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Exterior Insulation: A More Layered Understanding


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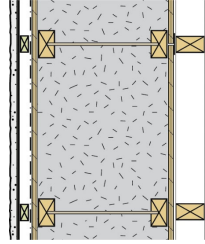

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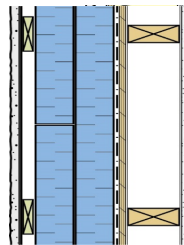
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How to Insulate More

Stuff It?



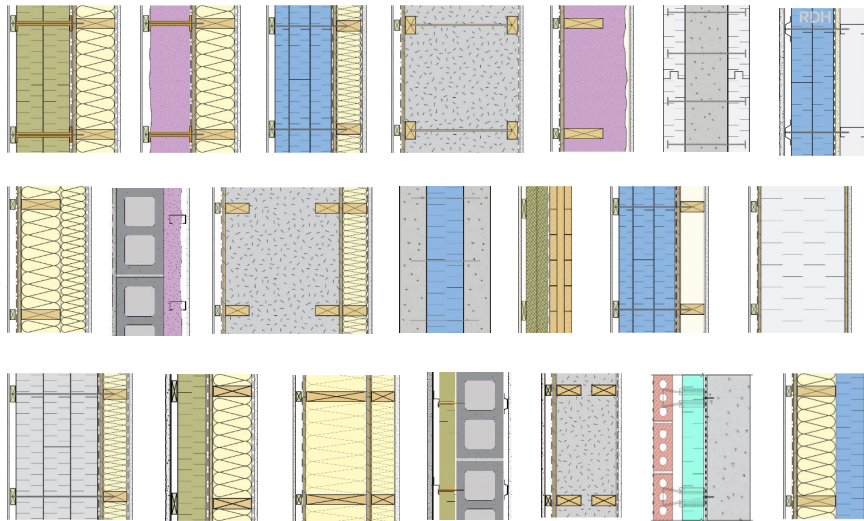
Wrap It?



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More than one way to get there...



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With all the options, why use exterior insulation?

→ A huge number of options exist, so developing clear criteria can help select a strategy

We want our walls to...

- meet (or exceed) building code requirements for airtightness & thermal performance
- be highly durable for the long term
- use proven materials and techniques
- be constructible
- and... much more!



With all the options, why use exterior insulation?



