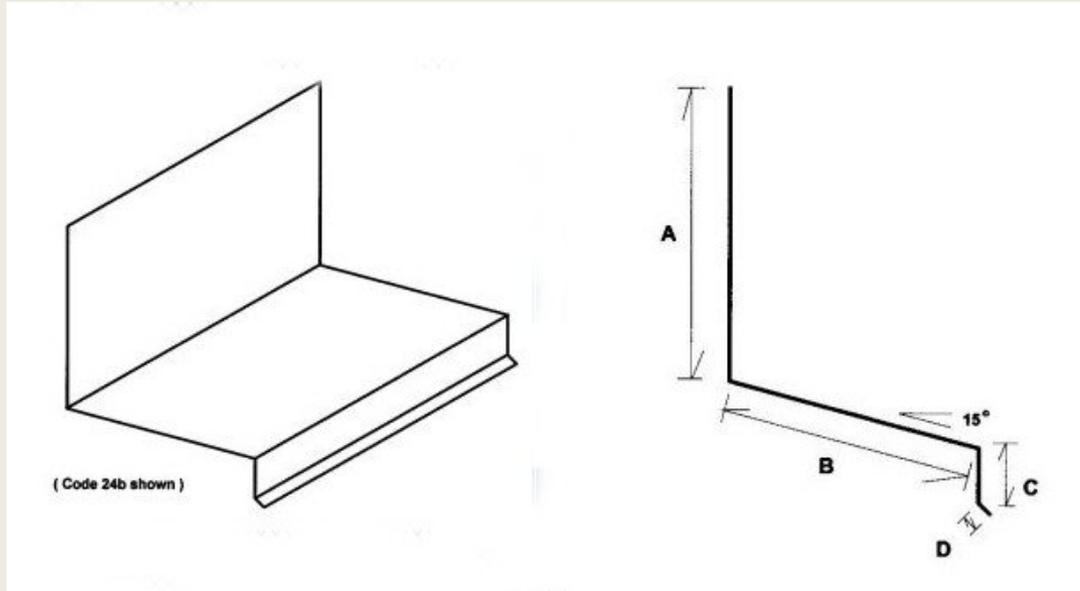
Break surface tension



Feathers on a Duck overlapping

FLOWING WATER

Window and Door Header Flashings



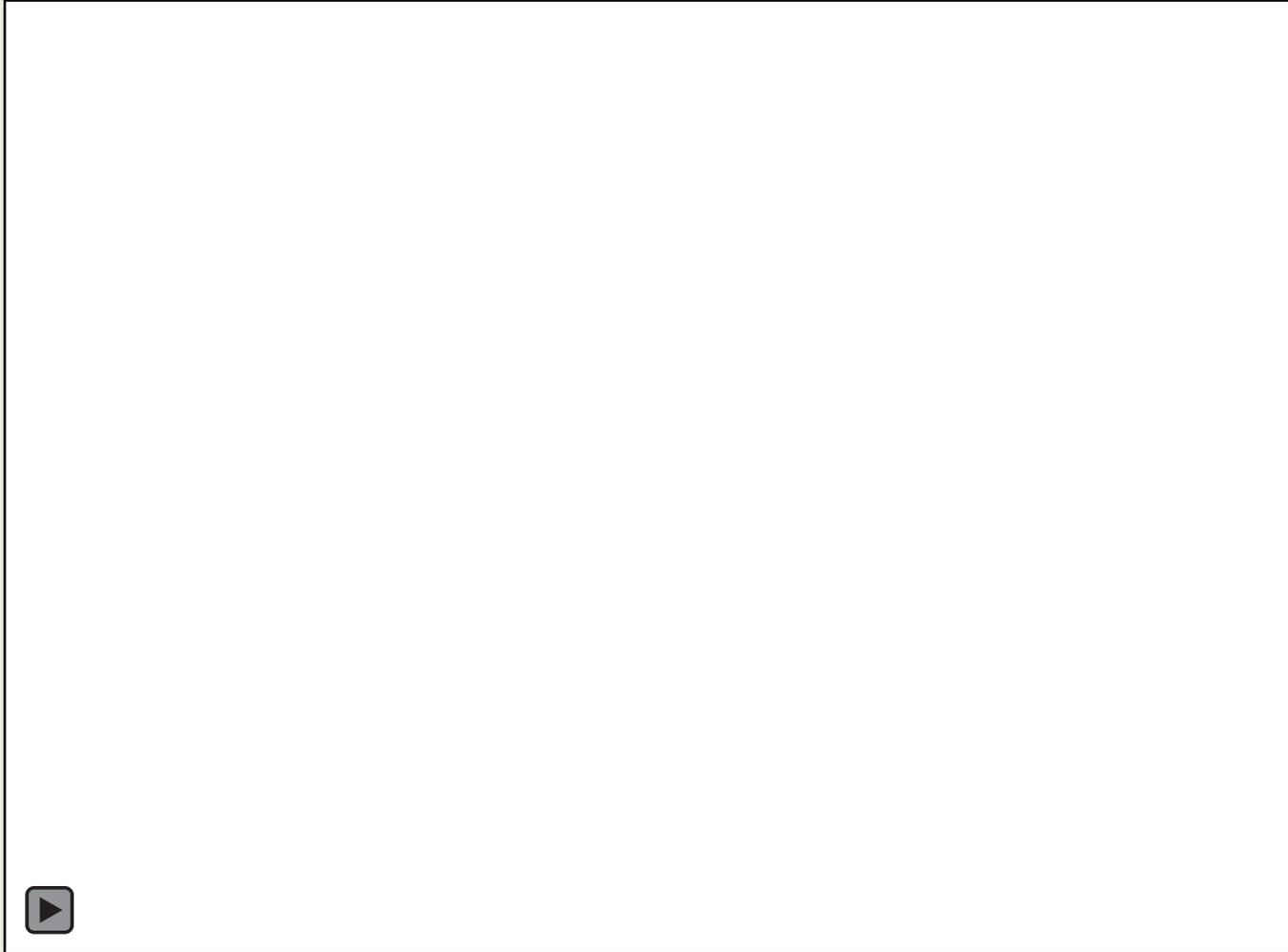
FLOWING WATER – Window Sills



FLOWING WATER - Downspouts



FLOWING WATER – Plumbing Drains



FLOWING WATER

Soap – Friend and Foe

**Soapy water cleans well because
it breaks the water's surface tension**

