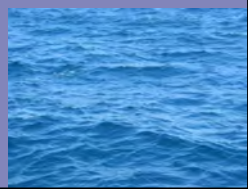
John Straube, Ph.D., P.Eng

Floor Slabs

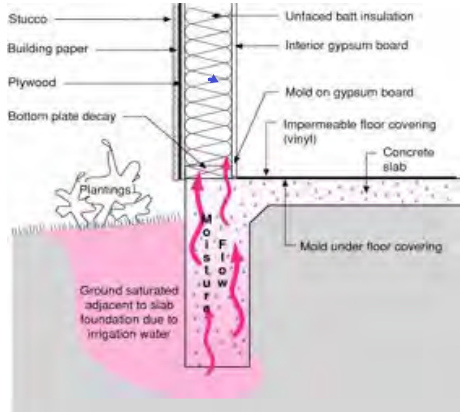


presented by www.buildingscience.com

Capillary Rise

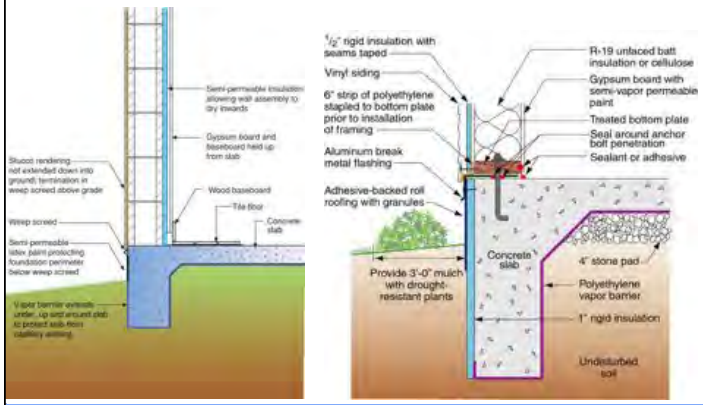
- Wicking upward from footing / foundation
- Beware connecting wet soil to moisture sensitive materials via foundations

Problems



"Works" with carpet, does not with impermeable flooring

Solutions



An insulated slab w/poly & break

Sand over poly = stupid

- Built in moisture
- Construction water
- Perimeter leaks

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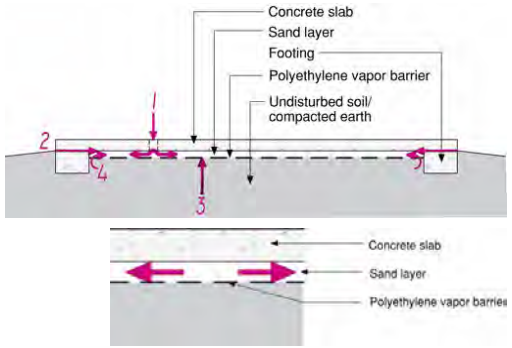
Wetting sand sub-slab



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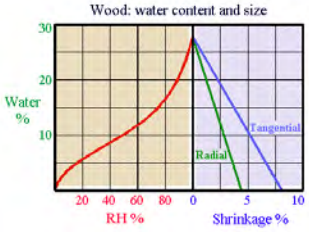
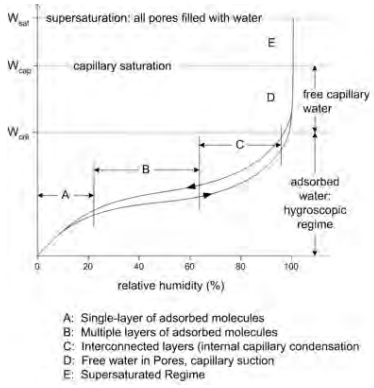
Moisture Storage

- RH vs MC





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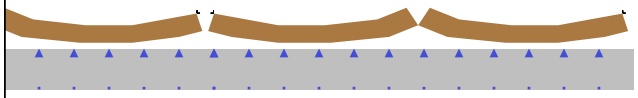
Wood flooring

- Cupping and cracking
  - Due to internal moisture gradients
  - Moisture gradients caused by wetting/drying
  - Wood movement occurs in vapor regime
  - Often moisture rises from below through untreated wood
  - Poly under slab, dry concrete



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Wood floor – built-in moisture solutions

- Maintain stable RH (not vapor pressure)
- Reduce absorption on all 6 sides of wood
  - Seal back with impermeable coatings
- Slow drying rate / reduce rate of moisture supply
  - coat concrete with impermeable coating
  - Special vapor tight adhesives (e.g. Bostik BST)
- Use engineered wood (less cross grain)
  - Don't get wood movement

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Solid wood on radiant floors