Thermal performance



Condensation risk management



Water penetration resistance




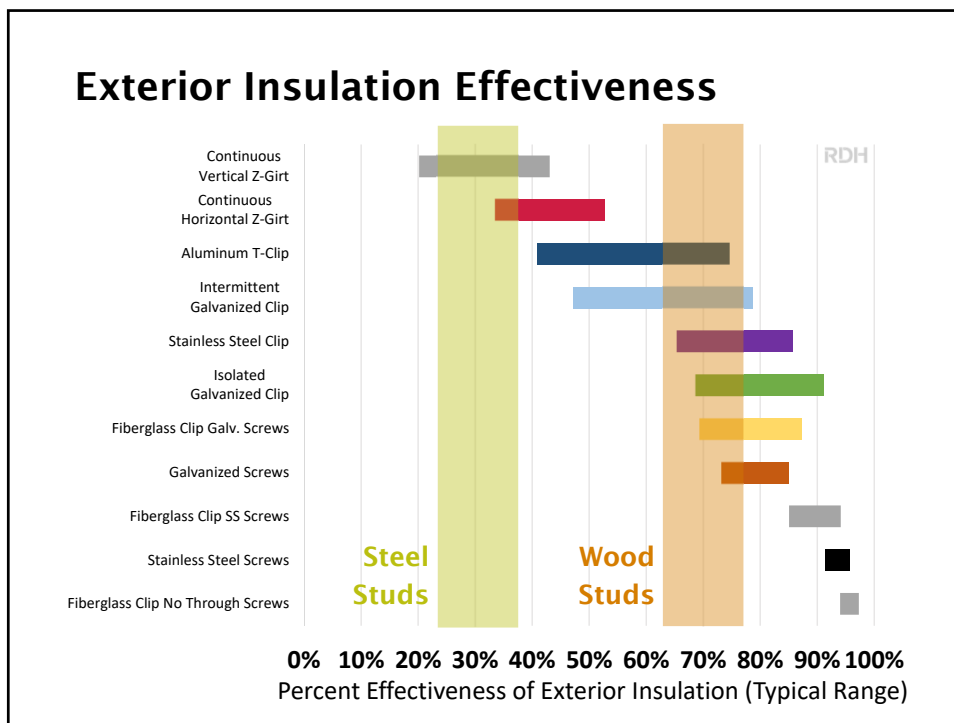
Proven strategies & available guidance

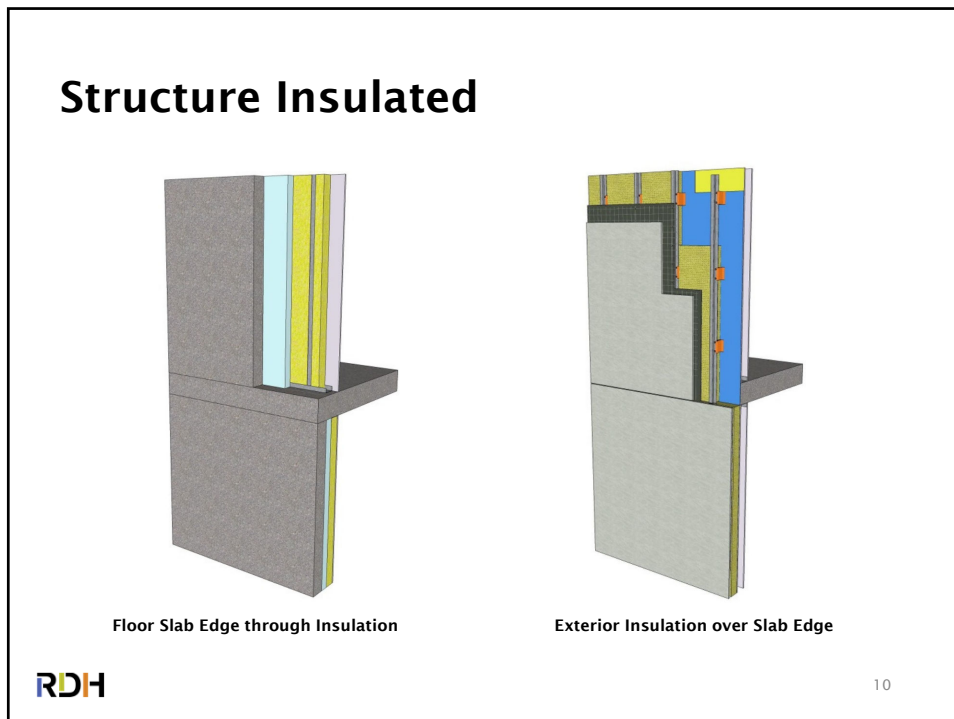
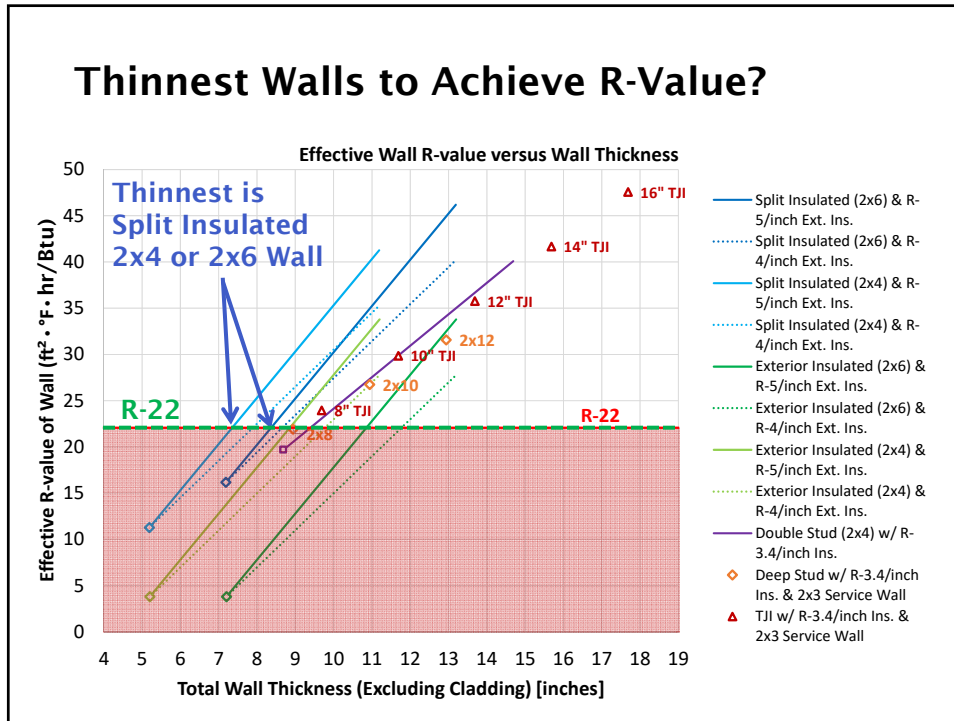


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Why Use Exterior Insulation?

Thermal Performance




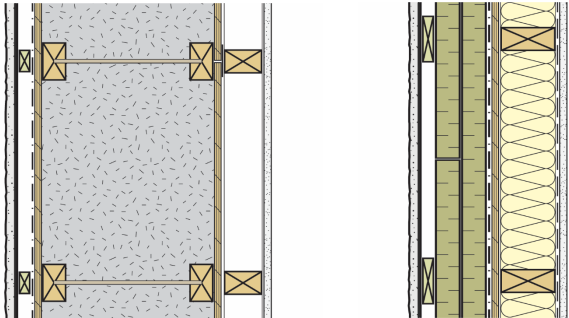
Why Use Exterior Insulation?

Condensation Control

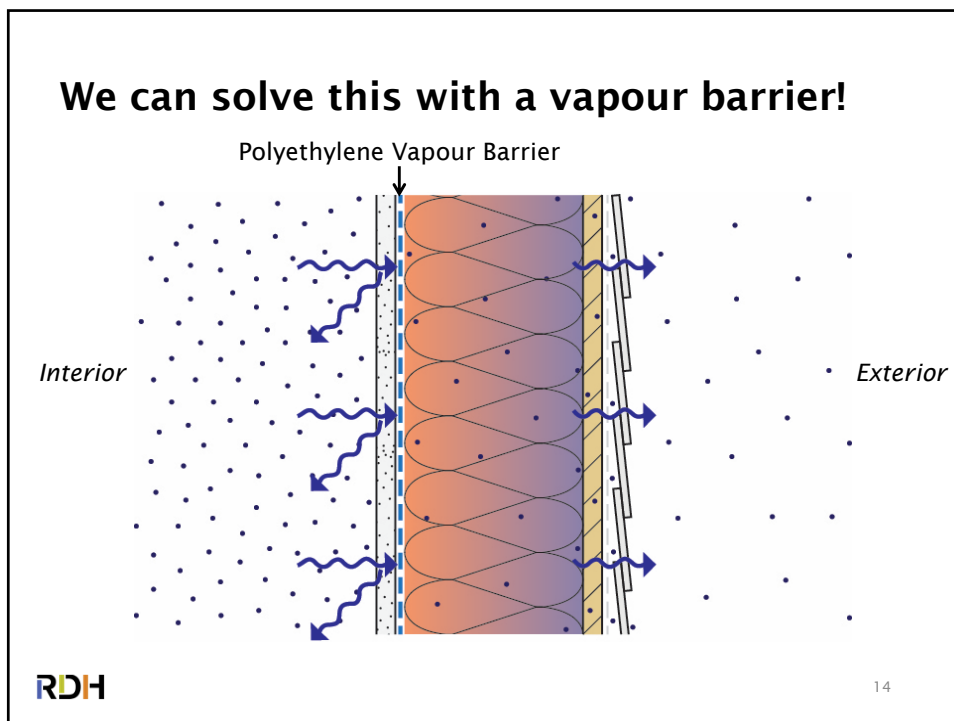
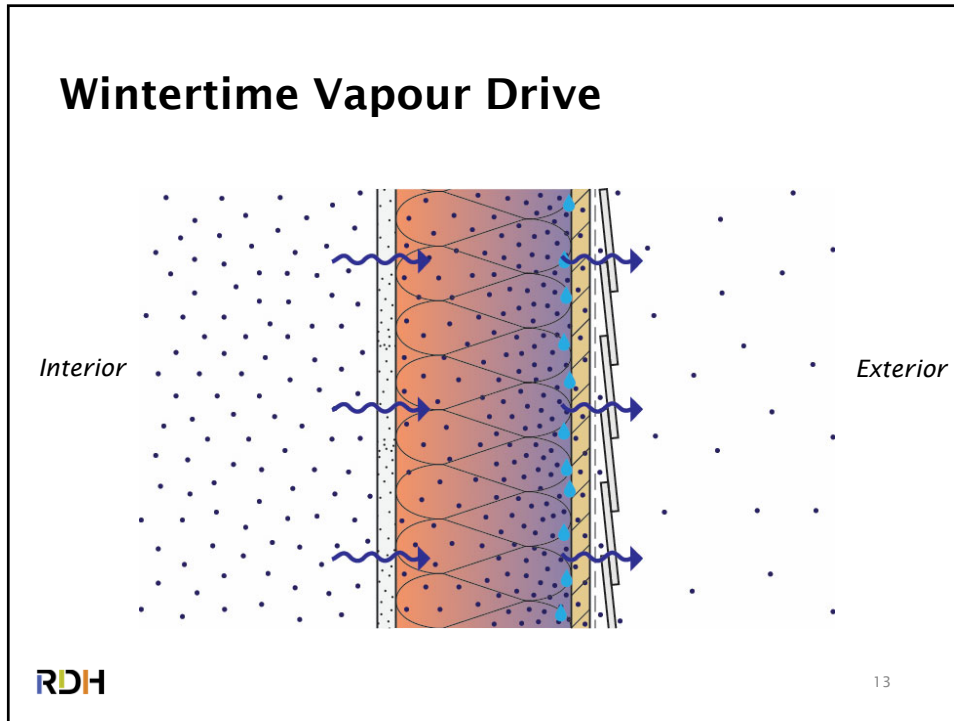