**Soapy water makes waterproof things
no longer waterproof – like House Wraps.**

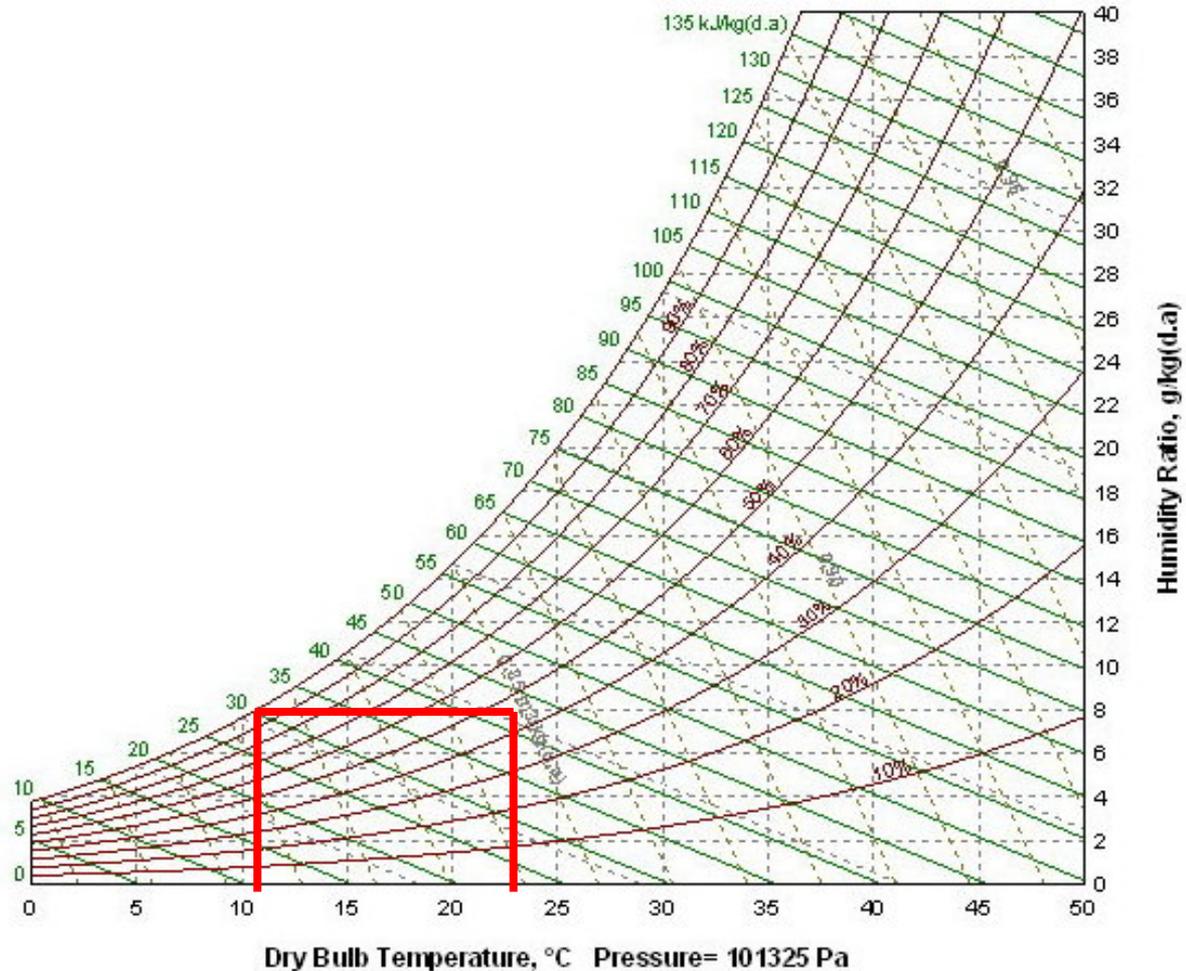
H₂O BALANCE

Condensation on Windows



H₂O BALANCE

Condensation on Windows



H₂O BALANCE

Condensation on Windows

Indoor Relative Humidity levels
that will keep
thermal pane windows
condensation free

