

Presentation

- **Rain Control Strategies for Walls: R&C / Intermediate**
- **Venting, Ventilation, or Drainage?**
- *John Straube, P. Eng, Ph.D., Building Science Consulting, Inc.*
- **EMERALD III**
- When do you need to vent walls and when do you need to ventilate them? What's the difference and how much of each is needed? Learn practical field-tested methods for achieving drainage venting and ventilation in residential and commercial enclosures in Vermont.



Dr John Straube, P.Eng.

Rain Control for Walls: Venting, Ventilation and Drainage

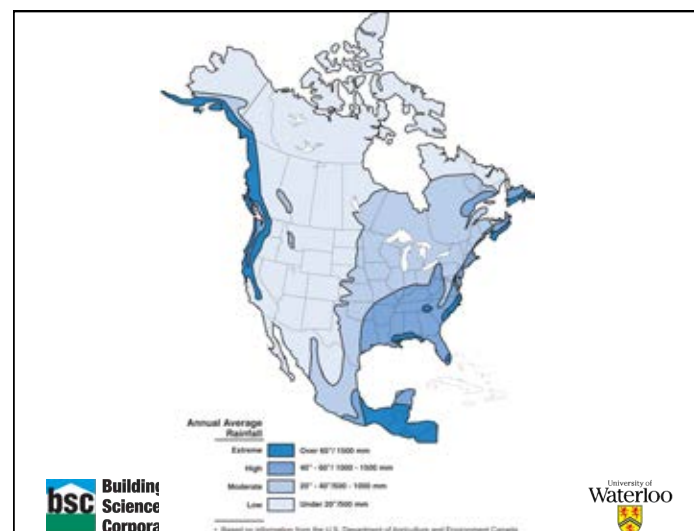


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Overview

- Rain Control basics review
- Role of ventilation and drainage
- What makes them work?
- When do we need them?



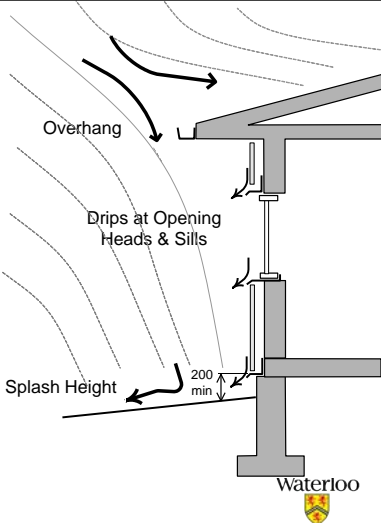
Controlling Rain Penetration

- **Deflection**
 - reduce water on building
 - redirect water away
 - slope surfaces, use flashing
- **Drainage / Exclusion / Storage**
 - enclosure design choice
 - provide drainage, barrier or storage
- **Drying**
 - allow any remaining water to dry