Building Science 2008 Slabs and Flooring No.14

Flooring on slabs

- Something that keeps coming up
  - Flooring on slab on grades
  - Concrete on metal decks
- Changes in flooring
  - More VCT, vinyl, ceramic (less permeable)
  - Water based adhesives
  - Slower drying concrete
  - Faster construction cycles

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Building Science 2008 Slabs and Flooring No.16

Adhesive failure

- Latex based floor adhesives
  - Start as emulsions, dry to form latex film
  - Won't break down when re-wetted
  - High alkalinity + moisture causes failure

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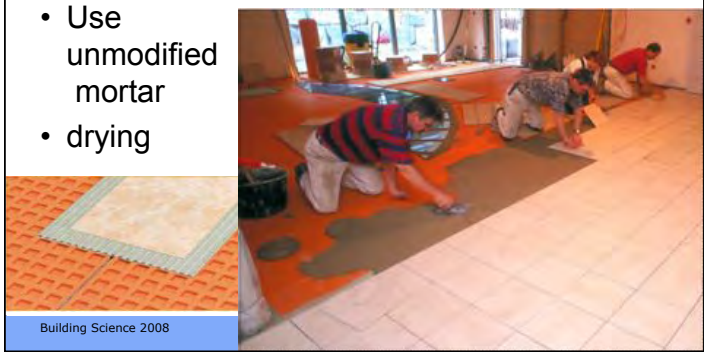
Isolation sheet - Tiles

- Vapor barrier, flexible shear isolation
- Use unmodified mortar
- drying



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Adhesive Failure: Resilient Flooring

- VCT and sheet vinyl are vapor barriers
- Adhered with latex based adhesives
- Must protect from alkali / moisture

- Sol'n: alkali reistant sheets and coatings

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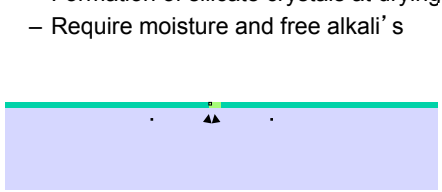
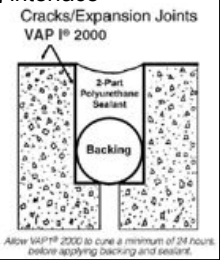
Epoxy

e.g.: Aquafin Vaportight Coat
Koester Vap I 2000
Sinak VECT-R

- Epoxy coating can be the vapor barrier
- Small holes/joints allow water to evaporate
- Epoxy floor coatings
  - Formation of silicate crystals at drying interface
  - Require moisture and free alkali's





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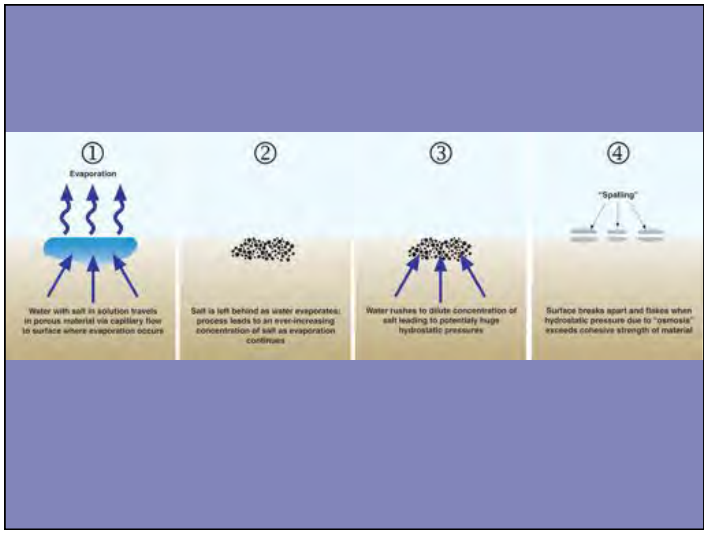
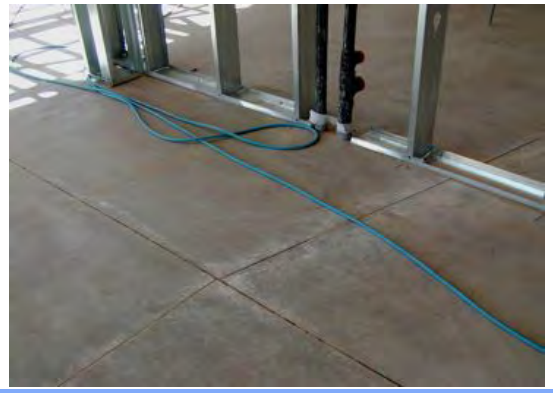


Ceramic Tile Crack Reflection



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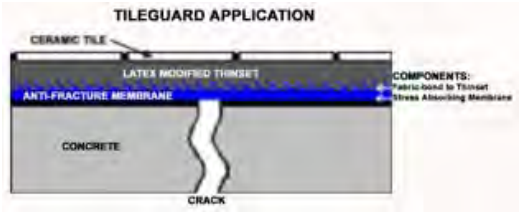
Ceramic tile / Stone cracking

