Joseph Lstiburek, Ph.D., P.Eng, ASHRAE Fellow

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Windows, Glazing and Curtain Walls

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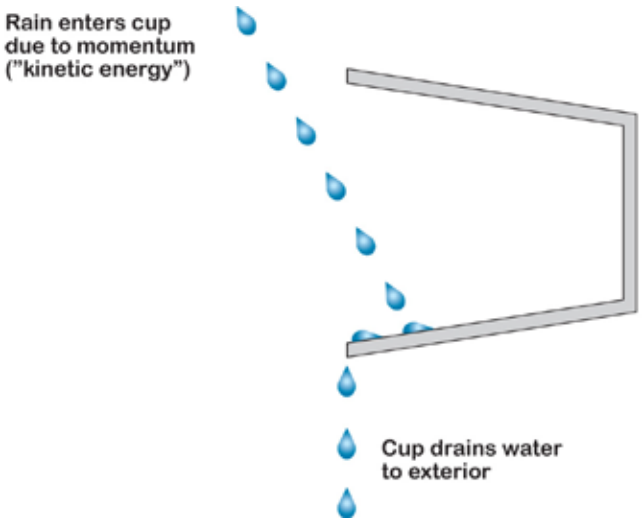
Windows



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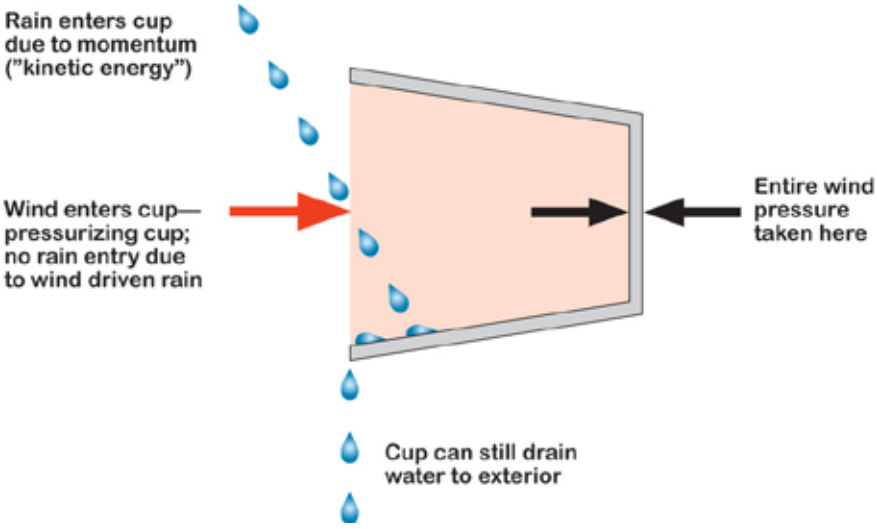

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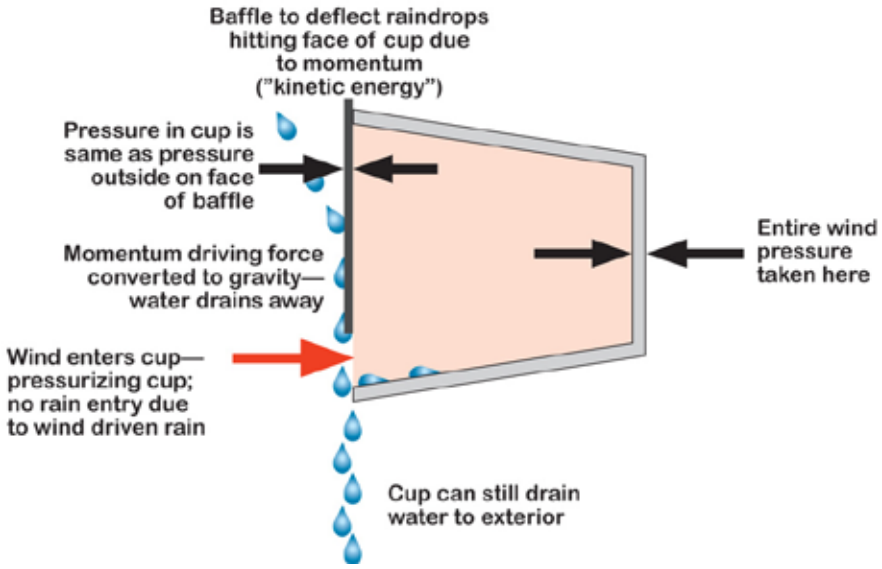

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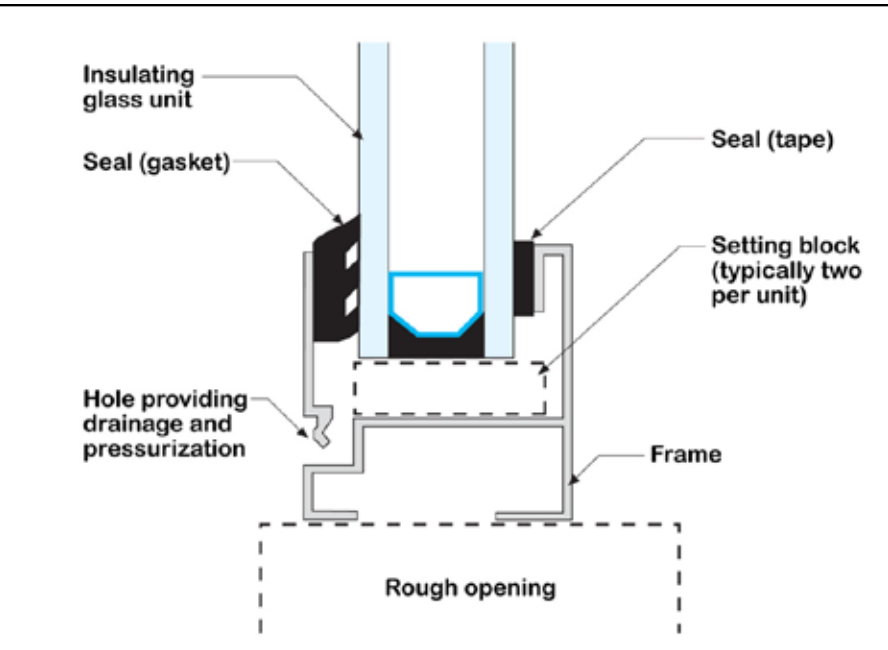

