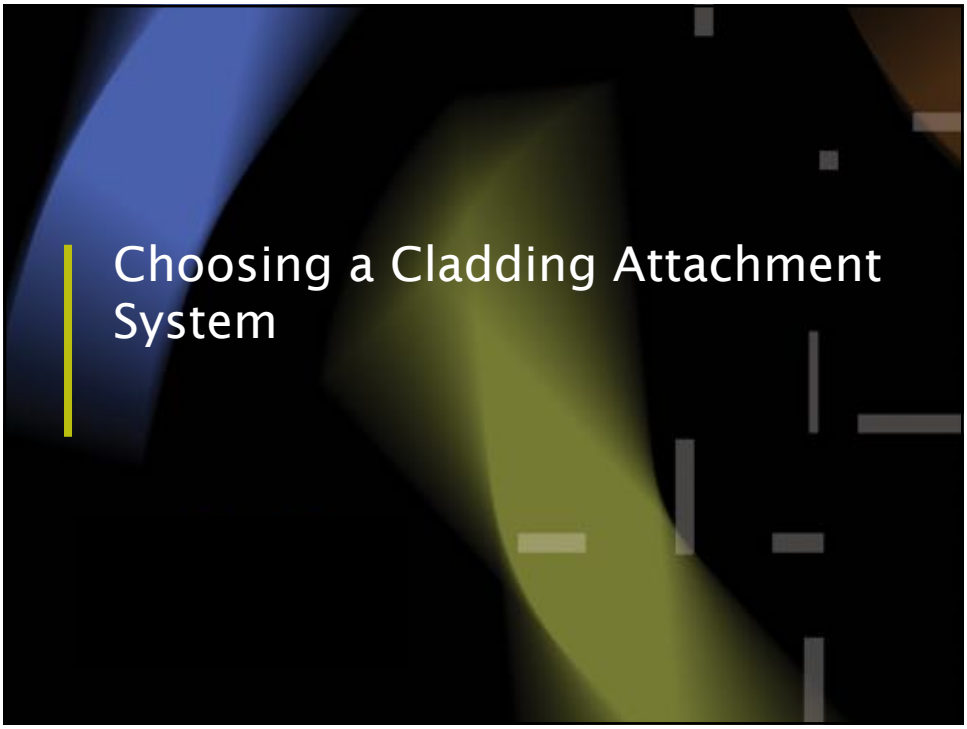


21

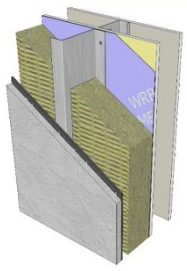
Exterior Insulation & Cladding Attachment Considerations

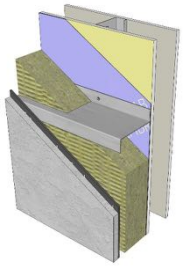
RDH

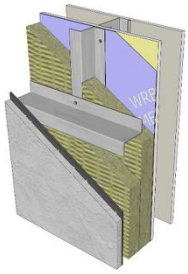
- Cladding weight & gravity loads
- Wind & seismic loads
- Back-up wall construction (wood, concrete, steel)
  - Attachment from clip/girt back into structure (studs, sheathing, or slab edge)
- Thickness of exterior insulation
- Use of rigid, semi-rigid or spray-applied insulation
  - Ability to fasten cladding supports through face
  - Ability to fit insulation tightly around cladding supports
- R-value target, tolerable thermal loss from supports
- Cladding orientation (panel, vertical, horizontal)
- Ease of attachment of cladding – returns, corners, penetrations etc.
- Combustibility requirements

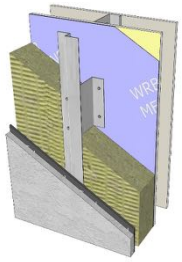
22

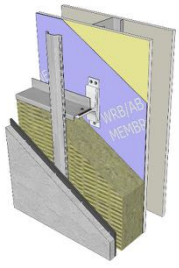
Many Cladding Attachment Options & Counting