Deflection

- **Surface & site features are also important**



Deflection



Rain penetration test



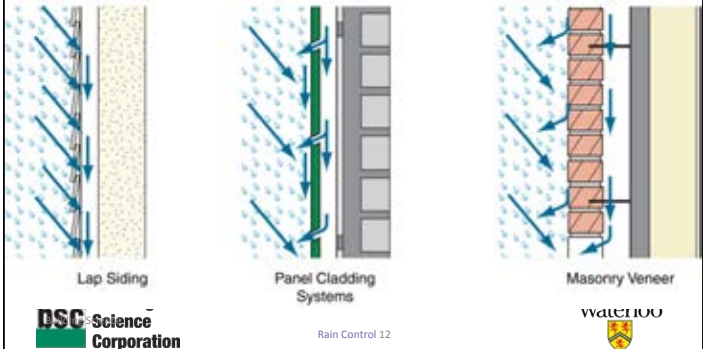
Many claddings leak

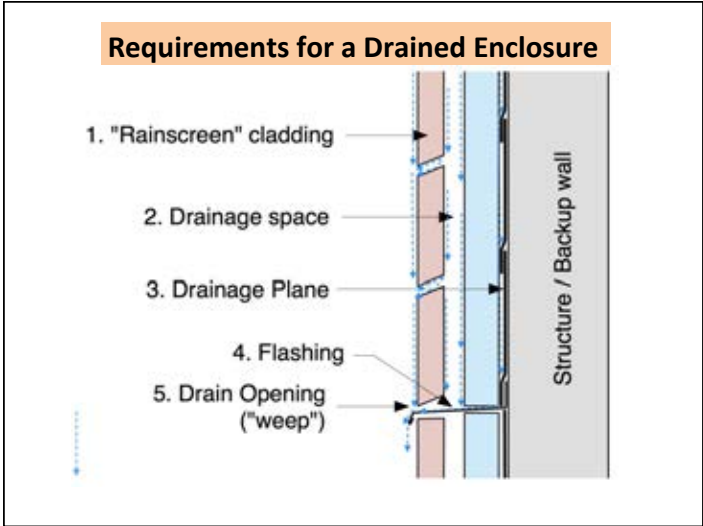
- Brick
- Wood, vinyl, fiber-cement siding
- Stucco
- Metal panels

- Joints leak: window, precast, curtainwall

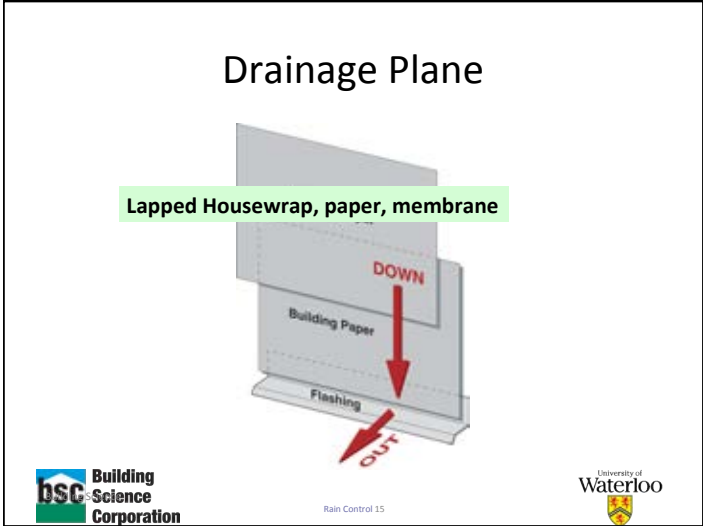


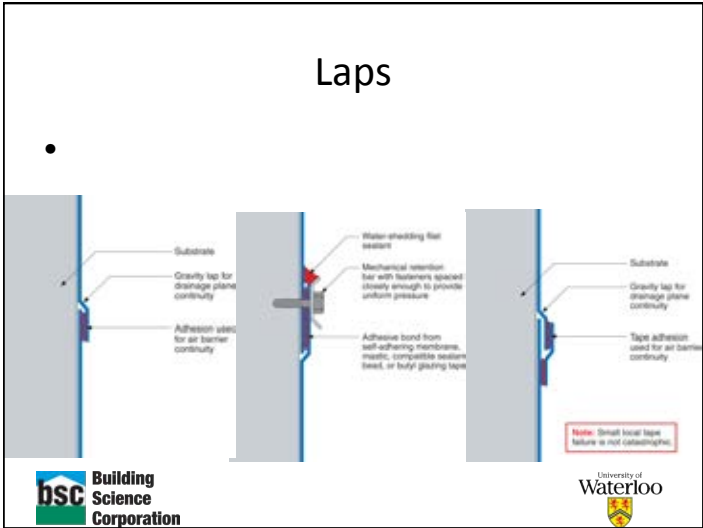
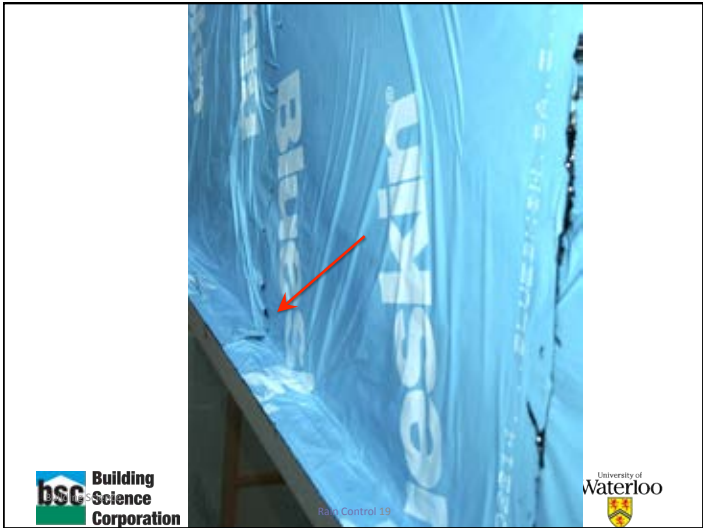
Drained Walls