Outside Air Temp (°C)	Maximum Indoor Relative Humidity at 20 °C (68 °F)
-30 °C or below	15%
-30 °C to -24 °C	20%
-24 °C to -18 °C	25%
-18 °C to -12 °C	35%
-12 °C to 0 °C	40%

H₂O BALANCE

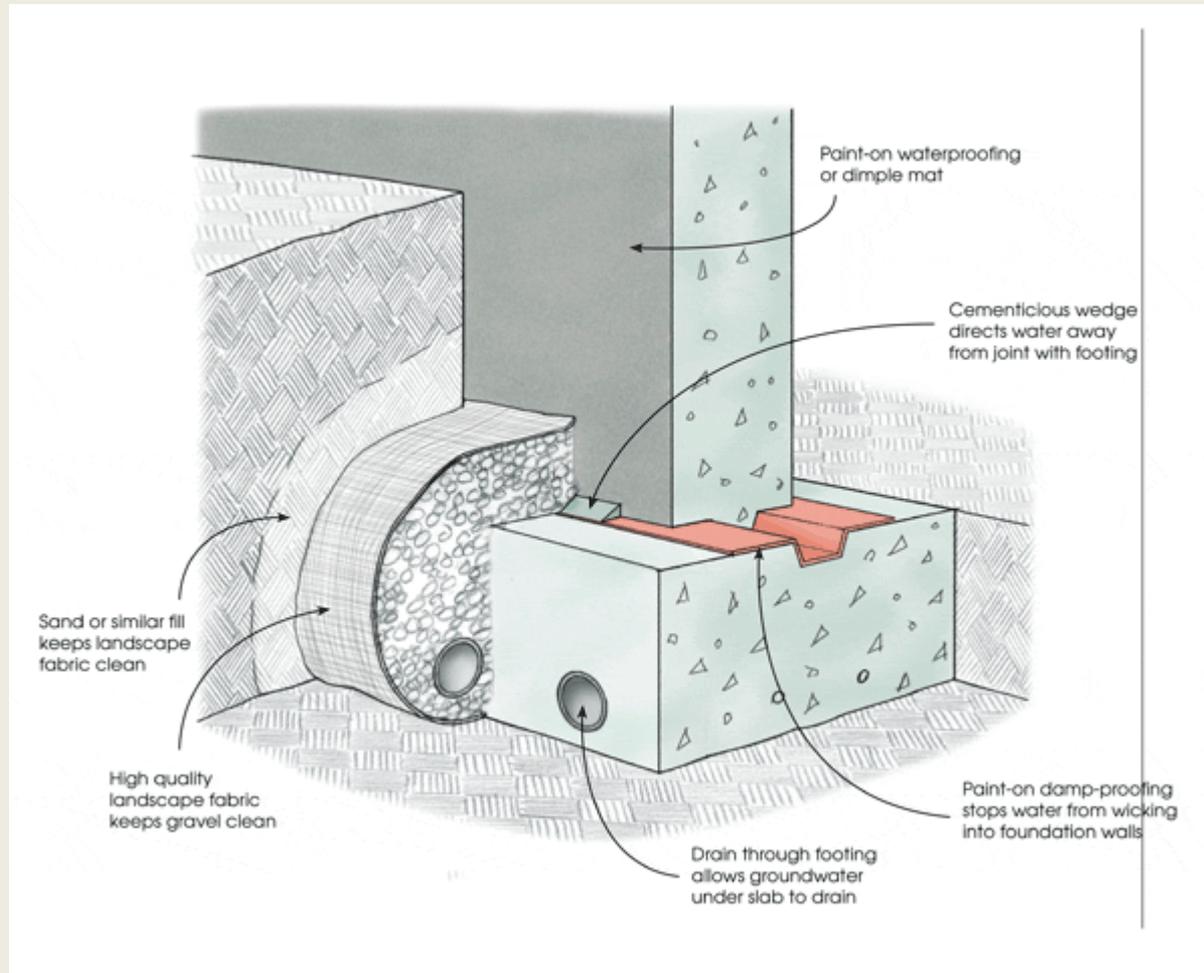
Wood on Concrete Rotting



H₂O BALANCE Efflorescence



H₂O BALANCE Efflorescence



H₂O BALANCE

Mould in Walls



H₂O BALANCE

Where Posts Rot



H₂O BALANCE

Floor Gaps – Floor Buckling



H₂O BALANCE

Drywall Corners Buckling



H₂O BALANCE

Concrete Spalling



**Match principles
to problems
for good solutions**