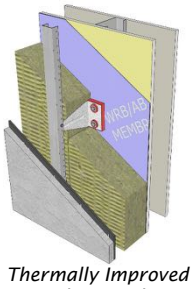

Vertical Z-girts

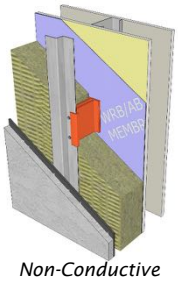

Horizontal Z-girts

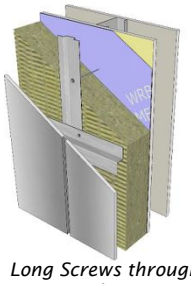

Crossing Z-girts


Galvanized/Stainless Clip & Rail


Aluminum Clip & Rail

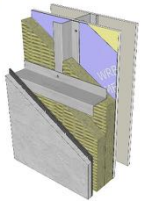

Thermally Improved Clip & Rail


Non-Conductive Clip & Rail

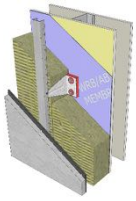

Long Screws through Insulation

23

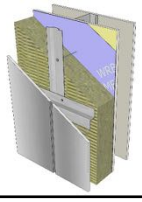
Types of Insulation & Cladding Attachment



→ **Continuous Girts** – Rigid or Semi-rigid boards or spray-foam (i.e. almost anything works)



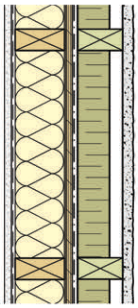
→ **Intermittent Clip & Rail Systems** – Semi-rigid boards or spray-foam (i.e. flexibility & ease of installation is key)



→ **Screws through Insulation** – rigid insulation boards (i.e. stiff enough to support compression load)

24

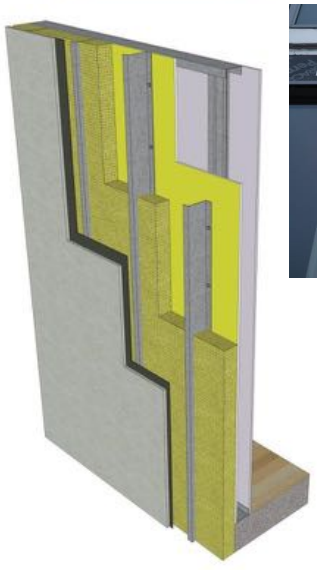
Cladding Attachment: Continuous Wood Framing



~15-30% loss in R-value

25

Cladding Attachment: Vertical Steel Z-Girts

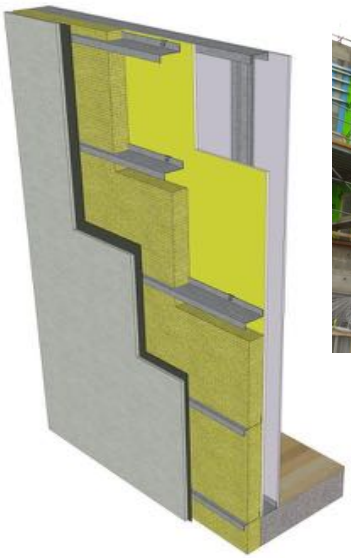


~60-80%+ loss in R-value

26

Cladding Attachment: Horizontal Steel Z-Girts

RDH



~50-70%+ loss in R-value

27

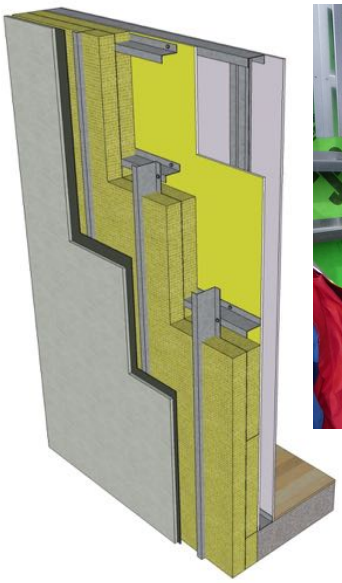
Cladding Attachment: Horizontal Steel Z-Girts

