

## **APPENDIX B – CATALOGUE THERMAL DATA SHEETS**



# CATALOGUE INDEX

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# Introduction

## 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 catalogue with full thermal information for each detail.

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2.	Conventional Curtain Wall
3.	Unitized Curtain Wall
4.	High Performance Curtain Wall
5.	Steel-Framed Construction
6.	Metal Buildings
7.	Concrete and Mass Masonry Construction
8.	Wood-Frame and Timber Construction
9.	Balconies and Doors
10.	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. That data sheet contains the material information for both the slab detail, and the clear field steel stud assembly above and below it. The clear field steel stud assembly material data sheet 5.1.14 is not additionally required to analyze 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 7.2.2.

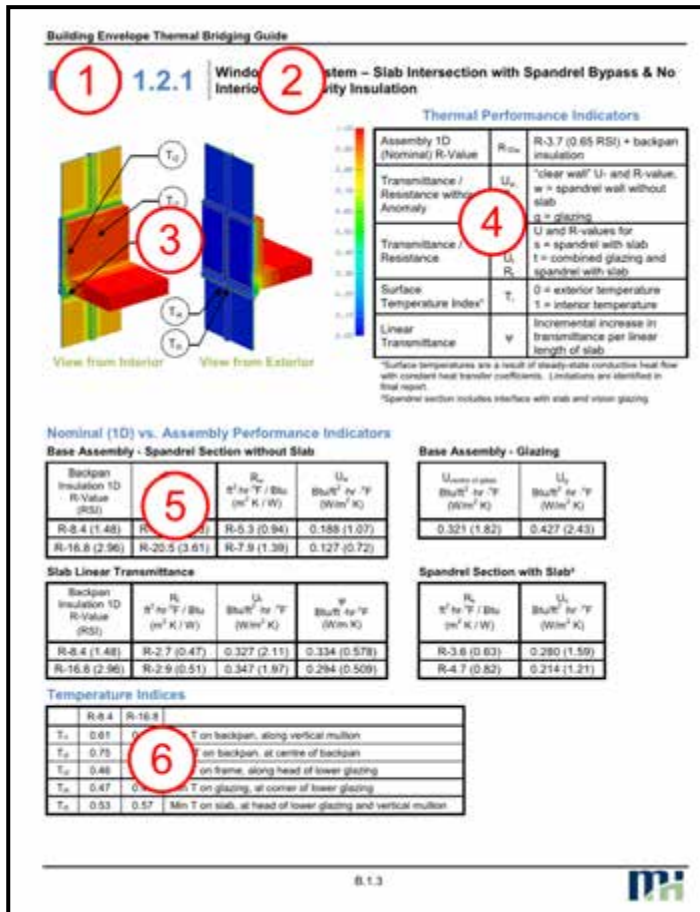
## Modelling Assumptions

- 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

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



### 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<sub>o</sub> and R<sub>o</sub>. 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 modelled 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.
- $\Psi$  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

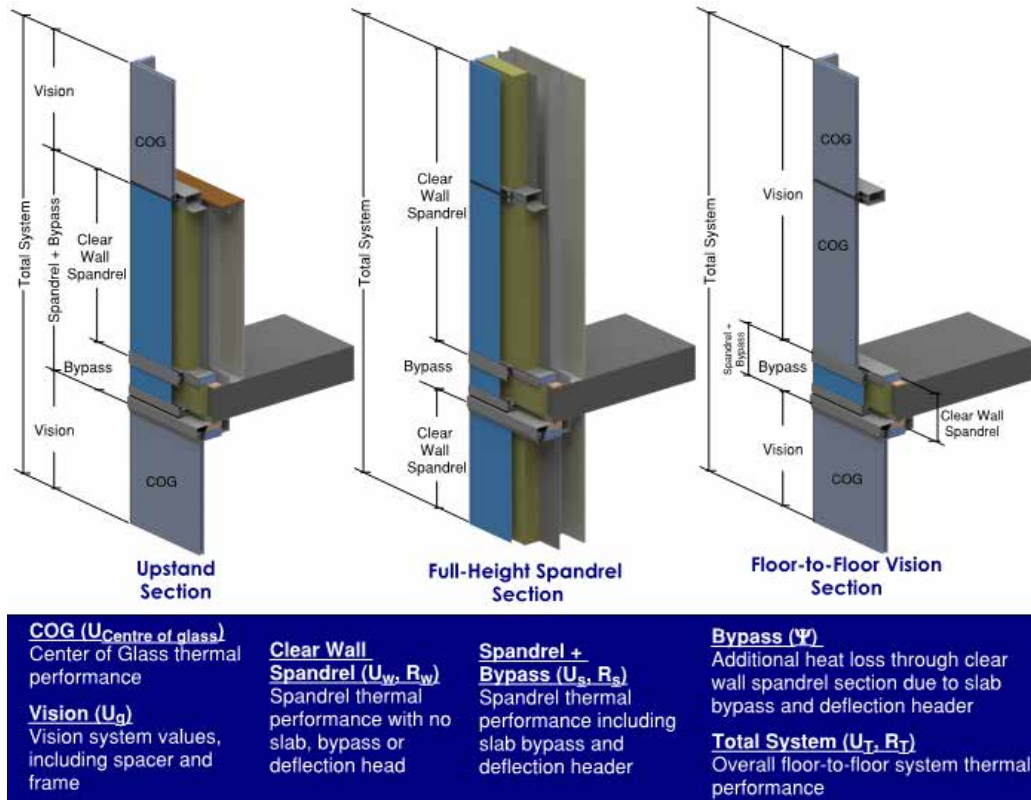
$$T_i = \frac{T_{\text{surface}} - T_{\text{outside}}}{T_{\text{inside}} - T_{\text{outside}}}$$

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  $T_{\text{surface}}$ . 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) Window-Wall Systems

Window-wall systems integrate vision glazing, opaque spandrels, and intermediate floor bypasses into their systems, making it difficult to differentiate the thermal performance of these sections. Below is a figure to help clarify how different sections are identified in the thermal bridging details.

For the floor-to-floor vision section scenario the bypass linear transmittance  $\Psi$  is compared to a spandrel clear wall section of the same dimension but with regular mullions in place of the deflection header and without the impact of the slab.



## 8) At-Ground Transitions

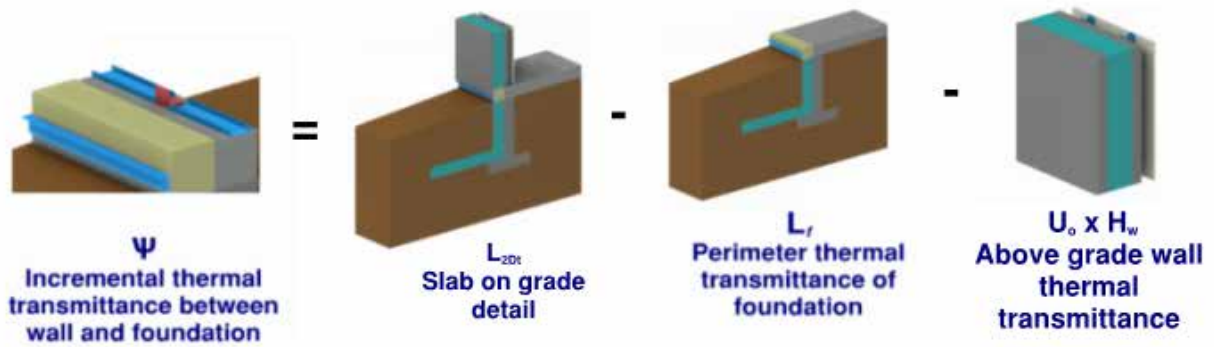
Some details contain at-grade transitions. The  $\Psi$ -value can be used like any other linear transmittance and it represents the incremental heat flow between the wall and foundation assembly. While heat flow through the wall assembly is based on heat flow per area (U-value), heat flow at foundation assemblies (slab on grade or below grade) 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 through 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  $\Psi$ . 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:

- $\Psi$  = 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 modelled assembly



### 9) 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.



# 1.0 Window Wall

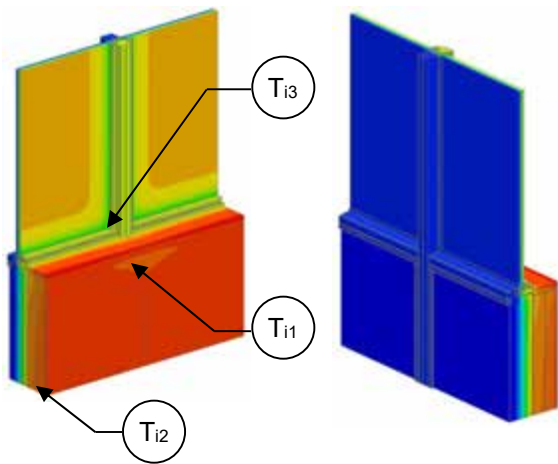
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# Detail 1.1.1

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

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance	U <sub>w</sub> , R <sub>w</sub> , U <sub>g</sub>	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 <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sub>centre of glass</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.408 (2.32)

#### Combined Assembly

Backpan Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

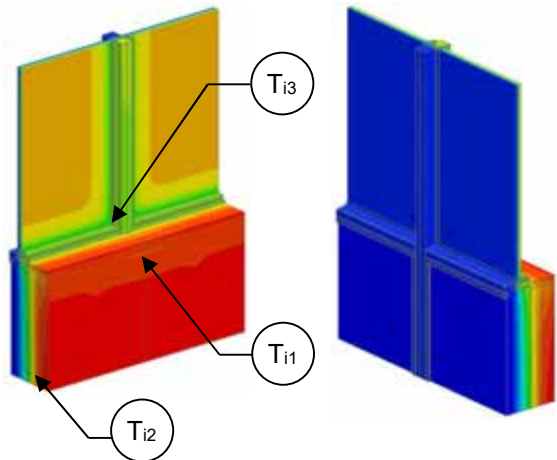
### Temperature Indices

	R8.4	R12.6	R16.8	
T <sub>i1</sub>	0.63	0.64	0.65	Min T in stud cavity, on frame at backpan
T <sub>i2</sub>	0.77	0.80	0.82	Max T on backpan, at center of backpan
T <sub>i3</sub>	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 <sub>1D</sub>	R-15.1 (2.67 RSI) + backpan insulation
Transmittance / Resistance	U <sub>w</sub> , R <sub>w</sub> , U <sub>g</sub>	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 <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sub>centre of glass</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.408 (2.32)

#### Combined Assembly

Backpan Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

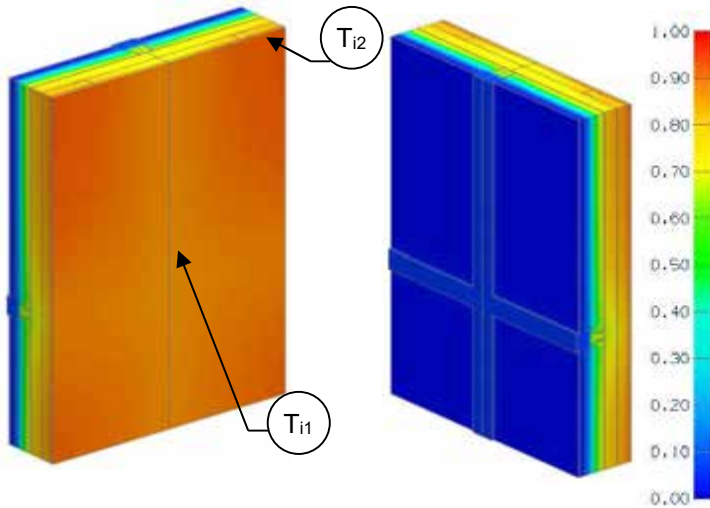
### Temperature Indices

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



# Detail 1.1.3

## Window Wall System – Full Height Spandrel with 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	$U_o, R_o$	“clear wall” spandrel wall U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

### Temperature Indices

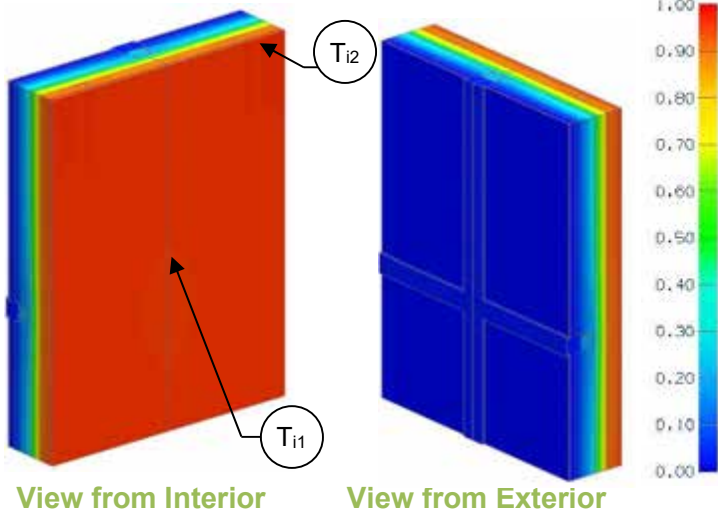
	R8.4	R12.6	R16.8	
$T_{i1}$	0.58	0.60	0.62	Min T in stud cavity, on frame at backpan
$T_{i2}$	0.78	0.82	0.84	Max T on backpan, at center of backpan



# Detail 1.1.4

## Window Wall System – Full Height Spandrel with Interior Spray Foam Insulation

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	Spandrel Wall, R-15.1 (2.67 RSI) + backpan insulation
Transmittance / Resistance	$U_o$ , $R_o$	“clear wall” spandrel wall U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

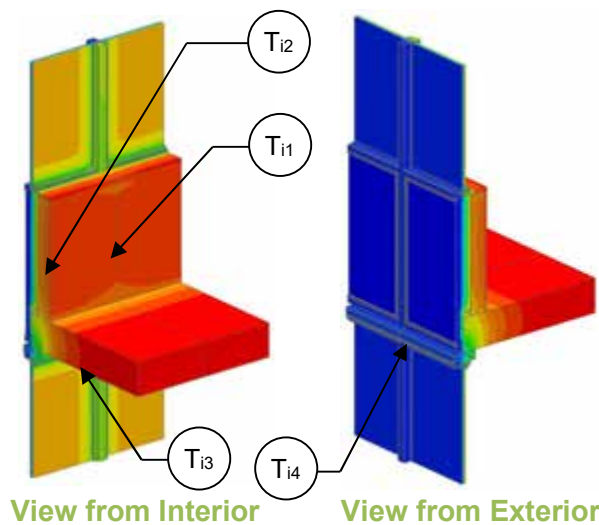
### Temperature Indices

	R8.4	R12.6	R16.8	
$T_{i1}$	0.91	0.91	0.92	Min T on sprayfoam, in line with frame
$T_{i2}$	0.92	0.93	0.93	Max T on sprayfoam in stud cavity

# 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 <sub>1D</sub>	R-3.2 (0.55 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U <sub>w</sub> , R <sub>w</sub> , U <sub>g</sub>	“clear wall” U- and R-value, w = spandrel wall without slab g = glazing
Transmittance / Resistance	U <sub>s</sub> , R <sub>s</sub> , U <sub>t</sub> , R <sub>t</sub>	U and R-values for s = spandrel with slab t = combined glazing and spandrel with slab
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Spandrel 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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sub>centre of glass</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.408 (2.32)

#### Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	R <sub>t</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>t</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 Slab<sup>2</sup>

R <sub>s</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>s</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

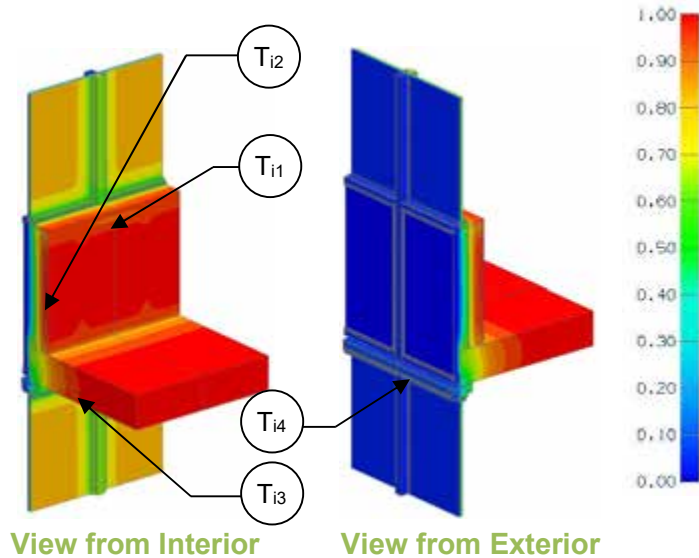
	R8.4	R12.6	R16.8	
T <sub>11</sub>	0.60	0.63	0.63	Min T in stud cavity, on frame at backpan
T <sub>12</sub>	0.75	0.78	0.80	Max T on backpan, at center of backpan
T <sub>13</sub>	0.51	0.51	0.51	Min T on interior glazing, at corner of deflection header
T <sub>14</sub>	0.54	0.54	0.54	Min T on slab, at head 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 <sup>1</sup>	$T_i$	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Spandrel 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.408 (2.32)

#### Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 Slab<sup>2</sup>

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

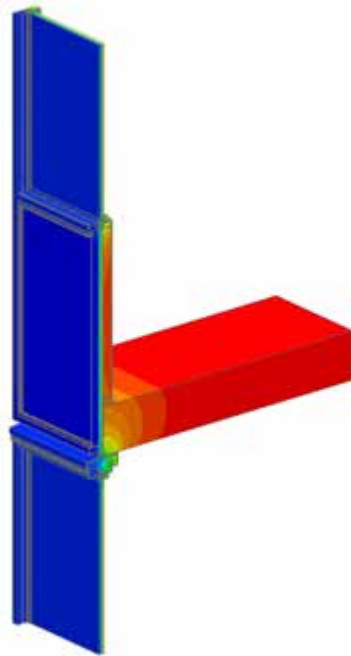
### Temperature Indices

	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

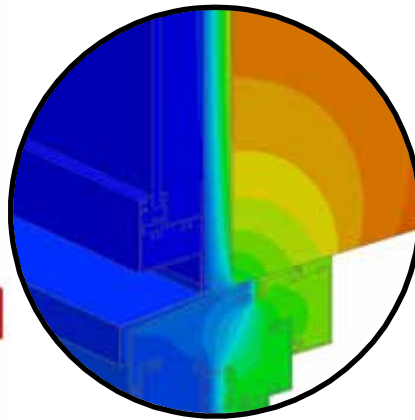
# Detail 1.2.3

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

### Thermal Performance Indicators



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

<sup>1</sup> $U_t$  based on a window to wall ratio of 40%  
AIM = Architectural Insulation Module

### Scenarios

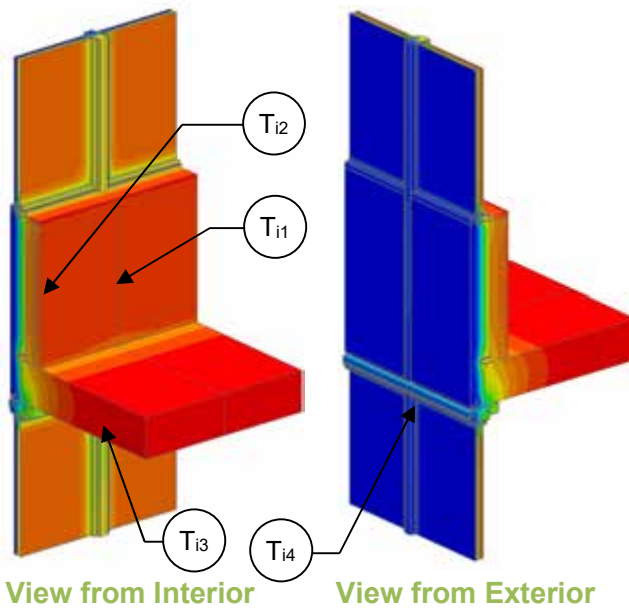
Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
A	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM adhered to Frame	None
B	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM adhered to Frame + 2" (51 mm) Mineral Wool in Backpan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

### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t$ <sup>1</sup> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)
A	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)
B	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Spandrel 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.143 (0.81)	0.250 (1.42)

#### Slab Linear Transmittance

Scenario	Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 Slab<sup>2</sup>

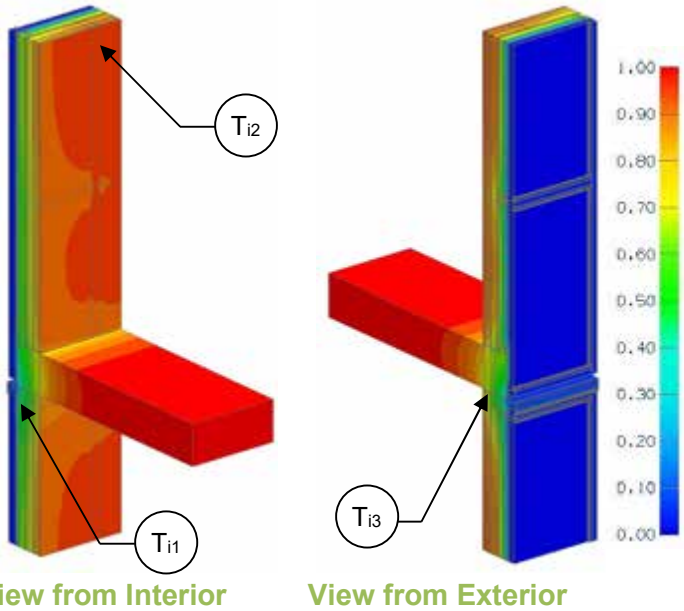
$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-4.4 (0.78)	0.226 (1.28)
R-6.5 (1.14)	0.154 (0.87)

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

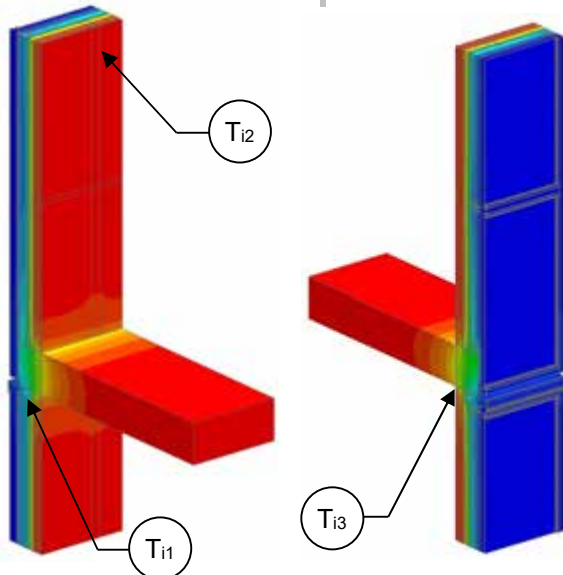
Backpan Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-8.4 (1.48)	R-5.2 (0.91)	0.193 (1.10)	0.366 (0.634)
R-12.6 (2.22)	R-5.6 (0.98)	0.179 (1.02)	0.379 (0.655)
R-16.8 (2.96)	R-5.8 (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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

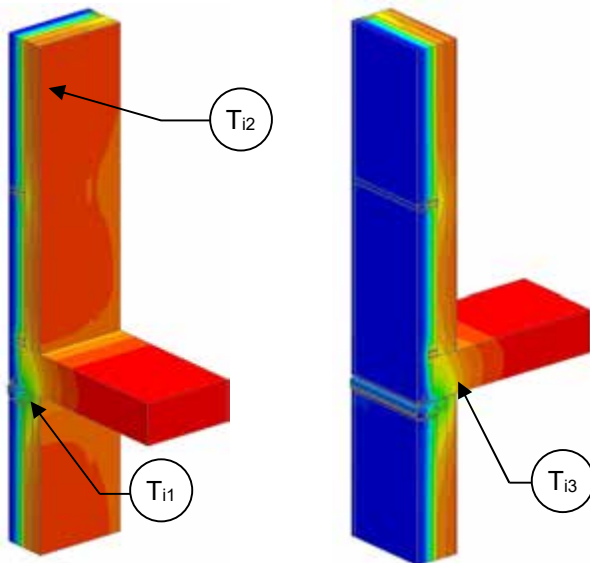
Backpan Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-8.4 (1.48)	R-9.0 (1.58)	0.111 (0.63)	0.456 (0.789)
R-12.6 (2.22)	R-9.3 (1.63)	0.108 (0.61)	0.449 (0.776)
R-16.8 (2.96)	R-9.4 (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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.6 (2.22)	R-15.7 (2.77)	R-8.6 (1.51)	0.117 (0.66)

#### Slab Linear Transmittance

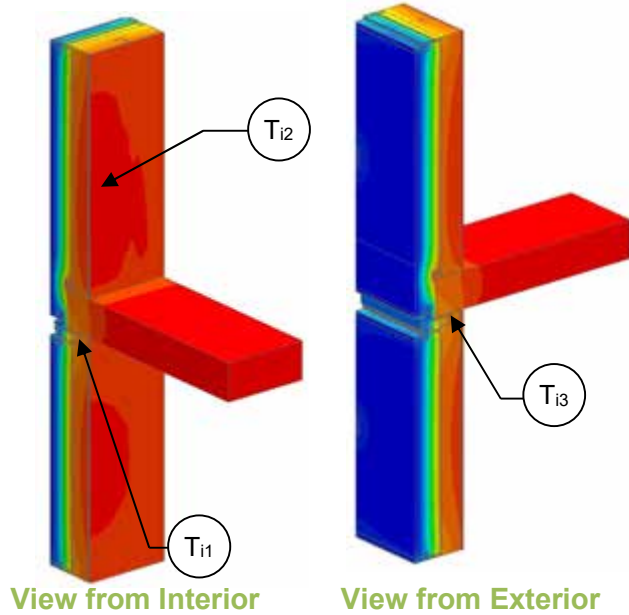
Scenario	Backpan Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
A	R-12.6 (2.22)	R-6.2 (1.09)	0.161 (0.92)	0.357 (0.617)
B	R-12.6 (2.22)	R-7.8 (1.37)	0.129 (0.73)	0.096 (0.166)

### 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



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-23.1 (4.07)	R-26.3 (4.63)	R-12.7 (2.24)	0.079 (0.45)

#### Slab Linear Transmittance

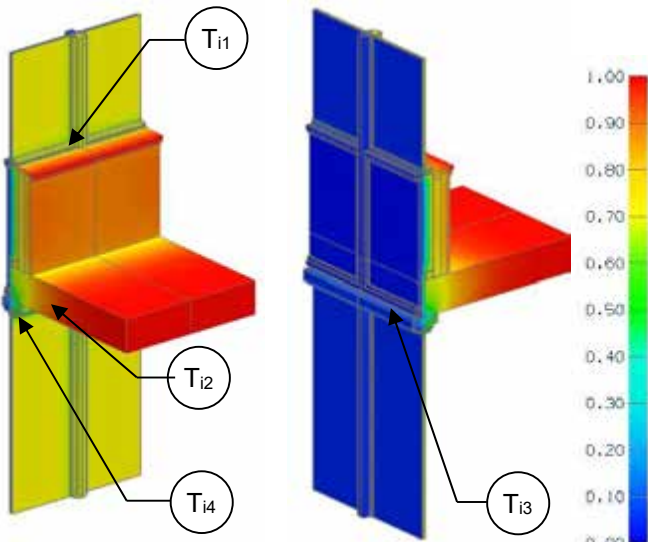
Backpan Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-23.1 (4.07)	R-11.1 (1.96)	0.090 (0.51)	0.089 (0.154)

### 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 1.2.9

## Window Wall System with Uprand Spandrel Section – Intermediate Floor Intersection with Spandrel Bypass and no Interior Stud Cavity Insulation



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56 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	$U_s, R_s, U_t, R_t$	U and R-values for: s = spandrel with slab t = combined glazing and spandrel with slab
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Spandrel 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.6 (2.22)	R-15.7 (2.77)	R-7.8 (1.38)	0.128 (0.73)

#### Base Assembly Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.242 (1.37)	0.329 (1.87)

#### Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-12.6 (2.22)	R-3.0 (0.53)	0.331 (1.88)	0.557 (0.964)

#### Spandrel Section with Slab<sup>2</sup>

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-3.0 (0.52)	0.337 (1.91)

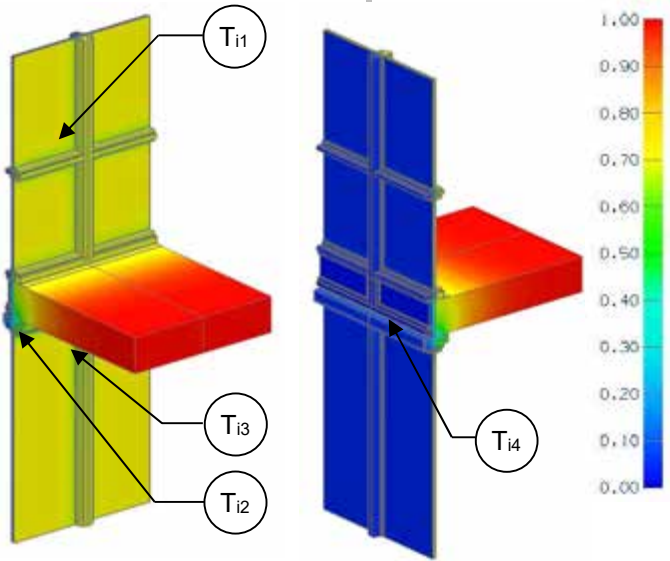
### Temperature Indices

$T_{11}$	0.63	Min T in stud cavity, on vertical frame at edge of backpan
$T_{12}$	0.46	Min T on interior glazing, at corner of vertical mullion and deflection head
$T_{13}$	0.51	Min T on slab, at deflection head connection
$T_{14}$	0.44	Min T on window frame, head at centre of window



# Detail 1.2.10

## Window Wall System with Full Height Vision Section – Intermediate Floor Intersection with Spandrel Bypass and no Interior Stud Cavity Insulation



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56 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	$U_s, R_s, U_t, R_t$	U and R-values for: s = spandrel with slab t = combined glazing and spandrel with slab
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Bypass 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-12.6 (2.22)	R-15.7 (2.77)	R-6.8 (1.20)	0.147 (0.84)

#### Base Assembly Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.242 (1.37)	0.340 (1.93)

#### Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
R-12.6 (2.22)	R-2.6 (0.47)	0.379 (2.15)	0.497 (0.860)

#### Spandrel Section with Slab<sup>2</sup>

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-1.3 (0.23)	0.784 (4.45)

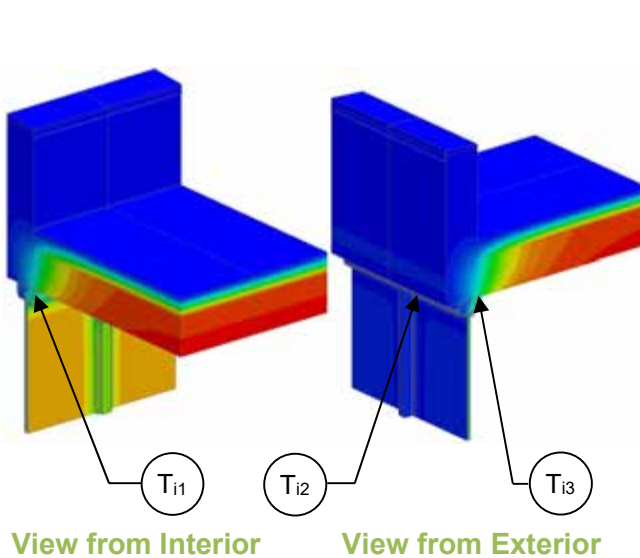
### Temperature Indices

$T_{i1}$	0.52	Min T on interior glazing, at corner of vertical mullion and intermediate horizontal mullion
$T_{i2}$	0.44	Min T on window frame, head at centre of window
$T_{i3}$	0.46	Min T on interior glazing, at corner of deflection head and vertical mullion
$T_{i4}$	0.51	Min T on slab, at deflection head connection

# 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9(3.86)	0.046 (0.26)

#### Base Assembly - Glazing

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

#### Parapet Linear Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-3.5 (0.61)	0.288 (1.63)	0.567 (0.981)

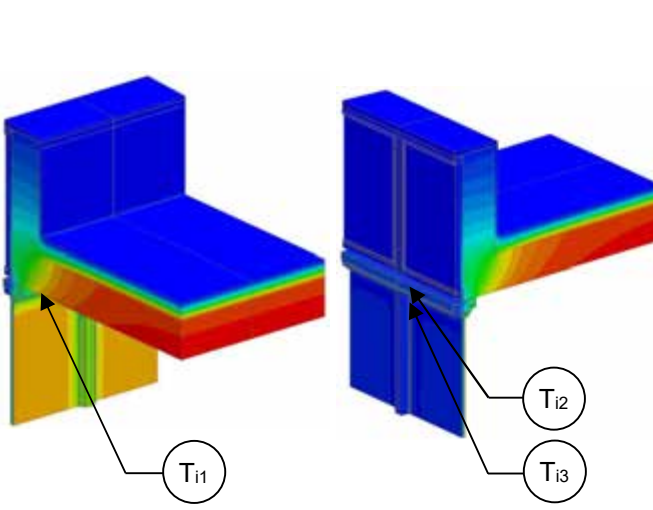
### Temperature Indices

$T_{i1}$	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 <sup>1</sup>	$T_i$	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9(3.86)	0.046 (0.26)

#### Base Assembly - Glazing

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

#### Glazing-Spandrel Linear Transmittance

Spandrel Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

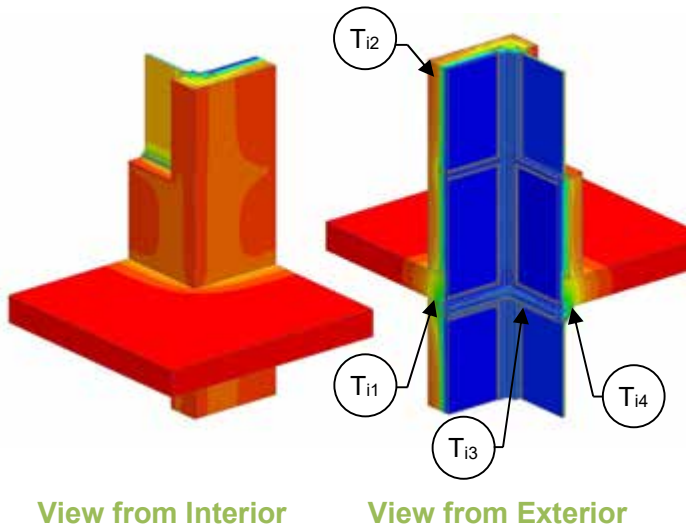
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_c$	Incremental increase in transmittance per linear length of s = slab c = corner transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.408 (2.32)

#### Full Spandrel Wall Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_s$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_c$ 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)

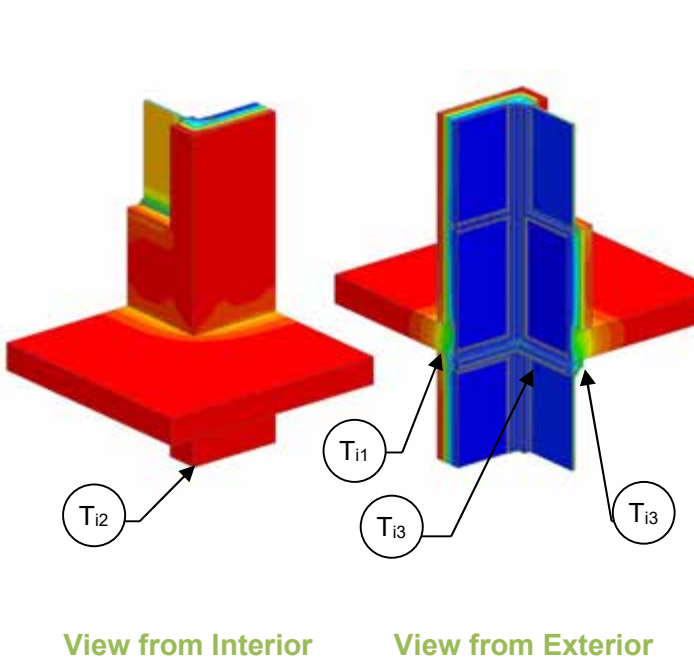
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_c$	Incremental increase in transmittance per linear length of s = slab c = corner transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.408 (2.32)

#### Full Spandrel Wall Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_c$ 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)

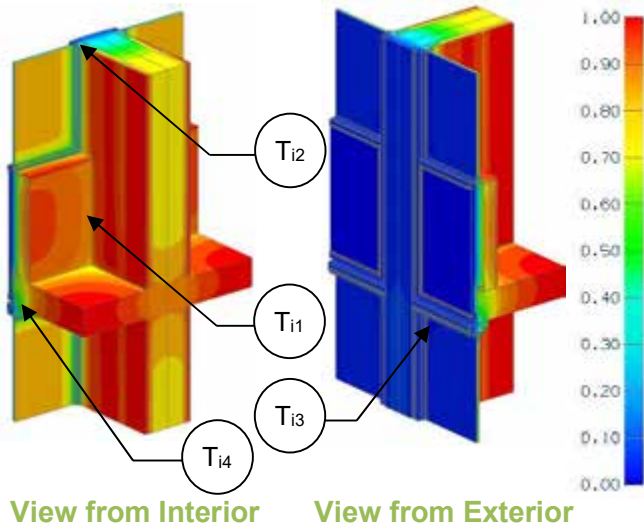
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_v$	Incremental increase in transmittance per linear length of s = slab, v = vertical wall projection

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.408 (2.32)

#### Horizontal Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_s$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_v$ 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)

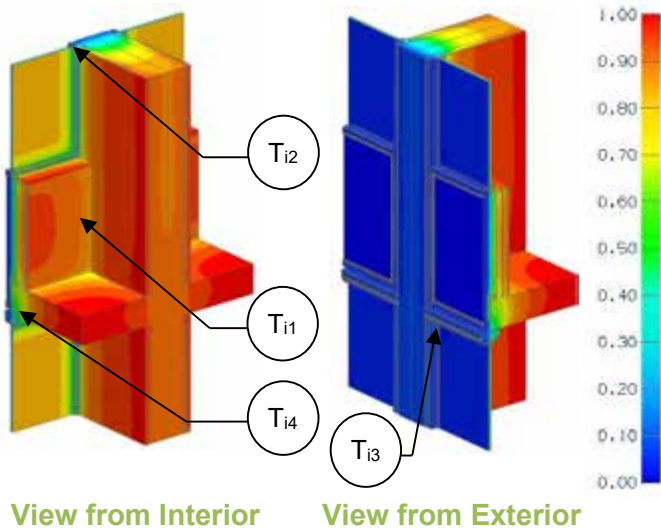
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_v$	Incremental increase in transmittance per linear length of s = slab v = vertical wall projection

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.408 (2.32)

#### Intersection Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_v$ 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



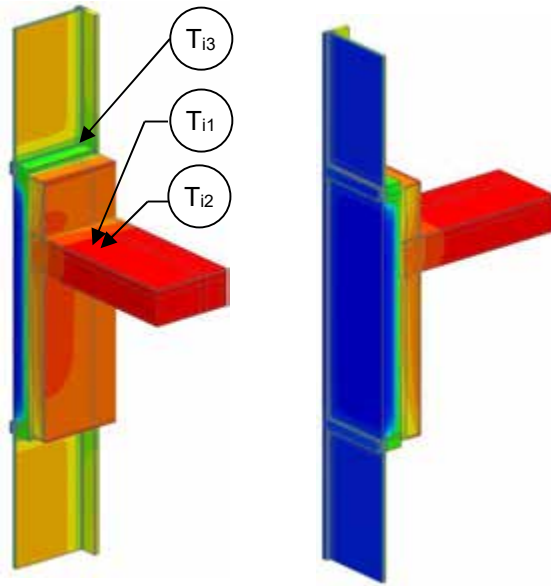
<b>Detail 2.1.1</b> .....	<b>B.2.1</b>
Conventional Curtain Wall System with Spandrel Panel and 3 5/8" x 1 5/8" Steel Studs (16" o.c.) – Slab Intersection & No Interior Insulation in Stud Cavity	
<b>Detail 2.1.2</b> .....	<b>B.2.2</b>
Conventional Curtain Wall System with Insulated Spandrel Panel and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

<b>Detail 2.1.11</b> .....	<b>B.2.11</b>
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	
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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	
<b>Detail 2.1.13</b> .....	<b>B.2.13</b>
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	
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<b>Detail 2.2.1</b> .....	<b>B.2.15</b>
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	
<b>Detail 2.2.2</b> .....	<b>B.2.16</b>
Conventional Curtain Wall System – Insulated Spandrel & Roof Intersection	
<b>Detail 2.2.3</b> .....	<b>B.2.17</b>
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	
<b>Detail 2.2.4</b> .....	<b>B.2.18</b>
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	
<b>Detail 2.3.1</b> .....	<b>B.2.19</b>
Conventional Curtain Wall System with Insulated Spandrel Panel – Un-insulated Jamb Intersection with Vision Section	
<b>Detail 2.3.2</b> .....	<b>B.2.20</b>
Conventional Curtain Wall System with Insulated Spandrel Panel – Rigid Insulated Jamb Intersection with Vision Section	
<b>Detail 2.3.3</b> .....	<b>B.2.21</b>
Conventional Curtain Wall System with Insulated Spandrel Panel – Aerogel Insulated Jamb Intersection with Vision Section	
<b>Detail 2.4.1</b> .....	<b>B.2.22</b>
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	

<b>Detail 2.4.2</b> .....	<b>B.2.23</b>
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	
<b>Detail 2.4.3</b> .....	<b>B.2.24</b>
Conventional Curtain Wall with Insulated Spandrel Panel & 3 5/8" x 1 5/8" Steel Stud (16" o.c.) - Canopy Beam & Gutter Intersection	
<b>Detail 2.4.4</b> .....	<b>B.2.25</b>
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	
<b>Detail 2.5.1</b> .....	<b>B.2.26</b>
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 <sup>1</sup>	$U_s, R_s$	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 <sup>2</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

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

### Nominal (1D) vs. Assembly Performance Indicators

Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

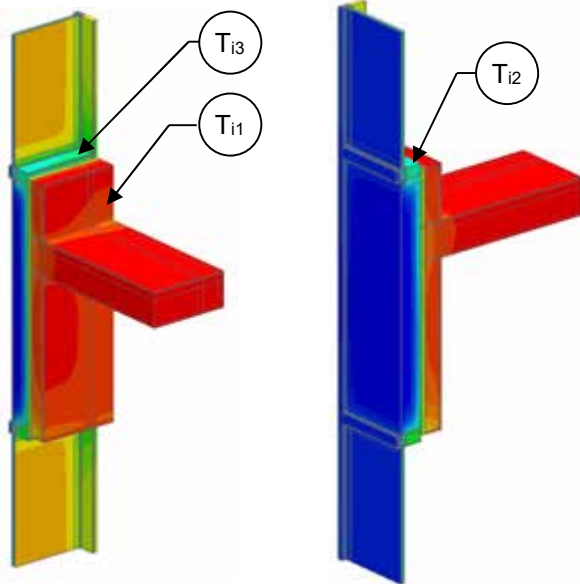
### Temperature Indices

	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 <sup>1</sup>	$U_s, R_s$	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

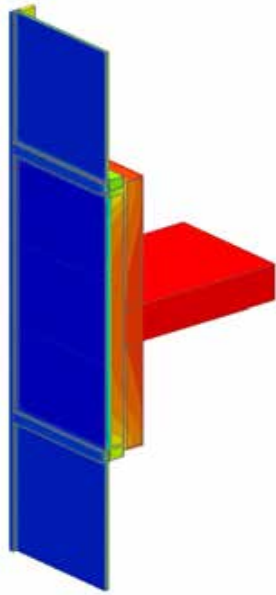
#### Temperature Indices

	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

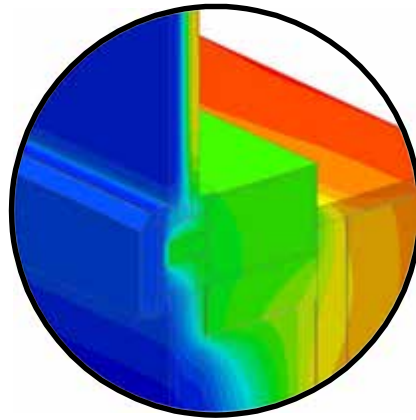
## Detail 2.1.3

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

#### 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

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

#### Scenario

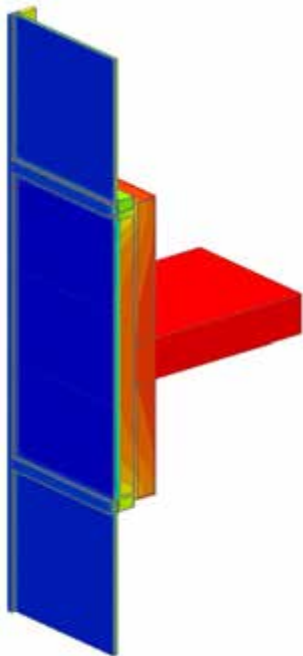
Scenario	Vision Glass and Spacer	Insulation Thickness and Application
A	Double Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan

#### Nominal (1D) vs. Assembly Performance Indicators

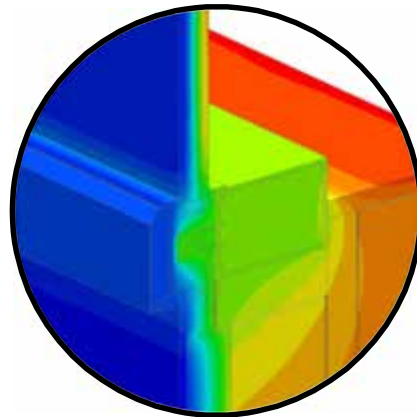
Scenario	Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
A	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

<sup>1</sup> $U_t$  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
A	Double Glazed with Aluminum Spacer	1.5" (38 mm) AIM adhered to Monolithic Glass	None
B	Double Glazed with Aluminum Spacer	1.5" (38 mm) AIM adhered to Insulating Glass	None
C	Double Glazed with Aluminum Spacer	0.75" (19 mm) AIM between Glass	Aluminum Spacer
D	Double Glazed with Aluminum Spacer	1" (25 mm) AIM between Metal Skins	Rigid Insulation

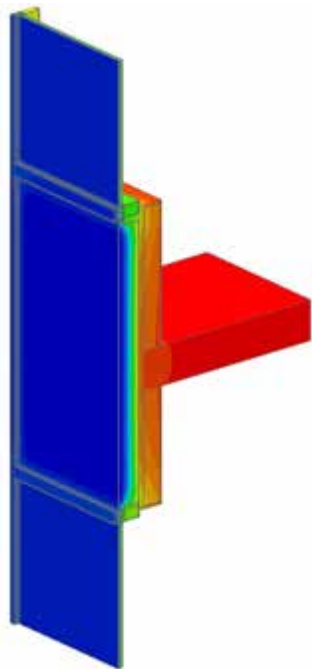
### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
A	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)
B	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)
C	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)
D	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)

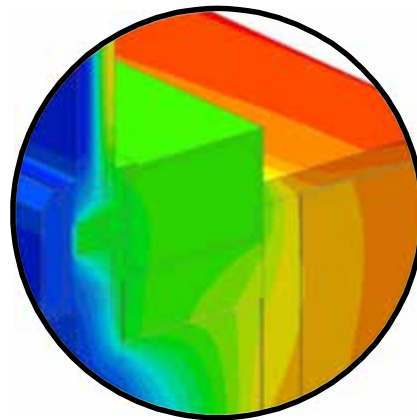
# Detail 2.1.5

## 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

<sup>1</sup> $U_t$  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
A	Double Glazed with Silicone Warm Edge Spacer	4" (100 mm) Mineral Wool in Backpan

### Nominal (1D) vs. Assembly Performance Indicators

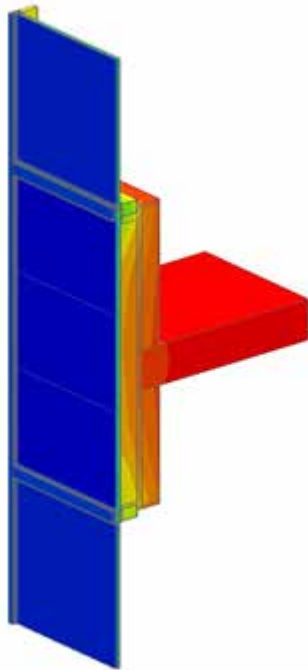
Scenario	Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
A	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)



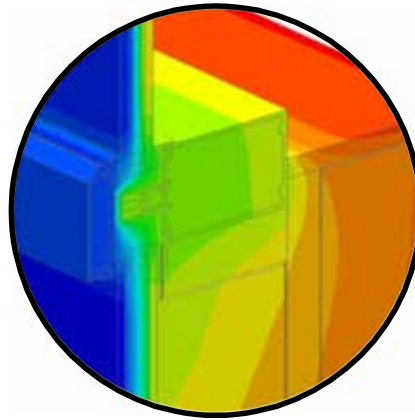
# Detail 2.1.6

## 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

<sup>1</sup> $U_t$  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
A	Vertical & Horizontal Pressure Plates	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
B	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

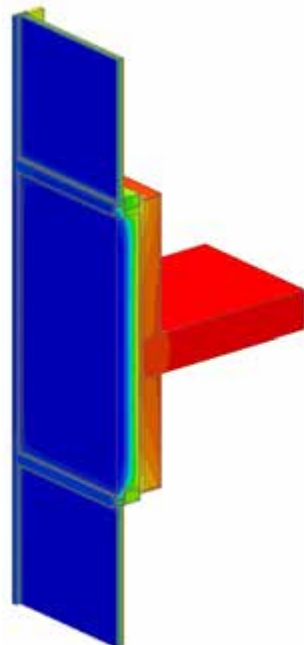
### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ <sup>1</sup> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
A	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)
B	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)

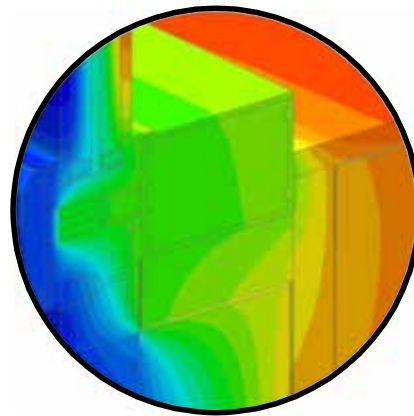
# Detail 2.1.7

## 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

<sup>1</sup> $U_t$  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
A	Triple Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan

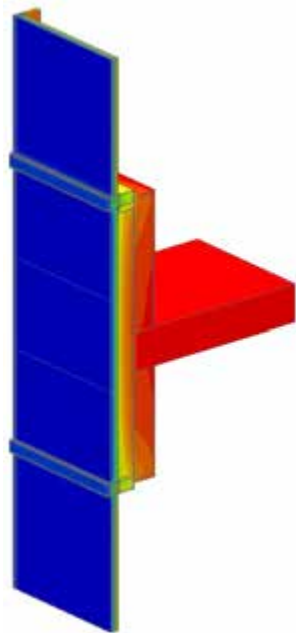
### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
A	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)

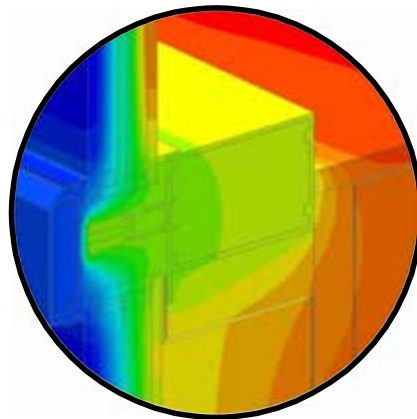
# Detail 2.1.8

## 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

<sup>1</sup> $U_t$  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
A	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

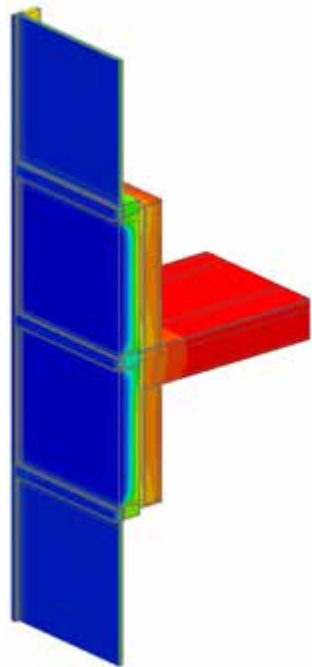
### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
A	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)

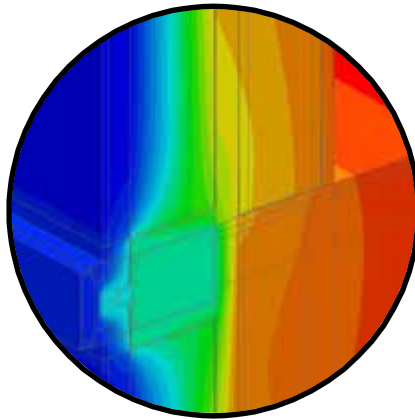
# Detail 2.1.9

## 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

<sup>1</sup> $U_t$  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
A	Double Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan

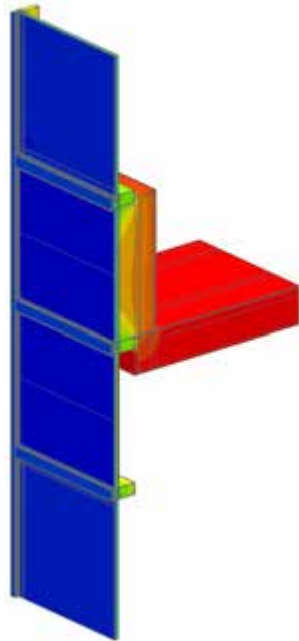
### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
A	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)

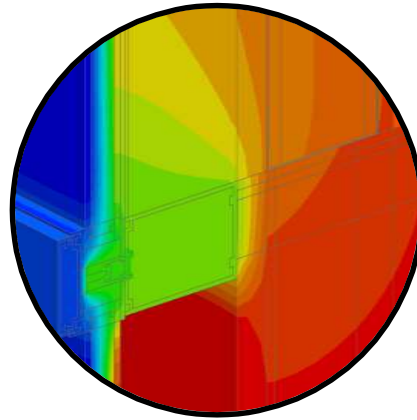
# Detail 2.1.10

## 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

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

AIM = Architectural Insulation Module

### Scenarios

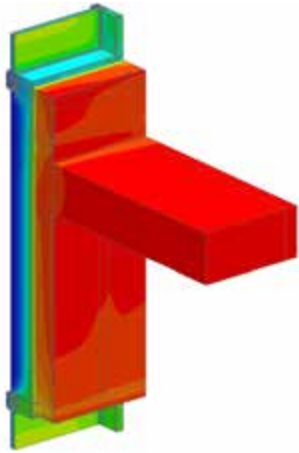
Scenario	Curtain Wall Framing	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
A	Vertical & Horizontal Pressure Plates	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
B	Vertical Structural Silicone & Horizontal Pressure Plates	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
C	Vertical Structural Silicone & Horizontal Pressure Plates	Double Glazed with Silicone Warm Edge Spacer	1" (25 mm) AIM between Metal Skins	Rigid Insulation
D	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

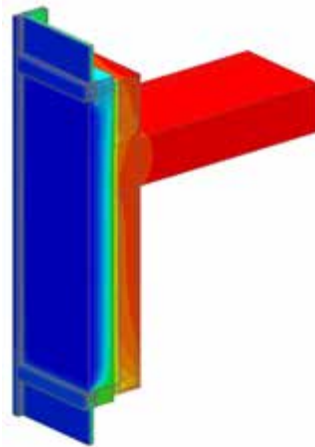
Scenario	Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
A	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)
B	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)
C	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)
D	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

<sup>1</sup>For performance of base assembly spandrel without thermal breaks, refer to Detail 2.1.2

### Scenario

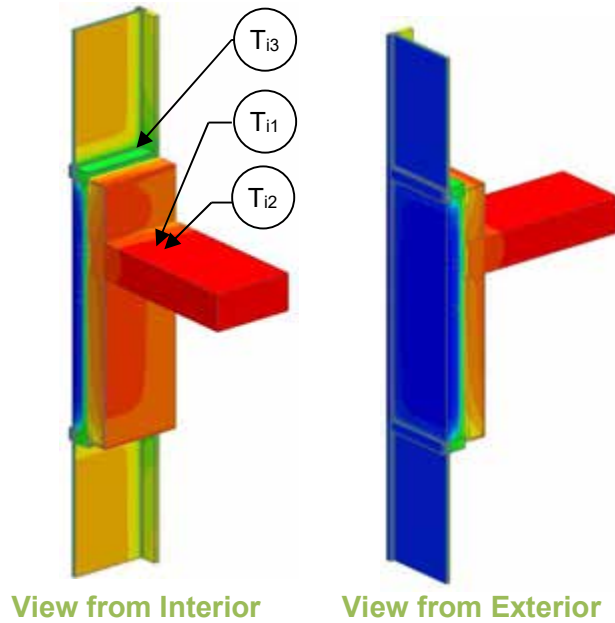
Scenario	Flashing and Shelf Angle
1	2" Armatherm 500 beneath stud cavity
2	2" Armatherm 500 beneath stud cavity and 3/8" FRR at support angle

### Back Pan Insulation vs. Assembly Performance Indicators

Scenario	Backpan Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>1</sup>	$U_s, R_s$	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 <sup>2</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>  $U_t$  based on a window to wall ratio of 50%

<sup>2</sup> 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

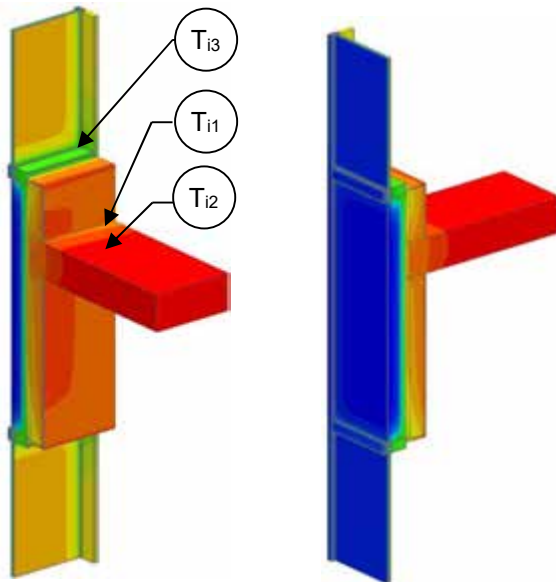
Scenario	Insulation R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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



View from Interior

View from Exterior

### Thermal Performance Indicators

Transmittance / Resistance <sup>1</sup>	$U_s, R_s$	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 <sup>2</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>  $U_t$  based on a window to wall ratio of 50%

<sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ <sup>1</sup> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

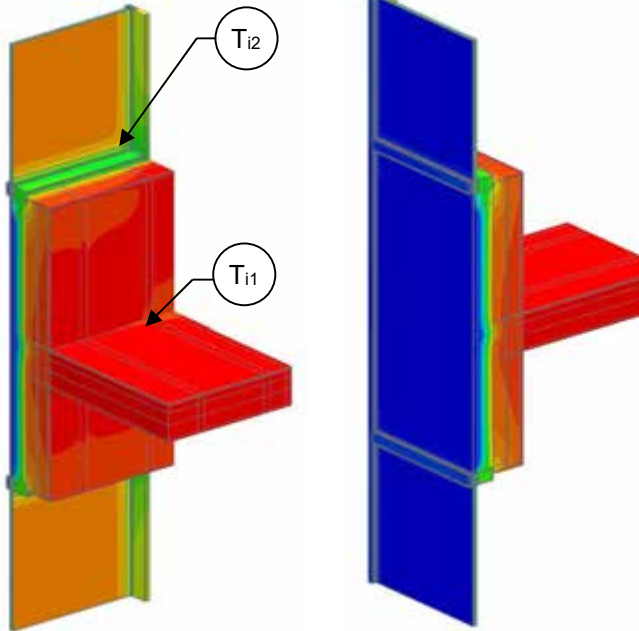
### Temperature Indices

	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 2.1.14

## Conventional Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – Owens Corning Thermafiber Impasse System and Intermediate Floor Intersection



View from Interior

View from Exterior

### 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

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

### Nominal (1D) vs. Assembly Performance Indicators

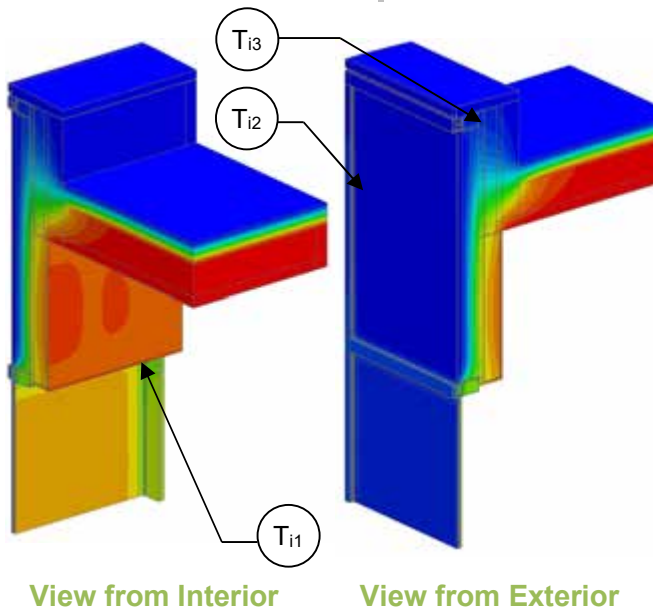
Insulation R-Value (RSI)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)
R-8.4 (1.48)	0.188 (1.07)	R-5.3 (0.94)	0.455 (2.58)	R-2.2 (0.39)	0.321 (1.83)	R-3.1 (0.55)
R-16.8 (2.96)	0.129 (0.73)	R-7.8 (1.37)	0.455 (2.58)	R-2.2 (0.39)	0.292 (1.66)	R-3.4 (0.60)

### Temperature Indices

	R8.4	R16.8	
$T_{i1}$	0.17	0.28	Min T on interior frame, at vertical mullion behind slab
$T_{i2}$	0.64	0.60	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 <sub>1D</sub>	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U <sub>r</sub> , R <sub>r</sub> , U <sub>s</sub> , R <sub>s</sub> , U <sub>g</sub>	"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 <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sub>r</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>r</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

#### Base Assembly - Glazing

U <sub>centre of glass</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.429 (2.44)

#### Base Assembly – Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>s</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>s</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

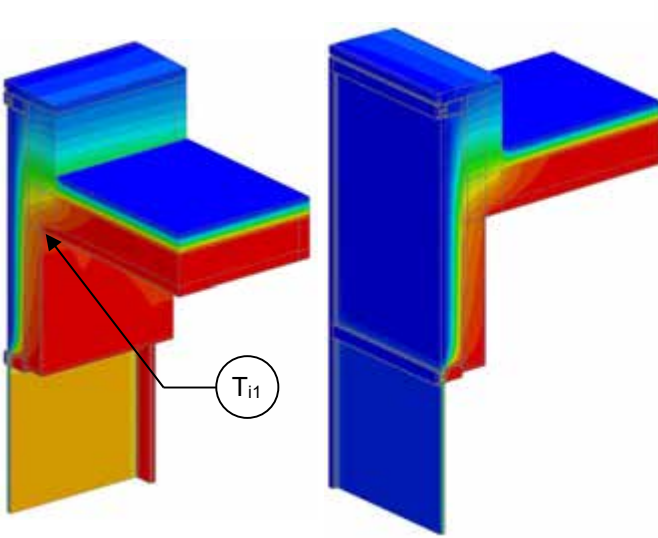
### Temperature Indices

	R8.4	R16.8	
T <sub>i1</sub>	0.54	0.58	Min T on interior frame, along head at edge of glazing
T <sub>i2</sub>	0.56	0.57	Min T on concrete ceiling, at curtain wall anchor
T <sub>i3</sub>	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 Interior<sup>2</sup>

View from Exterior<sup>2</sup>

Spandrel Wall 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.7 (0.65 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U <sub>r</sub> , R <sub>r</sub> , U <sub>s</sub> , R <sub>s</sub> , U <sub>g</sub>	“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 <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Thermal image shown is for the Aerogel detail

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Roof

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

#### Base Assembly – Glazing

U <sub>centre of glass</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.429 (2.44)

#### Base Assembly – Spandrel Section

Backpan Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>s</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>s</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-20.5 (3.61)	R-8.9 (1.56)	0.112 (0.64)

#### Parapet Linear Transmittance

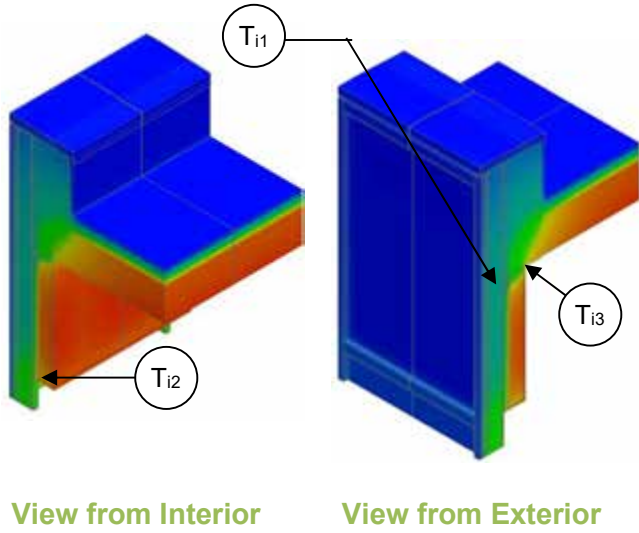
Parapet Insulation	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ Btu/ft hr °F (W/m K)
Conventional	R-2.5 (0.44)	0.397 (2.25)	0.614 (1.06)
Aerogel	R-2.8 (0.49)	0.363 (2.06)	0.513 (0.89)

### Temperature Indices

	Conventional	Aerogel	
T <sub>i1</sub>	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 <sub>1D</sub>	R-14.9 (2.62 RSI) + backpan insulation
Transmittance / Resistance without Anomaly	U <sub>r</sub> , R <sub>r</sub> , U <sub>s</sub> , R <sub>s</sub>	"clear wall" U- and R-value r = insulated roof s = curtain wall spandrel
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

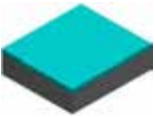
#### Base Assembly – Spandrel Panel Section

Backpan Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>s</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>s</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-1 <sup>2</sup> (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)

<sup>2</sup> This value represents no insulation in the back pan.