DRAINAGE PLANE





DRAINAGE GAP

Drainage Gaps

- We have long built gaps in walls/roofs
- Why?
 - Both drainage and ventilation use gaps
- What is the proper gap size for:
 - Drainage?
 - Ventilation?
- When do I need drainage? Ventilation?

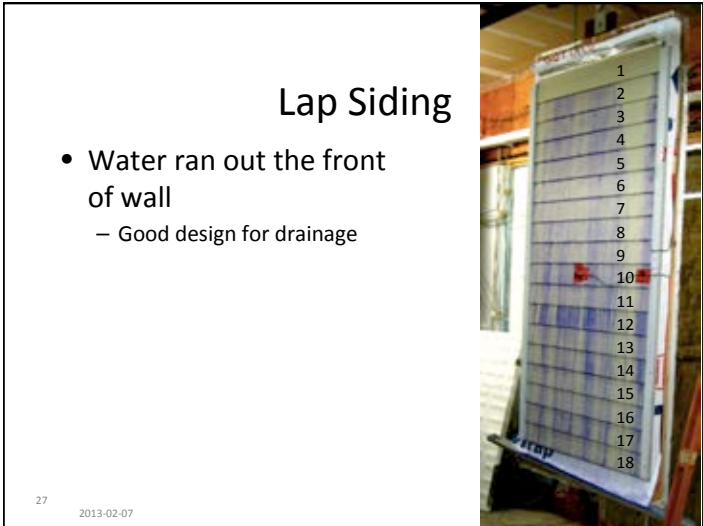
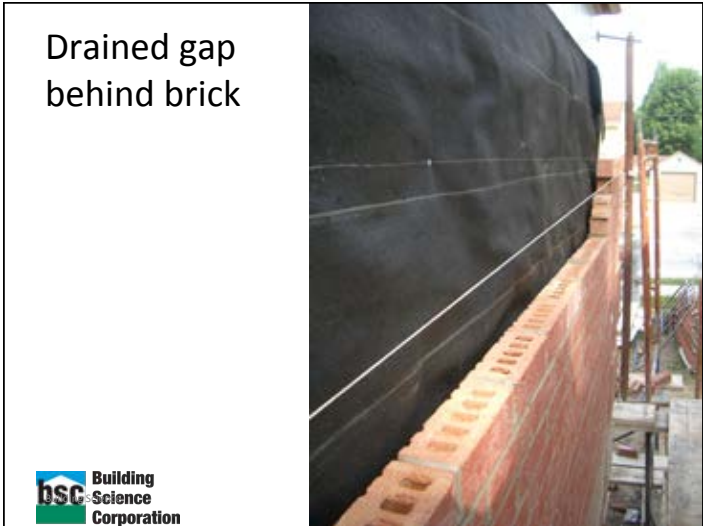
Drainage Gaps

- Gap avoids hydrostatic pressure
 - drains away water
- Reduces time of wetness on housewrap, membrane, cladding
- Requires only small gap, e.g. $<1/16''$