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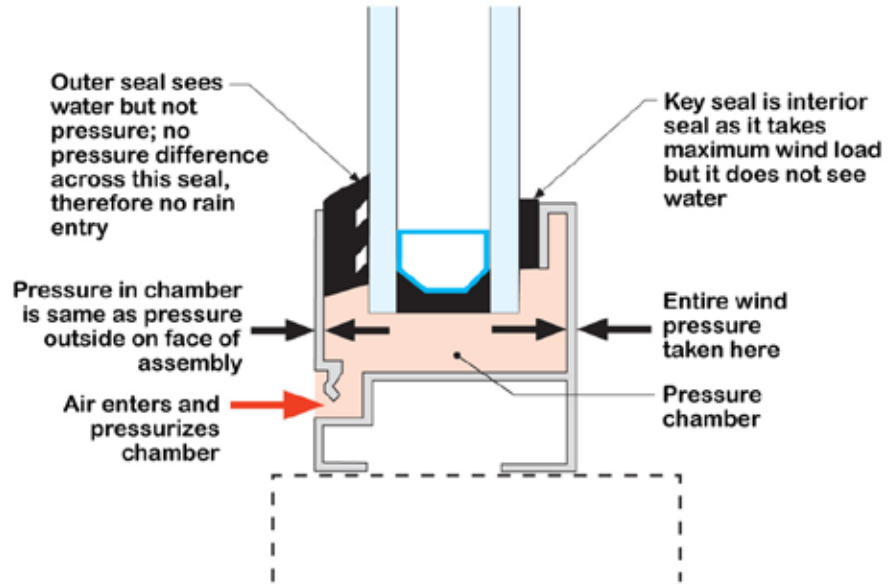

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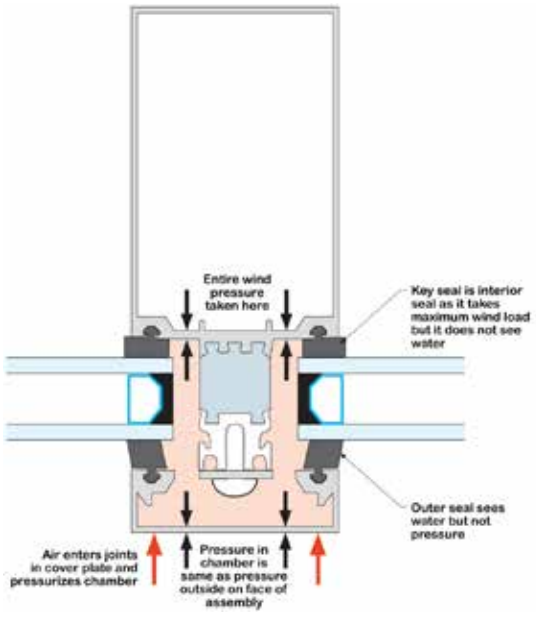

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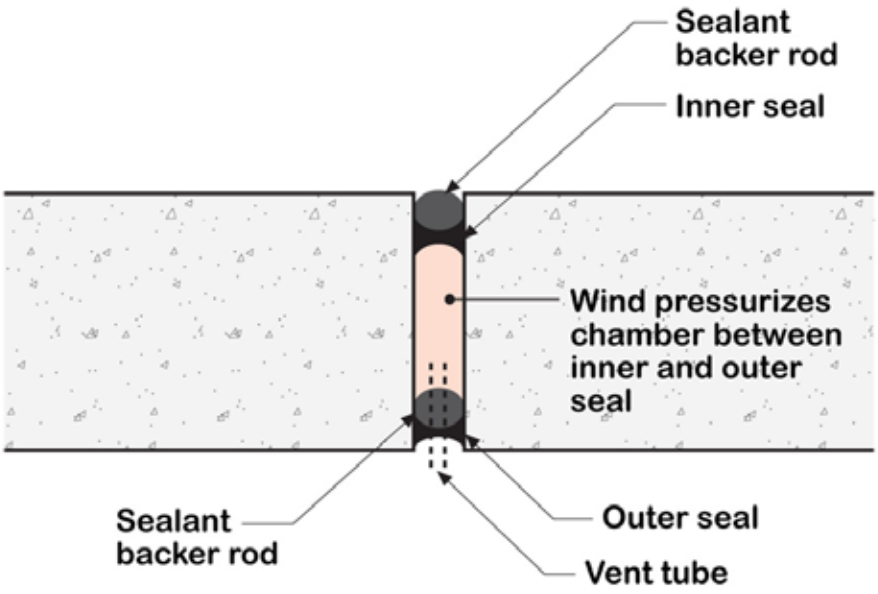

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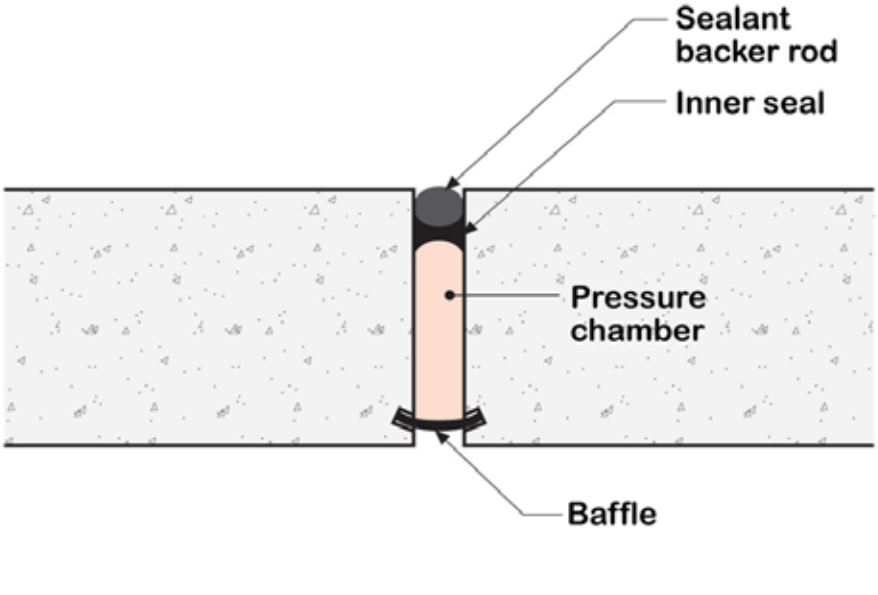