RDH

28

Cladding Attachment: Crossing Steel Z-Girts

RDH



~40-60%+ loss in R-value

29

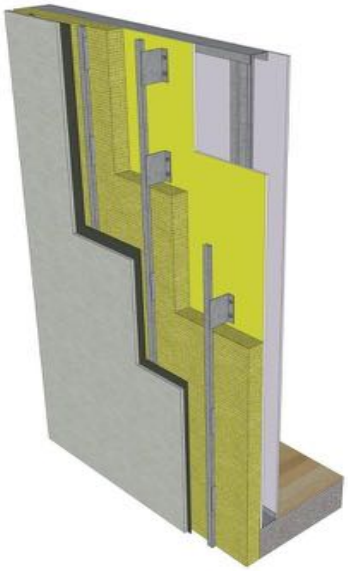
Cladding Attachment: Crossing Z-Girts

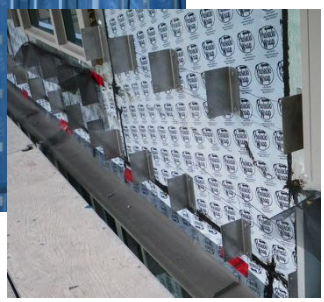
RDH

30

Cladding Attachment: Clip & Rail, Steel

RDH





~25-50% loss in R-value for galvanized, ***15-35% for stainless steel (4x less conductivity)***

31

Cladding Attachment: Clip & Rail, Steel

RDH

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Cladding Attachment: Clip & Rail, Stainless Steel

33

Cladding Attachment: Clips w/ Diagonal Z-Girts

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Cladding Attachment: Metal Panel Clips (Steel)

RDH

35

Cladding Attachment: Metal Panel Clips (Aluminum)

RDH

36

Cladding Attachment: Adjustable Steel Clip & Rail RDH

37

Cladding Attachment: Adjustable Steel Clip & Rail RDH

38

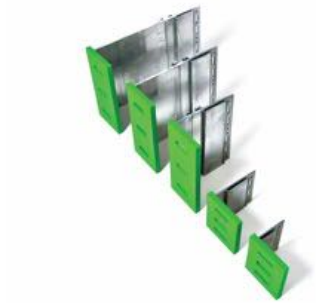
Cladding Attachment: Adjustable Clip & Rail

RDH

39

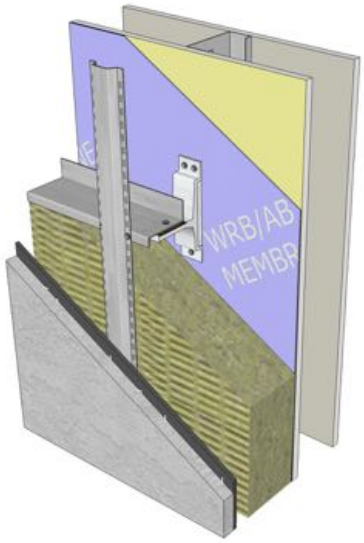
Other Steel & Aluminum Cladding Clip & Rail Technologies

RDH



40

Cladding Attachment: Aluminum Clip & Dual Girt

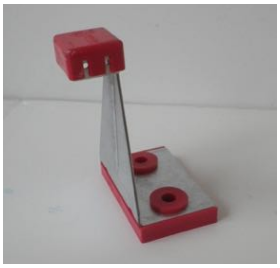


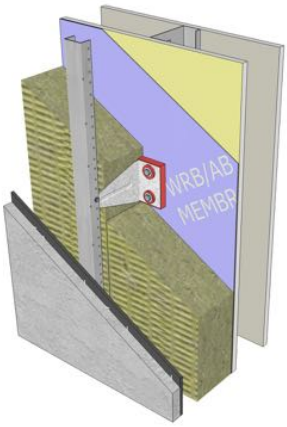
~30-50% loss in R-value (spacing dependant)