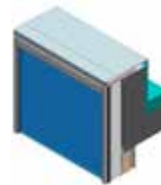
#### Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	R <sub>r</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>r</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

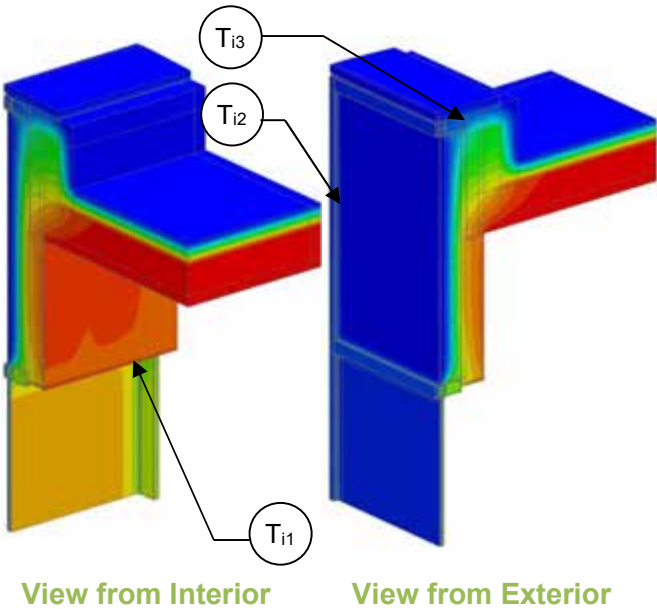


### Temperature Indices

	R1	R5	R15	R25	
T <sub>i1</sub>	0.26	0.34	0.38	0.39	Min T on Back Pan, at the mullion, the between slab and bottom transom
T <sub>i2</sub>	0.47	0.51	0.53	0.53	Min T on interior frame, at mullion transom corner
T <sub>i3</sub>	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



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

#### Base Assembly - Glazing

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

#### Base Assembly – Spandrel Section

Backpan Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

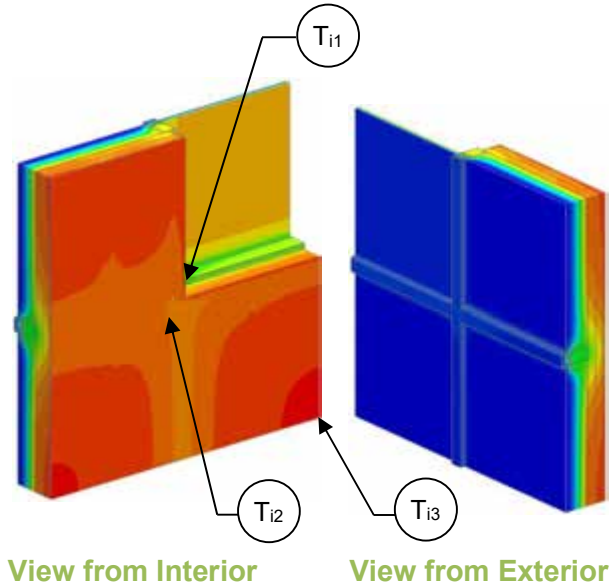
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.429 (2.44)

#### Combined Assembly

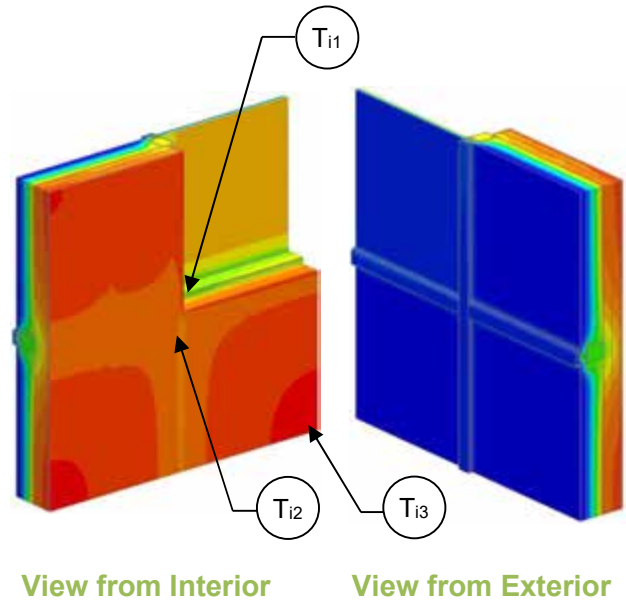
Backpan Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-3.7 (0.65)	0.273 (1.55)
R-16.8 (2.96)	R-4.0 (0.71)	0.249 (1.41)

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.429 (2.44)

##### Combined Assembly

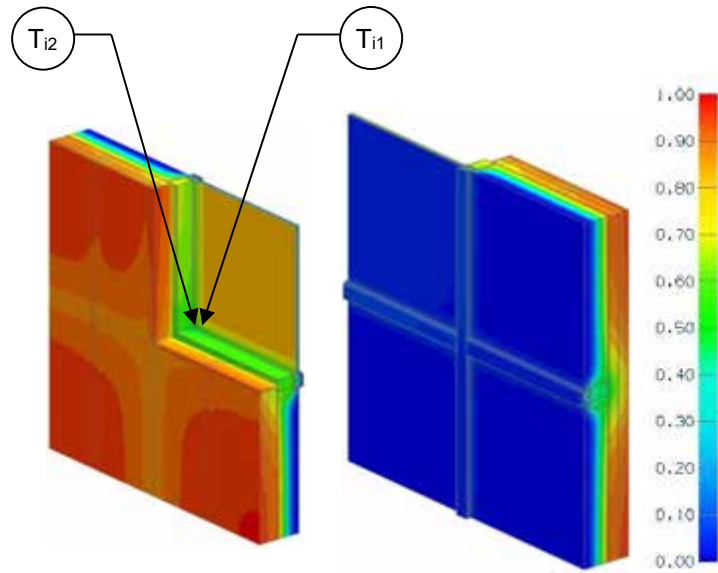
Backpan Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-3.8 (0.67)	0.264 (1.50)
R-16.8 (2.96)	R-4.4 (0.77)	0.228 (1.30)

#### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Thermal image shown is for the Aerogel detail

View from Interior<sup>2</sup>

View from Exterior<sup>2</sup>

#### Scenario

Scenario	Jamb Condition
A	No Aerogel
B	Aerogel

#### Nominal (1D) vs. Assembly Performance Indicators

##### Spandrel Section

Scenario	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
A	R-20.5 (3.61)	R-5.3 (0.93)	0.189 (1.07)
B	R-20.5 (3.61)	R-6.5 (1.14)	0.155 (0.88)

##### Glazing

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

#### Combined Assembly

Scenario	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
Scenario A	R-4.0 (0.71)	0.249 (1.41)
A	R-4.5 (0.79)	0.224 (1.27)

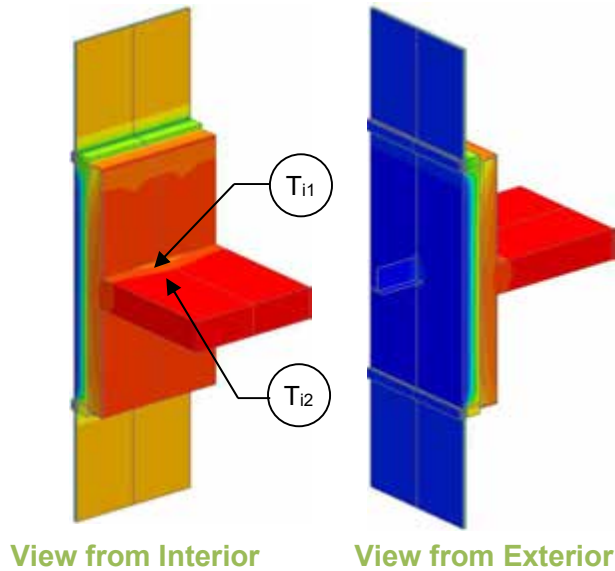
#### Temperature Indices

	A	B	
$T_{i1}$	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for steel beam attached to slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

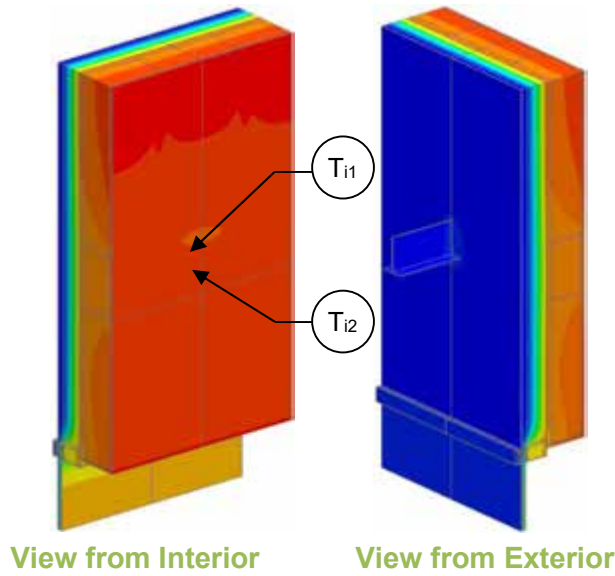
Backpan insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for steel beam attached to a steel beam

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

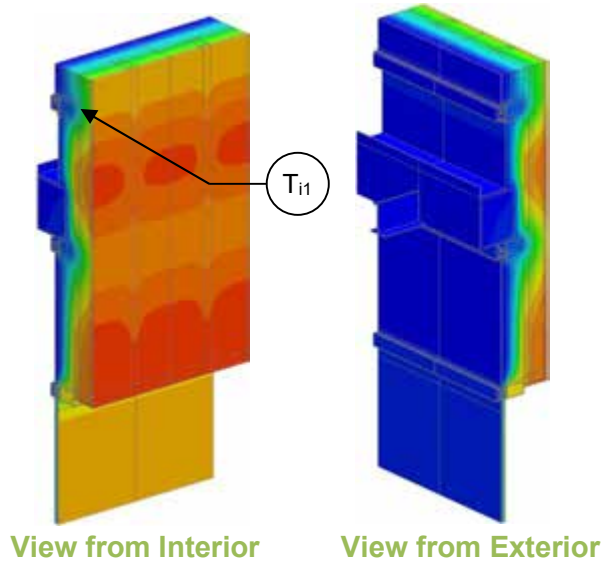
Backpan Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of gutter

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

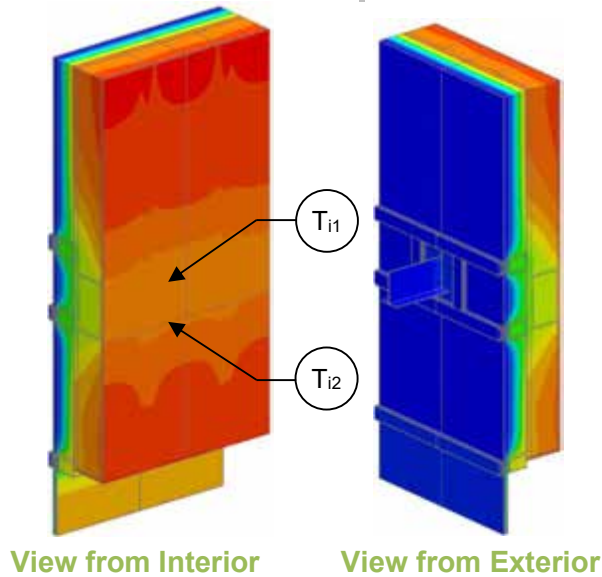
Backpan Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for a steel beam attached to a steel beam with additional mullions

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ 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)

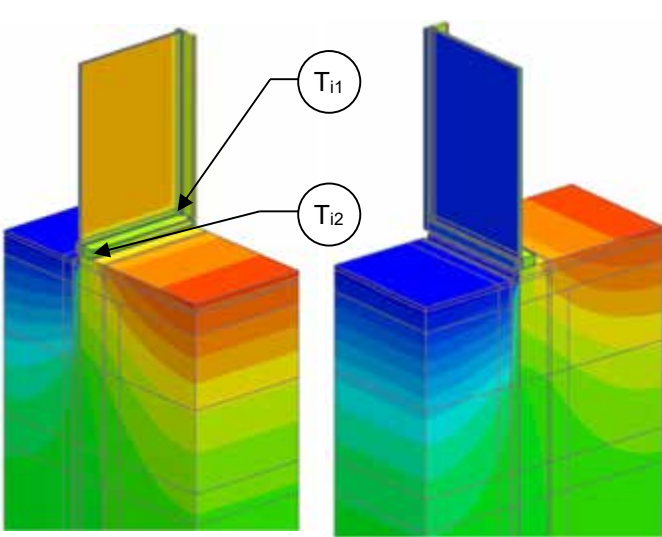
#### Temperature Indices

	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 Interior<sup>2</sup>

View from Exterior<sup>2</sup>

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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab-on-grade

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Thermal image shown is for the Aerogel detail

<sup>3</sup>R-value and U-value do not include the soil.

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Foundation<sup>3</sup>

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

#### Base Assembly - Glazing

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

#### Foundation Linear Transmittance

Slab Edge Insulation	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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

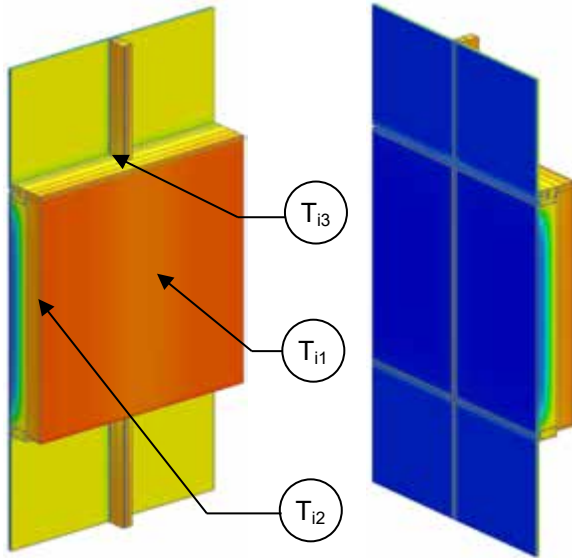
	Conventional	Aerogel	
$T_{i1}$	0.54	0.50	Min T on glazing, at corner of glass
$T_{i2}$	0.70	0.62	Min T on concrete, at curtain wall sill intersection

## 3.0 Unitized Curtain Wall

<b>Detail 3.1.1</b> .....	<b>B.3.1</b>
Unitized Curtain Wall System – Spandrel Clear Wall & No Interior Stud Cavity Insulation	
<b>Detail 3.1.2</b> .....	<b>B.3.2</b>
Unitized Curtain Wall System – Spandrel Clear Wall & Interior Sprayfoam Insulation	
<b>Detail 3.2.1</b> .....	<b>B.3.3</b>
Unitized Curtain Wall System – Intermediate Floor Intersection & No Interior Stud Cavity Insulation	
<b>Detail 3.2.2</b> .....	<b>B.3.4</b>
Unitized Curtain Wall System – Intermediate Floor Intersection & Interior Sprayfoam Insulation	
<b>Detail 3.2.3</b> .....	<b>B.3.5</b>
Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – Insulated Backpan and Intermediate Floor Intersection	
<b>Detail 3.2.4</b> .....	<b>B.3.6</b>
Unitized Curtain Wall System with 4-Sided Structural Silicone Joints and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection	
<b>Detail 3.2.5</b> .....	<b>B.3.7</b>
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	
<b>Detail 3.2.6</b> .....	<b>B.3.8</b>
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	
<b>Detail 3.3.1</b> .....	<b>B.3.9</b>
Unitized Curtain Wall System – Window Wall Transition	
<b>Detail 3.3.2</b> .....	<b>B.3.10</b>
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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.373 (2.12)

#### Combined Assembly

Backpan Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-3.8 (0.66)	0.266 (1.51)
R-16.8 (2.96)	R-3.9 (0.69)	0.254 (1.44)

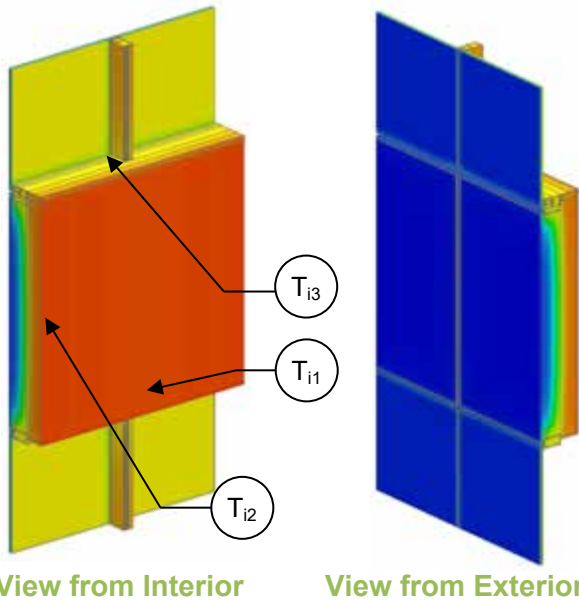
### Temperature Indices

	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><math>R_{1D}</math></td> <td>R-15.7 (2.77 RSI) + backpan insulation</td> </tr> <tr> <td>Transmittance / Resistance</td> <td><math>U_w, R_w, U_g</math></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 Index<sup>1</sup></td> <td><math>T_i</math></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 <sup>1</sup>	$T_i$	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 <sup>1</sup>	$T_i$	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													

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.371 (2.11)

##### Combined Assembly

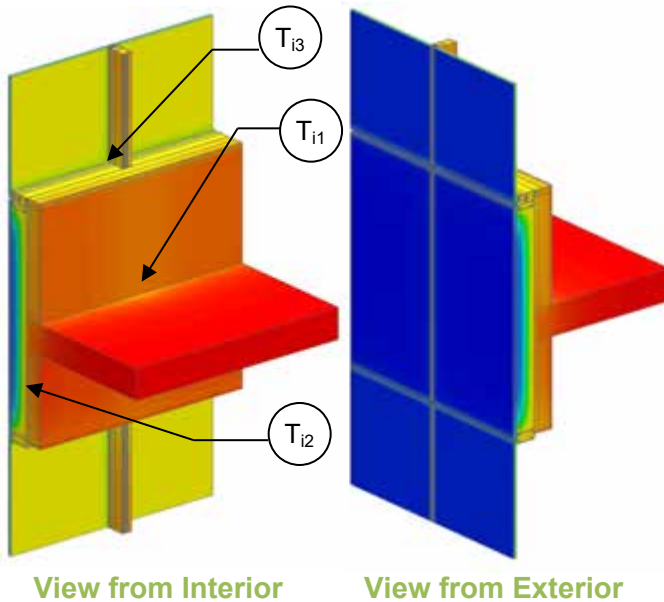
Backpan Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-4.0 (0.70)	0.253 (1.44)
R-16.8 (2.96)	R-4.1 (0.72)	0.244 (1.39)

#### 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 <sup>1</sup>	$T_i$	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Spandrel 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.373 (2.12)

#### Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 Slab<sup>2</sup>

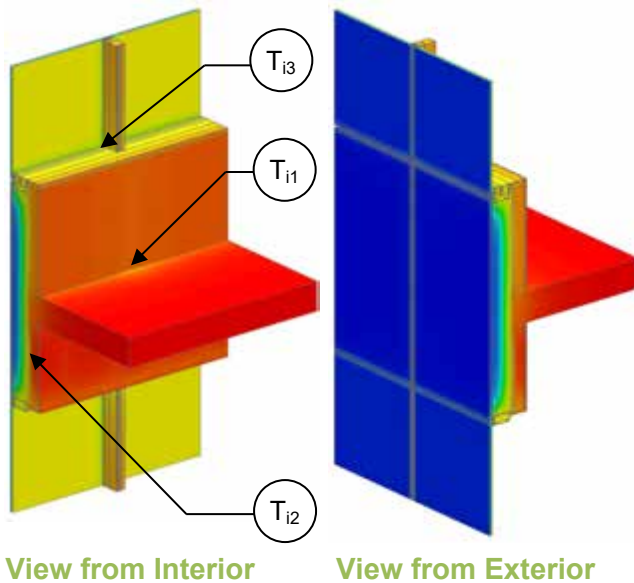
$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.3 (1.12)	0.158 (0.90)
R-7.7 (1.35)	0.130 (0.74)

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Spandrel 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.371 (2.11)

#### Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 Slab<sup>2</sup>

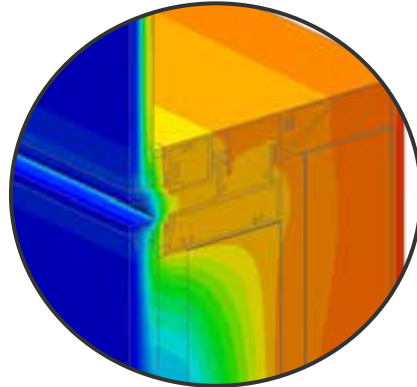
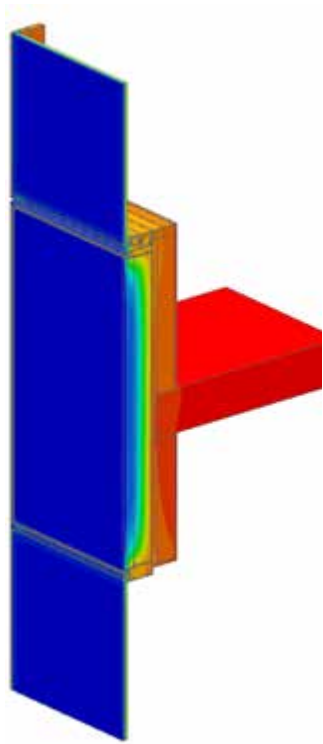
$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-7.2 (1.27)	0.138 (0.79)
R-8.6 (1.51)	0.117 (0.66)

### 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

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

View from Exterior

### Scenarios

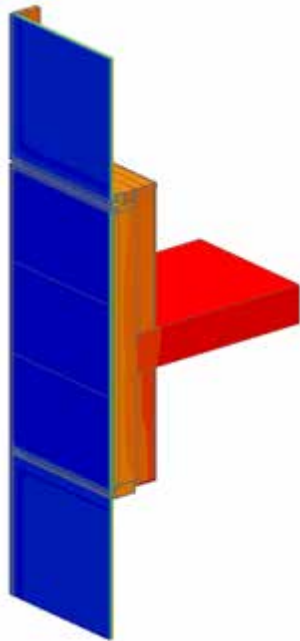
Scenario	Vision Glass and Spacer	Insulation Thickness and Application
A	Double Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan
B	Double Glazed with Silicone Warm Edge Spacer	4" (100 mm) Mineral Wool in Backpan

### Nominal (1D) vs. Assembly Performance Indicators

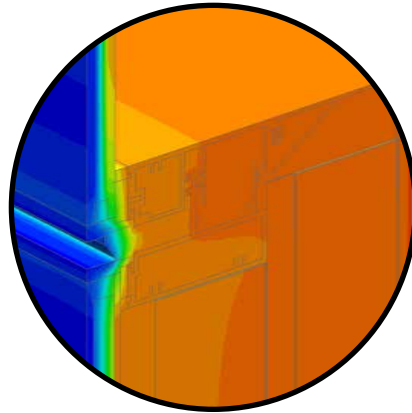
Scenario	Insulation R-Value (RSI)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)
A	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)
B	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

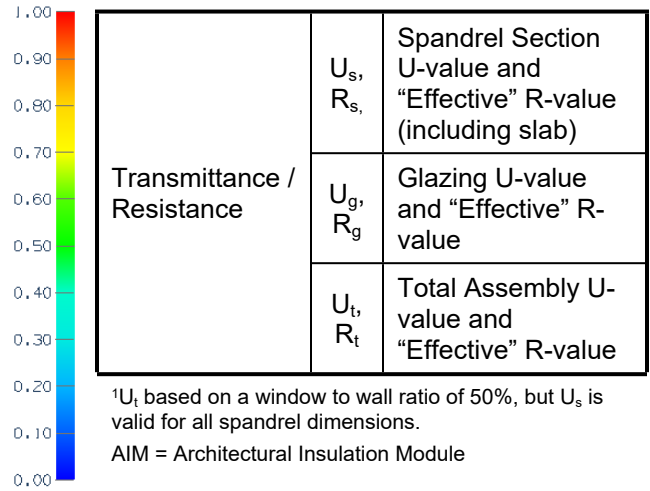


View from Exterior



Mullion Detail

### Thermal Performance Indicators



### Scenarios

Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
A	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
B	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
C	Double Glazed with Silicone Warm Edge Spacer	1" (25 mm) AIM between Metal Skins	Rigid Insulation

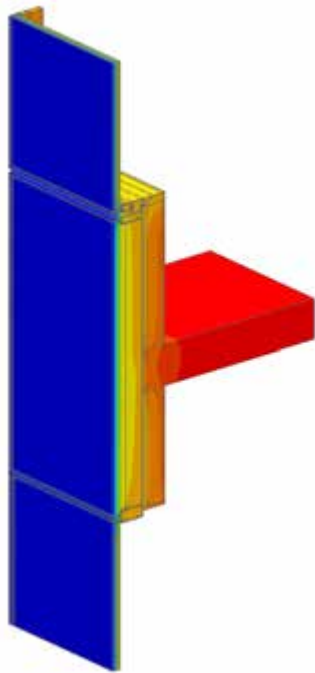
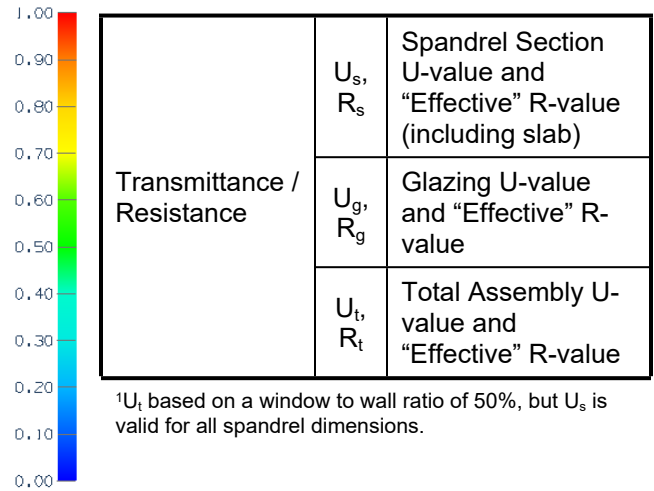
### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)
A	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)
B	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)
C	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)

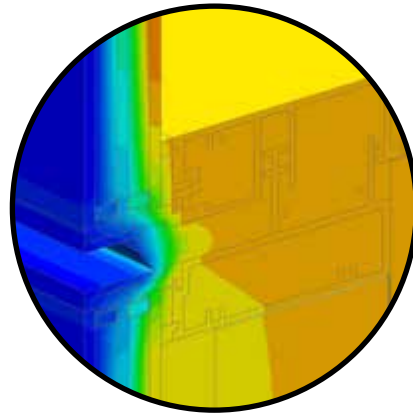
# Detail 3.2.5

## 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

### Thermal Performance Indicators



View from Exterior



Mullion Detail

### Scenario

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

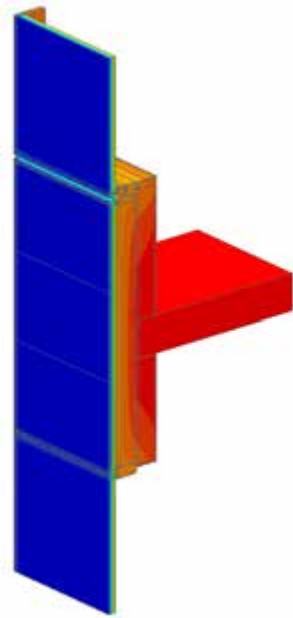
### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)
A	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)

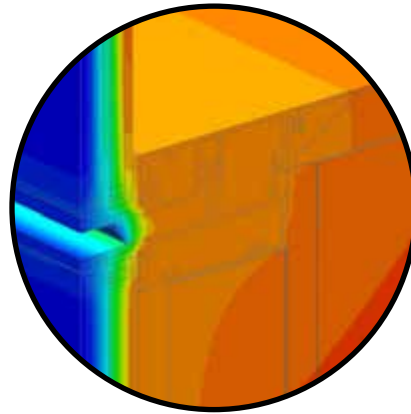
# Detail 3.2.6

## 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

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

AIM = Architectural Insulation Module

### Scenarios

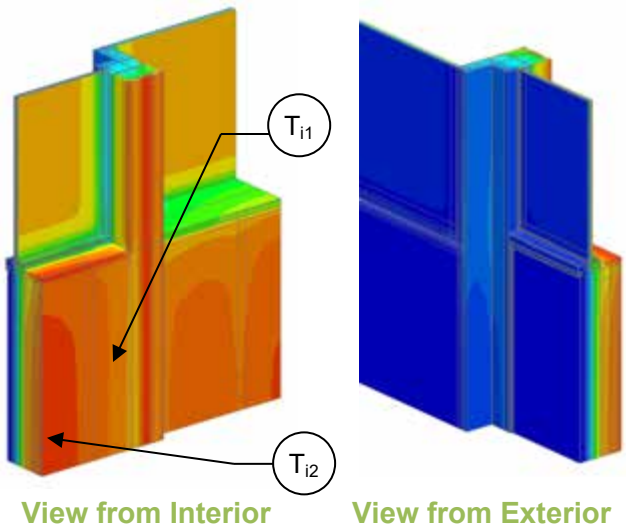
Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
A	Triple Glazed with Silicone Warm Edge Spacer	1.5" (38 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer
B	Triple Glazed with Silicone Warm Edge Spacer	Shadow AIM with 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 <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)
A	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)
B	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of transition joint

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_{cw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{cw}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.373 (2.12)

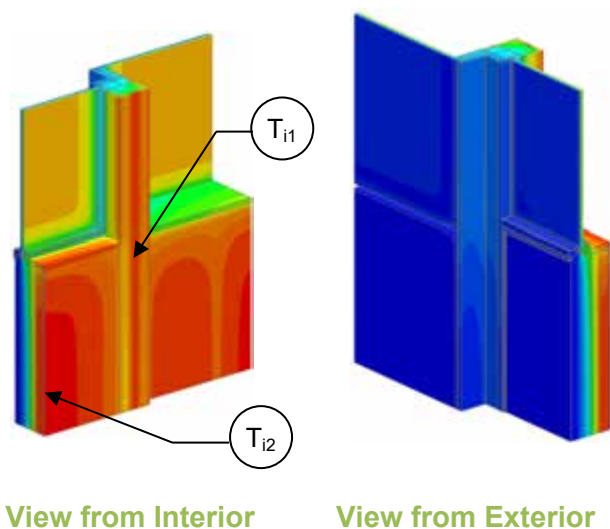
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of transition joint

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_{cw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{cw}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.373 (2.12)

### Temperature Indices

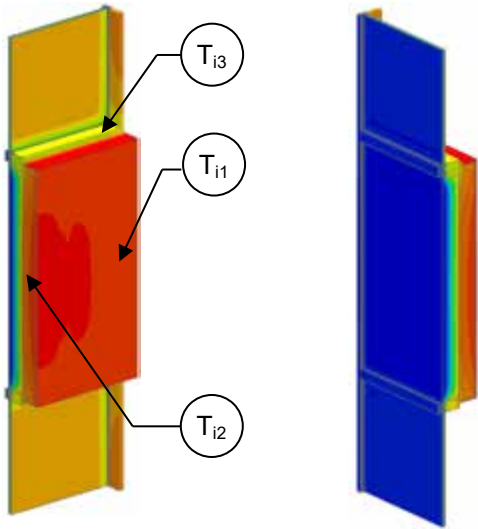
	R8.4	R16.8	
$T_{i1}$	0.90	0.91	Min T on sprayfoam, along vertical mullion
$T_{i2}$	0.91	0.92	Max T on sprayfoam, at centre of backpan

## 4.0 High Performance Curtain Wall

<b>Detail 4.1.1</b> .....	<b>B.4.1</b>
High Performance Curtain Wall System – Spandrel Clear Wall & No Interior Stud Cavity Insulation	
<b>Detail 4.1.2</b> .....	<b>B.4.2</b>
High Performance Curtain Wall System – Spandrel Clear Wall & Interior Sprayfoam Insulation	
<b>Detail 4.2.1</b> .....	<b>B.4.3</b>
High Performance Curtain Wall System – Intermediate Floor Intersection & No Interior Stud Cavity Insulation	
<b>Detail 4.2.2</b> .....	<b>B.4.4</b>
High Performance Curtain Wall System – Intermediate Floor Intersection & Interior Sprayfoam Insulation	
<b>Detail 4.2.3</b> .....	<b>B.4.5</b>
High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – Insulated Backpan and Intermediate Floor Intersection	
<b>Detail 4.2.4</b> .....	<b>B.4.6</b>
High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates and 5' x 5' Spandrel Section – AIM Applications and Intermediate Floor Intersection	
<b>Detail 4.2.5</b> .....	<b>B.4.7</b>
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	
<b>Detail 4.2.6</b> .....	<b>B.4.8</b>
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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.373 (2.12)

#### Combined Assembly

Backpan Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

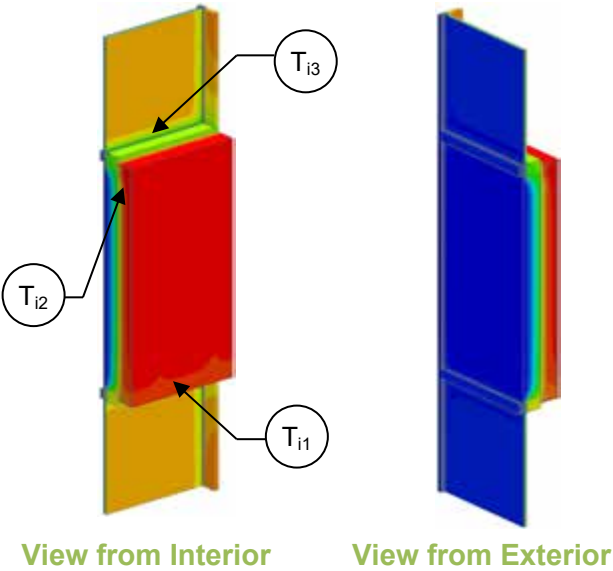
### Temperature Indices

	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><math>R_{1D}</math></td> <td>R-15.7 (2.77 RSI) + backpan insulation</td> </tr> <tr> <td>Transmittance / Resistance</td> <td><math>U_w</math>, <math>R_w</math>, <math>U_g</math></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 Index<sup>1</sup></td> <td><math>T_i</math></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 <sup>1</sup>	$T_i$	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 <sup>1</sup>	$T_i$	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													

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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

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

#### Combined Assembly

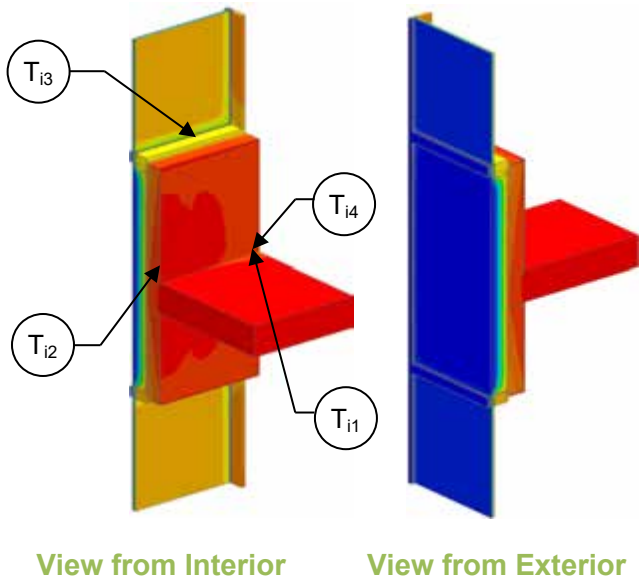
Backpan Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-3.8 (0.67)	0.264 (1.50)
R-16.8 (2.96)	R-4.2 (0.73)	0.24 (1.36)

### 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

1.00	Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.7 (0.65 RSI) + backpan insulation
0.90	Transmittance / Resistance without Anomaly	$U_w, R_w, U_g$	“clear wall” U- and R-value, w = spandrel wall without slab, g = glazing
0.80	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
0.70	Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature, 1 = interior temperature
0.60	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab
0.50			
0.40			
0.30			
0.20			
0.10			
0.00			

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Spandrel 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.373 (2.12)

#### Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 Slab<sup>2</sup>

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

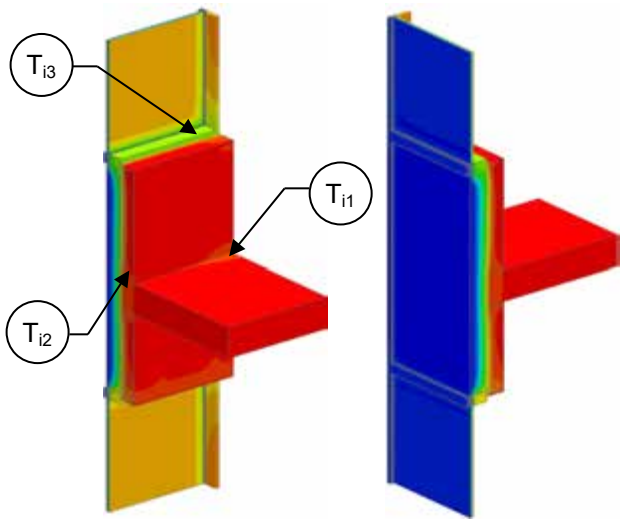
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Spandrel 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.367 (2.08)

#### Slab Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 Slab<sup>2</sup>

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

### Temperature Indices

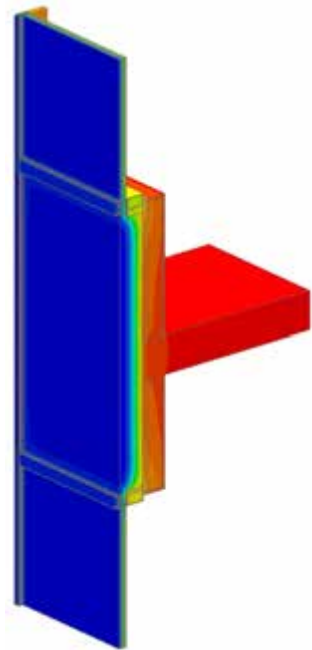
	R8.4	R16.8	
$T_{i1}$	0.68	0.77	Min T on spray foam, around slab anchor
$T_{i2}$	0.95	0.96	Max T on spray foam, at top of spandrel, away from frame and studs
$T_{i3}$	0.45	0.51	Min T on frame, along edge of glazing



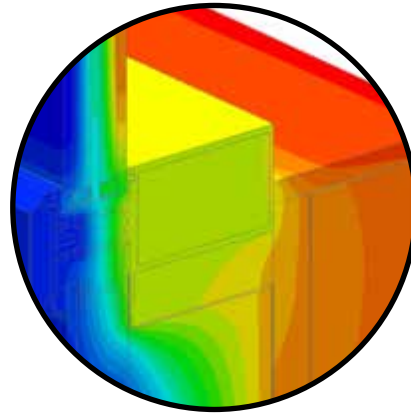
## Detail 4.2.3

### 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

<sup>1</sup> $U_t$  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
A	Triple Glazed with Aluminum Spacer	4" (100 mm) Mineral Wool in Backpan

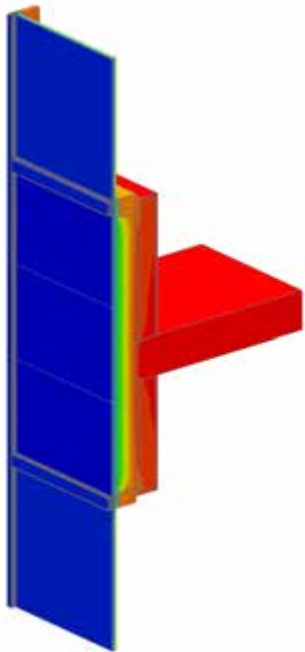
#### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Insulation R-Value (RSI)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)
A	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)

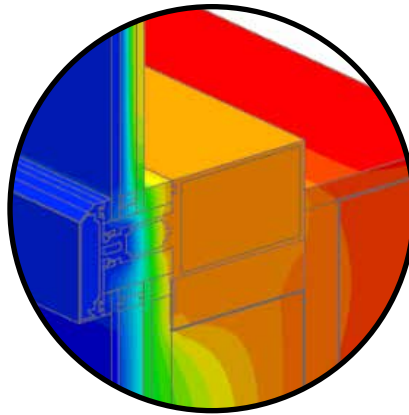


# Detail 4.2.4

## 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

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

AIM = Architectural Insulation Module

### Scenarios

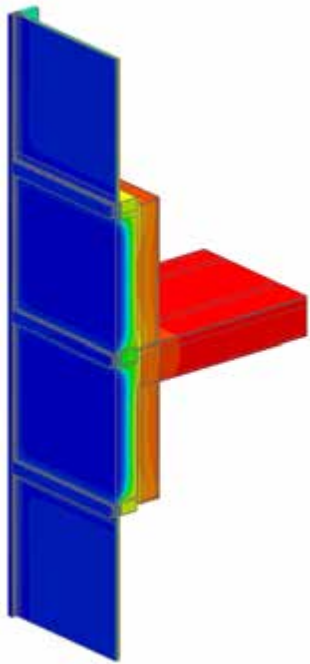
Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
A	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer
B	Double Glazed with Silicone Warm Edge Spacer	1.5" (38 mm) AIM between Glass + 4" (100 mm) Mineral Wool in Backpan	Silicone Warm Edge Spacer
C	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
D	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

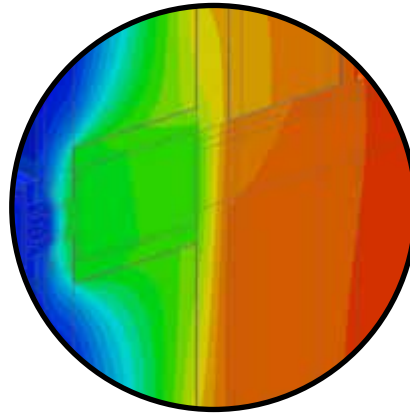
Scenario	Insulation R-Value (RSI)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)
A	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)
B	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)
C	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)
D	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



#### Thermal Performance Indicators



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

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

View from Exterior

#### Scenario

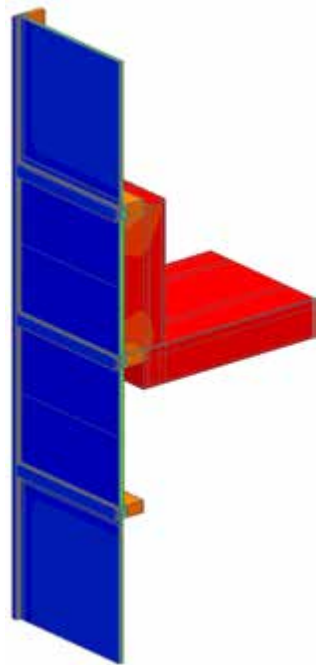
Scenario	Vision Glass and Spacer	Insulation Thickness and Application
A	Double Glazed with Silicone Warm Edge Spacer	4" (100 mm) Mineral Wool in Backpan

#### Nominal (1D) vs. Assembly Performance Indicators

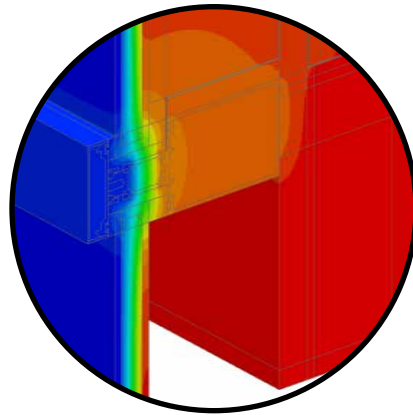
Scenario	Insulation R-Value (RSI)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ <sup>1</sup> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)
A	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

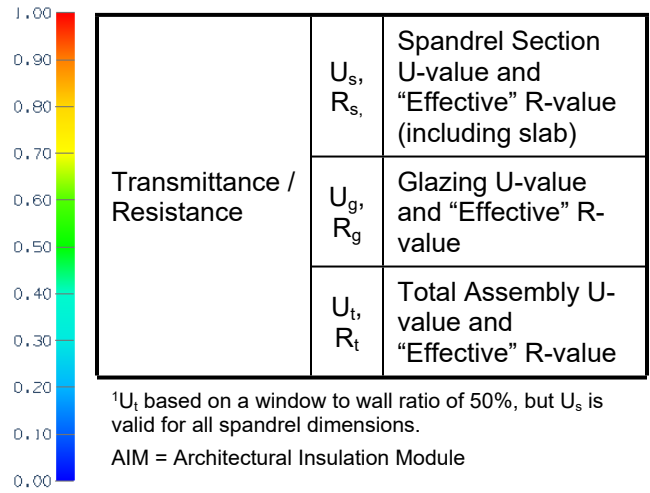


View from Exterior



Mullion Detail

### Thermal Performance Indicators



### Scenarios

Scenario	Vision Glass and Spacer	Insulation Thickness and Application	AIM Spacer/Edge Condition
A	Double Glazed with Silicone Warm Edge Spacer	0.75" (19 mm) AIM between Glass	Silicone Warm Edge Spacer
B	Double Glazed with Silicone Warm Edge Spacer	1" (25mm) AIM between Metal Skins	Rigid Insulation
C	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 <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t^1$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)
A	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)
B	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)
C	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-Frame Construction

<b>Detail 5.1.1</b> .....	<b>B.5.1</b>
Interior Insulated 3 5/8" x 1 5/8" Steel Stud Wall Assembly – Clear Wall	
<b>Detail 5.1.2</b> .....	<b>B.5.2</b>
Interior Insulated 6" x 1 5/8" Steel Stud Wall Assembly – Clear Wall	
<b>Detail 5.1.3</b> .....	<b>B.5.3</b>
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Clear Wall	
<b>Detail 5.1.4</b> .....	<b>B.5.4</b>
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly with R-12 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.5</b> .....	<b>B.5.5</b>
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	
<b>Detail 5.1.6</b> .....	<b>B.5.6</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-Girts (16" o.c.) Supporting Metal Cladding and R-20 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.7</b> .....	<b>B.5.7</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-Girts (16" o.c.) and 1 1/2" Spray Foam (R-9.8) in Stud Cavity – Clear Wall	
<b>Detail 5.1.8</b> .....	<b>B.5.8</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-Girts (16" o.c.) and 2" Spray Foam (R-11.4) in Stud Cavity – Clear Wall	
<b>Detail 5.1.9</b> .....	<b>B.5.9</b>
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	
<b>Detail 5.1.10</b> .....	<b>B.5.10</b>
Exterior and Interior Insulated 6" x 1 /58" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.11</b> .....	<b>B.5.11</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Plus 110 Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.12</b> .....	<b>B.5.12</b>

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier 45 Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.13</b> .....	<b>B.5.13</b>
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 and R-12 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.14</b> .....	<b>B.5.14</b>
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 and R-12 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.15</b> .....	<b>B.5.15</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) and 1 1/2" Spray Foam (R-9.8) in Stud Cavity – Clear Wall	
<b>Detail 5.1.16</b> .....	<b>B.5.16</b>
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	
<b>Detail 5.1.17</b> .....	<b>B.5.17</b>
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	
<b>Detail 5.1.18</b> .....	<b>B.5.18</b>
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	
<b>Detail 5.1.19</b> .....	<b>B.5.19</b>
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 and R-12 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.20</b> .....	<b>B.5.20</b>
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 and R-12 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.21</b> .....	<b>B.5.21</b>
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	
<b>Detail 5.1.22</b> .....	<b>B.5.22</b>
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 and R-19 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.23</b> .....	<b>B.5.23</b>

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	
<b>Detail 5.1.24</b> .....	<b>B.5.24</b>
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	
<b>Detail 5.1.25</b> .....	<b>B.5.25</b>
Exterior Insulated 3 5/8" x 1/58" Steel Stud (16" o.c.) Wall Assembly with Fiber Reinforced Girts (TAC) Supporting Cladding – Clear Wall	
<b>Detail 5.1.26</b> .....	<b>B.5.26</b>
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	
<b>Detail 5.1.27</b> .....	<b>B.5.27</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.28</b> .....	<b>B.5.28</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Plus 110 Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.29</b> .....	<b>B.5.29</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier 45 Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.30</b> .....	<b>B.5.30</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation and R-22 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.31</b> .....	<b>B.5.31</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Plus 110 Exterior Insulation and R-22 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.32</b> .....	<b>B.5.32</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier 45 Insulation and R-22 Batt Insulation in Stud Cavity – Clear Wall	

- Detail 5.1.33**.....**B.5.33**  
 Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation and R-24 Batt Insulation in Stud Cavity – Clear Wall
- Detail 5.1.34**.....**B.5.34**  
 Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Plus 110 Exterior Insulation and R-24 Batt Insulation in Stud Cavity – Clear Wall
- Detail 5.1.35**.....**B.5.35**  
 Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier 45 Insulation and R-24 Batt Insulation in Stud Cavity – Clear Wall
- Detail 5.1.36**.....**B.5.36**  
 Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (8" o.c.) and 1 1/2" Spray Foam (R-9.8) in Stud Cavity – Clear Wall
- Detail 5.1.37**.....**B.5.37**  
 Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (16" o.c.) and 1 1/2" Spray Foam (R-9.8) in Stud Cavity – Clear Wall
- Detail 5.1.38**.....**B.5.38**  
 Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (8" o.c.) – 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 R-TEC CI Bracket System Supporting Vertical Sub-girts – Clear Wall
- Detail 5.1.40**.....**B.5.40**  
 Exterior and Interior 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 and R-13 Batt Insulation in Stud Cavity – 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 Thermally Broken ISO Clip System Supporting Vertical Sub-girts – 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 Thermally Broken ISO Clip System Supporting Horizontal Sub-girts – Clear Wall
- Detail 5.1.43**.....**B.5.43**



Exterior and Interior 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 and R-12 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.44</b> .....	<b>B.5.44</b>
Exterior and Interior 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 and R-12 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.45</b> .....	<b>B.5.45</b>
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	
<b>Detail 5.1.46</b> .....	<b>B.5.46</b>
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	
<b>Detail 5.1.47</b> .....	<b>B.5.47</b>
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	
<b>Detail 5.1.48</b> .....	<b>B.5.48</b>
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 and R-12 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.49</b> .....	<b>B.5.49</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding and R-19 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.50</b> .....	<b>B.5.50</b>
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 and R-19 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.51</b> .....	<b>B.5.51</b>
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 and R-13 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.52</b> .....	<b>B.5.52</b>
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 and R-13 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.53</b> .....	<b>B.5.53</b>
Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Cascadia Clip Fiberglass Thermal Spacers – Clear Wall	
<b>Detail 5.1.54</b> .....	<b>B.5.54</b>

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" o.c. and 36" o.c.) Supporting Cladding and Owens Corning R-20 Batt Insulation in Stud Cavity – Clear Wall	
<b>Detail 5.1.55</b> .....	<b>B.5.55</b>
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Insulation in Stud Cavity – Uninsulated Intermediate Floor Intersection with Uninsulated Curb

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**Metal Cladding – Double Glazed Aluminum Window and Intermediate Floor Intersection**

**Detail 5.3.15.....B.5.202**

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-20 Batt in Stud Cavity – Double Glazed Aluminum Window and Intermediate Floor Intersection

**Detail 5.3.16.....B.5.203**

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-22.5 Batt in Stud Cavity – Double Glazed Aluminum Window and Intermediate Floor Intersection

**Detail 5.3.17.....B.5.204**

Owens Corning Exterior Insulated 6" x 1 5/8" 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 and Intermediate Floor Intersection

**Detail 5.3.18.....B.5.205**

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-20 Batt in Stud Cavity – Triple Glazed Aluminum Window and Intermediate Floor Intersection

**Detail 5.3.19.....B.5.206**

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-22.5 Batt in Stud Cavity – Triple Glazed Aluminum Window and Intermediate Floor Intersection

**Detail 5.3.20.....B.5.207**

Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP and Thermally Broken Vertical Brackets and Rail System Supporting Metal Cladding – Triple Glazed Vinyl Window and Intermediate Floor Intersection

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

**Detail 5.3.22.....B.5.209**

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

**Detail 5.3.23.....B.5.210**



Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP and Thermally Broken Vertical Brackets and Rail System Supporting Metal Cladding with Aerogel Insulation Blanket and R-19 Batt in Stud Cavity– Triple Glazed Vinyl Window and Intermediate Floor Intersection	
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Cladding and Owens Corning R-22.5 Batt in Stud Cavity – Concrete Parapet and Roof Intersection

**Detail 5.5.15.....B.5.231**

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-24 Batt in Stud Cavity – Concrete Parapet and Roof Intersection

**Detail 5.5.16.....B.5.232**

Owens Corning Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet

**Detail 5.5.17.....B.5.233**

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-20 Batt in Stud Cavity – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet

**Detail 5.5.18.....B.5.234**

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-22.5 Batt in Stud Cavity – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet

**Detail 5.5.19.....B.5.235**

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-24 Batt in Stud Cavity – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet

**Detail 5.5.20.....B.5.236**

Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System Supporting Metal Cladding – Concrete Roof Deck at Isokorb AXT Thermally Broken Concrete Parapet

**Detail 5.5.21.....B.5.237**

Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System Supporting Metal Cladding and R-19 Batt in Stud Cavity – Concrete Roof Deck at Isokorb AXT Thermally Broken Concrete Parapet

**Detail 5.5.22.....B.5.238**

Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Concrete Parapet and Roof Intersection

**Detail 5.5.23.....B.5.239**

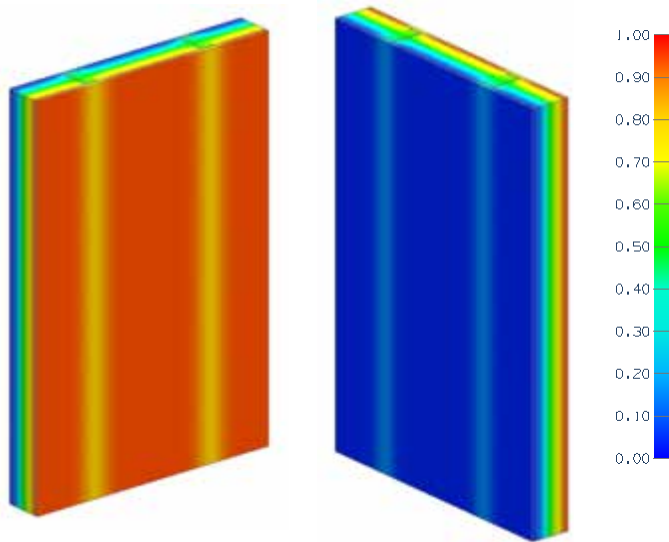
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and R-20 Batt in Stud Cavity – Concrete Parapet and Roof Intersection	
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Exterior 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 and R-12 Batt Insulation in Stud Cavity – Structural Steel Floor Intersection with Isokorb KST System Thermally Broken Beam	
<b>Detail 5.8.1</b> .....	<b>B.5.263</b>
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 and R-12 Batt Insulation in Stud Cavity – Interior Wall Intersection	
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Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding – At-Grade Foundation Wall Intersection	
<b>Detail 5.8.3</b> .....	<b>B.5.265</b>
Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding and R19 Batt Insulation in Stud Cavity – At-Grade Foundation Wall Intersection	

