

APPENDIX B – CATALOGUE THERMAL DATA SHEETS

CATALOGUE INDEX

Introduction	B.i
Visual Summary	B.0.i
Clear Wall Assemblies	B.0.1
Floor Slab Linear Transmittance	B.0.14
Glazing Transition Linear Transmittance	B.0.21
Parapet Linear Transmittance	B.0.25
Corner Linear Transmittance	B.0.28
Structural Beam Point Transmittance	B.0.30
Beam and Post Linear Transmittance	B.0.32
Interior Wall Intersection Linear Transmittance	B.0.33
At-Grade Transition Linear Transmittance	B.0.34
Roof Clear Field Assemblies	B.0.35
Roof Interface Details Linear Transmittance	B.0.36
1.0 Window Wall	B.1.i
2.0 Conventional Curtain Wall	B.2.i
3.0 Unitized Curtain Wall	B.3.i
4.0 High Performance Curtain Wall	B.4.i
5.0 Steel Stud Construction	B.5.i
6.0 Concrete Construction	B.6.i
7.0 Wood Frame Construction	B.7.i
8.0 Doors and Balconies	B.8.i
9.0 Roofs	B.9.i

Introduction

Appendix B contains the catalogue of thermal performance data sheets for all the details available for this guide. The thermal performance information includes U-values, transmittance values and condensation indices. Appendix B consists of a Visual Summary of the details, followed by the Catalogue with full thermal information for each detail.

Catalogue Index	
1.	Window Wall
2.	Conventional Curtain Wall
3.	Unitized Curtain Wall
4.	High Performance Curtain Wall
5.	Steel Framed Walls
6.	Mass Walls
7.	Wood Frame Construction
8.	Balconies and Doors
9.	Roofs

Each thermal data sheet, along with its matching material data sheet, is meant to be standalone. For instance, Detail 5.2.5 is a balcony slab detail for a steel stud assembly given in Detail 5.1.7. The thermal data sheet for Detail 5.2.5 contains the thermal information for both the slab detail, and the clear field steel stud assembly, so the thermal data sheet for 5.1.7. is not needed to evaluate the performance of the slab detail. Additionally, some assemblies contain more than one interface detail, so while they are arranged by major detail type (slab, then parapet etc), there may be other interface details contained within it. Each thermal data sheet contains the thermal performance values for all interface details contained within that assembly detail. Note that some clear field assemblies do not have their own individual thermal data sheet and may be included within other thermal data sheets. For instance, there is no separate clear field data sheet for an interior insulated concrete wall, however there is clear field data available for that wall within the slab interface detail 6.2.2.

Visual Summary

The visual results summary provides a quick reference for details with key thermal performance information. The summary is arranged by transmittance type (ie: clear field details, slab details, parapets etc). Each summary gives a basic description of the detail, along with a closeup image of the detail. This is followed by the Detail index number in the catalogue. For clear field assemblies, the clear field U-value is given for upto 3 levels of insulation (if available). For linear and point transmittances, the most conservative value (largest) of the transmittances are provided. Finally, for the interface details, a performance category, from poor to excellent, based on the ranges given in section 1.3.2.

Table B.1: Visual Summary Example for Clear Field Assemblies


Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
						Btu / hr ft ² F	W/ m ² K
 Z-Girts	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Vertical Z-Girts Supporting Metal Cladding	5.1.3	R-5	0.16	0.89
					R-10	0.12	0.68
					R-15	0.10	0.59
					R-20	0.09	0.52
					R-25	0.08	0.48

Table B.2: Visual Summary Example for Linear Interface Assembly

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
					Btu / hr R _F	W / m K	
Exposed	Steel Framed	Interior and Exterior Insulated Steel Stud	Exposed Concrete Floor with an Interior and Exterior Insulated Steel Stud Wall Assembly with Vertical Z-Girts Supporting Stucco Cladding	5.2.8	0.67	1.2	Poor

Modelling Assumptions

- Exterior surfaces and air spaces include convection, conduction and radiation heat exchange.
- The models were evaluated at non-dimensionalized temperatures, where 0 is the exterior temperature and 1 is the interior. This was done to allow the results to be applicable to any temperature difference. See condensation indices below for more information.
- The model was analyzed at steady state, so thermal mass is not taken into account within assembly U-values.
- Air leakage was not taken into account. It was assumed materials were well fit together
- Contact resistances between materials were used

Additional modeling parameters and assumptions can be found in Section 5 of ASHRAE 1365-RP.

Thermal Data Sheets

Building Envelope Thermal Bridging Guide

1.2.1 Window Interior System – Slab Intersection with Spandrel Bypass & No Parapet Insulation

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D,w}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U _w	"clear wall" U- and R-value, w = spandrel wall without slab
Transmittance / Resistance	U _t , R _t	U and R-values for t = combined glazing and spandrel with slab
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.
²Spandrel section includes interface with slab and vision glazing.

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly - Spandrel Section without Slab				Base Assembly - Glazing	
Backpan Insulation 1D R-Value (RSI)	R _w ft ² ·hr ² ·F / Btu (m ² ·K / W)	U _w Btu/ft ² ·hr·°F (W/m ² ·K)		U _g Btu/ft ² ·hr·°F (W/m ² ·K)	U _p Btu/ft ² ·hr·°F (W/m ² ·K)
R-8.4 (1.48)	R-5.3 (0.94)	0.188 (1.07)		0.321 (1.82)	0.427 (2.43)
R-16.8 (2.96)	R-20.5 (3.61)	R-7.9 (1.39)	0.127 (0.72)		

Slab Linear Transmittance				Spandrel Section with Slab ²	
Backpan Insulation 1D R-Value (RSI)	R _t ft ² ·hr ² ·F / Btu (m ² ·K / W)	U _t Btu/ft ² ·hr·°F (W/m ² ·K)	ψ Btu/ft ³ ·hr·°F (W/m ³ ·K)	R _s ft ² ·hr ² ·F / Btu (m ² ·K / W)	U _s Btu/ft ² ·hr·°F (W/m ² ·K)
R-8.4 (1.48)	R-2.7 (0.47)	0.327 (2.11)	0.334 (0.578)	R-3.6 (0.63)	0.280 (1.59)
R-16.8 (2.96)	R-2.9 (0.51)	0.347 (1.97)	0.294 (0.509)	R-4.7 (0.82)	0.214 (1.21)

Temperature Indices

	R-8.4	R-16.8	
T ₁	0.61	0.57	T on backpan, along vertical mullion
T ₂	0.75	0.57	T on backpan, at centre of backpan
T ₃	0.46	0.57	T on frame, along head of lower glazing
T ₄	0.47	0.57	T on glazing, at corner of lower glazing
T ₅	0.53	0.57	Min T on slab, at head of lower glazing and vertical mullion

B.1.3

Each thermal data sheet contains several pieces of information. An example thermal data sheet is shown below with a description for each section following.

1) Detail Name

Each detail is named based on position within the catalogue index. The first number 1.x.x indicates the construction type according to the main index (ie 1 is Window-Wall, 5 is Steel Framed, 7 is Wood Framed etc). The second number x.1.x indicates detail group (ie. 1 is clear field values, 2 may be all slabs and 3 may be all parapets). The last number x.x.1 is simply the order in which the detail appears within that grouping (ie slab detail 1, slab detail 2 etc).

2) Detail Description

A basic description is included that denotes the construction system or type, along with additional detail identifiers such as limited dimension information, transmittance type and insulation locations



3) Thermal Image

An isometric thermal image from the interior and from the exterior is provided, along with a non-dimensionalized temperature scale and key locations for temperature indices, see condensation indices below. While temperatures could be read off these images, they are meant to give a general look at where the areas of high heat flow are.

4) Thermal Performance Legend

A thermal performance legend is provided denoting terms and subscripts for the thermal values that follow.

5) Thermal Values

The thermal data sheets contain several types of thermal performance indicators. If one or more assemblies are present on a detail, there will typically be multiple tables present, one for each assembly and one for the averaged values for all the assemblies combined. For clear field thermal data sheets, they typically have all the information contained within one table, however for curtain wall and window wall assembly clear field thermal data sheets; they also include the glazing data. In these instances, the spandrel clear field value and glazing values are in two separate tables, along with a combined assembly that is an average of the glazing and spandrel combined.

For interface detail thermal data sheets, each type of interface detail present in a single assembly has their own table, along with a separate table for the clear field values. There may be multiple ways the clear field values are presented. If there is only one clear field assembly, all values for the detail are given in a single table and the clear field values are presented as U_o and R_o . If there are multiple clear field assemblies or multiple interface transmittances in a single detail, the clear field values for each clear field assembly will be presented in a “Base Assembly” table. This is usually the case when there are glazing assemblies involved.

The thermal values provided in these tables are as follows:

- Insulation 1D R-value is the value of insulation if it is varied within the model. This is typically the exterior insulation or backpan insulation amount.
- R_{1D} is the combined thermal resistance of all the materials in a clear field assembly. This is the value of the assembly if there were absolutely no thermal bridging.
- R_o and U_o is the clear field thermal resistance and transmittance when there is only one base clear field assembly.
- R_x and U_x is the thermal resistance and transmittance for base assembly “X” when there are multiple clear field assemblies. Be aware of the subscripts given in the Thermal Performance legend. The subscript may not always represent a clear field assembly value.
- $U_{\text{center of glass}}$ and U_g are the thermal transmittances through the 1D center of glass and the overall glazing assembly respectively.
- R and U are modeled assembly thermal resistance and transmittance that include the effects of interface details for the specific size of the modeled assembly. There may be additional subscripts if the assembly contains multiple interface details, please be aware of the subscript labels given in the Thermal Performance Legend. This is important for details with glazing, such as window wall and curtain wall. The thermal values for the combined assembly with spandrel and glazing may be wanted, however as glazing can be dealt with separately, most designers will only want the information on the spandrel, therefore the spandrel only values with the slab are given separately.
- Ψ is the linear transmittance value. There may be additional subscripts if there are multiple interface details within one assembly
- X is the point transmittance value. There may be additional subscripts if there are multiple interface details within one assembly
- T_{ix} is the condensation indice for location x

6) Condensation Indices

The thermal data sheets also provide surface temperatures of assembly components that could be exposed to interior air to help locate potential areas of risk for condensation. In order to be applicable for any climate (varying indoor and outdoor temperatures), the temperatures are non-dimensionalized into a temperature index, T_i , as shown below

$$T_i = \frac{T_{surface} - T_{outside}}{T_{inside} - T_{outside}}$$

The index is the ratio of the surface temperature relative to the interior and exterior temperatures. The temperature index has a value between 0 and 1, where 0 is the exterior temperature and 1 is the interior temperature. If T_i is known, the above equation can be rearranged for $T_{surface}$. Note that these not meant as absolute temperatures and are only given as guidance on potential regions of condensation. There are many factors that can affect the formation of condensation that are not included in the modeling. For more discussion, see section 5.3 of ASHRAE 1365-RP.

7) At-Ground Transitions

Some details contain at-grade transitions. The Ψ -value can be used like any other linear transmittance; however it is calculated differently. Heat flow at slab on grade transitions is calculated by L-value based on ISO 10211: 2007. The L-value is simply the overall heat flow of the slab on grade per unit length of the slab perimeter. It is based on the assumption that the overall steady state heat flow though slab on grade is dominated by the perimeter, similar to F-factors referenced in ASHRAE 90.1.

Wall and floor junctions with slab on grade are still characterized by linear transmittance. The linear transmittance at wall to floor junctions are calculated by subtracting the L-value of the overall assembly by the L-value of the slab and thermal transmittance of the clear wall per unit width as shown by the equation below:

$$\Psi = L_{2Dt} - L_{2Df} - U_{ow} * H_w$$

Where:

Ψ = Linear transmittance of wall/ slab on grade transition

L_{2Dt} = Heat flow of overall assembly per unit length of slab perimeter

L_{2Df} = Heat flow of slab edge per unit length of slab perimeter

U_{ow} = U-value of the clear wall

H_w = Height of the clear wall in the overall modeled assembly

8) PDF Version

With the PDF version of the catalogue, each entry in the catalogue index is linked to each construction section. Within each section, there is an additional index for the details, which are also linked directly to each detail thermal sheet. To return to the index, simply click on the Building Envelope Thermal Bridging Guide header.

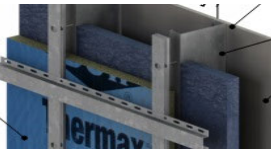
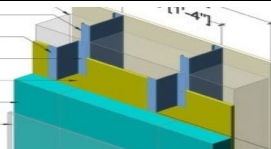
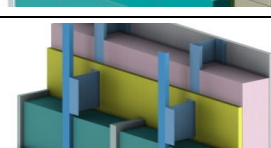
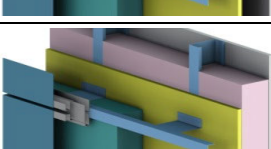
Visual Summary

Clear Wall Assemblies

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
						Btu / hr ft ² F	W / m ² K
	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Vertical Z-Girts 16"o.c. Supporting Metal Cladding	5.1.3	R-5	0.157	0.89
					R-10	0.120	0.68
					R-15	0.103	0.59
					R-20	0.091	0.52
					R-25	0.084	0.48
	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Vertical Z-Girts Supporting Cladding – Clear Wall	5.1.69	R-5	0.125	0.71
					R-10	0.079	0.45
					R-15	0.058	0.33
					R-20	0.046	0.26
					R-25	0.038	0.22
	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Horizontal Z-Girts 24"o.c. Supporting Metal Cladding	5.1.5	R-5	0.146	0.83
					R-10	0.106	0.60
					R-15	0.088	0.50
					R-20	0.076	0.43
					R-25	0.069	0.39
	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall	5.1.67	R-5	0.121	0.69
					R-10	0.077	0.44
					R-15	0.057	0.32
					R-20	0.045	0.25
					R-25	0.037	0.21
	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Vertical and Horizontal Z-Girts 24"o.c. Supporting Metal Cladding	5.1.9	R-10	0.097	0.55
					R-15	0.076	0.43
					R-20	0.065	0.37
					R-25	0.058	0.33
	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Horizontal Z-Girts 24"o.c. Supporting Metal Cladding	5.1.7	R-5	0.075	0.42
					R-10	0.061	0.35
					R-15	0.054	0.31
					R-20	0.049	0.28
	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall	5.1.68	R-5	0.067	0.38
					R-10	0.051	0.29
					R-15	0.041	0.23
					R-20	0.034	0.19
					R-25	0.029	0.17
	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Vertical Z-Girts 16"o.c. Supporting Cladding and Spray Foam in Stud Cavity	5.1.4	R-10	0.086	0.42
					R-15	0.071	0.40
					R-20	0.066	0.38
					R-25	0.061	0.36
					R-30	0.056	0.34
	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Horizontal Z-Girts 24"o.c. Supporting Cladding and Spray Foam in Stud Cavity	5.1.8	R-10	0.066	0.37
					R-15	0.061	0.36
	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Vertical Z-Girts 16"o.c. Supporting Stucco Cladding	5.1.6	R-10	0.077	0.44
					R-15	0.071	0.40
					R-20	0.066	0.38



Clear Wall Assemblies

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
						Btu / hr ft ² F	W / m ² K
 Z-Girts	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Vertical Z-Girts Supporting Cladding – Clear Wall	5.1.70	R-5	0.069	0.39
					R-10	0.052	0.30
					R-15	0.042	0.24
					R-20	0.035	0.20
					R-25	0.030	0.17
					R-30	0.027	0.15
 Z-Girts	Wood	Exterior and Interior Insulated Wood-Framed	Exterior and Interior Insulated Wood-Framed Wall with Horizontal Z-Girts 16"o.c. Supporting Fiber Cement Board	7.1.4	R-5	0.043	0.24
					R-10	0.038	0.21
					R-15	0.035	0.20
 Girts	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Knight Wall Systems CI-Girt and Metal Fasteners at 8" o.c. Supporting Cladding and Spray Foam in Stud Cavity	5.1.20	R-10	0.056	0.32
					R-19	0.039	0.22
 Girts	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Knight Wall Systems CI-Girt and Metal Fasteners at 16" o.c. Supporting Cladding and Spray Foam in Stud Cavity	5.1.21	R-10	0.053	0.30
					R-19	0.037	0.21
 Girts	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Knight Wall Systems CI-Girt and Metal Fasteners at 8" o.c. Supporting Cladding	5.1.22	R-10	0.080	0.45
					R-19	0.048	0.27
 Metal Clip	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Intermittent Vertical Z-Girts at 12" o.c. Vertically Supporting Metal Cladding	5.1.10	R-5	0.142	0.81
					R-10	0.101	0.58
					R-15	0.082	0.47
					R-20	0.070	0.40
					R-25	0.062	0.35
 Metal Clip	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Intermittent Vertical Z-Girts at 24" o.c. vertically Supporting Metal Cladding	5.1.10	R-5	0.136	0.77
					R-10	0.093	0.53
					R-15	0.073	0.42
					R-20	0.061	0.35
					R-25	0.053	0.30
 Metal Clip	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Intermittent Vertical Z-Girts at 36" o.c. Vertically Supporting Metal Cladding	5.1.10	R-5	0.132	0.75
					R-10	0.089	0.50
					R-15	0.068	0.39
					R-20	0.057	0.32
					R-25	0.049	0.28
 Metal Clip	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Vertical Clips 16"o.c. Supporting Stucco Cladding	5.1.13	R-10	0.062	0.35
					R-15	0.054	0.30
					R-20	0.048	0.27
 Clips	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Horizontal Clips 24"o.c. Supporting Metal Cladding	5.1.11	R-15	0.068	0.39
					R-20	0.056	0.32
					R-25	0.049	0.28
 Clips	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Horizontal Clips 24"o.c. Supporting Metal Cladding	5.1.12	R-10	0.058	0.33
					R-15	0.049	0.28
					R-20	0.042	0.24

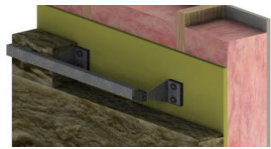
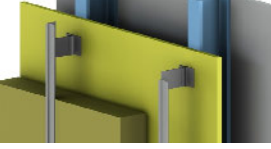
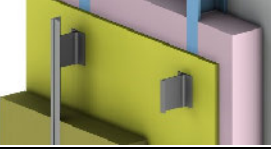


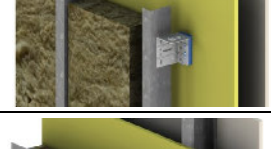

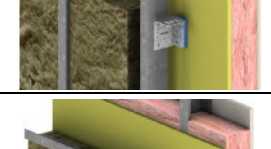



Clear Wall Assemblies

Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation		Thermal Transmittance	
						R-value	U-value	Btu / hr ft ² F	W / m ² K
Clips		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Vci Vertical System – Clear Wall	5.1.63	R-8	0.107	0.61	
						R-13	0.087	0.49	
						R-15	0.080	0.45	
						R-17	0.075	0.43	
						R-26	0.067	0.38	
Clips		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Vci Vertical System – Clear Wall	5.1.64	R-8	0.060	0.34	
						R-13	0.054	0.30	
						R-15	0.051	0.29	
						R-17	0.049	0.28	
						R-26	0.042	0.24	
Clips		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Hci Horizontal System – Clear Wall	5.1.65	R-8	0.112	0.63	
						R-13	0.090	0.51	
						R-15	0.084	0.48	
						R-17	0.080	0.45	
						R-26	0.067	0.38	
Clips		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Hci Horizontal System – Clear Wall	5.1.66	R-8	0.061	0.35	
						R-13	0.054	0.31	
						R-15	0.052	0.30	
						R-17	0.050	0.29	
						R-26	0.045	0.26	
Fiberglass Clip		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Cascadia Clip Fiberglass Spacer 26"o.c. and Through Insulation Fasteners Supporting Cladding	5.1.31	R-8	0.090	0.51	
						R-11	0.078	0.44	
						R-13	0.069	0.39	
						R-15	0.061	0.35	
						R-17	0.055	0.31	
						R-21	0.046	0.26	
						R-25	0.040	0.23	
Polyamide Clip		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with CL-Talon 300 Clip System Supporting Cladding – Clear Wall	5.1.16	R-8	0.110	0.62	
						R-13	0.073	0.42	
						R-17	0.057	0.32	
Thermally Isolated Clip		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Thermally Isolated Aluminum Clip Horizontal Sub-girt System 41"o.c. Supporting Cladding	5.1.17	R-17	0.059	0.34	
						R-21	0.049	0.28	
						R-25	0.042	0.24	
Thermally Isolated Clip		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Thermally Isolated Aluminum Clip Horizontal Sub-girt System 41"o.c. Supporting Cladding	5.1.17	R-17	0.044	0.25	
						R-21	0.039	0.22	
						R-25	0.035	0.20	
Thermally Isolated Clip		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Thermally Isolated Steel Clip and Rail System 24"o.c. Supporting Cladding	5.1.14	R-8	0.093	0.53	
						R-13	0.071	0.40	
						R-15	0.064	0.36	
						R-17	0.058	0.33	
						R-25	0.044	0.25	
Thermally Isolated Clip		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Thermally Isolated Steel Clip and Rail System Supporting Cladding	5.1.15	R-8	0.052	0.30	
						R-13	0.045	0.26	
						R-15	0.042	0.24	
						R-17	0.039	0.22	
						R-25	0.032	0.18	
Thermally Isolated Clip		Wood	Exterior Insulated Wood Frame	Exterior Insulated Wood Frame Assembly with Thermally Isolated Steel Clip and Rail System 24"o.c. Supporting Cladding	7.1.5	R-8	0.090	0.51	
						R-13	0.069	0.39	
						R-15	0.062	0.35	
						R-17	0.056	0.32	
						R-25	0.042	0.24	



Clear Wall Assemblies

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
						Btu / hr ft ² F	W / m ² K
Thermally Isolated Clip 	Wood	Exterior and Interior Insulated Wood Frame	Exterior and Interior Insulated Wood Frame Assembly with Thermally Isolated Steel Clip and Rail System 24"o.c. Supporting Cladding	7.1.6	R-8	0.038	0.22
					R-13	0.033	0.19
					R-15	0.032	0.18
					R-17	0.030	0.17
					R-21	0.028	0.16
Thermally Isolated Clip 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Thermally Isolated Aluminum Clip and Rail System 30"o.c. Supporting Cladding	5.1.19	R-13	0.070	0.40
					R-17	0.057	0.33
					R-21	0.049	0.28
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Thermally Isolated Aluminum Clip and Rail System 30"o.c. Supporting Cladding	5.1.19	R-13	0.049	0.28
					R-17	0.043	0.24
					R-21	0.038	0.22
Thermally Isolated Clip 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with R-TEC CI Bracket System 24"o.c. Supporting Vertical Sub-girts	5.1.23	R-13	0.068	0.39
					R-17	0.053	0.30
					R-21	0.044	0.25
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with R-TEC CI Bracket System 24"o.c. Supporting Vertical Sub-girts	5.1.24	R-13	0.047	0.27
					R-17	0.039	0.22
					R-21	0.034	0.19
Thermally Isolated Clip 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Thermally Broken ISO Clip System 24"o.c. Supporting Vertical Sub-girts	5.1.25	R-17	0.070	0.40
					R-21	0.063	0.36
					R-25	0.059	0.33
Thermally Isolated Clip 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Thermally Broken ISO Clip System 24"o.c. vertical spacing on 16"o.c. Studs Supporting Horizontal Sub-girts	5.1.26	R-17	0.066	0.38
					R-21	0.059	0.34
					R-25	0.054	0.31
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Thermally Broken ISO Clip System 24"o.c. Supporting Vertical Sub-girts	5.1.27	R-17	0.051	0.29
					R-21	0.048	0.27
					R-25	0.045	0.26
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Thermally Broken ISO Clip System 24"o.c. on 16"o.c. Studs Supporting Horizontal Sub-girts	5.1.28	R-17	0.048	0.27
					R-21	0.044	0.25
					R-25	0.041	0.24



Clear Wall Assemblies

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
						Btu / hr ft ² F	W / m ² K
Thermally Isolated Clip 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System (16" o.c.) Supporting Horizontal and Vertical Sub-girts – Clear Wall	5.1.57	R-17	0.046	0.26
Thermally Isolated Clip 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System (32" o.c.) Supporting Horizontal and Vertical Sub-girts – Clear Wall	5.1.58	R-17	0.042	0.24
Thermally Isolated Clip 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Nvelope NV1 Clip System 24"o.c. Supporting Cladding	5.1.29	R-13	0.082	0.46
					R-17	0.068	0.39
					R-21	0.060	0.34
					R-25	0.054	0.31
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Nvelope NV1 Clip System 24"o.c. Supporting Cladding and R-12 Batt Insulation	5.1.30	R-8	0.063	0.36
					R-13	0.055	0.31
					R-17	0.049	0.28
					R-21	0.044	0.25
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System 24" o.c. Supporting Cladding – Clear Wall	5.1.59	R-6	0.060	0.34
					R-8	0.055	0.31
					R-12	0.049	0.28
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated 6" x 1 5/8" Slotted Steel R-Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System 24" o.c. Supporting Cladding – Clear Wall	5.1.60	R-6	0.049	0.28
					R-8	0.046	0.26
					R-12	0.042	0.24
					R-17	0.038	0.22
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – Eko Thermobracelet Clip System Supporting Cladding – Clear Wall	5.1.61	R-42	0.021	0.12
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – Eko Thermobracelet and NV1 Clip System Supporting Cladding – Clear Wall	5.1.62	R-57	0.028	0.16
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Thermally Broken Clip System 24"o.c. vertical spacing on 24"o.c. Studs Supporting Cladding and R-20 Batt Insulation	5.1.32	R-4	0.055	0.31
					R-9	0.047	0.27
					R-13	0.042	0.24
					R-17	0.038	0.21
Thermally Isolated Clip 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Thermally Broken Clip System 24"o.c. vertical spacing on 24"o.c. Studs Supporting Cladding and R-22.5 Batt Insulation	5.1.33	R-4	0.053	0.30
					R-9	0.046	0.26
					R-13	0.041	0.23
					R-17	0.037	0.21



Clear Wall Assemblies

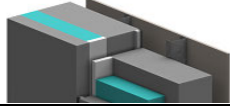
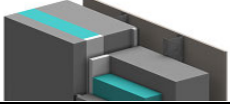
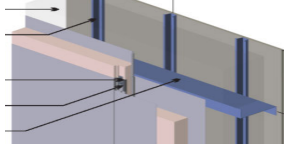
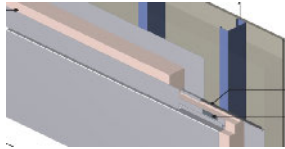
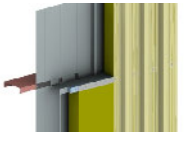
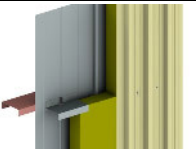
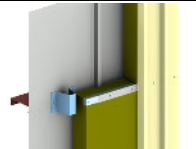
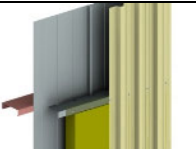
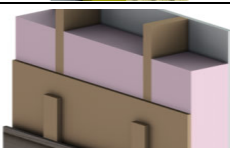

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
						Btu / hr ft ² F	W/ m ² K
 Thermally Isolated Clip	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Thermally Broken Clip System 24"o.c. vertical spacing on 24"o.c. Studs Supporting Cladding and R-24 Batt Insulation	5.1.34	R-4	0.051	0.29
					R-9	0.044	0.25
					R-13	0.040	0.23
					R-17	0.036	0.20
 Thermally Isolated Clip	Concrete	Exterior Insulated Concrete block	Exterior Insulated Concrete Block Assembly with Thermally Isolated Aluminum Clip and Rail System Supporting Cladding	6.1.2	R-13	0.058	0.33
 Thermally Isolated Clip	Concrete	Exterior Insulated Concrete block	Exterior Insulated Concrete Block Assembly with Thermally Broken ISO Clip System 16"o.c. x 24"o.c. Supporting Horizontal Sub-girts	6.1.3	R-17	0.066	0.37
					R-21	0.059	0.34
					R-25	0.054	0.31
 Thermally Isolated Clip	Poured-in-Place Concrete	Exterior Insulated Poured-in-place Concrete Assembly	Exterior Insulated Concrete Mass Wall Assembly with Nvelope NV1 Clip System 16"o.c.x 24"o.c. Supporting Cladding	6.1.4	R-8	0.098	0.56
					R-13	0.078	0.44
					R-17	0.065	0.37
					R-21	0.057	0.33
 Thermally Isolated Clip	Concrete	Exterior Insulated Concrete block	Exterior Insulated Concrete Block Assembly with Nvelope NV1 Clip System 16"o.c. x 24"o.c. Supporting Cladding	6.1.5	R-8	0.092	0.52
					R-13	0.074	0.42
					R-17	0.062	0.35
					R-21	0.055	0.31
 Thermally Isolated Clip	Wood	Exterior Insulated Steel Stud	Exterior Insulated Wood Frame Assembly with Thermally Isolated Aluminum Clip and Rail System 24"o.c. Supporting Cladding	7.1.7	R-13	0.065	0.37
 Thermally Isolated Clip	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Fiber Reinforced Clips and Steel Rail 24"o.c. Supporting Cladding	5.1.18	R-13	0.066	0.37
					R-17	0.052	0.30
					R-21	0.043	0.24
 Thermally Isolated Clip	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Fiber Reinforced Clips and Steel Rail 24"o.c. Supporting Cladding	5.1.18	R-13	0.047	0.27
					R-17	0.039	0.22
					R-21	0.034	0.19
					R-25	0.030	0.17
 EIFS	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Drained EIFS	5.1.1	R-8	0.100	0.57
					R-11	0.073	0.41
					R-15	0.057	0.33




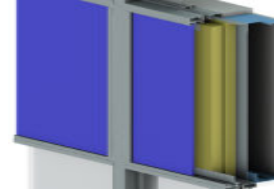
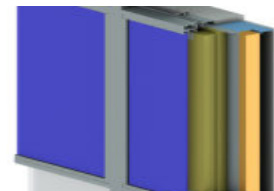
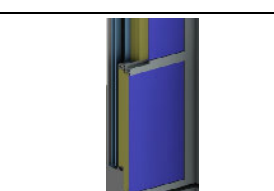
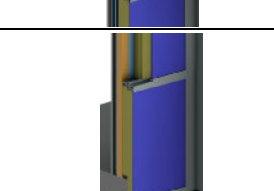
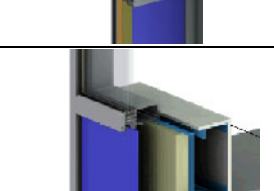
Clear Wall Assemblies

Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
							Btu / hr ft ² F	W / m ² K
EIFS		Steel Framed	Exterior and Interior Insulated Steel Stud	Split Insulated Steel Frame Assembly with Interior Insulation and Drained EIFS	5.1.2	R-8	0.060	0.34
						R-15	0.042	0.24
EIFS		Poured-in-Place Concrete	Exterior Insulated Poured-in-place Concrete Assembly	Exterior Insulated Concrete Mass Wall with Drained EIFS	6.1.1	R-15	0.057	0.32
Interior Insulated		Poured-in-Place Concrete	Interior Insulated Poured-in-place Concrete Assembly	Interior Insulated Concrete Mass Wall with 16"o.c. Steel Studs Supporting Interior Finish and no Insulation in Stud Cavity	6.2.3	R-11	0.074	0.42
Interior Insulated		Poured-in-Place Concrete	Interior Insulated Poured-in-place Concrete Assembly	Interior Insulated Concrete Mass Wall with Insulation Outboard of 16"o.c. Studs	6.3.2	R-10	0.078	0.44
						R-15	0.056	0.32
Interior Insulated		Poured-in-Place Concrete	Interior Insulated Poured-in-place Concrete Assembly	Interior Insulated Concrete Mass Wall with Insulation Outboard of 16"o.c. Studs and Batt Insulation in Stud Cavity	6.2.4	R-10	0.050	0.29
						R-15	0.040	0.23
Interior Insulated		Concrete	Interior Insulated Pre-cast Concrete Panel	Interior Insulated Pre-cast Concrete Wall with 16"o.c. Steel Stud and Rigid Insulation Outboard of Studs	6.2.7	R-13	0.078	0.44
Interior Insulated		Concrete	Interior Insulated Pre-cast Concrete Panel	Interior Insulated Pre-cast Concrete Wall with 16"o.c. Steel Stud and Insulation in Stud Cavity	6.2.6	R-15	0.118	0.67
Sandwich Panels		Concrete	Precast Sandwich Panels	Precast Sandwich Panel Wall with Steel and Plastic Connectors and Insulation Outboard of 16"o.c. Studs	6.2.8	R-13	0.079	0.45
Sandwich Panels		Concrete	Precast Sandwich Panels	Precast Sandwich Panel Wall with Concrete at Panel Perimeter and Steel Connectors	6.2.9	R-10	0.207	1.17
Sandwich Panels		Concrete	Precast Sandwich Panels	Precast Sandwich Panel Wall with Steel or Composite Connectors	6.2.10	Steel Connectors at 16" o.c.	0.088	0.50
					6.2.11	Steel Connectors at 36" o.c.	0.086	0.49
					6.2.12	Steel Connectors at 48" o.c.	0.085	0.48
					6.2.13	Composite Connectors at 16" o.c.	0.088	0.50

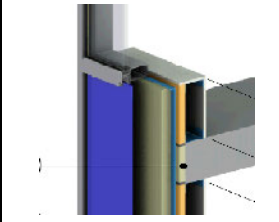
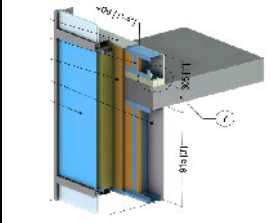
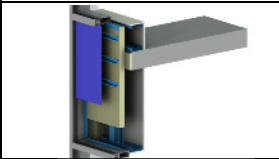
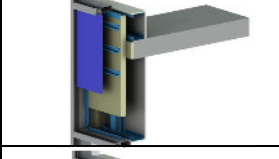
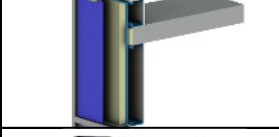
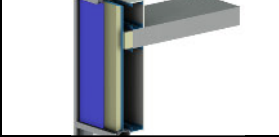

Clear Wall Assemblies

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
						Btu / hr ft ² F	W / m ² K
 Sandwich Panels	Concrete	Precast Sandwich Panels	Precast Sandwich Panel Wall Assembly with Concrete Panel Joints - Clear Wall	6.1.8	R-10	0.078	0.44
					R-15	0.056	0.32
					R-20	0.044	0.25
 Sandwich Panels	Concrete	Precast Sandwich Panels	Precast Sandwich Panel Wall Assembly with Tigerloc Thermally Broken Panel Joints – Clear Wall	6.1.9	R-10	0.078	0.44
					R-15	0.056	0.32
					R-20	0.044	0.25
 Insulated Metal Panels	Insulated Metal Panel	Vertical Insulated Metal Panel	Insulated Metal Panel Wall with Vertical Connection Joint and Steel Structure	5.1.49	R-21	0.047	0.27
 Insulated Metal Panels	Insulated Metal Panel	Horizontal Insulated Metal Panel	Insulated Metal Panel Wall with Horizontal Connection Joint and Steel Stud Back Up	5.1.51	R-21	0.052	0.29
 Structural Sheet Steel	Steel Framed	Insulated Sheet Steel	Insulated Structural Sheet Steel Wall with Continuous Notched Z-bar and Thermal Block, 60" Vertical Spacing	5.1.53	R-25	0.044	0.25
 Structural Sheet Steel	Steel Framed	Insulated Sheet Steel	Insulated Structural Sheet Steel Wall with Intermittent Notched Z-bar, 60" Vertical Spacing	5.1.54	R-25	0.047	0.27
 Structural Sheet Steel	Steel Framed	Insulated Sheet Steel	Insulated Structural Sheet Steel Wall with Thermal Chairs, 60" Vertical Spacing, 24" Horizontal Spacing	5.1.55	R-25	0.041	0.23
 Structural Sheet Steel	Steel Framed	Insulated Sheet Steel	Insulated Structural Sheet Steel Wall with Continuous Notched Z-bar and Ceramic Blanket, 60" Vertical Spacing	5.1.56	R-25	0.070	0.40
 Strapping	Wood	Interior Insulated Wood-Framed	Interior Insulated Wood-Framed Wall with Wood Strapping 16"o.c. Supporting Fiber Cement Board	7.1.1	Int. R-19	0.051	0.29
 Strapping	Wood	Exterior and Interior Insulated Wood-Framed	Exterior and Interior Insulated Wood-Framed Wall with Wood Strapping 16"o.c. Supporting Fiber Cement Board	7.1.2	R-5	0.042	0.24
					R-10	0.036	0.20
					R-15	0.032	0.18

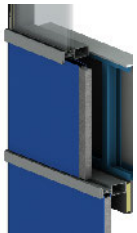
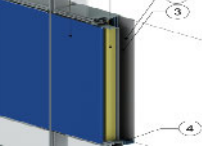
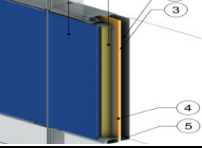
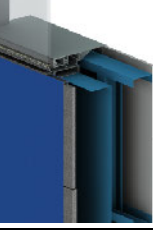
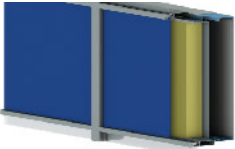
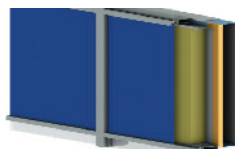
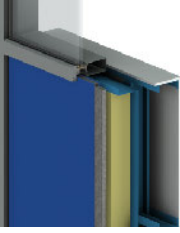
Clear Wall Assemblies

Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
							Btu / hr ft ² F	W / m ² K
Strapping		Wood	Exterior and Interior Insulated Wood-Framed	Exterior and Interior Insulated Wood-Framed Wall with Rigid Insulation and Wood Strapping 16"o.c. Supporting Fiber Cement Board	7.1.3	R-5	0.041	0.23
						R-10	0.034	0.19
						R-15	0.030	0.17
Spandrel Section		Window Wall	Window-wall Spandrel	Window-wall Spandrel with no Interior Stud Cavity Insulation	1.1.1	R-8	0.158	0.90
						R-13	0.140	0.80
						R-17	0.132	0.75
Spandrel Section		Window Wall	Window-wall Spandrel with Interior Insulation	Window-wall Spandrel with Interior Spray Foam Insulation	1.1.2	R-8	0.111	0.63
						R-13	0.102	0.58
						R-17	0.097	0.55
Spandrel Section		Window Wall	Window-wall Full Height Spandrel	Window-wall Full Height Spandrel with no Interior Stud Cavity Insulation	1.4.1	R-8	0.147	0.84
						R-13	0.132	0.75
						R-17	0.122	0.69
Spandrel Section		Window Wall	Window-wall Full Height Spandrel	Window-wall Full Height Spandrel with no Interior Stud Cavity Insulation	1.4.2	R-8	0.054	0.31
						R-13	0.052	0.29
						R-17	0.050	0.28
Spandrel Section		Curtain-Wall	Conventional Curtain-wall Spandrel	Conventional Curtain-wall Spandrel with no Interior Stud Cavity Insulation	2.1.1	R-8	0.274	1.56
						R-17	0.207	1.17

Clear Wall Assemblies

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
						Btu / hr ft ² F	W/ m ² K
 Spandrel Section	Curtain-Wall	Conventional Curtain-wall Spandrel with Interior Insulation	Conventional Curtain-wall Spandrel with Interior Spray Foam Insulation	2.1.2	R-8	0.186	1.05
					R-17	0.149	0.85
 Spandrel Section	Curtain-Wall	Conventional Curtain-wall Spandrel with Interior Insulation	Conventional Curtain-wall Spandrel with Interior Spray Foam Insulation and Thermally Broken Stud Cavity and Anchor	2.1.11	R-15	0.103	0.59
 Spandrel Section	Curtain-Wall	Conventional Curtain-wall Spandrel	Conventional Curtain-wall Spandrel with No Metal Back Pan and No Mullion Wrap	2.1.12	R-8	0.241	1.37
 Spandrel Section	Curtain-Wall	Conventional Curtain-wall Spandrel	Conventional Curtain-wall Spandrel with No Metal Back Pan and with Mullion Wrap	2.1.12	R-8	0.209	1.18
 Spandrel Section	Curtain-Wall	Conventional Curtain-wall Spandrel	Conventional Curtain-wall Spandrel with Back Pan Connected to Side of Frame	2.1.13	R-8	0.231	1.31
					R-17	0.160	0.91
 Spandrel Section	Curtain-Wall	Conventional Curtain-wall Spandrel	Conventional Curtain-wall Spandrel with Back Pan Inset and Connected to Side of Frame	2.1.13	R-8	0.181	1.03
 Spandrel Section	Curtain-Wall	Conventional Curtain-wall Spandrel with AIM Application	Conventional Curtain-wall Spandrel with AIM Application	2.1.4, 2.1.6 & 2.1.8	Varies	0.095 to 0.163	0.54 to 0.93

Clear Wall Assemblies

Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
							Btu / hr ft ² F	W / m ² K
Spandrel Section		Curtain-Wall	Conventional Curtain-wall Spandrel with AIM Application	Conventional Curtain-wall Spandrel with AIM Application and Intermediate Mullion	2.1.10	Varies	0.163 to 0.217	0.92 to 1.23
Spandrel Section		Curtain-Wall	Unitized Curtain-wall Spandrel	Unitized Curtain-wall Spandrel with no Interior Stud Cavity Insulation	3.1.1	R-8	0.157	0.89
						R-17	0.129	0.74
Spandrel Section		Curtain-Wall	Unitized Curtain-wall Spandrel with Interior insulation	Unitized Curtain-wall Spandrel with Interior Spray Foam Insulation	3.1.2	R-8	0.132	0.75
						R-17	0.112	0.64
Spandrel Section		Curtain-Wall	Unitized Curtain-wall Spandrel with AIM Application	Unitized Curtain-wall Spandrel with AIM Application	3.2.4 & 3.2.6	Varies	0.060 to 0.103	0.34 to 0.59
Spandrel Section		Curtain-Wall	High performance Curtain-wall Spandrel	High Performance Curtain-wall Spandrel with no Interior Stud Cavity Insulation	4.1.1	R-8	0.237	1.35
						R-17	0.144	0.82
Spandrel Section		Curtain-Wall	High performance Curtain-wall Spandrel with Interior Insulation	High Performance Curtain-wall Spandrel with Interior Spray Foam Insulation	4.1.2	R-8	0.167	0.95
						R-17	0.113	0.64
Spandrel Section		Curtain-Wall	High Performance Curtain-wall Spandrel with AIM Application	High Performance Curtain-wall Spandrel with AIM Application	4.2.4	Varies	0.072 to 0.090	0.41 to 0.51



Clear Wall Assemblies

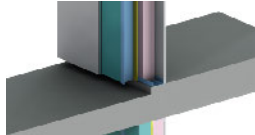
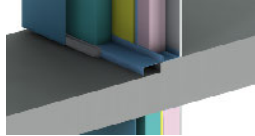
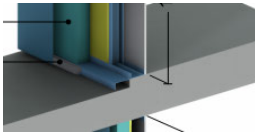
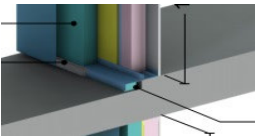
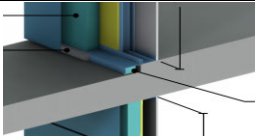

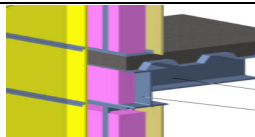
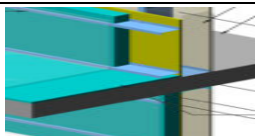


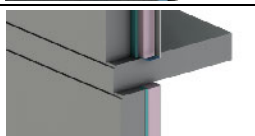
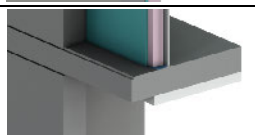
Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
							Btu / hr ft ² F	W / m ² K
Spandrel Section		Curtain-Wall	High Performance Curtain-wall Spandrel with AIM Application	High Performance Curtain-wall Spandrel with AIM Application and Intermediate Mullion	4.2.6	Varies	0.098 to 0.141	0.55 to 0.80
Brick Veneer		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Steel Brick Ties Supporting Brick Veneer and R-12 Batt Insulation	5.2.28	R-5	0.072	0.41
						R-10	0.059	0.33
						R-15	0.051	0.29
						R-20	0.045	0.25
Brick Veneer		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Steel Brick Ties Supporting Brick Veneer and R-20 Batt Insulation	5.1.35	R-5	0.058	0.33
						R-8	0.051	0.29
						R-10	0.046	0.26
Brick Veneer		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Steel Brick Ties Supporting Brick Veneer and R-22.5 Batt Insulation	5.1.36	R-5	0.057	0.32
						R-8	0.050	0.28
						R-10	0.045	0.25
Brick Veneer		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated Steel Frame Assembly with Steel Brick Ties Supporting Brick Veneer and R-24 Batt Insulation	5.1.37	R-5	0.056	0.32
						R-8	0.049	0.28
						R-10	0.044	0.25
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Zinc 2-Seal Anchor 16"o.c. Supporting Brick Veneer	5.1.38	R-4	0.130	0.74
						R-8	0.090	0.51
						R-13	0.071	0.40
						R-17	0.058	0.33
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Anchor 16"o.c. Supporting Brick Veneer	5.1.39	R-4	0.126	0.71
						R-8	0.084	0.48
						R-13	0.063	0.36
						R-17	0.051	0.29
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Wing Nut Anchor 16"o.c. Supporting Brick Veneer	5.1.40	R-4	0.127	0.72
						R-8	0.085	0.48
						R-13	0.064	0.36
						R-17	0.051	0.29
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Carbon Steel X-Seal Anchor 16"o.c. Supporting Brick Veneer	5.1.41	R-4	0.137	0.78
						R-8	0.099	0.56
						R-13	0.080	0.46
						R-17	0.068	0.39
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Stainless Steel X-Seal Anchor 16"o.c. Supporting Brick Veneer	5.1.42	R-4	0.133	0.75
						R-8	0.093	0.53
						R-13	0.073	0.42
						R-17	0.062	0.35



Clear Wall Assemblies

Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	1D Insulation	Thermal Transmittance	
							Btu / hr ft ² F	W / m ² K
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Carbon Steel HB-213 2X Anchor 16"o.c. Supporting Brick Veneer	5.1.43	R-4	0.127	0.72
						R-8	0.091	0.52
						R-13	0.074	0.42
						R-17	0.061	0.35
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Stainless Steel HB-213 2X Anchor 16"o.c. Supporting Brick Veneer	5.1.44	R-4	0.123	0.70
						R-8	0.086	0.49
						R-13	0.067	0.38
						R-17	0.055	0.31
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Carbon Steel HB-200-X Anchor 16"o.c. Supporting Brick Veneer	5.1.45	R-4	0.127	0.72
						R-8	0.091	0.52
						R-13	0.074	0.42
						R-17	0.063	0.36
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Stainless Steel HB-200-X Anchor 16"o.c. Supporting Brick Veneer	5.1.46	R-4	0.123	0.70
						R-8	0.085	0.49
						R-13	0.066	0.38
						R-17	0.056	0.32
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Carbon Steel BL-407 Anchor 16"o.c. Supporting Brick Veneer	5.1.47	R-4	0.129	0.73
						R-8	0.089	0.51
						R-13	0.069	0.39
						R-17	0.057	0.33
Brick Veneer		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Assembly with Hohmann & Barnard Masonry Stainless Steel BL-407 Anchor 16"o.c. Supporting Brick Veneer	5.1.48	R-4	0.127	0.72
						R-8	0.087	0.49
						R-13	0.066	0.38
						R-17	0.054	0.30
Brick Veneer		Concrete	Exterior Insulated Concrete Block Wall Assembly	Exterior Insulated Concrete Block Assembly with Brick Ties Supporting Brick Veneer	6.2.14	R-5	0.096	0.55
						R-10	0.070	0.40
						R-15	0.056	0.32
						R-20	0.048	0.27
Brick Veneer		Concrete	Exterior Insulated Concrete Block Wall Assembly	Exterior Insulated Concrete Block Assembly with Hohmann & Barnard Masonry Zinc 2-Seal Anchor Supporting Brick Veneer	6.1.6	R-4	0.132	0.75
						R-8	0.094	0.54
						R-13	0.075	0.42
						R-17	0.062	0.36
Brick Veneer		Concrete	Exterior Insulated Concrete Block Wall Assembly	Exterior Insulated Concrete Block Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Wing Nut Anchor Supporting Brick Veneer	6.1.7	R-4	0.126	0.71
						R-8	0.084	0.48
						R-13	0.064	0.36
						R-17	0.051	0.29
Brick Veneer		Wood	Exterior and Interior Insulated Wood-Framed	Exterior and Interior Insulated Wood-Framed Assembly with Brick Ties Supporting Brick Veneer	7.6.4	R-5	0.041	0.24
						R-10	0.036	0.20
						R-15	0.032	0.18
Cross Laminated Timber		Wood	Exterior Insulated Cross Laminated Timber	Exterior Insulated Cross Laminated Timber Supporting Fibre Cement Board	7.7.2	R-15	0.044	0.25
						R-20	0.037	0.21
						R-25	0.033	0.19

Floor Slab Linear Transmittance

Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
						Btu / hr ft F	W/ m K	
Exposed		Steel Framed	Exterior and Interior Insulated Steel Stud	Exposed Concrete Floor with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Vertical Z-Girts Supporting Stucco Cladding	5.2.8	0.665	1.151	Poor
Exposed		Steel Framed	Exterior and Interior Insulated Steel Stud	Exposed Concrete Floor with an Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding and Uninsulated Curb	5.2.5	0.612	1.059	Poor
Exposed		Steel Framed	Exterior Insulated Steel Stud	Exposed Concrete Floor with an Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding and Uninsulated Curb	5.2.4	0.584	1.011	Poor
Exposed		Steel Framed	Exterior and Interior Insulated Steel Stud	Exposed Concrete Floor with an Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding and Insulated Curb	5.2.7	0.528	0.914	Poor
Exposed		Steel Framed	Exterior Insulated Steel Stud	Exposed Concrete Floor with an Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding and Insulated Curb	5.2.6	0.485	0.840	Poor
Exposed		Steel Framed	Exterior Insulated Steel Stud	Exposed Concrete Floor with an R-15 Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding	5.2.1	0.445	0.770	Poor
Exposed		Steel Framed	Interior Insulated Steel Stud Wall	Structural Steel and Composite Concrete Floor with Interior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding	5.2.25	0.487	0.842	Poor
Exposed		Steel Framed	Exterior Insulated Steel Stud	Insulated Top and Exposed Underside Concrete Projection with an Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding and 0.66ft. Balcony Insulation Distance	5.2.2	0.402	0.695	Poor
Exposed		Poured-in-Place Concrete	Interior Insulated Poured-in-place concrete Assembly	Exposed Concrete Floor with Interior Insulated Concrete Mass Wall	6.2.2	0.465	0.805	Poor
Exposed		Poured-in-Place Concrete	Interior Insulated Poured-in-place concrete Assembly	Exposed Concrete Floor with Interior Insulated Concrete Mass Wall	6.2.5	0.447	0.773	Poor
Exposed		Poured-in-Place Concrete	Interior Insulated Poured-in-place concrete Assembly	Exposed Concrete Floor with R-10 Interior Insulated Concrete Mass Wall	6.2.4	0.476	0.824	Poor
Exposed		Poured-in-Place Concrete	Interior Insulated Poured-in-place concrete Assembly	Exposed Edge and Insulated at Underside of Concrete Floor with Interior Insulated Concrete Mass Wall and Exterior Insulation of R-10	6.7.1	0.406	0.702	Poor



Floor Slab Linear Transmittance

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category	
					Btu / hr ft F	W/ m K		
Exposed		Concrete Block	Exterior Insulated Concrete block with brick veneer	Exposed Concrete Floor with R-15 Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer	6.2.18	0.368	0.636	Poor
Exposed		Concrete Block	Exterior Insulated Concrete block with brick veneer	Exposed Concrete Floor with R-15 Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer	6.2.16	0.352	0.609	Poor
Exposed		Floor to Ceiling Glazing	Window-wall with exterior insulated concrete curb	Exterior Insulated Curb and Exposed Concrete Floor at Sliding Door Supported by a Steel Angle with R-15 Curb Insulation	8.1.4	1.064	1.842	Poor
Exposed		Floor to Ceiling Glazing	Window-wall with exterior insulated concrete curb	Exterior Insulated Curb and Recessed Exposed Concrete Floor at Sliding Door Supported by a Steel Angle with R-15 Curb Insulation	8.1.5	1.050	1.817	Poor
Exposed		Floor to Ceiling Glazing	Window-wall with Interior Insulated Concrete Curb	Interior Insulated Curb and Exposed Concrete Floor at Sliding Door	8.1.3	0.974	1.686	Poor
Exposed		Floor to Ceiling Glazing	Window-wall and sliding door with no interior insulation	Exterior Insulated Curb, Spandrel Panel, and Exposed Concrete Floor at Sliding Door with R-13 Backpan Insulation	8.1.6	0.645	1.116	Poor
Under- Insulated		Steel Stud	Exterior Insulated Steel Stud	Insulated Concrete Projection with an Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding and 0.66ft. Balcony Insulation Distance	5.2.3	0.342	0.592	Poor
Under- Insulated		Concrete	Interior Insulated Precast Concrete Panel	Under-insulated Floor Slab with Batt Insulation between Steel Studs and Precast Concrete	6.2.6	0.286	0.495	Regular
Under- Insulated		Concrete	Interior Insulated Precast Concrete Panel	Under-insulated Floor Slab with Continuous Insulation outboard Steel Studs and Precast Concrete	6.2.7	0.218	0.377	Regular
Exposed		Window-wall	Window-wall Spandrel and Vision with no Interior Insulation	Window-wall Spandrel Concrete Balcony and Curb Intersection with Sliding Door with no Interior Stud Cavity Insulation and R-13 Backpan Insulation	8.1.9	0.651	1.130	Poor
Under- Insulated		Window-wall	Window-wall Spandrel Section without Insulation Inboard the Metal Back-pan	Window-wall Bypass at Spandrel Section without Interior Spray foam Insulation and R-13 Backpan Insulation	1.2.1	0.359	0.622	Poor
Under- Insulated		Window-wall	Window-wall Spandrel Section with Insulation Inboard the Metal Back-pan	Window-wall Bypass at Spandrel Section with Interior Spray foam Insulation and R-13 Backpan Insulation	1.2.2	0.376	0.651	Poor



Floor Slab Linear Transmittance

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category	
					Btu / hr ft F	W/ m K		
Efficiently Insulated		Window-wall	Window-wall Spandrel Section with Insulation Inboard the Metal Back-pan	Improved Window-wall Bypass at Spandrel Section with Thermally Broken Deflection Header with Interior Spray foam Insulation and R-13 Backpan Insulation	1.2.4	0.104	0.181	Efficient
Under-Insulated		Window-wall	Window-wall Spandrel Section with Insulation Inboard the Metal Back-pan	Window-wall Bypass at Full Height Spandrel Section without Interior Spray foam Insulation and R-13 Backpan Insulation	1.2.5	0.379	0.655	Poor
Under-Insulated		Window-wall	Window-wall Spandrel Section with Insulation Inboard the Metal Back-pan	Window-wall Bypass at Full Height Spandrel Section with Interior Spray foam Insulation and R-13 Backpan Insulation	1.2.6	0.449	0.776	Poor
Under-Insulated		Window-wall	Window-wall Spandrel Section with Insulation Inboard the Metal Back-pan	Improved Window-wall Bypass at Full Height Spandrel Section with Thermally Broken Deflection Header and without Interior Spray foam Insulation and with R-13 Backpan Insulation	1.2.7	0.096	0.166	Efficient
Shelf Angle		Steel Framed	Exterior and Interior Insulated Steel Stud with Brick Veneer	Standard Shelf Angle with Metal Flashing at Concrete Floor Slab with R-15 Exterior and Interior Insulated Steel Stud with Brick Ties Supporting Brick Veneer	5.2.28	0.314	0.544	Poor
Shelf Angle		Steel Framed	Exterior and Interior Insulated Steel Stud with Brick Veneer	Stand-off Shelf Angle with Metal Flashing at Concrete Floor Slab with R-15 Exterior and Interior Insulated Steel Stud with Brick Ties Supporting Brick Veneer	5.2.29	0.189	0.326	Improved
Shelf Angle		Steel Framed	Exterior and Interior Insulated Steel Stud with Brick Veneer	Thermally Broken Shelf Angle at Concrete Floor Slab with Exterior and Interior Insulated Steel Stud with Brick Ties Supporting Brick Veneer	5.2.30	0.135	0.234	Improved
Shelf Angle		Concrete	Exterior Insulated Concrete block with brick veneer	Shelf Angle with Metal Flashing at Concrete Floor with R-15 Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer	6.2.14	0.268	0.464	Regular
Shelf Angle		Concrete	Exterior Insulated Concrete block with brick veneer	Stand-off Shelf Angle with Metal Flashing at Concrete Floor with R-15 Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer	6.2.15	0.186	0.322	Improved
Shelf Angle		Concrete	Exterior Insulated Concrete block with brick veneer	Thermally Broken Shelf Angle at Concrete Floor with Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer	6.2.19	0.108	0.186	Efficient
Shelf Angle		Concrete	Exterior Insulated Concrete block with brick veneer	Balcony Slab Supported by Stand-off Shelf Angle at Concrete Floor with R-15 Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer	6.2.17	0.126	0.218	Improved
Manufactured Thermal Break		Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Slab Projection with Un-insulated Concrete Curb with Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding	5.2.11	0.319	0.551	Poor


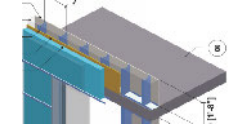
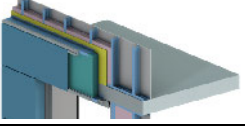
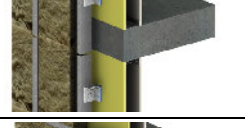

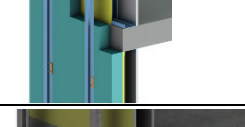


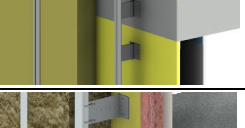




Floor Slab Linear Transmittance


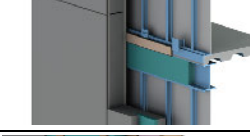
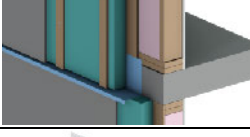
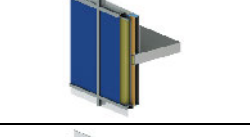
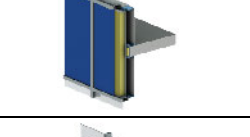
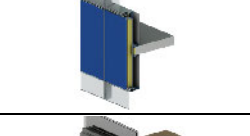
Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
					Btu / hr ft F	W/ m K	
Manufactured Thermal Break 	Steel Framed	Exterior Insulated Steel Stud	Thermally Broken Slab Projection with Un-Insulated Concrete Curb with Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding	5.2.12	0.261	0.452	Regular
Manufactured Thermal Break 	Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Slab Projection with Exterior and Interior Insulated Steel Stud Wall Assembly with Drained EIFS	5.2.10	0.246	0.426	Regular
Manufactured Thermal Break 	Steel Framed	Exterior Insulated Steel Stud	Thermally Broken Slab Projection with Exterior Insulated Steel Stud Wall Assembly with Drained EIFS	5.2.9	0.253	0.438	Regular
Manufactured Thermal Break 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 3 5/8" x 1 5/8" Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding – Armatherm 500 Thermally Broken Slab Projection with Insulated Curb	5.2.31	0.210	0.363	Regular
Manufactured Thermal Break 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 3 5/8" x 1 5/8" Steel Stud Wall Assembly with Armatherm Z-girts Supporting Metal Cladding – Armatherm 500-080 Thermally Broken Slab Projection with Insulated Curb	5.2.32	0.107	0.185	Efficient
Manufactured Thermal Break 	Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Slab Projection with Insulated Concrete Curb with Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding	5.2.14	0.189	0.327	Improved
Manufactured Thermal Break 	Steel Framed	Exterior Insulated Steel Stud	Thermally Broken Slab Projection with Insulated Concrete Curb with Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding	5.2.13	0.117	0.203	Improved
Manufactured Thermal Break 	Window-wall	Window-wall and sliding door with no interior insulation	Thermally Broken Slab with Exterior Insulated Curb with Window Wall System and Spandrel Section at Sliding Door and R-13 Backpan Insulation	8.1.8	0.494	0.856	Poor
Manufactured Thermal Break 	Concrete	Interior Insulated Poured-in-place concrete Assembly	Interior Thermally Broken Floor Slab with Interior Insulated Concrete Mass	6.2.20	0.179	0.310	Improved
Exterior Insulated 	Insulated Metal Panel	Vertical Insulated Metal Panel	Continuous Metal Stack Joint of Insulated Metal Panel at Composite Floor	5.2.26	0.187	0.323	Improved
Exterior Insulated 	Insulated Metal Panel	Horizontal Insulated Metal Panel	Horizontal Joint of Insulated Metal Panel at Composite Floor	5.2.27	0.016	0.027	Efficient
Exterior Insulated 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior Insulated Floor Slab with Metal Flashing Connected to Steel Bottom Stud Track and an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Vertical Z-Girts Supporting Stucco Cladding	5.2.19	0.159	0.275	Improved



Floor Slab Linear Transmittance

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
					Btu / hr ft F	W/ m K	
Exterior Insulated 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior Insulated Floor Slab with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding	5.2.24	0.093	0.162	Efficient
Exterior Insulated 	Steel Framed	Exterior Insulated Steel Stud Assembly	Exterior Insulated Steel Stud Assembly with Horizontal Z-Girts Supporting Metal Cladding and R-11 Slab	5.3.3	0.025	0.044	Efficient
Exterior Insulated 	Steel Framed	Exterior and Interior Insulated Steel Stud Assembly	Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts Supporting Metal Cladding and R-14 Slab	5.3.4	0.092	0.160	Efficient
Exterior Insulated 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Floor Slab with an R-17 Exterior Insulated Steel Stud Wall Assembly with Thermally Broken ISO Clip System Supporting Vertical Sub-girts	5.2.17	0.027	0.046	Efficient
Exterior Insulated 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Floor Slab with an R-17 Exterior Insulated Steel Stud Wall Assembly with Thermally Broken ISO Clip System Supporting Horizontal Sub-girts	5.2.18	0.027	0.046	Efficient
Exterior Insulated 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Fiberglass Spacer and Through Insulation Fasteners Supporting Cladding – Insulated Intermediate Floor Intersection	5.2.20	0.035	0.060	Efficient
Exterior Insulated 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Floor Slab with an R-17 Exterior Insulated Steel Stud Wall Assembly with Thermally Broken Clips and Rail System Supporting Metal Cladding	5.2.21	0.029	0.050	Efficient
Exterior Insulated 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Floor Slab with an R-17 Exterior Insulated Steel Stud Wall Assembly with Fibre Reinforced Plastic Clips Supporting Metal Cladding	5.2.22	0.009	0.016	Efficient
Exterior Insulated 	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Floor Slab with a Thermally Isolated Aluminum Clip and Rail System Supporting Cladding and R-17 Exterior Insulation	5.2.23	0.041	0.071	Efficient
Exterior Insulated 	Steel Framed	Exterior and Interior Insulated Steel Stud Assembly	Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – Eko Thermobacket and NV1 Clip System Supporting Cladding – Intermediate Floor Intersection	5.2.33	0.004	0.006	Efficient
Exterior Insulated 	Steel Framed	Exterior and Interior Insulated Steel Stud Assembly	Exterior Insulated Concrete Floor Slab with R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Drained EIFS	5.2.16	0.032	0.056	Efficient

Floor Slab Linear Transmittance

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
					Btu / hr ft F	W/ m K	
Exterior Insulated 	Steel Framed	Exterior Insulated Steel Stud Assembly	Exterior Insulated Concrete Floor Slab with R-11 Exterior Insulated Steel Stud Wall Assembly with Drained EIFS	5.2.15	0.018	0.032	Efficient
Exterior Insulated 	Concrete	Exterior Insulated Poured-in-place concrete Assembly	Exterior Insulated Floor Slab with Concrete Wall Assembly with Drained EIFS	6.2.1	0.013	0.023	Efficient
Exterior Insulated 	Concrete	Precast Sandwich Panels	Exterior Insulated Concrete Floor Slab with Precast Sandwich Panel Wall Assembly	6.2.8	0.118	0.205	Improved
Exterior Insulated 	Concrete	Precast Sandwich Panels	Exterior Insulated Composite Floor Slab with Precast Sandwich Panel Wall Assembly with Steel Connectors and Concrete at Perimeter Edges	6.2.9	0.085	0.146	Efficient
Exterior Insulated 	Concrete	Precast Sandwich Panels	Exterior Insulated Composite Floor Slab with Precast Sandwich Panel Wall Assembly with Steel and Plastic Connectors	6.2.10 - 6.2.13	0.011 to 0.026	0.018 to 0.046	Efficient
Exterior Insulated 	Wood and Concrete	Exterior and Interior Insulated Wood-Framed	Exterior Insulated Concrete Floor Slab with Metal Flashing with a Wood-frame Wall Assembly and Wood Strapping and Continuous Insulation Supporting Fiber Cement Board and R-14 Slab	7.7.1	0.328	0.568	Poor
Exterior Insulated 	Curtain-Wall	High performance curtain-wall	Spandrel Section at Floor Slab with High Performance Curtain-wall System with Interior Spray foam Insulation and R-8 Backpan Insulation	4.2.2	0.093	0.161	Efficient
Exterior Insulated 	Curtain-Wall	Unitized curtain-wall	Spandrel Section at Floor Slab with Unitized-curtain Wall System with Interior Spray foam Insulation and R-8 Backpan Insulation	3.2.2	0.031	0.053	Efficient
Exterior Insulated 	Curtain-Wall	High performance curtain-wall	Spandrel Section at Floor Slab with High Performance Curtain-wall System without Interior Spray foam Insulation with R-8 Backpan Insulation	4.2.1	0.037	0.064	Efficient
Exterior Insulated 	Curtain-Wall	Unitized curtain-wall	Spandrel Section at Floor Slab with Unitized-curtain Wall System without Interior Spray foam Insulation with R-8 Backpan Insulation	3.2.1	0.004	0.007	Efficient
Wood 	Wood	Exterior and Interior Insulated Wood-Framed at a Sliding Door	Independently Supported Wood-framed Balcony with a Wood-frame Wall Assembly and Wood Strapping and R-15 Exterior Insulation Supporting Fiber Cement Board at a Sliding Door	7.2.4	0.078	0.134	Efficient

Floor Slab Linear Transmittance

Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
						Btu / hr ft F	W/ m K	
Wood		Wood	Exterior and Interior Insulated Wood-Framed at a Sliding Door	Cantilevered Wood-framed Balcony with a Wood-frame Wall Assembly and Wood Strapping and R-15 Exterior Insulation Supporting Fiber Cement Board at a Sliding Door	7.2.3	0.067	0.115	Efficient
Wood		Wood	Exterior and Interior Insulated Wood-Framed	Exterior Insulated Wood-framed Floor Joist with Metal Flashing with a Wood-frame Wall Assembly and Wood Strapping and R-10 Exterior Insulation Supporting Fiber Cement Board	7.2.1	0.046	0.080	Efficient
Wood		Wood	Exterior and Interior Insulated Wood-Framed	Exterior Insulated Wood-framed Floor Joist with Stand-off Metal Flashing with a Wood-frame Wall Assembly and Wood Strapping and R-10 Exterior Insulation Supporting Fiber Cement Board	7.2.2	0.035	0.061	Efficient
Wood		Wood	Exterior and Interior Insulated Wood-Framed	Exterior Insulated Wood-framed Floor Joist without Metal Flashing with a Wood-frame Wall Assembly and Wood Strapping and R-15 Exterior Insulation Supporting Fiber Cement Board	7.3.1	0.022	0.037	Efficient
Wood		Wood	Cross Laminated Timber (CLT) with exterior insulation	Exterior Insulated Floor Slab with Metal Flashing with an Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly and Wood Strapping and R-20 Exterior Rigid Insulation Supporting Fiber Cement Board	7.7.2	0.030	0.052	Efficient
Wood		Wood	Exterior and Interior Insulated Wood-Framed	Wood-framed Cantilevered Floor with a Wood-frame Wall assembly and Wood Strapping and R-15 Exterior Insulation Supporting Fiber Cement Board	7.2.5	0.021	0.036	Efficient
Wood		Wood	Exterior and Interior Insulated Wood-Framed	Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection	7.6.5	0.034	0.058	Efficient
Wood		Wood	Exterior and Interior Insulated Wood-Framed	Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection	7.6.6	0.032	0.056	Efficient

Glazing Transition Linear Transmittance

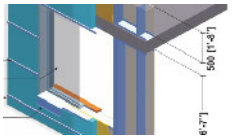
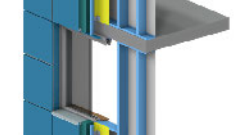
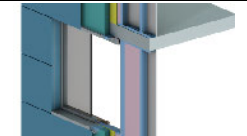
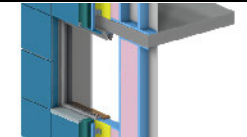
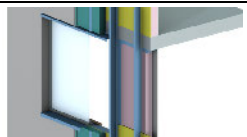


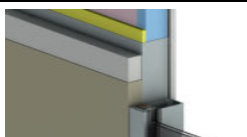
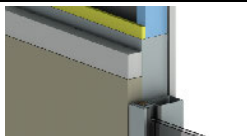
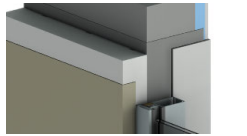
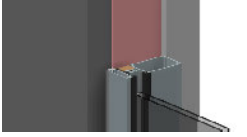
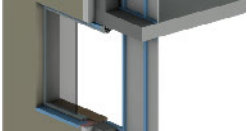
Description of Detail (Thermal Anomaly)	Wall Construction Type	Glazing Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
						Btu / hr ft F	W / m K	
Un-Insulated Perimeter 	Concrete	Thermally Broken Aluminum Framed Window	Pre-cast Sandwich Panels	Continuous Concrete at Aluminum Window Perimeter	6.3.4	0.611	1.058	Poor
Un-Insulated Perimeter 	Concrete	Thermally Broken Aluminum Framed Window	Interior Insulated Poured-in-Place Concrete Assembly	Un-insulated Concrete Opening at Aluminum Window Perimeter with R-15 Interior Insulation	6.3.2	0.186	0.322	Regular
Un-Insulated Perimeter 	Concrete	Thermally Broken Aluminum Framed Window	Interior Insulated Poured-in-Place Concrete Assembly	Un-insulated Concrete Opening at Aluminum Window Perimeter with R-15 Interior Insulation	6.3.3	0.188	0.325	Regular
Insulated Perimeter 	Concrete	Thermally Broken Aluminum Framed Window	Interior Insulated Poured-in-Place Concrete Assembly	Concrete Opening at Aluminum Window Perimeter with Plywood Liner and R-15 Interior Insulation	6.3.9	0.131	0.226	Regular
Insulated Perimeter 	Concrete	Thermally Broken Aluminum Framed Window	Interior Insulated Poured-in-Place Concrete Assembly	Concrete Opening at Aluminum Window Perimeter with R-5 Insulated Plywood Liner and R-15 Interior Insulation	6.3.9	0.090	0.156	Efficient
Insulated Perimeter 	Concrete	Thermally Broken Aluminum Framed Window	Interior Insulated Poured-in-Place Concrete Assembly	Concrete Opening at Aluminum Window Perimeter with R-5 Insulation Wrapped into Opening and R-15 Interior Insulation	6.3.10	0.116	0.201	Regular
Un-Insulated Perimeter 	Concrete	Thermally Broken Aluminum Framed Window	Interior Insulated Poured-in-Place Concrete Assembly	Un-insulated Concrete Opening at Aluminum Window Perimeter with R-15 Interior Insulation	6.3.11	0.062	0.107	Efficient
Flashing and Framing Bypass 	Steel Framed	Thermally Broken Aluminum Framed Window	Vertical Insulated Metal Panel	Metal Closure Bypasses Thermal Insulation at Aluminum Window Perimeter	5.3.6	0.292	0.505	Poor
Flashing and Framing Bypass 	Steel Framed	Thermally Broken Aluminum Framed Window	Horizontal Insulated Metal Panel	Metal Closure Bypasses Thermal Insulation at Aluminum Window Perimeter	5.3.7	0.263	0.454	Poor
Misaligned Glazing 	Curtain Wall	Window-wall	Unitized Curtain-Wall and Window-Wall Spandrel and Vision	Unitized Curtain Wall Transition to Window-wall with no Interior Insulation and with R-8 Backpan Insulation	3.3.1	0.120	0.207	Regular
Misaligned Glazing 	Curtain Wall	Window-wall	Unitized Curtain-Wall and Window-Wall Spandrel and Vision	Unitized Curtain Wall Transition to Window-wall with Interior Spray Foam Insulation and R-8 Backpan Insulation	3.3.2	0.334	0.578	Poor
Un-Insulated Perimeter 	Concrete	Curtain Wall	Interior Insulated Poured-in-Place Concrete Assembly	Conventional Curtain Wall Transition with Interior Insulated Concrete Wall	6.4.3	0.171	0.295	Regular



Glazing Transition Linear Transmittance

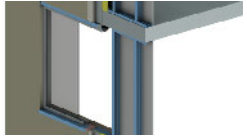
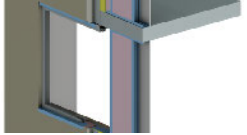
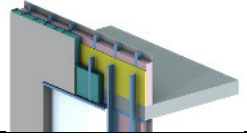
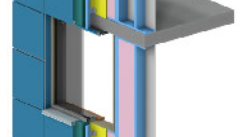
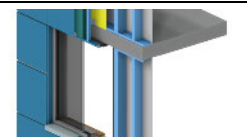
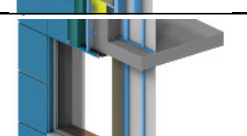

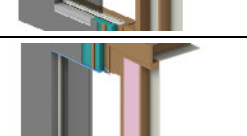
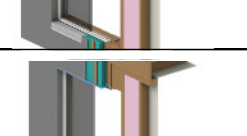
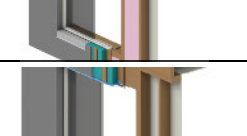
Description of Detail (Thermal Anomaly)	Wall Construction Type	Glazing Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category	
						Btu / hr ft F	W / m K		
Flashing and Framing Bypass		Steel Framed	Curtain Wall	Exterior Insulated Concrete Assembly	Conventional Curtain Wall Transition with R-20 Exterior Insulated Concrete Wall and Steel Stud Infill	5.4.6	0.204	0.353	Poor
Improved		Steel Framed	Curtain Wall	Exterior Insulated Concrete Assembly	Conventional Curtain Wall Transition with R-20 Exterior Insulated Concrete Wall and Steel Stud Assembly Supporting Metal Cladding	5.4.5	0.134	0.232	Regular
Window Thermal Break Positioned in Concrete Opening		Concrete	Thermally Broken Aluminum Framed Window	Exterior Insulated Pour-in-Place Concrete	Aluminum Window Transition with Concrete Wall Assembly and Thermally Isolated Vertical Brackets and Rail System at Concrete Floor Slab and R-15 Exterior Insulation	6.3.12	0.202	0.350	Poor
Misaligned Glazing and Framing Bypass		Concrete	Thermally Broken Aluminum Framed Window	Exterior Insulated Pour-in-Place Concrete	Aluminum Window Transition with Concrete Wall Assembly and Drained EIFS at Concrete Floor Slab	6.3.1	0.177	0.307	Regular
Misaligned Glazing and Framing Bypass		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior Insulated Steel Stud	Aluminum Window Transition with a Steel Stud Assembly and Drained EIFS at Concrete Floor Slab and R-11 Exterior Insulation	5.3.1	0.175	0.303	Regular
Flashing and Framing Bypass		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior and Interior Insulated Steel Stud	Aluminum Window Transition with a Split Insulated Steel Stud Assembly and Drained EIFS at Concrete Floor Slab and R-15 Exterior Insulation	5.3.2	0.155	0.268	Regular
Flashing and Framing Bypass		Wood	Thermally Broken Aluminum Framed Window	Exterior and Interior Insulated Wood-Framed	Aluminum Window Transition with Exterior and Interior Insulated Wood Stud Assembly with and Wood-framed Floor Joist Intersection	7.3.2	0.139	0.240	Regular
Flashing and Framing Bypass		Wood	Vinyl Framed Window	Exterior and Interior Insulated Wood-Framed	Vinyl Window Transition with Exterior and Interior Insulated Wood Stud Assembly at 16" o.c. with Wood-framed Floor Joist Intersection	7.3.1	0.040	0.070	Efficient
Flashing and Framing Bypass		Wood	Vinyl Framed Window	Exterior and Interior Insulated Wood-Framed	Vinyl Window Transition with Exterior and Interior Insulated Wood Stud Assembly at 8" o.c. with Wood-framed Floor Joist Intersection	7.3.3	0.040	0.069	Efficient
Efficiently Aligned Glazing		Concrete	Conventional Curtain Wall	Pre-cast Sandwich Panel	Curtain Wall Transition with Thermal Break aligned with Insulation in Sandwich Panel	6.4.2	0.082	0.142	Efficient
Efficiently Aligned Glazing		Concrete	Conventional Curtain Wall	Pre-cast Sandwich Panel	Precast Sandwich Panel Wall Assembly – Tigerloc Thermally Broken Curtain Wall Transition	6.4.5	0.041	0.071	Efficient
Efficiently Aligned Glazing		Concrete	Thermally Broken Aluminum Framed Window	Pre-cast Sandwich Panel	Aluminum Window Transition with Precast Sandwich Panel	6.3.5	0.028	0.048	Efficient

Glazing Transition Linear Transmittance

Description of Detail (Thermal Anomaly)	Wall Construction Type	Glazing Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category	
						Btu / hr ft F	W / m K		
Flashing and Framing Bypass		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior Insulated Steel Stud	Aluminum Window Transition with an R-15 Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding at Concrete Floor Slab	5.3.3	0.062	0.108	Efficient
Window Thermal Break Positioned in Steel Framing		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior Insulated Steel Stud	Aluminum Window Transition with an R-15 Exterior Insulated Steel Stud Wall Assembly with Thermally Isolated Vertical Brackets and Rail System Supporting Metal Cladding at Concrete Floor Slab	5.3.12	0.151	0.261	Regular
Flashing and Framing Bypass		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior and Interior Insulated Steel Stud	Aluminum Window Transition with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding at Concrete Floor Slab	5.3.4	0.130	0.225	Regular
Window Thermal Break Positioned in Steel Framing		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior and Interior Insulated Steel Stud	Aluminum Window Transition with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Thermally Isolated Vertical Brackets and Rail System Supporting Metal Cladding at Concrete Floor Slab	5.3.13	0.118	0.204	Regular
Flashing and Framing Bypass		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior and Interior Insulated Steel Stud	Aluminum Window Transition with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Vertical Z-Girts Supporting Stucco Cladding at Concrete Floor Slab	5.3.5	0.081	0.140	Efficient
Flashing and Framing Bypass		Steel Framed	Curtain Wall	Exterior and Interior Insulated Steel Stud	Conventional Curtain Wall Transition with R-15 Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts Supporting Metal Cladding	5.4.4	0.088	0.151	Efficient
Efficiently Aligned		Steel Framed	Conventional Curtain Wall	Exterior and Interior Insulated Steel Stud	Curtain Wall Transition with Aerogel Blanket	5.4.3	0.019	0.033	Efficient
Efficiently Aligned		Steel Framed	Conventional Curtain Wall	Exterior and Interior Insulated Steel Stud	Curtain Wall Transition with Thermal Break aligned with R-15 Exterior Insulation	5.4.2	0.039	0.067	Efficient
Efficiently Aligned		Steel Framed	Conventional Curtain Wall	Exterior Insulated Steel Stud	Curtain Wall Transition with Thermal Break aligned with R-11 Exterior Insulation	5.4.1	0.049	0.084	Efficient
Efficiently Aligned		Concrete	Conventional Curtain Wall	Exterior Insulated Pour-in-Place Concrete	Curtain Wall Transition with Thermal Break aligned with Exterior Insulation	6.4.1	0.059	0.103	Efficient
Insulated Perimeter		Concrete	Conventional Curtain Wall	Interior Insulated Poured-in-Place Concrete Assembly	Conventional Curtain Wall Transition with Interior Insulated Concrete Wall and Insulation in Curtain Wall Jamb	6.4.4	0.050	0.086	Efficient
Insulated Perimeter		Concrete	Thermally Broken Aluminum Framed Window	Exterior Insulated Pour-in-Place Concrete	Aluminum Window Transition with Concrete Wall Assembly, Aerogel Insulation around the Window Perimeter, and Drained EIFS at Concrete Floor Slab	6.3.6	0.106	0.184	Efficient



Glazing Transition Linear Transmittance

Description of Detail (Thermal Anomaly)		Wall Construction Type	Glazing Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
							Btu / hr ft F	W / m K	
Insulated Perimeter		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior Insulated Steel Stud	Aluminum Window Transition with a Steel Stud Assembly, Aerogel Insulation around the Window Perimeter, R-11 Exterior Insulation, and Drained EIFS at Concrete Floor Slab	5.3.8	0.103	0.178	Efficient
Insulated Perimeter		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior and Interior Insulated Steel Stud	Aluminum Window Transition with a Split Insulated Steel Stud Assembly, Aerogel Insulation around the Window Perimeter, R-15 Exterior Insulation, and Drained EIFS at Concrete Floor Slab	5.3.9	0.103	0.178	Efficient
Exterior Insulated		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior and Interior Insulated Steel Stud	Aluminum Window Transition with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Vertical Z-Girts Supporting Stucco Cladding at Concrete Floor Slab	5.3.5	0.081	0.140	Efficient
Window Thermal Break Positioned in Exterior Insulation		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior and Interior Insulated Steel Stud	Aluminum Window Transition with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Thermally Isolated Brackets and Rail System Supporting Metal Cladding at Concrete Floor Slab	5.3.15	0.043	0.074	Efficient
Window Thermal Break Positioned in Exterior Insulation		Steel Framed	Thermally Broken Aluminum Framed Window	Exterior Insulated Steel Stud	Aluminum Window Transition with an R-15 Exterior Insulated Steel Stud Wall Assembly with Thermally Isolated Brackets and Rail System Supporting Metal Cladding at Concrete Floor Slab	5.3.14	0.033	0.058	Efficient
Window Thermal Break Positioned in Exterior Insulation		Concrete	Thermally Broken Aluminum Framed Window	Exterior Insulated Pour-in-Place Concrete	Aluminum Window Transition with Concrete Wall Assembly and Thermally Isolated Vertical Brackets, R-15 Exterior Insulation, and Rail System at Concrete Floor Slab	6.3.13	0.024	0.041	Efficient
Window Thermal Break Positioned in Wood Framing		Wood	Vinyl Framed Window	Exterior Insulated Wood-Framed	Vinyl Window Transition with R-10 Exterior Insulated Wood Stud Assembly at 16" o.c. with Wood-framed Floor Joist Intersection	7.3.4	0.014	0.024	Efficient
Window Thermal Break Positioned in Wood Framing		Wood	Vinyl Framed Window	Exterior and Interior Insulated Wood-Framed	Vinyl Window Transition with R-10 Exterior and Interior Insulated Wood Stud Assembly at 16" o.c. with Wood-framed Floor Joist Intersection	7.3.5	0.018	0.031	Efficient
Window Thermal Break Positioned in Wood Framing		Wood	Insulated Vinyl Framed Window	Exterior and Interior Insulated Wood-Framed	Vinyl Window Transition with R-10 Exterior and Interior Insulated Wood Stud Assembly at 16" o.c. with Wood-framed Floor Joist Intersection	7.3.7	0.014	0.025	Efficient
Window Thermal Break Positioned in Wood Framing		Wood	Insulated Vinyl Framed Window	Exterior Insulated Wood-Framed	Vinyl Window Transition with R-15 Exterior Insulated Wood Stud Assembly at 16" o.c. with Wood-framed Floor Joist Intersection	7.3.6	0.014	0.024	Efficient

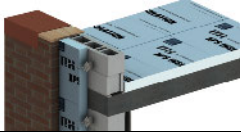
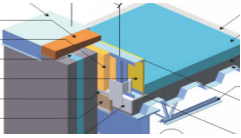
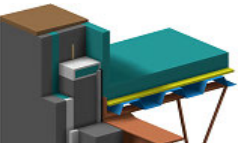
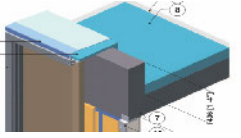
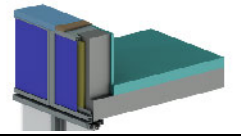
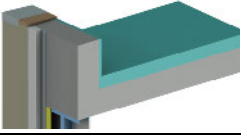
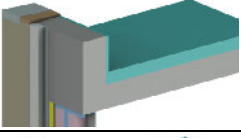
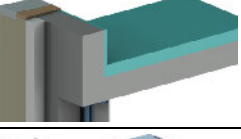
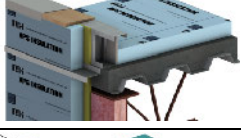
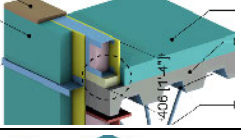
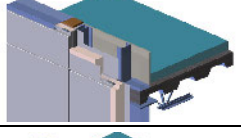
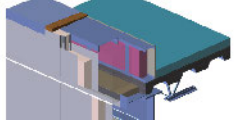


Parapet Linear Transmittance

Description of Detail (Thermal Anomaly)	Roof Construction Type	Wall Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
						Btu / hr ft F	W/ m K	
Exposed 	Concrete	Steel Framed	Exterior and Interior Insulated Steel Stud	Exposed Concrete Parapet with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding with Concrete Roof Deck	5.5.6	0.444	0.768	Poor
Exposed 	Concrete	Steel Framed	Exterior and Interior Insulated Steel Stud	Exposed Concrete Parapet with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Vertical Z-Girts Supporting Stucco Cladding	5.5.7	0.445	0.770	Poor
Exposed 	Concrete	Steel Framed	Exterior and Interior Insulated Steel Stud	Exposed Concrete Parapet with Exterior and Interior Insulated Steel Stud Wall Assembly with Intermittent Vertical Z-Girts Supporting Metal Cladding with Concrete Roof Deck	5.5.8	0.396	0.686	Poor
Exposed 	Concrete	Concrete	Interior Insulated Poured-in-Place Concrete Assembly	Exposed Concrete Parapet with Interior Insulated Concrete Mass Wall with Concrete Roof Deck	6.5.3	0.449	0.777	Poor
Exposed 	Concrete	Window-wall	Window-wall Vision	Exposed Concrete Parapet at Window-Wall with Concrete Roof Deck	1.3.1	0.567	0.981	Poor
Exposed 	Concrete	Curtain Wall	Conventional Curtain-Wall Spandrel	Exposed Concrete Parapet with Curtain-wall Outboard of Parapet and Concrete Roof Deck and R-8 Spandrel Insulation	2.2.1	0.493	0.853	Poor
Exposed 	Concrete	Curtain Wall	Conventional Curtain-Wall Spandrel	Exposed Concrete Parapet with Curtain-wall Outboard of Parapet and Concrete Roof Deck	2.2.2	0.614	1.063	Poor
Exposed 	Concrete	Curtain Wall	Conventional Curtain-Wall Spandrel	Exposed Concrete Parapet with Curtain-wall Outboard of Parapet and Concrete Roof Deck and Aerogel	2.2.2	0.513	0.888	Poor
Exposed 	Concrete	Steel Framed	Interior Insulated Pre-cast Concrete Panel	Exposed Steel Framed Parapet with Pre-cast Concrete Wall Assembly with Steel Stud and Rigid Insulated Outboard of Studs and Concrete Roof Deck	6.5.6	0.334	0.579	Poor
Exposed 	Concrete	Steel Framed	Interior Insulated Pre-cast Concrete Panel	Exposed Steel Framed Parapet with Pre-cast Concrete Wall Assembly with Steel Stud and Rigid Insulated Outboard of Studs and Concrete Roof Deck with Thermal break under Parapet Cavity	6.5.7	0.227	0.393	Regular
Exposed 	Steel Framed	Concrete	Pre-cast Sandwich Panels	Exposed Steel Framed Parapet with Pre-cast Sandwich Panels with Concrete Edges and Steel Roof Deck	6.5.5	0.511	0.884	Poor
Exposed 	Concrete	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Concrete Parapet with an R-15 Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding and Concrete Roof Deck	5.5.5	0.271	0.468	Poor



Parapet Linear Transmittance

Description of Detail (Thermal Anomaly)	Roof Construction Type	Wall Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
						Btu / hr ft F	W/ m K	
Exposed 	Concrete	Concrete Block	Exterior Insulated Concrete block with brick veneer	Exposed Concrete Block Parapet with R-15 Exterior Insulated Concrete Block with Brick Veneer and Concrete Roof Deck	6.5.8	0.180	0.311	Regular
Major Conductive Bypass 	Steel Framed	Concrete	Pre-cast Sandwich Panels	Exposed Steel Framed Parapet with Pre-cast Sandwich Panels and Steel Roof Deck	6.5.4	0.375	0.650	Poor
Major Conductive Bypass 	Steel Framed	Concrete	Pre-cast Sandwich Panels	Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Paraloc Thermally Broken Parapet Intersection	6.5.9	0.184	0.319	Regular
Major Conductive Bypass 	Concrete	Steel Framed	Conventional Curtain-Wall Spandrel	Exterior Insulated Concrete Parapet with a Conventional Curtain Wall System with R-5 Insulated Spandrel Panel and Interior Insulated (Spray Foam) Steel Stud Wall Assembly	2.2.3	0.404	0.699	Poor
Major Conductive Bypass 	Concrete	Window-wall	Window-wall Spandrel and Vision	Partially Insulated Concrete Parapet with Window-wall Spandrel and Concrete Roof and R-8 Spandrel Insulation	1.3.2	0.563	0.975	Poor
Under-Insulated 	Concrete	Steel Framed	Exterior Insulated Steel Stud	Partially Insulated Concrete Parapet with an R-11 Exterior Insulated Steel Stud Wall Assembly with EIFS	5.5.1	0.273	0.472	Poor
Under-Insulated 	Concrete	Steel Framed	Exterior and Interior Insulated Steel Stud	Partially Insulated Concrete Parapet with an Interior Insulated EIFS Steel Stud Wall Assembly and R-15 Exterior Insulation	5.5.3	0.260	0.451	Poor
Under-Insulated 	Concrete	Concrete	Exterior Insulated Pour-in-Place Concrete	Partially Insulated Concrete Parapet with an EIFS Concrete Wall Assembly	6.5.1	0.231	0.400	Regular
Under-Insulated 	Steel Framed	Steel Framed	Exterior and Interior Insulated Steel Stud	Insulated Steel Framed Parapet with R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding and Steel Roof Deck with Open Web Steel Joist	5.5.10	0.201	0.348	Regular
Efficiently Insulated 	Steel Framed	Steel Framed	Exterior and Interior Insulated Steel Stud	Insulated Steel Framed Parapet with Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding and Steel Roof Deck with Open Web Steel Joist with Thermal Break under Parapet Cavity	5.5.11	0.151	0.260	Improved
Under-Insulated 	Steel Framed	Insulated Metal Panel	Horizontal Insulated Metal Panel	Horizontal Insulated Metal Panel at Parapet with Steel Roof Deck and Open Web Steel Joist	5.5.13	0.237	0.410	Regular
Major Conductive Bypass 	Steel Framed	Insulated Metal Panel	Vertical Insulated Metal Panel	Vertical Insulated Metal Panel at Parapet with Steel Roof Deck and Open Web Steel Joist	5.5.12	0.283	0.489	Poor



Parapet Linear Transmittance

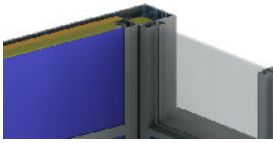
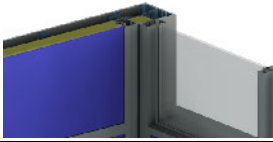
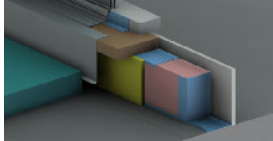
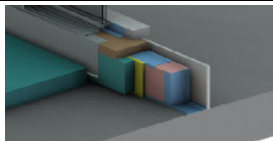
Description of Detail (Thermal Anomaly)		Roof Construction Type	Wall Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
							Btu / hr ft F	W/ m K	
Major Conductive Bypass		Concrete	Curtain Wall	Conventional Curtain-Wall Spandrel	Exterior Insulated Concrete Parapet with Curtain-wall Outboard of Parapet and Concrete Roof Deck and R-8 Spandrel Insulation	2.2.4	0.444	0.768	Poor
Fully Insulated		Concrete	Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Concrete Parapet with an Steel Stud Wall Assembly and Drained EIFS and R-11 Exterior Insulation	5.5.2	0.168	0.291	Improved
Fully Insulated		Concrete	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior Insulated Concrete Parapet with an Interior Insulated Steel Stud Wall Assembly and Drained EIFS and R-8 Exterior Insulation	5.5.4	0.225	0.390	Regular
Fully Insulated		Concrete	Concrete	Exterior Insulated Pour-in-Place Concrete	Exterior Insulated Concrete Parapet with Concrete Wall Assembly and Drained EIFS	6.5.2	0.125	0.217	Improved
Efficiently Insulated		Concrete	Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Concrete Parapet at Roof Deck with Exterior and Interior Insulated Steel Stud Wall Assembly at Concrete Deck	5.5.9	0.058	0.100	Efficient
Efficiently Insulated		Wood	Wood	Exterior and Interior Insulated Wood-Framed	Exterior Insulated Wood-Framed Parapet with a Wood-frame Wall Assembly and Flat Roof Assembly with Insulation Between Joists and R-8 Exterior Insulation	7.4.1	0.032	0.056	Efficient

Corner Linear Transmittance

Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
						Btu / hr ft F	W/ m K	
Outside Corner		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior Insulated Steel Frame Outside Corner Transition with an R-15 Exterior and Interior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding	5.6.5	0.098	0.170	Efficient
Outside Corner		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Outside Corner Transition with an R-15 Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-Girts Supporting Metal Cladding	5.6.3	0.089	0.154	Efficient
Outside Corner		Steel Framed	Exterior Insulated Steel Stud	Exterior Insulated Steel Frame Outside Corner Transition with an R-15 Exterior Insulated Steel Stud Wall Assembly with Reduced Framing and Horizontal Z-Girts Supporting Metal Cladding	5.6.4	0.085	0.147	Efficient
Outside Corner		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior Insulated Outside Corner Transition with a Split Insulated Steel Stud Assembly and Drained EIFS and R-15 Exterior Insulation	5.6.2	0.031	0.054	Efficient
Outside Corner		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior Insulated Outside Corner Transition with Steel Stud Assembly and Drained EIFS and R-11 Exterior Insulation	5.6.1	0.051	0.088	Efficient
Outside Corner		Concrete	Exterior Insulated Pour-in-Place Concrete	Exterior Insulated Outside Corner Transition with Concrete Wall Assembly and Drained EIFS	6.6.1	0.085	0.147	Efficient
Outside Corner		Insulated Metal Panel	Vertical Insulated Metal Panel	Exterior Insulated Metal Panel Outside Corner Transition with Vertical Insulated Metal Panel with Steel Structure	5.6.8	0.090	0.156	Efficient
Outside Corner		Insulated Metal Panel	Horizontal Insulated Metal Panel	Exterior Insulated Metal Panel Outside Corner Transition with Horizontal Insulated Metal Panel with Steel Structure	5.6.9	0.037	0.064	Efficient
Outside Corner		Wood	Exterior and Interior Insulated Wood-Framed	Exterior Insulated Wood-Framed Outside Corner Transition with a Wood-frame Wall Assembly and Wood Strapping and R-5 Exterior Insulation Supporting Fiber Cement Board	7.5.1	0.020	0.034	Efficient
Inside Corner		Steel Framed	Exterior and Interior Insulated Steel Stud	Inside Corner Window-wall Transition with R-15 Exterior and Interior Insulated Steel Stud Assembly and Spray Foam Insulation behind Back Pan	5.6.7	0.137	0.237	Regular
Inside Corner		Steel Framed	Exterior Insulated Steel Stud	Inside Corner Window-wall Transition with R-15 Exterior Insulated Steel Stud Assembly	5.6.6	0.120	0.207	Regular

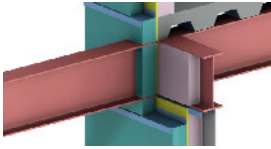
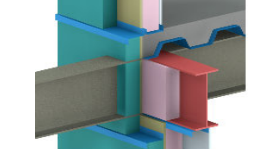
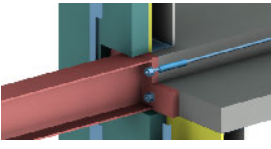
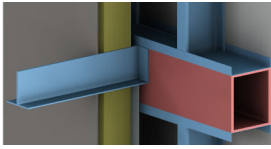
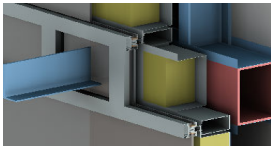
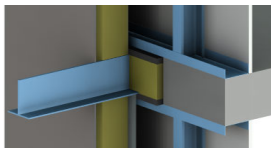

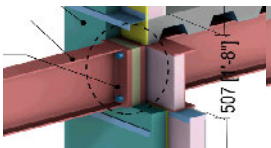

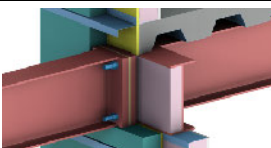


Corner Linear Transmittance

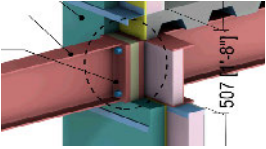
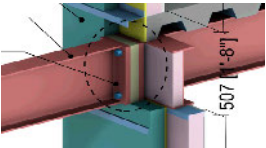
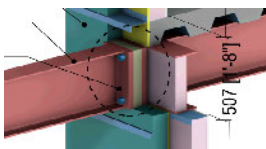
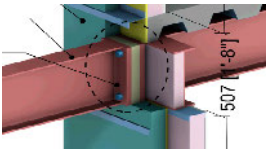
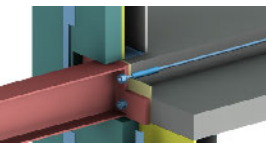
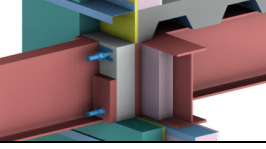
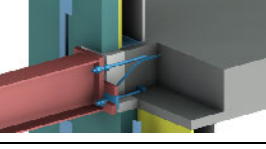
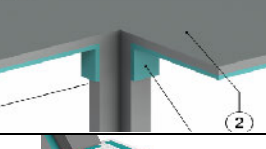
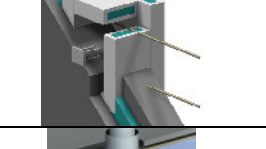
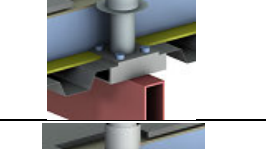
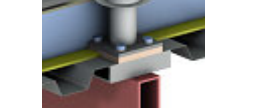
Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
						Btu / hr ft F	W/ m K	
Inside Corner		Window Wall	Window-wall Spandrel and Vision	Inside Corner Window-wall Transition with Interior Spray Foam Insulation	1.4.2	0.117	0.203	Regular
				Inside Corner Window-wall Transition with no Interior Insulation				
Horizontal Corner Under- Insulated		Steel Stud	Interior Insulated Steel Stud Curb at Exterior Insulated Concrete Roof Deck	Interior Insulated Steel Stud Curb at Sliding Door and Exterior Insulated Concrete Roof Deck	8.1.10	0.395	0.684	Poor
Horizontal Corner Exterior Insulated		Steel Framed	Exterior and Interior Insulated Steel Stud Curb at Exterior Insulated Concrete Roof Deck	Exterior and Interior Insulated Steel Stud Curb at Sliding Door and R-15 Exterior Insulated Concrete Roof Deck	8.1.11	0.097	0.169	Efficient



Structural Beam Point Transmittance

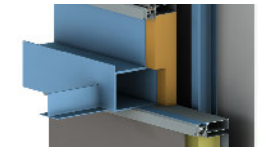

Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	Point Transmittance	
						Btu / hr F	W / K
Through Beam		Steel Framed	Exterior and Interior Insulated Steel Stud	Steel-to-Steel Through Beam Connection with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts Supporting Metal Cladding and Composite Floor	5.7.2	1.73	0.92
Through Beam		Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Aerolon Coating	5.7.9	1.17	0.62
Through Beam		Steel Framed	Exterior Insulated Steel Stud	Steel-to-Concrete Through Beam Connection with Exterior Insulated Steel Stud Assembly with Intermittent Vertical Z-Girts Supporting Metal Cladding	5.7.5	1.24	0.66
Through Beam		Curtain Wall	Conventional Curtain-Wall Spandrel	Steel-to-Steel Through Beam Connection with Conventional Curtain Wall Spandrel and R-8 Backpan Insulation	2.4.2	0.27	0.14
Through Beam		Curtain Wall	Conventional Curtain-Wall Spandrel	Steel-to-Steel Through Beam Connection with Conventional Curtain Wall Spandrel and Boxed Mullions and R-8 Backpan Insulation	2.4.4	0.15	0.08
Through Beam		Curtain Wall	Conventional Curtain-Wall Spandrel	Steel-to-Concrete Through Beam Connection with Conventional Curtain Wall Spandrel and R-8 Backpan Insulation	2.4.1	0.18	0.10
Thermally Isolated		Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Steel-to-Steel Through Beam Connection with 5 mm Isolator Pad and Steel Bolts with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts	5.7.3	2.24	1.19
Thermally Isolated		Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Steel-to-Steel Through Beam Connection with 5 mm Isolator Pad and Stainless Steel Bolts with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts	5.7.3	2.17	1.15
Thermally Isolated		Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Steel-to-Steel Through Beam Connection with 10 mm Isolator Pad and Steel Bolts with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts	5.7.3	1.89	1.00
Thermally Isolated		Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Steel-to-Steel Through Beam Connection with 10 mm Isolator Pad and Stainless Steel Bolts with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts	5.7.3	1.82	0.97

Structural Beam Point Transmittance

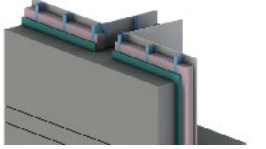
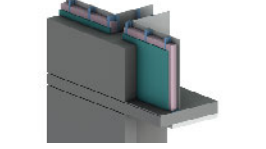
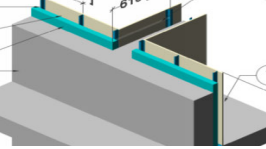
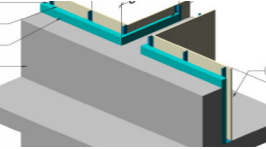
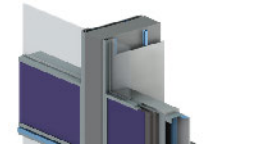
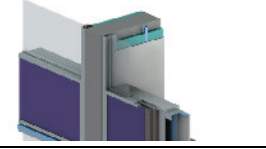
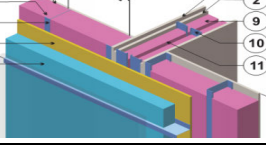
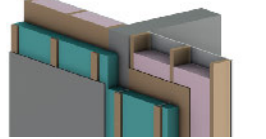
Description of Detail (Thermal Anomaly)		Construction Type	Wall Assembly Description	Detailed Description	Reference	Point Transmittance	
						Btu / hr F	W / K
Thermally Isolated		Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Steel-to-Steel Through Beam Connection with 25 mm Isolator Pad and Steel Bolts with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts	5.7.8	1.56	0.83
Thermally Isolated		Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Steel-to-Steel Through Beam Connection with 25 mm Isolator Pad and Stainless Steel Bolts with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts	5.7.8	1.16	0.62
Thermally Isolated		Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Steel-to-Steel Through Beam Connection with 25 mm Isolator Pad, Washers and Bushings, and Stainless Steel Bolts with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts	5.7.8	0.95	0.50
Thermally Isolated		Steel Framed	Exterior and Interior Insulated Steel Stud	Thermally Broken Steel-to-Steel Through Beam Connection with 50 mm Isolator Pad, Washers and Bushings, and Stainless Steel Bolts with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts	5.7.8	0.72	0.38
Thermally Isolated		Steel Framed	Exterior Insulated Steel Stud	Thermally Broken Steel-to-Concrete Through Beam Connection with Isolator Pad and Exterior Insulated Steel Stud Assembly with Intermittent Vertical Z-Girts	5.7.6	0.91	0.48
Manufactured Thermal Break		Steel Framed	Exterior and Interior Insulated Steel Stud	Manufactured Thermal Break Steel-to-Steel Through Beam Connection with Exterior and Interior Insulated Steel Stud Assembly with Horizontal Z-Girts	5.7.4	0.91	0.48
Manufactured Thermal Break		Steel Framed	Exterior Insulated Steel Stud	Manufactured Thermal Break Steel-to-Concrete Through Beam Connection with Exterior Insulated Steel Stud Assembly with Intermittent Vertical Z-Girts	5.7.7	0.07	0.04
Through Column		Poured-in-Place Concrete	Exterior Insulated Poured-in-place Concrete Assembly	Concrete Column Connection with Insulated Floor Slab and Insulation 2.5ft. down Column	6.7.2	0.19	0.33
Column Embedment		Concrete	Precast Sandwich Panels	Precast Sandwich Panel Wall Assembly – Emloc Thermally Broken Embedment Detail	6.8.1	0.05	0.03
Roof Anchor		Steel Framed	Exterior Insulated Flat Roof	Exterior Insulated Conventional Flat Roof – Roof Anchor	9.3.1	0.20	0.35
Roof Anchor		Steel Framed	Exterior Insulated Flat Roof	Exterior Insulated Conventional Flat Roof – Armatherm Thermal Break under Roof Anchor	9.3.2	0.18	0.30



Beam and Post Linear Transmittance

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
					Btu / hr ft F	W/ m K	
 <p>Beam</p>	Curtain Wall	Conventional Curtain-wall Spandrel	Structural Beam and Canopy Gutter Intersection with Curtain Wall and R-8 Backpan Insulation	2.4.3	0.588	1.017	Poor
 <p>Post</p>	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior Insulated Structural Post with R-15 Exterior Insulation	5.7.1	0.160	0.080	Efficient

Interior Wall Intersection Linear Transmittance

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
					Btu / hr ft F	W/ m K	
Exposed 	Concrete	Interior Insulated Poured-in-place Concrete Assembly	Exposed Interior Concrete Mass Wall Intersection with Non-Insulated Partition Wall and R-15 Interior Insulation	6.2.4	0.410	0.710	Poor
Exposed 	Concrete	Interior Insulated Poured-in-place Concrete Assembly	Exposed Interior Concrete Mass Wall Intersection with Non-Insulated Partition Wall Intersection and Unheated Floor Slab (Parking Garage)	6.7.1	0.461	0.799	Poor
Exposed 	Concrete	Interior Insulated Poured-in-place Concrete Assembly	Exposed Interior Concrete Mass Wall Intersection with Non-Insulated Partition Wall Intersection with Slab Projection	6.2.2	0.385	0.666	Poor
Insulation Return 	Concrete	Interior Insulated Poured-in-place Concrete Assembly	Exposed Interior Concrete Mass Wall Intersection with Insulated Partition Wall Intersection with Slab Projection	6.2.3	0.262	0.454	Poor
Exposed 	Concrete	Window-wall Spandrel and Vision	Exposed Concrete Mass Wall Intersection with Window-wall and Non-insulated Partition Wall	1.5.1	0.386	0.668	Poor
Exposed 	Concrete	Window-wall Spandrel and Vision	Exposed Concrete Mass Wall Intersection with Window-wall and Insulated Partition Wall	1.5.2	0.575	0.995	Poor
Exterior Insulated 	Steel Framed	Exterior and Interior Insulated Steel Stud	Exterior Insulated Steel Framed Wall Intersection with an R-15 Exterior and Interior Insulated Steel Stud Wall	5.8.1	0.010	0.017	Efficient
Exterior Insulated 	Concrete	Exterior and Interior Insulated Wood-Framed	Exterior Insulated Concrete Mass Wall Intersection with an R-10 Exterior and Interior Insulated Wood Stud Assembly	7.7.1	0.092	0.159	Efficient

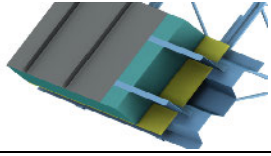
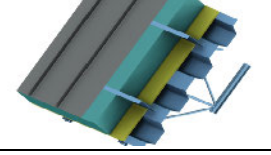
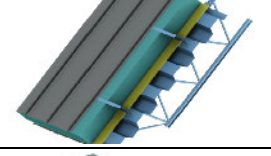
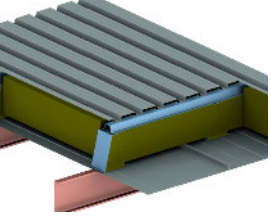
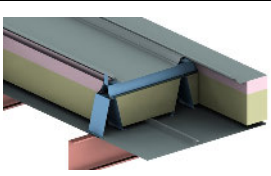
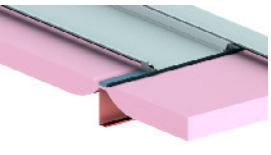






At-Grade Transition Linear Transmittance

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
					Btu / hr ft F	W/ m K	
Exposed 	Wood	Wood-Frame with Sliding Door	Wood-Frame Door Sill on Concrete Deck Over Unheated Space (Parking Garage)	7.6.1	0.320	0.554	Poor
Under-Insulated 	Concrete	Pre-cast Sandwich Panels	Insulated Slab-on-Grade Transition with Pre-cast Sandwich Panel with Discontinuous (24") Insulation at Footing	6.7.3	0.415	0.719	Poor
Under-Insulated 	Wood	Exterior and Interior Insulated Wood-Framed	Insulated Foundation Wall Transition with R-10 Exterior and Interior Insulated Wood Stud Assembly with Wood Framed Wall at Rim Joist	7.6.2	0.047	0.082	Efficient
Exterior Insulated 	Wood	Exterior and Interior Insulated Wood-Framed	Exterior Insulated Foundation Wall Transition with R-10 Exterior and Interior Insulated Wood Framed Wall with Shelf Angle and Brick Ties Supporting Brick Veneer	7.6.4	0.509	0.881	Poor
Exterior Insulated 	Concrete	Pre-cast Sandwich Panels	Insulated Footing Transition with Pre-cast Sandwich Panel with 24" of Insulation Aligned with Footing Insulation	6.7.4	0.139	0.236	Regular
Exterior Insulated 	Concrete	Pre-cast Sandwich Panels	Insulated Footing Transition with Pre-cast Sandwich Panel with Horizontal Footing Insulation and Thermally Broken Concrete Slab	6.7.5	0.170	0.294	Regular
Exterior Insulated 	Wood	Exterior and Interior Insulated Wood-Framed	Exterior Insulated Foundation Wall Transition with R-10 Exterior and Interior Insulated Wood Framed Wall at Rim Joist	7.6.3	0.059	0.103	Efficient
Exterior Insulated 	Curtain Wall	Conventional Curtain Wall	Exterior Insulated Foundation Wall Transition with Conventional Curtain Wall	2.5.1	0.495	0.857	Poor
Exterior Insulated 	Curtain Wall	Conventional Curtain Wall	Exterior Insulated Foundation Wall Transition with Conventional Curtain Wall and Aerogel insulation	2.5.1	0.370	0.640	Poor
Exterior Insulated 	Concrete	Exterior Slab Insulation	Insulated Slab on Grade – Steel Column	6.7.6	0.03	0.19	Efficient
Exterior Insulated 	Concrete	Exterior Slab Insulation	Insulated Slab on Grade – Armatherm 500 Thermal Break under Column	6.7.7	0.03	0.18	Efficient

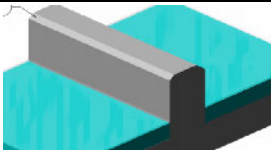
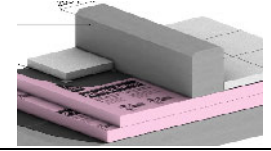
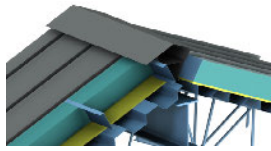
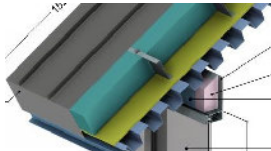
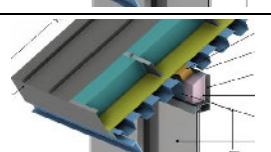
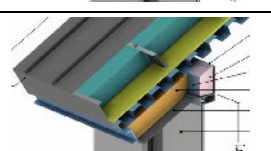


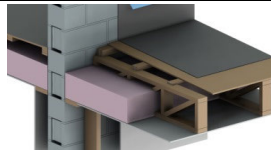


Roof Clear Field Assemblies

Description of Detail (Thermal Anomaly)	Construction Type	Wall Assembly Description	Detailed Description	Reference	Roof Pan Insulation	Thermal Transmittance	
						Btu / hr ft ² F	W / m ² K
 <p>Metal Roof</p>	Steel Framed	Exterior Insulated Metal Roof	Exterior Insulated Sloped Metal Roof with Continuous Metal Sub-Girts at 12" o.c.	9.1.1	R-20	0.149	0.846
					R-30	0.130	0.738
					R-40	0.117	0.664
 <p>Metal Roof</p>	Steel Framed	Exterior Insulated Metal Roof	Exterior Insulated Sloped Metal Roof with Continuous Metal Sub-Girts at 24" o.c.	9.1.2	R-20	0.097	0.551
					R-30	0.080	0.454
					R-40	0.070	0.397
 <p>Metal Roof</p>	Steel Framed	Exterior Insulated Metal Roof	Exterior Insulated Sloped Metal Roof with Continuous Metal Sub-Girts at 36" o.c.	9.1.3	R-20	0.081	0.460
					R-30	0.065	0.369
					R-40	0.055	0.312
 <p>Metal Roof</p>	Steel Framed	Insulated Sheet Steel Roof	Insulated Sheet Steel Roof with Thermal Chairs at 36" o.c. and Purlins at 48" o.c.	9.1.6	R-25	0.045	0.256
					R-34	0.035	0.198
					R-45	0.029	0.162
					R-54	0.026	0.148
 <p>Metal Roof</p>	Steel Framed	Insulated Sheet Steel Roof	Insulated Standing Seam Roof with Thermal Chairs and R-19 Insulation Compressed Between and Over Hat Tracks	9.1.7	R-19	0.030	0.170
 <p>Metal Roof</p>	Steel Framed	Insulated Sheet Steel Roof	Insulated Standing Seam Roof with R-19 Draped Insulation	9.1.8	R-19	0.064	0.361
 <p>Metal Roof</p>	Steel Framed	Exterior Insulated Metal Roof	Exterior Insulated Flat Roof with Steel Fasteners	9.1.9	R-22.8	0.041	0.240
 <p>Wood</p>	Wood	Conventional Ventilated Attic Sloped Roof	Wood Framed Roof Intersection with Wood Frame Wall with Insulation at Ceiling	7.4.2	R-30	0.033	0.187
 <p>Wood</p>	Wood	Un-vented Sloped Roof	Wood Framed Roof Intersection with Wood-frame wall with Insulation at Roof Sheathing	7.4.3	R-30	0.041	0.233
 <p>Wood</p>	Wood	Ventilated Low Sloped Roof	Wood Framed Roof Intersection with Masonry Firewall	7.4.4	R-30	0.034	0.193



Roof Interface Details Linear Transmittance

Description of Detail (Thermal Anomaly)	Construction Type	Roof Assembly Description	Detailed Description	Reference	Linear Transmittance		Category
					Btu / hr ft F	W/ m K	
Concrete 	Concrete	Insulation in Deck	Concrete Curb or Wall Intersection	9.2.2	0.536	0.927	Poor
Concrete 	Concrete	Insulation in Deck	Floating Concrete Wall Intersection	9.2.3	0.000	0.000	Efficient
Metal 	Steel Framed	Exterior Insulated Metal Sloped Roof	Metal Roof Ridge Intersection with R-20 Exterior Insulation	9.2.1	0.324	0.560	Poor
Metal 	Steel Framed	Exterior Insulated Metal Sloped Roof	Metal Roof Intersection at Curtain Wall with Through Beam and Metal Deck	9.2.4	0.679	1.177	Poor
Metal 	Steel Framed	Exterior Insulated Metal Sloped Roof	Metal Roof Intersection at Curtain Wall with Through Beam and Thermally Broken Metal Deck	9.2.5	0.350	0.607	Poor
Metal 	Steel Framed	Exterior Insulated Metal Sloped Roof	Metal Roof Intersection at Curtain Wall with Through Beam and Metal Deck and Fully Insulated Soffit	9.2.6	0.365	0.633	Poor
Wood 	Wood	Conventional Ventilated Attic Sloped Roof	Wood Framed Roof Intersection with Wood Frame Wall with R-8 Insulation at Ceiling	7.4.2	0.028	0.049	Efficient
Wood 	Wood	Un-vented Sloped Roof	Wood Framed Roof Intersection with Wood Frame Wall with R-8 Insulation at Roof Sheathing	7.4.3	0.084	0.146	Efficient
Wood 	Wood	Ventilated Low Sloped Roof	Wood Framed Roof Intersection with Masonry Firewall	7.4.4	0.037	0.064	Efficient

1.0 Window Wall

Detail 1.1.1	B.1.1
Window Wall System – Spandrel Panel Clear Wall with No Interior Stud Cavity Insulation	
Detail 1.1.2	B.1.2
Window Wall System – Spandrel Panel Clear Wall with Interior Sprayfoam Insulation	
Detail 1.2.1	B.1.3
Window Wall System – Intermediate Floor Intersection with Spandrel Bypass & No Interior Stud Cavity Insulation	
Detail 1.2.2	B.1.4
Window Wall System – Intermediate Floor Intersection with Spandrel Bypass & Interior Sprayfoam Insulation	
Detail 1.2.3	B.1.5
Window Wall System with 3' x 3' Spandrel Section – AIM Applications at Intermediate Floor Intersection	
Detail 1.2.4	B.1.6
Window Wall System – Triple Glazed Insulated Frame at Slab Intersection with Improved Spandrel Bypass & No Interior Stud Cavity Insulation	
Detail 1.2.5	B.1.7
Window Wall System – Full Height Spandrel at Slab Intersection with Spandrel Bypass & No Interior Stud Cavity Insulation	
Detail 1.2.6	B.1.8
Window Wall System – Full Height Spandrel at Slab Intersection with Spandrel Bypass & Interior Sprayfoam Insulation	
Detail 1.2.7	B.1.9
Window Wall System – Full Height Insulated Frame at Slab Intersection with Improved Spandrel Bypass & No Interior Stud Cavity Insulation	
Detail 1.2.8	B.1.10
Window Wall System – Full Height Insulated Frame at Slab Intersection with Hybridized Clipped Spandrel & No Interior Stud Cavity Insulation	
Detail 1.3.1	B.1.11
Window Wall System – Un-insulated Concrete Parapet & Roof Intersection	
Detail 1.3.2	B.1.12
Window Wall System – Partially Insulated Concrete Parapet & Roof Intersection	
Detail 1.4.1	B.1.13
Window Wall System – Inside Corner with Spandrel to Vision Transition & No Interior Stud Cavity Insulation	
Detail 1.4.2	B.1.14

Window Wall System – Inside Corner with Spandrel to Vision Transition & Interior Sprayfoam Insulation

Detail 1.5.1 **B.1.15**

Window Wall System with Insulated Spandrel Panel – Uninsulated Interior Concrete Wall and Intermediate Floor Intersection

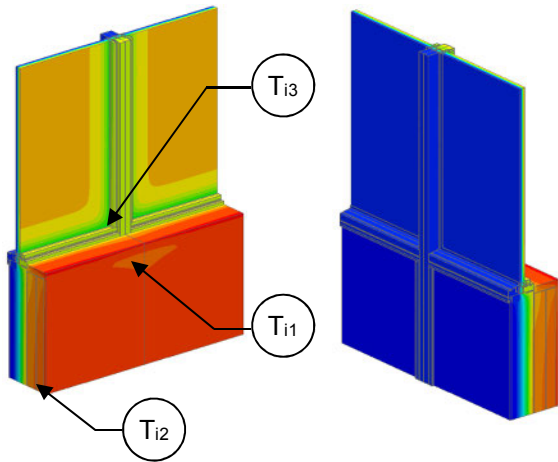
Detail 1.5.2 **B.1.16**

Window Wall System with Insulated Spandrel Panel – Insulated Interior Concrete Wall and Intermediate Floor Intersection

Detail 1.1.1

Window Wall System – Spandrel Panel Clear Wall with No Interior Stud Cavity Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance	U_w, R_w, U_g	U-value and R-value for w = spandrel wall g = glazing, including framing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.04)	R-6.3 (1.11)	0.158 (0.90)
R-12.6 (2.22)	R-15.8 (2.78)	R-7.1 (1.26)	0.140 (0.80)
R-16.8 (2.96)	R-20.0 (3.52)	R-7.6 (1.33)	0.132 (0.75)

Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Combined Assembly

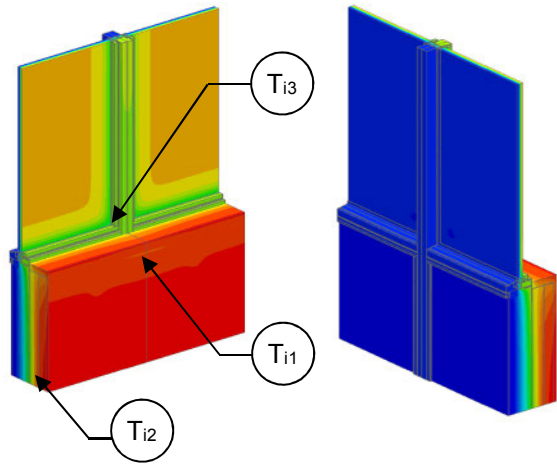
Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-3.2 (0.56)	0.314 (1.79)
R-12.6 (2.22)	R-3.2 (0.57)	0.308 (1.75)
R-16.8 (2.96)	R-3.3 (0.58)	0.305 (1.73)

Temperature Indices

	R8.4	R12.6	R16.8	
T_{i1}	0.63	0.64	0.65	Min T in stud cavity, on frame at backpan
T_{i2}	0.77	0.80	0.82	Max T on backpan, at center of backpan
T_{i3}	0.57	0.58	0.59	Min T on interior glazing, at corner of glazing

Detail 1.1.2 Window Wall System – Spandrel Panel Clear Wall with Interior Sprayfoam Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R _{1D}	R-15.1 (2.67 RSI) + backpan insulation
Transmittance / Resistance	U _w , R _w U _g	U-value and R-value for w = spandrel wall g = glazing, including framing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature

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

View from Interior View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Clear Wall Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _w ft ² ·hr·°F / Btu (m ² K / W)	U _w Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-23.5 (4.15)	R-9.0 (1.59)	0.111 (0.63)
R-12.6 (2.22)	R-27.7 (4.89)	R-9.8 (1.72)	0.102 (0.58)
R-16.8 (2.96)	R-31.9 (5.63)	R-10.4 (1.82)	0.097 (0.55)

Glazing

U _{centre of glass} Btu/ft ² ·hr·°F (W/m ² K)	U _g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Combined Assembly

Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-3.4 (0.59)	0.297 (1.68)
R-12.6 (2.22)	R-3.4 (0.60)	0.293 (1.67)
R-16.8 (2.96)	R-3.4 (0.60)	0.291 (1.65)

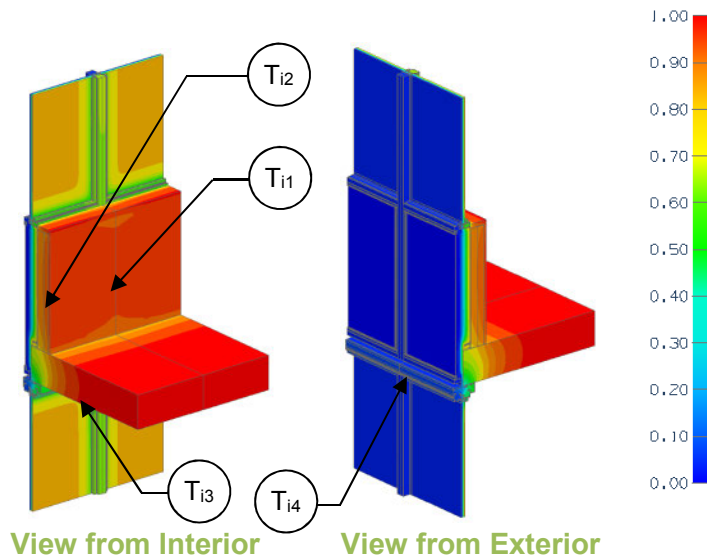
Temperature Indices

	R8.4	R12.6	R16.8	
T _{i1}	0.74	0.75	0.76	Min T in stud cavity, on sprayfoam in line with vertical frame
T _{i2}	0.93	0.94	0.94	Max T on sprayfoam, in line with center of backpan
T _{i3}	0.53	0.54	0.54	Min T on interior glazing, at corner of glazing

Detail 1.2.1

Window Wall System – Intermediate Floor Intersection with Spandrel Bypass & No Interior Stud Cavity Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall without slab g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab t = combined glazing and spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

²Spandrel section includes interface with slab and vision glazing.