Condensation Control

- What are the key differences between the options?
- One is the temperature of moisture-sensitive elements

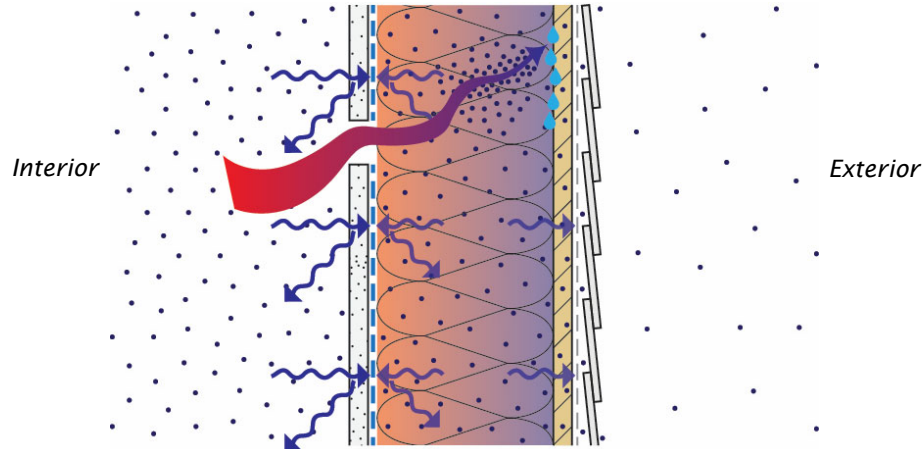


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But air leakage is a different story...

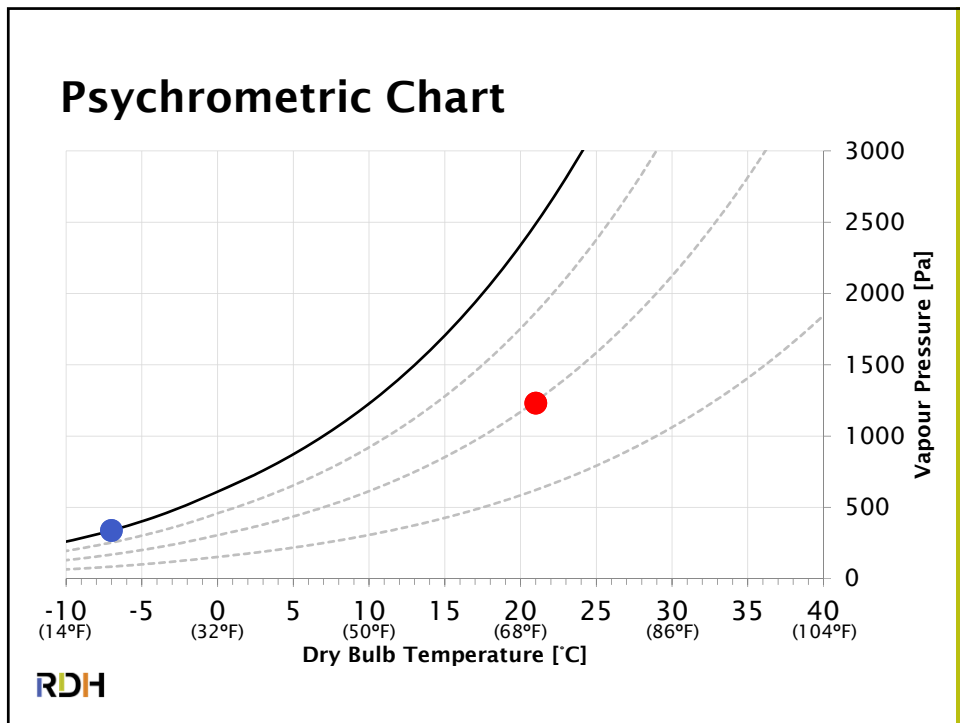
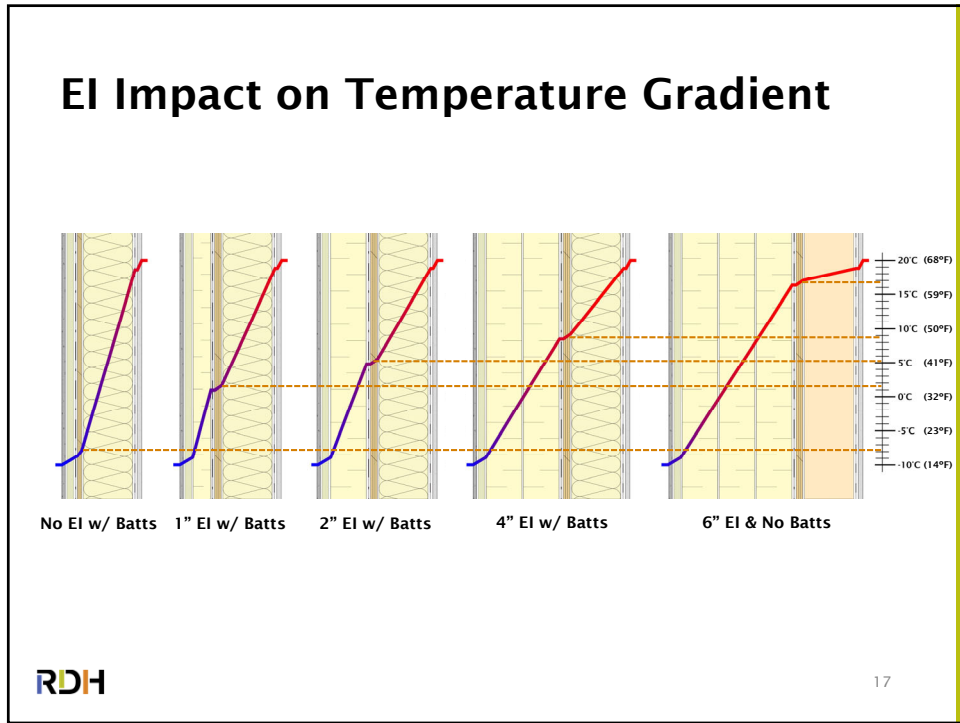
→ Air leakage bypasses the vapour barrier, so risk depends more on temperature of the sheathing