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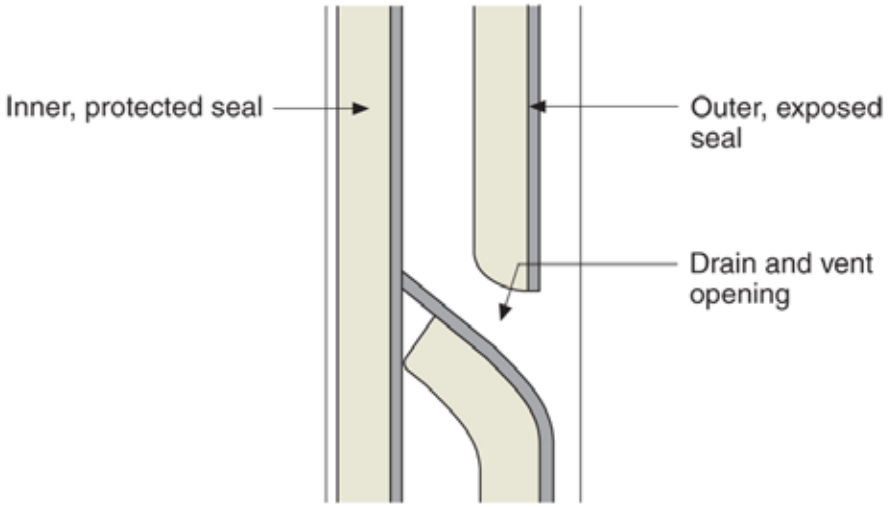

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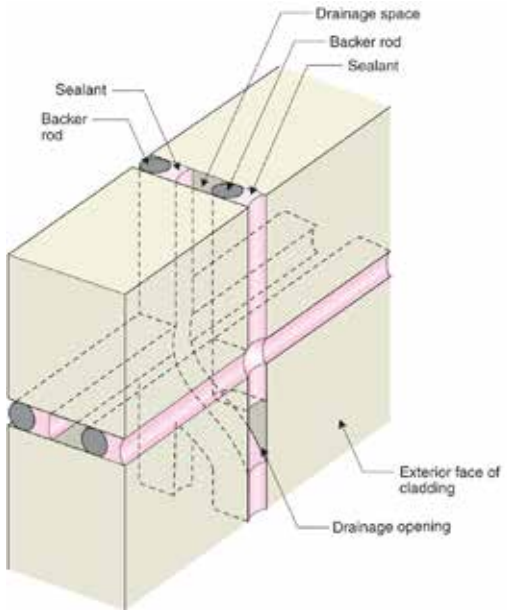

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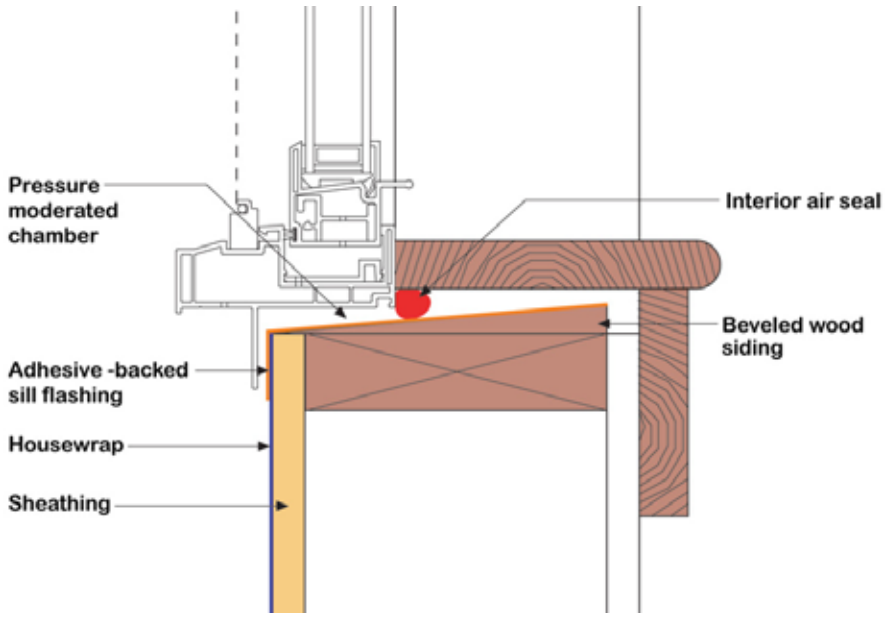

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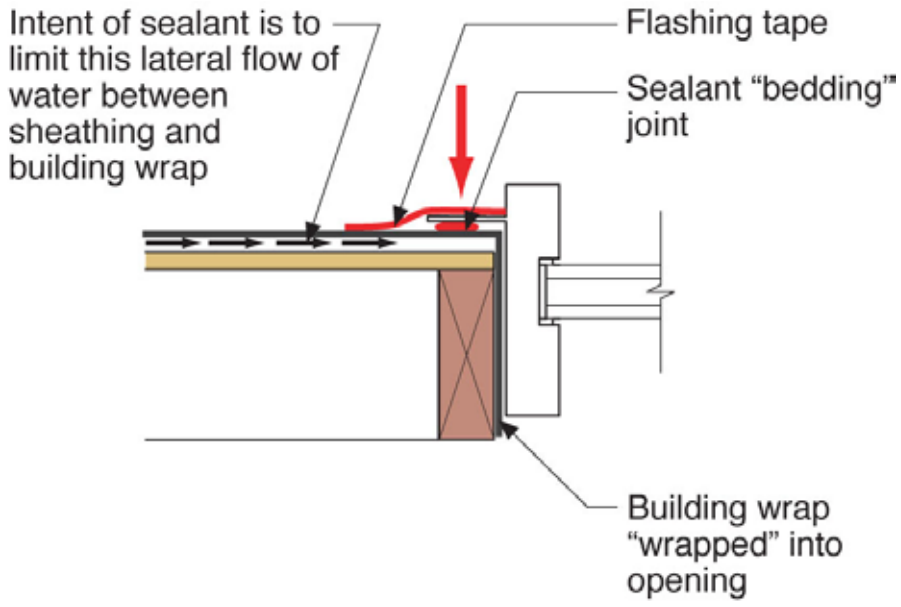
Joseph Lstiburek 19



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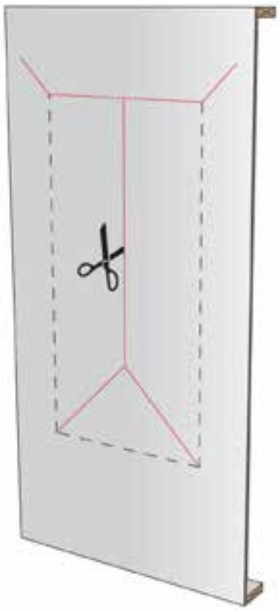