41

Cladding Attachment: Clip & Rail, Isolated Galvanized

→ Isolate the metal, improve the performance





~10-40% loss in R-value (spacing dependant)

42

Cladding Attachment: Clip & Rail, Isolated Galvanized

RDH

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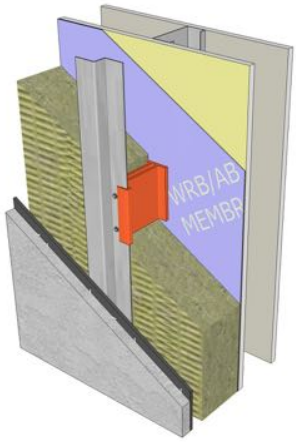
Cladding Attachment: Clip & Rail, Fiberglass

RDH

→ Remove the metal – maximize the performance

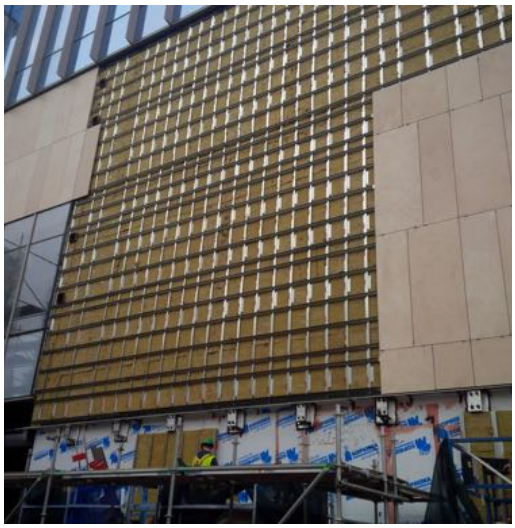


~5-30% loss in R-value (spacing & fastener type dependant)

44

Cladding Attachment: Clip & Rail, Fiberglass

RDH

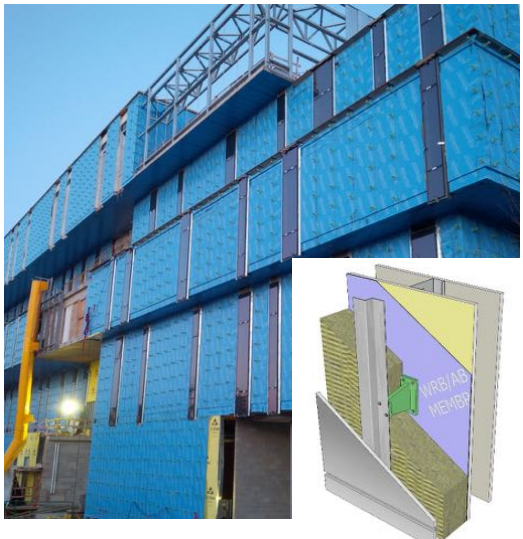


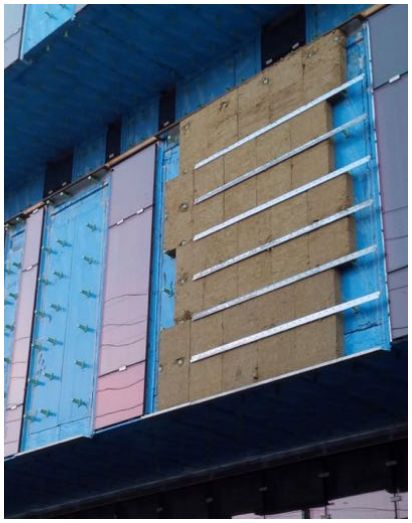
Structural & Thermal Calculator - http://www.cascadiawindows.com/cascadia-clip-calculator

45

Cladding Attachment: Clip & Rail Fiberglass (No Screws)