Leaks

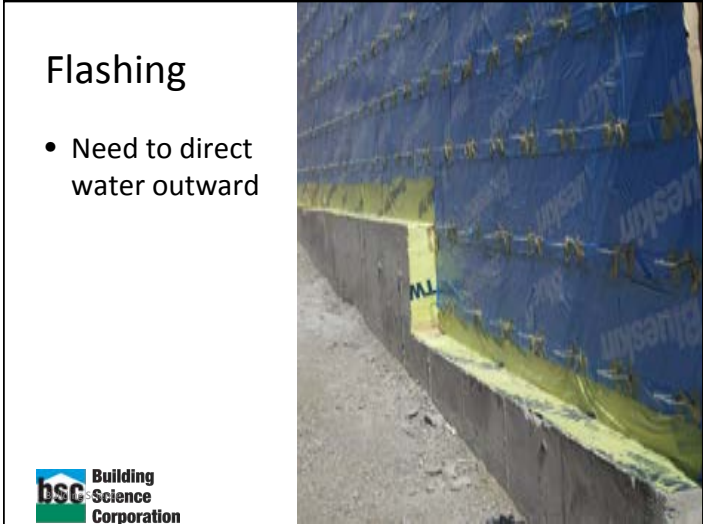
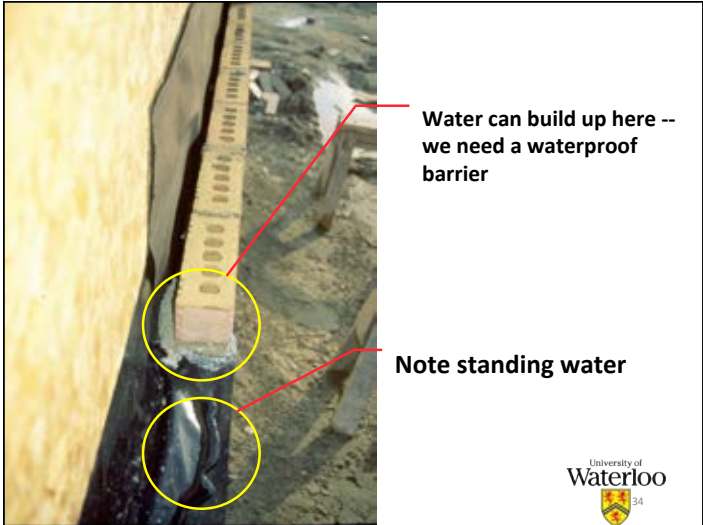
- If obstruction, head builds up and small nail/staple holes leak
- Some housewraps come with pre-manufactured holes