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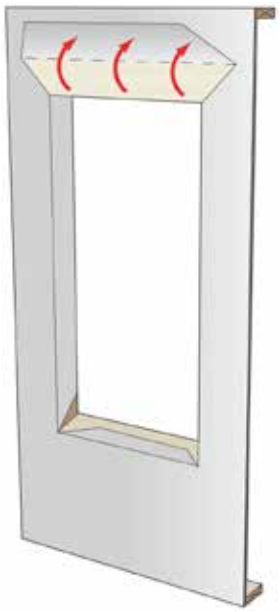

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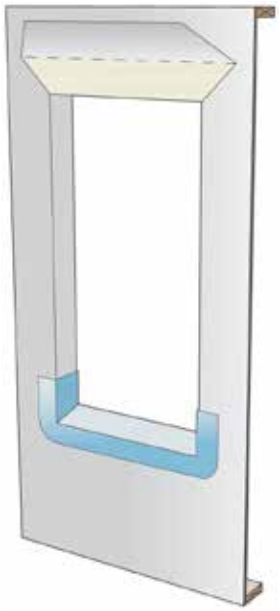

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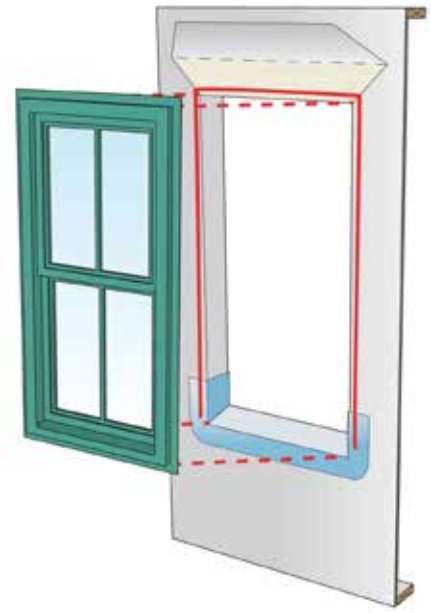

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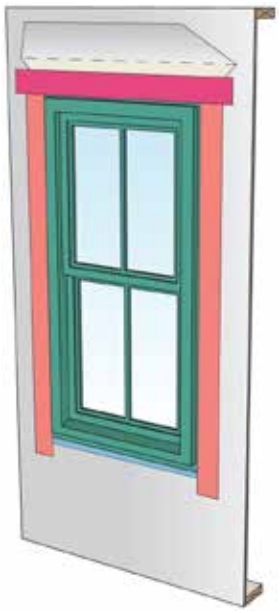

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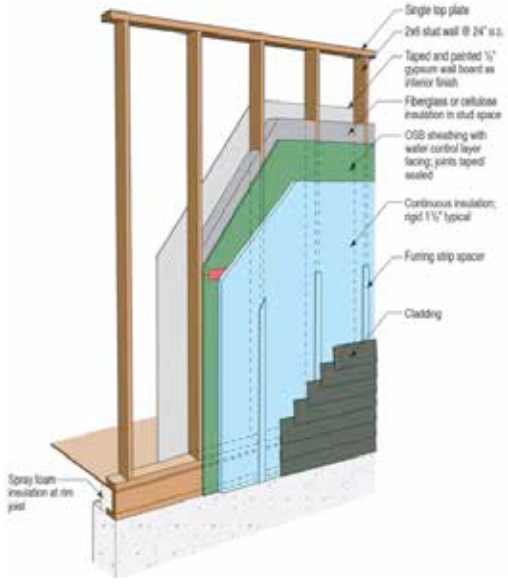
Joseph Lstiburek 31



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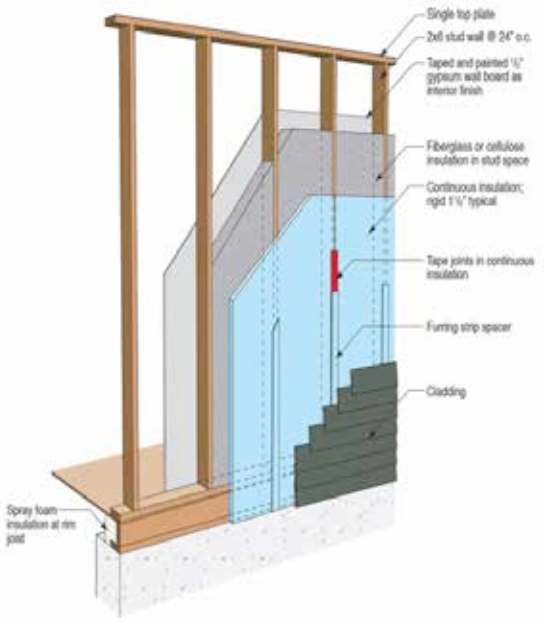

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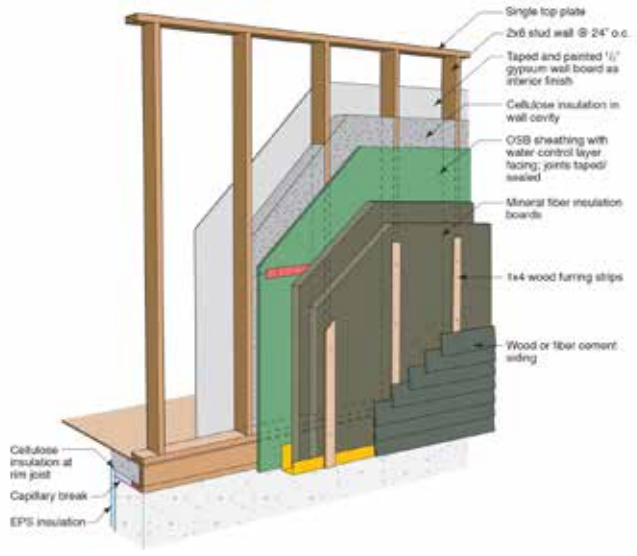

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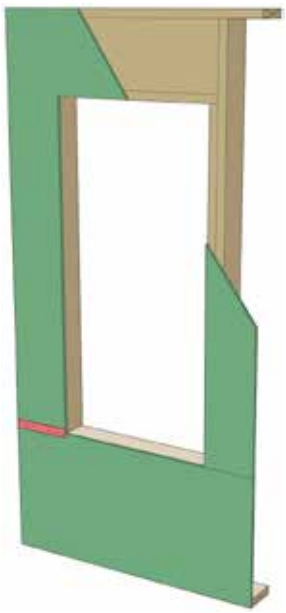