RDH



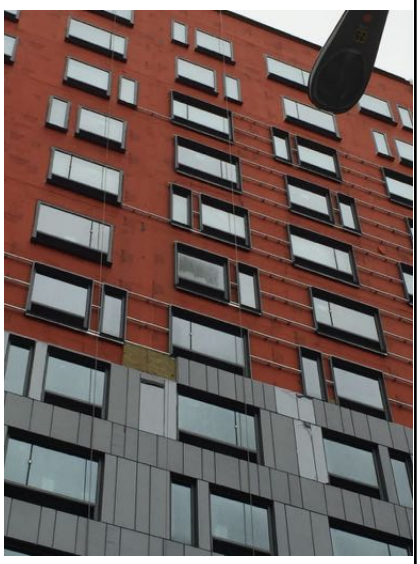


<10% loss in R-value

48

Clip & Rail and Cladding Panel Orientation

RDH



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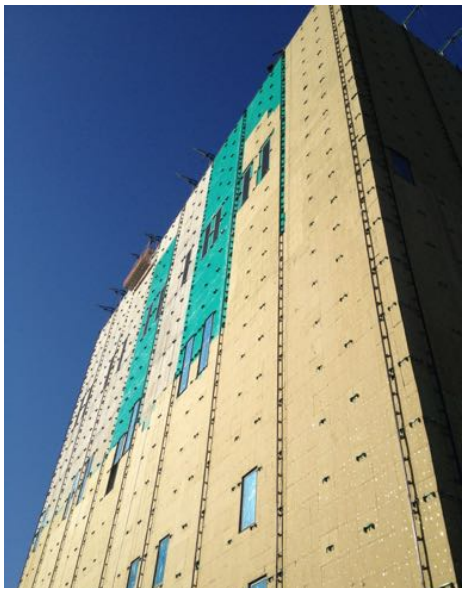
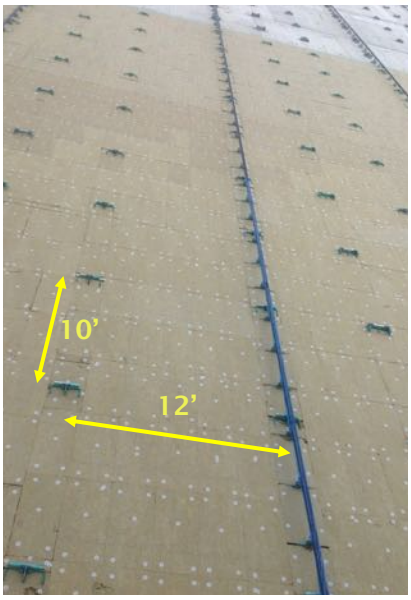
Cladding Attachment: Other Discrete Engineered

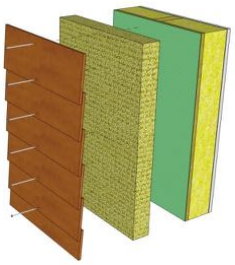
RDH



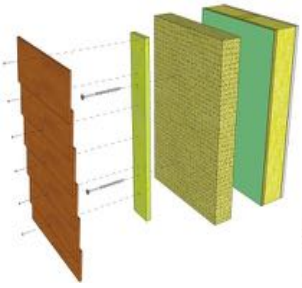


51

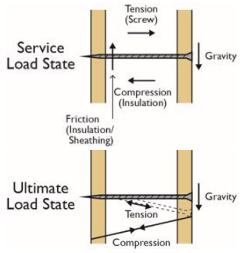
Cladding Attachment: Screws through Insulation

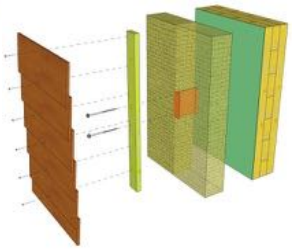


Longer cladding Fasteners directly through rigid insulation (up to 2" for light claddings)



Long screws through vertical strapping and rigid insulation creates truss – short cladding fasteners into vertical strapping