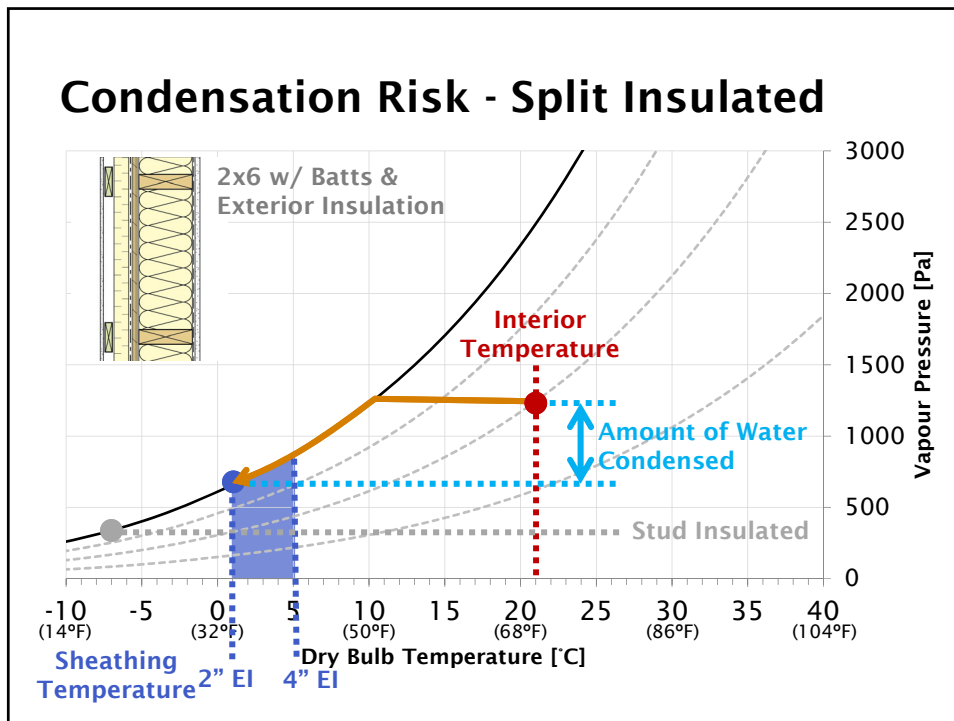
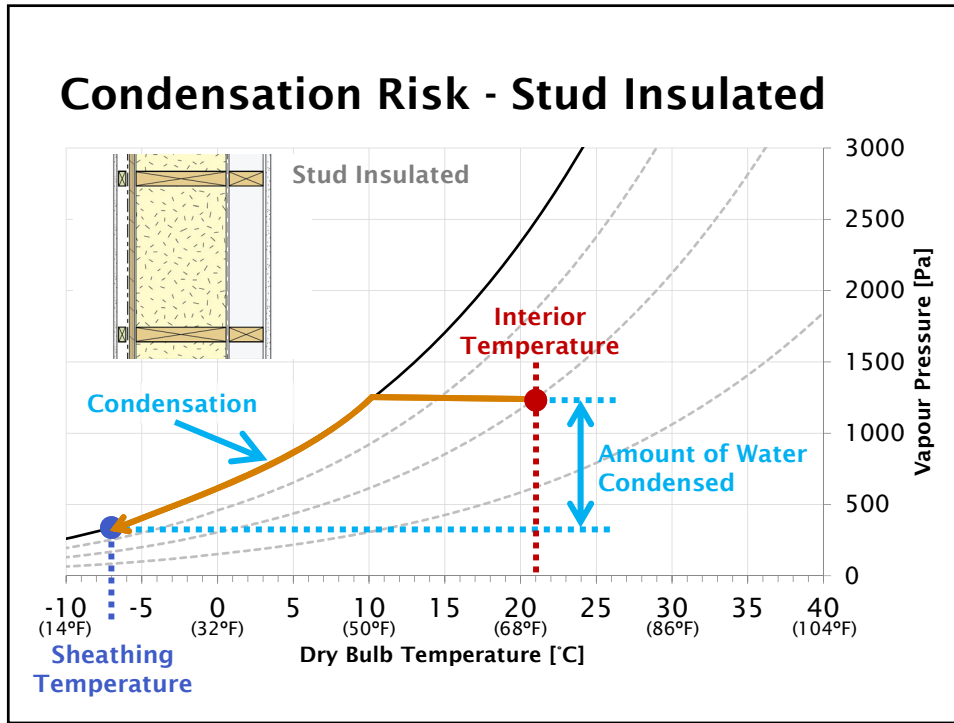


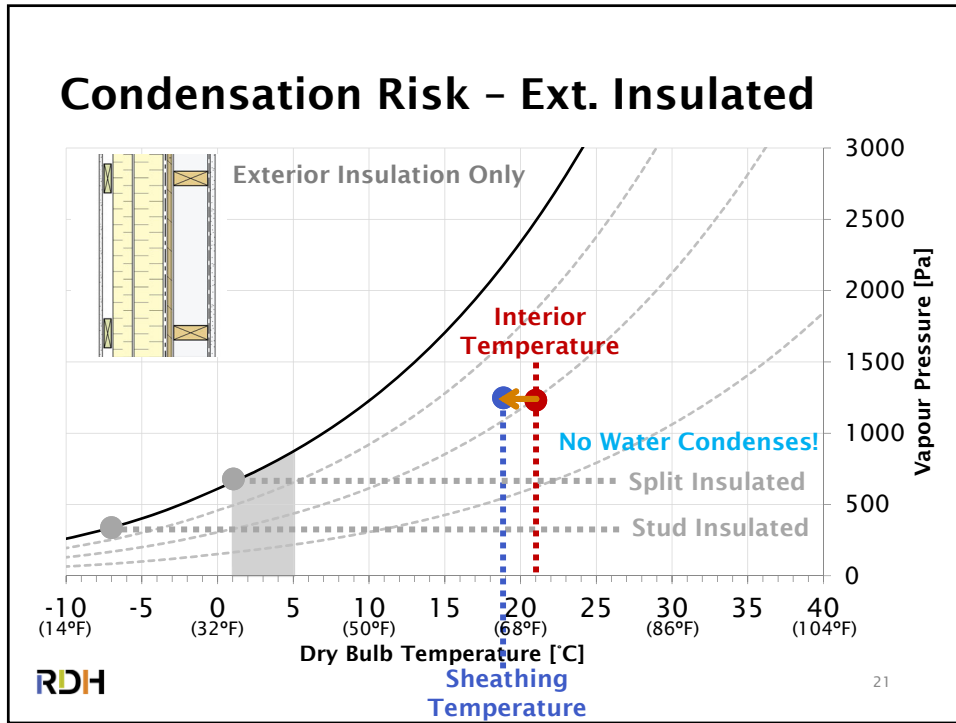
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Very Real Damage









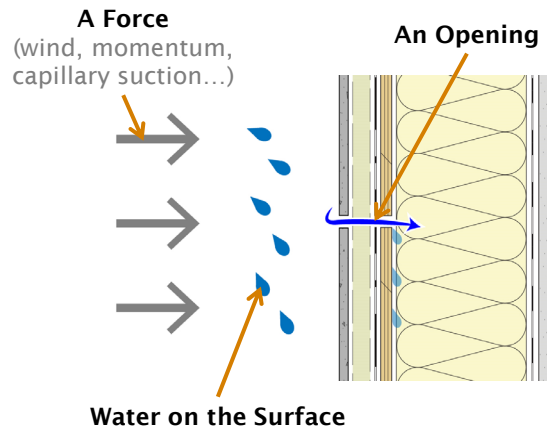
Why Use Exterior Insulation?