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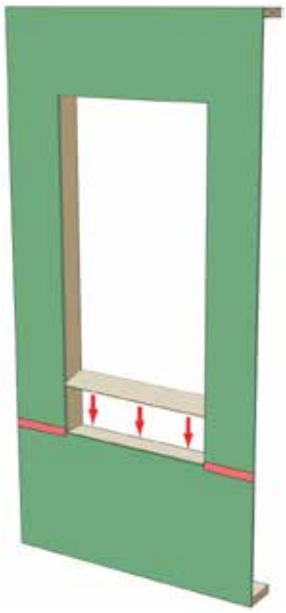

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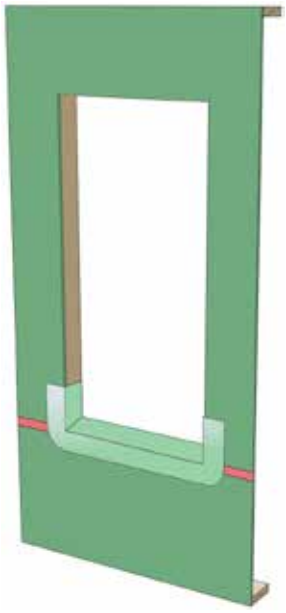

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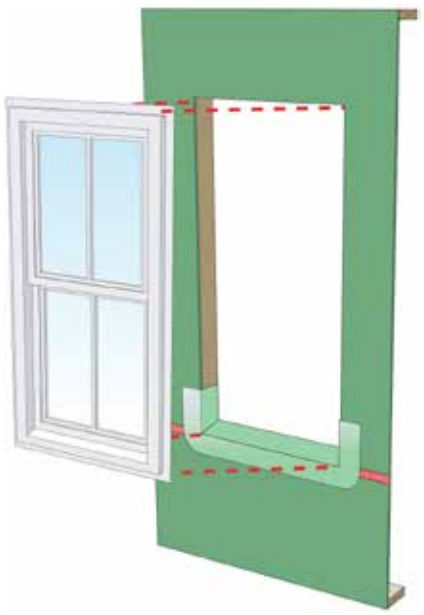

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Outies

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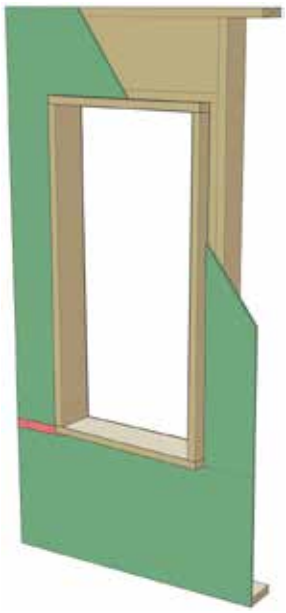

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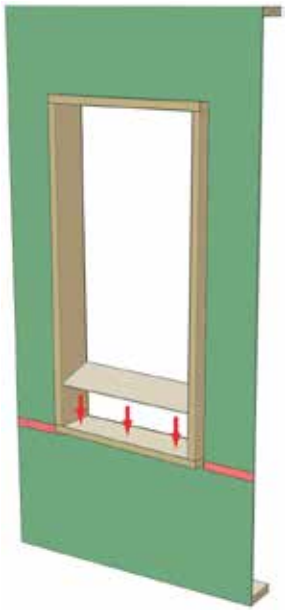

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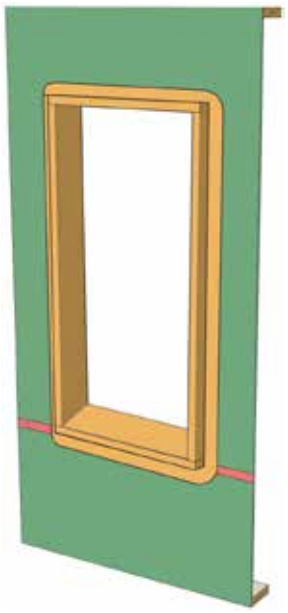

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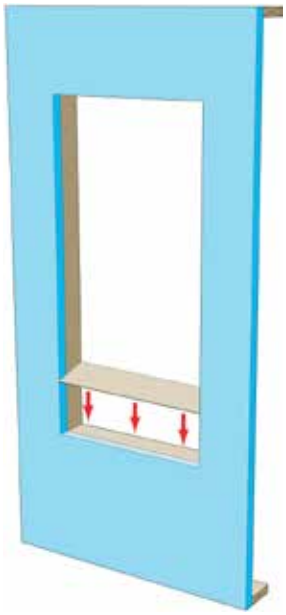
Joseph Lstiburek 53



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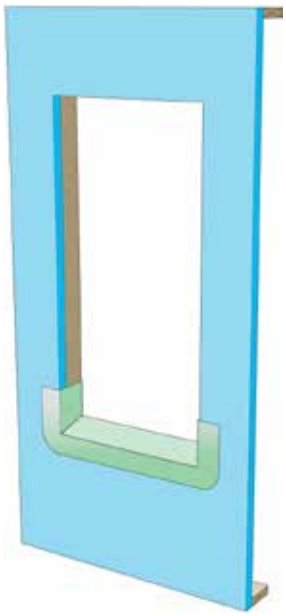

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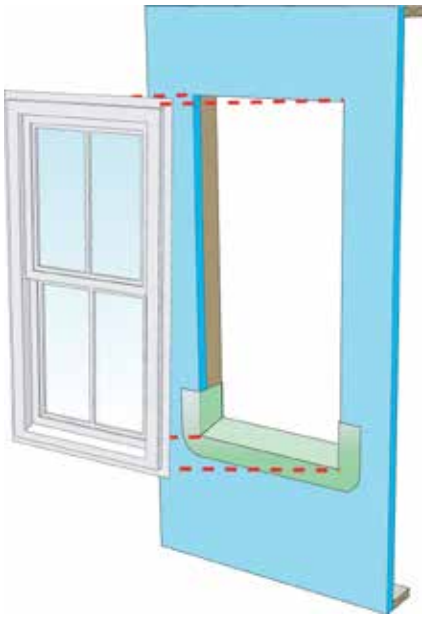