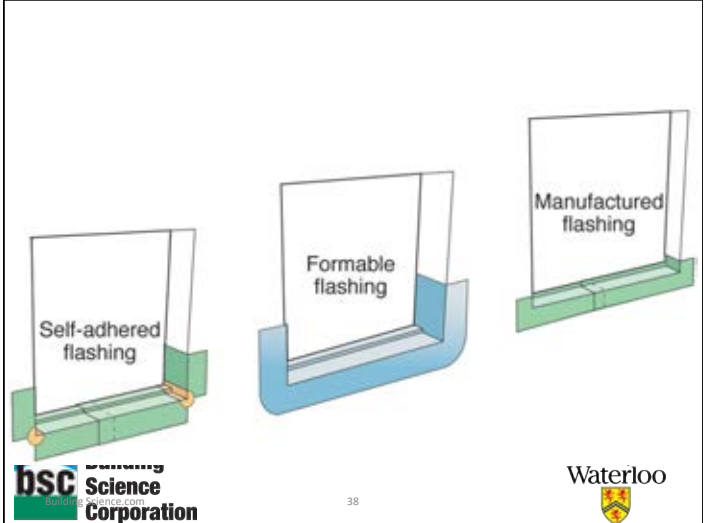


FLASHING + WEEPHOLES

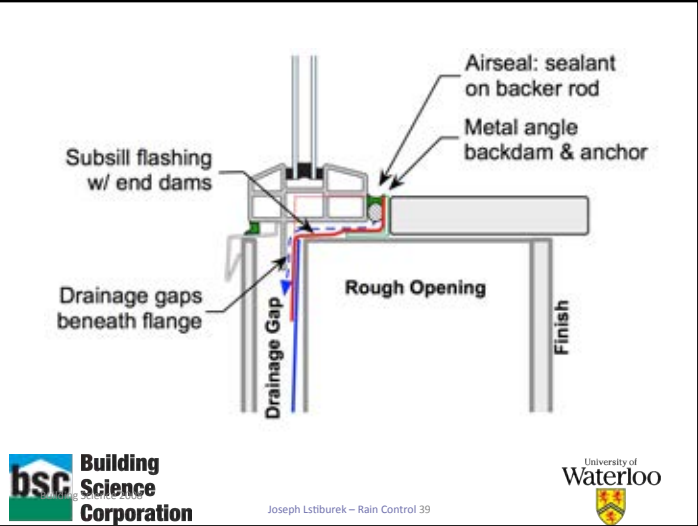


Leaky windows

- Leaks around windows occur
- Collect and dump onto drainage plane w/ flashing

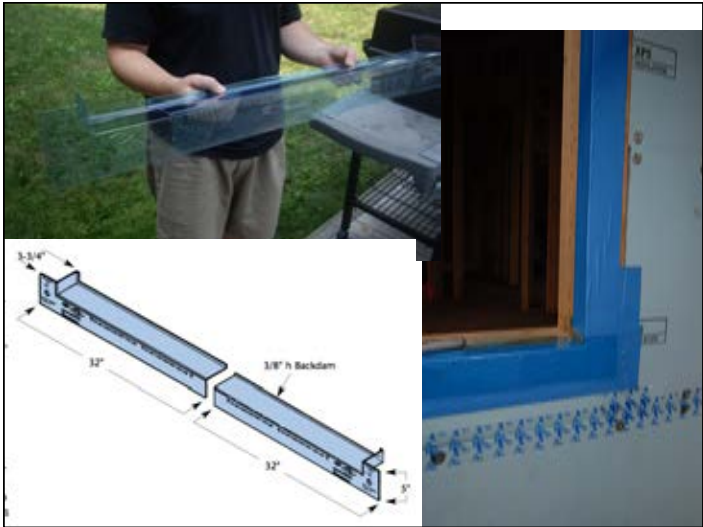


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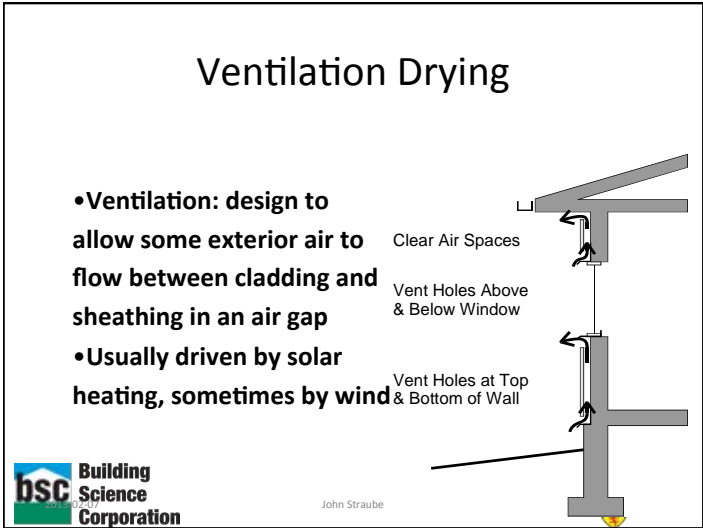
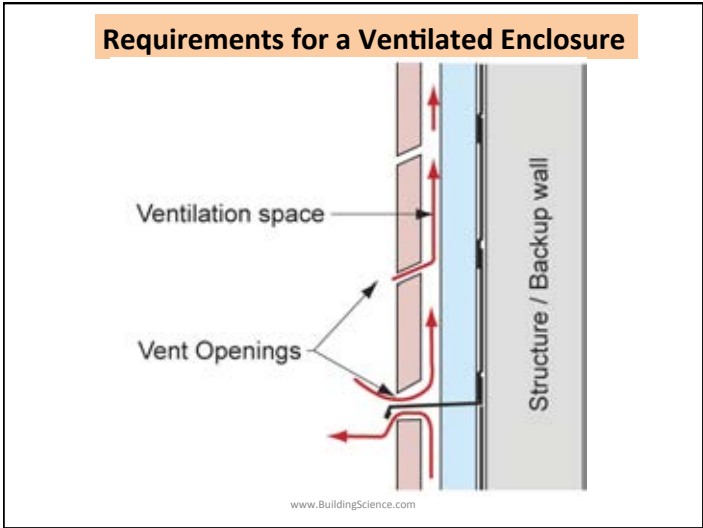