# Detail 5.1.1

## Interior Insulated 3 5/8" x 1 5/8" Steel Stud Wall Assembly – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

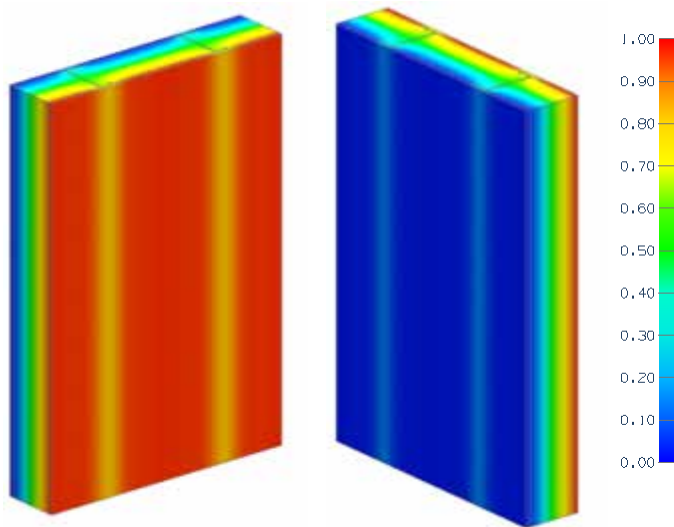
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.3 (0.40 RSI) + interior insulation or R-0.9 (0.16 RSI) for air in stud cavity
Transmittance / Resistance	$U_o, R_o$	“clear wall” U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Stud Spacing	Stud Cavity Insulation	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
16" o.c.	Air	R-3.2 (0.56)	R-3.1 (0.55)	0.321 (1.82)
	R-12 (2.11 RSI) Batt	R-14.3 (2.51)	R-9.2 (1.61)	0.109 (0.62)
	R-13 (2.29 RSI) Batt	R-15.3 (2.69)	R-9.5 (1.68)	0.105 (0.60)
24" o.c.	Air	R-3.2 (0.56)	R-3.1 (0.55)	0.318 (1.81)
	R-12 (2.11 RSI) Batt	R-14.3 (2.51)	R-10.4 (1.83)	0.096 (0.55)
	R-13 (2.29 RSI) Batt	R-15.3 (2.69)	R-10.9 (1.92)	0.092 (0.52)

## Detail 5.1.2

### Interior Insulated 6" x 1 5/8" Steel Stud Wall Assembly – Clear Wall



View from Interior

View from Exterior

#### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.3 (0.40 RSI) + interior insulation or R-0.9 (0.16 RSI) for air in stud cavity
Transmittance / Resistance	$U_o$ , $R_o$	“clear wall” U- and R-value

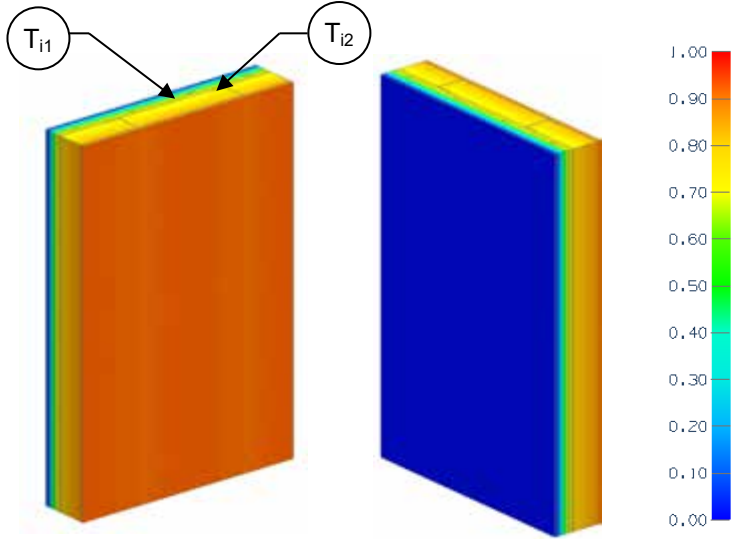
#### Nominal (1D) vs. Assembly Performance Indicators

Stud Spacing	Stud Cavity Insulation	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
16" o.c.	Air	R-3.2 (0.56)	R-3.1 (0.55)	0.320 (1.82)
	R-19 (3.35 RSI) Batt	R-21.3 (3.75)	R-11.4 (2.01)	0.088 (0.50)
	R-20 (3.52 RSI) Batt	R-22.3 (3.92)	R-11.6 (2.05)	0.086 (0.49)
	R-22 (3.87 RSI) Batt	R-24.3 (4.27)	R-12.1 (2.14)	0.082 (0.47)
	R-24 (4.22 RSI) Batt	R-26.3 (4.63)	R-12.6 (2.22)	0.079 (0.45)
24" o.c.	Air	R-3.2 (0.56)	R-3.1 (0.56)	0.318 (1.80)
	R-19 (3.35 RSI) Batt	R-21.3 (3.75)	R-13.5 (2.37)	0.074 (0.42)
	R-20 (3.52 RSI) Batt	R-22.3 (3.92)	R-13.8 (2.44)	0.072 (0.41)
	R-22 (3.87 RSI) Batt	R-24.3 (4.27)	R-14.5 (2.56)	0.069 (0.39)
	R-24 (4.22 RSI) Batt	R-26.3 (4.63)	R-15.2 (2.68)	0.066 (0.37)



# Detail 5.1.3

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

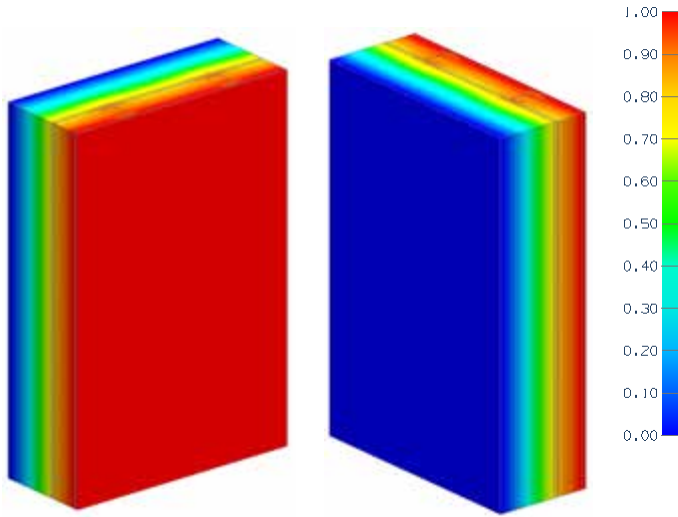
### Temperature Indices

	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 5.1.4

## Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly with R-12 Batt Insulation in Stud Cavity – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-13.8 (2.43 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"clear wall" U- and R-value

View from Interior

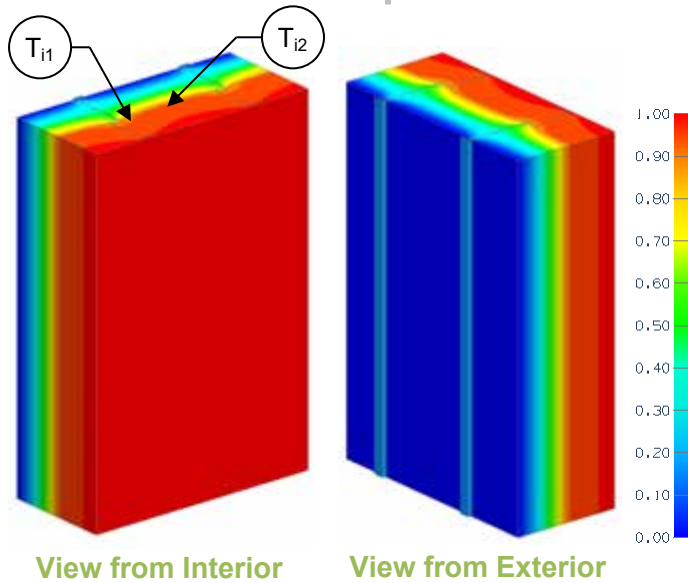
View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-7.5 (1.32)	R-21.3 (3.75)	R-16.6 (2.92)	0.060 (0.34)
R-11.3 (1.98)	R-25.0 (4.41)	R-20.3 (3.57)	0.049 (0.28)
R-15.0 (2.64)	R-28.8 (5.07)	R-24.0 (4.23)	0.042 (0.24)
R-18.8 (3.30)	R-32.5 (5.73)	R-27.8 (4.89)	0.036 (0.20)
R-22.5 (3.96)	R-36.3 (6.39)	R-31.5 (5.55)	0.032 (0.18)

# Detail 5.1.5

## 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) + insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	“clear field” U- and R-value, without connectors or joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

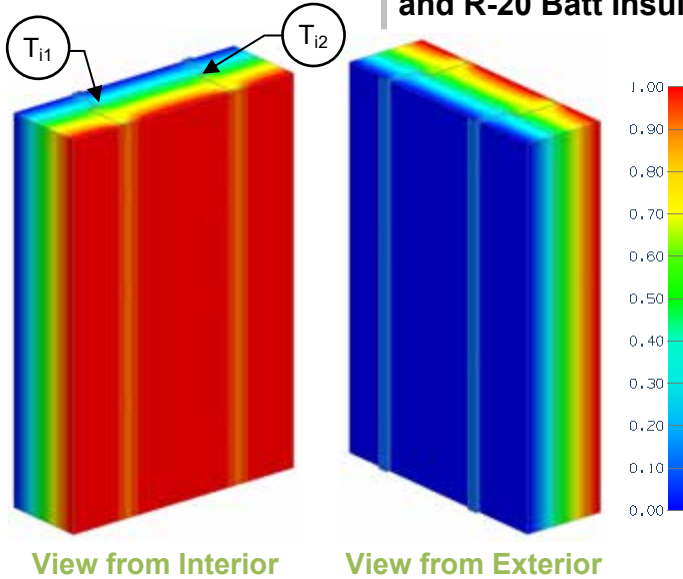
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-8.2 (1.44)	R-6.4 (1.12)	0.157 (0.89)
R-10.0 (1.76)	R-13.2 (2.32)	R-8.3 (1.47)	0.120 (0.68)
R-15.0 (2.64)	R-18.2 (3.20)	R-9.7 (1.70)	0.103 (0.59)
R-20.0 (3.52)	R-23.2 (4.08)	R-10.8 (1.91)	0.092 (0.52)
R-25.0 (4.40)	R-28.2 (4.96)	R-11.8 (2.08)	0.085 (0.48)
R-30.0 (5.28)	R-33.2 (5.85)	R-12.7 (2.23)	0.079 (0.45)
R-35.0 (6.16)	R-38.2 (6.73)	R-13.5 (2.38)	0.074 (0.42)
R-40.0 (7.04)	R-43.2 (7.61)	R-14.3 (2.52)	0.070 (0.40)

### Temperature Indices

	R5	R10	R15	R20	R25	R30	R35	R40	
$T_{i1}$	0.63	0.69	0.72	0.75	0.77	0.78	0.79	0.80	Min T on sheathing, along girts at stud intersection
$T_{i2}$	0.72	0.80	0.84	0.84	0.86	0.87	0.88	0.89	Max T on sheathing, centre of stud cavity

## Detail 5.1.6

### Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-Girts (16" o.c.) Supporting Metal Cladding and R-20 Batt Insulation in Stud Cavity – Clear Wall



#### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.93) + insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	"clear field" U- and R-value, without connectors or joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

#### Nominal (1D) vs. Assembly Performance Indicators

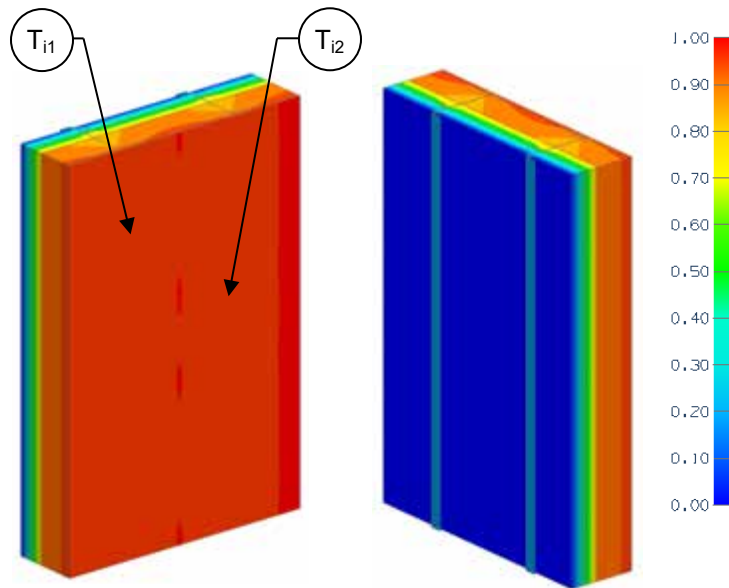
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-42.3 (7.45)	R-17.6 (3.11)	0.057 (0.32)
R-25.0 (4.40)	R-47.3 (8.33)	R-18.6 (3.27)	0.054 (0.31)
R-30.0 (5.28)	R-52.3 (9.21)	R-19.4 (3.42)	0.052 (0.29)

#### Temperature Indices

	R20	R25	R30	
$T_{i1}$	0.45	0.48	0.50	Min T on sheathing, beside studs
$T_{i2}$	0.52	0.54	0.56	Max T on sheathing, behind girts at stud intersection

## Detail 5.1.7

### Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-Girts (16" o.c.) and 1 1/2" Spray Foam (R-9.8) in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### View from Interior

#### View from Exterior

#### Nominal (1D) vs. Assembly Performance Indicators

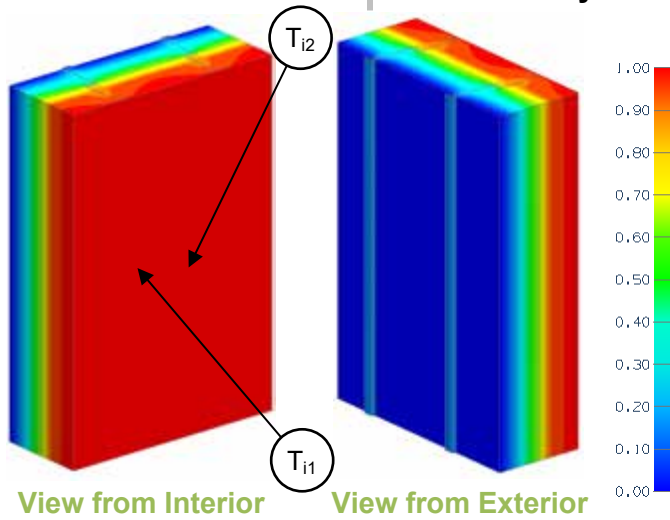
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-10.1 (1.78)	R-22.7 (4.00)	R-11.6 (2.04)	0.086 (0.42)

#### Temperature Indices

	R10	
$T_{i1}$	0.78	Min T on Spray Foam, beside studs
$T_{i2}$	0.81	Max T on Spray Foam, between studs

# Detail 5.1.8

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Vertical Z-Girts (16" o.c.) and 2" Spray Foam (R-11.4) in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-14.6 (2.57) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear field" U- and R-value, without connectors or joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

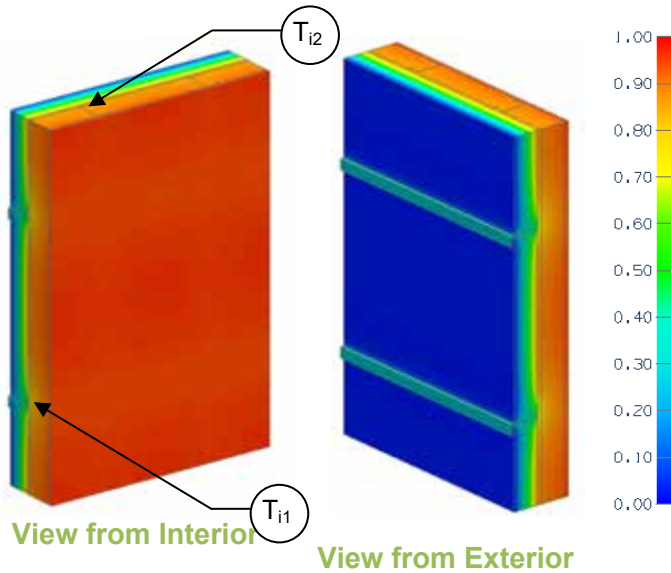
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-24.6 (4.33)	R-12.0 (2.11)	0.083 (0.47)
R-15.0 (2.64)	R-29.6 (5.21)	R-13.2 (2.32)	0.076 (0.43)
R-20.0 (3.52)	R-34.6 (6.09)	R-14.2 (2.50)	0.071 (0.40)
R-25.0 (4.40)	R-39.6 (6.97)	R-15.1 (2.66)	0.066 (0.38)
R-30.0 (5.28)	R-44.6 (7.85)	R-15.9 (2.80)	0.063 (0.36)

### Temperature Indices

	R10	R15	R20	R25	R30	
$T_{i1}$	0.79	0.81	0.82	0.83	0.84	Min T on Spray Foam, beside studs
$T_{i2}$	0.88	0.90	0.90	0.91	0.92	Max T on Spray Foam, between studs

# Detail 5.1.9

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

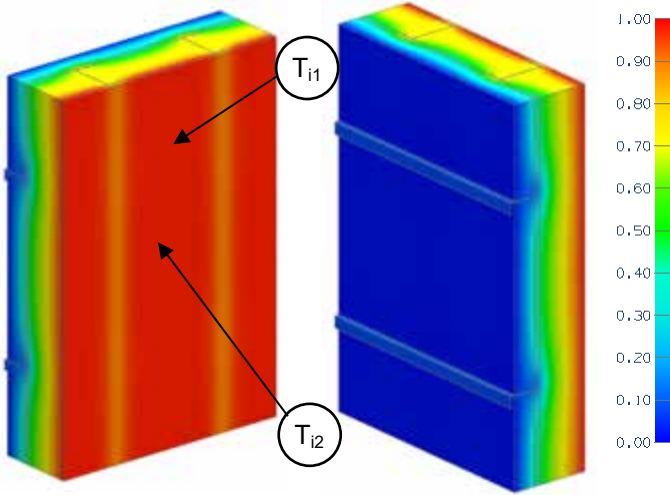
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

# Detail 5.1.10

## Exterior and Interior Insulated 6" x 1/58" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.5 (3.96 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-4.0 (0.70)	R-26.5 (4.67)	R-15.9 (2.80)	0.063 (0.357)
R-8.0 (1.41)	R-30.5 (5.37)	R-18.4 (3.24)	0.054 (0.308)
R-12.0 (2.11)	R-34.5 (6.08)	R-20.9 (3.68)	0.048 (0.272)
R-16.0 (2.82)	R-38.5 (6.78)	R-22.7 (4.00)	0.044 (0.250)
R-20.0 (3.52)	R-42.5 (7.48)	R-24.5 (4.31)	0.041 (0.232)
R-24.0 (4.23)	R-46.5 (8.19)	R-26.0 (4.58)	0.038 (0.218)

### Temperature Indices

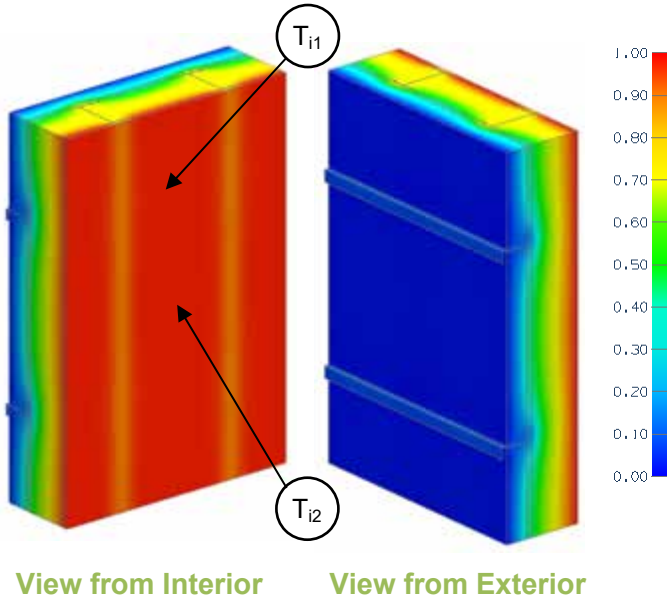
	R4	R12	R20	R24	
$T_{i1}$	0.14	0.23	0.29	0.31	Min T on sheathing, along girts between studs
$T_{i2}$	0.22	0.43	0.57	0.57	Max T on sheathing, between studs and girt

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.



# Detail 5.1.11

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Plus 110 Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.5 (3.96 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-4.1 (0.72)	R-26.6 (4.68)	R-16.0 (2.82)	0.063 (0.355)
R-8.2 (1.44)	R-30.7 (5.41)	R-18.5 (3.26)	0.054 (0.306)
R-12.3 (2.17)	R-34.8 (6.13)	R-21.1 (3.71)	0.047 (0.270)
R-16.4 (2.89)	R-38.9 (6.85)	R-22.9 (4.03)	0.044 (0.248)
R-20.5 (3.61)	R-43.0 (7.57)	R-24.7 (4.35)	0.041 (0.230)
R-24.6 (4.33)	R-47.1 (8.29)	R-26.2 (4.62)	0.038 (0.217)

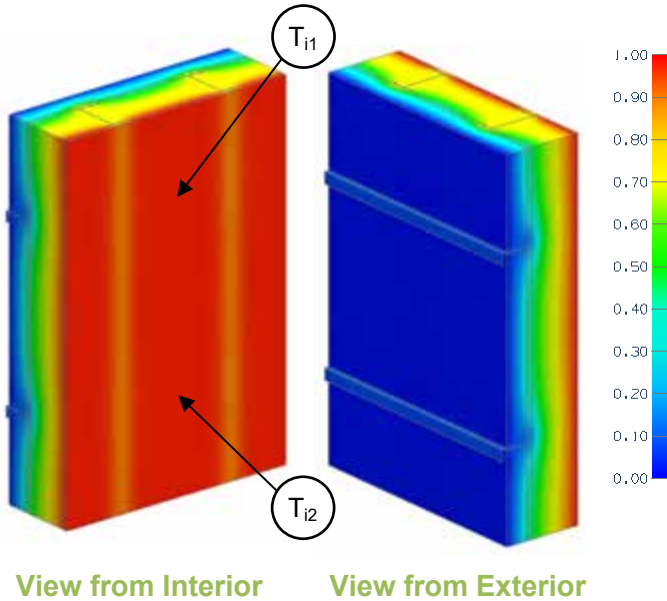
### Temperature Indices

	R4.1	R12.3	R20.5	R24.6	
$T_{i1}$	0.14	0.23	0.29	0.31	Min T on sheathing, along girts between studs
$T_{i2}$	0.23	0.43	0.58	0.58	Max T on sheathing, between studs and girt

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.12

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier 45 Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.5 (3.96 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-26.7 (4.70)	R-16.1 (2.83)	0.062 (0.353)
R-8.4 (1.48)	R-30.9 (5.44)	R-18.6 (3.28)	0.054 (0.304)
R-12.6 (2.22)	R-35.1 (6.18)	R-21.2 (3.74)	0.047 (0.268)
R-16.8 (2.96)	R-39.3 (6.92)	R-23.1 (4.06)	0.043 (0.246)
R-21.0 (3.70)	R-43.5 (7.66)	R-24.9 (4.38)	0.040 (0.228)
R-25.2 (4.44)	R-47.7 (8.40)	R-26.4 (4.66)	0.038 (0.215)

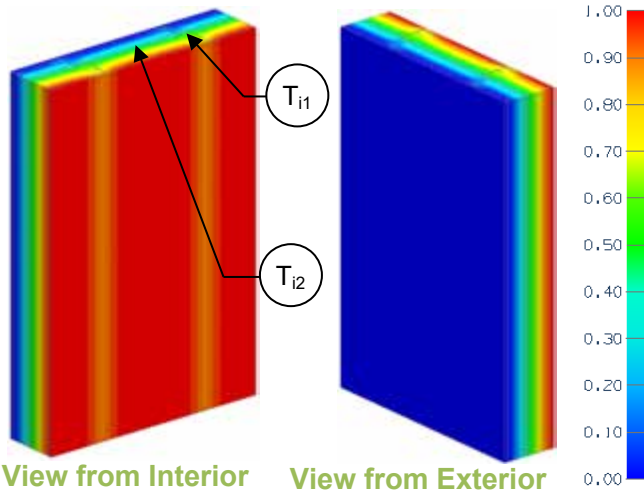
### Temperature Indices

	R4.2	R12.6	R21.0	R25.2	
$T_{i1}$	0.14	0.23	0.29	0.31	Min T on sheathing, along girts between studs
$T_{i2}$	0.23	0.44	0.55	0.58	Max T on sheathing, between studs and girt

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# 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-girts (16" o.c.) Supporting Stucco Cladding and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

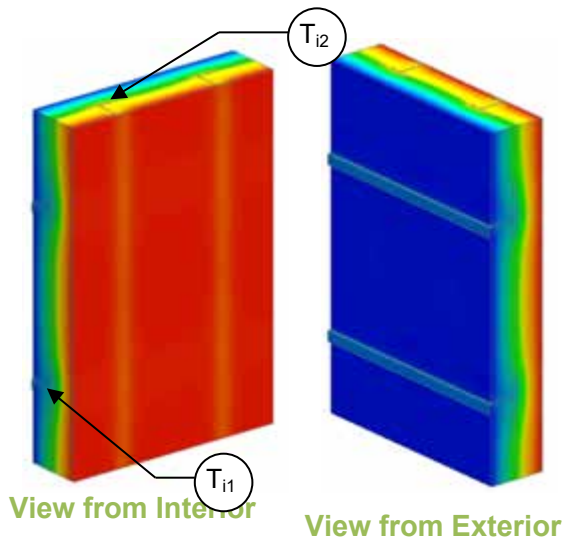
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-24.5 (4.31)	R-13.0 (2.29)	0.077 (0.44)
R-15 (2.64)	R-29.5 (5.20)	R-14.1 (2.49)	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 5.1.14

## 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

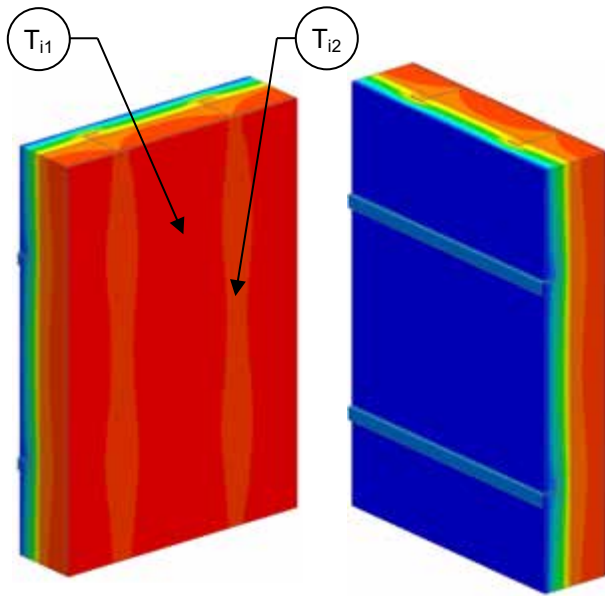
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-0 (0)	R-14.2 (2.50)	R-9.2 (1.62)	0.109 (0.62)
R-5 (0.88)	R-19.2 (3.38)	R-13.4 (2.36)	0.075 (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 5.1.15

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) and 1 1/2" Spray Foam (R-9.8) in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

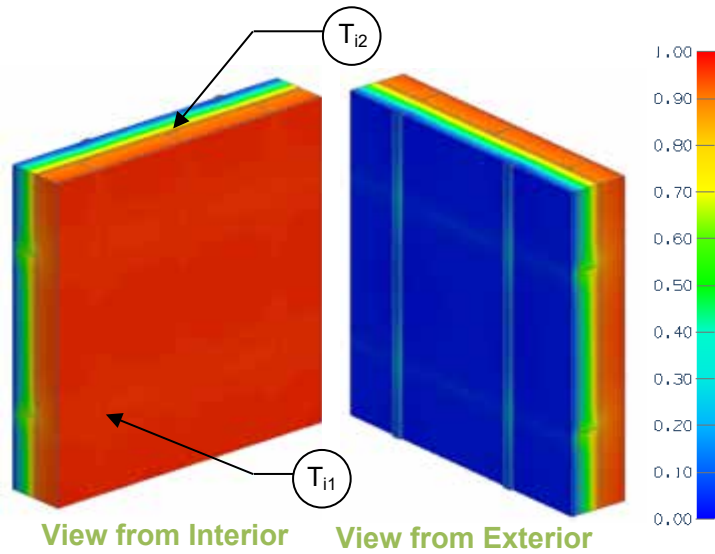
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.1 (1.78)	R-22.7 (4.00)	R-15.2 (2.68)	0.066 (0.37)

### Temperature Indices

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

# Detail 5.1.16

## 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



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

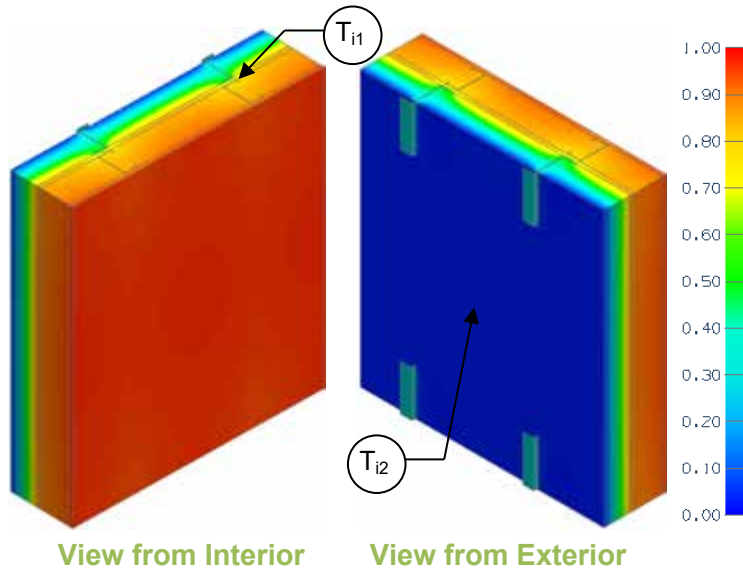
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (0.88)	R-13.2 (2.32)	R-10.4 (1.82)	0.097 (0.55)
R-15 (1.76)	R-18.2 (3.20)	R-13.1 (2.31)	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 5.1.17

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

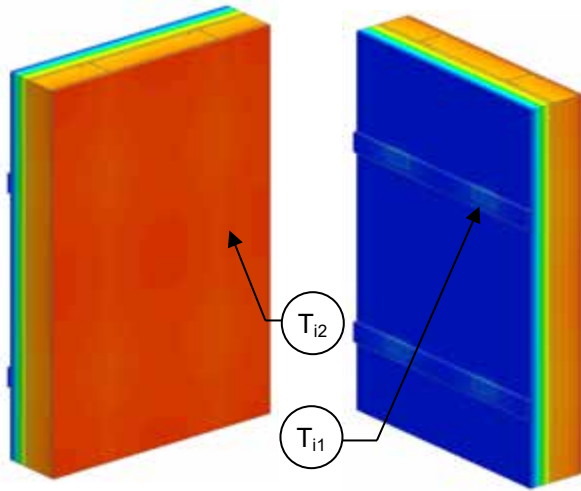
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	12" Vertical Spacing		24" Vertical Spacing		36" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.18

## 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



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
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

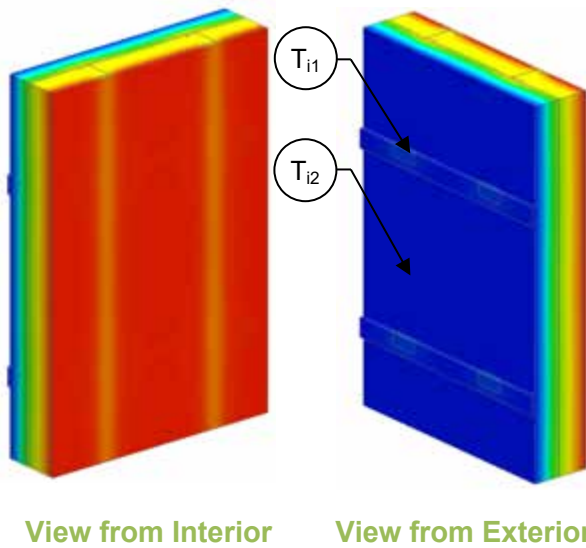
	R15	R20	R25	
$T_{i1}$	0.75	0.78	0.80	Min T on sheathing, along girts at stud and clip intersection
$T_{i2}$	0.88	0.90	0.91	Max T on sheathing at stud away from clip





# Detail 5.1.19

## 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

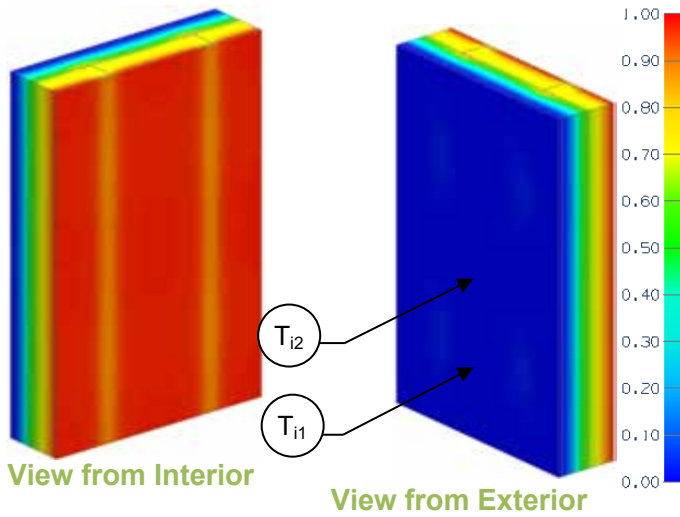
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-24.4 (4.30)	R-17.3 (3.04)	0.058 (0.33)
R-15 (2.64)	R-29.4 (5.18)	R-20.6 (3.62)	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 5.1.20

## 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

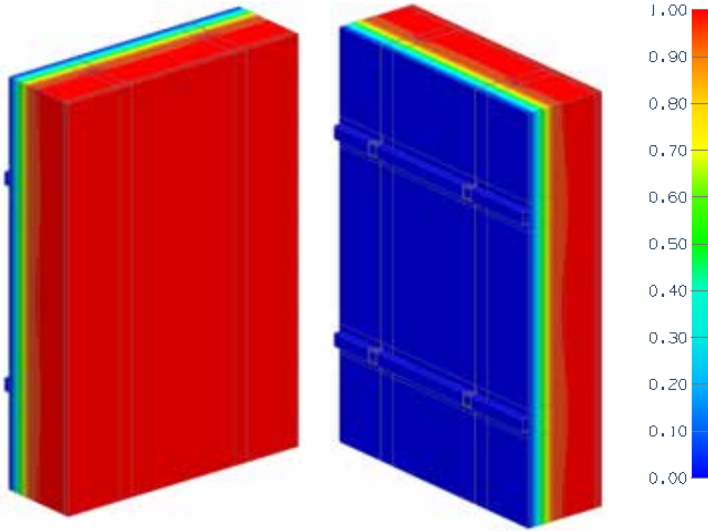
### Temperature Indices

	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 5.1.21

## 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



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

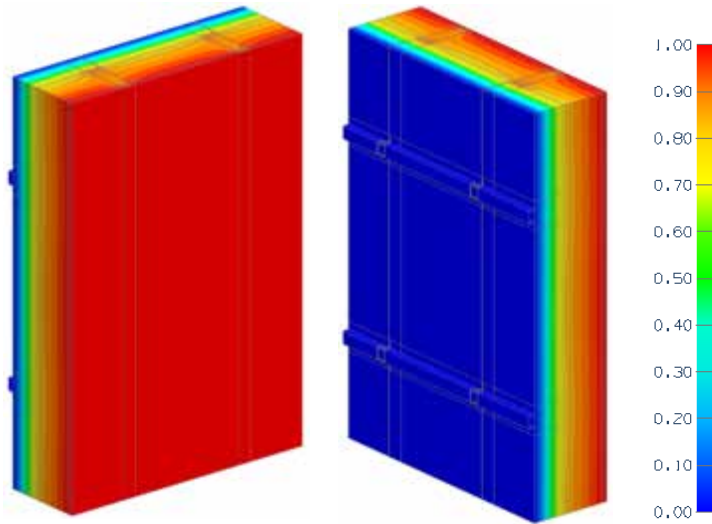
View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.22

## 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 and R-19 Batt Insulation in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

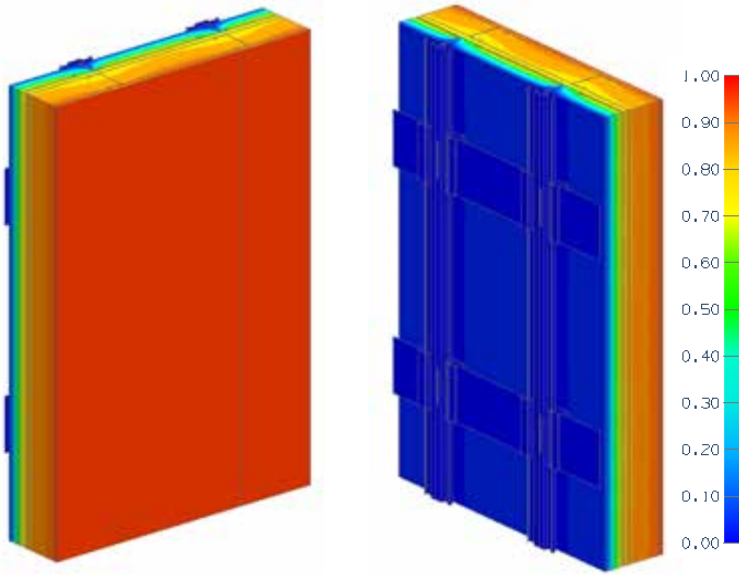
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.23

## 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



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

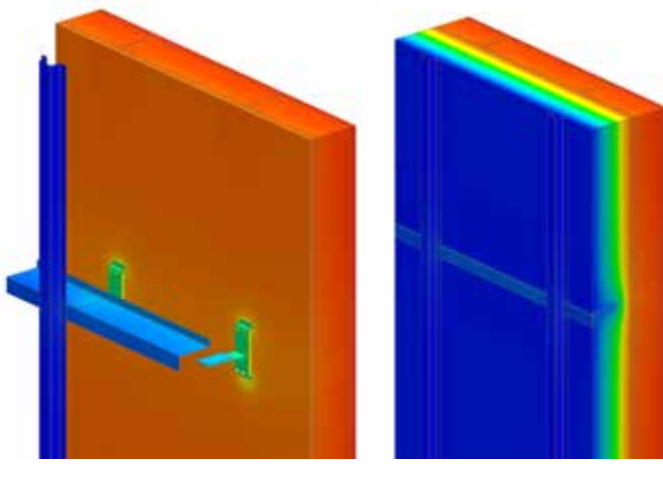
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.24

## 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 <sup>1</sup>
Transmittance / Resistance	$U_a$ , $R_a$ , $U_b$ , $R_b$	“Clear wall” U- and R-value: a = without batt insulation b = with batt insulation

<sup>1</sup>If 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	34" Vertical Clip Spacing		41" Vertical Clip Spacing		48" Vertical Clip Spacing	
			$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

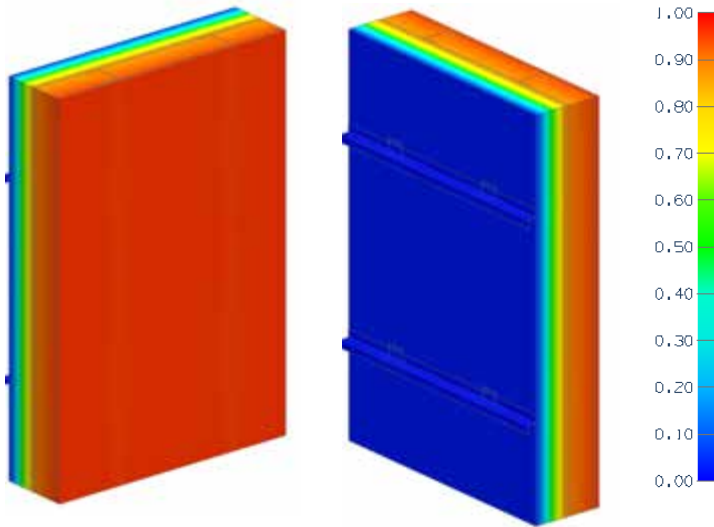
#### Clear Wall – Exterior and Interior Insulated Assembly

Clip System	Exterior Insulation 1D R-Value (RSI)	$R_{1Db}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	34" Vertical Clip Spacing		41" Vertical Clip Spacing		48" Vertical Clip Spacing	
			$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.25

## 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



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 <sup>1</sup>
Transmittance / Resistance	$U_a$ , $R_a$ , $U_b$ , $R_b$	“Clear wall” U- and R-value: a = without batt insulation b = with batt insulation

<sup>1</sup>If 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

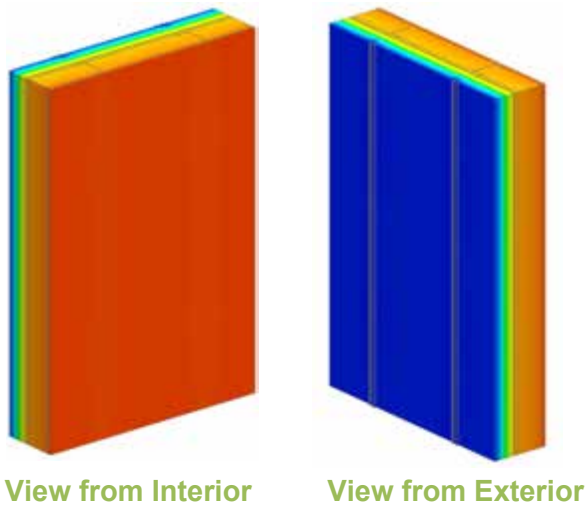
Exterior Insulation 1D R-Value (RSI)	$R_{1Da}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.26

## 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 <sup>1</sup>
Transmittance / Resistance	$U_a$ , $R_a$ , $U_b$ , $R_b$	"Clear wall" U- and R-value: a = without batt insulation b = with batt insulation

<sup>1</sup>If 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		30" Vertical Clip Spacing		36" Vertical Clip Spacing		42" Vertical Clip Spacing	
		$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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

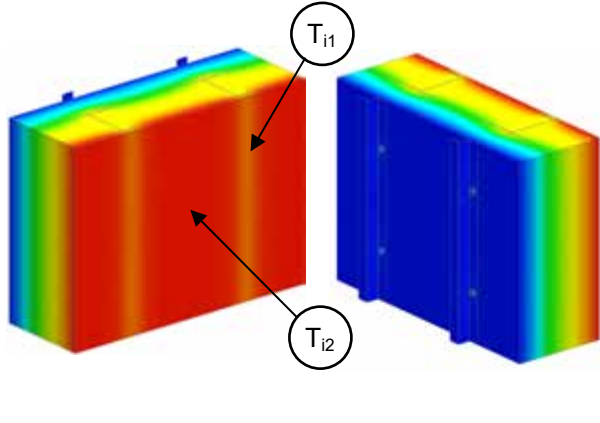
Exterior Insulation 1D R-Value (RSI)	$R_{1Db}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		30" Vertical Clip Spacing		36" Vertical Clip Spacing		42" Vertical Clip Spacing	
		$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.27

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall**

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.5 (3.96 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.0 (0.70)	R-26.5 (4.67)	R-15.5 (2.72)	0.065 (0.367)
R-8.0 (1.41)	R-30.5 (5.37)	R-18.5 (3.26)	0.054 (0.307)
R-12.0 (2.11)	R-34.5 (6.08)	R-21.6 (3.80)	0.046 (0.263)
R-16.0 (2.82)	R-38.5 (6.78)	R-24.4 (4.30)	0.041 (0.233)

### Temperature Indices

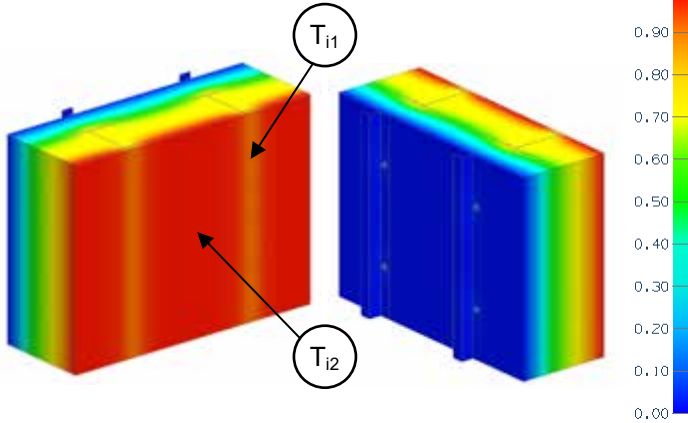
	R4	R12	R16	
$T_{i1}$	0.27	0.41	0.46	Min T on sheathing, at fastener along studs
$T_{i2}$	0.22	0.44	0.51	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.28

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Plus 110 Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.5 (3.96 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.1 (0.72)	R-26.6 (4.68)	R-15.5 (2.74)	0.064 (0.366)
R-8.2 (1.44)	R-30.7 (5.41)	R-18.6 (3.28)	0.054 (0.305)
R-12.3 (2.17)	R-34.8 (6.13)	R-21.8 (3.83)	0.046 (0.261)
R-16.4 (2.89)	R-38.9 (6.85)	R-24.7 (4.34)	0.041 (0.230)

### Temperature Indices

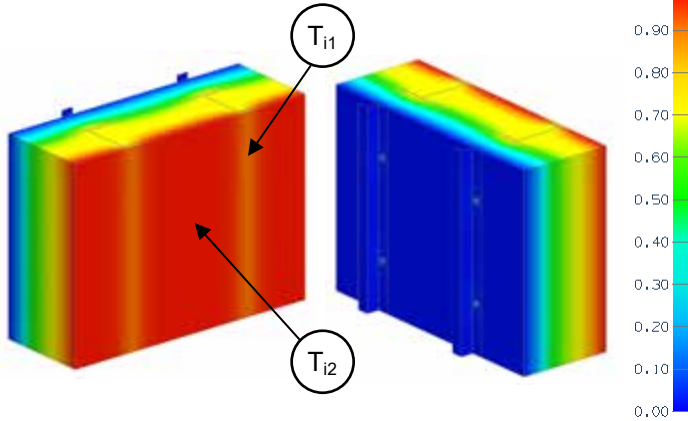
	R4.1	R12.3	R16.4	
$T_{i1}$	0.27	0.41	0.46	Min T on sheathing, at fastener along studs
$T_{i2}$	0.23	0.45	0.52	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.29

## Exterior and Interior Insulated 6" 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier 45 Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.5 (3.96 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-26.7 (4.70)	R-15.6 (2.75)	0.064 (0.363)
R-8.4 (1.48)	R-30.9 (5.44)	R-18.8 (3.31)	0.053 (0.302)
R-12.6 (2.22)	R-35.1 (6.18)	R-21.9 (3.86)	0.046 (0.259)
R-16.8 (2.96)	R-39.3 (6.92)	R-24.9 (4.39)	0.040 (0.228)

### Temperature Indices

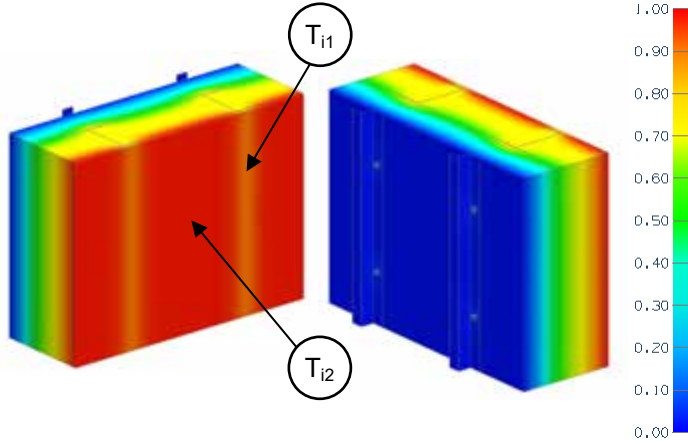
	R4.2	R12.6	R16.8	
$T_{i1}$	0.27	0.41	0.46	Min T on sheathing, at fastener along studs
$T_{i2}$	0.23	0.45	0.52	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.30

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation and R-22 Batt Insulation in Stud Cavity – Clear Wall**

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-24.5 (4.31 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.0 (0.70)	R-28.5 (5.02)	R-16.0 (2.81)	0.063 (0.355)
R-8.0 (1.41)	R-32.5 (5.72)	R-19.0 (3.35)	0.053 (0.299)
R-12.0 (2.11)	R-36.5 (6.43)	R-22.1 (3.89)	0.045 (0.257)
R-16.0 (2.82)	R-40.5 (7.13)	R-24.9 (4.39)	0.040 (0.228)

### Temperature Indices

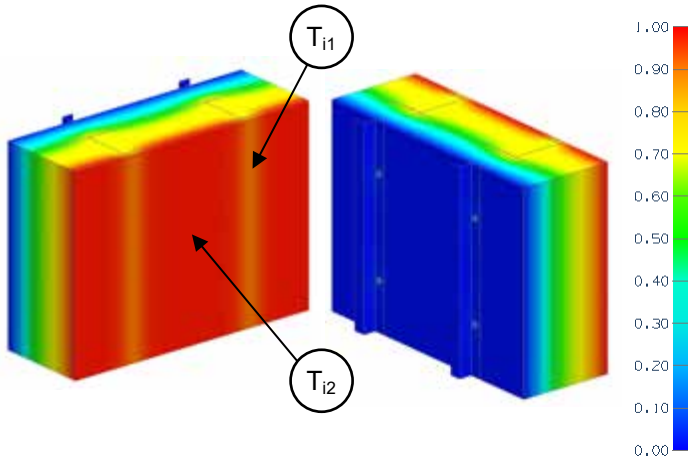
	R4	R12	R16	
$T_{i1}$	0.27	0.40	0.45	Min T on sheathing, at fastener along studs
$T_{i2}$	0.21	0.42	0.49	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.31

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Plus 110 Exterior Insulation and R-22 Batt Insulation in Stud Cavity – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-24.5 (4.31 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.1 (0.72)	R-28.6 (5.04)	R-16.1 (2.83)	0.062 (0.354)
R-8.2 (1.44)	R-32.7 (5.76)	R-19.2 (3.37)	0.052 (0.296)
R-12.3 (2.17)	R-36.8 (6.48)	R-22.3 (3.92)	0.045 (0.255)
R-16.4 (2.89)	R-40.9 (7.20)	R-25.2 (4.43)	0.040 (0.226)

### Temperature Indices

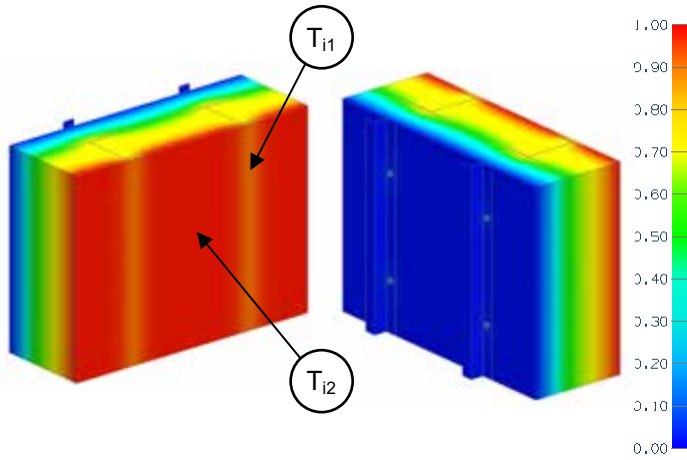
	R4.1	R12.3	R16.4	
$T_{i1}$	0.27	0.40	0.46	Min T on sheathing, at fastener along studs
$T_{i2}$	0.21	0.43	0.50	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.32

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier 45 Insulation and R-22 Batt Insulation in Stud Cavity – Clear Wall**

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-24.5 (4.31 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-28.7 (5.05)	R-16.1 (2.84)	0.062 (0.352)
R-8.4 (1.48)	R-32.9 (5.79)	R-19.3 (3.40)	0.052 (0.294)
R-12.6 (2.22)	R-37.1 (6.53)	R-22.5 (3.95)	0.045 (0.253)
R-16.8 (2.96)	R-41.3 (7.27)	R-25.4 (4.48)	0.039 (0.223)

### Temperature Indices

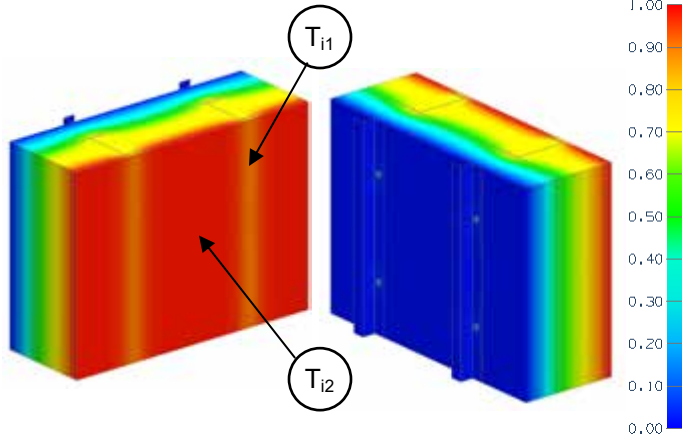
	R4.2	R12.6	R16.8	
$T_{i1}$	0.27	0.41	0.46	Min T on sheathing, at fastener along studs
$T_{i2}$	0.22	0.44	0.51	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.33

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation and R-24 Batt Insulation in Stud Cavity – Clear Wall**

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-26.4 (4.67 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.0 (0.70)	R-30.5 (5.37)	R-16.5 (2.90)	0.061 (0.345)
R-8.0 (1.41)	R-34.5 (6.08)	R-19.5 (3.43)	0.051 (0.291)
R-12.0 (2.11)	R-38.5 (6.78)	R-22.5 (3.97)	0.044 (0.252)
R-16.0 (2.82)	R-42.5 (7.48)	R-25.4 (4.47)	0.039 (0.224)

### Temperature Indices

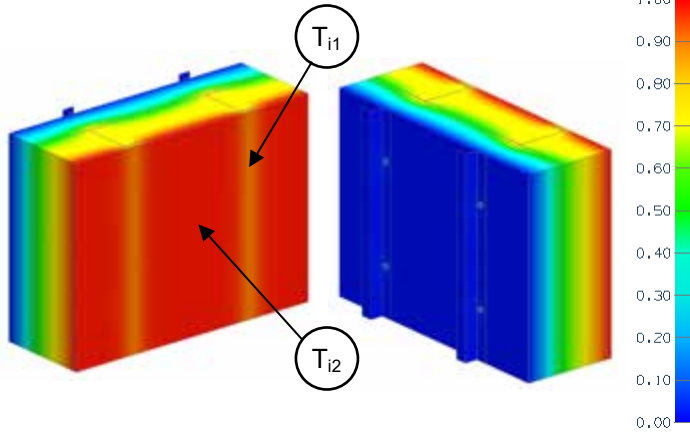
	R4	R12	R16	
$T_{i1}$	0.26	0.40	0.45	Min T on sheathing, at fastener along studs
$T_{i2}$	0.20	0.41	0.48	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.34

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Plus 110 Exterior Insulation and R-24 Batt Insulation in Stud Cavity – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-26.4 (4.67 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.1 (0.72)	R-30.6 (5.39)	R-16.5 (2.91)	0.060 (0.344)
R-8.2 (1.44)	R-34.7 (6.11)	R-19.6 (3.46)	0.051 (0.289)
R-12.3 (2.17)	R-38.8 (6.83)	R-22.7 (4.01)	0.044 (0.250)
R-16.4 (2.89)	R-42.9 (7.55)	R-25.6 (4.51)	0.039 (0.222)

### Temperature Indices

	R4.1	R12.3	R16.4	
$T_{i1}$	0.27	0.40	0.45	Min T on sheathing, at fastener along studs
$T_{i2}$	0.20	0.42	0.48	Min T on sheathing, between studs and fasteners

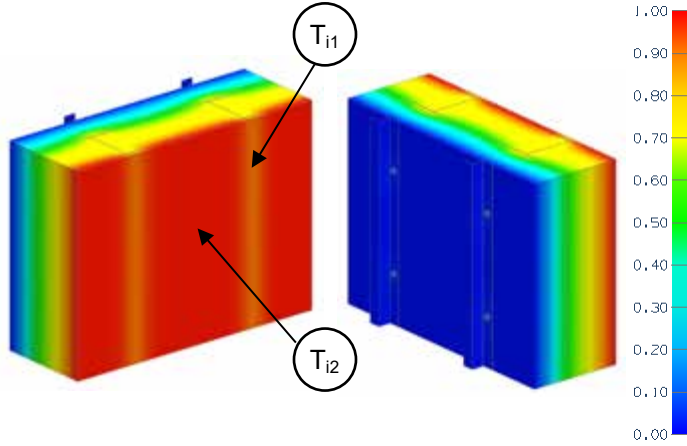
Temperature indices listed for selected scenarios. All other scenarios to be interpolated.