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Clear Wall Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.03)	R-6.3 (1.11)	0.158 (0.90)
R-12.6 (2.22)	R-15.7 (2.77)	R-7.1 (1.26)	0.140 (0.80)
R-16.8 (2.96)	R-19.9 (3.51)	R-7.6 (1.33)	0.132 (0.75)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-2.8 (0.49)	0.358 (2.03)	0.350 (0.606)
R-12.6 (2.22)	R-2.8 (0.50)	0.353 (2.00)	0.359 (0.622)
R-16.8 (2.96)	R-2.8 (0.50)	0.350 (1.99)	0.363 (0.628)

Spandrel Section with Slab²

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-3.6 (0.64)	0.275 (1.56)
R-3.8 (0.68)	0.260 (1.48)
R-3.9 (0.70)	0.253 (1.44)

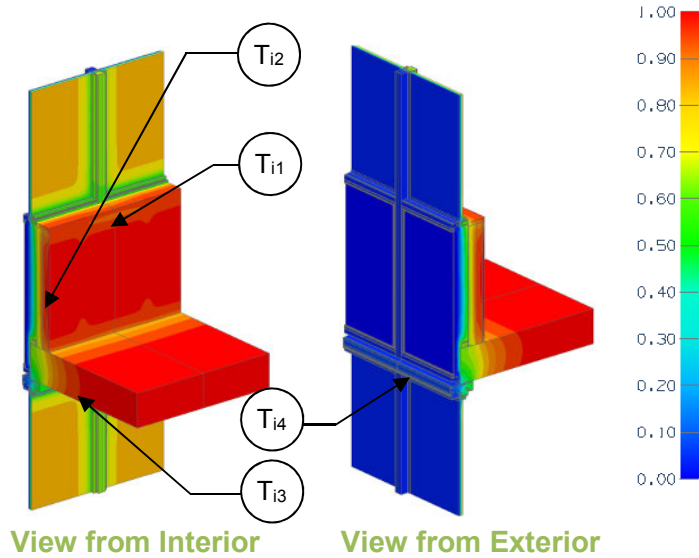
Temperature Indices

	R8.4	R12.6	R16.8	
T_{i1}	0.60	0.63	0.63	Min T in stud cavity, on frame at backpan
T_{i2}	0.75	0.78	0.80	Max T on backpan, at center of backpan
T_{i3}	0.51	0.51	0.51	Min T on interior glazing, at corner of deflection header
T_{i4}	0.54	0.54	0.54	Min T on slab, at head of lower glazing and vertical mullion

Detail 1.2.2

Window Wall System – Intermediate Floor Intersection with Spandrel Bypass & Interior Sprayfoam Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-15.1 (2.67 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w , R_w , U_g	“clear wall” U- and R-value, w = spandrel wall without slab g = glazing
Transmittance / Resistance	U_s , R_s , U_t , R_t	U and R-values for s = spandrel with slab t = combined glazing and spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

²Spandrel section includes interface with slab and vision glazing.

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Clear Wall Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-23.5 (4.15)	R-9.0 (1.59)	0.111 (0.63)
R-12.6 (2.22)	R-27.7 (4.89)	R-9.8 (1.72)	0.102 (0.58)
R-16.8 (2.96)	R-31.9 (5.63)	R-10.4 (1.82)	0.097 (0.55)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-2.9 (0.51)	0.344 (1.95)	0.377 (0.652)
R-12.6 (2.22)	R-2.9 (0.52)	0.340 (1.93)	0.376 (0.651)
R-16.8 (2.96)	R-3.0 (0.52)	0.339 (1.92)	0.380 (0.658)

Spandrel Section with Slab²

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	0.228 (1.29)
R-4.4 (0.77)	0.228 (1.29)
R-4.5 (0.79)	0.223 (1.27)

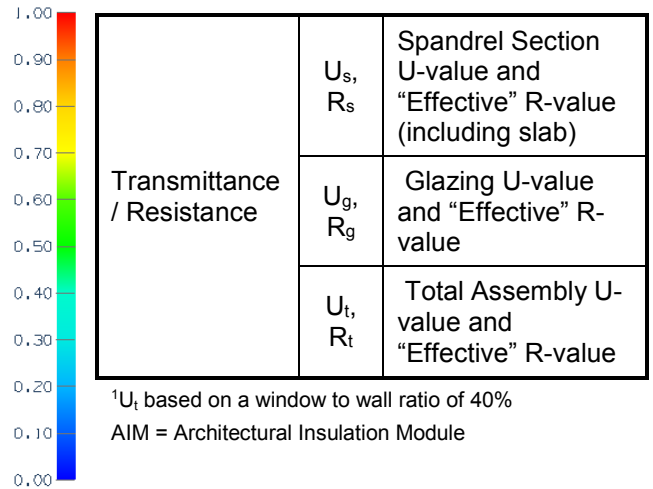
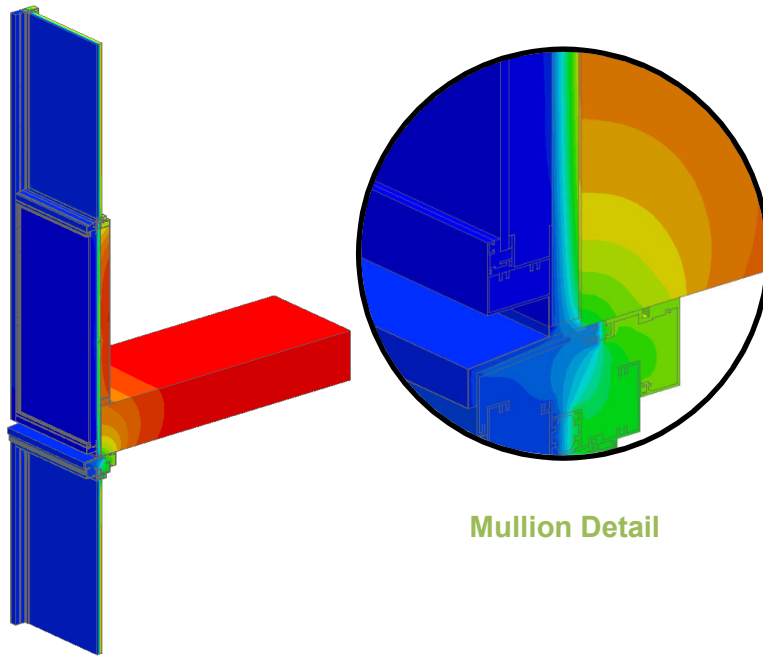
Temperature Indices

	R8.4	R12.6	R16.8	
T_{i1}	0.73	0.74	0.75	Min T in stud cavity, on sprayfoam in line with vertical frame
T_{i2}	0.93	0.93	0.94	Max T on sprayfoam, in line with center of backpan
T_{i3}	0.51	0.51	0.51	Min T on interior glazing, at corner of deflection header
T_{i4}	0.53	0.53	0.53	Min T on slab, at deflection header, in line with vertical frame

Detail 1.2.3

Window Wall System with 3' x 3' Spandrel Section – AIM Applications at Intermediate Floor Intersection

Thermal Performance Indicators



Mullion Detail

View from Exterior

Scenarios

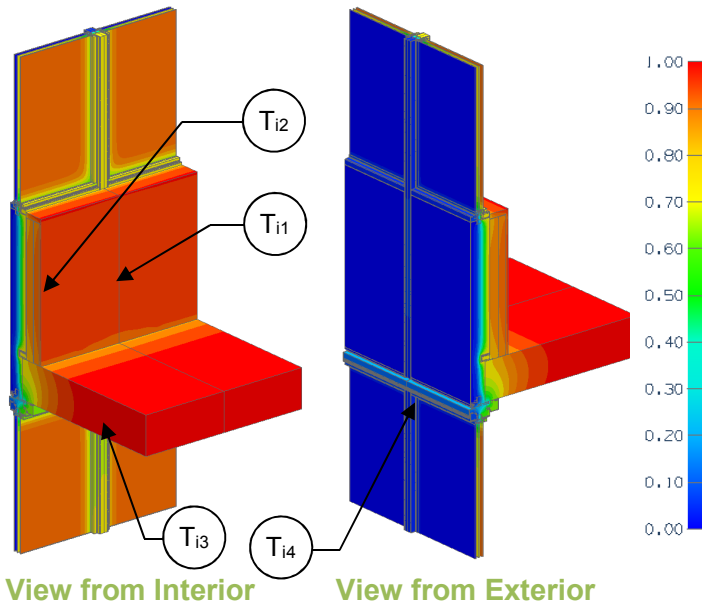
Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
G1	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM adhered to Frame	None
G2	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM adhered to Frame + 2" (51 mm) Mineral Wool in Backpan	None

Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	U_s Btu/ft ² · hr · °F (W/m ² K)	R_s ft ² · hr · °F / Btu (m ² K / W)	U_g Btu/ft ² · hr · °F (W/m ² K)	R_g ft ² · hr · °F / Btu (m ² K / W)	U_t^1 Btu/ft ² · hr · °F (W/m ² K)	R_t ft ² · hr · °F / Btu (m ² K / W)
G1	R-29.3 (5.16)	0.111 (0.63)	R-9.0 (1.58)	0.475 (2.70)	R-2.1 (0.37)	0.339 (1.93)	R-2.9 (0.52)
G2	R-37.7 (6.64)	0.107 (0.61)	R-9.3 (1.64)	0.474 (2.69)	R-2.1 (0.37)	0.337 (1.91)	R-3.0 (0.52)

Detail 1.2.4

Window Wall System – Triple Glazed Insulated Frame at Slab Intersection with Improved Spandrel Bypass & No Interior Stud Cavity Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall without slab g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab t = combined glazing and spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

²Spandrel section includes interface with slab and vision glazing. Images are for Scenario A

Scenario

Scenario	Spandrel And Deflection Header
A	Triple Glazing Break, Improved Bypass, Standard Deflection Header
B	Triple Glazing Break, Improved Bypass, Deflection Header Thermal Break in line with Slab Insulation

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Clear Wall Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-12.6 (2.22)	R-15.7 (2.77)	R-8.4 (1.48)	0.119 (0.68)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.143 (0.81)	0.250 (1.42)

Slab Linear Transmittance

Scenario	Backpan Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
A	R-12.6 (2.22)	R-4.2 (0.73)	0.241 (1.37)	0.321 (0.555)
B	R-12.6 (2.22)	R-4.7 (0.82)	0.214 (1.21)	0.104 (0.181)

Spandrel Section with Slab²

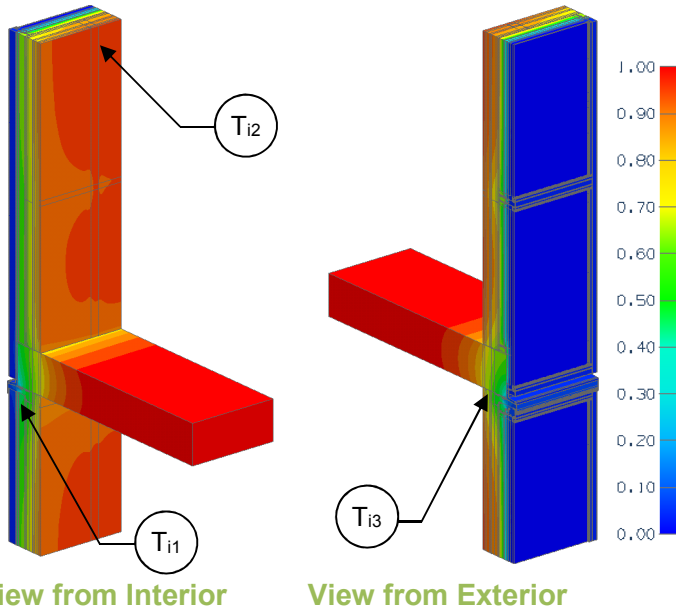
R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)
R-4.4 (0.78)	0.226 (1.28)
R-6.5 (1.14)	0.154 (0.87)

Temperature Indices

	A	B	
T_{i1}	0.69	0.70	Min T in stud cavity, on frame at backpan
T_{i2}	0.81	0.83	Max T on backpan, at center of backpan
T_{i3}	0.63	0.69	Min T on interior glazing, at corner of deflection header
T_{i4}	0.66	0.79	Min T on slab, at head of lower glazing and vertical mullion

Detail 1.2.5

Window Wall System – Full Height Spandrel at Slab Intersection with Spandrel Bypass & No Interior Stud Cavity Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w	“clear wall” spandrel wall without slab U- and R-value
Transmittance / Resistance	U_s, R_s	U and R-values for spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Clear Wall Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.03)	R-6.8 (1.20)	0.147 (0.84)
R-12.6 (2.22)	R-15.7 (2.77)	R-7.6 (1.34)	0.132 (0.75)
R-16.8 (2.96)	R-19.9 (3.51)	R-8.2 (1.44)	0.122 (0.69)

Slab Linear Transmittance

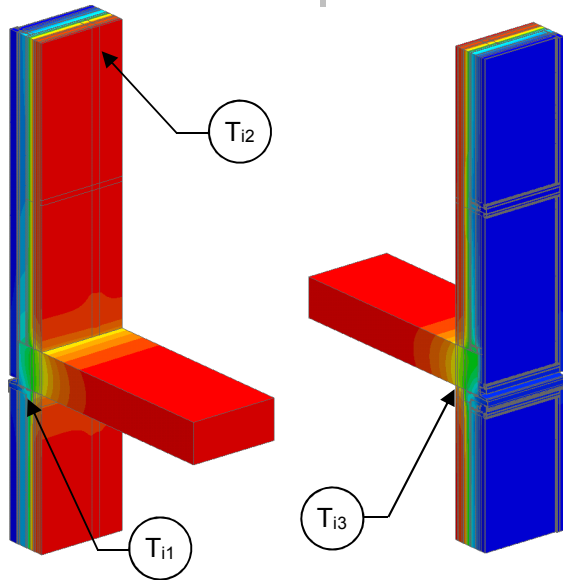
Backpan Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-8.4 (1.48)	R-5.2 (0.91)	0.193 (1.10)	0.366 (0.634)
R-12.6 (2.22)	R-5.6 (0.98)	0.179 (1.02)	0.379 (0.655)
R-16.8 (2.96)	R-5.8 (1.03)	0.171 (0.97)	0.390 (0.675)

Temperature Indices

	R8.4	R12.6	R16.8	
T_{i1}	0.49	0.51	0.51	Min T in stud cavity, on frame at deflection header
T_{i2}	0.78	0.82	0.84	Max T on backpan, at center of backpan
T_{i3}	0.53	0.54	0.54	Min T on slab, above deflection header

Detail 1.2.6

Window Wall System – Full Height Spandrel at Slab Intersection with Spandrel Bypass & Interior Sprayfoam Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	Spandrel Wall, R-15.1 (2.67 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w	“clear wall” spandrel wall without slab U- and R-value
Transmittance / Resistance	U_s, R_s	U and R-values for spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Clear Wall Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-23.5 (4.15)	R-18.5 (3.25)	0.054 (0.31)
R-12.6 (2.22)	R-27.7 (4.89)	R-19.4 (3.41)	0.052 (0.29)
R-16.8 (2.96)	R-31.9 (5.63)	R-20.0 (3.52)	0.050 (0.28)

Slab Linear Transmittance

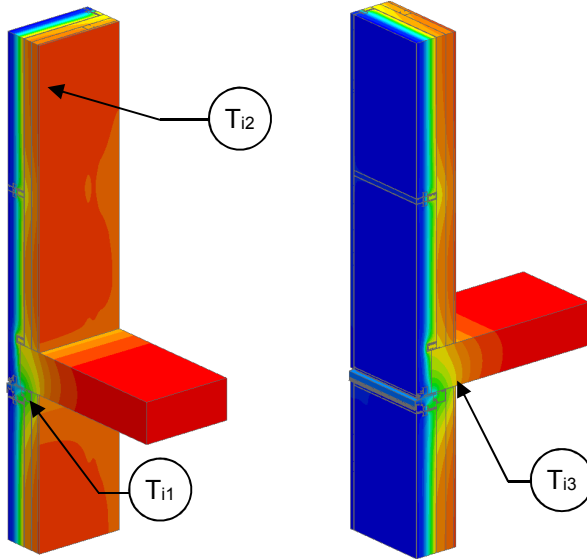
Backpan Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-8.4 (1.48)	R-9.0 (1.58)	0.111 (0.63)	0.456 (0.789)
R-12.6 (2.22)	R-9.3 (1.63)	0.108 (0.61)	0.449 (0.776)
R-16.8 (2.96)	R-9.4 (1.66)	0.106 (0.60)	0.447 (0.774)

Temperature Indices

	R8.4	R12.6	R16.8	
T_{i1}	0.69	0.69	0.69	Min T on sprayfoam, in line with deflection header
T_{i2}	0.93	0.93	0.93	Max T on sprayfoam in stud cavity
T_{i4}	0.68	0.69	0.69	Min T on slab, on ceiling stud track

Detail 1.2.7

Window Wall System – Full Height Insulated Frame at Slab Intersection with Improved Spandrel Bypass & No Interior Stud Cavity Insulation



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w	“clear wall” spandrel wall without slab U- and R-value
Transmittance / Resistance	U_s, R_s	U and R-values for spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP. Images are for Scenario A.

Scenario

Scenario	Spandrel And Deflection Header
A	Triple Glazing Break, Improved Bypass, Standard Deflection Header
B	Triple Glazing Break, Improved Bypass, Deflection Header Thermal Break in line with Slab Insulation

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Clear Wall Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-12.6 (2.22)	R-15.7 (2.77)	R-8.6 (1.51)	0.117 (0.66)

Slab Linear Transmittance

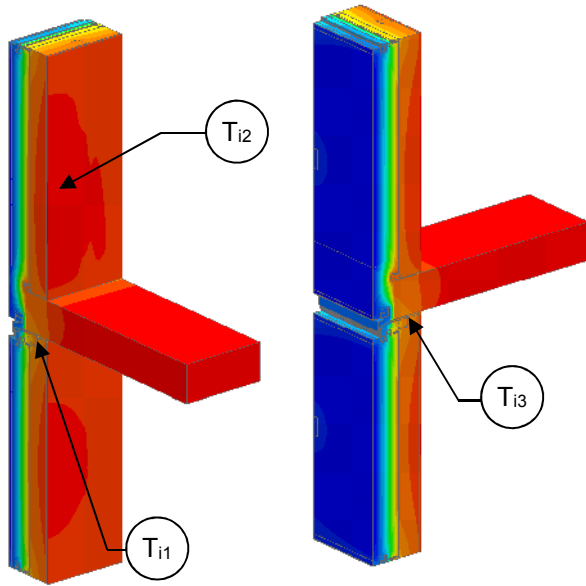
Scenario	Backpan Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
A	R-12.6 (2.22)	R-6.2 (1.09)	0.161 (0.92)	0.357 (0.617)
B	R-12.6 (2.22)	R-7.8 (1.37)	0.129 (0.73)	0.096 (0.166)

Temperature Indices

	A	B	
T_{i1}	0.58	0.73	Min T in stud cavity, on frame at deflection header
T_{i2}	0.83	0.84	Max T on backpan, at center of backpan
T_{i3}	0.60	0.75	Min T on slab, above deflection header

Detail 1.2.8

Window Wall System – Full Height Insulated Frame at Slab Intersection with Hybridized Clipped Spandrel & No Interior Stud Cavity Insulation



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w	“clear wall” spandrel wall without slab U- and R-value
Transmittance / Resistance	U_s, R_s	U and R-values for spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Clear Wall Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-23.1 (4.07)	R-26.3 (4.63)	R-12.7 (2.24)	0.079 (0.45)

Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-23.1 (4.07)	R-11.1 (1.96)	0.090 (0.51)	0.089 (0.154)

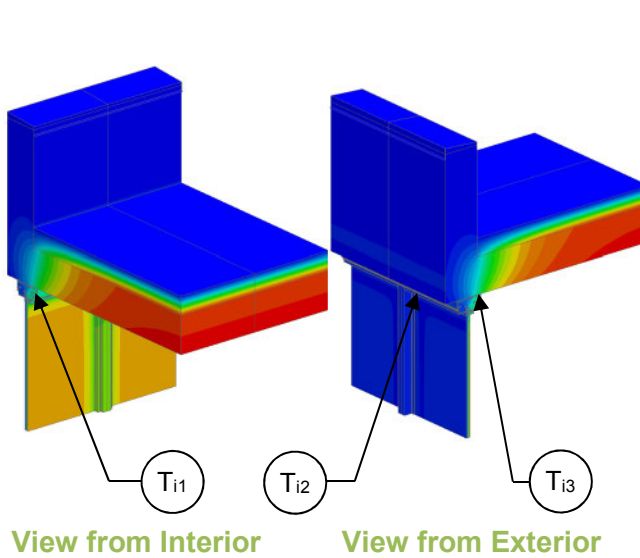
Temperature Indices

T_{i1}	0.80	Min T in stud cavity, on frame at deflection header
T_{i2}	0.89	Max T on backpan, at center of backpan
T_{i3}	0.81	Min T on slab, above deflection header

Detail 1.3.1

Window Wall System – Un-insulated Concrete Parapet & Roof Intersection

Thermal Performance Indicators



Transmittance / Resistance without Anomaly	U_r , R_r , U_g	“clear field” U- and R-value, r = roof, g = glazing
Transmittance / Resistance	U , R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9(3.86)	0.046 (0.26)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Parapet Linear Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-3.5 (0.61)	0.288 (1.63)	0.567 (0.981)

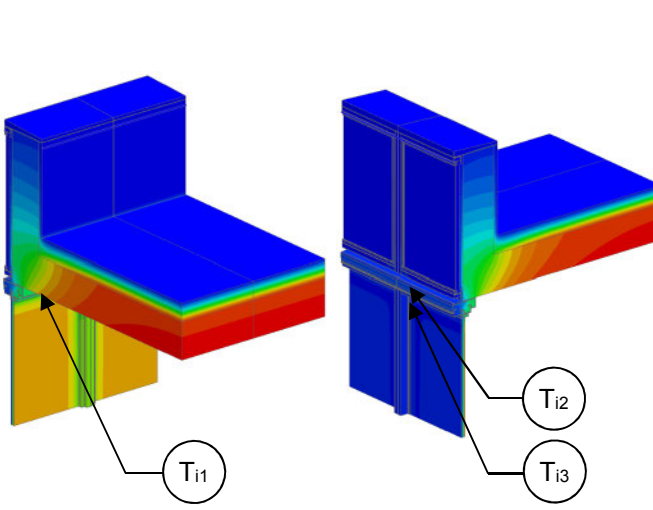
Temperature Indices

T_{i1}	0.44	Min T on frame, along head of window wall away from centre mullion
T_{i2}	0.49	Min T on interior glazing, at corner of glazing
T_{i3}	0.48	Min T on slab, along head of window wall away from centre mullion

Detail 1.3.2

Window Wall System – Partially Insulated Concrete Parapet & Roof Intersection

Thermal Performance Indicators



Transmittance / Resistance without Anomaly	U_r , R_r , U_g	“clear field” U- and R-value, r = roof, g = glazing
Transmittance / Resistance	U , R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9(3.86)	0.046 (0.26)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Glazing-Spandrel Linear Transmittance

Spandrel Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-4.2 (0.74)	R-3.5 (0.61)	0.289 (1.64)	0.576 (0.996)
R-8.4 (1.48)	R-3.5 (0.61)	0.287 (1.63)	0.563 (0.975)

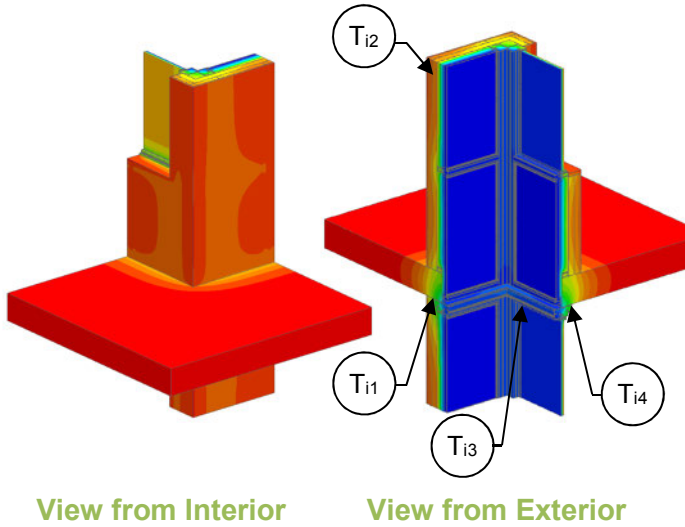
Temperature Indices

	R4.2	R8.4	
T_{i1}	0.47	0.47	Min T on frame, along head at edge of glazing
T_{i2}	0.49	0.50	Min T on glazing, at corner of glazing
T_{i3}	0.51	0.52	Min T on slab, along head of window wall close to centre mullion

Detail 1.4.1

Window Wall System – Inside Corner with Spandrel to Vision Transition & No Interior Stud Cavity Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	Spandrel Wall, R-3.2 (0.56 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall without slab g = glazing
Transmittance / Resistance without Anomaly	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab t = combined glazing, spandrel with slab and corner
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_c	Incremental increase in transmittance per linear length of s = slab c = corner transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Full Spandrel Wall Clear Wall

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.04)	R-6.8 (1.20)	0.147 (0.84)
R-12.6 (2.22)	R-15.8 (2.78)	R-7.6 (1.34)	0.132 (0.75)
R-16.8 (2.96)	R-20.0 (3.52)	R-8.2 (1.44)	0.122 (0.69)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Full Spandrel Wall Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-5.2 (0.91)	0.193 (1.10)	0.366 (0.634)
R-12.6 (2.22)	R-5.6 (0.98)	0.179 (1.02)	0.379 (0.655)
R-16.8 (2.96)	R-5.8 (1.03)	0.171 (0.97)	0.390 (0.675)

Corner Linear Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ_c Btu/ft ·hr ·°F (W/m K)
R-2.9 (0.50)	0.350 (1.99)	0.244 (0.421)
R-2.9 (0.52)	0.341 (1.94)	0.245 (0.424)
R-3.0 (0.52)	0.336 (1.91)	0.247 (0.427)

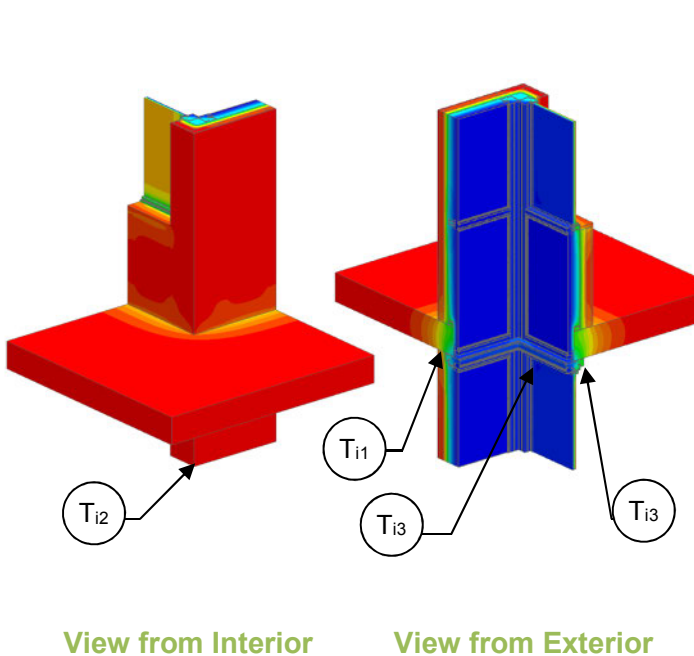
Temperature Indices

	R8.4	R12.6	R16.8	
T_{i1}	0.51	0.53	0.53	Min T in stud cavity, at deflection header away from corner
T_{i2}	0.78	0.82	0.83	Max T on backpan, at center of backpan away from slab and glazing
T_{i3}	0.52	0.52	0.52	Min T on interior glazing, at corner of deflection header
T_{i4}	0.54	0.55	0.55	Min T on slab, at deflection header, in line with vertical frame

Detail 1.4.2

Window Wall System – Inside Corner with Spandrel to Vision Transition & Interior Sprayfoam Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	Spandrel Wall, R-15.1 (2.67 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall without slab g = glazing
Transmittance / Resistance without Anomaly	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab t = combined glazing, spandrel with slab and corner
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_c	Incremental increase in transmittance per linear length of s = slab c = corner transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Full Spandrel Wall Clear Wall

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-23.5 (4.15)	R-18.5 (3.25)	0.054 (0.31)
R-12.6 (2.22)	R-27.7 (4.89)	R-19.4 (3.41)	0.052 (0.29)
R-16.8 (2.96)	R-31.9 (5.63)	R-20.0 (3.52)	0.050 (0.28)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Full Spandrel Wall Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ·hr·°F (W/m K)
R-8.4 (1.48)	R-9.0 (1.58)	0.111 (0.63)	0.456 (0.789)
R-12.6 (2.22)	R-9.3 (1.63)	0.108 (0.61)	0.449 (0.776)
R-16.8 (2.96)	R-9.4 (1.66)	0.106 (0.60)	0.447 (0.774)

Corner Linear Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ_c Btu/ft ·hr·°F (W/m K)
R-3.7 (0.65)	0.270 (1.53)	0.114 (0.197)
R-3.8 (0.66)	0.266 (1.51)	0.117 (0.203)
R-3.8 (0.67)	0.265 (1.50)	0.119 (0.206)

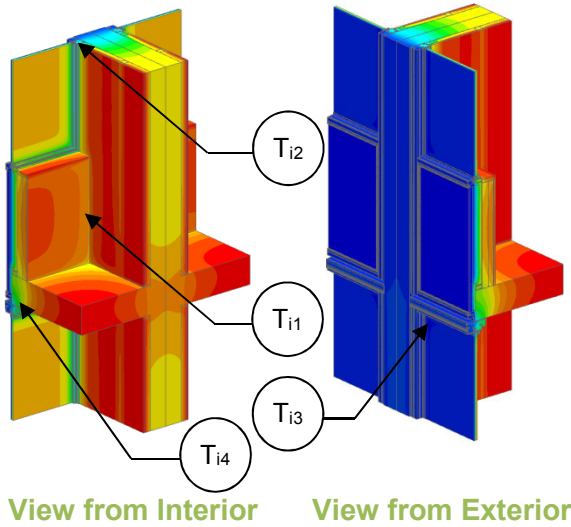
Temperature Indices

	R8.4	R12.6	R16.8	
T_{i1}	0.67	0.68	0.68	Min T in stud cavity, on sprayfoam in line with deflection header
T_{i2}	0.97	0.97	0.98	Max T on sprayfoam, at corner away from slab
T_{i3}	0.44	0.45	0.45	Min T on interior glazing, at corner of deflection header
T_{i4}	0.57	0.57	0.57	Min T on slab, at deflection header, in line with vertical frame

Detail 1.5.1

Window Wall System with Insulated Spandrel Panel – Uninsulated Interior Concrete Wall and Intermediate Floor Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab t = combined glazing and spandrel with vertical concrete wall and horizontal slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_v	Incremental increase in transmittance per linear length of s = slab v = vertical wall projection

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly - Spandrel Section Clear Wall

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.03)	R-6.3 (1.11)	0.158 (0.90)
R-16.8 (2.96)	R-20.0 (3.52)	R-7.6 (1.33)	0.132 (0.75)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Horizontal Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ_s Btu/ft·hr·°F (W/m K)
R-8.4 (1.48)	R-3.6 (0.64)	0.275 (1.56)	0.350 (0.606)
R-16.8 (2.96)	R-3.9 (0.70)	0.253 (1.44)	0.363 (0.628)

Vertical Wall Linear Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	ψ_v Btu/ft·hr·°F (W/m K)
R-2.4 (0.42)	0.419 (2.38)	0.386 (0.67)
R-2.5 (0.43)	0.405 (2.30)	0.476 (0.82)

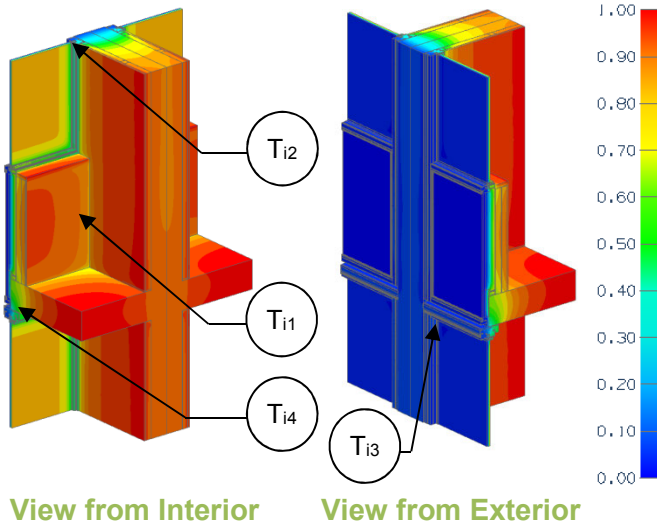
Temperature Indices

	R8.4	R16.8	
T_{i1}	0.29	0.31	Min T in stud cavity, on curtain wall frame, mid height of spandrel
T_{i2}	0.37	0.38	Min T on exposed window frame, away from sill
T_{i3}	0.52	0.52	Min T on interior glazing, at corner of deflection header
T_{i4}	0.54	0.55	Min T on slab, at deflection header

Detail 1.5.2

Window Wall System with Insulated Spandrel Panel – Insulated Interior Concrete Wall and Intermediate Floor Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab t = combined glazing and spandrel with vertical concrete wall and horizontal slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ_s, Ψ_v	Incremental increase in transmittance per linear length of s = slab v = vertical wall projection

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly - Spandrel Section Clear Wall

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.03)	R-6.3 (1.11)	0.158 (0.90)
R-16.8 (2.96)	R-19.9 (3.51)	R-7.6 (1.33)	0.132 (0.75)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.408 (2.32)

Intersection Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	Ψ Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-3.6 (0.64)	0.275 (1.56)	0.350 (0.606)
R-16.8 (2.96)	R-3.9 (0.70)	0.253 (1.44)	0.363 (0.628)

Vertical Wall Linear Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	Ψ_v Btu/ft ·hr ·°F (W/m K)
R-2.3 (0.40)	0.280 (1.59)	0.575 (1.00)
R-2.3 (0.41)	0.214 (1.21)	0.662 (1.15)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.32	0.35	Min T in stud cavity, on curtain wall frame, mid height of spandrel
T_{i2}	0.41	0.41	Min T on exposed window frame, away from sill
T_{i3}	0.52	0.52	Min T on interior glazing, at corner of deflection header
T_{i4}	0.54	0.55	Min T on slab, at deflection header

2.0 Conventional Curtain Wall

Detail 2.1.1	B.2.1
Conventional Curtain Wall System with Spandrel Panel and 3 5/8" x 1 5/8" Steel Studs (16" o.c.) – Slab Intersection & No Interior Insulation in Stud Cavity	
Detail 2.1.2	B.2.2
Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Intermediate Floor Intersection & Spray Foam Insulation in Stud Cavity	
Detail 2.1.3	B.2.3
Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – Insulated Metal Backpan and Intermediate Floor Intersection	
Detail 2.1.4	B.2.4
Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection	
Detail 2.1.5	B.2.5
Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – Insulated Metal Backpan and Intermediate Floor Intersection	
Detail 2.1.6	B.2.6
Conventional Curtain Wall System with 5' x 5' Spandrel Section – Alternative Glazing Methods and Intermediate Floor Intersection	
Detail 2.1.7	B.2.7
Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – Insulated Backpan and Improved Glazing at Intermediate Floor Intersection	
Detail 2.1.8	B.2.8
Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – AIM Applications and Improved Glazing at Intermediate Floor Intersection	
Detail 2.1.9	B.2.9
Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates – Intermediate Mullion and 5' x 5' Spandrel Section – Insulated Backpan and Intermediate Floor Intersection	
Detail 2.1.10	B.2.10
Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates – Intermediate Mullion and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection	
Detail 2.1.11	B.2.11

Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Slab Intersection & Spray Foam Insulation in Stud Cavity with Thermal Break Under Stud Cavity and at Anchors	
Detail 2.1.12	B.2.12
Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Studs (16" o.c.) – Slab Intersection & No Metal Back Pan	
Detail 2.1.13	B.2.13
Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Studs (16" o.c.) – Slab Intersection & Metal Back Pan Connected to Side of Frame	
Detail 2.2.1	B.2.14
Conventional Curtain Wall System with Insulated Spandrel Panel & 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Uninsulated Concrete with Spandrel & Roof Intersection	
Detail 2.2.2	B.2.15
Conventional Curtain Wall System –Insulated Spandrel & Roof Intersection	
Detail 2.2.3	B.2.16
Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Concrete Parapet Roof Intersection & Spray Foam Insulation in Stud Cavity	
Detail 2.2.4	B.2.17
Conventional Curtain Wall System with Insulated Spandrel Panel & 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Insulated Concrete with Spandrel & Roof Intersection	
Detail 2.3.1	B.2.18
Conventional Curtain Wall System with Insulated Spandrel Panel– Un-insulated Jamb Intersection with Vision Section	
Detail 2.3.2	B.2.19
Conventional Curtain Wall System with Insulated Spandrel Panel– Rigid Insulated Jamb Intersection with Vision Section	
Detail 2.3.3	B.2.20
Conventional Curtain Wall System with Insulated Spandrel Panel –Aerogel Insulated Jamb Intersection with Vision Section	
Detail 2.4.1	B.2.21
Conventional Curtain Wall with Insulated Spandrel Panel & 3 5/8" x 1 5/8" Steel Stud (16" o.c.) - Beam Intersection Connected to Concrete Slab	
Detail 2.4.2	B.2.22
Conventional Curtain Wall with Insulated Spandrel Panel & 5 5/8" x 1 5/8" Steel Stud (16" o.c.)- Beam Intersection Connected to Steel Beam	
Detail 2.4.3	B.2.23

Conventional Curtain Wall with Insulated Spandrel Panel & 3 5/8" x 1 5/8" Steel Stud (16" o.c.) - Canopy Beam & Gutter Intersection

Detail 2.4.4 B.2.24

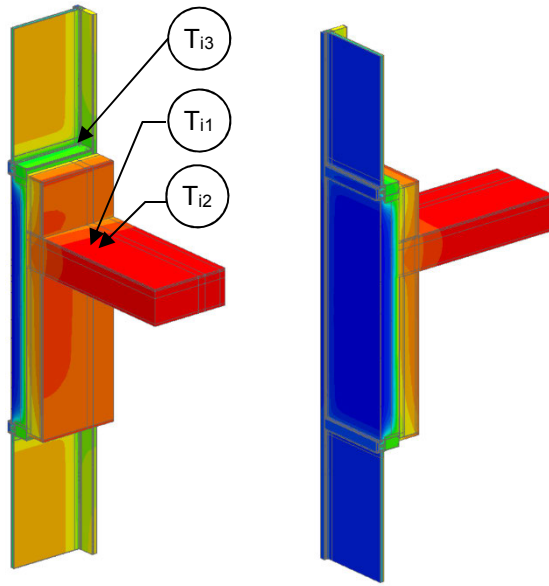
Conventional Curtain Wall with Insulated Spandrel Panel & 5 5/8" x 1 5/8" Steel Stud (16" o.c.) - Beam Intersection Connected to Steel Beam with Additional Mullions

Detail 2.5.1 B.2.25

Conventional Curtain Wall System – At-Grade Slab Transition

Detail 2.1.1

Conventional Curtain Wall System with Spandrel Panel and 3 5/8" x 1 5/8" Steel Studs (16" o.c.) – Slab Intersection & No Interior Insulation in Stud Cavity



View from Interior

View from Exterior

Thermal Performance Indicators

Transmittance / Resistance ¹	U_s, R_s	Spandrel Section U-Value and "Effective" R-value (including slab)
	U_g, R_g	Glazing U-value and "Effective" R-value
	U_t, R_t	Total Assembly U-value and "Effective" R-value
Surface Temperature Index ²	T_i	0 = exterior temperature 1 = interior temperature

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimension
² Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Nominal (1D) vs. Assembly Performance Indicators

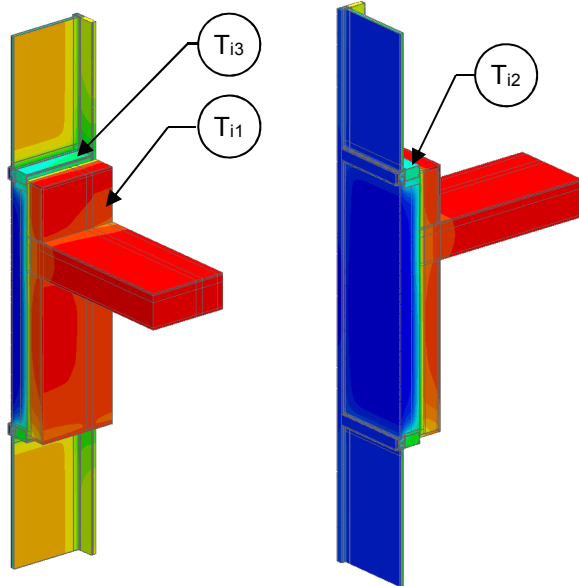
Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-3.6 (0.64)	0.274 (1.56)	R-2.2 (0.39)	0.452 (2.57)	R-2.7 (0.48)	0.366 (2.08)
R-16.8 (2.96)	R-4.8 (0.85)	0.207 (1.17)	R-2.2 (0.39)	0.452 (2.57)	R-3.0 (0.53)	0.334 (1.89)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.49	0.61	Min T on Back Pan, at the mullion, by the slab
T_{i2}	0.42	0.53	Min T on interior frame, at vertical mullion behind slab
T_{i3}	0.47	0.50	Min T on interior window, at bottom corner

Detail 2.1.2

Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Stud (16" o.c) – Intermediate Floor Intersection & Spray Foam Insulation in Stud Cavity



View from Interior

View from Exterior

Thermal Performance Indicators

Transmittance / Resistance ¹	U_s, R_s	Spandrel Section U-Value and "Effective" R-value (including slab)
	U_g, R_g	Glazing U-value and "Effective" R-value
	U_t, R_t	Total Assembly U-value and "Effective" R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

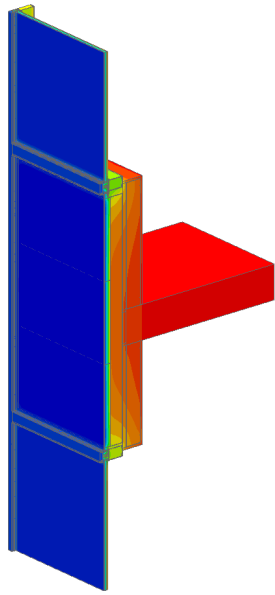
Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-5.4 (0.95)	0.186 (1.05)	R-2.2 (0.39)	0.452 (2.57)	R-3.1 (0.54)	0.323 (1.84)
R-16.8 (2.96)	R-6.7 (1.18)	0.149 (0.85)	R-2.2 (0.39)	0.452 (2.57)	R-3.3 (0.58)	0.306 (1.74)

Temperature Indices

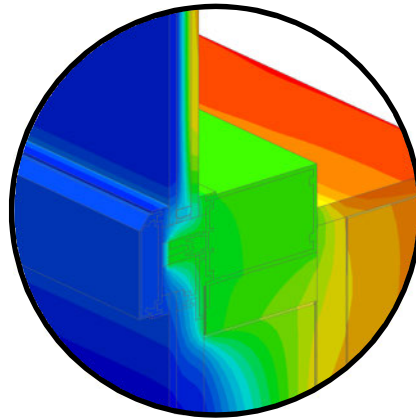
	R8.4	R16.8	
T_{i1}	0.43	0.50	Min T in stud cavity, on Anchor
T_{i2}	0.48	0.49	Min T on interior frame, on sill
T_{i3}	0.44	0.45	Min T on interior window, at bottom corner

Detail 2.1.3

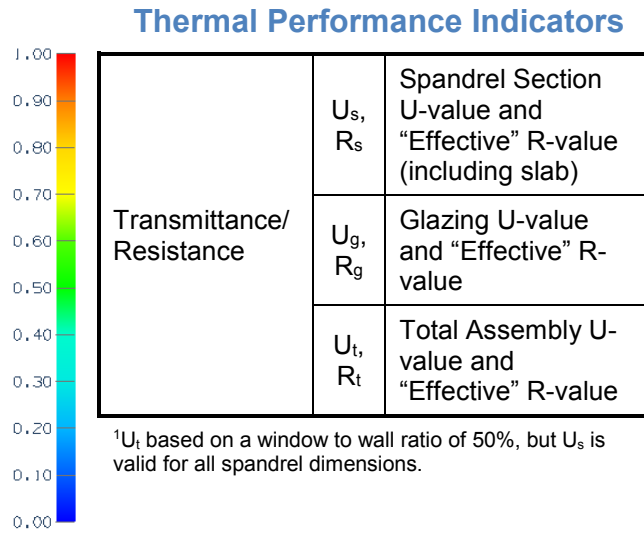
Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – Insulated Metal Backpan and Intermediate Floor Intersection



View from Exterior



Mullion Detail



Scenario

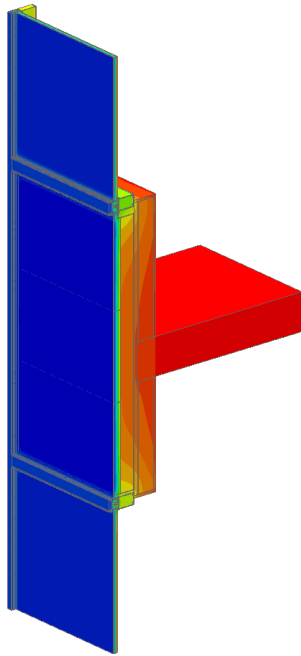
Scenario	Vision Glass and Spacer	Insulation Thickness and Application
A0	Double Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan

Nominal (1D) vs. Assembly Performance Indicators

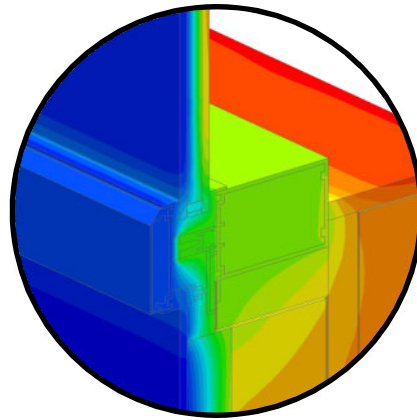
Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
A0	R-16.8 (2.96)	R-4.9 (0.86)	0.204 (1.16)	R-2.4 (0.42)	0.417 (2.37)	R-3.2 (0.57)	0.310 (1.76)

Detail 2.1.4

Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection



View from Exterior



Mullion Detail

Thermal Performance Indicators



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and "Effective" R-value (including slab)
	U_g, R_g	Glazing U-value and "Effective" R-value
	U_t, R_t	Total Assembly U-value and "Effective" R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

AIM = Architectural Insulation Module

Scenarios

Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
A1	Double Glazed with Aluminum Spacer	1.5" (38 mm) AIM adhered to Monolithic Glass	None
A2	Double Glazed with Aluminum Spacer	1.5" (38 mm) AIM adhered to Insulating Glass	None
A3	Double Glazed with Aluminum Spacer	0.75" (19 mm) AIM between Glass	Aluminum Spacer
A4	Double Glazed with Aluminum Spacer	1" (25 mm) AIM between Metal Skins	Rigid Insulation

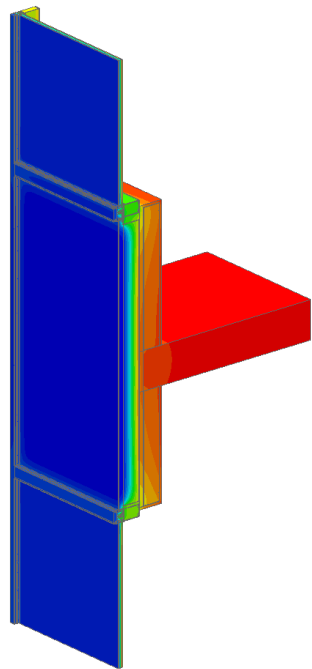
Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
A1	R-58.6 (10.32)	R-6.1 (1.08)	0.163 (0.93)	R-2.3 (0.41)	0.427 (2.42)	R-3.4 (0.60)	0.295 (1.68)
A2	R-58.6 (10.32)	R-6.3 (1.10)	0.160 (0.91)	R-2.4 (0.42)	0.416 (2.36)	R-3.5 (0.61)	0.288 (1.64)
A3	R-29.3 (5.16)	R-6.4 (1.12)	0.157 (0.89)	R-2.4 (0.42)	0.422 (2.40)	R-3.5 (0.61)	0.289 (1.64)
A4	R-39.1 (6.89)	R-7.1 (1.25)	0.141 (0.80)	R-2.4 (0.42)	0.417 (2.37)	R-3.6 (0.63)	0.279 (1.58)

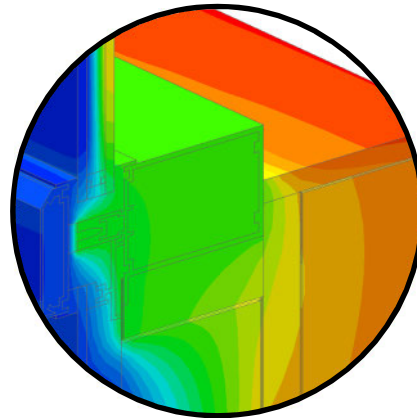
Detail 2.1.5

Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – Insulated Metal Backpan and Intermediate Floor Intersection

Thermal Performance Indicators



View from Exterior



Mullion Detail



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

Scenario

Scenario	Vision Glass and Spacer	Insulation Thickness and Application
B0	Double Glazed with Silicone Warm Edge Spacer	4" (100 mm) Mineral Wool in Backpan

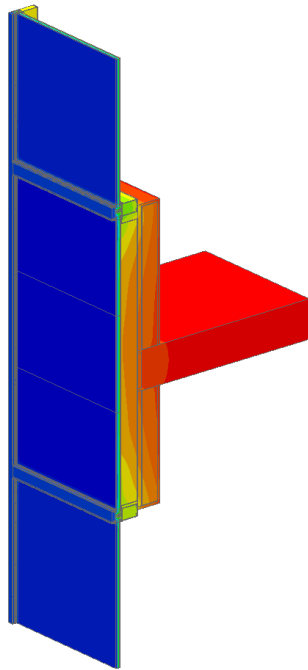
Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
B0	R-16.8 (2.96)	4.9 (0.86)	0.204 (1.16)	2.5 (0.43)	0.408 (2.32)	3.3 (0.58)	0.306 (1.74)

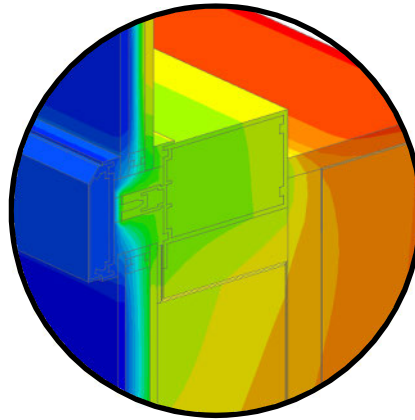
Detail 2.1.6

Conventional Curtain Wall System with 5' x 5' Spandrel Section – Alternative Glazing Methods and Intermediate Floor Intersection

Thermal Performance Indicators



View from Exterior



Mullion Detail



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

AIM = Architectural Insulation Module

Scenarios

Scenario	Glazing Method	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
B1	Vertical & Horizontal Pressure Plates	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
B2	Vertical Structural Silicone & Horizontal Pressure Plates	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer

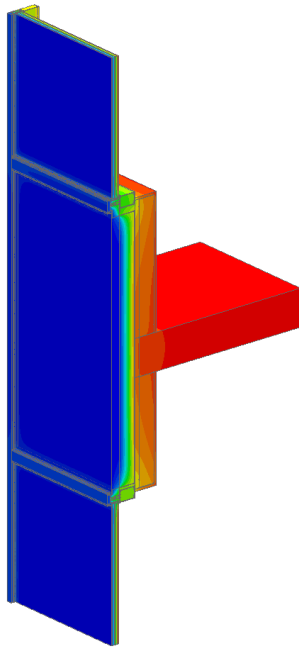
Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
B1	R-29.3 (5.16)	R-6.6 (1.16)	0.151 (0.86)	R-2.4 (0.42)	0.415 (2.36)	R-3.5 (0.62)	0.283 (1.61)
B2	R-46.1 (8.12)	R-8.8 (1.56)	0.113 (0.64)	R-2.6 (0.46)	0.382 (2.17)	R-4.0 (0.71)	0.249 (1.41)

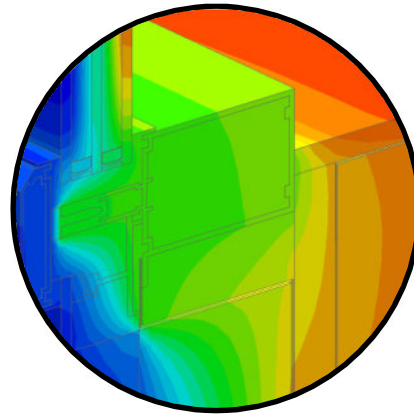
Detail 2.1.7

Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – Insulated Backpan and Improved Glazing at Intermediate Floor Intersection

Thermal Performance Indicators



View from Exterior



Mullion Detail



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

Scenario

Scenario	Vision Glass and Spacer	Insulation Thickness and Application
C0	Triple Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan

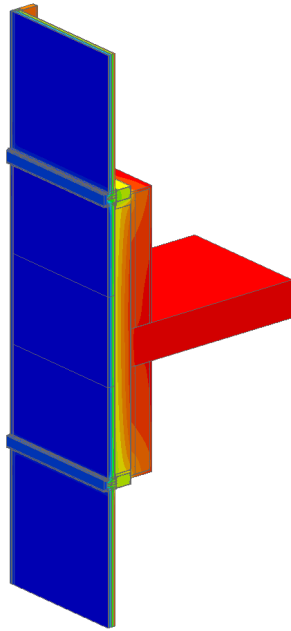
Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
C0	R-16.8 (2.96)	R-5.3 (0.93)	0.189 (1.07)	R-3.5 (0.61)	0.289 (1.64)	R-4.2 (0.74)	0.239 (1.35)

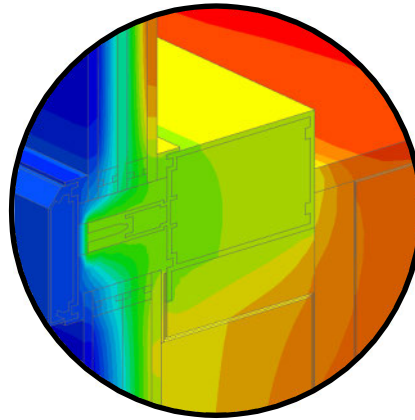
Detail 2.1.8

Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – AIM Applications and Improved Glazing at Intermediate Floor Intersection

Thermal Performance Indicators



View from Exterior



Mullion Detail



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

AIM = Architectural Insulation Module

Scenarios

Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
C1	Triple Glazed with Silicone Warm Edge Spacer	1.5" (38 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer

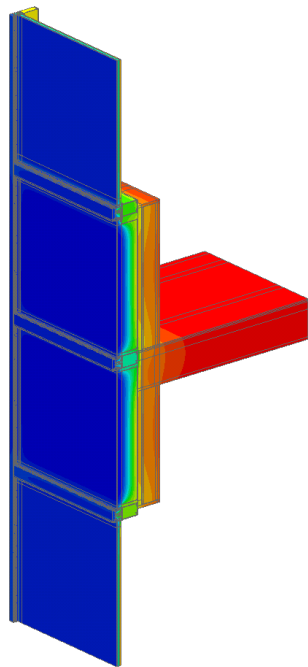
Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
C1	R-75.4 (13.28)	R-10.5 (1.85)	0.095 (0.54)	R-4.0 (0.70)	0.250 (1.42)	R-5.8 (1.02)	0.173 (0.98)

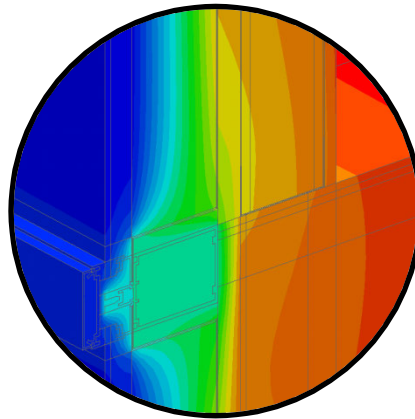
Detail 2.1.9

Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates – Intermediate Mullion and 5' x 5' Spandrel Section – Insulated Backpan and Intermediate Floor Intersection

Thermal Performance Indicators



View from Exterior



Mullion Detail



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

Scenario

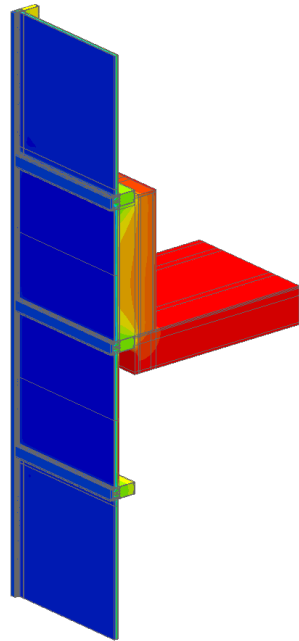
Scenario	Vision Glass and Spacer	Insulation Thickness and Application
D0	Double Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan

Nominal (1D) vs. Assembly Performance Indicators

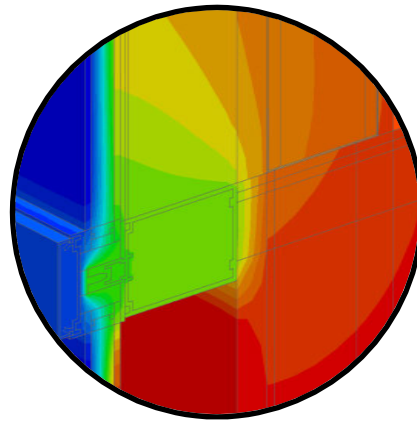
Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
D0	R-16.8 (2.96)	R-4.0 (0.70)	0.250 (1.42)	R-2.5 (0.44)	0.404 (2.29)	R-3.1 (0.54)	0.327 (1.86)

Detail 2.1.10 Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates – Intermediate Mullion and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection

Thermal Performance Indicators



View from Exterior



Mullion Detail



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

AIM = Architectural Insulation Module

Scenarios

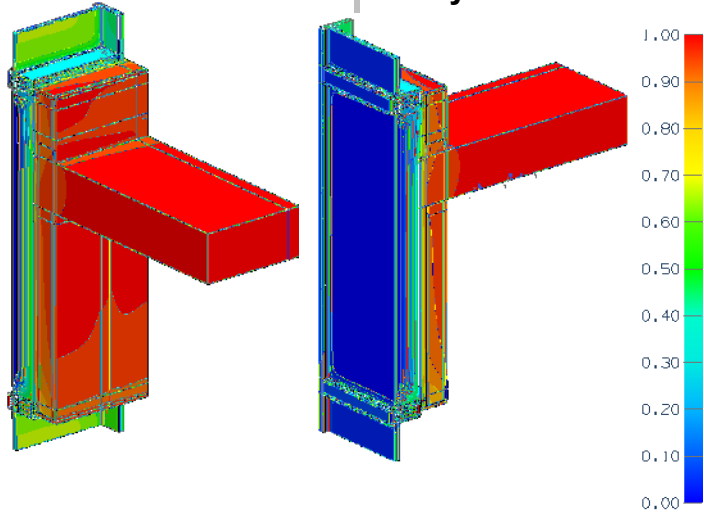
Scenario	Curtain Wall Framing	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
D1	Vertical & Horizontal Pressure Plates	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
D2	Vertical Structural Silicone & Horizontal Pressure Plates	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
D3	Vertical Structural Silicone & Horizontal Pressure Plates	Double Glazed with Silicone Warm Edge Spacer	1" (25 mm) AIM between Metal Skins	Rigid Insulation
D4	Vertical Structural Silicone & Horizontal Pressure Plates	Triple Glazed with Silicone Warm Edge Spacer	1.5" (38 mm) AIM between Glass	Silicone Warm Edge Spacer

Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
D1	R-29.3 (5.16)	R-4.6 (0.81)	0.217 (1.23)	R-2.4 (0.42)	0.414 (2.35)	R-3.1 (0.55)	0.318 (1.81)
D2	R-29.3 (5.16)	R-5.4 (0.96)	0.184 (1.04)	R-2.6 (0.45)	0.390 (2.22)	R-3.5 (0.61)	0.287 (1.63)
D3	R-39.1 (6.89)	R-6.0 (1.05)	0.167 (0.95)	R-2.6 (0.46)	0.385 (2.19)	R-3.6 (0.64)	0.276 (1.57)
D4	R-58.6 (10.32)	R-6.1 (1.08)	0.163 (0.92)	R-4.0 (0.71)	0.250 (1.42)	R-4.9 (0.85)	0.206 (1.17)

Detail 2.1.11

Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Stud (16" o.c) – Slab Intersection & Spray Foam Insulation in Stud Cavity with Thermal Break Under Stud Cavity and at Anchors



View from Interior View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance of spandrel section + backup wall with sprayfoam
Spandrel Transmittance/Resistance	U_s, R_s	U- and R-Value for Spandrel section only
Surface Temperature Index	T_i	0 = exterior temperature 1 = interior temperature

¹For performance of base assembly spandrel without thermal breaks, refer to Detail 2.1.2

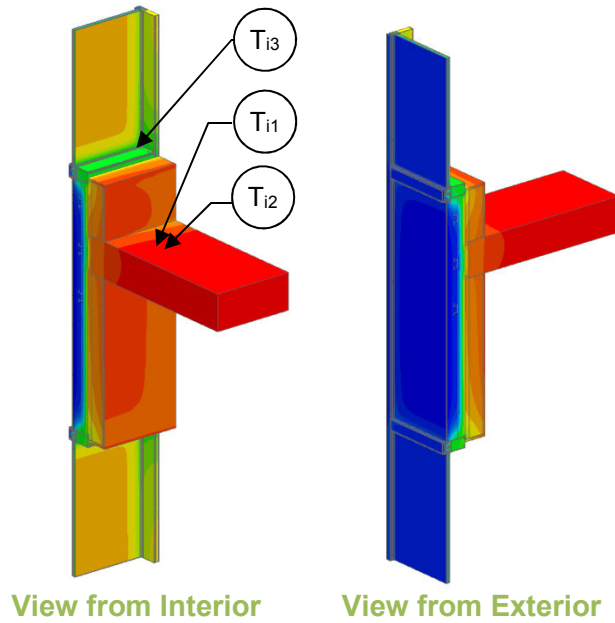
Scenario

Scenario	Flashing and Shelf Angle
1	2" Armatherm 500 beneath stud cavity
2	2" Armatherm 500 beneath stud cavity and 3/8" FRR at support angle

Back Pan Insulation vs. Assembly Performance Indicators

Scenario	Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
1	R-15 (2.64)	R-29.91 (5.26)	R-9.4 (1.66)	0.106 (0.60)
2	R-15 (2.64)	R-29.91 (5.26)	R-9.6 (1.70)	0.103 (0.59)

Detail 2.1.12 Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Studs (16" o.c.) – Slab Intersection & No Metal Back Pan



Thermal Performance Indicators

Transmittance / Resistance ¹	U_s, R_s	Spandrel Section U-Value and "Effective" R-value (including slab)
	U_g, R_g	Glazing U-value and "Effective" R-value
	U_t, R_t	Total Assembly U-value and "Effective" R-value
Surface Temperature Index ²	T_i	0 = exterior temperature 1 = interior temperature

¹ U_t based on a window to wall ratio of 50%

² Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Scenario

Scenario	Mullion Wrap
A	None
B	Yes

Nominal (1D) vs. Assembly Performance Indicators

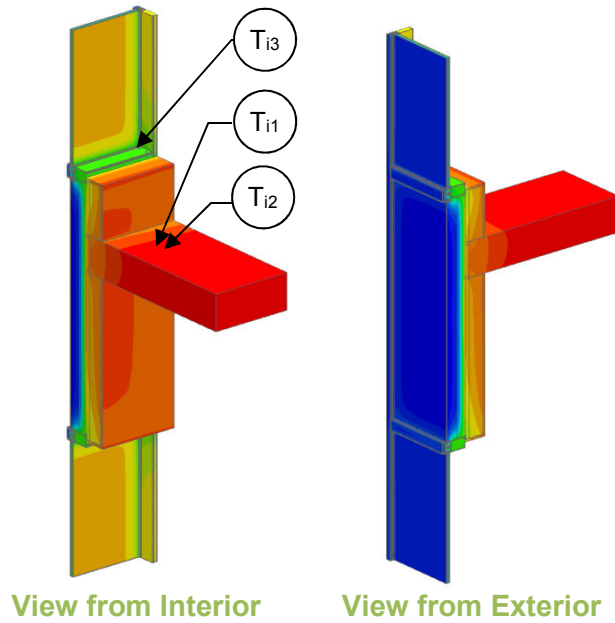
Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr ·°F (W/m ² K)
A	R-8.4 (1.48)	R-4.1 (0.73)	0.241 (1.37)	R-2.2 (0.39)	0.452 (2.57)	R-2.9 (0.50)	0.350 (1.99)
B	R-8.4 (1.48)	R-4.8 (0.84)	0.209 (1.18)	R-2.2 (0.39)	0.452 (2.57)	R-3.0 (0.53)	0.335 (1.90)

Temperature Indices

	A	B	
T_{i1}	0.35	0.25	Min T on Back Pan, at the mullion, by the slab
T_{i2}	0.35	0.21	Min T on interior frame, at vertical mullion behind slab
T_{i3}	0.46	0.45	Min T on interior window, at bottom corner

Detail 2.1.13

Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Studs (16" o.c.) – Slab Intersection & Metal Back Pan Connected to Side of Frame



Thermal Performance Indicators

Transmittance / Resistance ¹	U_s, R_s	Spandrel Section U-Value and "Effective" R-value (including slab)
	U_g, R_g	Glazing U-value and "Effective" R-value
	U_t, R_t	Total Assembly U-value and "Effective" R-value
Surface Temperature Index ²	T_i	0 = exterior temperature 1 = interior temperature

¹ U_t based on a window to wall ratio of 50%

² Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Scenario

Scenario	Location of Metal Back Pan Connected at Frame
A, B	Interior
C	Inset

Nominal (1D) vs. Assembly Performance Indicators

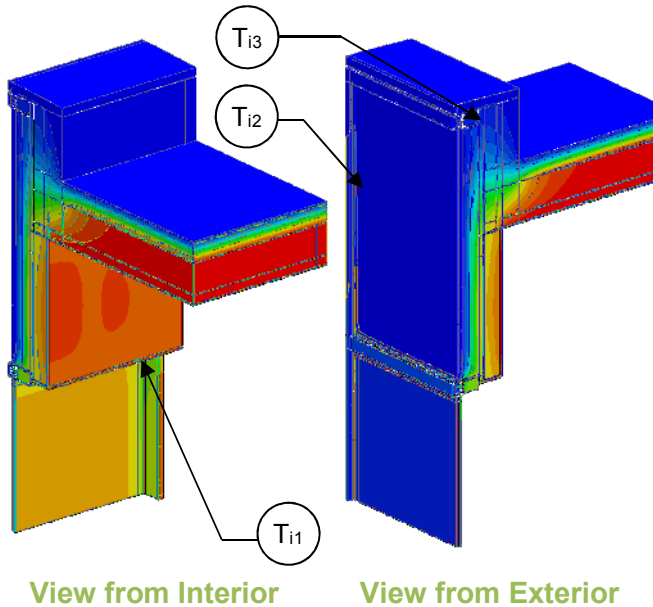
Scenario	Insulation R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr ·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t ¹ Btu/ft ² ·hr ·°F (W/m ² K)
A	R-8.4 (1.48)	R-4.3 (0.76)	0.231 (1.31)	R-2.2 (0.39)	0.452 (2.57)	R-2.9 (0.51)	0.346 (1.96)
B	R-16.8 (2.96)	R-6.2 (1.10)	0.160 (0.91)	R-2.2 (0.39)	0.452 (2.57)	R-3.2 (0.57)	0.311 (1.77)
C	R-8.4 (1.48)	R-5.5 (0.97)	0.181 (1.03)	R-2.2 (0.39)	0.452 (2.57)	R-3.1 (0.55)	0.322 (1.83)

Temperature Indices

	A	B	C	
T_{i1}	0.52	0.65	0.64	Min T on Back Pan, at the mullion, by the slab
T_{i2}	0.50	0.64	0.63	Min T on interior frame, at vertical mullion behind slab
T_{i3}	0.48	0.52	0.52	Min T on interior window, at bottom corner

Detail 2.2.1

Conventional Curtain Wall System with Insulated Spandrel Panel & 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Uninsulated Concrete with Spandrel & Roof Intersection



Thermal Performance Indicators



Spandrel Wall 1D (Nominal) R-Value	R_{1D}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_s, R_s, U_g	“clear field” U- and R-value r = roof s = spandrel wall g = glazing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.429 (2.44)

Base Assembly – Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-6.9 (1.21)	0.145 (0.82)
R-16.8 (2.96)	R-20.5 (3.61)	R-8.8 (1.55)	0.113 (0.64)

Parapet Linear Transmittance

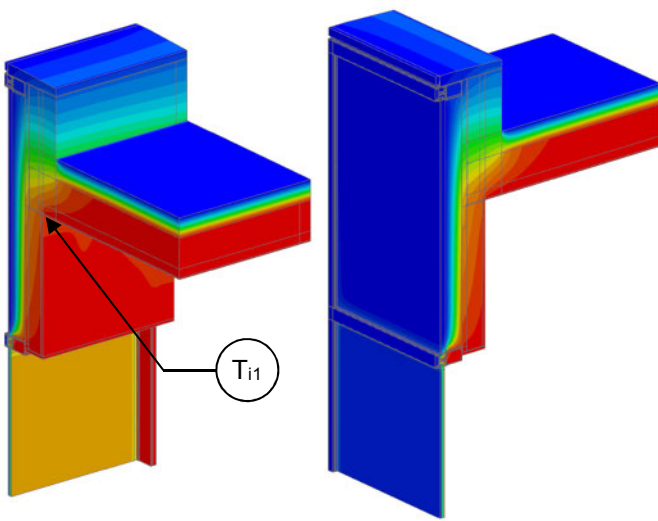
Spandrel Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-8.4 (1.48)	R-3.6 (0.63)	0.280 (1.59)	0.493 (0.853)
R-16.8 (2.96)	R-3.9 (0.68)	0.259 (1.47)	0.484 (0.838)

Temperature Indices

	R8.4	R16.8	
T_{11}	0.54	0.58	Min T on interior frame, along head at edge of glazing
T_{12}	0.56	0.57	Min T on concrete ceiling, at curtain wall anchor
T_{13}	0.09	0.10	Min T on frame, at top of parapet

Detail 2.2.2 Conventional Curtain Wall System – Insulated Spandrel & Roof Intersection

Thermal Performance Indicators



View from Interior²

View from Exterior²

Spandrel Wall 1D (Nominal) R-Value	R _{1D}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U _r , R _r , U _s , R _s , U _g	“clear wall” U- and R-value r = roof s = spandrel wall g = glazing
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

²Thermal image shown is for the Aerogel detail

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R _r ft ² ·hr·°F / Btu (m ² K / W)	U _r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Base Assembly – Glazing

U _{centre of glass} Btu/ft ² ·hr ·°F (W/m ² K)	U _g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.429 (2.44)

Base Assembly – Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _s ft ² ·hr·°F / Btu (m ² K / W)	U _s Btu/ft ² ·hr ·°F (W/m ² K)
R-16.8 (2.96)	R-20.5 (3.61)	R-8.9 (1.56)	0.112 (0.64)

Parapet Linear Transmittance

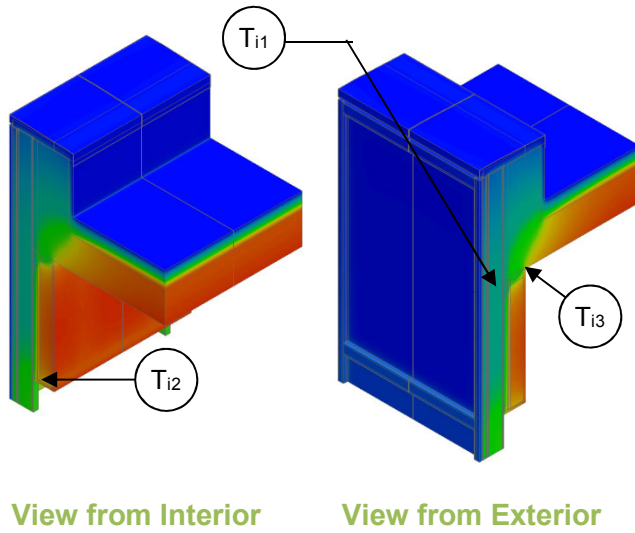
Parapet Insulation	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
Conventional	R-2.5 (0.44)	0.397 (2.25)	0.614 (1.06)
Aerogel	R-2.8 (0.49)	0.363 (2.06)	0.513 (0.89)

Temperature Indices

	Conventional	Aerogel	
T _{i1}	0.94	0.94	Min T on interior concrete, at roof intersection

Detail 2.2.3

Conventional Curtain Wall System with Insulated Spandrel Panel and 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Concrete Parapet Roof Intersection & Spray Foam Insulation in Stud Cavity



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-14.9 (2.62 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U _r , R _r , U _s , R _s	"clear wall" U- and R-value r = insulated roof s = curtain wall spandrel
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

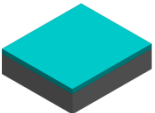
Base Assembly – Spandrel Panel Section

Backpan Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _s ft ² ·hr·°F / Btu (m ² K / W)	U _s Btu/ft ² ·hr ·°F (W/m ² K)
R-1 ² (0.18)	R-15.9 (2.80)	R-7.4 (1.30)	0.135 (0.77)
R-5 (0.88)	R-19.9 (3.50)	R-8.2 (1.44)	0.122 (0.69)
R-15 (2.64)	R-29.9 (5.26)	R-8.8 (1.55)	0.113 (0.64)
R-25 (4.40)	R-39.9 (7.02)	R-9.1 (1.60)	0.110 (0.63)

² This value represents no insulation in the back pan.

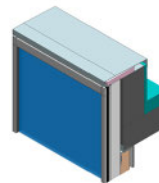
Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R _r ft ² ·hr·°F / Btu (m ² K / W)	U _r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)



Parapet Linear Transmittance

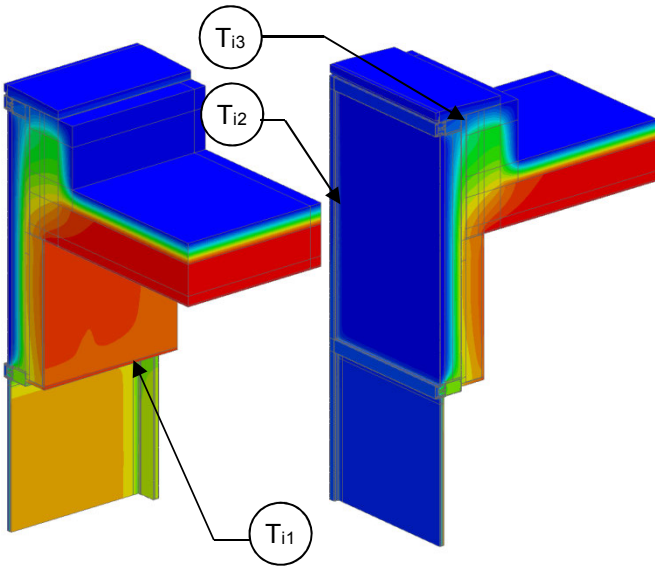
Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-1 (0.18)	R-6.6 (1.16)	0.151 (0.86)	0.426 (0.738)
R-5 (0.88)	R-7.0 (1.23)	0.143 (0.81)	0.404 (0.699)
R-15 (2.64)	R-7.4 (1.30)	0.136 (0.77)	0.384 (0.664)
R-25 (4.40)	R-7.5 (1.32)	0.134 (0.76)	0.380 (0.657)



Temperature Indices

	R1	R5	R15	R25	
T _{i1}	0.26	0.34	0.38	0.39	Min T on Back Pan, at the mullion, the between slab and bottom transom
T _{i2}	0.47	0.51	0.53	0.53	Min T on interior frame, at mullion transom corner
T _{i3}	0.60	0.64	0.65	0.66	Min T ceiling, at gypsum/ceiling intersection, adjacent to curtain wall anchor

Detail 2.2.4 Conventional Curtain Wall System with Insulated Spandrel Panel & 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Insulated Concrete with Spandrel & Roof Intersection



View from Interior

View from Exterior

Thermal Performance Indicators

Spandrel Wall 1D (Nominal) R-Value	R_{1D}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_s, R_s, U_g	"clear field" U- and R-value r = roof s = spandrel wall g = glazing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.429 (2.44)

Base Assembly – Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-6.9 (1.21)	0.145 (0.82)
R-16.8 (2.96)	R-20.5 (3.61)	R-8.8 (1.55)	0.113 (0.64)

Parapet Linear Transmittance

Spandrel Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-8.4 (1.48)	R-3.7 (0.64)	0.273 (1.55)	0.444 (0.768)
R-16.8 (2.96)	R-3.9 (0.69)	0.254 (1.44)	0.439 (0.760)

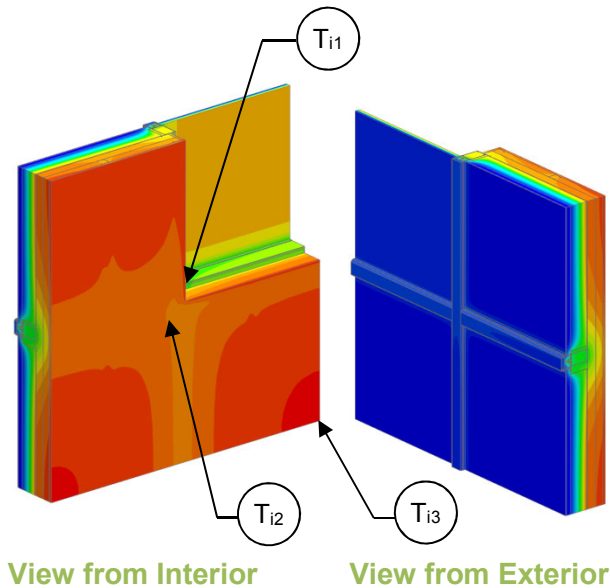
Temperature Indices

	R8.4	R16.8	
T_{11}	0.49	0.53	Min T on interior frame, along head at edge of glazing
T_{12}	0.57	0.64	Min T on concrete ceiling, at curtain wall anchor
T_{13}	0.13	0.15	Min T on frame, at top of parapet

Detail 2.3.1

Conventional Curtain Wall System with Insulated Spandrel Panel– Un-insulated Jamb Intersection with Vision Section

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance	U_w, R_w, U_g	U-value and R-value for w = spandrel wall g = glazing, including framing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-4.5 (0.80)	0.221 (1.25)
R-16.8 (2.96)	R-20.5 (3.61)	R-5.3 (0.93)	0.189 (1.07)

Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.429 (2.44)

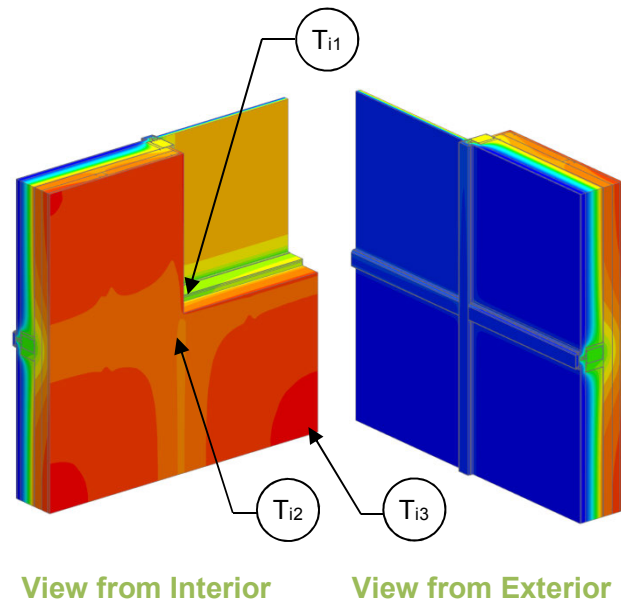
Combined Assembly

Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-3.7 (0.65)	0.273 (1.55)
R-16.8 (2.96)	R-4.0 (0.71)	0.249 (1.41)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.46	0.52	Min T on frame, at corner of lower glazing
T_{i2}	0.47	0.58	Min T on backpan, at upper corner diagonal from glazing
T_{i3}	0.81	0.88	Max T on backpan, at centre of backpan below glazing

Detail 2.3.2 Conventional Curtain Wall System with Insulated Spandrel Panel–Rigid Insulated Jamb Intersection with Vision Section



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance	U_w, R_w, U_g	U-value and R-value for w = spandrel wall g = glazing, including framing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-4.8 (0.84)	0.209 (1.19)
R-16.8 (2.96)	R-20.5 (3.61)	R-6.2 (1.09)	0.161 (0.92)

Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.429 (2.44)

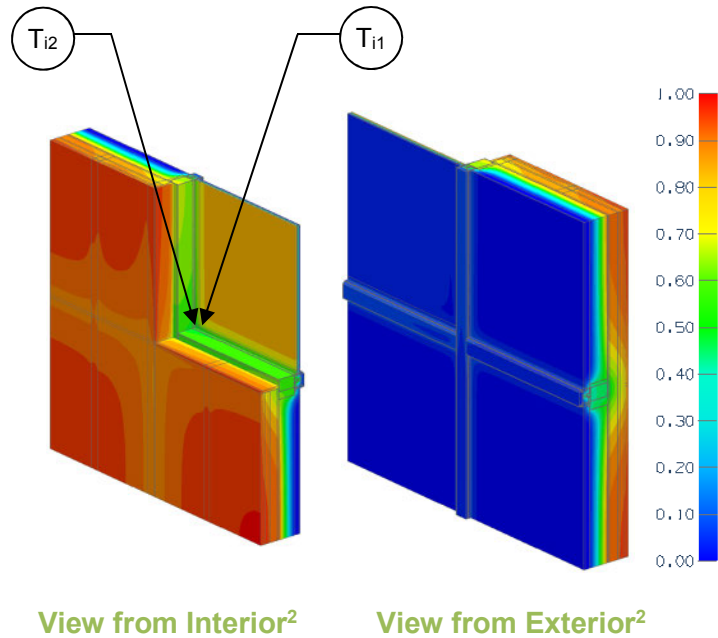
Combined Assembly

Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-3.8 (0.67)	0.264 (1.50)
R-16.8 (2.96)	R-4.4 (0.77)	0.228 (1.30)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.47	0.54	Min T on frame, at corner of lower glazing
T_{i2}	0.50	0.62	Min T on backpan, at upper corner diagonal from glazing
T_{i3}	0.81	0.88	Max T on backpan, at centre of backpan below glazing

Detail 2.3.3 Conventional Curtain Wall System with Insulated Spandrel Panel – Aerogel Insulated Jamb Intersection with Vision Section



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-3.7 (0.65 RSI) + R-16.8 (2.96 RSI) backpan insulation
Transmittance / Resistance	U _w , R _w , U _g	U-value and R-value for w = spandrel wall g = glazing, including framing
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature

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

²Thermal image shown is for the Aerogel detail

Nominal (1D) vs. Assembly Performance Indicators

Spandrel Section

Jamb Condition	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _w ft ² ·hr·°F / Btu (m ² K / W)	U _w Btu/ft ² ·hr ·°F (W/m ² K)
No Aerogel	R-20.5 (3.61)	R-5.3 (0.93)	0.189 (1.07)
Aerogel	R-20.5 (3.61)	R-6.5 (1.14)	0.155 (0.88)

Glazing

U _{centre of glass} Btu/ft ² ·hr ·°F (W/m ² K)	U _g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.429 (2.44)

Combined Assembly

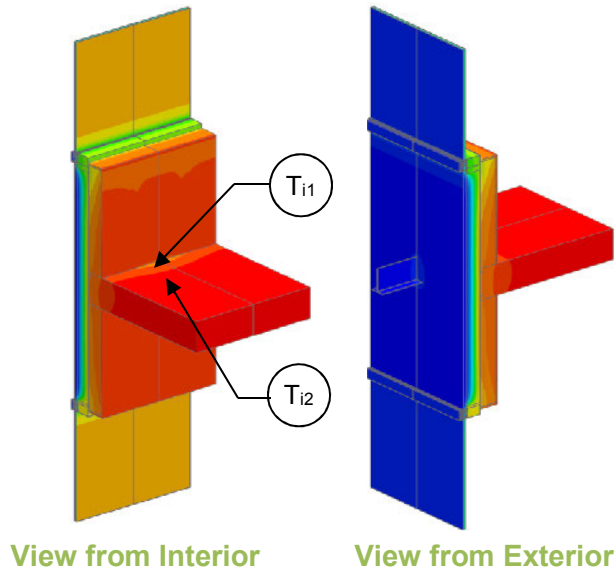
Jamb Condition	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)
No Aerogel	R-4.0 (0.71)	0.249 (1.41)
Aerogel	R-4.5 (0.79)	0.224 (1.27)

Temperature Indices

	Conventional	Aerogel	
T _{i1}	0.47	0.51	Min T on glazing, at corner of glass
T _{i2}	0.53	0.59	Min T on frame, at corner of glass

Detail 2.4.1

Conventional Curtain Wall with Insulated Spandrel Panel & 3 5/8" x 1 5/8" Steel Stud (16" o.c.) - Beam Intersection Connected to Concrete Slab



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.57 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value of spandrel without slab and beam
Transmittance / Resistance	U, R	U and R-values for the assembly including spandrel, slab and beam intersection
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for steel beam attached to slab

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

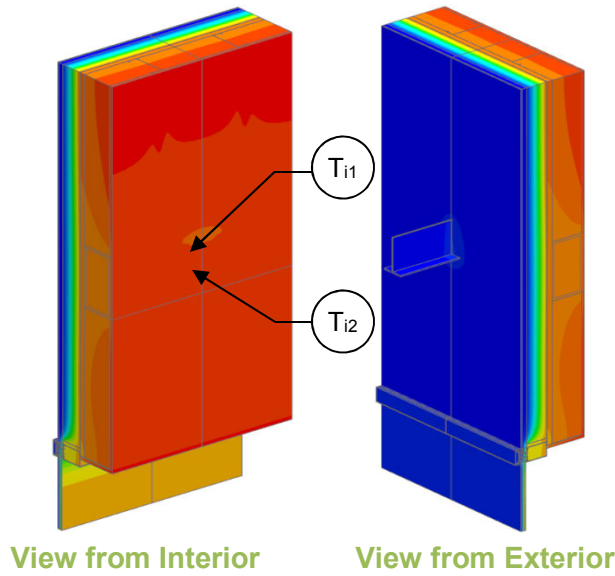
Nominal (1D) vs. Assembly Performance Indicators

Backpan insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr · °F (W/K)
R-8.4 (1.48)	R-11.6 (2.05)	R-6.5 (1.15)	0.153 (0.87)	R-5.6 (0.99)	0.177 (1.01)	0.182 (0.10)
R-16.8 (2.96)	R-20.0 (3.53)	R-8.1 (1.42)	0.124 (0.70)	R-6.6 (1.15)	0.153 (0.87)	0.220 (0.12)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.46	0.48	Min T on knife edge and backpan, at intersection
T_{i2}	0.69	0.68	Min T on slab, below knife edge intersection

Detail 2.4.2 Conventional Curtain Wall with Insulated Spandrel Panel & 5 5/8" x 1 5/8" Steel Stud (16" o.c.)- Beam Intersection Connected to Steel Beam



Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.57 RSI) + ackpan insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value of spandrel without beam
Transmittance / Resistance	U, R	U and R-values for the assembly including spandrel and beam intersection
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for steel beam attached to a steel beam

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

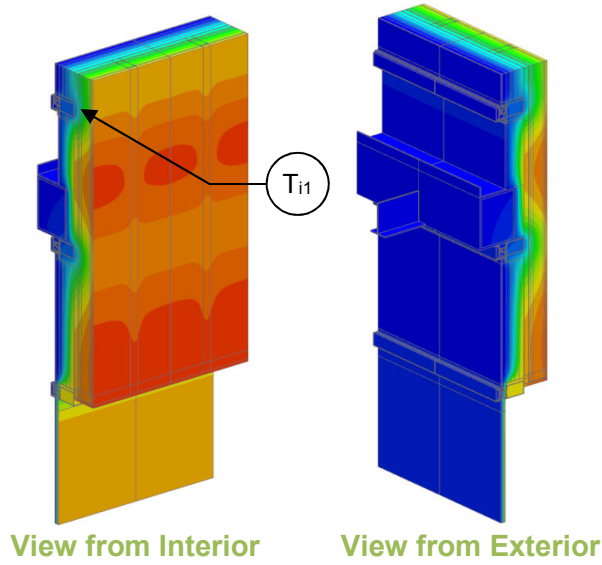
Nominal (1D) vs. Assembly Performance Indicators

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr · °F (W/K)
R-8.4 (1.48)	R-11.6 (2.05)	R-9.5 (1.67)	0.105 (0.60)	R-7.1 (1.25)	0.141 (0.80)	0.268 (0.14)
R-16.8 (2.96)	R-20.0 (3.53)	R-13.5 (2.38)	0.074 (0.42)	R-8.8 (1.55)	0.114 (0.65)	0.296 (0.16)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.49	0.52	Min T on knife edge and backpan, at intersection
T_{i2}	0.66	0.69	Min T on steel beam, below knife edge intersection

Detail 2.4.3 Conventional Curtain Wall with Insulated Spandrel Panel & 3 5/8" x 1 5/8" Steel Stud (16" o.c.) - Canopy Beam & Gutter Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.57 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value of spandrel without beam
Transmittance / Resistance	U, R	U and R-values for the assembly including spandrel and beam intersection
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of gutter

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

Nominal (1D) vs. Assembly Performance Indicators

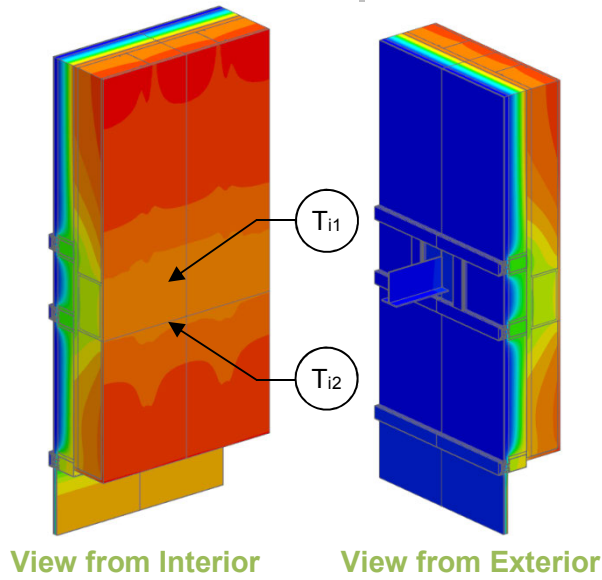
Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-8.4 (1.48)	R-11.6 (2.05)	R-9.4 (1.66)	0.106 (0.60)	R-4.5 (0.80)	0.221 (1.25)	0.588 (1.017)
R-16.8 (2.96)	R-20.0 (3.53)	R-13.5 (2.38)	0.074 (0.42)	R-4.8 (0.84)	0.210 (1.19)	0.695 (1.204)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.15	0.16	Min T on upper backpan, away from knife edge

Detail 2.4.4

Conventional Curtain Wall with Insulated Spandrel Panel & 5 5/8" x 1 5/8" Steel Stud (16" o.c.) - Beam Intersection Connected to Steel Beam with Additional Mullions



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.57 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value of spandrel without beam
Transmittance / Resistance	U, R	U and R-values for the assembly including spandrel and beam intersection
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for a steel beam attached to a steel beam with additional mullions

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

Nominal (1D) vs. Assembly Performance Indicators

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	χ Btu/hr·°F (W/K)
R-8.4 (1.48)	R-11.6 (2.05)	R-5.8 (1.02)	0.172 (0.98)	R-5.3 (0.93)	0.19 (1.08)	0.148 (0.08)
R-16.8 (2.96)	R-20.0 (3.53)	R-7.4 (1.30)	0.135 (0.77)	R-6.3 (1.10)	0.16 (0.91)	0.208 (0.11)

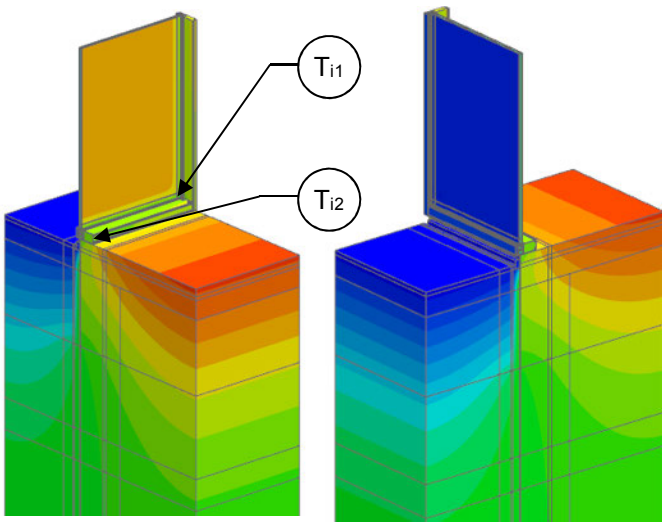
Temperature Indices

	R8.4	R16.8	
T_{i1}	0.42	0.45	Min T on knife edge and backpan, at intersection
T_{i2}	0.53	0.57	Min T on steel beam, underneath the knife edge

Detail 2.5.1

Conventional Curtain Wall System – At-Grade Slab Transition

Thermal Performance Indicators



View from Interior²

View from Exterior²

Transmittance / Resistance without Anomaly	U_f , R_f , U_g	“clear field” U- and R-value: f = foundation g = glazing, including framing
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab-on-grade

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

²Thermal image shown is for the Aerogel detail

³R-value and U-value do not include the soil.

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Foundation³

R_f ft ² ·hr·°F / Btu (m ² K / W)	U_f Btu/ft ² ·hr ·°F (W/m ² K)
R-1.3 (0.24)	0.746 (4.24)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.429 (2.44)

Foundation Linear Transmittance

Slab Edge Insulation	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
Conventional	R-3.9 (0.68)	0.259 (1.47)	0.495 (0.857)
Aerogel	R-4.1 (0.72)	0.244 (1.39)	0.370 (0.640)

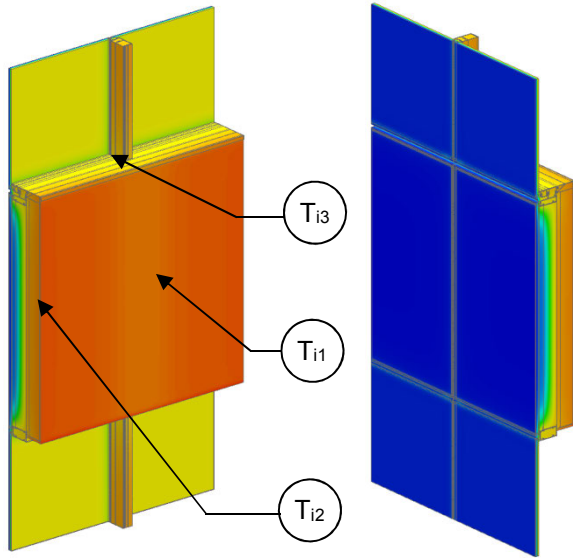
Temperature Indices

	Conventional	Aerogel	
T_{i1}	0.54	0.50	Min T on glazing, at corner of glass
T_{i2}	0.70	0.62	Min T on concrete, at curtain wall sill intersection

3.0 Unitized Curtain Wall

Detail 3.1.1	B.3.1
Unitized Curtain Wall System – Spandrel Clear Wall & No Interior Stud Cavity Insulation	
Detail 3.1.2	B.3.2
Unitized Curtain Wall System – Spandrel Clear Wall & Interior Sprayfoam Insulation	
Detail 3.2.1	B.3.3
Unitized Curtain Wall System – Intermediate Floor Intersection & No Interior Stud Cavity Insulation	
Detail 3.2.2	B.3.4
Unitized Curtain Wall System – Intermediate Floor Intersection & Interior Sprayfoam Insulation	
Detail 3.2.3	B.3.5
Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – Insulated Backpan and Intermediate Floor Intersection	
Detail 3.2.4	B.3.6
Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection	
Detail 3.2.5	B.3.7
Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – Insulated Backpan and Improved Glazing at Intermediate Floor Intersection	
Detail 3.2.6	B.3.8
Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – AIM Applications and Improved Glazing at Intermediate Floor Intersection	
Detail 3.3.1	B.3.9
Unitized Curtain Wall System – Window Wall Transition	
Detail 3.3.2	B.3.10
Unitized Curtain Wall System – Window Wall Transition with Foam Insulation	

Detail 3.1.1 Unitized Curtain Wall System – Spandrel Clear Wall & No Interior Stud Cavity Insulation



View from Interior View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance	U_w, R_w, U_g	U-value and R-value for w = spandrel wall g = glazing, including framing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-6.4 (1.12)	0.157 (0.89)
R-16.8 (2.96)	R-20.5 (3.61)	R-7.7 (1.36)	0.129 (0.74)

Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.373 (2.12)

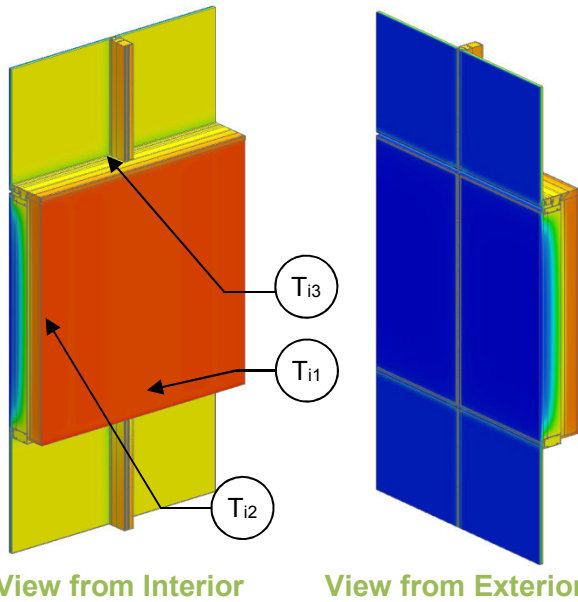
Combined Assembly

Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-3.8 (0.66)	0.266 (1.51)
R-16.8 (2.96)	R-3.3 (0.69)	0.254 (1.44)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.66	0.70	Min T in stud cavity, at edge of backpan
T_{i2}	0.82	0.85	Max T on backpan, at centre of backpan
T_{i3}	0.61	0.62	Min T on frame, at corner of glazing

Detail 3.1.2 Unitized Curtain Wall System – Spandrel Clear Wall & Interior Sprayfoam Insulation



Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-15.7 (2.77 RSI) + backpan insulation</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U_w, R_w, U_g</td> <td>U-value and R-value for w = spandrel wall g = glazing, including framing</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U, R</td> <td>U- and R-values for overall assembly</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R_{1D}	R-15.7 (2.77 RSI) + backpan insulation	Transmittance / Resistance	U_w, R_w, U_g	U-value and R-value for w = spandrel wall g = glazing, including framing	Transmittance / Resistance	U, R	U- and R-values for overall assembly	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Assembly 1D (Nominal) R-Value		R_{1D}	R-15.7 (2.77 RSI) + backpan insulation										
Transmittance / Resistance		U_w, R_w, U_g	U-value and R-value for w = spandrel wall g = glazing, including framing										
Transmittance / Resistance		U, R	U- and R-values for overall assembly										
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature											
0.90													
0.80													
0.70													
0.60													
0.50													
0.40													
0.30													
0.20													
0.10													
0.00													

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

Nominal (1D) vs. Assembly Performance Indicators

Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-24.1 (4.24)	R-7.6 (1.33)	0.132 (0.75)
R-16.8 (2.96)	R-32.5 (5.72)	R-8.9 (1.57)	0.112 (0.64)

Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.371 (2.11)

Combined Assembly

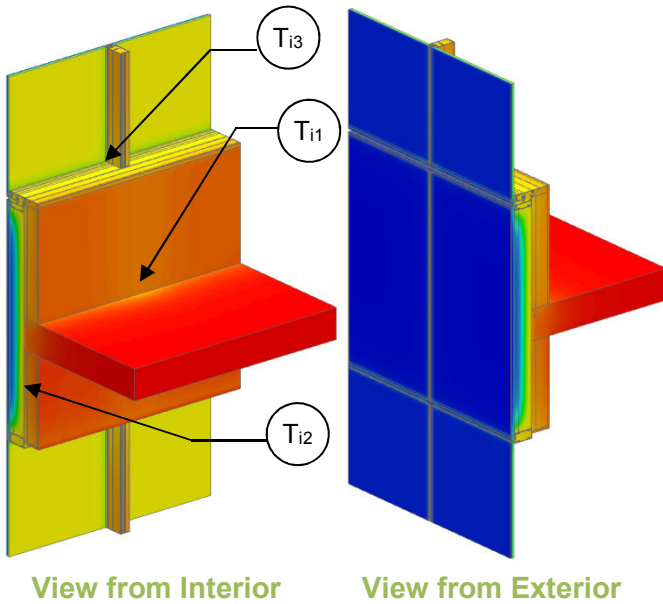
Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-4.0 (0.70)	0.253 (1.44)
R-16.8 (2.96)	R-4.1 (0.72)	0.244 (1.39)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.83	0.84	Min T on sprayfoam, at bottom of spandrel
T_{i2}	0.89	0.90	Max T on sprayfoam, away from frame and studs
T_{i3}	0.60	0.61	Min T on frame, at corner of glazing

Detail 3.2.1

Unitized Curtain Wall System – Intermediate Floor Intersection & No Interior Stud Cavity Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall without slab, g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab, t = combined glazing and spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

²Spandrel section includes interface with slab and vision glazing

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly - Spandrel Section Only

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-6.4 (1.12)	0.157 (0.89)
R-16.8 (2.96)	R-20.5 (3.61)	R-7.7 (1.36)	0.129 (0.74)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.373 (2.12)

Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-3.7 (0.66)	0.267 (1.52)	0.004 (0.007)
R-16.8 (2.96)	R-3.9 (0.69)	0.254 (1.44)	0.002 (0.004)

Spandrel Section with Slab²

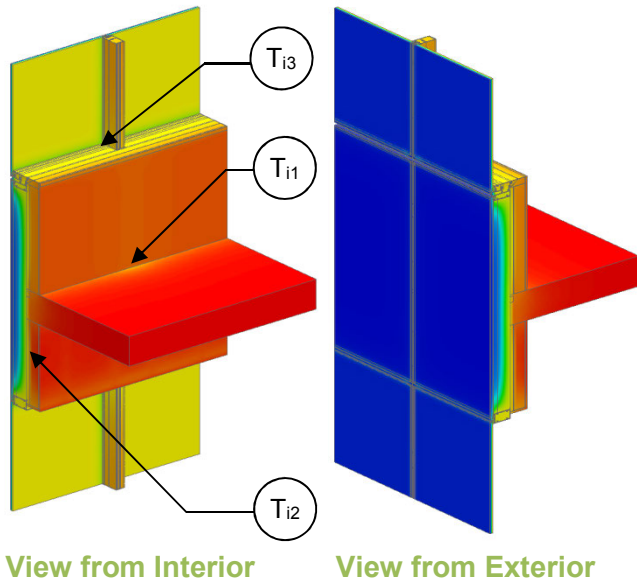
R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-6.3 (1.12)	0.158 (0.90)
R-7.7 (1.35)	0.130 (0.74)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.65	0.69	Min T in stud cavity, at anchor
T_{i2}	0.85	0.89	Max T on backpan, at centre of backpan under slab
T_{i3}	0.61	0.62	Min T on frame, at corner of glazing

Detail 3.2.2

Unitized Curtain Wall System – Intermediate Floor Intersection & Interior Sprayfoam Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-15.7 (2.77 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall without slab g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab t = combined glazing and spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

²Spandrel section includes interface with slab and vision glazing

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly - Spandrel Section Only

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-24.1 (4.24)	R-7.6 (1.33)	0.132 (0.75)
R-16.8 (2.96)	R-32.5 (5.72)	R-8.9 (1.57)	0.112 (0.64)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.371 (2.11)

Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-3.9 (0.69)	0.256 (1.45)	0.031 (0.053)
R-16.8 (2.96)	R-4.1 (0.71)	0.246 (1.40)	0.022 (0.038)

Spandrel Section with Slab²

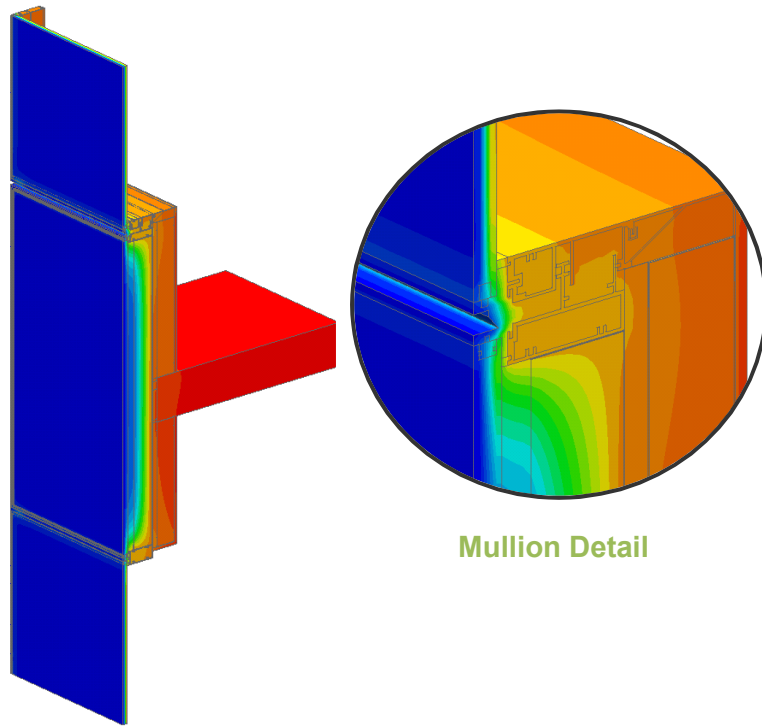
R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-7.2 (1.27)	0.138 (0.79)
R-8.6 (1.51)	0.117 (0.66)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.74	0.77	Min T on sprayfoam, at anchor
T_{i2}	0.94	0.95	Max T on sprayfoam, away from frame and studs below slab
T_{i3}	0.60	0.61	Min T on frame, at corner of glazing

Detail 3.2.3

Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – Insulated Backpan and Intermediate Floor Intersection



Mullion Detail

Thermal Performance Indicators



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

View from Exterior

Scenarios

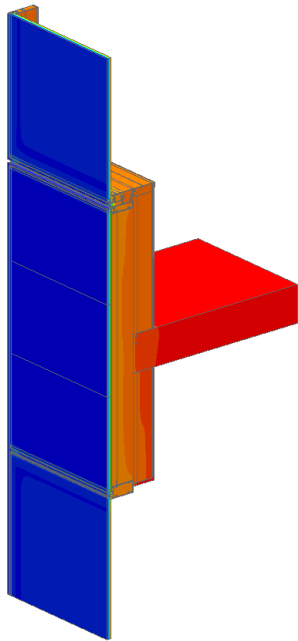
Scenario	Vision Glass and Spacer	Insulation Thickness and Application
H0.1	Double Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan
H0.2	Double Glazed with Silicone Warm Edge Spacer	4" (100 mm) Mineral Wool in Backpan

Nominal (1D) vs. Assembly Performance Indicators

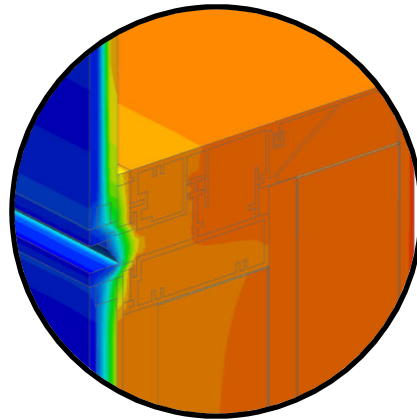
Scenario	Insulation R-Value (RSI)	U_s Btu/ft ² ·hr·°F (W/m ² K)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_t^1 Btu/ft ² ·hr·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)
H0.1	R-16.8 (2.96)	0.233 (1.32)	R-4.3 (0.76)	0.370 (2.10)	R-2.7 (0.48)	0.302 (1.72)	R-3.3 (0.58)
H0.2	R-16.8 (2.96)	0.233 (1.32)	R-4.3 (0.76)	0.356 (2.02)	R-2.8 (0.50)	0.295 (1.67)	R-3.4 (0.60)

Detail 3.2.4

Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection



View from Exterior



Mullion Detail

Thermal Performance Indicators



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

AIM = Architectural Insulation Module

Scenarios

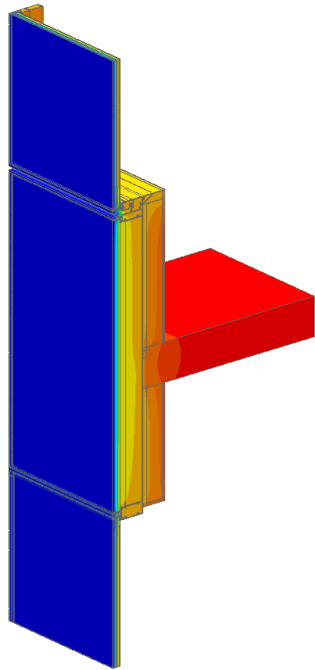
Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
H1	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
H2	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer
H3	Double Glazed with Silicone Warm Edge Spacer	1" (25 mm) AIM between Metal Skins	Rigid Insulation

Nominal (1D) vs. Assembly Performance Indicators

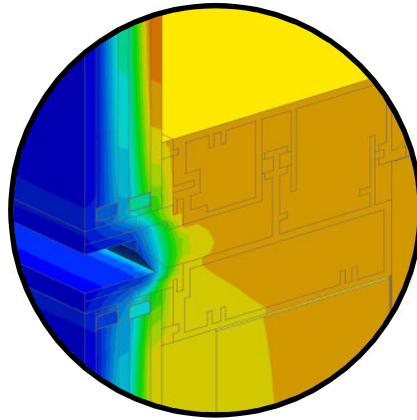
Scenario	Insulation R-Value (RSI)	U_s Btu/ft ² · hr · °F (W/m ² K)	R_s ft ² · hr · °F / Btu (m ² K / W)	U_g Btu/ft ² · hr · °F (W/m ² K)	R_g ft ² · hr · °F / Btu (m ² K / W)	U_t^1 Btu/ft ² · hr · °F (W/m ² K)	R_t ft ² · hr · °F / Btu (m ² K / W)
H1	R-29.3 (5.16)	0.103 (0.59)	R-9.7 (1.71)	0.366 (2.08)	R-2.7 (0.48)	0.236 (1.34)	R-4.2 (0.75)
H2	R-46.1 (8.12)	0.098 (0.56)	R-10.2 (1.79)	0.362 (2.06)	R-2.8 (0.49)	0.231 (1.31)	R-4.3 (0.76)
H3	R-39.1 (6.89)	0.060 (0.34)	R-16.6 (2.92)	0.378 (2.15)	R-2.6 (0.47)	0.221 (1.25)	R-4.5 (0.80)

Detail 3.2.5

Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – Insulated Backpan and Improved Glazing at Intermediate Floor Intersection



View from Exterior



Mullion Detail

Thermal Performance Indicators



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

Scenario

Scenario	Vision Glass and Spacer	Insulation Thickness and Application
I0	Triple Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan

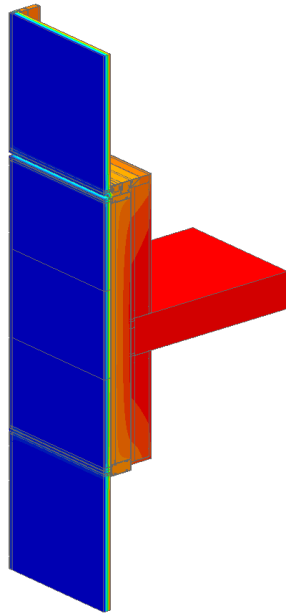
Nominal (I0) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	U_s Btu/ft ² · hr · °F (W/m ² K)	R_s ft ² · hr · °F / Btu (m ² K / W)	U_g Btu/ft ² · hr · °F (W/m ² K)	R_g ft ² · hr · °F / Btu (m ² K / W)	U_t^1 Btu/ft ² · hr · °F (W/m ² K)	R_t ft ² · hr · °F / Btu (m ² K / W)
I0	R-16.8 (2.96)	0.213 (1.21)	R-4.7 (0.83)	0.238 (1.35)	R-4.2 (0.74)	0.226 (1.28)	R-4.4 (0.78)

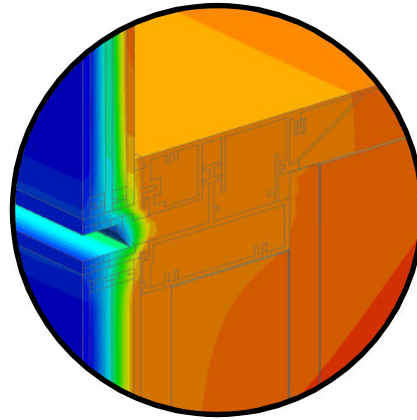
Detail 3.2.6

Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – AIM Applications and Improved Glazing at Intermediate Floor Intersection

Thermal Performance Indicators



View from Exterior



Mullion Detail



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

AIM = Architectural Insulation Module

Scenarios

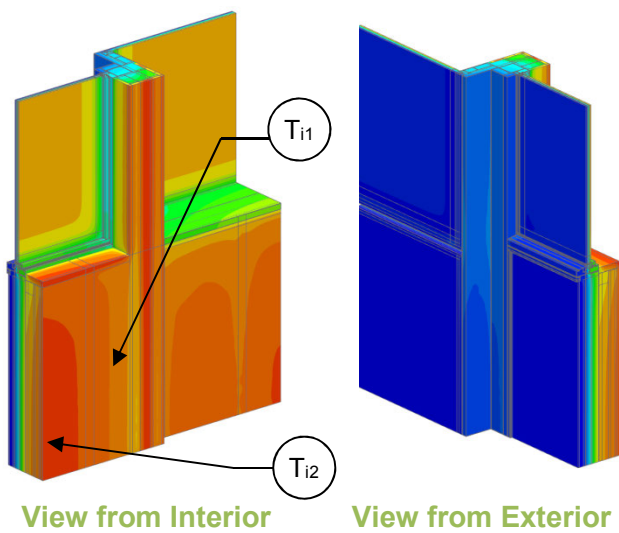
Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
I1	Triple Glazed with Silicone Warm Edge Spacer	1.5" (38 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer
I2	Triple Glazed with Silicone Warm Edge Spacer	Shadow AIM with 5/8" (16mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer

Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	U_s Btu/ft ² ·hr·°F (W/m ² K)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_g Btu/ft ² ·hr·°F (W/m ² K)	R_g ft ² ·hr·°F / Btu (m ² K / W)	U_t ¹ Btu/ft ² ·hr·°F (W/m ² K)	R_t ft ² ·hr·°F / Btu (m ² K / W)
I1	R-75.4 (13.28)	0.068 (0.39)	R-14.7 (2.59)	0.242 (1.37)	R-4.1 (0.73)	0.156 (0.88)	R-6.4 (1.13)
I2	R-41.2 (7.26)	0.094 (0.53)	R-10.6 (1.87)	0.241 (1.37)	R-4.1 (0.73)	0.168 (0.96)	R-5.9 (1.05)

Detail 3.3.1 | Unitized Curtain Wall System – Window Wall Transition

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1Dw}, R_{1Dcw}	Nominal thermal resistance of two base assemblies: w = window-wall R-3.7 (0.65 RSI) + backpan insulation cw= curtain-wall R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_{cw}, R_{cw}, U_g$	“clear wall” spandrel U- and R-value for the base assemblies g = glazing
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of transition joint

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Window Wall

Backpan Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-5.3 (0.94)	0.188 (1.07)
R-16.8 (2.96)	R-20.5 (3.61)	R-7.9 (1.39)	0.127 (0.72)

Base Assembly – Curtain Wall

Backpan Insulation 1D R-Value (RSI)	R_{1Dcw} ft ² ·hr·°F / Btu (m ² K / W)	R_{cw} ft ² ·hr·°F / Btu (m ² K / W)	U_{cw} Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-5.0 (0.88)	0.200 (1.140)
R-16.8 (2.96)	R-20.5 (3.61)	R-7.2 (1.27)	0.139 (0.787)

Transition Joint Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-2.7 (0.47)	0.327 (2.11)	0.120 (0.207)
R-16.8 (2.96)	R-2.9 (0.51)	0.347 (1.97)	0.125 (0.217)

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.373 (2.12)