Joseph Lstiburek - Rain Control 39



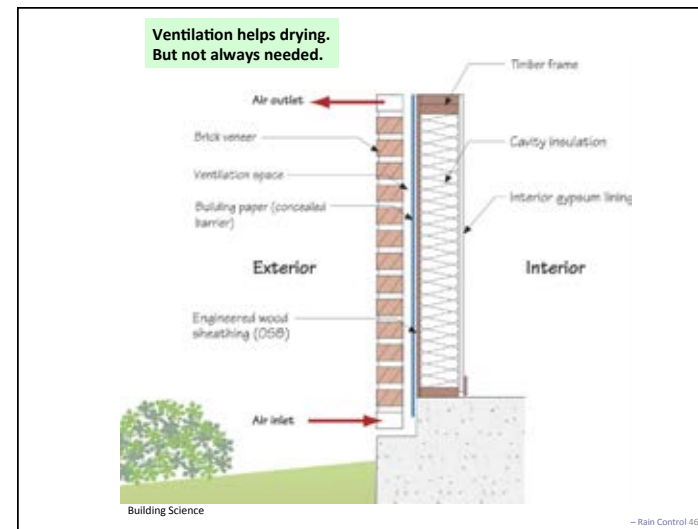


VENTILATION



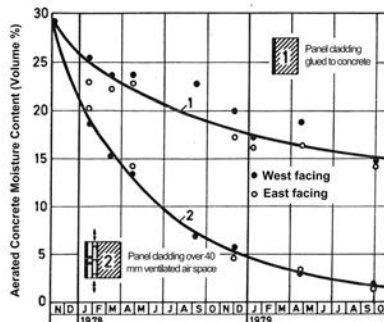
How much Ventilation do you need

- Are materials adjoining the gap moisture sensitive, e.g.?
 - Are you drying the cladding back?
 - Wood siding, fiber-cement
 - Are you drying the wall sheathing?
 - OSB exposed to wet cladding like stucco, brick, etc
- Are you controlling inward vapor drives?
 - Moisture storing claddings, with vapor permeable sheathing