# Detail 5.1.35

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier 45 Insulation and R-24 Batt Insulation in Stud Cavity – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-26.4 (4.67 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-30.7 (5.41)	R-16.6 (2.93)	0.060 (0.342)
R-8.4 (1.48)	R-34.9 (6.15)	R-19.8 (3.48)	0.051 (0.287)
R-12.6 (2.22)	R-39.1 (6.89)	R-22.9 (4.04)	0.044 (0.248)
R-16.8 (2.96)	R-43.3 (7.63)	R-25.9 (4.56)	0.039 (0.219)

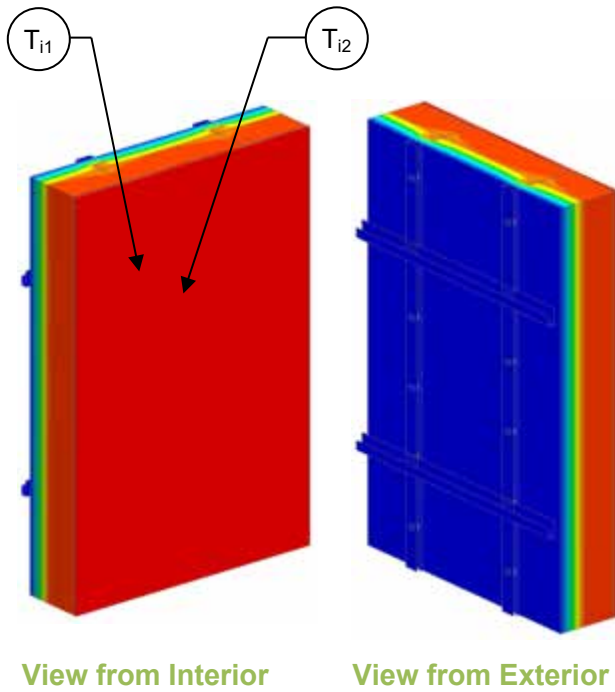
### Temperature Indices

	R4.2	R12.6	R16.8	
$T_{i1}$	0.27	0.40	0.45	Min T on sheathing, at fastener along studs
$T_{i2}$	0.21	0.42	0.49	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.36

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (8" o.c.) and 1 1/2" Spray Foam (R-9.8) in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

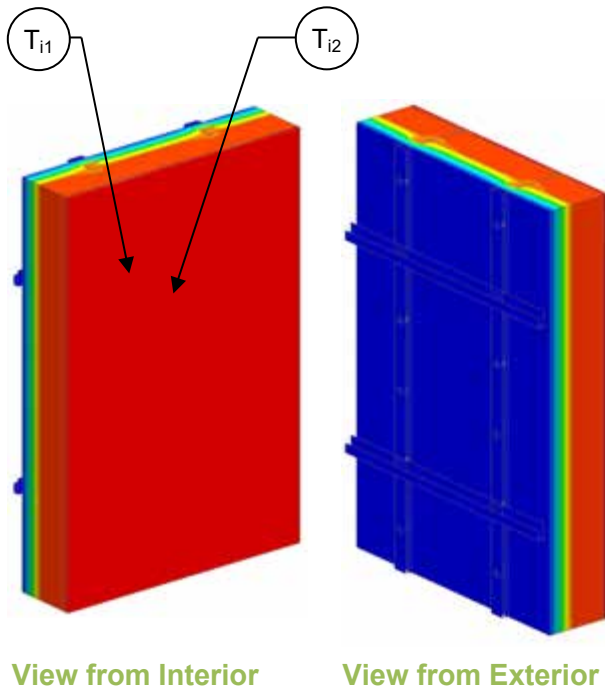
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.1 (1.78)	R-22.7 (4.00)	R-18.0 (3.17)	0.056 (0.32)
R-19.0 (3.35)	R-31.6 (5.57)	R-25.6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

### Temperature Indices

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

# Detail 5.1.37

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Knight CI-System (16" o.c.) and 1 1/2" Spray Foam (R-9.8) in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

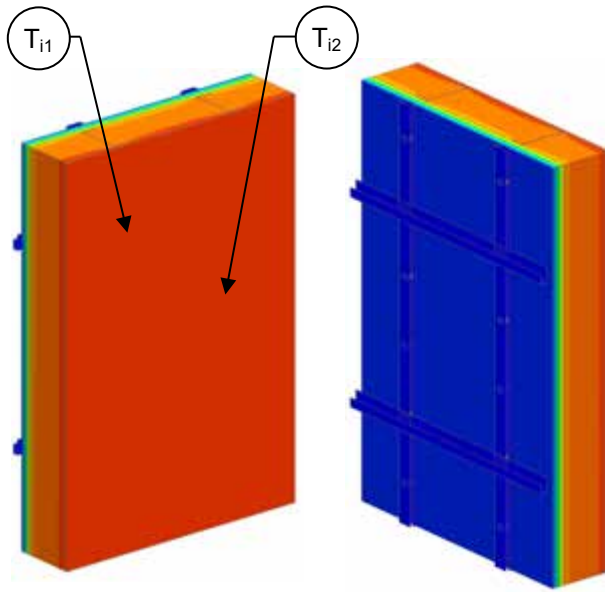
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.1 (1.78)	R-22.7 (4.00)	R-18.8 (3.31)	0.053 (0.30)
R-19.0 (3.35)	R-31.6 (5.57)	R-27.0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

### Temperature Indices

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

# Detail 5.1.38

## Exterior Insulated 6" 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

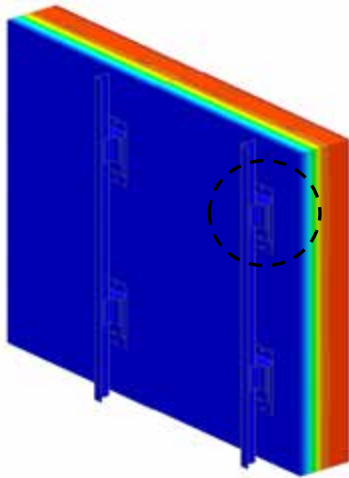
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.1 (1.78)	R-12.9 (2.27)	R-12.5 (2.20)	0.080 (0.45)
R-19.0 (3.35)	R-21.8 (3.84)	R-20.7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

### Temperature Indices

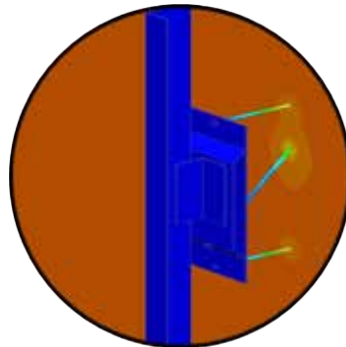
	R10	R19	
$T_{i1}$	0.61	0.68	Min T on exterior insulation, around fasteners
$T_{i2}$	0.85	0.91	Max T on exterior insulation, along studs

# Detail 5.1.39

## 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



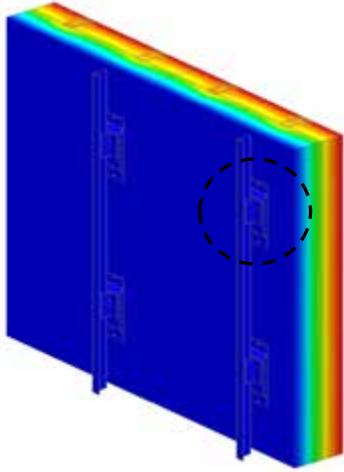
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"Clear wall" $U_o$ and R-value

### Nominal (1D) vs. Assembly Performance Indicators

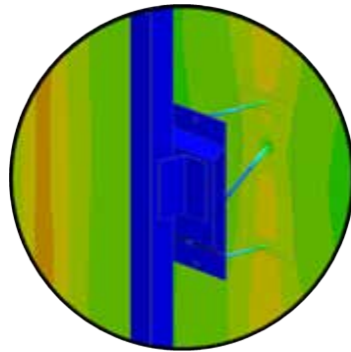
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.40

## Exterior and Interior 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 and R-13 Batt Insulation in Stud Cavity – Clear Wall



View from Exterior



View of Bracket

### Thermal Performance Indicators



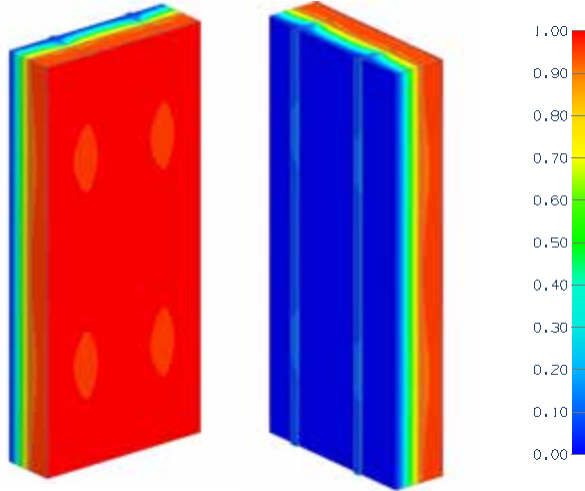
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-15.3 (2.69 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators Clear Wall – With Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	$R_{1Db}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.41

## 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

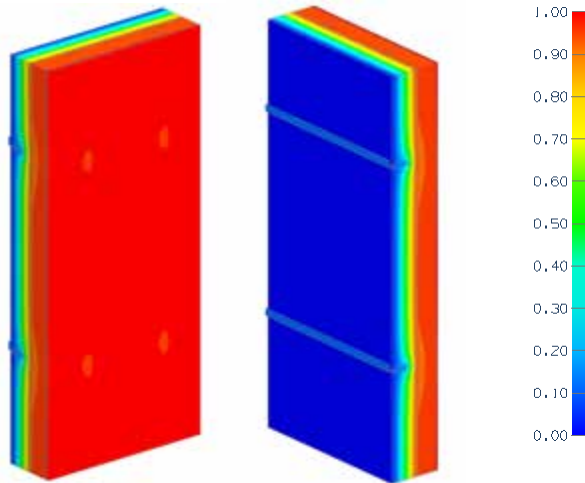
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	“Clear wall” U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.42

## 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

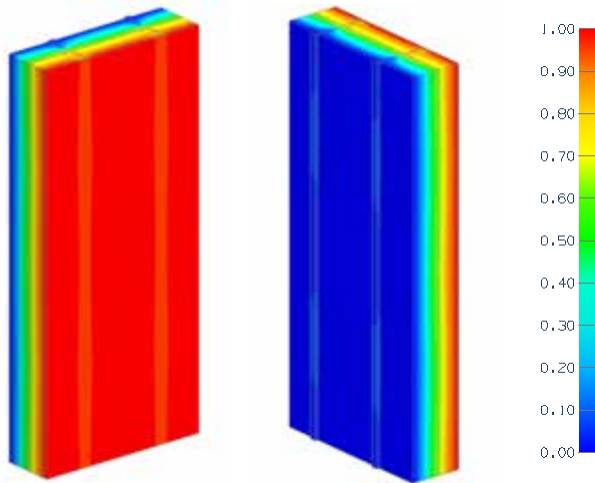
### Nominal (1D) vs. Assembly Performance Indicators

Stud Spacing	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		60" Vertical Clip Spacing	
			$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.43

## Exterior and Interior 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 and R-12 Batt Insulation in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance	U <sub>o</sub> , R <sub>o</sub>	“Clear wall” U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

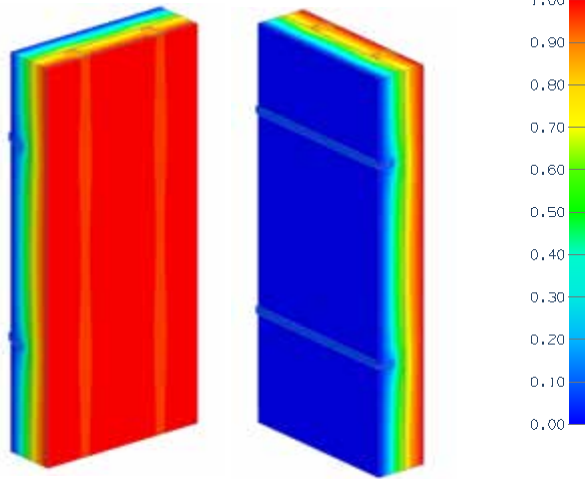
#### Clear Wall – With Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		60" Vertical Clip Spacing	
		R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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) <sup>1</sup>	0.046 (0.263) <sup>1</sup>
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) <sup>1</sup>	0.043 (0.245) <sup>1</sup>
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) <sup>1</sup>	0.040 (0.230) <sup>1</sup>

<sup>1</sup> Values were interpolated and not explicitly modelled

# Detail 5.1.44

## Exterior and Interior 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 and R-12 Batt Insulation in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

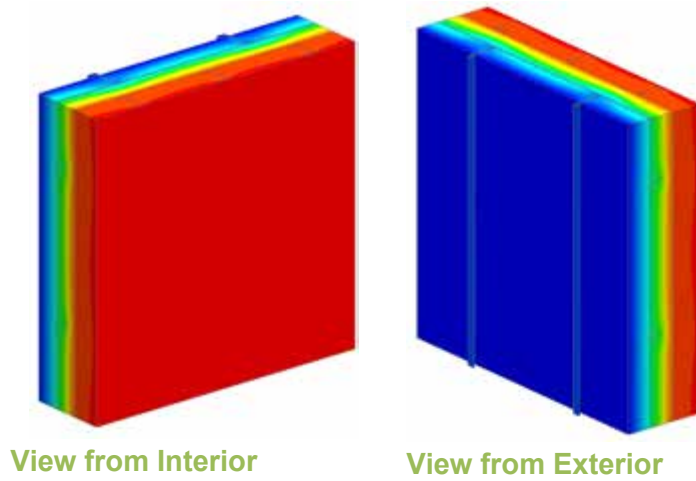
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-14.3 (2.52 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	“Clear wall” U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Stud Spacing	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		60" Vertical Clip Spacing	
			$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.45

## 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



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

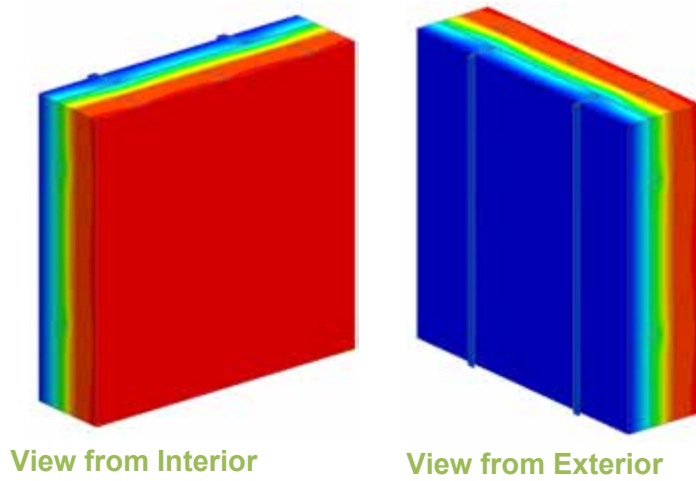
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		40" Vertical Clip Spacing		60" Vertical Clip Spacing	
				$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.46

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

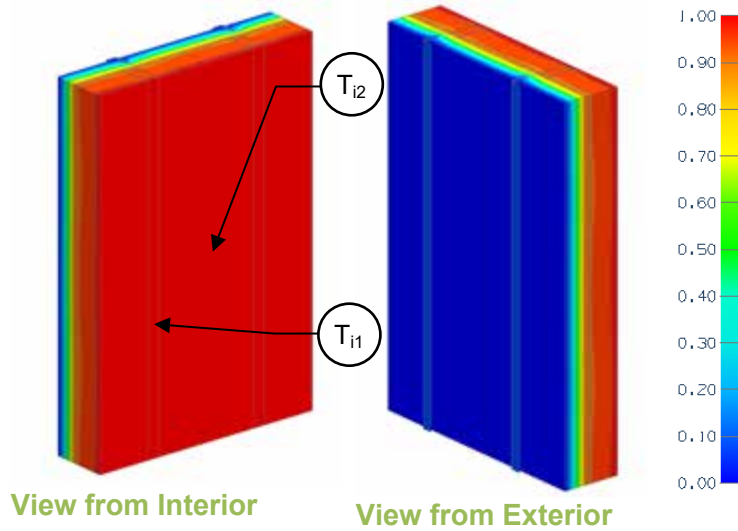
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		40" Vertical Clip Spacing		60" Vertical Clip Spacing	
				$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.47

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

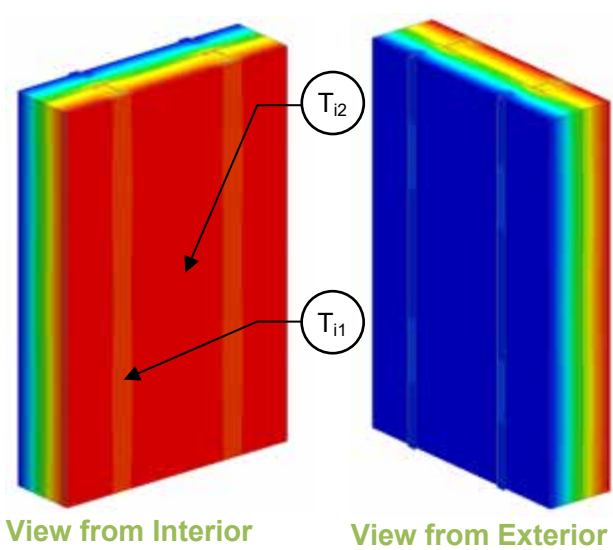
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-12.6 (2.22)	R-15.8 (2.78)	R-12.6 (2.22)	0.079 (0.45)	R-13.3 (2.34)	0.075 (0.43)	R-13.7 (2.42)	0.073 (0.41)
R-16.8 (2.96)	R-20.0 (3.52)	R-14.9 (2.63)	0.067 (0.38)	R-16.1 (2.83)	0.062 (0.35)	R-16.8 (2.96)	0.059 (0.34)
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)	0.050 (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 5.1.48

## 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 and R-12 Batt Insulation in Stud Cavity – Clear Wall



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-22.7 (4.00)	R-15.9 (2.81)	0.063 (0.36)	R-16.4 (2.90)	0.061 (0.35)	R-16.9 (2.97)	0.059 (0.34)
R-12.6 (2.22)	R-26.9 (4.74)	R-18.3 (3.22)	0.055 (0.31)	R-19.2 (3.38)	0.052 (0.30)	R-19.8 (3.48)	0.051 (0.29)
R-16.8 (2.96)	R-31.1 (5.48)	R-20.6 (3.63)	0.049 (0.28)	R-22.0 (3.87)	0.046 (0.26)	R-22.9 (4.03)	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)

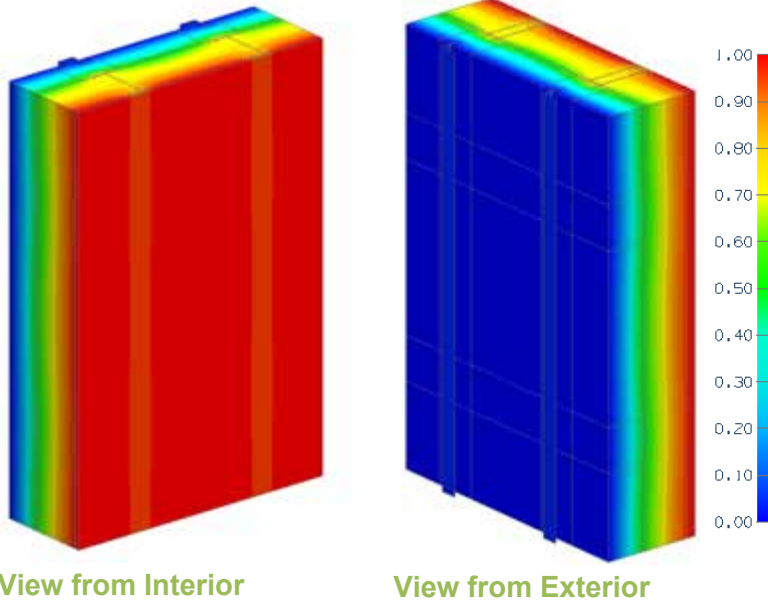
### Temperature Indices

	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 5.1.49

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

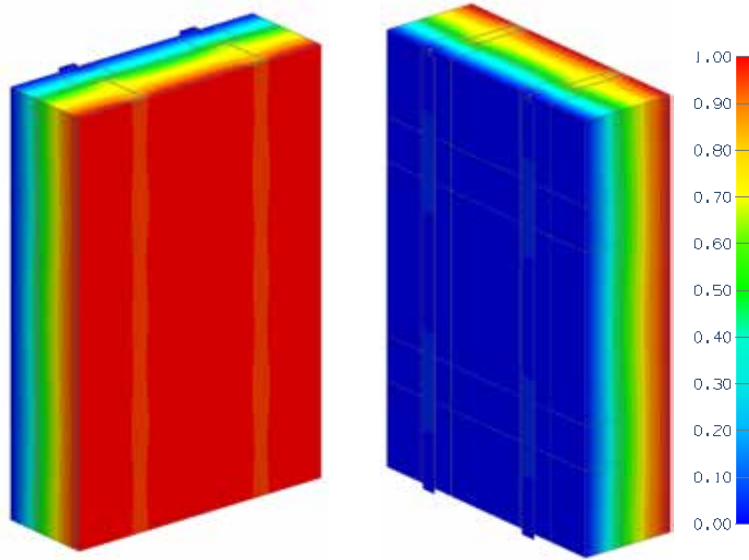
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-6.3 (1.11)	R-27.6 (4.86)	R-16.8 (2.95)	0.060 (0.34)	R-17.2 (3.03)	0.058 (0.33)	R-17.3 (3.05)	0.058 (0.33)
R-8.4 (1.48)	R-29.7 (5.23)	R-18.2 (3.2)	0.055 (0.31)	R-18.8 (3.31)	0.053 (0.30)	R-19.1 (3.36)	0.052 (0.30)
R-12.6 (2.22)	R-33.9 (5.97)	R-20.5 (3.61)	0.049 (0.28)	R-21.5 (3.78)	0.047 (0.27)	R-21.9 (3.86)	0.046 (0.26)
R-16.8 (2.96)	R-38.1 (6.71)	R-22.8 (4.01)	0.044 (0.25)	R-24.2 (4.26)	0.041 (0.24)	R-25.0 (4.40)	0.040 (0.23)

# Detail 5.1.50

## 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 and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

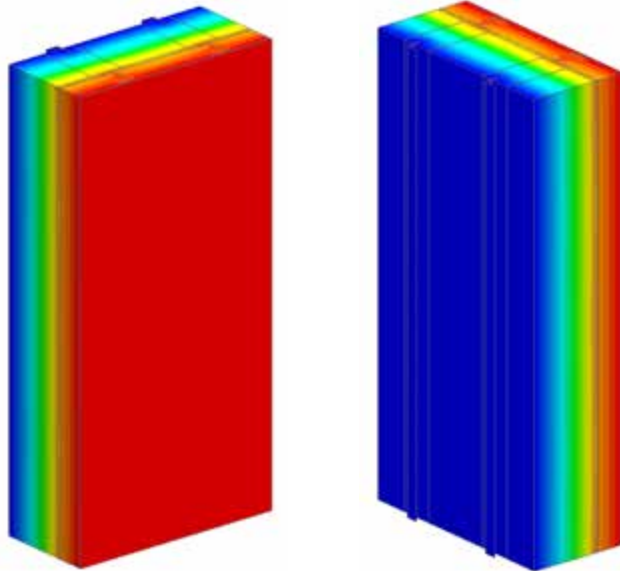
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-6.3 (1.11)	R-27.6 (4.86)	R-19.5 (3.44)	0.051 (0.29)	R-19.9 (3.51)	0.050 (0.29)	R-20.1 (3.54)	0.050 (0.28)
R-8.4 (1.48)	R-29.7 (5.23)	R-21.0 (3.69)	0.048 (0.27)	R-21.6 (3.81)	0.046 (0.26)	R-21.8 (3.85)	0.046 (0.26)
R-12.6 (2.22)	R-33.9 (5.97)	R-23.3 (4.11)	0.043 (0.24)	R-24.3 (4.29)	0.041 (0.23)	R-24.7 (4.35)	0.040 (0.23)
R-16.8 (2.96)	R-38.1 (6.71)	R-25.6 (4.52)	0.039 (0.22)	R-27.2 (4.78)	0.037 (0.21)	R-27.8 (4.90)	0.036 (0.20)



# Detail 5.1.51

## 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 and R-13 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

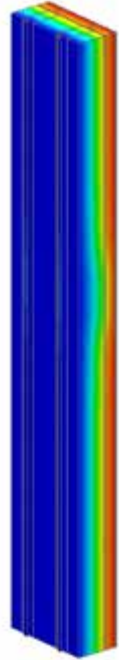
Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-42 (7.40)	R-57.3 (10.09)	R-47.8 (8.37)	0.021 (0.119)

# Detail 5.1.52

## 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 and R-13 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

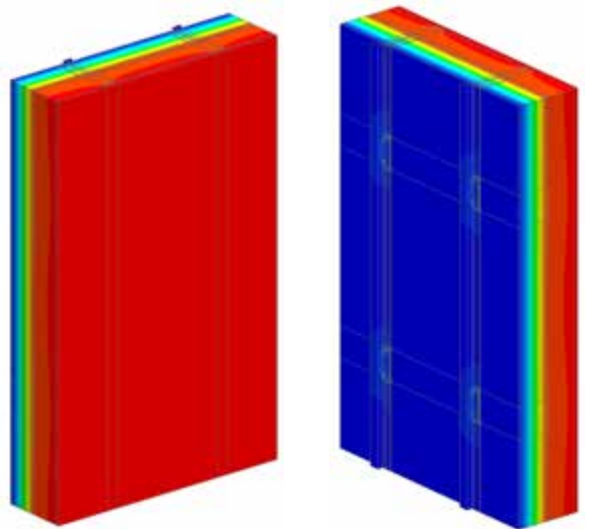
### Nominal (1D) vs. Assembly Performance Indicators

Floor Height ft (mm)	Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.53

## 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



View from Interior

View from Exterior

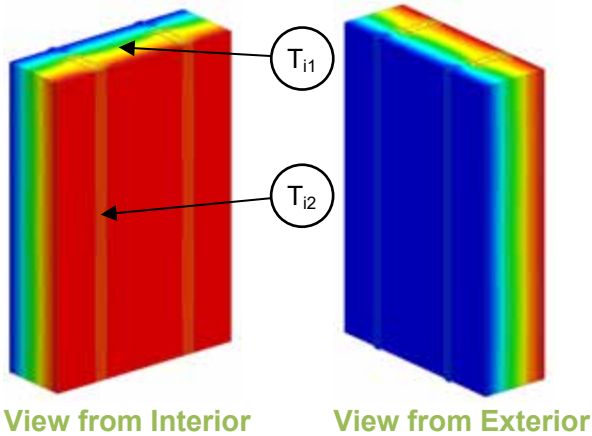
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	26" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.54

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" o.c. and 36" o.c.) Supporting Cladding and Owens Corning R-20 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear field" U- and R-value, without connectors or joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

#### 16" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-26.6 (4.68)	R-15.7 (2.77)	0.064 (0.36)	R-15.9 (2.80)	0.063 (0.36)
R-8.4 (1.48)	R-30.8 (5.42)	R-18.3 (3.22)	0.055 (0.31)	R-18.7 (3.30)	0.053 (0.30)
R-12.6 (2.22)	R-35.0 (6.16)	R-20.4 (3.59)	0.049 (0.28)	R-21.0 (3.69)	0.048 (0.27)
R-16.8 (2.96)	R-39.2 (6.90)	R-22.9 (4.03)	0.044 (0.25)	R-24.0 (4.23)	0.042 (0.24)

#### 24" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-26.6 (4.68)	R-18.2 (3.20)	0.055 (0.31)	R-18.3 (3.23)	0.055 (0.31)
R-8.4 (1.48)	R-30.8 (5.42)	R-21.1 (3.72)	0.047 (0.27)	R-21.5 (3.78)	0.047 (0.26)
R-12.6 (2.22)	R-35.0 (6.16)	R-23.6 (4.16)	0.042 (0.24)	R-24.3 (4.27)	0.041 (0.23)
R-16.8 (2.96)	R-39.2 (6.90)	R-26.5 (4.68)	0.038 (0.21)	R-27.6 (4.86)	0.036 (0.21)

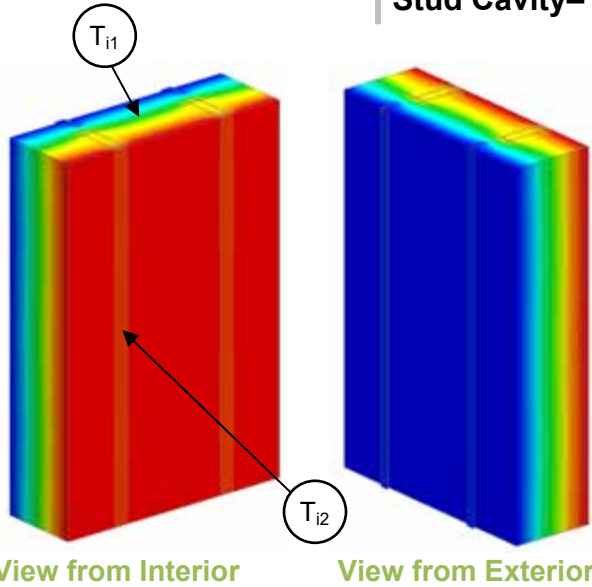
### Temperature Indices

	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	0.23	0.35	0.43	0.47	Min T on sheathing, between studs
$T_{i2}$	0.53	0.60	0.65	0.69	Max T on sheathing, at stud, between clips

Temperature indices taken from scenario with 16" o.c. studs with 24" vertical clip spacing. All other scenarios have higher minimum temperature index.

# Detail 5.1.55

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" O.C. and 36" o.c.) Supporting Cladding and Owens Corning 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-29.1 (5.13)	R-16.3 (2.86)	0.062 (0.35)	R-16.4 (2.9)	0.061 (0.35)
R-8.4 (1.48)	R-33.3 (5.86)	R-18.8 (3.32)	0.053 (0.30)	R-19.3 (3.39)	0.052 (0.29)
R-12.6 (2.22)	R-37.5 (6.60)	R-20.9 (3.68)	0.048 (0.27)	R-21.6 (3.81)	0.046 (0.26)
R-16.8 (2.96)	R-41.7 (7.34)	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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-29.1 (5.13)	R-18.9 (3.34)	0.053 (0.30)	R-19.1 (3.37)	0.052 (0.30)
R-8.4 (1.48)	R-33.3 (5.86)	R-21.9 (3.85)	0.046 (0.26)	R-22.3 (3.92)	0.045 (0.25)
R-12.6 (2.22)	R-37.5 (6.60)	R-24.4 (4.29)	0.041 (0.23)	R-25 (4.41)	0.040 (0.23)
R-16.8 (2.96)	R-41.7 (7.34)	R-27.3 (4.81)	0.037 (0.21)	R-28.4 (5.0)	0.035 (0.20)

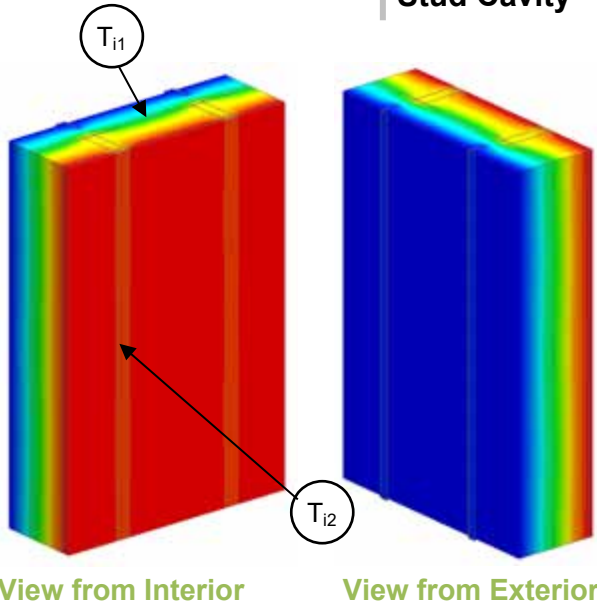
### Temperature Indices

	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	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 5.1.56

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" O.C. and 36" o.c.) Supporting Cladding and Owens Corning 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-30.6 (5.39)	R-16.8 (2.95)	0.060 (0.34)	R-16.9 (2.98)	0.059 (0.34)
R-8.4 (1.48)	R-34.8 (6.13)	R-19.3 (3.40)	0.052 (0.29)	R-19.8 (3.48)	0.051 (0.29)
R-12.6 (2.22)	R-39.0 (6.87)	R-21.3 (3.76)	0.047 (0.27)	R-22.1 (3.89)	0.045 (0.26)
R-16.8 (2.96)	R-43.2 (7.61)	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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-30.6 (5.39)	R-19.7 (3.47)	0.051 (0.29)	R-19.8 (3.50)	0.050 (0.29)
R-8.4 (1.48)	R-34.8 (6.13)	R-22.6 (3.98)	0.044 (0.25)	R-23.0 (4.05)	0.043 (0.25)
R-12.6 (2.22)	R-39.0 (6.87)	R-25.1 (4.42)	0.040 (0.23)	R-25.7 (4.53)	0.039 (0.22)
R-16.8 (2.96)	R-43.2 (7.61)	R-28.0 (4.93)	0.036 (0.20)	R-29.1 (5.12)	0.034 (0.20)

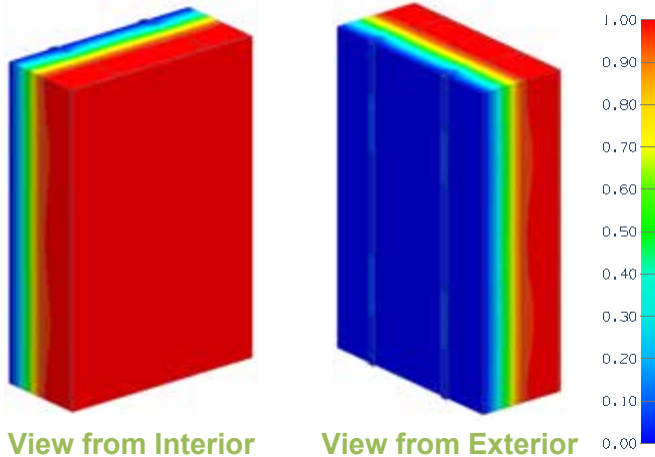
### Temperature Indices

	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	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 5.1.57

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Vertical Clips (24" o.c. and 36" o.c.) Supporting Cladding – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.3 (0.58) + insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	“clear field” U- and R-value, without connectors or joint

### Nominal (1D) vs. Assembly Performance Indicators

#### 16" o.c. Studs

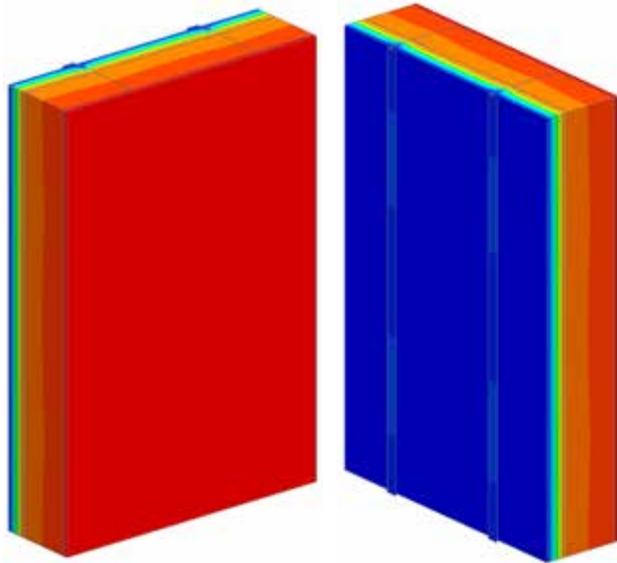
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-7.5 (1.32)	R-7.1 (1.24)	0.142 (0.81)	R-7.1 (1.26)	0.140 (0.80)
R-8.4 (1.48)	R-11.7 (2.06)	R-9.9 (1.75)	0.101 (0.57)	R-10.2 (1.80)	0.098 (0.56)
R-12.6 (2.22)	R-15.9 (2.80)	R-12.2 (2.15)	0.082 (0.47)	R-12.7 (2.23)	0.079 (0.45)
R-16.8 (2.96)	R-20.1 (3.54)	R-14.7 (2.59)	0.068 (0.39)	R-15.6 (2.75)	0.064 (0.36)
R-21.0 (3.70)	R-24.3 (4.28)	R-17.0 (3.00)	0.059 (0.33)	R-18.8 (3.30)	0.053 (0.30)
R-25.2 (4.44)	R-28.5 (5.02)	R-19.1 (3.37)	0.052 (0.30)	R-21.4 (3.77)	0.047 (0.26)
R-29.4 (5.18)	R-32.7 (5.76)	R-21.0 (3.71)	0.048 (0.27)	R-23.9 (4.22)	0.042 (0.24)

#### 24" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-7.5 (1.32)	R-7.2 (1.27)	0.139 (0.79)	R-7.3 (1.28)	0.137 (0.78)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.5 (1.84)	0.096 (0.54)	R-10.7 (1.88)	0.094 (0.53)
R-12.6 (2.22)	R-15.9 (2.80)	R-13.2 (2.33)	0.076 (0.43)	R-13.6 (2.40)	0.073 (0.42)
R-16.8 (2.96)	R-20.1 (3.54)	R-16.1 (2.84)	0.062 (0.35)	R-16.9 (2.98)	0.059 (0.34)
R-21.0 (3.70)	R-24.3 (4.28)	R-18.9 (3.33)	0.053 (0.30)	R-20.3 (3.57)	0.049 (0.28)
R-25.2 (4.44)	R-28.5 (5.02)	R-21.5 (3.78)	0.047 (0.26)	R-23.4 (4.11)	0.043 (0.24)
R-29.4 (5.18)	R-32.7 (5.76)	R-23.9 (4.20)	0.042 (0.24)	R-26.3 (4.63)	0.038 (0.22)

# Detail 5.1.58

## Owens Corning Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (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-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	"clear wall" U- and R-value

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

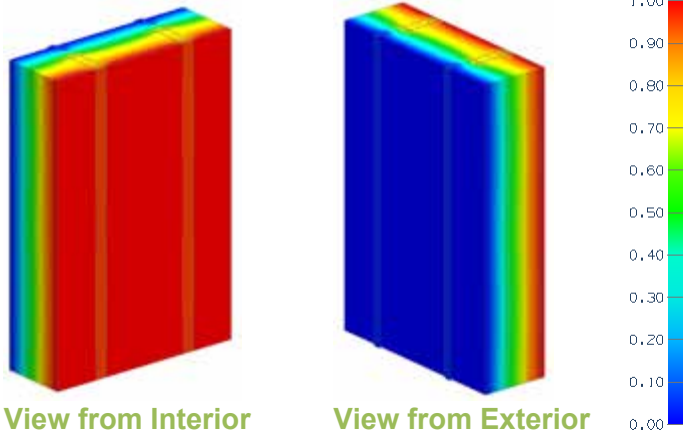
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.0 (1.77)	0.100 (0.57)
R-21.0 (3.70)	R-24.3 (4.28)	R-17.6 (3.10)	0.057 (0.32)



# Detail 5.1.59

## Exterior and Interior Insulated 6" x 1 5/8" 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) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without connectors or joint

### Nominal (1D) vs. Assembly Performance Indicators

#### 16" o.c. Studs

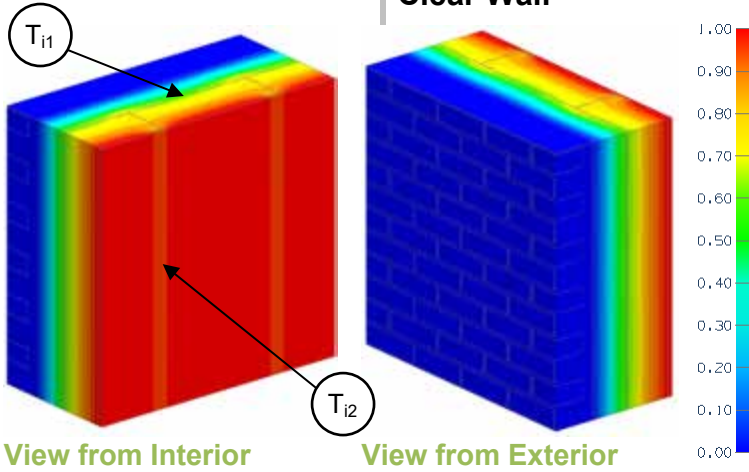
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-39.2 (6.90)	R-22.9 (4.03)	0.044 (0.25)	R-24.0 (4.23)	0.042 (0.24)
R-21.0 (3.70)	R-43.4 (7.64)	R-25.2 (4.44)	0.040 (0.23)	R-27.3 (4.80)	0.037 (0.21)
R-25.2 (4.44)	R-47.6 (8.38)	R-27.3 (4.81)	0.037 (0.21)	R-30.0 (5.28)	0.033 (0.19)
R-29.4 (5.18)	R-51.8 (9.12)	R-29.2 (5.15)	0.034 (0.19)	R-32.5 (5.72)	0.031 (0.17)

#### 24" o.c. Studs

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-39.2 (6.90)	R-26.6 (4.68)	0.038 (0.21)	R-27.6 (4.86)	0.036 (0.21)
R-21.0 (3.70)	R-43.4 (7.64)	R-29.3 (5.16)	0.034 (0.19)	R-31.0 (5.47)	0.032 (0.18)
R-25.2 (4.44)	R-47.6 (8.38)	R-31.8 (5.60)	0.031 (0.18)	R-34.1 (6.01)	0.029 (0.17)
R-29.4 (5.18)	R-51.8 (9.12)	R-34.2 (6.02)	0.029 (0.17)	R-37.0 (6.52)	0.027 (0.15)

# Detail 5.1.60

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Steel Brick Anchors Supporting Brick Veneer and Owens Corning R-20 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-23.4 (4.12 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c.		24" o.c.	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-28.4 (5.01)	R-16.5 (2.91)	0.061 (0.34)	R-19.2 (3.38)	0.052 (0.30)
R-7.5 (1.32)	R-30.9 (5.45)	R-18.4 (3.23)	0.054 (0.31)	R-21.2 (3.74)	0.047 (0.27)
R-10.0 (1.76)	R-33.4 (5.89)	R-20.1 (3.54)	0.050 (0.28)	R-23.2 (4.09)	0.043 (0.25)
R-15.0 (2.64)	R-38.4 (6.77)	R-23.3 (4.10)	0.043 (0.24)	R-27.0 (4.75)	0.037 (0.21)

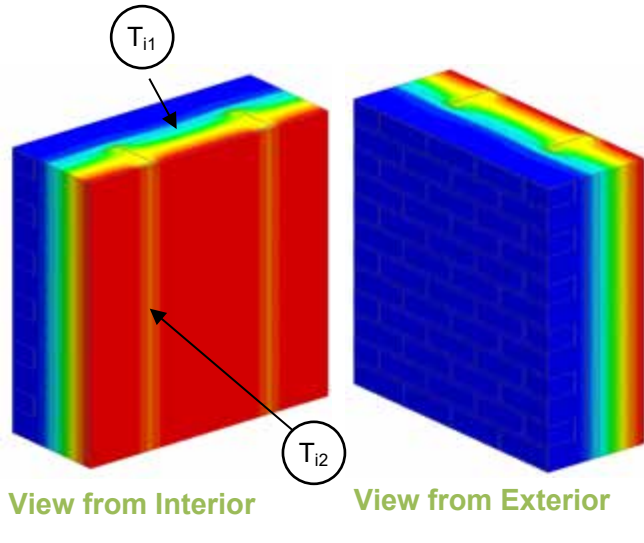
### Temperature Indices

	R5	R7.5	R10	R15	
$T_{i1}$	0.29	0.36	0.42	0.51	Min T on sheathing, between studs
$T_{i2}$	0.56	0.61	0.64	0.69	Max T on sheathing, along studs

Temperature indices taken from scenario with 16" o.c. studs. All other scenarios have higher minimum temperature index.

# Detail 5.1.61

## Exterior and Interior Insulation 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Brick Ties Supporting Brick Veneer and Owens Corning 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c.		24" o.c.	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c.		24" o.c.	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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

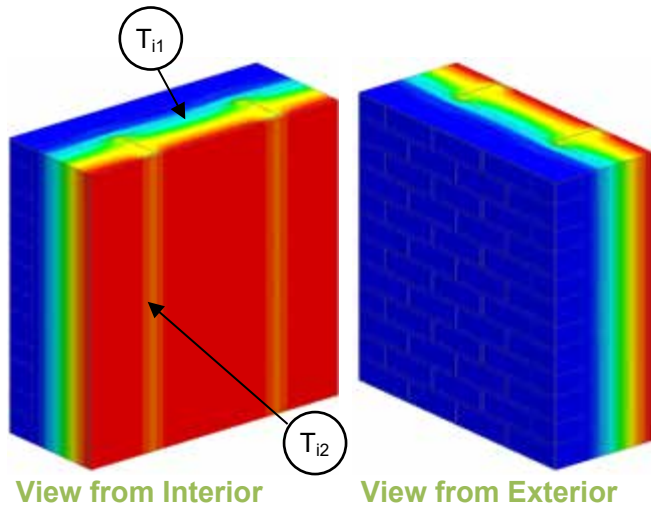
	R5	R7.5	R10	R15	
$T_{i1}$	0.26	0.33	0.39	0.48	Min T on sheathing, between studs
$T_{i2}$	0.57	0.64	0.67	0.72	Max T on sheathing, along studs

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

# Detail 5.1.62

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Brick Ties Supporting Brick Veneer and Owens Corning 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c.		24" o.c.	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c.		24" o.c.	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

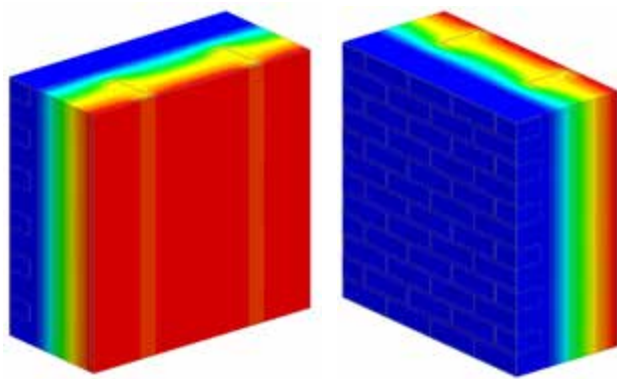
### Temperature Indices

	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 5.1.63

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Owens Corning R-20 Batt Insulation in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-23.4 (4.12 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	"clear wall" U- and R-value

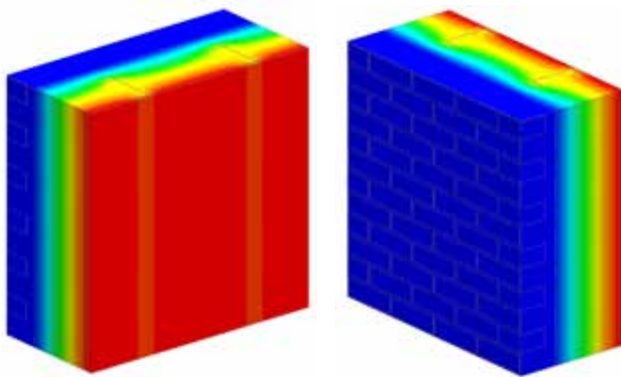
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.3 (1.11)	R-29.7 (5.23)	R-17.1 (3.02)	0.058 (0.33)
R-8.4 (1.48)	R-31.8 (5.60)	R-18.6 (3.28)	0.054 (0.31)
R-12.6 (2.22)	R-36.0 (6.34)	R-21.3 (3.75)	0.047 (0.27)
R-16.8 (2.96)	R-40.2 (7.08)	R-23.7 (4.17)	0.042 (0.24)
R-21.0 (3.70)	R-44.4 (7.82)	R-26.3 (4.62)	0.038 (0.22)

# Detail 5.1.64

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Owens Corning R-22.5 Batt Insulation in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-25.9 (4.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	"clear wall" U- and R-value

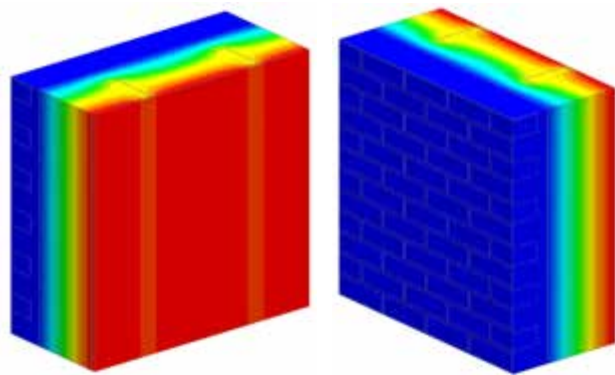
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-6.3 (1.11)	R-32.2 (5.67)	R-17.7 (3.12)	0.056 (0.32)
R-8.4 (1.48)	R-34.3 (6.04)	R-19.2 (3.38)	0.052 (0.30)
R-12.6 (2.22)	R-38.5 (6.78)	R-21.9 (3.85)	0.046 (0.26)
R-16.8 (2.96)	R-42.7 (7.52)	R-24.2 (4.26)	0.041 (0.24)
R-21.0 (3.70)	R-46.9 (8.26)	R-26.8 (4.71)	0.037 (0.21)

# Detail 5.1.65

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Owens Corning R-24 Batt Insulation in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

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

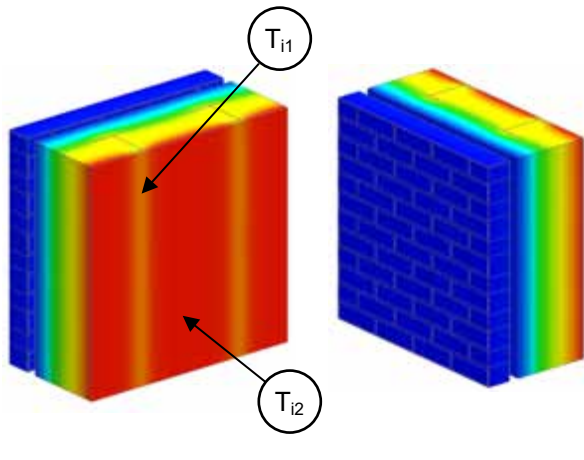
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.3 (1.11)	R-33.7 (5.94)	R-18.0 (3.17)	0.055 (0.32)
R-8.4 (1.48)	R-35.8 (6.31)	R-19.5 (3.43)	0.051 (0.29)
R-12.6 (2.22)	R-40.0 (7.04)	R-22.3 (3.93)	0.045 (0.25)
R-16.8 (2.96)	R-44.2 (7.78)	R-24.5 (4.31)	0.041 (0.23)
R-21.0 (3.70)	R-48.4 (8.52)	R-27.0 (4.76)	0.037 (0.21)

# Detail 5.1.66

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Steel Anchor Supporting Brick Veneer, Owens Corning XPS Exterior Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-23.0 (4.06 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-28.0 (4.94)	R-15.7 (2.77)	0.064 (0.361)
R-10.0 (1.76)	R-33.0 (5.82)	R-18.4 (3.24)	0.054 (0.309)
R-15.0 (2.64)	R-38.0 (6.70)	R-21.1 (3.71)	0.047 (0.270)
R-20.0 (3.52)	R-43.0 (7.58)	R-22.9 (4.04)	0.044 (0.247)
R-25.0 (4.40)	R-48.0 (8.46)	R-24.9 (4.39)	0.040 (0.228)

### Temperature Indices

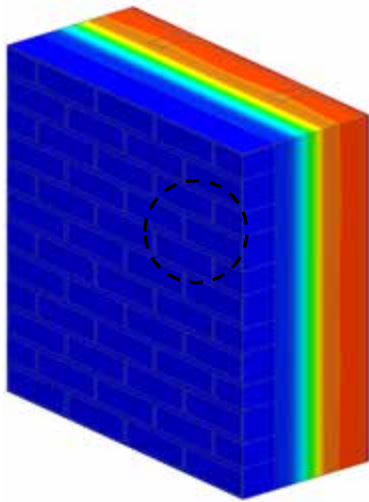
	R5	R15	R20	R25	
$T_{i1}$	0.30	0.44	0.44	0.47	Min T on sheathing, at anchor
$T_{i2}$	0.28	0.49	0.54	0.59	Min T on sheathing, between studs and anchors

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

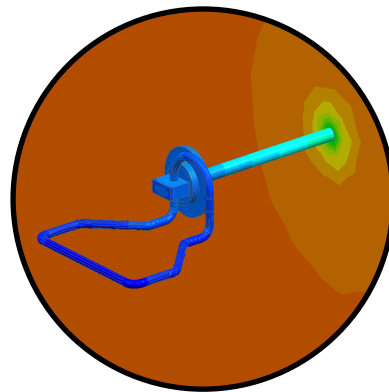


# Detail 5.1.67

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

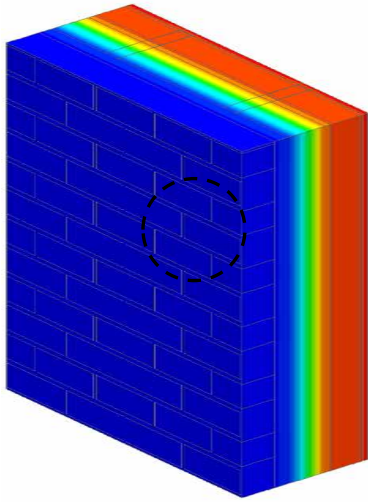
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

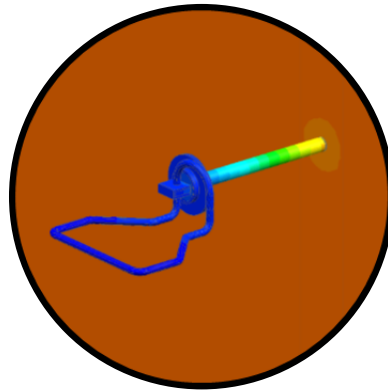
	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	0.42	0.47	0.51	0.55	Min T on sheathing behind stud at Tie Penetration
$T_{i2}$	0.72	0.79	0.83	0.86	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

# Detail 5.1.68

## 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" $U$ - and $R$ -value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

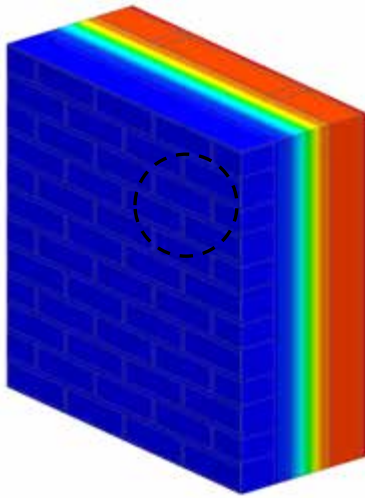
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

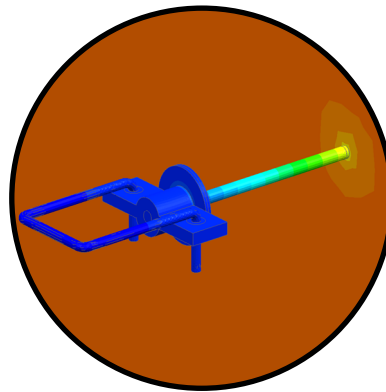
	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	0.67	0.75	0.81	0.80	Min T on sheathing behind stud at Tie Penetration
$T_{i2}$	0.74	0.82	0.86	0.89	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

# Detail 5.1.69

## 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

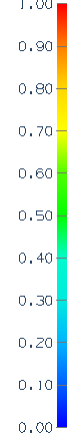


View of Exterior



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" $U$ - and $R$ -value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

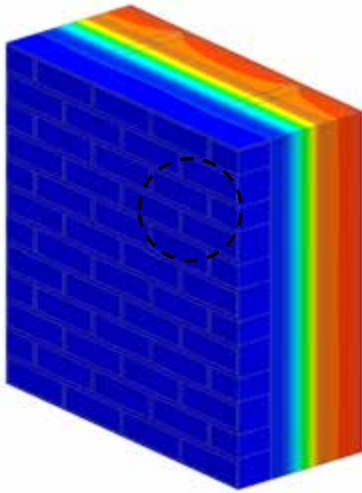
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

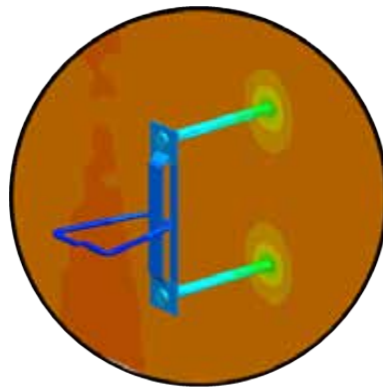
	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	0.56	0.66	0.72	0.76	Min T on sheathing behind stud at Tie Penetration
$T_{i2}$	0.75	0.83	0.87	0.90	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

# Detail 5.1.70

## 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

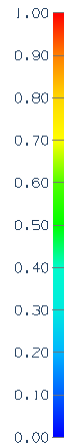


View of Exterior



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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

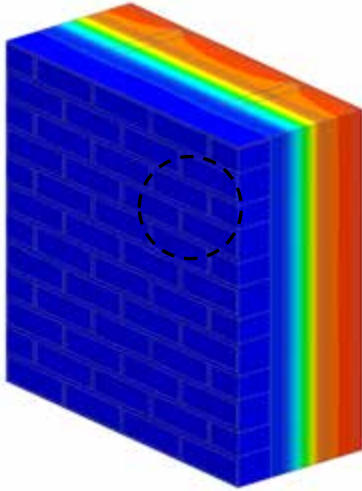
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

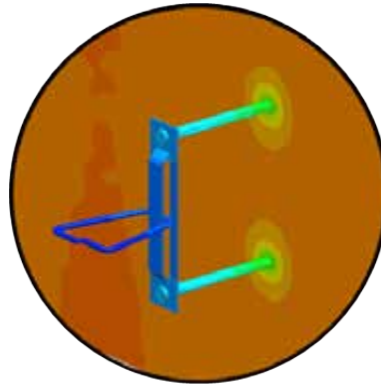
	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	0.47	0.53	0.57	0.60	Min T on sheathing behind stud at Tie Penetration
$T_{i2}$	0.69	0.76	0.80	0.82	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

# Detail 5.1.71

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

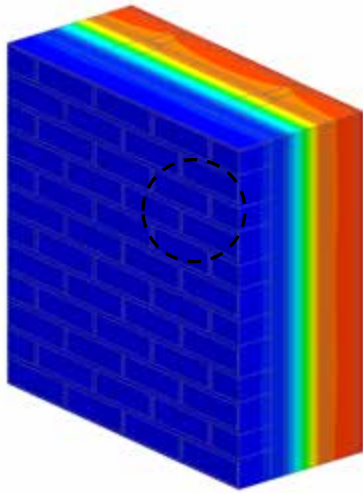
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

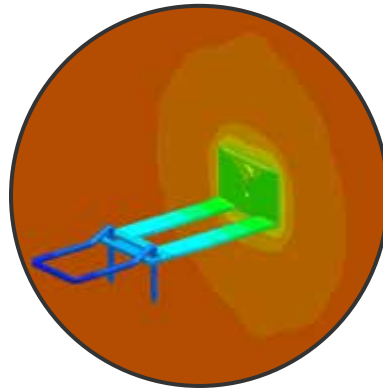
	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	0.56	0.63	0.67	0.70	Min T on sheathing behind stud at Tie Penetration
$T_{i2}$	0.71	0.78	0.82	0.85	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

# Detail 5.1.72

## 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" $U$ - and $R$ -value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

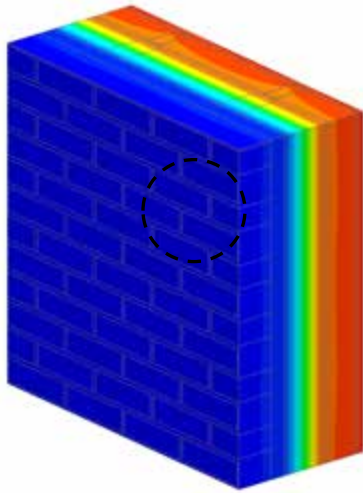
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

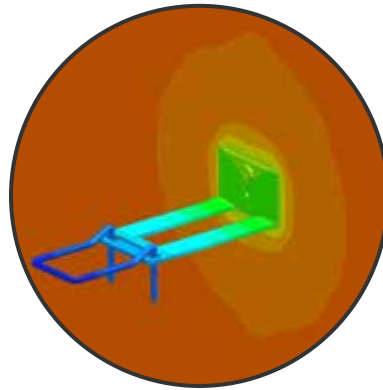
	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	0.59	0.64	0.69	0.71	Min T on sheathing behind stud at Tie Penetration
$T_{i2}$	0.72	0.78	0.82	0.84	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

# Detail 5.1.73

## 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" $U$ - and $R$ -value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

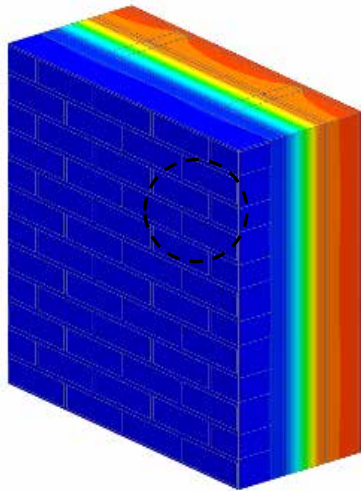
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

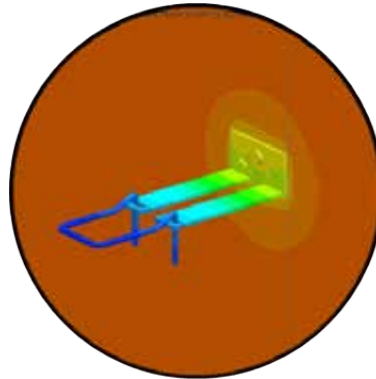
	R4.2	R8.4	R12.6	R16.8	
$T_{i1}$	0.66	0.73	0.78	0.81	Min T on sheathing behind stud at Tie Penetration
$T_{i2}$	0.73	0.80	0.84	0.87	Max T on sheathing at edge of Steel Stud Flange aligned with Tie Penetration

# Detail 5.1.74

## 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" $U$ - and $R$ -value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

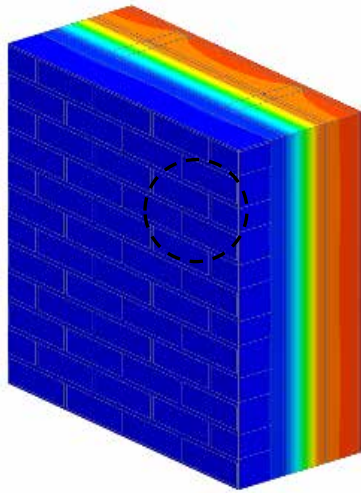
### Temperature Indices

	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

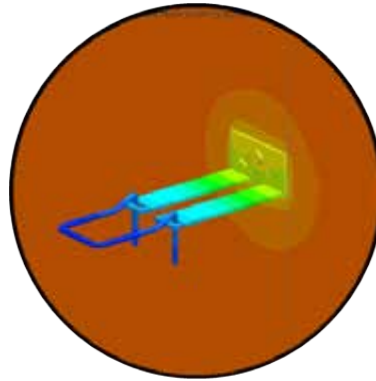


# Detail 5.1.75

## 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" $U$ - and $R$ -value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

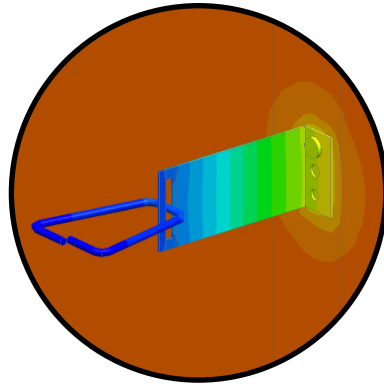
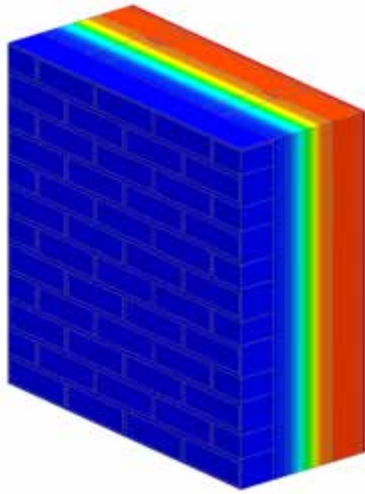
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.76

## 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



### 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

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

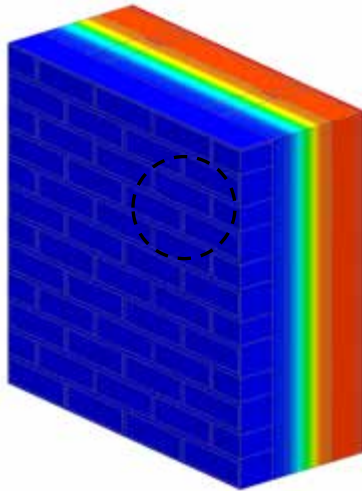
View of Anchoring Tie

### Nominal (1D) vs. Assembly Performance Indicators

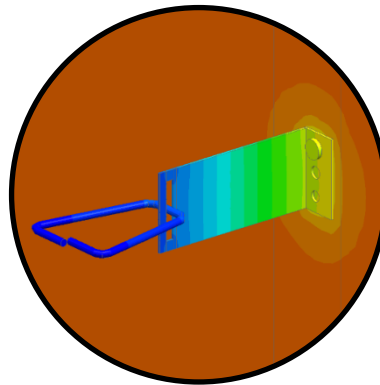
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-8.5 (1.50)	R-7.3 (1.29)	0.136 (0.77)	R-7.7 (1.36)	0.129 (0.73)	R-7.8 (1.38)	0.128 (0.73)
R-8.4 (1.48)	R-12.7 (2.24)	R-10.1 (1.78)	0.099 (0.56)	R-11.2 (1.97)	0.089 (0.51)	R-11.5 (2.02)	0.087 (0.50)
R-12.6 (2.22)	R-16.9 (2.98)	R-12.5 (2.21)	0.080 (0.45)	R-14.4 (2.54)	0.069 (0.39)	R-14.9 (2.62)	0.067 (0.38)
R-16.8 (2.96)	R-21.1 (3.72)	R-14.8 (2.61)	0.068 (0.38)	R-17.4 (3.07)	0.057 (0.33)	R-18.2 (3.20)	0.055 (0.31)
R-21.0 (3.70)	R-25.3 (4.46)	R-16.9 (2.97)	0.059 (0.34)	R-20.4 (3.58)	0.049 (0.28)	R-21.4 (3.77)	0.047 (0.26)
R-25.2 (4.44)	R-29.5 (5.20)	R-18.9 (3.33)	0.053 (0.30)	R-23.2 (4.08)	0.043 (0.24)	R-24.6 (4.33)	0.041 (0.23)
R-29.4 (5.18)	R-33.7 (5.94)	R-20.9 (3.67)	0.048 (0.27)	R-25.9 (4.57)	0.039 (0.22)	R-27.7 (4.87)	0.036 (0.21)

# Detail 5.1.77

## 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" $U$ - and $R$ -value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

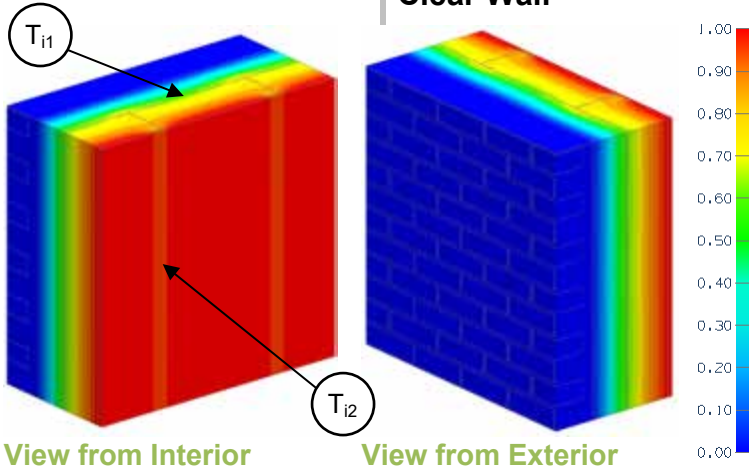
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.78

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Stainless Steel Brick Anchors Supporting Brick Veneer and R-20 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-23.4 (4.12 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c.		24" o.c.	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-28.4 (5.01)	R-16.9 (2.97)	0.059 (0.34)	R-19.5 (3.44)	0.051 (0.29)
R-7.5 (1.32)	R-30.9 (5.45)	R-19.0 (3.35)	0.053 (0.30)	R-21.7 (3.83)	0.046 (0.26)
R-10.0 (1.76)	R-33.4 (5.89)	R-21.1 (3.71)	0.047 (0.27)	R-23.9 (4.21)	0.042 (0.24)
R-15.0 (2.64)	R-38.4 (6.77)	R-25.2 (4.44)	0.040 (0.23)	R-28.3 (4.98)	0.035 (0.20)
R-20.0 (3.52)	R-43.4 (7.65)	R-28.8 (5.07)	0.035 (0.20)	R-32.2 (5.68)	0.031 (0.18)
R-25.0 (4.40)	R-48.4 (8.53)	R-32.8 (5.77)	0.030 (0.17)	R-36.5 (6.43)	0.027 (0.16)
R-30.0 (5.28)	R-53.4 (9.41)	R-36.7 (6.47)	0.027 (0.15)	R-40.7 (7.18)	0.025 (0.14)
R-35.0 (6.16)	R-58.4 (10.29)	R-40.7 (7.17)	0.025 (0.14)	R-45.0 (7.92)	0.022 (0.13)

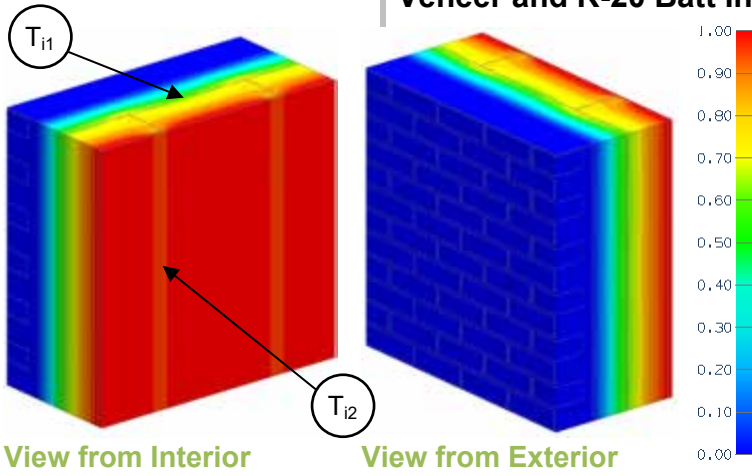
### Temperature Indices

	R5	R7.5	R10	R15	R20	R25	R30	R35	
$T_{i1}$	0.30	0.37	0.43	0.52	0.61	0.65	0.69	0.72	Min T on sheathing, between studs
$T_{i2}$	0.57	0.62	0.66	0.72	0.75	0.78	0.80	0.82	Max T on sheathing, along studs

Temperature indices taken from scenario with 16" o.c. studs. All other scenarios have higher minimum temperature index.