Water Control

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Water Control

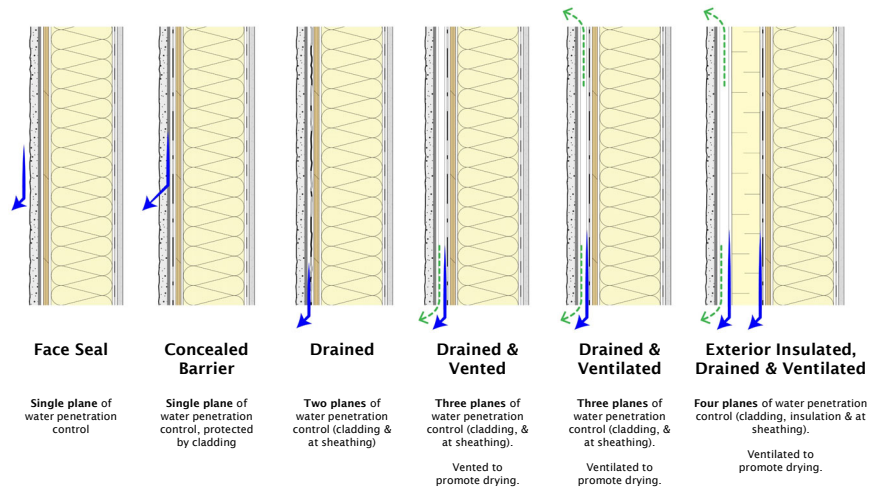
→ Need three things all at the exact same location for a leak:



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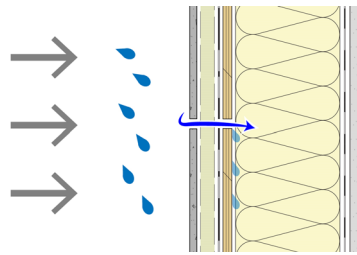
Water Control Strategies



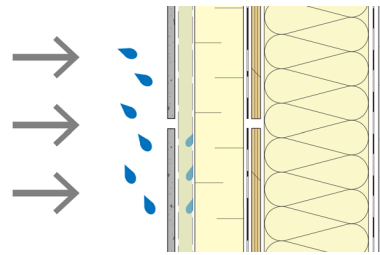
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No EI vs. EI



Hole in cladding that lines up with hole in WRB creates potential for water ingress.



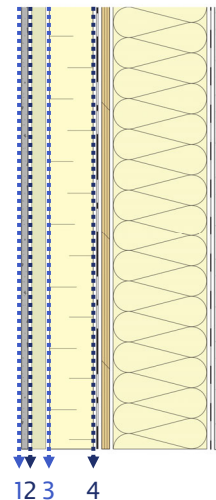
Exterior insulation adds a drainage plane between cladding and WRB.

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Drainage Planes in EI Walls

1. Face of Cladding
2. Back of Cladding
3. Face of Insulation
4. Water Resistant Barrier (WRB)

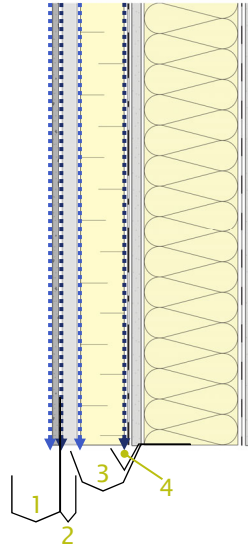


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Drainage Testing

- Set-up wall assembly to collect water from each drainage path to assess how much water actually makes it to the WRB



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Wall Testing

- 4'x8' test walls
- Open-jointed cladding (6" acrylic with 1/2" gaps between)
- Exterior insulation:
 - 1 with 2" XPS
 - 1 with 3" rock wool
- Spray rack used to apply water at 3.4 L/(m² · min) [5.0 US gal/ft² · hr]
 - ASTM E 547
 - Very high rate of wetting (70x higher than 90% of the rainfall events in Toronto)



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Wall Testing Results

Test	Face of Cladding*	Back of Cladding	Face of Insulation	Water Resistive Barrier
XPS	48%	23%	29%	0%
Rock Wool	49%	22%	29%	0%

*Actually ~1/3 of this water bounced back off of the cladding



For details: <https://www.rdh.com/wp-content/uploads/2017/10/RDH-RSL-Drainage-Balance-Spray-Back-Report.pdf>

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Wall Testing Results



Tape joints in front of nozzles



Vinyl siding



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Wall Testing Results

Test	Face of Cladding*	Back of Cladding	Face of Insulation	Water Resistive Barrier
XPS	48%	23%	29%	0%
Rock Wool	49%	22%	29%	0%
Rock Wool (Taped 50% Joints in Cladding)	62%	27%	11%	0%
Rock Wool (Vinyl Siding)	100%	0%	0%	0%

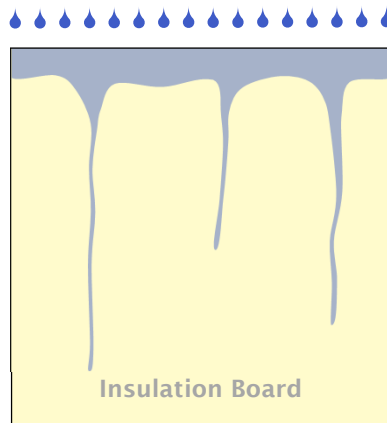
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For details: <https://www.rdh.com/wp-content/uploads/2017/10/RDH-RSL-Drainage-Balance-Spray-Back-Report.pdf>