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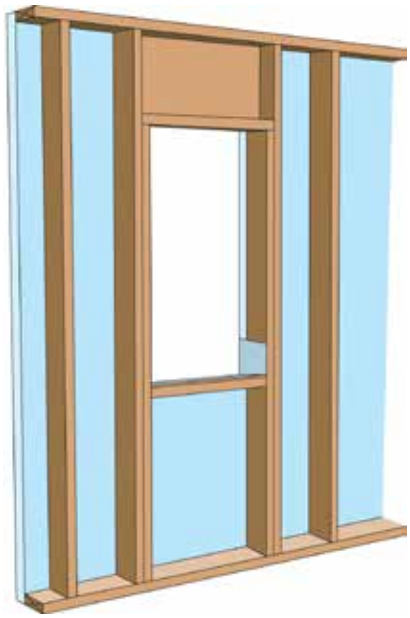

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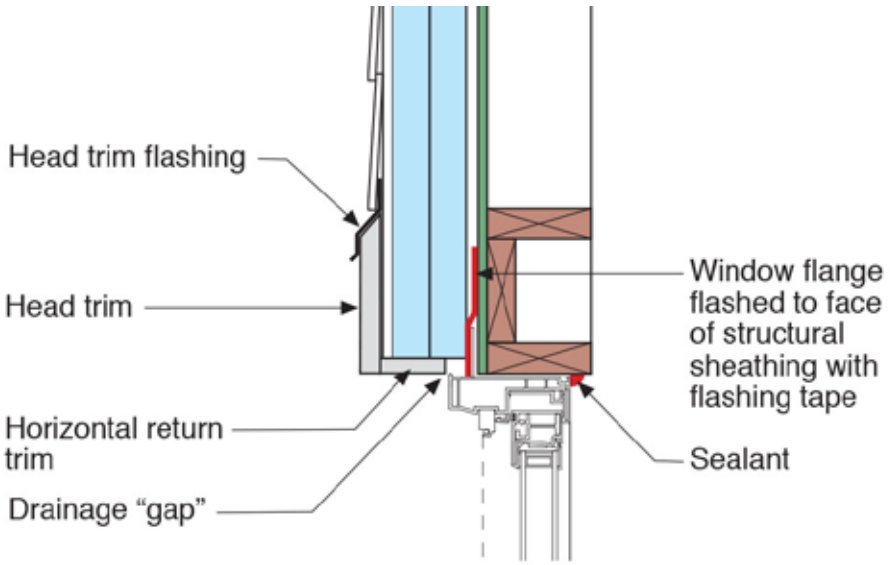

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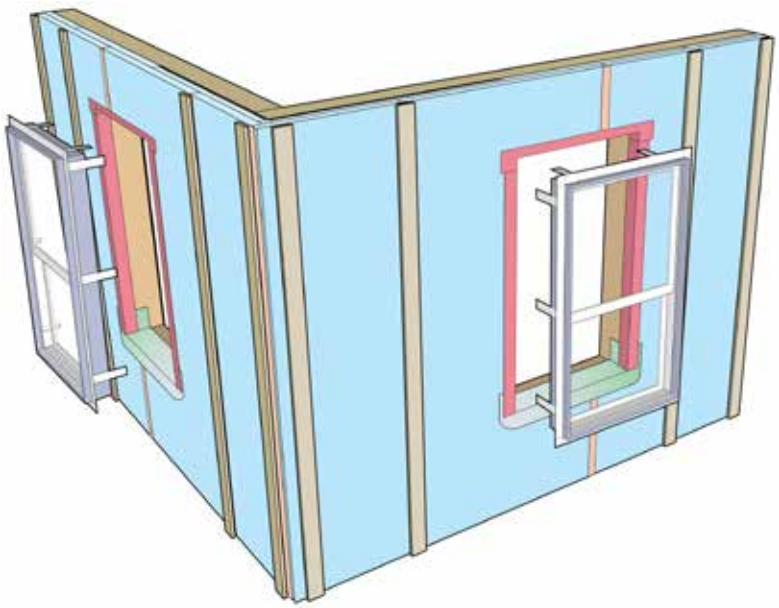

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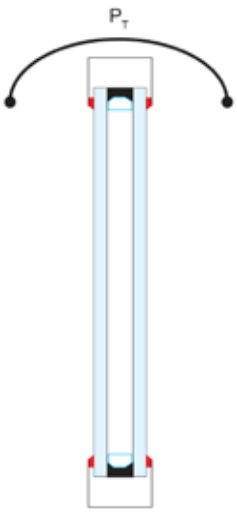
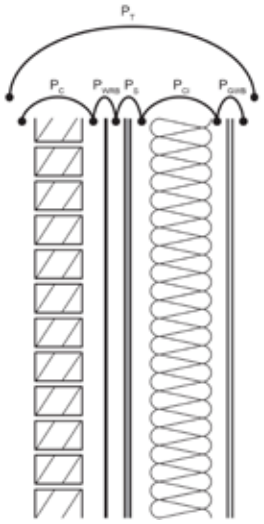
Joseph Lstiburek 66

Games People Play



We assume a window unit is a single layer.

Under this assumption, it does not matter which side of the assembly we establish the ΔP.



$P_T = P_C + P_{WRB} + P_S + P_{CI} + P_{GWB}$

Not all layers equally "tight"

ΔP across each layer depends on the side of the wall the pressure is induced

Removing a layer changes everything

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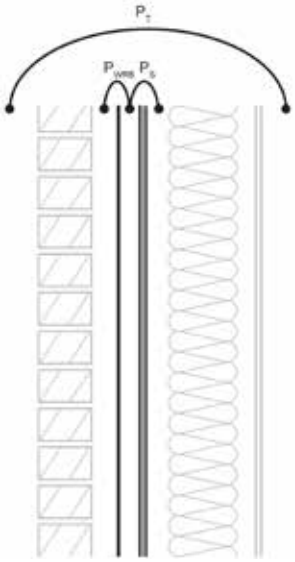