# Detail 5.1.79

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c. and 24" o.c.) Wall Assembly with Steel Brick Anchors Supporting Brick Veneer and R-20 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-23.4 (4.12 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c.		24" o.c.	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-43.4 (7.65)	R-26.3 (4.62)	0.038 (0.22)	R-30.3 (5.34)	0.033 (0.19)
R-25.0 (4.40)	R-48.4 (8.53)	R-29.3 (5.17)	0.034 (0.19)	R-33.9 (5.97)	0.030 (0.17)
R-30.0 (5.28)	R-53.4 (9.41)	R-32.2 (5.68)	0.031 (0.18)	R-37.4 (6.58)	0.027 (0.15)
R-35.0 (6.16)	R-58.4 (10.29)	R-35.4 (6.23)	0.028 (0.16)	R-40.8 (7.19)	0.025 (0.14)

### Temperature Indices

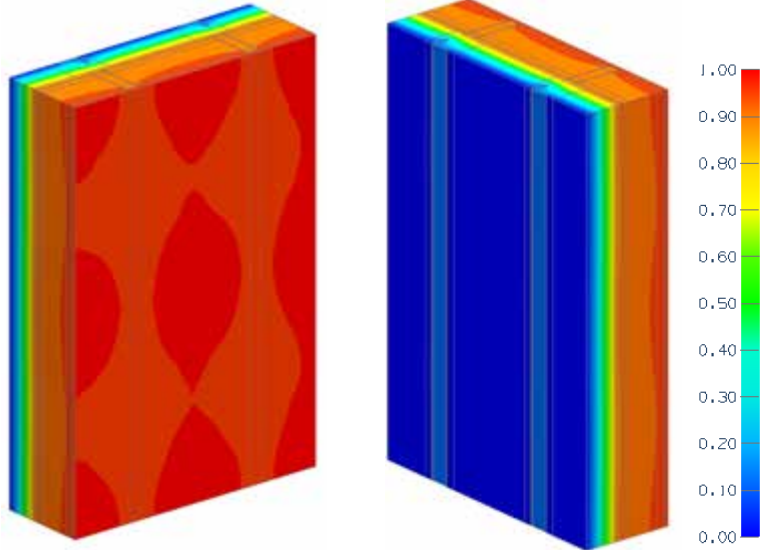
	R20	R25	R30	R35	
$T_{i1}$	0.59	0.62	0.65	0.68	Min T on sheathing, between studs
$T_{i2}$	0.72	0.75	0.77	0.79	Max T on sheathing, along studs

Temperature indices taken from scenario with 16" o.c. studs. All other scenarios have higher minimum temperature index.



# Detail 5.1.80

## Exterior Insulated 6" 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### 16" Horizontal Clip Spacing

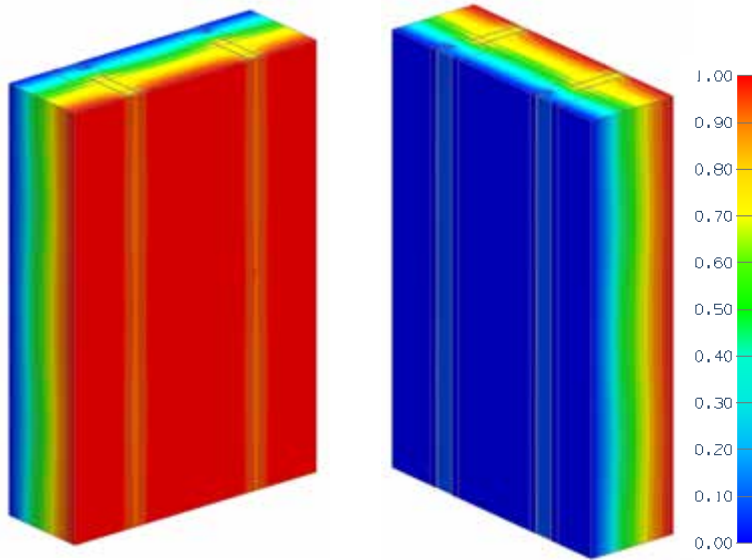
Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.81

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Vci Vertical System and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

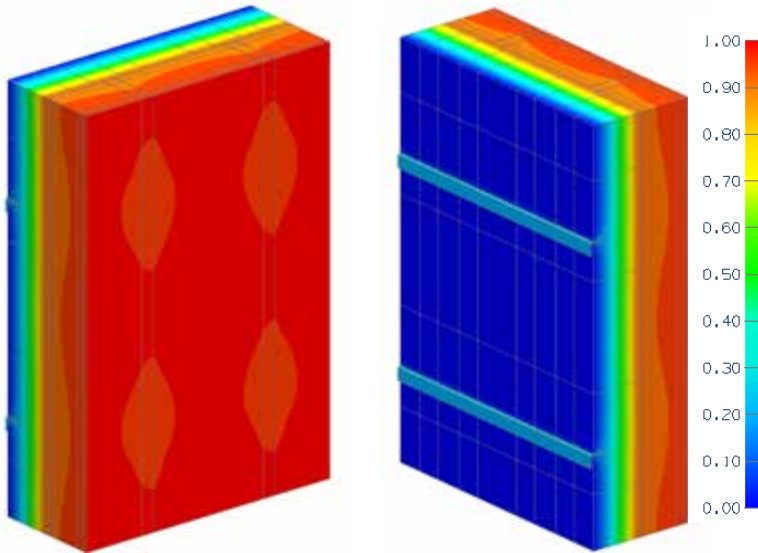
#### 32" Horizontal and 24" Vertical Clip Spacing

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.82

## Exterior Insulated 6" 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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

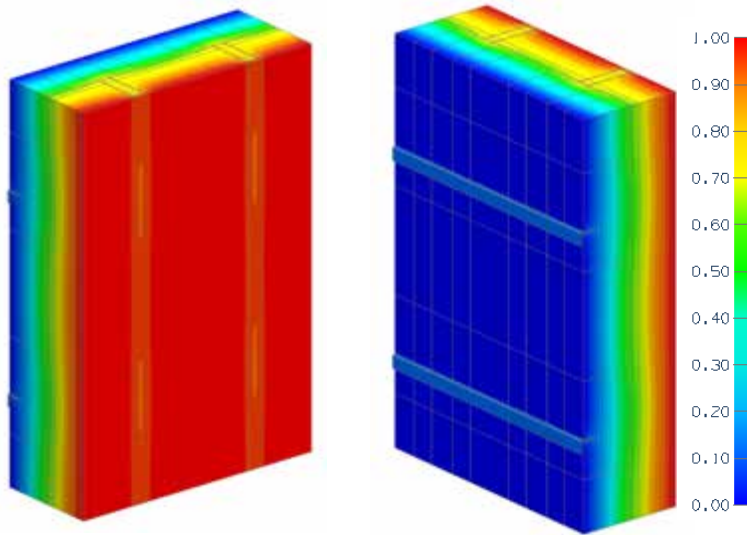
Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.05)	R-9.9 (1.75)	0.101 (0.572)
R-12.9 (2.28)	R-16.2 (2.85)	R-12.6 (2.22)	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 5.1.83

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with ECO Cladding Alpha Hci Horizontal System and R-19 Batt Insulation in Stud Cavity – Clear Wall

### Thermal Performance Indicators



View from Interior

View from Exterior

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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### 16" Horizontal Clip Spacing

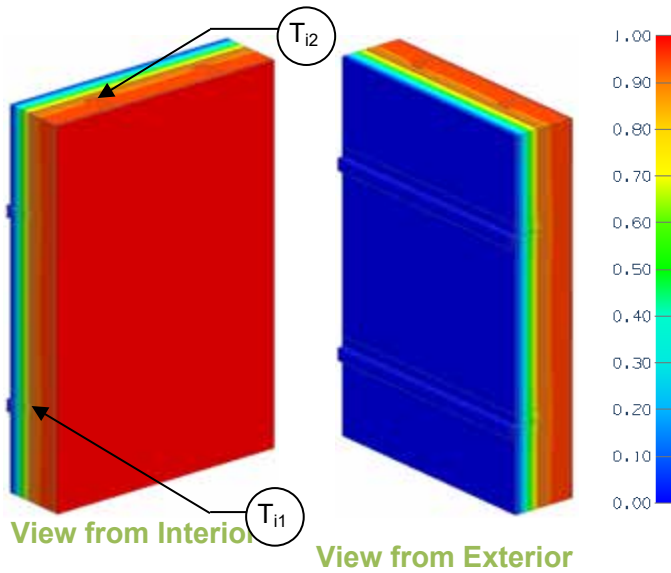
Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.84

## 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



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

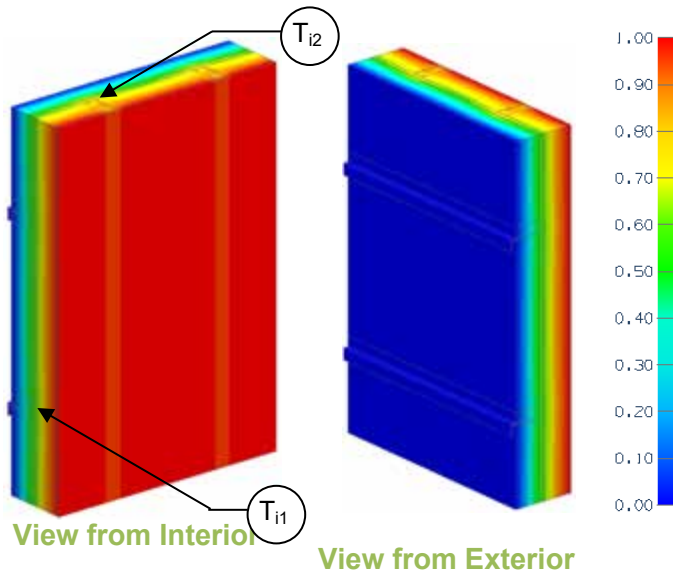
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Girt Spacing		36" Vertical Girt Spacing		48" Vertical Girt Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.1.85

## 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 and R-13 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

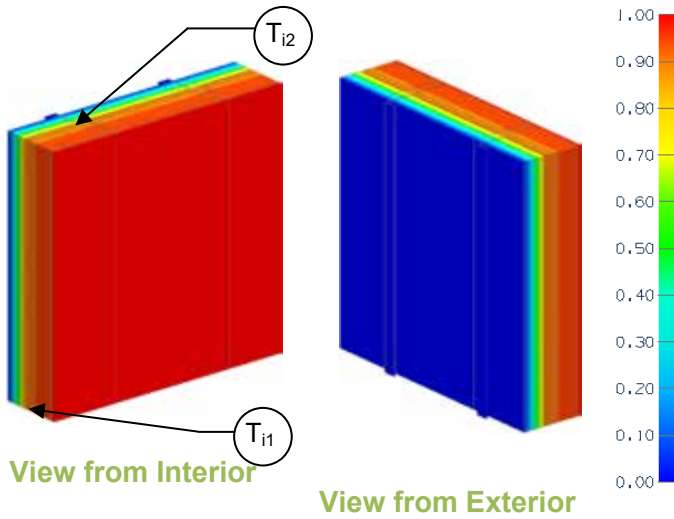
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Girt Spacing		36" Vertical Girt Spacing		48" Vertical Girt Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5.1.86

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

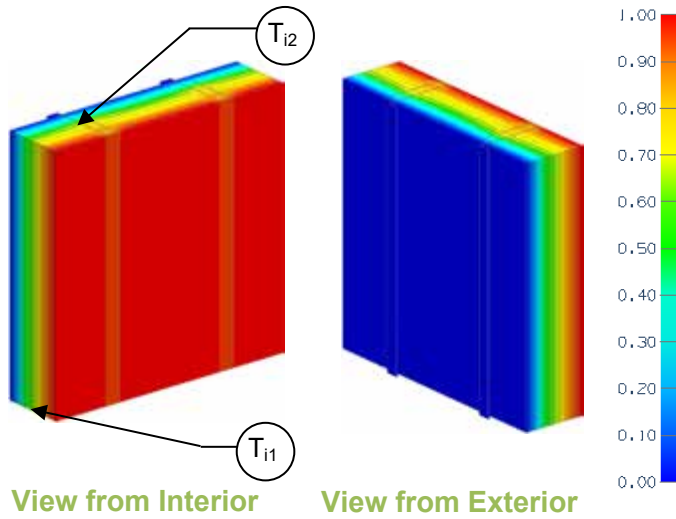
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-8.3 (1.46)	R-8.0 (1.41)	0.125 (0.71)
R-10.0 (1.76)	R-13.3 (2.34)	R-12.6 (2.22)	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 5.1.87

## 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 and R-13 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

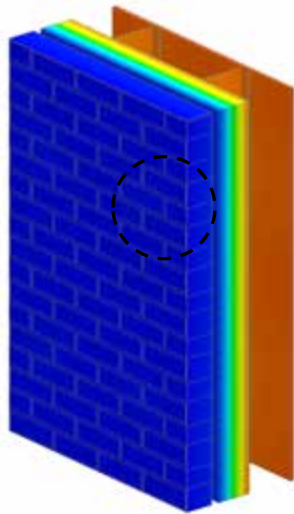
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-20.4 (3.59)	R-14.6 (2.56)	0.069 (0.39)
R-10.0 (1.76)	R-25.4 (4.47)	R-19.1 (3.37)	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

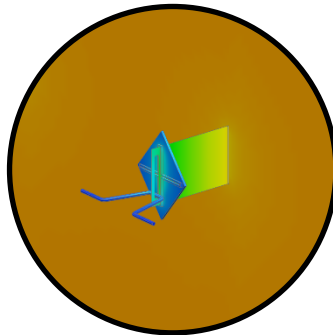
	R5	R10	R15	R20	R25	R30	R35	
$T_{i1}$	0.36	0.51	0.60	0.67	0.71	0.75	0.78	Min T on sheathing, along girts between studs
$T_{i2}$	0.56	0.67	0.73	0.78	0.81	0.83	0.85	Max T on sheathing, along studs between girts

# Detail 5.1.88

## Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Brick Ties (24" o.c.) Supporting Brick Veneer – Clear Wall



View of Exterior



View of Anchoring Tie

### Thermal Performance Indicators



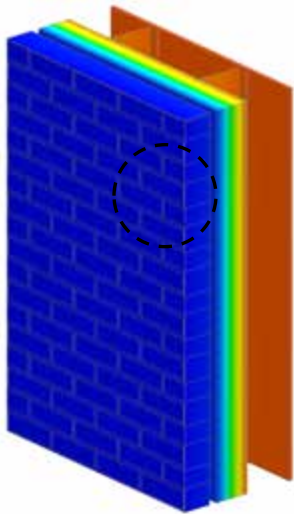
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

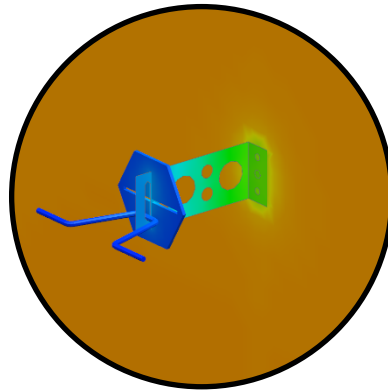
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-21.1 (3.72)	R-16.1 (2.83)	0.062 (0.353)
R-24.0 (4.23)	R-28.3 (4.98)	R-19.8 (3.48)	0.051 (0.287)

# Detail 5.1.89

## Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FERO Slotted Rap Ties (24" o.c.) Supporting Brick Veneer – Clear Wall

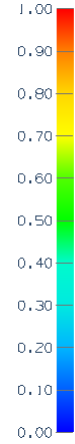


View of Exterior



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

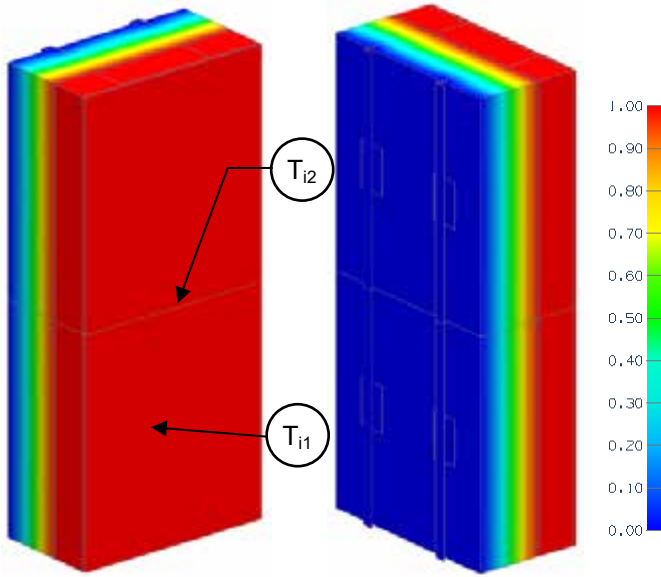
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Without Aerogel		With Aerogel	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-21.1 (3.72)	R-18.6 (3.28)	0.054 (0.305)	R-18.8 (3.32)	0.053 (0.302)
R-24.0 (4.23)	R-28.3 (4.98)	R-24.1 (4.25)	0.041 (0.235)	R-24.5 (4.31)	0.041 (0.232)

# Detail 5.1.90

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Fiber Reinforced Plastic Clip Supporting Cladding – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without connectors or joint
Point Transmittance	$\chi$	Incremental increase in transmittance for connector
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> · hr ·°F (W/m <sup>2</sup> K)
R-25.2 (4.44)	R-28.4 (5.00)	R-24.0 (4.23)	0.042 (0.24)
R-33.6 (5.92)	R-36.8 (6.48)	R-31.1 (5.47)	0.032 (0.18)
R-42.0 (7.40)	R-45.2 (7.96)	R-40.0 (7.04)	0.025 (0.14)

### Temperature Indices

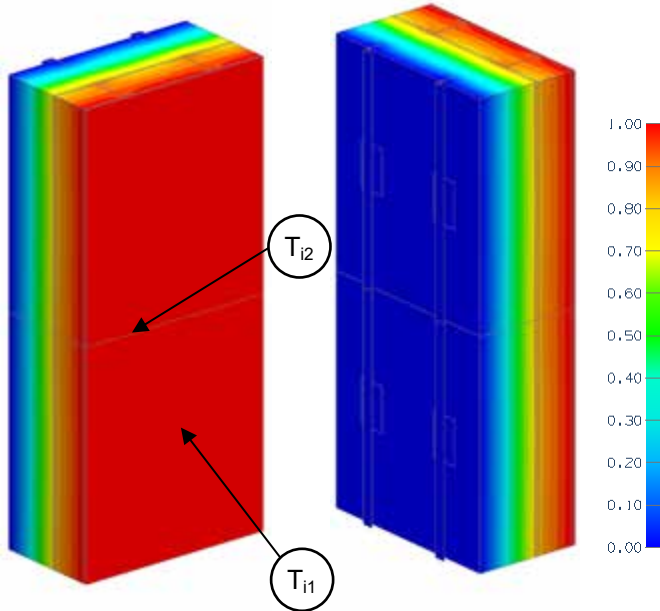
	R25.2	R33.6	R42.0	
$T_{i1}$	0.89	0.92	0.94	Min T on sheathing, at clip and stud intersection
$T_{i2}$	0.92	0.94	0.95	Max T on sheathing, center of stud cavity between clips



# Detail 5.1.91

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Fiber Reinforced Plastic Clip Supporting Metal Cladding and R-19 Batt in Stud Cavity – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear field" U- and R-value, without connectors or joint
Point Transmittance	$\chi$	Incremental increase in transmittance for connector
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-25.2 (4.44)	R-46.5 (8.19)	R-32.1 (5.66)	0.031 (0.18)
R-33.6 (5.92)	R-54.9 (9.67)	R-39.3 (6.91)	0.025 (0.15)
R-42.0 (7.40)	R-63.3 (11.15)	R-48.3 (8.50)	0.021 (0.12)

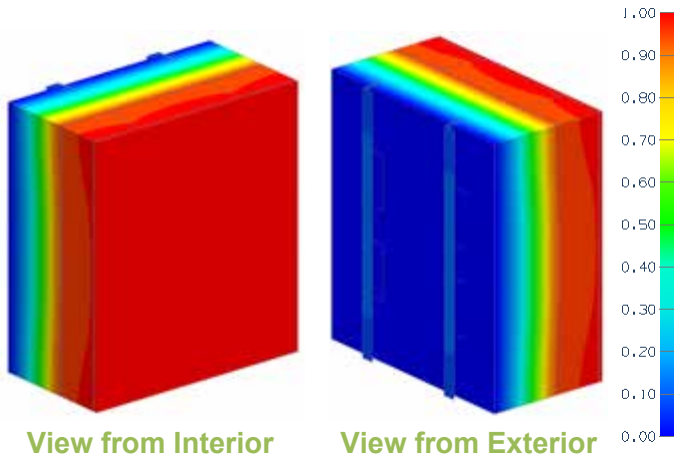
### Temperature Indices

	R25.2	R33.6	R42.0	
$T_{i1}$	0.62	0.69	0.75	Min T on sheathing, between studs
$T_{i2}$	0.79	0.83	0.86	Max T on sheathing, at stud, between clips

# Detail 5.1.92

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Double Aluminum Bracket Supporting Metal Cladding

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56) + insulation
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Point Transmittance	$\chi$	Incremental increase in transmittance for connector

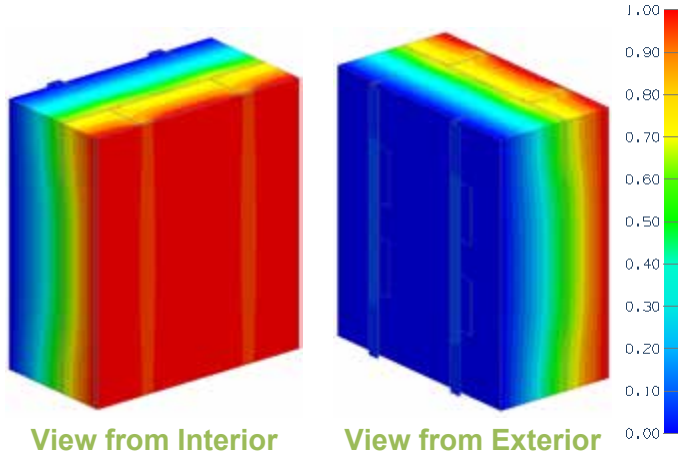
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
R-25.2 (4.44)	R-28.4 (5.00)	R-12.8 (2.25)	0.078 (0.44)	0.073 (0.038)
R-33.6 (5.92)	R-36.8 (6.48)	R-13.9 (2.44)	0.072 (0.41)	0.080 (0.042)
R-42.0 (7.40)	R-45.2 (7.96)	R-14.7 (2.60)	0.068 (0.39)	0.086 (0.045)

# Detail 5.1.93

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Double Aluminum Bracket Supporting Metal Cladding and R-19 Batt Insulation in Stud Cavity

### Thermal Performance Indicators



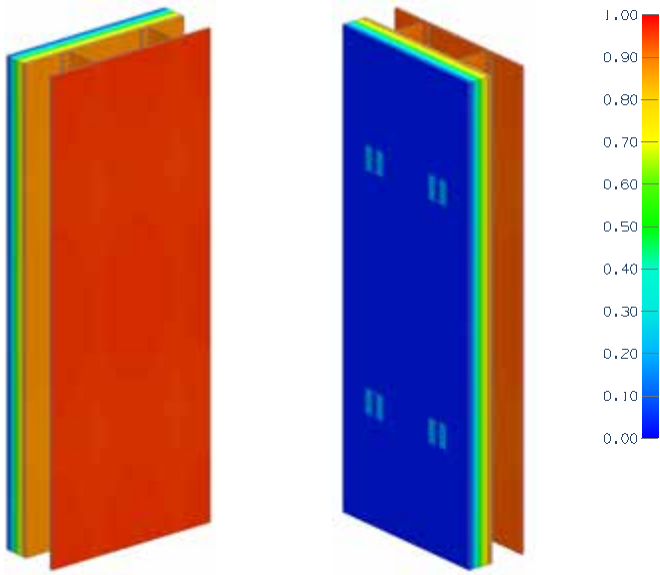
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75) + insulation
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Point Transmittance	$\chi$	Incremental increase in transmittance for connector

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
R-25.2 (4.44)	R-46.5 (8.19)	R-20.2 (3.55)	0.050 (0.28)	0.037 (0.020)
R-33.6 (5.92)	R-54.9 (9.67)	R-21.3 (3.75)	0.047 (0.27)	0.043 (0.023)
R-42.0 (7.40)	R-63.3 (11.15)	R-22.2 (3.90)	0.045 (0.26)	0.049 (0.026)

# Detail 5.1.94

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Technoform Clip and Steel Fasteners - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.30 (0.58 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

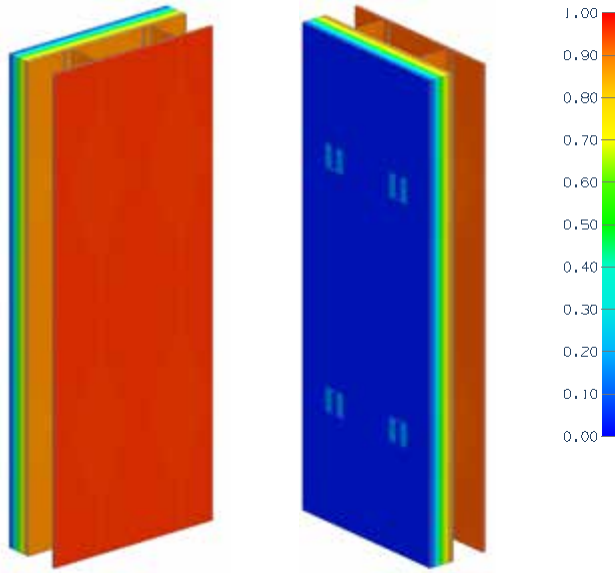
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	12" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing		36" Vertical Clip Spacing		42" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-9.6 (1.70)	0.104 (0.59)	R-9.9 (1.75)	0.101 (0.57)	R-10.4 (1.83)	0.096 (0.55)	R-10.9 (1.92)	0.092 (0.52)	R-11.0 (1.94)	0.091 (0.51)
R-16.8 (2.96)	R-20.1 (3.54)	R-14.3 (2.51)	0.070 (0.40)	R-15.1 (2.65)	0.066 (0.38)	R-16.4 (2.88)	0.061 (0.35)	R-17.6 (3.11)	0.057 (0.32)	R-18.0 (3.16)	0.056 (0.32)
R-25.2 (4.44)	R-28.5 (5.02)	R-18.8 (3.31)	0.053 (0.30)	R-20.1 (3.54)	0.050 (0.28)	R-22.2 (3.91)	0.045 (0.26)	R-24.3 (4.28)	0.041 (0.23)	R-24.8 (4.37)	0.040 (0.23)
R-33.6 (5.92)	R-36.9 (6.50)	R-21.3 (3.76)	0.047 (0.27)	R-22.7 (4.00)	0.044 (0.25)	R-25.3 (4.46)	0.039 (0.22)	R-28.9 (5.08)	0.035 (0.20)	R-30.5 (5.36)	0.033 (0.19)

# Detail 5.1.95

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" O.C.) Wall Assembly with Technoform Clip and Stainless Steel Fasteners - Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.30 (0.58 RSI) + exterior insulation
Transmittance / Resistance	U <sub>o</sub> , R <sub>o</sub>	"Clear wall" U- and R-value

View from Interior

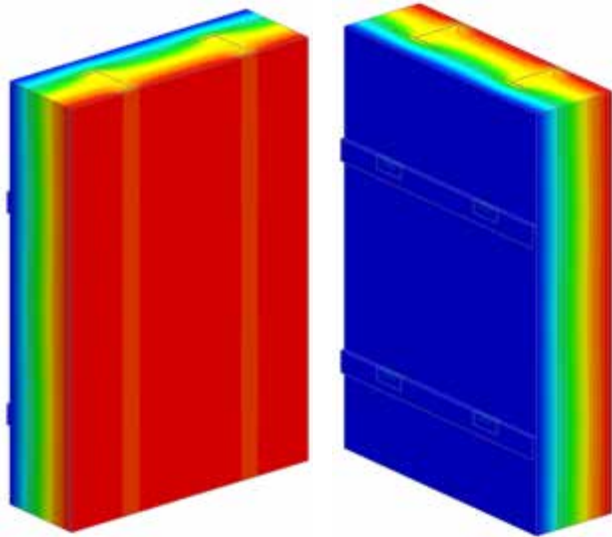
View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	12" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing		36" Vertical Clip Spacing		42" Vertical Clip Spacing	
		R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.0 (1.76)	0.100 (0.57)	R-10.2 (1.80)	0.098 (0.56)	R-10.7 (1.88)	0.094 (0.53)	R-11.1 (1.95)	0.090 (0.51)	R-11.2 (1.97)	0.090 (0.51)
R-16.8 (2.96)	R-20.1 (3.54)	R-15.5 (2.73)	0.065 (0.37)	R-16.2 (2.85)	0.062 (0.35)	R-17.2 (3.04)	0.058 (0.33)	R-18.3 (3.22)	0.055 (0.31)	R-18.5 (3.26)	0.054 (0.31)
R-25.2 (4.44)	R-28.5 (5.02)	R-21.4 (3.77)	0.047 (0.27)	R-22.4 (3.95)	0.045 (0.25)	R-24.1 (4.24)	0.042 (0.24)	R-25.7 (4.52)	0.039 (0.22)	R-26.0 (4.59)	0.038 (0.22)
R-33.6 (5.92)	R-36.9 (6.50)	R-24.7 (4.34)	0.041 (0.23)	R-26.0 (4.57)	0.039 (0.22)	R-28.3 (4.99)	0.035 (0.20)	R-31.2 (5.49)	0.032 (0.18)	R-32.3 (5.69)	0.031 (0.18)

# Detail 5.1.96

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Galvanized Horizontal Intermittent Clips (24" o.c.) Supporting Metal Cladding and Owens Corning R-20 Batt Insulation in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	"clear wall" U- and R-value

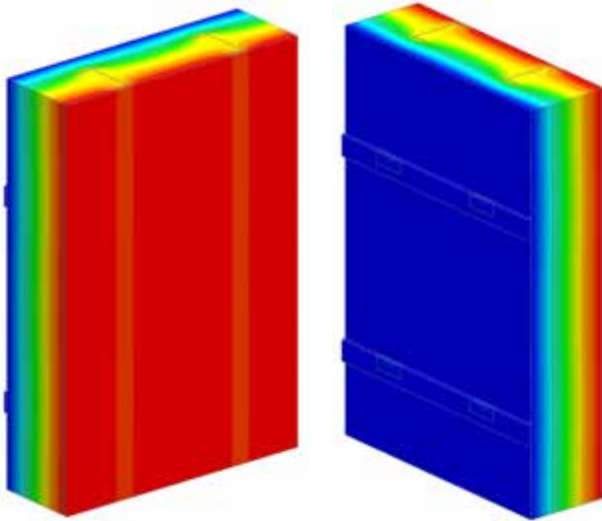
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.3 (1.11)	R-28.7 (5.05)	R-17.1 (3.02)	0.058 (0.33)
R-8.4 (1.48)	R-30.8 (5.42)	R-18.7 (3.29)	0.054 (0.30)
R-12.6 (2.22)	R-35.0 (6.16)	R-21.6 (3.80)	0.046 (0.26)
R-16.8 (2.96)	R-39.2 (6.90)	R-24.3 (4.27)	0.041 (0.23)
R-21.0 (3.70)	R-43.4 (7.64)	R-26.8 (4.72)	0.037 (0.21)

# Detail 5.1.97

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Galvanized Horizontal Intermittent Clips (24" o.c.) Supporting Metal Cladding and Owens Corning R-22.5 Batt Insulation in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-24.9 (4.38 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value

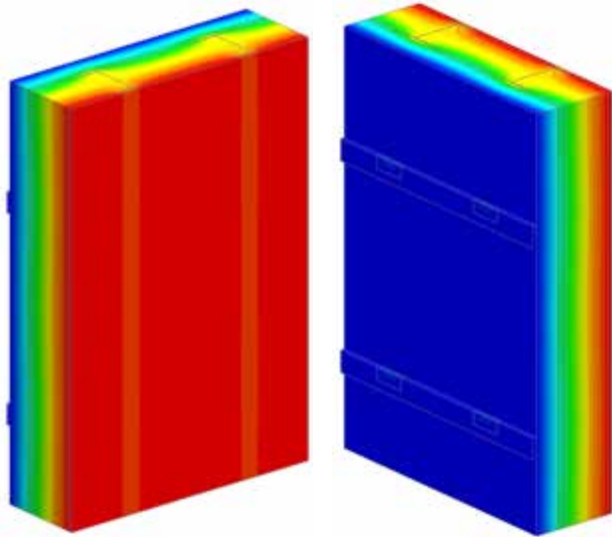
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.3 (1.11)	R-31.2 (5.49)	R-17.8 (3.13)	0.056 (0.32)
R-8.4 (1.48)	R-33.3 (5.86)	R-19.3 (3.40)	0.052 (0.29)
R-12.6 (2.22)	R-37.5 (6.60)	R-22.2 (3.91)	0.045 (0.26)
R-16.8 (2.96)	R-41.7 (7.34)	R-24.9 (4.38)	0.040 (0.23)
R-21.0 (3.70)	R-45.9 (8.08)	R-27.4 (4.83)	0.036 (0.21)

# Detail 5.1.98

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Galvanized Horizontal Intermittent Clips (24" o.c.) Supporting Metal Cladding and Owens Corning R-24 Batt Insulation in Stud Cavity – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-26.4 (4.65 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	"clear wall" U- and R-value

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

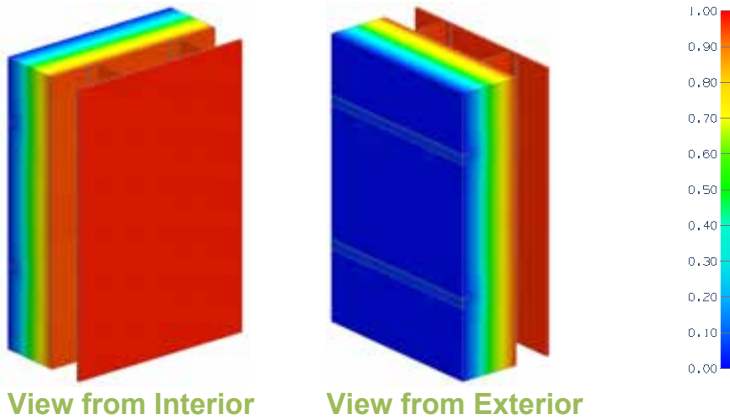
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-6.3 (1.11)	R-32.7 (5.76)	R-18.1 (3.19)	0.055 (0.31)
R-8.4 (1.48)	R-34.8 (6.13)	R-19.6 (3.46)	0.051 (0.29)
R-12.6 (2.22)	R-39.0 (6.87)	R-22.5 (3.97)	0.044 (0.25)
R-16.8 (2.96)	R-43.2 (7.61)	R-25.2 (4.44)	0.040 (0.23)
R-21.0 (3.70)	R-47.4 (8.34)	R-27.8 (4.89)	0.036 (0.20)



# Detail 5.1.99

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with EJOT Crossfix Console and Horizontal Rail System Supporting Metal Cladding - Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.30 (0.58 RSI) + exterior insulation
Transmittance / Resistance	U <sub>o</sub> , R <sub>o</sub>	"Clear wall" U- and R- value

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

#### 16" Horizontal Console Spacing

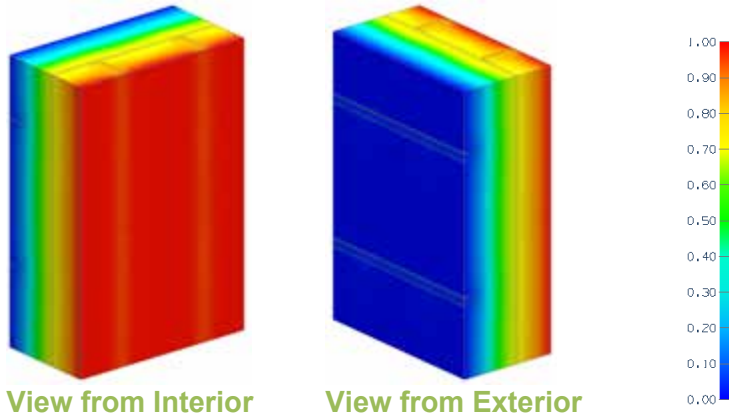
Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.2 (1.80)	0.098 (0.55)	R-10.7 (1.88)	0.094 (0.53)	R-10.9 (1.92)	0.092 (0.52)
R-12.6 (2.22)	R-15.9 (2.80)	R-13.6 (2.39)	0.076 (0.43)	R-14.2 (2.51)	0.073 (0.41)	R-14.6 (2.58)	0.071 (0.40)
R-14.7 (2.59)	R-18.0 (3.17)	R-15.2 (2.68)	0.066 (0.37)	R-16.0 (2.82)	0.062 (0.35)	R-16.5 (2.90)	0.061 (0.34)
R-21.0 (3.70)	R-24.3 (4.28)	R-20.1 (3.54)	0.050 (0.28)	R-21.3 (3.76)	0.047 (0.27)	R-22.0 (3.88)	0.045 (0.26)
R-27.3 (4.81)	R-30.6 (5.39)	R-25.0 (4.40)	0.042 (0.24)	R-26.6 (4.69)	0.040 (0.22)	R-27.5 (4.85)	0.038 (0.22)
R-35.7 (6.29)	R-39.0 (6.87)	R-31.5 (5.55)	0.032 (0.18)	R-33.7 (5.93)	0.030 (0.17)	R-34.9 (6.14)	0.029 (0.16)
R-42.0 (7.40)	R-45.3 (7.98)	R-36.1 (6.36)	0.028 (0.16)	R-38.7 (6.82)	0.026 (0.15)	R-40.2 (7.08)	0.025 (0.14)
R-48.3 (8.51)	R-51.6 (9.08)	R-40.7 (7.18)	0.025 (0.14)	R-43.8 (7.72)	0.023 (0.13)	R-45.5 (8.02)	0.022 (0.13)
R-54.6 (9.62)	R-57.9 (10.19)	R-45.4 (7.99)	0.022 (0.13)	R-48.9 (8.61)	0.020 (0.12)	R-50.9 (8.96)	0.020 (0.11)
R-60.9 (10.73)	R-64.2 (11.30)	R-50.0 (8.80)	0.020 (0.11)	R-54.0 (9.50)	0.019 (0.11)	R-56.2 (9.90)	0.018 (0.10)
R-67.2 (11.84)	R-70.5 (12.41)	R-54.6 (9.61)	0.018 (0.10)	R-59.0 (10.39)	0.017 (0.10)	R-61.5 (10.84)	0.016 (0.09)

#### 32" Horizontal Console Spacing

Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.7 (1.88)	0.094 (0.53)	R-11.0 (1.94)	0.091 (0.52)	R-11.2 (1.97)	0.090 (0.51)
R-12.6 (2.22)	R-15.9 (2.80)	R-14.2 (2.50)	0.073 (0.41)	R-14.7 (2.59)	0.071 (0.40)	R-15.0 (2.64)	0.069 (0.39)
R-14.7 (2.59)	R-18.0 (3.17)	R-16.0 (2.81)	0.063 (0.36)	R-16.6 (2.92)	0.060 (0.34)	R-16.9 (2.98)	0.059 (0.34)
R-21.0 (3.70)	R-24.3 (4.28)	R-21.5 (3.79)	0.046 (0.26)	R-22.4 (3.94)	0.045 (0.25)	R-22.8 (4.02)	0.044 (0.25)
R-27.3 (4.81)	R-30.6 (5.39)	R-27.0 (4.76)	0.039 (0.22)	R-28.1 (4.95)	0.038 (0.21)	R-28.7 (5.05)	0.037 (0.21)
R-35.7 (6.29)	R-39.0 (6.87)	R-34.4 (6.05)	0.029 (0.17)	R-35.8 (6.30)	0.028 (0.16)	R-36.5 (6.43)	0.027 (0.16)
R-42.0 (7.40)	R-45.3 (7.98)	R-39.7 (6.99)	0.025 (0.14)	R-41.4 (7.29)	0.024 (0.14)	R-42.3 (7.45)	0.024 (0.13)
R-48.3 (8.51)	R-51.6 (9.08)	R-45.0 (7.93)	0.023 (0.13)	R-47.0 (8.28)	0.022 (0.12)	R-48.1 (8.47)	0.021 (0.12)
R-54.6 (9.62)	R-57.9 (10.19)	R-50.4 (8.88)	0.020 (0.11)	R-52.6 (9.27)	0.019 (0.11)	R-53.9 (9.49)	0.019 (0.11)
R-60.9 (10.73)	R-64.2 (11.30)	R-55.7 (9.81)	0.018 (0.10)	R-58.3 (10.26)	0.017 (0.10)	R-59.6 (10.51)	0.017 (0.10)
R-67.2 (11.84)	R-70.5 (12.41)	R-61.0 (10.75)	0.016 (0.09)	R-63.9 (11.25)	0.016 (0.09)	R-65.4 (11.52)	0.015 (0.09)

# Detail 5.1.100

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with EJOT Crossfix Console and Horizontal Rail System Supporting Metal 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

### Nominal (1D) vs. Assembly Performance Indicators

#### 16" Horizontal Console Spacing

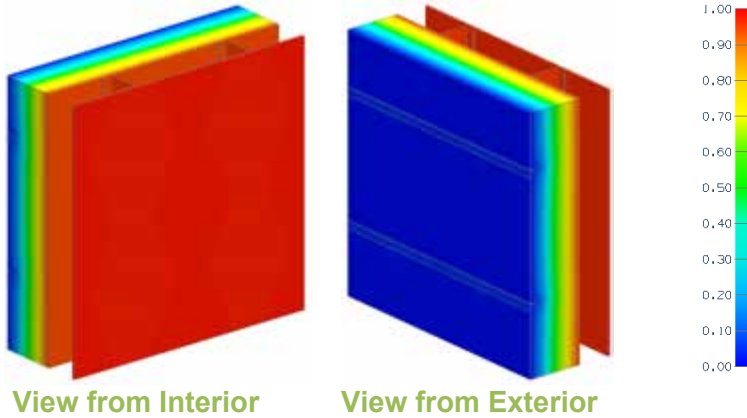
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-18.6 (3.27)	0.054 (0.31)	R-19.2 (3.39)	0.052 (0.30)	R-19.6 (3.45)	0.051 (0.29)
R-12.6 (2.22)	R-35.0 (6.16)	R-21.8 (3.85)	0.046 (0.26)	R-22.8 (4.01)	0.044 (0.25)	R-23.3 (4.10)	0.044 (0.25)
R-14.7 (2.59)	R-37.1 (6.53)	R-23.5 (4.14)	0.043 (0.24)	R-24.6 (4.33)	0.041 (0.23)	R-25.2 (4.43)	0.040 (0.23)
R-21.0 (3.70)	R-43.4 (7.64)	R-28.3 (4.98)	0.035 (0.20)	R-29.8 (5.24)	0.034 (0.19)	R-30.6 (5.39)	0.033 (0.19)
R-27.3 (4.81)	R-49.7 (8.75)	R-33.1 (5.83)	0.031 (0.18)	R-35.0 (6.17)	0.029 (0.17)	R-36.1 (6.35)	0.029 (0.16)
R-35.7 (6.29)	R-58.1 (10.23)	R-39.5 (6.96)	0.025 (0.14)	R-42.0 (7.40)	0.024 (0.14)	R-43.4 (7.64)	0.023 (0.13)
R-42.0 (7.40)	R-64.4 (11.34)	R-44.1 (7.77)	0.023 (0.13)	R-47.0 (8.29)	0.021 (0.12)	R-48.7 (8.58)	0.021 (0.12)
R-48.3 (8.51)	R-70.7 (12.45)	R-48.7 (8.58)	0.021 (0.12)	R-52.1 (9.18)	0.019 (0.11)	R-54.0 (9.51)	0.019 (0.11)
R-54.6 (9.62)	R-77.0 (13.56)	R-53.3 (9.39)	0.019 (0.11)	R-57.2 (10.07)	0.017 (0.10)	R-59.4 (10.45)	0.017 (0.10)
R-60.9 (10.73)	R-83.3 (14.67)	R-57.9 (10.20)	0.017 (0.10)	R-62.2 (10.96)	0.016 (0.09)	R-64.7 (11.39)	0.016 (0.09)
R-67.2 (11.84)	R-89.6 (15.78)	R-62.5 (11.01)	0.016 (0.09)	R-67.3 (11.85)	0.015 (0.08)	R-70.0 (12.33)	0.014 (0.08)

#### 32" Horizontal Console Spacing

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-19.4 (3.41)	0.052 (0.29)	R-19.8 (3.49)	0.051 (0.29)	R-20.0 (3.53)	0.050 (0.28)
R-12.6 (2.22)	R-35.0 (6.16)	R-22.9 (4.03)	0.044 (0.25)	R-23.5 (4.14)	0.043 (0.24)	R-23.9 (4.21)	0.042 (0.24)
R-14.7 (2.59)	R-37.1 (6.53)	R-24.7 (4.34)	0.041 (0.23)	R-25.4 (4.47)	0.039 (0.22)	R-25.8 (4.55)	0.039 (0.22)
R-21.0 (3.70)	R-43.4 (7.64)	R-30.1 (5.31)	0.033 (0.19)	R-31.1 (5.49)	0.032 (0.18)	R-31.7 (5.58)	0.032 (0.18)
R-27.3 (4.81)	R-49.7 (8.75)	R-35.6 (6.27)	0.029 (0.16)	R-36.9 (6.49)	0.028 (0.16)	R-37.6 (6.61)	0.027 (0.16)
R-35.7 (6.29)	R-58.1 (10.23)	R-42.9 (7.56)	0.023 (0.13)	R-44.5 (7.84)	0.022 (0.13)	R-45.4 (7.99)	0.022 (0.13)
R-42.0 (7.40)	R-64.4 (11.34)	R-48.3 (8.50)	0.021 (0.12)	R-50.1 (8.83)	0.020 (0.11)	R-51.1 (9.01)	0.020 (0.11)
R-48.3 (8.51)	R-70.7 (12.45)	R-53.6 (9.44)	0.019 (0.11)	R-55.8 (9.82)	0.018 (0.10)	R-56.9 (10.02)	0.018 (0.10)
R-54.6 (9.62)	R-77.0 (13.56)	R-58.9 (10.38)	0.017 (0.10)	R-61.4 (10.81)	0.016 (0.09)	R-62.7 (11.04)	0.016 (0.09)
R-60.9 (10.73)	R-83.3 (14.67)	R-64.2 (11.31)	0.016 (0.09)	R-67.0 (11.80)	0.015 (0.09)	R-68.5 (12.06)	0.015 (0.08)
R-67.2 (11.84)	R-89.6 (15.78)	R-69.6 (12.25)	0.014 (0.08)	R-72.6 (12.79)	0.014 (0.08)	R-74.2 (13.07)	0.013 (0.08)

# Detail 5.1.101

## Exterior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with EJOT Crossfix Console and Horizontal Rail System Supporting Metal Cladding - Clear Wall



### Thermal Performance Indicators

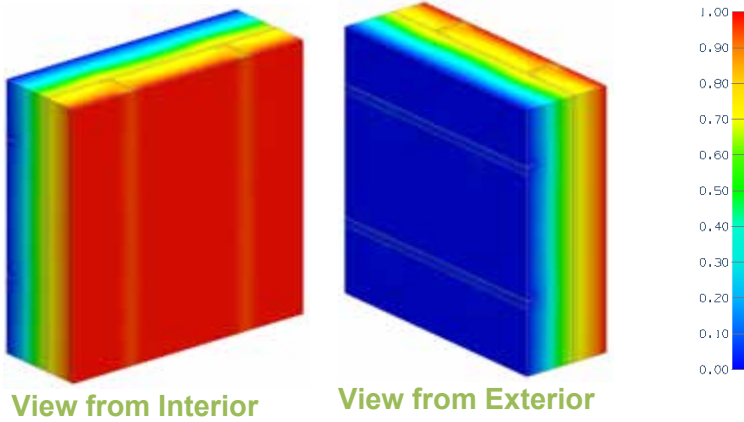
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.30 (0.58 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.5 (1.86)	0.095 (0.54)	R-10.9 (1.92)	0.092 (0.52)	R-11.1 (1.95)	0.090 (0.51)
R-12.6 (2.22)	R-15.9 (2.80)	R-14.0 (2.46)	0.074 (0.42)	R-14.6 (2.57)	0.071 (0.40)	R-14.9 (2.62)	0.070 (0.40)
R-14.7 (2.59)	R-18.0 (3.17)	R-15.7 (2.77)	0.064 (0.36)	R-16.4 (2.89)	0.061 (0.35)	R-16.8 (2.96)	0.060 (0.34)
R-21.0 (3.70)	R-24.3 (4.28)	R-21.0 (3.70)	0.048 (0.27)	R-22.0 (3.88)	0.045 (0.26)	R-22.6 (3.97)	0.044 (0.25)
R-27.3 (4.81)	R-30.6 (5.39)	R-26.3 (4.63)	0.040 (0.23)	R-27.6 (4.86)	0.038 (0.22)	R-28.3 (4.98)	0.037 (0.21)
R-35.7 (6.29)	R-39.0 (6.87)	R-33.3 (5.87)	0.030 (0.17)	R-35.0 (6.17)	0.029 (0.16)	R-36.0 (6.33)	0.028 (0.16)
R-42.0 (7.40)	R-45.3 (7.98)	R-38.4 (6.77)	0.026 (0.15)	R-40.5 (7.13)	0.025 (0.14)	R-41.6 (7.32)	0.024 (0.14)
R-48.3 (8.51)	R-51.6 (9.08)	R-43.5 (7.66)	0.023 (0.13)	R-45.9 (8.08)	0.022 (0.13)	R-47.2 (8.31)	0.021 (0.12)
R-54.6 (9.62)	R-57.9 (10.19)	R-48.6 (8.56)	0.021 (0.12)	R-51.3 (9.04)	0.019 (0.11)	R-52.8 (9.30)	0.019 (0.11)
R-60.9 (10.73)	R-64.2 (11.30)	R-53.7 (9.45)	0.019 (0.11)	R-56.8 (10.00)	0.018 (0.10)	R-58.4 (10.29)	0.017 (0.10)
R-67.2 (11.84)	R-70.5 (12.41)	R-58.7 (10.34)	0.017 (0.10)	R-62.2 (10.95)	0.016 (0.09)	R-64.1 (11.28)	0.016 (0.09)

# Detail 5.1.102

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with EJOT Crossfix Console and Horizontal Rail System Supporting Metal Cladding and R-20 Batt Insulation in Stud Cavity - Clear Wall



### Thermal Performance Indicators

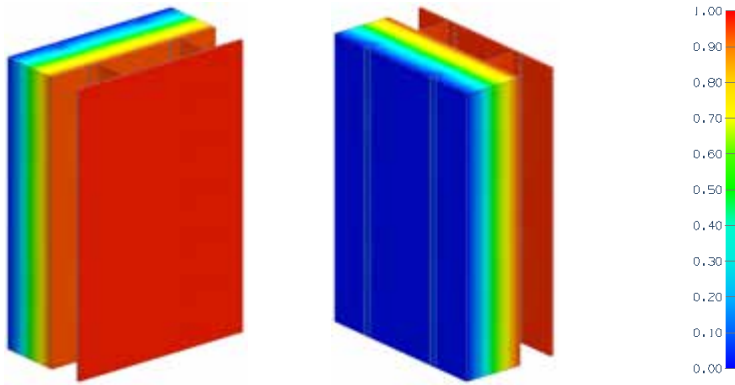
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-21.3 (3.75)	0.047 (0.27)	R-21.9 (3.85)	0.046 (0.26)	R-22.2 (3.91)	0.045 (0.26)
R-12.6 (2.22)	R-35.0 (6.16)	R-24.7 (4.36)	0.041 (0.23)	R-25.6 (4.51)	0.040 (0.22)	R-26.0 (4.59)	0.039 (0.22)
R-14.7 (2.59)	R-37.1 (6.53)	R-26.5 (4.66)	0.038 (0.21)	R-27.5 (4.84)	0.036 (0.21)	R-28.0 (4.93)	0.036 (0.20)
R-21.0 (3.70)	R-43.4 (7.64)	R-31.7 (5.58)	0.032 (0.18)	R-33.0 (5.81)	0.030 (0.17)	R-33.7 (5.93)	0.030 (0.17)
R-27.3 (4.81)	R-49.7 (8.75)	R-36.9 (6.50)	0.028 (0.16)	R-38.5 (6.79)	0.027 (0.15)	R-39.4 (6.94)	0.026 (0.15)
R-35.7 (6.29)	R-58.1 (10.23)	R-43.9 (7.73)	0.023 (0.13)	R-45.9 (8.09)	0.022 (0.12)	R-47.0 (8.29)	0.021 (0.12)
R-42.0 (7.40)	R-64.4 (11.34)	R-48.9 (8.61)	0.020 (0.12)	R-51.3 (9.04)	0.019 (0.11)	R-52.6 (9.27)	0.019 (0.11)
R-48.3 (8.51)	R-70.7 (12.45)	R-53.9 (9.50)	0.019 (0.11)	R-56.7 (9.99)	0.018 (0.10)	R-58.3 (10.26)	0.017 (0.10)
R-54.6 (9.62)	R-77.0 (13.56)	R-59.0 (10.39)	0.017 (0.10)	R-62.2 (10.95)	0.016 (0.09)	R-63.9 (11.25)	0.016 (0.09)
R-60.9 (10.73)	R-83.3 (14.67)	R-64.1 (11.28)	0.016 (0.09)	R-67.6 (11.90)	0.015 (0.08)	R-69.5 (12.24)	0.014 (0.08)
R-67.2 (11.84)	R-89.6 (15.78)	R-69.1 (12.17)	0.014 (0.08)	R-73.0 (12.85)	0.014 (0.08)	R-75.1 (13.22)	0.013 (0.08)