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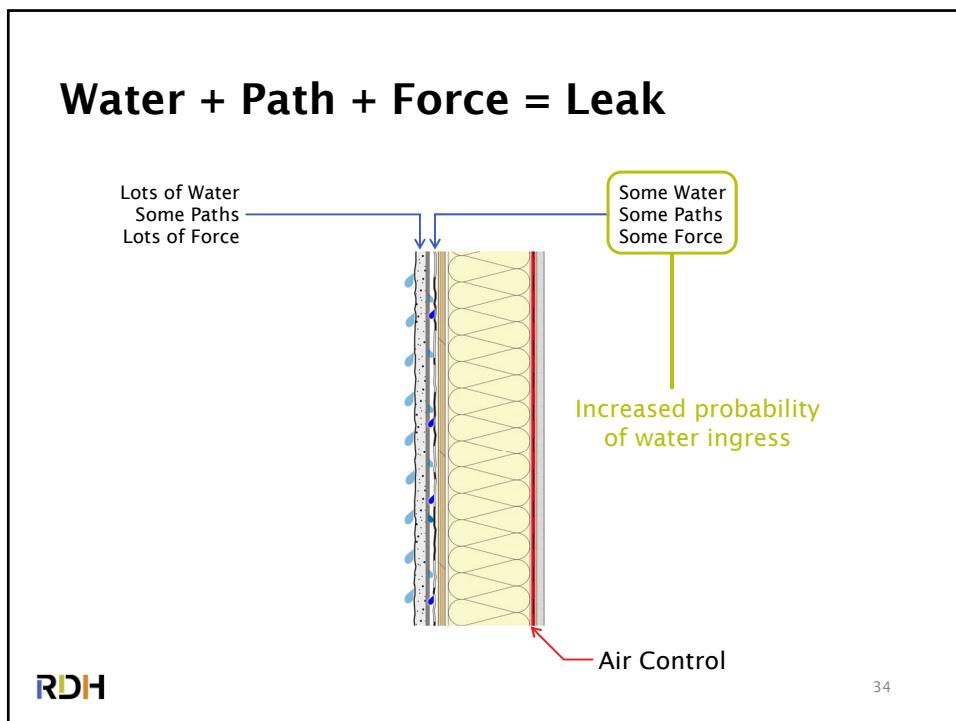
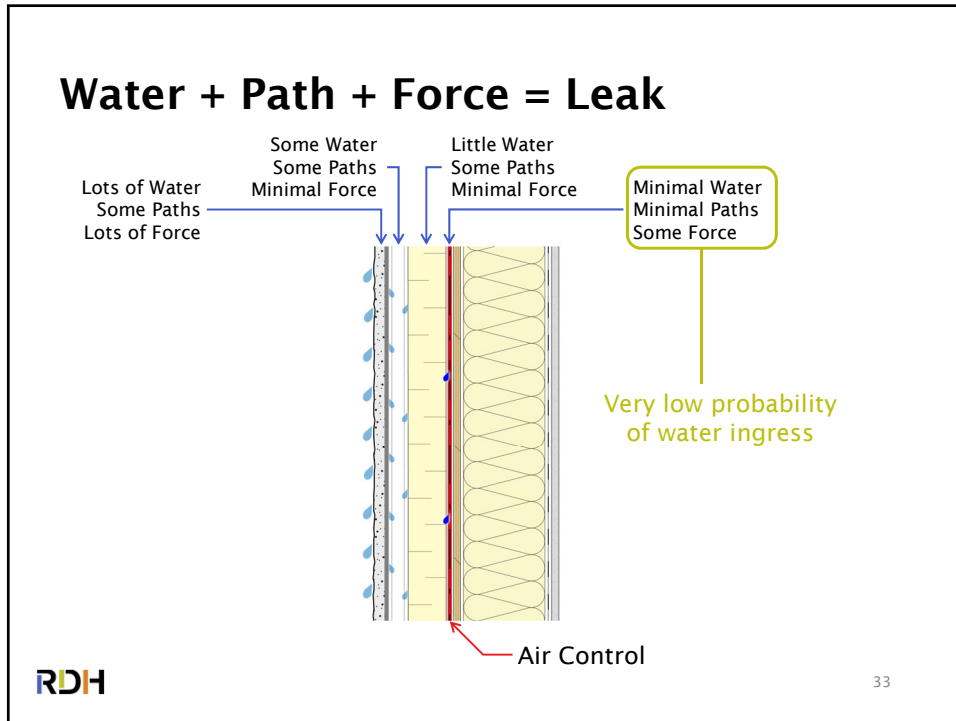
Water Draining on a Surface



What % of WRB is actually wetted?



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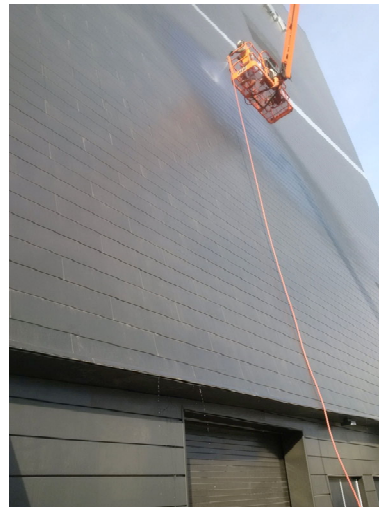
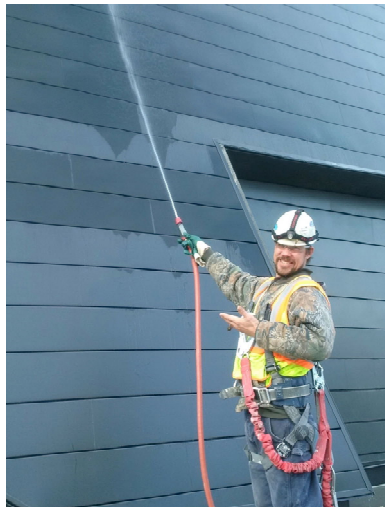
“Woofs” Are Different