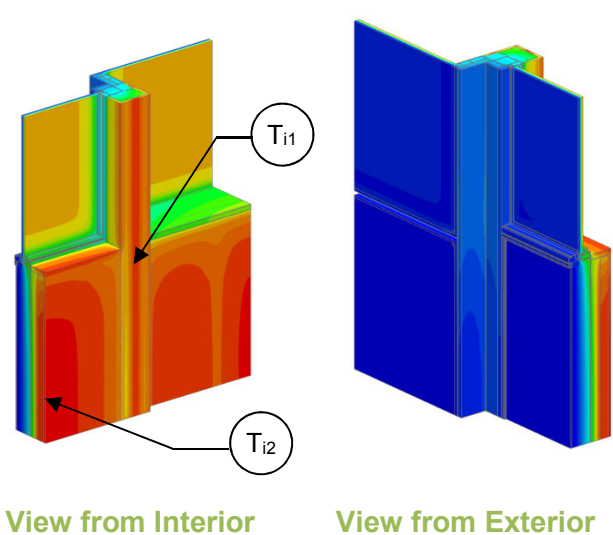
Temperature Indices

	R8.4	R16.8	
T_{i1}	0.61	0.69	Min T on backpan, along vertical mullion
T_{i2}	0.75	0.82	Max T on backpan, at centre of backpan

Detail 3.3.2

Unitized Curtain Wall System – Window Wall Transition with Foam Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1Dw}, R_{1Dcw}	Nominal thermal resistance of two base assemblies: w = window-wall R-15.7 (2.77 RSI) + backpan insulation cw= curtain-wall R-15.7 (2.77 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_{cw}, R_{cw}, U_g$	“clear wall” spandrel U- and R-value for the base assemblies g = glazing
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of transition joint

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Window Wall

Backpan Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-24.1 (4.24)	R-7.6 (1.33)	0.132 (0.75)
R-16.8 (2.96)	R-32.5 (5.72)	R-10.8 (1.90)	0.093 (0.53)

Base Assembly – Curtain Wall

Backpan Insulation 1D R-Value (RSI)	R_{1Dcw} ft ² ·hr·°F / Btu (m ² K / W)	R_{cw} ft ² ·hr·°F / Btu (m ² K / W)	U_{cw} Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-24.1 (4.24)	R-7.3 (1.28)	0.136 (0.78)
R-16.8 (2.96)	R-32.5 (5.72)	R-10.1 (1.78)	0.099 (0.56)

Transition Joint Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-2.7 (0.47)	0.327 (2.11)	0.334 (0.578)
R-16.8 (2.96)	R-2.9 (0.51)	0.347 (1.97)	0.294 (0.509)

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.373 (2.12)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.90	0.91	Min T on sprayfoam, along vertical mullion
T_{i2}	0.91	0.92	Max T on sprayfoam, at centre of backpan

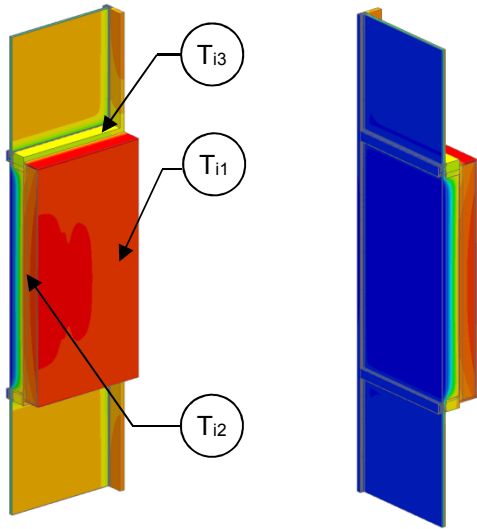
4.0 High Performance Curtain Wall

Detail 4.1.1	B.4.1
High Performance Curtain Wall System – Spandrel Clear Wall & No Interior Stud Cavity Insulation	
Detail 4.1.2	B.4.2
High Performance Curtain Wall System – Spandrel Clear Wall & Interior Sprayfoam Insulation	
Detail 4.2.1	B.4.3
High Performance Curtain Wall System – Intermediate Floor Intersection & No Interior Stud Cavity Insulation	
Detail 4.2.2	B.4.4
High Performance Curtain Wall System – Intermediate Floor Intersection & Interior Sprayfoam Insulation	
Detail 4.2.3	B.4.5
High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates and 5’ x 5’ Spandrel Section – Insulated Backpan and Intermediate Floor Intersection	
Detail 4.2.4	B.4.6
High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates and 5’ x 5’ Spandrel Section – AIM Applications and Intermediate Floor Intersection	
Detail 4.2.5	B.4.7
High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates, Intermediate Mullion and 5’ x 5’ Spandrel Section – Insulated Backpan and Intermediate Floor Intersection	
Detail 4.2.6	B.4.8
High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates, Intermediate Mullion and 5’ x 5’ Spandrel Section – AIM Applications and Intermediate Floor Intersection	

Detail 4.1.1

High Performance Curtain Wall System – Spandrel Clear Wall & No Interior Stud Cavity Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance	U_w, R_w, U_g	U-value and R-value for w = spandrel wall g = glazing, including framing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-4.2 (0.74)	0.237 (1.35)
R-16.8 (2.96)	R-20.5 (3.61)	R-6.9 (1.22)	0.144 (0.82)

Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.373 (2.12)

Combined Assembly

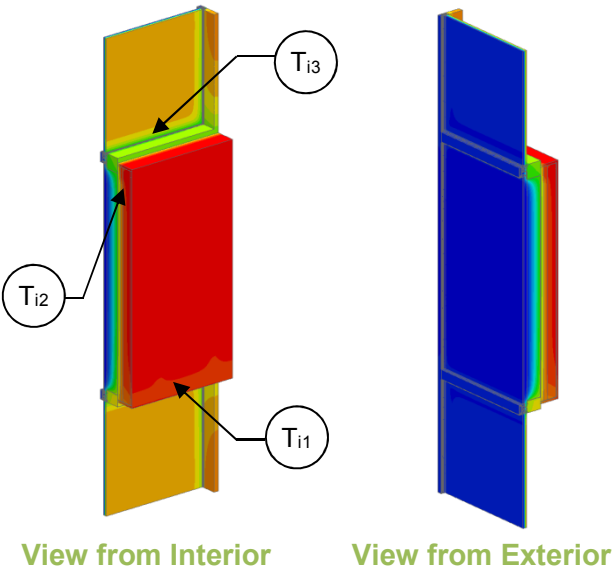
Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-3.3 (0.58)	0.302 (1.72)
R-16.8 (2.96)	R-3.9 (0.68)	0.259 (1.47)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.51	0.69	Min T on backpan, at edge of backpan
T_{i2}	0.80	0.87	Max T on backpan, at centre of backpan
T_{i3}	0.50	0.56	Min T on frame, at corner of glazing

Detail 4.1.2 High Performance Curtain Wall System – Spandrel Clear Wall & Interior Sprayfoam Insulation

Thermal Performance Indicators



1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-15.7 (2.77 RSI) + backpan insulation</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U_w, R_w, U_g</td> <td>U-value and R-value for w = spandrel wall g = glazing, including framing</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U, R</td> <td>U- and R-values for overall assembly</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R _{1D}	R-15.7 (2.77 RSI) + backpan insulation	Transmittance / Resistance	U _w , R _w , U _g	U-value and R-value for w = spandrel wall g = glazing, including framing	Transmittance / Resistance	U, R	U- and R-values for overall assembly	Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Assembly 1D (Nominal) R-Value		R _{1D}	R-15.7 (2.77 RSI) + backpan insulation										
Transmittance / Resistance		U _w , R _w , U _g	U-value and R-value for w = spandrel wall g = glazing, including framing										
Transmittance / Resistance		U, R	U- and R-values for overall assembly										
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature											
0.90													
0.80													
0.70													
0.60													
0.50													
0.40													
0.30													
0.20													
0.10													
0.00													

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

Nominal (1D) vs. Assembly Performance Indicators

Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _w ft ² ·hr·°F / Btu (m ² K / W)	U _w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-24.1 (4.24)	R-6.0 (1.05)	0.168 (0.95)
R-16.8 (2.96)	R-32.5 (5.72)	R-8.9 (1.56)	0.113 (0.64)

Glazing

U _{centre of glass} Btu/ft ² ·hr ·°F (W/m ² K)	U _g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.367 (2.08)

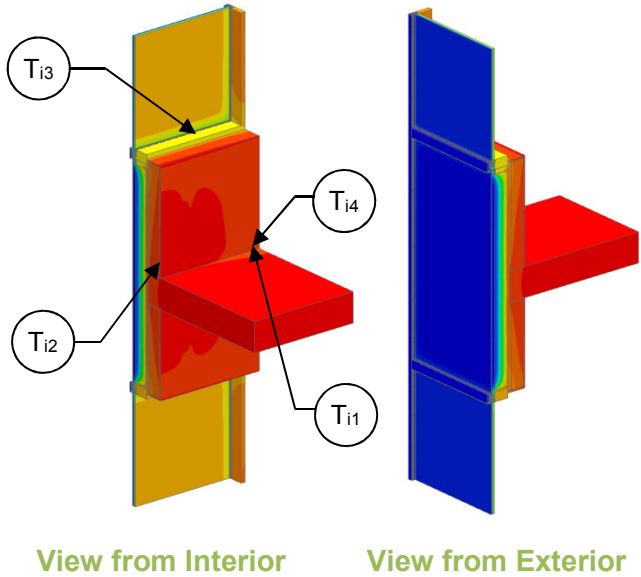
Combined Assembly

Backpan Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-3.8 (0.67)	0.264 (1.50)
R-16.8 (2.96)	R-4.2 (0.73)	0.24 (1.36)

Temperature Indices

	R8.4	R16.8	
T _{i1}	0.74	0.81	Min T on spray foam, at bottom of spandrel
T _{i2}	0.94	0.95	Max T on spray foam, at top of spandrel, away from frame and studs
T _{i3}	0.44	0.50	Min T on frame, at corner of glazing

Detail 4.2.1 High Performance Curtain Wall System – Intermediate Floor Intersection & No Interior Stud Cavity Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall without slab, g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab, t = combined glazing and spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

²Spandrel section includes interface with slab and vision glazing

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly - Spandrel Section Only

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-12.1 (2.13)	R-4.2 (0.74)	0.237 (1.35)
R-16.8 (2.96)	R-20.5 (3.61)	R-6.9 (1.22)	0.144 (0.82)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.373 (2.12)

Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-3.3 (0.58)	0.306 (1.74)	0.037 (0.064)
R-16.8 (2.96)	R-3.8 (0.68)	0.260 (1.48)	0.016 (0.028)

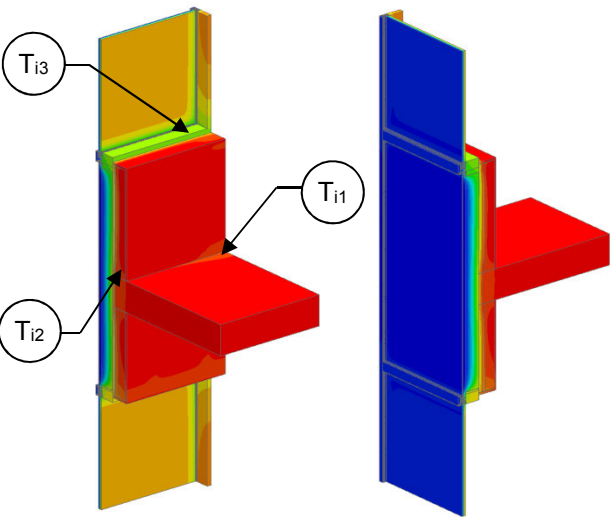
Spandrel Section with Slab²

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-4.1 (0.72)	0.244 (1.39)
R-6.8 (1.20)	0.147 (0.83)

Temperature Indices

	R8.4	R16.8	
T_{i1}	0.53	0.71	Min T on backpan, at anchor
T_{i2}	0.81	0.88	Max T on backpan, at centre of backpan above slab
T_{i3}	0.51	0.57	Min T on frame, along edge of glazing
T_{i4}	0.55	0.71	Min T on slab anchor

Detail 4.2.2 High Performance Curtain Wall System – Intermediate Floor Intersection & Interior Sprayfoam Insulation



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-15.7 (2.77 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = spandrel wall without slab g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = spandrel with slab t = combined glazing and spandrel with slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

²Spandrel section includes interface with slab and vision glazing

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly - Spandrel Section Only

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-24.1 (4.24)	R-6.0 (1.05)	0.168 (0.95)
R-16.8 (2.96)	R-32.5 (5.72)	R-8.9 (1.56)	0.113 (0.64)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.367 (2.08)

Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-8.4 (1.48)	R-3.7 (0.64)	0.274 (1.55)	0.093 (0.161)
R-16.8 (2.96)	R-4.1 (0.72)	0.245 (1.39)	0.050 (0.087)

Spandrel Section with Slab²

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-5.4 (0.95)	0.186 (1.05)
R-8.2 (1.45)	0.122 (0.69)

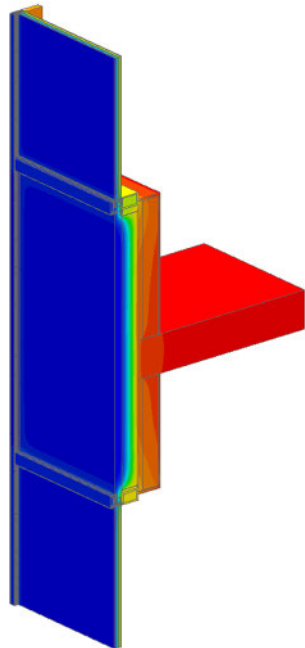
Temperature Indices

	R8.4	R16.8	
T_{i1}	0.68	0.77	Min T on spray foam, around slab anchor
T_{i2}	0.95	0.96	Max T on spray foam, at top of spandrel, away from frame and studs
T_{i3}	0.45	0.51	Min T on frame, along edge of glazing

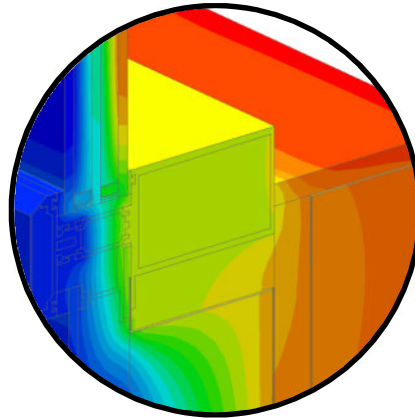
Detail 4.2.3

High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – Insulated Backpan and Intermediate Floor Intersection

Thermal Performance Indicators



View from Exterior



Mullion Detail



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

Scenario

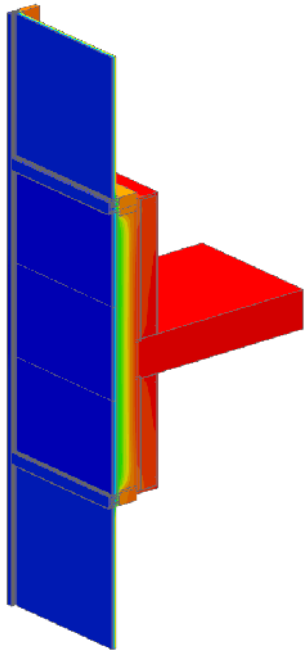
Scenario	Vision Glass and Spacer	Insulation Thickness and Application
E0	Triple Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan

Nominal (1D) vs. Assembly Performance Indicators

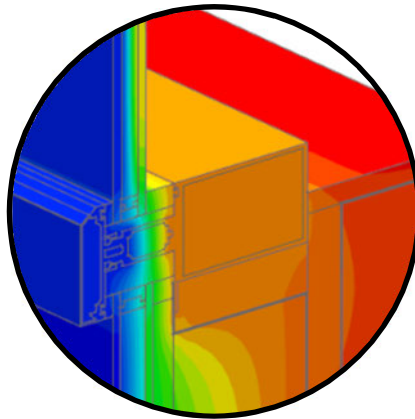
Scenario	Insulation R-Value (RSI)	U_s Btu/ft ² · hr · °F (W/m ² K)	R_s ft ² · hr · °F / Btu (m ² K / W)	U_g Btu/ft ² · hr · °F (W/m ² K)	R_g ft ² · hr · °F / Btu (m ² K / W)	U_t^1 Btu/ft ² · hr · °F (W/m ² K)	R_t ft ² · hr · °F / Btu (m ² K / W)
E0	R-16.8 (2.96)	0.156 (0.89)	R-6.4 (1.13)	0.238 (1.35)	R-4.2 (0.74)	0.197 (1.12)	R-5.1 (0.89)

Detail 4.2.4

High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection



View from Exterior



Mullion Detail

Thermal Performance Indicators



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and “Effective” R-value (including slab)
	U_g, R_g	Glazing U-value and “Effective” R-value
	U_t, R_t	Total Assembly U-value and “Effective” R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

AIM = Architectural Insulation Module

Scenarios

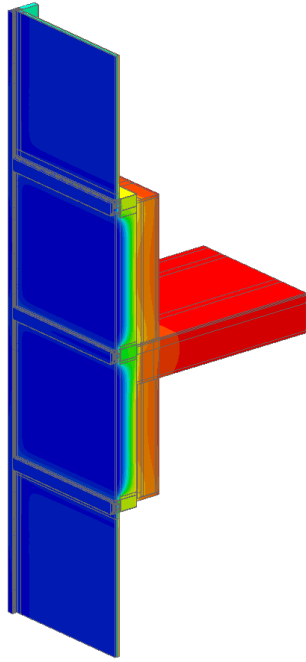
Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
E1	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer
E2	Double Glazed with Silicone Warm Edge Spacer	1.5" (38 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer
E3	Triple Glazed with Silicone Warm Edge Spacer	1.5" (38 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer
E4	Triple Glazed with Silicone Warm Edge Spacer	Shadow AIM with 5/8" (16mm) AIM in Secondary Unit + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer

Nominal (1D) vs. Assembly Performance Indicators

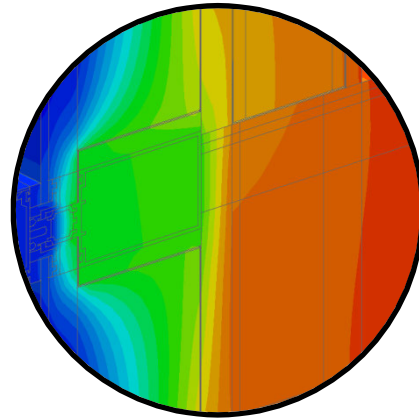
Scenario	Insulation R-Value (RSI)	U_s Btu/ft ² · hr · °F (W/m ² K)	R_s ft ² · hr · °F / Btu (m ² K / W)	U_g Btu/ft ² · hr · °F (W/m ² K)	R_g ft ² · hr · °F / Btu (m ² K / W)	U_t^1 Btu/ft ² · hr · °F (W/m ² K)	R_t ft ² · hr · °F / Btu (m ² K / W)
E1	R-46.1 (8.12)	0.086 (0.49)	R-11.7 (2.06)	0.359 (2.04)	R-2.8 (0.49)	0.222 (1.26)	R-4.5 (0.79)
E2	R-75.4 (13.28)	0.075 (0.43)	R-13.3 (2.34)	0.361 (2.05)	R-2.8 (0.49)	0.218 (1.24)	R-4.6 (0.81)
E3	R-75.4 (13.28)	0.072 (0.41)	R-13.8 (2.43)	0.240 (1.36)	R-4.2 (0.73)	0.156 (0.89)	R-6.4 (1.13)
E4	R-41.2 (7.26)	0.090 (0.51)	R-11.2 (1.96)	0.229 (1.30)	R-4.4 (0.77)	0.159 (0.90)	R-6.3 (1.11)

Detail 4.2.5

High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates, Intermediate Mullion and 5' x 5' Spandrel Section – Insulated Backpan and Intermediate Floor Intersection

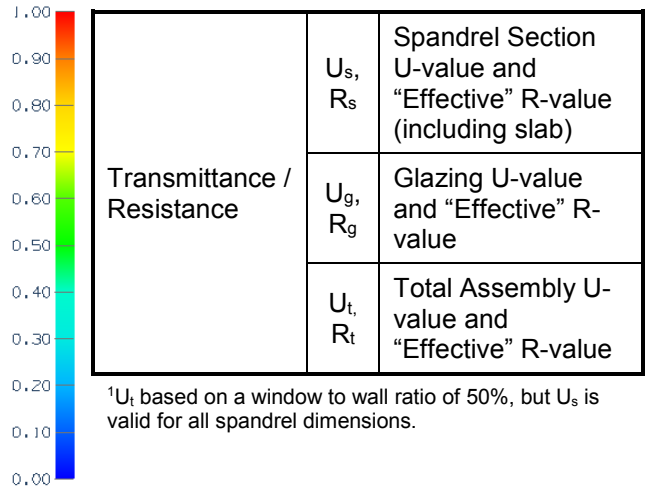


View from Exterior



Mullion Detail

Thermal Performance Indicators



Scenario

Scenario	Vision Glass and Spacer	Insulation Thickness and Application
F0	Double Glazed with Silicone Warm Edge Spacer	4" (100 mm) Mineral Wool in Backpan

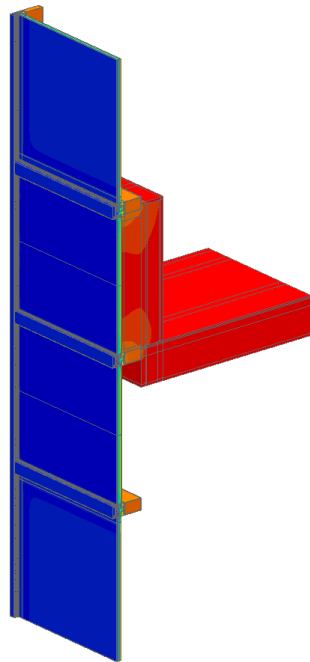
Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	U_s Btu/ft ² · hr · °F (W/m ² K)	R_s ft ² · hr · °F / Btu (m ² K / W)	U_g Btu/ft ² · hr · °F (W/m ² K)	R_g ft ² · hr · °F / Btu (m ² K / W)	U_t^1 Btu/ft ² · hr · °F (W/m ² K)	R_t ft ² · hr · °F / Btu (m ² K / W)
F0	R-16.8 (2.96)	0.204 (1.16)	R-4.9 (0.86)	0.357 (2.03)	R-2.8 (0.49)	0.281 (1.59)	R-3.6 (0.63)

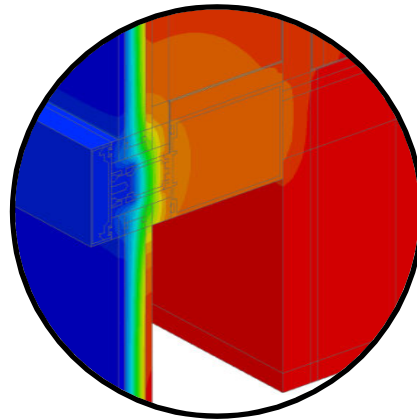
Detail 4.2.6

High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates, Intermediate Mullion and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection

Thermal Performance Indicators



View from Exterior



Mullion Detail



Transmittance / Resistance	U_s, R_s	Spandrel Section U-value and "Effective" R-value (including slab)
	U_g, R_g	Glazing U-value and "Effective" R-value
	U_t, R_t	Total Assembly U-value and "Effective" R-value

¹ U_t based on a window to wall ratio of 50%, but U_s is valid for all spandrel dimensions.

AIM = Architectural Insulation Module

Scenarios

Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
F1	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
F2	Double Glazed with Silicone Warm Edge Spacer	1" (25mm) AIM between Metal Skins	Rigid Insulation
F3	Triple Glazed with Silicone Warm Edge Spacer	1.5" (38 mm) AIM between Glass	Silicone Warm Edge Spacer

Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	U_s Btu/ft ² · hr · °F (W/m ² K)	R_s ft ² · hr · °F / Btu (m ² K / W)	U_g Btu/ft ² · hr · °F (W/m ² K)	R_g ft ² · hr · °F / Btu (m ² K / W)	U_t^1 Btu/ft ² · hr · °F (W/m ² K)	R_t ft ² · hr · °F / Btu (m ² K / W)
F1	R-29.3 (5.16)	0.141 (0.80)	R-7.1 (1.25)	0.361 (2.05)	R-2.8 (0.49)	0.251 (1.43)	R-4.0 (0.70)
F2	R-39.1 (6.89)	0.112 (0.63)	R-8.9 (1.57)	0.357 (2.03)	R-2.8 (0.49)	0.234 (1.33)	R-4.3 (0.75)
F3	R-58.6 (10.32)	0.098 (0.55)	R-10.2 (1.80)	0.220 (1.25)	R-4.5 (0.80)	0.159 (0.90)	R-6.3 (1.11)

5.0 Steel Stud Construction

Detail 5.1.1	B.5.1
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Clear Wall	
Detail 5.1.2	B.5.2
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Clear Wall	
Detail 5.1.3	B.5.3
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Vertical Z-Girts (16" O.C.) Supporting Metal Cladding – Clear Wall	
Detail 5.1.4	B.5.4
Exterior and Interior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-Girts (16" o.c.) – Clear Wall	
Detail 5.1.5	B.5.5
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Clear Wall	
Detail 5.1.6	B.5.6
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-girts (16" o.c.) Supporting Stucco Cladding – Clear Wall	
Detail 5.1.7	B.5.7
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Clear Wall	
Detail 5.1.8	B.5.8
Exterior and Interior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) – Clear Wall	
Detail 5.1.9	B.5.9
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Vertical Z-Girts (24" O.C.) & Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Clear Wall	
Detail 5.1.10	B.5.10
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Intermittent Vertical Z-Girts (16" O.C.) Supporting Metal Cladding – Clear Wall	
Detail 5.1.11	B.5.11
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Clips (24" o.c.) Supporting Metal Cladding – Clear Wall	
Detail 5.1.12	B.5.12
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Clips (24" o.c.) Supporting Metal Cladding – Clear Wall	
Detail 5.1.13	B.5.13

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z Clips (16" o.c.) Supporting Stucco Cladding – Clear Wall	
Detail 5.1.14	B.5.14
Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight MFI-System (24" o.c.) Supporting Cladding – Clear Wall	
Detail 5.1.15	B.5.15
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight MFI-System (24" o.c.) Supporting Cladding – Clear Wall	
Detail 5.1.16	B.5.16
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with CL-Talon 300 Clip System Supporting Cladding – Clear Wall	
Detail 5.1.17	B.5.17
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Aluminum Clip Horizontal Sub-girt System Supporting Cladding – Clear Wall	
Detail 5.1.18	B.5.18
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Fiber Reinforced Girts (TAC) Supporting Cladding – Clear Wall	
Detail 5.1.19	B.5.19
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken Aluminum Clip Rail System (24" o.c.) Supporting Cladding – Clear Wall	
Detail 5.1.20	B.5.20
Exterior and Interior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (8" o.c.) – Clear Wall	
Detail 5.1.21	B.5.21
Exterior and Interior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (16" o.c.) – Clear Wall	
Detail 5.1.22	B.5.22
Exterior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (8" o.c.) – Clear Wall	
Detail 5.1.23	B.5.23
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with R-TEC CI Bracket System Supporting Vertical Sub-girts – Clear Wall	
Detail 5.1.24	B.5.24
Interior and Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with R-TEC CI Bracket System Supporting Vertical Sub-girts – Clear Wall	
Detail 5.1.25	B.5.25
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Vertical Sub-girts – Clear Wall	

Detail 5.1.26	B.5.26
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Horizontal Sub-girts – Clear Wall	
Detail 5.1.27	B.5.27
Interior and Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Vertical Sub-girts – Clear Wall	
Detail 5.1.28	B.5.28
Interior and Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Horizontal Sub-girts – Clear Wall	
Detail 5.1.29	B.5.29
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall	
Detail 5.1.30	B.5.30
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall	
Detail 5.1.31	B.5.31
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Cascadia Clip Fiberglass Thermal Spacers – Clear Wall	
Detail 5.1.32	B.5.32
Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" o.c. and 36" o.c.) Supporting Cladding and R-20 Batt Insulation in Stud Cavity– Clear Wall	
Detail 5.1.33	B.5.33
Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" O.C. and 36" o.c.) Supporting Cladding and R-22.5 Batt Insulation in Stud Cavity– Clear Wall	
Detail 5.1.34	B.5.34
Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" O.C. and 36" o.c.) Supporting Cladding and R-24 Batt Insulation in Stud Cavity– Clear Wall	
Detail 5.1.35	B.5.35
Exterior and Interior Insulation 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Brick Ties Supporting Brick Veneer and R-20 Batt Insulation in Stud Cavity – Clear Wall	
Detail 5.1.36	B.5.36
Exterior and Interior Insulation 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Brick Ties Supporting Brick Veneer and R-22.5 Batt Insulation in Stud Cavity – Clear Wall	
Detail 5.1.37	B.5.37

Exterior and Interior Insulation 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Brick Ties Supporting Brick Veneer and R-24 Batt Insulation in Stud Cavity – Clear Wall

Detail 5.1.38 **B.5.38**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Zinc 2-Seal Anchor Supporting Brick Veneer – Clear Wall

Detail 5.1.39 **B.5.39**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Anchor Supporting Brick Veneer – Clear Wall

Detail 5.1.40 **B.5.40**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Wing Nut Anchor Supporting Brick Veneer – Clear Wall

Detail 5.1.41 **B.5.41**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Carbon Steel X-Seal Anchor Supporting Brick Veneer – Clear Wall

Detail 5.1.42 **B.5.42**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel X-Seal Anchor Supporting Brick Veneer – Clear Wall

Detail 5.1.43 **B.5.43**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Carbon Steel HB-213 2X Anchor Supporting Brick Veneer – Clear Wall

Detail 5.1.44 **B.5.44**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel HB-213 2X Anchor Supporting Brick Veneer – Clear Wall

Detail 5.1.45 **B.5.45**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Carbon Steel HB-200-X Steel Tie Supporting Brick Veneer – Clear Wall

Detail 5.1.46 **B.5.46**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel HB-200-X Anchor Supporting Brick Veneer – Clear Wall

Detail 5.1.47 **B.5.47**

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Carbon Steel BL-407 Anchor Supporting Brick Veneer – Clear Wall	
Detail 5.1.48	B.5.48
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel BL-407 Anchor Supporting Brick Veneer – Clear Wall	
Detail 5.1.49	B.5.49
Vertical Insulated Metal Panel – Clear Wall with Vertical Connection Joint and Support Girt/Hat Track Backup Wall	
Detail 5.1.50	B.5.50
Vertical Insulated Metal Panel - Metal Stack Joint and Support Girt Back/Hat Track Backup Wall	
Detail 5.1.51	B.5.51
Horizontal Insulated Metal Panel – Clear Wall with Horizontal Connection Joint and Steel Stud Backup Wall	
Detail 5.1.52	B.5.52
Horizontal Insulated Metal Panel – Vertical Gasket Joint with Steel Stud Backup Wall	
Detail 5.1.53	B.5.53
Structural Sheet Steel Wall with Cladding Supported by Notched Z-Bar – Clear Wall	
Detail 5.1.54	B.5.54
Structural Sheet Steel Wall with Cladding Supported by Intermittent Notched Z- Bar – Clear Wall	
Detail 5.1.55	B.5.55
Structural Sheet Steel Wall with Cladding Supported by Thermal Chairs – Clear Wall	
Detail 5.1.56	B.5.56
2 Hour Fire Rated Structural Steel Sheet Wall with Cladding Supported by Notched Z-bar with Ceramic Blanket – Clear Wall	
Detail 5.1.57	B.5.57
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System (16" o.c.) Supporting Horizontal and Vertical Sub-girts – Clear Wall	
Detail 5.1.58	B.5.58
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System (32" o.c.) Supporting Horizontal and Vertical Sub-girts – Clear Wall	
Detail 5.1.59	B.5.59

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall	
Detail 5.1.60	B.5.60
Exterior and Interior Insulated 6" x 1 5/8" Slotted Steel R-Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall	
Detail 5.1.61	B.5.61
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – Eko Thermobacket Clip System Supporting Cladding – Clear Wall	
Detail 5.1.62	B.5.62
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – Eko Thermobacket and NV1 Clip System Supporting Cladding – Clear Wall	
Detail 5.1.63	B.5.63
Exterior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Vci Vertical System – Clear Wall	
Detail 5.1.64	B.5.64
Exterior and Interior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Vci Vertical System – Clear Wall	
Detail 5.1.65	B.5.65
Exterior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Hci Horizontal System – Clear Wall	
Detail 5.1.66	B.5.66
Exterior and Interior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Hci Horizontal System – Clear Wall	
Detail 5.1.67	B.5.67
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall	
Detail 5.1.68	B.5.68
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall	
Detail 5.1.69	B.5.69
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Vertical Z-Girts Supporting Cladding – Clear Wall	
Detail 5.1.70	B.5.70
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Vertical Z-Girts Supporting Cladding – Clear Wall	
Detail 5.2.1	B.5.71

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Intermediate Floor Intersection	
Detail 5.2.2	B.5.72
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Intermediate Floor Intersection with Top Side Insulation	
Detail 5.2.3	B.5.73
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Intermediate Floor Intersection with Top & Under Side Insulation	
Detail 5.2.4	B.5.74
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Uninsulated Curb	
Detail 5.2.5	B.5.75
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Uninsulated Curb	
Detail 5.2.6	B.5.76
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Insulated Curb	
Detail 5.2.7	B.5.77
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Insulated Curb	
Detail 5.2.8	B.5.78
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z Girts (16" o.c.) Supporting Stucco Cladding – Uninsulated Intermediate Floor Intersection	
Detail 5.2.9	B.5.79
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Isokorb CM20 Thermally Broken Slab Projection without Concrete Curb	
Detail 5.2.10	B.5.80
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Isokorb CM20 Thermally Broken Slab Projection without Concrete Curb	
Detail 5.2.11	B.5.81

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Uninsulated Curb	
Detail 5.2.12	B.5.82
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Uninsulated Curb	
Detail 5.2.13	B.5.83
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Insulated Curb	
Detail 5.2.14	B.5.84
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Insulated Curb	
Detail 5.2.15	B.5.85
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Intermediate Floor Intersection	
Detail 5.2.16	B.5.86
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Intermediate Floor Intersection	
Detail 5.2.17	B.5.87
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Vertical Sub-girts – Intermediate Concrete Floor Intersection	
Detail 5.2.18	B.5.88
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Horizontal Sub-girts – Intermediate Concrete Floor Intersection	
Detail 5.2.19	B.5.89
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-girts (16" o.c.) Supporting Stucco Cladding – Steel Framed Floor with Cross Cavity Flashing	
Detail 5.2.20	B.5.90
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Fiberglass Spacer and Through Insulation Fasteners Supporting Cladding – Insulated Intermediate Floor Intersection	
Detail 5.2.21	B.5.91
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Aluminum Clip Horizontal Sub-girt System Supporting Cladding – Intermediate Floor Intersection	

Detail 5.2.22	B.5.92
Exterior Insulated 3 5/8" x 1/58" Steel Stud (16"o.c.) Wall Assembly with TAC Fiber Reinforced Plastic Girts Supporting Cladding – Intermediate Floor Intersection	
Detail 5.2.23	B.5.93
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken Aluminum Clip Rail System (24" o.c.) Supporting Cladding – Intermediate Floor Intersection	
Detail 5.2.24	B.5.94
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Structural Steel Framed Floor Intersection	
Detail 5.2.25	B.5.95
Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Structural Steel Framed Floor Intersection	
Detail 5.2.26	B.5.96
Vertical Insulated Metal Panel Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Support Girt/Hat Track Backup Wall	
Detail 5.2.27	B.5.97
Horizontal Insulated Metal Panel Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Steel Stud Backup Wall	
Detail 5.2.28	B.5.98
Exterior and Interior Insulated Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection	
Detail 5.2.29	B.5.99
Exterior and Interior Insulated Wall Assembly with Spaced Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection	
Detail 5.2.30	B.5.100
Exterior and Interior Insulated Wall Assembly with Thermally Broken Steel Shelf Angle & Brick Ties Supporting Brick Veneer – Slab Intersection	
Detail 5.2.31	B.5.101
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding – Armatherm 500 Thermally Broken Slab Projection with Insulated Curb	
Detail 5.2.32	B.5.102
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud Wall Assembly with Armatherm Z-girts Supporting Metal Cladding – Armatherm 500-080 Thermally Broken Slab Projection with Insulated Curb	
Detail 5.2.33	B.5.103

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – Eko Thermobrace and NV1 Clip System Supporting Cladding – Intermediate Floor Intersection	
Detail 5.3.1	B.5.104
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection	
Detail 5.3.2	B.5.105
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection	
Detail 5.3.3	B.5.106
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Window & Slab Intersection	
Detail 5.3.4	B.5.107
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Window and Intermediate Floor Intersection	
Detail 5.3.5	B.5.108
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z Girts (16" o.c.) Supporting Stucco Cladding – Window and Intermediate Floor Intersection	
Detail 5.3.6	B.5.109
Vertical Insulated Metal Panel – Window Glazing Transition with Steel Support Framing	
Detail 5.3.7	B.5.110
Horizontal Insulated Metal Panel – Window Glazing Transition with Steel Support Framing	
Detail 5.3.8	B.5.111
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection	
Detail 5.3.9	B.5.112
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection	
Detail 5.3.10	B.5.113
Interior Insulated Steel Frame Wall Assembly with Brick Cladding - Window Intersection	
Detail 5.3.11	B.5.114
Interior Insulated Steel Frame Wall Assembly with Brick Cladding - Window Intersection Aligned with Insulation	
Detail 5.3.12	B.5.115

Exterior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Window & Intermediate Floor Intersection with Window Thermal Break Positioned in Steel Framing	
Detail 5.3.13	B.5.116
Exterior and Interior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Window & Intermediate Floor Intersection with Window Thermal Break Positioned in Steel Framing	
Detail 5.3. 14	B.5.117
Exterior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Curtain Wall & Intermediate Floor Intersection with Window Thermal Break Positioned in the Exterior Insulation	
Detail 5.3. 15	B.5.118
Exterior and Interior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Curtain Wall & Intermediate Floor Intersection with Window Thermal Break Positioned in the Exterior Insulation	
Detail 5.4.1	B.5.119
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Conventional Curtain Wall Transition	
Detail 5.4.2	B.5.120
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Conventional Curtain Wall Transition	
Detail 5.4.3	B.5.121
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly – Curtain Wall Transition	
Detail 5.4.4	B.5.122
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Conventional Curtain Wall Intersection	
Detail 5.4.5	B.5.123
Exterior Insulated Concrete Wall and Steel Stud Assembly Supporting Metal Cladding– Curtain Wall Transition Intersection	
Detail 5.4.6	B.5.124
Exterior Insulated Concrete Wall and Steel Stud Assembly Supporting Metal Cladding with Cavity Insulation– Curtain Wall Transition Intersection	
Detail 5.5.1	B.5.125
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection	

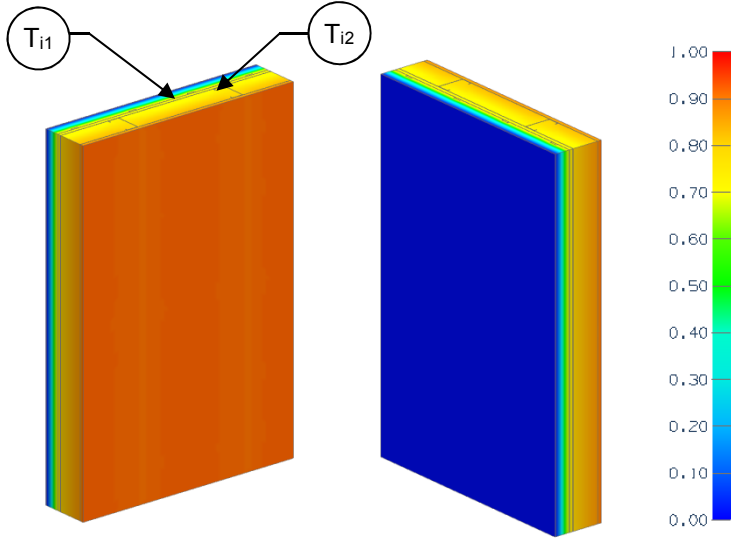
Detail 5.5.2	B.5.126
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection	
Detail 5.5.3	B.5.127
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection	
Detail 5.5.4	B.5.128
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection	
Detail 5.5.5	B.5.129
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Concrete Parapet & Slab Intersection	
Detail 5.5.6	B.5.130
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Concrete Parapet and Slab Intersection	
Detail 5.5.7	B.5.131
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z Girts (16" o.c.) Supporting Stucco Cladding –Concrete Parapet & Slab Intersection	
Detail 5.5.8	B.5.132
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z Girts (16" o.c.) Supporting Metal Cladding –Concrete Roof Deck at Continuous Concrete Parapet	
Detail 5.5.9	B.5.133
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z Girts (16" o.c.) Supporting Metal Cladding –Concrete Roof Deck at Isokorb AXT1 Thermally Broken Concrete Parapet	
Detail 5.5.10	B.5.134
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection	
Detail 5.5.11	B.5.135
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection with Thermal Break under Parapet Stud Cavity	
Detail 5.5.12	B.5.136
Vertical Insulated Metal Panel - Steel Roof Deck with Open Web Steel Joist & Parapet Intersection	

Detail 5.5.13	B.5.137
Horizontal Insulated Metal Panel - Steel Roof Deck with Open Web Steel Joist & Parapet Intersection	
Detail 5.6.1	B.5.138
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Corner Intersection	
Detail 5.6.2	B.5.139
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Corner Intersection	
Detail 5.6.3	B.5.140
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Corner Intersection	
Detail 5.6.4	B.5.141
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Corner Intersection with Alternative Framing	
Detail 5.6.5	B.5.142
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Corner Intersection	
Detail 5.6.6	B.5.143
Window Wall System – Transition to Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding & No Interior Stud Cavity Insulation	
Detail 5.6.7	B.5.144
Window Wall System – Transition to Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding & Interior Sprayfoam and Fibreglass Batt Insulation	
Detail 5.6.8	B.5.145
Vertical Insulated Metal Panel - Corner Intersection with Post and Support Girt/Hat Track Backup Wall	
Detail 5.6.9	B.5.146
Horizontal Insulated Metal Panel – Corner Intersection with Post and Steel Stud Backup Wall	
Detail 5.7.1	B.5.147
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Structural Steel Column & Cantilever Beam Intersection (Canopy Support)	
Detail 5.7.2	B.5.148

- Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Uninterrupted Beam
- Detail 5.7.3** **B.5.149**
- Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Isolator Pad
- Detail 5.7.4** **B.5.150**
- Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Isokorb S22 Thermally Broken Beam
- Detail 5.7.5** **B.5.151**
- Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z-girts (16" o.c.) Supporting Metal Cladding – Concrete Floor to Steel Beam Connection
- Detail 5.7.6** **B.5.152**
- Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z-girts (16" o.c.) Supporting Metal Cladding – Concrete Floor to Steel Beam with a Thermal Isolator Pad Connection
- Detail 5.7.7** **B.5.153**
- Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z-girts (16" o.c.) Supporting Metal Cladding – Concrete Floor to Steel Beam with Isokorb KS14 Connection
- Detail 5.7.8** **B.5.154**
- Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Beam Thermal Break
- Detail 5.7.9** **B.5.155**
- Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Aerolon Coating
- Detail 5.8.1** **B.5.156**
- Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Interior Wall Intersection

Detail 5.1.1

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

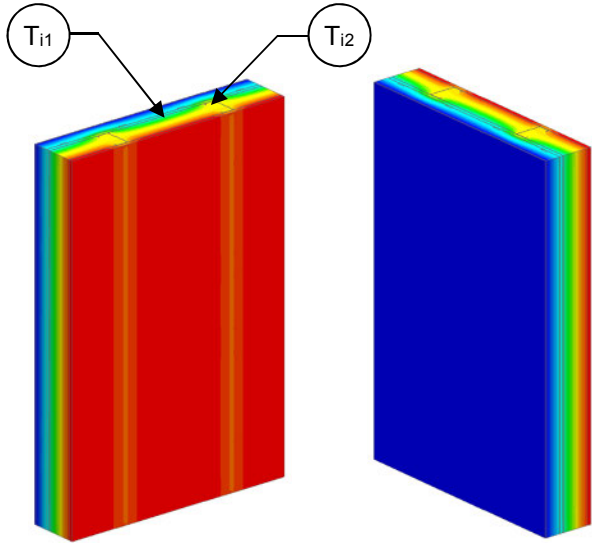
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-7.5 (1.32)	R-10.2 (1.80)	R-10.0 (1.76)	0.100 (0.57)
R-11.3 (1.98)	R-13.9 (2.46)	R-13.7 (2.41)	0.073 (0.41)
R-15 (2.64)	R-17.7 (3.12)	R-17.4 (3.06)	0.057 (0.33)

Temperature Indices

	R7.5	R11.3	R15	
T_{i1}	0.80	0.85	0.88	Min T on sheathing, between studs
T_{i2}	0.82	0.86	0.89	Max T on sheathing, along studs

Detail 5.1.2

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	“clear wall” U- and R-value
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

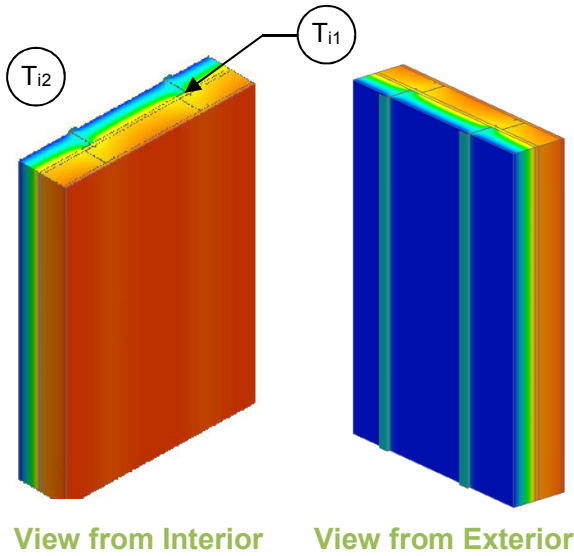
Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
R-7.5 (1.32)	R-21.7 (3.83)	R-16.6 (2.93)	0.060 (0.34)
R-15 (2.64)	R-29.2 (5.15)	R-24.0 (4.23)	0.042 (0.24)

Temperature Indices

	R7.5	R15	
T _{i1}	0.40	0.58	Min T on sheathing, between studs
T _{i2}	0.68	0.77	Max T on sheathing, along studs

Detail 5.1.3

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Vertical Z-Girts (16" O.C.) Supporting Metal Cladding – Clear Wall



Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

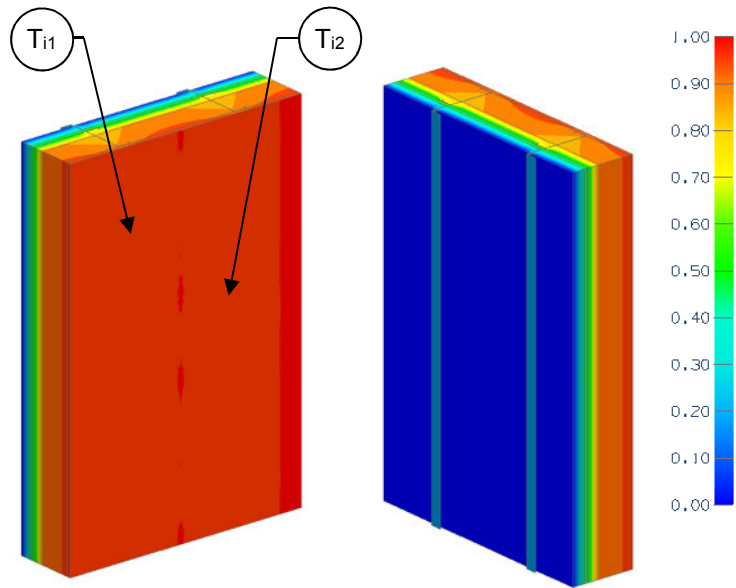
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-8.2 (1.44)	R-6.4 (1.12)	0.157 (0.89)
R-10 (1.76)	R-13.2 (2.32)	R-8.3 (1.47)	0.120 (0.68)
R-15 (2.64)	R-18.2 (3.20)	R-9.7 (1.71)	0.103 (0.59)
R-20 (3.52)	R-23.2 (4.08)	R-11.0 (1.93)	0.091 (0.52)
R-25 (4.40)	R-28.2 (4.96)	R-12.0 (2.11)	0.084 (0.48)

Temperature Indices

	R5	R10	R15	R20	R25	
T_{i1}	0.63	0.70	0.72	0.75	0.76	Min T on sheathing, along girts at stud intersection
T_{i2}	0.72	0.80	0.84	0.86	0.87	Max T on sheathing, centre of stud cavity

Detail 5.1.4

Exterior and Interior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-Girts (16" o.c.) – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-12.6 (2.22 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

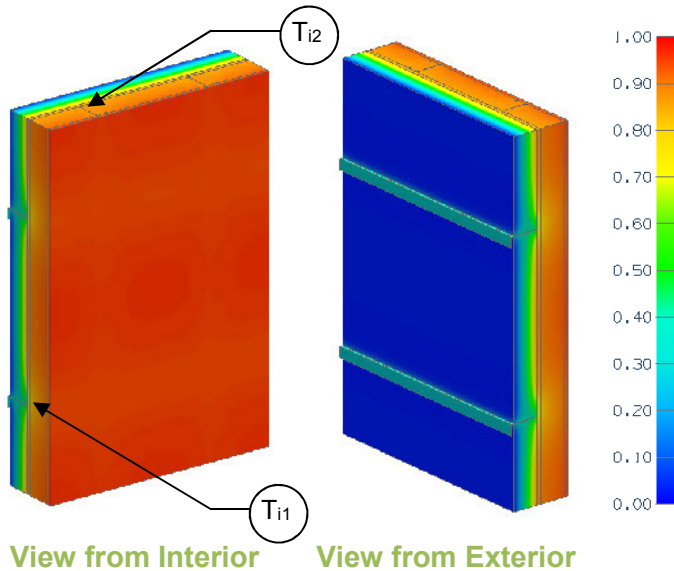
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-10.1 (1.78)	R-22.7 (4.00)	R-11.6 (2.04)	0.086 (0.42)

Temperature Indices

	R10	
T_{i1}	0.78	Min T on sprayfoam, around studs
T_{i2}	0.81	Max T on sprayfoam, between studs

Detail 5.1.5

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

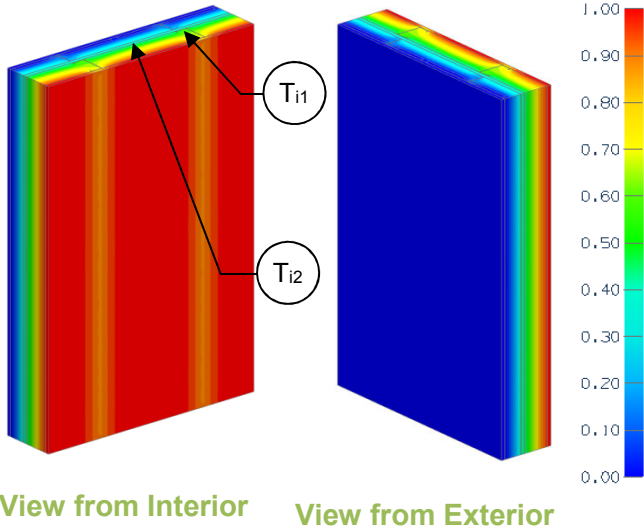
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-8.2 (1.44)	R-6.8 (1.21)	0.146 (0.83)
R-10 (1.76)	R-13.2 (2.32)	R-9.4 (1.66)	0.106 (0.60)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)
R-20 (3.52)	R-23.2 (4.08)	R-13.1 (2.31)	0.076 (0.43)
R-25 (4.40)	R-28.2 (4.96)	R-14.5 (2.56)	0.069 (0.39)

Temperature Indices

	R5	R10	R15	R20	R25	
T_{i1}	0.62	0.69	0.72	0.75	0.76	Min T on sheathing, along girts at stud intersection
T_{i2}	0.76	0.83	0.87	0.89	0.90	Max T on sheathing, along studs between girts

Detail 5.1.6

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-girts (16" o.c.) Supporting Stucco Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.5 (2.55 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

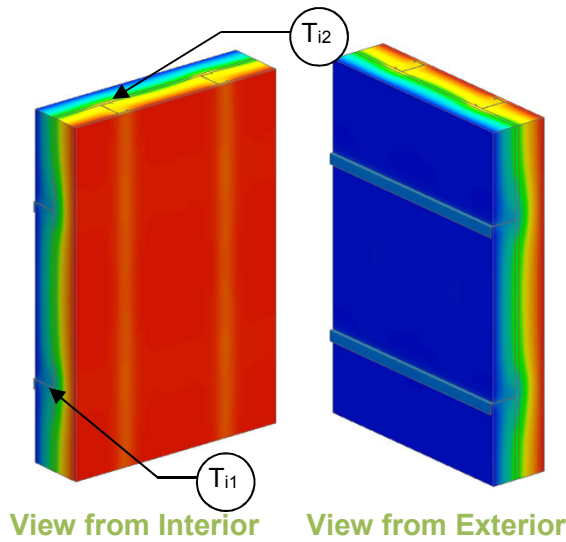
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-10 (1.76)	R-24.5 (4.31)	R-13.0 (2.29)	0.077 (0.44)
R-15 (2.64)	R-29.5 (5.20)	R-14.1 (2.49)	0.071 (0.40)
R-20 (3.52)	R-34.5 (6.08)	R-15.1 (2.66)	0.066 (0.38)

Temperature Indices

	R10	R15	R20	
T_{i1}	0.42	0.47	0.49	Min T on sheathing, beside studs
T_{i2}	0.48	0.53	0.57	Max T on sheathing, between studs

Detail 5.1.7

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.50 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

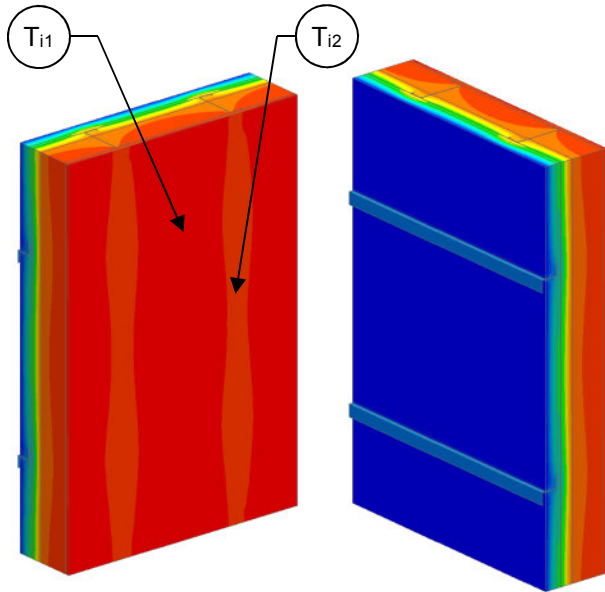
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-0 (0)	R-14.2 (2.50)	R-9.2 (1.62)	0.109 (0.62)
R-5 (0.88)	R-19.2 (3.38)	R-13.4 (2.36)	0.075 (0.42)
R-10 (1.76)	R-24.2 (4.26)	R-16.3 (2.87)	0.061 (0.35)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)
R-20 (3.52)	R-34.2 (6.02)	R-20.5 (3.61)	0.049 (0.28)
R-25 (4.40)	R-39.2 (6.90)	R-22.1 (3.90)	0.045 (0.26)

Temperature Indices

	R0	R5	R10	R15	R20	R25	
T_{i1}	0.06	0.21	0.28	0.32	0.36	0.38	Min T on sheathing, along girts between studs
T_{i2}	0.35	0.59	0.68	0.72	0.75	0.78	Max T on sheathing, along studs between girts

Detail 5.1.8

Exterior and Interior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) – Clear Wall



View from Interior

View from Exterior

Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-12.6 (2.22 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td>U_o, R_o</td> <td>"clear wall" U- and R-value</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R_{1D}	R-12.6 (2.22 RSI) + exterior insulation	Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Assembly 1D (Nominal) R-Value		R_{1D}	R-12.6 (2.22 RSI) + exterior insulation							
Transmittance / Resistance without Anomaly		U_o, R_o	"clear wall" U- and R-value							
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature								
0.90										
0.80										
0.70										
0.60										
0.50										
0.40										
0.30										
0.20										
0.10										
0.00										

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

Nominal (1D) vs. Assembly Performance Indicators

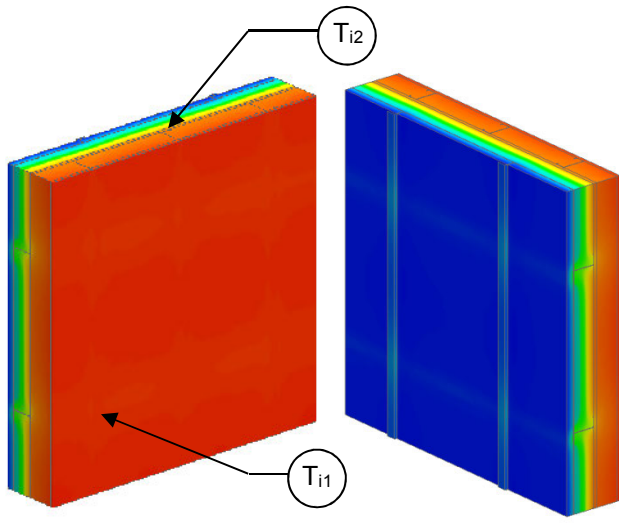
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-10.1 (1.78)	R-22.7 (4.00)	R-15.2 (2.68)	0.066 (0.37)

Temperature Indices

T_{i1}	0.78	Min T on sprayfoam, along horizontal girts between studs
T_{i2}	0.84	Max T on sprayfoam, along studs between horizontal girts

Detail 5.1.9

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Vertical Z-Girts (24" O.C.) & Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Clear Wall



View from Interior View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R Value	R _{1D}	R-3.2 (0.56 RSI) + horizontal exterior insulation + vertical exterior insulation R-5 (0.88 RSI)
Transmittance / Resistance	U _o , R _o	"clear wall" U- and R-value
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

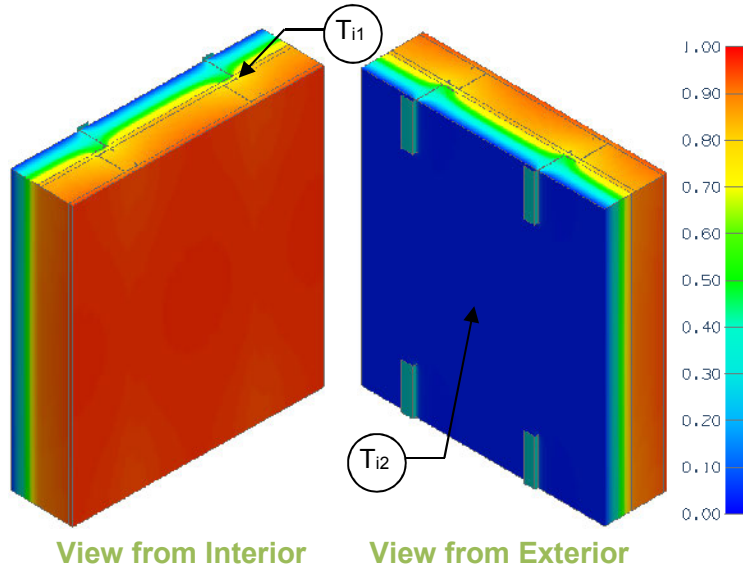
Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (0.88)	R-13.2 (2.32)	R-10.4 (1.82)	0.097 (0.55)
R-15 (1.76)	R-18.2 (3.20)	R-13.1 (2.31)	0.076 (0.43)
R-20 (2.64)	R-23.2 (4.08)	R-15.3 (2.70)	0.065 (0.37)
R-25 (3.52)	R-28.2 (4.96)	R-17.2 (3.03)	0.058 (0.33)
R-30 (4.40)	R-33.2 (5.84)	R-18.9 (3.33)	0.053 (0.30)

Temperature Indices

	R10	R15	R20	R25	R30	
T _{i1}	0.74	0.77	0.80	0.81	0.82	Min T on sheathing, at vertical and horizontal girt intersection, not at a stud intersection
T _{i2}	0.85	0.89	0.90	0.91	0.93	Max T on sheathing, along studs between girts

Detail 5.1.10

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Intermittent Vertical Z-Girts (16" O.C.) Supporting Metal Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-3.2 (0.56 RSI) + horizontal exterior insulation
Transmittance / Resistance	U _o , R _o	“clear wall” U- and R-value. Results for three vertical spacings (12”, 24”, 36”) are presented below
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

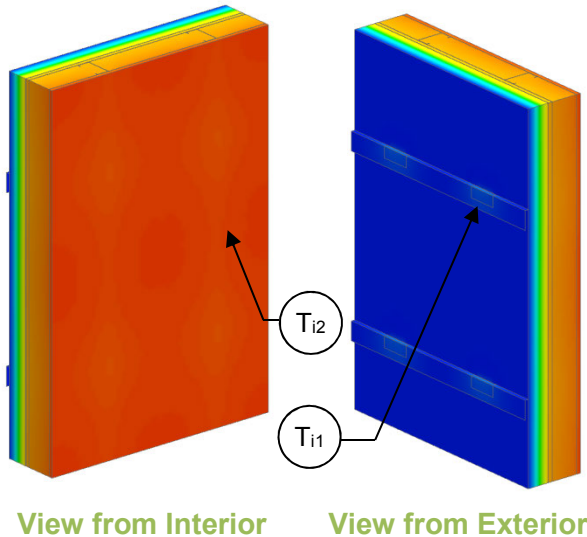
Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	12" Vertical Spacing		24" Vertical Spacing		36" Vertical Spacing	
		R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-13.2 (2.32)	R-7.0 (1.24)	0.142 (0.81)	R-7.4 (1.30)	0.136 (0.77)	R-7.6 (1.33)	0.132 (0.75)
R-10 (1.76)	R-18.2 (3.20)	R-9.9 (1.74)	0.101 (0.58)	R-10.8 (1.90)	0.093 (0.53)	R-11.3 (1.99)	0.089 (0.50)
R-15 (2.64)	R-23.2 (4.08)	R-12.2 (2.15)	0.082 (0.47)	R-13.7 (2.41)	0.073 (0.42)	R-14.6 (2.57)	0.068 (0.39)
R-20 (3.52)	R-28.2 (4.96)	R-14.2 (2.50)	0.070 (0.40)	R-16.3 (2.87)	0.061 (0.35)	R-17.6 (3.10)	0.057 (0.32)
R-25 (4.40)	R-33.2 (5.84)	R-16.1 (2.83)	0.062 (0.35)	R-18.7 (3.30)	0.053 (0.30)	R-20.4 (3.60)	0.049 (0.28)

Temperature Indices

Spacing	T _i	R5	R10	R15	R20	R25	
12"	T _{i1}	0.62	0.69	0.73	0.75	0.77	Min T on sheathing, at girt and stud intersection
	T _{i2}	0.75	0.83	0.87	0.89	0.90	Max T on sheathing, centre of stud cavity between girts
24"	T _{i1}	0.63	0.70	0.73	0.76	0.78	Min T on sheathing, at girt and stud intersection
	T _{i2}	0.77	0.85	0.88	0.90	0.92	Max T on sheathing, centre of stud cavity between girts
36"	T _{i1}	0.63	0.70	0.73	0.76	0.78	Min T on sheathing, at girt and stud intersection
	T _{i2}	0.78	0.86	0.90	0.92	0.93	Max T on sheathing, centre of stud cavity between girts

Detail 5.1.11

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Clips (24" o.c.) Supporting Metal Cladding – Clear Wall



Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-3.2 (0.56 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U_o, R_o</td> <td>"clear wall" U- and R-value</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation	Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Assembly 1D (Nominal) R-Value		R_{1D}	R-3.2 (0.56 RSI) + exterior insulation							
Transmittance / Resistance		U_o, R_o	"clear wall" U- and R-value							
Surface Temperature Index ¹		T_i	0 = exterior temperature 1 = interior temperature							
0.90										
0.80										
0.70										
0.60										
0.50										
0.40										
0.30										
0.20										
0.10										
0.00										

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

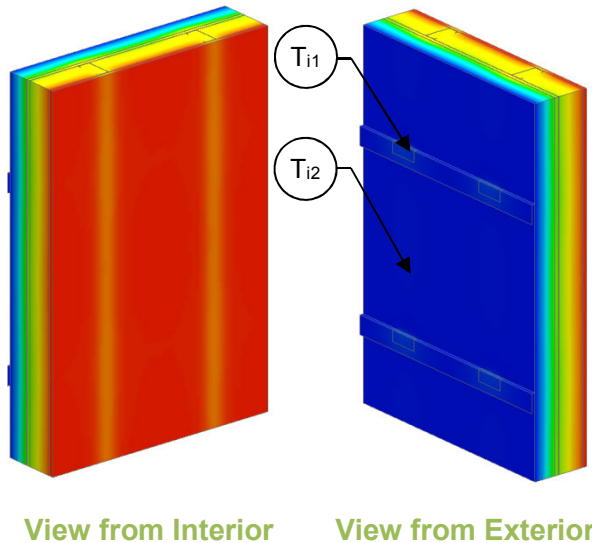
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-15 (2.64)	R-18.2 (3.20)	R-14.7 (2.59)	0.068 (0.39)
R-20 (3.52)	R-23.2 (4.08)	R-17.8 (3.13)	0.056 (0.32)
R-25 (4.40)	R-28.2 (4.96)	R-20.6 (3.63)	0.049 (0.28)

Temperature Indices

	R15	R20	R25	
T_{i1}	0.75	0.78	0.80	Min T on sheathing, along girts at stud and clip intersection
T_{i2}	0.88	0.90	0.91	Max T on sheathing at stud away from clip

Detail 5.1.12 Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Clips (24" o.c.) Supporting Metal Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.4 (2.54 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior View from Exterior

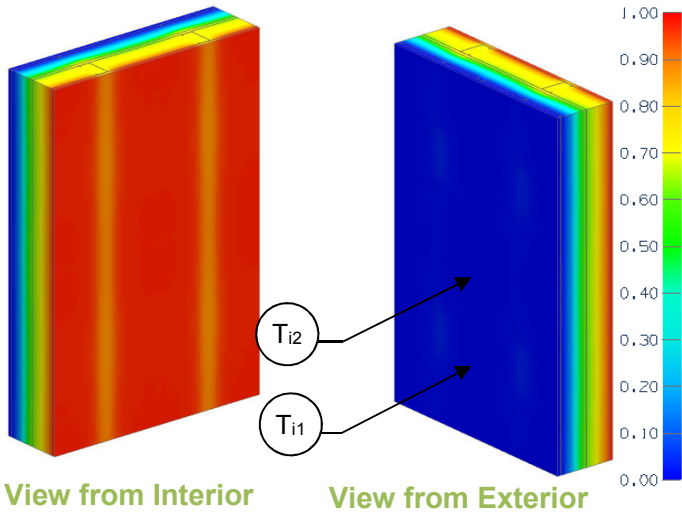
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-10 (1.76)	R-24.4 (4.30)	R-17.3 (3.04)	0.058 (0.33)
R-15 (2.64)	R-29.4 (5.18)	R-20.6 (3.62)	0.049 (0.28)
R-20 (3.52)	R-34.4 (6.06)	R-23.6 (4.16)	0.042 (0.24)

Temperature Indices

	R10	R15	R20	
T_{i1}	0.44	0.50	0.55	Min T on sheathing, at stud and girt intersection
T_{i2}	0.69	0.74	0.78	Max T on sheathing, at stud, between girts

Detail 5.1.13 Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z Clips (16" o.c.) Supporting Stucco Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R Value	R_{1D}	R-14.5 (2.55 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

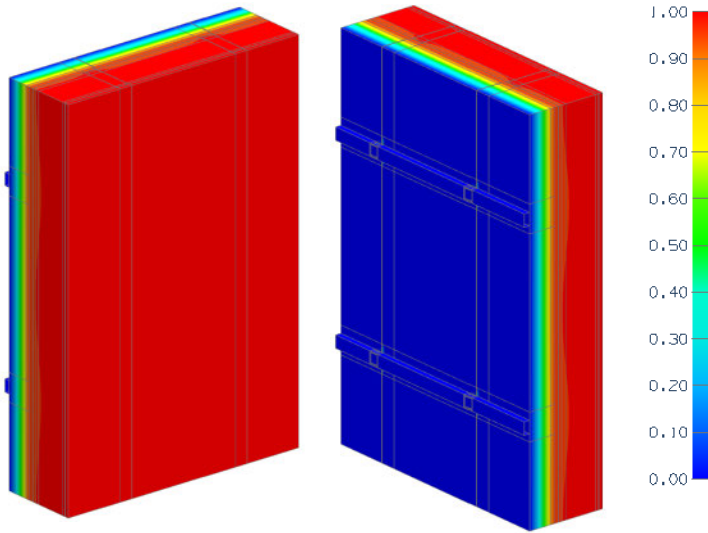
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-10 (1.76)	R-24.5 (4.31)	R-16.0 (2.82)	0.062 (0.35)
R-15 (2.64)	R-29.5 (5.20)	R-18.6 (3.28)	0.054 (0.30)
R-20 (3.52)	R-34.5 (6.08)	R-21.0 (3.70)	0.048 (0.27)

Temperature Indices

	R10	R15	R20	
T_{i1}	0.45	0.51	0.55	Min T on sheathing, at clip to stud connection
T_{i2}	0.67	0.72	0.75	Max T on sheathing, at stud, between clips

Detail 5.1.14 Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight MFI-System (24" o.c.) Supporting Cladding – Clear Wall

Thermal Performance Indicators



View from Interior

View from Exterior

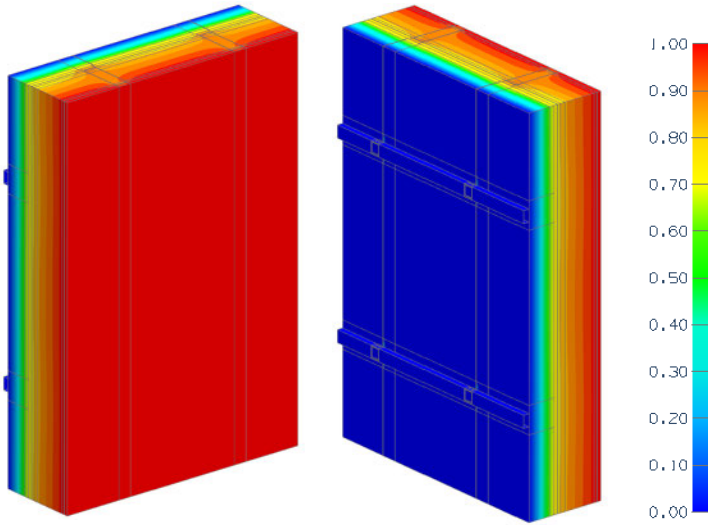
Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	U_o , R_o	"clear wall" U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.04)	R-10.8 (1.90)	0.093 (0.53)
R-12.6 (2.22)	R-15.8 (2.78)	R-14.1 (2.48)	0.071 (0.40)
R-14.7 (2.59)	R-17.9 (3.15)	R-15.7 (2.77)	0.064 (0.36)
R-16.8 (2.96)	R-20.0 (3.52)	R-17.2 (3.03)	0.058 (0.33)
R-21.0 (3.70)	R-24.2 (4.26)	R-20.1 (3.54)	0.050 (0.28)
R-25.2 (4.44)	R-28.4 (5.00)	R-22.7 (4.00)	0.044 (0.25)

Detail 5.1.15

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight MFI-System (24" o.c.) Supporting Cladding – Clear Wall



View from Interior

View from Exterior

Thermal Performance Indicators

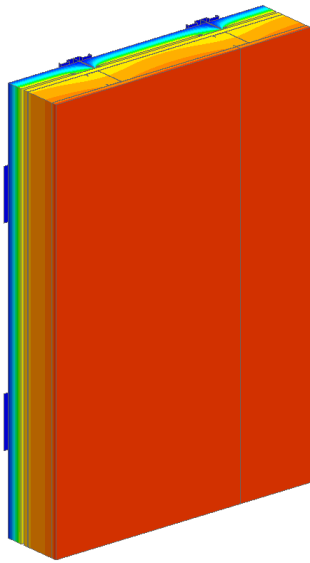
Assembly 1D (Nominal) R-Value	R_{1D}	R-21.3 (3.75 RSI) + exterior insulation
Transmittance / Resistance	U_o , R_o	"clear wall" U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

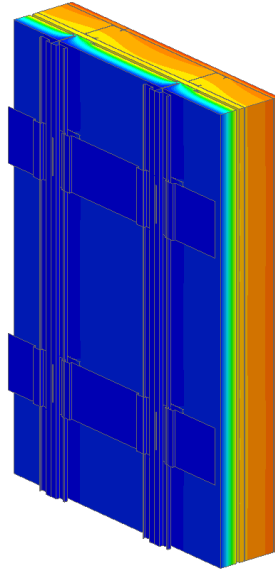
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-29.7 (5.23)	R-19.2 (3.38)	0.052 (0.30)
R-12.6 (2.22)	R-33.9 (5.97)	R-22.5 (3.96)	0.045 (0.26)
R-14.7 (2.59)	R-36.0 (6.34)	R-24.0 (4.23)	0.042 (0.24)
R-16.8 (2.96)	R-38.1 (6.71)	R-25.4 (4.47)	0.039 (0.22)
R-21.0 (3.70)	R-42.3 (7.45)	R-28.2 (4.97)	0.035 (0.20)
R-25.2 (4.44)	R-46.5 (8.19)	R-30.8 (5.42)	0.032 (0.18)

Detail 5.1.16

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with CL-Talon 300 Clip System Supporting Cladding – Clear Wall



View from Interior



View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.4 (0.60 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear field" U- and R-values
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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



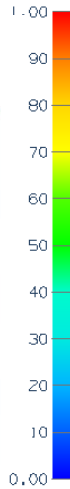
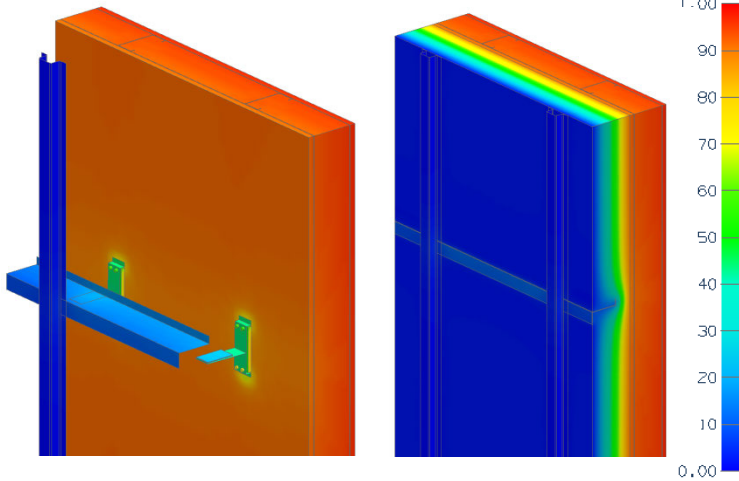
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.8 (2.08)	R-9.1 (1.61)	0.110 (0.622)	R-9.3 (1.63)	0.108 (0.612)	R-9.4 (1.65)	0.107 (0.606)
R-12.6 (2.22)	R-16.0 (2.82)	R-13.7 (2.41)	0.073 (0.416)	R-14.3 (2.52)	0.070 (0.397)	R-14.4 (2.54)	0.069 (0.393)
R-16.8 (2.96)	R-20.2 (3.56)	R-17.6 (3.09)	0.057 (0.323)	R-17.9 (3.15)	0.056 (0.317)	R-18.5 (3.26)	0.054 (0.307)

Detail 5.1.17

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Aluminum Clip Horizontal Sub-girt System Supporting Cladding – Clear Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1Da}	R-3.2 (0.56 RSI) + exterior insulation (without fiberglass batt insulation)
Assembly 1D (Nominal) R-Value	R_{1Db}	R-14.4 (2.54 RSI) + exterior insulation and fiberglass batt insulation ¹
Transmittance / Resistance	U_a , R_a , U_b , R_b	“Clear wall” U- and R-value: a = without batt insulation b = with batt insulation

¹If insulation in stud cavity is used, R-0.9 insulation for the cavity space is eliminated

View of Isolated Clips

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Clear Wall – Exterior Insulated Assembly

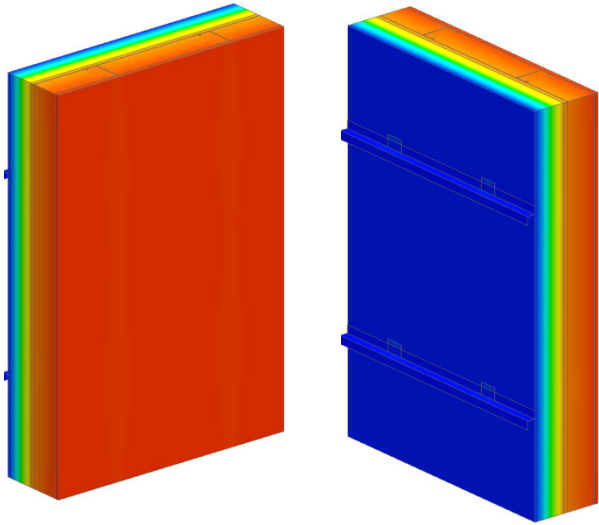
Clip System	Exterior Insulation 1D R-Value (RSI)	R_{1Da} ft ² ·hr·°F / Btu (m ² K / W)	34" Vertical Clip Spacing		41" Vertical Clip Spacing		48" Vertical Clip Spacing	
			R_a ft ² ·hr·°F / Btu (m ² K / W)	U_a Btu/ft ² ·hr·°F (W/m ² K)	R_a ft ² ·hr·°F / Btu (m ² K / W)	U_a Btu/ft ² ·hr·°F (W/m ² K)	R_a ft ² ·hr·°F / Btu (m ² K / W)	U_a Btu/ft ² ·hr·°F (W/m ² K)
T100	R-16.8 (2.96)	R-20.0 (3.52)	R-16.4 (2.89)	0.061 (0.35)	R-16.9 (2.98)	0.059 (0.34)	R-17.3 (3.04)	0.058 (0.33)
T125	R-21.0 (3.70)	R-24.2 (4.26)	R-19.7 (3.48)	0.051 (0.29)	R-20.4 (3.60)	0.049 (0.28)	R-20.9 (3.68)	0.048 (0.27)
T150	R-25.2 (4.44)	R-28.4 (5.00)	R-22.7 (3.99)	0.044 (0.25)	R-23.6 (4.15)	0.042 (0.24)	R-24.2 (4.26)	0.041 (0.24)

Clear Wall – Exterior and Interior Insulated Assembly

Clip System	Exterior Insulation 1D R-Value (RSI)	R_{1Db} ft ² ·hr·°F / Btu (m ² K / W)	34" Vertical Clip Spacing		41" Vertical Clip Spacing		48" Vertical Clip Spacing	
			R_b ft ² ·hr·°F / Btu (m ² K / W)	U_b Btu/ft ² ·hr·°F (W/m ² K)	R_b ft ² ·hr·°F / Btu (m ² K / W)	U_b Btu/ft ² ·hr·°F (W/m ² K)	R_b ft ² ·hr·°F / Btu (m ² K / W)	U_b Btu/ft ² ·hr·°F (W/m ² K)
T100	R-16.8 (2.96)	R-31.2 (5.50)	R-22.2 (3.91)	0.045 (0.26)	R-22.7 (4.00)	0.044 (0.25)	R-22.7 (4.00)	0.044 (0.25)
T125	R-21.0 (3.70)	R-35.4 (6.24)	R-25.0 (4.40)	0.040 (0.23)	R-25.6 (4.52)	0.039 (0.22)	R-26.3 (4.63)	0.038 (0.22)
T150	R-25.2 (4.44)	R-39.6 (6.98)	R-27.8 (4.89)	0.036 (0.20)	R-28.6 (5.03)	0.035 (0.20)	R-29.4 (5.18)	0.034 (0.19)

Detail 5.1.18 Exterior Insulated 3 5/8" x 1/58" Steel Stud (16"o.c.) Wall Assembly with Fiber Reinforced Girts (TAC) Supporting Cladding – Clear Wall

Thermal Performance Indicators



View from Interior

View from Exterior



Assembly 1D (Nominal) R-Value	R _{1Da}	R-3.2 (0.56 RSI) + exterior insulation (without fiberglass batt insulation)
Assembly 1D (Nominal) R-Value	R _{1Db}	R-14.4 (2.54 RSI) + exterior insulation and fiberglass batt insulation ¹
Transmittance / Resistance	U _a , R _a , U _b , R _b	"Clear wall" U- and R-value: a = without batt insulation b = with batt insulation

¹If insulation in stud cavity is used, R-0.9 insulation for the cavity space is eliminated

Nominal (1D) vs. Assembly Performance Indicators

Clear Wall – Without Fiberglass Batt Insulation in Stud Cavity

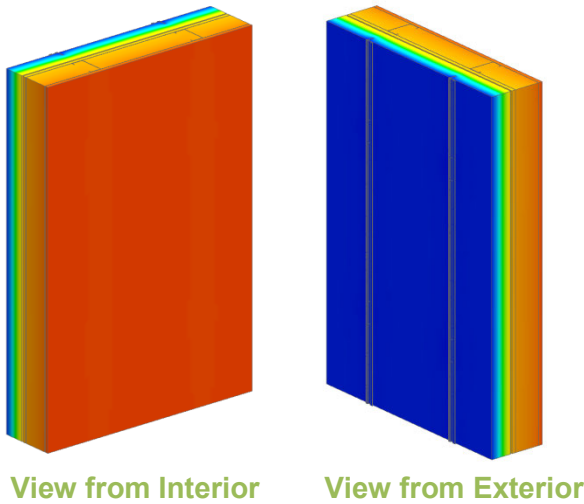
Exterior Insulation 1D R-Value (RSI)	R _{1Da} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R _a ft ² ·hr·°F / Btu (m ² K / W)	U _a Btu/ft ² ·hr ·°F (W/m ² K)	R _a ft ² ·hr·°F / Btu (m ² K / W)	U _a Btu/ft ² ·hr ·°F (W/m ² K)	R _a ft ² ·hr·°F / Btu (m ² K / W)	U _a Btu/ft ² ·hr ·°F (W/m ² K)
R-12.6 (2.22)	R-15.8 (2.78)	R-15.2 (2.68)	0.066 (0.37)	R-15.4 (2.70)	0.065 (0.37)	R-15.4 (2.70)	0.065 (0.37)
R-16.8 (3.00)	R-20.0 (3.52)	R-19.2 (3.38)	0.052 (0.30)	R-19.2 (3.45)	0.052 (0.29)	R-19.6 (3.45)	0.051 (0.29)
R-21.0 (3.70)	R-24.2 (4.27)	R-23.3 (4.10)	0.043 (0.24)	R-23.8 (4.17)	0.042 (0.24)	R-23.8 (4.17)	0.042 (0.24)
R-25.2 (4.40)	R-28.4 (5.00)	R-27.8 (4.90)	0.036 (0.21)	R-27.8 (4.76)	0.036 (0.21)	R-27.8 (4.76)	0.036 (0.20)

Clear Wall – With Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	R _{1Db} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R _b ft ² ·hr·°F / Btu (m ² K / W)	U _b Btu/ft ² ·hr ·°F (W/m ² K)	R _b ft ² ·hr·°F / Btu (m ² K / W)	U _b Btu/ft ² ·hr ·°F (W/m ² K)	R _b ft ² ·hr·°F / Btu (m ² K / W)	U _b Btu/ft ² ·hr ·°F (W/m ² K)
R-12.6 (2.22)	R-27.0 (4.76)	R-21.3 (3.70)	0.047 (0.27)	R-21.7 (3.85)	0.046 (0.26)	R-21.7 (3.85)	0.046 (0.26)
R-16.8 (3.00)	R-31.2 (5.49)	R-25.0 (4.35)	0.039 (0.22)	R-25.6 (4.55)	0.039 (0.22)	R-25.6 (4.55)	0.039 (0.22)
R-21.0 (3.70)	R-35.4 (6.23)	R-29.4 (5.26)	0.034 (0.19)	R-30.3 (5.26)	0.033 (0.19)	R-30.3 (5.26)	0.033 (0.19)
R-25.2 (4.40)	R-39.6 (6.97)	R-33.3 (5.88)	0.030 (0.17)	R-34.5 (5.88)	0.029 (0.17)	R-34.5 (5.88)	0.029 (0.17)

Detail 5.1.19

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken Aluminum Clip Rail System (24" o.c.) Supporting Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1Da}	R-3.2 (0.56 RSI) + exterior insulation (without fiberglass batt insulation)
Assembly 1D (Nominal) R-Value	R _{1Db}	R-14.4 (2.54 RSI) + exterior insulation and fiberglass batt insulation ¹
Transmittance / Resistance	U _a , R _a , U _b , R _b	"Clear wall" U- and R-value: a = without batt insulation b = with batt insulation

¹If insulation in stud cavity is used, R-0.9 insulation for the cavity space is eliminated

Nominal (1D) vs. Assembly Performance Indicators

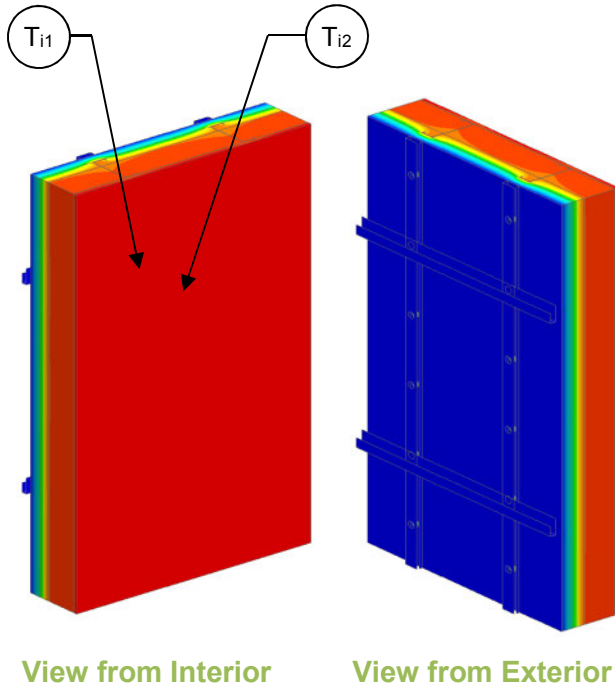
Clear Wall – Without Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	R _{1Da} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		30" Vertical Clip Spacing		36" Vertical Clip Spacing		42" Vertical Clip Spacing	
		R _a ft ² ·hr·°F / Btu (m ² K / W)	U _a Btu/ft ² ·hr ·°F (W/m ² K)	R _a ft ² ·hr·°F / Btu (m ² K / W)	U _a Btu/ft ² ·hr ·°F (W/m ² K)	R _a ft ² ·hr·°F / Btu (m ² K / W)	U _a Btu/ft ² ·hr ·°F (W/m ² K)	R _a ft ² ·hr·°F / Btu (m ² K / W)	U _a Btu/ft ² ·hr ·°F (W/m ² K)
R-12.6 (2.22)	R-15.8 (2.78)	R-14.1 (2.47)	0.071 (0.41)	R-14.3 (2.51)	0.070 (0.40)	R-14.5 (2.54)	0.069 (0.39)	R-14.5 (2.56)	0.069 (0.39)
R-16.8 (3.00)	R-20.0 (3.52)	R-16.9 (3.00)	0.059 (0.33)	R-17.5 (3.07)	0.057 (0.33)	R-17.9 (3.13)	0.056 (0.32)	R-17.9 (3.16)	0.056 (0.32)
R-21.0 (3.70)	R-24.2 (4.27)	R-19.6 (3.45)	0.051 (0.29)	R-20.4 (3.57)	0.049 (0.28)	R-20.8 (3.66)	0.048 (0.27)	R-21.3 (3.73)	0.047 (0.27)
R-25.2 (4.40)	R-28.4 (5.00)	R-21.7 (3.86)	0.046 (0.26)	R-22.7 (3.91)	0.044 (0.26)	R-23.8 (4.15)	0.042 (0.24)	R-24.4 (4.26)	0.041 (0.24)

Clear Wall – With Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	R _{1Db} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		30" Vertical Clip Spacing		36" Vertical Clip Spacing		42" Vertical Clip Spacing	
		R _b ft ² ·hr·°F / Btu (m ² K / W)	U _b Btu/ft ² ·hr ·°F (W/m ² K)	R _b ft ² ·hr·°F / Btu (m ² K / W)	U _b Btu/ft ² ·hr ·°F (W/m ² K)	R _b ft ² ·hr·°F / Btu (m ² K / W)	U _b Btu/ft ² ·hr ·°F (W/m ² K)	R _b ft ² ·hr·°F / Btu (m ² K / W)	U _b Btu/ft ² ·hr ·°F (W/m ² K)
R-12.6 (2.22)	R-27.0 (4.76)	R-19.2 (3.37)	0.052 (0.30)	R-20.4 (3.60)	0.049 (0.28)	R-20.8 (3.65)	0.048 (0.27)	R-20.8 (3.68)	0.048 (0.27)
R-16.8 (3.00)	R-31.2 (5.49)	R-23.3 (4.05)	0.043 (0.25)	R-23.3 (4.17)	0.043 (0.24)	R-23.8 (4.23)	0.042 (0.24)	R-23.8 (4.29)	0.041 (0.23)
R-21.0 (3.70)	R-35.4 (6.23)	R-25.6 (4.50)	0.039 (0.22)	R-26.3 (4.65)	0.038 (0.22)	R-27.0 (4.76)	0.037 (0.21)	R-27.0 (4.81)	0.037 (0.21)
R-25.2 (4.40)	R-39.6 (6.97)	R-27.8 (4.93)	0.036 (0.20)	R-29.4 (5.10)	0.034 (0.20)	R-30.3 (5.26)	0.033 (0.19)	R30.3 (5.35)	0.033 (0.19)

Detail 5.1.20 Exterior and Interior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (8" o.c.) – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-12.6 (2.22 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

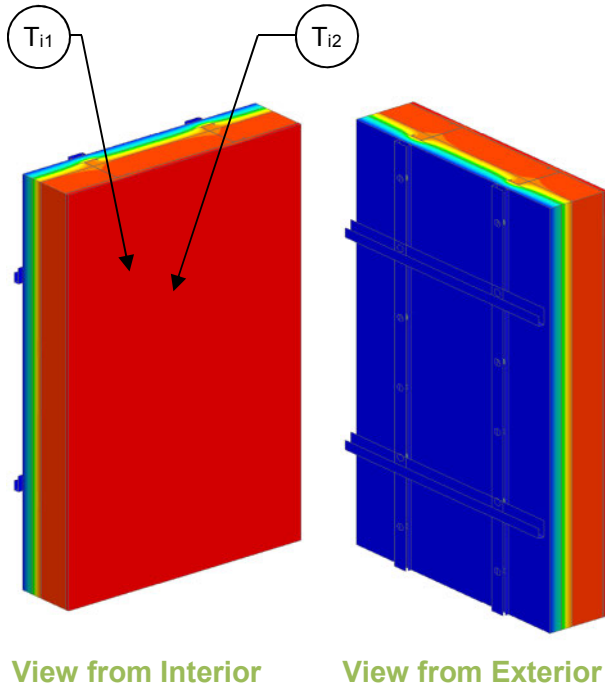
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10.1 (1.78)	R-22.7 (4.00)	R-18.0 (3.17)	0.056 (0.32)
R-19.0 (3.35)	R-31.6 (5.57)	R-25.6 (4.51)	0.039 (0.22)

Temperature Indices

	R10	R19	
T_{i1}	0.89	0.92	Min T on sprayfoam, at fasteners along studs
T_{i2}	0.90	0.93	Max T on sprayfoam, between studs

Detail 5.1.21 Exterior and Interior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (16" o.c.) – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-12.6 (2.22 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

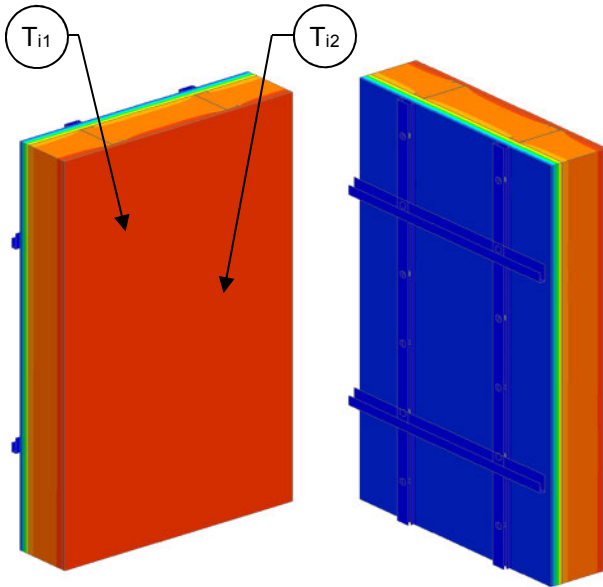
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10.1 (1.78)	R-22.7 (4.00)	R-18.8 (3.31)	0.053 (0.30)
R-19.0 (3.35)	R-31.6 (5.57)	R-27.0 (4.76)	0.037 (0.21)

Temperature Indices

	R10	R19	
T_{i1}	0.89	0.92	Min T on sprayfoam, at fasteners along studs
T_{i2}	0.90	0.93	Max T on sprayfoam, between studs

Detail 5.1.22 Exterior Insulated 5 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (8" o.c.) – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.8 (0.49 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

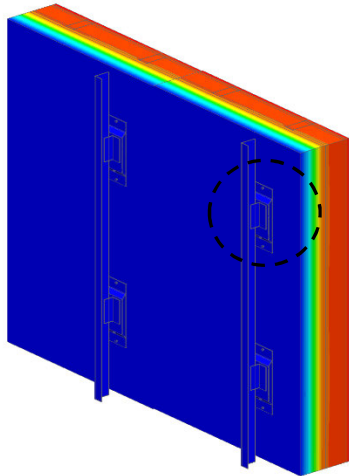
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10.1 (1.78)	R-12.9 (2.27)	R-12.5 (2.20)	0.080 (0.45)
R-19.0 (3.35)	R-21.8 (3.84)	R-20.7 (3.65)	0.048 (0.27)

Temperature Indices

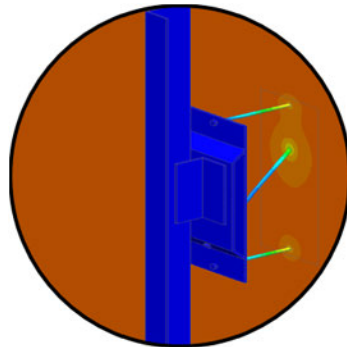
	R10	R19	
T_{i1}	0.61	0.68	Min T on exterior insulation, around fasteners
T_{i2}	0.85	0.91	Max T on exterior insulation, along studs

Detail 5.1.23

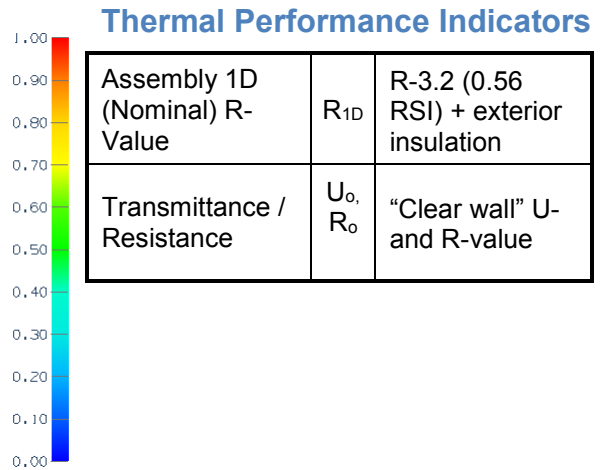
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with R-TEC CI Bracket System Supporting Vertical Sub-girts – Clear Wall



View from Exterior



View of Bracket

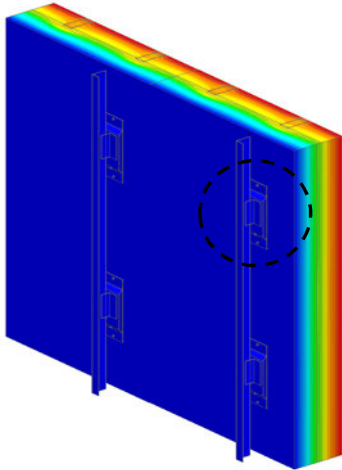


Nominal (1D) vs. Assembly Performance Indicators

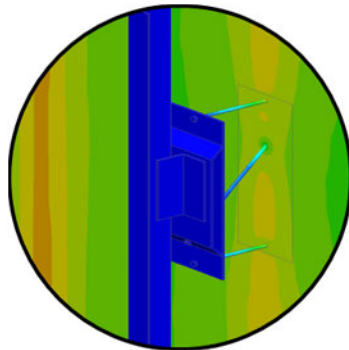
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
12.6 (2.22)	15.8 (2.78)	R-14.7 (2.59)	0.068 (0.387)	R-15.0 (2.65)	0.067 (0.378)	R-15.2 (2.68)	0.066 (0.374)
16.8 (2.96)	20.0 (3.52)	R-18.7 (3.29)	0.053 (0.304)	R-19.2 (3.38)	0.052 (0.296)	R-19.4 (3.42)	0.051 (0.292)
21.0 (3.70)	24.2 (4.26)	R-22.7 (3.99)	0.044 (0.250)	R-23.1 (4.07)	0.043 (0.246)	R-23.5 (4.13)	0.043 (0.242)
25.2 (4.44)	28.4 (5.00)	R-26.5 (4.67)	0.038 (0.214)	R-27.3 (4.8)	0.037 (0.208)	R-27.6 (4.87)	0.036 (0.206)

Detail 5.1.24

Interior and Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with R-TEC CI Bracket System Supporting Vertical Sub-girts – Clear Wall



View from Exterior



View of Bracket

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R _{1D}	R-15.3 (2.69 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	"Clear wall" U- and R-value

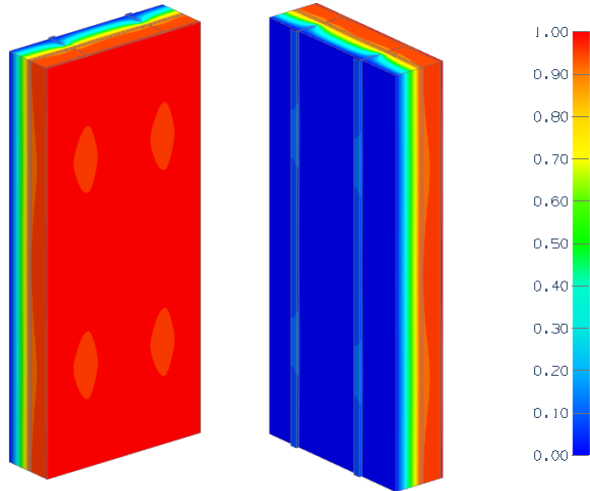
Nominal (1D) vs. Assembly Performance Indicators

Clear Wall – With Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	R _{1Db} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
12.6 (2.22)	27.9 (4.91)	R-21.3 (3.74)	0.047 (0.267)	R-21.6 (3.80)	0.046 (0.263)	R-21.8 (3.84)	0.046 (0.261)
16.8 (2.96)	32.1 (5.65)	R-25.4 (4.47)	0.039 (0.224)	R-25.8 (4.54)	0.039 (0.220)	R-26.1 (4.59)	0.038 (0.218)
21.0 (3.70)	36.3 (6.39)	R-29.3 (5.16)	0.034 (0.194)	R-29.9 (5.27)	0.033 (0.190)	R-30.0 (5.29)	0.033 (0.189)
25.2 (4.44)	40.5 (7.13)	R-33.4 (5.88)	0.030 (0.170)	R-33.7 (5.93)	0.030 (0.169)	R-34.2 (6.02)	0.029 (0.166)

Detail 5.1.25

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Vertical Sub-girts – Clear Wall



View from Interior

View from Exterior

Thermal Performance Indicators

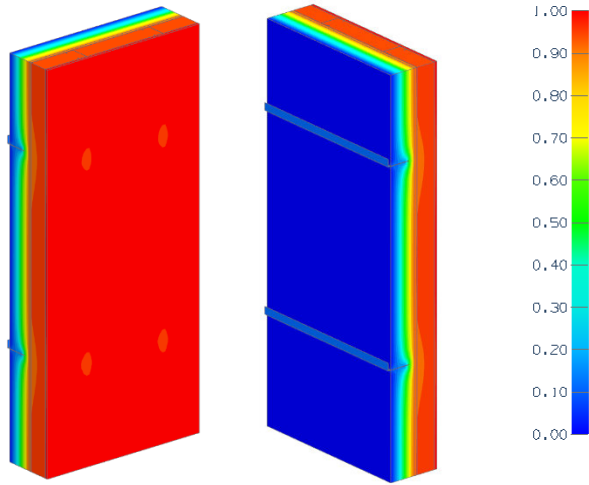
Assembly 1D (Nominal) R-Value	R _{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	“Clear wall” U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
16.8 (2.96)	20 (3.52)	R-14.3 (2.51)	0.070 (0.398)	R-15.1 (2.66)	0.066 (0.376)	R-15.6 (2.75)	0.064 (0.363)
21.0 (3.70)	24.2 (4.26)	R-15.8 (2.78)	0.063 (0.360)	R-16.7 (2.94)	0.060 (0.340)	R-17.4 (3.06)	0.058 (0.327)
25.2 (4.44)	28.4 (5.00)	R-17.0 (2.99)	0.059 (0.334)	R-18.0 (3.18)	0.055 (0.315)	R-18.8 (3.31)	0.053 (0.302)

Detail 5.1.26

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Horizontal Sub-girts – Clear Wall



View from Interior View from Exterior

Thermal Performance Indicators

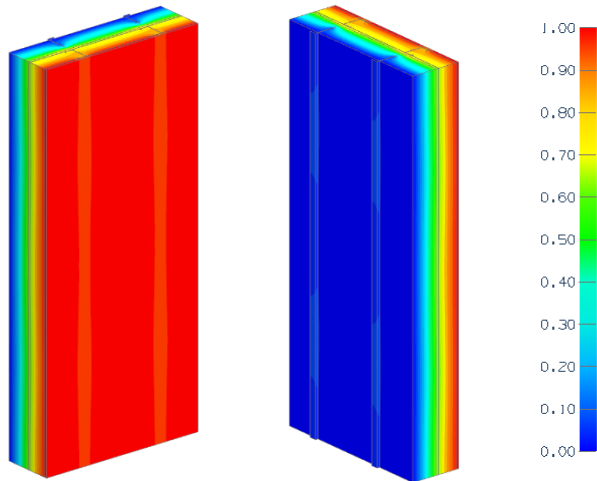
Assembly 1D (Nominal) R-Value	R _{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	"Clear wall" U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Stud Spacing	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		60" Vertical Clip Spacing	
			R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
16" o.c.	16.8 (2.96)	20 (3.52)	R-15.1 (2.65)	0.066 (0.377)	R-16.4 (2.88)	0.061 (0.347)	R-17.2 (3.02)	0.058 (0.331)	R-17.7 (3.12)	0.057 (0.321)
	21.0 (3.70)	24.2 (4.26)	R-16.9 (2.98)	0.059 (0.335)	R-18.7 (3.3)	0.053 (0.303)	R-19.8 (3.5)	0.050 (0.286)	R-20.6 (3.64)	0.048 (0.275)
	25.2 (4.44)	28.4 (5.00)	R-18.5 (3.26)	0.054 (0.307)	R-20.9 (3.67)	0.048 (0.273)	R-22.3 (3.93)	0.045 (0.254)	R-23.4 (4.12)	0.043 (0.243)
24" o.c.	16.8 (2.96)	20 (3.52)	R-16.0 (2.82)	0.062 (0.354)	R-17.1 (3.01)	0.058 (0.332)	R-17.8 (3.13)	0.056 (0.319)	R-18.2 (3.21)	0.055 (0.312)
	21.0 (3.70)	24.2 (4.26)	R-18.1 (3.19)	0.055 (0.314)	R-19.7 (3.47)	0.051 (0.289)	R-20.7 (3.64)	0.048 (0.275)	R-21.3 (3.75)	0.047 (0.266)
	25.2 (4.44)	28.4 (5.00)	R-19.9 (3.50)	0.050 (0.286)	R-22.0 (3.87)	0.045 (0.258)	R-23.3 (4.10)	0.043 (0.244)	R-24.2 (4.26)	0.041 (0.235)

Detail 5.1.27

Interior and Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Vertical Sub-girts – Clear Wall



View from Interior View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	“Clear wall” U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

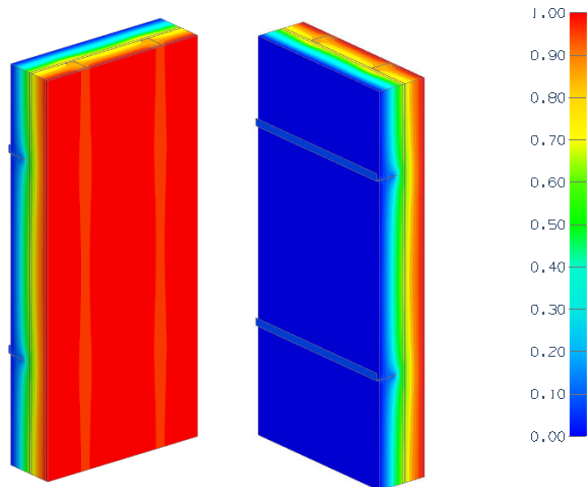
Clear Wall – With Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		60" Vertical Clip Spacing	
		R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
16.8 (2.96)	31.1 (5.48)	R-19.6 (3.46)	0.051 (0.289)	R-20.7 (3.64)	0.048 (0.274)	R-21.4 (3.76)	0.047 (0.266)	R-21.6 (3.80) ¹	0.046 (0.263) ¹
21.0 (3.70)	35.3 (6.22)	R-21.0 (3.7)	0.048 (0.270)	R-22.2 (3.92)	0.045 (0.255)	R-23.0 (4.05)	0.043 (0.247)	R-23.2 (4.08) ¹	0.043 (0.245) ¹
25.2 (4.44)	39.5 (6.96)	R-22.2 (3.91)	0.045 (0.255)	R-23.5 (4.14)	0.043 (0.241)	R-24.4 (4.29)	0.041 (0.233)	R-24.7 (4.35) ¹	0.040 (0.230) ¹

¹ Values were interpolated and not explicitly modelled

Detail 5.1.28

Interior and Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Horizontal Sub-girts – Clear Wall



View from Interior View from Exterior

Thermal Performance Indicators

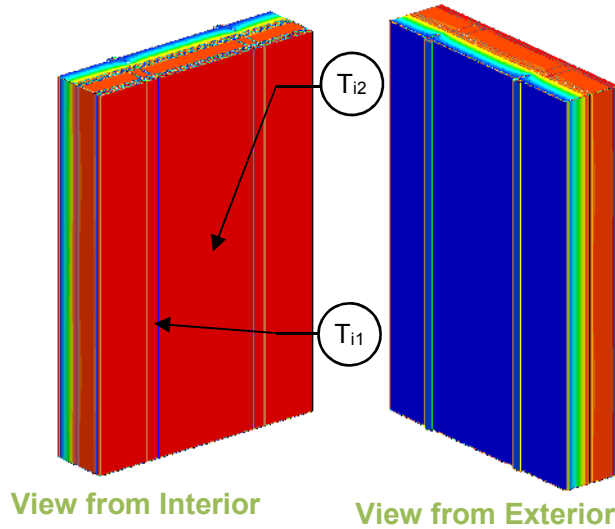
Assembly 1D (Nominal) R-Value	R _{1D}	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	"Clear wall" U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Stud Spacing	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		60" Vertical Clip Spacing	
			R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
16" o.c.	16.8 (2.96)	31.1 (5.48)	R-20.8 (3.66)	0.048 (0.273)	R-22.3 (3.92)	0.045 (0.255)	R-23.1 (4.08)	0.043 (0.245)	R-23.8 (4.19)	0.042 (0.239)
	21.0 (3.70)	35.3 (6.22)	R-22.6 (3.98)	0.044 (0.251)	R-24.6 (4.34)	0.041 (0.231)	R-25.9 (4.55)	0.039 (0.220)	R-26.7 (4.71)	0.037 (0.212)
	25.2 (4.44)	39.5 (6.96)	R-24.2 (4.26)	0.041 (0.235)	R-26.8 (4.71)	0.037 (0.212)	R-28.4 (5.00)	0.035 (0.200)	R-29.5 (5.20)	0.034 (0.192)
24" o.c.	16.8 (2.96)	31.1 (5.48)	R-23.0 (4.04)	0.044 (0.247)	R-24.3 (4.28)	0.041 (0.234)	R-25.1 (4.42)	0.040 (0.226)	R-25.6 (4.51)	0.039 (0.222)
	21.0 (3.70)	35.3 (6.22)	R-25.0 (4.40)	0.040 (0.227)	R-26.8 (4.73)	0.037 (0.211)	R-28.0 (4.93)	0.036 (0.203)	R-28.7 (5.06)	0.035 (0.198)
	25.2 (4.44)	39.5 (6.96)	R-26.8 (4.71)	0.037 (0.212)	R-29.2 (5.14)	0.034 (0.195)	R-30.6 (5.40)	0.033 (0.185)	R-31.7 (5.58)	0.032 (0.179)

Detail 5.1.29

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall



Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-12.6 (2.22)	R-15.8 (2.78)	R-12.3 (2.16)	0.082 (0.46)	R-12.9 (2.28)	0.077 (0.44)	R-13.3 (2.33)	0.075 (0.43)
R-16.8 (2.96)	R-20.0 (3.52)	R-14.7 (2.59)	0.068 (0.39)	R-15.8 (2.78)	0.063 (0.36)	R-16.4 (2.89)	0.061 (0.35)
R-21.0 (3.70)	R-24.2 (4.26)	R-16.7 (2.94)	0.060 (0.34)	R-18.3 (3.23)	0.055 (0.31)	R-19.2 (3.39)	0.052 (0.30)
R-25.2 (4.44)	R-28.4 (5.00)	R-18.4 (3.25)	0.054 (0.31)	R-20.6 (3.63)	0.049 (0.28)	R-21.9 (3.85)	0.046 (0.26)

Temperature Indices

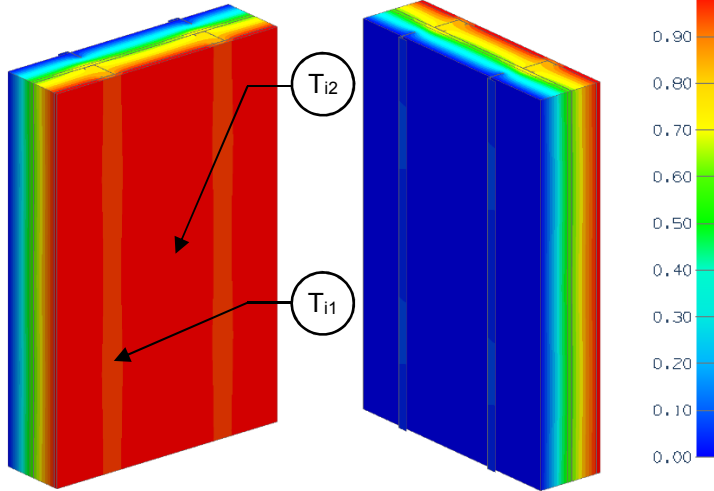
	R12.6	R16.8	R21	R25.1	
T_{i1}	0.71	0.73	0.73	0.74	Min T on sheathing, at clip and stud intersection
T_{i2}	0.85	0.89	0.90	0.90	Max T on sheathing, center of stud cavity between clips

Detail 5.1.30

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall

View from Interior

View from Exterior



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-22.7 (4.00)	R-15.8 (2.78)	0.063 (0.36)	R-16.2 (2.86)	0.062 (0.35)	R-16.5 (2.9)	0.061 (0.34)
R-12.6 (2.22)	R-26.9 (4.74)	R-18.1 (3.19)	0.055 (0.31)	R-18.9 (3.33)	0.053 (0.30)	R-19.3 (3.41)	0.052 (0.29)
R-16.8 (2.96)	R-31.1 (5.48)	R-20.5 (3.61)	0.049 (0.28)	R-21.9 (3.85)	0.046 (0.26)	R-22.6 (3.97)	0.044 (0.25)
R-21.0 (3.70)	R-35.3 (6.22)	R-22.5 (3.96)	0.044 (0.25)	R-24.4 (4.30)	0.041 (0.23)	R-25.4 (4.48)	0.039 (0.22)
R-25.2 (4.44)	R-39.5 (6.96)	R-24.2 (4.27)	0.041 (0.23)	R-26.7 (4.70)	0.037 (0.21)	R-28.1 (4.95)	0.036 (0.20)

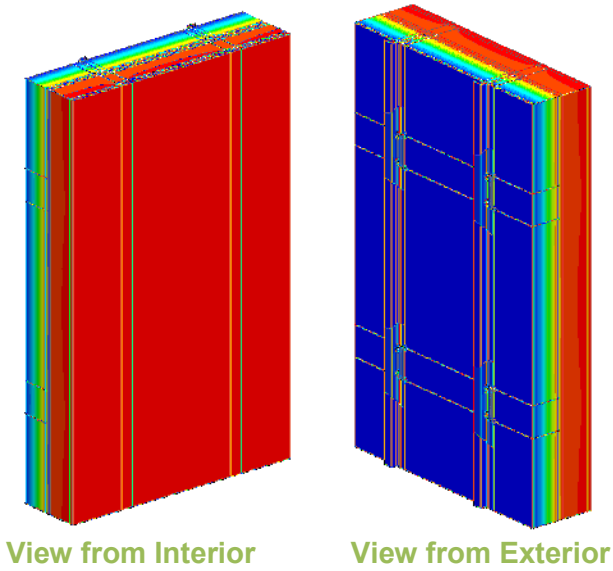
Temperature Indices

	R8.4	R12.6	R16.8	R21	R25.1	
T_{i1}	0.42	0.47	0.50	0.52	0.53	Min T on sheathing, at clip and stud intersection
T_{i2}	0.65	0.70	0.74	0.77	0.79	Max T on sheathing, center of stud cavity between clips

Detail 5.1.31

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Cascadia Clip Fiberglass Thermal Spacers – Clear Wall

Thermal Performance Indicators



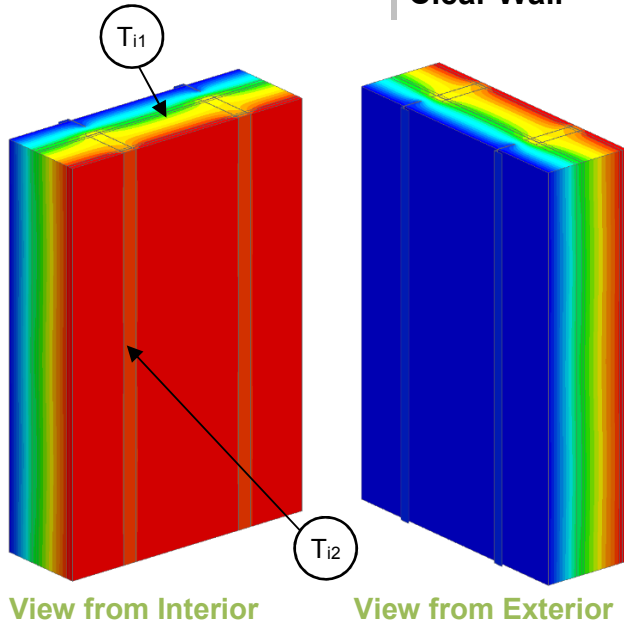
1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-3.2 (0.56 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U_o, R_o</td> <td>"clear wall" U- and R-value</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation	Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Assembly 1D (Nominal) R-Value		R_{1D}	R-3.2 (0.56 RSI) + exterior insulation				
Transmittance / Resistance		U_o, R_o	"clear wall" U- and R-value				
0.90							
0.80							
0.70							
0.60							
0.50							
0.40							
0.30							
0.20							
0.10							
0.00							

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	26" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.04)	R-11.1 (1.95)	0.090 (0.51)	R-11.4 (2.00)	0.088 (0.50)	R-11.6 (2.04)	0.086 (0.49)
R-10.5 (1.85)	R-13.7 (2.41)	R-12.9 (2.27)	0.078 (0.44)	R-13.3 (2.34)	0.075 (0.43)	R-13.5 (2.38)	0.074 (0.42)
R-12.6 (2.22)	R-15.8 (2.78)	R-14.6 (2.57)	0.069 (0.39)	R-15.0 (2.65)	0.066 (0.38)	R-15.3 (2.70)	0.065 (0.37)
R-14.7 (2.59)	R-17.9 (3.15)	R-16.4 (2.89)	0.061 (0.35)	R-16.9 (2.98)	0.059 (0.34)	R-17.3 (3.05)	0.058 (0.33)
R-16.8 (2.96)	R-20.0 (3.52)	R-18.2 (3.20)	0.055 (0.31)	R-18.8 (3.31)	0.053 (0.30)	R-19.2 (3.39)	0.052 (0.30)
R-21.0 (3.70)	R-24.2 (4.26)	R-21.5 (3.79)	0.046 (0.26)	R-22.4 (3.94)	0.045 (0.25)	R-22.9 (4.04)	0.044 (0.25)
R-25.2 (4.44)	R-28.4 (5.00)	R-24.8 (4.37)	0.040 (0.23)	R-25.9 (4.55)	0.039 (0.22)	R-26.6 (4.68)	0.038 (0.21)
R-33.6 (5.92)	R-36.8 (6.48)	R-31.4 (5.53)	0.032 (0.18)	R-32.9 (5.79)	0.030 (0.17)	R-33.9 (5.97)	0.030 (0.17)

Detail 5.1.32

Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" o.c. and 36" o.c.) Supporting Cladding and R-20 Batt Insulation in Stud Cavity–Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-22.4 (3.94 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

16" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-4.2 (0.75)	R-26.6 (4.69)	R-15.7 (2.77)	0.064 (0.36)	R-15.9 (2.80)	0.063 (0.36)
R-8.5 (1.49)	R-30.9 (5.44)	R-18.3 (3.22)	0.055 (0.31)	R-18.7 (3.30)	0.053 (0.30)
R-12.7 (2.24)	R-35.1 (6.19)	R-20.4 (3.59)	0.049 (0.28)	R-21.1 (3.72)	0.047 (0.27)
R-17.0 (2.99)	R-39.4 (6.93)	R-22.9 (4.04)	0.044 (0.25)	R-24.1 (4.25)	0.041 (0.24)

24" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-4.2 (0.75)	R-26.6 (4.69)	R-18.2 (3.20)	0.055 (0.31)	R-18.3 (3.23)	0.055 (0.31)
R-8.5 (1.49)	R-30.9 (5.44)	R-21.1 (3.72)	0.047 (0.27)	R-21.5 (3.79)	0.047 (0.26)
R-12.7 (2.24)	R-35.1 (6.19)	R-23.7 (4.17)	0.042 (0.24)	R-24.3 (4.28)	0.041 (0.23)
R-17.0 (2.99)	R-39.4 (6.93)	R-26.6 (4.68)	0.038 (0.21)	R-27.6 (4.86)	0.036 (0.21)

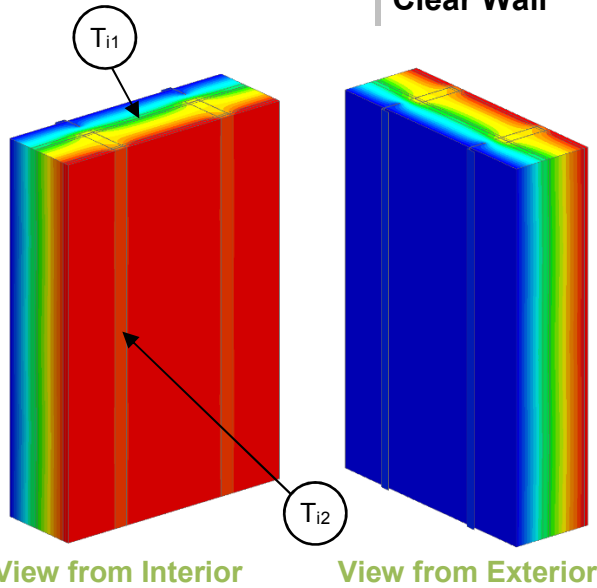
Temperature Indices

	R4.2	R8.5	R12.7	R17	
T_{i1}	0.22	0.33	0.42	0.47	Min T on sheathing, between studs
T_{i2}	0.54	0.61	0.66	0.71	Max T on sheathing, at stud, between clips

Temperature indices taken from scenario with 24" o.c. studs with 36" vertical clip spacing. All other scenarios have higher minimum temperature index.