$P_T = P_{WRB} + P_S$

is very different than

$P_T = P_C + P_{WRB} + P_S + P_{CI} + P_{GWB}$

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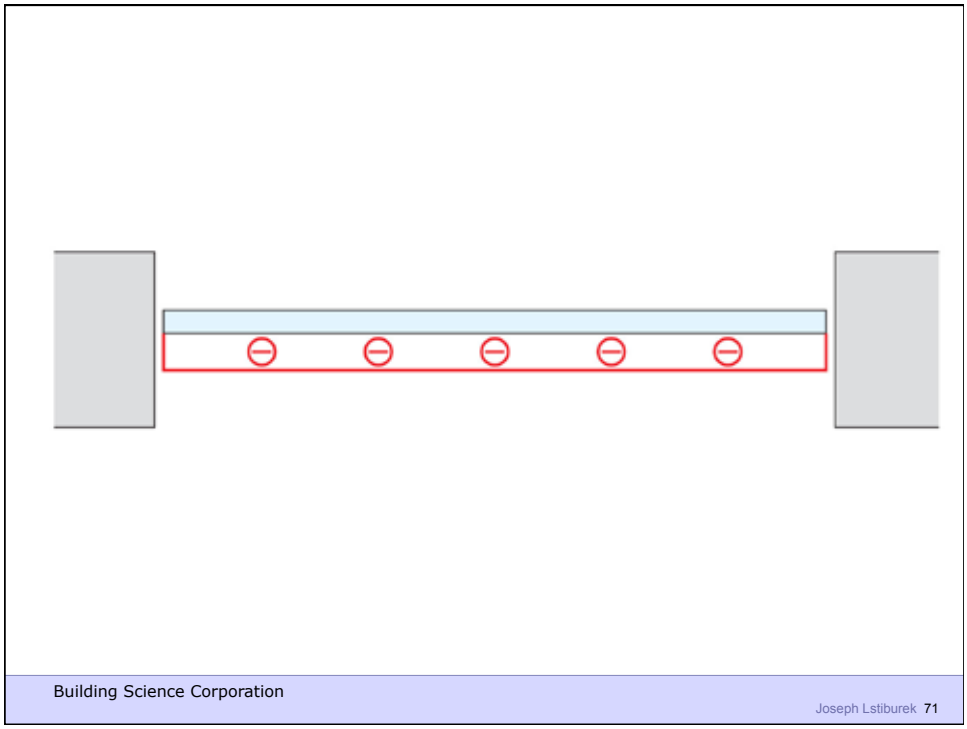
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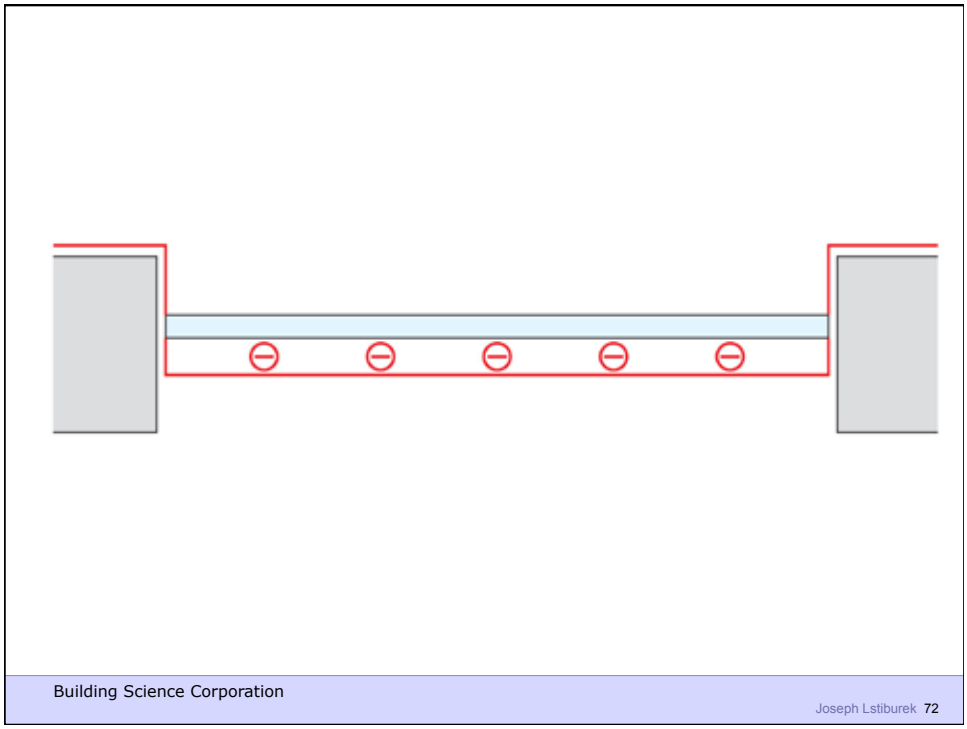
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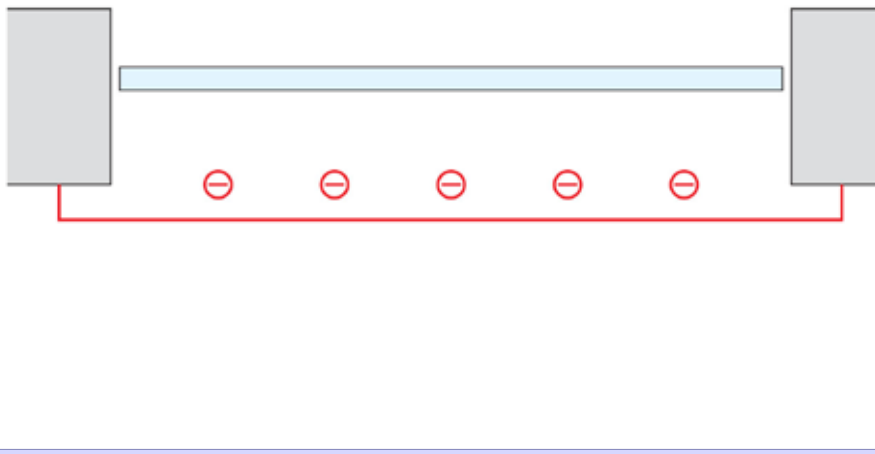

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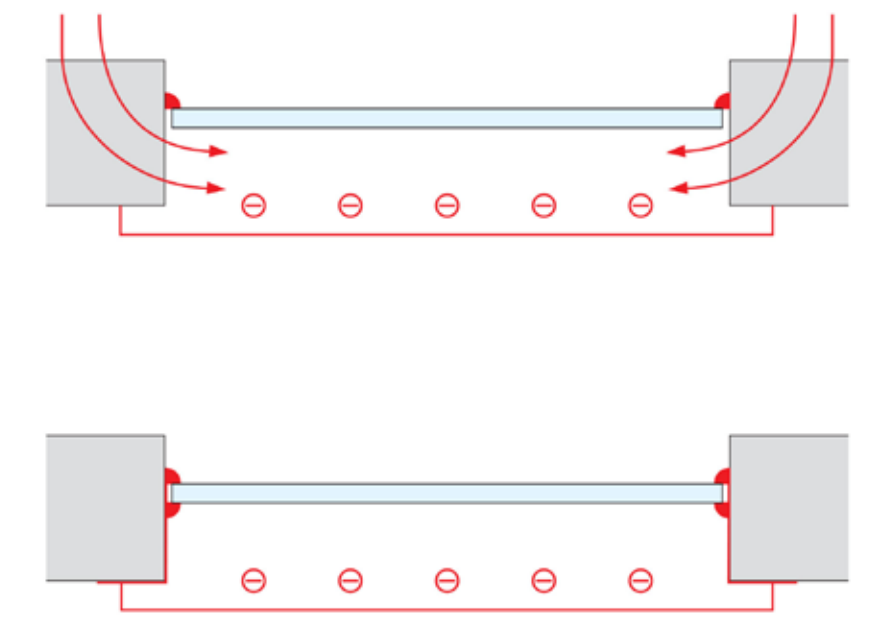