# Detail 5.1.103

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with EJOT Crossfix Console and Vertical Rail System Supporting Metal Cladding - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.30 (0.58 RSI) + exterior insulation
Transmittance / Resistance	U <sub>o</sub> , R <sub>o</sub>	"Clear wall" U- and R- value

### Nominal (1D) vs. Assembly Performance Indicators

#### 16" Horizontal Console Spacing

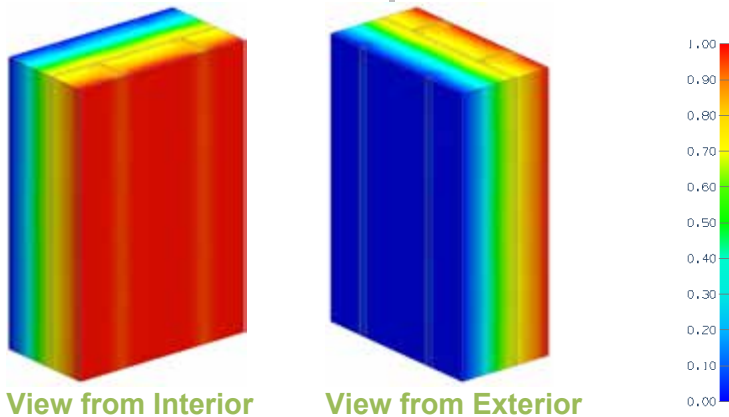
Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.0 (1.77)	0.100 (0.57)	R-10.3 (1.82)	0.097 (0.55)	R-10.5 (1.84)	0.096 (0.54)
R-12.6 (2.22)	R-15.9 (2.80)	R-12.9 (2.27)	0.080 (0.45)	R-13.4 (2.36)	0.077 (0.44)	R-13.6 (2.40)	0.076 (0.43)
R-14.7 (2.59)	R-18.0 (3.17)	R-14.3 (2.52)	0.070 (0.40)	R-14.9 (2.62)	0.067 (0.38)	R-15.2 (2.68)	0.066 (0.37)
R-21.0 (3.70)	R-24.3 (4.28)	R-19.1 (3.37)	0.052 (0.30)	R-20.1 (3.55)	0.050 (0.28)	R-20.7 (3.64)	0.048 (0.27)
R-27.3 (4.81)	R-30.6 (5.39)	R-23.8 (4.20)	0.044 (0.25)	R-25.3 (4.45)	0.042 (0.24)	R-26.1 (4.60)	0.040 (0.23)
R-35.7 (6.29)	R-39.0 (6.87)	R-30.2 (5.31)	0.033 (0.19)	R-32.2 (5.67)	0.031 (0.18)	R-33.3 (5.87)	0.030 (0.17)
R-42.0 (7.40)	R-45.3 (7.98)	R-34.7 (6.11)	0.029 (0.16)	R-37.2 (6.55)	0.027 (0.15)	R-38.6 (6.80)	0.026 (0.15)
R-48.3 (8.51)	R-51.6 (9.08)	R-39.4 (6.93)	0.026 (0.15)	R-42.3 (7.45)	0.024 (0.14)	R-44.0 (7.74)	0.023 (0.13)
R-54.6 (9.62)	R-57.9 (10.19)	R-44.0 (7.75)	0.023 (0.13)	R-47.4 (8.34)	0.021 (0.12)	R-49.3 (8.68)	0.020 (0.12)
R-60.9 (10.73)	R-64.2 (11.30)	R-48.6 (8.56)	0.021 (0.12)	R-52.4 (9.24)	0.019 (0.11)	R-54.6 (9.62)	0.018 (0.10)
R-67.2 (11.84)	R-70.5 (12.41)	R-53.2 (9.38)	0.019 (0.11)	R-57.5 (10.13)	0.017 (0.10)	R-60.0 (10.56)	0.017 (0.09)

#### 32" Horizontal Console Spacing

Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.8 (1.90)	0.093 (0.53)	R-11.0 (1.93)	0.091 (0.52)	R-11.0 (1.94)	0.091 (0.51)
R-12.6 (2.22)	R-15.9 (2.80)	R-14.2 (2.51)	0.073 (0.41)	R-14.5 (2.56)	0.071 (0.40)	R-14.7 (2.58)	0.071 (0.40)
R-14.7 (2.59)	R-18.0 (3.17)	R-15.9 (2.81)	0.063 (0.36)	R-16.3 (2.87)	0.061 (0.35)	R-16.5 (2.90)	0.061 (0.34)
R-21.0 (3.70)	R-24.3 (4.28)	R-21.4 (3.77)	0.047 (0.27)	R-22.0 (3.88)	0.045 (0.26)	R-22.4 (3.94)	0.045 (0.25)
R-27.3 (4.81)	R-30.6 (5.39)	R-26.8 (4.72)	0.039 (0.22)	R-27.7 (4.88)	0.038 (0.22)	R-28.2 (4.96)	0.037 (0.21)
R-35.7 (6.29)	R-39.0 (6.87)	R-34.0 (5.99)	0.029 (0.17)	R-35.3 (6.21)	0.028 (0.16)	R-35.9 (6.33)	0.028 (0.16)
R-42.0 (7.40)	R-45.3 (7.98)	R-39.3 (6.92)	0.025 (0.14)	R-40.9 (7.19)	0.024 (0.14)	R-41.7 (7.34)	0.024 (0.14)
R-48.3 (8.51)	R-51.6 (9.08)	R-44.6 (7.86)	0.023 (0.13)	R-46.5 (8.19)	0.022 (0.12)	R-47.5 (8.36)	0.021 (0.12)
R-54.6 (9.62)	R-57.9 (10.19)	R-50.0 (8.80)	0.020 (0.11)	R-52.1 (9.18)	0.019 (0.11)	R-53.3 (9.38)	0.019 (0.11)
R-60.9 (10.73)	R-64.2 (11.30)	R-55.3 (9.74)	0.018 (0.10)	R-57.7 (10.17)	0.017 (0.10)	R-59.0 (10.39)	0.017 (0.10)
R-67.2 (11.84)	R-70.5 (12.41)	R-60.6 (10.68)	0.016 (0.09)	R-63.3 (11.16)	0.016 (0.09)	R-64.8 (11.41)	0.015 (0.09)

# Detail 5.1.104

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with EJOT Crossfix Console and Vertical Rail System Supporting Metal 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

### Nominal (1D) vs. Assembly Performance Indicators

#### 16" Horizontal Console Spacing

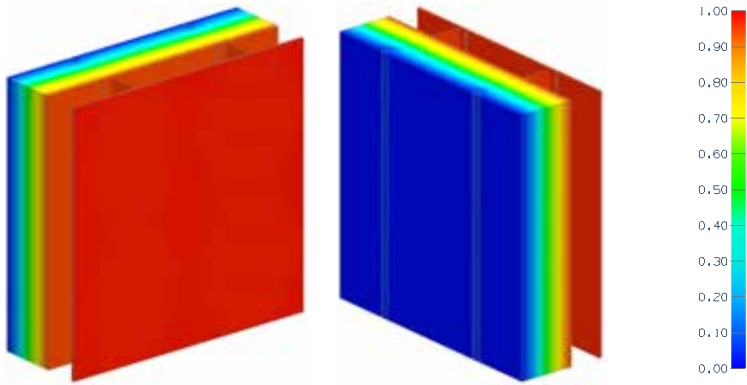
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-18.0 (3.17)	0.056 (0.32)	R-18.5 (3.25)	0.054 (0.31)	R-18.7 (3.30)	0.053 (0.30)
R-12.6 (2.22)	R-35.0 (6.16)	R-20.8 (3.66)	0.049 (0.28)	R-21.5 (3.78)	0.047 (0.27)	R-21.8 (3.85)	0.046 (0.26)
R-14.7 (2.59)	R-37.1 (6.53)	R-22.2 (3.90)	0.045 (0.26)	R-23.0 (4.05)	0.044 (0.25)	R-23.4 (4.12)	0.043 (0.24)
R-21.0 (3.70)	R-43.4 (7.64)	R-27.0 (4.76)	0.037 (0.21)	R-28.3 (4.98)	0.035 (0.20)	R-29.0 (5.11)	0.034 (0.20)
R-27.3 (4.81)	R-49.7 (8.75)	R-31.7 (5.59)	0.032 (0.18)	R-33.5 (5.90)	0.031 (0.17)	R-34.5 (6.08)	0.030 (0.17)
R-35.7 (6.29)	R-58.1 (10.23)	R-38.1 (6.70)	0.026 (0.15)	R-40.4 (7.12)	0.025 (0.14)	R-41.8 (7.36)	0.024 (0.14)
R-42.0 (7.40)	R-64.4 (11.34)	R-42.6 (7.51)	0.023 (0.13)	R-45.5 (8.01)	0.022 (0.12)	R-47.1 (8.29)	0.021 (0.12)
R-48.3 (8.51)	R-70.7 (12.45)	R-47.3 (8.32)	0.021 (0.12)	R-50.6 (8.90)	0.020 (0.11)	R-52.4 (9.23)	0.019 (0.11)
R-54.6 (9.62)	R-77.0 (13.56)	R-51.9 (9.14)	0.019 (0.11)	R-55.6 (9.80)	0.018 (0.10)	R-57.8 (10.17)	0.017 (0.10)
R-60.9 (10.73)	R-83.3 (14.67)	R-56.5 (9.96)	0.018 (0.10)	R-60.7 (10.69)	0.017 (0.09)	R-63.1 (11.11)	0.016 (0.09)
R-67.2 (11.84)	R-89.6 (15.78)	R-61.2 (10.77)	0.016 (0.09)	R-65.8 (11.59)	0.015 (0.09)	R-68.5 (12.06)	0.015 (0.08)

#### 32" Horizontal Console Spacing

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-19.3 (3.39)	0.052 (0.29)	R-19.5 (3.44)	0.051 (0.29)	R-19.7 (3.47)	0.051 (0.29)
R-12.6 (2.22)	R-35.0 (6.16)	R-22.7 (4.00)	0.045 (0.25)	R-23.1 (4.07)	0.044 (0.25)	R-23.3 (4.11)	0.043 (0.25)
R-14.7 (2.59)	R-37.1 (6.53)	R-24.4 (4.30)	0.041 (0.23)	R-24.9 (4.38)	0.040 (0.23)	R-25.1 (4.43)	0.040 (0.23)
R-21.0 (3.70)	R-43.4 (7.64)	R-29.9 (5.26)	0.033 (0.19)	R-30.7 (5.40)	0.033 (0.19)	R-31.1 (5.47)	0.032 (0.18)
R-27.3 (4.81)	R-49.7 (8.75)	R-35.3 (6.21)	0.029 (0.17)	R-36.4 (6.40)	0.028 (0.16)	R-36.9 (6.50)	0.028 (0.16)
R-35.7 (6.29)	R-58.1 (10.23)	R-42.5 (7.49)	0.024 (0.13)	R-43.9 (7.74)	0.023 (0.13)	R-44.7 (7.88)	0.022 (0.13)
R-42.0 (7.40)	R-64.4 (11.34)	R-47.8 (8.42)	0.021 (0.12)	R-49.5 (8.73)	0.020 (0.11)	R-50.5 (8.89)	0.020 (0.11)
R-48.3 (8.51)	R-70.7 (12.45)	R-53.1 (9.36)	0.019 (0.11)	R-55.2 (9.72)	0.018 (0.10)	R-56.3 (9.91)	0.018 (0.10)
R-54.6 (9.62)	R-77.0 (13.56)	R-58.5 (10.30)	0.017 (0.10)	R-60.8 (10.71)	0.016 (0.09)	R-62.1 (10.93)	0.016 (0.09)
R-60.9 (10.73)	R-83.3 (14.67)	R-63.8 (11.24)	0.016 (0.09)	R-66.4 (11.70)	0.015 (0.09)	R-67.8 (11.95)	0.015 (0.08)
R-67.2 (11.84)	R-89.6 (15.78)	R-69.2 (12.18)	0.014 (0.08)	R-72.0 (12.69)	0.014 (0.08)	R-73.6 (12.96)	0.014 (0.08)

# Detail 5.1.105

## Exterior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with EJOT Crossfix Console and Vertical Rail System Supporting Metal Cladding - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

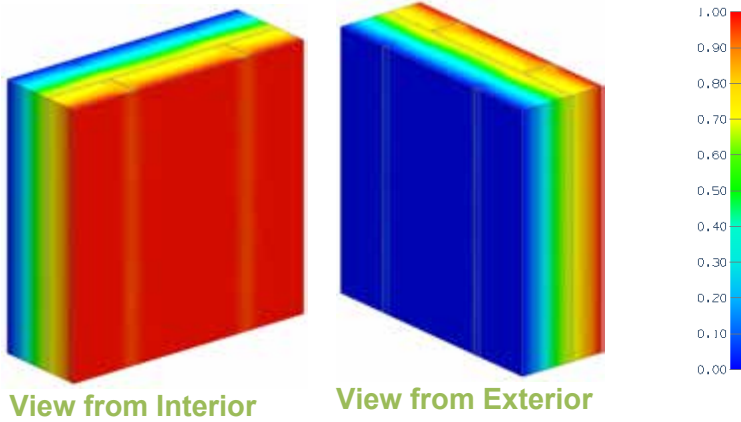
Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.30 (0.58 RSI) + exterior insulation
Transmittance / Resistance	U <sub>o</sub> , R <sub>o</sub>	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.5 (1.86)	0.095 (0.54)	R-10.7 (1.89)	0.093 (0.53)	R-10.9 (1.91)	0.092 (0.52)
R-12.6 (2.22)	R-15.9 (2.80)	R-13.8 (2.42)	0.075 (0.43)	R-14.1 (2.49)	0.073 (0.42)	R-14.3 (2.52)	0.072 (0.41)
R-14.7 (2.59)	R-18.0 (3.17)	R-15.4 (2.71)	0.065 (0.37)	R-15.8 (2.79)	0.063 (0.36)	R-16.1 (2.83)	0.062 (0.35)
R-21.0 (3.70)	R-24.3 (4.28)	R-20.6 (3.62)	0.049 (0.28)	R-21.4 (3.76)	0.047 (0.27)	R-21.8 (3.84)	0.046 (0.26)
R-27.3 (4.81)	R-30.6 (5.39)	R-25.7 (4.53)	0.041 (0.23)	R-26.9 (4.73)	0.039 (0.22)	R-27.5 (4.84)	0.038 (0.22)
R-35.7 (6.29)	R-39.0 (6.87)	R-32.6 (5.75)	0.031 (0.17)	R-34.2 (6.02)	0.029 (0.17)	R-35.0 (6.17)	0.029 (0.16)
R-42.0 (7.40)	R-45.3 (7.98)	R-37.6 (6.63)	0.027 (0.15)	R-39.6 (6.97)	0.025 (0.14)	R-40.6 (7.15)	0.025 (0.14)
R-48.3 (8.51)	R-51.6 (9.08)	R-42.7 (7.52)	0.024 (0.13)	R-45.0 (7.93)	0.023 (0.13)	R-46.3 (8.15)	0.022 (0.12)
R-54.6 (9.62)	R-57.9 (10.19)	R-47.8 (8.42)	0.021 (0.12)	R-50.4 (8.88)	0.020 (0.11)	R-51.9 (9.14)	0.019 (0.11)
R-60.9 (10.73)	R-64.2 (11.30)	R-52.9 (9.31)	0.019 (0.11)	R-55.9 (9.84)	0.018 (0.10)	R-57.5 (10.13)	0.018 (0.10)
R-67.2 (11.84)	R-70.5 (12.41)	R-58.0 (10.21)	0.017 (0.10)	R-61.3 (10.79)	0.016 (0.09)	R-63.1 (11.12)	0.016 (0.09)

# Detail 5.1.106

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with EJOT Crossfix Console and Vertical Rail System Supporting Metal 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

### Nominal (1D) vs. Assembly Performance Indicators

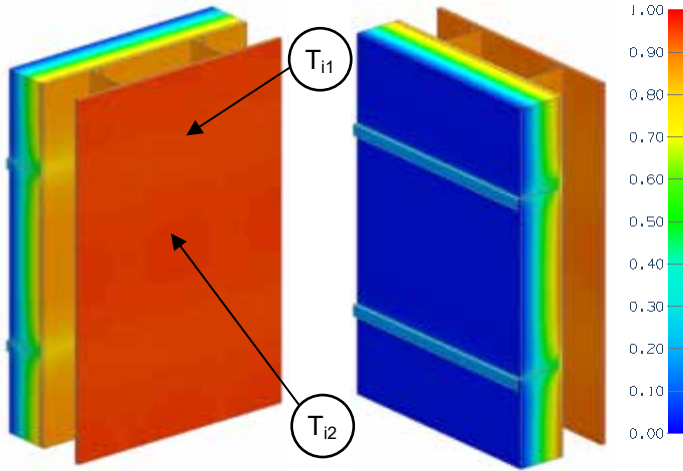
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-20.9 (3.68)	0.048 (0.27)	R-21.3 (3.75)	0.047 (0.27)	R-21.5 (3.79)	0.046 (0.26)
R-12.6 (2.22)	R-35.0 (6.16)	R-24.0 (4.23)	0.042 (0.24)	R-24.6 (4.34)	0.041 (0.23)	R-25.0 (4.40)	0.040 (0.23)
R-14.7 (2.59)	R-37.1 (6.53)	R-25.6 (4.50)	0.039 (0.22)	R-26.3 (4.63)	0.038 (0.22)	R-26.7 (4.70)	0.037 (0.21)
R-21.0 (3.70)	R-43.4 (7.64)	R-30.9 (5.43)	0.032 (0.18)	R-32.0 (5.63)	0.031 (0.18)	R-32.6 (5.74)	0.031 (0.17)
R-27.3 (4.81)	R-49.7 (8.75)	R-36.0 (6.35)	0.028 (0.16)	R-37.5 (6.61)	0.027 (0.16)	R-38.3 (6.75)	0.027 (0.15)
R-35.7 (6.29)	R-58.1 (10.23)	R-43.0 (7.56)	0.023 (0.13)	R-44.9 (7.91)	0.022 (0.13)	R-46.0 (8.10)	0.022 (0.12)
R-42.0 (7.40)	R-64.4 (11.34)	R-48.0 (8.45)	0.021 (0.12)	R-50.3 (8.86)	0.020 (0.11)	R-51.6 (9.08)	0.019 (0.11)
R-48.3 (8.51)	R-70.7 (12.45)	R-53.1 (9.34)	0.019 (0.11)	R-55.8 (9.82)	0.018 (0.10)	R-57.2 (10.08)	0.018 (0.10)
R-54.6 (9.62)	R-77.0 (13.56)	R-58.1 (10.24)	0.017 (0.10)	R-61.2 (10.78)	0.016 (0.09)	R-62.8 (11.07)	0.016 (0.09)
R-60.9 (10.73)	R-83.3 (14.67)	R-63.2 (11.13)	0.016 (0.09)	R-66.6 (11.73)	0.015 (0.09)	R-68.5 (12.06)	0.015 (0.08)
R-67.2 (11.84)	R-89.6 (15.78)	R-68.3 (12.03)	0.015 (0.08)	R-72.1 (12.69)	0.014 (0.08)	R-74.1 (13.05)	0.013 (0.08)



# Detail 5.1.107

## Exterior Insulated 6" x 1/58" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-Girts (24" o.c.) Supporting Cladding and Owens Corning ThermaFiber RainBarrier HC Max Insulation – Clear Wall

### 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 wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.0 (0.70)	R-7.4 (1.30)	R-6.5 (1.15)	0.153 (0.87)
R-8.0 (1.41)	R-11.4 (2.01)	R-8.6 (1.52)	0.116 (0.66)
R-12.0 (2.11)	R-15.4 (2.71)	R-10.7 (1.89)	0.093 (0.53)
R-16.0 (2.82)	R-19.4 (3.42)	R-12.2 (2.15)	0.082 (0.46)
R-20.0 (3.52)	R-23.4 (4.12)	R-13.7 (2.42)	0.073 (0.41)
R-24.0 (4.23)	R-27.4 (4.82)	R-15.0 (2.64)	0.067 (0.38)

### Temperature Indices

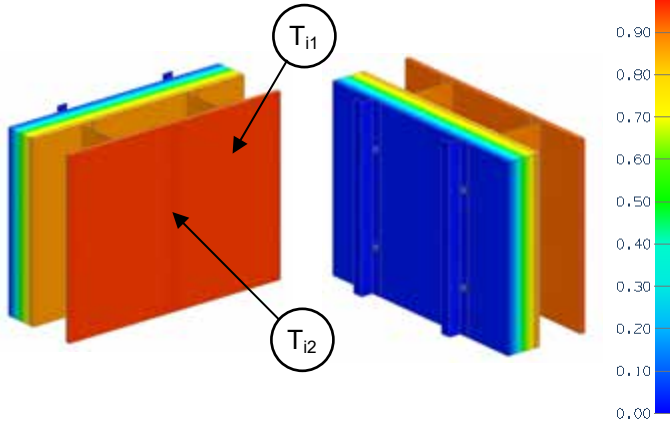
	R4	R12	R20	R24	
$T_{i1}$	0.62	0.73	0.77	0.79	Min T on sheathing, along girts between studs
$T_{i2}$	0.69	0.83	0.87	0.88	Max T on sheathing, between studs and girt

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.108

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation – Clear Wall

### 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 wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-4.0 (0.70)	R-7.4 (1.30)	R-7.0 (1.24)	0.142 (0.81)
R-8.0 (1.41)	R-11.4 (2.01)	R-10.2 (1.79)	0.098 (0.56)
R-12.0 (2.11)	R-15.4 (2.71)	R-13.3 (2.35)	0.075 (0.43)
R-16.0 (2.82)	R-19.4 (3.42)	R-16.3 (2.87)	0.061 (0.35)

### Temperature Indices

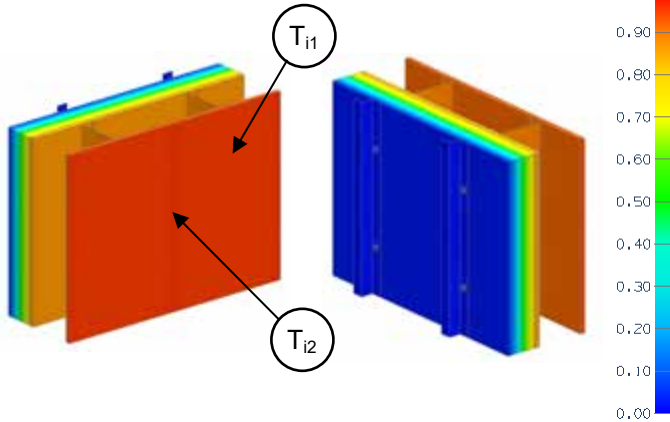
	R4	R12	R16	
$T_{i1}$	0.37	0.54	0.59	Min T on sheathing, at fastener along studs
$T_{i2}$	0.69	0.85	0.88	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.109

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier Ci HC 80/45 Insulation – Clear Wall

### 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 wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-7.6 (1.34)	R-7.2 (1.27)	0.139 (0.79)
R-8.4 (1.48)	R-11.8 (2.08)	R-10.5 (1.85)	0.095 (0.54)
R-12.6 (2.22)	R-16.0 (2.82)	R-13.8 (2.42)	0.073 (0.41)
R-16.8 (2.96)	R-20.2 (3.56)	R-16.8 (2.96)	0.059 (0.34)

### Temperature Indices

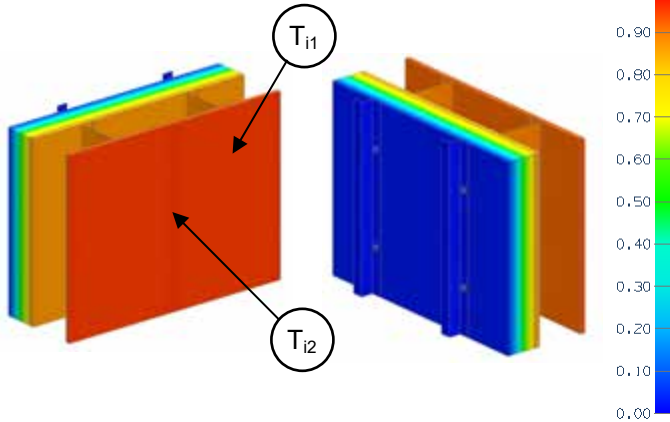
	R4	R12	R16	
$T_{i1}$	0.38	0.54	0.59	Min T on sheathing, at fastener along studs
$T_{i2}$	0.70	0.85	0.88	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.110

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Stainless Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation – Clear Wall

### 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 wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-4.0 (0.70)	R-7.4 (1.30)	R-7.2 (1.27)	0.139 (0.79)
R-8.0 (1.41)	R-11.4 (2.01)	R-10.7 (1.89)	0.093 (0.53)
R-12.0 (2.11)	R-15.4 (2.71)	R-14.3 (2.52)	0.070 (0.40)
R-16.0 (2.82)	R-19.4 (3.42)	R-17.8 (3.14)	0.056 (0.32)

### Temperature Indices

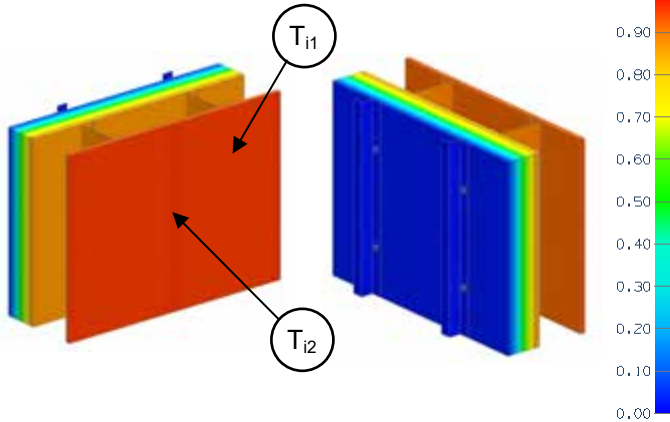
	R4	R12	R16	
$T_{i1}$	0.51	0.71	0.76	Min T on sheathing, at fastener along studs
$T_{i2}$	0.70	0.85	0.88	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.111

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Stainless Steel Fasteners (12" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier Ci HC 80/45 Insulation – Clear Wall

### 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 wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-7.6 (1.34)	R-7.4 (1.30)	0.136 (0.77)
R-8.4 (1.48)	R-11.8 (2.08)	R-11.1 (1.95)	0.090 (0.51)
R-12.6 (2.22)	R-16.0 (2.82)	R-14.8 (2.61)	0.068 (0.38)
R-16.8 (2.96)	R-20.2 (3.56)	R-18.5 (3.26)	0.054 (0.31)

### Temperature Indices

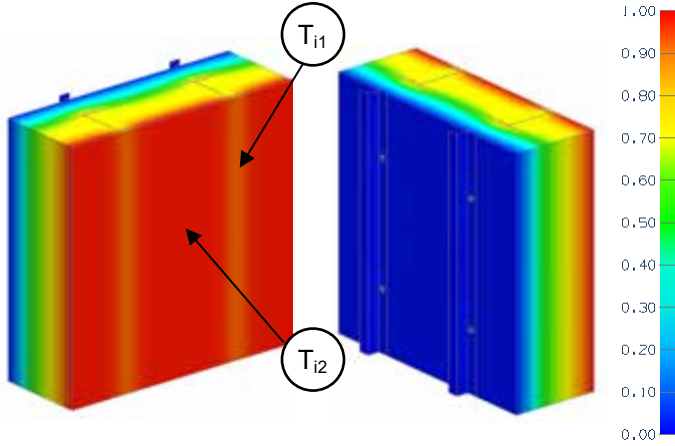
	R4	R12	R16	
$T_{i1}$	0.51	0.72	0.76	Min T on sheathing, at fastener along studs
$T_{i2}$	0.70	0.86	0.89	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.112

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Stainless Steel Fasteners (16" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier HC Max Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall**

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.5 (3.96 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.0 (0.70)	R-26.5 (4.67)	R-16.0 (2.82)	0.062 (0.35)
R-8.0 (1.41)	R-30.5 (5.37)	R-19.7 (3.48)	0.051 (0.29)
R-12.0 (2.11)	R-34.5 (6.08)	R-23.4 (4.13)	0.043 (0.24)
R-16.0 (2.82)	R-38.5 (6.78)	R-27.1 (4.77)	0.037 (0.21)

### Temperature Indices

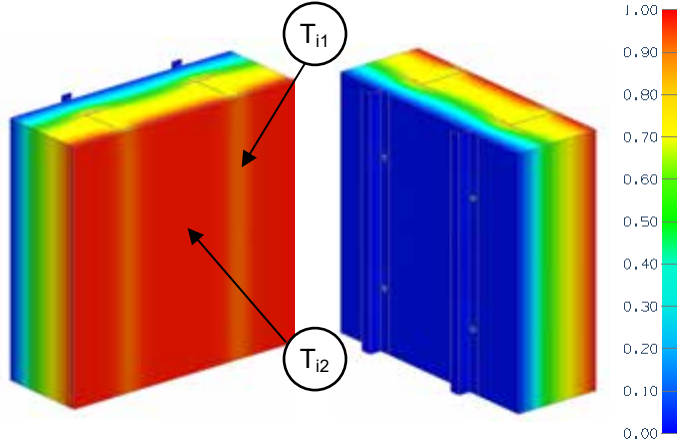
	R4.2	R12.6	R16.8	
$T_{i1}$	0.39	0.56	0.62	Min T on sheathing, at fastener along studs
$T_{i2}$	0.23	0.46	0.53	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.113

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with High Compression Insulation and Through Insulation Stainless Steel Fasteners (16" o.c.) Supporting Cladding, Owens Corning ThermaFiber RainBarrier Ci HC 80/45 Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall**

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.5 (3.96 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-26.7 (4.70)	R-16.2 (2.85)	0.062 (0.35)
R-8.4 (1.48)	R-30.9 (5.44)	R-20.1 (3.54)	0.050 (0.28)
R-12.6 (2.22)	R-35.1 (6.18)	R-24.0 (4.22)	0.042 (0.24)
R-16.8 (2.96)	R-39.3 (6.92)	R-27.8 (4.89)	0.036 (0.20)

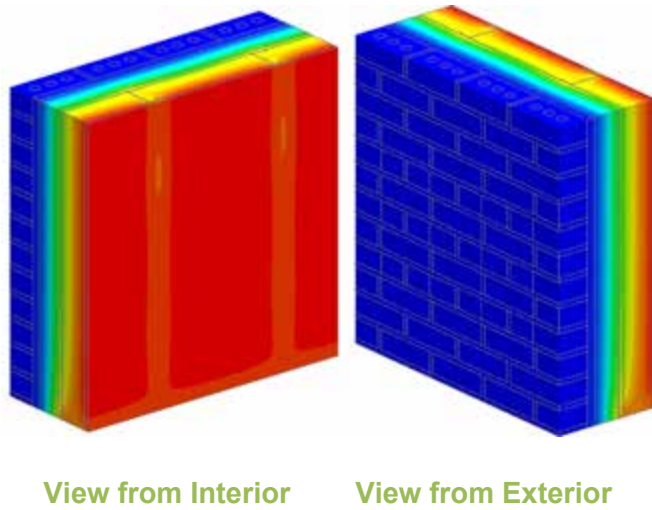
### Temperature Indices

	R4.2	R12.6	R16.8	
$T_{i1}$	0.39	0.57	0.62	Min T on sheathing, at fastener along studs
$T_{i2}$	0.24	0.47	0.54	Min T on sheathing, between studs and fasteners

Temperature indices listed for selected scenarios. All other scenarios to be interpolated.

# Detail 5.1.114

## Exterior and Interior Insulated Wall Assembly with Brick Ties Supporting Brick Veneer and R-12 Batt Insulation in Stud Cavity – Clear Wall



### 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

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-5 (0.88)	R-20.3 (3.58)	R-13.9 (2.45)	0.072 (0.41)
R-10 (1.76)	R-25.3 (4.46)	R-17.0 (3.00)	0.059 (0.33)
R-15 (2.64)	R-30.3 (5.34)	R-19.8 (3.48)	0.051 (0.29)
R-20 (3.52)	R-35.3 (6.22)	R-22.5 (3.96)	0.045 (0.25)
R-25 (4.40)	R-40.3 (7.10)	R-24.9 (4.39)	0.040 (0.23)

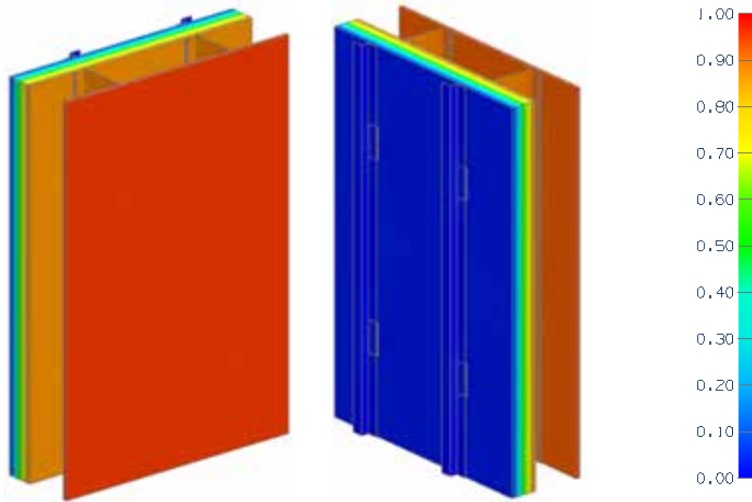


# Detail 5.1.115

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip Supporting Metal Cladding - Clear Wall

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.17 (0.56 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value



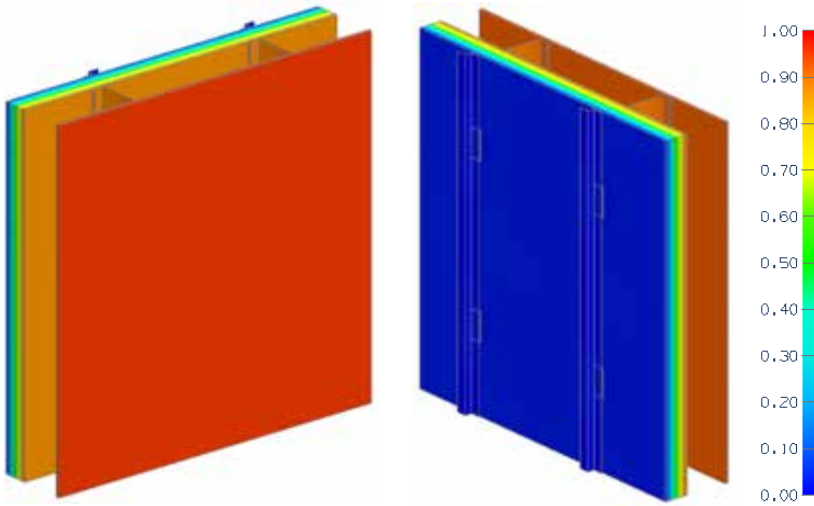
View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15.0 (2.64)	R-18.2 (3.20)	R-17.2 (3.03)	0.058 (0.33)	R-17.5 (3.09)	0.057 (0.32)	R-17.7 (3.11)	0.057 (0.32)
R-20.0 (3.52)	R-23.2 (4.08)	R-21.6 (3.81)	0.046 (0.26)	R-22.1 (3.89)	0.045 (0.26)	R-22.4 (3.94)	0.045 (0.25)
R-25.0 (4.40)	R-28.2 (4.96)	R-25.9 (4.56)	0.039 (0.22)	R-26.6 (4.68)	0.038 (0.21)	R-27.0 (4.75)	0.037 (0.21)
R-30.0 (5.28)	R-33.2 (5.84)	R-30.2 (5.32)	0.033 (0.19)	R-31.1 (5.48)	0.032 (0.18)	R-31.6 (5.57)	0.032 (0.18)
R-35.0 (6.16)	R-38.2 (6.72)	R-34.3 (6.04)	0.029 (0.17)	R-35.5 (6.25)	0.028 (0.16)	R-36.1 (6.36)	0.028 (0.16)

# Detail 5.1.116

## Exterior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip Supporting Metal Cladding - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

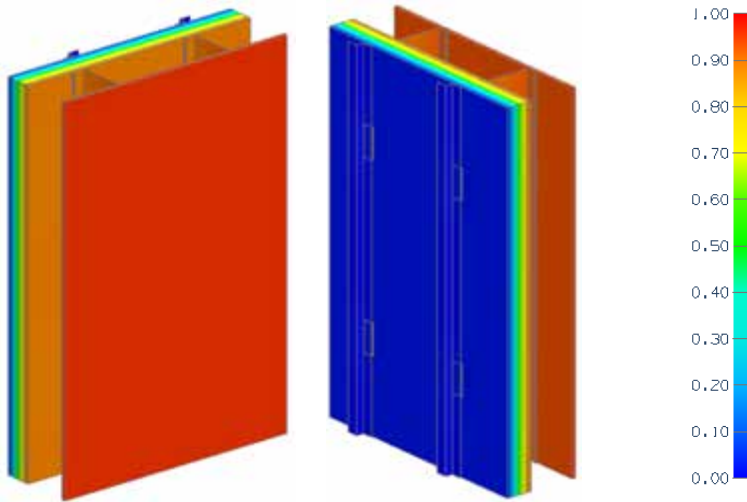
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.17 (0.56 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15.0 (2.64)	R-18.2 (3.20)	R-17.5 (3.09)	0.057 (0.32)	R-17.7 (3.12)	0.056 (0.32)	R-17.8 (3.14)	0.056 (0.32)
R-20.0 (3.52)	R-23.2 (4.08)	R-22.1 (3.90)	0.045 (0.26)	R-22.5 (3.96)	0.045 (0.25)	R-22.6 (3.99)	0.044 (0.25)
R-25.0 (4.40)	R-28.2 (4.96)	R-26.6 (4.69)	0.038 (0.21)	R-27.1 (4.78)	0.037 (0.21)	R-27.4 (4.82)	0.037 (0.21)
R-30.0 (5.28)	R-33.2 (5.84)	R-31.1 (5.48)	0.032 (0.18)	R-31.8 (5.60)	0.031 (0.18)	R-32.1 (5.65)	0.031 (0.18)
R-35.0 (6.16)	R-38.2 (6.72)	R-35.5 (6.26)	0.028 (0.16)	R-36.3 (6.40)	0.028 (0.16)	R-36.8 (6.48)	0.027 (0.15)

# Detail 5.1.117

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-SPF 202 and ACS-S Thermal Clip Supporting Metal Cladding - Clear Wall



View from Interior      View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.17 (0.56 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

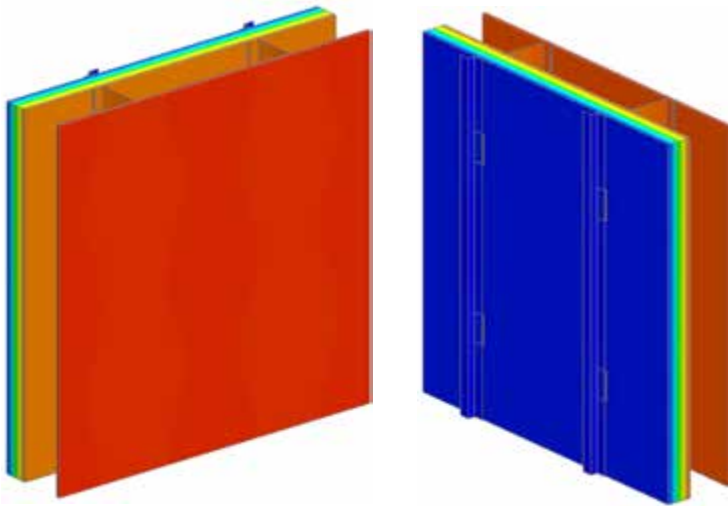
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.2 (1.09)	R-9.4 (1.65)	R-9.2 (1.62)	0.109 (0.62)	R-9.2 (1.63)	0.108 (0.61)	R-9.2 (1.63)	0.108 (0.61)
R-12.4 (2.18)	R-15.6 (2.74)	R-14.8 (2.61)*	0.067 (0.38)*	R-15.0 (2.65)*	0.066 (0.38)*	R-15.2 (2.67)*	0.066 (0.37)*
R-18.6 (3.28)	R-21.8 (3.83)	R-20.3 (3.58)	0.049 (0.28)	R-20.8 (3.66)	0.048 (0.27)	R-21.0 (3.70)	0.048 (0.27)
R-24.8 (4.37)	R-28.0 (4.93)	R-25.7 (4.52)	0.039 (0.22)	R-26.4 (4.64)	0.038 (0.22)	R-26.7 (4.71)	0.037 (0.21)
R-31.0 (5.46)	R-34.2 (6.02)	R-30.8 (5.42)	0.033 (0.18)	R-31.8 (5.60)	0.031 (0.18)	R-32.3 (5.70)	0.031 (0.18)
R-37.2 (6.55)	R-40.4 (7.11)	R-36.0 (6.33)	0.028 (0.16)	R-37.3 (6.57)	0.027 (0.15)	R-38.0 (6.69)	0.026 (0.15)

\*Indicates interpolated value

# Detail 5.1.118

## Exterior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with SOPREMA SOPRA-SPF 202 and ACS-S Thermal Clip Supporting Metal Cladding - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.17 (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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.2 (1.09)	R-9.4 (1.65)	R-9.3 (1.63)	0.108 (0.61)	R-9.3 (1.63)	0.108 (0.61)	R-9.3 (1.64)	0.108 (0.61)
R-12.4 (2.18)	R-15.6 (2.74)	R-15.1 (2.65)*	0.066 (0.38)*	R-15.2 (2.68)*	0.066 (0.37)*	R-15.3 (2.69)*	0.065 (0.37)*
R-18.6 (3.28)	R-21.8 (3.83)	R-20.8 (3.66)	0.048 (0.27)	R-21.1 (3.71)	0.047 (0.27)	R-21.2 (3.74)	0.047 (0.27)
R-24.8 (4.37)	R-28.0 (4.93)	R-26.4 (4.65)	0.038 (0.22)	R-26.9 (4.73)	0.037 (0.21)	R-27.1 (4.78)	0.037 (0.21)
R-31.0 (5.46)	R-34.2 (6.02)	R-31.8 (5.60)	0.031 (0.18)	R-32.6 (5.73)	0.031 (0.17)	R-32.9 (5.80)	0.030 (0.17)
R-37.2 (6.55)	R-40.4 (7.11)	R-37.3 (6.57)	0.027 (0.15)	R-38.2 (6.73)	0.026 (0.15)	R-38.7 (6.82)	0.026 (0.15)

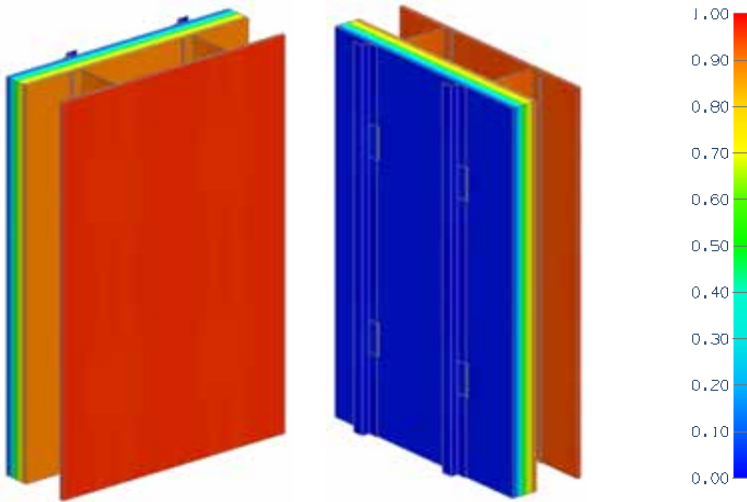
\*Indicates interpolated value

# Detail 5.1.119

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip Supporting Metal Cladding - Clear Wall

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.17 (0.56 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value



View from Interior      View from Exterior

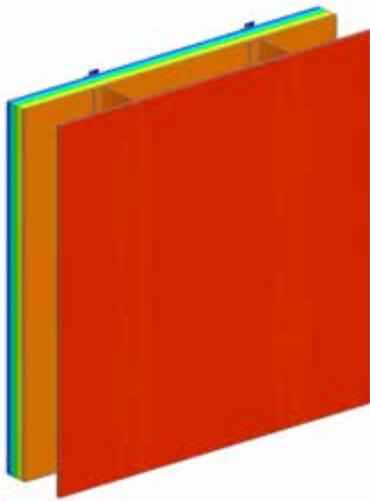
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.5 (1.14)	R-9.7 (1.70)	R-9.5 (1.68)	0.105 (0.60)	R-9.6 (1.69)	0.104 (0.59)	R-9.6 (1.69)	0.104 (0.59)
R-13.0 (2.29)	R-16.2 (2.85)	R-15.4 (2.71)*	0.065 (0.37)*	R-15.7 (2.76)*	0.064 (0.36)*	R-15.8 (2.78)*	0.063 (0.36)*
R-16.3 (2.86)	R-19.4 (3.42)	R-18.3 (3.22)*	0.055 (0.31)*	R-18.6 (3.28)*	0.054 (0.30)*	R-18.8 (3.32)*	0.053 (0.30)*
R-19.5 (3.43)	R-22.7 (3.99)	R-21.2 (3.73)	0.047 (0.27)	R-21.6 (3.81)	0.046 (0.26)	R-21.9 (3.85)	0.046 (0.26)
R-22.8 (4.01)	R-25.9 (4.56)	R-23.9 (4.22)*	0.042 (0.24)*	R-24.6 (4.33)*	0.041 (0.23)*	R-24.9 (4.38)*	0.040 (0.23)*
R-26.0 (4.58)	R-29.2 (5.14)	R-26.7 (4.71)	0.037 (0.21)	R-27.5 (4.84)	0.036 (0.21)	R-27.9 (4.91)	0.036 (0.20)
R-29.3 (5.15)	R-32.4 (5.71)	R-29.5 (5.19)*	0.034 (0.19)*	R-30.4 (5.35)*	0.033 (0.19)*	R-30.9 (5.43)*	0.032 (0.18)*
R-32.5 (5.72)	R-35.7 (6.28)	R-32.1 (5.65)	0.031 (0.18)	R-33.2 (5.84)	0.030 (0.17)	R-33.8 (5.95)	0.030 (0.17)
R-35.8 (6.30)	R-38.9 (6.85)	R-34.8 (6.13)*	0.029 (0.16)*	R-36.1 (6.35)*	0.028 (0.16)*	R-36.7 (6.47)*	0.027 (0.15)*
R-39.0 (6.87)	R-42.2 (7.43)	R-37.5 (6.60)	0.027 (0.15)	R-38.9 (6.86)	0.026 (0.15)	R-39.7 (6.99)	0.025 (0.14)

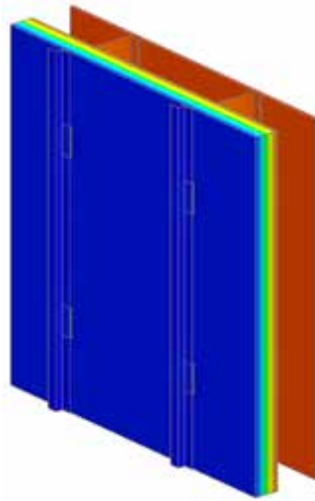
\*Indicates interpolated value

# Detail 5.1.120

## Exterior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip Supporting Metal Cladding - Clear Wall



View from Interior



View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.17 (0.56 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

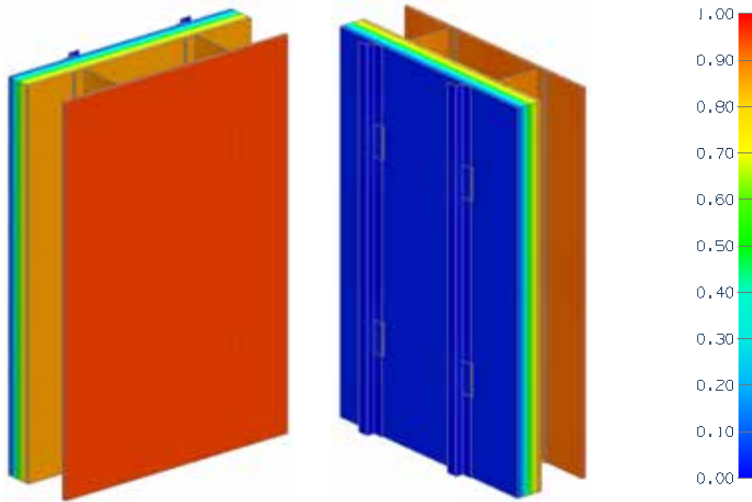
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.5 (1.14)	R-9.7 (1.70)	R-9.6 (1.69)	0.104 (0.59)	R-9.6 (1.69)	0.104 (0.59)	R-9.6 (1.70)	0.104 (0.59)
R-13.0 (2.29)	R-16.2 (2.85)	R-15.7 (2.76)*	0.064 (0.36)*	R-15.8 (2.79)*	0.063 (0.36)*	R-15.9 (2.80)*	0.063 (0.36)*
R-16.3 (2.86)	R-19.4 (3.42)	R-18.7 (3.29)*	0.054 (0.30)*	R-18.9 (3.33)*	0.053 (0.30)*	R-19.0 (3.35)*	0.053 (0.30)*
R-19.5 (3.43)	R-22.7 (3.99)	R-21.7 (3.81)	0.046 (0.26)	R-22.0 (3.87)	0.045 (0.26)	R-22.1 (3.90)	0.045 (0.26)
R-22.8 (4.01)	R-25.9 (4.56)	R-24.6 (4.33)*	0.041 (0.23)*	R-25.0 (4.41)*	0.040 (0.23)*	R-25.2 (4.44)*	0.040 (0.23)*
R-26.0 (4.58)	R-29.2 (5.14)	R-27.5 (4.85)	0.036 (0.21)	R-28.0 (4.94)	0.036 (0.20)	R-28.3 (4.99)	0.035 (0.20)
R-29.3 (5.15)	R-32.4 (5.71)	R-30.4 (5.35)*	0.033 (0.19)*	R-31.0 (5.47)*	0.032 (0.18)*	R-31.4 (5.52)*	0.032 (0.18)*
R-32.5 (5.72)	R-35.7 (6.28)	R-33.2 (5.85)	0.030 (0.17)	R-34.0 (5.99)	0.029 (0.17)	R-34.4 (6.06)	0.029 (0.17)
R-35.8 (6.30)	R-38.9 (6.85)	R-36.1 (6.36)*	0.028 (0.16)*	R-37.0 (6.51)*	0.027 (0.15)*	R-37.4 (6.59)*	0.027 (0.15)*
R-39.0 (6.87)	R-42.2 (7.43)	R-38.9 (6.86)	0.026 (0.15)	R-39.9 (7.03)	0.025 (0.14)	R-40.5 (7.13)	0.025 (0.14)

\*Indicates interpolated value

# Detail 5.1.121

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Mineral Wool and ACS-S Thermal Clip Supporting Metal Cladding - Clear Wall



View from Interior      View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.17 (0.56 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

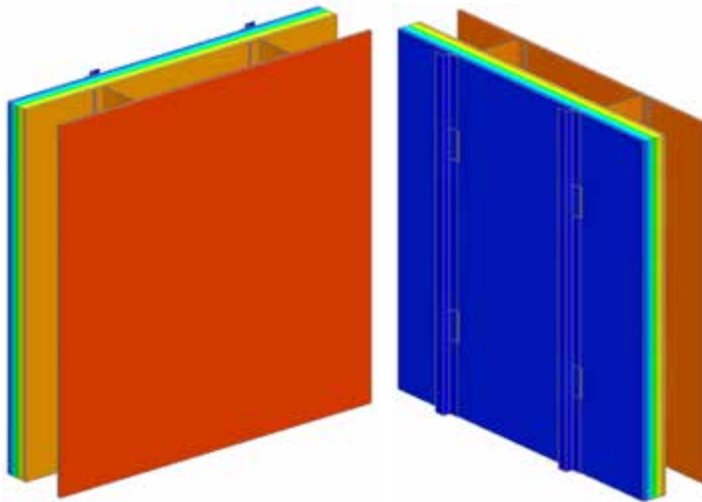
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.9 (2.27)	R-16.1 (2.83)	R-15.3 (2.70)	0.065 (0.37)	R-15.6 (2.74)	0.064 (0.36)	R-15.7 (2.76)	0.064 (0.36)
R-17.2 (3.03)	R-20.4 (3.59)	R-19.1 (3.37)*	0.052 (0.30)*	R-19.5 (3.44)*	0.051 (0.29)*	R-19.7 (3.47)*	0.051 (0.29)*
R-21.5 (3.79)	R-24.7 (4.34)	R-22.9 (4.03)	0.044 (0.25)	R-23.5 (4.13)	0.043 (0.24)	R-23.7 (4.18)	0.042 (0.24)
R-25.8 (4.54)	R-29.0 (5.10)	R-26.7 (4.70)	0.037 (0.21)	R-27.4 (4.82)	0.037 (0.21)	R-27.8 (4.89)	0.036 (0.20)
R-30.1 (5.30)	R-33.3 (5.86)	R-30.3 (5.34)	0.033 (0.19)	R-31.2 (5.50)	0.032 (0.18)	R-31.7 (5.58)	0.032 (0.18)
R-34.4 (6.06)	R-37.6 (6.62)	R-34.1 (6.00)	0.029 (0.17)	R-35.1 (6.19)	0.028 (0.16)	R-35.7 (6.29)	0.028 (0.16)

\*Indicates interpolated value

# Detail 5.1.122

## Exterior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with Mineral Wool and ACS-S Thermal Clip Supporting Metal Cladding - Clear Wall



View from Interior

View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.17 (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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.9 (2.27)	R-16.1 (2.83)	R-15.6 (2.75)	0.064 (0.36)	R-15.7 (2.77)	0.063 (0.36)	R-15.8 (2.79)	0.063 (0.36)
R-17.2 (3.03)	R-20.4 (3.59)	R-19.5 (3.44)*	0.051 (0.29)*	R-19.8 (3.49)*	0.050 (0.29)*	R-19.9 (3.51)*	0.050 (0.28)*
R-21.5 (3.79)	R-24.7 (4.34)	R-23.5 (4.13)	0.043 (0.24)	R-23.9 (4.21)	0.042 (0.24)	R-24.1 (4.24)	0.042 (0.24)
R-25.8 (4.54)	R-29.0 (5.10)	R-27.4 (4.83)	0.036 (0.21)	R-27.9 (4.91)	0.036 (0.20)	R-28.2 (4.96)	0.036 (0.20)
R-30.1 (5.30)	R-33.3 (5.86)	R-31.2 (5.50)	0.032 (0.18)	R-31.9 (5.61)	0.031 (0.18)	R-32.2 (5.67)	0.031 (0.18)
R-34.4 (6.06)	R-37.6 (6.62)	R-35.2 (6.19)	0.028 (0.16)	R-35.9 (6.33)	0.028 (0.16)	R-36.3 (6.40)	0.028 (0.16)

\*Indicates interpolated value

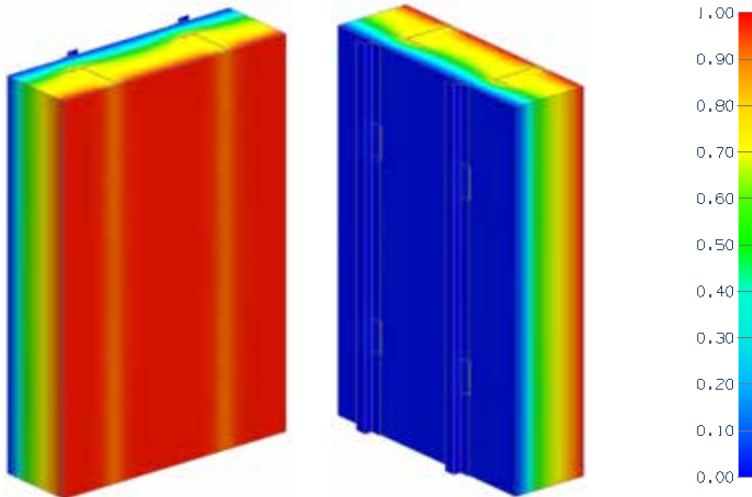


# Detail 5.1.123

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.92 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value



View from Interior      View from Exterior

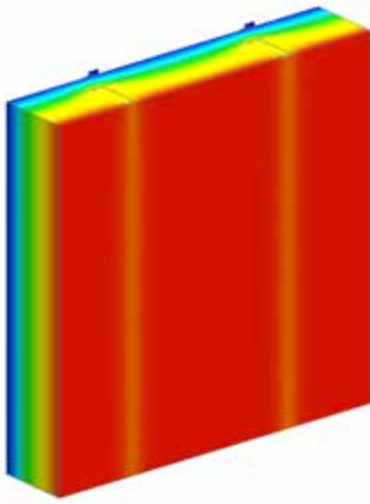
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-27.3 (4.80)	R-17.5 (3.08)	0.057 (0.32)	R-17.5 (3.08)	0.057 (0.32)	R-17.5 (3.09)	0.057 (0.32)
R-7.5 (1.32)	R-29.8 (5.24)	R-19.8 (3.48)*	0.051 (0.29)*	R-19.9 (3.51)*	0.050 (0.29)*	R-20.0 (3.52)*	0.050 (0.28)*
R-10.0 (1.76)	R-32.3 (5.68)	R-22.1 (3.88)*	0.045 (0.26)*	R-22.3 (3.92)*	0.045 (0.25)*	R-22.4 (3.94)*	0.045 (0.25)*
R-15.0 (2.64)	R-37.3 (6.56)	R-26.6 (4.68)	0.038 (0.21)	R-27.0 (4.75)	0.037 (0.21)	R-27.2 (4.79)	0.037 (0.21)
R-20.0 (3.52)	R-42.3 (7.44)	R-30.9 (5.45)*	0.032 (0.18)*	R-31.5 (5.56)*	0.032 (0.18)*	R-31.9 (5.61)*	0.031 (0.18)*
R-25.0 (4.40)	R-47.3 (8.33)	R-35.2 (6.19)	0.028 (0.16)	R-36.0 (6.34)	0.028 (0.16)	R-36.5 (6.42)	0.027 (0.16)
R-30.0 (5.28)	R-52.3 (9.21)	R-39.4 (6.94)*	0.025 (0.14)*	R-40.5 (7.14)*	0.025 (0.14)*	R-41.1 (7.24)*	0.024 (0.14)*
R-35.0 (6.16)	R-57.3 (10.09)	R-43.6 (7.67)	0.023 (0.13)	R-44.9 (7.91)	0.022 (0.13)	R-45.6 (8.04)	0.022 (0.12)

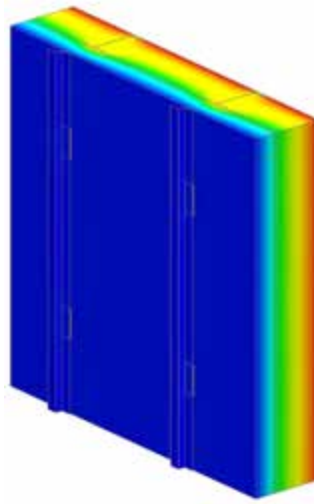
\*Indicates interpolated value

# Detail 5.1.124

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior



View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.92 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-27.3 (4.80)	R-19.9 (3.50)	0.050 (0.29)	R-19.9 (3.50)	0.050 (0.29)	R-19.9 (3.51)	0.050 (0.29)
R-7.5 (1.32)	R-29.8 (5.24)	R-22.3 (3.92)*	0.045 (0.26)*	R-22.4 (3.94)*	0.045 (0.25)*	R-22.4 (3.95)*	0.045 (0.25)*
R-10.0 (1.76)	R-32.3 (5.68)	R-24.6 (4.34)*	0.041 (0.23)*	R-24.8 (4.37)*	0.040 (0.23)*	R-24.9 (4.39)*	0.040 (0.23)*
R-15.0 (2.64)	R-37.3 (6.56)	R-29.3 (5.17)	0.034 (0.19)	R-29.7 (5.23)	0.034 (0.19)	R-29.8 (5.26)	0.034 (0.19)
R-20.0 (3.52)	R-42.3 (7.44)	R-33.9 (5.97)*	0.029 (0.17)*	R-34.4 (6.06)*	0.029 (0.17)*	R-34.7 (6.10)*	0.029 (0.16)*
R-25.0 (4.40)	R-47.3 (8.33)	R-38.4 (6.76)	0.026 (0.15)	R-39.1 (6.88)	0.026 (0.15)	R-39.4 (6.94)	0.025 (0.14)
R-30.0 (5.28)	R-52.3 (9.21)	R-42.9 (7.55)*	0.023 (0.13)*	R-43.7 (7.70)*	0.023 (0.13)*	R-44.1 (7.77)*	0.023 (0.13)*
R-35.0 (6.16)	R-57.3 (10.09)	R-47.2 (8.32)	0.021 (0.12)	R-48.2 (8.50)	0.021 (0.12)	R-48.8 (8.59)	0.020 (0.12)