Detail 5.1.33

Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" O.C. and 36" o.c.) Supporting Cladding and R-22.5 Batt Insulation in Stud Cavity—Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-24.9 (4.39 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

16" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-4.2 (0.75)	R-29.1 (5.13)	R-16.3 (2.86)	0.062 (0.35)	R-16.4 (2.9)	0.061 (0.35)
R-8.5 (1.49)	R-33.4 (5.88)	R-18.8 (3.32)	0.053 (0.30)	R-19.3 (3.39)	0.052 (0.29)
R-12.7 (2.24)	R-37.6 (6.62)	R-20.9 (3.68)	0.048 (0.27)	R-21.6 (3.81)	0.046 (0.26)
R-17.0 (2.99)	R-41.9 (7.38)	R-23.4 (4.12)	0.043 (0.24)	R-24.7 (4.34)	0.041 (0.23)

24" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-4.2 (0.75)	R-29.1 (5.13)	R-18.9 (3.34)	0.053 (0.30)	R-19.1 (3.37)	0.052 (0.30)
R-8.5 (1.49)	R-33.4 (5.88)	R-21.9 (3.85)	0.046 (0.26)	R-22.3 (3.92)	0.045 (0.25)
R-12.7 (2.24)	R-37.6 (6.62)	R-24.4 (4.29)	0.041 (0.23)	R-25.0 (4.41)	0.040 (0.23)
R-17.0 (2.99)	R-41.9 (7.38)	R-27.3 (4.81)	0.037 (0.21)	R-28.4 (5.00)	0.035 (0.20)

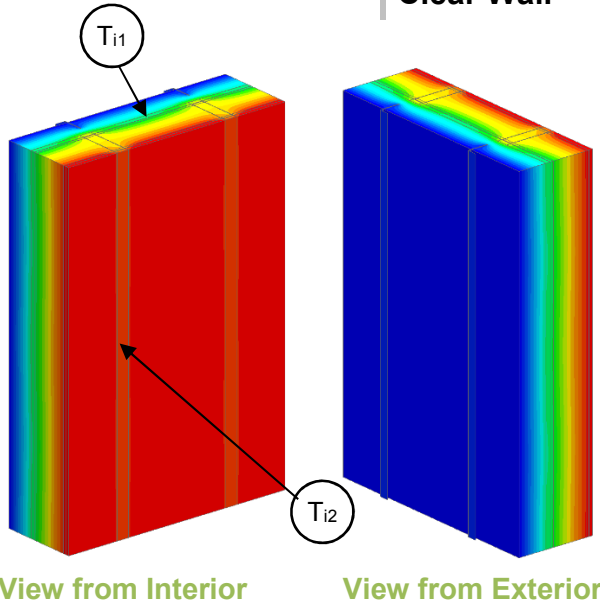
Temperature Indices

	R4.2	R8.5	R12.7	R17	
T_{i1}	0.20	0.32	0.40	0.45	Min T on sheathing, between studs
T_{i2}	0.53	0.60	0.65	0.70	Max T on sheathing, at stud, between clips

Temperature indices taken from scenario with 24" o.c. studs with 36" vertical clip spacing. All other scenarios have higher minimum temperature index.

Detail 5.1.34

Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" O.C. and 36" o.c.) Supporting Cladding and R-24 Batt Insulation in Stud Cavity– Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-26.4 (4.65 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

16" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.75)	R-30.6 (5.39)	R-16.8 (2.95)	0.060 (0.34)	R-16.9 (2.98)	0.059 (0.34)
R-8.5 (1.49)	R-34.9 (6.15)	R-19.3 (3.40)	0.052 (0.29)	R-19.8 (3.48)	0.051 (0.29)
R-12.7 (2.24)	R-39.1 (6.89)	R-21.3 (3.76)	0.047 (0.27)	R-22.1 (3.89)	0.045 (0.26)
R-17.0 (2.99)	R-43.4 (7.64)	R-23.9 (4.21)	0.042 (0.24)	R-25.1 (4.43)	0.040 (0.23)

24" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.75)	R-30.6 (5.39)	R-19.7 (3.47)	0.051 (0.29)	R-19.8 (3.50)	0.050 (0.29)
R-8.5 (1.49)	R-34.9 (6.15)	R-22.6 (3.98)	0.044 (0.25)	R-23.0 (4.05)	0.043 (0.25)
R-12.7 (2.24)	R-39.1 (6.89)	R-25.1 (4.42)	0.040 (0.23)	R-25.7 (4.53)	0.039 (0.22)
R-17.0 (2.99)	R-43.4 (7.64)	R-28.0 (4.93)	0.036 (0.20)	R-29.1 (5.12)	0.034 (0.20)

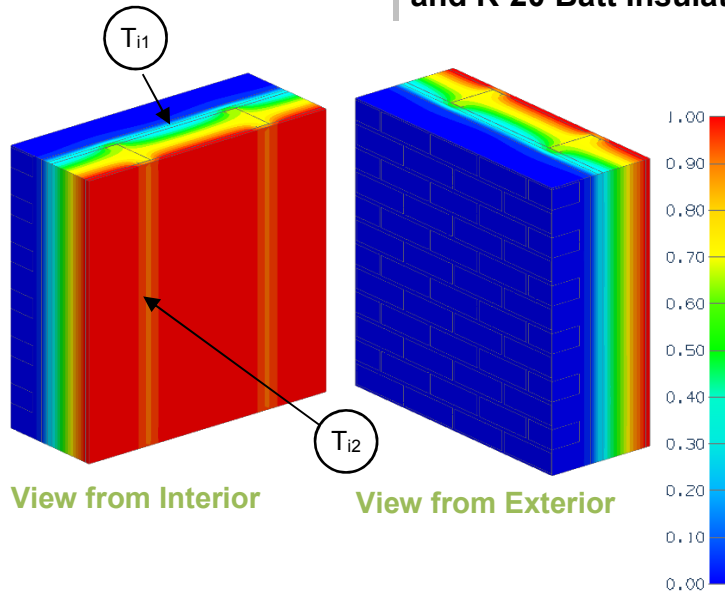
Temperature Indices

	R4.2	R8.5	R12.7	R17	
T_{i1}	0.19	0.30	0.38	0.44	Min T on sheathing, between studs
T_{i2}	0.53	0.56	0.64	0.69	Max T on sheathing, at stud, between clips

Temperature indices taken from scenario with 24" o.c. studs with 36" vertical clip spacing. All other scenarios have higher minimum temperature index.

Detail 5.1.35

Exterior and Interior Insulation 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Brick Ties Supporting Brick Veneer and R-20 Batt Insulation in Stud Cavity – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-22.4 (3.94 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

Carbon Steel Anchor, Bolts, and Brick Ties

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	16" o.c.		24" o.c.	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-27.4 (4.83)	R-17.1 (3.01)	0.058 (0.33)	R-19.6 (3.45)	0.051 (0.29)
R-7.5 (1.32)	R-29.9 (5.27)	R-19.5 (3.43)	0.051 (0.29)	R-22.1 (3.89)	0.045 (0.26)
R-10 (1.76)	R-32.4 (5.71)	R-21.8 (3.84)	0.046 (0.26)	R-24.5 (4.31)	0.041 (0.23)
R-15 (2.64)	R-37.4 (6.59)	R-26.3 (4.63)	0.038 (0.22)	R-29.2 (5.15)	0.034 (0.19)

Stainless Steel Anchor, Bolts, and Brick Ties

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	16" o.c.		24" o.c.	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-27.4 (4.83)	R-17.1 (3.01)	0.059 (0.33)	R-19.6 (3.45)	0.051 (0.29)
R-7.5 (1.32)	R-29.9 (5.27)	R-19.5 (3.44)	0.051 (0.29)	R-22.1 (3.89)	0.045 (0.26)
R-10 (1.76)	R-32.4 (5.71)	R-21.9 (3.85)	0.046 (0.26)	R-24.5 (4.32)	0.041 (0.23)
R-15 (2.64)	R-37.4 (6.59)	R-26.5 (4.66)	0.038 (0.21)	R-29.2 (5.15)	0.034 (0.19)

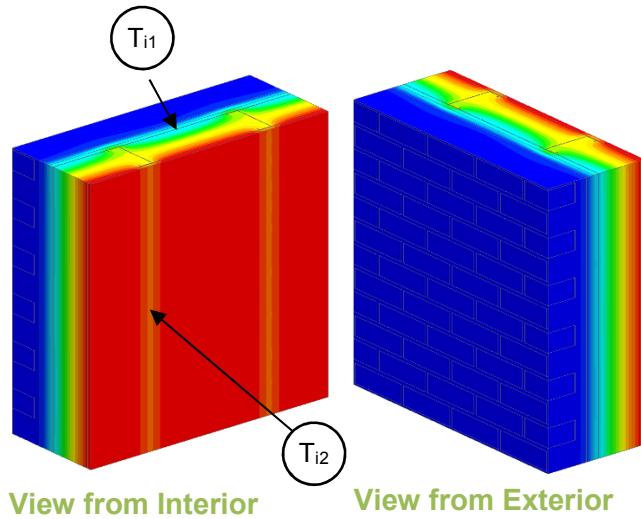
Temperature Indices

	R5	R7.5	R10	R15	
T_{i1}	0.28	0.35	0.41	0.50	Min T on sheathing, between studs
T_{i2}	0.58	0.64	0.68	0.73	Max T on sheathing, along studs

Temperature indices taken from scenario with 24" o.c. studs. All other scenarios have higher minimum temperature index.

Detail 5.1.36

Exterior and Interior Insulation 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Brick Ties Supporting Brick Veneer and R-22.5 Batt Insulation in Stud Cavity – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-24.4 (4.30 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

Carbon Steel Anchor, Bolts, and Brick Ties

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	16" o.c.		24" o.c.	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-29.4 (5.18)	R-17.5 (3.09)	0.057 (0.32)	R-20.3 (3.58)	0.049 (0.28)
R-7.5 (1.32)	R-31.9 (5.62)	R-19.9 (3.51)	0.050 (0.28)	R-22.8 (4.02)	0.044 (0.25)
R-10 (1.76)	R-34.4 (6.06)	R-22.3 (3.93)	0.045 (0.25)	R-25.2 (4.44)	0.040 (0.23)
R-15 (2.64)	R-39.4 (6.94)	R-26.8 (4.72)	0.037 (0.21)	R-30.0 (5.29)	0.033 (0.19)

Stainless Steel Anchor, Bolts, and Brick Ties

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	16" o.c.		24" o.c.	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-29.4 (5.18)	R-17.6 (3.1)	0.057 (0.32)	R-20.3 (3.58)	0.049 (0.28)
R-7.5 (1.32)	R-31.9 (5.62)	R-20.0 (3.52)	0.050 (0.28)	R-22.8 (4.02)	0.044 (0.25)
R-10 (1.76)	R-34.4 (6.06)	R-22.4 (3.94)	0.045 (0.25)	R-25.3 (4.46)	0.040 (0.22)
R-15 (2.64)	R-39.4 (6.94)	R-27.0 (4.75)	0.037 (0.21)	R-30.1 (5.29)	0.033 (0.19)

Temperature Indices

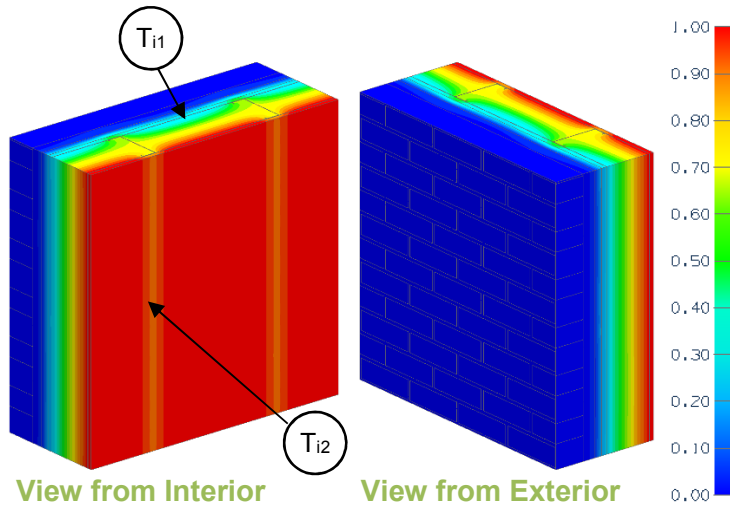
	R5	R7.5	R10	R15	
T_{i1}	0.26	0.33	0.39	0.48	Min T on sheathing, between studs
T_{i2}	0.57	0.64	0.67	0.72	Max T on sheathing, along studs

Temperature indices taken from scenario with 24" o.c. studs. All other scenarios have higher minimum temperature index.

Detail 5.1.37

Exterior and Interior Insulation 2" x 6" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Brick Ties Supporting Brick Veneer and R-24 Batt Insulation in Stud Cavity – Clear Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R Value	R_{1D}	R-26.4 (4.65 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

Carbon Steel Anchor, Bolts, and Brick Ties

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	16" o.c.		24" o.c.	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-31.4 (5.53)	R-18.0 (3.17)	0.056 (0.32)	R-21.0 (3.70)	0.048 (0.27)
R-7.5 (1.32)	R-33.9 (5.97)	R-20.4 (3.59)	0.049 (0.28)	R-23.5 (4.15)	0.042 (0.24)
R-10 (1.76)	R-36.4 (6.41)	R-22.8 (4.01)	0.044 (0.25)	R-25.9 (4.57)	0.039 (0.22)
R-15 (2.64)	R-41.4 (7.29)	R-27.2 (4.78)	0.037 (0.21)	R-30.6 (5.40)	0.033 (0.19)

Stainless Steel Anchor, Bolts, and Brick Ties

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	16" o.c.		24" o.c.	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-31.4 (5.53)	R-18.0 (3.17)	0.056 (0.32)	R-21.0 (3.70)	0.048 (0.27)
R-7.5 (1.32)	R-33.9 (5.97)	R-20.4 (3.6)	0.049 (0.28)	R-23.6 (4.15)	0.042 (0.24)
R-10 (1.76)	R-36.4 (6.41)	R-22.8 (4.02)	0.044 (0.25)	R-26.1 (4.59)	0.038 (0.22)
R-15 (2.64)	R-41.4 (7.29)	R-27.2 (4.78)	0.037 (0.21)	R-30.7 (5.41)	0.033 (0.18)

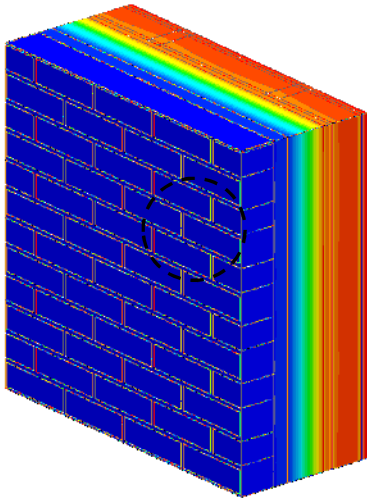
Temperature Indices

	R5	R7.5	R10	R15	
T_{i1}	0.25	0.32	0.37	0.47	Min T on sheathing, between studs
T_{i2}	0.57	0.63	0.67	0.72	Max T on sheathing, along studs

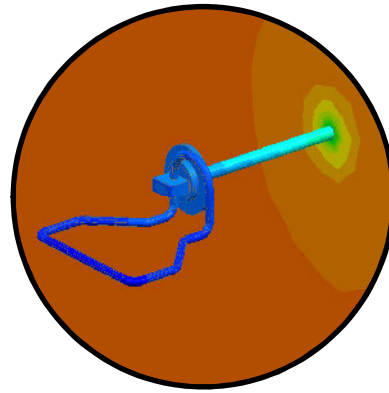
Temperature indices taken from scenario with 24" o.c. studs. All other scenarios have higher minimum temperature index.

Detail 5.1.38

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Zinc 2-Seal Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U- and R-value: a = without batt insulation
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

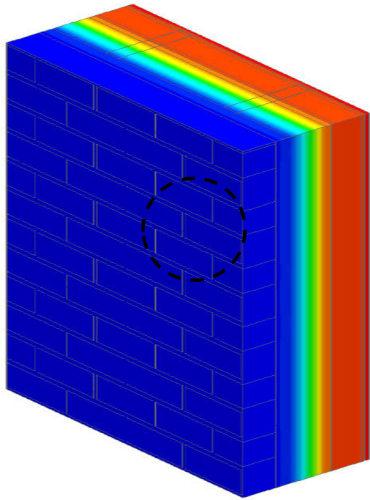
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.3 (1.29)	0.137 (0.777)	R-7.7 (1.35)	0.130 (0.740)	R-7.8 (1.38)	0.128 (0.725)
R-8.4 (1.48)	R-12.7 (2.24)	R-10.1 (1.78)	0.099 (0.563)	R-11.1 (1.95)	0.090 (0.514)	R-11.5 (2.02)	0.087 (0.495)
R-12.6 (2.22)	R-16.9 (2.96)	R-12.5 (2.20)	0.080 (0.454)	R-14.2 (2.50)	0.071 (0.401)	R-14.9 (2.62)	0.067 (0.381)
R-16.8 (2.96)	R-21.1 (3.72)	R-14.7 (2.59)	0.068 (0.386)	R-17.1 (3.01)	0.058 (0.332)	R-18.2 (3.20)	0.055 (0.313)

Temperature Indices

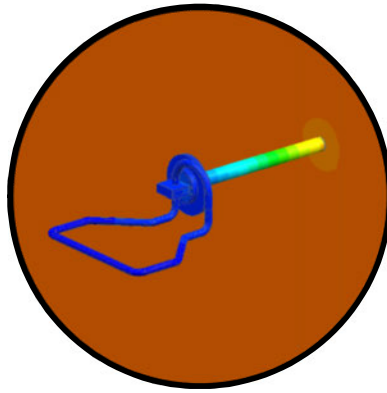
	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.42	0.47	0.51	0.55	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.72	0.79	0.83	0.86	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.39

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-4.4 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U_o and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

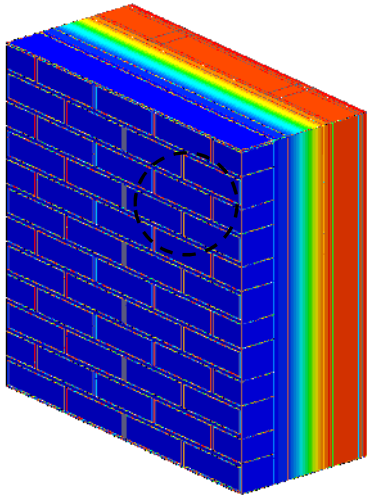
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.8 (1.37)	0.129 (0.731)	R-8.0 (1.4)	0.126 (0.714)	R-8.0 (1.41)	0.125 (0.708)
R-8.4 (1.48)	R-12.7 (2.24)	R-11.5 (2.02)	0.087 (0.495)	R-11.9 (2.1)	0.084 (0.477)	R-12.0 (2.12)	0.083 (0.471)
R-12.6 (2.22)	R-16.9 (2.96)	R-15.2 (2.67)	0.066 (0.375)	R-15.8 (2.78)	0.063 (0.359)	R-16.1 (2.83)	0.062 (0.354)
R-16.8 (2.96)	R-21.1 (3.72)	R-18.8 (3.31)	0.053 (0.302)	R-19.7 (3.47)	0.051 (0.288)	R-20.1 (3.53)	0.050 (0.283)

Temperature Indices

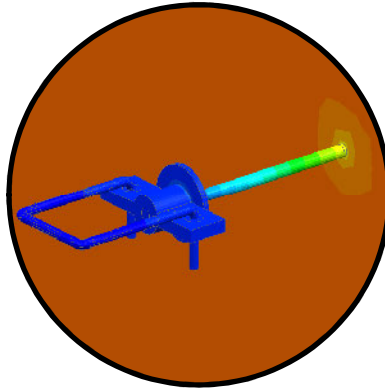
	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.67	0.75	0.81	0.80	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.74	0.82	0.86	0.89	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.40

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Wing Nut Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U_o and R_o -value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature



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

Nominal (1D) vs. Assembly Performance Indicators

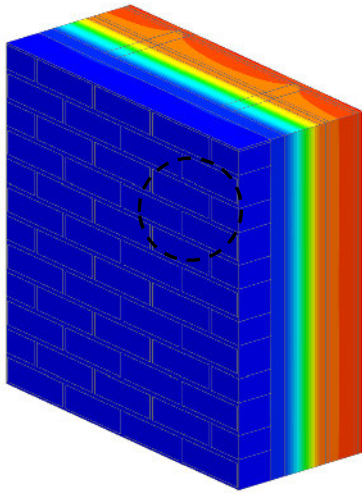
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.7 (1.36)	0.130 (0.737)	R-7.9 (1.39)	0.127 (0.721)	R-7.9 (1.40)	0.126 (0.716)
R-8.4 (1.48)	R-12.7 (2.24)	R-11.4 (2.01)	0.088 (0.498)	R-11.8 (2.08)	0.085 (0.481)	R-11.9 (2.10)	0.084 (0.475)
R-12.6 (2.22)	R-16.9 (2.96)	R-15.0 (2.64)	0.067 (0.379)	R-15.7 (2.76)	0.064 (0.362)	R-16.0 (2.81)	0.063 (0.356)
R-16.8 (2.96)	R-21.1 (3.72)	R-18.6 (3.27)	0.054 (0.306)	R-19.6 (3.44)	0.051 (0.290)	R-19.9 (3.51)	0.050 (0.285)

Temperature Indices

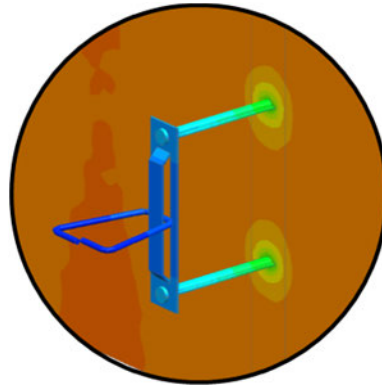
	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.56	0.66	0.72	0.76	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.75	0.83	0.87	0.90	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.41

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Carbon Steel X-Seal Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o , R_o	"Clear wall" U - and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

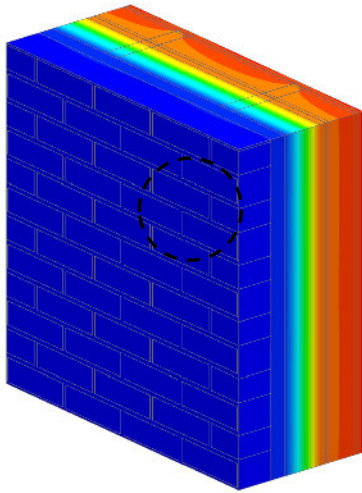
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-6.7 (1.19)	0.149 (0.844)	R-7.3 (1.29)	0.137 (0.776)	R-7.6 (1.33)	0.132 (0.750)
R-8.4 (1.48)	R-12.7 (2.24)	R-8.7 (1.54)	0.115 (0.651)	R-10.1 (1.78)	0.099 (0.563)	R-10.7 (1.89)	0.093 (0.530)
R-12.6 (2.22)	R-16.9 (2.96)	R-10.3 (1.82)	0.097 (0.551)	R-12.5 (2.20)	0.080 (0.456)	R-13.5 (2.39)	0.074 (0.419)
R-16.8 (2.96)	R-21.1 (3.72)	R-11.7 (2.06)	0.086 (0.486)	R-14.6 (2.57)	0.068 (0.389)	R-16.2 (2.85)	0.062 (0.351)

Temperature Indices

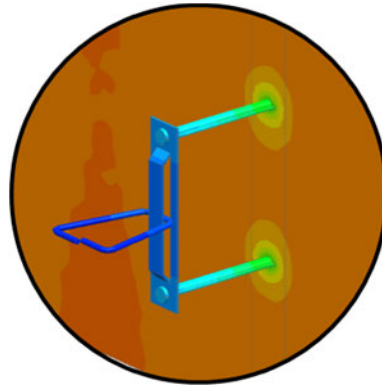
	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.47	0.53	0.57	0.60	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.69	0.76	0.80	0.82	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.42

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel X-Seal Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	"Clear wall" U- and R-value
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

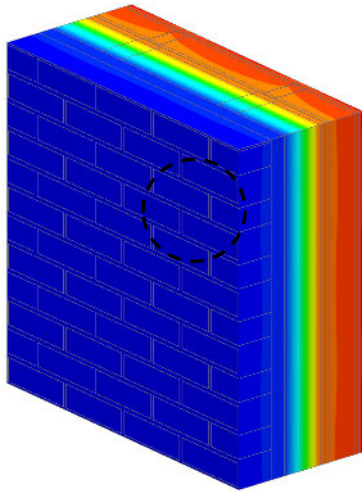
Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.1 (1.24)	0.142 (0.804)	R-7.5 (1.33)	0.133 (0.754)	R-7.7 (1.36)	0.129 (0.735)
R-8.4 (1.48)	R-12.7 (2.24)	R-9.6 (1.69)	0.104 (0.593)	R-10.7 (1.88)	0.093 (0.531)	R-11.2 (1.97)	0.089 (0.507)
R-12.6 (2.22)	R-16.9 (2.96)	R-11.7 (2.06)	0.086 (0.486)	R-13.6 (2.4)	0.073 (0.417)	R-14.4 (2.54)	0.069 (0.394)
R-16.8 (2.96)	R-21.1 (3.72)	R-13.5 (2.39)	0.074 (0.419)	R-16.2 (2.85)	0.062 (0.351)	R-17.5 (3.09)	0.057 (0.324)

Temperature Indices

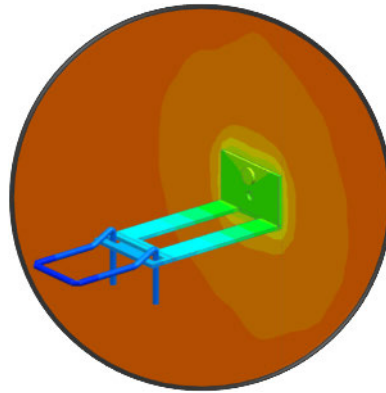
	R4.2	R8.4	R12.6	R16.8	
T _{i1}	0.56	0.63	0.67	0.70	Min T on sheathing behind stud at Tie Penetration
T _{i2}	0.71	0.78	0.82	0.85	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.43

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Carbon Steel HB-213 2X Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U_o and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

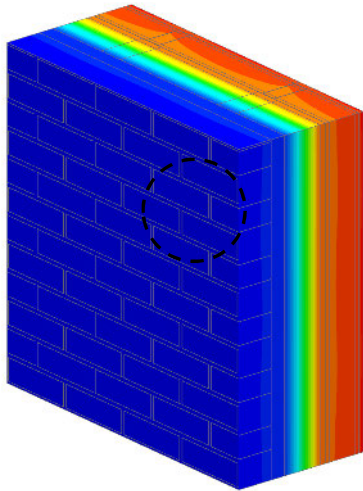
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.4 (1.30)	0.136 (0.770)	R-7.9 (1.39)	0.127 (0.722)	R-8.0 (1.42)	0.124 (0.706)
R-8.4 (1.48)	R-12.7 (2.24)	R-9.8 (1.72)	0.102 (0.580)	R-11.0 (1.94)	0.091 (0.516)	R-11.4 (2.01)	0.088 (0.498)
R-12.6 (2.22)	R-16.9 (2.96)	R-11.8 (2.08)	0.085 (0.480)	R-13.6 (2.39)	0.074 (0.418)	R-14.7 (2.58)	0.068 (0.387)
R-16.8 (2.96)	R-21.1 (3.72)	R-13.7 (2.40)	0.073 (0.416)	R-16.4 (2.89)	0.061 (0.346)	R-18.0 (3.17)	0.056 (0.315)

Temperature Indices

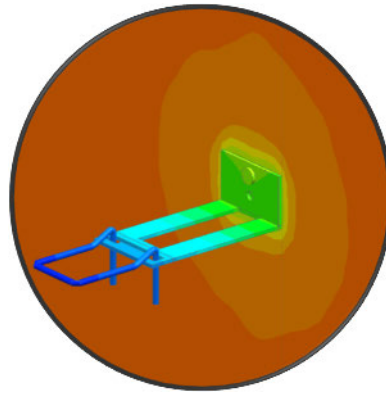
	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.59	0.64	0.69	0.71	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.72	0.78	0.82	0.84	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.44

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel HB-213 2X Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U_o and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

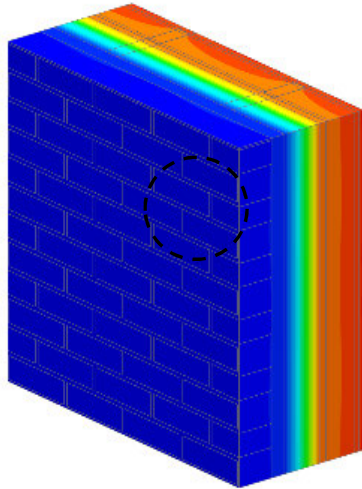
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.7 (1.35)	0.130 (0.740)	R-8.1 (1.43)	0.123 (0.701)	R-8.2 (1.45)	0.122 (0.691)
R-8.4 (1.48)	R-12.7 (2.24)	R-10.9 (1.92)	0.092 (0.520)	R-11.6 (2.04)	0.086 (0.490)	R-11.9 (2.1)	0.084 (0.476)
R-12.6 (2.22)	R-16.9 (2.96)	R-13.6 (2.39)	0.074 (0.418)	R-14.9 (2.62)	0.067 (0.382)	R-15.5 (2.74)	0.064 (0.365)
R-16.8 (2.96)	R-21.1 (3.72)	R-16 (2.81)	0.063 (0.356)	R-18.1 (3.19)	0.055 (0.313)	R-19.0 (3.35)	0.053 (0.298)

Temperature Indices

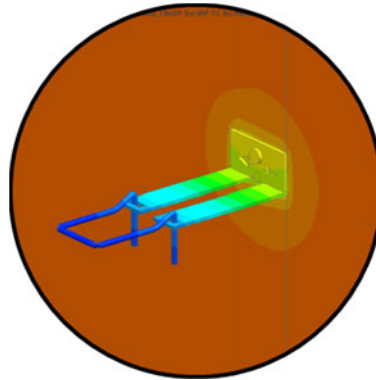
	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.66	0.73	0.78	0.81	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.73	0.80	0.84	0.87	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.45

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Carbon Steel HB-200-X Steel Tie Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U_o and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

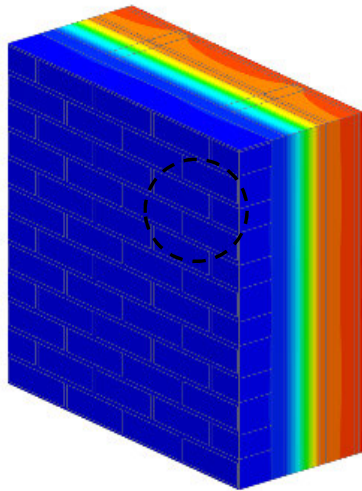
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.4 (1.31)	0.134 (0.762)	R-7.9 (1.39)	0.127 (0.719)	R-8.1 (1.43)	0.123 (0.699)
R-8.4 (1.48)	R-12.7 (2.24)	R-9.8 (1.72)	0.103 (0.582)	R-11 (1.94)	0.091 (0.517)	R-11.6 (2.04)	0.086 (0.489)
R-12.6 (2.22)	R-16.9 (2.96)	R-11.6 (2.05)	0.086 (0.488)	R-13.6 (2.39)	0.074 (0.418)	R-14.6 (2.57)	0.068 (0.388)
R-16.8 (2.96)	R-21.1 (3.72)	R-13.3 (2.34)	0.075 (0.428)	R-15.9 (2.81)	0.063 (0.356)	R-17.6 (3.10)	0.057 (0.323)

Temperature Indices

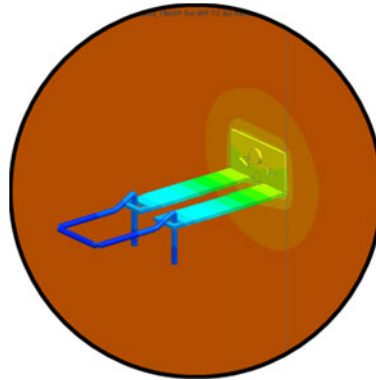
	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.61	0.64	0.69	0.71	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.72	0.78	0.82	0.84	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.46

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel HB-200-X Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U_o and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

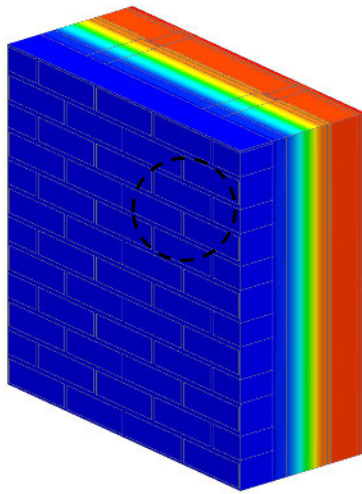
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.7 (1.36)	0.130 (0.738)	R-8.1 (1.43)	0.123 (0.698)	R-8.2 (1.45)	0.121 (0.690)
R-8.4 (1.48)	R-12.7 (2.24)	R-10.6 (1.86)	0.094 (0.536)	R-11.7 (2.06)	0.085 (0.485)	R-12.0 (2.11)	0.084 (0.475)
R-12.6 (2.22)	R-16.9 (2.96)	R-13.5 (2.38)	0.074 (0.421)	R-15.1 (2.65)	0.066 (0.377)	R-15.4 (2.72)	0.065 (0.368)
R-16.8 (2.96)	R-21.1 (3.72)	R-16.2 (2.86)	0.062 (0.350)	R-18 (3.16)	0.056 (0.316)	R-18.9 (3.33)	0.053 (0.300)

Temperature Indices

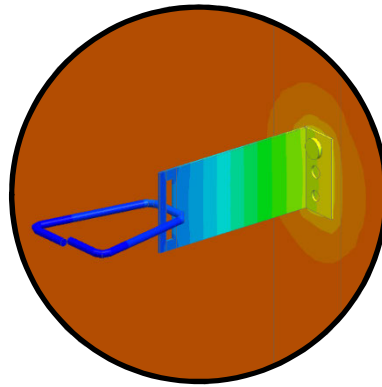
	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.66	0.73	0.77	0.80	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.73	0.80	0.84	0.90	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.47

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Carbon Steel BL-407 Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

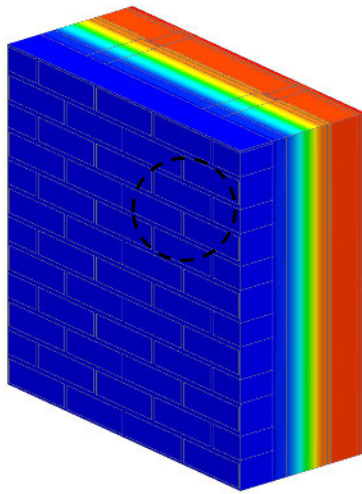
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.3 (1.29)	0.136 (0.773)	R-7.7 (1.36)	0.129 (0.733)	R-7.8 (1.38)	0.128 (0.726)
R-8.4 (1.48)	R-12.7 (2.24)	R-10.1 (1.78)	0.099 (0.561)	R-11.2 (1.97)	0.089 (0.507)	R-11.5 (2.02)	0.087 (0.496)
R-12.6 (2.22)	R-16.9 (2.96)	R-12.5 (2.21)	0.080 (0.452)	R-14.4 (2.54)	0.069 (0.394)	R-14.9 (2.62)	0.067 (0.381)
R-16.8 (2.96)	R-21.1 (3.72)	R-14.8 (2.6)	0.068 (0.385)	R-17.4 (3.07)	0.057 (0.326)	R-18.2 (3.20)	0.055 (0.312)

Temperature Indices

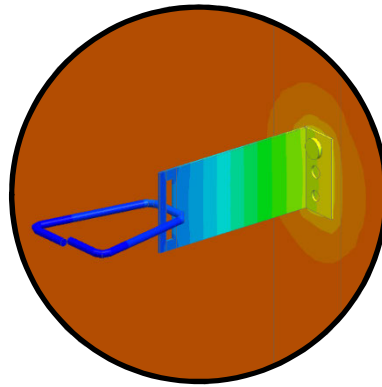
	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.59	0.66	0.70	0.74	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.72	0.79	0.83	0.85	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.48

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Hohmann & Barnard Masonry Stainless Steel BL-407 Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U_o and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

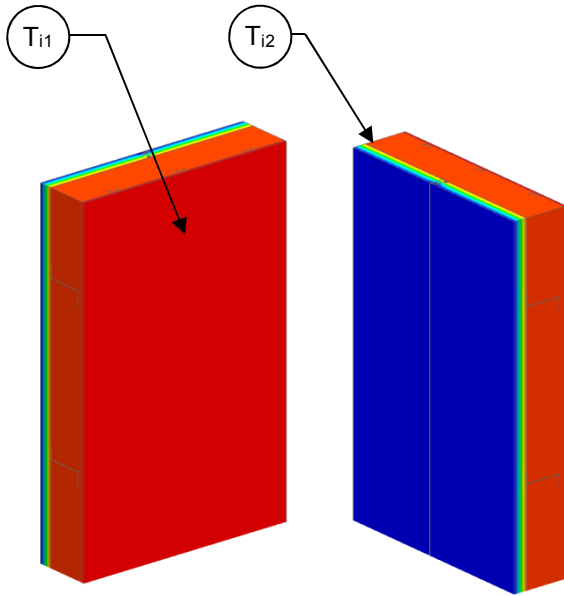
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.6 (1.33)	0.132 (0.751)	R-7.8 (1.38)	0.127 (0.724)	R-7.9 (1.39)	0.126 (0.718)
R-8.4 (1.48)	R-12.7 (2.24)	R-10.8 (1.9)	0.093 (0.525)	R-11.6 (2.04)	0.087 (0.491)	R-11.8 (2.07)	0.085 (0.483)
R-12.6 (2.22)	R-16.9 (2.96)	R-13.9 (2.45)	0.072 (0.408)	R-15.1 (2.67)	0.066 (0.375)	R-15.5 (2.73)	0.065 (0.366)
R-16.8 (2.96)	R-21.1 (3.72)	R-16.9 (2.98)	0.059 (0.336)	R-18.7 (3.29)	0.054 (0.304)	R-19.2 (3.39)	0.052 (0.295)

Temperature Indices

	R4.2	R8.4	R12.6	R16.8	
T_{i1}	0.65	0.74	0.78	0.82	Min T on sheathing behind stud at Tie Penetration
T_{i2}	0.73	0.81	0.85	0.88	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

Detail 5.1.49 Vertical Insulated Metal Panel – Clear Wall with Vertical Connection Joint and Support Girt/Hat Track Backup Wall



View from Interior View from Exterior

Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>Nominal thermal resistance value of panel and backup wall</td> </tr> <tr> <td>Transmittance / Resistance without anomalies</td> <td>U_o, R_o</td> <td>“clear wall” U and R-value</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td>ψ</td> <td>Incremental increase in transmittance per length of connection joint</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance value of panel and backup wall	Transmittance / Resistance without anomalies	U_o, R_o	“clear wall” U and R-value	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature	Linear Transmittance	ψ	Incremental increase in transmittance per length of connection joint	
Assembly 1D (Nominal) R-Value		R_{1D}	Nominal thermal resistance value of panel and backup wall											
Transmittance / Resistance without anomalies		U_o, R_o	“clear wall” U and R-value											
Surface Temperature Index ¹		T_i	0 = exterior temperature 1 = interior temperature											
Linear Transmittance	ψ	Incremental increase in transmittance per length of connection joint												
0.90														
0.80														
0.70														
0.60														
0.50														
0.40														
0.30														
0.20														
0.10														
0.00														

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

²The linear transmittance of the panel joint can be used with the R_{1D} value to find the clear filed values for any size of panel

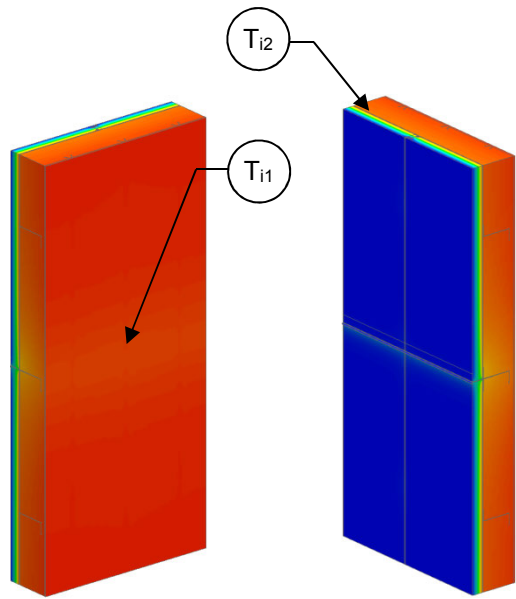
Nominal (1D) vs. Assembly Performance Indicators

Insulated Panel 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	ψ^2 Btu/ft·hr·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-21.4 (3.80)	0.047 (0.27)	0.013 (0.023)

Temperature Indices

T_{i1}	0.88	Min T on interior panel face, at panel joint and bolts
T_{i2}	0.91	Max T on interior panel face, between joints

Detail 5.1.50 Vertical Insulated Metal Panel - Metal Stack Joint and Support Girt Back/Hat Track Backup Wall



View from Interior

View from Exterior

Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>Nominal thermal resistance value of panel and backup wall</td> </tr> <tr> <td>Transmittance / Resistance without anomalies</td> <td>U_o, R_o</td> <td>"clear wall" U and R-value</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U, R</td> <td>U- and R-values for overall assembly</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td>ψ</td> <td>Incremental increase in transmittance per length of stack joint</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance value of panel and backup wall	Transmittance / Resistance without anomalies	U_o, R_o	"clear wall" U and R-value	Transmittance / Resistance	U, R	U- and R-values for overall assembly	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature	Linear Transmittance	ψ	Incremental increase in transmittance per length of stack joint	0.90
Assembly 1D (Nominal) R-Value		R_{1D}	Nominal thermal resistance value of panel and backup wall														
Transmittance / Resistance without anomalies		U_o, R_o	"clear wall" U and R-value														
Transmittance / Resistance		U, R	U- and R-values for overall assembly														
Surface Temperature Index ¹		T_i	0 = exterior temperature 1 = interior temperature														
Linear Transmittance	ψ	Incremental increase in transmittance per length of stack joint															
0.80	0.70																
0.60	0.50																
0.40	0.30																
0.20	0.10																
0.00	0.00																

¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP
²The linear transmittance of the panel joint can be used with the R_{1D} value to find the clear filed values for any size of panel

Nominal (1D) vs. Assembly Performance Indicators

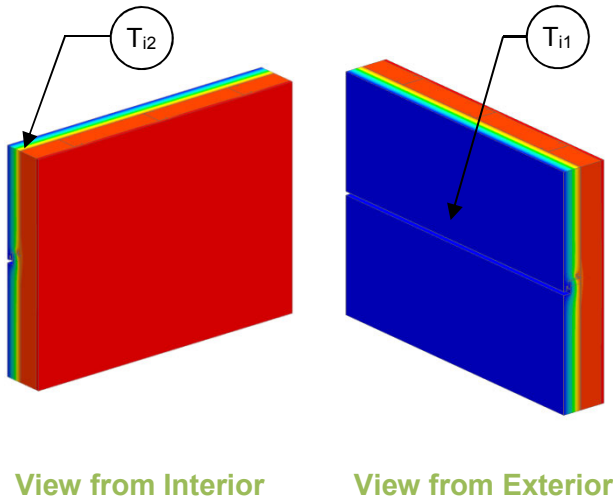
Insulated Panel 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ^2 Btu/ft ·hr ·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-21.4 (3.80)	0.047 (0.27)	R-15.8 (2.78)	0.063 (0.36)	0.154 (0.266)

Temperature Indices

T_{i1}	0.73	Min T on interior panel face, at bolts and stack joint
T_{i2}	0.91	Max T on interior panel face, between stack joint and panel joints

Detail 5.1.51 | Horizontal Insulated Metal Panel – Clear Wall with Horizontal Connection Joint and Steel Stud Backup Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance value of panel and backup wall
Transmittance / Resistance without anomalies	U_o, R_o	“clear wall” U and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of connection joint

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

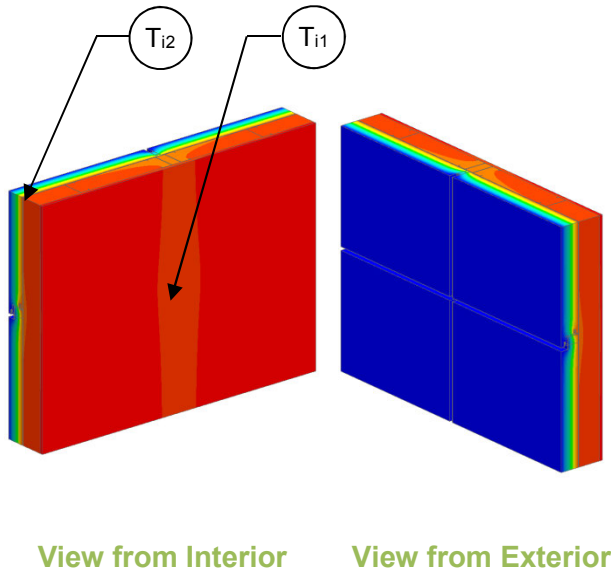
Nominal (1D) vs. Assembly Performance Indicators

Insulated Panel 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-19.5 (3.43)	0.052 (0.29)	0.025 (0.042)

Temperature Indices

T_{i1}	0.89	Min T on interior panel face, at panel joint and bolts
T_{i2}	0.91	Max T on interior panel face, between joints

Detail 5.1.52 | Horizontal Insulated Metal Panel – Vertical Gasket Joint with Steel Stud Backup Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance value of panel and backup wall
Transmittance / Resistance without anomalies	U_o, R_o	"clear wall" U and R-value
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of gasket joint

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

Nominal (1D) vs. Assembly Performance Indicators

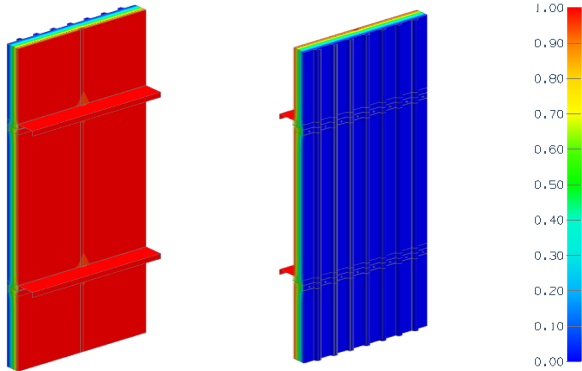
Insulated Panel 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-19.5 (3.43)	0.052 (0.29)	R-16.9 (2.97)	0.059 (0.34)	0.032 (0.055)

Temperature Indices

T_{i1}	0.85	Min T on interior panel face, at bolts, at horizontal and vertical joint intersection
T_{i2}	0.91	Max T on interior panel face, between joints

Detail 5.1.53

Structural Sheet Steel Wall with Cladding Supported by Notched Z-Bar – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-0.9 (0.15 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	“Clear wall” U- and R-value

View from Interior View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Baseline System

Vertical Spacing of Z-bar	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
48	R-25 (4.44)	R-25.9 (4.59)	R-21.8 (3.84)	0.046 (0.260)
60	R-25 (4.44)	R-25.9 (4.59)	R-22.5 (3.96)	0.044 (0.253)
72	R-25 (4.44)	R-25.9 (4.59)	R-23.0 (4.05)	0.044 (0.247)

Sensitivity Analysis – Impact of Steel Liner and Notched Z-Bar Thickness for Vertical Spacing of Z-Bar at 60” o.c.

Steel Thickness	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	Liner		Z-Bar	
			R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
24 Ga	R-25 (4.44)	R-25.9 (4.59)	R-22.5 (3.96)	0.044 (0.253)	R-22.9 (4.03)	0.045 (0.256)
18 Ga	R-25 (4.44)	R-25.9 (4.59)	R-22.4 (3.95)	0.045 (0.253)	R-22.5 (3.96)	0.044 (0.253)
12 Ga	R-25 (4.44)	R-25.9 (4.59)	-	-	R-22.2 (3.91)	0.044 (0.248)

Sensitivity Analysis – Impact of PVC Coating on Notched Z-Bar with Vertical Spacing of Z-Bar at 60” o.c

PVC Coating Thickness on Thermal Chairs and Outer Rails (mils)	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
0 Top, 0 Bottom	R-25 (4.44)	R-25.9 (4.59)	R-22.5 (3.96)	0.044 (0.253)
8 Top, 4 Bottom	R-25 (4.44)	R-25.9 (4.59)	R-22.7 (3.99)	0.044 (0.251)

Sensitivity Analysis – Impact of Thermal Tape at Notched Z-Bar with Vertical Spacing of Z-Bar at 60” o.c

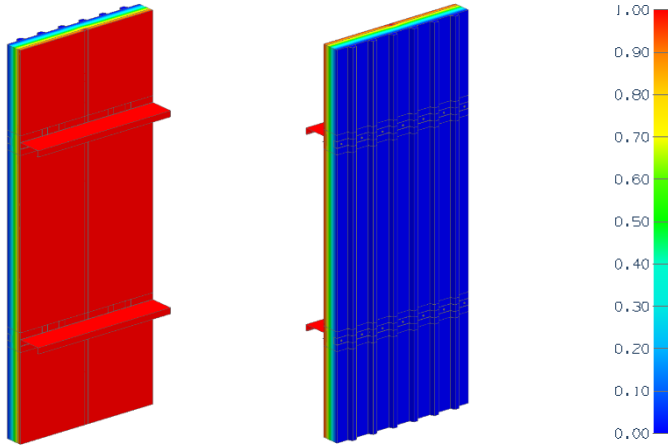
Tape Thickness (in)	Tape R-Value (RSI)	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
0	R-0 (0.00)	R-25 (4.44)	R-25.9 (4.59)	R-21.4 (3.78)	0.047 (0.265)
1/8	R-1 (0.23)	R-25 (4.44)	R-25.9 (4.59)	R-22.5 (3.96)	0.044 (0.253)
1/4	R-3 (0.45)	R-25 (4.44)	R-25.9 (4.59)	R-22.8 (4.01)	0.044 (0.249)

Sensitivity Analysis – Impact of Insulation Type for Notched Z-Bar with Vertical Spacing of Z-Bar at 60” o.c

Insulation Thickness (in)	R-4.2/inch insulation			R-5/inch insulation			R-6/inch insulation		
	Exterior Insulation 1D R-Value (RSI)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	Exterior Insulation 1D R-Value (RSI)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	Exterior Insulation 1D R-Value (RSI)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
6	R-25 (4.44)	R-22.5 (3.96)	0.044 (0.253)	R-30 (5.28)	R-26.0 (4.57)	0.039 (0.219)	R-36 (6.34)	R-30.1 (5.31)	0.033 (0.188)
7	R-29 (5.18)	R-25.7 (4.52)	0.039 (0.221)	R-35 (6.16)	R-29.6 (5.21)	0.034 (0.192)	R-42 (7.40)	R-34.2 (6.03)	0.029 (0.166)
8	R-34 (5.92)	R-28.4 (5.01)	0.035 (0.200)	R-40 (7.04)	R-32.7 (5.76)	0.031 (0.173)	R-48 (8.45)	R-37.8 (6.65)	0.026 (0.150)

Detail 5.1.54

Structural Sheet Steel Wall with Cladding Supported by Intermittent Notched Z-Bar – Clear Wall



View from Interior View from Exterior

Thermal Performance Indicators

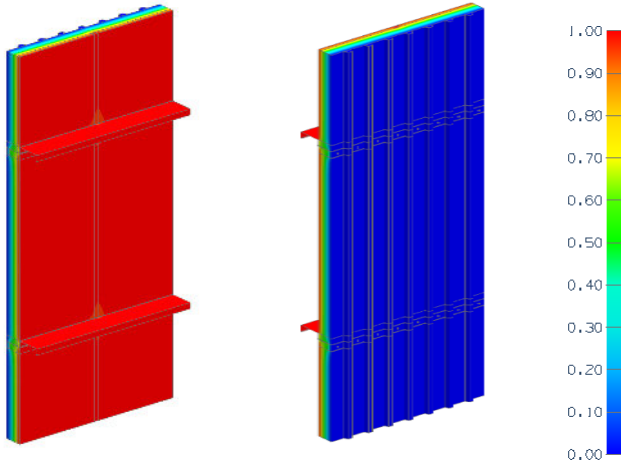
Assembly 1D (Nominal) R-Value	R_{1D}	R-0.9 (0.15 RSI) + exterior insulation
Transmittance / Resistance	U_o , R_o	“Clear wall” U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Vertical Spacing of Z-bar	Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
Continuous z-bar with Thermal Block	R-25 (4.44)	R-25.9 (4.59)	R-22.5 (3.96)	0.044 (0.253)
Intermittent z-bar without Thermal Block	R-25 (4.44)	R-25.9 (4.59)	R-21.1 (3.72)	0.047 (0.269)

Detail 5.1.55

Structural Sheet Steel Wall with Cladding Supported by Thermal Chairs – Clear Wall



View from Interior View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-0.9 (0.15 RSI) + exterior insulation
Transmittance / Resistance	U_o , R_o	“Clear wall” U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Baseline System

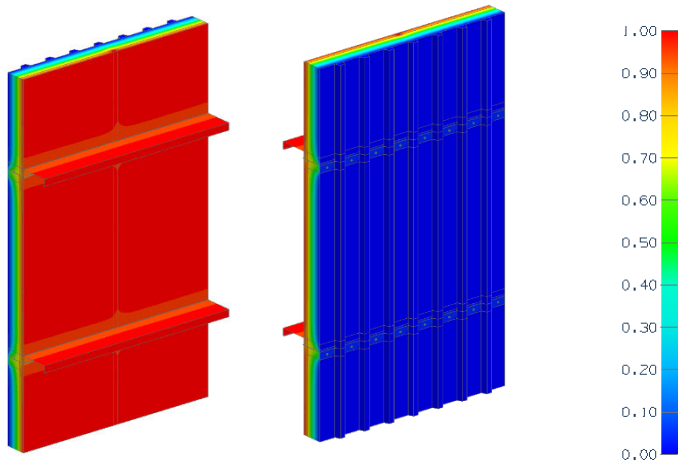
Vertical Spacing of Z-Bar (in)	Horizontal Thermal Chair Spacing (in)	Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
60	24	R-25 (4.44)	R-25.9 (4.59)	R-24.3 (4.28)	0.041 (0.233)
60	36	R-25 (4.44)	R-25.9 (4.59)	R-24.4 (4.30)	0.041 (0.233)
60	48	R-25 (4.44)	R-25.9 (4.59)	R-24.8 (4.36)	0.040 (0.229)

Sensitivity Analysis – Impact of Steel Chair and Notched U-Channel Thickness for Horizontal Spacing at 24” o.c. and Vertical Spacing of Thermal Chair at 60” o.c.

Steel Thickness	Exterior Insulation 1D R-Value (RSI)	Thermal Chair R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	Thermal Chair		U-Channel	
			R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
24 Ga	R-25 (4.44)	R-25.9 (4.59)	R-24.4 (4.30)	0.041 (0.233)	R-24.3 (4.28)	0.041 (0.233)
18 Ga	R-25 (4.44)	R-25.9 (4.59)	R-24.3 (4.28)	0.041 (0.233)	R-22.5 (3.96)	0.041 (0.233)
14 Ga	R-25 (4.44)	R-25.9 (4.59)	R-24.2 (4.27)	0.041 (0.234)	R-22.2 (3.91)	0.041 (0.234)

Detail 5.1.56

2 Hour Fire Rated Structural Steel Sheet Wall with Cladding Supported by Notched Z-bar with Ceramic Blanket – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-0.9 (0.15 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	“Clear wall” U- and R-value

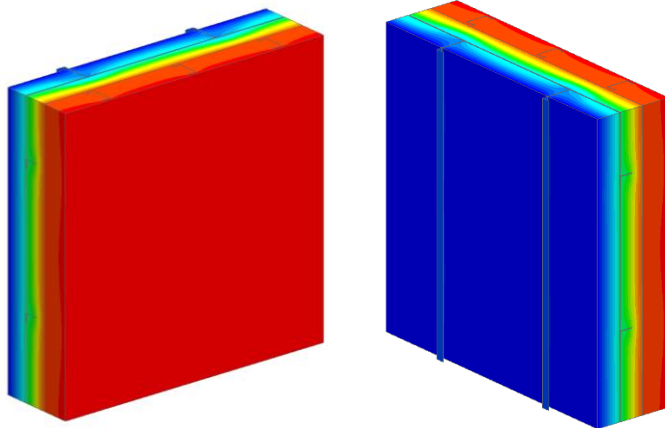
View from Interior View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Vertical Spacing of Z-bar	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
60	R-25 (4.44)	R-25.9 (4.59)	R-14.2 (2.51)	0.070 (0.400)

Detail 5.1.57

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System (16" o.c.) Supporting Horizontal and Vertical Sub-girts – Clear Wall



View from Interior

View from Exterior



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear field" U- and R-value, without roof anchor
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

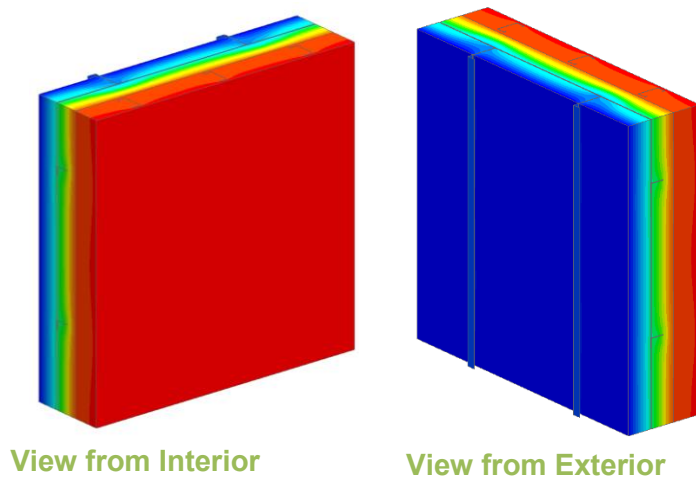
¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Nominal (1D) vs. Assembly Performance Indicators

Vertical Girt Spacing	Base Layer Exterior Insulation 1D R-Value (RSI)	Outer Layer Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		40" Vertical Clip Spacing		60" Vertical Clip Spacing	
				R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
24"	R-16.8 (2.96)	R-12.6 (2.22)	R-32.6 (5.74)	R-21.9 (3.85)	0.046 (0.26)	R-23.9 (4.22)	0.042 (0.24)	R-25.2 (4.43)	0.040 (0.23)
	R-16.8 (2.96)	R-16.8 (2.96)	R-36.8 (6.48)	R-23.1 (4.07)	0.043 (0.25)	R-25.3 (4.45)	0.040 (0.23)	R-26.6 (4.68)	0.038 (0.21)
40"	R-16.8 (2.96)	R-12.6 (2.22)	R-32.6 (5.74)	R-24.1 (4.24)	0.042 (0.24)	R-26.0 (4.59)	0.038 (0.22)	R-27.2 (4.79)	0.037 (0.21)
	R-16.8 (2.96)	R-16.8 (2.96)	R-36.8 (6.48)	R-26.0 (4.58)	0.038 (0.22)	R-28.1 (4.96)	0.036 (0.20)	R-29.4 (5.18)	0.034 (0.19)
60"	R-16.8 (2.96)	R-12.6 (2.22)	R-32.6 (5.74)	R-25.5 (4.50)	0.039 (0.22)	R-27.5 (4.85)	0.036 (0.21)	R-28.6 (5.04)	0.035 (0.20)
	R-16.8 (2.96)	R-16.8 (2.96)	R-36.8 (6.48)	R-28.1 (4.95)	0.036 (0.20)	R-30.2 (5.33)	0.033 (0.19)	R-31.2 (5.49)	0.032 (0.18)

Detail 5.1.58

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System (32" o.c.) Supporting Horizontal and Vertical Sub-girts – Clear Wall



Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear field" U- and R-value, without roof anchor
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

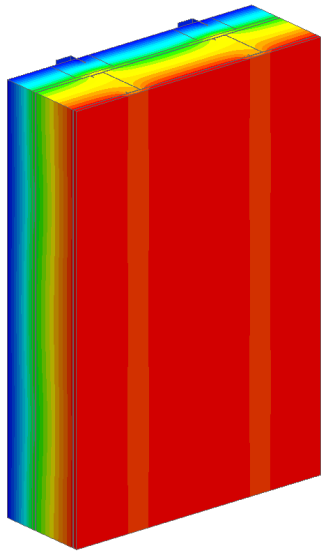
¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Nominal (1D) vs. Assembly Performance Indicators

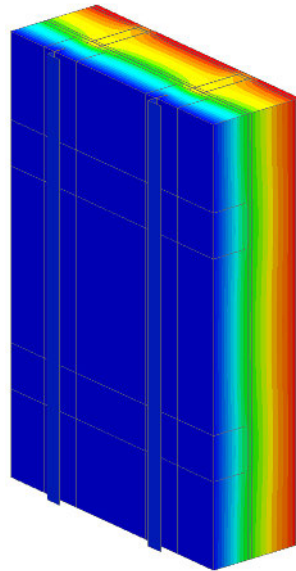
Vertical Girt Spacing	Base Layer Exterior Insulation 1D R-Value (RSI)	Outer Layer Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		40" Vertical Clip Spacing		60" Vertical Clip Spacing	
				R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
24"	R-16.8 (2.96)	R-12.6 (2.22)	R-32.6 (5.74)	R-23.9 (4.21)	0.042 (0.24)	R-25.6 (4.50)	0.039 (0.22)	R-26.4 (4.65)	0.038 (0.22)
	R-16.8 (2.96)	R-16.8 (2.96)	R-36.8 (6.48)	R-25.2 (4.44)	0.040 (0.23)	R-27.0 (4.76)	0.037 (0.21)	R-27.9 (4.92)	0.036 (0.20)
40"	R-16.8 (2.96)	R-12.6 (2.22)	R-32.6 (5.74)	R-25.9 (4.56)	0.039 (0.22)	R-27.9 (4.91)	0.036 (0.20)	R-28.2 (4.97)	0.035 (0.20)
	R-16.8 (2.96)	R-16.8 (2.96)	R-36.8 (6.48)	R-27.9 (4.91)	0.036 (0.20)	R-30.0 (5.29)	0.033 (0.19)	R-30.5 (5.37)	0.033 (0.19)
60"	R-16.8 (2.96)	R-12.6 (2.22)	R-32.6 (5.74)	R-27.2 (4.79)	0.037 (0.21)	R-28.6 (5.04)	0.035 (0.20)	R-29.4 (5.17)	0.034 (0.19)
	R-16.8 (2.96)	R-16.8 (2.96)	R-36.8 (6.48)	R-29.8 (5.25)	0.034 (0.19)	R-31.4 (5.52)	0.032 (0.18)	R-32.2 (5.67)	0.031 (0.18)

Detail 5.1.59

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall



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	U_o, R_o	"clear field" U- and R-values
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

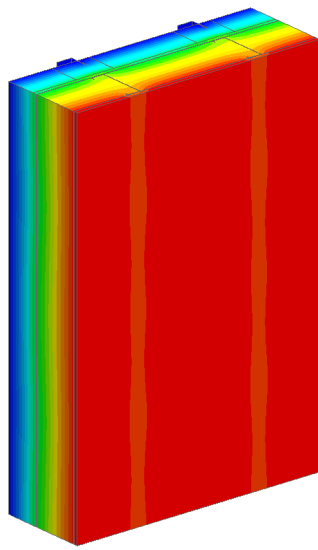
¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Nominal (1D) vs. Assembly Performance Indicators

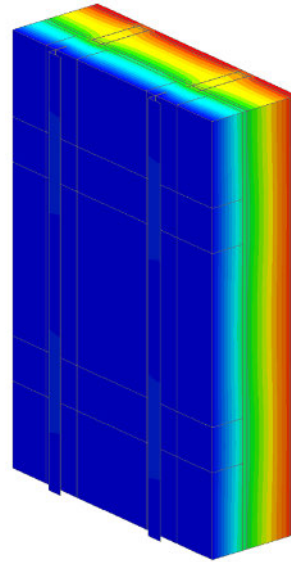
Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-6.3 (1.11)	R-27.6 (4.86)	R-16.8 (2.95)	0.060 (0.339)	R-17.2 (3.03)	0.058 (0.331)	R-17.3 (3.05)	0.058 (0.328)
R-8.4 (1.48)	R-29.7 (5.23)	R-18.2 (3.20)	0.055 (0.312)	R-18.8 (3.31)	0.053 (0.302)	R-19.1 (3.36)	0.052 (0.297)
R-12.6 (2.22)	R-33.9 (5.97)	R-20.5 (3.61)	0.049 (0.277)	R-21.5 (3.78)	0.047 (0.265)	R-21.9 (3.86)	0.046 (0.259)
R-16.8 (2.96)	R-38.1 (6.71)	R-22.8 (4.01)	0.044 (0.249)	R-24.2 (4.26)	0.041 (0.235)	R-25.0 (4.40)	0.040 (0.227)

Detail 5.1.60

Exterior and Interior Insulated 6" x 1 5/8" Slotted Steel R-Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall



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	U_o, R_o	"clear field" U- and R-values
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

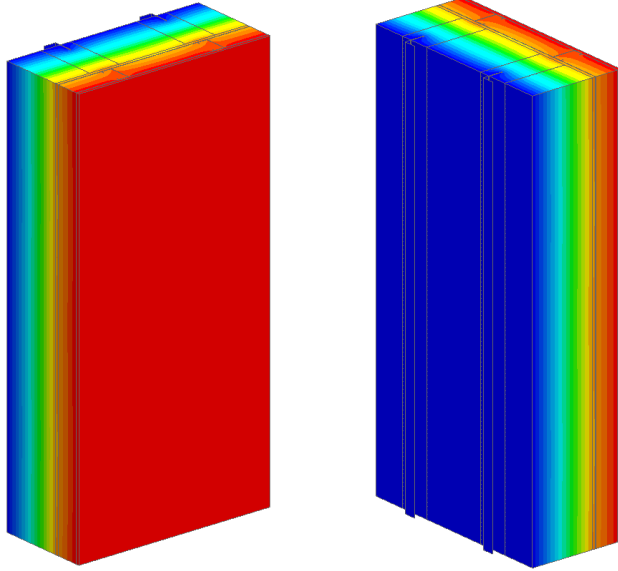
¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-6.3 (1.11)	R-27.6 (4.86)	R-20.2 (3.56)	0.049 (0.281)	R-20.7 (3.65)	0.048 (0.274)	R-20.8 (3.66)	0.048 (0.273)
R-8.4 (1.48)	R-29.7 (5.23)	R-21.7 (3.82)	0.046 (0.262)	R-22.4 (3.94)	0.045 (0.254)	R-22.5 (3.97)	0.044 (0.252)
R-12.6 (2.22)	R-33.9 (5.97)	R-24.1 (4.24)	0.042 (0.236)	R-25.1 (4.43)	0.040 (0.226)	R-25.4 (4.48)	0.039 (0.223)
R-16.8 (2.96)	R-38.1 (6.71)	R-26.4 (4.65)	0.038 (0.215)	R-28.0 (4.94)	0.036 (0.203)	R-28.6 (5.03)	0.035 (0.199)

Detail 5.1.61

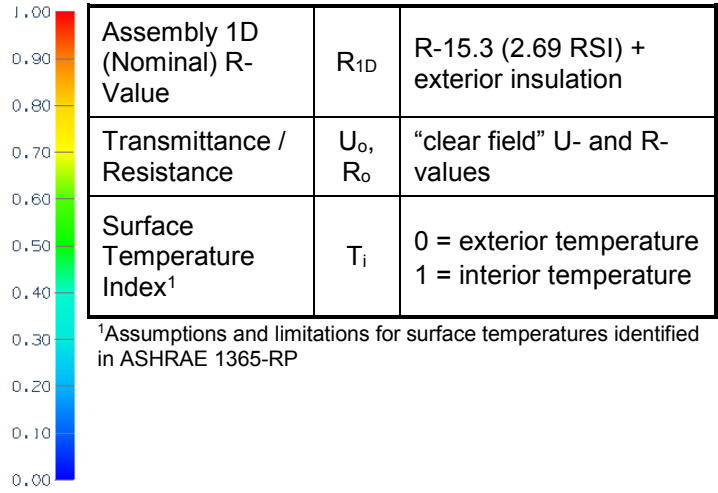
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – Eko Thermobacket Clip System Supporting Cladding – Clear Wall



View from Interior

View from Exterior

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-15.3 (2.69 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear field" U- and R-values
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

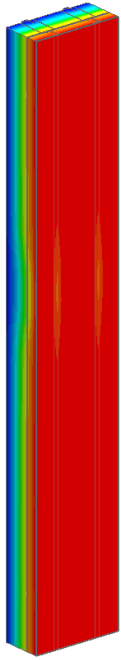
¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Nominal (1D) vs. Assembly Performance Indicators

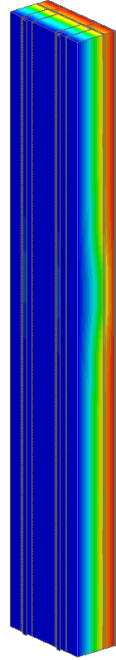
Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-42 (7.40)	R-57.3 (10.09)	R-47.8 (8.37)	0.021 (0.119)

Detail 5.1.62

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – Eko Thermobracek and NV1 Clip System Supporting Cladding – Clear Wall



View from Interior



View from Exterior



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-15.3 (2.69 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear field" U- and R-values
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

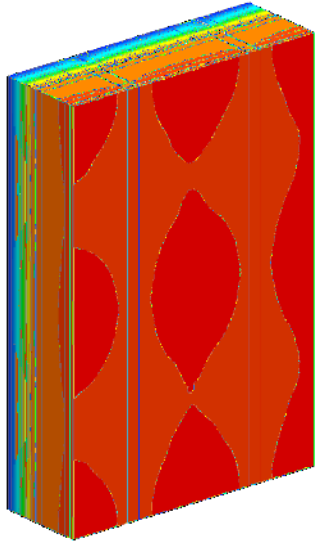
¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Nominal (1D) vs. Assembly Performance Indicators

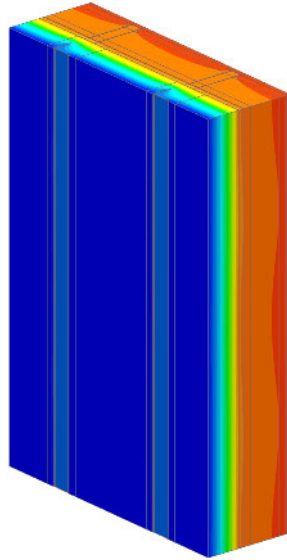
Floor Height ft (mm)	Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
11' (3353)	R-42 (7.40)	R-57.3 (10.09)	R-35.6 (6.27)	0.028 (0.16)
13.5' (4115)	R-42 (7.40)	R-57.3 (10.09)	R-37.3 (6.57)	0.027 (0.15)
16' (4877)	R-42 (7.40)	R-57.3 (10.09)	R-38.6 (6.80)	0.026 (0.15)

Detail 5.1.63

Exterior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Vci Vertical System – Clear Wall



View from Interior



View from Exterior

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.3 (0.57 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear field" U- and R-values
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

16" Horizontal Clip Spacing

Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.7 (2.05)	R-9.3 (1.64)	0.107 (0.609)	R-9.7 (1.72)	0.103 (0.583)
R-12.9 (2.28)	R-16.2 (2.85)	R-11.5 (2.02)	0.087 (0.494)	R-12.2 (2.16)	0.082 (0.464)
R-15.1 (2.66)	R-18.4 (3.23)	R-12.6 (2.21)	0.080 (0.452)	R-13.6 (2.39)	0.074 (0.419)
R-17.3 (3.04)	R-20.5 (3.61)	R-13.4 (2.35)	0.075 (0.425)	R-14.7 (2.58)	0.068 (0.387)
R-21.6 (3.80)	R-24.8 (4.37)	R-15.0 (2.64)	0.067 (0.379)	R-16.8 (2.96)	0.060 (0.338)
R-25.9 (4.56)	R-29.1 (5.13)	R-16.5 (2.91)	0.061 (0.344)	R-18.8 (3.31)	0.053 (0.302)

32" Horizontal and 24" Vertical Clip Spacing

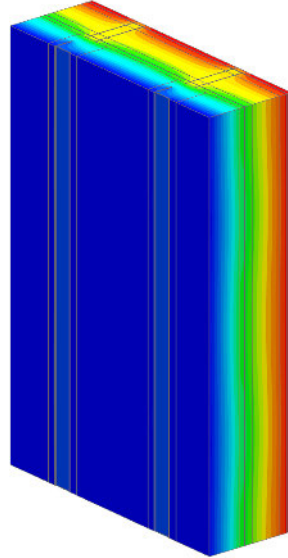
Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.7 (2.05)	R-10.4 (1.83)	0.096 (0.547)
R-12.9 (2.28)	R-16.2 (2.85)	R-13.4 (2.37)	0.074 (0.422)
R-15.1 (2.66)	R-18.4 (3.23)	R-14.9 (2.63)	0.067 (0.381)
R-17.3 (3.04)	R-20.5 (3.61)	R-16.2 (2.85)	0.062 (0.351)
R-21.6 (3.80)	R-24.8 (4.37)	R-18.7 (3.29)	0.054 (0.304)
R-25.9 (4.56)	R-29.1 (5.13)	R-21.0 (3.70)	0.048 (0.270)

Detail 5.1.64

Exterior and Interior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Vci Vertical System – Clear Wall



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	U_o, R_o	"clear field" U- and R-values
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

16" Horizontal Clip Spacing

Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-29.8 (5.24)	R-16.7 (2.94)	0.060 (0.340)	R-17.3 (3.05)	0.058 (0.328)
R-12.9 (2.28)	R-34.3 (6.04)	R-18.7 (3.29)	0.054 (0.304)	R-19.7 (3.47)	0.051 (0.288)
R-15.1 (2.66)	R-36.5 (6.42)	R-19.7 (3.47)	0.051 (0.288)	R-21.0 (3.70)	0.048 (0.270)
R-17.3 (3.04)	R-38.6 (6.80)	R-20.5 (3.61)	0.049 (0.277)	R-22.1 (3.90)	0.045 (0.257)
R-21.6 (3.80)	R-42.9 (7.56)	R-22.1 (3.89)	0.045 (0.257)	R-24.3 (4.28)	0.041 (0.234)
R-25.9 (4.56)	R-47.2 (8.32)	R-23.6 (4.16)	0.042 (0.240)	R-26.3 (4.63)	0.038 (0.216)

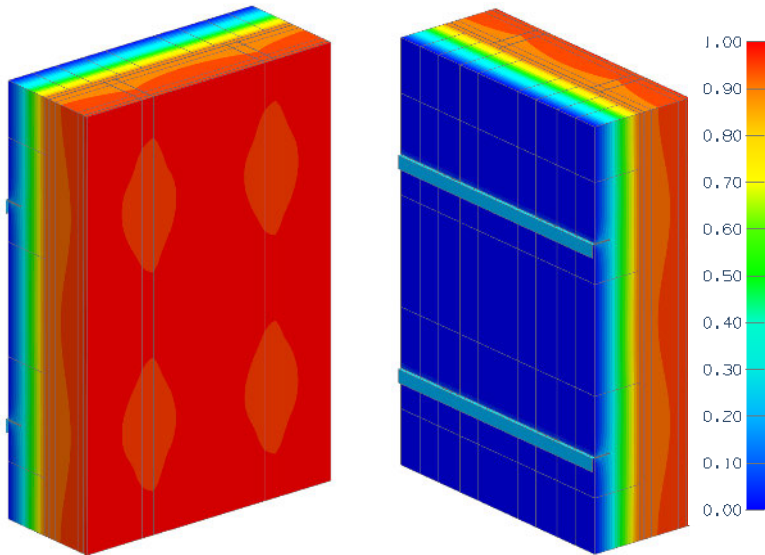
32" Horizontal and 24" Vertical Clip Spacing

Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-29.8 (5.24)	R-18.4 (3.23)	0.054 (0.309)
R-12.9 (2.28)	R-34.3 (6.04)	R-21.4 (3.76)	0.047 (0.266)
R-15.1 (2.66)	R-36.5 (6.42)	R-22.8 (4.02)	0.044 (0.249)
R-17.3 (3.04)	R-38.6 (6.80)	R-24.1 (4.25)	0.041 (0.235)
R-21.6 (3.80)	R-42.9 (7.56)	R-26.6 (4.69)	0.038 (0.213)
R-25.9 (4.56)	R-47.2 (8.32)	R-29.0 (5.11)	0.034 (0.196)

Detail 5.1.65

Exterior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Hci Horizontal System – Clear Wall

Thermal Performance Indicators



View from Interior

View from Exterior

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.3 (0.57 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear field" U- and R-values
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

16" Horizontal Clip Spacing

Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.7 (2.05)	R-9.0 (1.58)	0.112 (0.633)	R-9.7 (1.71)	0.103 (0.584)
R-12.9 (2.28)	R-16.2 (2.85)	R-11.1 (1.95)	0.090 (0.512)	R-12.4 (2.18)	0.081 (0.459)
R-15.1 (2.66)	R-18.4 (3.23)	R-11.9 (2.09)	0.084 (0.478)	R-13.4 (2.37)	0.074 (0.423)
R-17.3 (3.04)	R-20.5 (3.61)	R-12.6 (2.21)	0.080 (0.452)	R-14.4 (2.53)	0.069 (0.395)
R-21.6 (3.80)	R-24.8 (4.37)	R-13.9 (2.45)	0.072 (0.408)	R-16.2 (2.86)	0.062 (0.350)
R-25.9 (4.56)	R-29.1 (5.13)	R-14.8 (2.61)	0.067 (0.383)	R-17.7 (3.11)	0.057 (0.322)

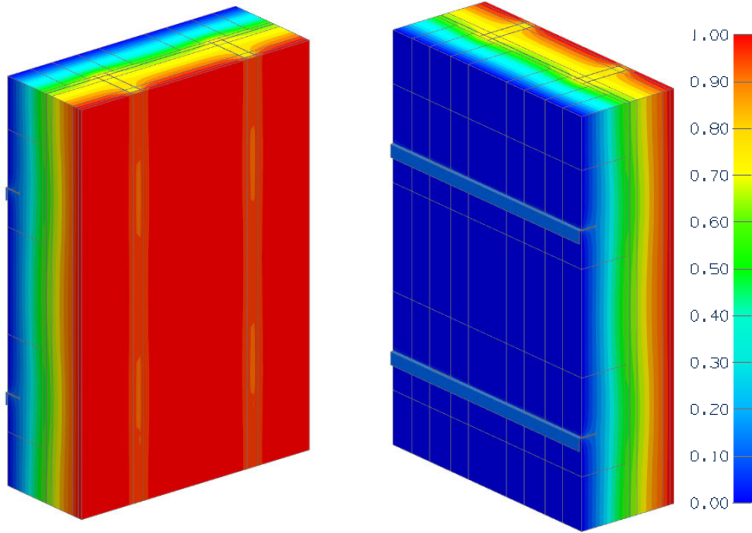
32" Horizontal and 24" Vertical Clip Spacing

Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.7 (2.05)	R-9.9 (1.75)	0.101 (0.572)
R-12.9 (2.28)	R-16.2 (2.85)	R-12.6 (2.22)	0.079 (0.450)
R-15.1 (2.66)	R-18.4 (3.23)	R-13.8 (2.44)	0.072 (0.410)
R-17.3 (3.04)	R-20.5 (3.61)	R-14.8 (2.60)	0.068 (0.384)
R-21.6 (3.80)	R-24.8 (4.37)	R-17.1 (3.01)	0.059 (0.332)
R-25.9 (4.56)	R-29.1 (5.13)	R-18.8 (3.31)	0.053 (0.302)

Detail 5.1.66

Exterior and Interior Insulated 5 1/2" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Hci Horizontal System – Clear Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-21.3 (3.75 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear field" U- and R-values
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

16" Horizontal Clip Spacing

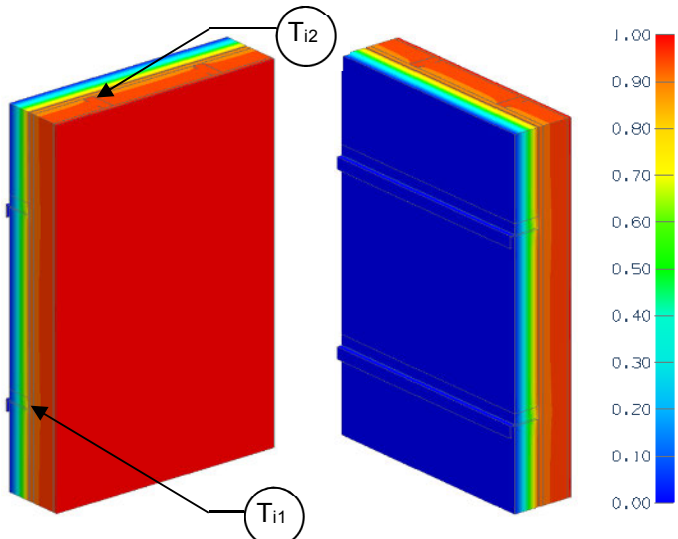
Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-29.8 (5.24)	R-16.4 (2.90)	0.061 (0.345)	R-17.5 (3.08)	0.057 (0.324)
R-12.9 (2.28)	R-34.3 (6.04)	R-18.5 (3.25)	0.054 (0.308)	R-20.1 (3.54)	0.050 (0.282)
R-15.1 (2.66)	R-36.5 (6.42)	R-19.2 (3.38)	0.052 (0.296)	R-21.1 (3.72)	0.047 (0.269)
R-17.3 (3.04)	R-38.6 (6.80)	R-19.9 (3.50)	0.050 (0.286)	R-22.1 (3.89)	0.045 (0.257)
R-21.6 (3.80)	R-42.9 (7.56)	R-21.2 (3.73)	0.047 (0.268)	R-24.0 (4.22)	0.042 (0.237)
R-25.9 (4.56)	R-47.2 (8.32)	R-22.1 (3.90)	0.045 (0.256)	R-25.5 (4.48)	0.039 (0.223)

32" Horizontal and 24" Vertical Clip Spacing

Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-29.8 (5.24)	R-18.0 (3.17)	0.055 (0.315)
R-12.9 (2.28)	R-34.3 (6.04)	R-20.7 (3.65)	0.048 (0.274)
R-15.1 (2.66)	R-36.5 (6.42)	R-22.0 (3.87)	0.046 (0.259)
R-17.3 (3.04)	R-38.6 (6.80)	R-23.0 (4.04)	0.044 (0.247)
R-21.6 (3.80)	R-42.9 (7.56)	R-25.4 (4.46)	0.039 (0.224)
R-25.9 (4.56)	R-47.2 (8.32)	R-27.2 (4.79)	0.037 (0.209)

Detail 5.1.67

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall



View from Interior View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	“clear wall” U- and R-value
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

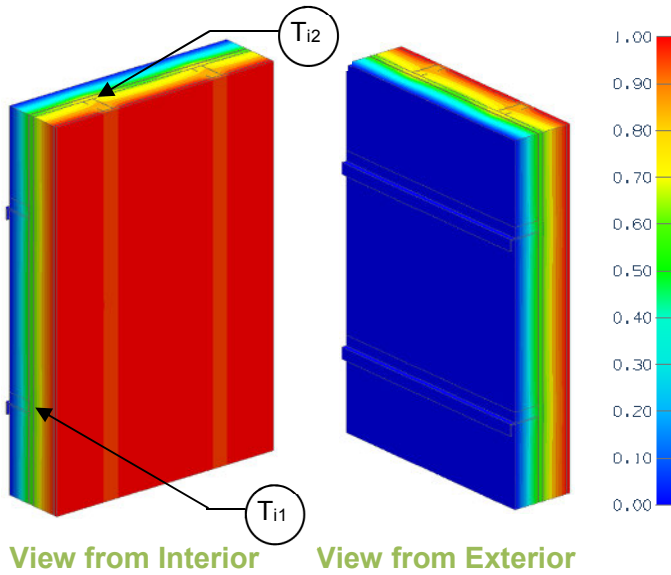
Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Girt Spacing		36" Vertical Girt Spacing		48" Vertical Girt Spacing	
		R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
R-5.0 (0.88)	R-8.3 (1.46)	R-8.3 (1.46)	0.121 (0.69)	R-8.2 (1.44)	0.122 (0.69)	R-8.2 (1.45)	0.122 (0.69)
R-10.0 (1.76)	R-13.3 (2.34)	R-12.9 (2.28)	0.077 (0.44)	R-13.0 (2.29)	0.077 (0.44)	R-13.1 (2.31)	0.076 (0.43)
R-15.0 (2.64)	R-18.3 (3.22)	R-17.6 (3.10)	0.057 (0.32)	R-17.9 (3.15)	0.056 (0.32)	R-18.0 (3.16)	0.056 (0.32)
R-20.0 (3.52)	R-23.3 (4.10)	R-22.3 (3.93)	0.045 (0.25)	R-22.7 (4.00)	0.044 (0.25)	R-22.8 (4.02)	0.044 (0.25)
R-25.0 (4.40)	R-28.3 (4.98)	R-27.0 (4.75)	0.037 (0.21)	R-27.5 (4.85)	0.036 (0.21)	R-27.7 (4.88)	0.036 (0.20)
R-30.0 (5.28)	R-33.3 (5.86)	R-31.6 (5.57)	0.032 (0.18)	R-32.4 (5.70)	0.031 (0.18)	R-32.6 (5.74)	0.031 (0.17)
R-35.0 (6.16)	R-38.3 (6.74)	R-36.3 (6.39)	0.028 (0.16)	R-37.2 (6.56)	0.027 (0.15)	R-37.5 (6.60)	0.027 (0.15)

Temperature Indices

	R5	R10	R15	R20	R25	R30	R35	
T _{i1}	0.75	0.84	0.88	0.90	0.92	0.93	0.94	Min T on sheathing, along girts between studs
T _{i2}	0.78	0.86	0.90	0.92	0.93	0.94	0.95	Max T on sheathing, along studs between girts

Detail 5.1.68

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-15.4 (2.71 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

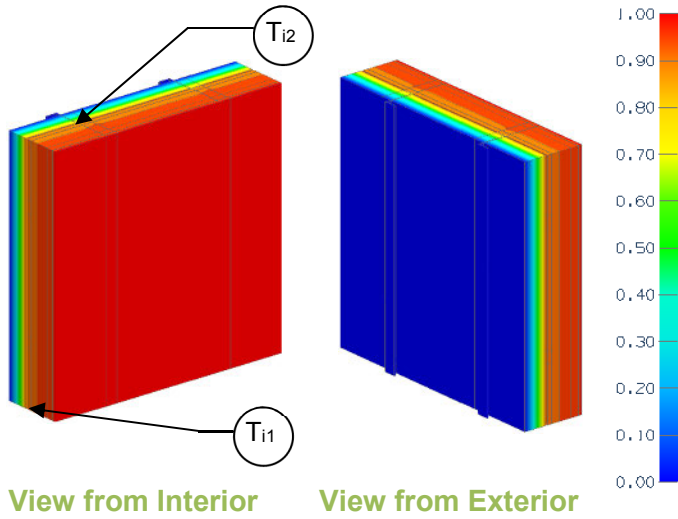
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Girt Spacing		36" Vertical Girt Spacing		48" Vertical Girt Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5.0 (0.88)	R-20.4 (3.59)	R-14.9 (2.63)	0.067 (0.38)	R-15.0 (2.64)	0.067 (0.38)	R-15.0 (2.65)	0.067 (0.38)
R-10.0 (1.76)	R-25.4 (4.47)	R-19.7 (3.47)	0.051 (0.29)	R-19.8 (3.49)	0.050 (0.29)	R-19.9 (3.51)	0.050 (0.29)
R-15.0 (2.64)	R-30.4 (5.35)	R-24.5 (4.31)	0.041 (0.23)	R-24.7 (4.35)	0.041 (0.23)	R-24.8 (4.37)	0.040 (0.23)
R-20.0 (3.52)	R-35.4 (6.23)	R-29.3 (5.15)	0.034 (0.19)	R-29.5 (5.20)	0.034 (0.19)	R-29.7 (5.23)	0.034 (0.19)
R-25.0 (4.40)	R-40.4 (7.11)	R-34.0 (5.99)	0.029 (0.17)	R-34.4 (6.06)	0.029 (0.17)	R-34.6 (6.09)	0.029 (0.16)
R-30.0 (5.28)	R-45.4 (7.99)	R-38.8 (6.84)	0.026 (0.15)	R-39.2 (6.91)	0.025 (0.14)	R-39.5 (6.95)	0.025 (0.14)
R-35.0 (6.16)	R-50.4 (8.87)	R-43.6 (7.68)	0.023 (0.13)	R-44.1 (7.76)	0.023 (0.13)	R-44.4 (7.81)	0.023 (0.13)

Temperature Indices

	R5	R10	R15	R20	R25	R30	R35	
T_{i1}	0.32	0.48	0.58	0.65	0.70	0.73	0.76	Min T on sheathing, along girts between studs
T_{i2}	0.57	0.67	0.74	0.78	0.81	0.84	0.85	Max T on sheathing, along studs between girts

Detail 5.1.69

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Vertical Z-Girts Supporting Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

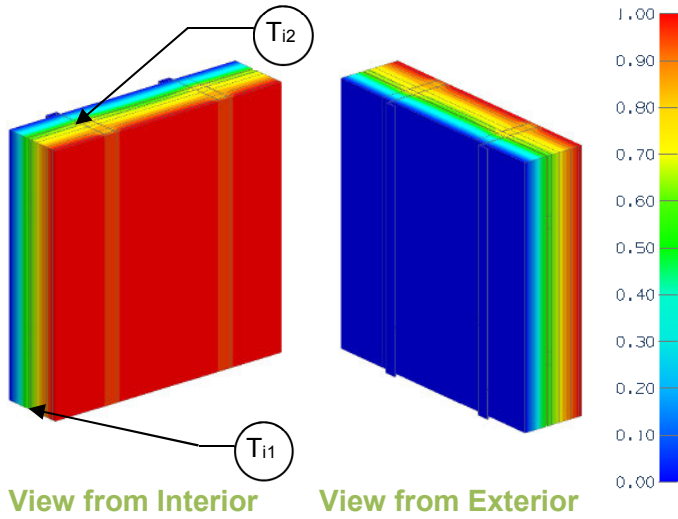
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-5.0 (0.88)	R-8.3 (1.46)	R-8.0 (1.41)	0.125 (0.71)
R-10.0 (1.76)	R-13.3 (2.34)	R-12.6 (2.22)	0.079 (0.45)
R-15.0 (2.64)	R-18.3 (3.22)	R-17.2 (3.03)	0.058 (0.33)
R-20.0 (3.52)	R-23.3 (4.1)	R-21.8 (3.84)	0.046 (0.26)
R-25.0 (4.40)	R-28.3 (4.98)	R-26.4 (4.64)	0.038 (0.22)
R-30.0 (5.28)	R-33.3 (5.86)	R-31.0 (5.46)	0.032 (0.18)
R-35.0 (6.16)	R-38.3 (6.74)	R-35.6 (6.26)	0.028 (0.16)

Temperature Indices

	R5	R10	R15	R20	R25	R30	R35	
T_{i1}	0.75	0.84	0.88	0.91	0.92	0.93	0.93	Min T on sheathing, along girts between studs
T_{i2}	0.76	0.85	0.89	0.91	0.93	0.94	0.94	Max T on sheathing, along studs between girts

Detail 5.1.70

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Armadillo FRR Vertical Z-Girts Supporting Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-15.4 (2.71 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

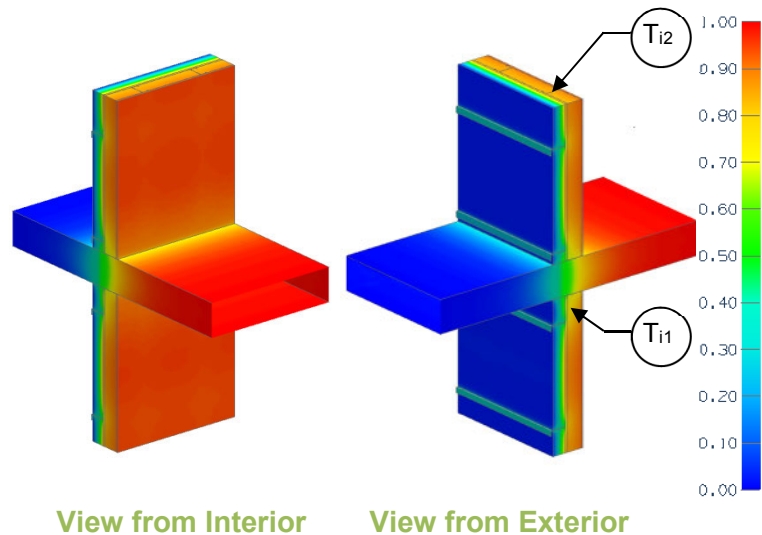
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-5.0 (0.88)	R-20.4 (3.59)	R-14.6 (2.56)	0.069 (0.39)
R-10.0 (1.76)	R-25.4 (4.47)	R-19.1 (3.37)	0.052 (0.30)
R-15.0 (2.64)	R-30.4 (5.35)	R-23.7 (4.18)	0.042 (0.24)
R-20.0 (3.52)	R-35.4 (6.23)	R-28.3 (4.99)	0.035 (0.20)
R-25.0 (4.40)	R-40.4 (7.11)	R-32.9 (5.79)	0.030 (0.17)
R-30.0 (5.28)	R-45.4 (7.99)	R-37.5 (6.60)	0.027 (0.15)
R-35.0 (6.16)	R-50.4 (8.87)	R-42.1 (7.41)	0.024 (0.13)

Temperature Indices

	R5	R10	R15	R20	R25	R30	R35	
T_{i1}	0.36	0.51	0.60	0.67	0.71	0.75	0.78	Min T on sheathing, along girts between studs
T_{i2}	0.56	0.67	0.73	0.78	0.81	0.83	0.85	Max T on sheathing, along studs between girts

Detail 5.2.1

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

View from Interior View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

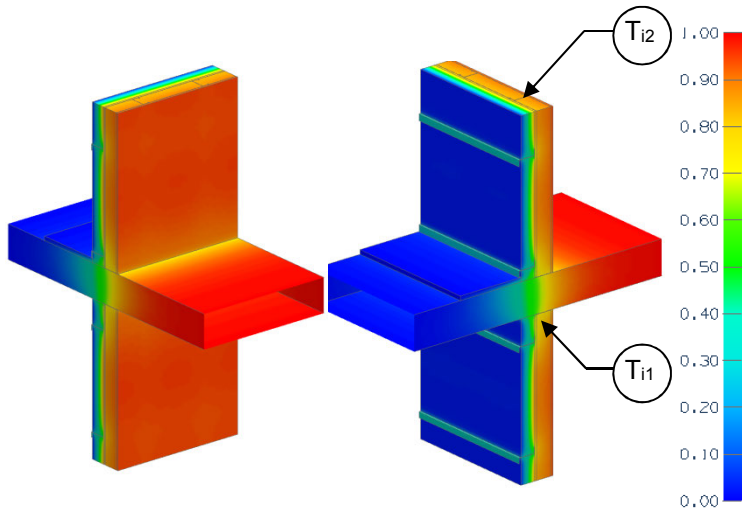
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-8.2 (1.44)	R-6.9 (1.21)	0.146 (0.83)	R-4.74 (0.83)	0.211 (1.20)	0.433 (0.749)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)	R-6.45 (1.14)	0.155 (0.88)	0.445 (0.770)
R-25 (4.40)	R-28.2 (4.96)	R-14.6 (2.56)	0.069 (0.39)	R-7.61 (1.34)	0.131 (0.75)	0.418 (0.724)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.50	0.58	0.63	Min T on sheathing, at slab, between studs
T_{i2}	0.73	0.84	0.88	Max T on sheathing, at studs, between girts

Detail 5.2.2

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Intermediate Floor Intersection with Top Side Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

View from Interior View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly –Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)

Slab Linear Transmittance

Balcony Insulation Distance from wall ft (m)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
0.00 (0.0)	R-6.5 (1.14)	0.155 (0.88)	0.445 (0.770)
0.66 (0.2)	R-7.0 (1.22)	0.144 (0.82)	0.402 (0.695)
1.31 (0.4)	R-7.1 (1.25)	0.141 (0.80)	0.395 (0.683)
2.62 (0.8)	R-7.1 (1.26)	0.139 (0.79)	0.393 (0.680)

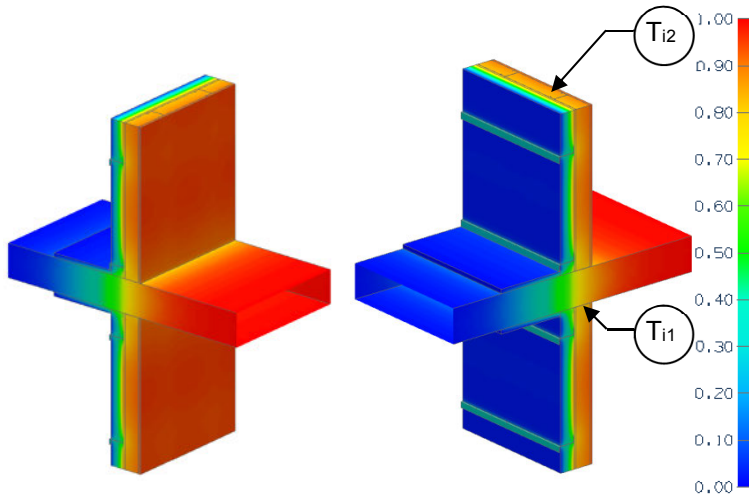
Temperature Indices

D(ft)	0	0.66	1.31	2.62	
T_{i1}	0.58	0.61	0.62	0.62	Min T on sheathing, at slab, between studs
T_{i2}	0.84	0.84	0.85	0.85	Max T on sheathing, at studs, between girts

Detail 5.2.3

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Intermediate Floor Intersection with Top & Under Side Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

View from Interior View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)

Slab Linear Transmittance

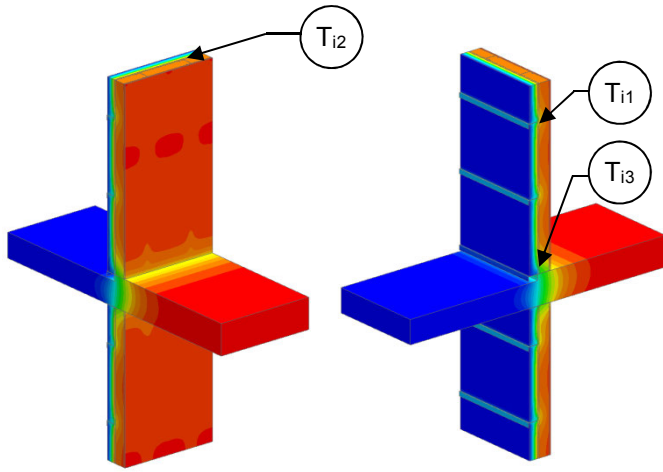
Balcony Insulation Distance from wall ft (m)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
0.00 (0.0)	R-6.5 (1.14)	0.155 (0.88)	0.445 (0.770)
0.66 (0.2)	R-7.2 (1.26)	0.140 (0.79)	0.342 (0.592)
1.31 (0.4)	R-7.5 (1.32)	0.134 (0.76)	0.306 (0.529)
2.62 (0.8)	R-7.6 (1.34)	0.131 (0.75)	0.287 (0.496)

Temperature Indices

D(ft)	0	0.66	1.31	2.62	
T_{i1}	0.58	0.66	0.69	0.70	Min T on sheathing, at slab, between studs
T_{i2}	0.84	0.85	0.85	0.85	Max T on sheathing, at studs, between girts

Detail 5.2.4

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Uninsulated Curb



View from Interior

View from Exterior

Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-3.2 (0.56 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td>U_o, R_o</td> <td>"clear wall" U- and R-value, without slab</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U, R</td> <td>U- and R-values for overall assembly</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td>ψ</td> <td>Incremental increase in transmittance per linear length of slab</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation	Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab	Transmittance / Resistance	U, R	U- and R-values for overall assembly	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature	Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab
Assembly 1D (Nominal) R-Value		R_{1D}	R-3.2 (0.56 RSI) + exterior insulation													
Transmittance / Resistance without Anomaly		U_o, R_o	"clear wall" U- and R-value, without slab													
Transmittance / Resistance		U, R	U- and R-values for overall assembly													
Surface Temperature Index ¹		T_i	0 = exterior temperature 1 = interior temperature													
Linear Transmittance		ψ	Incremental increase in transmittance per linear length of slab													
0.90																
0.80																
0.70																
0.60																
0.50																
0.40																
0.30																
0.20																
0.10																
0.00																

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

Nominal (1D) vs. Assembly Performance Indicators

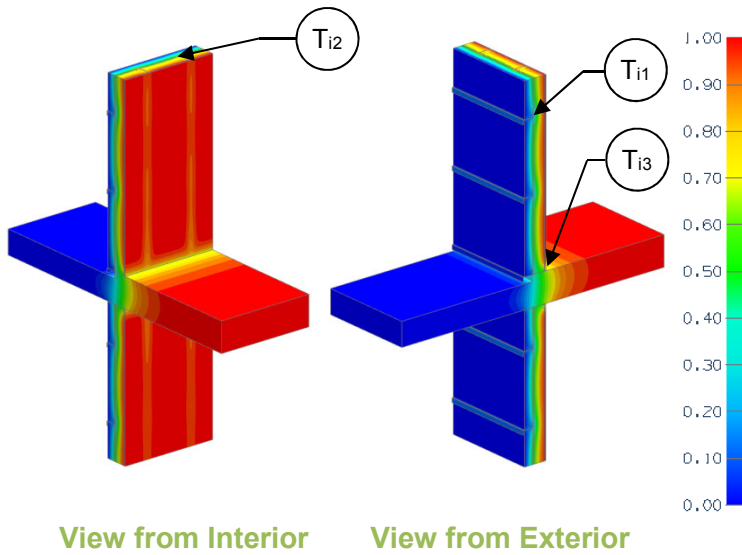
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)	R-6.8 (1.19)	0.148 (0.84)	0.584 (1.011)

Temperature Indices

T_{i1}	0.71	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.86	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.45	Min T on slab exposed to interior air, at sheathing between studs

Detail 5.2.5

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Uninsulated Curb



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-15 (2.64)	R-29.2 (5.15)	R-18.5 (3.25)	0.054 (0.31)	R-8.6 (1.51)	0.116 (0.66)	0.612 (1.059)

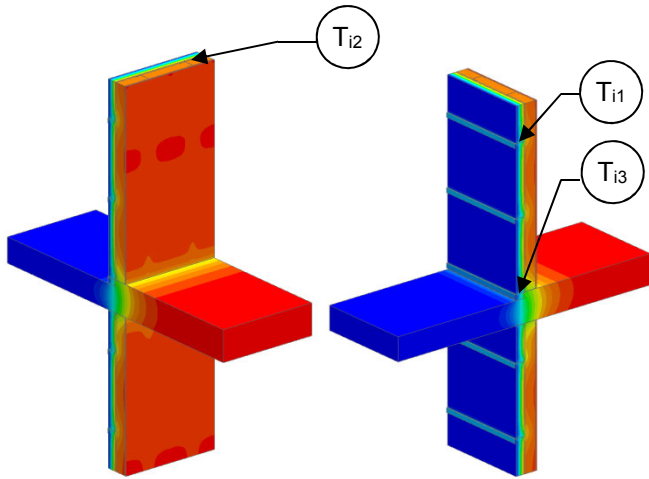
Temperature Indices

T_{i1}	0.35	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.73	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.64	Min T on slab exposed to interior air, at gypsum between studs

Detail 5.2.6

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Insulated Curb

Thermal Performance Indicators



View from Interior

View from Exterior



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

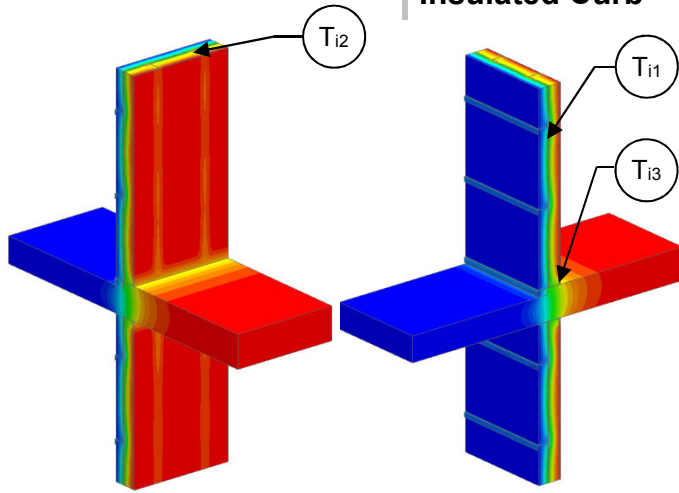
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)	R-7.3 (1.28)	0.138 (0.78)	0.485 (0.840)

Temperature Indices

T_{i1}	0.71	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.86	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.57	Min T on slab exposed to interior air, at sheathing between studs

Detail 5.2.7

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Insulated Curb



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

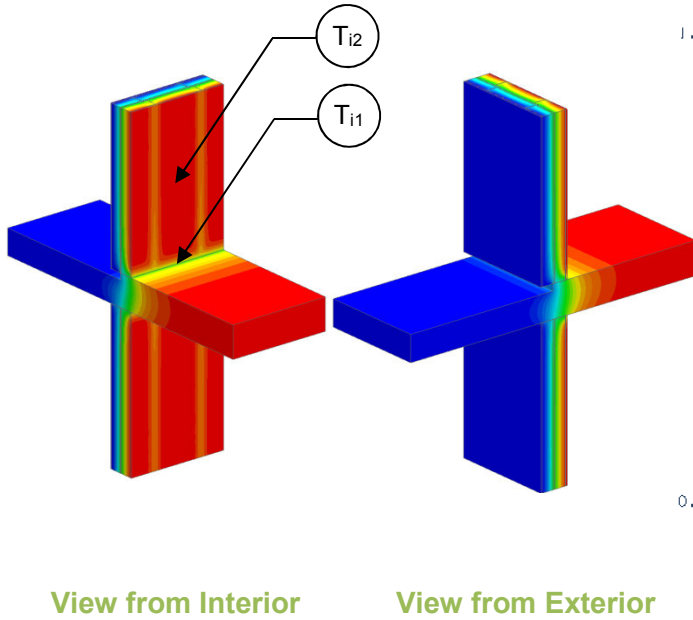
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-29.2 (5.15)	R-18.5 (3.25)	0.054 (0.31)	R-9.3 (1.63)	0.108 (0.61)	0.528 (0.914)

Temperature Indices

T_{i1}	0.35	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.73	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.70	Min T on slab exposed to interior air, at gypsum between studs

Detail 5.2.8

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z Girts (16" o.c.) Supporting Stucco Cladding – Uninsulated Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.5 (2.55 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

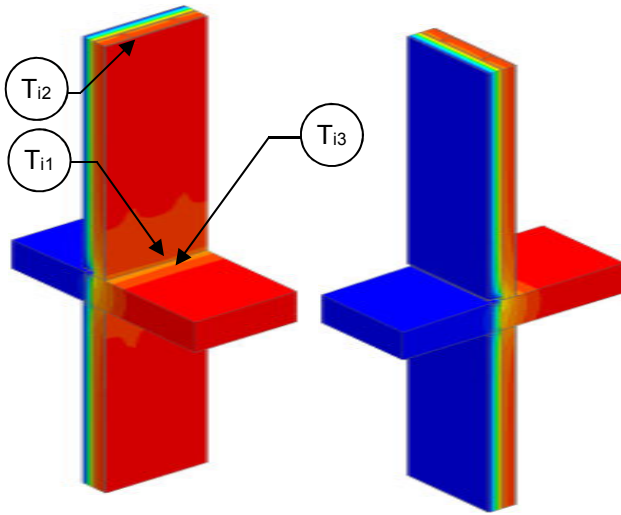
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-10 (1.76)	R-24.5 (4.31)	R-13.0 (2.29)	0.077 (0.44)	R-6.6 (1.16)	0.152 (0.86)	0.664 (1.149)
R-15 (2.64)	R-29.5 (5.20)	R-14.1 (2.49)	0.071 (0.40)	R-6.9 (1.21)	0.146 (0.83)	0.665 (1.151)

Temperature Indices

	R10	R15	
T_{i1}	0.29	0.30	Min T on sheathing, along slab, between studs
T_{i2}	0.48	0.52	Max T on sheathing, at studs, between girts

Detail 5.2.9

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Isokorb CM20 Thermally Broken Slab Projection without Concrete Curb



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

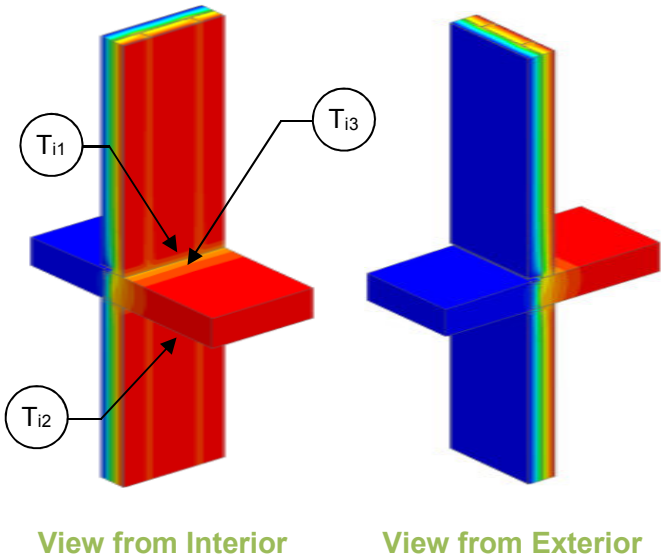
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-17.7 (3.12)	R-17.4 (3.06)	0.057 (0.33)	R-12.1 (2.12)	0.083 (0.40)	0.253 (0.438)

Temperature Indices

T_{i1}	0.66	Min T on sheathing, along gap below EIFS at track, between studs
T_{i2}	0.89	Max T on sheathing, away from slab, at studs
T_{i3}	0.71	Min T on slab, along gypsum between studs, exposed to interior air

Detail 5.2.10 Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Isokorb CM20 Thermally Broken Slab Projection without Concrete Curb



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U _o , R _o	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

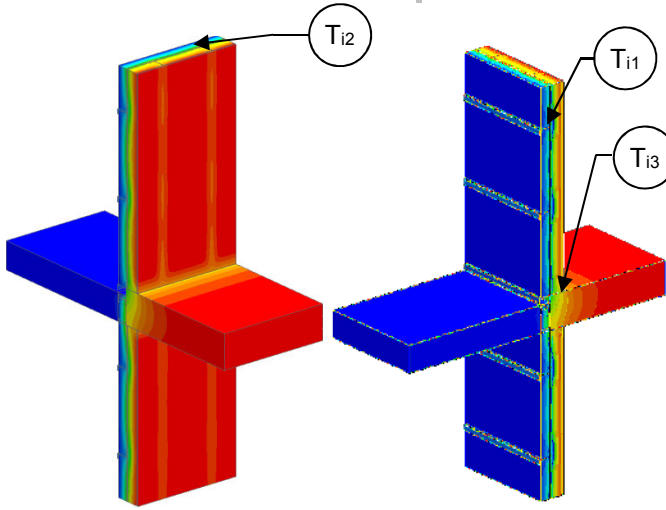
Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-29.2 (5.1)	R-24.0 (4.23)	0.042 (0.24)	R-15.0 (2.64)	0.067 (0.38)	0.246 (0.426)

Temperature Indices

T ₁₁	0.45	Min T on sheathing, along gap below EIFS at track, between studs
T ₁₂	0.77	Max T on sheathing, below slab, between studs
T ₁₃	0.68	Min T on slab, along gypsum between studs, exposed to interior air

Detail 5.2.11

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Uninsulated Curb



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

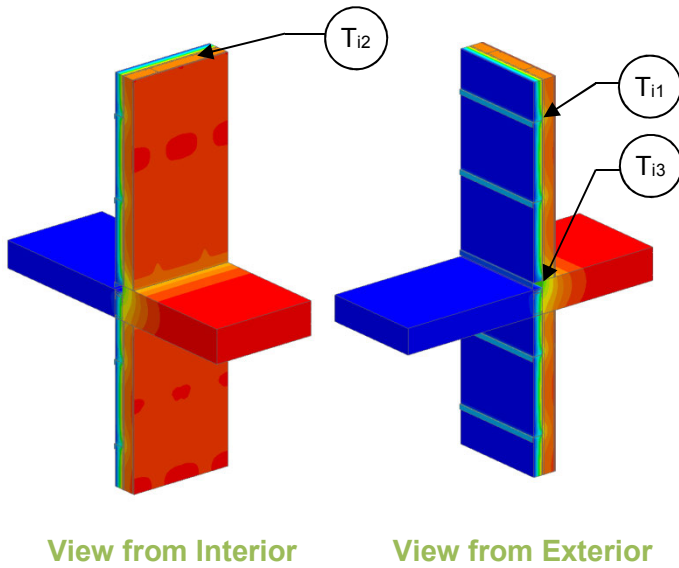
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)	R-11.6 (2.04)	0.087 (0.49)	0.319 (0.551)

Temperature Indices

T_{11}	0.35	Min T on sheathing away from slab, between studs at girts
T_{12}	0.73	Max T on sheathing away from slab, between girts at studs
T_{13}	0.77	Min T on slab exposed to interior air, at gypsum between studs

Detail 5.2.12

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Uninsulated Curb



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

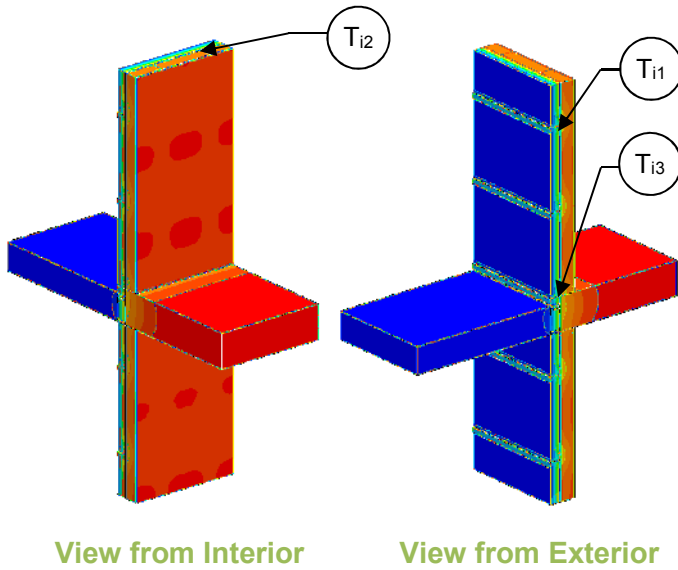
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)	R-8.7 (1.53)	0.115 (0.65)	0.261 (0.452)

Temperature Indices

T_{i1}	0.71	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.86	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.60	Min T on slab exposed to interior air, at sheathing between studs

Detail 5.2.13

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Insulated Curb



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)	R-10.0 (1.76)	0.100 (0.57)	0.117 (0.203)

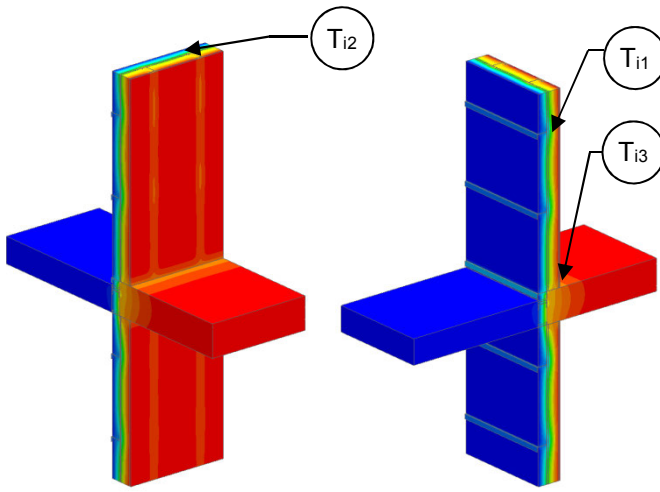
Temperature Indices

T_{i1}	0.71	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.86	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.77	Min T on slab exposed to interior air, at sheathing between studs

Detail 5.2.14

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Insulated Curb

Thermal Performance Indicators



View from Interior

View from Exterior

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

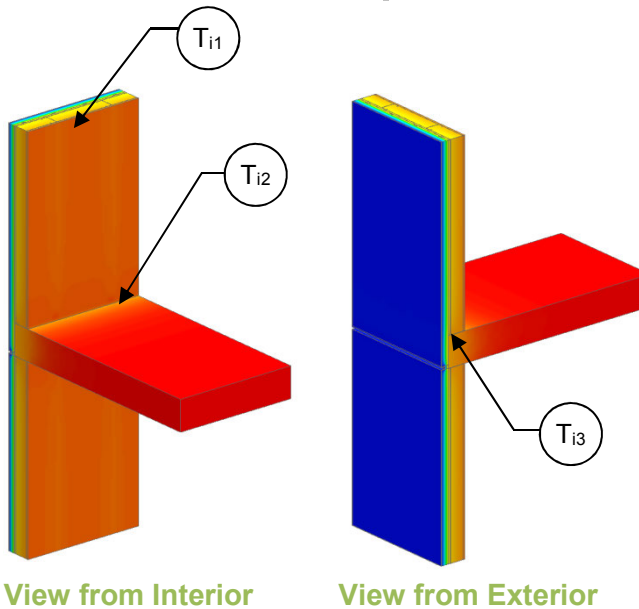
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)	R-13.6 (2.40)	0.073 (0.42)	0.189 (0.327)

Temperature Indices

T_{i1}	0.35	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.73	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.85	Min T on slab exposed to interior air, at gypsum between studs

Detail 5.2.15 Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

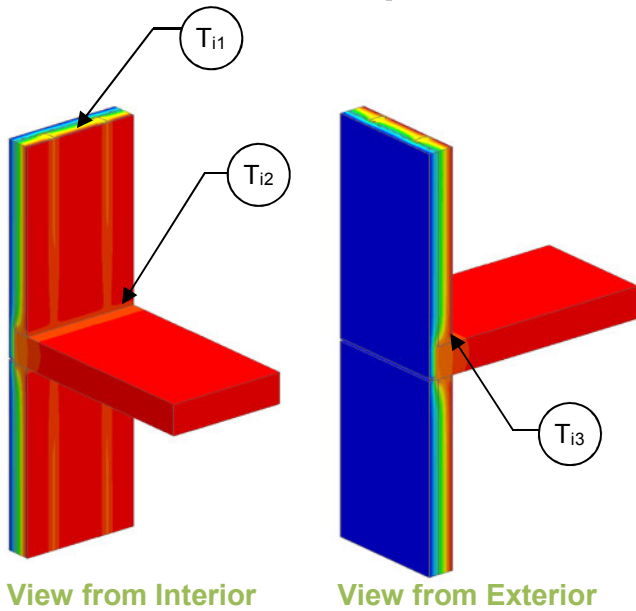
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-7.5 (1.32)	R-10.2 (1.80)	R-10.0 (1.76)	0.100 (0.57)	R-9.7 (1.70)	0.104 (0.59)	0.032 (0.055)
R-11.3 (1.98)	R-13.9 (2.46)	R-13.7 (2.41)	0.073 (0.41)	R-13.3 (2.35)	0.075 (0.43)	0.018 (0.032)
R-15 (2.64)	R-17.7 (3.12)	R-17.4 (3.06)	0.057 (0.33)	R-17.0 (2.99)	0.059 (0.33)	0.012 (0.022)

Temperature Indices

	R7.5	R11.3	R15	
T_{i1}	0.80	0.85	0.88	Min T on sheathing, between studs
T_{i2}	0.86	0.90	0.93	Max T on sheathing, along steel track at slab
T_{i3}	0.91	0.94	0.95	Min T on slab, at edge interior drywall, exposed to interior air

Detail 5.2.16 Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-7.5 (1.32)	R-21.7 (3.83)	R-16.6 (2.93)	0.060 (0.34)	R-14.5 (2.55)	0.069 (0.39)	0.076 (0.132)
R-15 (2.64)	R-29.2 (5.15)	R-24.0 (4.23)	0.042 (0.24)	R-22.0 (3.88)	0.045 (0.26)	0.032 (0.056)

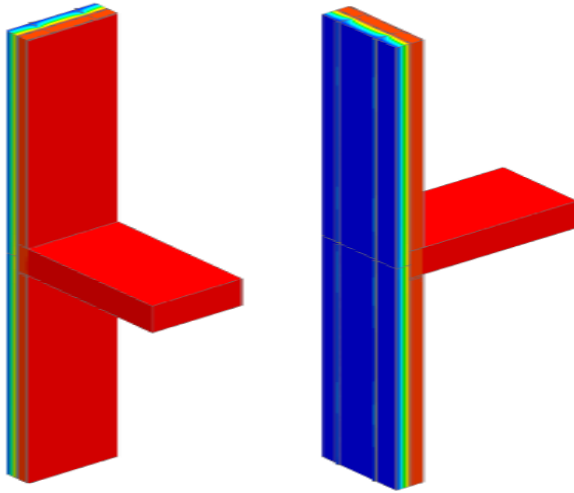
Temperature Indices

	R7.5	R15	
T_{i1}	0.41	0.58	Min T on sheathing, between studs
T_{i2}	0.85	0.91	Max T on sheathing, along steel track at slab
T_{i3}	0.90	0.94	Min T on slab, at edge interior drywall, exposed to interior air

Detail 5.2.17

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Vertical Sub-girts – Intermediate Concrete Floor Intersection

Thermal Performance Indicators



View from Interior

View from Exterior



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

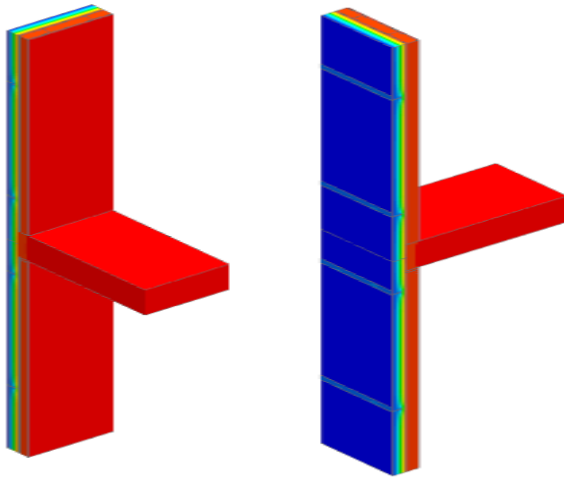
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
16.8 (2.96)	20.1 (3.54)	R-15.1 (2.66)	0.066 (0.376)	14.7 (2.59)	0.068 (0.388)	0.027 (0.046)
21.0 (3.70)	24.2 (4.28)	R-16.7 (2.94)	0.060 (0.340)	16.4 (2.89)	0.061 (0.347)	0.017 (0.029)
25.2 (4.44)	28.5 (5.02)	R-18.0 (3.18)	0.055 (0.315)	17.9 (3.14)	0.056 (0.319)	0.009 (0.016)