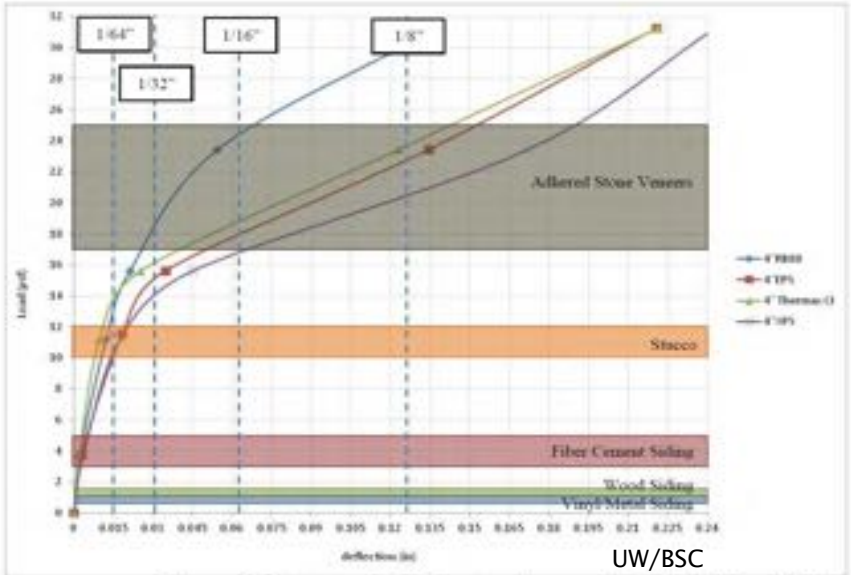




Rigid shear block type connection through insulation, short cladding fasteners into vertical strapping

52

Cladding Attachment: Screws through Insulation



UW/BSC

Figure 9: Short term deflection testing results (4" thick insulation)

53

Cladding Attachment: Screws Through Insulation

~5-25% loss in R-value (back-up wall, spacing & fastener type dependant)

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Cladding Attachment & Roofing Details Too

55

Cladding Attachment: Screws through Insulation

RDH

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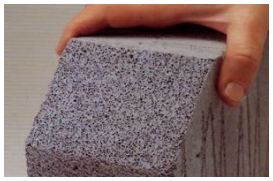
Really Thick Insulation = Really Long Screws

RDH

57

Other Systems & Technologies - No Clips

- Insulated Metal Panels
- Fiberglass Girts
- Insulated Concrete Forms
- Structurally Insulated Panels & Insulated Sheathing Panels
- Precast Concrete Sandwich Panels
- Autoclaved Aerated Concrete



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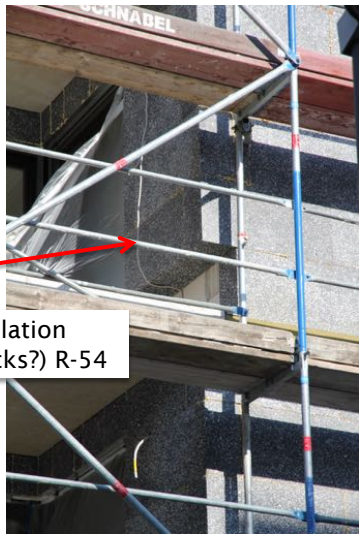
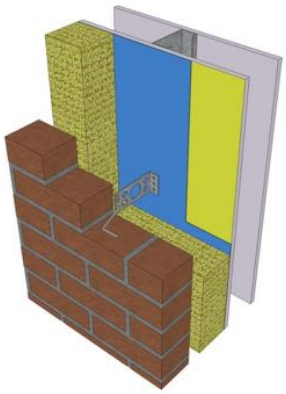
Adhered & Mechanically Attached EIFS



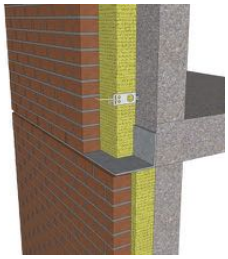
12" EPS insulation boards (blocks?) R-54

59

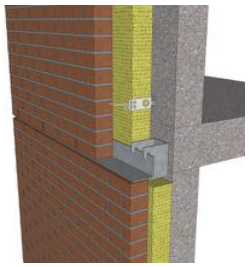
Cladding Attachment: Masonry Ties & Shelf Angles