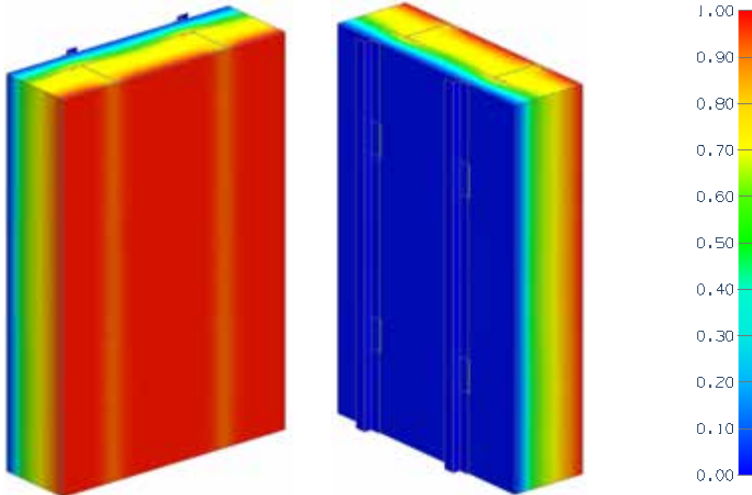
\*Indicates interpolated value

# Detail 5.1.125

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-SPF 202 and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.92 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value



View from Interior      View from Exterior

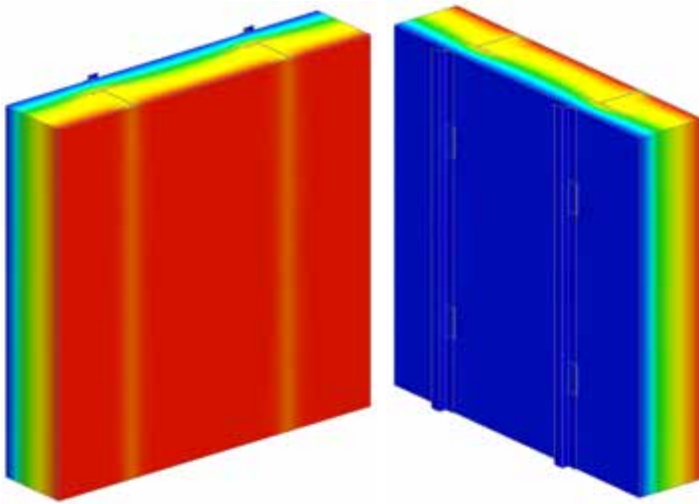
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.2 (1.09)	R-28.5 (5.01)	R-18.4 (3.23)	0.054 (0.31)	R-18.4 (3.23)	0.054 (0.31)	R-18.4 (3.24)	0.054 (0.31)
R-12.4 (2.18)	R-34.7 (6.11)	R-23.9 (4.21)*	0.042 (0.24)*	R-24.2 (4.25)*	0.041 (0.24)*	R-24.3 (4.28)*	0.041 (0.23)*
R-18.6 (3.28)	R-40.9 (7.20)	R-29.4 (5.18)	0.034 (0.19)	R-29.9 (5.26)	0.033 (0.19)	R-30.2 (5.31)	0.033 (0.19)
R-24.8 (4.37)	R-47.1 (8.29)	R-34.6 (6.10)*	0.029 (0.16)*	R-35.4 (6.24)*	0.028 (0.16)*	R-35.9 (6.32)*	0.028 (0.16)*
R-31.0 (5.46)	R-53.3 (9.38)	R-39.7 (6.99)	0.025 (0.14)	R-40.9 (7.19)	0.024 (0.14)	R-41.5 (7.30)	0.024 (0.14)
R-37.2 (6.55)	R-59.5 (10.47)	R-44.8 (7.90)*	0.022 (0.13)*	R-46.3 (8.15)*	0.022 (0.12)*	R-47.1 (8.29)*	0.021 (0.12)*
R-43.4 (7.64)	R-65.7 (11.57)	R-49.8 (8.77)	0.020 (0.11)	R-51.6 (9.09)	0.019 (0.11)	R-52.6 (9.27)	0.019 (0.11)

\*Indicates interpolated value

# Detail 5.1.126

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with SOPREMA SOPRA-SPF 202 and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.92 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.2 (1.09)	R-28.5 (5.01)	R-20.8 (3.67)	0.048 (0.27)	R-20.8 (3.67)	0.048 (0.27)	R-20.8 (3.67)	0.048 (0.27)
R-12.4 (2.18)	R-34.7 (6.11)	R-26.6 (4.68)*	0.038 (0.21)*	R-26.8 (4.72)*	0.037 (0.21)*	R-26.9 (4.74)*	0.037 (0.21)*
R-18.6 (3.28)	R-40.9 (7.20)	R-32.3 (5.69)	0.031 (0.18)	R-32.7 (5.76)	0.031 (0.17)	R-32.9 (5.80)	0.030 (0.17)
R-24.8 (4.37)	R-47.1 (8.29)	R-37.8 (6.66)*	0.026 (0.15)*	R-38.5 (6.78)*	0.026 (0.15)*	R-38.8 (6.83)*	0.026 (0.15)*
R-31.0 (5.46)	R-53.3 (9.38)	R-43.3 (7.62)	0.023 (0.13)	R-44.1 (7.77)	0.023 (0.13)	R-44.6 (7.85)	0.022 (0.13)
R-37.2 (6.55)	R-59.5 (10.47)	R-48.7 (8.58)*	0.021 (0.12)*	R-49.8 (8.77)*	0.020 (0.11)*	R-50.4 (8.88)*	0.020 (0.11)*
R-43.4 (7.64)	R-65.7 (11.57)	R-54.0 (9.51)	0.019 (0.11)	R-55.4 (9.75)	0.018 (0.10)	R-56.1 (9.88)	0.018 (0.10)

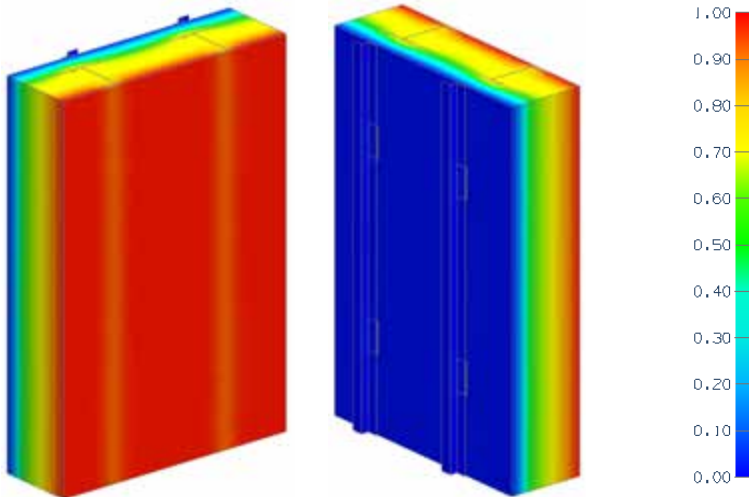
\*Indicates interpolated value

# Detail 5.1.127

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.92 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value



View from Interior      View from Exterior

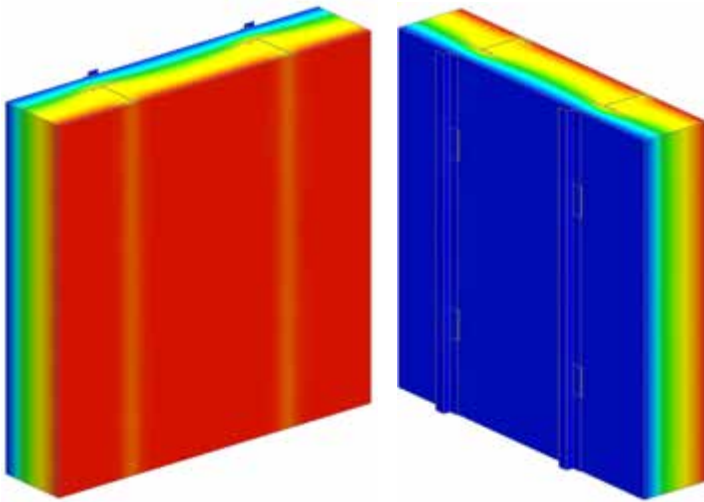
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.0 (1.06)	R-28.3 (4.98)	R-18.5 (3.26)	0.054 (0.31)	R-18.5 (3.26)	0.054 (0.31)	R-18.6 (3.27)	0.054 (0.31)
R-9.0 (1.59)	R-31.3 (5.51)	R-21.2 (3.74)*	0.047 (0.27)*	R-21.4 (3.77)*	0.047 (0.27)*	R-21.5 (3.78)*	0.047 (0.26)*
R-12.0 (2.11)	R-34.3 (6.04)	R-23.9 (4.21)*	0.042 (0.24)*	R-24.2 (4.26)*	0.041 (0.23)*	R-24.3 (4.28)*	0.041 (0.23)*
R-15.0 (2.64)	R-37.3 (6.56)	R-26.5 (4.67)*	0.038 (0.21)*	R-27.0 (4.75)*	0.037 (0.21)*	R-27.2 (4.79)*	0.037 (0.21)*
R-18.0 (3.17)	R-40.3 (7.09)	R-29.2 (5.15)	0.034 (0.19)	R-29.8 (5.24)	0.034 (0.19)	R-30.0 (5.29)	0.033 (0.19)
R-21.0 (3.70)	R-43.3 (7.62)	R-31.7 (5.59)*	0.031 (0.18)*	R-32.4 (5.71)*	0.031 (0.18)*	R-32.8 (5.78)*	0.030 (0.17)*
R-24.0 (4.23)	R-46.3 (8.15)	R-34.3 (6.04)*	0.029 (0.17)*	R-35.1 (6.19)*	0.028 (0.16)*	R-35.6 (6.27)*	0.028 (0.16)*
R-27.0 (4.76)	R-49.3 (8.68)	R-36.8 (6.49)*	0.027 (0.15)*	R-37.8 (6.66)*	0.026 (0.15)*	R-38.3 (6.75)*	0.026 (0.15)*
R-30.0 (5.28)	R-52.3 (9.21)	R-39.3 (6.92)	0.025 (0.14)	R-40.4 (7.12)	0.025 (0.14)	R-41.0 (7.23)	0.024 (0.14)
R-33.0 (5.81)	R-55.3 (9.73)	R-41.8 (7.37)*	0.024 (0.14)*	R-43.1 (7.59)*	0.023 (0.13)*	R-43.8 (7.72)*	0.023 (0.13)*
R-36.0 (6.34)	R-58.3 (10.26)	R-44.3 (7.80)*	0.023 (0.13)*	R-45.7 (8.05)*	0.022 (0.12)*	R-46.5 (8.19)*	0.022 (0.12)*
R-39.0 (6.87)	R-61.3 (10.79)	R-46.7 (8.22)*	0.021 (0.12)*	R-48.3 (8.51)*	0.021 (0.12)*	R-49.2 (8.66)*	0.020 (0.12)*
R-42.0 (7.40)	R-64.3 (11.32)	R-49.1 (8.65)	0.020 (0.12)	R-50.9 (8.97)	0.020 (0.11)	R-51.9 (9.13)	0.019 (0.11)

\*Indicates interpolated value

# Detail 5.1.128

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.92 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.0 (1.06)	R-28.3 (4.98)	R-20.9 (3.68)	0.048 (0.27)	R-20.9 (3.69)	0.048 (0.27)	R-21.0 (3.69)	0.048 (0.27)
R-9.0 (1.59)	R-31.3 (5.51)	R-23.7 (4.18)*	0.042 (0.24)*	R-23.9 (4.21)*	0.042 (0.24)*	R-23.9 (4.22)*	0.042 (0.24)*
R-12.0 (2.11)	R-34.3 (6.04)	R-26.5 (4.67)*	0.038 (0.21)*	R-26.8 (4.72)*	0.037 (0.21)*	R-26.9 (4.74)*	0.037 (0.21)*
R-15.0 (2.64)	R-37.3 (6.56)	R-29.3 (5.16)*	0.034 (0.19)*	R-29.7 (5.22)*	0.034 (0.19)*	R-29.8 (5.25)*	0.034 (0.19)*
R-18.0 (3.17)	R-40.3 (7.09)	R-32.1 (5.65)	0.031 (0.18)	R-32.5 (5.73)	0.031 (0.17)	R-32.8 (5.77)	0.031 (0.17)
R-21.0 (3.70)	R-43.3 (7.62)	R-34.8 (6.13)*	0.029 (0.16)*	R-35.3 (6.22)*	0.028 (0.16)*	R-35.6 (6.27)*	0.028 (0.16)*
R-24.0 (4.23)	R-46.3 (8.15)	R-37.5 (6.60)*	0.027 (0.15)*	R-38.1 (6.72)*	0.026 (0.15)*	R-38.5 (6.77)*	0.026 (0.15)*
R-27.0 (4.76)	R-49.3 (8.68)	R-40.2 (7.07)*	0.025 (0.14)*	R-40.9 (7.21)*	0.024 (0.14)*	R-41.3 (7.28)*	0.024 (0.14)*
R-30.0 (5.28)	R-52.3 (9.21)	R-42.8 (7.53)	0.023 (0.13)	R-43.7 (7.69)	0.023 (0.13)	R-44.1 (7.77)	0.023 (0.13)
R-33.0 (5.81)	R-55.3 (9.73)	R-45.4 (8.00)*	0.022 (0.12)*	R-46.4 (8.18)*	0.022 (0.12)*	R-46.9 (8.27)*	0.021 (0.12)*
R-36.0 (6.34)	R-58.3 (10.26)	R-48.0 (8.46)*	0.021 (0.12)*	R-49.2 (8.66)*	0.020 (0.12)*	R-49.7 (8.76)*	0.020 (0.11)*
R-39.0 (6.87)	R-61.3 (10.79)	R-50.6 (8.91)*	0.020 (0.11)*	R-51.9 (9.13)*	0.019 (0.11)*	R-52.5 (9.25)*	0.019 (0.11)*
R-42.0 (7.40)	R-64.3 (11.32)	R-53.2 (9.37)	0.019 (0.11)	R-54.5 (9.61)	0.018 (0.10)	R-55.3 (9.73)	0.018 (0.10)

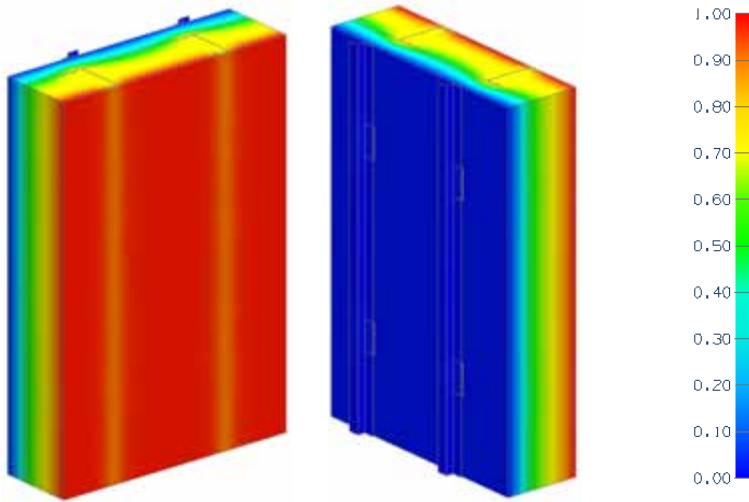
\*Indicates interpolated value

# Detail 5.1.129

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Mineral Wool and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.92 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value



View from Interior      View from Exterior

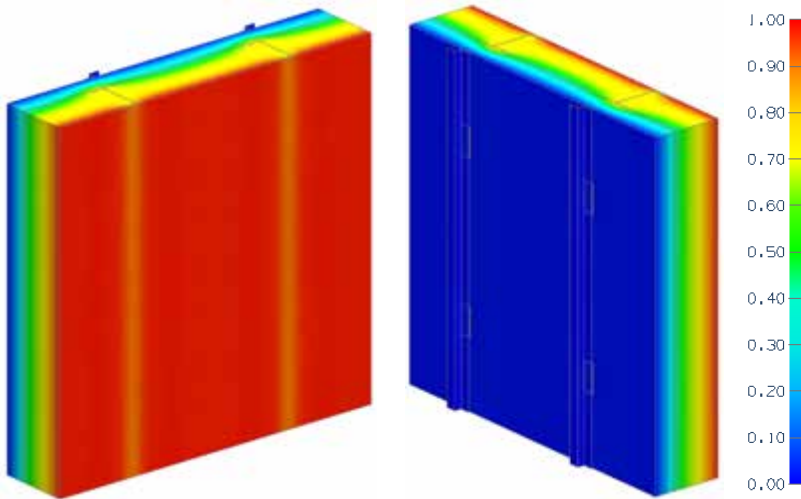
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.3 (0.76)	R-26.6 (4.68)	R-16.8 (2.95)	0.060 (0.34)	R-16.8 (2.95)	0.060 (0.34)	R-16.8 (2.96)	0.060 (0.34)
R-8.6 (1.51)	R-30.9 (5.44)	R-20.7 (3.65)*	0.048 (0.27)*	R-20.9 (3.68)*	0.048 (0.27)*	R-21.0 (3.70)*	0.048 (0.27)*
R-12.9 (2.27)	R-35.2 (6.19)	R-24.7 (4.35)	0.040 (0.23)	R-25.0 (4.41)	0.040 (0.23)	R-25.2 (4.44)	0.040 (0.23)
R-17.2 (3.03)	R-39.5 (6.95)	R-28.5 (5.01)*	0.035 (0.20)*	R-29.0 (5.10)*	0.035 (0.20)*	R-29.2 (5.15)*	0.034 (0.19)*
R-21.5 (3.79)	R-43.8 (7.71)	R-32.2 (5.67)	0.031 (0.18)	R-32.9 (5.79)	0.030 (0.17)	R-33.2 (5.85)	0.030 (0.17)
R-25.8 (4.54)	R-48.1 (8.47)	R-36.0 (6.34)*	0.028 (0.16)*	R-36.8 (6.49)*	0.027 (0.15)*	R-37.3 (6.57)*	0.027 (0.15)*
R-30.1 (5.30)	R-52.4 (9.22)	R-39.7 (6.99)*	0.025 (0.14)*	R-40.7 (7.17)*	0.025 (0.14)*	R-41.3 (7.27)*	0.024 (0.14)*
R-34.4 (6.06)	R-56.7 (9.98)	R-43.3 (7.63)	0.023 (0.13)	R-44.6 (7.85)	0.022 (0.13)	R-45.2 (7.96)	0.022 (0.13)

\*Indicates interpolated value

# Detail 5.1.130

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with Mineral Wool and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.92 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

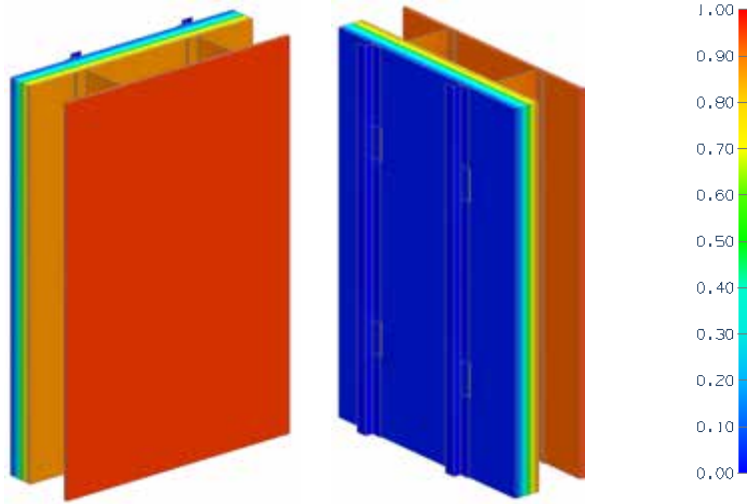
Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.3 (0.76)	R-26.6 (4.68)	R-19.1 (3.37)	0.052 (0.30)	R-19.1 (3.37)	0.052 (0.30)	R-19.1 (3.37)	0.052 (0.30)
R-8.6 (1.51)	R-30.9 (5.44)	R-23.3 (4.10)*	0.043 (0.24)*	R-23.4 (4.12)*	0.043 (0.24)*	R-23.5 (4.13)*	0.043 (0.24)*
R-12.9 (2.27)	R-35.2 (6.19)	R-27.4 (4.82)	0.037 (0.21)	R-27.7 (4.87)	0.036 (0.21)	R-27.8 (4.89)	0.036 (0.20)
R-17.2 (3.03)	R-39.5 (6.95)	R-31.3 (5.52)*	0.032 (0.18)*	R-31.7 (5.59)*	0.032 (0.18)*	R-31.9 (5.62)*	0.031 (0.18)*
R-21.5 (3.79)	R-43.8 (7.71)	R-35.2 (6.21)	0.028 (0.16)	R-35.8 (6.30)	0.028 (0.16)	R-36.1 (6.35)	0.028 (0.16)
R-25.8 (4.54)	R-48.1 (8.47)	R-39.2 (6.91)*	0.026 (0.14)*	R-39.9 (7.02)*	0.025 (0.14)*	R-40.2 (7.08)*	0.025 (0.14)*
R-30.1 (5.30)	R-52.4 (9.22)	R-43.1 (7.59)*	0.023 (0.13)*	R-43.9 (7.73)*	0.023 (0.13)*	R-44.3 (7.80)*	0.023 (0.13)*
R-34.4 (6.06)	R-56.7 (9.98)	R-46.9 (8.26)	0.021 (0.12)	R-47.8 (8.42)	0.021 (0.12)	R-48.3 (8.51)	0.021 (0.12)

\*Indicates interpolated value



# Detail 5.1.131

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Protected SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip Supporting Metal Cladding - Clear Wall



View from Interior      View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance	U <sub>o</sub> , R <sub>o</sub>	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

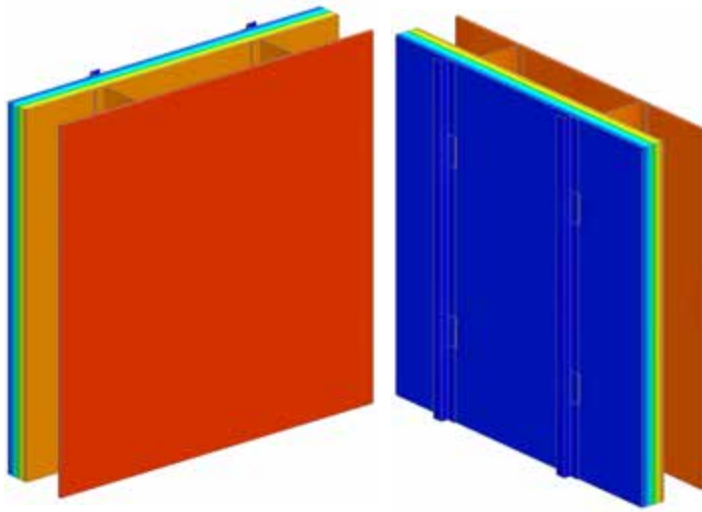
Exterior Insulation 1D R-value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-15.1 (2.66)	R-18.3 (3.22)	R-17.5 (3.08)	0.057 (0.32)	R-17.8 (3.13)	0.056 (0.32)	R-17.9 (3.15)	0.056 (0.32)
R-18.4 (3.23)	R-21.5 (3.79)	R-20.3 (3.58)*	0.049 (0.28)*	R-20.7 (3.65)*	0.048 (0.27)*	R-20.9 (3.69)*	0.048 (0.27)*
R-21.6 (3.80)	R-24.8 (4.36)	R-23.2 (4.08)	0.043 (0.24)	R-23.7 (4.17)	0.042 (0.24)	R-24.0 (4.22)	0.042 (0.24)
R-24.9 (4.38)	R-28.0 (4.93)	R-26.0 (4.57)*	0.039 (0.22)*	R-26.6 (4.69)*	0.038 (0.21)*	R-27.0 (4.75)*	0.037 (0.21)*
R-28.1 (4.95)	R-31.3 (5.51)	R-28.7 (5.05)	0.035 (0.20)	R-29.5 (5.19)	0.034 (0.19)	R-29.9 (5.27)	0.033 (0.19)
R-31.4 (5.52)	R-34.5 (6.08)	R-31.4 (5.54)*	0.032 (0.18)*	R-32.4 (5.71)*	0.031 (0.18)*	R-32.9 (5.79)*	0.030 (0.17)*
R-34.6 (6.09)	R-37.8 (6.65)	R-34.2 (6.02)	0.029 (0.17)	R-35.3 (6.22)	0.028 (0.16)	R-35.9 (6.32)	0.028 (0.16)
R-37.9 (6.67)	R-41.0 (7.22)	R-36.8 (6.48)*	0.027 (0.15)*	R-38.1 (6.71)*	0.026 (0.15)*	R-38.8 (6.83)*	0.026 (0.15)*
R-41.1 (7.24)	R-44.3 (7.80)	R-39.4 (6.94)	0.025 (0.14)	R-40.9 (7.20)	0.024 (0.14)	R-41.7 (7.34)	0.024 (0.14)
R-47.6 (8.38)	R-50.8 (8.94)	R-44.6 (7.85)**	0.022 (0.13)**	R-46.5 (8.18)**	0.022 (0.12)**	R-47.5 (8.36)**	0.021 (0.12)**

\*Indicates interpolated value

\*\*Indicates extrapolated value

# Detail 5.1.132

## Exterior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with Protected SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip 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

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-15.1 (2.66)	R-18.3 (3.22)	R-17.8 (3.13)	0.056 (0.32)	R-18.0 (3.17)	0.056 (0.32)	R-18.1 (3.18)	0.055 (0.31)
R-18.4 (3.23)	R-21.5 (3.79)	R-20.8 (3.65)*	0.048 (0.27)*	R-21.0 (3.70)*	0.048 (0.27)*	R-21.2 (3.73)*	0.047 (0.27)*
R-21.6 (3.80)	R-24.8 (4.36)	R-23.7 (4.18)	0.042 (0.24)	R-24.1 (4.24)	0.042 (0.24)	R-24.2 (4.27)	0.041 (0.23)
R-24.9 (4.38)	R-28.0 (4.93)	R-26.6 (4.69)*	0.038 (0.21)*	R-27.1 (4.77)*	0.037 (0.21)*	R-27.3 (4.81)*	0.037 (0.21)*
R-28.1 (4.95)	R-31.3 (5.51)	R-29.5 (5.20)	0.034 (0.19)	R-30.1 (5.30)	0.033 (0.19)	R-30.4 (5.35)	0.033 (0.19)
R-31.4 (5.52)	R-34.5 (6.08)	R-32.4 (5.71)*	0.031 (0.18)*	R-33.1 (5.83)*	0.030 (0.17)*	R-33.4 (5.89)*	0.030 (0.17)*
R-34.6 (6.09)	R-37.8 (6.65)	R-35.3 (6.22)	0.028 (0.16)	R-36.1 (6.36)	0.028 (0.16)	R-36.5 (6.43)	0.027 (0.16)
R-37.9 (6.67)	R-41.0 (7.22)	R-38.1 (6.71)*	0.026 (0.15)*	R-39.0 (6.87)*	0.026 (0.15)*	R-39.5 (6.96)*	0.025 (0.14)*
R-41.1 (7.24)	R-44.3 (7.80)	R-40.9 (7.21)	0.024 (0.14)	R-42.0 (7.39)	0.024 (0.14)	R-42.5 (7.49)	0.024 (0.13)
R-47.6 (8.38)	R-50.8 (8.94)	R-46.5 (8.19)**	0.022 (0.12)**	R-47.8 (8.43)**	0.021 (0.12)**	R-48.6 (8.56)**	0.021 (0.12)**

\*Indicates interpolated value

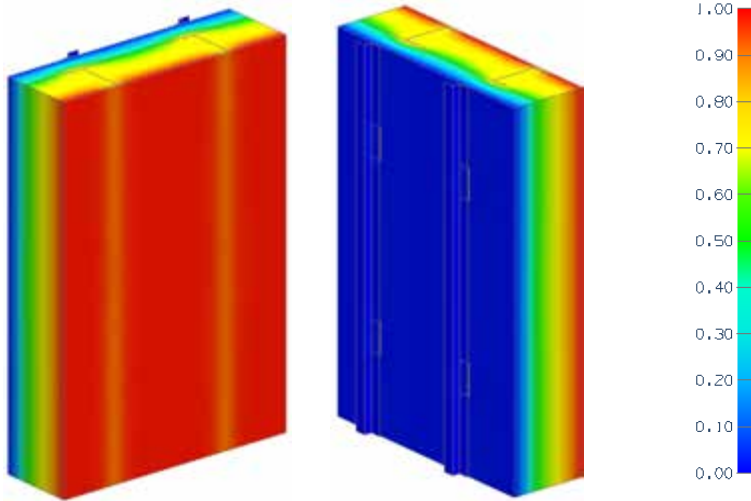
\*\*Indicates extrapolated value

# Detail 5.1.133

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Protected SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.3 (3.92 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

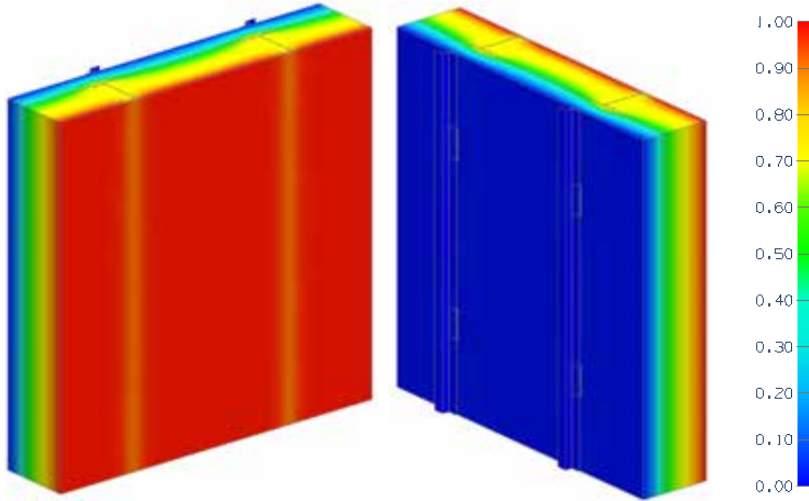
Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-14.6 (2.57)	R-36.9 (6.49)	R-26.5 (4.66)	0.038 (0.21)	R-26.8 (4.72)	0.037 (0.21)	R-27.0 (4.75)	0.037 (0.21)
R-17.6 (3.10)	R-39.9 (7.02)	R-29.1 (5.12)*	0.034 (0.20)*	R-29.5 (5.20)*	0.034 (0.19)*	R-29.8 (5.25)*	0.034 (0.19)*
R-20.6 (3.63)	R-42.9 (7.55)	R-31.7 (5.58)	0.032 (0.18)	R-32.3 (5.68)	0.031 (0.18)	R-32.6 (5.74)	0.031 (0.17)
R-23.6 (4.16)	R-45.9 (8.08)	R-34.2 (6.02)*	0.029 (0.17)*	R-34.9 (6.15)*	0.029 (0.16)*	R-35.3 (6.22)*	0.028 (0.16)*
R-26.6 (4.68)	R-48.9 (8.61)	R-36.7 (6.46)	0.027 (0.15)	R-37.6 (6.62)	0.027 (0.15)	R-38.1 (6.70)	0.026 (0.15)
R-29.6 (5.21)	R-51.9 (9.14)	R-39.2 (6.91)*	0.026 (0.14)*	R-40.3 (7.09)*	0.025 (0.14)*	R-40.8 (7.19)*	0.024 (0.14)*
R-32.6 (5.74)	R-54.9 (9.66)	R-41.7 (7.34)*	0.024 (0.14)*	R-42.9 (7.56)*	0.023 (0.13)*	R-43.6 (7.67)*	0.023 (0.13)*
R-35.6 (6.27)	R-57.9 (10.19)	R-44.2 (7.78)*	0.023 (0.13)*	R-45.5 (8.02)*	0.022 (0.12)*	R-46.3 (8.15)*	0.022 (0.12)*
R-38.6 (6.80)	R-60.9 (10.72)	R-46.6 (8.21)	0.021 (0.12)	R-48.1 (8.48)	0.021 (0.12)	R-49.0 (8.62)	0.020 (0.12)

\*Indicates interpolated value

# Detail 5.1.134

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (24" o.c.) Wall Assembly with Protected SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-20 Cellulose Insulation in Stud Cavity - Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-22.3 (3.92 RSI) + exterior insulation
Transmittance / Resistance	U <sub>o</sub> , R <sub>o</sub>	"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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-14.6 (2.57)	R-36.9 (6.49)	R-29.2 (5.14)	0.034 (0.19)	R-29.5 (5.19)	0.034 (0.19)	R-29.6 (5.22)	0.034 (0.19)
R-17.6 (3.10)	R-39.9 (7.02)	R-31.9 (5.62)*	0.031 (0.18)*	R-32.3 (5.69)*	0.031 (0.18)*	R-32.5 (5.72)*	0.031 (0.17)*
R-20.6 (3.63)	R-42.9 (7.55)	R-34.6 (6.10)	0.029 (0.16)	R-35.1 (6.18)	0.028 (0.16)	R-35.4 (6.23)	0.028 (0.16)
R-23.6 (4.16)	R-45.9 (8.08)	R-37.3 (6.57)*	0.027 (0.15)*	R-37.9 (6.67)*	0.026 (0.15)*	R-38.2 (6.72)*	0.026 (0.15)*
R-26.6 (4.68)	R-48.9 (8.61)	R-39.9 (7.03)	0.025 (0.14)	R-40.6 (7.16)	0.025 (0.14)	R-41.0 (7.22)	0.024 (0.14)
R-29.6 (5.21)	R-51.9 (9.14)	R-42.6 (7.51)*	0.023 (0.13)*	R-43.4 (7.65)*	0.023 (0.13)*	R-43.8 (7.72)*	0.023 (0.13)*
R-32.6 (5.74)	R-54.9 (9.66)	R-45.3 (7.97)*	0.022 (0.13)*	R-46.2 (8.13)*	0.022 (0.12)*	R-46.7 (8.22)*	0.021 (0.12)*
R-35.6 (6.27)	R-57.9 (10.19)	R-47.9 (8.43)*	0.021 (0.12)*	R-48.9 (8.61)*	0.020 (0.12)*	R-49.5 (8.71)*	0.020 (0.11)*
R-38.6 (6.80)	R-60.9 (10.72)	R-50.5 (8.89)	0.020 (0.11)	R-51.6 (9.09)	0.019 (0.11)	R-52.3 (9.20)	0.019 (0.11)

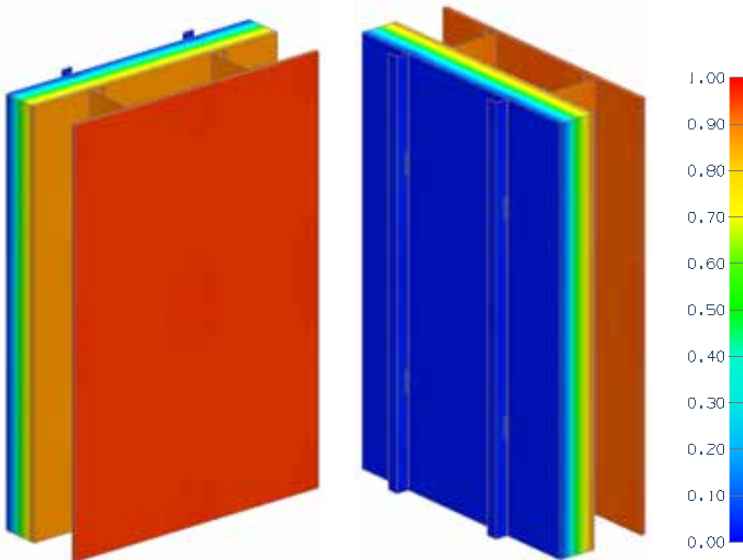
\*Indicates interpolated value

# Detail 5.1.135

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with U-Kon ND-062 Brackets and Vertical Rail System Supporting Metal Cladding - Clear Wall

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.30 (0.58 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value



View from Interior

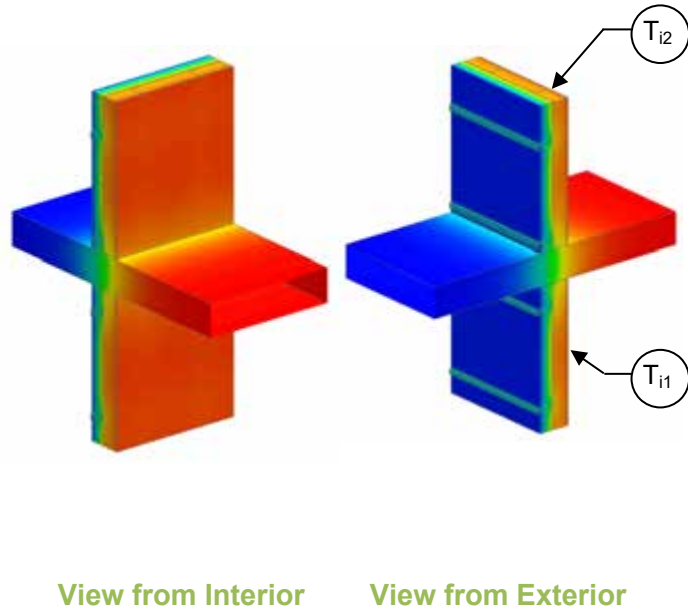
View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.6 (2.22)	R-15.9 (2.80)	R-14.2 (2.50)	0.070 (0.40)	R-14.7 (2.58)	0.068 (0.39)	R-14.9 (2.62)	0.067 (0.38)
R-16.8 (2.96)	R-20.1 (3.54)	R-17.7 (3.11)	0.057 (0.32)	R-18.3 (3.23)	0.055 (0.31)	R-18.7 (3.29)	0.054 (0.30)
R-21.0 (3.70)	R-24.3 (4.28)	R-21.1 (3.71)	0.047 (0.27)	R-21.9 (3.86)	0.046 (0.26)	R-22.4 (3.94)	0.045 (0.25)
R-25.2 (4.44)	R-28.5 (5.02)	R-24.8 (4.37)	0.040 (0.23)	R-25.8 (4.54)	0.039 (0.22)	R-26.3 (4.64)	0.038 (0.22)
R-42.0 (7.40)	R-45.3 (7.98)	R-38.9 (6.86)	0.026 (0.15)	R-40.7 (7.17)	0.025 (0.14)	R-41.7 (7.34)	0.024 (0.14)

# 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

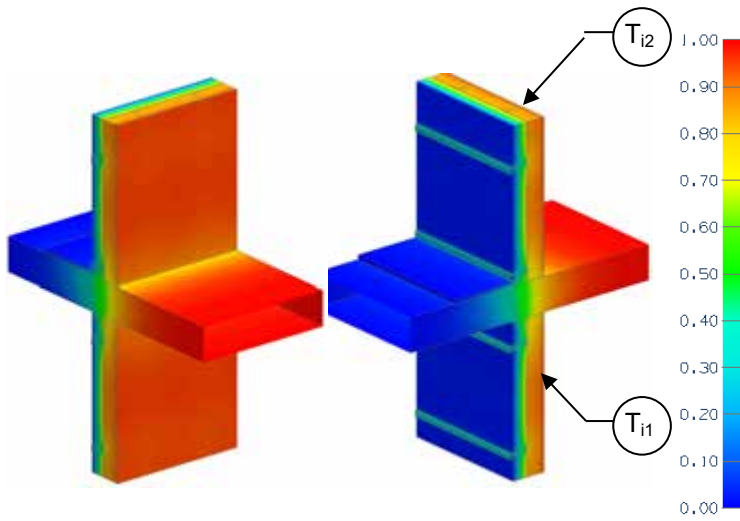
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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)

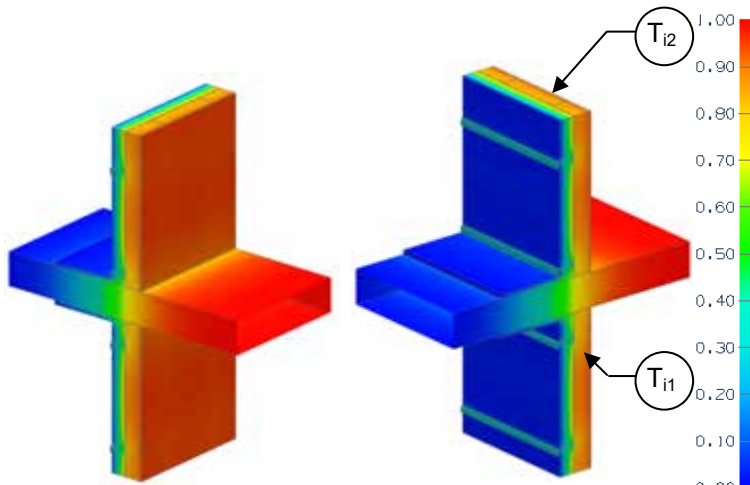
### Temperature Indices

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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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)

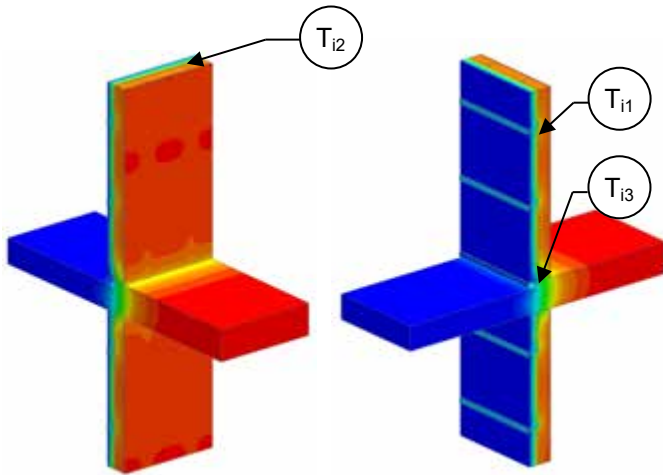
### Temperature Indices

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



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

View from Interior

View from Exterior

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

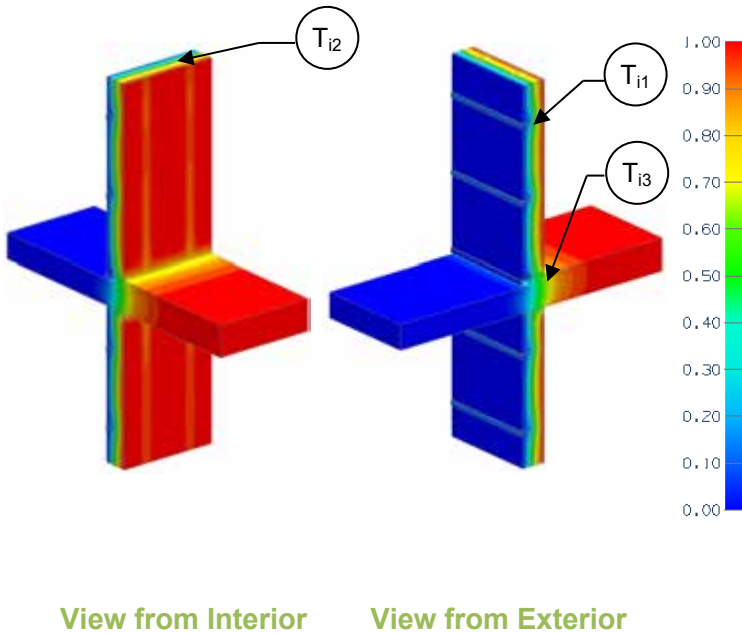
### Temperature Indices

$T_{i1}$	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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

View from Interior

View from Exterior

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

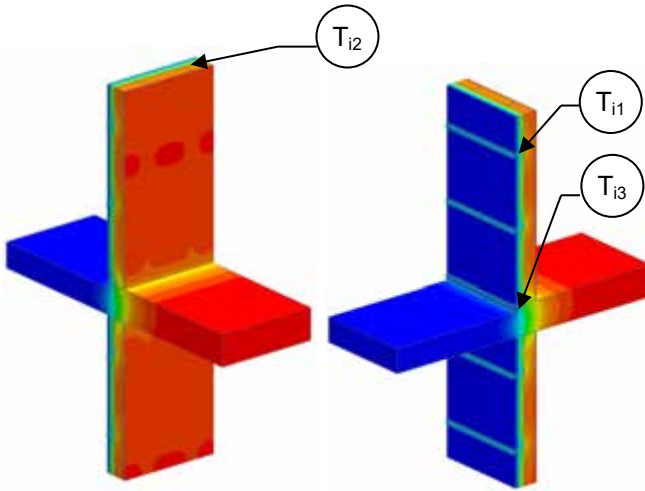
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

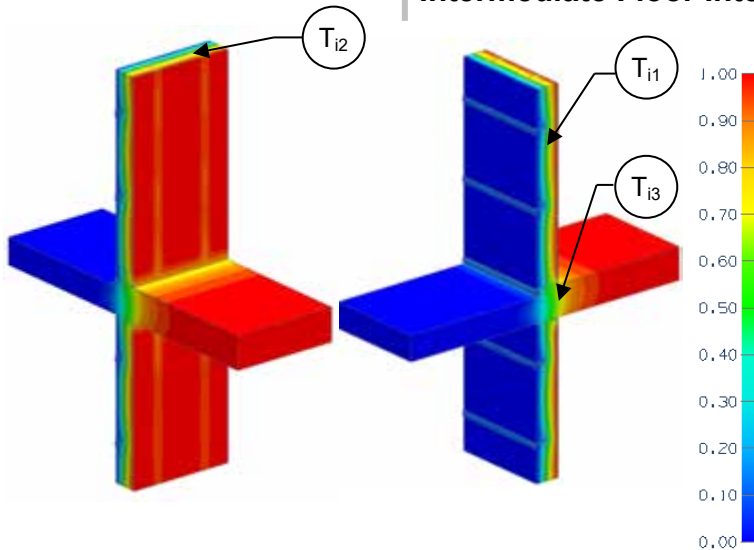
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 and R-12 Batt Insulation in Stud Cavity – Uninsulated Intermediate Floor Intersection with Insulated 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

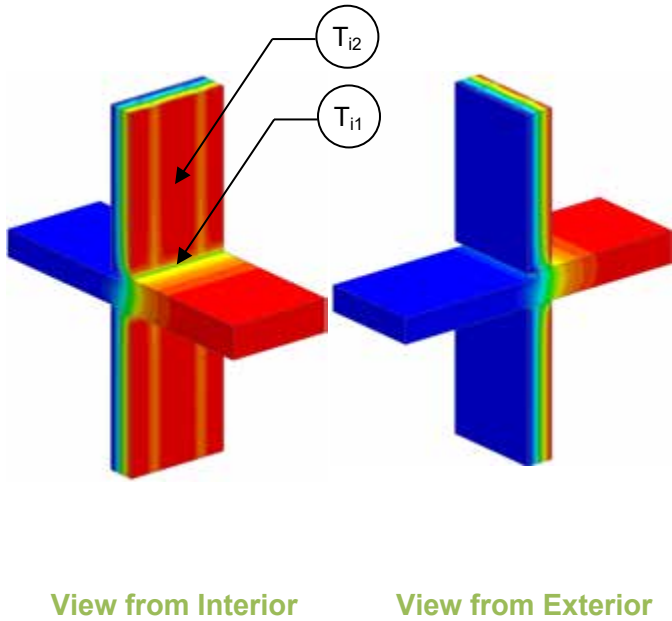
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

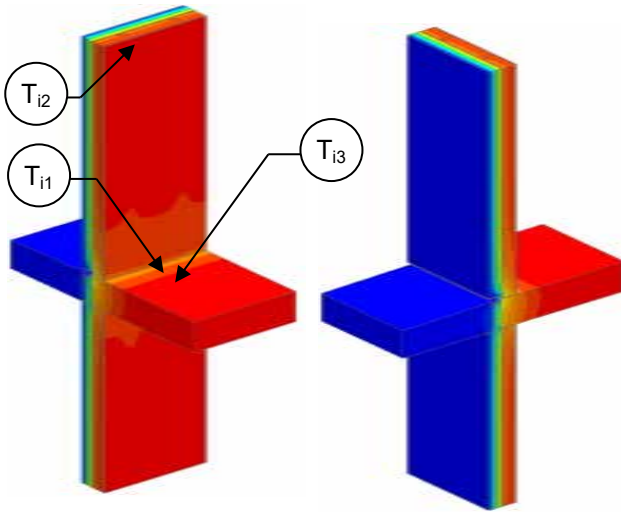
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

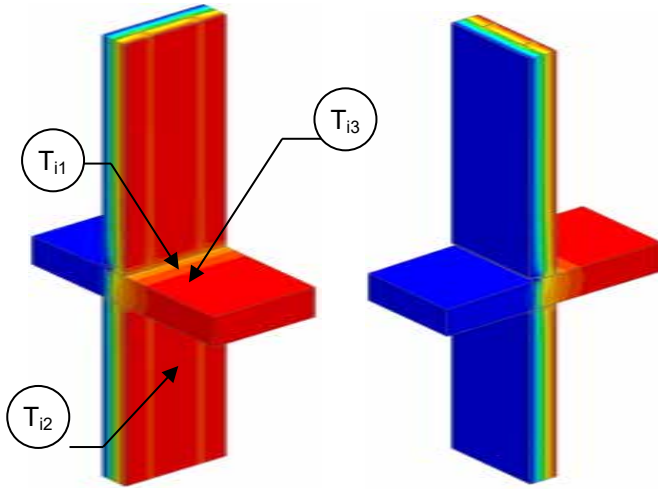
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 with R-12 Batt Insulation in Stud Cavity – Isokorb CM20 Thermally Broken Slab Projection without Concrete Curb



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-14.2 (2.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	“clear wall” U- and R-value, without slab
Transmittance / Resistance	U, R	U and R-values for the assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

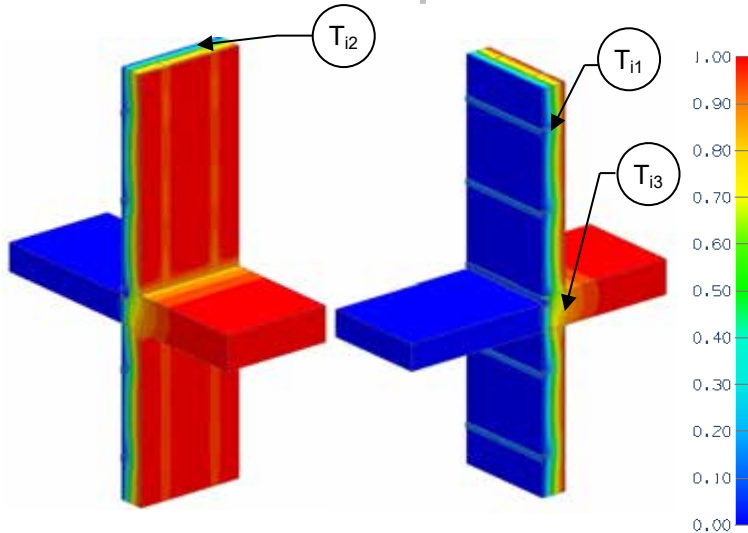
Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sub>i1</sub>	0.45	Min T on sheathing, along gap below EIFS at track, between studs
T <sub>i2</sub>	0.77	Max T on sheathing, below slab, between studs
T <sub>i3</sub>	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 and R-12 Batt Insulation in Stud Cavity – Isokorb CM20 Thermally Broken Slab Projection 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

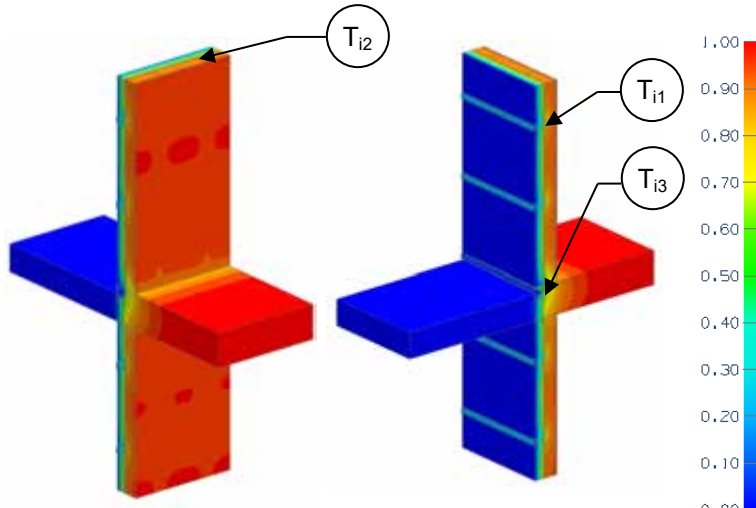
## Temperature Indices

$T_{i1}$	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
$T_{i3}$	0.77	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



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

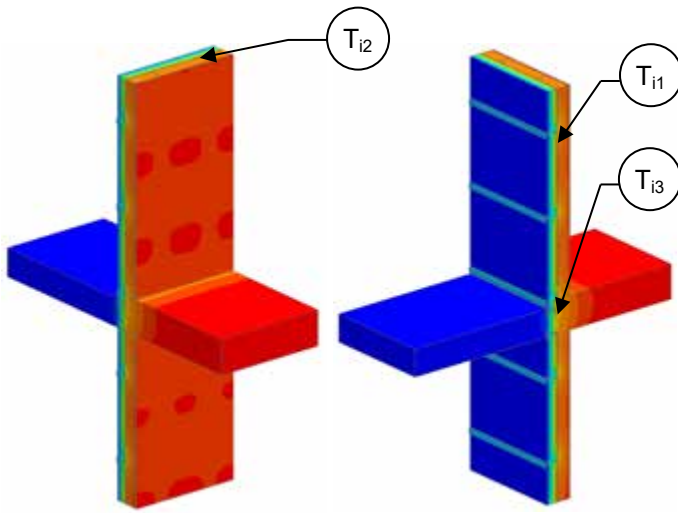
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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)

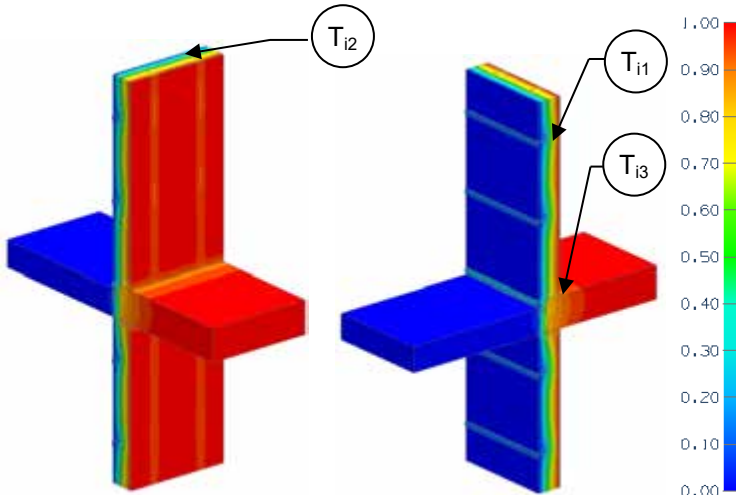
### Temperature Indices

$T_{i1}$	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 and R-12 Batt Insulation in Stud Cavity – Isokorb CM20 Thermally Broken Slab Projection with Insulated 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

## Nominal (1D) vs. Assembly Performance Indicators

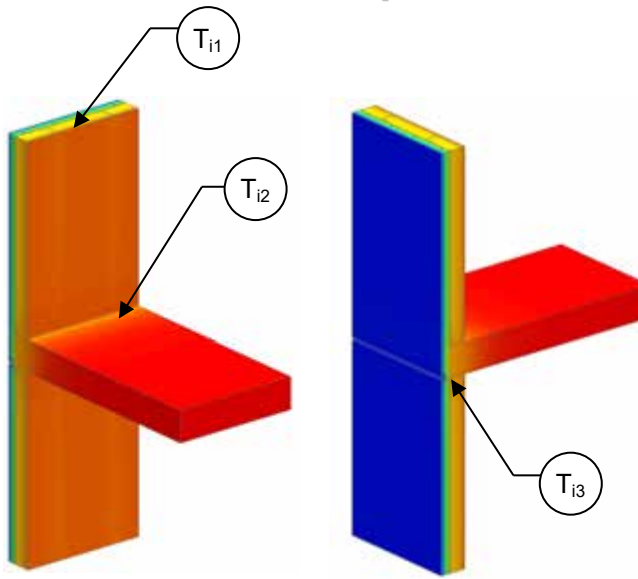
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 <sub>1D</sub>	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

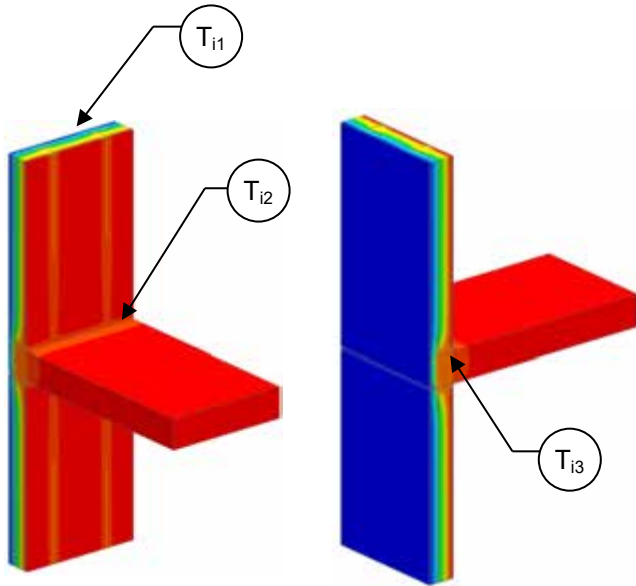
Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sub>i1</sub>	0.80	0.85	0.88	Min T on sheathing, between studs
T <sub>i2</sub>	0.86	0.90	0.93	Max T on sheathing, along steel track at slab
T <sub>i3</sub>	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 with R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

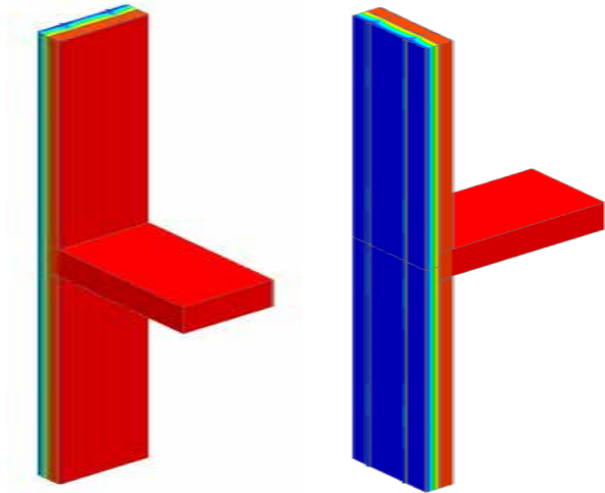
### Temperature Indices

	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



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	$\psi$	Incremental increase in transmittance per linear length of slab

View from Interior

View from Exterior

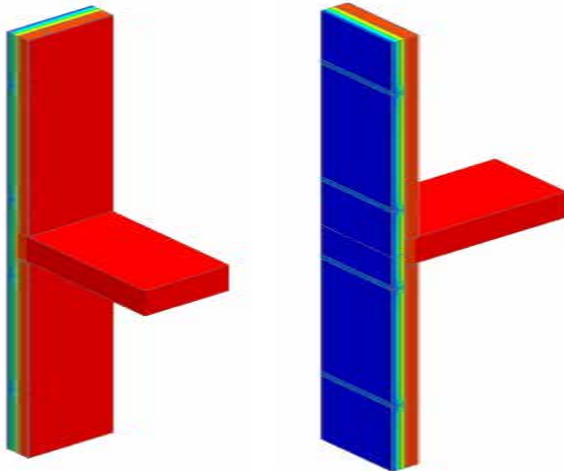
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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	$\psi$	Incremental increase in transmittance per linear length of slab

View from Interior

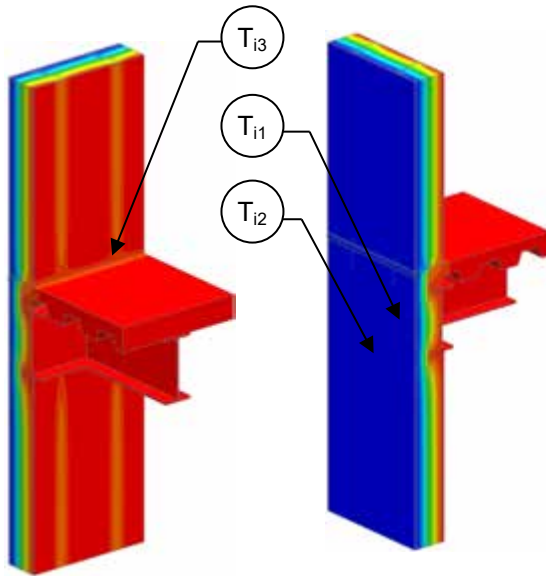
View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 and R-12 Batt Insulation in Stud Cavity – Steel Framed Floor with Cross Cavity Flashing



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-14.5 (2.55 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value, without slab
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length steel framed floor