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Joseph Lstiburek 83

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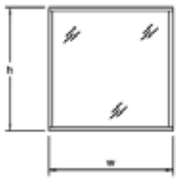
Joseph Lstiburek 84

Other Stuff

More Frames = More Heat flow

Spec. one large window rather than many small ones



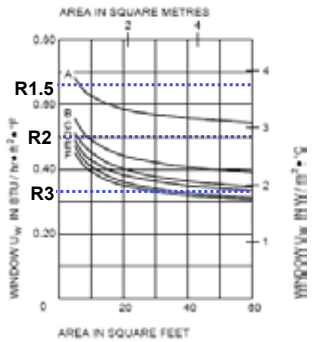
OVERALL WINDOW U-VALUE (U_W)

For fixed window configurations as shown with height (h) equal to width (w).

SEALED UNIT GLAZING TYPE

A = 6mm clear / ½" air / 6mm clear / metal spacer
B = 6mm clear / ½" air / 6mm low-e[1] / metal spacer
C = 6mm clear / ½" argon / 6mm low-e[1] / metal spacer
D = 6mm clear / ½" argon / 6mm low-e[1] / Helima thermally broken spacer
E = 6mm clear / ½" argon / 6mm low-e[2] / Helima thermally broken spacer
F = 6mm clear / ½" argon / 6mm low-e[2] / Edgetech Super Spacer®

1 - low-e coating emittance = 0.10
2 - low-e coating emittance = 0.05



Kawneer Isoport 518

Beware Thermal Flanking

- Beware heat flow around window frame

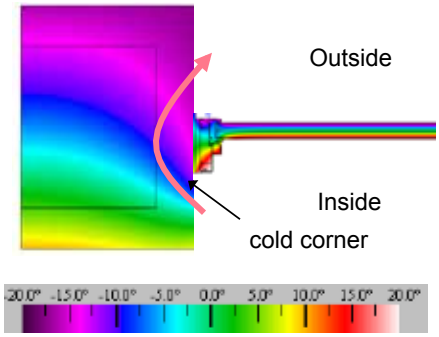


Figure 1: Thermal Flanking

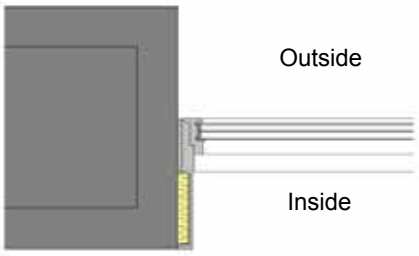
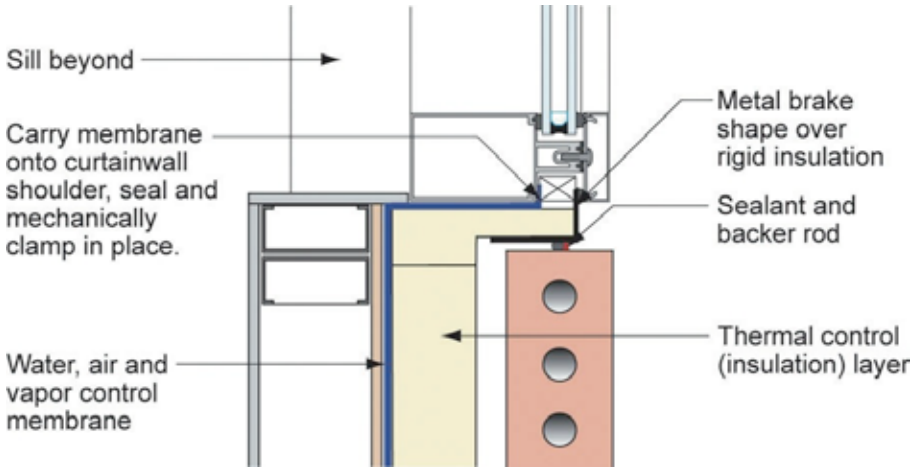
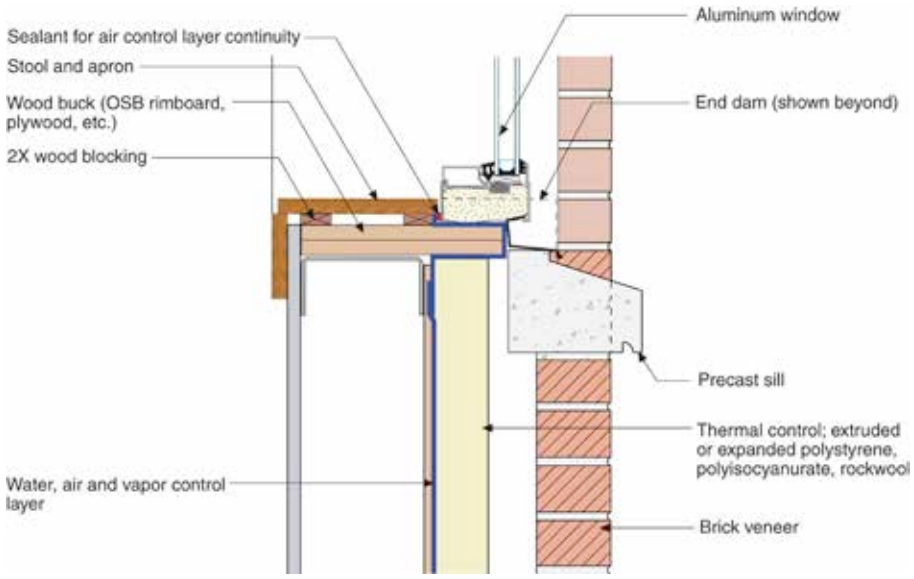


Figure 2: Flanking Reduced





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