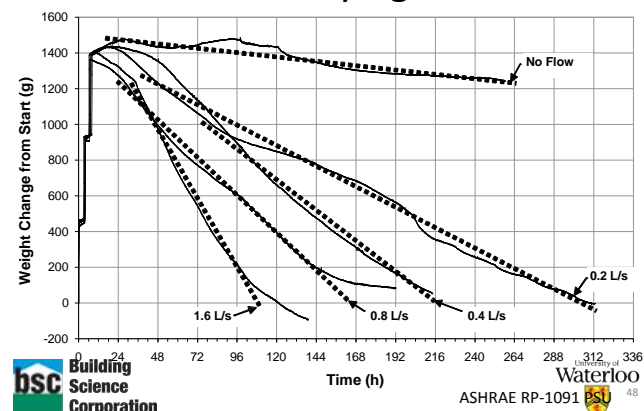


Previous Ventilation Research

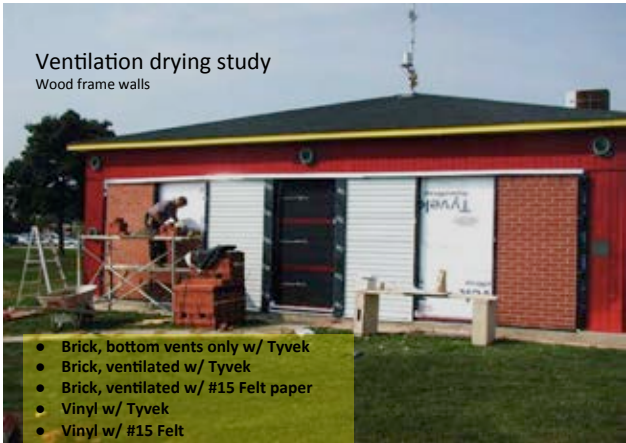
- Fraunhofer Institut
 - Cladding on wet AAC
 - Test hut
 - Ventilation allowed faster drying
- Hansen (2002)
 - Initially dry test hut
 - No effect of ventilation found
 - No wetter/drier



Lab test: Drying vs flow

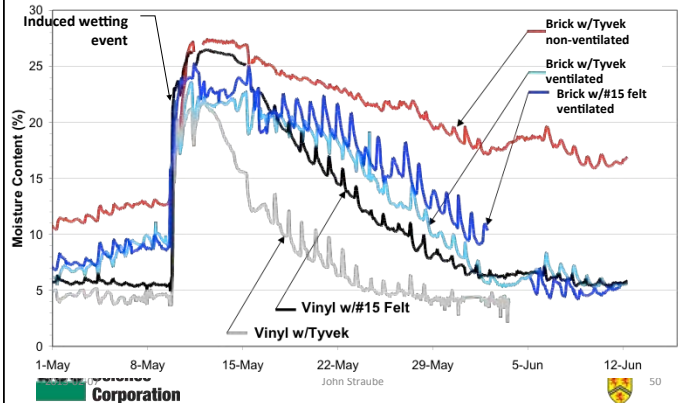


Ventilation Research: ASHRAE 1091



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Example Field Results: ASHRAE RP1091



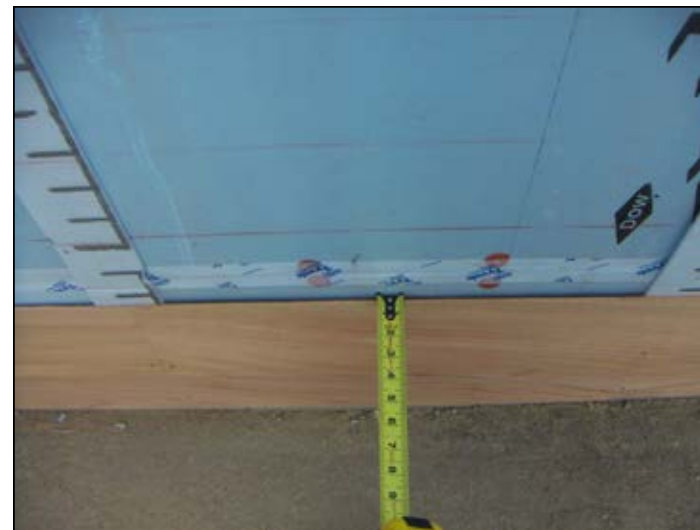
Specified 1" gap
Actual



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Drained gap behind wood





Summary

- We need gaps to provide drainage
 - flashing, esp at penetrations, critical
- The required size of the drainage gap is very small (in the 1/16" +)
- Larger gaps can be useful for ventilation drying (1/4" - 3/4" clear)
 - We don't always need ventilation drying