Detail 5.2.18

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken ISO Clip System Supporting Horizontal Sub-girts – Intermediate Concrete Floor Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

View from Interior

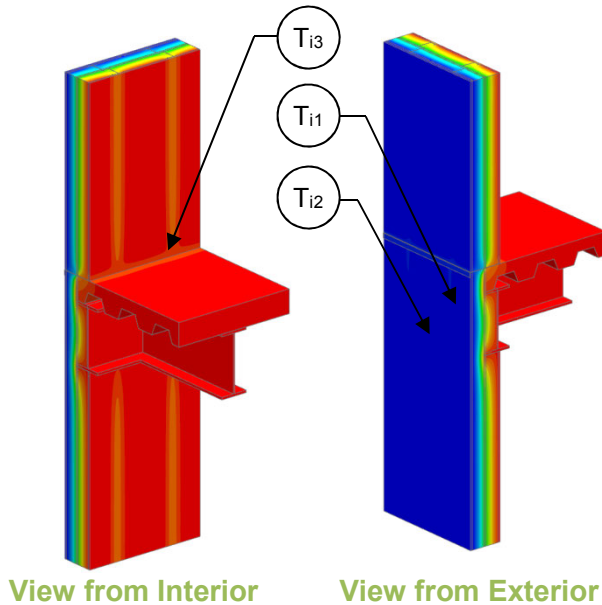
View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
16.8 (2.96)	20.1 (3.54)	R-16.3 (2.87)	0.061 (0.349)	15.4 (2.71)	0.065 (0.369)	0.027 (0.046)
21.0 (3.70)	24.3 (4.28)	R-18.6 (3.28)	0.054 (0.305)	17.5 (3.09)	0.057 (0.322)	0.017 (0.029)
25.2 (4.44)	28.5 (5.02)	R-20.7 (3.65)	0.048 (0.274)	19.6 (3.45)	0.051 (0.289)	0.009 (0.016)

Detail 5.2.19

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-girts (16" o.c.) Supporting Stucco Cladding – Steel Framed Floor with Cross Cavity Flashing



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.5 (2.55 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length steel framed floor

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

Nominal (1D) vs. Assembly Performance Indicators

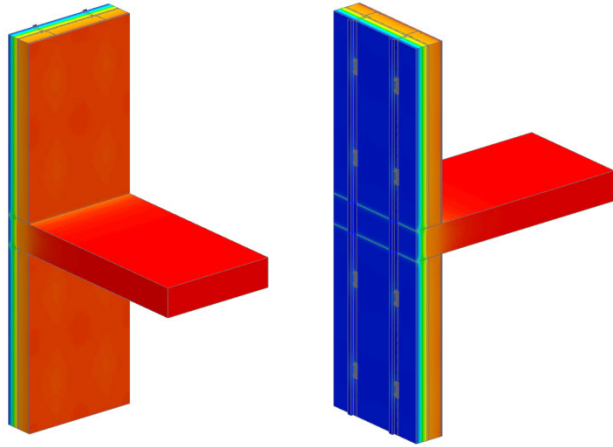
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-24.5 (4.31)	R-13.0 (2.29)	0.077 (0.44)	R-10.5 (1.85)	0.095 (0.54)	0.178 (0.309)
R-15 (2.64)	R-29.5 (5.20)	R-14.1 (2.49)	0.071 (0.40)	R-11.5 (2.03)	0.087 (0.49)	0.159 (0.275)

Temperature Indices

	R10	R15	
T_{i1}	0.35	0.36	Min T on sheathing, mid height of cavity behind I-beam, aligned with external girts
T_{i2}	0.90	0.92	Max T on sheathing, bottom of cavity behind I- beam, beside lower wall track, centered between external girts
T_{i3}	0.08	0.86	Min T on floor slab, at gypsum and studs, along upper track

Detail 5.2.20

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Fiberglass Spacer and Through Insulation Fasteners Supporting Cladding – Insulated Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Linear Transmittance	ψ	Incremental increase in transmittance per linear length steel framed floor

View from Interior

View from Exterior

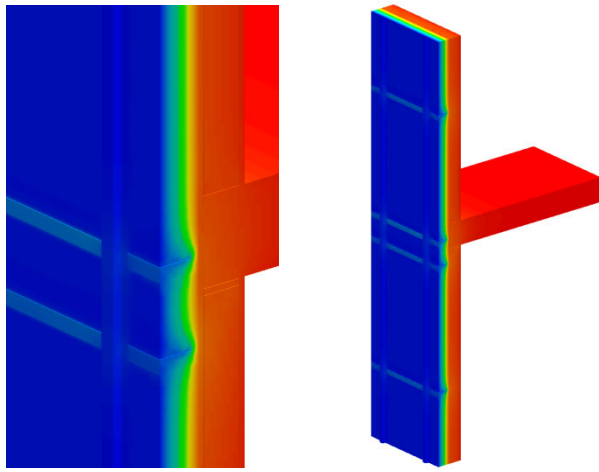
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-14.7 (2.59)	R-18.0 (3.17)	R-15.0 (2.65)	0.066 (0.38)	R-14.9 (2.63)	0.070 (0.38)	0.035 (0.060)

Detail 5.2.21

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Aluminum Clip Horizontal Sub-girt System Supporting Cladding – Intermediate Floor Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

View of Intersection

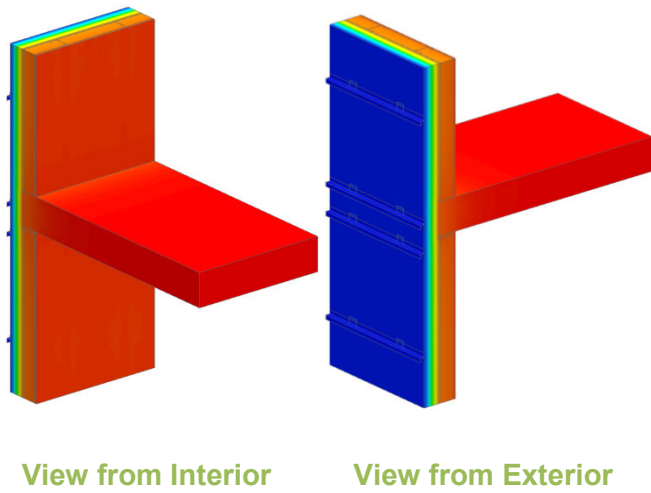
View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Assembly – Exterior Insulated Assembly

Clip Type	Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	34" Vertical Clip Spacing		41" Vertical Clip Spacing		48" Vertical Clip Spacing		ψ Btu/ft hr °F (W/m K)
			R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	
T100	R-16.8 (2.96)	R-21.1 (3.54)	R-15.6 (2.75)	0.064 (0.364)	R-16.1 (2.84)	0.062 (0.354)	R-16.4 (2.89)	0.061 (0.346)	0.029 (0.05)
T125	R-21.0 (3.70)	R-24.3 (5.28)	R-18.2 (3.20)	0.055 (0.312)	R-18.9 (3.32)	0.053 (0.303)	R-19.2 (3.39)	0.052 (0.297)	0.041 (0.07)
T150	R-25.2 (4.44)	R-28.5 (5.02)	R-20.8 (3.67)	0.048 (0.275)	R-21.3 (3.75)	0.047 (0.266)	R-21.7 (3.83)	0.046 (0.259)	0.041 (0.07)

Detail 5.2.22 Exterior Insulated 3 5/8" x 1/58" Steel Stud (16" o.c.) Wall Assembly with TAC Fiber Reinforced Plastic Girts Supporting Cladding – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

Nominal (1D) vs. Assembly Performance Indicators

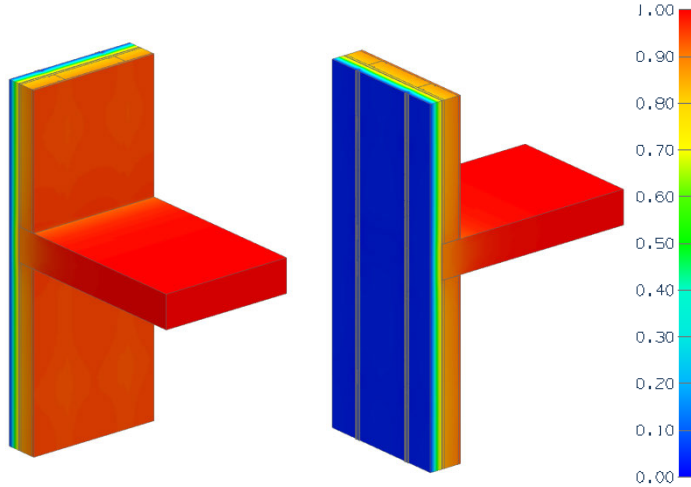
Without Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		ψ Btu/ft hr °F (W/m K)
		R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	
R-12.6 (2.22)	R-15.8 (2.78)	R-14.7 (2.56)	0.068 (0.39)	R-14.9 (2.63)	0.067 (0.38)	R-14.9 (2.63)	0.067 (0.38)	0.017 (0.029)
R-16.8 (3.00)	R-20.0 (3.52)	R-18.9 (3.33)	0.053 (0.30)	R-18.9 (3.33)	0.053 (0.30)	R-19.2 (3.33)	0.052 (0.30)	0.009 (0.016)
R-21.0 (3.70)	R-24.4 (4.30)	R-22.7 (4.00)	0.044 (0.25)	R-23.2 (4.00)	0.043 (0.25)	R-23.2 (4.00)	0.043 (0.25)	0.008 (0.014)
R-25.2 (4.40)	R-28.4 (5.00)	R-27.0 (4.76)	0.037 (0.21)	R-27.0 (4.76)	0.037 (0.21)	R-27.0 (4.76)	0.037 (0.21)	0.008 (0.014)

Detail 5.2.23

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Broken Aluminum Clip Rail System (24" o.c.) Supporting Cladding – Intermediate Floor Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R _{1D}	R-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

View from Interior

View from Exterior

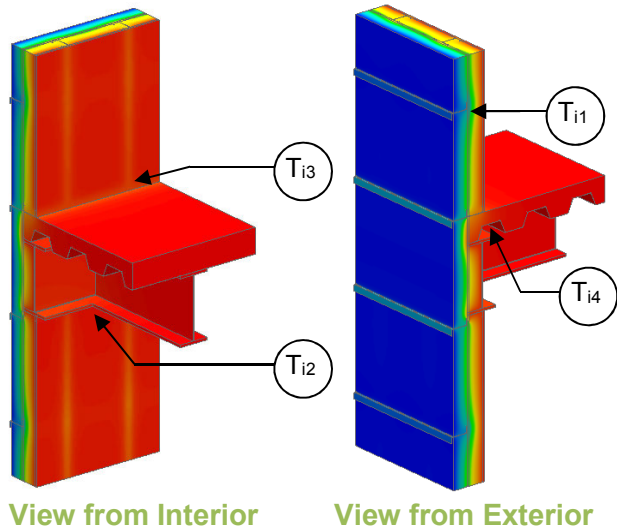
Nominal (1D) vs. Assembly Performance Indicators

Assembly – Without Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		30" Vertical Clip Spacing		36" Vertical Clip Spacing		42" Vertical Clip Spacing		ψ Btu/ft hr °F (W/m K)
		R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	
R-12.6 (2.22)	R-15.8 (2.78)	R-13.0 (2.27)	0.077 (0.44)	R-13.2 (2.33)	0.076 (0.43)	R-13.5 (2.38)	0.074 (0.42)	R-13.7 (2.41)	0.073 (0.42)	0.042 (0.073)
R-16.8 (3.00)	R-20.0 (3.52)	R-15.4 (2.71)	0.065 (0.37)	R-15.9 (2.81)	0.063 (0.36)	R-16.4 (2.89)	0.061 (0.35)	R-16.7 (2.95)	0.060 (0.34)	0.041 (0.071)
R-21.0 (3.70)	R-24.4 (4.30)	R-17.5 (3.10)	0.057 (0.32)	R-18.5 (3.25)	0.054 (0.31)	R-18.9 (3.36)	0.053 (0.30)	R-19.6 (3.44)	0.051 (0.29)	0.040 (0.068)
R-25.2 (4.40)	R-28.4 (5.00)	R-19.2 (3.41)	0.052 (0.29)	R-20.4 (3.60)	0.049 (0.28)	R-21.3 (3.75)	0.047 (0.27)	R-21.7 (3.86)	0.046 (0.26)	0.042 (0.072)

Detail 5.2.24

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Structural Steel Framed Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R- 14.2 (2.50 RSI) + Exterior Insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab and I-Beam
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of the slab and I-Beam

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

Nominal (1D) vs. Assembly Performance Indicators

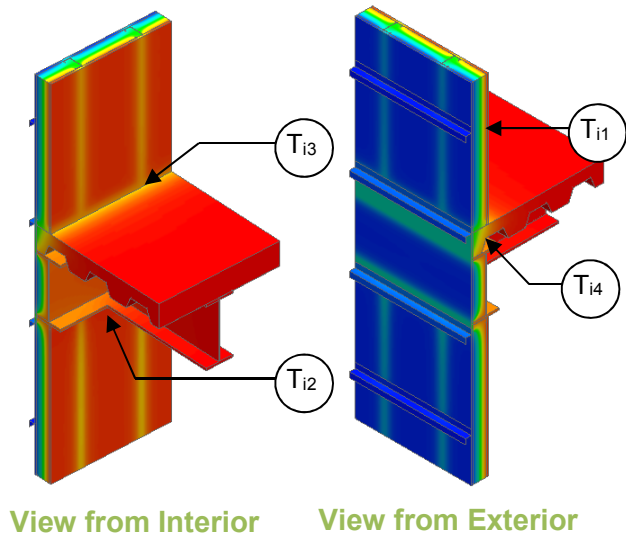
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	Ψ Btu/ft hr °F (W/m K)
R-0 (0)	R-14.2 (2.50)	R-9.2 (1.62)	0.109 (0.62)	R-5.9 (1.04)	0.170 (0.96)	0.487 (0.842)
R-5 (0.88)	R-19.2 (3.38)	R-13.4 (2.36)	0.075 (0.42)	R-10.3 (1.82)	0.097 (0.55)	0.177 (0.306)
R-10 (1.76)	R-24.2 (4.26)	R-16.3 (2.87)	0.061 (0.35)	R-13.1 (2.30)	0.077 (0.44)	0.121 (0.210)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)	R-15.2 (2.68)	0.066 (0.37)	0.093 (0.162)
R-20 (3.52)	R-34.2 (6.02)	R-20.5 (3.61)	0.049 (0.28)	R-17.1 (3.00)	0.059 (0.33)	0.079 (0.137)
R-25 (4.40)	R-39.2 (6.90)	R-22.1 (3.90)	0.045 (0.26)	R-18.7 (3.28)	0.054 (0.30)	0.067 (0.117)

Temperature Indices

	R5	R10	R15	R20	R25	
T_{i1}	0.21	0.28	0.33	0.36	0.39	Min T on sheathing, along girt between studs, away from slab
T_{i2}	0.89	0.92	0.94	0.95	0.95	Max T on sheathing, at I-Beam intersection
T_{i3}	0.89	0.91	0.93	0.93	0.94	Min T on floor, at gypsum and steel studs
T_{i4}	0.94	0.96	0.96	0.97	0.97	Min T on ceiling, at corrugated sheet, away from I-Beam

Detail 5.2.25

Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Structural Steel Framed Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R- 14.2 (2.50 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab and I-Beam
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of the slab and I-Beam

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

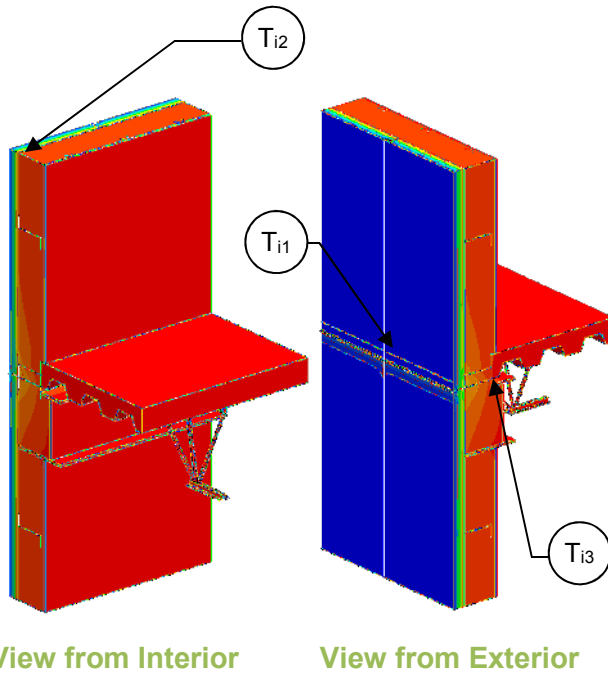
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	Ψ Btu/ft hr °F (W/m K)
R-0 (0)	R-14.2 (2.50)	R-9.2 (1.62)	0.109 (0.62)	5.9 (1.04)	0.170 (0.96)	0.487 (0.842)

Temperature Indices

T_{i1}	0.07	Min T on sheathing, along girt between studs, away from slab
T_{i2}	0.71	Max T on sheathing, at I-Beam intersection
T_{i3}	0.79	Min T on floor, at gypsum and steel studs
T_{i4}	0.81	Min T on ceiling, at corrugated steel, away from I-Beam

Detail 5.2.26 Vertical Insulated Metal Panel Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Support Girt/Hat Track Backup Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance value of panel and backup wall
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U and R-value
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

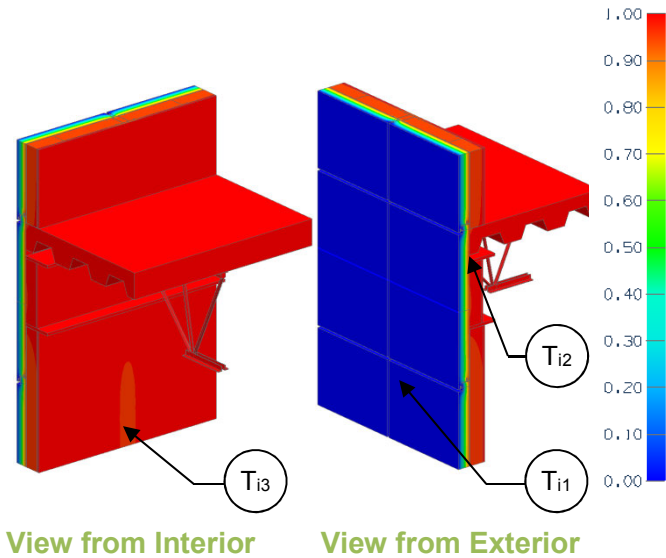
Insulated Panel 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-21.4 (3.80)	0.047 (0.27)	R-14.9 (2.63)	0.067 (0.38)	0.187 (0.323)

Temperature Indices

T_{i1}	0.73	Min T on interior panel face, at bolts and stack joint
T_{i2}	0.91	Max T on interior panel face, away from slab and joints
T_{i3}	0.90	Min T on interior surfaces, on corrugated slab ceiling

Detail 5.2.27 Horizontal Insulated Metal Panel Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Steel Stud Backup Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R _{1D}	Nominal thermal resistance value of panel and backup wall
Transmittance / Resistance without anomalies	U _o , R _o	"clear wall" U and R-value
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

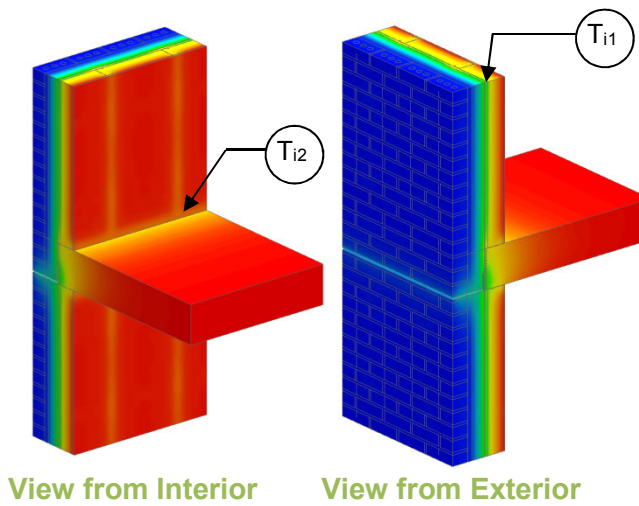
Insulated Panel 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-19.5 (3.43)	0.052 (0.29)	R-16.3 (2.87)	0.061 (0.35)	0.016 (0.027)

Temperature Indices

T _{i1}	0.87	Min T on interior panel face, at bolts and joint intersection, away from slab
T _{i2}	0.97	Max T on interior panel face, at I-Beam
T _{i3}	0.95	Min T on interior surfaces, at steel studs, away from I-Beam

Detail 5.2.28

Exterior and Interior Insulated Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-15.3 (2.70 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab and shelf angle
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of shelf angle and slab

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

Nominal (1D) vs. Assembly Performance Indicators

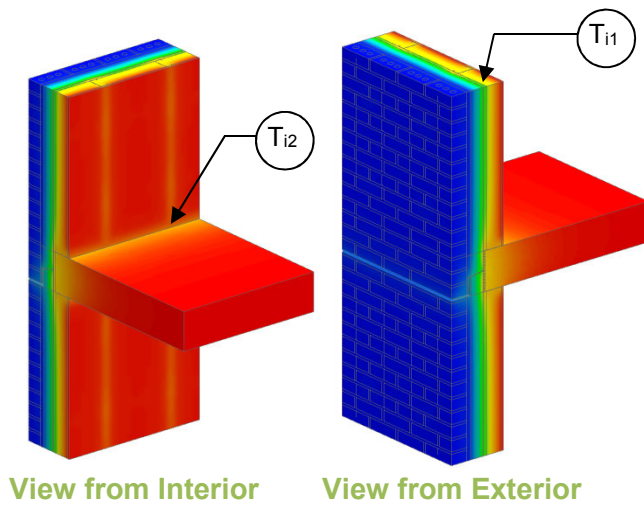
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-20.3 (3.58)	R-13.9 (2.45)	0.072 (0.41)	R-8.7 (1.53)	0.115 (0.65)	0.268 (0.464)
R-10 (1.76)	R-25.3 (4.46)	R-17.1 (3.00)	0.059 (0.33)	R-9.3 (1.63)	0.108 (0.61)	0.305 (0.528)
R-15 (2.64)	R-30.3 (5.34)	R-19.8 (3.48)	0.051 (0.29)	R-9.9 (1.74)	0.101 (0.58)	0.314 (0.544)
R-20 (3.52)	R-35.3 (6.22)	R-22.4 (3.95)	0.045 (0.25)	R-10.9 (1.92)	0.092 (0.52)	0.291 (0.504)
R-25 (4.40)	R-40.3 (7.10)	R-24.9 (4.39)	0.040 (0.23)	R-11.6 (2.04)	0.086 (0.49)	0.286 (0.496)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.39	0.59	0.66	Min T on sheathing cavity centre away from slab
T_{i2}	0.66	0.71	0.77	Max T on sheathing, at slab, at steel studs

Detail 5.2.29

Exterior and Interior Insulated Wall Assembly with Spaced Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-15.3 (2.70 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab and shelf angle
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of shelf angle and slab

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

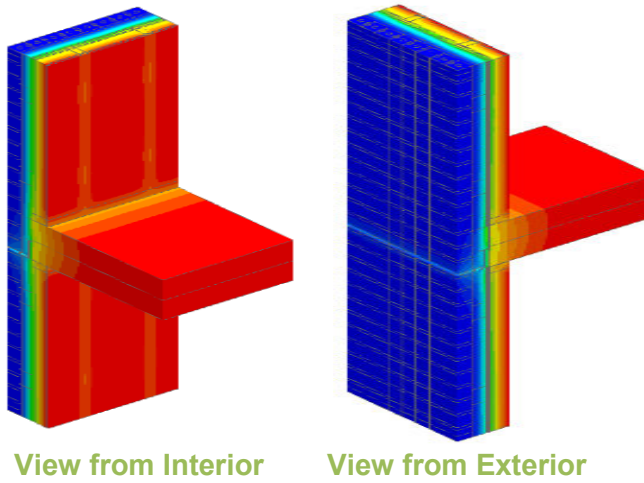
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-20.3 (3.58)	R-13.9 (2.45)	0.072 (0.41)	R-9.4 (1.65)	0.072 (0.61)	0.217 (0.376)
R-10 (1.76)	R-25.3 (4.46)	R-17.1 (3.00)	0.059 (0.33)	R-11.1 (1.95)	0.059 (0.51)	0.197 (0.341)
R-15 (2.64)	R-30.3 (5.34)	R-19.8 (3.48)	0.051 (0.29)	R-12.6 (2.17)	0.051 (0.46)	0.189 (0.326)
R-20 (3.52)	R-35.3 (6.22)	R-22.4 (3.95)	0.045 (0.25)	R-13.8 (2.43)	0.045 (0.41)	0.174 (0.301)
R-25 (4.40)	R-40.3 (7.10)	R-24.9 (4.39)	0.040 (0.23)	R-15.0 (2.64)	0.040 (0.38)	0.165 (0.290)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.39	0.59	0.69	Min T on sheathing, cavity centre away from slab
T_{i2}	0.72	0.79	0.83	Max T on sheathing, at slab, at steel studs

Detail 5.2.30 Exterior and Interior Insulated Wall Assembly with Thermally Broken Steel Shelf Angle & Brick Ties Supporting Brick Veneer – Slab Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-15.3 (2.70 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab and shelf angle
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab with shelf angle

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

Scenario

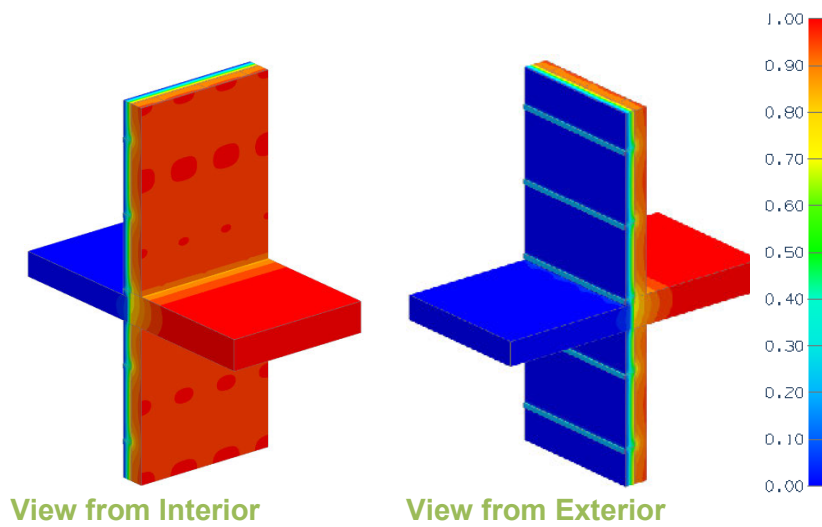
Scenario	Flashing and Shelf Angle
1	Metal Flashing with Steel Shelf Angle and Bolts
2	Self-Adhered Membrane Flashing with Steel Shelf Angle and Bolts

Nominal (1D) vs. Assembly Performance Indicators

Scenario	Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
1	R-15 (2.64)	R-30.3 (5.34)	R-19.8 (3.48)	0.051 (0.29)	R-11.3 (1.98)	0.089 (0.50)	0.237 (0.410)
2	R-15 (2.64)	R-30.3 (5.34)	R-19.8 (3.48)	0.051 (0.29)	R-13.8 (2.43)	0.072 (0.41)	0.135 (0.234)

Detail 5.2.31

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding – Armatherm 500 Thermally Broken Slab Projection with Insulated Curb



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report

Scenarios

Scenario	Thermal Break	Rebar Type
A	Armatherm 500-280	Carbon Steel
B	Armatherm 500-280	Stainless Steel
C	Armatherm 500-080	Carbon Steel
D	Armatherm 500-080	Stainless Steel

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly

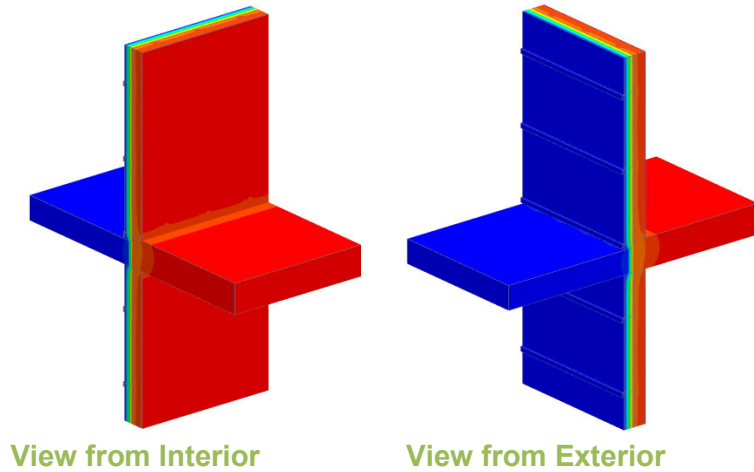
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-14.7 (2.59)	R-17.9 (3.15)	R-11.2 (1.97)	0.089 (0.51)

Slab Linear Transmittance

Scenario	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
A	R-9.1 (1.60)	0.110 (0.63)	0.210 (0.363)
B	R-9.6 (1.69)	0.104 (0.59)	0.147 (0.254)
C	R-9.4 (1.65)	0.107 (0.61)	0.173 (0.299)
D	R-10.0 (1.77)	0.100 (0.57)	0.102 (0.176)

Detail 5.2.32

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud Wall Assembly with Armatherm Z-girts Supporting Metal Cladding – Armatherm 500-080 Thermally Broken Slab Projection with Insulated Curb



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value, without roof anchor
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report

Nominal (1D) vs. Assembly Performance Indicators

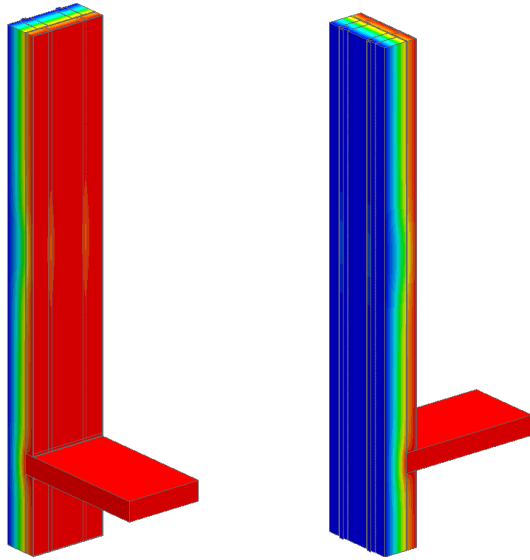
Base Assembly

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-14.7 (2.59)	R-17.9 (3.15)	R-17.3 (3.050)	0.058 (0.33)

Slab Linear Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-14.6 (2.57)	0.068 (0.39)	0.107 (0.185)

Detail 5.2.33 Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – Eko Thermobacket and NV1 Clip System Supporting Cladding – Intermediate Floor Intersection



View from Interior

View from Exterior

Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-15.3 (2.52 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U_o, R_o</td> <td>“clear wall” U- and R-value without slab</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U, R</td> <td>U and R-values for overall assembly</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td>ψ</td> <td>Incremental increase in transmittance per linear length of floor slab</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R_{1D}	R-15.3 (2.52 RSI) + exterior insulation	Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value without slab	Transmittance / Resistance	U, R	U and R-values for overall assembly	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature	Linear Transmittance	ψ	Incremental increase in transmittance per linear length of floor slab
Assembly 1D (Nominal) R-Value		R_{1D}	R-15.3 (2.52 RSI) + exterior insulation													
Transmittance / Resistance		U_o, R_o	“clear wall” U- and R-value without slab													
Transmittance / Resistance		U, R	U and R-values for overall assembly													
Surface Temperature Index ¹		T_i	0 = exterior temperature 1 = interior temperature													
Linear Transmittance		ψ	Incremental increase in transmittance per linear length of floor slab													
0.90																
0.80																
0.70																
0.60																
0.50																
0.40																
0.30																
0.20																
0.10																
0.00																

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Floor Height ft (mm)	Exterior Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
11' (3353)	R-42 (7.40)	R-57.3 (10.09)	R-35.6 (6.27)	0.028 (0.16)
13.5' (4115)	R-42 (7.40)	R-57.3 (10.09)	R-37.3 (6.57)	0.027 (0.15)
16' (4877)	R-42 (7.40)	R-57.3 (10.09)	R-38.6 (6.80)	0.026 (0.15)

Uninsulated Floor Intersection Linear Transmittance

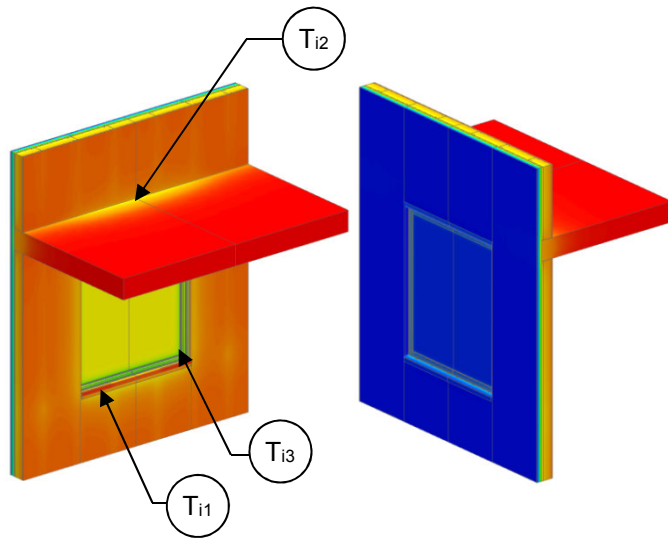
Floor Height ft (mm)	Exterior Insulation 1D R-value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
11' (3353)	R-42 (7.40)	R-35.0 (6.17)	0.029 (0.16)	0.005 (0.009)
13.5' (4115)	R-42 (7.40)	R-36.8 (6.48)	0.027 (0.15)	
16' (4877)	R-42 (7.40)	R-38.2 (6.72)	0.026 (0.15)	

Insulated Floor Intersection Linear Transmittance

Floor Height ft (mm)	Exterior Insulation 1D R-value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
11' (3353)	R-42 (7.40)	R-35.2 (6.19)	0.028 (0.16)	0.004 (0.006)
13.5' (4115)	R-42 (7.40)	R-36.9 (6.51)	0.027 (0.15)	
16' (4877)	R-42 (7.40)	R-38.3 (6.74)	0.026 (0.15)	

Detail 5.3.1

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab and window
Transmittance / Resistance	U_s, R_s, U_g	U and R-values for s = wall + slab g = glazing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of s = slab g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-7.5 (1.32)	R-10.2 (1.80)	R-10.0 (1.76)	0.100 (0.57)
R-11.3 (1.98)	R-13.9 (2.46)	R-13.7 (2.41)	0.073 (0.41)
R-15 (2.64)	R-17.7 (3.12)	R-17.4 (3.06)	0.057 (0.33)

Base Assembly - Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ_g^2 Btu/ft ² hr °F (W/m K)
R-7.5 (1.32)	R-4.8 (0.84)	0.210 (1.19)	0.160 (0.277)
R-11.3 (1.98)	R-5.2 (0.92)	0.192 (1.09)	0.175 (0.303)
R-15 (2.64)	R-5.5 (0.97)	0.182 (1.03)	0.187 (0.324)

Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ² ·hr ·°F (W/m ² K)
R-9.7 (1.70)	0.104 (0.59)	0.032 (0.055)
R-13.3 (2.35)	0.075 (0.43)	0.018 (0.032)
R-17.0 (2.99)	0.059 (0.33)	0.012 (0.022)

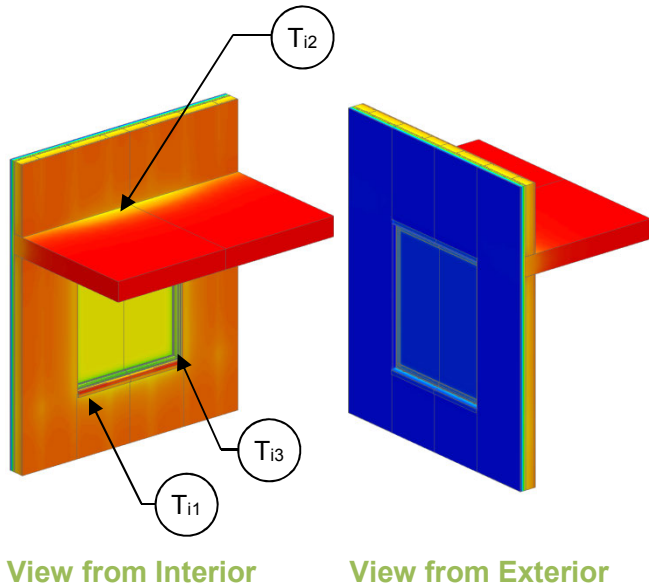
Temperature Indices

	R7.5	R11.3	R15	
T_{i1}	0.33	0.33	0.34	Min T on sheathing, below window sill
T_{i2}	0.86	0.89	0.91	Max T on sheathing, at slab intersection away from window
T_{i3}	0.55	0.56	0.56	Min T on window frame, at corner of window at glass

²For the linear transmittance, use the window perimeter

Detail 5.3.2

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab and window
Transmittance / Resistance	U_s, R_s, U_g	U and R-values for s = wall + slab g = glazing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of s = slab g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-7.5 (1.32)	R-21.7 (3.83)	R-16.6 (2.93)	0.060 (0.34)
R-15 (2.64)	R-29.2 (5.15)	R-24.0 (4.23)	0.042 (0.24)

Base Assembly - Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ_{g^2} Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-5.6 (0.98)	0.180 (1.02)	0.136 (0.236)
R-15 (2.64)	R-6.1 (1.07)	0.165 (0.94)	0.155 (0.268)

Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ² ·hr ·°F (W/m ² K)
R-14.5 (2.55)	0.069 (0.39)	0.076 (0.132)
R-22.0 (3.88)	0.045 (0.26)	0.032 (0.056)

Temperature Indices

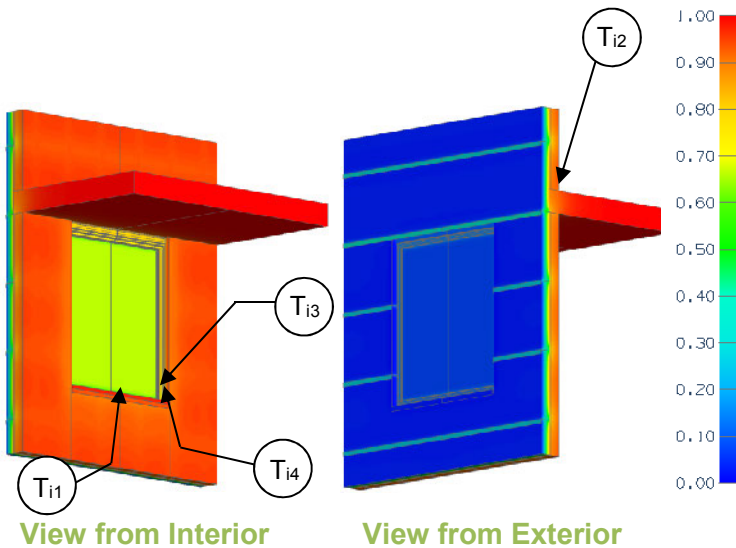
	R7.5	R15	
T_{i1}	0.25	0.26	Min T on sheathing, below window sill between studs
T_{i2}	0.84	0.89	Max T on sheathing, along steel tracks at slab
T_{i3}	0.52	0.53	Min T on window frame, at corner of window at glass

²For the linear transmittance, use the window perimeter

Detail 5.3.3

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Window & Slab Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + horizontal exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab and window
Transmittance / Resistance	U_s, R_s, U_g	U and R-values for s = wall + slab g = glazing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of s = slab g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-8.2 (1.44)	R-6.8 (1.21)	0.146 (0.83)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)
R-25 (4.40)	R-28.2 (4.96)	R-14.5 (2.56)	0.069 (0.39)

Base Assembly - Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ_g^2 Btu/ft ² hr °F (W/m K)
R-5 (0.88)	R-6.0 (1.05)	0.168 (0.95)	0.044 (0.077)
R-15 (2.64)	R-9.0 (1.59)	0.111 (0.63)	0.062 (0.108)
R-25 (4.40)	R-10.9 (1.91)	0.092 (0.52)	0.069 (0.120)

Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ² ·hr ·°F (W/m ² K)
R-6.4 (1.13)	1.56 (0.89)	0.061 (0.106)
R-10.8 (1.90)	0.093 (0.53)	0.025 (0.044)
R-13.9 (2.45)	0.072 (0.41)	0.019 (0.034)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.39	0.39	0.39	Min T on sheathing, interior surface at window sill, centre of cavity
T_{i2}	0.79	0.88	0.91	Max T on sheathing, at slab floor, at studs, away from window
T_{i3}	0.61	0.62	0.63	Min T on window frame, at bottom corner
T_{i4}	0.58	0.58	0.59	Min T on window glass, at bottom corner

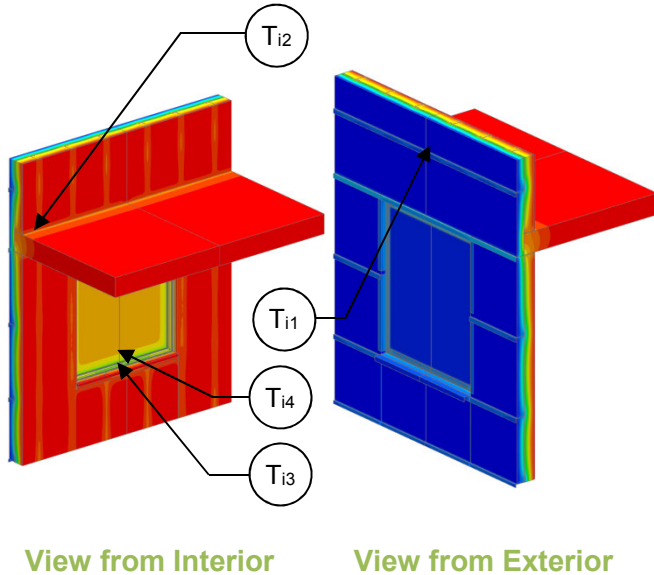
²For the linear transmittance, use the window perimeter



Detail 5.3.4

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Window and Intermediate Floor Intersection

Thermal Performance Indicators



1.00	Assembly 1D (Nominal) R-Value	R_{1D}	R-14.4 (2.54 RSI) + exterior insulation
0.90	Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab and window
0.80	Transmittance / Resistance	U_s, R_s, U_g	U and R-values for s = concrete wall + slab g = glazing
0.70	Transmittance / Resistance	U, R	U- and R-values for overall assembly
0.60	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
0.50	Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of s = slab g = glazing transition
0.40			
0.30			
0.20			
0.10			
0.00			

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-24.4 (4.30)	R-16.1 (2.83)	0.062 (0.35)
R-15 (2.64)	R-29.4 (5.18)	R-18.5 (3.26)	0.054 (0.31)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ_g^2 Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-5.8 (1.02)	0.173 (0.98)	0.113 (0.196)
R-15 (2.64)	R-5.8 (1.03)	0.171 (0.97)	0.130 (0.225)

Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ² ·hr ·°F (W/m ² K)
R-12 (2.19)	0.080 (0.46)	0.109 (0.188)
R-14 (2.53)	0.069 (0.39)	0.092 (0.160)

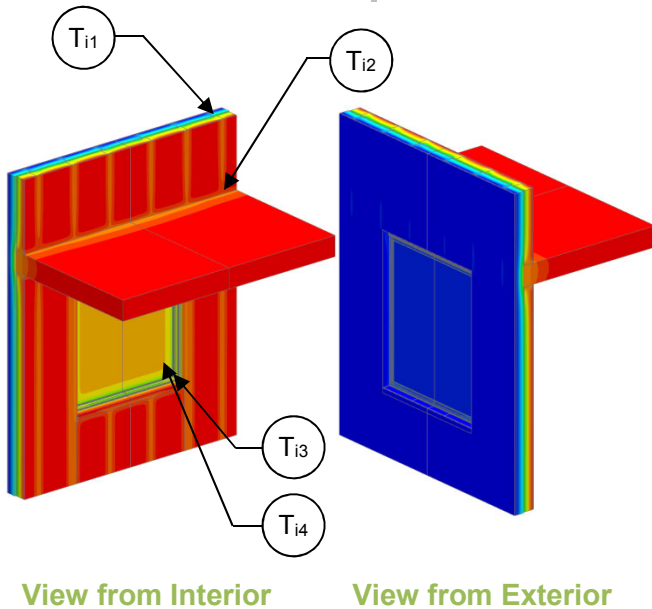
Temperature Indices

	R10	R15	
T_{i1}	0.24	0.26	Min T on sheathing, between studs at girts, away from window
T_{i2}	0.81	0.83	Max T on sheathing, at slab floor, at studs, away from window
T_{i3}	0.61	0.61	Min T on window frame, at bottom edge of glazing
T_{i4}	0.61	0.60	Min T on window glass, at bottom edge

²For the linear transmittance, use the window perimeter

Detail 5.3.5

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z Girts (16" o.c.) Supporting Stucco Cladding – Window and Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.5 (2.55 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab and window
Transmittance / Resistance	U_s, R_s, U_g	U and R-values for s = concrete wall + slab g = glazing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of s = slab g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-24.5 (4.31)	R-13.0 (2.29)	0.077 (0.44)
R-15 (2.64)	R-29.5 (5.20)	R-14.1 (2.49)	0.071 (0.40)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ_g^2 Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-5.5 (0.96)	0.183 (1.04)	0.074 (0.128)
R-15 (2.64)	R-6.6 (0.99)	0.179 (1.01)	0.081 (0.140)

Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ² ·hr ·°F (W/m ² K)
R-11.5 (2.02)	0.087 (0.50)	0.090 (0.155)
R-12.6 (2.22)	0.079 (0.45)	0.075 (0.129)

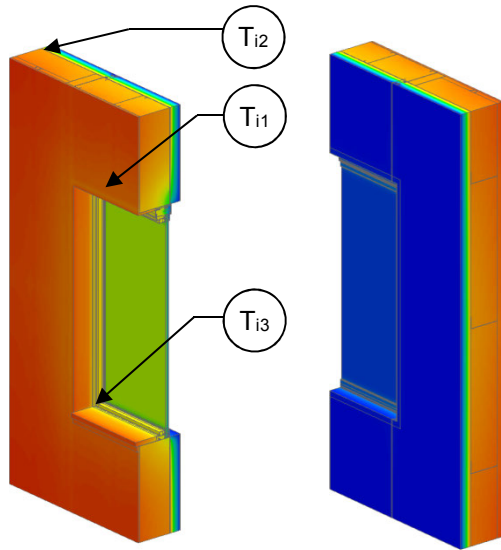
Temperature Indices

	R10	R15	
T_{i1}	0.34	0.38	Min T on sheathing, along studs behind girt away from window/slab
T_{i2}	0.79	0.81	Max T on sheathing, at slab floor, between studs, away from window
T_{i3}	0.59	0.59	Min T on window frame, at bottom corner
T_{i4}	0.58	0.58	Min T on window glass, at corners

²For the linear transmittance, use the window perimeter

Detail 5.3.6

Vertical Insulated Metal Panel – Window Glazing Transition with Steel Support Framing



View from Interior

View from Exterior

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance value of wall
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U and R-value
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Insulated Panel 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-21.0 (3.70)	R-23.2 (4.09)	R-21.4 (3.80)	0.047 (0.27)

Window Transition Transmittance

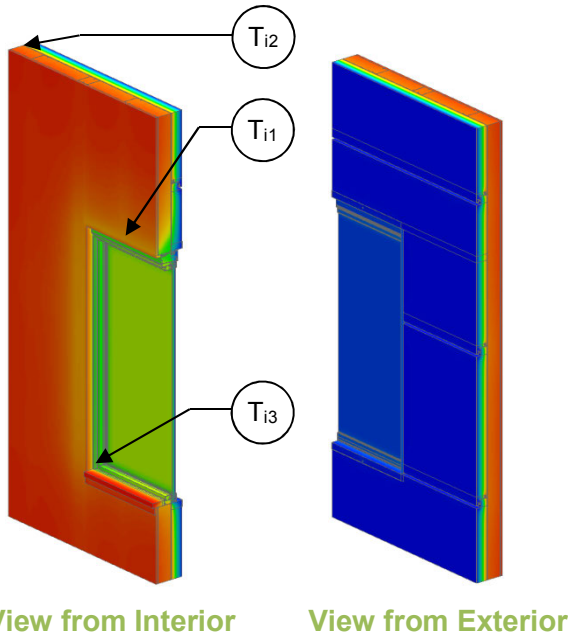
R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-7.1 (1.25)	0.414 (0.80)	0.292 (0.505)

Temperature Indices

T_{i1}	0.41	Min T on interior panel face, at top track
T_{i2}	0.91	Max T on interior panel face, away from window, between joints
T_{i3}	0.54	Min T on frame, at jamb and sill intersection

Detail 5.3.7

Horizontal Insulated Metal Panel – Window Glazing Transition with Steel Support Framing



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance value of wall
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U and R-value
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Insulated Panel 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-21.0 (3.70)	R-23.2 (4.09)	R-19.5 (3.43)	0.052 (0.29)

Window Transition Transmittance

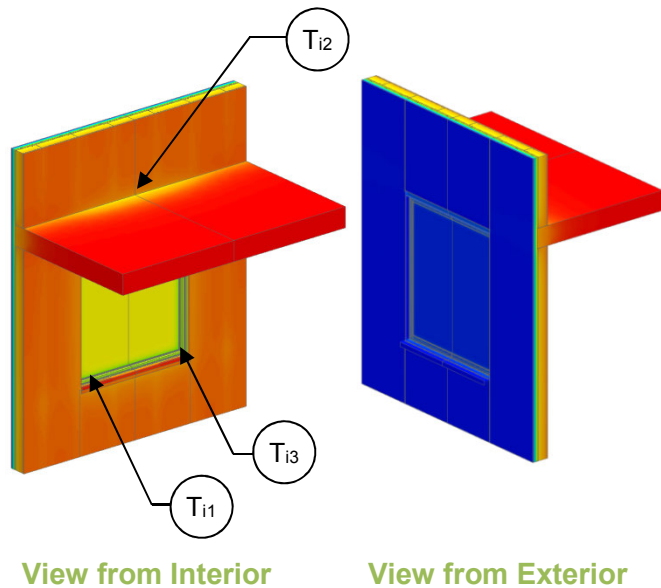
R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-7.5 (1.32)	0.133 (0.75)	0.263 (0.454)

Temperature Indices

T_{i1}	0.45	Min T on interior panel face, at top track
T_{i2}	0.91	Max T on interior panel face, away from window, between joints
T_{i3}	0.54	Min T on frame, at jamb and sill intersection

Detail 5.3.8

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab and window
Transmittance / Resistance	U_s, R_s, U_g	U and R-values for s = wall + slab g = glazing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of s = slab g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-7.5 (1.32)	R-10.2 (1.80)	R-10.0 (1.76)	0.100 (0.57)
R-11.3 (1.98)	R-13.9 (2.46)	R-13.7 (2.41)	0.073 (0.41)
R-15 (2.64)	R-17.7 (3.12)	R-17.4 (3.06)	0.057 (0.33)

Base Assembly - Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ_g^2 Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-5.1 (0.90)	0.196 (1.11)	0.093 (0.160)
R-11.3 (1.98)	R-5.7 (1.00)	0.176 (1.00)	0.103 (0.178)
R-15 (2.64)	R-6.0 (1.06)	0.166 (0.94)	0.112 (0.194)

Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ² ·hr ·°F (W/m ² K)
R-9.7 (1.70)	0.104 (0.59)	0.032 (0.055)
R-13.3 (2.35)	0.075 (0.43)	0.018 (0.032)
R-17.0 (2.99)	0.059 (0.33)	0.012 (0.022)

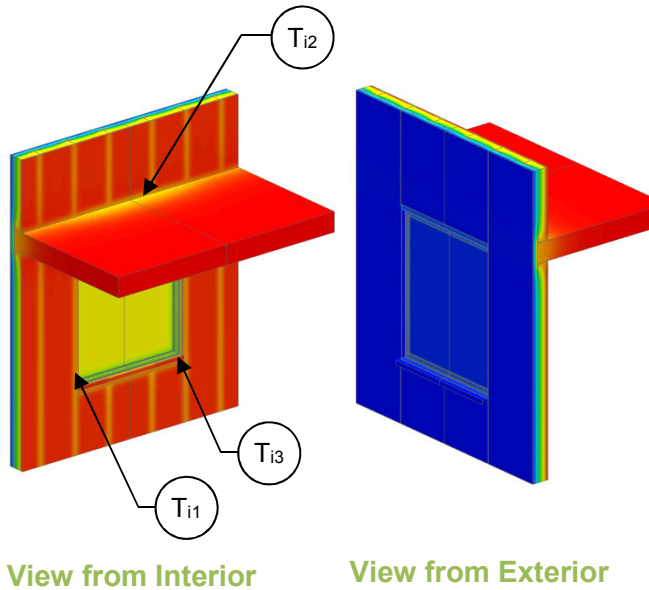
Temperature Indices

	R7.5	R11.3	R15	
T_{i1}	0.60	0.62	0.63	Min T on sheathing, below window sill
T_{i2}	0.87	0.90	0.92	Max T on sheathing, at slab intersection away from window
T_{i3}	0.59	0.59	0.59	Min T on window frame, at corner of window at glass

²For the linear transmittance, use the window perimeter

Detail 5.3.9

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab and window
Transmittance / Resistance	U_s, R_s, U_g	U and R-values for s = wall + slab g = glazing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of s = slab g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-7.5 (1.32)	R-21.7 (3.83)	R-16.6 (2.93)	0.060 (0.34)
R-15 (2.64)	R-29.2 (5.15)	R-24.0 (4.23)	0.042 (0.24)

Base Assembly - Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ_g^2 Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-6.0 (1.05)	0.168 (0.95)	0.083 (0.144)
R-15 (2.64)	R-6.5 (1.15)	0.154 (0.87)	0.103 (0.178)

Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ_s Btu/ft ² ·hr·°F (W/m ² K)
R-14.5 (2.55)	0.069 (0.39)	0.076 (0.132)
R-22.0 (3.88)	0.045 (0.26)	0.032 (0.056)

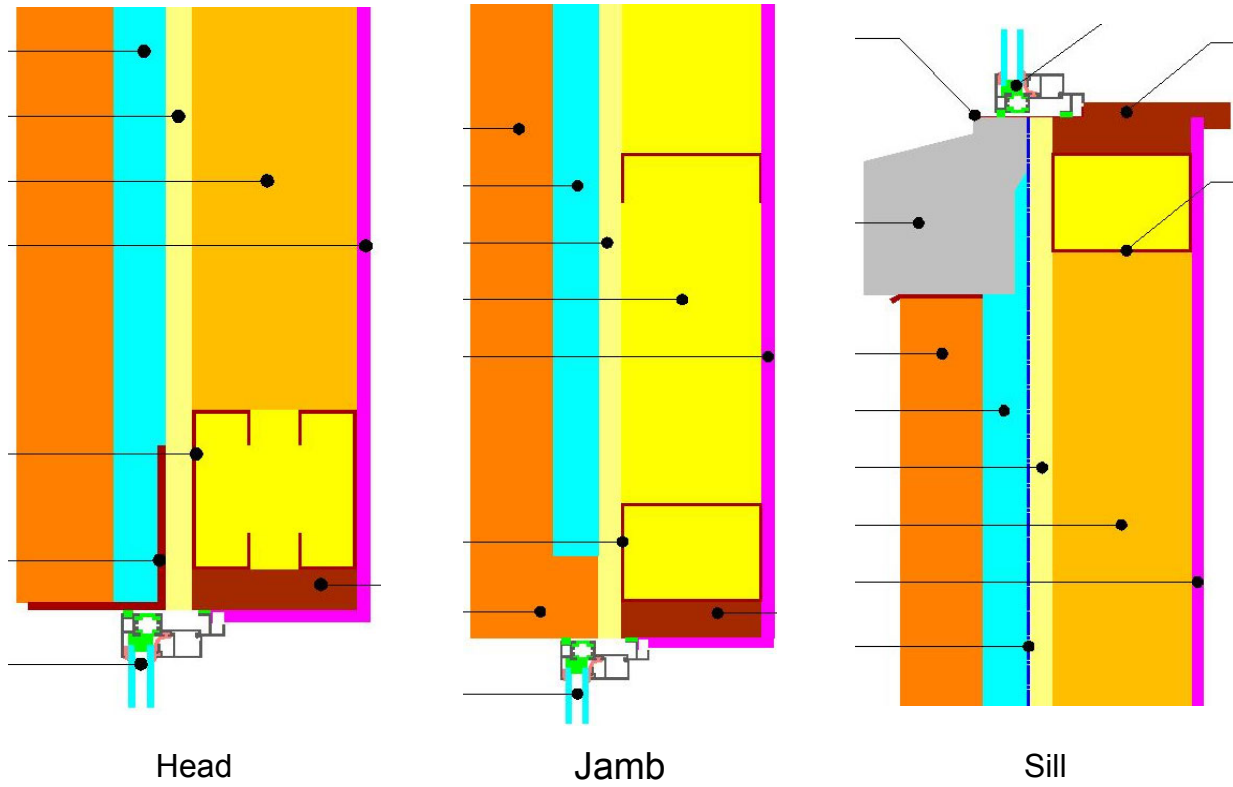
Temperature Indices

	R7.5	R15	
T_{i1}	0.39	0.51	Min T on sheathing, below window sill between studs
T_{i2}	0.85	0.90	Max T on sheathing, along steel tracks at slab
T_{i3}	0.56	0.57	Min T on window frame, at corner of window at glass

²For the linear transmittance, use the window perimeter

Detail 5.3.10 Interior Insulated Steel Frame Wall Assembly with Brick Cladding - Window Intersection

Detail referenced from work done by Passive House Academy

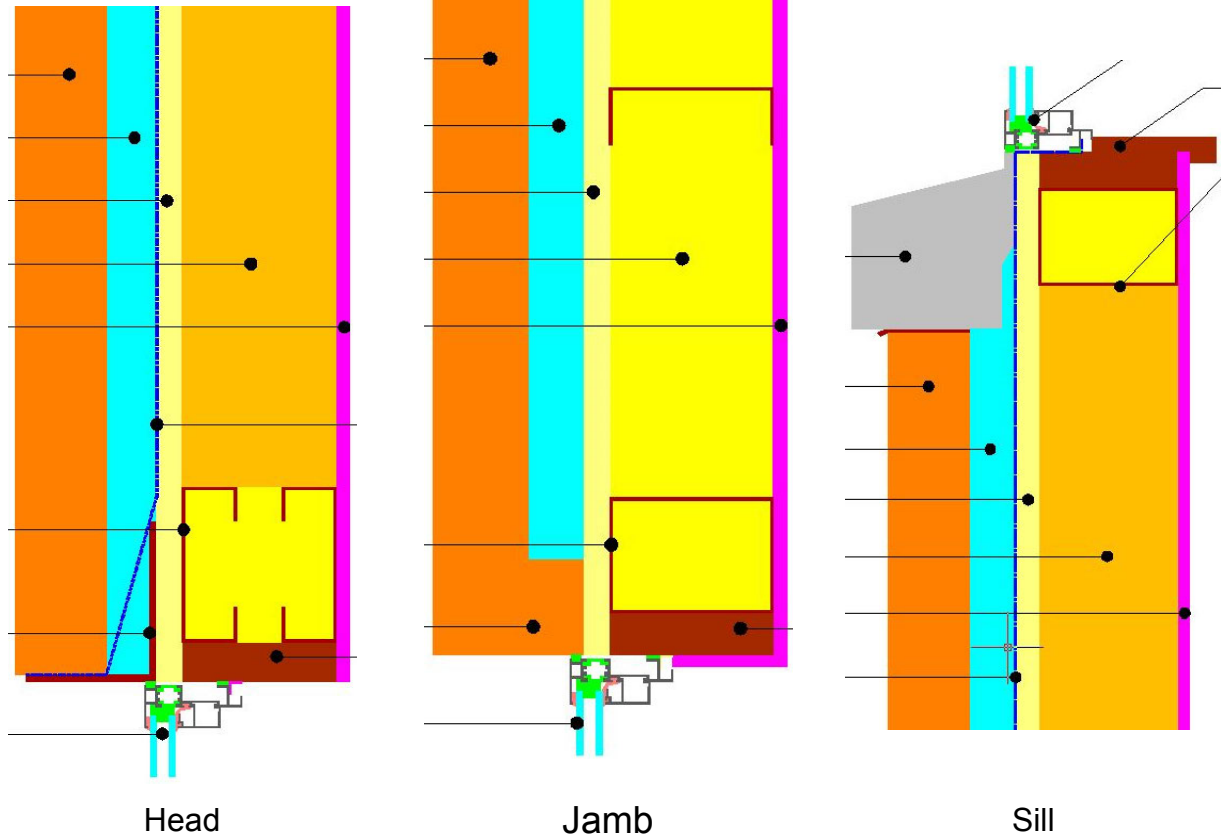


Thermal Performance

Condition	Clear Wall R-Value ft ² ·hr·°F / Btu (m ² K / W)	Clear Wall U-Value Btu/ ft ² ·hr·°F (W/m ² K)	Linear Transmittance (Ψ) Btu/hr ft F (W/m K)
Wall Clear Field	R-22.6 (3.98)	0.044 (0.251)	-
Typical Jamb			0.110 (0.191)
Typical Head			0.143 (0.247)
Typical Sill			0.278 (0.481)
Typical Overall Window			0.160 (0.278)

Detail 5.3.11 Interior Insulated Steel Frame Wall Assembly with Brick Cladding - Window Intersection Aligned with Insulation

Detail referenced from work done by Passive House Academy

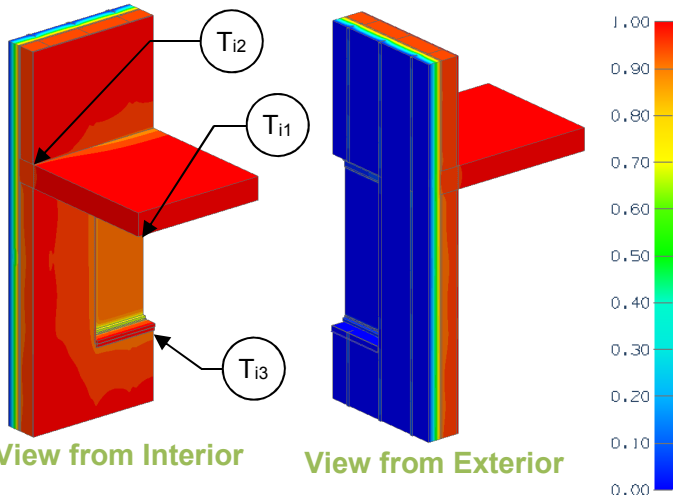


Thermal Performance

Condition	Clear Wall R-Value ft ² ·hr·°F / Btu (m ² K / W)	Clear Wall U-Value Btu / ft ² ·hr·°F (W/m ² K)	Linear Transmittance (Ψ) Btu/hr ft F (W/m K)
Wall Clear Field	R-22.6 (3.98)	0.044 (0.251)	-
Aligned Jamb			0.056 (0.097)
Aligned Head			0.044 (0.077)
Aligned Sill			0.057 (0.098)
Aligned Overall Window			0.053 (0.092)

Detail 5.3.12

Exterior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Window & Intermediate Floor Intersection with Window Thermal Break Positioned in Steel Framing



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-3.2 (0.56 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
Surface Temperature Index ¹	T _i	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length

Base Assembly – Glazing

U _{centre of glass} Btu/ft ² ·hr ·°F (W/m ² K)	U _g Btu/ft ² ·hr ·°F (W/m ² K)
0.142 (0.81)	0.303 (1.72)

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _w ft ² ·hr·°F / Btu (m ² K / W)	U _w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.2 (2.32)	R-11.2 (1.97)	0.090 (0.51)
R-15 (2.64)	R-18.2 (3.20)	R-13.9 (2.45)	0.072 (0.41)
R-20 (3.52)	R-23.2 (4.08)	R-16.9 (2.98)	0.059 (0.34)
R-25 (4.40)	R-28.2 (4.96)	R-19.7 (3.48)	0.051 (0.29)

Intermediate Floor Linear Transmittance

R _{floor} ft ² ·hr·°F / Btu (m ² K / W)	U _{floor} Btu/ft ² ·hr ·°F (W/m ² K)	ψ _{floor} Btu/ft ² ·hr ·°F (W/m ² K)
R-10.6 (1.88)	0.094 (0.53)	0.030 (0.052)
R-13.2 (2.32)	0.076 (0.43)	0.029 (0.051)
R-15.9 (2.81)	0.063 (0.36)	0.026 (0.045)
R-18.5 (3.27)	0.054 (0.31)	0.023 (0.040)

Window Transition Transmittance

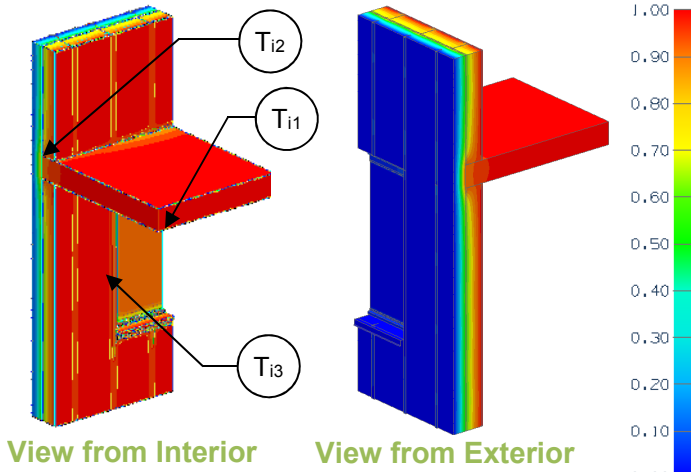
Exterior Insulation 1D R-Value (RSI)	R _t ft ² ·hr·°F / Btu (m ² K / W)	U _t Btu/ft ² ·hr ·°F (W/m ² K)	ψ _{Head} Btu/ft ² ·hr ·°F (W/m K)	ψ _{Sill} Btu/ft ² ·hr ·°F (W/m K)	ψ _{Jamb} Btu/ft ² ·hr ·°F (W/m K)	ψ _{Total} Btu/ft ² ·hr ·°F (W/m K)
R-10 (1.76)	R-6.0 (1.06)	0.166 (0.95)	0.259 (0.448)	0.111 (0.192)	0.102 (0.176)	0.137 (0.238)
R-15 (2.64)	R-6.4 (1.14)	0.155 (0.88)	0.270 (0.467)	0.122 (0.211)	0.110 (0.190)	0.151 (0.261)
R-20 (3.52)	R-6.8 (1.20)	0.147 (0.83)	0.280 (0.484)	0.129 (0.223)	0.115 (0.199)	0.159 (0.275)
R-25 (4.40)	R-7.1 (1.25)	0.141 (0.80)	0.315 (0.545)	0.133 (0.231)	0.120 (0.208)	0.167 (0.289)

Temperature Indices

	R10	R15	R20	R25	
T ₁₁	0.44	0.44	0.44	0.44	Min T on window frame, centre of window head
T ₁₂	0.84	0.87	0.89	0.90	Max T on interior surface of sheathing, along bottom track
T ₁₃	0.58	0.58	0.59	0.60	Min T on interior surface of sheathing, along window sill track

Detail 5.3.13

Exterior and Interior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Window & Intermediate Floor Intersection with Window Thermal Break Positioned in Steel Framing



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
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.142 (0.81)	0.303 (1.72)

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² · hr · °F (W/m ² K)
R-10 (1.76)	R-31.3 (5.51)	R-19.2 (3.38)	0.052 (0.30)
R-15 (2.64)	R-36.3 (6.39)	R-21.8 (3.83)	0.046 (0.26)
R-20 (3.52)	R-41.3 (7.28)	R-24.8 (4.37)	0.040 (0.23)
R-25 (4.40)	R-46.3 (8.15)	R-27.6 (4.86)	0.036 (0.21)

Intermediate Floor Linear Transmittance

R_{floor} ft ² ·hr·°F / Btu (m ² K / W)	U_{floor} Btu/ft ² · hr · °F (W/m ² K)	ψ_{floor} Btu/ft ² · hr · °F (W/m ² K)
R-16.1 (2.83)	0.062 (0.35)	0.071 (0.122)
R-18.5 (3.26)	0.054 (0.31)	0.056 (0.098)
R-21.3 (3.75)	0.047 (0.27)	0.046 (0.080)
R-23.9 (4.21)	0.042 (0.24)	0.040 (0.068)

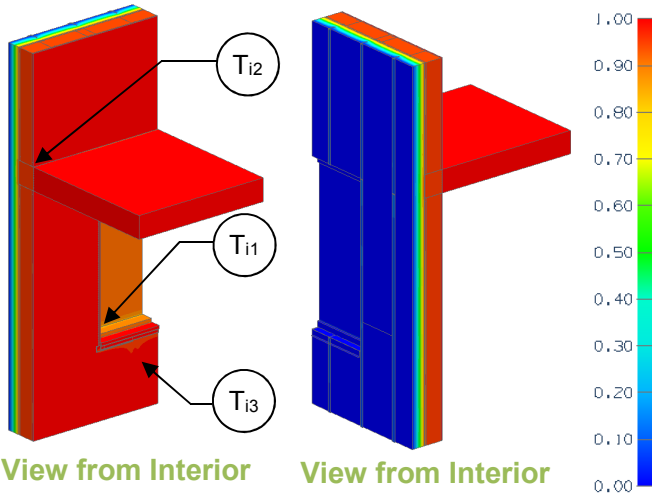
Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² 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)
R-10 (1.76)	R-7.4 (1.30)	0.135 (0.77)	0.240 (0.414)	0.073 (0.127)	0.074 (0.127)	0.110 (0.191)
R-15 (2.64)	R-7.6 (1.35)	0.131 (0.74)	0.252 (0.436)	0.079 (0.136)	0.077 (0.132)	0.118 (0.204)
R-20 (3.52)	R-7.9 (1.39)	0.127 (0.72)	0.262 (0.453)	0.083 (0.143)	0.079 (0.136)	0.123 (0.213)
R-25 (4.40)	R-8.1 (1.42)	0.124 (0.70)	0.285 (0.492)	0.086 (0.148)	0.081 (0.141)	0.129 (0.223)

Temperature Indices

	R10	R15	R20	R25	
T_{i1}	0.43	0.43	0.43	0.43	Min T on window frame, centre of window head
T_{i2}	0.74	0.80	0.82	0.84	Max T on interior surface of sheathing, along bottom track
T_{i3}	0.35	0.38	0.38	0.39	Min T on interior surface of sheathing, along window sill track

Detail 5.3.14 Exterior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Curtain Wall & Intermediate Floor Intersection with Window Thermal Break Positioned in the Exterior Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 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
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.142 (0.81)	0.199 (1.13)

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² · hr · °F (W/m ² K)
R-10 (1.76)	R-13.2 (2.32)	R-11.2 (1.97)	0.090 (0.51)
R-15 (2.64)	R-18.2 (3.20)	R-13.9 (2.45)	0.072 (0.41)
R-20 (3.52)	R-23.2 (4.08)	R-16.9 (2.98)	0.059 (0.34)
R-25 (4.40)	R-28.2 (4.96)	R-19.7 (3.48)	0.051 (0.29)

Intermediate Floor Linear Transmittance

R_{floor} ft ² ·hr·°F / Btu (m ² K / W)	U_{floor} Btu/ft ² · hr · °F (W/m ² K)	Ψ_{floor} Btu/ft ² · hr · °F (W/m ² K)
R-10.6 (1.88)	0.094 (0.53)	0.030 (0.052)
R-13.2 (2.32)	0.076 (0.43)	0.029 (0.051)
R-15.9 (2.81)	0.063 (0.36)	0.026 (0.045)
R-18.5 (3.27)	0.054 (0.31)	0.023 (0.040)

Window Transition Transmittance

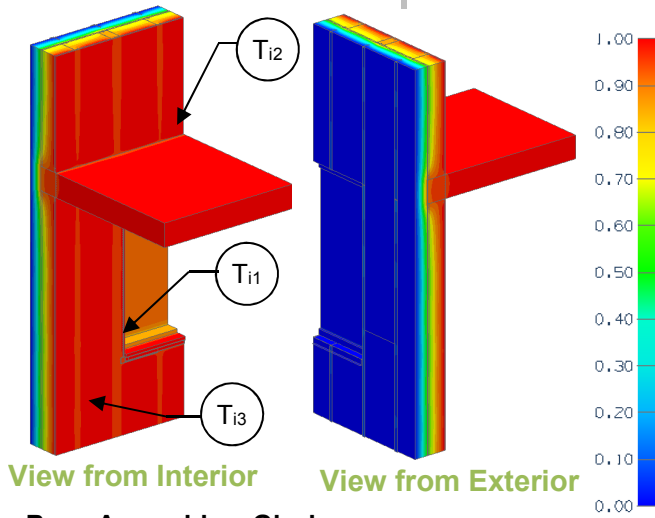
Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² K)	Ψ_{Head} Btu/ft · hr · °F (W/m K)	Ψ_{Sill} Btu/ft · hr · °F (W/m K)	Ψ_{Jamb} Btu/ft · hr · °F (W/m K)	Ψ_{Total} Btu/ft · hr · °F (W/m K)
R-10 (1.76)	R-8.1 (1.43)	0.123 (0.70)	0.041 (0.071)	0.013 (0.023)	0.035 (0.060)	0.029 (0.050)
R-15 (2.64)	R-9.1 (1.60)	0.110 (0.62)	0.043 (0.074)	0.026 (0.044)	0.040 (0.069)	0.033 (0.058)
R-20 (3.52)	R-9.9 (1.74)	0.101 (0.58)	0.047 (0.082)	0.033 (0.058)	0.044 (0.077)	0.042 (0.072)
R-25 (4.40)	R-10.5 (1.85)	0.095 (0.54)	0.052 (0.090)	0.035 (0.061)	0.046 (0.080)	0.047 (0.081)

Temperature Indices

	R10	R15	R20	R25	
T_{i1}	0.77	0.77	0.77	0.78	Min T on window frame, at bottom corner at edge of glass
T_{i2}	0.85	0.88	0.90	0.91	Max T on interior surface of sheathing, along bottom track
T_{i3}	0.73	0.74	0.76	0.77	Min T on interior surface of sheathing, at bracket

Detail 5.3.15

Exterior and Interior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Curtain Wall & Intermediate Floor Intersection with Window Thermal Break Positioned in the Exterior Insulation



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
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.142 (0.81)	0.199 (1.13)

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² · hr · °F (W/m ² K)
R-10 (1.76)	R-31.3 (5.51)	R-19.2 (3.38)	0.052 (0.30)
R-15 (2.64)	R-36.3 (6.39)	R-21.8 (3.83)	0.046 (0.26)
R-20 (3.52)	R-41.3 (7.28)	R-24.8 (4.37)	0.040 (0.23)
R-25 (4.40)	R-46.3 (8.15)	R-27.6 (4.86)	0.036 (0.21)

Intermediate Floor Linear Transmittance

R_{floor} ft ² ·hr·°F / Btu (m ² K / W)	U_{floor} Btu/ft ² · hr · °F (W/m ² K)	Ψ_{floor} Btu/ft ² · hr · °F (W/m ² K)
R-16.1 (2.83)	0.062 (0.35)	0.071 (0.122)
R-18.5 (3.26)	0.054 (0.31)	0.056 (0.098)
R-21.3 (3.75)	0.047 (0.27)	0.046 (0.080)
R-23.9 (4.21)	0.042 (0.24)	0.040 (0.068)

Window Transition Transmittance

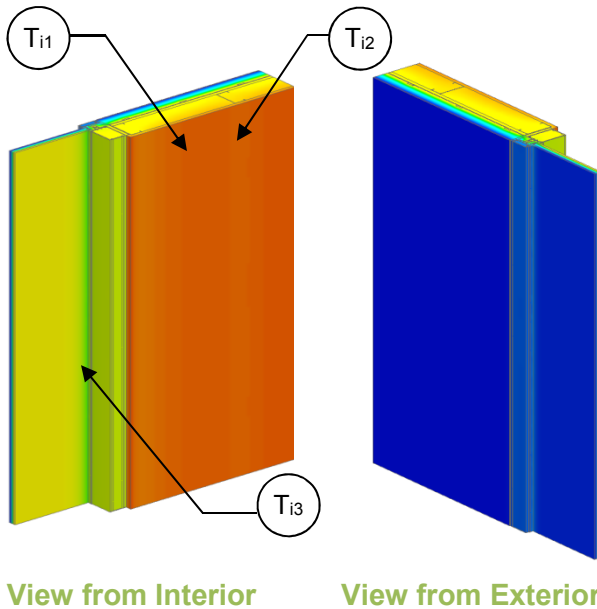
Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² K)	Ψ_{Head} Btu/ft · hr · °F (W/m K)	Ψ_{Sill} Btu/ft · hr · °F (W/m K)	Ψ_{Jamb} Btu/ft · hr · °F (W/m K)	Ψ_{Total} Btu/ft · hr · °F (W/m K)
R-10 (1.76)	R-8.1 (1.43)	0.123 (0.70)	0.036 (0.063)	0.028 (0.048)	0.046 (0.080)	0.042 (0.073)
R-15 (2.64)	R-9.1 (1.60)	0.110 (0.62)	0.040 (0.069)	0.031 (0.053)	0.047 (0.081)	0.043 (0.074)
R-20 (3.52)	R-9.9 (1.74)	0.101 (0.58)	0.044 (0.076)	0.033 (0.058)	0.048 (0.083)	0.047 (0.082)
R-25 (4.40)	R-10.5 (1.85)	0.095 (0.54)	0.048 (0.083)	0.033 (0.058)	0.047 (0.082)	0.050 (0.086)

Temperature Indices

	R10	R15	R20	R25	
T_{i1}	0.76	0.76	0.76	0.75	Min T on window frame, at bottom corner at edge of glass
T_{i2}	0.76	0.79	0.82	0.84	Max T on interior surface of sheathing, along bottom track
T_{i3}	0.41	0.44	0.48	0.51	Min T on interior surface of sheathing, between studs

Detail 5.4.1

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Conventional Curtain Wall Transition



Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-2.7 (0.47 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td>U_g, U_w, R_w</td> <td>"clear wall" U- and R-value for: g = curtain wall glazing w = steel stud assembly</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U, R</td> <td>U- and R-values for overall assembly</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td>Ψ</td> <td>Incremental increase in transmittance per linear length of curtain wall transition</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R _{1D}	R-2.7 (0.47 RSI) + exterior insulation	Transmittance / Resistance without Anomaly	U _g , U _w , R _w	"clear wall" U- and R-value for: g = curtain wall glazing w = steel stud assembly	Transmittance / Resistance	U, R	U- and R-values for overall assembly	Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature	Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of curtain wall transition	0.90
Assembly 1D (Nominal) R-Value		R _{1D}	R-2.7 (0.47 RSI) + exterior insulation														
Transmittance / Resistance without Anomaly		U _g , U _w , R _w	"clear wall" U- and R-value for: g = curtain wall glazing w = steel stud assembly														
Transmittance / Resistance		U, R	U- and R-values for overall assembly														
Surface Temperature Index ¹		T _i	0 = exterior temperature 1 = interior temperature														
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of curtain wall transition															
0.80	0.80																
0.70	0.70																
0.60	0.60																
0.50	0.50																
0.40	0.40																
0.30	0.30																
0.20	0.20																
0.10	0.10																
0.00	0.00																

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _w ft ² ·hr·°F / Btu (m ² K / W)	U _w Btu/ft ² ·hr ·°F (W/m ² K)
R-7.5 (1.32)	R-10.2 (1.80)	R-10.0 (1.76)	0.100 (0.57)
R-11.3 (1.98)	R-13.9 (2.46)	R-13.7 (2.41)	0.073 (0.41)
R-15 (2.64)	R-17.7 (3.12)	R-17.4 (3.06)	0.057 (0.33)

Base Assembly – Curtain Wall Glazing

U _{centre of glazing} Btu/ft ² ·hr ·°F (W/m ² K)	U _g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.476 (2.7)

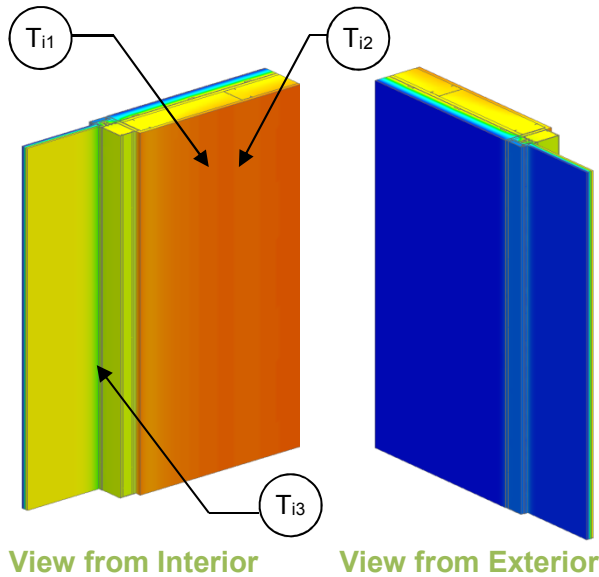
Curtain Wall Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	Ψ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-4.0 (0.70)	0.250 (1.42)	0.045 (0.079)
R-11.3 (1.98)	R-4.3 (0.75)	0.234 (1.33)	0.049 (0.084)
R-15 (2.64)	R-4.4 (0.78)	0.225 (1.28)	0.051 (0.088)

Temperature Indices

	R7.5	R11.3	R15	
T _{i1}	0.62	0.64	0.65	Min T on sheathing, between studs
T _{i2}	0.81	0.86	0.89	Max T on sheathing, along studs
T _{i3}	0.56	0.56	0.57	Min T on frame, at edge of frame at glass

Detail 5.4.2 Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Conventional Curtain Wall Transition



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U _g , U _w , R _w	"clear wall" U- and R-value for: g = curtain wall glazing w = steel stud assembly
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of curtain wall transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _w ft ² ·hr·°F / Btu (m ² K / W)	U _w Btu/ft ² ·hr ·°F (W/m ² K)
R-7.5 (1.32)	R-21.7 (3.83)	R-16.6 (2.93)	0.060 (0.34)
R-15 (2.64)	R-29.2 (5.15)	R-24.0 (4.23)	0.042 (0.24)

Base Assembly – Curtain Wall Glazing

U _{centre of glazing} Btu/ft ² ·hr ·°F (W/m ² K)	U _g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.476 (2.7)

Curtain Wall Transition Linear Transmittance

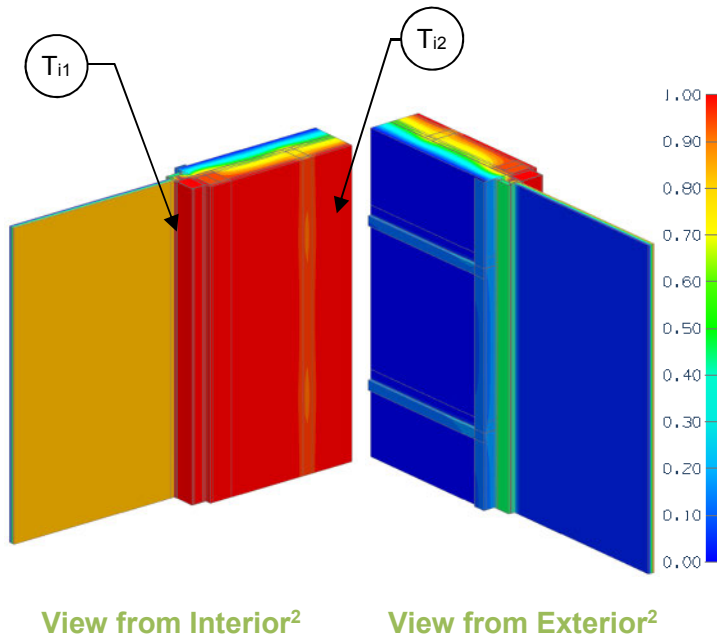
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	Ψ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-4.5 (0.79)	0.224 (1.27)	0.043 (0.074)
R-15 (2.64)	R-4.7 (0.83)	0.211 (1.20)	0.039 (0.067)

Temperature Indices

	R7.5	R15	
T _{i1}	0.40	0.57	Min T on sheathing, between studs
T _{i2}	0.66	0.77	Max T on sheathing, along studs
T _{i3}	0.55	0.56	Min T on frame, at edge of frame at glass

Detail 5.4.3

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly – Curtain Wall Transition



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-13.9 (2.46 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_g, U_w, R_w	"clear wall" U- and R-value for: g = curtain wall glazing w = steel stud assembly
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of curtain wall transition

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

²Thermal image shown is for the Aerogel detail

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-28.9 (5.09)	R-18.3 (3.23)	0.054 (0.31)

Base Assembly – Curtain Wall Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.429 (2.44)

Curtain Wall Transition Linear Transmittance

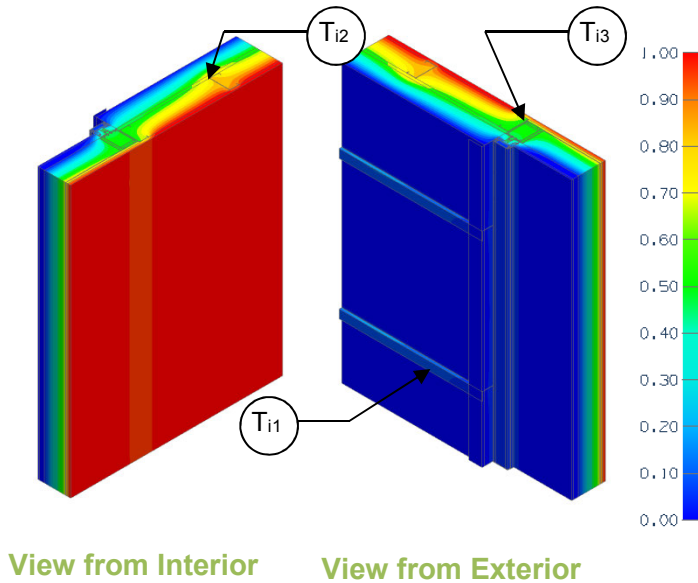
Curtain Wall Transition	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
Conventional	R-3.8 (0.67)	0.262 (1.49)	0.069 (0.12)
Aerogel	R-3.8 (0.68)	0.260 (1.48)	0.019 (0.03)

Temperature Indices

	Conventional	Aerogel	
T_{i1}	0.32	0.33	Min T on glazing, along edge of glass
T_{i2}	0.77	0.77	Min T on sheathing, along Z-girts

Detail 5.4.4

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Conventional Curtain Wall Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}, R_{1Dcw}	Nominal thermal resistance of two base assemblies: w = wall cw = curtain wall
Transmittance / Resistance without Anomaly	$U_{ow}, R_{ow}, U_{ocw}, R_{ocw}$	“clear wall” U- and R-value for the two base assemblies
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of transition joint

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_{ow} ft ² ·hr·°F / Btu (m ² K / W)	U_{ow} Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-19.2 (3.38)	R-13.4 (2.36)	0.075 (0.42)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)
R-25 (4.40)	R-39.2 (6.90)	R-22.1 (3.90)	0.045 (0.26)

Base Assembly – Curtain Wall Spandrel

R_{1Dcw}^2 ft ² ·hr·°F / Btu (m ² K / W)	R_{ocw} ft ² ·hr·°F / Btu (m ² K / W)	U_{ocw} Btu/ft ² ·hr·°F (W/m ² K)
R-18.3 (3.22)	R-4.4 (0.78)	0.226 (1.29)

Transition Joint Linear Transmittance

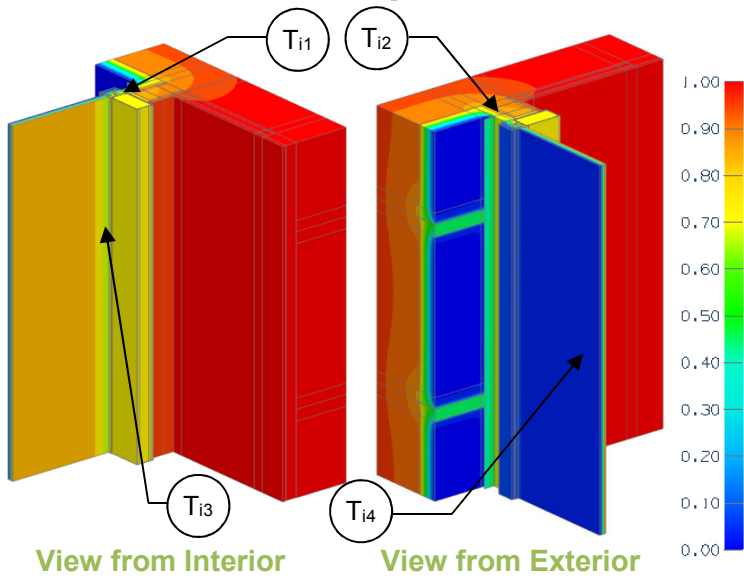
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-6.5 (1.14)	0.154 (0.88)	0.088 (0.151)
R-15 (2.64)	R-7.1 (1.25)	0.140 (0.80)	0.088 (0.151)
R-25 (4.40)	R-7.4 (1.30)	0.135 (0.77)	0.089 (0.155)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.19	0.26	0.32	Min T on sheathing, along girt between studs, close to curtain wall
T_{i2}	0.66	0.78	0.82	Max T on sheathing, at studs, between z girts, away from curtain wall
T_{i3}	0.52	0.53	0.54	Min T on air cavity behind curtain wall, at mullion panel

Detail 5.4.5

Exterior Insulated Concrete Wall and Steel Stud Assembly Supporting Metal Cladding– Curtain Wall Transition Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}	R-1.9 (0.33 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_g, U_w, R_w	“clear wall” U- and R-values for: g = curtain wall glazing w = concrete wall and steel stud assembly
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of inside corner

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Exterior Insulated Concrete Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-16.9 (2.98)	R-9.5 (1.67)	0.105 (0.60)
R-20 (3.52)	R-21.9 (3.86)	R-10.9 (1.92)	0.092 (0.52)
R-25 (4.40)	R-26.9 (4.74)	R-12.0 (2.11)	0.083 (0.47)

Base Assembly – Curtain Wall Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.305 (1.73)	0.441 (2.51)

Corner Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-15 (2.64)	R-2.5 (0.44)	0.396 (2.25)	0.140 (0.242)
R-20 (3.52)	R-2.6 (0.45)	0.389 (2.21)	0.134 (0.232)
R-25 (4.40)	R-2.6 (0.46)	0.383 (2.18)	0.127 (0.220)

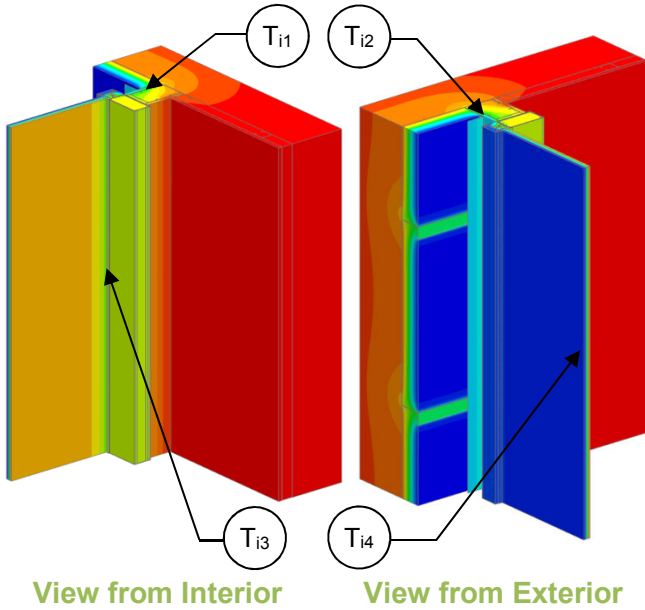
Temperature Indices

	R15	R20	R25	
T_{i1}	0.70	0.70	0.71	Min T on sheathing, along jamb
T_{i2}	0.83	0.85	0.86	Max T on sheathing, between studs
T_{i3}	0.65	0.65	0.65	Min T on jamb, along glazing
T_{i4}	0.65	0.65	0.65	Min T on glazing, centre of glazing

Detail 5.4.6

Exterior Insulated Concrete Wall and Steel Stud Assembly Supporting Metal Cladding with Cavity Insulation– Curtain Wall Transition Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1Dw}	R-1.9 (0.33 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_g,$ $U_w,$ R_w	“clear wall” U- and R-values for: g = curtain wall glazing w = concrete wall and steel stud assembly
Transmittance / Resistance	$U,$ R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of inside corner

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Exterior Insulated Concrete Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-16.9 (2.98)	R-9.5 (1.67)	0.105 (0.60)
R-20 (3.52)	R-21.9 (3.86)	R-10.9 (1.92)	0.092 (0.52)
R-25 (4.40)	R-26.9 (4.74)	R-12.0 (2.11)	0.083 (0.47)

Base Assembly – Curtain Wall Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.305 (1.73)	0.441 (2.51)

Corner Linear Transmittance

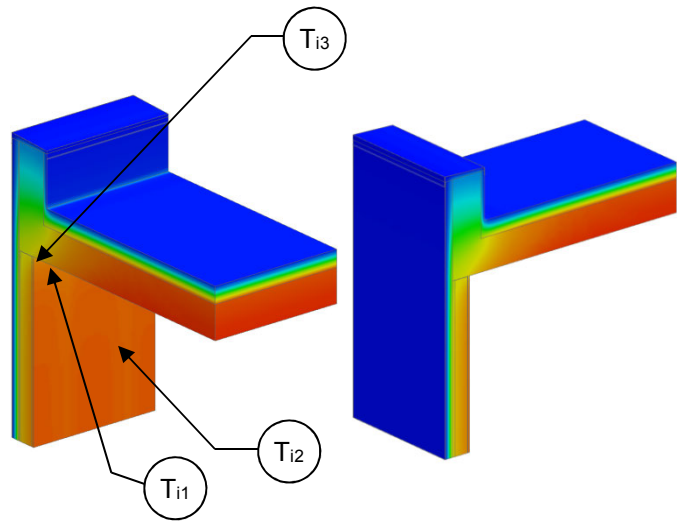
Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-15 (2.64)	R-2.3 (0.40)	0.438 (2.49)	0.234 (0.404)
R-20 (3.52)	R-2.4 (0.42)	0.421 (2.39)	0.204 (0.353)
R-25 (4.40)	R-2.5 (0.44)	0.403 (2.29)	0.171 (0.296)

Temperature Indices

	R15	R20	R25	
T_{i1}	0.49	0.53	0.59	Min T on sheathing, between studs
T_{i2}	0.74	0.77	0.81	Max T on sheathing, beside concrete wall
T_{i3}	0.62	0.63	0.63	Min T on jamb, along glazing
T_{i4}	0.62	0.63	0.63	Min T on centre of glazing

Detail 5.5.1

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	"clear field" U- and R-values for: r = roof w = wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-7.5 (1.32)	R-10.2 (1.80)	R-10.0 (1.76)	0.100 (0.57)
R-11.3 (1.98)	R-13.9 (2.46)	R-13.7 (2.41)	0.073 (0.41)
R-15 (2.64)	R-17.7 (3.12)	R-17.4 (3.06)	0.057 (0.33)

Base Assembly – Roof

Roof Insulation 1DR-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

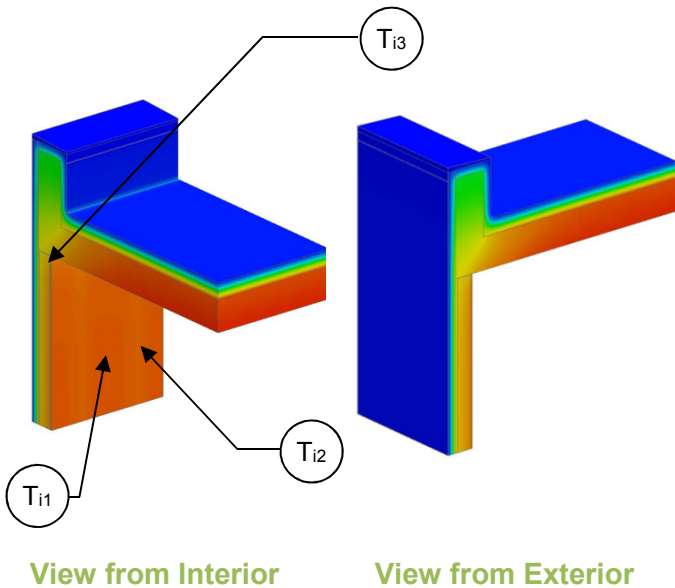
Parapet Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-6.5 (1.14)	0.155 (0.88)	0.295 (0.511)
R-11.3 (1.98)	R-7.5 (1.31)	0.134 (0.76)	0.273 (0.472)
R-15 (2.64)	R-8.1 (1.43)	0.123 (0.70)	0.263 (0.456)

Temperature Indices

	R7.5	R11.3	R15	
T_{i1}	0.71	0.74	0.76	Min T on sheathing, at roof slab
T_{i2}	0.82	0.87	0.89	Max T on sheathing, along steel studs away from slab
T_{i3}	0.77	0.79	0.81	Min T on concrete ceiling, at drywall intersection, exposed to interior air

Detail 5.5.2 Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r , R_r , U_w , R_w	“clear field” U- and R-values for: r = roof w = wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-7.5 (1.32)	R-10.2 (1.80)	R-10.0 (1.76)	0.100 (0.57)
R-11.3 (1.98)	R-13.9 (2.46)	R-13.7 (2.41)	0.073 (0.41)
R-15 (2.64)	R-17.7 (3.12)	R-17.4 (3.06)	0.057 (0.33)

Base Assembly - Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-7.1 (1.24)	0.141 (0.80)	0.220 (0.380)
R-11.3 (1.98)	R-8.7 (1.53)	0.115 (0.66)	0.168 (0.291)
R-15 (2.64)	R-10.0 (1.76)	0.100 (0.57)	0.138 (0.238)

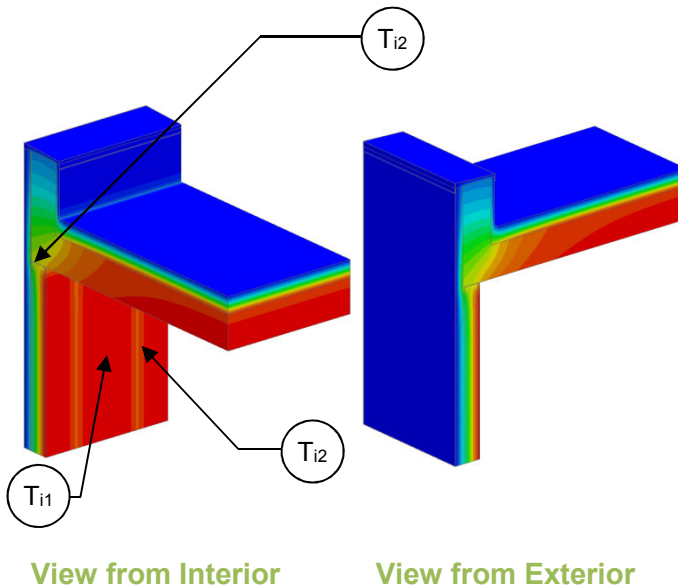
Temperature Indices

	R7.5	R11.3	R15	
T_{i1}	0.75	0.81	0.84	Min T on sheathing, along roof slab
T_{i2}	0.82	0.87	0.89	Max T on sheathing, along steel studs away from slab
T_{i3}	0.81	0.85	0.87	Min T on concrete ceiling, at drywall intersection, exposed to interior air

Detail 5.5.3

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1Dw}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	"clear field" U- and R-values for: r = roof w = wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-7.5 (1.32)	R-21.7 (3.83)	R-16.6 (2.93)	0.060 (0.34)
R-15 (2.64)	R-29.2 (5.15)	R-24 (4.23)	0.042 (0.24)

Base Assembly - Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

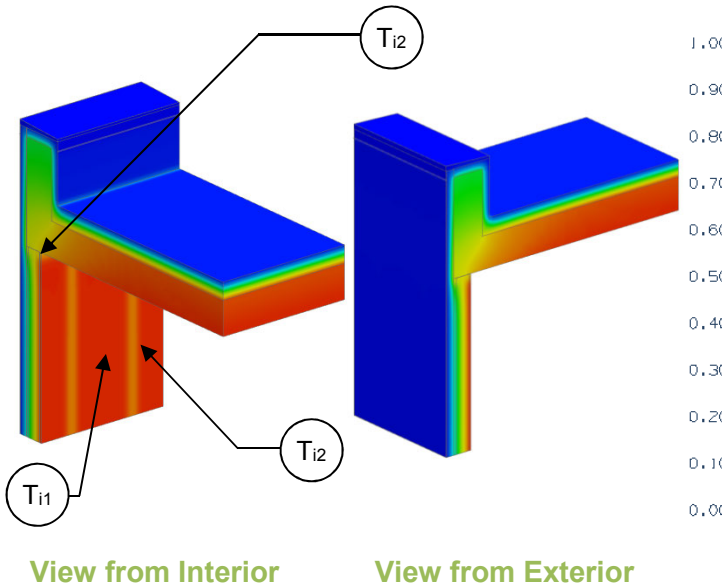
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-7.7 (1.35)	0.130 (0.74)	0.297 (0.514)
R-15 (2.64)	R-8.9 (1.57)	0.112 (0.64)	0.260 (0.451)

Temperature Indices

	R7.5	R15	
T_{i1}	0.41	0.58	Min T on sheathing, between studs
T_{i2}	0.68	0.77	Max T on sheathing, along steel studs
T_{i3}	0.75	0.78	Min T on concrete ceiling, at drywall intersection, exposed to interior air

Detail 5.5.4

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_{or}, R_{or}, U_{ow}, R_{ow}$	“clear field” U- and R-values for: r = roof w = wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-7.5 (1.32)	R-21.7 (3.83)	R-16.6 (2.93)	0.060 (0.34)
R-15 (2.64)	R-29.2 (5.15)	R-24.0 (4.23)	0.042 (0.24)

Base Assembly - Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-8.5 (1.50)	0.118 (0.67)	0.225 (0.390)
R-15 (2.64)	R-10.1 (1.78)	0.099 (0.56)	0.186 (0.323)

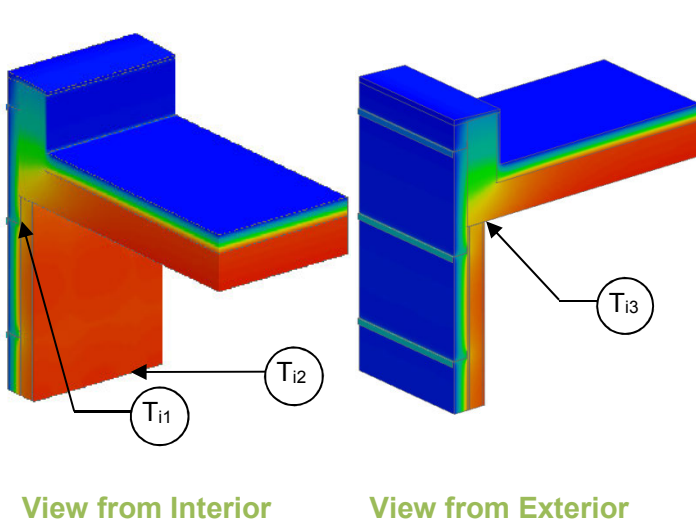
Temperature Indices

	R7.5	R15	
T_{i1}	0.41	0.51	Min T on sheathing, between studs
T_{i2}	0.72	0.78	Max T on sheathing, along steel studs
T_{i3}	0.75	0.84	Min T on concrete ceiling, at drywall intersection, exposed to interior air

Detail 5.5.5

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Concrete Parapet & Slab Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1Dw}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear field” U- and R-values for two base assemblies: r = insulated roof w = steel stud wall assembly with horizontal z girts
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-8.2 (1.44)	R-6.8 (1.21)	0.146 (0.83)
R-10 (1.76)	R-13.2 (2.32)	R-9.4 (1.66)	0.106 (0.60)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)
R-20 (3.52)	R-23.2 (4.08)	R-13.1 (2.31)	0.076 (0.43)
R-25 (4.40)	R-28.2 (4.96)	R-14.5 (2.56)	0.069 (0.39)

Base Assembly - Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-8.0 (1.40)	0.125 (0.71)	0.313 (0.541)
R-10 (1.76)	R-9.5 (1.67)	0.105 (0.60)	0.284 (0.491)
R-15 (2.64)	R-10.4 (1.83)	0.096 (0.55)	0.271 (0.468)
R-20 (3.52)	R-11.0 (1.94)	0.091 (0.52)	0.266 (0.460)
R-25 (4.40)	R-11.5 (2.02)	0.087 (0.49)	0.261 (0.452)

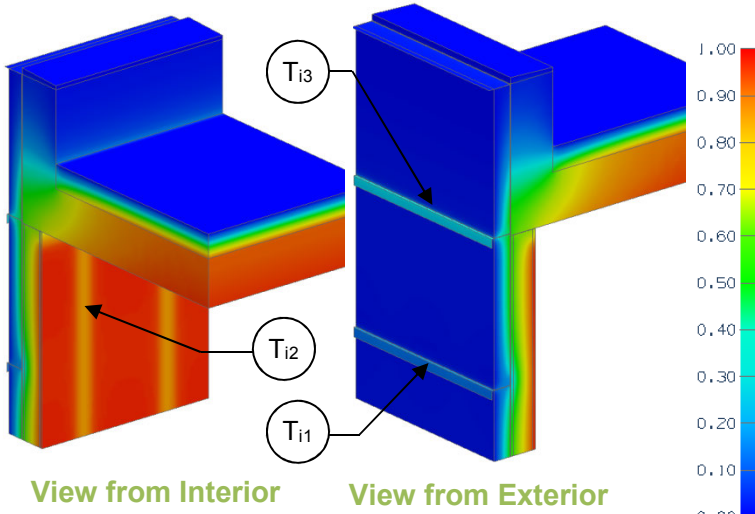
Temperature Indices

	R5	R10	R15	R20	R25	
T_{i1}	0.62	0.68	0.71	0.73	0.75	Min T on sheathing, along girt between studs, close to ceiling
T_{i2}	0.75	0.83	0.86	0.88	0.90	Max T on sheathing, at studs, away from ceiling
T_{i3}	0.74	0.77	0.79	0.80	0.80	Min T on ceiling, at gypsum and studs

Detail 5.5.6

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Concrete Parapet and Slab Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1Dw}	R-14.2 (2.50 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	"clear field" U- and R-values for: r = insulated roof w = steel stud wall assembly with horizontal z girts
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – External Insulated Steel Stud Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-24.2 (4.26)	R-16.3 (2.87)	0.061 (0.35)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-7.9 (1.39)	0.127 (0.72)	0.448 (0.776)
R-15 (2.64)	R-8.2 (1.44)	0.122 (0.70)	0.444 (0.768)

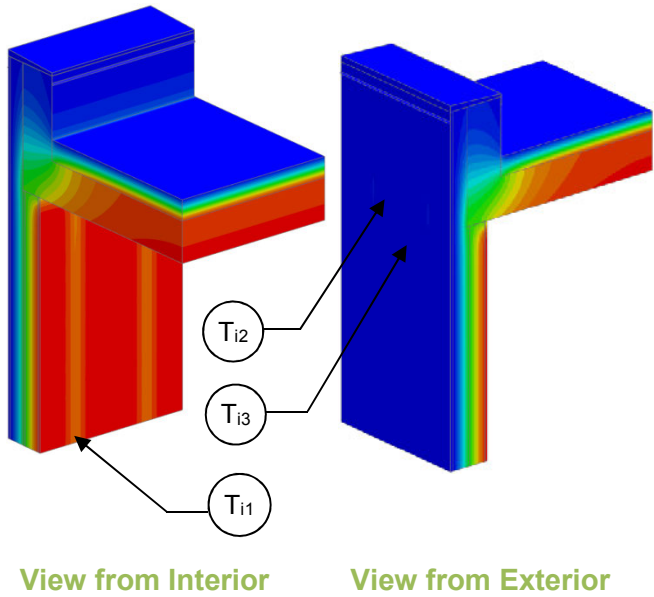
Temperature Indices

	R10	R15	
T_{i1}	0.30	0.34	Min T on sheathing, along girt between studs away from ceiling
T_{i2}	0.62	0.65	Max T on sheathing, at studs, between girts
T_{i3}	0.51	0.55	Min T on ceiling, at exterior gypsum between studs

Detail 5.5.7

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z Girts (16" o.c.) Supporting Stucco Cladding –Concrete Parapet & Slab Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1Dw}	R-14.5 (2.55 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	"clear field" U- and R-values for two base assemblies: r = insulated roof w = steel stud wall assembly with horizontal z girts
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-24.5 (4.31)	R-13.0 (2.29)	0.077 (0.44)
R-15 (2.64)	R-29.5 (5.20)	R-14.1 (2.49)	0.071 (0.40)

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

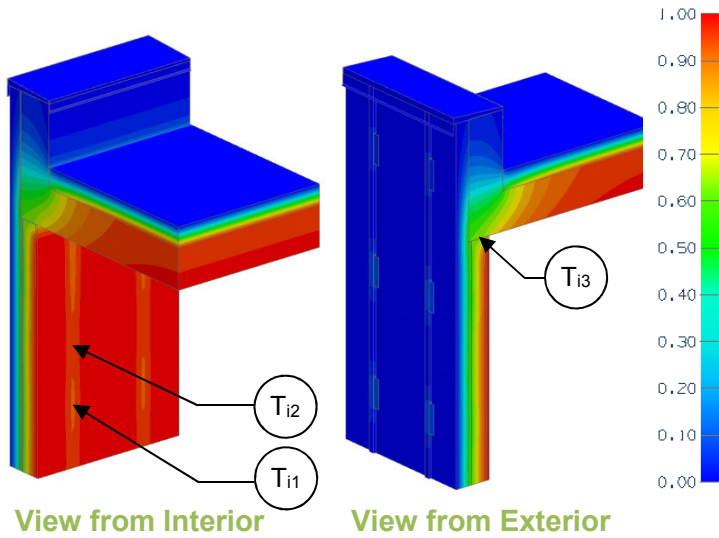
Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-7.8 (1.37)	0.129 (0.73)	0.454 (0.785)
R-15 (2.64)	R-8.1 (1.42)	0.124 (0.70)	0.445 (0.770)

Temperature Indices

	R10	R15	
T_{i1}	0.39	0.44	Min T on sheathing, along studs, away from ceiling
T_{i2}	0.55	0.56	Max T on sheathing, along track, behind braces
T_{i3}	0.64	0.65	Min T on ceiling, at gypsum and studs

Detail 5.5.8

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z Girts (16" o.c.) Supporting Metal Cladding –Concrete Roof Deck at Continuous Concrete Parapet



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.4 (2.54 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear field” U- and R-values for two base assemblies: r = insulated roof w = steel stud wall assembly with horizontal z girts
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-29.4 (5.18)	R-18.9 (3.33)	0.053 (0.30)

Base Assembly - Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

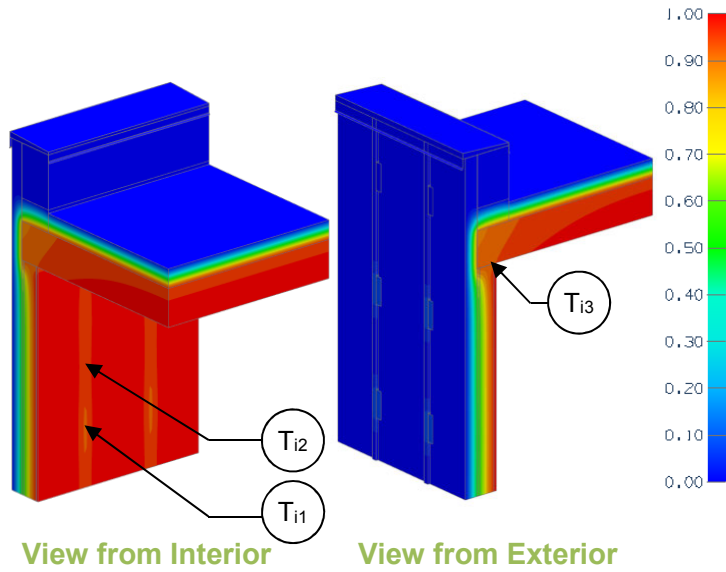
Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-9.6 (1.69)	0.104 (0.59)	0.396 (0.686)

Temperature Indices

T_{i1}	0.52	Min T on sheathing away from roof slab, at clip
T_{i2}	0.72	Max T on sheathing away from roof slab, between clips at stud
T_{i3}	0.69	Min T on roof slab exposed to interior air, at gypsum between studs

Detail 5.5.9

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z Girts (16" o.c.) Supporting Metal Cladding –Concrete Roof Deck at Isokorb AXT1 Thermally Broken Concrete Parapet



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	"clear field" U- and R-values for: r = insulated roof w = steel stud wall assembly with horizontal z girts
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-29.3 (5.16)	R-18.9 (3.33)	0.053 (0.30)

Base Assembly - Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

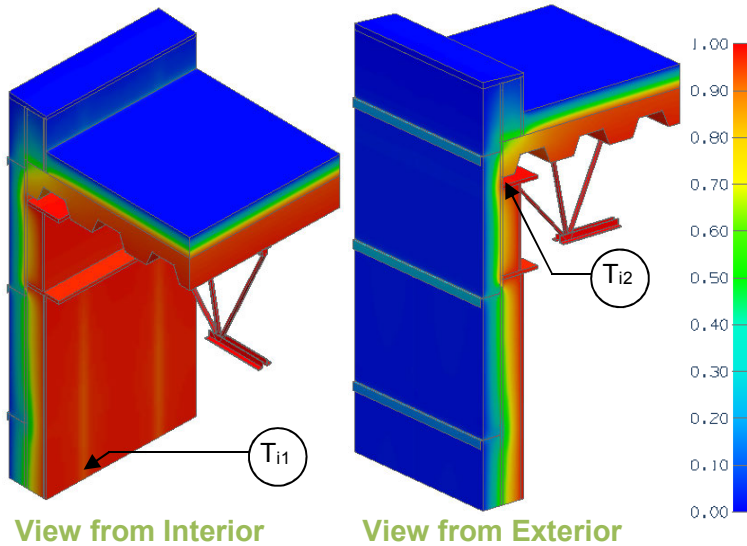
Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-17.4 (3.06)	0.058 (0.33)	0.058 (0.100)

Temperature Indices

T_{i1}	0.52	Min T on sheathing away from roof slab, at clip
T_{i2}	0.72	Max T on sheathing away from roof slab, between clips at stud
T_{i3}	0.90	Min T on roof slab exposed to interior air, at gypsum between studs

Detail 5.5.10

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}	R-14.2 (2.50 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	"clear field" U- and R-values for: r = insulated roof w = steel stud wall assembly with horizontal z girts
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-19.2 (3.38)	R-13.4 (2.36)	0.075 (0.42)
R-10 (1.76)	R-24.2 (4.26)	R-16.3 (2.87)	0.061 (0.35)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)
R-20 (3.52)	R-34.2 (6.02)	R-20.5 (3.61)	0.049 (0.28)
R-25 (4.40)	R-39.2 (6.90)	R-22.1 (3.90)	0.045 (0.26)

Base Assembly - Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

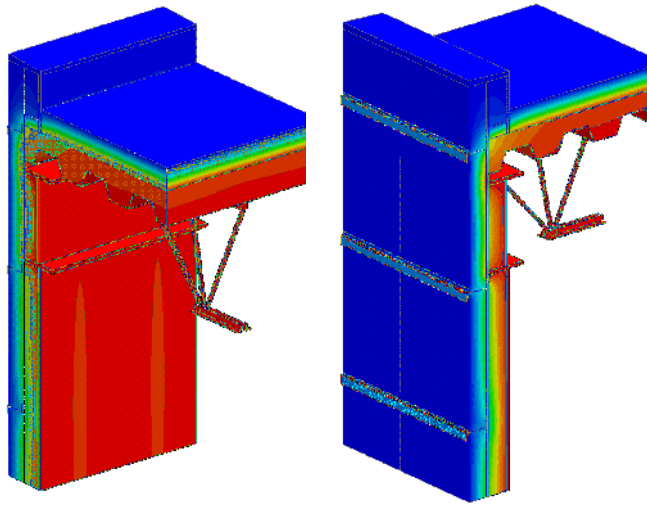
Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-9.8 (1.73)	0.102 (0.58)	0.289 (0.500)
R-10 (1.76)	R-11.7 (2.05)	0.086 (0.49)	0.227 (0.393)
R-15 (2.64)	R-12.8 (2.26)	0.078 (0.44)	0.201 (0.348)
R-20 (3.52)	R-13.7 (2.41)	0.073 (0.41)	0.187 (0.324)
R-25 (4.40)	R-14.5 (2.54)	0.069 (0.39)	0.176 (0.304)

Temperature Indices

	R5	R10	R15	R20	R25	
T_{i1}	0.27	0.35	0.41	0.45	0.48	Min T on sheathing, along studs between girts
T_{i2}	0.80	0.84	0.96	0.96	0.97	Min T on interior surfaces, at sheathing, away from joist

Detail 5.5.11

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection with Thermal Break under Parapet Stud Cavity



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}	R-14.2 (2.50 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear field” U- and R-values for: r = insulated roof w = steel stud wall assembly with horizontal z girts
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)

Base Assembly - Roof

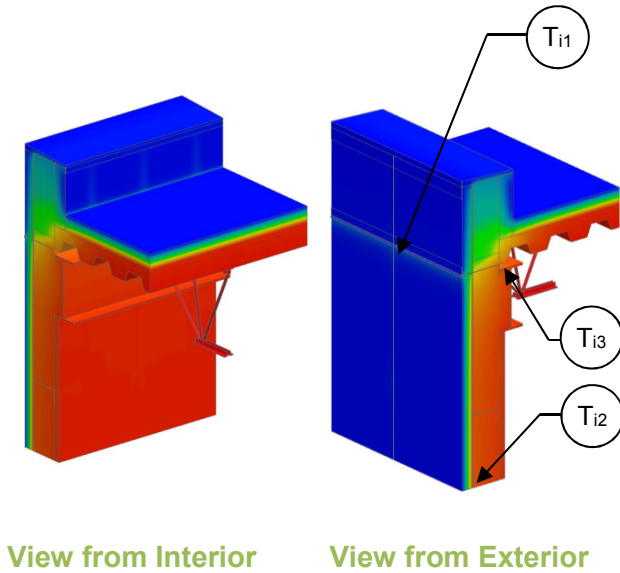
Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-14.0 (2.47)	0.071 (0.39)	0.151 (0.260)

Detail 5.5.12 Vertical Insulated Metal Panel - Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R _{1D}	R-2.2 (0.39 RSI) + exterior insulation
Transmittance / Resistance without anomalies	U _r , R _r , U _w , R _w	"clear field" U- and R-values for: r = insulated roof w = steel stud wall assembly with horizontal z girts
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Insulated Panel 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _w ft ² ·hr·°F / Btu (m ² K / W)	U _w Btu/ft ² ·hr ·°F (W/m ² K)
R-21.0 (3.70)	R-23.2 (4.09)	R-21.4 (3.80)	0.047 (0.27)

Base Assembly - Roof

Roof Exterior Insulation 1D R-Value (RSI)	R _r ft ² ·hr·°F / Btu (m ² K / W)	U _r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Transmittance

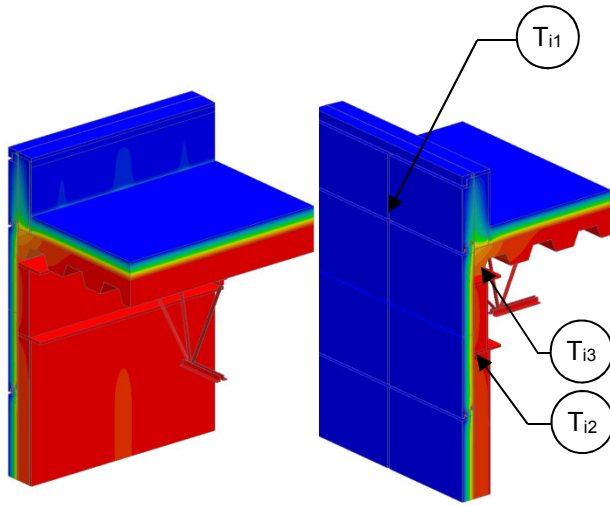
Insulated Panel 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-21.0 (3.70)	R-9.5 (1.68)	0.105 (0.60)	0.283 (0.489)

Temperature Indices

T _{i1}	0.71	Min T on interior panel face, at bolts, underneath support girt and semi-rigid insulation
T _{i2}	0.91	Max T on interior panel face, away from roof and joints
T _{i3}	0.84	Min T on interior surfaces, at roof and joist

Detail 5.5.13 Horizontal Insulated Metal Panel - Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