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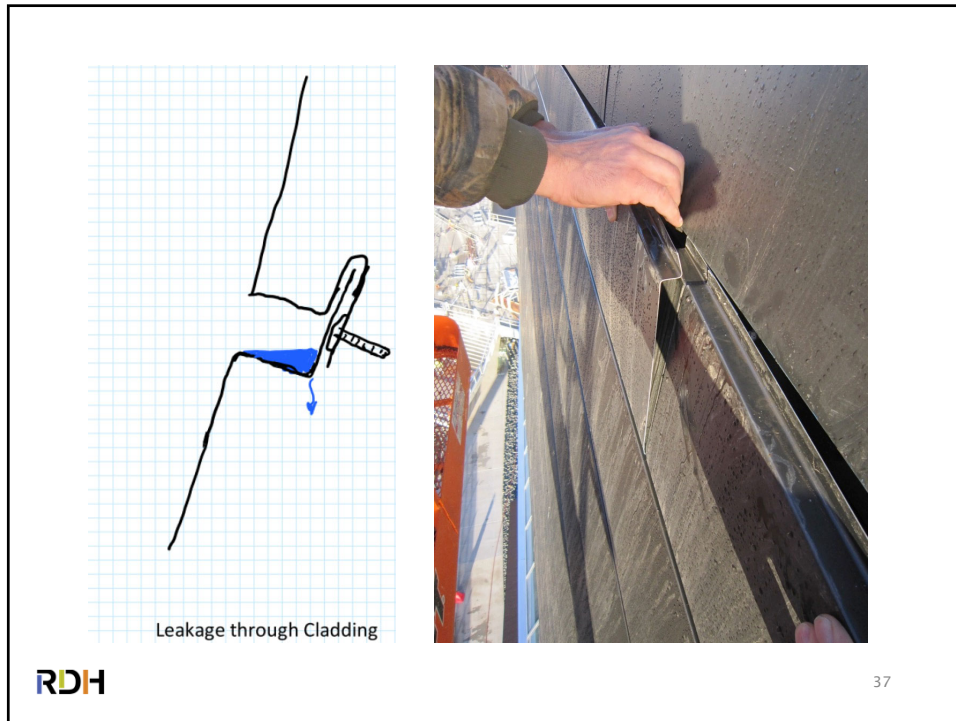
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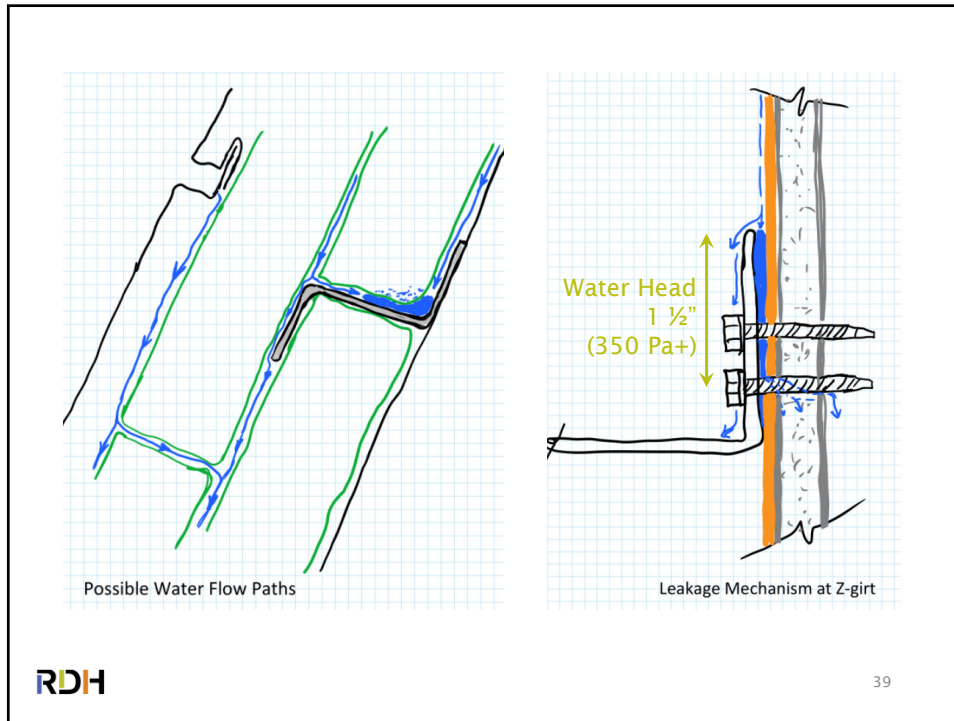
“Woofs” Are Different

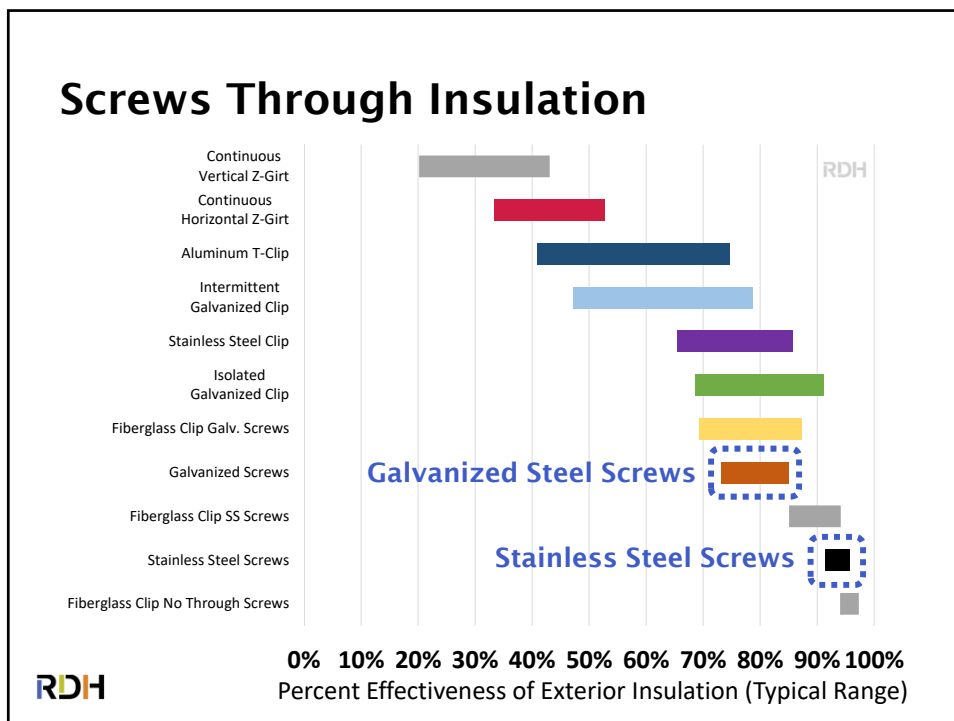


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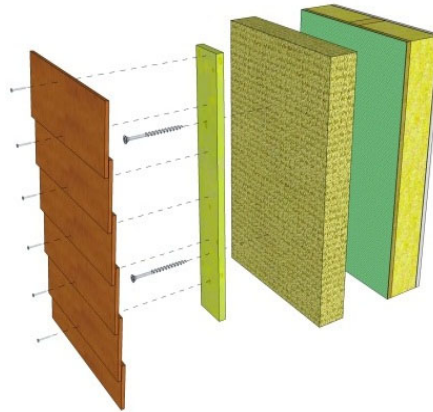






Screws Through Insulation

- Rapidly gaining popularity to meet increasing R-value requirements
- Uncertainty about:
 - How to do it
 - Allowable loads
 - Fastener types
 - Fastener spacing
 - Angle of installation
 - Deflection