Brick ties – 10-30% loss for galvanized ties, 5-10% loss for stainless steel



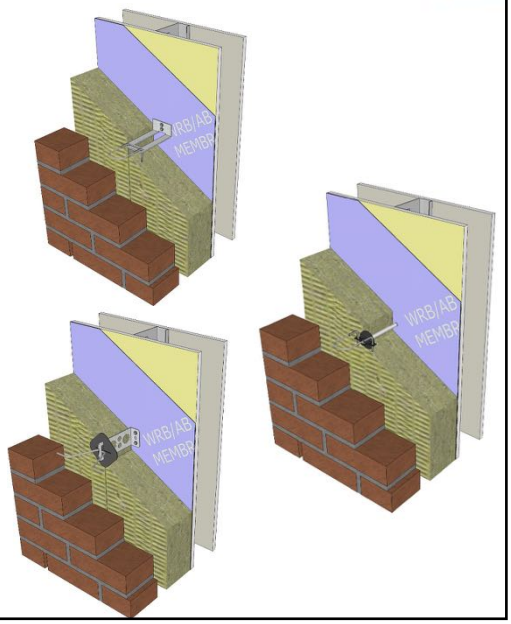
Continuous shelf angles ~50% R-value loss



Shelf angle on stand-offs only ~15% R-value loss

60

Cladding Attachment: Masonry & Ties



62

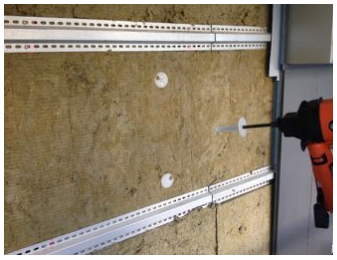
Efficient Masonry Attachments

RDH

63

Insulation Retainment/Attachment Fasteners

RDH



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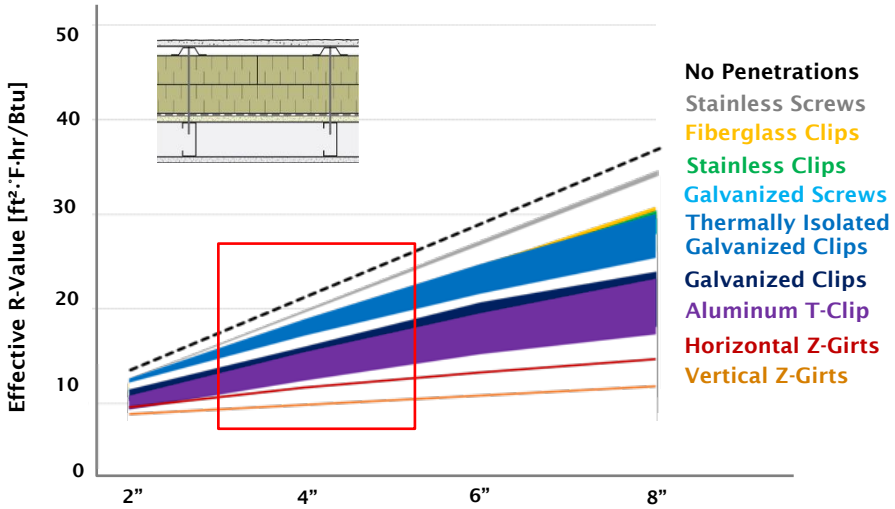
Effective R-value Summary of Various Cladding Support Systems