Thermal Performance Indicators



View from Interior View from Exterior

Assembly 1D (Nominal) R-Value	R_{1Dw}	R-2.2 (0.39 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear field” U- and R-values for: r = insulated roof w = steel stud wall assembly with horizontal z girts
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Insulated Panel 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-21.0 (3.70)	R-23.2 (4.09)	R-19.5 (3.43)	0.052 (0.29)

Base Assembly - Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

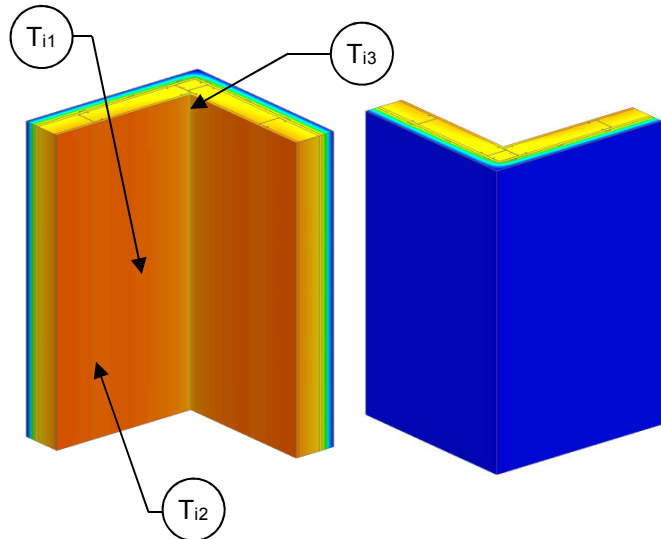
Parapet Transmittance

Insulated Panel 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-21.0 (3.70)	R-11.6 (2.04)	0.087 (0.49)	0.237 (0.410)

Temperature Indices

T_{i1}	0.52	Min T on interior panel face, at bolts and slab
T_{i2}	0.95	Max T on interior panel face, at I-Beam
T_{i3}	0.87	Min T on interior surfaces, on corrugated roof, near wall

Detail 5.6.1 Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Corner Intersection



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without corner
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of corner

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

Nominal (1D) vs. Assembly Performance Indicators

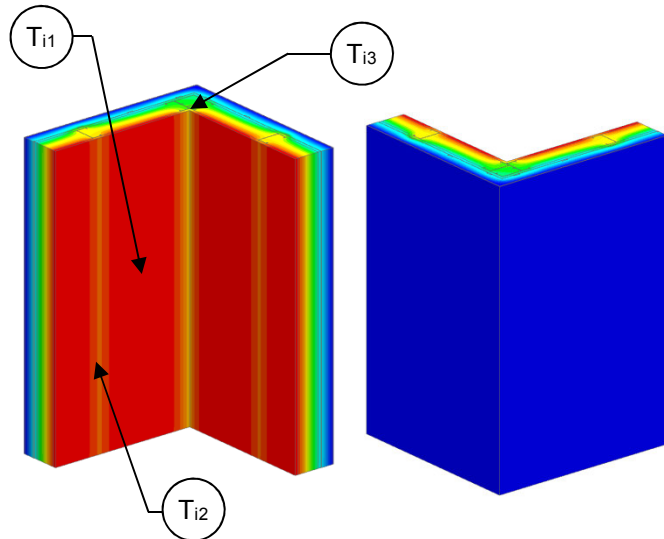
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-10.2 (1.80)	R-10.0 (1.76)	0.100 (0.57)	R-8.7 (1.53)	0.120 (0.65)	0.060 (0.105)
R-11.3 (1.98)	R-13.9 (2.46)	R-13.7 (2.41)	0.073 (0.41)	R-11.7 (2.05)	0.090 (0.49)	0.051 (0.088)
R-15 (2.64)	R-17.7 (3.12)	R-17.4 (3.06)	0.057 (0.33)	R-14.6 (2.57)	0.070 (0.39)	0.044 (0.076)

Temperature Indices

	R7.5	R11.3	R15	
T_{i1}	0.64	0.71	0.76	Min T on sheathing, between studs
T_{i2}	0.81	0.86	0.89	Max T on sheathing, along studs away from corner
T_{i3}	0.83	0.87	0.90	Min T on drywall, at corner

Detail 5.6.2

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Corner Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without corner
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of corner

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

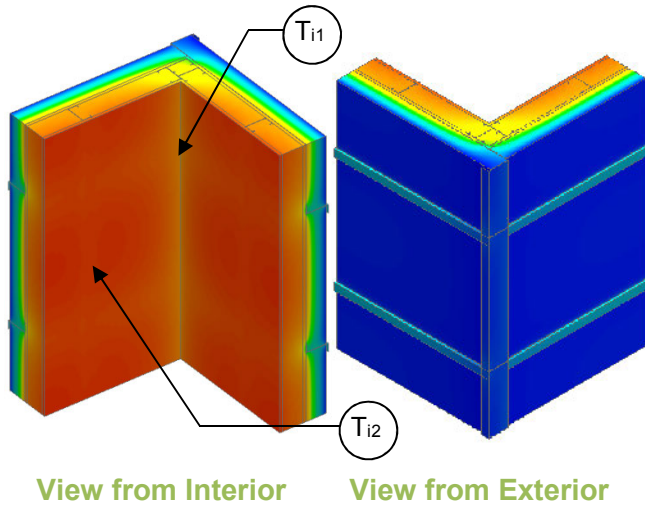
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-21.7 (3.83)	R-16.6 (2.93)	0.060 (0.34)	R-14.3 (2.52)	0.07 (0.40)	0.039 (0.067)
R-15 (2.64)	R-29.2 (5.15)	R-24.0 (4.23)	0.042 (0.24)	R-20.2 (3.56)	0.05 (0.28)	0.031 (0.054)

Temperature Indices

	R7.5	R15	
T_{i1}	0.39	0.56	Min T on sheathing, between studs
T_{i2}	0.66	0.77	Max T on sheathing, along studs away from corner
T_{i3}	0.75	0.81	Min T on drywall, at corner

Detail 5.6.3

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Corner Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without corner
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of corner

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

Nominal (1D) vs. Assembly Performance Indicators

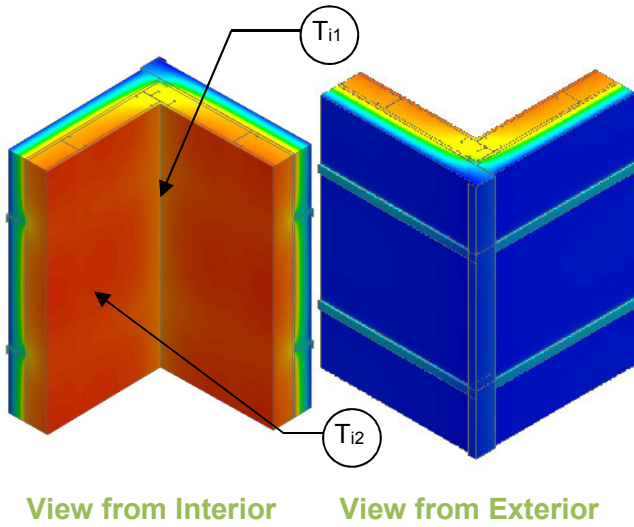
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-8.2 (1.44)	R-6.8 (1.21)	0.146 (0.83)	R-5.9 (1.04)	0.169 (0.96)	0.092 (0.160)
R-10 (1.76)	R-13.2 (2.32)	R-9.4 (1.66)	0.106 (0.60)	R-7.7 (1.36)	0.129 (0.73)	0.091 (0.158)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)	R-9.0 (1.59)	0.111 (0.63)	0.089 (0.154)
R-20 (3.52)	R-23.2 (4.08)	R-13.1 (2.31)	0.076 (0.43)	R-10.1 (1.77)	0.099 (0.56)	0.092 (0.160)
R-25 (4.40)	R-28.2 (4.96)	R-14.5 (2.56)	0.069 (0.39)	R-10.9 (1.92)	0.091 (0.52)	0.091 (0.158)

Temperature Indices

	R5	R10	R15	R20	R25	
T_{i1}	0.36	0.42	0.45	0.48	0.50	Min T on sheathing, along studs at girts and corner intersection
T_{i2}	0.76	0.83	0.87	0.89	0.90	Max T on sheathing, at steel studs, between girts, away from corner

Detail 5.6.4

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Horizontal Z-Girts (24" O.C.) Supporting Metal Cladding – Corner Intersection with Alternative Framing



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without corner
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of corner

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

Nominal (1D) vs. Assembly Performance Indicators

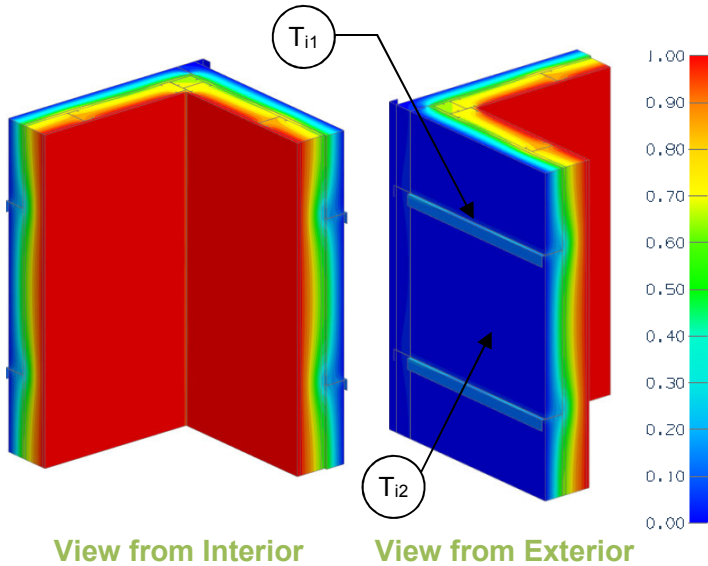
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-8.2 (1.44)	R-6.9 (1.21)	0.146 (0.83)	R-5.9 (1.05)	0.168 (0.96)	0.089 (0.153)
R-10 (1.76)	R-13.2 (2.32)	R-9.4 (1.66)	0.106 (0.60)	R-7.8 (1.37)	0.128 (0.73)	0.087 (0.152)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)	R-9.1 (1.61)	0.110 (0.62)	0.085 (0.147)
R-20 (3.52)	R-23.2 (4.08)	R-13.1 (2.31)	0.076 (0.43)	R-10.2 (1.79)	0.098 (0.56)	0.088 (0.152)
R-25 (4.40)	R-28.2 (4.96)	R-14.6 (2.56)	0.069 (0.39)	R-11.1 (1.95)	0.090 (0.51)	0.086 (0.149)

Temperature Indices

	R5	R10	R15	R20	R25	
T_{i1}	0.36	0.42	0.46	0.48	0.51	Min T on sheathing, along studs at girts and corner intersection
T_{i2}	0.76	0.83	0.86	0.89	0.90	Max T on sheathing, at steel studs, between girts, away from corner

Detail 5.6.5

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Corner Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.50 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without corner
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of corner

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

Nominal (1D) vs. Assembly Performance Indicators

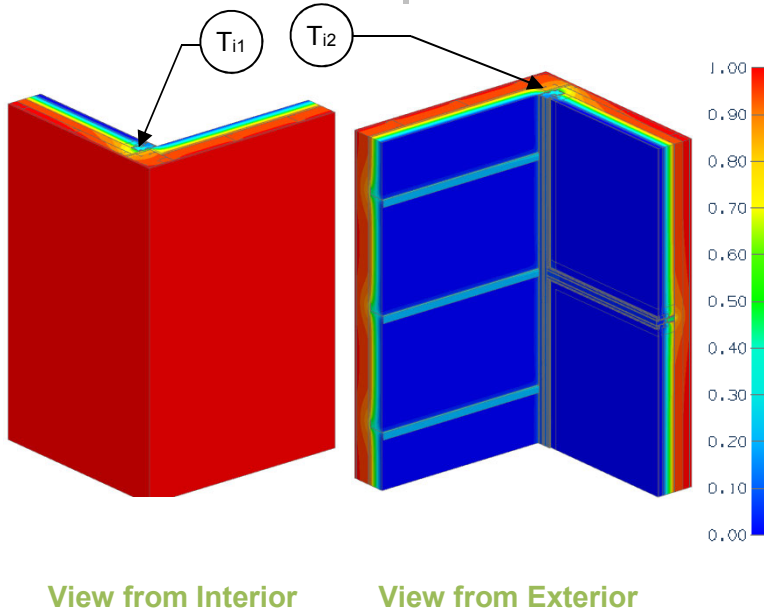
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-24.2 (4.26)	R-16.3 (2.87)	0.061 (0.35)	R-11.3 (1.99)	0.089 (0.50)	0.105 (0.181)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)	R-12.7 (2.23)	0.079 (0.45)	0.098 (0.170)

Temperature Indices

	R10	R15	
T_{i1}	0.29	0.33	Min T on sheathing, along girts, between studs
T_{i2}	0.71	0.75	Max T on sheathing, along studs, between girts

Detail 5.6.6

Window Wall System – Transition to Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding & No Interior Stud Cavity Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}	Stud wall, R-3.2 (0.56 RSI) + exterior insulation
Assembly 1D (Nominal) R-Value	R_{1Ds}	Spandrel wall, R-3.6 (0.64 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_s, R_s	“clear wall” U- and R-values for w = stud wall s = spandrel wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of corner transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-18.2 (3.20)	R-11.3 (1.99)	0.088 (0.50)
R-25 (4.40)	R-28.2 (4.96)	R-14.5 (2.56)	0.069 (0.39)

Base Assembly – Spandrel Wall

Backpan Insulation 1D R-Value (RSI)	R_{1Ds} ft ² ·hr·°F / Btu (m ² K / W)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-16.8 (2.96)	R-20.4 (3.60)	R-7.7 (1.36)	0.130 (0.74)

Corner Linear Transmittance

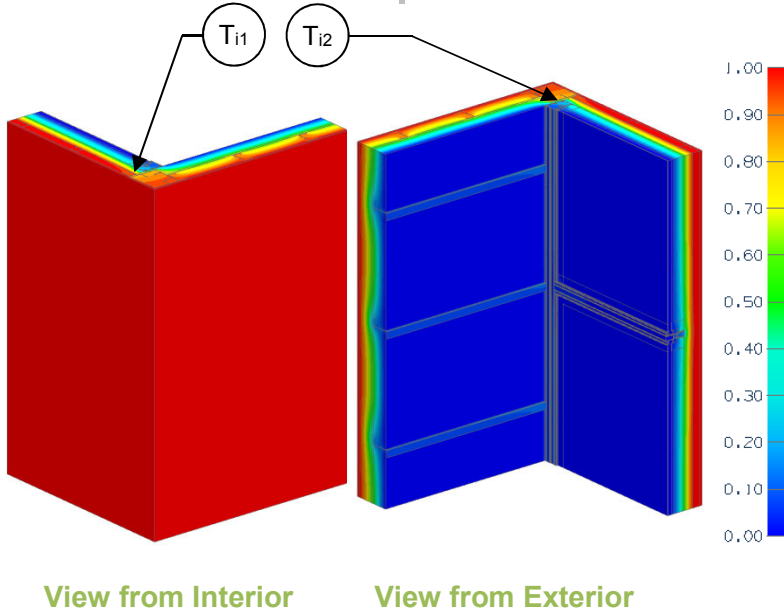
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-15 (2.64)	R-7.9 (1.38)	0.127 (0.72)	0.120 (0.207)
R-25 (4.40)	R-8.5 (1.49)	0.118 (0.67)	0.125 (0.217)

Temperature Indices

	R15	R25	
T_{i1}	0.63	0.64	Min T on sheathing, at corner
T_{i2}	0.39	0.39	Min T on interior side of spandrel, on vertical frame at corner

Detail 5.6.7

Window Wall System – Transition to Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding & Interior Sprayfoam and Fibreglass Batt Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw}	Stud wall, R-14.3 (2.52 RSI) + exterior insulation
Assembly 1D (Nominal) R-Value	R_{1Ds}	Spandrel wall, R-14.7 (2.59 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_s, R_s	“clear wall” U- and R-values for w = stud wall s = spandrel wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of corner transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)
R-25 (4.40)	R-39.2 (6.90)	R-22.1 (3.90)	0.045 (0.26)

Base Assembly – Spandrel Wall

Backpan Insulation 1D R-Value (RSI)	R_{1Ds} ft ² ·hr·°F / Btu (m ² K / W)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-16.8 (2.96)	R-31.5 (5.55)	R-17.5 (3.08)	0.057 (0.33)

Corner Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-15 (2.64)	R-12.9 (2.27)	0.078 (0.44)	0.137 (0.237)
R-25 (4.40)	R-13.7 (2.41)	0.073 (0.42)	0.138 (0.238)

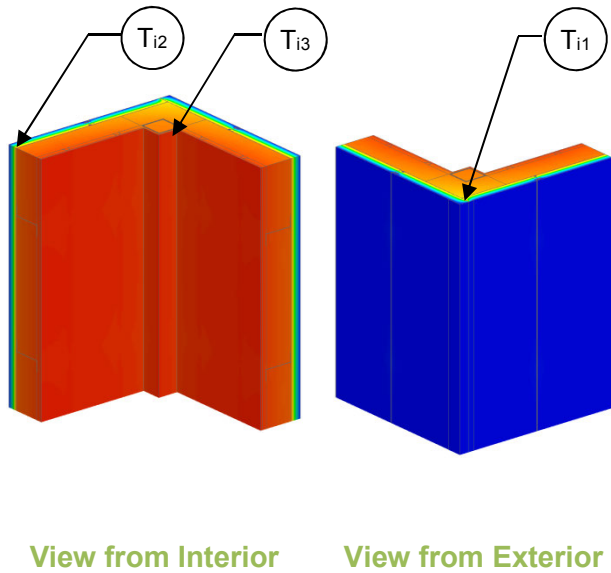
Temperature Indices

	R15	R25	
T_{i1}	0.57	0.58	Min T on sheathing, at corner
T_{i2}	0.90	0.91	Min T on interior side of spandrel, on sprayfoam in front of vertical frame

Detail 5.6.8

Vertical Insulated Metal Panel - Corner Intersection with Post and Support Girt/Hat Track Backup Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.2 (0.39 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without corner
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of corner

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

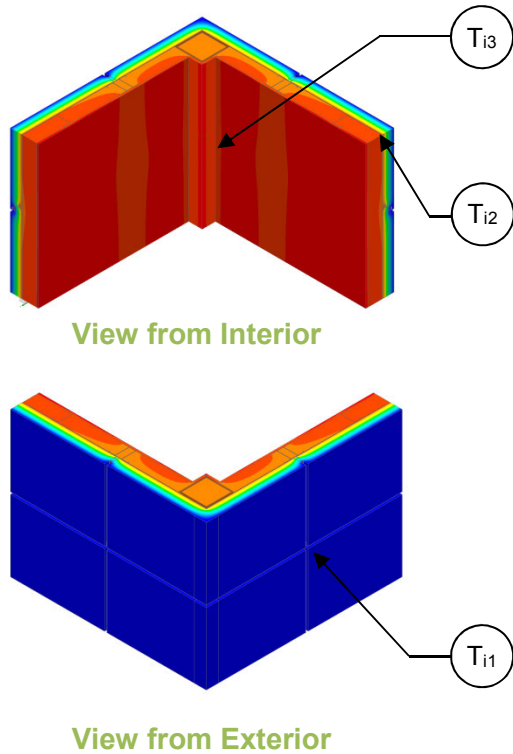
Nominal (1D) vs. Assembly Performance Indicators

Insulated Panel 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-21.4 (3.80)	0.047 (0.27)	R-16.3 (2.88)	0.061 (0.35)	0.090 (0.156)

Temperature Indices

T_{i1}	0.78	Min T on interior panel face, at corner, away from support girts
T_{i2}	0.91	Max T on interior panel face, at support girts. Away from corner
T_{i3}	0.93	Min T on interior surfaces, at interior drywall corner

Detail 5.6.9 Horizontal Insulated Metal Panel – Corner Intersection with Post and Steel Stud Backup Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-2.2 (0.39 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U _o , R _o	“clear field” U and R-value, without corner
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of corner

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

Nominal (1D) vs. Assembly Performance Indicators

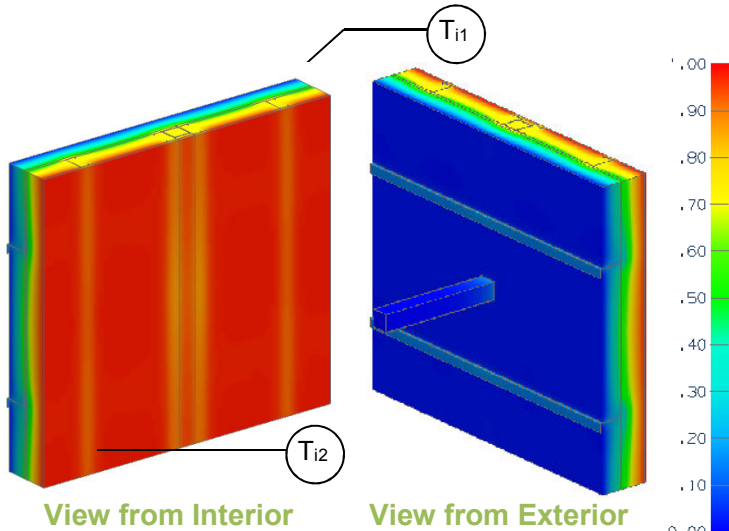
Insulated Panel 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-19.5 (3.43)	0.052 (0.29)	R-15.2 (2.68)	0.066 (0.37)	0.037 (0.064)

Temperature Indices

T _{i1}	0.85	Min T on interior panel face, at bolts, at joint intersection
T _{i2}	0.91	Max T on interior panel face, between joints away from corner
T _{i3}	0.92	Min T on interior surfaces, at inner drywall corner

Detail 5.7.1

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Structural Steel Column & Cantilever Beam Intersection (Canopy Support)



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.5 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without beam and post
Transmittance / Resistance	U_c, R_c	U- and R-values for stud wall with column
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of steel column
Point Transmittance	χ	Incremental increase in transmittance for steel beam attached to post

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-19.2 (3.38)	R-13.4 (2.36)	0.075 (0.42)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)
R-25 (4.40)	R-39.2 (6.90)	R-22.1 (3.90)	0.045 (0.26)

Column Linear Transmittance

R_c ft ² ·hr·°F / Btu (m ² K / W)	U_c Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-12.1 (2.13)	0.082 (0.47)	0.034 (0.060)
R-16.6 (2.92)	0.060 (0.34)	0.027 (0.047)
R-19.9 (3.49)	0.050 (0.29)	0.023 (0.040)

Beam Point Transmittance

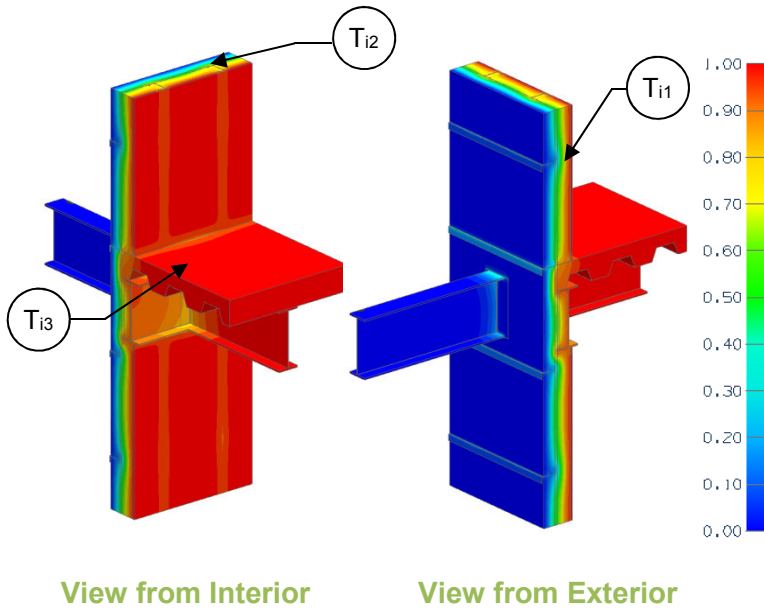
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr °F (W/K)
R-5 (0.88)	R- 11.0 (1.93)	0.091 (0.52)	0.16 (0.08)
R-15 (2.64)	R- 14.4 (2.54)	0.069 (0.39)	0.16 (0.08)
R-25 (4.40)	R-16.9 (2.97)	0.059 (0.34)	0.16 (0.08)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.23	0.35	0.42	Min T on sheathing, along girt between studs, away from post
T_{i2}	0.58	0.71	0.76	Max T on sheathing, at studs, between z girts, away from post

Detail 5.7.2

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Uninterrupted Beam



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value without slab or beam
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = steel stud wall + slab t = combined wall + slab + beam
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	χ	Incremental increase in transmittance for beam penetration

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)

Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15.6 (2.75)	0.064 (0.36)	0.083 (0.143)

Beam Point Transmittance

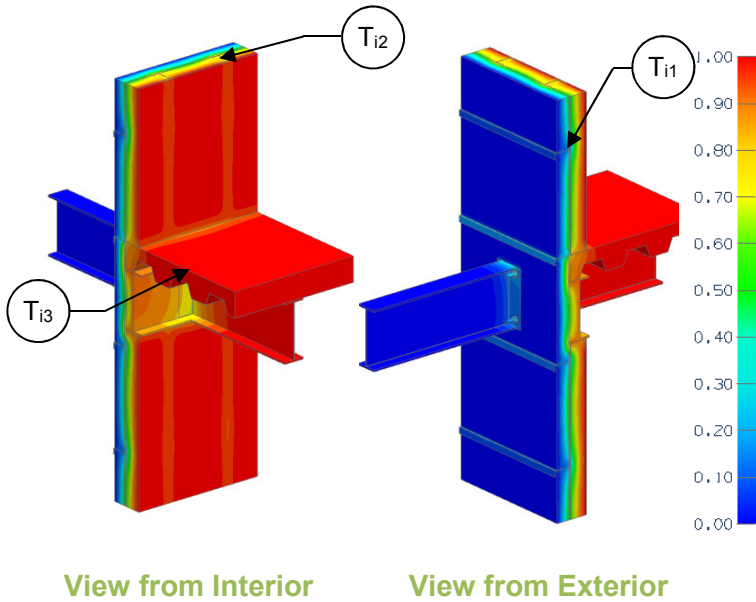
Wall Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr °F (W/K)
R-15 (2.64)	R-6.9 (1.21)	0.146 (0.83)	1.73 (0.92)

Temperature Indices

T_{i1}	0.35	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.73	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.52	Min T on beam exposed to interior air, top flange at I-beam intersection

Detail 5.7.3

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Isolator Pad



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab or beam
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = steel stud wall + slab t = combined wall + slab + beam
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	χ	Incremental increase in transmittance for beam penetration

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)

Beam Point Transmittance

Thermal Isolator Pad	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr °F (W/K)
5 mm pad, stainless steel bolts	R-6.0 (1.06)	0.167 (0.95)	2.17 (1.15)
5 mm pad, steel bolts	R-5.9 (1.04)	0.170 (0.97)	2.24 (1.19)
5 mm pad, stainless steel bolts, w/ R10 outboard of plates	R-6.4 (1.13)	0.156 (0.89)	1.80 (1.03)
10 mm pad, stainless steel bolts	R-6.7 (1.17)	0.150 (0.85)	1.82 (0.97)
10 mm pad, steel bolts	R-6.5 (1.15)	0.153 (0.87)	1.89 (1.00)

Slab Linear Transmittance

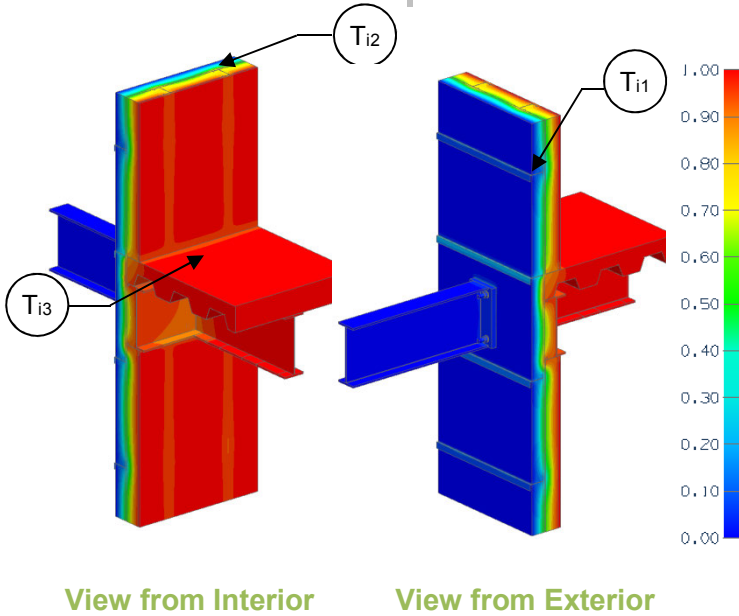
Wall Exterior Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-15.6 (2.75)	0.064 (0.36)	0.083 (0.143)

Temperature Indices

	5 mm pad, stainless bolts	5 mm pad, steel bolts	5 mm pad, stainless bolts, w/ R10	10 mm pad, stainless bolts	10 mm pad, steel bolts	
T_{i1}	0.35	0.35	0.35	0.35	0.35	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.73	0.73	0.73	0.73	0.73	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.33	0.32	0.39	0.42	0.41	Min T on beam exposed to interior air, top flange at I-beam intersection

Detail 5.7.4

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Isokorb S22 Thermally Broken Beam



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab or beam
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = steel stud wall + slab t = combined wall + slab + beam
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	χ	Incremental increase in transmittance for beam penetration

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{w1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)

Slab Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15.6 (2.75)	0.064 (0.36)	0.083 (0.143)

Beam Point Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	χ Btu/hr °F (W/K)
R-15 (2.64)	R-9.4 (1.65)	0.107 (0.61)	0.91 (0.48)

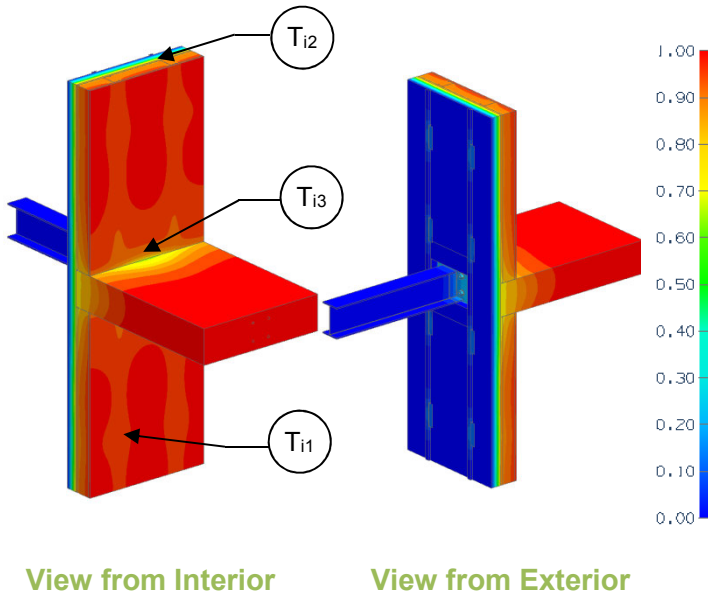
Temperature Indices

T_{i1}	0.32	Min T on sheathing away from slab, between studs at girts
T_{i2}	0.89	Max T on sheathing away from slab, between girts at studs
T_{i3}	0.79	Min T on beam exposed to interior air, top flange at I-beam intersection

Detail 5.7.5

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z-girts (16" o.c.) Supporting Metal Cladding – Concrete Floor to Steel Beam Connection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab or beam
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = steel stud wall + slab t = combined wall + slab + beam
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	χ	Incremental increase in transmittance for beam penetration

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-15 (2.64)	R-18.2 (3.20)	R-13.8 (2.44)	0.072 (0.41)

Slab Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-12.7 (2.24)	0.079 (0.45)	0.052 (0.090)

Beam Point Transmittance

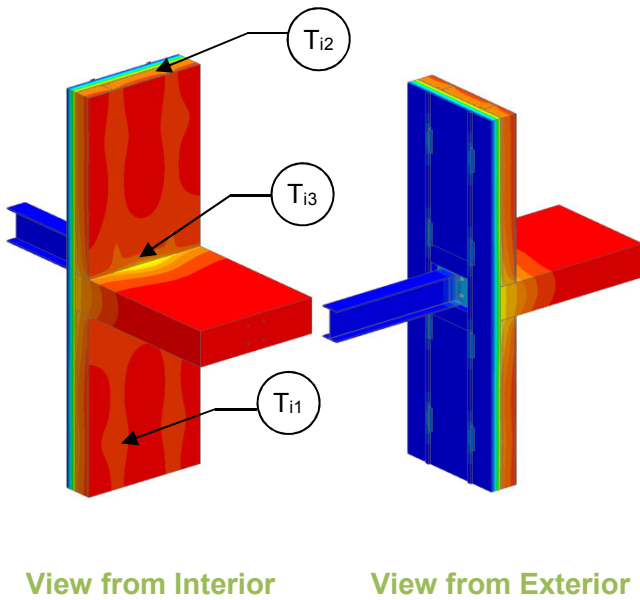
Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	χ Btu/hr °F (W/K)
R-15 (2.64)	R-7.3 (1.28)	0.137 (0.78)	1.24 (0.66)

Temperature Indices

T_{i1}	0.44	Min T on sheathing, at slab, in line with beam
T_{i2}	0.88	Max T on sheathing, at studs, between clips
T_{i3}	0.40	Min T on slab exposed to interior air, at sheathing, in line with beam

Detail 5.7.6

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z-girts (16" o.c.) Supporting Metal Cladding – Concrete Floor to Steel Beam with a Thermal Isolator Pad Connection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab or beam
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = steel stud wall + slab t = combined wall + slab + beam
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	χ	Incremental increase in transmittance for beam penetration

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-18.2 (3.20)	R-13.8 (2.44)	0.072 (0.41)

Slab Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-12.7 (2.24)	0.079 (0.45)	0.052 (0.090)

Beam Point Transmittance

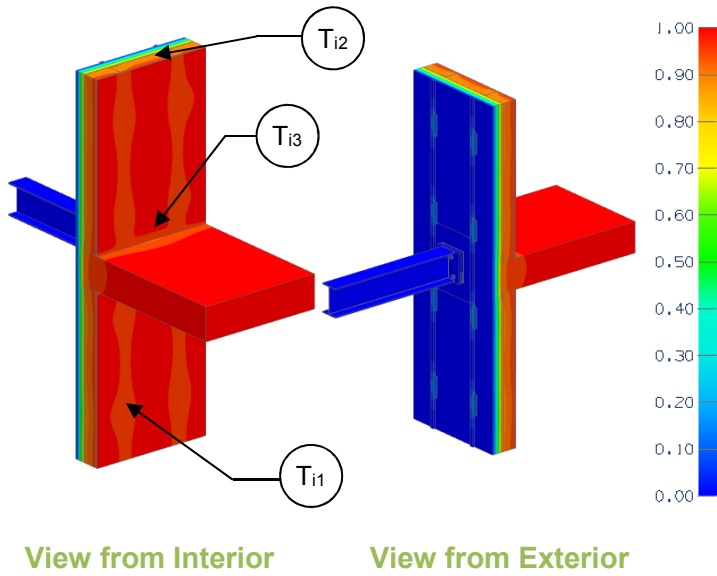
Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr °F (W/K)
R-15 (2.64)	R-8.2 (1.45)	0.121 (0.69)	0.91 (0.48)

Temperature Indices

T_{i1}	0.44	Min T on sheathing, at slab, in line with beam
T_{i2}	0.88	Max T on sheathing, at studs, between clips
T_{i3}	0.54	Min T on slab exposed to interior air, at sheathing, in line with beam

Detail 5.7.7

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z-girts (16" o.c.) Supporting Metal Cladding – Concrete Floor to Steel Beam with Isokorb KS14 Connection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U _o , R _o	"clear wall" U- and R-value without slab or beam
Transmittance / Resistance	U _s , R _s , U _t , R _t	U and R-values for s = steel stud wall + slab t = combined wall + slab + beam
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ _s	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	χ	Incremental increase in transmittance for beam penetration

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
R-15 (2.64)	R-18.2 (3.20)	R-13.8 (2.44)	0.072 (0.41)

Slab Transmittance

R _s ft ² ·hr·°F / Btu (m ² K / W)	U _s Btu/ft ² ·hr·°F (W/m ² K)	ψ _s Btu/ft hr °F (W/m K)
R-12.7 (2.24)	0.079 (0.45)	0.052 (0.090)

Beam Point Transmittance

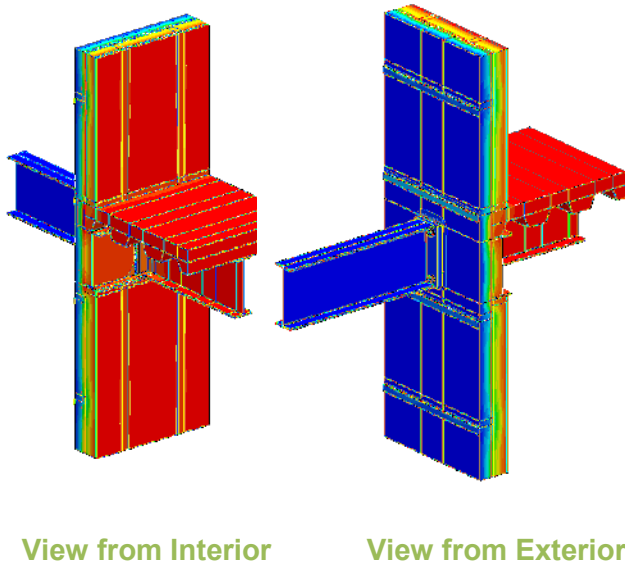
Exterior Insulation 1D R-Value (RSI)	R _t ft ² ·hr·°F / Btu (m ² K / W)	U _t Btu/ft ² ·hr·°F (W/m ² K)	χ Btu/hr °F (W/K)
R-15 (2.64)	R-12.2 (2.14)	0.082 (0.47)	0.07 (0.04)

Temperature Indices

T _{i1}	0.44	Min T on sheathing, at slab, in line with beam
T _{i2}	0.88	Max T on sheathing, at studs, between clips
T _{i3}	0.84	Min T on slab exposed to interior air, at sheathing, in line with beam

Detail 5.7.8

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Beam Thermal Break



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab or beam
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = steel stud wall + slab t = combined wall + slab + beam
Surface Temperature Index	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	χ	Incremental increase in transmittance for beam penetration

*Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Scenario

Scenario	
1	25mm Armatherm FRR between pressure plates
2	25mm Armatherm FRR with Stainless Steel Fasteners
3	25mm Armatherm FRR with Stainless Steel Fasteners and Armatherm bushings/washers
4	50mm Armatherm with Stainless Steel Fasteners and Armatherm bushings/washers

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)

Slab Linear Transmittance

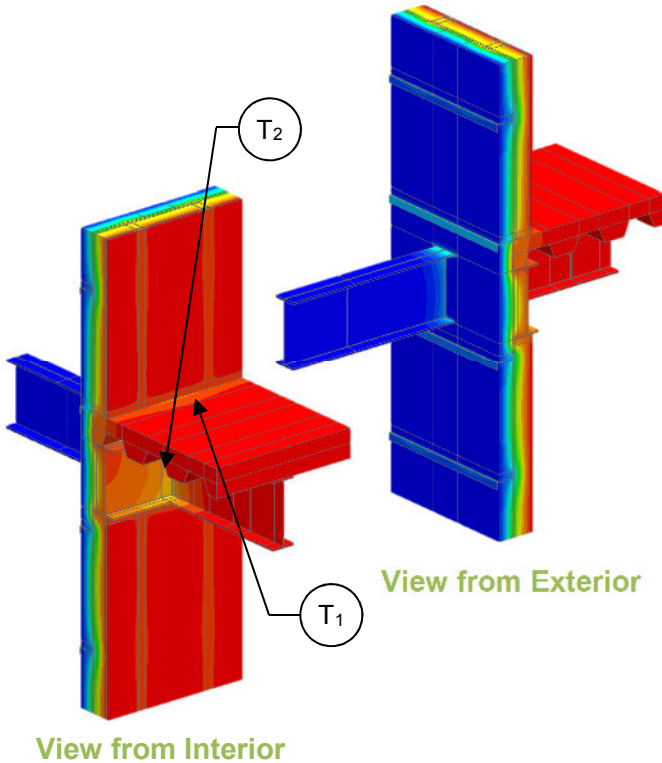
Wall Exterior Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-15.6 (2.75)	0.064 (0.36)	0.083 (0.143)

Beam Point Transmittance

Scenario	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr °F (W/K)
1	R-7.3 (1.28)	0.138 (0.78)	1.56 (0.83)
2	R-8.4 (1.48)	0.119 (0.68)	1.16 (0.62)
3	R-9.2 (1.61)	0.109 (0.62)	0.95 (0.50)
4	R-10.2 (1.79)	0.098 (0.56)	0.72 (0.38)

Detail 5.7.9

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Aerolon Coating



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value without slab or beam
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = steel stud wall + slab t = combined wall + slab + beam
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	χ	Incremental increase in transmittance for beam penetration

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-29.3 (5.16)	R-18.5 (3.25)	0.054 (0.31)

Slab Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-15.6 (2.75)	0.064 (0.36)	0.083 (0.143)

Beam Point Transmittance

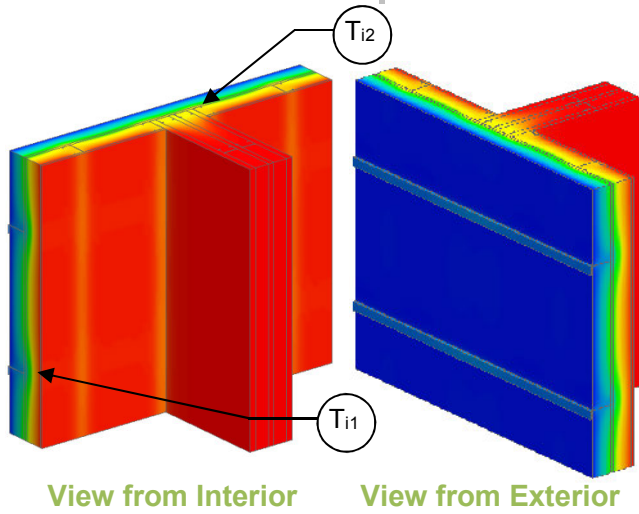
R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr °F (W/K)
R-8.4 (1.48)	0.119 (0.68)	1.17 (0.62)

Temperature Indices

T_1	0.59	Min T on coating at top flange of steel beam exposed to interior air
T_2	0.78	Min T on coating at underside of beam exposed to interior

Detail 5.8.1

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Metal Cladding – Interior Wall Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14.2 (2.5 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without interior wall
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of inner wall

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

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-19.2 (3.38)	R-13.4 (2.36)	0.075 (0.42)	R-12.6 (2.22)	0.079 (0.45)	0.023 (0.039)
R-10 (1.76)	R-24.2 (4.26)	R-16.3 (2.87)	0.061 (0.35)	R-15.6 (2.74)	0.064 (0.37)	0.014 (0.024)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)	R-17.8 (3.14)	0.056 (0.32)	0.010 (0.017)
R-20 (3.52)	R-34.2 (6.02)	R-20.5 (3.61)	0.049 (0.28)	R-19.8 (3.49)	0.050 (0.29)	0.008 (0.014)
R-25 (4.40)	R-39.2 (6.90)	R-22.1 (3.90)	0.045 (0.26)	R-21.4 (3.77)	0.047 (0.27)	0.007 (0.013)

Temperature Indices

	R5	R10	R15	R20	R25	
T_{i1}	0.27	0.29	0.33	0.37	0.39	Min T on sheathing, along girt between studs, away from interior wall intersection
T_{i2}	0.55	0.68	0.73	0.76	0.78	Max T on sheathing, at studs, between z girts, at the acoustic wall intersection

6.0 Concrete Construction

Detail 6.1.1	B.6.1
Exterior Insulated Concrete Drained EIFS Wall Assembly - Clear Wall	
Detail 6.1.2	B.6.2
Exterior Insulated Concrete Block Wall Assembly with Thermally Broken Aluminum Clip Rail System (24" o.c.) Supporting Cladding – Clear Wall	
Detail 6.1.3	B.6.3
Exterior Insulated Concrete Block Wall with Thermally Broken ISO Clip System with Horizontal Sub-Girt Supporting Cladding – Clear Wall	
Detail 6.1.4	B.6.4
Exterior Insulated Concrete Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall	
Detail 6.1.5	B.6.5
Exterior Insulated Concrete Block Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall	
Detail 6.1.6	B.6.6
Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Zinc 2-Seal Anchor Supporting Brick Veneer – Clear Wall	
Detail 6.1.7	B.6.7
Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Wing Nut Anchor Supporting Brick Veneer – Clear Wall	
Detail 6.1.8	B.6.8
Precast Sandwich Panel Wall Assembly with Concrete Panel Joints – Clear Wall	
Detail 6.1.9	B.6.9
Precast Sandwich Panel Wall Assembly with Tigerloc Thermally Broken Panel Joints – Clear Wall	
Detail 6.2.1	B.6.10
Exterior Insulated Concrete Drained EIFS Wall Assembly – Intermediate Floor Intersection	
Detail 6.2.2	B.6.11
Interior Insulated Concrete Mass Wall with 1 5/8" Steel Stud (16" o.c.) Supporting Interior Finish – Non-Insulated Interior Wall and Non-insulated Intermediate Floor Intersection	
Detail 6.2.3	B.6.12
Interior Insulated Concrete Mass Wall with 1 5/8" Steel Stud (16" o.c.) Supporting Interior Finish – Insulated Interior Wall and Non-insulated Intermediate Floor Intersection	
Detail 6.2.4	B.6.13

Interior Insulated Concrete Mass Wall with 3 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Interior Insulated Wall and Non-Insulated Partition Wall Intersection	
Detail 6.2.5	B.6.14
Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Continuous Concrete Intermediate Floor Intersection	
Detail 6.2.6	B.6.15
Precast Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c) and Insulation in Stud Cavity – Intermediate Floor Intersection	
Detail 6.2.7	B.6.16
Precast Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c) and Rigid Insulation Outboard of Studs – Intermediate Floor Intersection	
Detail 6.2.8	B.6.17
Precast Sandwich Panel Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Intermediate Floor Intersection	
Detail 6.2.9	B.6.18
Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors at 24" o.c. – Intermediate Floor Intersection	
Detail 6.2.10	B.6.19
Precast Sandwich Panel Wall Assembly with Steel Connectors at 16" o.c. – Intermediate Floor Intersection	
Detail 6.2.11	B.6.20
Precast Sandwich Panel Wall Assembly with Steel Connectors at 36" o.c. – Intermediate Floor Intersection	
Detail 6.2.12	B.6.21
Precast Sandwich Panel Wall Assembly with Steel Connectors at 48" o.c. – Intermediate Floor Intersection	
Detail 6.2.13	B.6.22
Precast Sandwich Panel Wall Assembly with Fiber-Reinforced Composite Connectors at 16" o.c. – Intermediate Floor Intersection	
Detail 6.2.14	B.6.23
Exterior Insulated Concrete Block Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection	
Detail 6.2.15	B.6.24
Exterior Insulated Concrete Block Wall Assembly with Stand-Off Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection	
Detail 6.2.16	B.6.25
Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony	

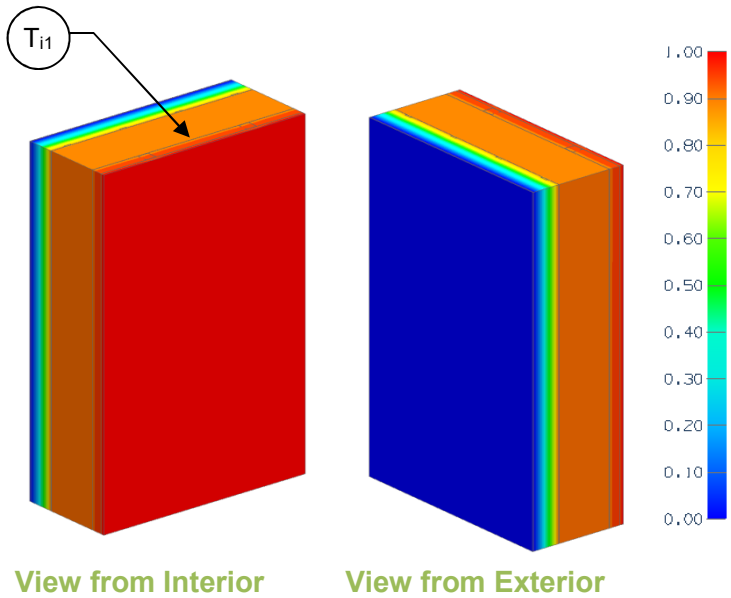
Detail 6.2.17	B.6.26
Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Angle Supported Slab & Intermediate Floor Intersection	
Detail 6.2.18	B.6.27
Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony	
Detail 6.2.19	B.6.28
Exterior Insulated Concrete Block Wall Assembly with Thermally Broken Shelf Angle & Brick Ties Supporting Brick Veneer – Slab Intersection	
Detail 6.2.20	B.6.29
Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Isokorb Rutherma DF Thermally Broken Concrete Intermediate Floor Intersection	
Detail 6.3.1	B.6.30
Exterior Insulated Concrete Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection	
Detail 6.3.2	B.6.31
Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Window & Intermediate Floor Intersection	
Detail 6.3.3	B.6.32
Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Window & Projected Slab Intersection	
Detail 6.3.4	B.6.33
Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors (24" o.c.) - Window Intersection	
Detail 6.3.5	B.6.34
Precast Sandwich Panel Wall Assembly with 3 5/8" Steel Stud (16" O.C.) – Window Intersection	
Detail 6.3.6	B.6.35
Exterior Insulated Concrete Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection	
Detail 6.3.7	B.6.36
Interior Insulated Concrete Block or Concrete Wall Assembly with Brick Cladding - Window Intersection	
Detail 6.3.8	B.6.37
Interior Insulated Concrete Block or Concrete Wall Assembly with Brick Cladding - Window Intersection Aligned with Insulation	
Detail 6.3.9	B.6.38

- Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.)
Supporting Interior Finish – Window & Projected Slab Intersection with Plywood
and Insulation Liner
- Detail 6.3.10** **B.6.39**
- Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.)
Supporting Interior Finish – Window & Projected Slab Intersection with Wall
Insulation Wrapped into Opening
- Detail 6.3.11** **B.6.40**
- Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.)
Supporting Interior Finish – Window & Projected Slab Intersection – Plywood
Liner and Glazing Aligned with Wall Insulation
- Detail 6.3.12** **B.6.41**
- Exterior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Stud (16" o.c.)
and Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting
Metal Cladding – Triple Glazed Aluminum Window & Intermediate Floor
Intersection with Window Thermal Break Positioned in Concrete Opening
- Detail 6.3.13** **B.6.42**
- Exterior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Stud (16" o.c.)
and Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting
Metal Cladding – Triple Glazed Aluminum Curtain Wall & Intermediate Floor
Intersection with Window Thermal Break Positioned in the Exterior Insulation
- Detail 6.4.1** **B.6.43**
- Exterior Insulated Concrete Drained EIFS Wall Assembly – Conventional Curtain
Wall Transition
- Detail 6.4.2** **B.6.44**
- Precast Sandwich Panel Wall Assembly with 3 5/8" Steel Stud (16" o.c.) –
Curtain Wall Transition
- Detail 6.4.3** **B.6.45**
- Interior Insulated Concrete Mass Wall – Conventional Curtain Wall Transition
- Detail 6.4.4** **B.6.46**
- Interior Insulated Concrete Mass Wall – Thermally Broken Curtain Wall
Transition
- Detail 6.4.5** **B.6.47**
- Precast Sandwich Panel Wall Assembly – Tigerloc Thermally Broken Curtain
Wall Transition
- Detail 6.5.1** **B.6.48**
- Exterior Insulated Concrete Drained EIFS Wall Assembly – Concrete Parapet &
Slab Intersection
- Detail 6.5.2** **B.6.49**
- Exterior Insulated Concrete Drained EIFS Wall Assembly – Insulated Concrete
Parapet & Slab Intersection

Detail 6.5.3	B.6.50
Interior Insulated Concrete Mass Wall with 1 5/8" Steel Stud (16" o.c) Supporting Interior Finish – Concrete Parapet & Roof Intersection	
Detail 6.5.4	B.6.51
Precast Sandwich Panel Wall Assembly with 3 5/8" Steel Stud (16" o.c.) – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection	
Detail 6.5.5	B.6.52
Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection	
Detail 6.5.6	B.6.53
Precast Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c) and Rigid Insulation Outboard of Studs – Parapet & Roof Intersection	
Detail 6.5.7	B.6.54
Precast Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c) and Rigid Insulation Outboard of Studs – Parapet & Roof Intersection with Thermal Break under Parapet Stud Cavity and At Anchors	
Detail 6.5.8	B.6.55
Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Parapet & Roof Intersection	
Detail 6.5.9	B.6.56
Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Paraloc Thermally Broken Parapet Intersection	
Detail 6.6.1	B.6.57
Exterior Insulated Concrete Drained EIFS Wall Assembly – Corner Intersection	
Detail 6.7.1	B.6.58
Interior Insulated Concrete Mass Wall with 3 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Intermediate Floor Intersection above Parking Garage	
Detail 6.7.2	B.6.59
Insulated Concrete Floor Slab – Concrete Column Intersection	
Detail 6.7.3	B.6.60
Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) – Concrete Slab and Foundation Intersection	
Detail 6.7.4	B.6.61
Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) - Concrete Slab and Foundation Wall Intersection	
Detail 6.7.5	B.6.62
Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) – Thermally Broken Concrete Slab and Foundation Intersection	

Detail 6.7.6	B.6.63
Insulated Slab on Grade – Steel Column	
Detail 6.7.7	B.6.64
Insulated Slab on Grade – Armatherm 500 Thermal Break under Column	
Detail 6.8.1	B.6.65
Precast Sandwich Panel Wall Assembly – Emloc Thermally Broken Embedment Detail	

Detail 6.1.1 Exterior Insulated Concrete Drained EIFS Wall Assembly - Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

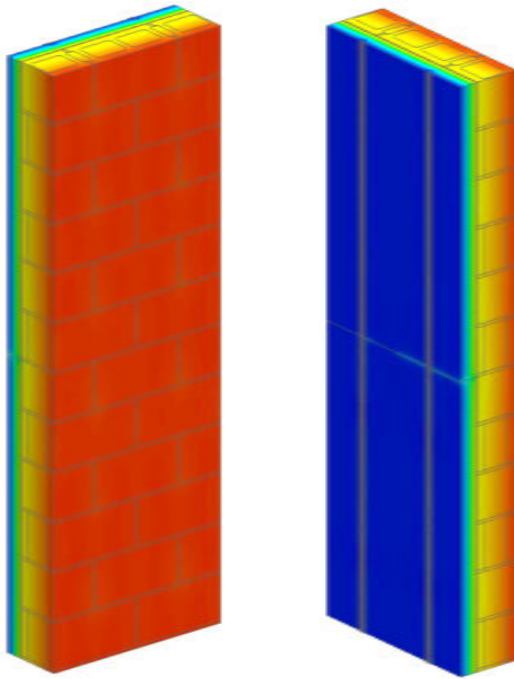
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)

Temperature Indices

T_{i1}	0.89	Consistent temperature along interior concrete surface
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Detail 6.1.2

Exterior Insulated Concrete Block Wall Assembly with Thermally Broken Aluminum Clip Rail System (24" o.c.) Supporting Cladding – Clear Wall



View from Interior

View from Exterior

Thermal Performance Indicators

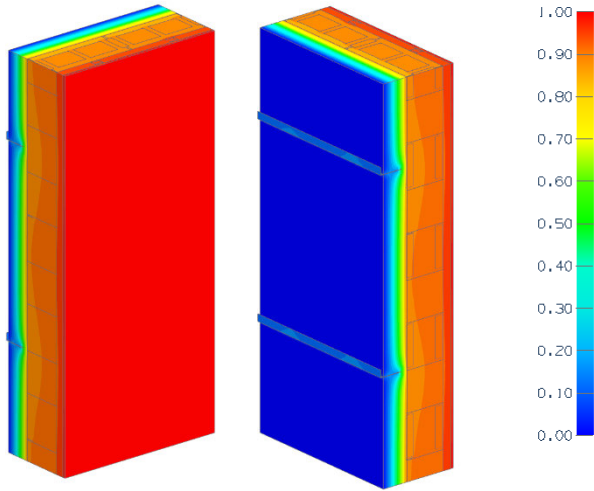
Assembly 1D (Nominal) R-Value	R_{1D}	R-6.3 (1.12 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-12.6 (2.22)	R-15.4 (2.72)	R-17.4 (3.07)	0.058 (0.33)

Detail 6.1.3

Exterior Insulated Concrete Block Wall with Thermally Broken ISO Clip System with Horizontal Sub-Girt Supporting Cladding – Clear Wall



View from Interior View from Exterior

Thermal Performance Indicators

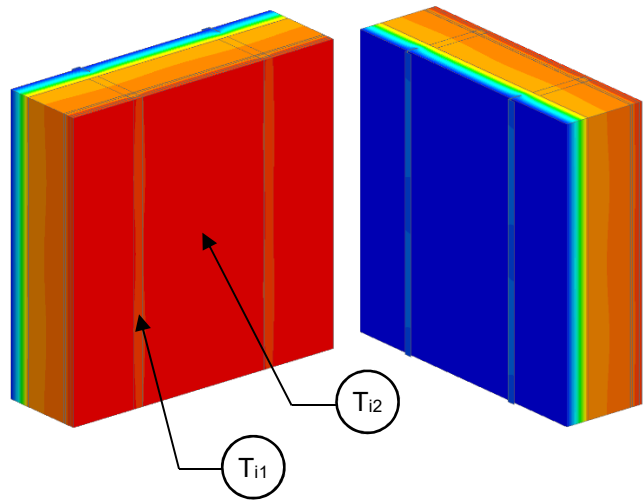
Assembly 1D (Nominal) R-Value	R _{1D}	R-4.2 (0.74 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	“Clear wall” U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Horizontal Clip Spacing	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		60" Vertical Clip Spacing	
			R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
16" o.c.	16.8 (2.96)	21 (3.70)	R-15.2 (2.68)	0.066 (0.374)	R-16.4 (2.89)	0.061 (0.345)	R-17.3 (3.04)	0.058 (0.329)	R-17.9 (3.15)	0.056 (0.318)
	21.0 (3.70)	25.2 (4.44)	R-16.9 (2.98)	0.059 (0.336)	R-18.6 (3.28)	0.054 (0.305)	R-19.8 (3.49)	0.050 (0.286)	R-20.7 (3.65)	0.048 (0.274)
	25.2 (4.44)	29.4 (5.18)	R-18.4 (3.24)	0.054 (0.309)	R-20.6 (3.63)	0.049 (0.276)	R-22.2 (3.91)	0.045 (0.256)	R-23.4 (4.12)	0.043 (0.243)
24" o.c.	16.8 (2.96)	21 (3.70)	R-16.1 (2.83)	0.062 (0.353)	R-17.2 (3.03)	0.058 (0.33)	R-18.0 (3.16)	0.056 (0.316)	R-18.5 (3.26)	0.054 (0.307)
	21.0 (3.70)	25.2 (4.44)	R-18.0 (3.17)	0.056 (0.316)	R-19.7 (3.46)	0.051 (0.289)	R-20.7 (3.65)	0.048 (0.274)	R-21.5 (3.78)	0.047 (0.264)
	25.2 (4.44)	29.4 (5.18)	R-19.6 (3.46)	0.051 (0.289)	R-21.8 (3.84)	0.046 (0.26)	R-23.2 (4.09)	0.043 (0.244)	R-24.3 (4.28)	0.041 (0.234)
32" o.c.	16.8 (2.96)	21 (3.70)	R-16.8 (2.95)	0.060 (0.339)	R-17.8 (3.14)	0.056 (0.319)	R-18.4 (3.25)	0.054 (0.308)	R-18.9 (3.33)	0.053 (0.300)
	21.0 (3.70)	25.2 (4.44)	R-18.8 (3.32)	0.053 (0.301)	R-20.4 (3.59)	0.049 (0.279)	R-21.3 (3.76)	0.047 (0.266)	R-22.0 (3.88)	0.045 (0.258)
	25.2 (4.44)	29.4 (5.18)	R-20.6 (3.63)	0.048 (0.275)	R-22.7 (4.00)	0.044 (0.250)	R-24.0 (4.22)	0.042 (0.237)	R-24.9 (4.39)	0.040 (0.228)

Detail 6.1.4

Exterior Insulated Concrete Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.4 (0.59 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-11.8 (2.07)	R-10.2 (1.79)	0.098 (0.56)	R-10.5 (1.85)	0.095 (0.54)	R-10.7 (1.88)	0.094 (0.53)
R-12.6 (2.22)	R-16.0 (2.81)	R-12.8 (2.26)	0.078 (0.44)	R-13.4 (2.36)	0.075 (0.42)	R-13.8 (2.43)	0.073 (0.41)
R-16.8 (2.96)	R-20.2 (3.55)	R-15.3 (2.70)	0.065 (0.37)	R-16.4 (2.88)	0.061 (0.35)	R-17.0 (2.99)	0.059 (0.33)
R-21.0 (3.7)	R-24.4 (4.29)	R-17.4 (3.07)	0.057 (0.33)	R-18.9 (3.33)	0.053 (0.30)	R-19.9 (3.50)	0.050 (0.29)
R-25.2 (4.44)	R-28.6 (5.03)	R-19.3 (3.40)	0.052 (0.29)	R-21.3 (3.75)	0.047 (0.27)	R-22.5 (3.97)	0.044 (0.25)

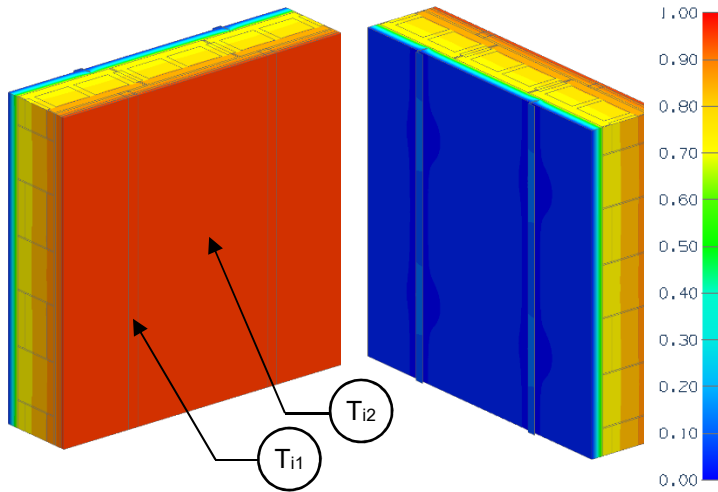
Temperature Indices

	R8.4	R12.6	R16.8	R21	R25.1	
T_{i1}	0.80	0.84	0.86	0.88	0.89	Min T on interior concrete surface, at clip
T_{i2}	0.81	0.85	0.87	0.89	0.90	Max T on interior concrete surface, away from clips

Detail 6.1.5

Exterior Insulated Concrete Block Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

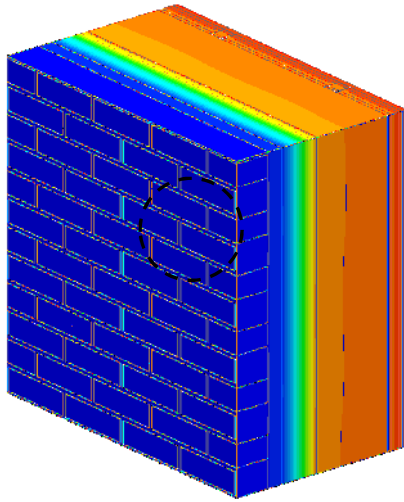
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-12.3 (2.17)	R-10.8 (1.91)	0.092 (0.52)	R-11.2 (1.96)	0.090 (0.51)	R-11.3 (1.99)	0.088 (0.50)
R-12.6 (2.22)	R-16.5 (2.91)	R-13.5 (2.38)	0.074 (0.42)	R-14.1 (2.49)	0.071 (0.40)	R-14.4 (2.54)	0.069 (0.39)
R-16.8 (2.96)	R-20.7 (3.65)	R-16.1 (2.83)	0.062 (0.35)	R-17.1 (3.01)	0.058 (0.33)	R-17.7 (3.12)	0.057 (0.32)
R-21.0 (3.70)	R-24.9 (4.39)	R-18.3 (3.22)	0.055 (0.31)	R-19.7 (3.48)	0.051 (0.29)	R-20.6 (3.63)	0.048 (0.28)
R-25.2 (4.44)	R-29.1 (5.13)	R-20.2 (3.56)	0.049 (0.28)	R-22.2 (3.91)	0.045 (0.26)	R-23.4 (4.12)	0.043 (0.24)

Temperature Indices

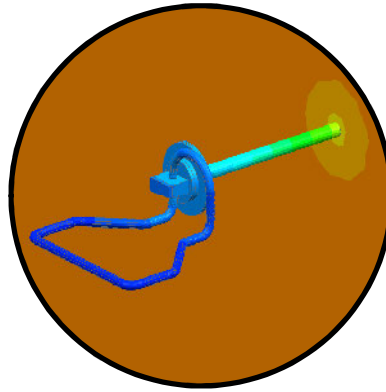
	R8.4	R12.6	R16.8	R21	R25.1	
T_{i1}	0.81	0.85	0.87	0.88	0.89	Min T on interior concrete surface, at clip
T_{i2}	0.82	0.86	0.88	0.89	0.90	Max T on interior concrete surface, away from clips

Detail 6.1.6

Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Zinc 2-Seal Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie

Thermal Performance Indicators



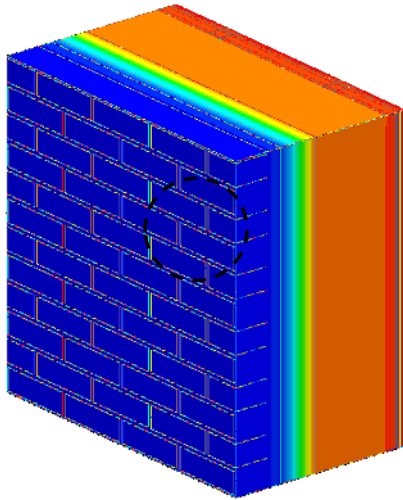
Assembly 1D (Nominal) R-Value	R_{1D}	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“Clear wall” U- and R-value: a = without batt insulation

Nominal (1D) vs. Assembly Performance Indicators

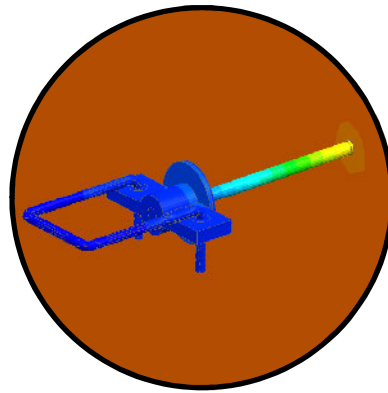
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8” Vertical Clip Spacing		16” Vertical Clip Spacing		24” Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.1 (1.25)	0.141 (0.800)	R-7.6 (1.33)	0.132 (0.750)	R-7.8 (1.37)	0.129 (0.730)
R-8.4 (1.48)	R-12.7 (2.24)	R-9.4 (1.66)	0.106 (0.604)	R-10.6 (1.87)	0.094 (0.535)	R-11.1 (1.96)	0.090 (0.509)
R-12.6 (2.22)	R-16.9 (2.98)	R-11.4 (2.01)	0.088 (0.497)	R-13.4 (2.36)	0.075 (0.424)	R-14.3 (2.52)	0.070 (0.397)
R-16.8 (2.96)	R-21.1 (3.72)	R-13.3 (2.35)	0.075 (0.426)	R-16.0 (2.82)	0.062 (0.355)	R-17.4 (3.06)	0.058 (0.327)

Detail 6.1.7

Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Wing Nut Anchor Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie

Thermal Performance Indicators



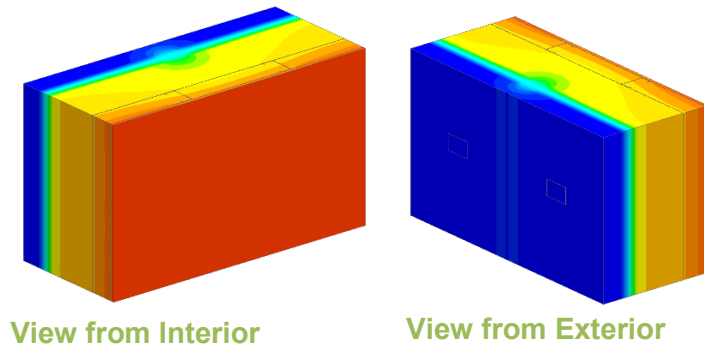
Assembly 1D (Nominal) R-Value	R_{1D}	R-4.4 (0.76 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"Clear wall" U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-4.2 (0.74)	R-8.6 (1.51)	R-7.7 (1.36)	0.129 (0.733)	R-7.9 (1.40)	0.126 (0.714)	R-8.0 (1.41)	0.125 (0.710)
R-8.4 (1.48)	R-12.8 (2.25)	R-11.4 (2.00)	0.088 (0.499)	R-11.8 (2.08)	0.084 (0.480)	R-12.0 (2.11)	0.083 (0.473)
R-12.6 (2.22)	R-17.0 (2.99)	R-14.9 (2.63)	0.067 (0.380)	R-15.7 (2.76)	0.064 (0.362)	R-16.0 (2.81)	0.063 (0.356)
R-16.8 (2.96)	R-21.2 (3.73)	R-18.5 (3.26)	0.054 (0.307)	R-19.6 (3.45)	0.051 (0.290)	R-19.9 (3.50)	0.050 (0.286)

Detail 6.1.8

Precast Sandwich Panel Wall Assembly with Concrete Panel Joints – Clear Wall



Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-3.1 (0.55 RSI) + sandwich panel insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td>U_o, R_o</td> <td>“clear field” U- and R-values, without panel joint</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U, R</td> <td>U- and R-values for overall assembly</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td>ψ</td> <td>Incremental increase in transmittance per linear length of transition joint</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R_{1D}	R-3.1 (0.55 RSI) + sandwich panel insulation	Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-values, without panel joint	Transmittance / Resistance	U, R	U- and R-values for overall assembly	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature	Linear Transmittance	ψ	Incremental increase in transmittance per linear length of transition joint
Assembly 1D (Nominal) R-Value		R_{1D}	R-3.1 (0.55 RSI) + sandwich panel insulation													
Transmittance / Resistance without Anomaly		U_o, R_o	“clear field” U- and R-values, without panel joint													
Transmittance / Resistance		U, R	U- and R-values for overall assembly													
Surface Temperature Index ¹		T_i	0 = exterior temperature 1 = interior temperature													
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of transition joint														
0.90																
0.80																
0.70																
0.60																
0.50																
0.40																
0.30																
0.20																
0.10																
0.00																

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

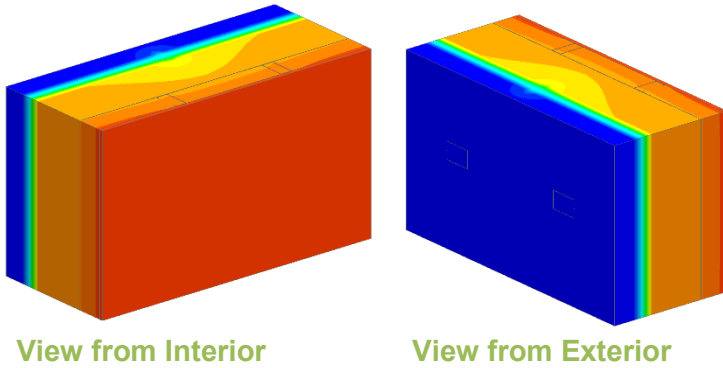
Sandwich Panel Insulation 1D R-value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.1 (2.31)	R-12.8 (2.26)	0.078 (0.44)
R-15 (2.64)	R-18.1 (3.19)	R-17.7 (3.12)	0.056 (0.32)
R-20 (3.52)	R-23.1 (4.07)	R-22.6 (3.98)	0.044 (0.25)

Panel Joint Linear Transmittance

Sandwich Panel Insulation 1D R-value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-7.1 (1.26)	0.140 (0.79)	0.211 (0.37)
R-15 (2.64)	R-8.4 (1.48)	0.119 (0.68)	0.214 (0.37)
R-20 (3.52)	R-9.5 (1.68)	0.105 (0.60)	0.207 (0.36)

Detail 6.1.9

Precast Sandwich Panel Wall Assembly with Tigerloc Thermally Broken Panel Joints – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.1 (0.55 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-values, without panel joint
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of transition joint

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

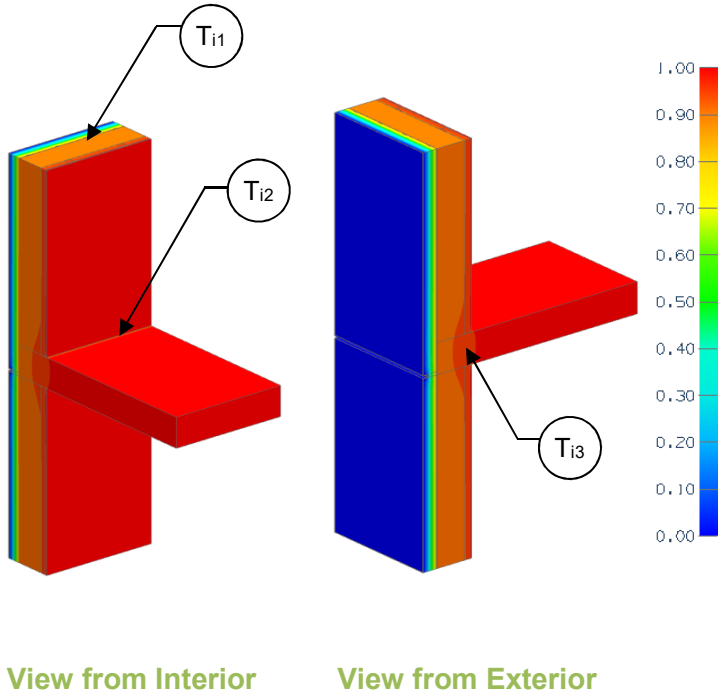
Sandwich Panel Insulation 1D R-value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.1 (2.31)	R-12.8 (2.26)	0.078 (0.44)
R-15 (2.64)	R-18.1 (3.19)	R-17.7 (3.12)	0.056 (0.32)
R-20 (3.52)	R-23.1 (4.07)	R-22.6 (3.98)	0.044 (0.25)

Panel Joint Linear Transmittance

Sandwich Panel Insulation 1D R-value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-9.3 (1.65)	0.107 (0.61)	0.099 (0.17)
R-15 (2.64)	R-12.0 (2.11)	0.084 (0.47)	0.092 (0.16)
R-20 (3.52)	R-14.5 (2.56)	0.069 (0.39)	0.084 (0.15)

Detail 6.2.1

Exterior Insulated Concrete Drained EIFS Wall Assembly – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U _o , R _o	“clear wall” U- and R-value without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

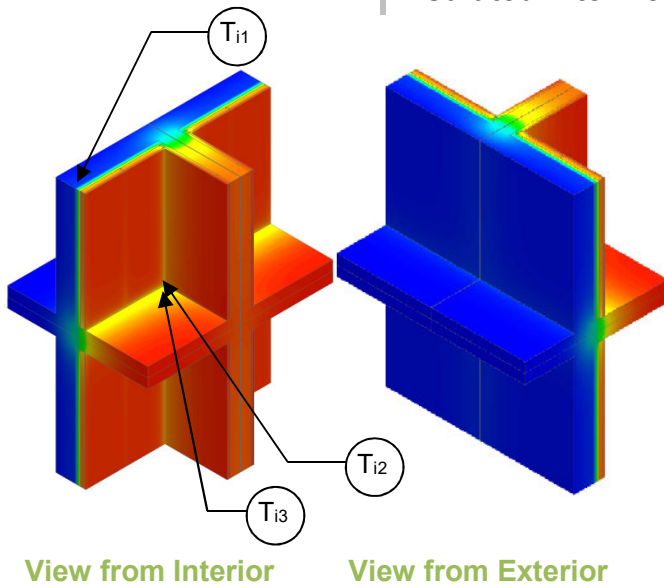
Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)	R-17.1 (3.02)	0.058 (0.33)	0.013 (0.023)

Temperature Indices

T _{i1}	0.89	Min T on concrete wall, between studs away from floor slab
T _{i2}	0.92	Max T on concrete, along steel track of floor slab
T _{i3}	0.94	Min T on slab, at edge interior drywall, exposed to interior air

Detail 6.2.2

Interior Insulated Concrete Mass Wall with 1 5/8" Steel Stud (16" o.c.) Supporting Interior Finish – Non-Insulated Interior Wall and Non-Insulated Intermediate Floor Intersection



Thermal Performance Indicators

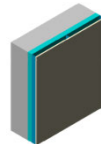
Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance of exterior wall
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value of just concrete wall and steel stud assembly
Transmittance / Resistance	U_s, R_s, U_i, R_i	U and R-values for: s = concrete wall + slab i = concrete wall + interior wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_i	Incremental increase in transmittance per linear length of: s = slab i = interior wall
Point Transmittance	χ	Incremental increase in transmittance for inner wall and slab intersection

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

Nominal (1D) vs. Assembly Performance Indicators

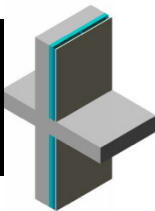
Base Assembly – Wall

R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-13.9 (2.44)	R-13.5 (2.37)	0.074 (0.42)



Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft hr °F (W/m K)
R-7.0 (1.22)	0.144 (0.82)	0.465 (0.805)



Interior Linear Transmittance

R_i ft ² ·hr·°F / Btu (m ² K / W)	U_i Btu/ft ² ·hr ·°F (W/m ² K)	ψ_i Btu/ft hr °F (W/m K)
R-7.4 (1.30)	0.135 (0.77)	0.385 (0.666)



Intersection Point Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	χ^2 Btu/ft hr °F (W/K)
R-4.4 (0.77)	0.228 (1.30)	-0.48 (-0.25)

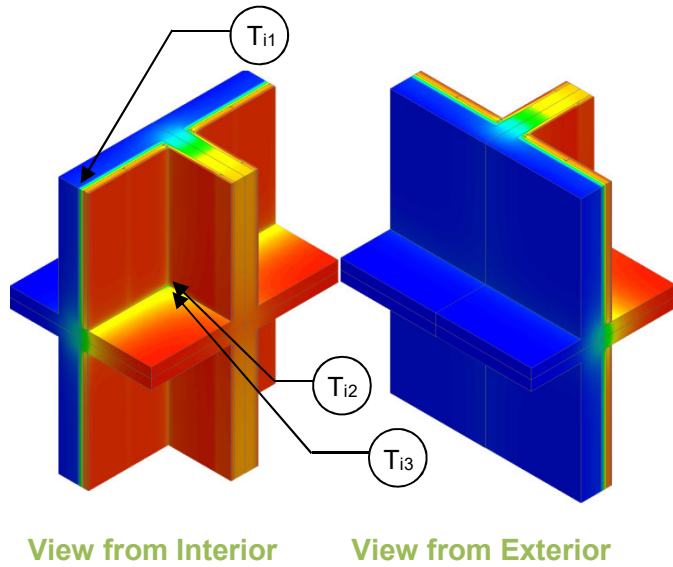
²Values are negative for a correction factor. See section 6 in ASHRAE 1365-RP for clarification.

Temperature Indices

T_{i1}	0.06	Min T on concrete wall, between studs, away from wall and slab
T_{i2}	0.35	Max T on concrete wall, at corner intersection
T_{i3}	0.59	Min T on interior surface, at corner intersection

Detail 6.2.3

Interior Insulated Concrete Mass Wall with 1 5/8" Steel Stud (16" o.c.) Supporting Interior Finish – Insulated Interior Wall and Non-insulated Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance of exterior wall
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value of just concrete wall and steel stud assembly
Transmittance / Resistance	U_s, R_s, U_i, R_i	U and R values for: s = concrete wall + slab i = concrete wall + interior wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_i	Incremental increase in transmittance per linear length of: s = slab i = interior wall
Point Transmittance	χ	Incremental increase in transmittance for inner wall and slab intersection

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-13.9 (2.44)	R-13.5 (2.37)	0.074 (0.42)



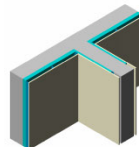
Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft hr °F (W/m K)
R-7.0 (1.22)	0.144 (0.82)	0.465 (0.805)



Interior Wall Linear Transmittance

R_i ft ² ·hr·°F / Btu (m ² K / W)	U_i Btu/ft ² ·hr ·°F (W/m ² K)	ψ_i Btu/ft hr °F (W/m K)
R-8.6 (1.52)	0.116 (0.66)	0.262 (0.454)



Intersection Point Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	χ^2 Btu/ft hr °F (W/K)
R-6.1 (1.07)	0.164 (0.93)	-0.29 (-0.16)

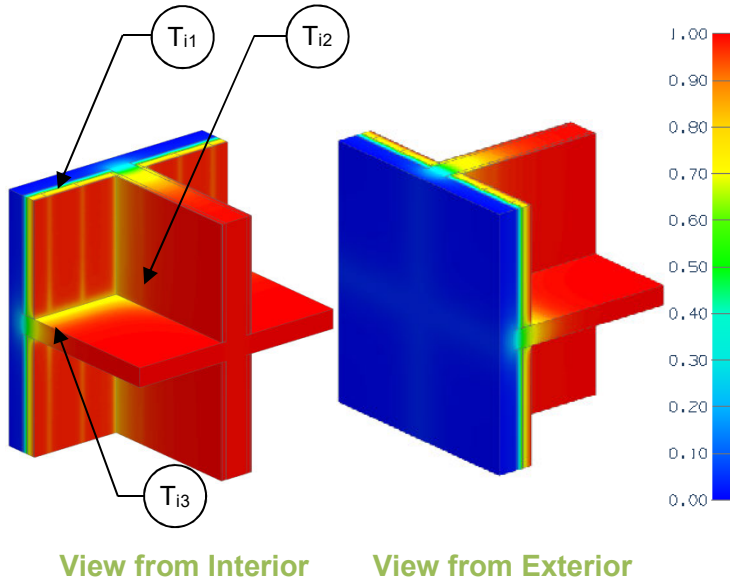
²Values are negative for a correction factor. See section 6 in ASHRAE-1365 RP for clarification.

Temperature Indices

Ti1	0.06	Min T on concrete wall between studs, away from wall and slab
Ti2	0.34	Max T on concrete wall, at corner intersection
Ti3	0.57	Min T on interior surface, at corner intersection

Detail 6.2.4

Interior Insulated Concrete Mass Wall with 3 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Interior Insulated Wall and Non-Insulated Partition Wall Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-14 (2.47 RSI) + interior insulation
Transmittance / Resistance without Anomaly	U _o , R _o	"clear wall" U- and R-value of just concrete wall and steel stud assembly
Transmittance / Resistance	U _s , R _s , U _i , R _i , U _t , R _t	U and R values for: s = concrete wall + slab i = concrete wall + interior wall t = combined concrete wall + slab + interior wall
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ _s , ψ _i	Incremental increase in transmittance per linear length of: s = slab i = interior wall
Point Transmittance	χ	Incremental increase in transmittance for inner wall and slab intersection

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Interior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-24.0 (4.23)	R-19.8 (3.49)	0.050 (0.29)
R-15 (2.64)	R-29.0 (5.11)	R-24.9 (4.38)	0.040 (0.23)

Slab Linear Transmittance

R _s ft ² ·hr·°F / Btu (m ² K / W)	U _s Btu/ft ² ·hr ·°F (W/m ² K)	ψ _s Btu/ft ·hr·°F (W/m K)
R-9.5 (1.67)	0.105 (0.60)	0.476 (0.824)
R-10.7 (1.89)	0.093 (0.53)	0.460 (0.797)

Interior Wall Linear Transmittance

Interior Insulation 1D R-Value (RSI)	R _i ft ² ·hr·°F / Btu (m ² K / W)	U _i Btu/ft ² ·hr ·°F (W/m ² K)	ψ _i Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-10.4 (1.83)	0.097 (0.55)	0.360 (0.622)
R-15 (2.64)	R-10.8 (1.90)	0.093 (0.53)	0.410 (0.710)

Intersection Point Transmittance

R _t ft ² ·hr·°F / Btu (m ² K / W)	U _t Btu/ft ² ·hr ·°F (W/m ² K)	χ ² Btu/ft ·hr·°F (W/K)
R-6.7 (1.19)	0.149 (0.84)	-0.184 (-0.098)
R-7.4 (1.30)	0.136 (0.77)	-0.670 (-0.353)

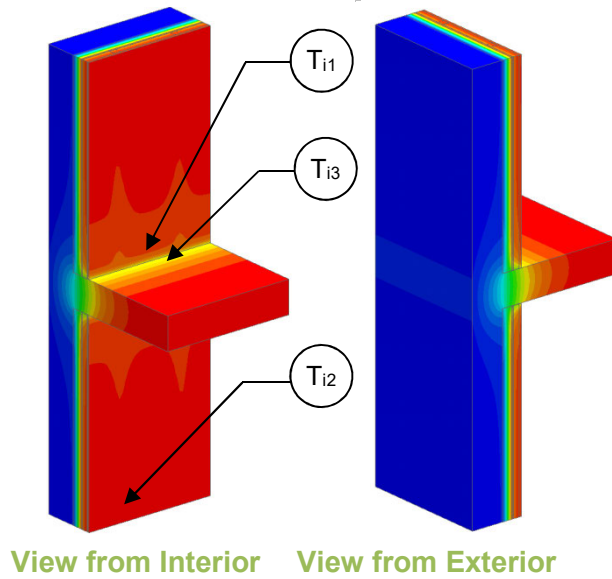
²Values are negative for a correction factor. See section 6 in ASHRAE-1365 RP for clarification.

Temperature Indices

	R10	R15	
T ₁₁	0.04	0.03	Min T on concrete wall, between studs, away from wall and slab
T ₁₂	0.29	0.27	Max T on concrete wall, at corner intersection
T ₁₃	0.27	0.27	Min T on slab, at exterior wall away from intersection

Detail 6.2.5

Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Continuous Concrete Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.9 (0.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

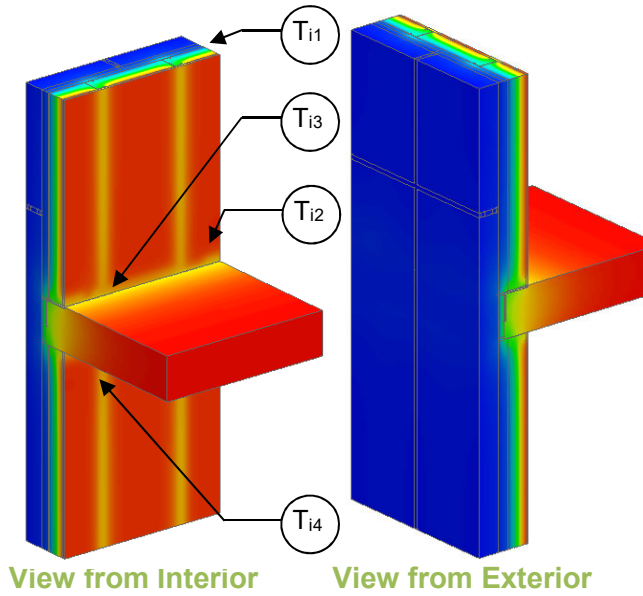
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-13.0 (2.29)	R-12.9 (2.26)	0.078 (0.44)	R-7.7 (1.36)	0.129 (0.74)	0.447 (0.773)

Temperature Indices

T_{i1}	0.84	Min T on insulation away from slab, between studs
T_{i2}	0.87	Max T on insulation away from slab, at studs
T_{i3}	0.57	Min T on slab exposed to interior air, at insulation between studs

Detail 6.2.6

Precast Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c) and Insulation in Stud Cavity – Intermediate Floor Intersection



Thermal Performance Indicators

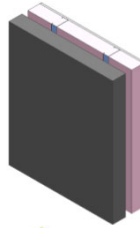
Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance of wall
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab and anchor connections
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

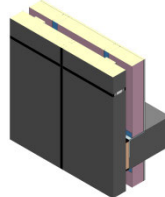
Base Assembly – Wall

R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-14.5 (2.55)	R-8.5 (1.49)	0.118 (0.67)



Slab Linear Transmittance²

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-6.2 (1.09)	0.161 (0.91)	0.286 (0.495)



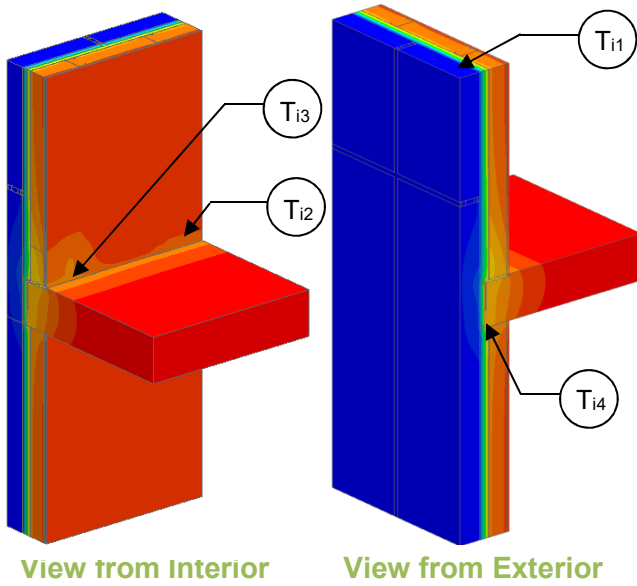
² Panel edges (caulked joints between panels) had negligible linear transmittance effects so values not presented

Temperature Indices

T_{i1}	0.05	Min T on concrete wall, between studs, away from slab
T_{i2}	0.23	Max T on concrete wall, at slot anchor
T_{i3}	0.73	Min T on floor, at gypsum and studs
T_{i4}	0.75	Min T on ceiling, at gypsum and studs

Detail 6.2.7

Precast Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c) and Rigid Insulation Outboard of Studs – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance of wall
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without slab and anchor connections
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

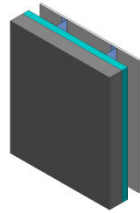


¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Nominal (1D) vs. Assembly Performance Indicators

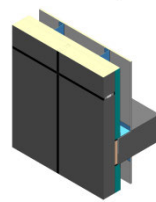
Base Assembly – Wall

R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-13.0 (2.29)	R-12.9 (2.26)	0.078 (0.44)



Slab Linear Transmittance²

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-9.1 (1.60)	0.110 (0.63)	0.218 (0.377)



² Panel edges (caulked joints between panels) had negligible linear transmittance effects so values not presented

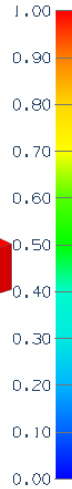
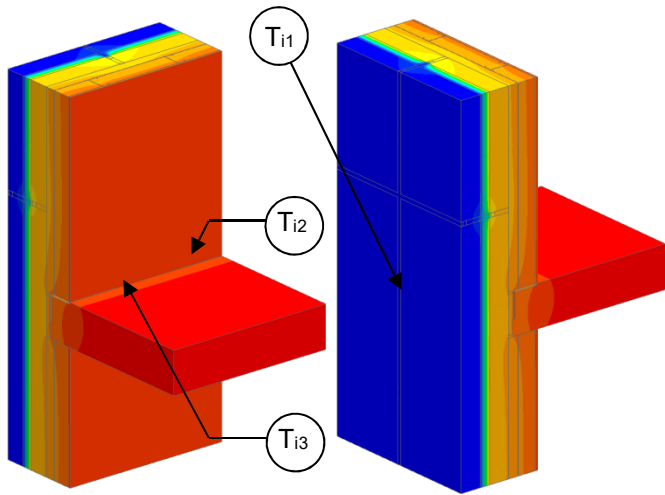
Temperature Indices

T_{i1}	0.04	Min T on concrete wall, between studs, away from slab
T_{i2}	0.31	Max T on concrete wall, at slot anchor connection
T_{i3}	0.80	Min T on floor, at gypsum and gravity anchor
T_{i4}	0.87	Min T on ceiling, at gypsum and studs

Detail 6.2.8

Precast Sandwich Panel Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Intermediate Floor Intersection

Thermal Performance Indicators



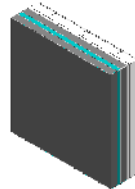
Assembly 1D (Nominal) R-Value	R _{1D}	Nominal Thermal Resistance of wall
Transmittance / Resistance without Anomaly	U _o , R _o	"clear wall" U- and R-value without slab
Transmittance / Resistance	U _j , R _j , U _s , R _s	U and R values for: j = concrete wall with panel joint s = concrete wall panel joint + concrete slab
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ _j , ψ _s	Incremental increase in transmittance per linear length of: j = panel joint s = slab

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

Nominal (1D) vs. Assembly Performance Indicators

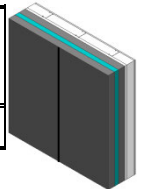
Base Assembly – Wall

R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
R-13.1 (2.30)	R-12.6 (2.22)	0.079 (0.45)



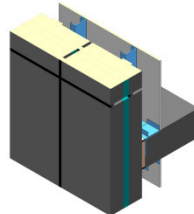
Panel Joint Linear Transmittance

R _j ft ² ·hr·°F / Btu (m ² K / W)	U _j Btu/ft ² ·hr ·°F (W/m ² K)	ψ _j Btu/ft hr °F (W/m K)
R-11.7 (2.05)	0.086 (0.49)	0.026 (0.046)



Slab Linear Transmittance

R _s ft ² ·hr·°F / Btu (m ² K / W)	U _s Btu/ft ² ·hr ·°F (W/m ² K)	ψ _s Btu/ft hr °F (W/m K)
R-8.8 (1.54)	0.114 (0.65)	0.118 (0.205)

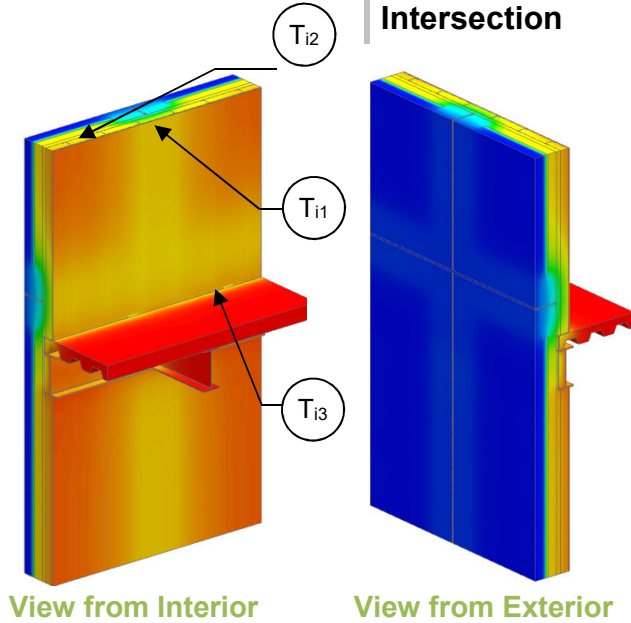


Temperature Indices

T _{i1}	0.73	Min T on interior concrete wall, at panel joints, at slab
T _{i2}	0.82	Max T on concrete wall, at slot anchor
T _{i3}	0.92	Min T in interior surface, at floor/gypsum intersection and anchor

Detail 6.2.9

Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors at 24" o.c. – Intermediate Floor Intersection



Thermal Performance Indicators

1.00	Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
0.90	Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
0.80	Transmittance / Resistance	U, R	U and R-values for the assembly
0.70	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
0.60	Linear Transmittance	ψ	Incremental increase in transmittance per linear length steel framed floor
0.50			
0.40			
0.30			
0.20			
0.10			
0.00			

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

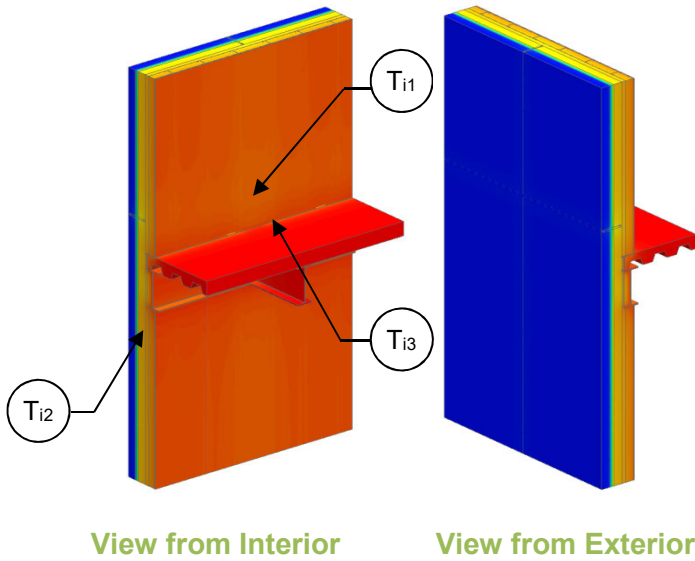
Nominal (1D) vs. Assembly Performance Indicators

Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-13.9 (2.45)	R-4.8 (0.85)	0.207 (1.17)	R-4.7 (0.83)	0.213 (1.21)	0.085 (0.146)

Temperature Indices

T_{i1}	0.31	Min T on sandwich panel, at intersection of concrete edges
T_{i2}	0.83	Max T on sandwich panel, at centre of panel away from concrete edges
T_{i3}	0.77	Min T on slab, at drywall intersection near slab angle

Detail 6.2.10 Precast Sandwich Panel Wall Assembly with Steel Connectors at 16" o.c. – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length steel framed floor

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

Nominal (1D) vs. Assembly Performance Indicators

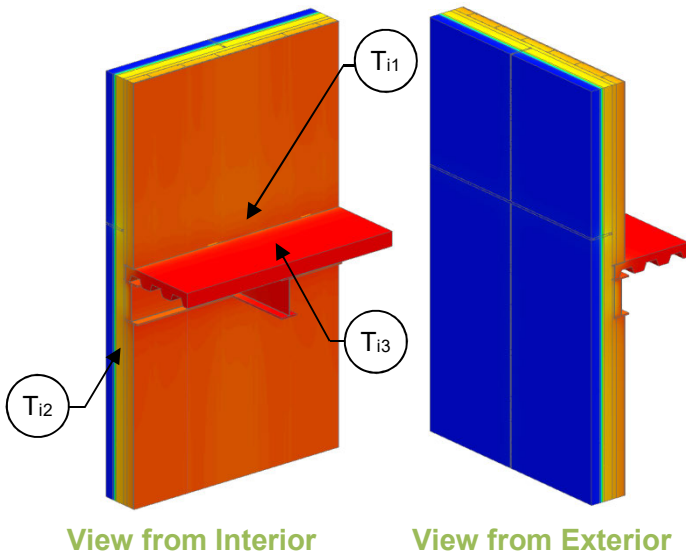
Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-13.9 (2.45)	R-11.3 (1.99)	0.088 (0.50)	R-11.2 (1.97)	0.089 (0.51)	0.013 (0.022)

Temperature Indices

T_{i1}	0.77	Min T on sandwich panel, at corner of sandwich panel
T_{i2}	0.88	Max T on sandwich panel, at centre of panel along top track of bottom wall
T_{i3}	0.93	Min T on slab, at drywall intersection near steel slab angle

Detail 6.2.11

Precast Sandwich Panel Wall Assembly with Steel Connectors at 36" o.c. – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length steel framed floor

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

Nominal (1D) vs. Assembly Performance Indicators

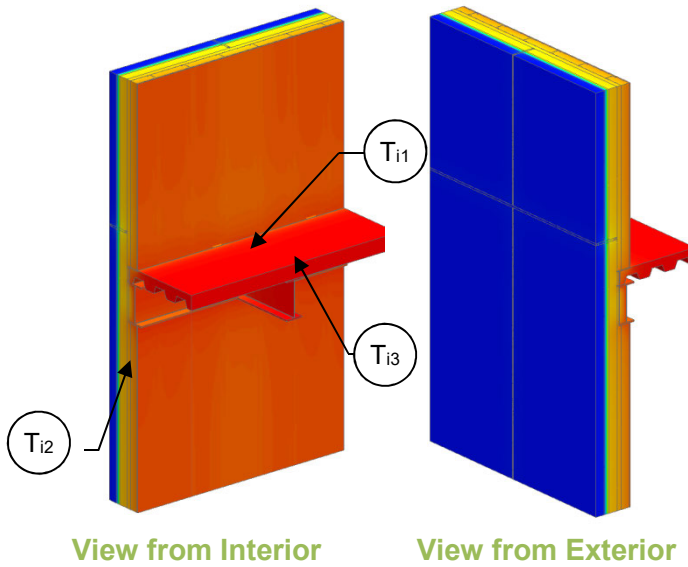
Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-13.9 (2.45)	R-11.6 (2.04)	0.086 (0.49)	R-11.4 (2.00)	0.088 (0.50)	0.026 (0.046)

Temperature Indices

T_{i1}	0.77	Min T on sandwich panel, at corner of sandwich panel
T_{i2}	0.88	Max T on sandwich panel, at centre of panel at top track of bottom wall
T_{i3}	0.93	Min T on slab, at drywall intersection near steel slab angle

Detail 6.2.12

Precast Sandwich Panel Wall Assembly with Steel Connectors at 48" o.c. – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length steel framed floor

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

Nominal (1D) vs. Assembly Performance Indicators

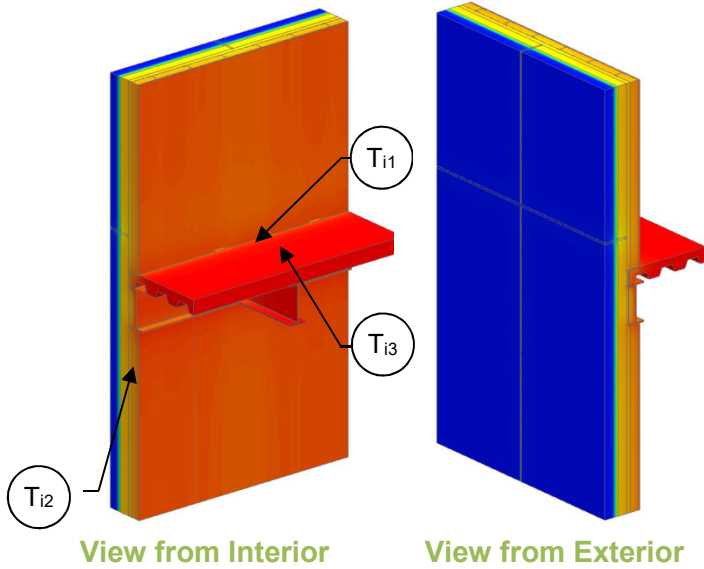
Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·oF / Btu (m ² K / W)	U Btu/ft ² ·hr ·oF (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-13.9 (2.45)	R-11.8 (2.07)	0.085 (0.48)	R-11.6 (2.05)	0.086 (0.49)	0.012 (0.022)

Temperature Indices

T_{i1}	0.78	Min T on sandwich panel, at corner of sandwich panels
T_{i2}	0.88	Max T on sandwich panel, at centre of panel along top track of bottom wall
T_{i3}	0.93	Min T on slab, at drywall intersection near steel slab angle

Detail 6.2.13

Precast Sandwich Panel Wall Assembly with Fiber-Reinforced Composite Connectors at 16" o.c. – Intermediate Floor Intersection



Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length steel framed floor

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

Nominal (1D) vs. Assembly Performance Indicators

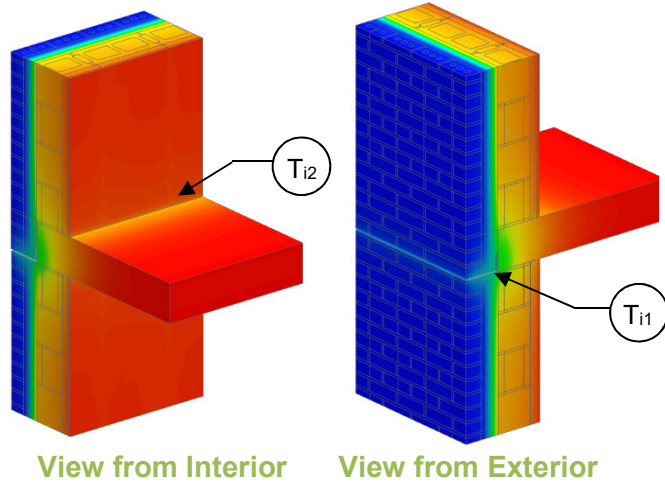
Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-13.9 (2.45)	R-11.3 (1.99)	0.088 (0.50)	R-11.2 (1.98)	0.089 (0.51)	0.011 (0.018)

Temperature Indices

T_{i1}	0.77	Min T on sandwich panel, at corner of sandwich panels
T_{i2}	0.88	Max T on sandwich panel, at centre of panel along top track of bottom wall
T_{i3}	0.93	Min T on slab, at drywall intersection near steel slab angle

Detail 6.2.14

Exterior Insulated Concrete Block Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-5.6 (0.98 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab and shelf angle
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of shelf angle and slab

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

Nominal (1D) vs. Assembly Performance Indicators

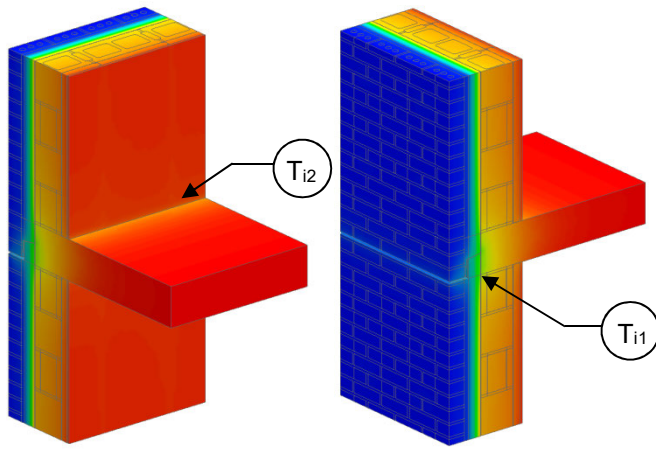
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-10.6 (1.86)	R-10.4 (1.83)	0.096 (0.55)	R-7.4 (1.30)	0.135 (0.77)	0.236 (0.408)
R-10 (1.76)	R-15.6 (2.74)	R-14.2 (2.50)	0.070 (0.40)	R-8.8 (1.56)	0.113 (0.64)	0.258 (0.446)
R-15 (2.64)	R-20.6 (3.62)	R-17.8 (3.13)	0.056 (0.32)	R-9.9 (1.75)	0.101 (0.57)	0.268 (0.464)
R-20 (3.52)	R-25.6 (4.50)	R-20.8 (3.66)	0.048 (0.27)	R-10.8 (1.90)	0.093 (0.53)	0.270 (0.467)
R-25 (4.40)	R-30.6 (5.38)	R-23.7 (4.17)	0.042 (0.24)	R-11.5 (2.03)	0.087 (0.49)	0.268 (0.463)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.47	0.51	0.57	Min T on exterior face of concrete blocks at air-filled blocks, at bottom of slab
T_{i2}	0.82	0.84	0.86	Min T on interior surfaces, at floor/gypsum intersection, at studs

Detail 6.2.15

Exterior Insulated Concrete Block Wall Assembly with Stand-Off Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection



View from Interior View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R- 5.6 (0.98 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab and shelf angle
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of shelf angle and slab

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

Nominal (1D) vs. Assembly Performance Indicators

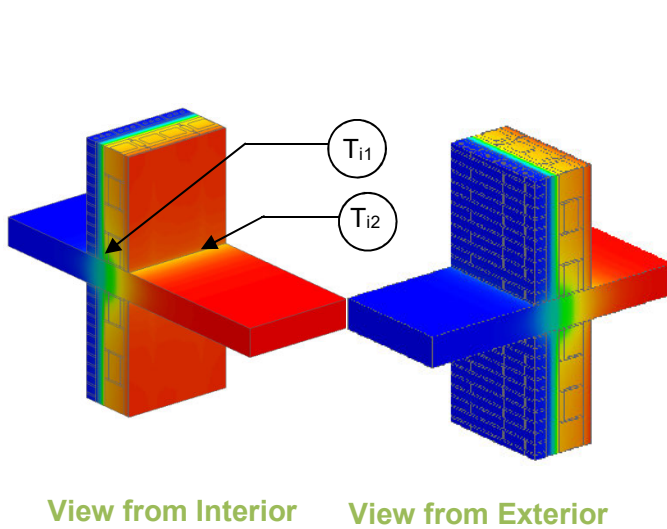
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-10.6 (1.86)	R-10.4 (1.83)	0.096 (0.55)	R-8.1 (1.42)	0.124 (0.70)	0.167 (0.289)
R-10 (1.76)	R-15.6 (2.74)	R-14.2 (2.50)	0.070 (0.40)	R-9.9 (1.74)	0.101 (0.57)	0.186 (0.322)
R-15 (2.64)	R-20.6 (3.62)	R-17.8 (3.13)	0.056 (0.32)	R-11.5 (2.02)	0.087 (0.49)	0.186 (0.322)
R-20 (3.52)	R-25.6 (4.50)	R-20.8 (3.66)	0.048 (0.27)	R-12.9 (2.27)	0.078 (0.44)	0.178 (0.307)
R-25 (4.40)	R-30.6 (5.38)	R-23.7 (4.17)	0.042 (0.24)	R-14.3 (2.51)	0.070 (0.40)	0.168 (0.290)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.54	0.58	0.64	Min T on exterior face of concrete blocks, at air-filled blocks, at bottom of slab
T_{i2}	0.84	0.87	0.89	Min T on interior surfaces, on floor/gypsum intersection, at studs

Detail 6.2.16

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R- 5.6 (0.98 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o R_o	“clear wall” U- and R-value without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

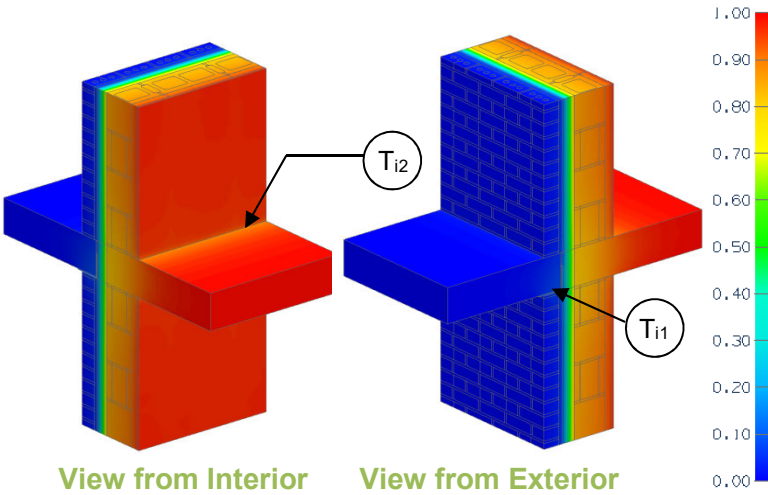
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-10.6 (1.86)	R-10.4 (1.83)	0.096 (0.55)	R-6.64 (1.17)	0.151 (0.86)	0.327 (0.565)
R-10 (1.76)	R-15.6 (2.74)	R-14.2 (2.50)	0.070 (0.40)	R-7.77 (1.37)	0.129 (0.73)	0.350 (0.606)
R-15 (2.64)	R-20.6 (3.62)	R-17.8 (3.13)	0.056 (0.32)	R-8.71 (1.53)	0.155 (0.65)	0.352 (0.609)
R-20 (3.52)	R-25.6 (4.50)	R-20.8 (3.66)	0.048 (0.27)	R-9.43 (1.66)	0.106 (0.60)	0.348 (0.603)
R-25 (4.40)	R-30.6 (5.38)	R-23.7 (4.17)	0.042 (0.24)	R-10.43 (1.84)	0.096 (0.54)	0.322 (0.558)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.42	0.49	0.55	Min T on exterior face of concrete blocks, at top of slab, at air filled blocks
T_{i2}	0.78	0.82	0.83	Min T on interior surfaces, at floor/gypsum intersection, at studs

Detail 6.2.17

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Angle Supported Slab & Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R- 5.6 (0.98 RSI) + Exterior Insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without balcony slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

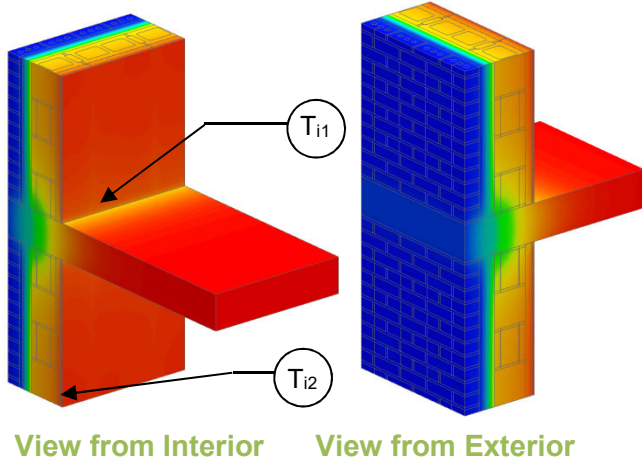
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-10.6 (1.86)	R-10.4 (1.83)	0.096 (0.55)	R-8.4 (1.47)	0.120 (0.68)	0.140 (0.243)
R-15 (2.64)	R-20.6 (3.62)	R-17.8 (3.13)	0.056 (0.32)	R-13.0 (2.28)	0.077 (0.44)	0.126 (0.218)
R-25 (4.40)	R-30.6 (5.38)	R-23.7 (4.17)	0.042 (0.24)	R-16.2 (2.84)	0.062 (0.35)	0.118 (0.205)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.55	0.65	0.70	Min T on exterior face of concrete blocks, at bottom of slab, at slab angle supports
T_{i2}	0.85	0.89	0.91	Min T on interior surfaces, at floor/gypsum intersection, at studs

Detail 6.2.18

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony



Thermal Performance Indicators

1.00		Assembly 1D (Nominal) R-Value	R_{1D}	R- 5.6 (0.98 RSI) + exterior insulation
0.90		Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab
0.80		Transmittance / Resistance	U, R	U- and R-values for overall assembly
0.70		Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
0.60		Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab
0.50				
0.40				
0.30				
0.20				
0.10				
0.00				

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

Nominal (1D) vs. Assembly Performance Indicators

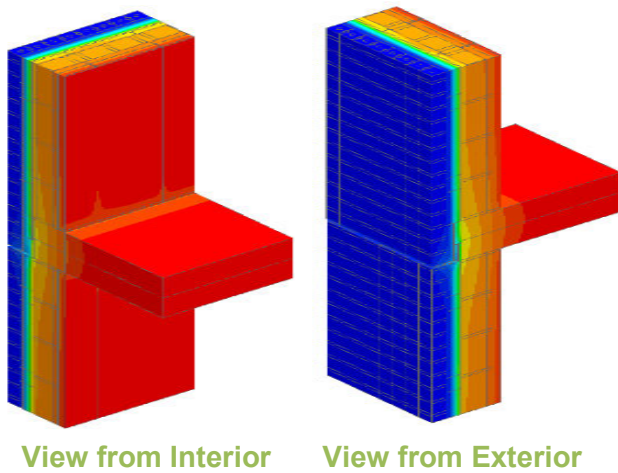
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-10.6 (1.86)	R-10.4 (1.83)	0.096 (0.55)	R-6.5 (1.14)	0.154 (0.88)	0.348 (0.602)
R-10 (1.76)	R-15.6 (2.74)	R-14.2 (2.50)	0.070 (0.40)	R-7.6 (1.34)	0.131 (0.75)	0.367 (0.636)
R-15 (2.64)	R-20.6 (3.62)	R-17.8 (3.13)	0.056 (0.32)	R-8.5 (1.50)	0.117 (0.67)	0.368 (0.636)
R-20 (3.52)	R-25.6 (4.50)	R-20.8 (3.66)	0.048 (0.27)	R-9.2 (1.61)	0.109 (0.62)	0.367 (0.636)
R-25 (4.40)	R-30.6 (5.38)	R-23.7 (4.17)	0.042 (0.24)	R-9.9 (1.75)	0.101 (0.57)	0.351 (0.607)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.39	0.48	0.53	Min T on exterior face of concrete blocks, at top of slab, at air filled blocks
T_{i2}	0.77	0.81	0.83	Min T on interior surfaces, at floor/gypsum intersection, at studs

Detail 6.2.19

Exterior Insulated Concrete Block Wall Assembly with Thermally Broken Shelf Angle & Brick Ties Supporting Brick Veneer – Slab Intersection



Thermal Performance Indicators

1.00	Assembly 1D (Nominal) R-Value	R_{1D}	R-5.6 (0.98 RSI) + exterior insulation
0.90	Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value without slab and shelf angle
0.80	Transmittance / Resistance	U, R	U- and R-values for overall assembly
0.70	Surface Temperature Index	T_i	0 = exterior temperature 1 = interior temperature
0.60	Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of slab with shelf angle
0.50			
0.40			
0.30			
0.20			
0.10			
0.00			

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

Scenario

Scenario	Flashing and Shelf Angle
1	Self-Adhered Membrane Flashing with Steel Shelf Angle and Bolts
2	Self-Adhered Membrane Flashing with Stainless Steel Shelf Angle and Bolts

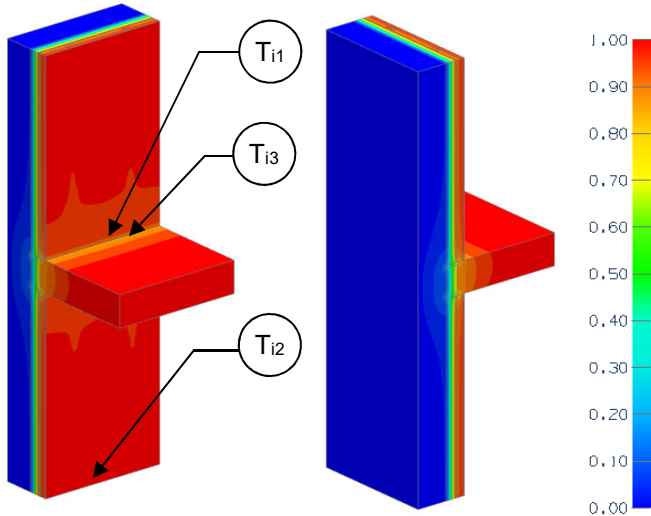
Nominal (1D) vs. Assembly Performance Indicators

Scenario	Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	Ψ Btu/ft hr °F (W/m K)
1	R-15 (2.64)	R-20.6 (3.62)	R-17.8 (3.13)	0.056 (0.32)	R-13.6 (2.39)	0.074 (0.42)	0.108 (0.186)
2	R-15 (2.64)	R-20.6 (3.62)	R-17.8 (3.13)	0.056 (0.32)	R-14.4 (2.53)	0.070 (0.39)	0.082 (0.141)

Detail 6.2.20

Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Isokorb Rutherford DF Thermally Broken Concrete Intermediate Floor Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.9 (0.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

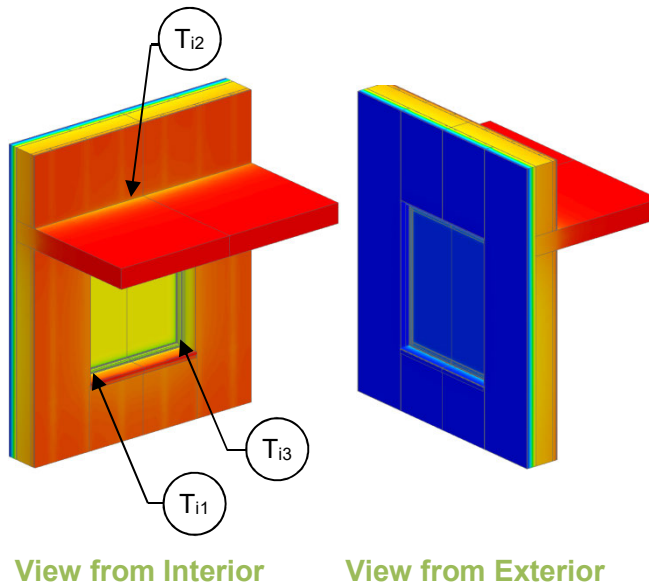
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-13.0 (2.29)	R-12.9 (2.26)	0.078 (0.44)	R-10.1 (1.78)	0.099 (0.56)	0.179 (0.310)

Temperature Indices

T_{i1}	0.84	Min T on insulation away from slab, between studs
T_{i2}	0.87	Max T on insulation away from slab, at studs
T_{i3}	0.70	Min T on slab exposed to interior air, at insulation between studs

Detail 6.3.1

Exterior Insulated Concrete Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w , R_w , U_g	“clear wall” U- and R-value: w = wall without slab g = glazing
Transmittance / Resistance	U_s , R_s , U_t , R_t	U and R-values for s = wall + slab t = combined wall + slab + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ_s , Ψ_g	Incremental increase in transmittance per linear length of: s = slab g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Concrete Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)

Base Assembly - Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Slab Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	Ψ_s Btu/ft ² ·hr·°F (W/m ² K)
R-15 (2.64)	R-17.1 (3.02)	0.058 (0.33)	0.013 (0.023)

Window Transition Linear Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	Ψ_g^2 Btu/ft hr °F (W/m K)
R-5.6 (0.98)	0.179 (1.02)	0.177 (0.307)