- Shear Isolation membranes or coatings

Weak Shear planes (and low perm)

- AFM Protecto wrap
- Polygard Tileguard
- Bostik MVP (not for VCT)



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Basement Floors

Concrete alone fine but when you finish…
- Comfort (cold and hard)
- Water under finish flooring
- Water condensing on top (summer)

- Solutions
  - Install finish over small amount of insulation
  - Install vapor barrier on top of concrete
    - Either very tough / durable (heavy duty)
    - Or must be adhered (epoxy)

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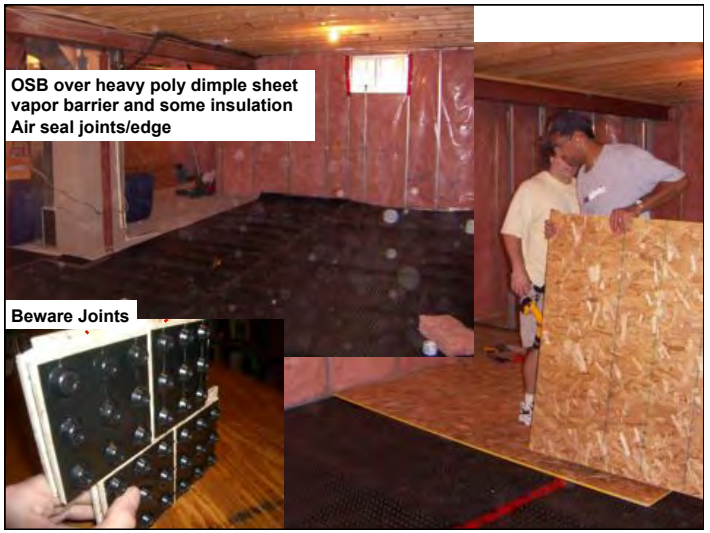
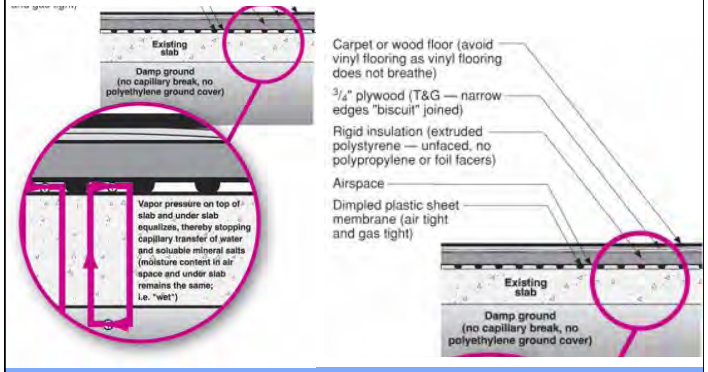
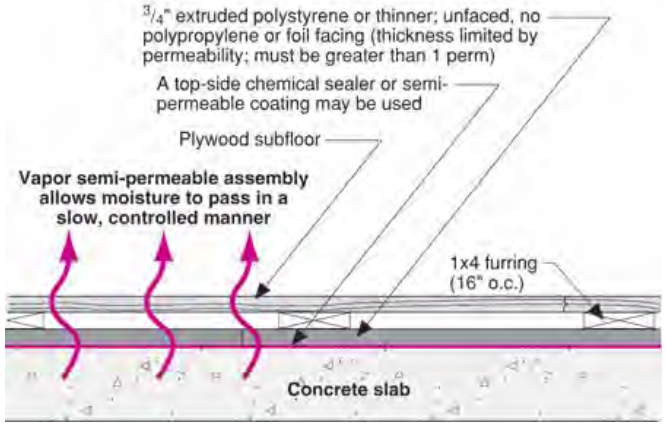




Building Science 2008 Slabs and Flooring No.27



Building Science 2008 Slabs and Flooring No.28

Slabs

Solutions

- Dry slabs, not just cure them!
- Vapor barrier under slab
  - Stop soil moisture by diffusion
- Capillary break
  - Stop capillary wicking
  - Sheet goods, crushed stone, air gap
- Insulation
  - Keep slab warmer
  - Insulation also can be vapor retarder cap break

Building Science 2008 Slabs and Flooring No.30

Flooring & Moisture

- Moisture Sources
  - Soil liquid and vapor
  - Built in moisture (concrete flooring adhesives)
  - Interior air vapor
  - Interior floods & plumbing leaks
- Transport Mechanisms
  - Capillary (from soil up)
  - Diffusion (from soil)
  - Air movement (from interior humidity)

Building Science 2008 Slabs and Flooring No.31