RDH

Base backup wall is 3 5/8" steel stud (empty) + exterior insulation

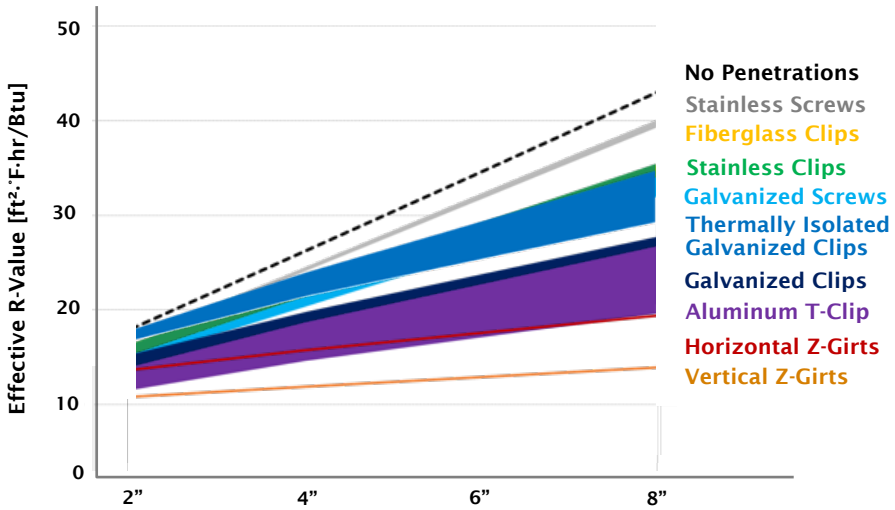


65

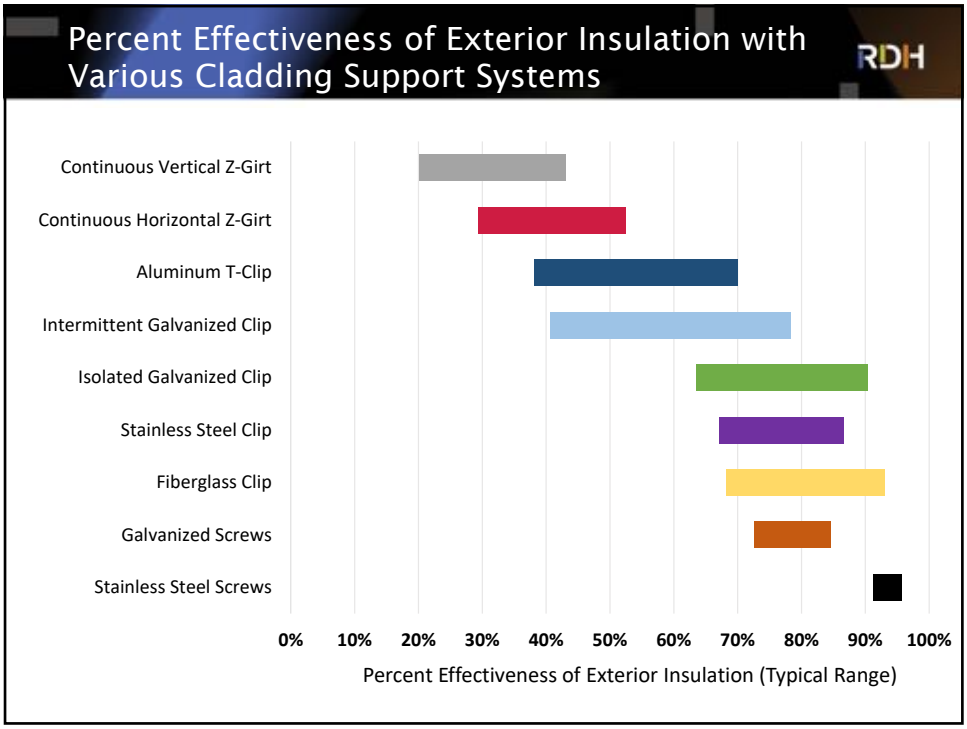
Effective R-value Summary of Various Cladding Support Systems

RDH

Base backup wall is 3 5/8" steel stud (w/ R-13 batts) + exterior insulation



67


Percent Effectiveness of Exterior Insulation with Various Cladding Support Systems
RDH
Continuous Vertical Z-Girt
Continuous Horizontal Z-Girt
Aluminum T-Clip
Intermittent Galvanized Clip
Isolated Galvanized Clip
Stainless Steel Clip
Fiberglass Clip
Galvanized Screws
Stainless Steel Screws
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent Effectiveness of Exterior Insulation (Typical Range)

71