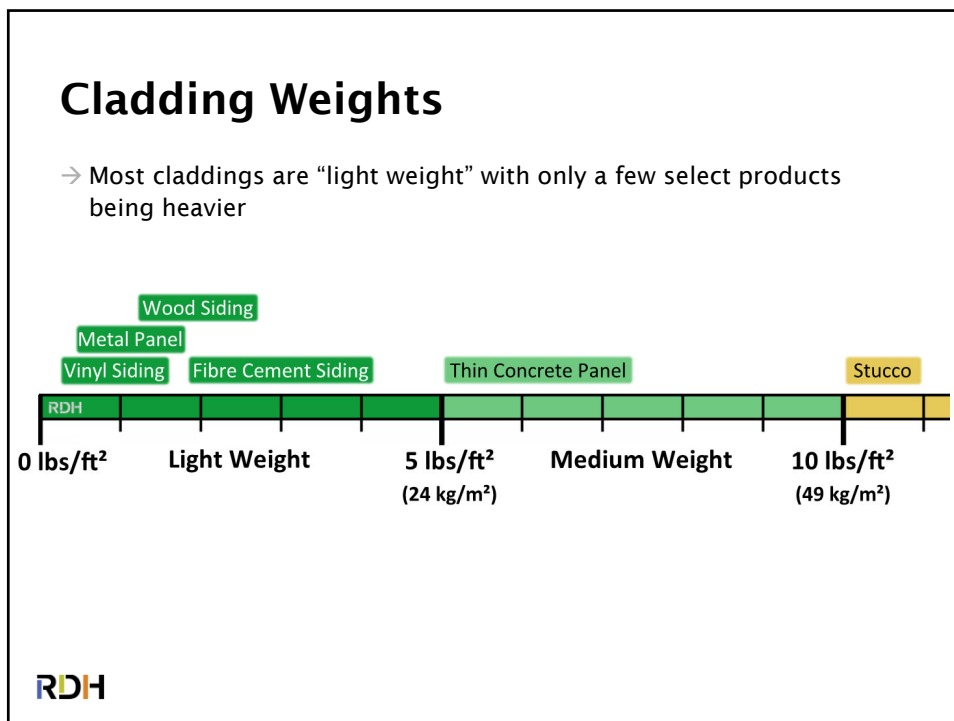
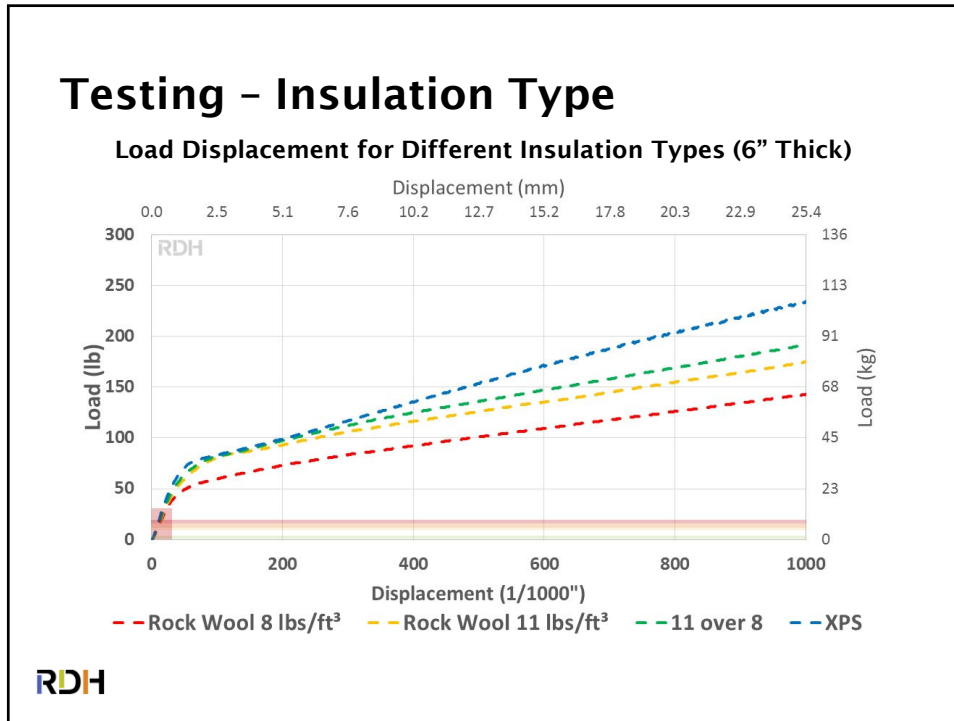


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Testing

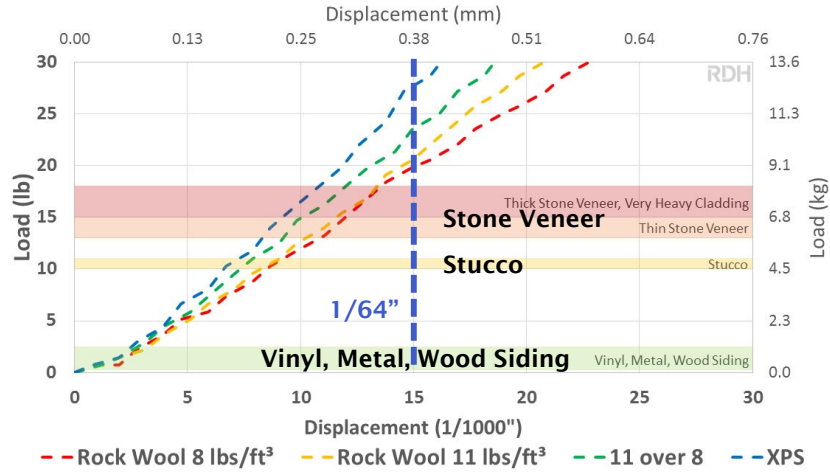


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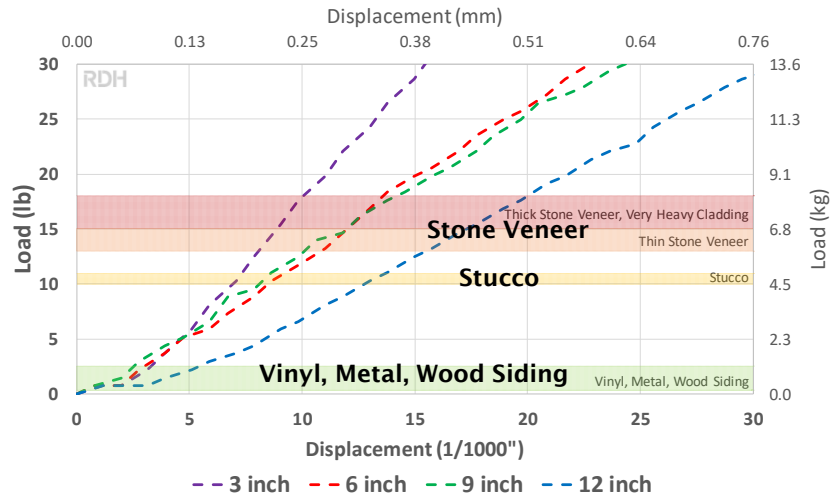
Testing - Insulation Type

Load Displacement for Different Insulation Types (6" Thick)



Testing - Insulation Thickness

Load Displacement for Different Mineral Wool Thicknesses



Available Guidance



Guides to Check Out



Find out more at the **RDH Technical Library**
rdh.com/technical-library



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EXTERIOR INSULATION: A MORE LAYERED UNDERSTANDING

Discussion + Questions

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