Temperature Indices

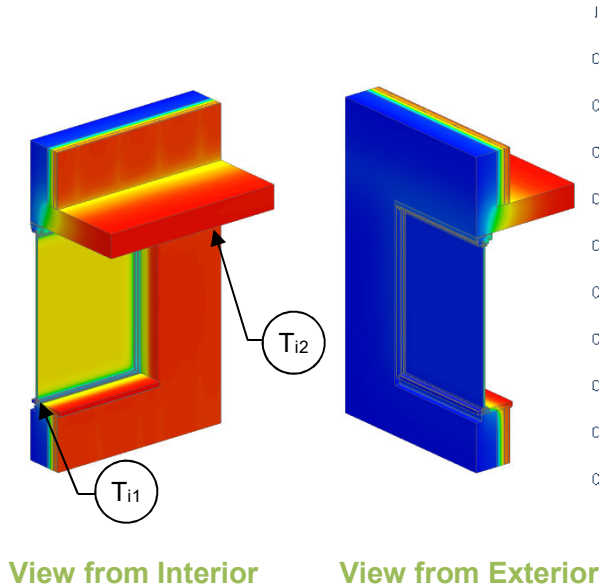
T_{i1}	0.73	Min T on concrete interior surface, below window sill between studs
T_{i2}	0.89	Max T on concrete, at floor slab intersection away from window
T_{i3}	0.60	Min T on window frame, at corner of glass

²F for the linear transmittance, use the window perimeter

Detail 6.3.2

Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Window & Intermediate Floor Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.9 (0.5 RSI) + interior insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	"clear wall" U- and R-value: w = concrete wall without slab g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for: s = wall + slab t = combined wall + slab + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of: s = slab g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Concrete Clear Wall

Interior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-10 (1.76)	R-13.0 (2.29)	R-12.9 (2.26)	0.078 (0.44)
R-15 (2.64)	R-18.0 (3.17)	R-17.9 (3.14)	0.056 (0.32)

Slab Linear Transmittance

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ_s Btu/ft ² ·hr·°F (W/m ² K)
R-7.3 (1.29)	0.137 (0.78)	0.514 (0.889)
R-8.4 (1.49)	0.119 (0.647)	0.545 (0.943)

Window Transition Linear Transmittance

Interior Insulation 1D R-Value (RSI)	Without Steel Sheet Connected to Studs			With Steel Sheet Connected to Studs		
	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	ψ_g^2 Btu/ft ² ·hr·°F (W/m K)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	ψ_g^2 Btu/ft ² ·hr·°F (W/m K)
R-10 (1.76)	R-3.5 (0.62)	0.285 (1.62)	0.144 (0.248)	R-3.4 (0.6)	0.292 (1.66)	0.170 (0.294)
R-15 (2.64)	R-3.7 (0.65)	0.272 (1.54)	0.158 (0.273)	R-3.6 (0.63)	0.279 (1.58)	0.186 (0.322)

²For the linear transmittance, use the window perimeter

Temperature Indices

	Without Sheet		With Sheet		
	R10	R15	R10	R15	
T_{i1}	0.24	0.24	0.29	0.28	Min T on window frame, at bottom middle of glazing
T_{i2}	0.07	0.05	0.07	0.05	Min T on concrete, away from window slab and studs

Base Assembly - Glazing

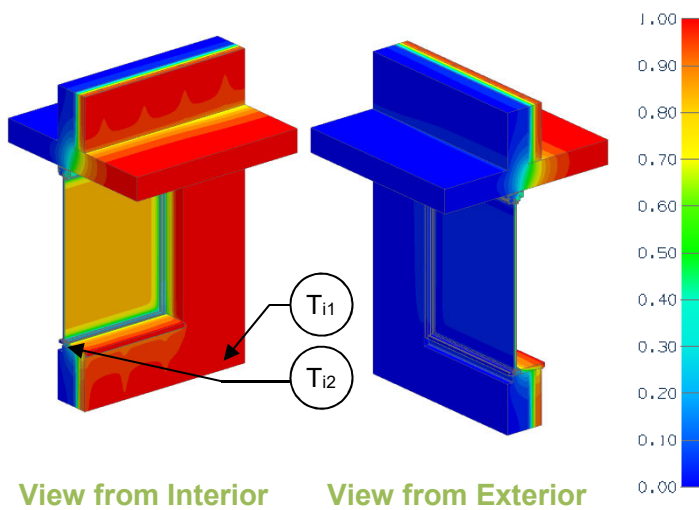
$U_{\text{centre of glass}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)



Detail 6.3.3

Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Window & Projected Slab Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.9 (0.51 RSI) + interior insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value: w = concrete wall without slab g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for: s = wall + slab t = combined wall + slab + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_h, \Psi_j, \Psi_l, \Psi_g, \Psi_s$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing s = slab

View from Interior

View from Exterior

Scenario

Base Assembly – Glazing

Scenario	Sill Sheet Steel
A, B	None
C, D	Yes

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

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

Nominal (1D) vs. Assembly Performance Indicators

Window Transition Transmittance

Scenario	Interior Insulation 1D R-Value (RSI)	R_t ft ² · hr · °F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² K)	Ψ_h Btu/ft · hr · °F (W/m K)	Ψ_l Btu/ft · hr · °F (W/m K)	Ψ_j Btu/ft · hr · °F (W/m K)	Ψ_g Btu/ft · hr · °F (W/m K)
A	R-10 (1.76)	R-3.5 (0.62)	0.283 (1.61)	0.091 (0.158)	0.084 (0.145)	0.217 (0.376)	0.143 (0.248)
B	R-15 (2.64)	R-3.7 (0.65)	0.270 (1.53)	0.129 (0.224)	0.094 (0.163)	0.224 (0.388)	0.160 (0.277)
C	R-10 (1.76)	R-3.5 (0.61)	0.290 (1.65)	0.091 (0.158)	0.176 (0.305)	0.217 (0.376)	0.170 (0.293)
D	R-15 (2.64)	R-3.6 (0.64)	0.277 (1.57)	0.129 (0.224)	0.192 (0.333)	0.224 (0.388)	0.188 (0.325)

Base Assembly – Concrete Clear Wall

Interior Insulation 1D R-Value (RSI)	R_{1D} ft ² · hr · °F / Btu (m ² K / W)	R_w ft ² · hr · °F / Btu (m ² K / W)	U_w Btu/ft ² · hr · °F (W/m ² K)
R-10 (1.76)	R-12.9 (2.28)	R-12.3 (2.16)	0.077 (0.44)
R-15 (2.64)	R-17.9 (3.16)	R-17.3 (3.05)	0.056 (0.32)

Slab Linear Transmittance

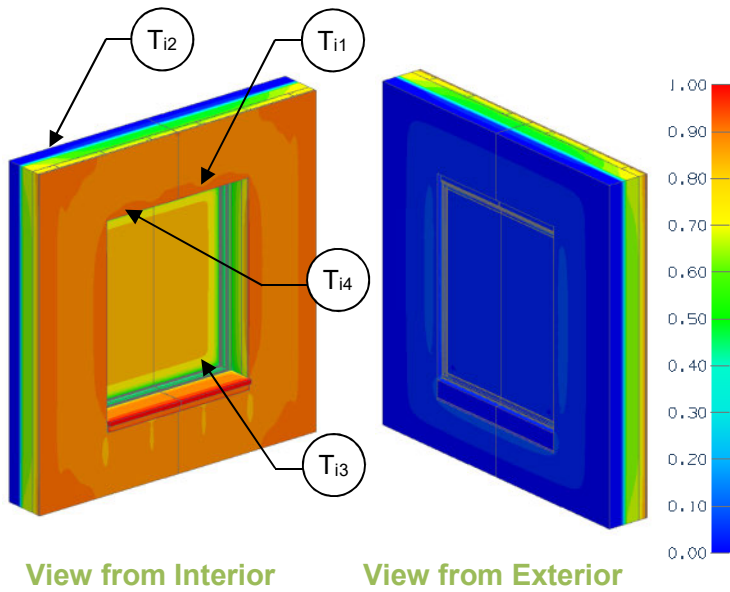
R_s ft ² · hr · °F / Btu (m ² K / W)	U_s Btu/ft ² · hr · °F (W/m ² K)	Ψ_s Btu/ft ² · hr · °F (W/m ² K)
R-7.4 (1.3)	0.135 (0.77)	0.499 (0.864)
R-9.1 (1.6)	0.110 (0.63)	0.471 (0.815)

Temperature Indices

	A	B	C	D	
T_{i1}	0.07	0.05	0.07	0.05	Min T on concrete, away from window slab and studs
T_{i2}	0.29	0.28	0.23	0.23	Min T on window frame, at bottom middle of glazing

Detail 6.3.4

Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors (24" o.c.) - Window Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_w , R_w , U_g	“clear wall” U- and R-value: w = sandwich panel wall g = glazing
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Precast Clear Wall

Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.9 (2.45)	R-4.8 (0.85)	0.207 (1.17)

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Window Transition Linear Transmittance

Sandwich Panel Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	Ψ^2 Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-1.9 (0.33)	0.536 (3.04)	0.611 (1.058)

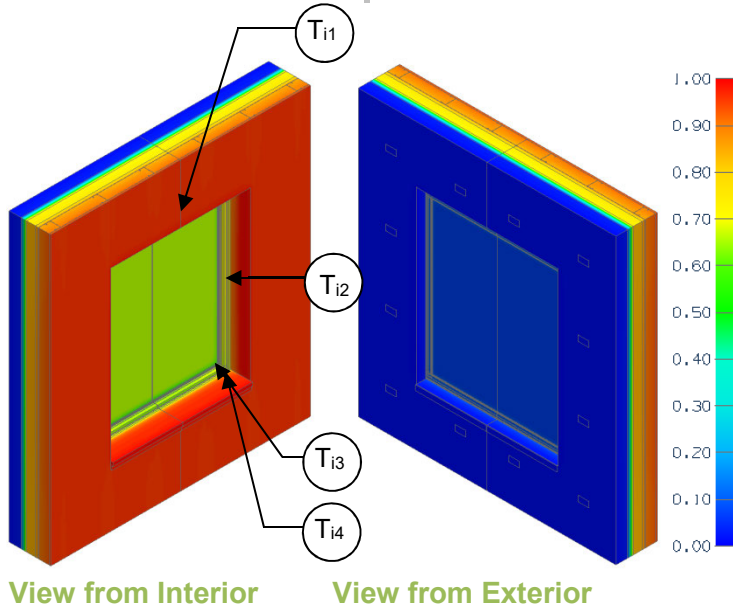
²For the linear transmittance, use the window perimeter

Temperature Indices

T_{i1}	0.45	Min T on sandwich panel, at concrete edge next to window opening
T_{i2}	0.69	Max T on sandwich panel, at centre of panel away from concrete edges
T_{i3}	0.43	Min T on glazing, at corner of window frame
T_{i4}	0.40	Min T on window frame, at window head

Detail 6.3.5

Precast Sandwich Panel Wall Assembly with 3 5/8" Steel Stud (16" O.C.) – Window Intersection



Thermal Performance Indicators

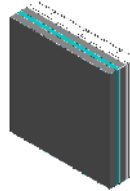
Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance wall
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value: w = sandwich panel wall g = glazing
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-13.1 (2.30)	R-12.6 (2.22)	0.079 (0.45)



Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Window Point and Linear Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ^2 Btu/ft hr °F (W/m K)
R-10.9 (1.92)	0.091 (0.52)	0.028 (0.048)

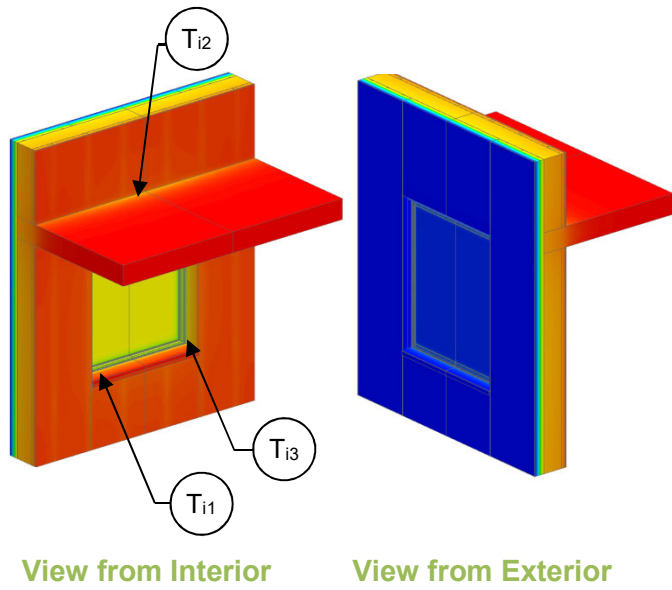
²For linear transmittance, use window perimeter for length

Temperature Indices

T_{i1}	0.82	Min T on concrete wall, centered above window head
T_{i2}	0.86	Max T on concrete wall, at steel stud and window frame
T_{i3}	0.59	Min T on window frame, at bottom corner
T_{i4}	0.56	Min T on window glass, in lower corner

Detail 6.3.6

Exterior Insulated Concrete Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w , R_w , U_g	“clear wall” U- and R-value: w = wall without slab g = glazing
Transmittance / Resistance	U_s , R_s , U_t , R_t	U and R-values for: s = wall + slab t = combined wall + slab + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s , ψ_g	Incremental increase in transmittance per linear length of s = slab g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Concrete Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)

Base Assembly - Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Slab Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-17.1 (3.02)	0.058 (0.33)	0.013 (0.023)

Window Transition Linear Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ_g^2 Btu/ft hr °F (W/m K)
R-6.1 (1.07)	0.164 (0.93)	0.106 (0.184)

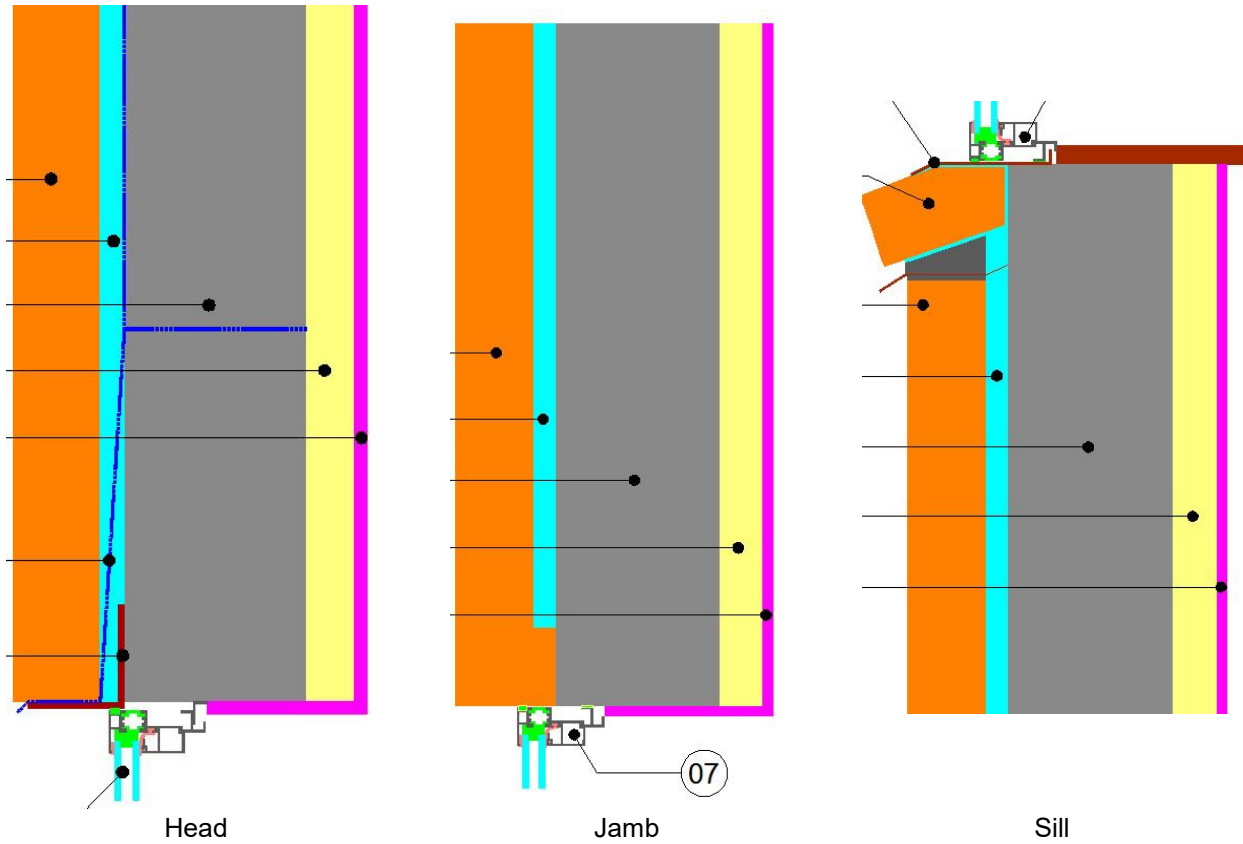
Temperature Indices

T_{i1}	0.82	Min T on concrete interior surface, below window sill between studs
T_{i2}	0.91	Max T on concrete, at floor slab intersection away from window
T_{i3}	0.59	Min T on window frame, at corner of glass

²For the linear transmittance, use the window perimeter

Detail 6.3.7 Interior Insulated Concrete Block or Concrete Wall Assembly with Brick Cladding - Window Intersection

Detail referenced from work done by Passive House Academy

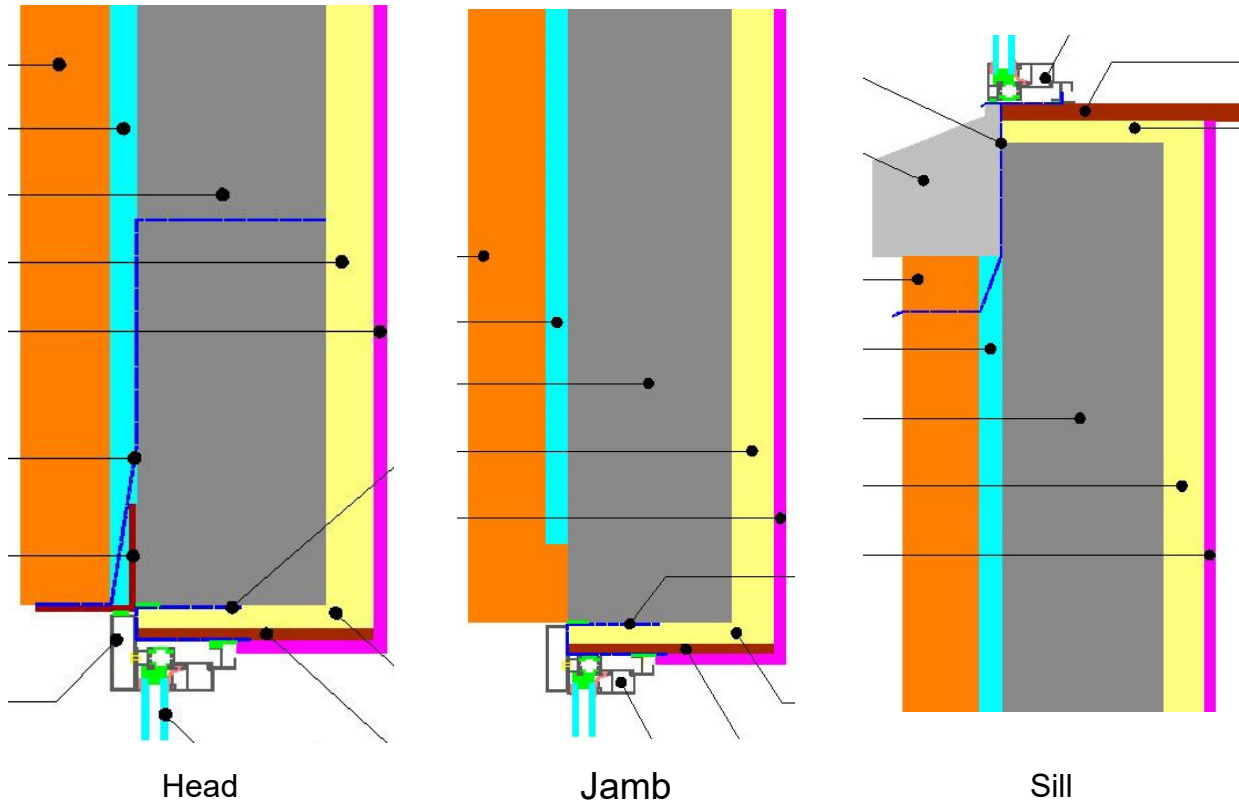


Thermal Performance

Condition	Clear Wall R-Value ft ² ·hr·°F / Btu (m ² K / W)	Clear Wall U-Value Btu/ ft ² ·hr·°F (W/m ² K)	Linear Transmittance (Ψ) Btu/hr ft °F (W/m K)
Wall Clear Field	R-16.0 (2.85)	0.063 (0.351)	-
Typical Jamb			0.308 (0.533)
Typical Head			0.315 (0.546)
Typical Sill			0.322 (0.558)
Typical Overall Window			0.313 (0.543)

Detail 6.3.8 Interior Insulated Concrete Block or Concrete Wall Assembly with Brick Cladding - Window Intersection Aligned with Insulation

Detail referenced from work done by Passive House Academy



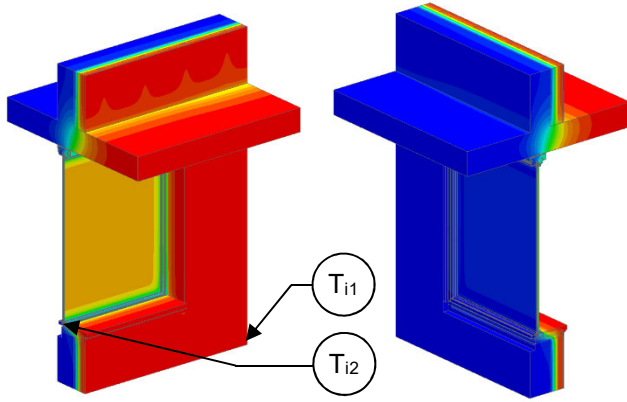
Thermal Performance

Condition	Clear Wall R-Value ft ² ·hr·°F / Btu (m ² K / W)	Clear Wall U-Value Btu / ft ² ·hr·°F (W/m ² K)	Linear Transmittance (Ψ) Btu/hr ft °F (W/m K)
Wall Clear Field	R-16.0 (2.85)	0.063 (0.351)	-
Aligned Jamb			0.079 (0.136)
Aligned Head			0.086 (0.149)
Aligned Sill			0.088 (0.152)
Aligned Overall Window			0.083 (0.143)

Detail 6.3.9

Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Window & Projected Slab Intersection with Plywood and Insulation Liner

Thermal Performance Indicators



View from Interior

View from Exterior



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.9 (0.51 RSI) + interior insulation
Transmittance / Resistance	U_t, R_t	U and R-values for: t = combined wall + slab + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance ²	$\psi_h, \psi_j, \psi_l, \psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP
²For performance of base assembly and slab linear transmittances, refer to Detail 6.3.3

Scenario

Scenario	Liner Insulation
A, B	None
C, D	R-5 (0.88)

Nominal (1D) vs. Assembly Performance Indicators

Window Transition Transmittance

Scenario	Interior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	ψ_h Btu/ft·hr·°F (W/m K)	ψ_l Btu/ft·hr·°F (W/m K)	ψ_j Btu/ft·hr·°F (W/m K)	ψ_g Btu/ft·hr·°F (W/m K)
A	R-10 (1.76)	R-3.6 (0.64)	0.275 (1.56)	0.091 (0.158)	0.066 (0.114)	0.155 (0.268)	0.111 (0.192)
B	R-15 (2.64)	R-3.8 (0.67)	0.263 (1.49)	0.129 (0.224)	0.088 (0.152)	0.160 (0.277)	0.131 (0.226)
C	R-10 (1.76)	R-3.8 (0.66)	0.265 (1.51)	0.091 (0.158)	0.046 (0.079)	0.076 (0.131)	0.072 (0.124)
D	R-15 (2.64)	R-4.0 (0.70)	0.253 (1.43)	0.129 (0.224)	0.066 (0.113)	0.080 (0.139)	0.090 (0.156)

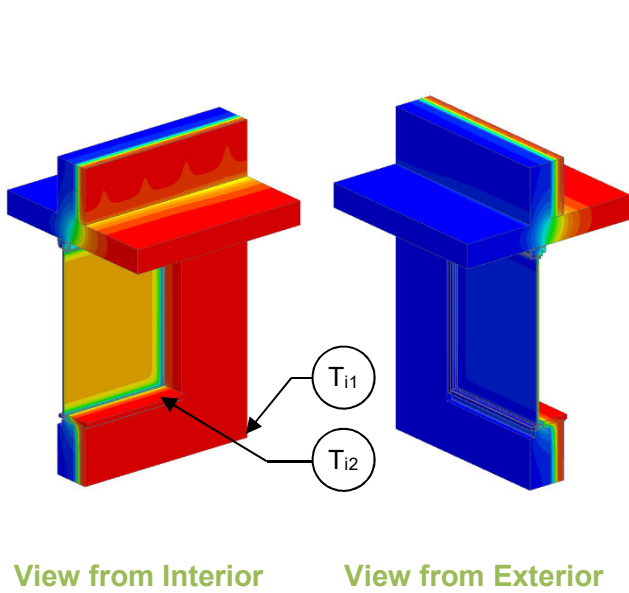
Temperature Indices

	A	B	C	D	
T_{i1}	0.06	0.05	0.06	0.05	Min T on concrete, away from window slab and studs
T_{i2}	0.28	0.29	0.31	0.32	Min T on window frame, at bottom middle of glazing

Detail 6.3.10

Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Window & Projected Slab Intersection with Wall Insulation Wrapped into Opening

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.9 (0.51 RSI) + interior insulation
Transmittance / Resistance	U_t, R_t	U and R-values for: t = combined wall + slab + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance ²	$\psi_h, \psi_j, \psi_l, \psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP
²For performance of base assembly and slab linear transmittances, refer to Detail 6.3.3

Scenario

Scenario	Sill Shim Insulation
A, B, C, D	None
E, F, G, H	Yes

Nominal (1D) vs. Assembly Performance Indicators

Window Transition Transmittance

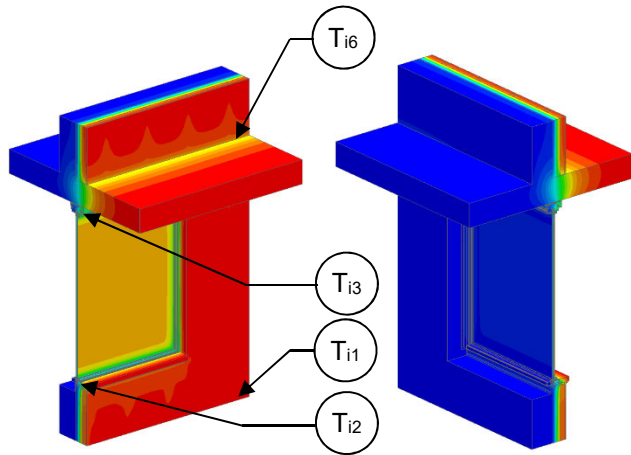
	Interior Insulation 1D R-Value (RSI)	Opening Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	ψ_h Btu/ft·hr·°F (W/m K)	ψ_l Btu/ft·hr·°F (W/m K)	ψ_j Btu/ft·hr·°F (W/m K)	ψ_g Btu/ft·hr·°F (W/m K)
A	R-10 (1.76)	R-5 (0.88)	R-3.7 (0.65)	0.272 (1.55)	0.091 (0.158)	0.129 (0.223)	0.087 (0.151)	0.100 (0.174)
B	R-15 (2.64)		R-3.9 (0.68)	0.259 (1.47)	0.129 (0.224)	0.142 (0.246)	0.091 (0.157)	0.116 (0.201)
C	R-10 (1.76)	R-10 (1.76)	R-3.7 (0.66)	0.268 (1.52)	0.091 (0.158)	0.085 (0.146)	0.073 (0.127)	0.082 (0.141)
D	R-15 (2.64)		R-3.9 (0.69)	0.254 (1.44)	0.129 (0.224)	0.086 (0.149)	0.076 (0.132)	0.094 (0.163)
E	R-10 (1.76)	R-5 (0.88)	R-3.7 (0.65)	0.270 (1.54)	0.091 (0.158)	0.100 (0.172)	0.087 (0.151)	0.092 (0.159)
F	R-15 (2.64)		R-3.9 (0.68)	0.257 (1.46)	0.129 (0.224)	0.113 (0.196)	0.091 (0.157)	0.108 (0.187)
G	R-10 (1.76)	R-10 (1.76)	R-3.8 (0.66)	0.266 (1.51)	0.091 (0.158)	0.054 (0.093)	0.073 (0.127)	0.073 (0.126)
H	R-15 (2.64)		R-4.0 (0.70)	0.252 (1.43)	0.129 (0.224)	0.057 (0.099)	0.076 (0.132)	0.086 (0.149)

Temperature Indices

	A	B	C	D	E	F	G	H	
T_{i1}	0.06	0.05	0.06	0.05	0.06	0.05	0.06	0.05	Min T on concrete, away from window slab and studs
T_{i2}	0.26	0.25	0.26	0.25	0.30	0.29	0.29	0.28	Min T on window frame, at bottom corner

Detail 6.3.11

Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Window & Projected Slab Intersection – Plywood Liner and Glazing Aligned with Wall Insulation



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.9 (0.51 RSI) + interior insulation
Transmittance / Resistance	U_t, R_t	U and R-values for: t = combined wall + slab + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance ²	$\psi_h, \psi_j, \psi_l, \psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

¹Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP
²For performance of base assembly and slab linear transmittances, refer to Detail 6.3.3

Scenario

Scenario	Sill Shim Insulation
A, B	None
C, D	Yes

Nominal (1D) vs. Assembly Performance Indicators

Window Transition Transmittance

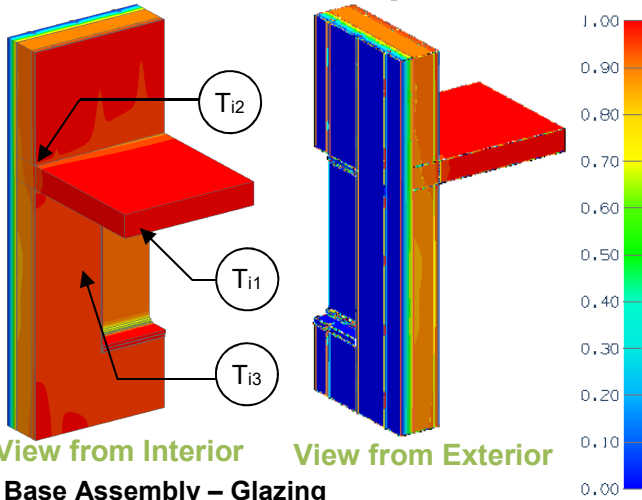
Scenario	Interior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	ψ_h Btu/ft·hr·°F (W/m K)	ψ_l Btu/ft·hr·°F (W/m K)	ψ_j Btu/ft·hr·°F (W/m K)	ψ_g Btu/ft·hr·°F (W/m K)
A	R-10 (1.76)	R-3.8 (0.68)	0.261 (1.48)	0.052 (0.09)	0.068 (0.118)	0.044 (0.076)	0.053 (0.092)
B	R-15 (2.64)	R-4.1 (0.72)	0.246 (1.39)	0.080 (0.139)	0.061 (0.106)	0.051 (0.088)	0.062 (0.107)
C	R-10 (1.76)	R-3.9 (0.69)	0.255 (1.45)	0.052 (0.090)	-0.004 (-0.007)	0.044 (0.076)	0.033 (0.056)
D	R-15 (2.64)	R-4.2 (0.73)	0.240 (1.36)	0.080 (0.139)	-0.023 (-0.040)	0.051 (0.088)	0.038 (0.066)

Temperature Indices

	A	B	C	D	
T_{i1}	0.05	0.04	0.04	0.03	Min T on concrete, away from window slab and studs
T_{i2}	-	-	0.47	0.47	Min T on window frame, at bottom middle of glazing
T_{i3}	0.39	0.39	-	-	Min T on window frame, at top middle of glazing

Detail 6.3.12

Exterior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Stud (16" o.c.) and Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Window & Intermediate Floor Intersection with Window Thermal Break Positioned in Concrete Opening



View from Interior View from Exterior

Base Assembly – Glazing

U _{centre of glass} Btu/ft ² · hr · °F (W/m ² K)	U _g Btu/ft ² · hr · °F (W/m ² K)
0.142 (0.81)	0.301 (1.72)

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-3.4 (0.59 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 + slab + window
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _w ft ² ·hr·°F / Btu (m ² K / W)	U _w Btu/ft ² · hr · °F (W/m ² K)
R-10 (1.76)	R-13.4 (2.35)	R-10.9 (1.92)	0.092 (0.52)
R-15 (2.64)	R-18.4 (3.23)	R-13.3 (2.34)	0.075 (0.43)
R-20 (3.52)	R-23.4 (4.11)	R-15.9 (2.80)	0.063 (0.36)
R-25 (4.40)	R-28.4 (4.99)	R-18.3 (3.22)	0.055 (0.31)

Intermediate Floor Linear Transmittance

R _{floor} ft ² ·hr·°F / Btu (m ² K / W)	U _{floor} Btu/ft ² · hr · °F (W/m ² K)	ψ _{floor} Btu/ft ² · hr · °F (W/m ² K)
R-10.4 (1.84)	0.096 (0.55)	0.030 (0.052)
R-12.6 (2.22)	0.079 (0.45)	0.030 (0.051)
R-15.0 (2.65)	0.066 (0.38)	0.026 (0.045)
R-17.3 (3.05)	0.058 (0.33)	0.022 (0.037)

Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	R _t ft ² ·hr·°F / Btu (m ² K / W)	U _t Btu/ft ² · hr · °F (W/m ² K)	ψ ^{Head} Btu/ft ² · hr · °F (W/m K)	ψ ^{Sill} Btu/ft ² · hr · °F (W/m K)	ψ ^{Jamb} Btu/ft ² · hr · °F (W/m K)	ψ ^{Total} Btu/ft ² · hr · °F (W/m K)
R-10 (1.76)	R-5.6 (0.99)	0.178 (1.01)	0.247 (0.428)	0.151 (0.261)	0.111 (0.192)	0.190 (0.328)
R-15 (2.64)	R-6.0 (1.05)	0.167 (0.95)	0.257 (0.445)	0.168 (0.291)	0.121 (0.209)	0.202 (0.350)
R-20 (3.52)	R-6.3 (1.10)	0.160 (0.91)	0.268 (0.463)	0.177 (0.306)	0.129 (0.224)	0.212 (0.368)
R-25 (4.40)	R-6.5 (1.14)	0.154 (0.87)	0.274 (0.475)	0.183 (0.316)	0.135 (0.234)	0.218 (0.378)

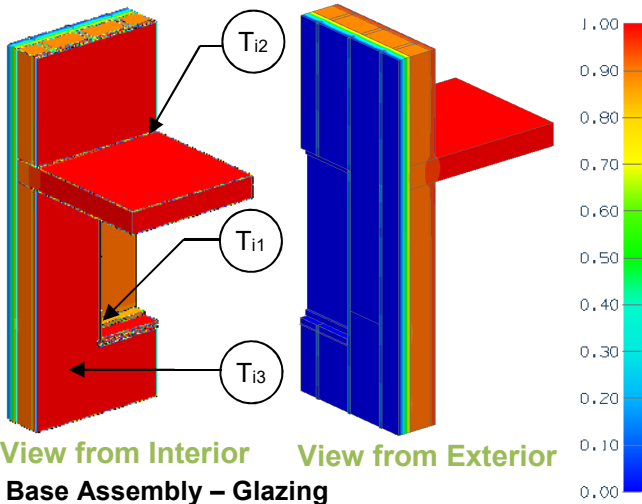
Temperature Indices

	R10	R15	R20	R25	
T _{i1}	0.43	0.44	0.44	0.44	Min T on window frame, at centre of window head
T _{i3}	0.84	0.86	0.87	0.89	Max T on interior surface of concrete at floor
T _{i4}	0.74	0.75	0.76	0.77	Min T on interior surface of concrete window jamb



Detail 6.3.13

Exterior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Stud (16" o.c.) and Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Curtain Wall & Intermediate Floor Intersection with Window Thermal Break Positioned in the Exterior Insulation



View from Interior View from Exterior

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.142 (0.81)	0.303 (1.72)

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.4 (0.59 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	$U_{\text{floor}},$ $R_{\text{floor}},$ $U_t,$ R_t	U and R-values for: floor = wall + intermediate floor t = combined wall + slab + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.4 (2.35)	R-10.9 (1.92)	0.092 (0.52)
R-15 (2.64)	R-18.4 (3.23)	R-13.3 (2.34)	0.075 (0.43)
R-20 (3.52)	R-23.4 (4.11)	R-15.9 (2.80)	0.063 (0.36)
R-25 (4.40)	R-28.4 (4.99)	R-18.3 (3.22)	0.055 (0.31)

Intermediate Floor Linear Transmittance

R_{floor} ft ² ·hr·°F / Btu (m ² K / W)	U_{floor} Btu/ft ² ·hr ·°F (W/m ² K)	Ψ_{floor} Btu/ft ² ·hr ·°F (W/m ² K)
R-10.4 (1.84)	0.096 (0.55)	0.030 (0.052)
R-12.6 (2.22)	0.079 (0.45)	0.030 (0.051)
R-15.0 (2.65)	0.066 (0.38)	0.026 (0.045)
R-17.3 (3.05)	0.058 (0.33)	0.022 (0.037)

Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² 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)
R-10 (1.76)	R-8.1 (1.42)	0.124 (0.70)	0.038 (0.066)	0.027 (0.046)	0.052 (0.090)	0.015 (0.026)
R-15 (2.64)	R-8.9 (1.57)	0.112 (0.64)	0.040 (0.070)	0.026 (0.045)	0.062 (0.107)	0.024 (0.041)
R-20 (3.52)	R-9.5 (1.67)	0.106 (0.60)	0.046 (0.079)	0.028 (0.049)	0.071 (0.123)	0.040 (0.069)
R-25 (4.40)	R-10.0 (1.76)	0.100 (0.57)	0.051 (0.089)	0.030 (0.052)	0.078 (0.135)	0.047 (0.081)

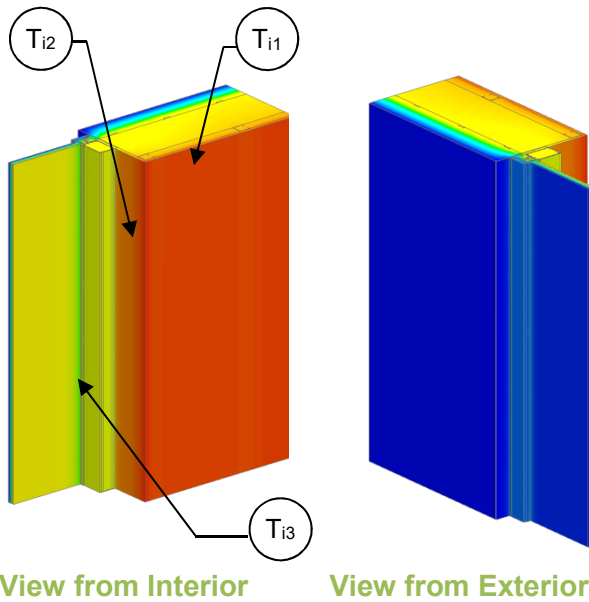
Temperature Indices

	R-10	R-15	R-20	R-25	
T_{i1}	0.75	0.76	0.76	0.76	Min T on window frame, at bottom corner
T_{i3}	0.89	0.90	0.91	0.92	Max T on interior surface of concrete at floor
T_{i4}	0.82	0.84	0.86	0.87	Min T on interior surface of concrete between steel studs



Detail 6.4.1

Exterior Insulated Concrete Drained EIFS Wall Assembly – Conventional Curtain Wall Transition



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U _g , U _w , R _w	“clear wall” U- and R-value for: g = curtain wall glazing w = concrete assembly
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of curtain wall transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _w ft ² ·hr·°F / Btu (m ² K / W)	U _w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)

Base Assembly – Curtain Wall Glazing

U _{centre of glazing} Btu/ft ² ·hr ·°F (W/m ² K)	U _g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.476 (2.70)

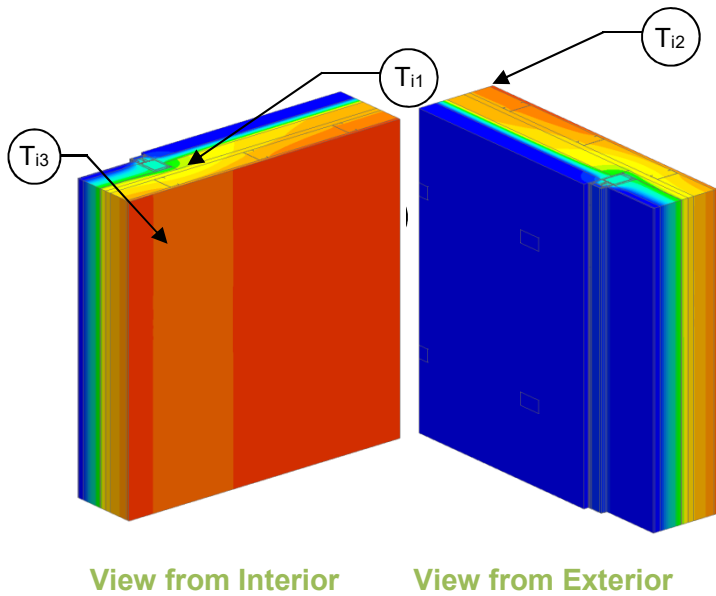
Curtain Wall Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	Ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-4.4 (0.78)	0.227 (1.29)	0.059 (0.103)

Temperature Indices

T _{i1}	0.79	Min T on concrete interior face, between steel studs
T _{i2}	0.87	Max T on concrete, at drywall return
T _{i3}	0.58	Min T on curtain wall, at glass

Detail 6.4.2 Precast Sandwich Panel Wall Assembly with 3 5/8" Steel Stud (16" o.c.) – Curtain Wall Transition



Thermal Performance Indicators

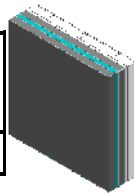
Assembly 1D (Nominal) R-Value	R_{1Dw} , R_{1Dcw}	Nominal thermal resistance of two base assemblies: w = concrete wall cw = curtain wall
Transmittance / Resistance without Anomaly	U_w , R_w , U_{cw} , R_{cw}	“clear wall” U- and R-value for the two base assemblies
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of transition joint

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

Nominal (1D) vs. Assembly Performance Indicators

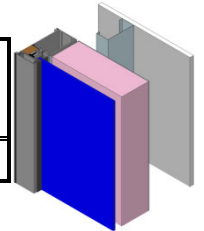
Base Assembly – Wall

R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-13.1 (2.30)	R-12.6 (2.22)	0.079 (0.45)



Base Assembly – Curtain Wall²

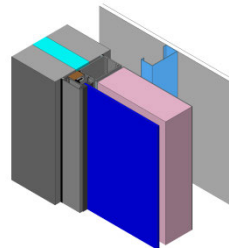
R_{1Dcw} ft ² ·hr·°F / Btu (m ² K / W)	R_{cw} ft ² ·hr·°F / Btu (m ² K / W)	U_{cw} Btu/ft ² ·hr ·°F (W/m ² K)
R-19.2 (3.38)	R-5.7 (1.01)	0.175 (0.99)



² R-15 back pan insulation

Transition Joint Linear Transmittance

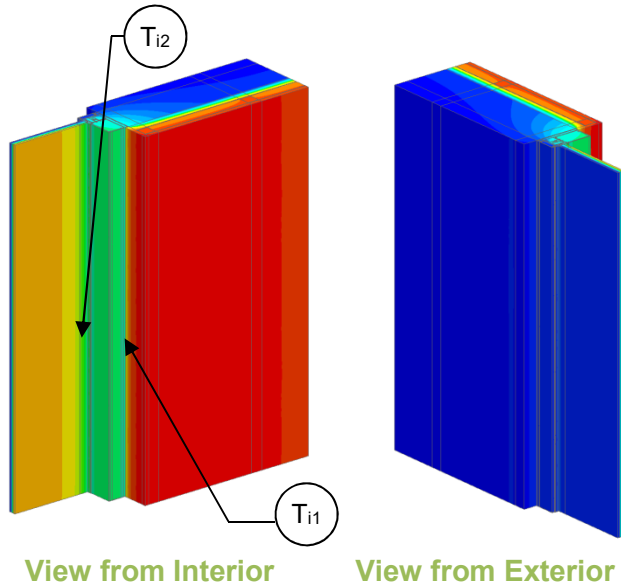
R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-8.0 (1.41)	0.125 (0.71)	0.082 (0.142)



Temperature Indices

T_{i1}	0.62	Min T on interior concrete wall, at mullion
T_{i2}	0.83	Max T on interior concrete wall, away from mullion
T_{i3}	0.43	Min T in air cavity, at mullion

Detail 6.4.3 Interior Insulated Concrete Mass Wall – Conventional Curtain Wall Transition



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.9 (0.50 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_g, U_w, R_w	“clear wall” U- and R-value for: g = curtain wall w = concrete assembly
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of curtain wall transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.0 (2.29)	R-12.9 (2.26)	0.078 (0.44)

Base Assembly – Curtain Wall Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.476 (2.70)

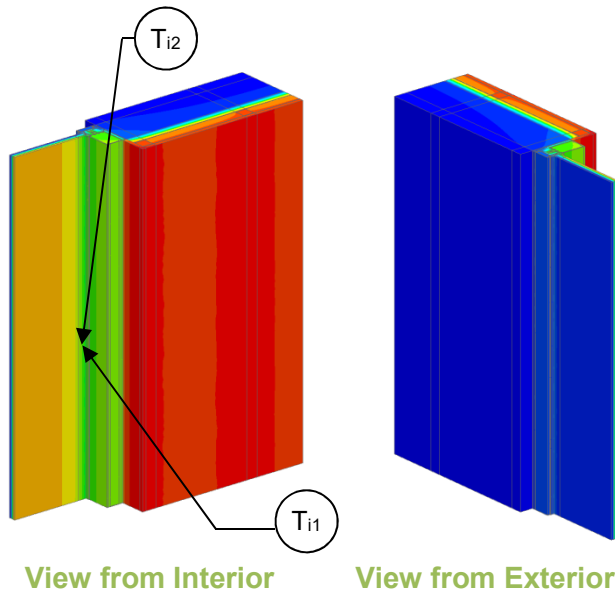
Curtain Wall Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	Ψ Btu/ft hr °F (W/m K)
R-10 (1.76)	R-3.7 (0.64)	0.274 (1.55)	0.171 (0.295)

Temperature Indices

T_{i1}	0.44	Min T on frame
T_{i2}	0.43	Min T on glazing

Detail 6.4.4 Interior Insulated Concrete Mass Wall – Thermally Broken Curtain Wall Transition



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.9 (0.50 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_g, U_w, R_w	“clear wall” U- and R-value for: g = curtain wall w = concrete assembly
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of curtain wall transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.0 (2.29)	R-12.9 (2.26)	0.078 (0.44)

Base Assembly – Curtain Wall

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.476 (2.70)

Curtain Wall Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	Ψ Btu/ft hr °F (W/m K)
R-10 (1.76)	R-4.2 (0.74)	0.237 (1.34)	0.050 (0.086)

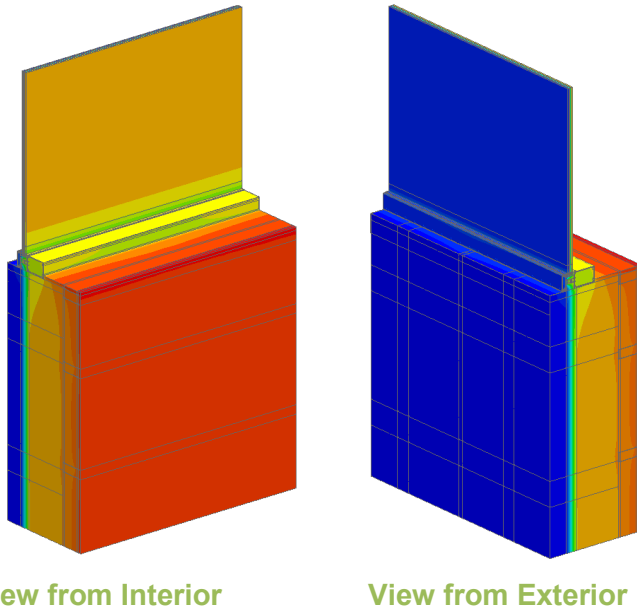
Temperature Indices

T_{i1}	0.52	Min T on frame
T_{i2}	0.50	Min T on glazing

Detail 6.4.5

Precast Sandwich Panel Wall Assembly – Tigerloc Thermally Broken Curtain Wall Transition

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance of wall
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear field” U- and R-value for: w = wall without panel joint g = glazing
Transmittance / Resistance	U_j, R_j, U_{cw}, R_{cw}	U- and R-values for: j = wall with joint panel cw = curtain wall
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ_j, Ψ_{cw}	Incremental increase in transmittance per linear length of anomaly

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Sandwich Panel Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.1 (2.31)	R-12.8 (2.26)	0.078 (0.44)
R-15 (2.64)	R-18.1 (3.19)	R-17.7 (3.12)	0.056 (0.32)
R-20 (3.52)	R-23.1 (4.07)	R-22.6 (3.98)	0.044 (0.25)

Base Assembly – Curtain Wall Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.32 (1.82)	0.389 (2.21)

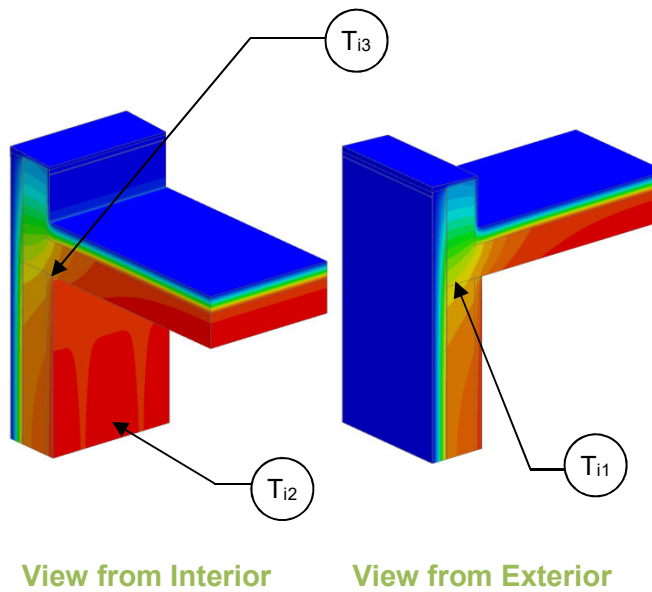
Panel Joint Linear Transmittance

Sandwich Panel Insulation 1D R-value (RSI)	R_j ft ² ·hr·°F / Btu (m ² K / W)	U_j Btu/ft ² ·hr ·°F (W/m ² K)	Ψ_j Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-9.3 (1.65)	0.107 (0.61)	0.099 (0.17)
R-15 (2.64)	R-12.0 (2.11)	0.084 (0.47)	0.092 (0.16)
R-20 (3.52)	R-14.5 (2.56)	0.069 (0.39)	0.084 (0.15)

Curtain Wall Transition Linear Transmittance

Sandwich Panel Insulation 1D R-value (RSI)	R_{cw} ft ² ·hr·°F / Btu (m ² K / W)	U_{cw} Btu/ft ² ·hr ·°F (W/m ² K)	Ψ_{cw} Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-4.2 (0.75)	0.236 (1.34)	0.041 (0.071)
R-15 (2.64)	R-4.5 (0.79)	0.224 (1.27)	0.044 (0.076)
R-20 (3.52)	R-4.6 (0.82)	0.215 (1.22)	0.044 (0.077)

Detail 6.5.1 Exterior Insulated Concrete Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear wall” U- and R-value: r = roof w = wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)

Base Assembly - Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

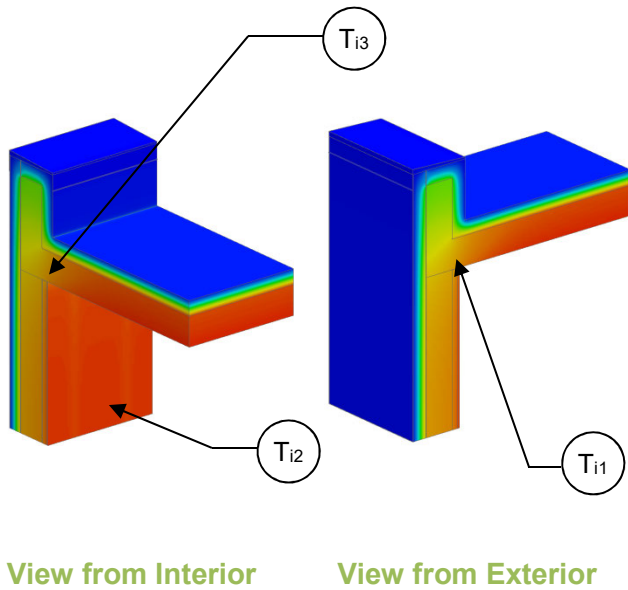
Parapet Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-8.6 (1.51)	0.117 (0.66)	0.231 (0.400)

Temperature Indices

T_{i1}	0.77	Min T on concrete interior surface, at concrete roof slab intersection
T_{i2}	0.88	Max T on concrete interior surface at mid-wall
T_{i3}	0.82	Min T on concrete ceiling, at drywall intersection, exposed to interior air

Detail 6.5.2 Exterior Insulated Concrete Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear wall” U- and R-value: r = roof w = wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)

Base Assembly - Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

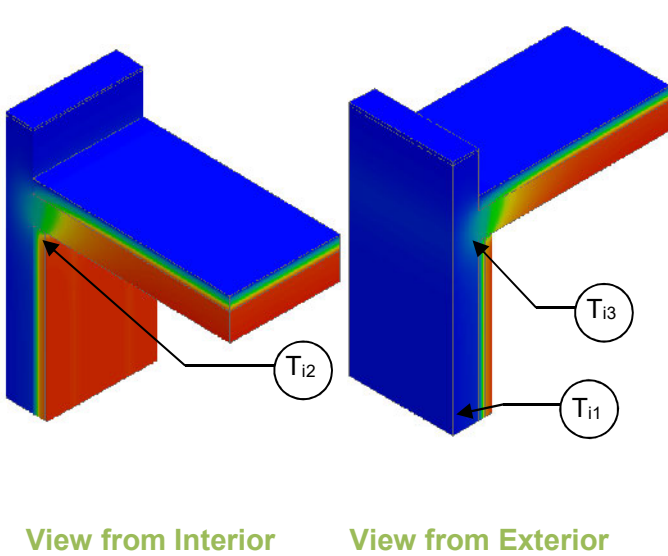
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-10.2 (1.80)	0.098 (0.55)	0.125 (0.217)

Temperature Indices

T_{i1}	0.83	Min T on concrete interior surface, at concrete roof slab intersection
T_{i2}	0.89	Max T on concrete interior surface, at mid-wall
T_{i3}	0.87	Min T on concrete ceiling, at drywall intersection, exposed to interior air

Detail 6.5.3 Interior Insulated Concrete Mass Wall with 1 5/8" Steel Stud (16" o.c) Supporting Interior Finish – Concrete Parapet & Roof Intersection

Thermal Performance Indicators



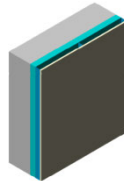
Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance of wall assembly
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	"clear field" U- and R-values: r = roof w = wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

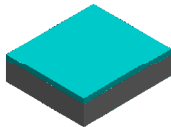
Base Assembly – Wall

R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-13.9 (2.44)	R-13.5 (2.37)	0.074 (0.42)



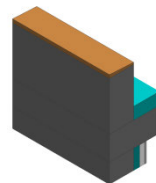
Base Assembly – Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)



Parapet Linear Transmittance

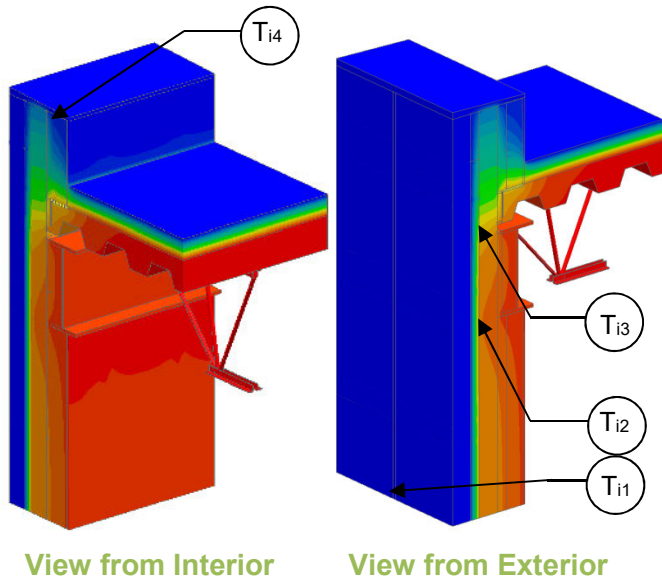
R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-8.94 (1.57)	0.112 (0.64)	0.449 (0.777)



Temperature Indices

T_{i1}	0.06	Min T on concrete wall, between studs, away from ceiling
T_{i2}	0.27	Max T on concrete wall, at wall/roof intersection
T_{i3}	0.59	Min T on interior ceiling, at gypsum board, between studs

Detail 6.5.4 Precast Sandwich Panel Wall Assembly with 3 5/8" Steel Stud (16" o.c.) – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection



Thermal Performance Indicators

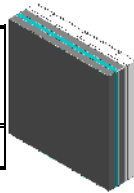
Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear field” U- and R-values: r = roof w = wall
Transmittance / Resistance	U_j, R_j, U_p, R_p	U- and R-values for: j = panel joint p = parapet
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ_j, Ψ_p	Incremental increase in transmittance per linear length of anomaly

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

Nominal (1D) vs. Assembly Performance Indicators

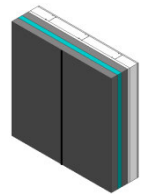
Base Assembly – Wall

R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-13.1 (2.30)	R-12.6 (2.22)	0.079 (0.45)



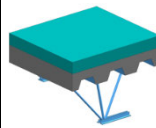
Interior Wall Linear Transmittance at Slab

R_j ft ² ·hr·°F / Btu (m ² K / W)	U_j Btu/ft ² ·hr·°F (W/m ² K)	Ψ_j Btu/ft hr °F (W/m K)
R-11.7(2.05)	0.086 (0.49)	0.026 (0.046)



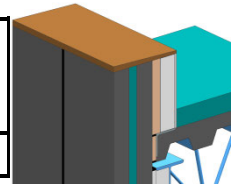
Base Assembly - Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046(0.26)



Parapet Linear Transmittance

R_p ft ² ·hr·°F / Btu (m ² K / W)	U_p Btu/ft ² ·hr·°F (W/m ² K)	Ψ_p Btu/ft hr °F (W/m K)
R-8.2 (1.43)	0.123 (0.70)	0.375 (0.650)



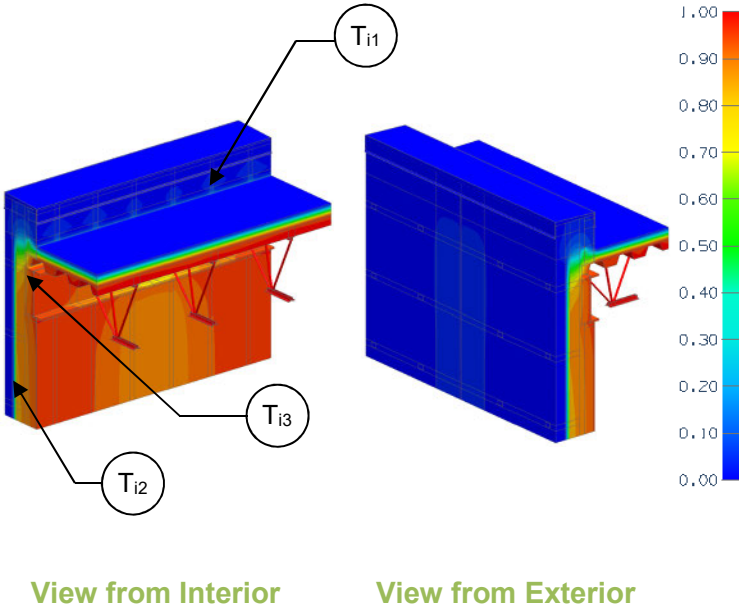
Temperature Indices

T_{i1}	0.82	Min T on concrete wall, at panel joint, away from roof
T_{i2}	0.89	Max T on concrete wall, below lbeam
T_{i3}	0.77	Min T in interior surface, on concrete, away from joist
T_{i4}	0.19	Min T on concrete parapet, and panel edge and wood block

Detail 6.5.5

Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_r , R_r , U_w , R_w	“clear wall” U- and R-value r = roof w = wall
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-10 (1.76)	R-13.9 (2.45)	R-4.8 (0.85)	0.207 (1.17)

Base Assembly – Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

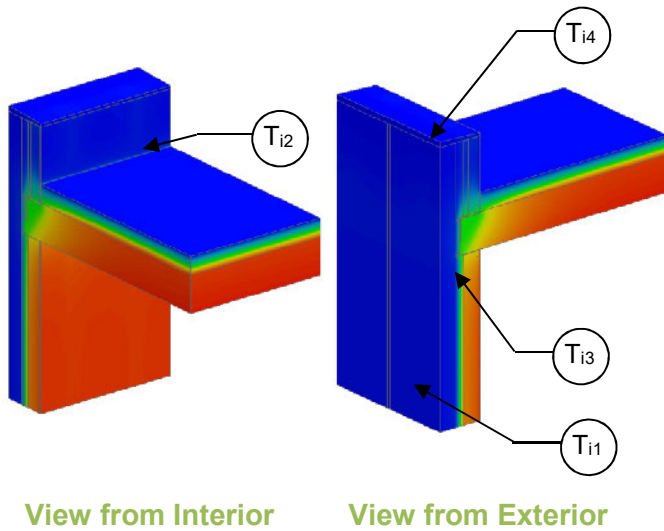
Sandwich Panel Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-3.7 (0.65)	0.273 (1.55)	0.511 (0.884)

Temperature Indices

T_{i1}	0.36	Min T on sandwich panel, at concrete edge and roof insulation intersection
T_{i2}	0.85	Max T on sandwich panel, at centre of panel away from concrete edges
T_{i3}	0.53	Min T on roof sheathing, along sandwich panel intersection

Detail 6.5.6 Precast Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c) and Rigid Insulation Outboard of Studs – Parapet & Roof Intersection

Thermal Performance Indicators



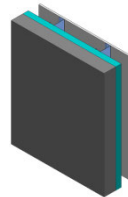
Assembly 1D (Nominal) R-Value	R_{1D}	Nominal thermal resistance
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	"clear field" U- and R-values: r = roof w = wall
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

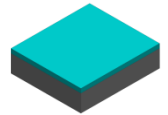
Base Assembly – Wall

R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-13.0 (2.29)	R-12.9 (2.26)	0.078 (0.44)



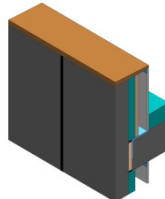
Base Assembly - Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)



Parapet Linear Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-9.1 (1.60)	0.110 (0.63)	0.334 (0.579)



² Panel edges (caulked joints between panels) had negligible linear transmittance effects so values not presented

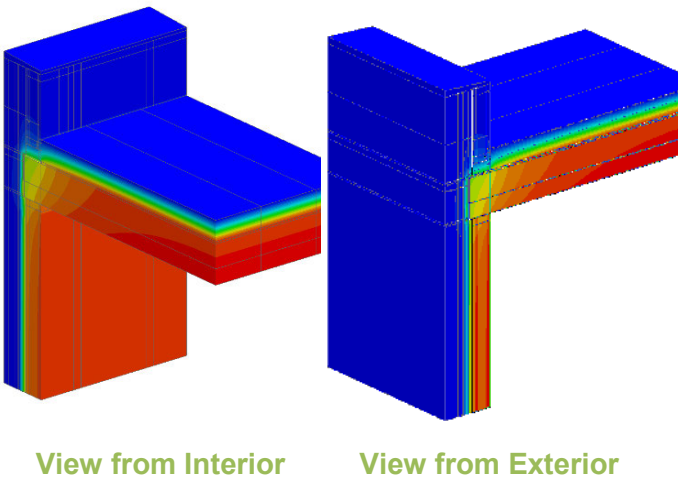
Temperature Indices

T_{i1}	0.04	Min T on concrete wall, between studs, away from roof
T_{i2}	0.16	Max T on concrete wall, at slot anchor
T_{i3}	0.73	Min T on ceiling, at gypsum board, at studs
T_{i4}	0.01	Min T on concrete parapet, at wood blocking

Detail 6.5.7

Precast Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c) and Rigid Insulation Outboard of Studs – Parapet & Roof Intersection with Thermal Break under Parapet Stud Cavity and At Anchors

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.8 (0.49 RSI) + Exterior Insulation for wall
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear field” U- and R-values: r = roof w = wall
Transmittance / Resistance	U, R	U and R-values for overall assembly
Surface Temperature Index	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Scenario

Scenario	
1	Armatherm 500 beneath stud cavity
2	Armatherm 500 beneath stud cavity, 3/8" FRR at anchors

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-12.8 (2.25)	R-12.2 (2.15)	0.082 (0.47)

Base Assembly - Roof

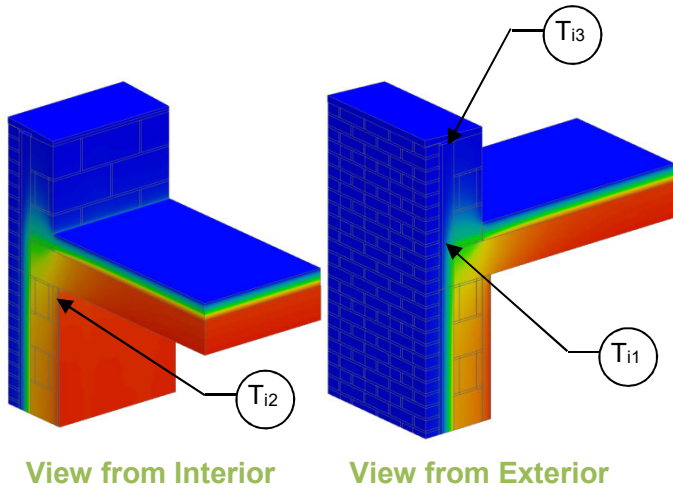
Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

Scenario	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
1	R-10.6 (1.86)	0.095 (0.54)	0.227 (0.393)
2	R-10.7 (1.89)	0.093 (0.53)	0.125 (0.216)

Panel edges (caulked joints between panels) had negligible linear transmittance effects so values not presented

Detail 6.5.8 Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Parapet & Roof Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-5.6 (0.97 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear field” U- and R-values: r = roof w = wall
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-10.6 (1.86)	R-10.4 (1.83)	0.096 (0.55)
R-15 (2.64)	R-20.6 (3.62)	R-17.8 (3.13)	0.056 (0.32)
R-25 (4.40)	R-30.6 (5.38)	R-23.7 (4.17)	0.042 (0.24)

Base Assembly – Roof

Roof Exterior Insulation 1D R-Value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

Parapet Linear Transmittance

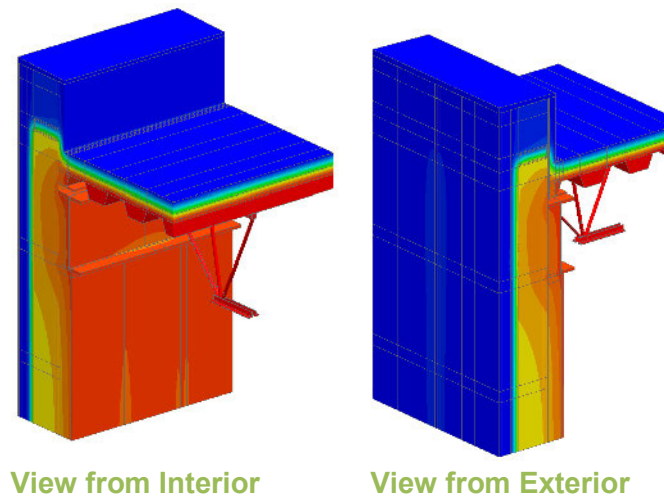
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-5 (0.88)	10.0 (1.8)	0.100 (0.57)	0.238 (0.412)
R-15 (2.64)	12.2 (2.1)	0.082 (0.47)	0.180 (0.311)
R-25 (4.40)	13.1 (2.3)	0.076 (0.43)	0.236 (0.408)

Temperature Indices

	R5	R15	R25	
T_{i1}	0.57	0.66	0.68	Min T on exterior face of concrete block wall, at roof/gypsum intersection and air filled blocks
T_{i2}	0.78	0.81	0.82	Min T on interior surfaces, at ceiling/gypsum intersection, at studs
T_{i3}	0.01	0.01	0.01	Min T on concrete block parapet, at wood block and air filled concrete blocks

Detail 6.5.9

Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Paraloc Thermally Broken Parapet Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.1 (0.55 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_r , R_r , U_w , R_w	“clear field” U- and R-values: r = roof w = wall
Transmittance / Resistance	U_j , R_j , U_p , R_p	U- and R-values for: j = panel joint p = parapet
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ_j , Ψ_p	Incremental increase in transmittance per linear length of anomaly

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Sandwich Panel Insulation 1D R-value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.1 (2.31)	R-12.8 (2.26)	0.078 (0.44)
R-15 (2.64)	R-18.1 (3.19)	R-17.7 (3.12)	0.056 (0.32)
R-20 (3.52)	R-23.1 (4.07)	R-22.6 (3.98)	0.044 (0.25)

Base Assembly – Roof

Roof Exterior Insulation 1D R-value (RSI)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.5 (3.79)	0.046 (0.26)

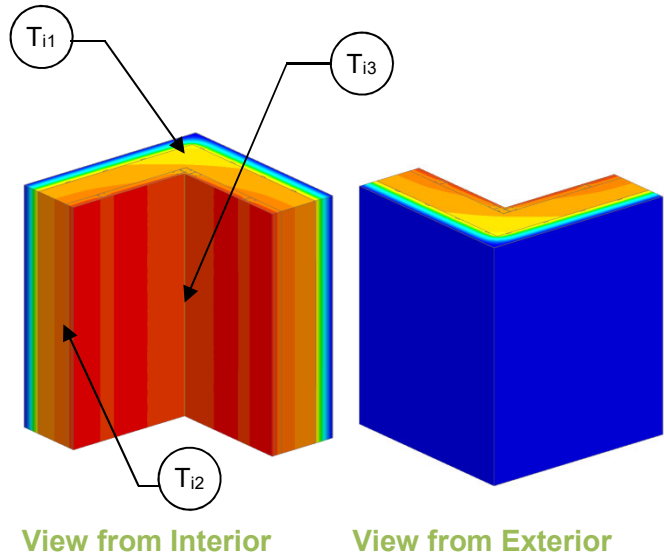
Panel Joint Linear Transmittance

Sandwich Panel Insulation 1D R-value (RSI)	R_j ft ² ·hr·°F / Btu (m ² K / W)	U_j Btu/ft ² ·hr ·°F (W/m ² K)	Ψ_j Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-9.3 (1.65)	0.107 (0.61)	0.099 (0.17)
R-15 (2.64)	R-12.0 (2.11)	0.084 (0.47)	0.092 (0.16)
R-20 (3.52)	R-14.5 (2.56)	0.069 (0.39)	0.084 (0.15)

Parapet Linear Transmittance

Sandwich Panel Insulation 1D R-value (RSI)	R_p ft ² ·hr·°F / Btu (m ² K / W)	U_p Btu/ft ² ·hr ·°F (W/m ² K)	Ψ_p Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-9.1 (1.60)	0.110 (0.63)	0.184 (0.319)
R-15 (2.64)	R-11.1 (1.96)	0.090 (0.51)	0.145 (0.250)
R-20 (3.52)	R-13.0 (2.28)	0.077 (0.44)	0.120 (0.208)

Detail 6.6.1 Exterior Insulated Concrete Drained EIFS Wall Assembly – Corner Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without corner
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of corner

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

Nominal (1D) vs. Assembly Performance Indicators

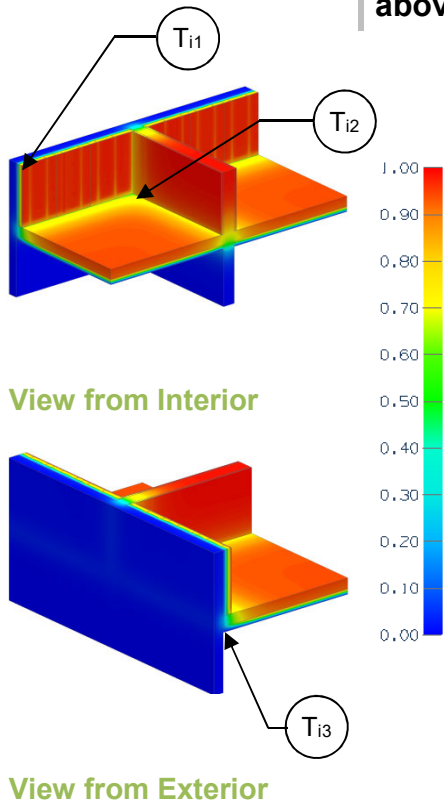
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)	R-13.1 (2.30)	0.08 (0.43)	0.085 (0.147)

Temperature Indices

T_{i1}	0.81	Min T on concrete interior surface, at corner
T_{i2}	0.87	Max T on concrete interior surface, between studs away from corner
T_{i3}	0.89	Min T on drywall, at corner

Detail 6.7.1

Interior Insulated Concrete Mass Wall with 3 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Intermediate Floor Intersection above Parking Garage



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-14 (2.47 RSI) + interior wall insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_f, R_f	"clear wall" U- and R-value of: w = concrete wall and steel stud assembly f = floor
Transmittance / Resistance	$U_s, R_s, U_i, R_i, U_p, R_p$	U and R values for: s = concrete wall + slab i = concrete wall + interior wall p = interior wall + slab
Transmittance / Resistance	U, R	U and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_i, ψ_s, ψ_p	Incremental increase in transmittance per linear length of i = interior wall at exterior wall s = slab at exterior wall p = interior wall at slab
Point Transmittance	χ	Incremental increase in transmittance for inner wall and slab intersection

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Interior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-10 (1.76)	R-24.0 (4.23)	R-19.8 (3.49)	0.050 (0.29)
R-15 (2.64)	R-29.0 (5.11)	R-24.9 (4.38)	0.040 (0.23)

Interior Wall Linear Transmittance at Exterior Wall

R_i ft ² ·hr·°F / Btu (m ² K / W)	U_i Btu/ft ² ·hr·°F (W/m ² K)	ψ_i Btu/ft·hr·°F (W/m K)
R-10.4 (1.83)	0.097 (0.55)	0.36 (0.622)
R-10.8 (1.90)	0.093 (0.53)	0.41 (0.710)

Base Assembly – Floor

Floor Insulation 1D R-Value (RSI)	R_f ft ² ·hr·°F / Btu (m ² K / W)	U_f Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-22.2 (3.91)	0.045 (0.26)

Interior Wall Linear Transmittance at Slab

R_p ft ² ·hr·°F / Btu (m ² K / W)	U_p Btu/ft ² ·hr·°F (W/m ² K)	ψ_p Btu/ft·hr·°F (W/m K)
R-13.0 (2.28)	0.077 (0.44)	0.461 (0.799)

Slab Linear Transmittance at Exterior Wall

Exterior Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ_s Btu/ft·hr·°F (W/m K)
R-10 (1.76)	R-11.1 (1.96)	0.090 (0.51)	0.406 (0.702)
R-15 (2.64)	R-12.0 (2.11)	0.084 (0.48)	0.390 (0.674)

Intersection Point Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	χ^2 Btu/hr·°F (W/K)
R-10.0 (1.77)	0.100 (0.57)	-0.590 (-0.314)
R-10.5 (1.85)	0.095 (0.54)	-0.746 (-0.397)

²Values are negative for a correction factor. See section 6 in ASHRAE 1365-RP for clarification.

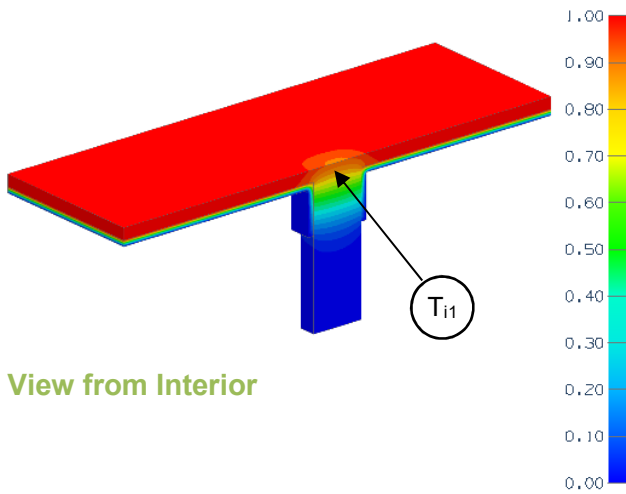
Temperature Indices

	R10	R15	
T_{i1}	0.04	0.03	Min T on concrete wall, between studs, away from wall and slab
T_{i2}	0.29	0.27	Max T on concrete wall, at corner intersection
T_{i3}	0.27	0.27	Min T on slab, at exterior wall away from intersection



Detail 6.7.2

Insulated Concrete Floor Slab – Concrete Column Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.2 (0.39 RSI) + Insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without pillar
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for concrete column

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

Scenarios

Scenario	Insulation
A	Without insulation returning down column
B	With insulation returning down column 2.5 ft

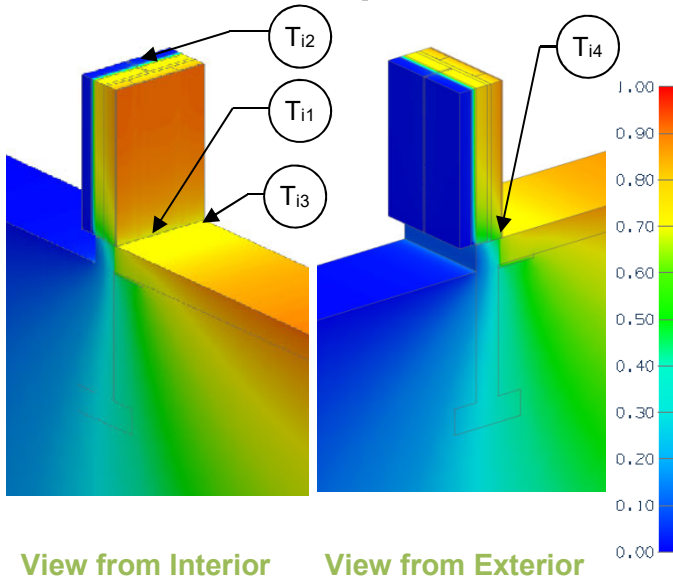
Nominal (1D) vs. Assembly Performance Indicators

	Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	χ Btu/hr °F (W/K)
A	R-20.0 (3.52)	R-22.2 (3.92)	R-22.2 (3.92)	0.040 (0.23)	R-19.7 (3.47)	0.051 (0.29)	0.43 (0.74)
B	R-20.0 (3.52)	R-22.2 (3.92)	R-22.2 (3.92)	0.040 (0.23)	R-21.0 (3.71)	0.048 (0.27)	0.19 (0.33)

Temperature Indices

	A	B	
T_{i1}	0.62	0.79	Min T on concrete floor at column

Detail 6.7.3 Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) – Concrete Slab and Foundation Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without foundation
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of foundation
Foundation Transmittance ²	L_{2Df}, L_{2Dt}	Heat loss of slab on grade per unit width of slab: f = floor t = assembly with foundation

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

²For on grade transition calculation, see Appendix B introduction

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-10 (1.76)	R-13.9 (2.45)	R-10.2 (1.79)	0.099 (0.56)

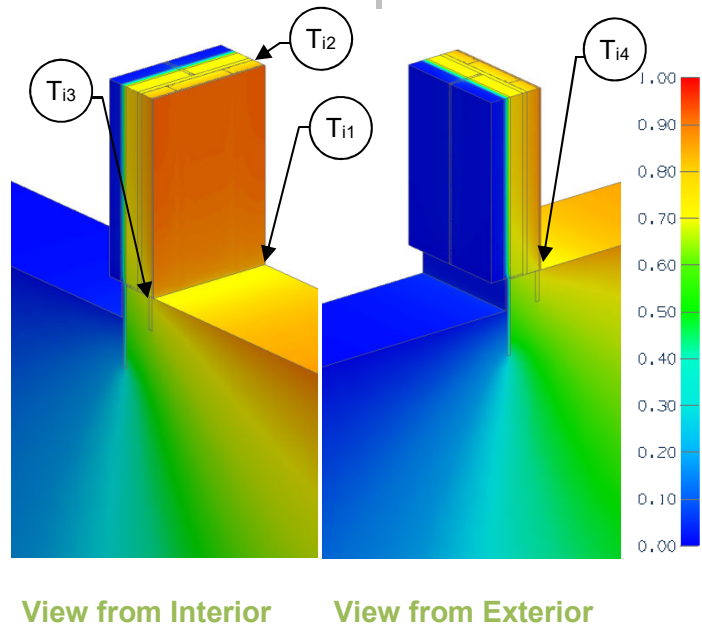
Foundation Linear Transmittance

Foundation Insulation 1D R-Value (RSI)	Insulation Length in (mm)	L_{2Df} Btu/ft·hr·°F (W/m K)	L_{2Dt} Btu/ft·hr·°F (W/m K)	ψ Btu/ft·hr·°F (W/m K)
R-5 (0.88)	12 (305)	1.18 (2.04)	1.97 (3.41)	0.400 (0.693)
R-5 (0.88)	24 (610)	1.12 (1.94)	1.93 (3.34)	0.415 (0.719)
R-5 (0.88)	36 (914)	1.07 (1.86)	1.89 (3.27)	0.419 (0.726)
R-5 (0.88)	48 (1219)	1.04 (1.80)	1.86 (3.22)	0.423 (0.732)

Temperature Indices

T_{i1}	0.41	Min T on sandwich panel, at slab intersection
T_{i2}	0.81	Max T on sandwich panel, at centre of panel away from vertical joint and slab
T_{i3}	0.16	Min T on slab, at sandwich panel intersection
T_{i4}	0.66	Min T on floor, at wall intersection

Detail 6.7.4 Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) - Concrete Slab and Foundation Wall Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without foundation
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of foundation
Foundation Transmittance ²	L_{2Df}, L_{2Dt}	Heat loss of slab on grade per unit width of slab: f = floor t = assembly with foundation

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

²For on grade transition calculation, see Appendix B introduction

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.9 (2.45)	R-10.2 (1.79)	0.099 (0.56)

Foundation Linear Transmittance

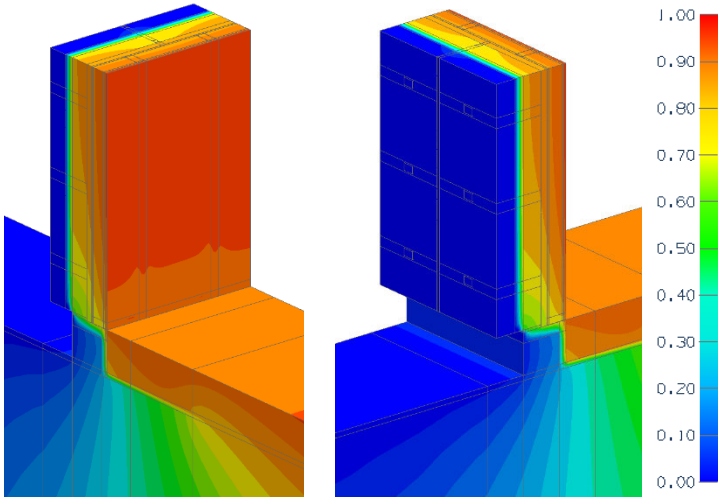
Foundation Insulation 1D R-Value (RSI)	Insulation Depth in (mm)	L_{2Df} Btu/ft ·hr·°F (W/m K)	L_{2Dt} Btu/ft ·hr·°F (W/m K)	ψ Btu/ft ·hr·°F (W/m K)
R-5 (0.88)	12 (305)	1.19 (2.06)	1.71 (2.96)	0.124 (0.214)
R-5 (0.88)	24 (610)	1.10 (1.90)	1.63 (2.82)	0.137 (0.236)
R-5 (0.88)	36 (914)	1.04 (1.81)	1.58 (2.73)	0.139 (0.241)

Temperature Indices

T_{i1}	0.71	Min T on sandwich panel, at slab intersection
T_{i2}	0.82	Max T on sandwich panel, at centre of panel away from vertical joint and slab
T_{i3}	0.68	Min T on slab, at sandwich panel intersection
T_{i4}	0.80	Min T on floor, at wall intersection

Detail 6.7.5 Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) – Thermally Broken Concrete Slab and Foundation Intersection

Thermal Performance Indicators



View from Interior

View from Exterior

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without foundation
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Foundation Transmittance ²	L_{2Df}, L_{2Dt}	Heat loss of slab on grade per unit width of slab: f = floor t = floor + wall + foundation
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of foundation

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

²Calculation method follows ISO 10211:2007, 10.4.3

Scenarios

Scenario	
1	Continuous Concrete Footing, Caulked Floor to Footing Joint
2	Continuous Concrete Footing, 1" Fibreboard Joint
3	2" Armatherm Block under Precast wall and Anchors Only, 1" Fibreboard Joint
4	2" Armatherm Block under Precast Wall, Anchors and Stud Wall, 1" Fibreboard Joint
5	2" Armatherm Block under Precast Wall, Anchors and Stud Wall, 2" Armatherm Joint

Nominal (1D) vs. Assembly Performance Indicators

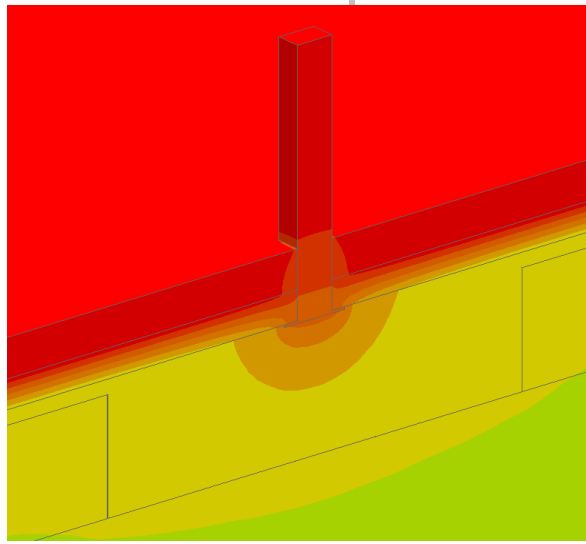
Base Assembly – Wall

Sandwich Panel Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-13.9 (2.45)	R-10.2 (1.79)	0.099 (0.56)

Foundation Linear Transmittance

Scenario	Foundation Insulation 1D R-Value (RSI)	Insulation Length From Footing in (mm)	L_{2Df} Btu/ft ·hr·°F (W/m K)	L_{2Dt} Btu/ft ·hr·°F (W/m K)	ψ Btu/ft ·hr·°F (W/m K)
1	R-5 (0.88)	12 (305)	1.18 (2.04)	1.97 (3.41)	0.400 (0.693)
2	R-5 (0.88)	12 (305)	1.18 (2.04)	1.88 (3.25)	0.309 (0.534)
3	R-5 (0.88)	12 (305)	1.18 (2.04)	1.83 (3.17)	0.262 (0.453)
4	R-5 (0.88)	12 (305)	1.18 (2.04)	1.74 (3.01)	0.170 (0.294)
5	R-5 (0.88)	12 (305)	1.18 (2.04)	1.71 (2.96)	0.139 (0.241)
	R-5 (0.88)	24 (610)	1.12 (1.94)	1.65 (2.85)	0.133 (0.230)
	R-5 (0.88)	36 (914)	1.07 (1.86)	1.60 (2.77)	0.132 (0.228)
	R-5 (0.88)	48 (1219)	1.04 (1.80)	1.57 (2.71)	0.131 (0.227)

Detail 6.7.6 Insulated Slab on Grade – Steel Column



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-1.7 (0.30 RSI) + insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value, without column
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for column and footing

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

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Floor

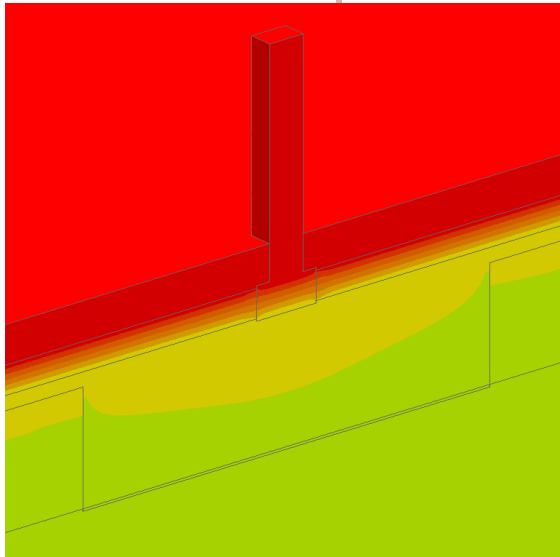
Slab Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-30 (5.26)	R-31.7 (5.57)	R-31.7 (5.57)	0.03 (0.179)

Column Point Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	χ Btu/hr·°F (W/K)
R-29.9 (5.26)	0.03 (0.190)	0.504 (0.864)

Detail 6.7.7

Insulated Slab on Grade – Armatherm 500 Thermal Break under Column



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-1.7 (0.30 RSI) + insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value, without column
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for column and footing

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

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Floor

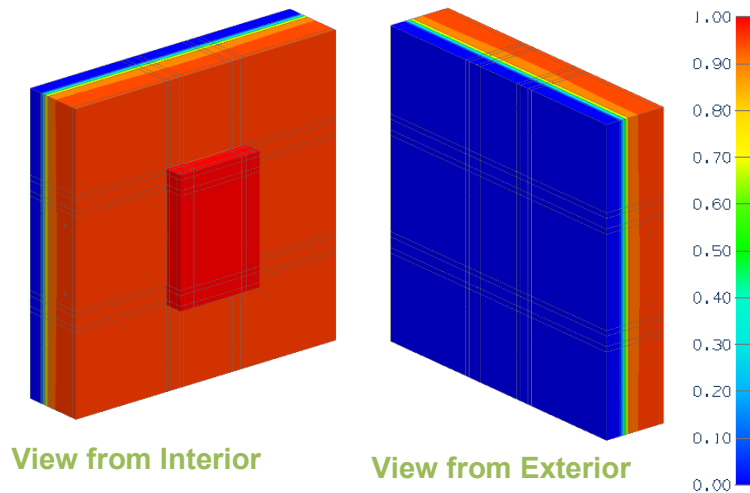
Slab Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-30 (5.26)	R-31.7 (5.57)	R-31.7 (5.57)	0.03 (0.179)

Column Point Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr·°F (W/K)
R-31.5 (5.55)	0.03 (0.180)	0.046 (0.079)

Detail 6.8.1

Precast Sandwich Panel Wall Assembly – Emloc Thermally Broken Embedment Detail



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-1.8 (0.32 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-values, without embedment
Transmittance / Resistance	U, R	U- and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for embedment

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Sandwich Panel Insulation 1D R-value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-11.8 (2.08)	R-11.8 (2.06)	0.085 (0.48)
R-15 (2.64)	R-16.8 (2.96)	R-16.7 (2.94)	0.060 (0.34)
R-20 (3.52)	R-21.8 (3.84)	R-21.7 (3.82)	0.046 (0.26)

Embedment Point Transmittance

Sandwich Panel Insulation 1D R-value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/ ·hr ·°F (W/K)
R-10 (1.76)	R-11.4 (2.00)	0.088 (0.50)	0.053 (0.028)
R-15 (2.64)	R-15.5 (2.73)	0.065 (0.367)	0.094 (0.050)
R-20 (3.52)	R-19.8 (3.48)	0.051 (0.287)	0.090 (0.048)

7.0 Wood Frame Construction

Detail 7.1.1	B.7.1
Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Clear Wall	
Detail 7.1.2	B.7.2
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Clear Wall	
Detail 7.1.3	B.7.3
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Clear Wall	
Detail 7.1.4	B.7.4
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Horizontal Metal Z-Girts (24" o.c.) Supporting Fiber Cement Board – Clear Wall	
Detail 7.1.5	B.7.5
Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Knight MFI-System (24" o.c.) Supporting Cladding – Clear Wall	
Detail 7.1.6	B.7.6
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Knight MFI-System (24" o.c.) Supporting Cladding – Clear Wall	
Detail 7.1.7	B.7.7
Exterior Insulated 2x6 Wood Stud (16"o.c.) Wall Assembly with Thermally Broken Aluminum Clip Rail System (24" o.c.) Supporting Cladding – Clear Wall	
Detail 7.2.1	B.7.8
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Rim Joist and Floor Intersection without Metal Flashing Bypassing Exterior Insulation	
Detail 7.2.2	B.7.9
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Rim Joist and Floor Intersection with Metal Flashing Bypassing Exterior Insulation	
Detail 7.2.3	B.7.10
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Cantilevered Wood Joist Balcony Intersection	
Detail 7.2.4	B.7.11
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Independently Supported Balcony Intersection	
Detail 7.2.5	B.7.12

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Cantilevered Floor Intersection

Detail 7.3.1 **B.7.13**

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Vinyl Window Intersection

Detail 7.3.2 **B.7.14**

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Aluminum Window Intersection

Detail 7.3.3 **B.7.15**

Exterior and Interior Insulated 2x6 Wood Stud (8" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Vinyl Window Intersection

Detail 7.3.4 **B.7.16**

Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed Flange Mounted Vinyl Window Intersection with Window Positioned in Wood Framing

Detail 7.3.5 **B.7.17**

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed Flange Mounted Vinyl Window Intersection with Window Positioned in Wood Framing

Detail 7.3.6 **B.7.18**

Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping (16" o.c.) and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed High Performance Vinyl Window Intersection (Insulated Frames)

Detail 7.3.7 **B.7.19**

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping (16" o.c.) and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed High Performance Vinyl Window Intersection (Insulated Frames)

Detail 7.4.1 **B.7.20**

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Vented Low-slope Roof & Parapet Intersection

Detail 7.4.2 **B.7.21**

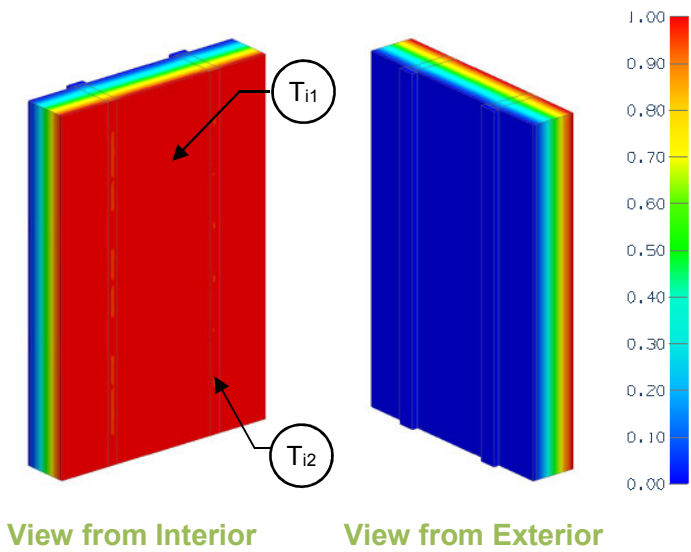
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Sloped Wood Framed Roof & Wall Intersection with Insulation at Ceiling

Detail 7.4.3	B.7.22
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Sloped Wood Framed Roof & Wall Intersection with Insulation at Roof Sheathing	
Detail 7.4.4	B.7.23
Ventilated Wood Frame Low Slope Roof – Masonry Firewall Intersection	
Detail 7.5.1	B.7.24
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting and Continuous Insulation Fiber Cement Board – Corner Intersection	
Detail 7.6.1	B.7.25
Wood-frame Sliding Door – Concrete Floor Intersection for Unheated Spaces (Parking Garages)	
Detail 7.6.2	B.7.26
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Continuous Insulation and Wood Strapping Supporting Fiber Cement Board – Rim Joist and Interior Insulated At-Grade Foundation Wall Intersection	
Detail 7.6.3	B.7.27
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Continuous Insulation and Wood Strapping Supporting Fiber Cement Board – Rim Joist and Exterior Insulated At-Grade Foundation Wall Intersection	
Detail 7.6.4	B.7.28
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Exterior Insulated At-Grade Foundation Wall Intersection	
Detail 7.6.5	B.7.29
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection	
Detail 7.6.6	B.7.30
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection	
Detail 7.7.1	B.7.31
Exterior Insulated Wood Infill Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Concrete Wall and Intermediate Floor Intersection with Flashing Bypassing Exterior Insulation	
Detail 7.7.2	B.7.32
Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Wood Strapping and Continuous Rigid Insulation Supporting Fiber Cement Board –	

Cross Laminated Timber Floor Intersection with Flashing Bypassing Exterior Insulation

Detail 7.1.1

Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R Value	R _{1D}	R-22.1 (3.89 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	"clear wall" U- and R-value
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

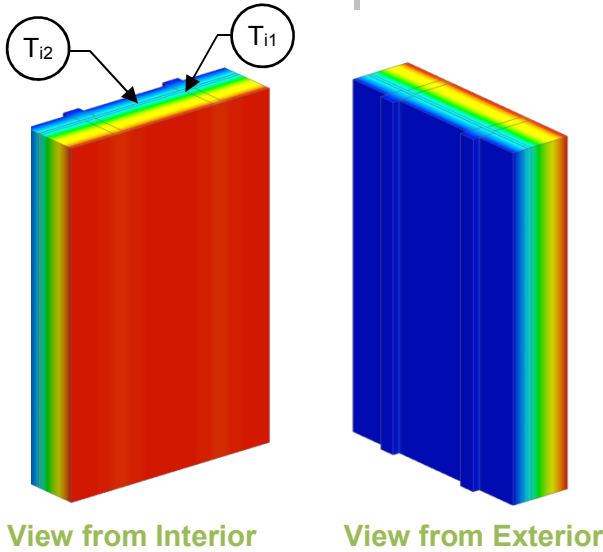
R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
R-22.1 (3.89)	R-19.7 (3.47)	0.051 (0.29)

Temperature Indices

T _{i1}	0.06	Min T on sheathing, between studs
T _{i2}	0.12	Max T on sheathing, along studs

Detail 7.1.2

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R Value	R_{1D}	R-21.7 (3.82 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

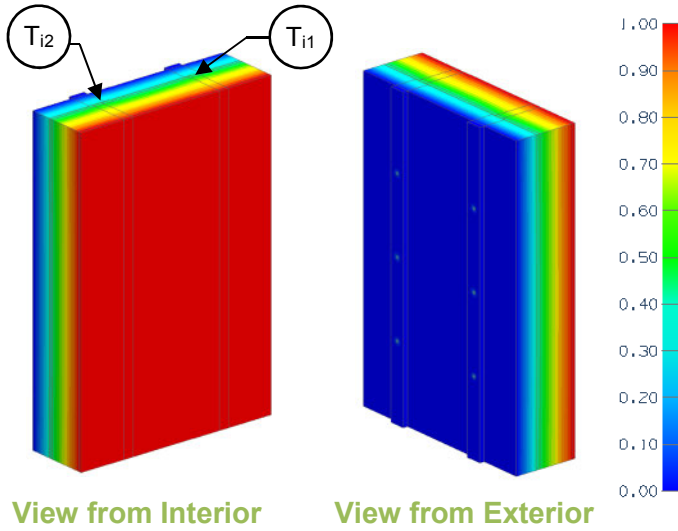
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-26.7 (4.70)	R-23.8 (4.20)	0.042 (0.24)
R-10 (1.76)	R-31.7 (5.58)	R-27.9 (4.91)	0.036 (0.20)
R-15 (2.64)	R-36.7 (6.46)	R-31.7 (5.59)	0.032 (0.18)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.23	0.34	0.42	Min T on sheathing, adjacent to studs
T_{i2}	0.25	0.36	0.44	Max T on sheathing, between studs at centre of stud cavity

Detail 7.1.3

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

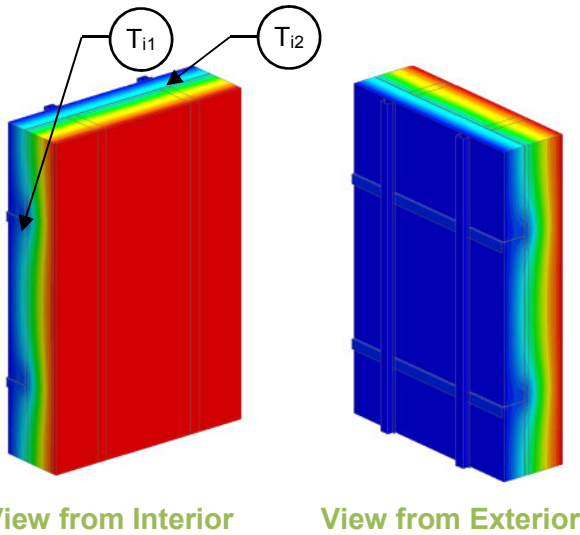
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.33)	0.041 (0.23)
R-10 (1.76)	R-31.6 (5.56)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.25	0.35	0.41	Min T on sheathing, at fasteners along studs
T_{i2}	0.32	0.42	0.50	Max T on sheathing, between fasteners along studs

Detail 7.1.4

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Horizontal Metal Z-Girts (24" o.c.) Supporting Fiber Cement Board – Clear Wall



Thermal Performance Indicators

Assembly 1D (Nominal) R Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	"clear wall" U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-26.6 (4.68)	R-23.4 (4.13)	0.043 (0.24)
R-10 (1.76)	R-31.6 (5.56)	R-26.4 (4.65)	0.038 (0.21)
R-15 (2.64)	R-36.6 (6.44)	R-28.8 (5.07)	0.035 (0.20)

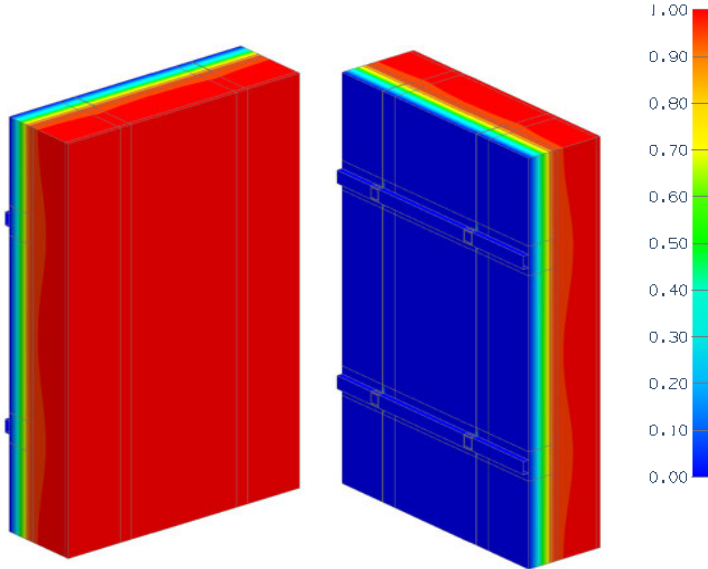
Temperature Indices

	R5	R10	R15	
T_{i1}	0.12	0.15	0.18	Min T on sheathing, along horizontal Z-girts
T_{i2}	0.30	0.41	0.48	Max T on sheathing, at studs between horizontal Z-girts

Detail 7.1.5

Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Knight MFI-System (24" o.c.) Supporting Cladding – Clear Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear wall” U- and R-value

View from Interior

View from Exterior

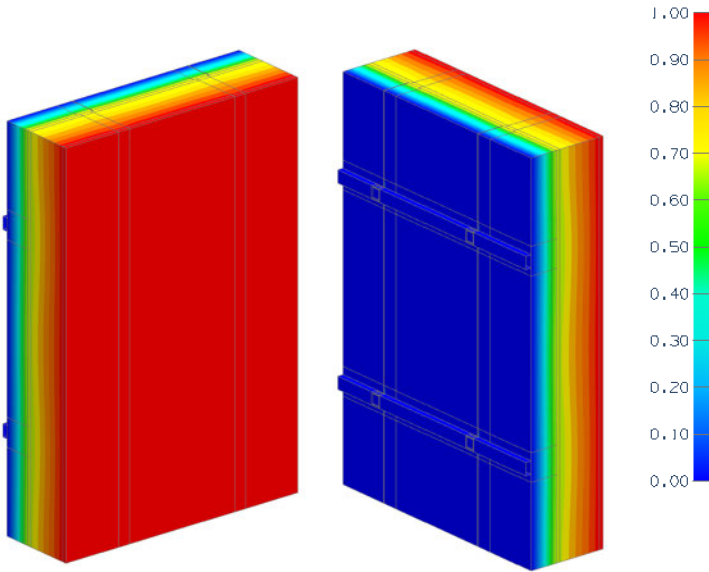
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.04)	R-11.1 (1.95)	0.090 (0.51)
R-12.6 (2.22)	R-15.8 (2.78)	R-14.6 (2.57)	0.069 (0.39)
R-14.7 (2.59)	R-17.9 (3.15)	R-16.2 (2.85)	0.062 (0.35)
R-16.8 (2.96)	R-20.0 (3.52)	R-17.8 (3.13)	0.056 (0.32)
R-21.0 (3.70)	R-24.2 (4.26)	R-20.8 (3.66)	0.048 (0.28)
R-25.2 (4.44)	R-28.4 (5.00)	R-23.6 (4.16)	0.042 (0.24)

Detail 7.1.6

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Knight MFI-System (24" o.c.) Supporting Cladding – Clear Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-21.3 (3.75 RSI) + exterior insulation
Transmittance / Resistance	U_o , R_o	"clear wall" U- and R-value

View from Interior

View from Exterior

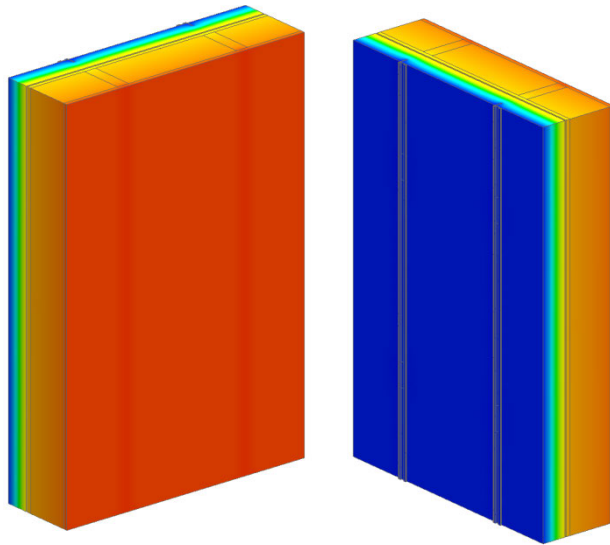
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-29.7 (5.23)	R-26.4 (4.65)	0.038 (0.22)
R-12.6 (2.22)	R-33.9 (5.97)	R-29.9 (5.27)	0.033 (0.19)
R-14.7 (2.59)	R-36.0 (6.34)	R-31.6 (5.57)	0.032 (0.18)
R-16.8 (2.96)	R-38.1 (6.71)	R-33.2 (5.85)	0.030 (0.17)
R-21.0 (3.70)	R-42.3 (7.45)	R-36.3 (6.39)	0.028 (0.16)
R-25.2 (4.44)	R-46.5 (8.19)	R-39.2 (6.90)	0.025 (0.14)

Detail 7.1.7

Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Thermally Broken Aluminum Clip Rail System (24" o.c.) Supporting Cladding – Clear Wall

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1Da}	R-2.6 (0.46 RSI) + exterior insulation and fiberglass batt insulation
Assembly 1D (Nominal) R-Value	R_{1Db}	R-20.6 (3.63 RSI) + exterior insulation (with fiberglass batt insulation)
Transmittance / Resistance	U_a , R_a , U_b , R_b	“Clear wall” U- and R-value: a = without batt insulation b = with batt insulation

¹If insulation in stud cavity is used, R-0.9 insulation for the cavity space is eliminated

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Clear Wall – Without Fiberglass Batt Insulation in Stud Cavity

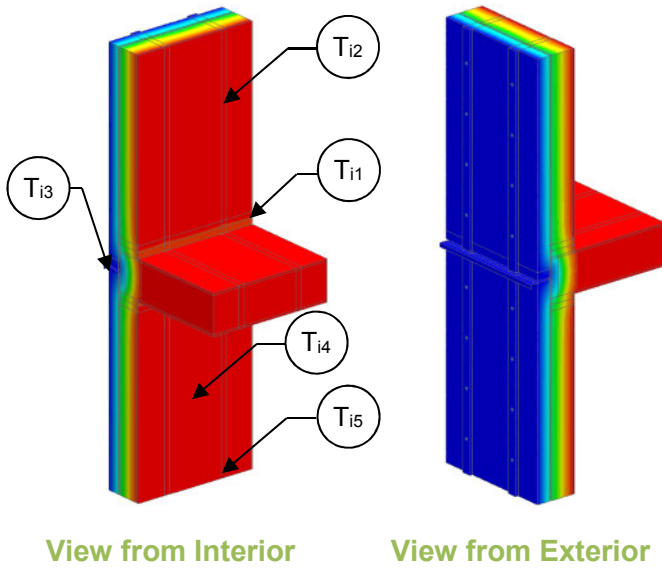
Exterior Insulation 1D R-Value (RSI)	R_{1Da} ft ² ·hr·°F / Btu (m ² K / W)	R_a ft ² ·hr·°F / Btu (m ² K / W)	U_a Btu/ft ² ·hr ·°F (W/m ² K)
R-12.6 (2.22)	R-15.2 (2.68)	R-15.4 (2.73)	0.065 (0.37)

Clear Wall – With Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	R_{1Db} ft ² ·hr·°F / Btu (m ² K / W)	R_b ft ² ·hr·°F / Btu (m ² K / W)	U_b Btu/ft ² ·hr ·°F (W/m ² K)
R-12.6 (2.22)	R-33.2 (5.85)	31.3 (5.49)	0.032 (0.18)

Detail 7.2.1

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Rim Joist and Floor Intersection without Metal Flashing Bypassing Exterior Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U _o , R _o	"clear wall" U- and R-value, without floor
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of wood framed floor

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

Nominal (1D) vs. Assembly Performance Indicators

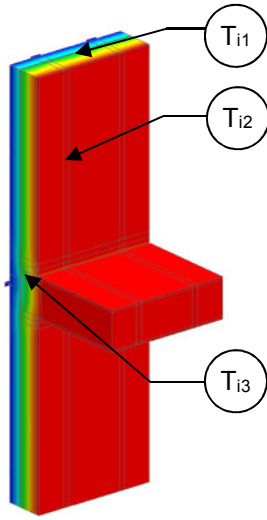
Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-0 (0.00)	R-21.6 (3.80)	R-20.0 (3.47)	0.051 (0.29)	R-17.0 (3.00)	0.059 (0.33)	0.07 (0.122)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.32)	0.041 (0.23)	R-21.6 (3.81)	0.046 (0.26)	0.049 (0.084)
R-10 (1.76)	R-31.6 (5.56)	R-29.2 (5.14)	0.034 (0.19)	R-25.3 (4.46)	0.039 (0.22)	0.046 (0.080)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)	R-28.8 (5.06)	0.035 (0.20)	0.045 (0.077)

Temperature Indices

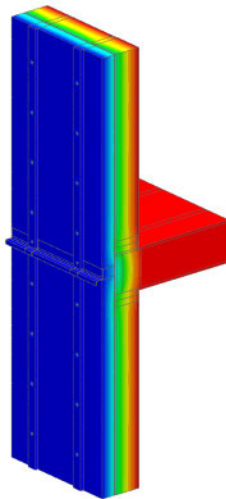
	R0	R5	R10	R15	
T _{i1}	-	0.25	0.35	0.39	Min T on sheathing, at floor intersection
T _{i2}	-	0.36	0.47	0.54	Max T on sheathing, at studs between fasteners
T _{i3}	0.15	0.28	0.32	0.35	Min T on rim joist, between floor joists
T _{i4}	0.06	-	-	-	Min T on sheathing, between studs in stud cavity
T _{i5}	0.16	-	-	-	Max T on sheathing, at studs

Detail 7.2.2

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Rim Joist and Floor Intersection with Metal Flashing Bypassing Exterior Insulation



View from Interior



View from Exterior

Thermal Performance Indicators

1.00	Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
0.90	Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without floor
0.80	Transmittance / Resistance	U, R	U and R-values for the overall assembly
0.70	Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
0.60	Linear Transmittance	ψ	Incremental increase in transmittance per linear length of wood framed floor
0.50			
0.40			
0.30			
0.20			
0.10			
0.00			

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

Nominal (1D) vs. Assembly Performance Indicators

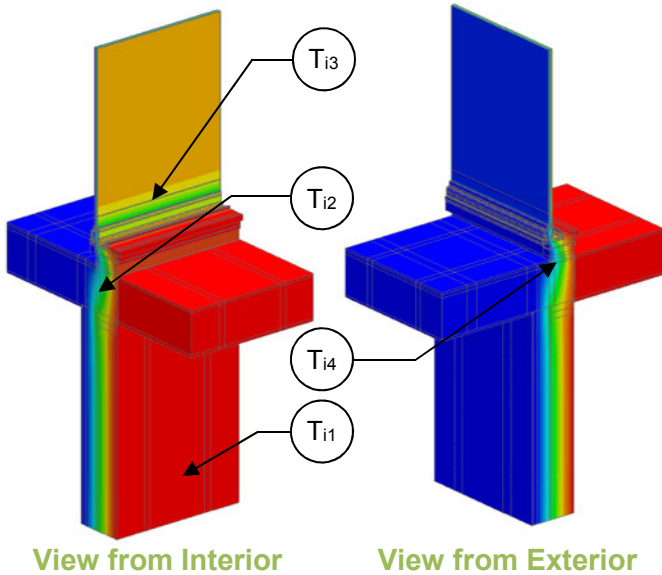
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.32)	0.041 (0.23)	R-21.9 (3.85)	0.046 (0.26)	0.044 (0.076)
R-10 (1.76)	R-31.6 (5.56)	R-29.2 (5.14)	0.034 (0.19)	R-26.1 (4.6)	0.038 (0.22)	0.035 (0.061)
R-15 (2.64)	R-36.6 (6.44)	R-33.6 (5.93)	0.03 (0.17)	R-30.1 (5.3)	0.033 (0.19)	0.031 (0.054)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.25	0.38	0.46	Min T on sheathing, between studs at centre of stud cavity
T_{i2}	0.35	0.47	0.54	Max T on sheathing, at studs between fasteners
T_{i3}	0.33	0.43	0.61	Min T on rim joist, between floor joists

Detail 7.2.3

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Cantilevered Wood Joist Balcony Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	"clear wall" U- and R-value w = wood framed wall without balcony g = glazed sliding door
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of balcony

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-31.6 (5.56)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)

Base Assembly – Sliding Door

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.323 (1.83)

Balcony Transition Linear Transmittance

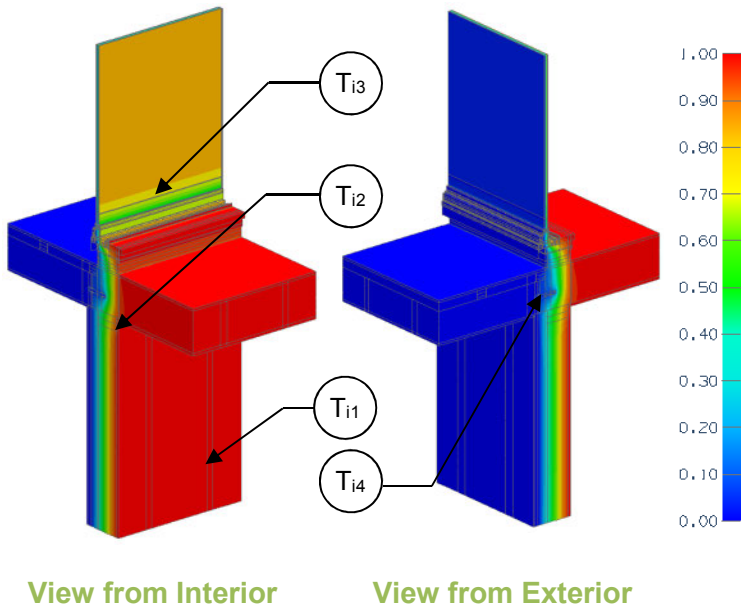
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-5.9 (1.04)	0.170 (0.97)	0.072 (0.125)
R-15 (2.64)	R-6.0 (1.06)	0.166 (0.95)	0.067 (0.115)

Temperature Indices

	R10	R15	
T_{i1}	0.34	0.43	Min T on sheathing, between studs and at fasteners
T_{i2}	0.45	0.54	Max T on sheathing, below floor header beam
T_{i3}	0.49	0.49	Min T on frame, at edge of glass
T_{i4}	0.31	0.34	Min T on rim joist, between floor joists

Detail 7.2.4

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Independently Supported Balcony Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value w = wood framed wall without balcony g = glazed sliding door
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of balcony

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-10 (1.76)	R-31.6 (5.56)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)

Base Assembly – Sliding Door

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.323 (1.83)

Balcony Transition Linear Transmittance

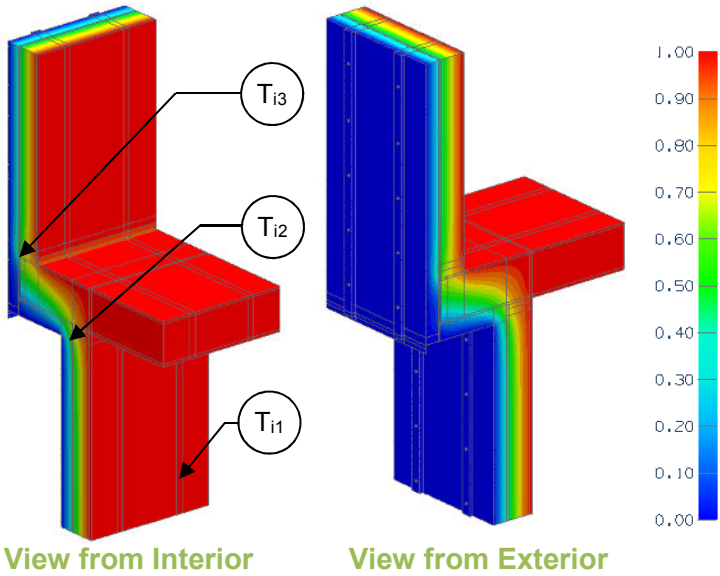
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-5.9 (1.04)	0.169 (0.96)	0.083 (0.143)
R-15 (2.64)	R-6.0 (1.06)	0.166 (0.94)	0.078 (0.134)

Temperature Indices

	R10	R15	
T_{i1}	0.37	0.43	Min T on sheathing, at fasteners along studs
T_{i2}	0.43	0.51	Max T on sheathing, at studs below floor header beam
T_{i3}	0.49	0.49	Min T on frame, at edge of glass
T_{i4}	0.22	0.22	Min T at balcony bolts, between floor joists

Detail 7.2.5

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Cantilevered Floor Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_f, R_f	“clear field” U- and R-value w = wood framed wall without floor f = floor assembly
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of soffit

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-10 (1.76)	R-31.6 (5.56)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)

Base Assembly – Floor

Exterior Insulation 1D R-Value (RSI)	R_f ft ² ·hr·°F / Btu (m ² K / W)	U_f Btu/ft ² ·hr·°F (W/m ² K)
R-10 (1.76)	R-31.4 (5.53)	0.032 (0.18)
R-15 (2.64)	R-36.1 (6.36)	0.028 (0.16)

Floor Transition Linear Transmittance

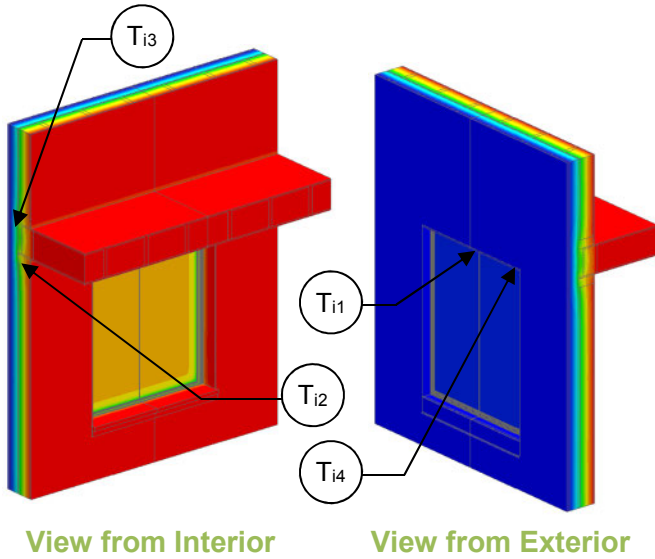
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-10 (1.76)	R-26.2 (4.61)	0.04 (0.22)	0.034 (0.059)
R-15 (2.64)	R-31.2 (5.49)	0.03 (0.18)	0.021 (0.036)

