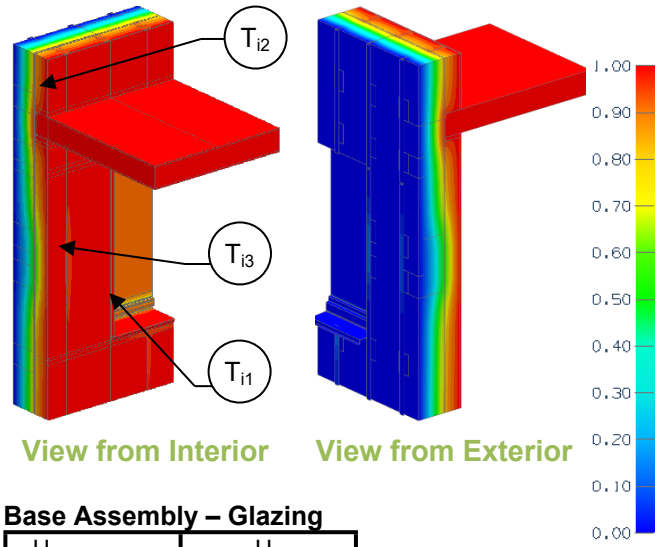
Detail 5.3.23

Exterior and Interior Insulated 6” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with FRP and Thermally Broken Vertical Brackets and Rail System Supporting Metal Cladding with Aerogel Insulation Blanket and R-19 Batt in Stud Cavity– Triple Glazed Vinyl Window and Intermediate Floor Intersection



View from Interior View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.3 (3.75 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_{w,}$ $R_{w,}$ $U_{g,}$	“clear wall” U- and R-value: w = wall without intermediate floor g = glazing
Transmittance / Resistance	$U_{floor,}$ $R_{floor,}$ $U_{t,}$ R_t	U and R-values for: floor = wall + intermediate floor t = combined wall + floor + window
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length

[1]Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Base Assembly – Glazing

$U_{centre\ of\ glass}$ Btu/ft² ·hr ·°F (W/m² K)	U_g Btu/ft² ·hr ·°F (W/m² K)
0.126 (0.72)	0.178 (1.01)

Scenario

Scenario	
A	With support bracket
B	Without support bracket

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft²·hr·°F / Btu (m² K / W)	R_w ft²·hr·°F / Btu (m² K / W)	U_w Btu/ft² ·hr ·°F (W/m² K)
R-42 (7.40)	R-63.3 (11.15)	R-48.3 (8.51)	0.021 (0.12)

Intermediate Floor Linear Transmittance

R_{floor} ft²·hr·°F / Btu (m² K / W)	U_{floor} Btu/ft² ·hr ·°F (W/m² K)	Ψ_{floor} Btu/ft² ·hr ·°F (W/m² K)
R-45.0 (7.92)	0.022 (0.13)	0.008 (0.015)

Window Transition Transmittance

Scenario	R_t ft²·hr·°F / Btu (m² K / W)	U_t Btu/ft² ·hr ·°F (W/m² K)	Ψ_{Head} Btu/ft ·hr ·°F (W/m K)	Ψ_{Sill} Btu/ft ·hr ·°F (W/m K)	Ψ_{Jamb} Btu/ft ·hr ·°F (W/m K)	Ψ_{Total} Btu/ft ·hr ·°F (W/m K)
A	R-12.9 (2.28)	0.077 (0.44)	0.021 (0.036)	0.049 (0.084)	0.039 (0.068)	0.040 (0.069)
B	R-13.0 (2.29)	0.077 (0.44)	0.021 (0.036)	0.040 (0.069)	0.039 (0.068)	0.037 (0.065)

Temperature Indices

	A	B	
T_{i1}	0.61	0.61	Min T on window frame, at bottom corner at edge of glass
T_{i2}	0.95	0.95	Max T on interior surface of sheathing, along bottom track
T_{i3}	0.41	0.41	Min T on interior surface of sheathing, at aluminum bracket