Temperature Indices

	R10	R15	
T_{i1}	0.36	0.43	Min T on sheathing, at fasteners along studs
T_{i2}	0.67	0.75	Max T on sheathing, below floor at bottom of header plate
T_{i3}	0.13	0.26	Min T on rim joist and overhang sheathing, at beam and overhang sheathing intersection

Detail 7.3.1

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Vinyl Window Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value w = wood framed wall without floor joist or glazing g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = wood frame wall + floor joist t = combined wall, glazing, and floor joist
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of s = floor g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-26.6 (4.68)	R-23.4 (4.12)	0.041 (0.23)
R-15 (2.64)	R-36.6 (6.44)	R-33.4 (5.88)	0.030 (0.17)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.344 (1.95)

Floor Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ·hr ·°F (W/m K)
R-5 (0.88)	R-21.9 (3.85)	0.046 (0.26)	0.044 (0.076)
R-15 (2.64)	R-31.1 (5.49)	0.032 (0.18)	0.031 (0.054)

Window Transition Linear Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ_g^2 Btu/ft ·hr ·°F (W/m K)
R-7.5 (1.33)	0.133 (0.75)	0.059 (0.103)
R-8.1 (1.42)	0.124 (0.70)	0.062 (0.107)

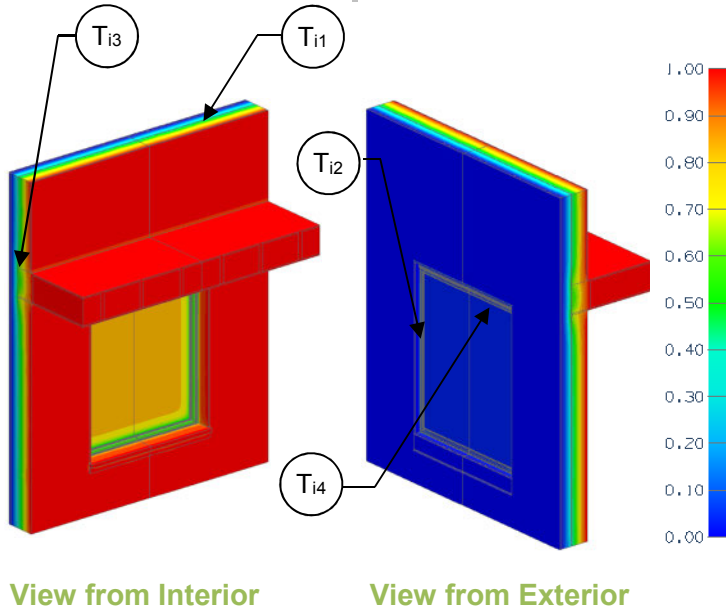
²For the linear transmittance, use the window perimeter

Temperature Indices

	R5	R15	
T_{i1}	0.21	0.30	Min T on sheathing, between window head and floor
T_{i2}	0.65	0.67	Max T on sheathing, below ceiling and floor header beam
T_{i3}	0.42	0.55	Min T on floor header beam, between floor joists
T_{i4}	0.40	0.39	Min T on window glass, at top corner of glazing

Detail 7.3.2

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Aluminum Window Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w , R_w , U_g	“clear wall” U- and R-value w = wood framed wall without floor joist or glazing g = glazing
Transmittance / Resistance	U_s , R_s , U_t , R_t	U and R-values for s = wood frame wall + floor joist t = combined wall, glazing, and floor joist
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s , ψ_g	Incremental increase in transmittance per linear length of s = floor g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.33)	0.041 (0.23)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)

Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.400 (2.27)

Floor Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-21.9 (3.85)	0.046 (0.26)	0.044 (0.076)
R-15 (2.64)	R-30.1 (5.30)	0.033 (0.19)	0.031 (0.054)

Window Transition Linear Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ_g^2 Btu/ft ·hr ·°F (W/m K)
R-6.3 (1.11)	0.159 (0.90)	0.139 (0.240)
R-6.9 (1.21)	0.146 (0.83)	0.099 (0.171)

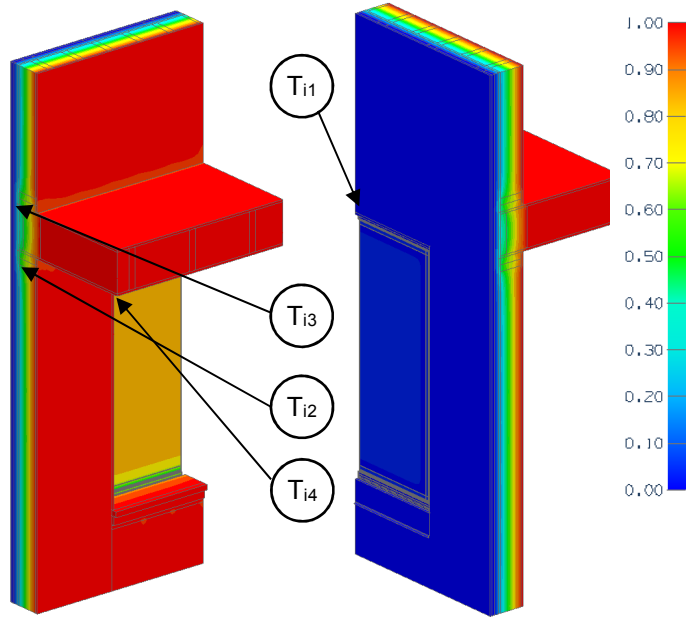
Temperature Indices

	R5	R15	
T_{i1}	0.21	0.34	Min T on sheathing, at fasteners adjacent to studs
T_{i2}	0.50	0.72	Max T on sheathing, along jamb of window opening
T_{i3}	0.42	0.55	Min T on floor header beam, between floor joists
T_{i4}	0.37	0.38	Min T on window glass, at top corner of glazing

²For the linear transmittance, use the window perimeter

Detail 7.3.3

Exterior and Interior Insulated 2x6 Wood Stud (8" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Vinyl Window Intersection



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-17.2 (3.03 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value, w = wood framed wall without joist or glazing g = glazing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = wood framed wall + floor joist t = combined wall, glazing, and floor joist
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_g	Incremental increase in transmittance per linear length of s = floor g = glazing transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly - Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-22.2 (3.91)	22.0 (3.88)	0.045 (0.26)
R-15 (2.64)	R-32.2 (5.67)	32.0 (5.64)	0.031 (0.18)

Base Assembly Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.344 (1.95)

Floor Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ_s Btu/ft·hr·°F (W/m K)
R-5 (0.88)	20.8 (3.66)	0.048 (0.27)	0.026 (0.046)
R-15 (2.64)	30.1 (5.29)	0.033 (0.19)	0.021 (0.036)

Window Transition Linear Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	ψ_g^2 Btu/ft·hr·°F (W/m K)
7.4 (1.31)	0.135 (0.76)	0.040 (0.069)
7.9 (1.40)	0.126 (0.72)	0.046 (0.079)

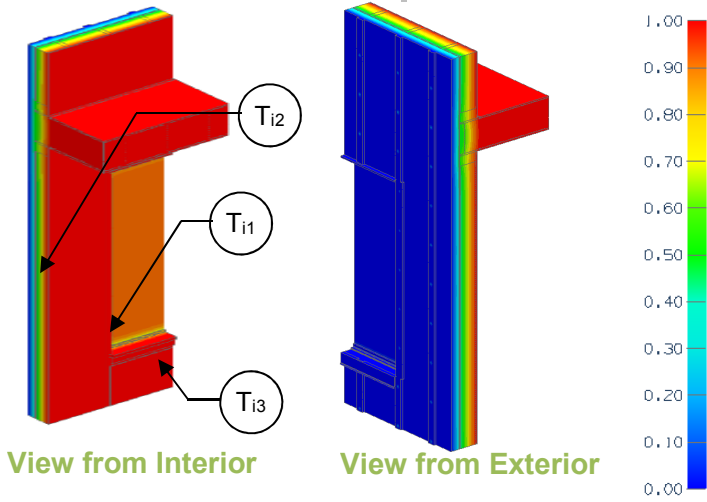
²For the linear transmittance, use the window perimeter

Temperature Indices

	R5	R15	
T_{i1}	0.24	0.26	Min T on sheathing, between window head and floor
T_{i2}	0.51	0.64	Max T on sheathing, below ceiling and floor header beam
T_{i3}	0.42	0.54	Min T on floor header beam, between floor joists
T_{i4}	0.37	0.37	Min T on window glass, at top corner of glazing

Detail 7.3.4

Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed Flange Mounted Vinyl Window Intersection with Window Positioned in Wood Framing



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w , R_w , U_g	“clear wall” U- and R-value: w = wall without floor g = glazing
Transmittance / Resistance	U_t , R_t	U and R-values for: t = combined wall + floor + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length

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

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.142 (0.81)	0.163 (0.92)

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² · hr · °F (W/m ² K)
R-5 (0.88)	R-8.2 (1.44)	R-8.5 (1.50)	0.117 (0.67)
R-10 (1.76)	R-13.2 (2.32)	R-13.0 (2.28)	0.077 (0.44)
R-15 (2.64)	R-18.2 (3.20)	R-17.1 (3.01)	0.058 (0.33)

Intermediate Floor Linear Transmittance

R_{floor} ft ² ·hr·°F / Btu (m ² K / W)	U_{floor} Btu/ft ² · hr · °F (W/m ² K)	Ψ_{floor} Btu/ft ² · hr · °F (W/m ² K)
R-8.7 (1.53)	0.115 (0.65)	-0.025 (-0.044)
R-13.2 (2.33)	0.076 (0.43)	-0.016 (-0.027)
R-17.3 (3.05)	0.058 (0.33)	-0.008 (-0.014)

Window Transition Transmittance

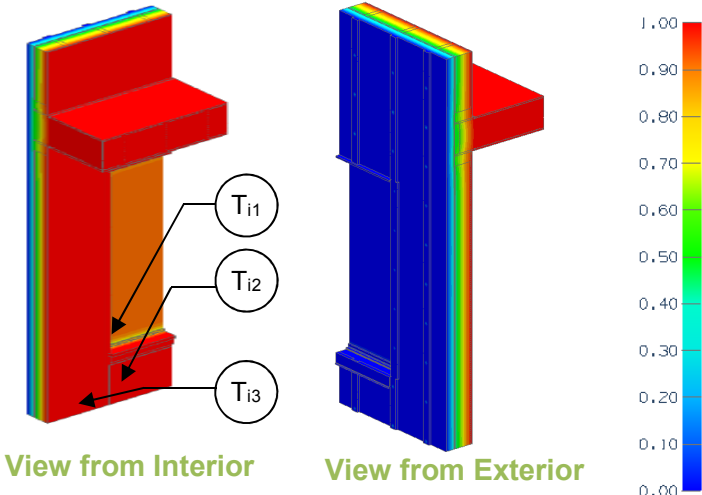
Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² K)	Ψ^{Head} Btu/ft · hr · °F (W/m K)	Ψ^{Sill} Btu/ft · hr · °F (W/m K)	Ψ^{Jamb} Btu/ft · hr · °F (W/m K)	Ψ^{Total} Btu/ft · hr · °F (W/m K)
R-5 (0.88)	R-7.9 (1.40)	0.126 (0.72)	-0.028 (-0.048)	0.003 (0.006)	0.008 (0.014)	0.000 (0.000)
R-10 (1.76)	R-10.0 (1.77)	0.100 (0.57)	0.000 (0.000)	0.013 (0.023)	0.015 (0.026)	0.014 (0.024)
R-15 (2.64)	R-11.4 (1.96)	0.090 (0.51)	0.017 (0.030)	0.024 (0.042)	0.026 (0.046)	0.029 (0.051)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.65	0.66	0.66	Min T on window frame, at bottom corner
T_{i2}	0.75	0.84	0.88	Max T on interior surface of sheathing between studs
T_{i3}	0.62	0.70	0.72	Min T on interior surface sheathing below window sill adjacent to wood stud

Detail 7.3.5

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed Flange Mounted Vinyl Window Intersection with Window Positioned in Wood Framing



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w , R_w , U_g	“clear wall” U- and R-value: w = wall without floor, g = glazing
Transmittance / Resistance	U_t , R_t	U and R-values for: t = combined wall + floor + window
Surface Temperature Index ¹	T_i	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length

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

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.142 (0.81)	0.163 (0.92)

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² · hr · °F (W/m ² K)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.33)	0.041 (0.23)
R-10 (1.76)	R-31.6 (5.57)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.6 (6.45)	R-33.7 (5.93)	0.030 (0.17)

Intermediate Floor Linear Transmittance

R_{floor} ft ² ·hr·°F / Btu (m ² K / W)	U_{floor} Btu/ft ² · hr · °F (W/m ² K)	Ψ_{floor} Btu/ft ² · hr · °F (W/m ² K)
R-23.6 (4.15)	0.042 (0.24)	0.018 (0.030)
R-28.2 (4.97)	0.035 (0.20)	0.012 (0.020)
R-33.6 (5.91)	0.030 (0.17)	0.001 (0.002)

Window Transition Transmittance

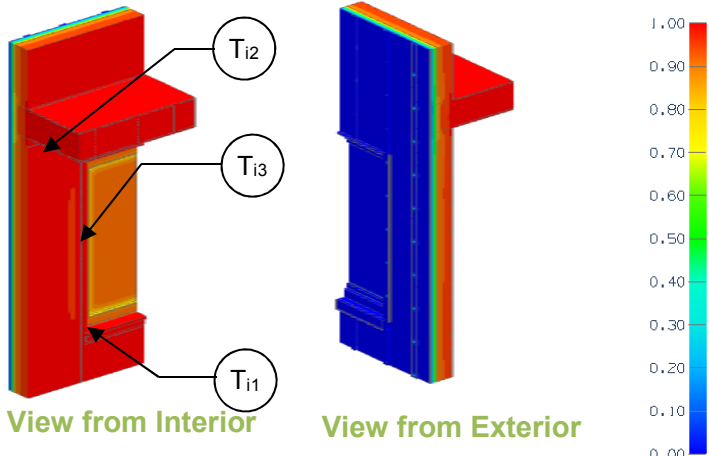
Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² K)	Ψ^{Head} Btu/ft · hr · °F (W/m K)	Ψ^{Sill} Btu/ft · hr · °F (W/m K)	Ψ^{Jamb} Btu/ft · hr · °F (W/m K)	Ψ^{Total} Btu/ft · hr · °F (W/m K)
R-5 (0.88)	R-13.1 (2.29)	0.077 (0.44)	0.023 (0.040)	0.015 (0.026)	0.018 (0.032)	0.018 (0.031)
R-10 (1.76)	R-14.0 (2.46)	0.071 (0.41)	0.035 (0.060)	0.015 (0.026)	0.019 (0.032)	0.018 (0.031)
R-15 (2.64)	R-14.7 (2.59)	0.068 (0.39)	0.032 (0.056)	0.016 (0.027)	0.020 (0.034)	0.022 (0.038)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.62	0.63	0.64	Min T on window frame, at bottom corner
T_{i2}	0.33	0.43	0.49	Max T on interior surface of sheathing, below window adjacent to wood studs
T_{i3}	0.25	0.35	0.41	Min T on interior surface of sheathing, adjacent to wood stud

Detail 7.3.6

Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping (16" o.c.) and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed High Performance Vinyl Window Intersection (Insulated Frames)



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.5 (0.61 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w , R_w , U_g	"clear wall" U- and R-value: w = wall without floor g = glazing
Transmittance / Resistance	U_t , R_t	U and R-values for: t = combined wall + floor + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length

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

Scenario

Scenario	Insulation Brought into Opening
A	No
B	Yes

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.142 (0.81)	0.163 (0.92)

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² · hr · °F (W/m ² K)
R-5 (0.88)	R-8.2 (1.44)	R-8.5 (1.50)	0.117 (0.67)
R-10 (1.76)	R-13.2 (2.32)	R-13.0 (2.28)	0.077 (0.44)
R-15 (2.64)	R-18.2 (3.20)	R-17.1 (3.01)	0.058 (0.33)

Intermediate Floor Linear Transmittance

R_{floor} ft ² ·hr·°F / Btu (m ² K / W)	U_{floor} Btu/ft ² · hr · °F (W/m ² K)	Ψ_{floor} Btu/ft ² · hr · °F (W/m ² K)
R-8.7 (1.53)	0.115 (0.65)	-0.025 (-0.044)
R-13.2 (2.33)	0.076 (0.43)	-0.016 (-0.027)
R-18.2 (3.20)	0.055 (0.31)	-0.008 (-0.014)

Window Transition Transmittance

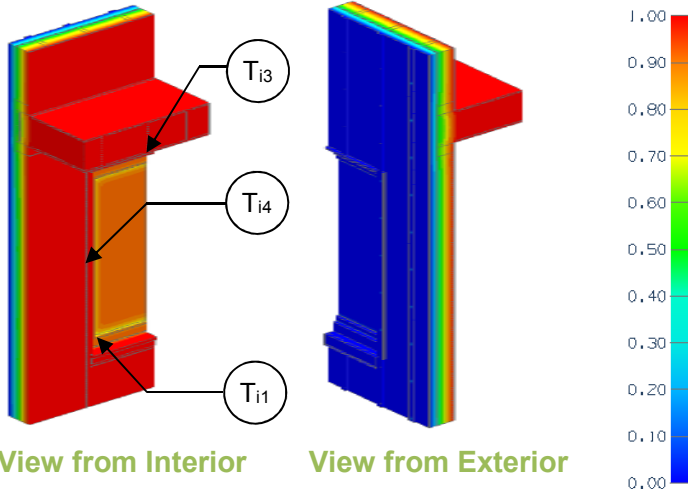
	Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² K)	Ψ_{Head} Btu/ft · hr · °F (W/m K)	Ψ_{Sill} Btu/ft · hr · °F (W/m K)	Ψ_{Jamb} Btu/ft · hr · °F (W/m K)	Ψ_{Total} Btu/ft · hr · °F (W/m K)
A	R-5 (0.88)	R-7.9 (1.39)	0.127 (0.72)	-0.017 (-0.029)	0.006(0.011)	0.007 (0.012)	-0.016 (-0.027)
	R-10 (1.76)	R-9.9 (1.75)	0.101 (0.57)	0.006 (0.011)	0.016 (0.027)	0.016 (0.028)	-0.001 (-0.002)
	R-15 (2.64)	R-11.0 (1.94)	0.091 (0.52)	0.021 (0.036)	0.027 (0.046)	0.027 (0.047)	0.014 (0.024)
B	R-5 (0.88)	R-7.9 (1.39)	0.126 (0.72)	-0.047 (-0.081)	0.001 (0.001)	0.003 (0.005)	-0.019 (-0.033)
	R-10 (1.76)	R-10.0 (1.76)	0.100 (0.57)	-0.040 (-0.070)	0.010 (0.017)	0.012 (0.020)	-0.005 (-0.008)
	R-15 (2.64)	R-11.1 (1.96)	0.090 (0.51)	0.008 (0.013)	0.021 (0.036)	0.023 (0.039)	0.010 (0.017)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.69	0.69	0.69	Min T on window frame, at bottom corner at edge of glazing
T_{i2}	0.33	0.45	0.53	Max T on interior surface of sheathing, below floor adjacent to wood stud
T_{i3}	0.25	0.30	0.33	Min T on interior surface of sheathing at centre of wall between wood stud

Detail 7.3.7

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping (16" o.c.) and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed High Performance Vinyl Window Intersection (Insulated Frames)



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_w, R_w, U_g	“clear wall” U- and R-value: w = wall without floor g = glazing
Transmittance / Resistance	U_t, R_t	U and R-values for: t = combined wall + floor + window
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length

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

Scenario

Scenario	Insulation Brought into Opening
A	No
B	Yes

Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.142 (0.81)	0.163 (0.92)

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² · hr · °F (W/m ² K)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.33)	0.041 (0.23)
R-10 (1.76)	R-31.6 (5.57)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.6 (6.45)	R-33.7 (5.93)	0.030 (0.17)

Intermediate Floor Linear Transmittance

R_{floor} ft ² ·hr·°F / Btu (m ² K / W)	U_{floor} Btu/ft ² · hr · °F (W/m ² K)	Ψ_{floor} Btu/ft ² · hr · °F (W/m ² K)
R-23.6 (4.15)	0.042 (0.24)	0.018 (0.030)
R-28.2 (4.97)	0.035 (0.20)	0.012 (0.020)
R-33.6 (5.91)	0.030 (0.17)	0.001 (0.002)

Window Transition Transmittance

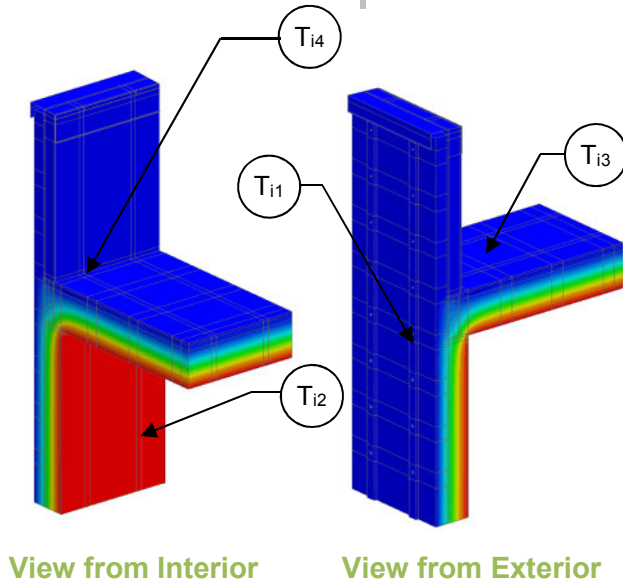
	Exterior Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² K)	Ψ_{Head} Btu/ft · hr · °F (W/m K)	Ψ_{Sill} Btu/ft · hr · °F (W/m K)	Ψ_{Jamb} Btu/ft · hr · °F (W/m K)	Ψ_{Total} Btu/ft · hr · °F (W/m K)
A	R-5 (0.88)	R-12.5 (2.20)	0.080 (0.45)	0.034 (0.059)	0.019 (0.032)	0.018 (0.032)	0.015 (0.026)
	R-10 (1.76)	R-13.4 (2.37)	0.074 (0.42)	0.028 (0.049)	0.020 (0.035)	0.019 (0.033)	0.014 (0.025)
	R-15 (2.64)	R-14.2 (2.51)	0.070 (0.40)	0.026 (0.044)	0.021 (0.036)	0.018 (0.032)	0.016 (0.028)
B	R-5 (0.88)	R-12.6 (2.22)	0.079 (0.45)	0.032 (0.056)	0.019 (0.033)	0.017 (0.029)	0.012 (0.021)
	R-10 (1.76)	R-13.6 (2.39)	0.074 (0.42)	0.026 (0.045)	0.015 (0.026)	0.016 (0.028)	0.011 (0.019)
	R-15 (2.64)	R-14.4 (2.53)	0.070 (0.40)	0.023 (0.041)	0.015 (0.026)	0.017 (0.029)	0.013 (0.022)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.69	0.69	0.69	Min T on window frame, at bottom corner at edge of glazing
T_{i2}	0.75	0.84	0.88	Max T on interior surface of sheathing, at centre of wall away from wood studs
T_{i3}	0.63	0.71	0.77	Min T on interior surface of sheathing, below window sill adjacent to wood stud

Detail 7.4.1

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Vented Low-slope Roof & Parapet Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear field” U- and R-value r = roof w = wood framed wall without parapet
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-0 (0)	R-21.6 (3.80)	R-19.7 (3.47)	0.051 (0.29)
R-7.5 (1.32)	R-29.0 (5.12)	R-26.9 (4.74)	0.037 (0.21)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-30 (5.28)	R-30.1 (5.3)	0.033 (0.19)

Parapet Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-0 (0)	R-22.1 (3.89)	0.045 (0.26)	0.031 (0.054)
R-7.5 (1.32)	R-25.9 (4.56)	0.039 (0.22)	0.032 (0.056)
R-15 (2.64)	R-29.3 (5.15)	0.034 (0.19)	0.026 (0.045)

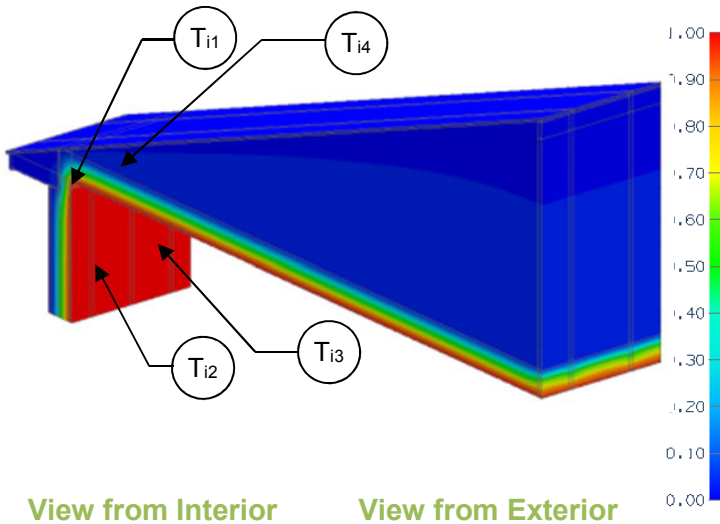
Temperature Indices

	R0	R7.5	R15	
T_{11}	-	0.26	0.33	Min T on sheathing, at studs and rim joist intersection
T_{12}	-	0.35	0.50	Max T on sheathing, at studs between fasteners
T_{13}	-	0.04	0.04	Min T on roof sheathing, between roof strapping
T_{14}	0.02	-	-	Min T on roof sheathing, at top of rim joist intersection

Detail 7.4.2

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Sloped Wood Framed Roof & Wall Intersection with Insulation at Ceiling

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	“clear field” U- and R-value r = roof w = wood framed wall without soffit line
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of soffit line

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-0 (0)	R-22.2 (3.91)	R-19.7 (3.47)	0.051 (0.29)
R-7.5 (1.32)	R-29.2 (5.14)	R-26.9 (4.74)	0.037 (0.21)
R-15 (2.64)	R-36.7 (6.46)	R-33.6 (5.93)	0.030 (0.17)

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-30 (5.28)	R-30.1 (5.3)	0.033 (0.19)

Soffit Line Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-0 (0.00)	R-27.0 (4.76)	0.037 (0.21)	0.019 (0.033)
R-7.5 (1.32)	R-28.5 (5.02)	0.035 (0.20)	0.028 (0.049)
R-15 (2.64)	R-29.3 (5.16)	0.034 (0.19)	0.035 (0.061)

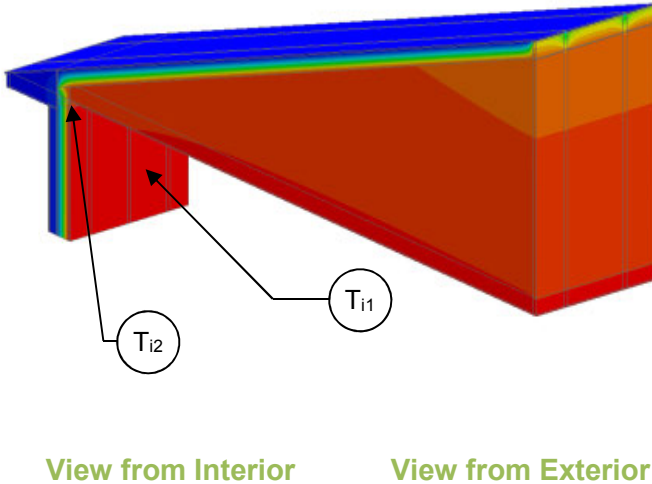
Temperature Indices

	R0	R7.5	R15	
T_{11}	-	0.11	0.13	Min T on sheathing, between studs at top plate
T_{12}	-	0.38	0.51	Max T on sheathing, along studs between fasteners
T_{13}	0.08	-	-	Min T on sheathing, between studs
T_{14}	0.15	-	-	Max T on sheathing, at top plate and truss intersection

Detail 7.4.3

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Sloped Wood Framed Roof & Wall Intersection with Insulation at Roof Sheathing

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_w, R_w	"clear field" U- and R-value r = roof w = wood framed wall without soffit line
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of soffit line

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-0 (0)	R-22.2 (3.91)	R-19.7 (3.47)	0.051 (0.29)
R-7.5 (1.32)	R-29.2 (5.14)	R-26.9 (4.74)	0.037 (0.21)
R-15 (2.64)	R-36.7 (6.46)	R-33.6 (5.93)	0.030 (0.17)

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_r ft ² hr °F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-30 (5.28)	R-24.5 (4.32)	0.041 (0.23)

Roof Linear Transmittance

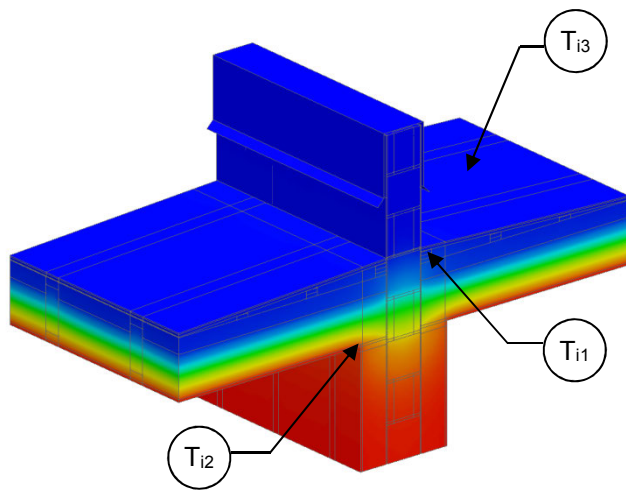
Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-0 (0.00)	R-22.6 (3.99)	0.044 (0.25)	0.039 (0.067)
R-7.5 (1.32)	R-22.8 (4.02)	0.044 (0.25)	0.084 (0.146)
R-15 (2.64)	R-23.0 (4.04)	0.044 (0.25)	0.108 (0.187)

Temperature Indices

	R0	R7.5	R15	
T_{i1}	0.08	0.11	0.13	Min T on sheathing, between studs
T_{i2}	0.26	0.26	0.27	Max T on sheathing, along top plate

Detail 7.4.4

Ventilated Wood Frame Low Slope Roof – Masonry Firewall Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.5 (0.62 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value, without firewall
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of fire wall

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

Nominal (1D) vs. Assembly Performance Indicators

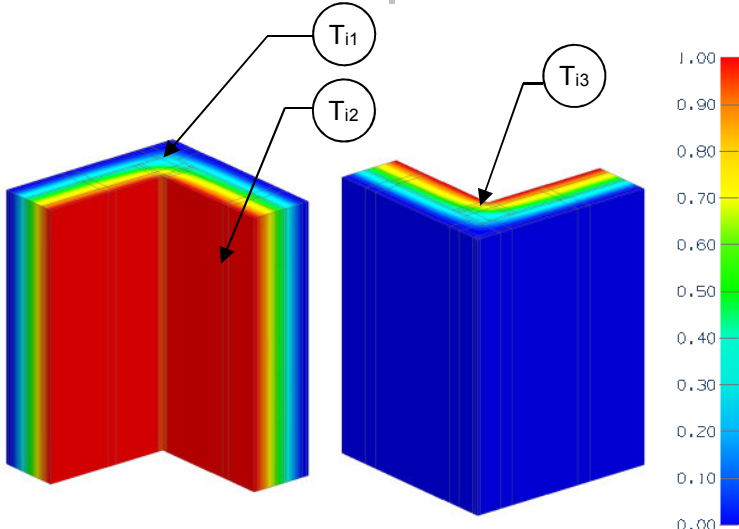
Roof Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-30 (5.28)	R-33.5 (5.90)	R-29.7 (5.22)	0.034 (0.19)	R-26.3 (4.64)	0.038 (0.22)	0.037 (0.064)

Temperature Indices

T_{i1}	0.02	Min T on concrete block, at roof sheathing intersection
T_{i2}	0.80	Max T on concrete block, at roof joist intersection
T_{i3}	0.03	Min T on roof sheathing, between joists

Detail 7.5.1

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting and Continuous Insulation Fiber Cement Board – Corner Intersection



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	"clear wall" U- and R-value, without corner
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of corner

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

Nominal (1D) vs. Assembly Performance Indicators

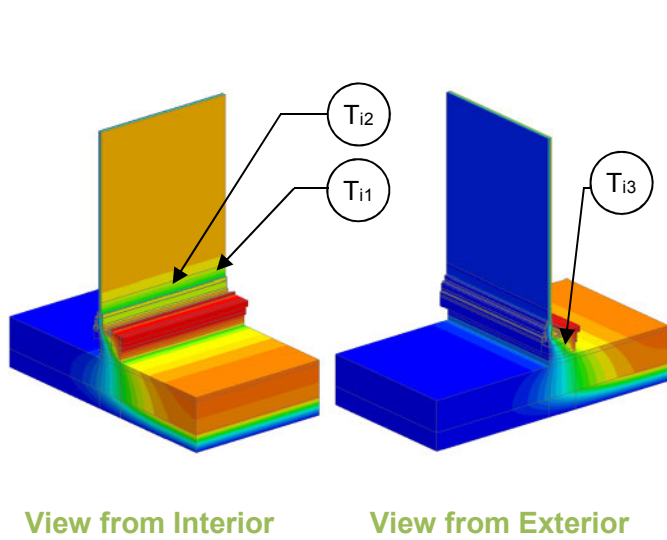
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-0 (0)	R-21.7 (3.82)	R-19.7 (3.47)	0.051 (0.29)	R-17.9 (3.15)	0.056 (0.32)	0.020 (0.035)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.33)	0.041 (0.23)	R-21.8 (3.85)	0.046 (0.26)	0.020 (0.034)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)	R-28.6 (5.03)	0.035 (0.20)	0.021 (0.036)

Temperature Indices

	R0	R5	R15	
T_{i1}	-	0.10	0.19	Min T on sheathing, at fasteners at corner intersection
T_{i2}	0.13	0.32	0.49	Max T on sheathing, along studs between fasteners
T_{i3}	0.02	-	-	Min T on sheathing, at corner intersection

Detail 7.6.1

Wood-frame Sliding Door – Concrete Floor Intersection for Unheated Spaces (Parking Garages)



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.3 (0.41 RSI) + Insulation
Transmittance / Resistance without Anomaly	U_f, R_f, U_g	“clear field” U- and R-value f = floor g = glazed sliding door
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of floor to sliding door transition

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Floor

Floor Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_f ft ² ·hr·°F / Btu (m ² K / W)	U_f Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-22.3 (3.93)	R-22.3 (3.93)	0.044 (0.25)

Base Assembly – Sliding Door

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.323 (1.83)

Sliding Door Sill/ Curb to Floor Linear Transmittance

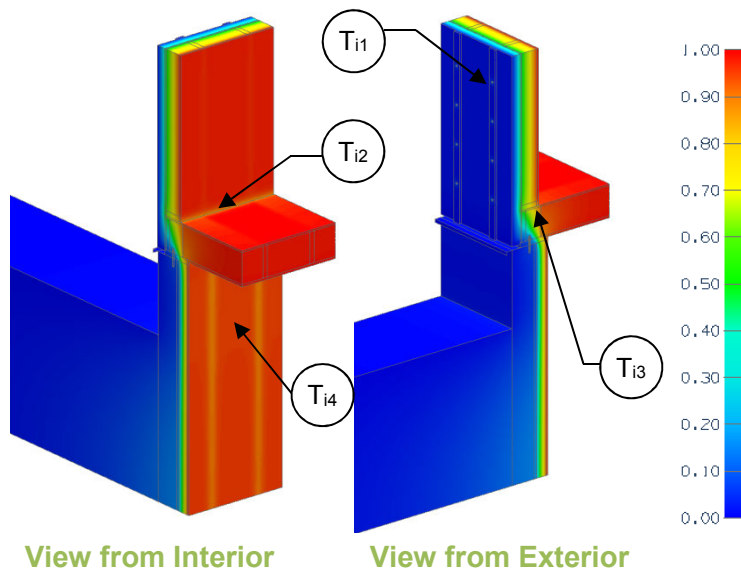
Wall Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-20 (3.52)	R-3.5 (0.621)	0.284 (1.61)	0.320 (0.554)

Temperature Indices

T_{i1}	0.47	-	Min T on glass
T_{i2}	0.42	0.13	Min T on frame
T_{i3}	0.55	0.02	Min T on floor, at interior surface of wood curb

Detail 7.6.2

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Continuous Insulation and Wood Strapping Supporting Fiber Cement Board – Rim Joist and Interior Insulated At-Grade Foundation Wall Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw} , R_{1Dfw}	R-21.6 (3.80 RSI) + exterior insulation for wood framed wall R-1.8 (0.32 RSI) + interior insulation for foundation w = wood framed wall fw = foundation wall
Transmittance / Resistance without Anomaly	U_w , R_w , U_{fw} , R_{fw}	“clear field” U- and R-values
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of foundation

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.32)	0.041 (0.23)
R-10 (1.76)	R-31.6 (5.56)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)

Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	R_{1Dfw} ft ² hr °F / Btu (m ² K / W)	R_{fw} ft ² ·hr·°F / Btu (m ² K / W)	U_{fw} Btu/ft ² ·hr·°F (W/m ² K)
R-19 (3.34)	R-20.8 (3.67)	R-12.7 (2.23)	0.079 (0.449)

Foundation Linear Transmittance

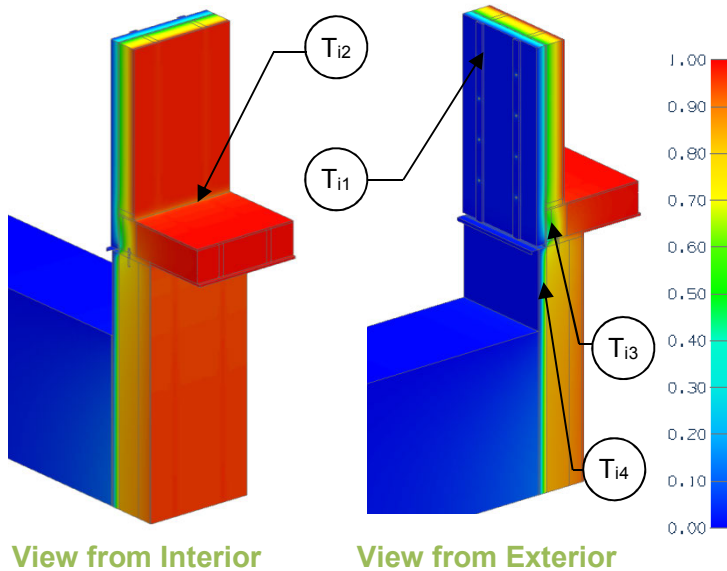
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-5 (0.88)	R-15.9 (2.81)	0.063 (0.36)	0.046 (0.080)
R-10 (1.76)	R-16.7 (2.94)	0.060 (0.34)	0.047 (0.082)
R-15 (2.64)	R-17.2 (3.03)	0.058 (0.33)	0.050 (0.087)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.25	0.36	0.43	Min T on sheathing, along studs at fasteners
T_{i2}	0.40	0.49	0.55	Max T on sheathing, along studs between fasteners and at bottom plate
T_{i3}	0.10	0.11	0.12	Min T on floor foundation sill plate, at rim joist
T_{i4}	0.07	0.07	0.07	Min T on foundation wall, at midsection between floor and grade between studs

Detail 7.6.3

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Continuous Insulation and Wood Strapping Supporting Fiber Cement Board – Rim Joist and Exterior Insulated At-Grade Foundation Wall Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw} , R_{1Dfw}	R-21.6 (3.80 RSI) + exterior insulation for wood framed wall R-3.5 (0.62 RSI) + insulation for foundation w = wood framed wall fw = foundation wall
Transmittance / Resistance without Anomaly	U_w , R_w , U_{fw} , R_{fw}	“clear field” U- and R-value
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of foundation

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.32)	0.041 (0.23)
R-10 (1.76)	R-31.6 (5.56)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)

Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	R_{1Dfw} ft ² hr °F / Btu (m ² K / W)	R_{fw} ft ² ·hr·°F / Btu (m ² K / W)	U_{fw} Btu/ft ² ·hr ·°F (W/m ² K)
R-12.5 (2.20)	R-16.0 (2.82)	R-16.0 (2.82)	0.062 (0.355)

Foundation Linear Transmittance

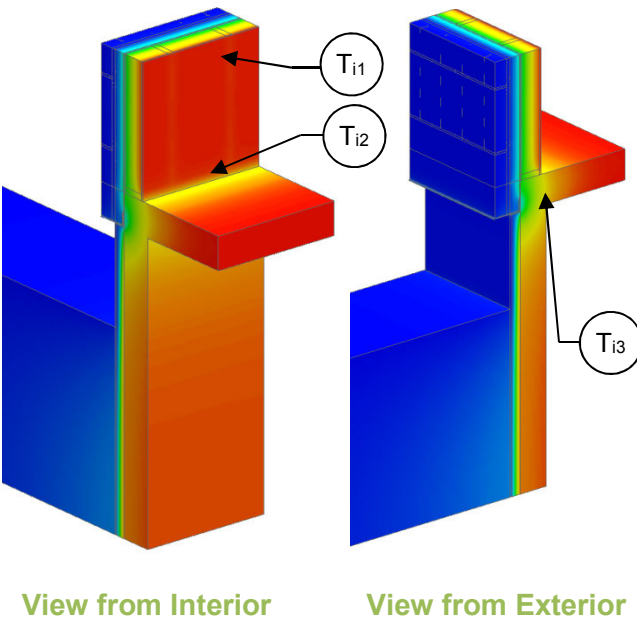
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-5 (0.88)	R-18.0 (3.16)	0.056 (0.32)	0.060 (0.104)
R-10 (1.76)	R-19.0 (3.34)	0.053 (0.30)	0.059 (0.102)
R-15 (2.64)	R-19.7 (3.47)	0.051 (0.29)	0.059 (0.103)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.25	0.36	0.43	Min T on sheathing, along studs at fasteners
T_{i2}	0.39	0.49	0.55	Max T on sheathing, along studs between fasteners and at bottom plate
T_{i3}	0.48	0.50	0.51	Min T on floor foundation sill plate, at rim joist
T_{i4}	0.82	0.82	0.82	Min T on foundation wall, at midsection between floor and grade between studs

Detail 7.6.4

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Exterior Insulated At-Grade Foundation Wall Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1Dw} , R_{1Dfw}	R-22.6 (3.98 RSI) + exterior insulation for wood framed wall R-1.3 (0.29 RSI) + insulation for foundation w = wood framed wall fw = foundation wall
Transmittance / Resistance without Anomaly	U_w , R_w , U_{fw} , R_{fw}	“clear wall” U- and R-value
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of foundation

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	R_{1Dw} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-27.6 (4.86)	R-24.1 (4.25)	0.041 (0.24)
R-10 (1.76)	R-32.6 (5.56)	R-28.0 (4.93)	0.036 (0.20)
R-15 (2.64)	R-37.6 (6.44)	R-31.5 (5.54)	0.032 (0.18)

Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	R_{1Dfw} ft ² hr °F / Btu (m ² K / W)	R_{fw} ft ² ·hr·°F / Btu (m ² K / W)	U_{fw} Btu/ft ² ·hr·°F (W/m ² K)
R-12.5 (2.20)	R-13.8 (2.43)	R-13.8 (2.43)	0.072 (0.412)

Foundation Linear Transmittance

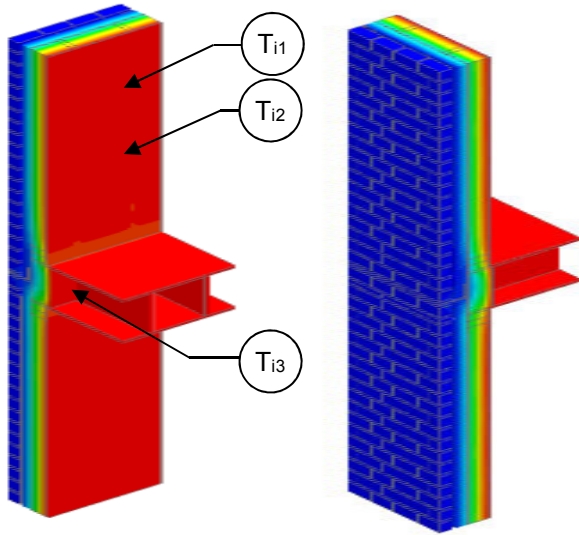
Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-5 (0.88)	R-8.7 (1.53)	0.115 (0.66)	0.493 (0.853)
R-10 (1.76)	R-8.8 (1.54)	0.114 (0.65)	0.509 (0.881)
R-15 (2.64)	R-8.8 (1.55)	0.114 (0.65)	0.523 (0.905)

Temperature Indices

	R5	R10	R15	
T_{i1}	0.19	0.24	0.27	Min T on sheathing, at brick ties adjacent to the studs
T_{i2}	0.50	0.51	0.51	Max T on sheathing, at concrete floor intersection
T_{i3}	0.78	0.78	0.78	Min T on foundation wall, at floor intersection

Detail 7.6.5

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection



View from Interior

View from Exterior

Thermal Performance Indicators

1.00		Assembly 1D (Nominal) R-Value	R_{1D}	R-27.4 (4.83 RSI) + exterior insulation
0.90		Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without floor
0.80		Transmittance / Resistance	U, R	U and R-values for the overall assembly
0.70		Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
0.60		Linear Transmittance	ψ	Incremental increase in transmittance per linear length of wood framed floor
0.50				
0.40				
0.30				
0.20				
0.10				
0.00				

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

Nominal (1D) vs. Assembly Performance Indicators

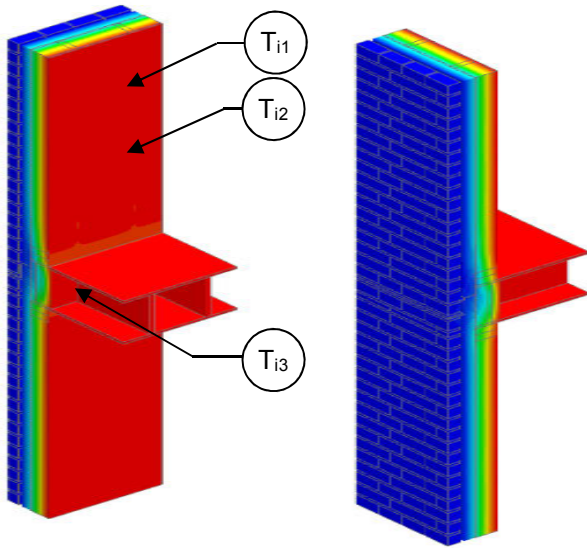
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-0.0 (0.00)	R-27.4 (4.83)	R-19.8 (3.49)	0.050 (0.29)	R-18.5 (3.25)	0.054 (0.307)	0.034 (0.058)
R-10.0 (1.76)	R-37.4 (6.59)	R-28.0 (4.93)	0.036 (0.20)	R-24.4 (4.30)	0.041 (0.233)	0.048 (0.083)

Temperature Indices

	R0	R10	
T_{i1}	0.19	0.32	T on sheathing, at studs near brick ties
T_{i2}	0.15	0.42	T on sheathing, at studs between brick ties
T_{i3}	0.43	0.49	Min T on rim joist, between floor joists

Detail 7.6.6

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection



Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R_{1D}</td> <td>R-27.4 (4.83 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td>U_o, R_o</td> <td>"clear wall" U- and R-value, without floor</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U, R</td> <td>U and R-values for the overall assembly</td> </tr> <tr> <td>Surface Temperature Index¹</td> <td>T_i</td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td>ψ</td> <td>Incremental increase in transmittance per linear length of wood framed floor</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R _{1D}	R-27.4 (4.83 RSI) + exterior insulation	Transmittance / Resistance without Anomaly	U _o , R _o	"clear wall" U- and R-value, without floor	Transmittance / Resistance	U, R	U and R-values for the overall assembly	Surface Temperature Index ¹	T _i	0 = exterior temperature 1 = interior temperature	Linear Transmittance	ψ	Incremental increase in transmittance per linear length of wood framed floor
Assembly 1D (Nominal) R-Value		R _{1D}	R-27.4 (4.83 RSI) + exterior insulation													
Transmittance / Resistance without Anomaly		U _o , R _o	"clear wall" U- and R-value, without floor													
Transmittance / Resistance		U, R	U and R-values for the overall assembly													
Surface Temperature Index ¹		T _i	0 = exterior temperature 1 = interior temperature													
Linear Transmittance		ψ	Incremental increase in transmittance per linear length of wood framed floor													
0.90																
0.80																
0.70																
0.60																
0.50																
0.40																
0.30																
0.20																
0.10																
0.00																

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

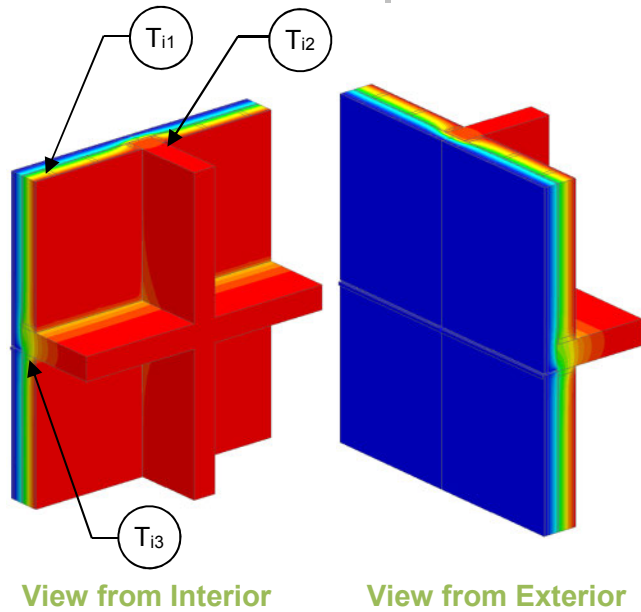
Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-0.0 (0.00)	R-27.4 (4.83)	R-19.8 (3.49)	0.050 (0.29)	R-18.5 (3.26)	0.054 (0.307)	0.032 (0.056)
R-10.0 (1.76)	R-37.4 (6.59)	R-28.0 (4.93)	0.036 (0.20)	R-24.8 (4.36)	0.040 (0.229)	0.043 (0.074)

Temperature Indices

	R0	R10	
T _{i1}	0.19	0.34	T on sheathing, at studs near brick ties
T _{i2}	0.15	0.42	T on sheathing, at studs between brick ties
T _{i3}	0.24	0.30	Min T on rim joist, at fasteners

Detail 7.7.1

Exterior Insulated Wood Infill Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Concrete Wall and Intermediate Floor Intersection with Flashing Bypassing Exterior Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-21.6 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value of concrete and wood infill assembly
Transmittance / Resistance	$U_s, R_s, U_i, R_t, U_t, R_t$	U and R-values for: s = wood infill wall + slab i = wood infill wall + interior wall t = combined assembly with wood infill wall + slab + interior wall
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_i	Incremental increase in transmittance per linear length of s = slab i = interior wall
Point Transmittance	χ	Incremental increase in transmittance for inner wall and slab intersection

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Wall

Wall Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.33)	0.041 (0.23)
R-10 (1.76)	R-31.6 (5.56)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.6 (6.44)	R-33.7 (5.93)	0.030 (0.17)

Slab Linear Transmittance

R_s ft ² hr °F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	ψ_s Btu/ft·hr·°F (W/m K)
R-12.8 (2.25)	0.078 (0.44)	0.34 (0.582)
R-14.1 (2.48)	0.071 (0.40)	0.33 (0.568)
R-15.5 (2.72)	0.065 (0.37)	0.31 (0.542)

Interior Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R_i ft ² ·hr·°F / Btu (m ² K / W)	U_i Btu/ft ² ·hr·°F (W/m ² K)	ψ_i Btu/ft·hr·°F (W/m K)
R-5 (0.88)	R-17.0 (3.00)	0.059 (0.33)	0.13 (0.232)
R-10 (1.76)	R-21.4 (3.78)	0.047 (0.26)	0.09 (0.159)
R-15 (2.64)	R-26.1 (4.60)	0.038 (0.22)	0.06 (0.110)

Intersection Point Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	χ^2 Btu·hr·°F (W/K)
R-10.9 (1.93)	0.091 (0.52)	-0.12 (-0.209)
R-12.6 (2.22)	0.079 (0.45)	-0.10 (-0.178)
R-13.8 (2.42)	0.073 (0.41)	-0.03 (-0.059)

Temperature Indices

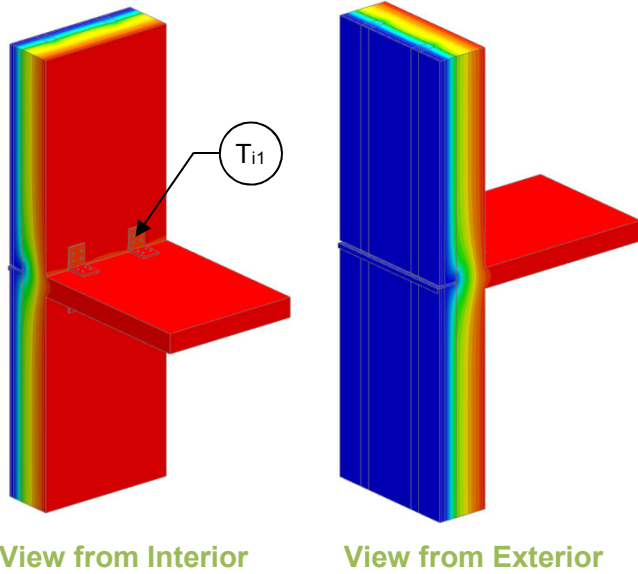
²Values are negative for a correction factor. See section 6 in ASHRAE 1365-RP for clarification.

	R5	R10	R15	
T_{i1}	0.25	0.33	0.38	Min T on sheathing, along studs at fasteners
T_{i2}	0.80	0.86	0.89	Max T on sheathing, along edge of interior concrete wall
T_{i3}	0.77	0.77	0.78	Min T on concrete, at wood frame wall and concrete ceiling intersection



Detail 7.7.2

Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Wood Strapping and Continuous Rigid Insulation Supporting Fiber Cement Board – Cross Laminated Timber Floor Intersection with Flashing Bypassing Exterior Insulation



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-10.5 (1.85 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without CLT floor slab
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of CLT floor slab

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

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
R-15 (2.64)	R-25.5 (4.49)	R-22.9 (4.04)	0.044 (0.25)	R-21.6 (3.81)	0.046 (0.26)	0.022 (0.038)
R-20 (3.52)	R-30.5 (5.37)	R-26.8 (4.72)	0.037 (0.21)	R-24.4 (4.30)	0.041 (0.23)	0.030 (0.052)
R-25 (4.40)	R-35.5 (6.25)	R-30.5 (5.36)	0.033 (0.19)	R-26.9 (4.73)	0.037 (0.21)	0.037 (0.064)

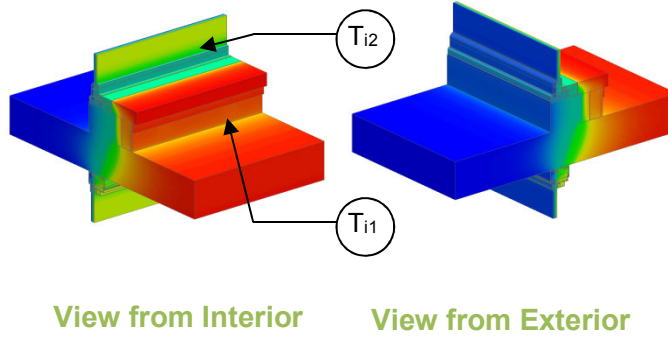
Temperature Indices

	R15	R20	R25	
T_{i1}	0.95	0.95	0.95	Min T on bolt head around edge touching bracket

8.0 Doors and Balconies

Detail 8.1.1	B.8.1
Interior Insulated Concrete Curb at Sliding Door Sill and Window Head – Intermediate Floor Intersection	
Detail 8.1.2	B.8.2
Non- Insulated Sliding Door Sill and Window Head – Intermediate Floor Intersection	
Detail 8.1.3	B.8.3
Interior Insulated Concrete Curb – Window-Wall and Intermediate Floor Intersection	
Detail 8.1.4	B.8.4
Exterior Insulated Concrete Curb at Sliding Door Sill and Head- Intermediate Floor Intersection	
Detail 8.1.5	B.8.5
Exterior Insulated Concrete Curb – Window-Wall and Recessed Intermediate Floor Intersection	
Detail 8.1.6	B.8.6
Window Wall System with Spandrel Panels and Sliding Door - Concrete Balcony and Curb Intersection	
Detail 8.1.7	B.8.7
Window-wall with Sliding Door and Insulated Spandrel Section – Concrete Intermediate Floor Intersection without Concrete Curb for Alternative Balcony Slab Connections	
Detail 8.1.8	B.8.8
Window Wall System with Spandrel Panels and Sliding Door - Thermally Broken Concrete Balcony and Curb Intersection	
Detail 8.1.9	B.8.9
Window Wall System with Spandrel Panels - Concrete Balcony and Bypass Intersection	
Detail 8.1.10	B.8.10
Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly - Door Sill with Exterior Slab Insulation	
Detail 8.1.11	B.8.11
Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly - Door Sill with Exterior Slab Insulation	

Detail 8.1.1 Interior Insulated Concrete Curb at Sliding Door Sill and Window Head – Intermediate Floor Intersection



Thermal Performance Indicators

Transmittance / Resistance ¹	U, R	U- and R-values for overall assembly
Surface Temperature Index ²	T_i	0 = exterior temperature 1 = interior temperature

¹ Projected distance from bottom of slab to top of curb

² Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Thermal Transmittance

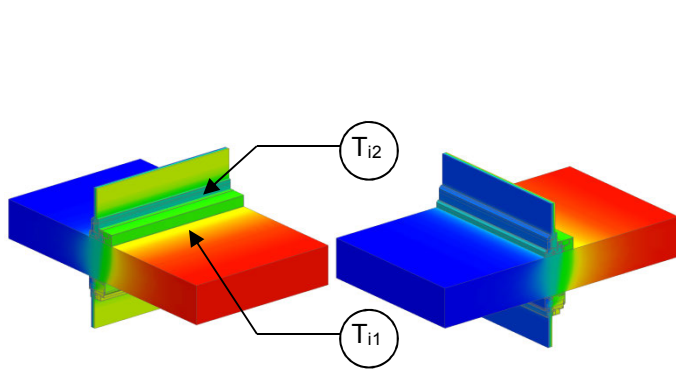
Sliding Door with Curb

R	U
ft ² ·hr·°F / Btu (m ² K / W)	Btu/ft ² ·hr·°F (W/m ² K)
R-1.6 (0.29)	0.618 (3.509)

Temperature Indices

T_{i1}	0.83	Min T on interior concrete, at gypsum, at studs
T_{i2}	0.44	Min T on glass, at gaskets

Detail 8.1.2 | Non- Insulated Sliding Door Sill and Window Head – Intermediate Floor Intersection



View from Interior View from Exterior

Thermal Performance Indicators

Transmittance / Resistance ¹	U, R	U- and R-value
Surface Temperature Index ²	T _i	0 = exterior temperature 1 = interior temperature

¹ Projected distance from bottom of slab to top of curb

² Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

Thermal Transmittance

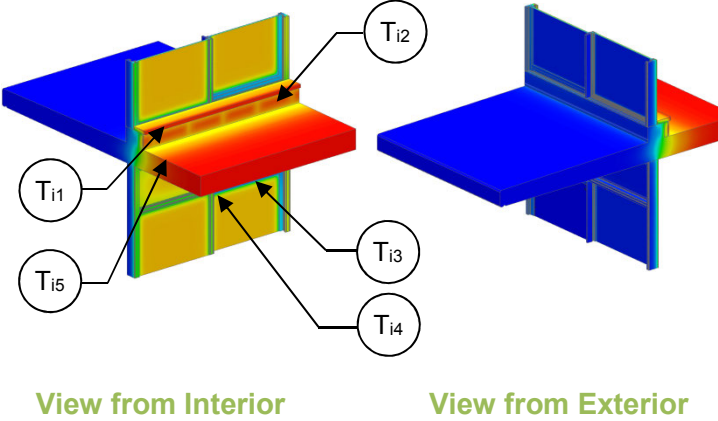
Sliding Door without Curb

R	U
ft ² ·hr·°F / Btu (m ² K / W)	Btu/ft ² ·hr ·°F (W/m ² K)
R-1.2 (0.22)	0.807 (4.59)

Temperature Indices

T _{i1}	0.58	Min T on interior concrete, at frame
T _{i2}	0.48	Min T on glass, at gaskets

Detail 8.1.3 Interior Insulated Concrete Curb – Window-Wall and Intermediate Floor Intersection



Thermal Performance Indicators



Transmittance without Anomaly	U_g	U-value for glazed sliding door, including framing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = balcony slab + curb only t = combined glazing + slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.321 (1.82)	0.486 (2.76)

Slab Linear Transmittance

Curb Insulation 1D R-Value (RSI)	R_t ft ² · hr · °F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² K)	ψ^2 Btu/ft · hr · °F (W/m K)
R-10 (1.76)	R-1.8 (0.32)	0.545 (3.09)	0.974 (1.686)

Balcony Only

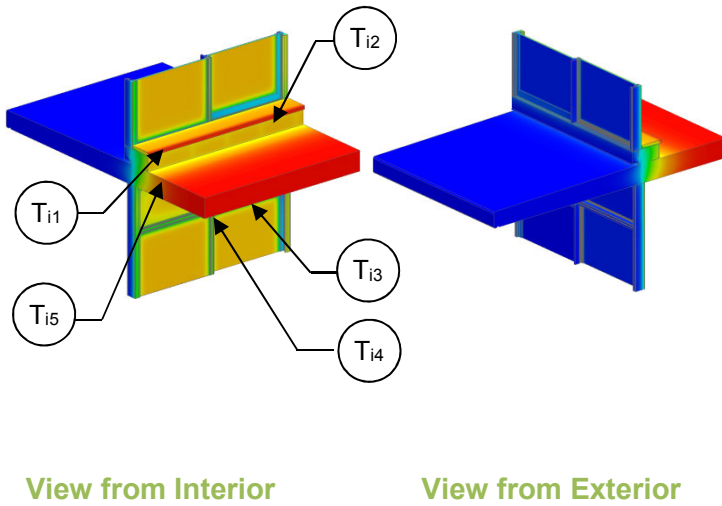
R_s ft ² · hr · °F / Btu (m ² K / W)	U_s Btu/ft ² · hr · °F (W/m ² K)
R-1.2 (0.21)	0.832 (4.72)

²Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

Temperature Indices

T_{i1}	0.50	Min T on concrete, between studs by wood block by fixed window
T_{i2}	0.67	Max T on concrete, between studs by sliding door
T_{i3}	0.16	Min T on window frame, middle of track at top of door (below slab)
T_{i4}	0.15	Min T on window glass, top middle corner of door glazing (below slab)
T_{i5}	0.50	Min T on slab, along spandrel head, on fixed window side

Detail 8.1.4 Exterior Insulated Concrete Curb at Sliding Door Sill and Head-Intermediate Floor Intersection



Thermal Performance Indicators

Transmittance without Anomaly	U_g	U-value for glazed sliding door, including framing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = balcony slab + curb only t = combined glazing + slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.321 (1.82)	0.486 (2.76)

Slab Linear Transmittance

Curb Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² · hr · °F (W/m ² K)	ψ^2 Btu/ft ² · hr · °F (W/m K)
R-10 (1.76)	R-1.8 (0.19)	0.558 (3.17)	1.066 (1.844)
R-15 (2.64)	R-1.8 (0.19)	0.558 (3.17)	1.064 (1.842)

Balcony Only

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² · hr · °F (W/m ² K)
R-1.1 (0.19)	0.910 (5.17)
R-1.1 (0.19)	0.909 (5.16)

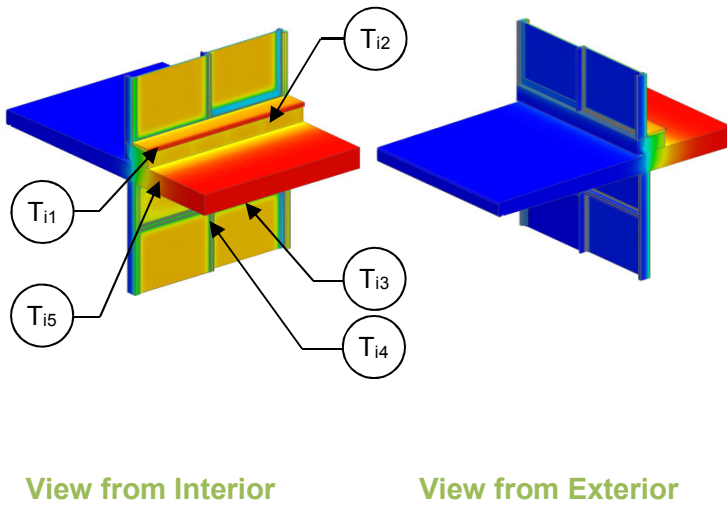
²Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

Temperature Indices

	R10	R15	
T_{i1}	0.49	0.49	Min T on concrete, between studs by wood block by fixed window
T_{i2}	0.57	0.57	Max T on concrete, between studs by sliding door
T_{i3}	0.16	0.16	Min T on window frame, middle of track at top of door (below slab)
T_{i4}	0.15	0.15	Min T on window glass, top middle corner of door glazing (below slab)
T_{i5}	0.50	0.50	Min T on slab, along spandrel head, on fixed window side

Detail 8.1.5

Exterior Insulated Concrete Curb – Window-Wall and Recessed Intermediate Floor Intersection



Thermal Performance Indicators

Transmittance without Anomaly	U_g	U-value for glazed sliding door, including framing
Transmittance / Resistance	U_s, R_s, U_t, R_t	U and R-values for s = balcony slab + curb only t = combined glazing + slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft ² · hr · °F (W/m ² K)	U_g Btu/ft ² · hr · °F (W/m ² K)
0.321 (1.82)	0.486 (2.76)

Slab Linear Transmittance

Curb Insulation 1D R-Value (RSI)	R ft ² · hr · °F / Btu (m ² K / W)	U Btu/ft ² · hr · °F (W/m ² K)	ψ^2 Btu/ft · hr · °F (W/m K)
R-10 (1.76)	R-1.8 (0.32)	0.556 (3.16)	1.053 (1.822)
R-15 (2.64)	R-1.8 (0.32)	0.556 (3.15)	1.050 (1.817)

Balcony Only

R_s ft ² · hr · °F / Btu (m ² K / W)	U_s Btu/ft ² · hr · °F (W/m ² K)
R-1.1 (0.20)	0.900 (5.11)
R-1.1 (0.20)	0.897 (5.09)

²Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing

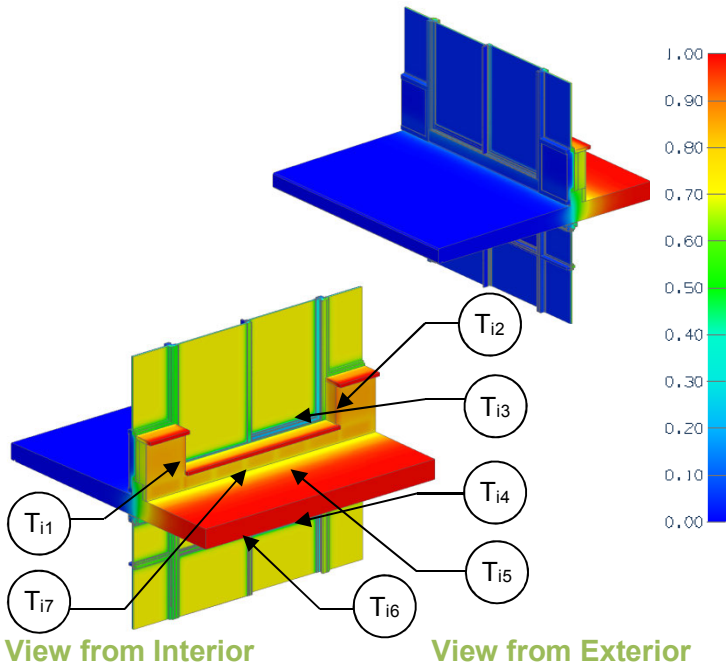
Temperature Indices

	R10	R15	
T _{i1}	0.50	0.50	Min T on concrete, between studs by wood block by fixed window
T _{i2}	0.58	0.58	Max T on concrete, between studs by sliding door
T _{i3}	0.16	0.16	Min T on window frame, middle of track at top of door (below slab)
T _{i4}	0.15	0.15	Min T on window glass, top middle corner of door glazing (below slab)
T _{i5}	0.50	0.50	Min T on slab, along spandrel head, on fixed window side

Detail 8.1.6

Window Wall System with Spandrel Panels and Sliding Door - Concrete Balcony and Curb Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance without Anomaly	U_g	U-value for glazed sliding door, including framing
Transmittance / Resistance	$U_w, R_w, U_s, R_s, U_t, R_t$	U and R-values for w = spandrel wall s = balcony slab + curb only t = combined glazing + spandrel + slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_w, ψ_s	Incremental increase in transmittance per linear length of w = slab under spandrel s = slab under door

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Spandrel Section without Slab

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.03)	R-6.3 (1.11)	0.158 (0.90)
R-12.6 (2.25)	R-15.7 (2.77)	R-7.1 (1.26)	0.140 (0.80)

Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.486 (2.76)

Balcony Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s^2 Btu/ft ·hr·°F (W/m K)
R-8.4 (1.48)	R-1.9 (0.34)	0.519 (2.95)	0.645 (1.116)
R-12.6 (2.25)	R-1.9 (0.34)	0.519 (2.95)	0.645 (1.116)

Balcony Only

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)
R-1.8 (0.32)	0.551 (3.13)
R-1.8 (0.32)	0.551 (3.13)

²Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

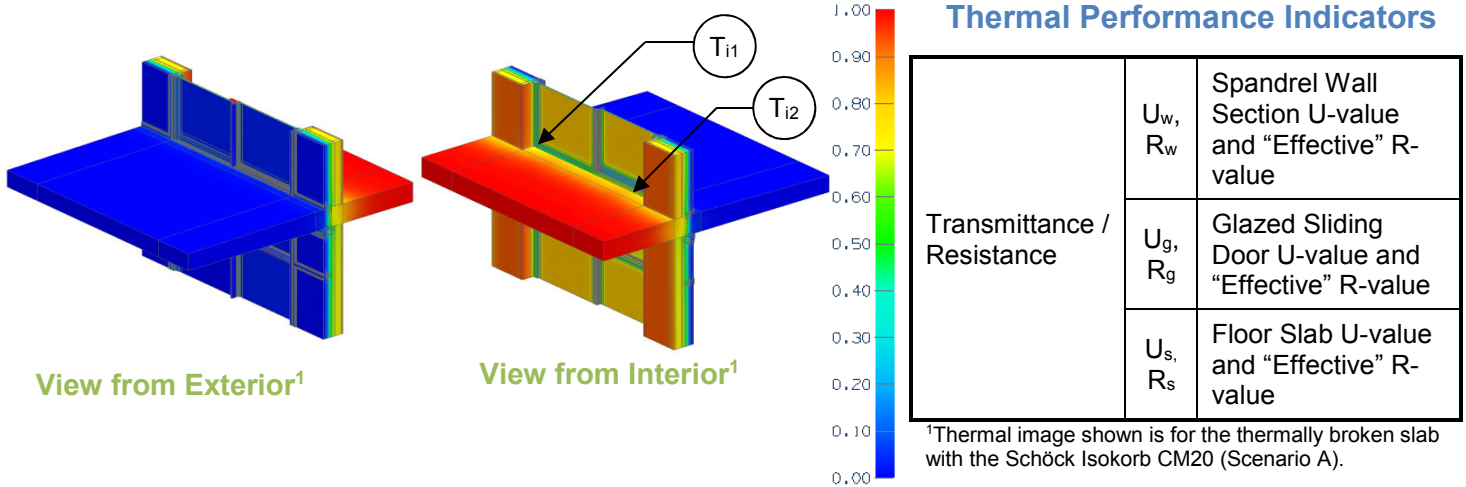
Temperature Indices

	R8.4	R12.6	
T_{11}	0.47	0.53	Min T on backpan, along edge of backpan
T_{12}	0.65	0.66	Max T on backpan, at centre of backpan
T_{13}	0.24	0.24	Min T on upper frame, along sill of sliding door frame
T_{14}	0.15	0.15	Min T on lower frame, along head of sliding door base frame
T_{15}	0.21	0.21	Min T on upper glazing, at bottom corner of sliding door glazing near fixed frame
T_{16}	0.20	0.20	Min T on lower glazing, at corner of sliding door frame near fixed frame
T_{17}	0.52	0.52	Min T on slab, along head of lower sliding door



Detail 8.1.7

Window-wall with Sliding Door and Insulated Spandrel Section – Concrete Intermediate Floor Intersection without Concrete Curb for Alternative Balcony Slab Connections



Scenarios

Scenario	Description
A	Thermally broken slab with 3” (80 mm) thick Schöck Isokorb CM20
B	Thermally Broken Slab with 1.5” (40 mm) Intermittent Slab Insulation (880mm insulation @1380)
C	Continuous Slab

Nominal (1D) vs. Assembly Performance Indicators

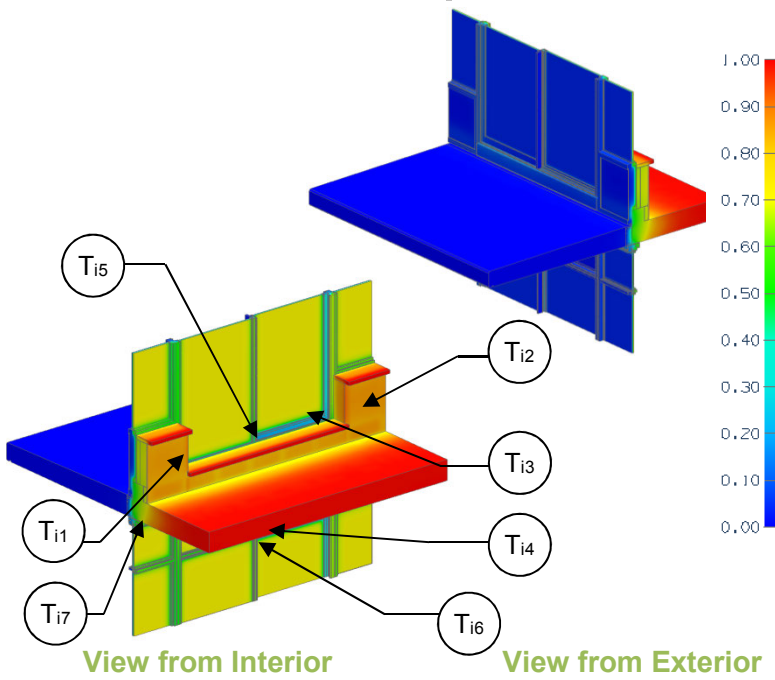
Scenario	U_w Btu/ft ² · hr · °F (W/m ² K)	R_w ft ² · hr · °F / Btu (m ² K / W)	U_g Btu/ft ² · hr · °F (W/m ² K)	R_g ft ² · hr · °F / Btu (m ² K / W)	U_s Btu/ft ² · hr · °F (W/m ² K)	R_s ft ² · hr · °F / Btu (m ² K / W)
A	0.140 (0.80)	R-7.1 (1.25)	0.476 (2.70)	R-2.1 (0.37)	0.213 (1.21)	R-4.7 (0.83)
B	0.140 (0.80)	R-7.1 (1.25)	0.476 (2.70)	R-2.1 (0.37)	0.680 (3.86)	R-1.5 (0.26)
C	0.140 (0.80)	R-7.1 (1.25)	0.476 (2.70)	R-2.1 (0.37)	0.859 (4.88)	R-1.2 (0.20)

Temperature Indices

	A	B	C	
T_{i1}	0.64	0.50	0.45	Min T on concrete floor, at bottom corner of door
T_{i2}	0.18	0.18	0.18	Min T on sliding door frame

Detail 8.1.8

Window Wall System with Spandrel Panels and Sliding Door - Thermally Broken Concrete Balcony and Curb Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance without Anomaly	U_g	U-value for glazed sliding door, including framing
Transmittance / Resistance	$U_w, R_w, U_s, R_s, U_t, R_t$	U and R-values for w = spandrel wall s = balcony slab + curb only t = combined glazing + spandrel + slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	Ψ_w, Ψ_s	Incremental increase in transmittance per linear length of w = slab under spandrel s = slab under door

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Spandrel Section without Slab

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_w ft ² ·hr·°F / Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.03)	R-6.3 (1.11)	0.158 (0.90)
R-12.6 (2.25)	R-15.7 (2.77)	R-7.1 (1.26)	0.140 (0.80)

Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.486 (2.76)

Balcony Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	Ψ_s^2 Btu/ft·hr·°F (W/m K)
R-8.4 (1.48)	R-2.0 (0.35)	0.503 (2.86)	0.492 (0.852)
R-12.6 (2.25)	R-2.0 (0.35)	0.503 (2.85)	0.494 (0.856)

Balcony Only

R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)
R-2.4 (0.42)	0.421 (2.39)
R-2.4 (0.42)	0.422 (2.40)

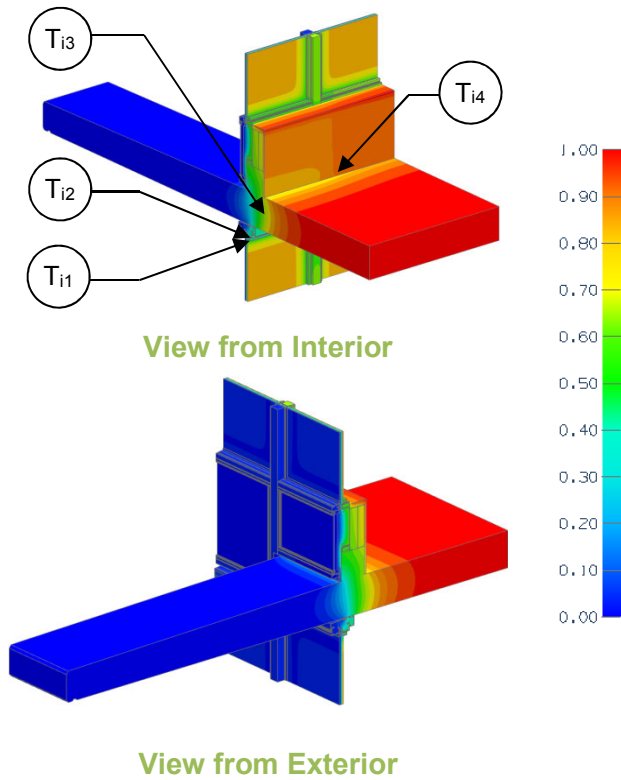
²Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

Temperature Indices

	R8.4	R12.6	
T _{i1}	0.50	0.50	Min T on backpan, along edge of backpan
T _{i2}	0.64	0.69	Max T on backpan, at centre of backpan
T _{i3}	0.24	0.24	Min T on upper frame, along sill of sliding door frame
T _{i4}	0.15	0.15	Min T on lower frame, along head of sliding door base frame
T _{i5}	0.20	0.20	Min T on upper glazing, at bottom corner of sliding door near fixed frame
T _{i6}	0.20	0.20	Min T on lower glazing, at corner of sliding door frame near fixed frame
T _{i7}	0.60	0.60	Min T on slab, along head of lower sliding door

Detail 8.1.9

Window Wall System with Spandrel Panels - Concrete Balcony and Bypass Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value spandrel section of window wall without slab
Transmittance / Resistance	$U_s, R_s, U_i, R_i, U_t, R_t$	U and R values for s = window wall spandrel + bypass i = window wall spandrel + balcony t = combined window wall spandrel + bypass + balcony + intersection
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ_s, ψ_i	Incremental increase in transmittance per linear length of s = bypass i = balcony
Point Transmittance	χ	Incremental increase in transmittance for inner wall and slab intersection

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Spandrel Section without Slab

Backpan Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-8.4 (1.48)	R-11.6 (2.03)	R-6.3 (1.11)	0.158 (0.90)
R-12.6 (2.25)	R-15.7 (2.77)	R-7.1 (1.26)	0.140 (0.80)

Balcony Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R_i ft ² ·hr·°F / Btu (m ² K / W)	U_i Btu/ft ² ·hr ·°F (W/m ² K)	ψ_i Btu/ft ·hr·°F (W/m K)
R-8.4 (1.48)	R-2.7 (0.48)	0.368 (2.09)	0.629 (1.09)
R-12.6 (2.25)	R-2.8 (0.49)	0.357 (2.03)	0.651 (1.13)

Temperature Indices

	R6.4	R12.8	
T_{i1}	0.44	0.44	Min T on glazing, lower glazing along frame header on balcony side away from intersection
T_{i2}	0.41	0.41	Min T on frame, lower frame edge along slab on balcony side away from intersection
T_{i3}	0.47	0.47	Min T on slab, along lower frame edge on balcony side away from intersection
T_{i4}	0.55	0.57	Min T on backpan, on bottom corner on non-balcony side at intersection

Bypass Linear Transmittance

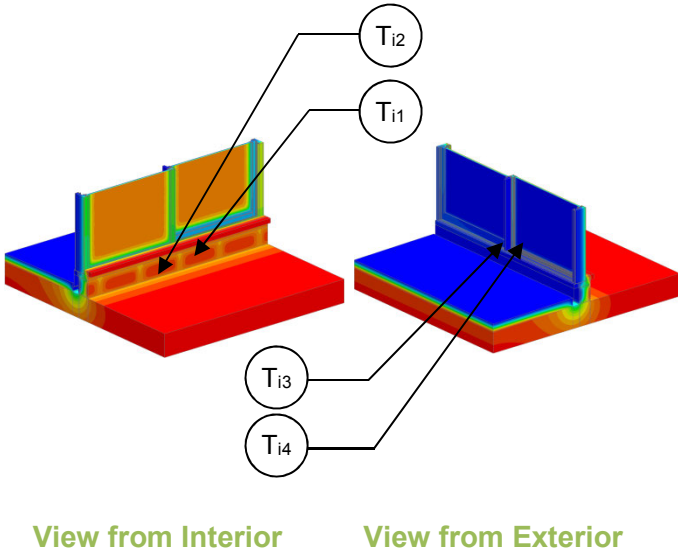
R_s ft ² ·hr·°F / Btu (m ² K / W)	U_s Btu/ft ² ·hr ·°F (W/m ² K)	ψ_s Btu/ft ·hr·°F (W/m K)
R-3.6 (0.64)	0.275 (1.56)	0.350 (0.606)
R-3.8 (0.68)	0.260 (1.48)	0.359 (0.622)

Intersection Point Transmittance

R_t ft ² ·hr·°F / Btu (m ² K / W)	U_t Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr·°F (W/K)
R-3.1 (0.54)	0.326 (1.85)	0.086 (0.046)
R-3.2 (0.56)	0.313 (1.78)	0.089 (0.047)

Detail 8.1.10 Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly - Door Sill with Exterior Slab Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-1.9 (0.33 RSI) + exterior deck insulation
Transmittance / Resistance without Anomaly	U_r , R_r , U_g	"clear field" U- and R-values for two base assemblies: r = roof deck g = glazed sliding door
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of door sill

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof Deck

Slab Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	R-21.9 (3.86)	0.046 (0.26)

Base Assembly – Glazed Door

$U_{\text{center of glazing}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.489 (2.78)

Door Sill Linear Transmittance

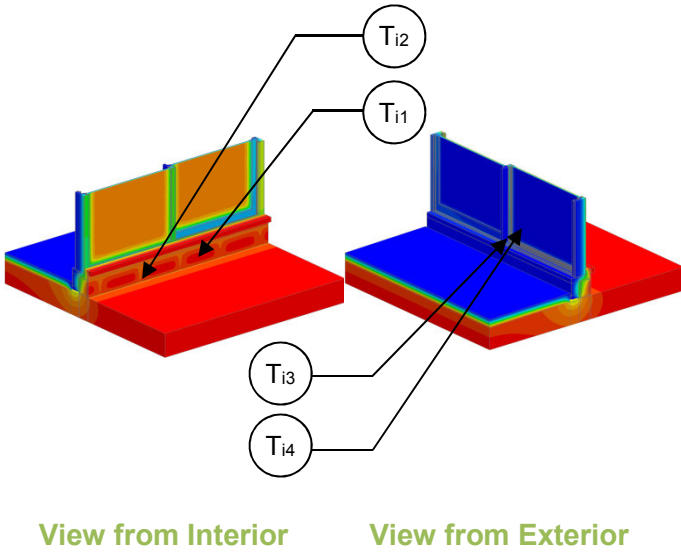
R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-3.0 (0.54)	0.329 (1.87)	0.395 (0.684)

Temperature Indices

T_i	Value	Description
T_{i1}	0.06	Min T on sheathing between studs, mid height
T_{i2}	0.55	Max T on sheathing along slab
T_{i3}	0.22	Min T on window frame, at bottom middle corner of door track
T_{i4}	0.20	Min T on window glass, bottom middle corner of door

Detail 8.1.11 Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly - Door Sill with Exterior Slab Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-1.9 (0.33 RSI) + exterior deck insulation
Transmittance / Resistance without Anomaly	U_r, R_r, U_g	"clear field" U- and R-values for: r = roof deck g = glazed sliding door
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of door sill

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

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof Deck

Slab Exterior Insulation 1D R-Value (RSI)	R_{1Dr} ft ² ·hr·°F / Btu (m ² K / W)	R_r ft ² ·hr·°F / Btu (m ² K / W)	U_r Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	R-21.9 (3.86)	0.046 (0.26)

Base Assembly – Door

$U_{center\ of\ glazing}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.489 (2.78)

Door Sill Linear Transmittance

Sill Exterior Insulation 1D R-Value (RSI)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-3.6 (0.63)	0.279 (1.58)	0.104 (0.180)
R-15 (2.64)	R-3.6 (0.63)	0.278 (1.58)	0.097 (0.169)

Temperature Indices

	R10	R15	
T_{i1}	0.47	0.49	Min T on sheathing between studs, mid height
T_{i2}	0.75	0.75	Max T on sheathing at studs
T_{i3}	0.23	0.23	Min T on window frame, at bottom middle corner of door track
T_{i4}	0.20	0.20	Min T on window glass, bottom middle corner of door

9.0 Roofs

Detail 9.1.1	B.9.1
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (12" o.c.) Supporting Standing Seam Metal Roof – Clear Roof	
Detail 9.1.2	B.9.2
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Standing Seam Metal Roof – Clear Roof	
Detail 9.1.3	B.9.3
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (36" o.c.) Supporting Standing Seam Metal Roof – Clear Roof	
Detail 9.1.4	B.9.4
Insulated Sheet Steel Roof Supported by Thermal Chairs – Baseline System – Clear Roof	
Detail 9.1.5	B.9.5
Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Scenarios – Clear Roof	
Detail 9.1.6	B.9.6
Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Insulation Type Scenarios – Clear Roof	
Detail 9.1.7	B.9.7
Insulated Standing Seam Roof Supported by Thermal Chairs – Clear Wall	
Detail 9.1.8	B.9.8
Standing Seam Roof with Draped Insulation – Clear Wall	
Detail 9.1.9	B.9.9
Exterior Insulated Low Sloped Roof – Clear Roof Assembly	
Detail 9.2.1	B.9.10
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Metal Roof – Ridge Intersection	
Detail 9.2.2	B.9.11
Insulated Concrete Slab – Concrete Curb or Wall Intersection	
Detail 9.2.3	B.9.12
Insulated Projected Membrane Roof – Floating Concrete Wall Intersection	
Detail 9.2.4	B.9.13
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Standing Seam Metal Roof and Curtain Wall – Roof to Wall Intersection with Through Wall Structural Beam and Continuous Through Wall Structural Metal Deck	
Detail 9.2.5	B.9.14

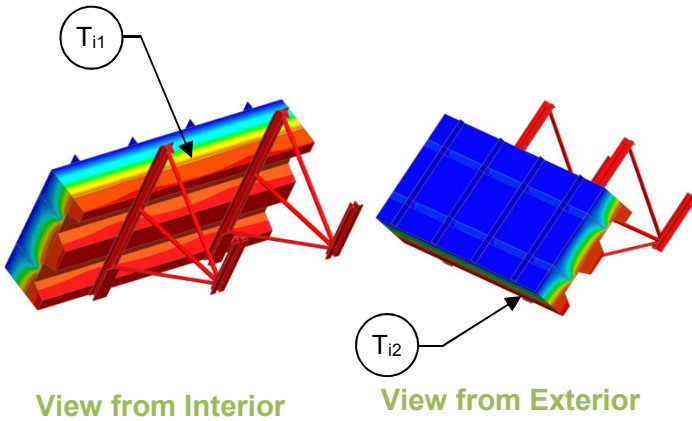
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Standing Seam Metal Roof and Curtain Wall – Roof to Wall Intersection with Through Wall Structural Beam and Thermally Broken Structural Metal Deck

Detail 9.2.6 **B.9.15**

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Standing Seam Metal Roof and Curtain Wall – Roof to Wall Intersection with Through Wall Structural Beam and Fully Insulated Soffit



Detail 9.1.1 Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (12" o.c.) Supporting Standing Seam Metal Roof – Clear Roof



Thermal Performance Indicators

Assembly 1D (Nominal) R Value	R_{1D}	R-2.5 (0.44 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear field” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

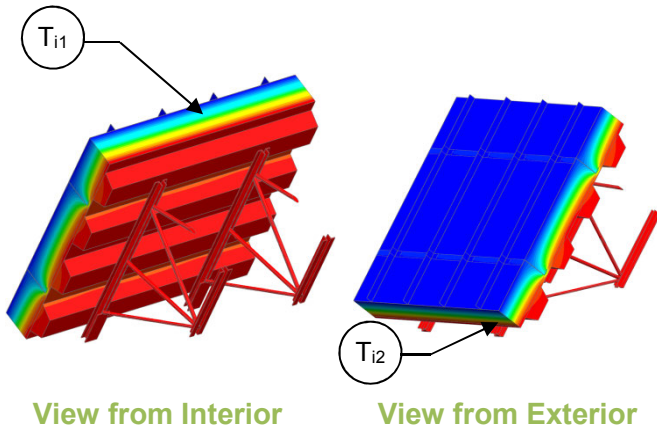
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-22.5 (3.96)	R-6.7 (1.18)	0.149 (0.85)
R-30 (5.28)	R-32.5 (5.72)	R-7.7 (1.35)	0.130 (0.74)
R-40 (7.04)	R-42.5 (7.48)	R-8.5 (1.50)	0.117 (0.66)

Temperature Indices

	R20	R30	R40	
T_{i1}	0.89	0.90	0.91	Min T on sheathing, closest to girt flange between joists
T_{i2}	0.93	0.94	0.94	Max T on sheathing above end bearings away from girts

Detail 9.1.2 Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Standing Seam Metal Roof – Clear Roof



Thermal Performance Indicators

Assembly 1D (Nominal) R Value	R_{1D}	R-2.5 (0.44 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear field” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-22.5 (3.96)	R-10.3 (1.81)	0.097 (0.55)
R-30 (5.28)	R-32.5 (5.72)	R-12.5 (2.19)	0.080 (0.46)
R-40 (7.04)	R-42.5 (7.48)	R-14.3 (2.52)	0.070 (0.40)

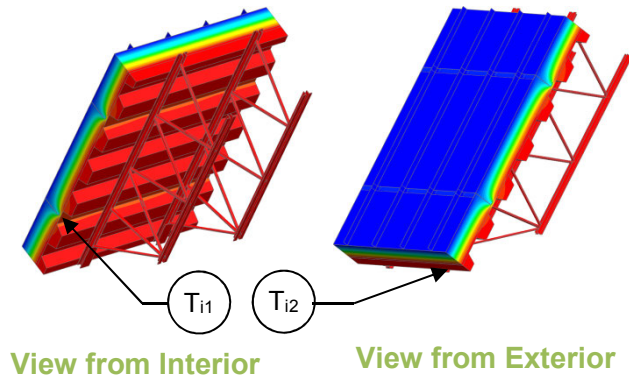
Temperature Indices

	R20	R30	R40	
T_{i1}	0.90	0.91	0.92	Min T on sheathing, closest to girt flange between joists
T_{i2}	0.97	0.97	0.98	Max T on sheathing, above end bearings away from girts

Detail 9.1.3

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (36" o.c.) Supporting Standing Seam Metal Roof – Clear Roof

Thermal Performance Indicators



Assembly 1D (Nominal) R Value	R_{1D}	R-2.5 (0.44 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“clear field” U- and R-value
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

Nominal (1D) vs. Assembly Performance Indicators

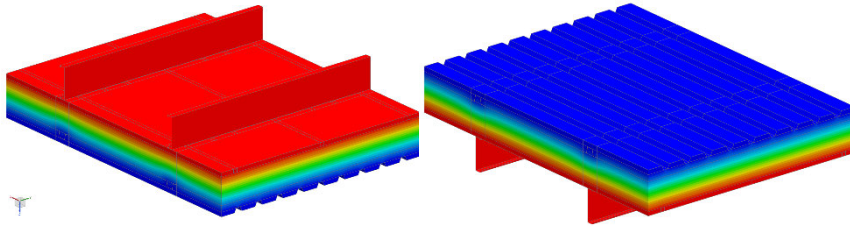
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-22.5 (3.96)	R-12.4 (2.19)	0.081 (0.46)
R-30 (5.28)	R-32.5 (5.72)	R-15.5 (2.73)	0.065 (0.37)
R-40 (7.04)	R-42.5 (7.48)	R-18.1 (3.19)	0.055 (0.31)

Temperature Indices

	R20	R30	R40	
T_{i1}	0.90	0.91	0.92	Min T on sheathing, at girt between joists
T_{i2}	0.97	0.98	0.98	Max T on sheathing, above end bearings away from girts

Detail 9.1.4

Insulated Sheet Steel Roof Supported by Thermal Chairs – Baseline System – Clear Roof



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-1.3 (0.23 RSI) + exterior insulation
Transmittance / Resistance	U_o, R_o	“Clear wall” U_o and R-value

Nominal (1D) vs. Assembly Performance Indicators

Baseline System

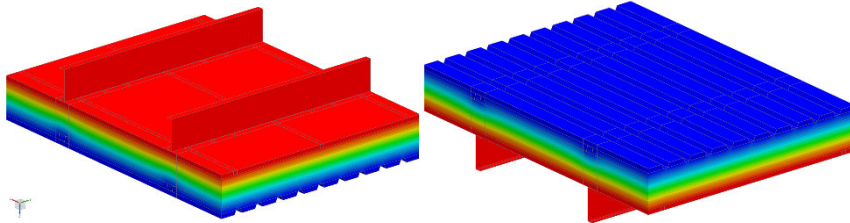
Chair Spacing (in)	Purlin Spacing (in)	Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
24	48	R-45 (7.95)	R-46.3 (8.15)	R-30.5 (5.38)	0.033 (0.186)
24	60	R-45 (7.95)	R-46.3 (8.15)	R-32.7 (5.76)	0.031 (0.174)
24	72	R-45 (7.95)	R-46.3 (8.15)	R-34.3 (6.04)	0.029 (0.166)
36	48	R-45 (7.95)	R-46.3 (8.15)	R-33.8 (5.96)	0.030 (0.168)
36	60	R-45 (7.95)	R-46.3 (8.15)	R-35.9 (6.32)	0.028 (0.158)
36	72	R-45 (7.95)	R-46.3 (8.15)	R-37.4 (6.58)	0.027 (0.152)
48	48	R-45 (7.95)	R-46.3 (8.15)	R-39.6 (6.97)	0.025 (0.143)
48	60	R-45 (7.95)	R-46.3 (8.15)	R-40.4 (7.11)	0.025 (0.141)
48	72	R-45 (7.95)	R-46.3 (8.15)	R-41.4 (7.29)	0.024 (0.137)

Sensitivity Analysis – Impact of Liner, Cladding, Chair and Purlin Thickness for 36” o.c. Chair Spacing and 48” o.c. Purlin Spacing

Steel Thickness	Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	Liner		Cladding		Chair		Purlins	
			R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
24 Ga	R-45 (7.95)	R-46.3 (8.15)	R-33.8 (5.96)	0.030 (0.168)	R-33.8 (5.96)	0.030 (0.168)	R-34.1 (6.01)	0.029 (0.167)	-	-
18 Ga	R-45 (7.95)	R-46.3 (8.15)	R-33.8 (5.95)	0.030 (0.168)	R-33.7 (5.94)	0.030 (0.168)	R-33.8 (5.96)	0.030 (0.168)	-	-
14 Ga	R-45 (7.95)	R-46.3 (8.15)	-	-	R-33.7 (5.93)	0.030 (0.169)	R-33.6 (5.91)	0.030 (0.169)	R-33.8 (5.96)	0.030 (0.168)
6 Ga	R-45 (7.95)	R-46.3 (8.15)	-	-	-	-	-	-	R-33.8 (5.95)	0.030 (0.168)

Detail 9.1.5

Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Scenarios – Clear Roof



View from Interior

View from Exterior

Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R _{1D}	R-1.3 (0.23 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	“Clear wall” U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Sensitivity Analysis – Impact of PVC Coated Thermal Chairs Spaced at 36” o.c. and Purlins Spaced at 48” o.c.

PVC Coating Thickness on Thermal Chairs and Outer Rails (mils)	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
0 Top, 0 Bottom	R-45 (7.95)	R-46.3 (8.15)	R-33.8 (5.96)	0.030 (0.168)
8 Top, 4 Bottom	R-45 (7.95)	R-46.3 (8.15)	R-34.2 (6.03)	0.029 (0.166)

Sensitivity Analysis – Impact of Thermal Tape Thickness for Thermal Chairs at 36” o.c. and Purlins at 48” o.c.

Tape Thickness (in)	Tape R-Value (RSI)	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
0	R-0 (0.00)	R-45 (7.95)	R-46.3 (8.15)	R-30.4 (5.36)	0.033 (0.187)
1/8	R-1 (0.23)	R-45 (7.95)	R-46.3 (8.15)	R-33.8 (5.96)	0.030 (0.168)
1/4	R-3 (0.45)	R-45 (7.95)	R-46.3 (8.15)	R-34.3 (6.04)	0.029 (0.166)

Sensitivity Analysis – Variable Material for Thermal Chairs at 36” o.c. and 48” o.c. Purlin Spacing

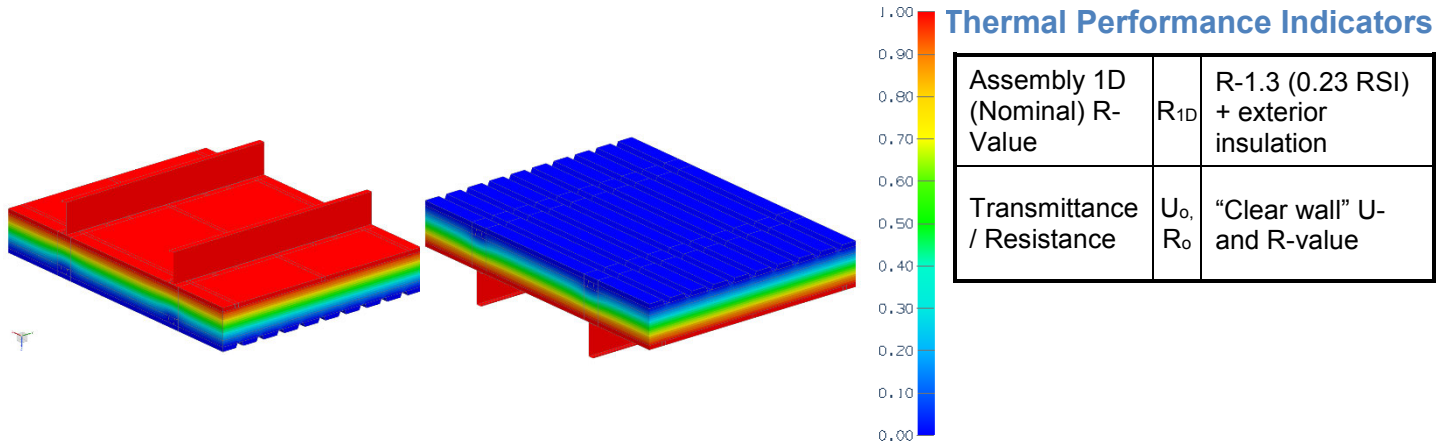
Thermal Chair Material	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
Steel	R-45 (7.95)	R-46.3 (8.15)	R-33.8 (5.96)	0.030 (0.168)
Plastic	R-45 (7.95)	R-46.3 (8.15)	R-37.1 (6.53)	0.027 (0.153)

Sensitivity Analysis – Reduction in Thermal Chair area for 36”o.c. Chair Spacing and 48”o.c. Purlin Spacing

Thermal Chair Material	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
Baseline	R-45 (7.95)	R-46.3 (8.15)	R-33.8 (5.96)	0.030 (0.168)
20% Reduction	R-45 (7.95)	R-46.3 (8.15)	R-34.0 (5.98)	0.029 (0.167)
30% Reduction	R-45 (7.95)	R-46.3 (8.15)	R-34.4 (6.05)	0.029 (0.165)
40% Reduction	R-45 (7.95)	R-46.3 (8.15)	R-34.6 (6.10)	0.029 (0.164)

Detail 9.1.6

Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Insulation Type Scenarios – Clear Roof



View from Exterior

View from Exterior

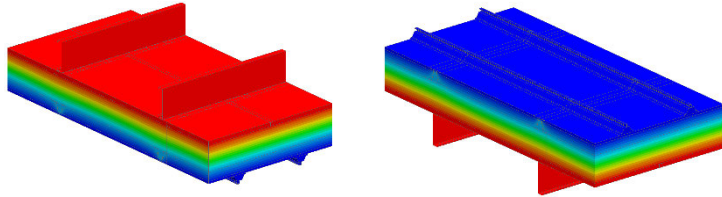
Nominal (1D) vs. Assembly Performance Indicators

Sensitivity Analysis – Impact of Insulation Type and Thickness for Thermal Chairs spaced at 36” o.c. and Purlins Spaced at 48” o.c.

Chair Thickness (in)	Insulation Thickness (in)	R-4.2/inch insulation			R-5/inch insulation			R-6/inch insulation		
		Exterior Insulation 1D R-Value (RSI)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	Exterior Insulation 1D R-Value (RSI)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)	Exterior Insulation 1D R-Value (RSI)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr ·°F (W/m ² K)
4 ¼	5	R-21 (3.70)	R-19.4 (3.41)	0.052 (0.293)	R-25 (4.40)	R-22.2 (3.91)	0.045 (0.256)	R-30 (5.29)	R-25.6 (4.51)	0.039 (0.222)
6	6 ¾	R-28 (4.99)	R-25.0 (4.40)	0.040 (0.227)	R-34 (5.95)	R-28.6 (5.04)	0.035 (0.198)	R-41 (7.13)	R-32.9 (5.80)	0.030 (0.172)
8 ¼	9	R-38 (6.66)	R-30.7 (5.42)	0.033 (0.185)	R-45 (7.93)	R-35.0 (6.17)	0.029 (0.162)	R-54 (9.51)	R-40.0 (7.04)	0.025 (0.142)
10	10 ¾	R-45 (7.95)	R-33.8 (5.96)	0.030 (0.168)	R-54 (9.46)	R-38.3 (6.74)	0.026 (0.148)	R-64 (11.36)	R-43.4 (7.64)	0.023 (0.131)

Detail 9.1.7

Insulated Standing Seam Roof Supported by Thermal Chairs – Clear Wall



View from Interior

View from Exterior

Thermal Performance Indicators



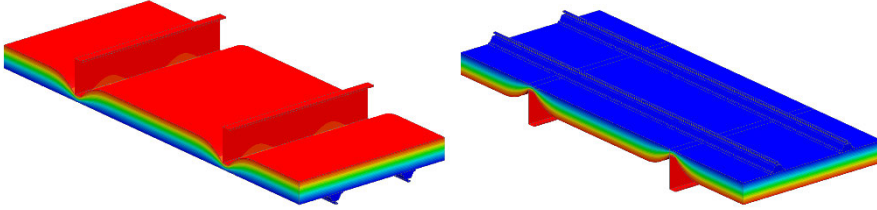
Assembly 1D (Nominal) R-Value	R _{1D}	R-1.3 (0.23 RSI) + exterior insulation
Transmittance / Resistance	U _o , R _o	“Clear wall” U- and R-value

Nominal (1D) vs. Assembly Performance Indicators

Insulation Placement	Exterior Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F / Btu (m ² K / W)	R _o ft ² ·hr·°F / Btu (m ² K / W)	U _o Btu/ft ² ·hr·°F (W/m ² K)
Compressed R-19 batt between and over hat tracks	R-57.6 (10.1)	R-58.9 (10.33)	R-33.4 (5.87)	0.030 (0.170)
Compressed R-19 batt between and over hat tracks with 1” XPS thermal block	R-57.6 (10.1)	R-58.9 (10.33)	R-36.4 (6.40)	0.028 (0.156)
Compressed R-19 batt between hat tracks	R-57.6 (10.1)	R-58.9 (10.33)	R-31.7 (5.59)	0.032 (0.179)
Mineral Wool between hat tracks, no compressed insulation over hat tracks	R-51.2 (9.0)	R-58.9 (10.33)	R-32.4 (5.71)	0.031 (0.175)

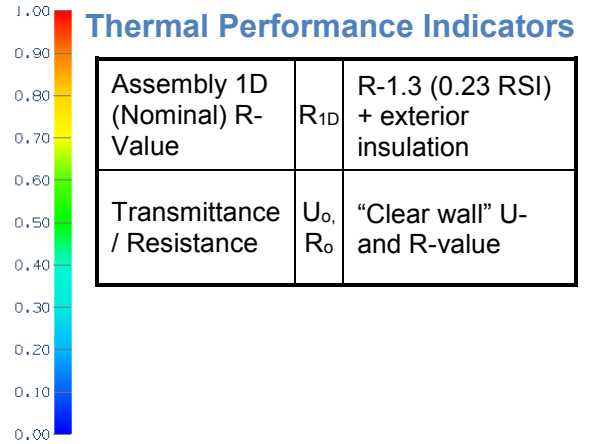
Detail 9.1.8

Standing Seam Roof with Draped Insulation – Clear Wall



View from Interior

View from Exterior

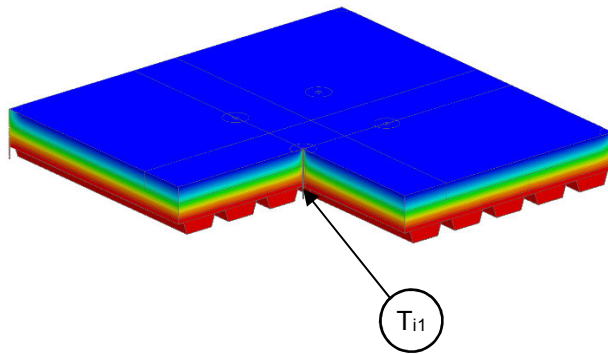


Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-19 (3.35)	R-20.3 (3.58)	R-15.7(2.77)	0.064 (0.361)

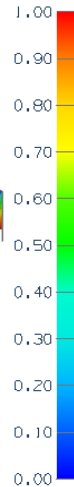
Detail 9.1.9

Exterior Insulated Low Sloped Roof – Clear Roof Assembly



View from Exterior

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.5 (0.45 RSI) + Insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without fastener
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for concrete column

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

Scenarios

Scenario	Fastener Arrangement
A	Fully Fastened
B	Partially Fastened
C	Fully Adhered

Nominal (1D) vs. Assembly Performance Indicators

	Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr °F (W/K)
A	R-22.8 (4.02)	R-25.3 (4.46)	R-24.5 (4.31)	0.041 (0.24)	R-24.1 (4.25)	0.041 (0.24)	0.0028 (0.0048)
B	R-22.8 (4.02)	R-25.3 (4.46)	R-24.5 (4.31)	0.041 (0.24)	R-24.4 (4.30)	0.041 (0.23)	0.0006 (0.0011)
C	R-22.8 (4.02)	R-25.3 (4.46)	R-24.5 (4.31)	0.041 (0.24)	R-24.5 (4.30)	0.041 (0.24)	-

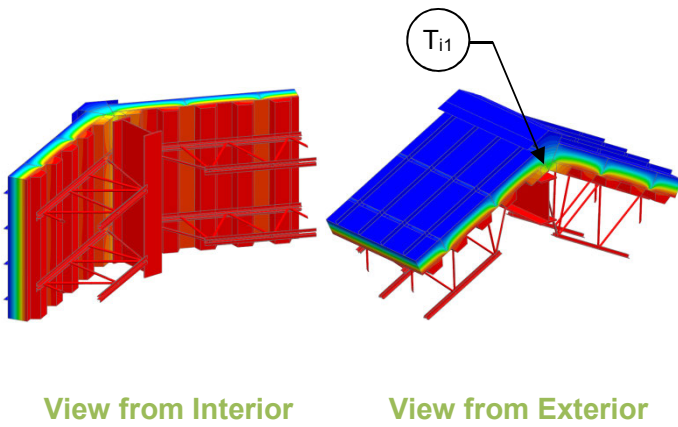
Temperature Indices

	A	B	C	
T_{i1}	0.976	0.979	0.980	At fastener penetration through steel deck

Detail 9.2.1

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Metal Roof – Ridge Intersection

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.5 (0.44 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value, without ridge (Detail 6.2)
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of ridge

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

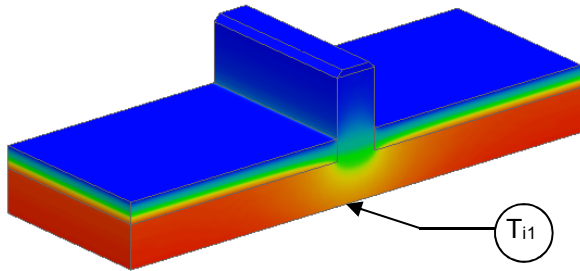
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr·°F (W/m K)
R-20 (3.52)	R-22.5 (3.96)	R-10.3 (1.81)	0.097 (0.55)	R-7.8 (1.37)	0.128 (0.73)	0.324 (0.56)
R-30 (5.28)	R-32.5 (5.72)	R-12.5 (2.19)	0.080 (0.46)	R-9.0 (1.59)	0.111 (0.63)	0.318 (0.55)

Temperature Indices

	R20	R30	
T_{i1}	0.48	0.51	Min T on sheathing, along ridge

Detail 9.2.2 | Insulated Concrete Slab – Concrete Curb or Wall Intersection



View from Exterior

Thermal Performance Indicators

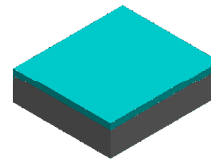
Assembly 1D (Nominal) R-Value	R_{1D}	R-1.9 (0.33 RSI) + Insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value, without concrete anomaly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of concrete anomaly

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	R-21.9 (3.86)	0.046 (0.26)



Concrete Anomaly Linear Transmittance

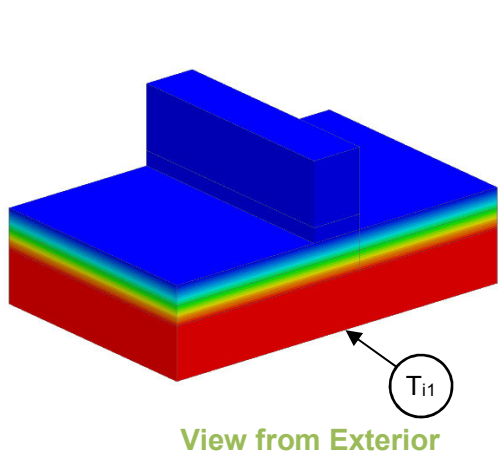
R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft hr °F (W/m K)
R-8.8 (1.54)	0.114 (0.65)	0.536 (0.927)

Temperature Indices

T_{i1}	0.82	Min T on concrete, at center of anomaly
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Detail 9.2.3

Insulated Projected Membrane Roof – Floating Concrete Wall Intersection



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-1.9 (0.33 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear wall” U- and R-value, without concrete anomaly
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of concrete anomaly

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly - Roof

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-20 (3.52)	R-21.9 (3.86)	R-21.9 (3.86)	0.046 (0.26)
R-30 (5.28)	R-31.9 (5.62)	R-31.9 (5.62)	0.031 (0.18)
R-40 (7.04)	R-41.9 (7.39)	R-41.9 (7.38)	0.024 (0.14)

Concrete Anomaly Linear Transmittance

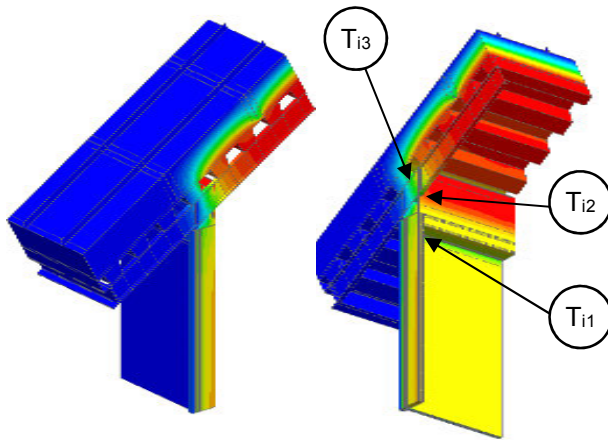
R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-21.9 (3.86)	0.046 (0.26)	0 (0)
R-31.9 (5.62)	0.031 (0.18)	0 (0)
R-41.9 (7.38)	0.024 (0.14)	0 (0)

Temperature Indices

T_{i1}	0.97	Min T on concrete, at center of anomaly
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Detail 9.2.4

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Standing Seam Metal Roof and Curtain Wall – Roof to Wall Intersection with Through Wall Structural Beam and Continuous Through Wall Structural Metal Deck



View from Exterior View from Interior



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.5 (0.44 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o, U_g	“clear field” U- and R-value: o = without curtainwall g = glazing
Transmittance / Resistance	U, R	U and R-values for the combined assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of curtainwall

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly Roof

Roof Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-36 (6.34)	R-38.5 (6.78)	12.4 (2.18)	0.081 (0.46)

Base Assembly Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.344 (1.95)

Roof to Wall Linear Transmittance

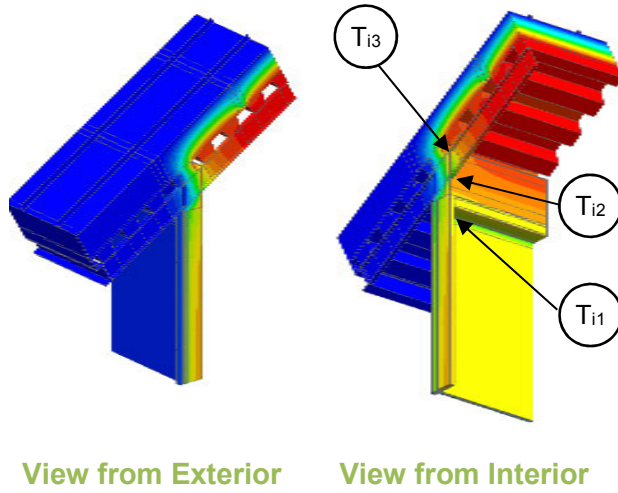
R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ² ·hr ·°F (W/m ² K)
2.7 (0.48)	0.369 (2.10)	0.679 (1.177)

Temperature Indices

T_{i1}	0.53	Upper corner of glazing
T_{i2}	0.54	Beam at curtain wall interior closure panel
T_{i3}	0.35	Underside of roof deck at beam

Detail 9.2.5

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Standing Seam Metal Roof and Curtain Wall – Roof to Wall Intersection with Through Wall Structural Beam and Thermally Broken Structural Metal Deck



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.5 (0.44 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o, U_g	"clear field" U- and R-value: o = without curtainwall g = glazing
Transmittance / Resistance	U, R	U and R-values for the combined assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of curtainwall

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly Roof

Roof Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-36 (6.34)	R-38.5 (6.78)	12.4 (2.18)	0.081 (0.46)

Base Assembly Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.321 (1.82)	0.344 (1.95)

Roof to Wall Linear Transmittance

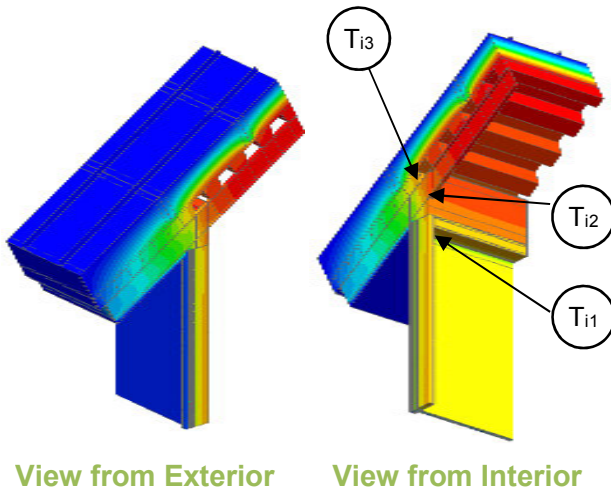
R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	ψ Btu/ft·hr·°F (W/m K)
3.2 (0.56)	0.317 (1.80)	0.350 (0.607)

Temperature Indices

T_{i1}	0.53	Upper corner of glazing
T_{i2}	0.53	Beam at curtain wall interior closure panel
T_{i3}	0.80	Underside of roof deck at beam

Detail 9.2.6

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Standing Seam Metal Roof and Curtain Wall – Roof to Wall Intersection with Through Wall Structural Beam and Fully Insulated Soffit



Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R_{1D}	R-2.5 (0.44 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U_o, R_o, U_g	"clear field" U- and R-value: o = without curtainwall g = glazing
Transmittance / Resistance	U, R	U and R-values for the combined assembly
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of curtainwall

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly Roof

Roof Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-36 (6.34)	R-38.5 (6.78)	12.4 (2.18)	0.081 (0.46)

Base Assembly Glazing

$U_{\text{centre of glass}}$ Btu/ft ² ·hr ·°F (W/m ² K)	U_g Btu/ft ² ·hr ·°F (W/m ² K)
0.321 (1.82)	0.344 (1.95)

Roof to Wall Linear Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	ψ Btu/ft ·hr ·°F (W/m K)
3.1 (0.55)	0.318 (1.81)	0.365 (0.633)

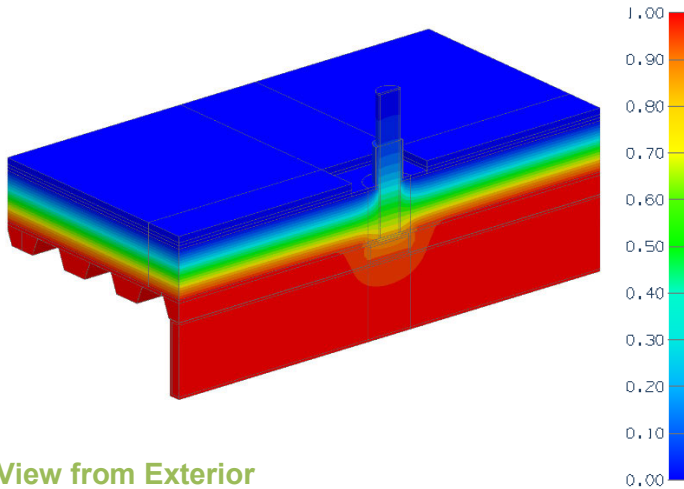
Temperature Indices

T_{i1}	0.58	Upper corner of glazing
T_{i2}	0.82	Beam at curtain wall interior closure panel
T_{i3}	0.71	Underside of roof deck at beam

Detail 9.3.1

Exterior Insulated Conventional Flat Roof – Roof Anchor

Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.3 (0.41 RSI) + insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value, without roof anchor
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for anchor

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr ·°F (W/m ² K)
R-40 (7.04)	R-42.3 (7.44)	R-42.3 (7.44)	0.024 (0.134)

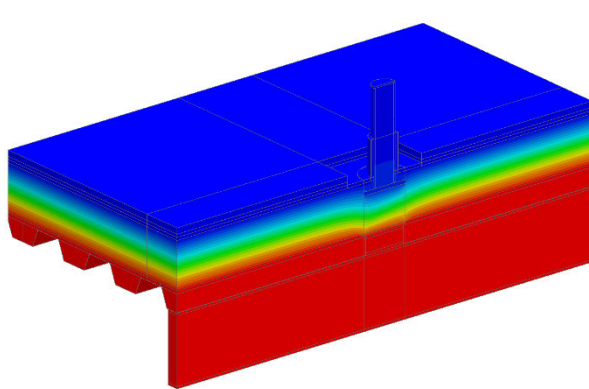
Roof Anchor Point Transmittance

R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr ·°F (W/m ² K)	χ Btu/hr·°F (W/K)
R-25.5 (4.49)	0.04 (0.223)	0.204 (0.35)

Detail 9.3.2

Exterior Insulated Conventional Flat Roof – Armatherm Thermal Break under Roof Anchor

Thermal Performance Indicators



View from Exterior



Assembly 1D (Nominal) R-Value	R_{1D}	R-2.3 (0.41 RSI) + insulation
Transmittance / Resistance without Anomaly	U_o, R_o	“clear field” U- and R-value, without roof anchor
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature
Point Transmittance	χ	Incremental increase in transmittance for anchor

¹Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report

Scenarios

Scenario	Roof Anchor Arrangement
A	1/2" Armatherm FRR thermal break under roof anchor
B	6" Armatherm 500 thermal break under roof anchor

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F / Btu (m ² K / W)	R_o ft ² ·hr·°F / Btu (m ² K / W)	U_o Btu/ft ² ·hr·°F (W/m ² K)
R-40 (7.04)	R-42.3 (7.44)	R-42.3 (7.44)	0.024 (0.134)

Roof Anchor Point Transmittance

Scenario	R ft ² ·hr·°F / Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	χ Btu/hr·°F (W/K)
A	R-27.2 (4.79)	0.04 (0.209)	0.175 (0.30)
B	R-37.2 (6.55)	0.03 (0.153)	0.041 (0.07)