<sup>1</sup>Assumptions 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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

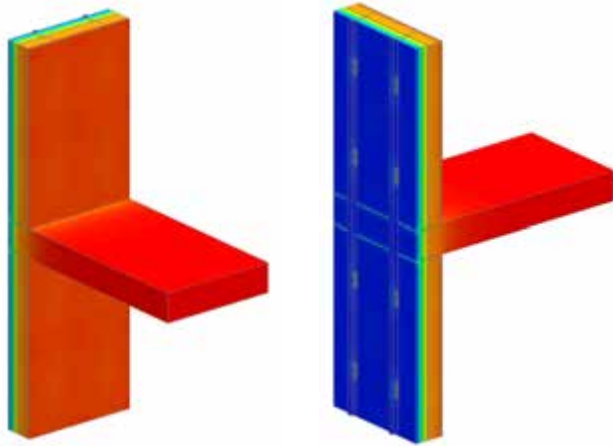
### Temperature Indices

	R10	R15	
T <sub>i1</sub>	0.35	0.36	Min T on sheathing, mid height of cavity behind I-beam, aligned with external girts
T <sub>i2</sub>	0.90	0.92	Max T on sheathing, bottom of cavity behind I- beam, beside lower wall track, centered between external girts
T <sub>i3</sub>	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	$\psi$	Incremental increase in transmittance per linear length steel framed floor

View from Interior

View from Exterior

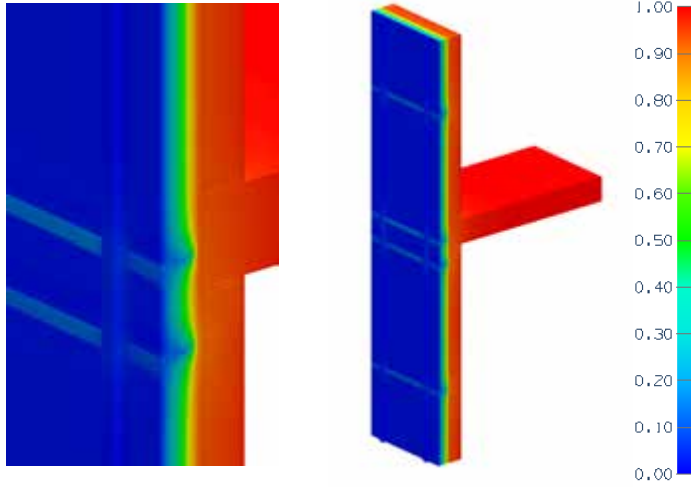
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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	$\psi$	Incremental increase in transmittance per linear length of slab

View of Intersection

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

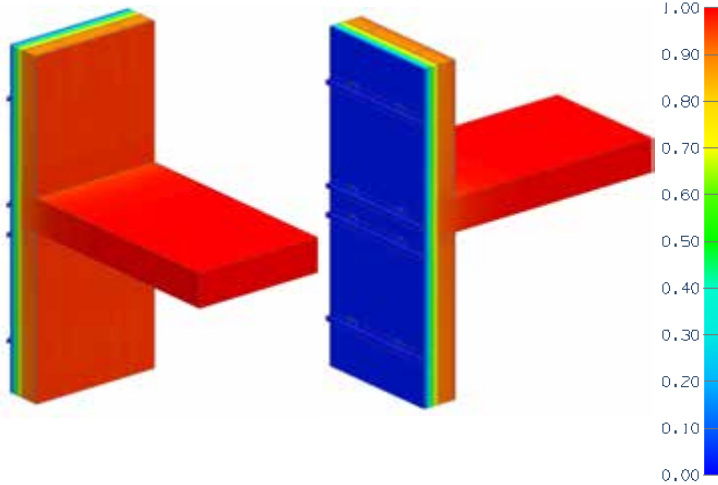
#### Assembly – Exterior Insulated Assembly

Clip Type	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	34" Vertical Clip Spacing		41" Vertical Clip Spacing		48" Vertical Clip Spacing		$\psi$ Btu/ft hr °F (W/m K)
			R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 5/8" 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	$\psi$	Incremental increase in transmittance per linear length of slab

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

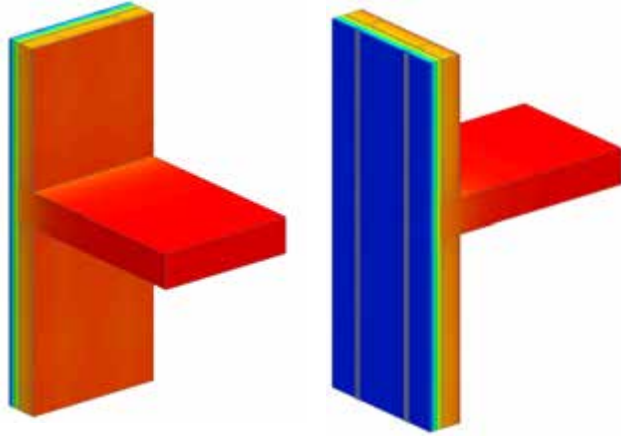
#### Without Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		$\psi$ Btu/ft hr °F (W/m K)
		R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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	$\psi$	Incremental increase in transmittance per linear length of slab

View from Interior

View from Exterior

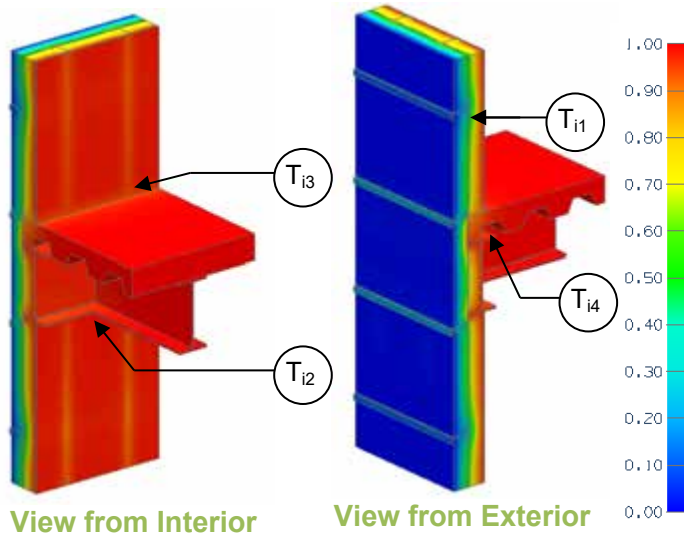
### Nominal (1D) vs. Assembly Performance Indicators

#### Assembly – Without Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		30" Vertical Clip Spacing		36" Vertical Clip Spacing		42" Vertical Clip Spacing		$\psi$ Btu/ft hr °F (W/m K)
		R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of the slab and I-Beam

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

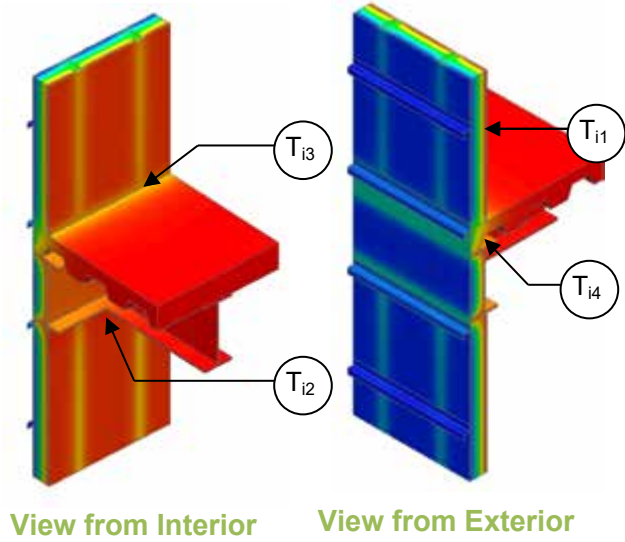
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of the slab and I-Beam

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

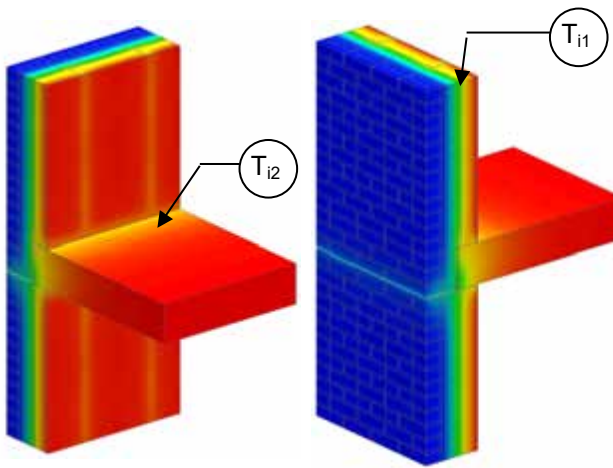
### Temperature Indices

$T_{i1}$	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

## Exterior and Interior Insulated Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer and R-12 Batt Insulation in Stud Cavity – Intermediate Floor Intersection

### Thermal Performance Indicators



View from Interior

View from Exterior

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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of shelf angle and slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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-17.0 (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-22.5 (3.96)	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 (4.38)	0.040 (0.23)	R-11.6 (2.04)	0.086 (0.49)	0.286 (0.496)

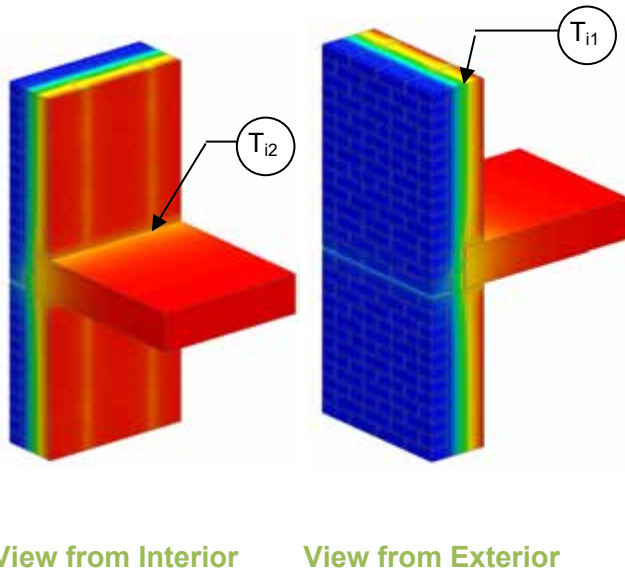
### Temperature Indices

	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 5.2.27

## Exterior and Interior Insulated Wall Assembly with Spaced Shelf Angle & Brick Ties Supporting Brick Veneer and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of shelf angle and slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)	0.106 (0.61)	0.217 (0.376)
R-10 (1.76)	R-25.3 (4.46)	R-17.0 (3.00)	0.059 (0.33)	R-11.1 (1.95)	0.090 (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)	0.080 (0.46)	0.189 (0.326)
R-20 (3.52)	R-35.3 (6.22)	R-22.5 (3.96)	0.045 (0.25)	R-13.8 (2.43)	0.072 (0.41)	0.174 (0.301)
R-25 (4.40)	R-40.3 (7.10)	R-24.9 (4.38)	0.040 (0.23)	R-15.0 (2.64)	0.067 (0.38)	0.165 (0.290)

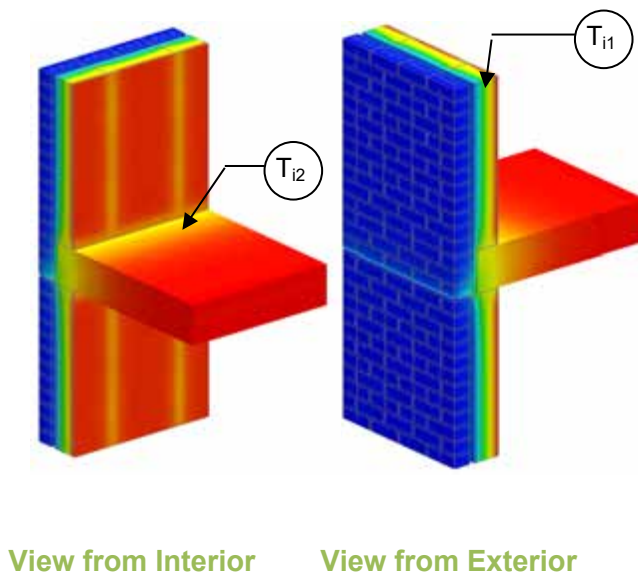
### Temperature Indices

	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 5.2.28

## Exterior and Interior Insulated Wall Assembly with Stainless Steel Shelf Angle & Brick Ties Supporting Brick Veneer and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of shelf angle and slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

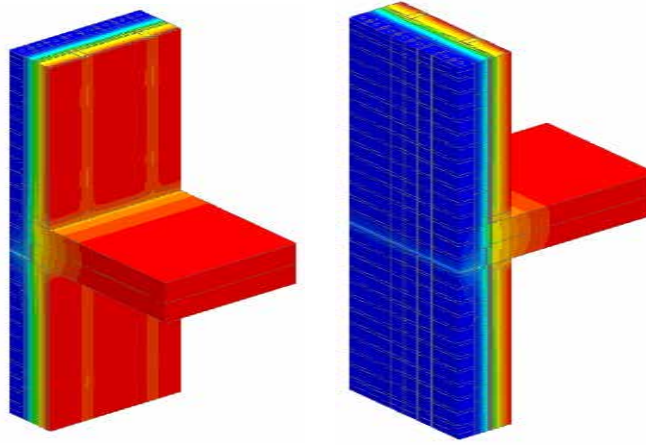
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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-9.0 (1.59)	0.111 (0.63)	0.242 (0.419)
R-10 (1.76)	R-25.3 (4.46)	R-17.0 (3.00)	0.059 (0.33)	R-10.0 (1.76)	0.100 (0.57)	0.256 (0.443)
R-15 (2.64)	R-30.3 (5.34)	R-19.8 (3.48)	0.051 (0.29)	R-11.0 (1.93)	0.091 (0.52)	0.251 (0.434)
R-20 (3.52)	R-35.3 (6.22)	R-22.5 (3.96)	0.045 (0.25)	R-12.2 (2.15)	0.082 (0.46)	0.231 (0.399)
R-25 (4.40)	R-40.3 (7.10)	R-24.9 (4.38)	0.040 (0.23)	R-13.2 (2.32)	0.076 (0.43)	0.221 (0.383)

### Temperature Indices

	R5	R15	R25	
$T_{i1}$	0.39	0.59	0.69	Min T on sheathing cavity centre away from slab
$T_{i2}$	0.68	0.73	0.78	Max T on sheathing, at slab, at steel studs

# Detail 5.2.29

## Exterior and Interior Insulated Wall Assembly with Thermally Broken Steel Shelf Angle & Brick Ties Supporting Brick Veneer and R-12 Batt Insulation in Stud Cavity – Slab Intersection



View from Interior

View from Exterior

### 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	$\psi$	Incremental increase in transmittance per linear length of slab with shelf angle

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Scenario

Scenario	Flashing and Shelf Angle
A	Metal Flashing with Steel Shelf Angle and Bolts
B	Self-Adhered Membrane Flashing with Steel Shelf Angle and Bolts

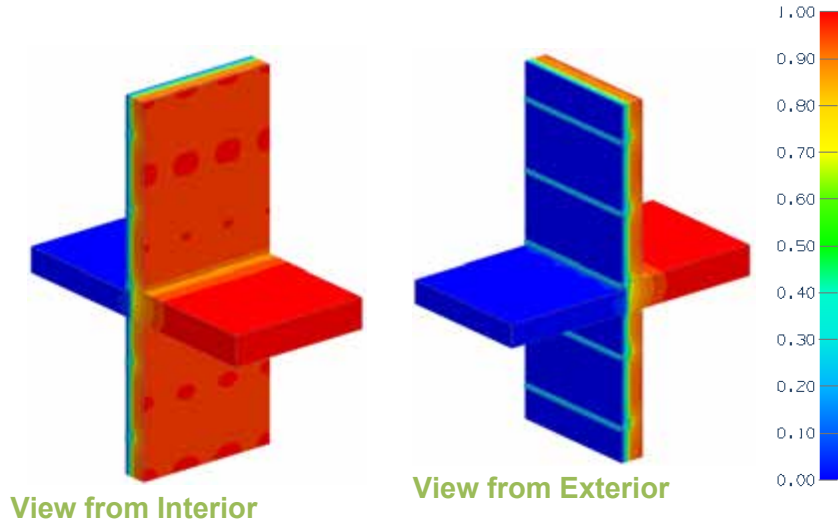
### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
A	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)
B	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 5.2.30

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Surface 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-14.7 (2.59)	R-17.9 (3.15)	R-11.2 (1.97)	0.089 (0.51)

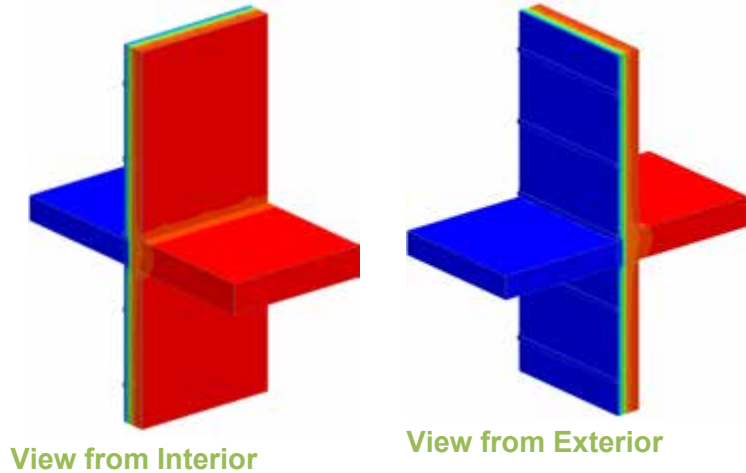
#### Slab Linear Transmittance

Scenario	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 5.2.31

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Surface 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

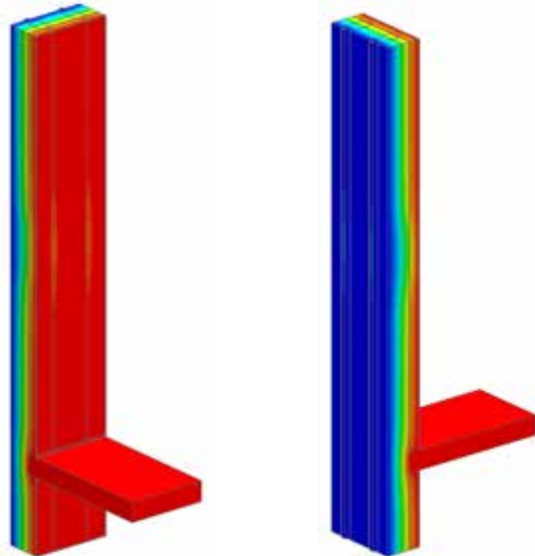
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-14.7 (2.59)	R-17.9 (3.15)	R-17.3 (3.050)	0.058 (0.33)

#### Slab Linear Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-14.6 (2.57)	0.068 (0.39)	0.107 (0.185)

# Detail 5.2.32

## 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 and R-13 Batt Insulation in Stud Cavity – Intermediate Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

1.00	Assembly 1D (Nominal) R-Value	$R_{1D}$	R-15.3 (2.52 RSI) + exterior insulation
0.90	Transmittance / Resistance	$U_o, R_o$	“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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
0.60	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor slab
0.50			
0.40			
0.30			
0.20			
0.10			
0.00			

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

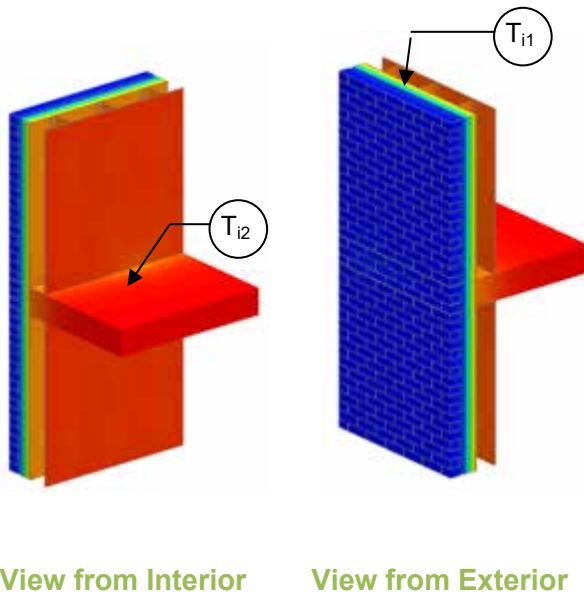
Floor Height ft (mm)	Exterior Insulation 1D R-value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
11' (3353)	R-42 (7.40)	R-35.0 (6.17)	0.029 (0.16)	0.005 (0.009)
13.5' (4115)	R-42 (7.40)	R-36.8 (6.48)	0.027 (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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 5.2.33

## Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FERRO Slotted Rap Ties (24" o.c.) and FERRO FAST Thermal Bracket (48" o.c.) Supporting Brick Veneer – Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-4.3 (0.76 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab with shelf angle

### Scenario

Scenario	Shelf Angle
A	Direct Anchor Shelf Angle
B	FERRO FAST Thermal Bracket System
C	FERRO FAST Thermal Bracket with Aerogel Coating

### Nominal (1D) vs. Assembly Performance Indicators

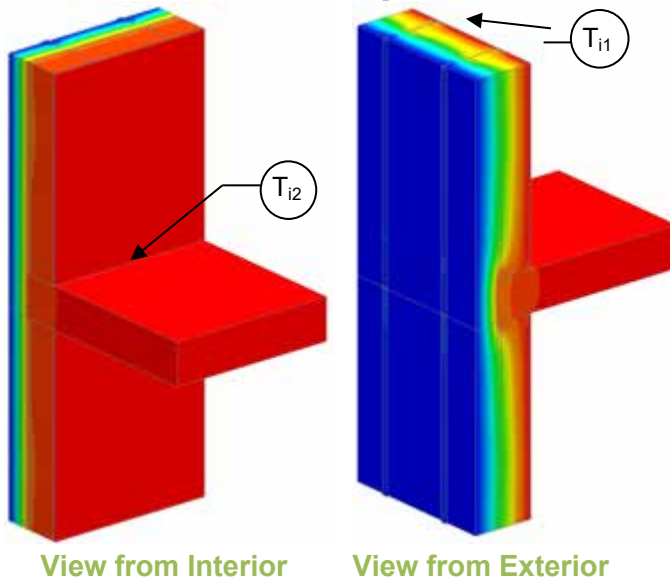
Scenario	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
A	R-16.8 (2.96)	R-21.1 (3.72)	R-18.6 (3.28)	0.054 (0.305)	R-10.8 (1.90)	0.093 (0.525)	0.337 (0.583)
	R-24.0 (4.23)	R-28.3 (4.98)	R-24.1 (4.25)	0.041 (0.235)	R-12.2 (2.15)	0.082 (0.466)	0.351 (0.608)
B	R-16.8 (2.96)	R-21.1 (3.72)	R-18.6 (3.28)	0.054 (0.305)	R-16.7 (2.94)	0.060 (0.341)	0.055 (0.095)
	R-24.0 (4.23)	R-28.3 (4.98)	R-24.1 (4.25)	0.041 (0.235)	R-20.8 (3.67)	0.048 (0.272)	0.056 (0.098)
C	R-16.8 (2.96)	R-21.1 (3.72)	R-18.6 (3.28)	0.054 (0.305)	R-17.1 (3.01)	0.059 (0.333)	0.043 (0.074)
	R-24.0 (4.23)	R-28.3 (4.98)	R-24.1 (4.25)	0.041 (0.235)	R-21.5 (3.79)	0.046 (0.264)	0.043 (0.075)

### Temperature Indices

	1		2		3		
	R16.8	R24	R16.8	R24	R16.8	R24	
$T_{11}$	0.89	0.91	0.89	0.92	0.89	0.92	Max T on sheathing cavity centre away from slab
$T_{12}$	0.67	0.68	0.81	0.82	0.83	0.85	Min T on sheathing, at slab, between steel studs at track

# Detail 5.2.34

## Owens Corning Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – 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 without slab and shelf angle
Transmittance / Resistance	$U, R$	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

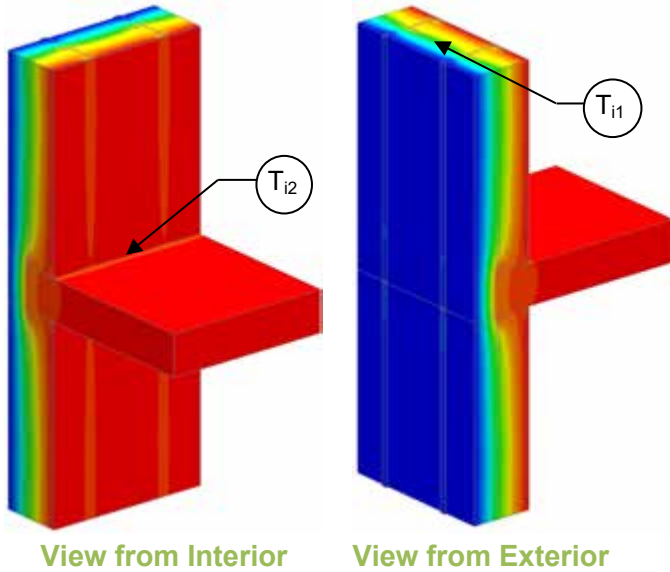
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.0 (1.77)	0.100 (0.57)	R-9.7 (1.72)	0.103 (0.58)	0.020 (0.034)
R-21.0 (3.70)	R-24.3 (4.28)	R-17.6 (3.10)	0.057 (0.32)	R-17.0 (3.00)	0.059 (0.33)	0.013 (0.023)

### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.80	0.89	Min T on sheathing cavity centre, away from slab
$T_{i2}$	0.84	0.91	Max T on sheathing, at slab, between steel studs

# Detail 5.2.35

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-20 Batt in Stud Cavity – Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-30.8 (5.42)	R-18.3 (3.23)	0.055 (0.31)	R-15.3 (2.69)	0.065 (0.37)	0.076 (0.132)
R-21.0 (3.70)	R-43.4 (7.64)	R-25.8 (4.54)	0.039 (0.22)	R-22.5 (3.96)	0.045 (0.25)	0.040 (0.069)

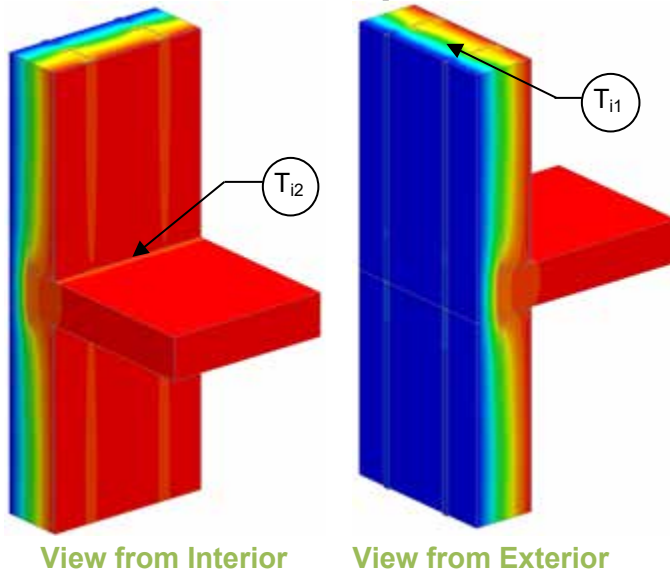
### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.35	0.55	Min T on sheathing cavity centre, away from slab
$T_{i2}$	0.80	0.88	Max T on sheathing, at slab, between steel studs



# Detail 5.2.36

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-22.5 Batt in Stud Cavity – Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-24.9 (4.38 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

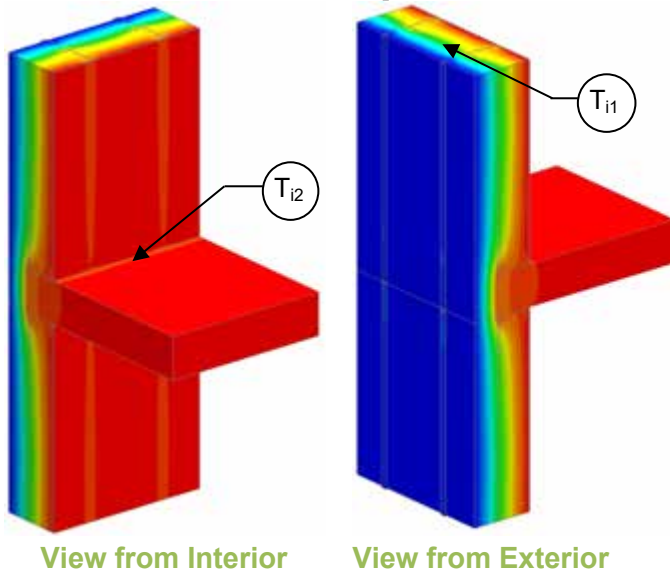
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-33.3 (5.86)	R-19.0 (3.34)	0.053 (0.30)	R-15.6 (2.75)	0.064 (0.36)	0.079 (0.136)
R-21.0 (3.70)	R-45.9 (8.08)	R-26.4 (4.64)	0.038 (0.22)	R-22.8 (4.02)	0.044 (0.25)	0.041 (0.071)

### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.33	0.53	Min T on sheathing cavity centre, away from slab
$T_{i2}$	0.80	0.87	Max T on sheathing, at slab, between steel studs

# Detail 5.2.37

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-24 Batt in Stud Cavity – Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-26.4 (4.65 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-34.8 (6.13)	R-19.3 (3.40)	0.052 (0.29)	R-15.8 (2.78)	0.063 (0.36)	0.080 (0.139)
R-21.0 (3.70)	R-47.4 (8.34)	R-26.7 (4.71)	0.037 (0.21)	R-23.0 (4.05)	0.043 (0.25)	0.042 (0.073)

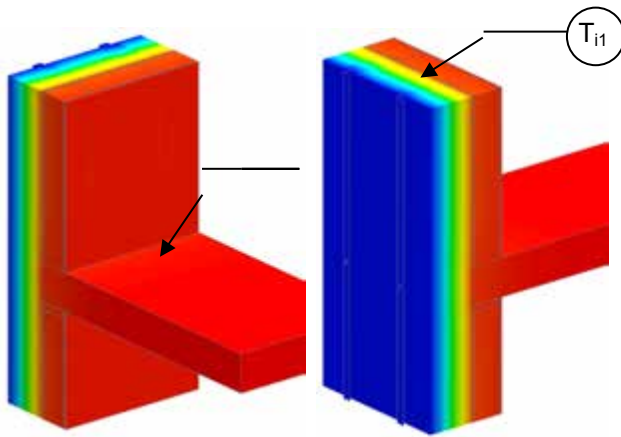
### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.32	0.52	Min T on sheathing cavity centre, away from slab
$T_{i2}$	0.80	0.87	Max T on sheathing, at slab, between steel studs

# Detail 5.2.38

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding – Intermediate Floor Intersection

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

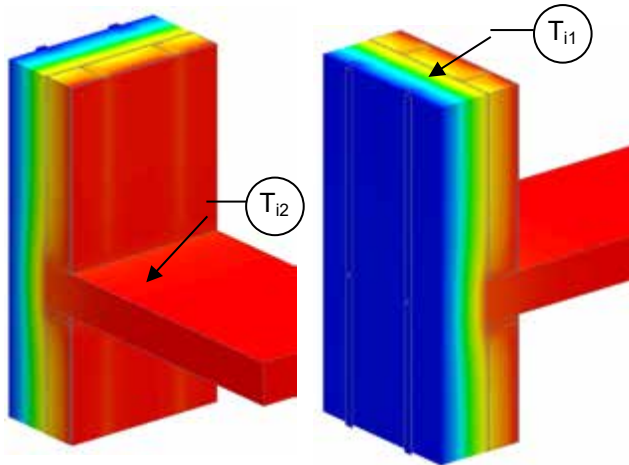
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-42 (7.40)	R-45.2 (7.96)	R-40.0 (7.04 )	0.025 (0.14)	R-39.5 (6.96)	0.025 (0.14)	0.002 (0.003)

### Temperature Indices

	R42	
$T_{i1}$	0.94	Min T on sheathing cavity centre away from slab
$T_{i2}$	0.96	Max T on sheathing, at slab, at steel studs

# Detail 5.2.39

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding and R-19 Batt in Stud Cavity – Intermediate Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value without slab
Transmittance / Resistance	$U, R$	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

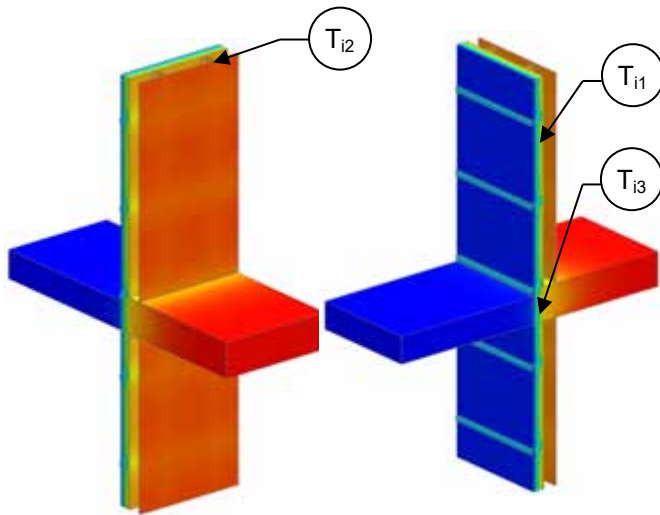
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-42 (7.40)	R-63.3 (11.15)	R-48.3 (8.51 )	0.021 (0.12)	R-45.0 (7.92)	0.022 (0.13)	0.008 (0.015)

### Temperature Indices

	R42	
$T_{i1}$	0.76	Min T on sheathing cavity centre away from slab
$T_{i2}$	0.94	Max T on sheathing, at slab, between steel studs

# Detail 5.2.40

## 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 K65-V8 Thermally Broken Slab Projection with Insulated Curb



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

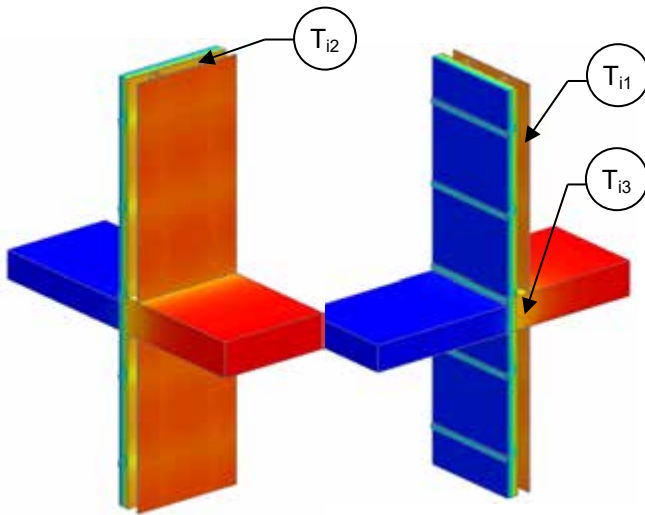
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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-9.7 (1.71)	0.103 (0.58)	0.143 (0.248)

### Temperature Indices

$T_{i1}$	0.75	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
$T_{i3}$	0.78	Min T on slab exposed to interior air, at sheathing between studs

# Detail 5.2.41

## 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 K10-V6 Thermally Broken Slab Projection with Insulated Curb



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

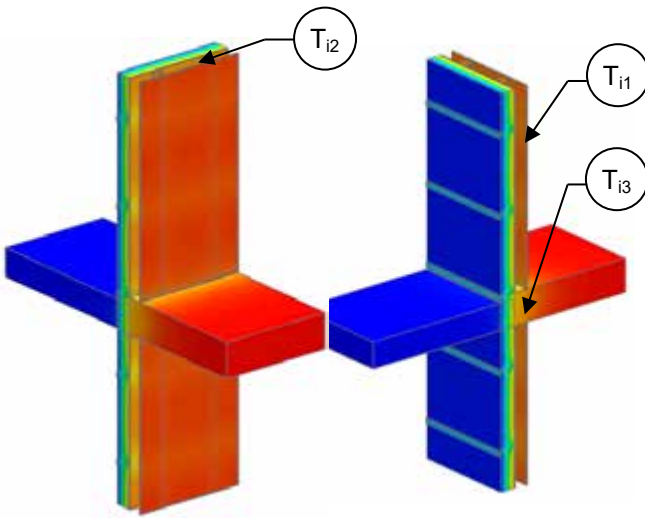
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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-10.4 (1.83)	0.096 (0.55)	0.075 (0.130)

### Temperature Indices

$T_{i1}$	0.75	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
$T_{i3}$	0.80	Min T on slab exposed to interior air, at sheathing between studs

# Detail 5.2.42

## 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 KXT65-V8 Thermally Broken Slab Projection with Insulated Curb



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

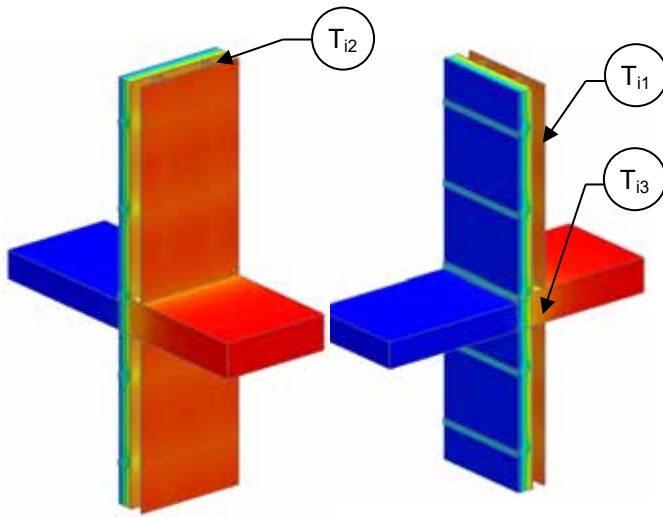
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-22.5 (3.96)	R-25.7 (4.52)	R-13.8 (2.44)	0.072 (0.41)	R-11.8 (2.07)	0.085 (0.48)	0.126 (0.217)

### Temperature Indices

$T_{i1}$	0.78	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
$T_{i3}$	0.81	Min T on slab exposed to interior air, at sheathing between studs

# Detail 5.2.43

## 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 KXT15-V6 Thermally Broken Slab Projection with Insulated Curb



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-22.5 (3.96)	R-25.7 (4.52)	R-13.8 (2.44)	0.072 (0.41)	R-12.6 (2.22)	0.079 (0.45)	0.068 (0.118)

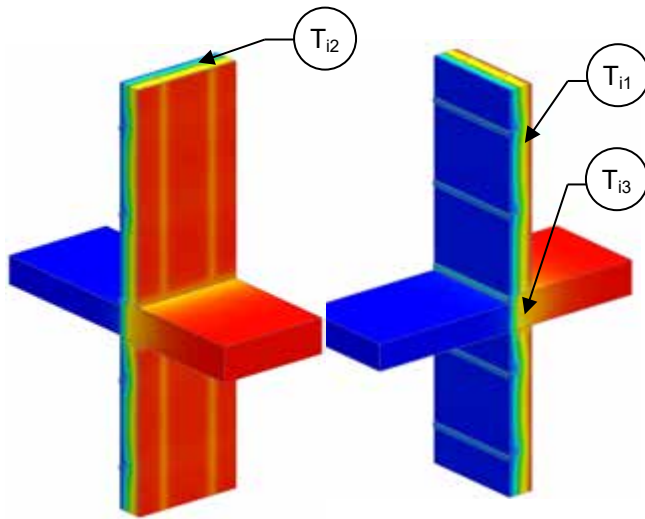
### Temperature Indices

$T_{i1}$	0.78	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
$T_{i3}$	0.83	Min T on slab exposed to interior air, at sheathing between studs



# Detail 5.2.44

**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 and R-12 Batt Insulation in Stud Cavity – Isokorb K65-V8 Thermally Broken Slab Projection with Insulated Curb**



## 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
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

## Nominal (1D) vs. Assembly Performance Indicators

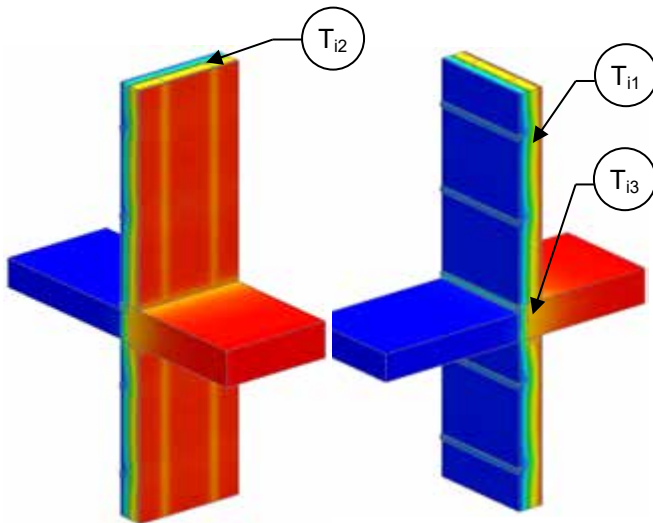
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-29.3 (5.16)	R-18.5 (3.25)	0.054 (0.31)	R-13.5 (2.38)	0.074 (0.42)	0.196 (0.339)

## Temperature Indices

$T_{11}$	0.36	Min T on sheathing away from slab, between studs at girts
$T_{12}$	0.70	Max T on sheathing away from slab, between girts at studs
$T_{13}$	0.63	Min T on slab exposed to interior air, at sheathing between studs

# Detail 5.2.45

**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 and R-12 Batt Insulation in Stud Cavity – Isokorb K10-V6 Thermally Broken Slab Projection with Insulated Curb**



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

## Nominal (1D) vs. Assembly Performance Indicators

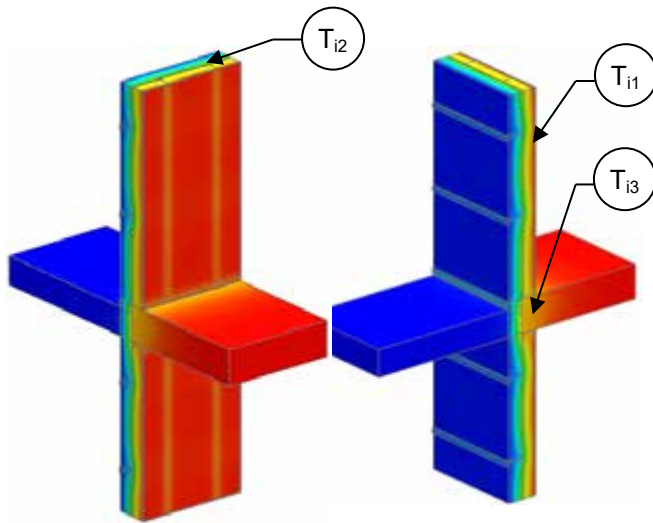
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-29.3 (5.16)	R-18.5 (3.25)	0.054 (0.31)	R-14.8 (2.61)	0.067 (0.38)	0.131 (0.226)

## Temperature Indices

$T_{11}$	0.36	Min T on sheathing away from slab, between studs at girts
$T_{12}$	0.70	Max T on sheathing away from slab, between girts at studs
$T_{13}$	0.65	Min T on slab exposed to interior air, at sheathing between studs

# Detail 5.2.46

**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 and R-12 Batt Insulation in Stud Cavity – Isokorb KXT65-V8 Thermally Broken Slab Projection with Insulated Curb**



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

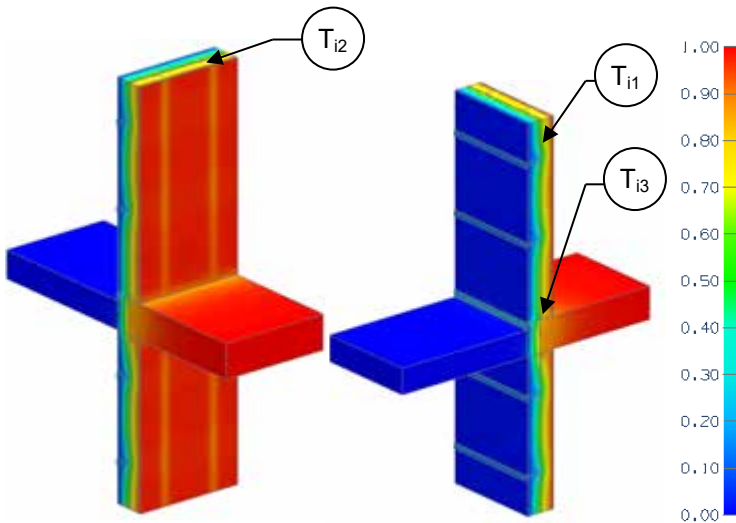
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-22.5 (3.96)	R-36.8 (6.48)	R-21.4 (3.76)	0.047 (0.27)	R-15.8 (2.79)	0.063 (0.36)	0.161 (0.278)

### Temperature Indices

$T_{i1}$	0.41	Min T on sheathing away from slab, between studs at girts
$T_{i2}$	0.74	Max T on sheathing away from slab, between girts at studs
$T_{i3}$	0.68	Min T on slab exposed to interior air, at sheathing between studs

# Detail 5.2.47

**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 and R-12 Batt Insulation in Stud Cavity – Isokorb KXT15-V6 Thermally Broken Slab Projection with Insulated Curb**



### 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
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-22.5 (3.96)	R-36.8 (6.48)	R-21.4 (3.76)	0.047 (0.27)	R-17.4 (3.06)	0.058 (0.33)	0.106 (0.183)

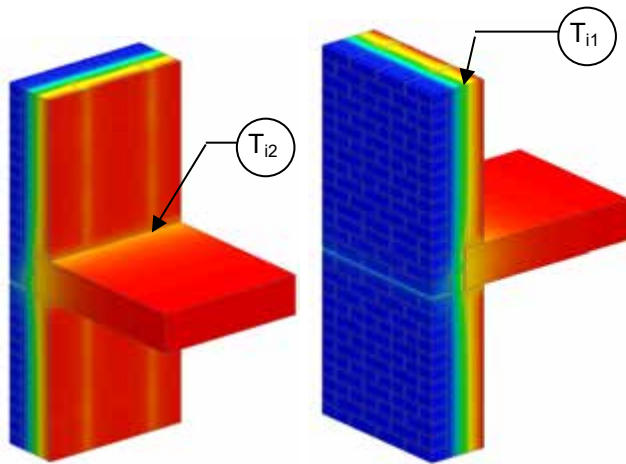
### Temperature Indices

$T_{i1}$	0.41	Min T on sheathing away from slab, between studs at girts
$T_{i2}$	0.74	Max T on sheathing away from slab, between girts at studs
$T_{i3}$	0.70	Min T on slab exposed to interior air, at sheathing between studs

# Detail 5.2.48

## Exterior and Interior Insulated Wall Assembly with Stainless Steel Spaced Shelf Angle & Brick Ties Supporting Brick Veneer and R-12 Batt Insulation in Stud Cavity – Intermediate Floor Intersection

### Thermal Performance Indicators



View from Interior

View from Exterior

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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of shelf angle and slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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-9.6 (1.70)	0.104 (0.59)	0.198 (0.343)
R-10 (1.76)	R-25.3 (4.46)	R-17.0 (3.00)	0.059 (0.33)	R-11.5 (2.02)	0.087 (0.49)	0.175 (0.304)
R-15 (2.64)	R-30.3 (5.34)	R-19.8 (3.48)	0.051 (0.29)	R-13.0 (2.28)	0.077 (0.44)	0.165 (0.285)
R-20 (3.52)	R-35.3 (6.22)	R-22.5 (3.96)	0.045 (0.25)	R-14.6 (2.57)	0.069 (0.39)	0.149 (0.257)
R-25 (4.40)	R-40.3 (7.10)	R-24.9 (4.38)	0.040 (0.23)	R-16.0 (2.82)	0.062 (0.35)	0.138 (0.239)

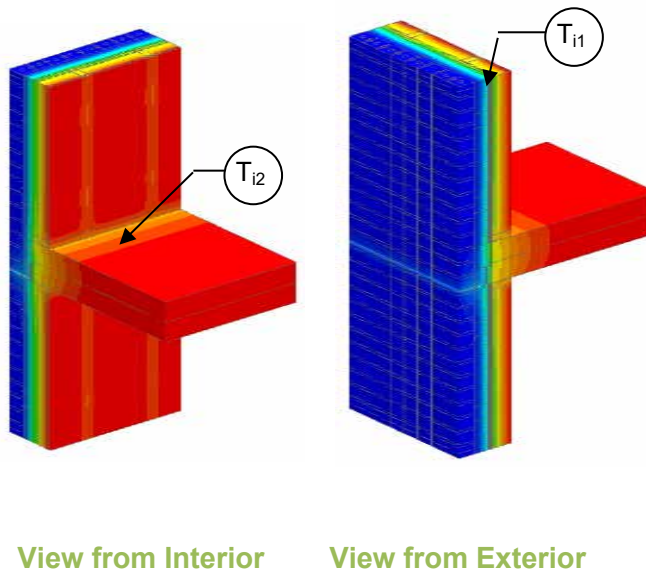
### Temperature Indices

	R5	R15	R25	
$T_{i1}$	0.39	0.59	0.69	Min T on sheathing, cavity centre away from slab
$T_{i2}$	0.70	0.78	0.82	Max T on sheathing, at slab, at steel studs

# Detail 5.2.49

## Exterior and Interior Insulated Wall Assembly with Thermally Broken Stainless Steel Shelf Angle & Brick Ties Supporting Brick Veneer and R-12 Batt Insulation in Stud Cavity – 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	$\psi$	Incremental increase in transmittance per linear length of slab with shelf angle

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

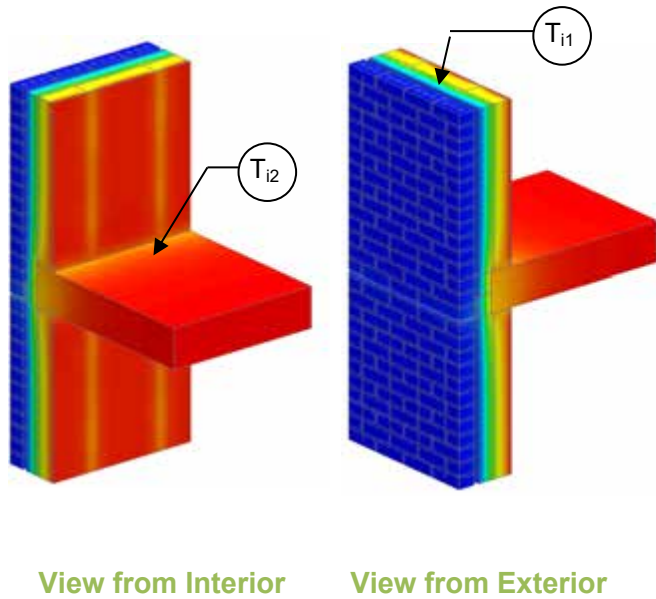
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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-9.2 (1.62)	0.109 (0.62)	0.228 (0.394)
R-10 (1.76)	R-25.3 (4.46)	R-17.0 (3.00)	0.059 (0.33)	R-12.8 (2.26)	0.078 (0.44)	0.119 (0.206)
R-15 (2.64)	R-30.3 (5.34)	R-19.8 (3.48)	0.051 (0.29)	R-14.5 (2.55)	0.069 (0.39)	0.114 (0.198)
R-20 (3.52)	R-35.3 (6.22)	R-22.5 (3.96)	0.045 (0.25)	R-16.0 (2.82)	0.062 (0.35)	0.111 (0.193)
R-25 (4.40)	R-40.3 (7.10)	R-24.9 (4.38)	0.040 (0.23)	R-17.4 (3.07)	0.057 (0.33)	0.107 (0.185)

### Temperature Indices

	R5	R15	R25	
$T_{i1}$	0.40	0.60	0.69	Min T on sheathing, cavity centre away from slab
$T_{i2}$	0.73	0.84	0.87	Max T on sheathing, at slab, between steel studs

# Detail 5.2.50

## Exterior and Interior Insulated Wall Assembly with Stainless Steel Spaced Shelf Angle Without Flashing & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection



### Thermal Performance Indicators

1.00	Assembly 1D (Nominal) R-Value	$R_{1D}$	R-15.3 (2.70 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
0.60	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of shelf angle and slab
0.50			
0.40			
0.30			
0.20			
0.10			
0.00			

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

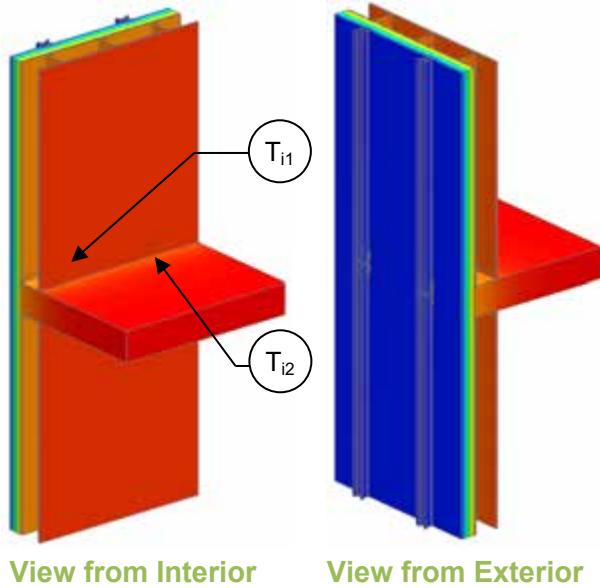
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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-11.0 (1.94)	0.091 (0.51)	0.116 (0.201)
R-10 (1.76)	R-25.3 (4.46)	R-17.0 (3.00)	0.059 (0.33)	R-13.7 (2.42)	0.073 (0.41)	0.088 (0.151)
R-15 (2.64)	R-30.3 (5.34)	R-19.8 (3.48)	0.051 (0.29)	R-15.8 (2.79)	0.063 (0.36)	0.078 (0.135)
R-20 (3.52)	R-35.3 (6.22)	R-22.5 (3.96)	0.045 (0.25)	R-18.1 (3.19)	0.055 (0.31)	0.066 (0.114)
R-25 (4.40)	R-40.3 (7.10)	R-24.9 (4.39)	0.040 (0.23)	R-20.1 (3.54)	0.050 (0.28)	0.059 (0.103)

### Temperature Indices

	R5	R15	R25	
$T_{i1}$	0.40	0.60	0.69	Min T on sheathing, cavity centre away from slab
$T_{i2}$	0.66	0.76	0.84	Max T on sheathing, at slab, at steel studs

# Detail 5.2.51

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with U-Kon ND 0-33 Bracket and Vertical Rail System Supporting Metal Cladding – Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.30 (0.58 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“Clear wall” U- and R-value (including rails)
Transmittance / Resistance	$U, R$	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab
Point Transmittance	$\chi$	Incremental increase in transmittance per bracket

<sup>1</sup>Assumptions and limitations for surface temperature identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### 24" Horizontal Bracket Spacing

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)	$\chi$ Btu/ ·hr ·°F (W/ K)
R-12.6 (2.22)	R-15.9 (2.80)	R-15.5 (2.73)	0.064 (0.37)	R-14.6 (2.57)	0.068 (0.39)	0.000 (0.000)	0.079 (0.042)
R-16.8 (2.96)	R-20.1 (3.54)	R-19.6 (3.44)	0.051 (0.29)	R-18.2 (3.21)	0.055 (0.31)	0.003 (0.006)	0.067 (0.036)
R-21.0 (3.70)	R-24.3 (4.28)	R-23.6 (4.15)	0.042 (0.24)	R-21.9 (3.85)	0.046 (0.26)	0.002 (0.004)	0.061 (0.032)
R-25.2 (4.44)	R-28.5 (5.02)	R-27.9 (4.92)	0.036 (0.20)	R-25.8 (4.54)	0.039 (0.22)	0.002 (0.003)	0.057 (0.030)
R-42.0 (7.40)	R-45.3 (7.98)	R-44.7 (7.87)	0.022 (0.13)	R-40.5 (7.13)	0.025 (0.14)	0.001 (0.001)	0.045 (0.024)

#### 30" Horizontal Bracket Spacing

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)	$\chi$ Btu/ ·hr ·°F (W/ K)
R-12.6 (2.22)	R-15.9 (2.80)	R-15.6 (2.74)	0.064 (0.37)	R-14.8 (2.61)	0.067 (0.38)	0.006 (0.010)	0.066 (0.035)
R-16.8 (2.96)	R-20.1 (3.54)	R-19.6 (3.46)	0.051 (0.29)	R-18.6 (3.27)	0.054 (0.31)	0.003 (0.006)	0.065 (0.035)
R-21.0 (3.70)	R-24.3 (4.28)	R-23.7 (4.17)	0.042 (0.24)	R-22.3 (3.92)	0.045 (0.26)	0.002 (0.004)	0.062 (0.033)
R-25.2 (4.44)	R-28.5 (5.02)	R-28.0 (4.93)	0.036 (0.20)	R-26.2 (4.62)	0.038 (0.22)	0.002 (0.003)	0.057 (0.030)
R-42.0 (7.40)	R-45.3 (7.98)	R-44.8 (7.89)	0.022 (0.13)	R-41.6 (7.33)	0.024 (0.14)	0.001 (0.001)	0.041 (0.022)

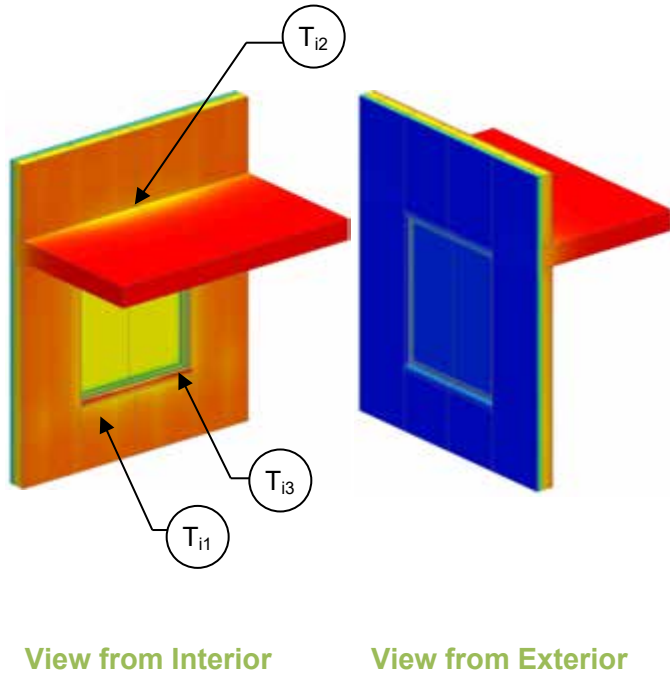
### Temperature Indices

Bracket Spacing		R-12.6	R-16.8	R-21.0	R-25.2	R-42.0	
24"	$T_{i1}$	0.86	0.89	0.90	0.91	0.94	Min T on sheathing, at slab, between studs
	$T_{i2}$	0.93	0.95	0.95	0.96	0.97	Min T on slab, at gypsum
30"	$T_{i1}$	0.86	0.89	0.90	0.91	0.95	Min T on sheathing, at slab, between studs
	$T_{i2}$	0.93	0.95	0.96	0.96	0.97	Min T on slab, at gypsum



# 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



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_g$	Incremental increase in transmittance per linear length of s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_g^2$ Btu/ft <sup>2</sup> ·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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

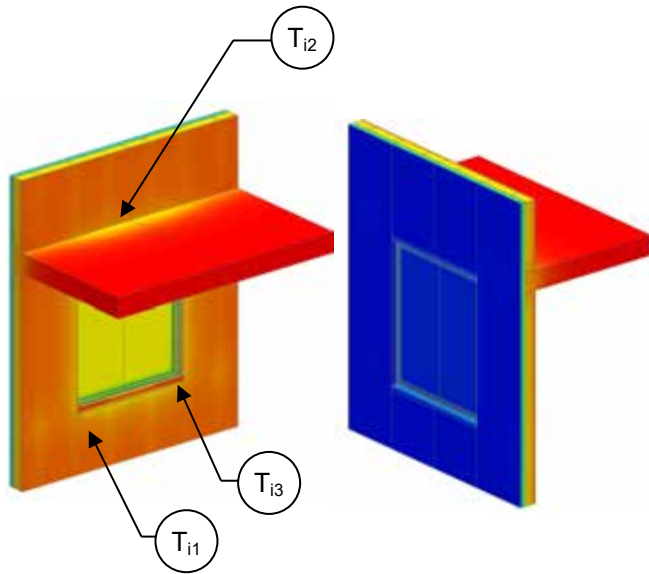
### Temperature Indices

	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

<sup>2</sup>For 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 with R-12 Batt Insulation in Stud Cavity – Window and Intermediate Floor Intersection



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_g$	Incremental increase in transmittance per linear length of s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_g^2$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

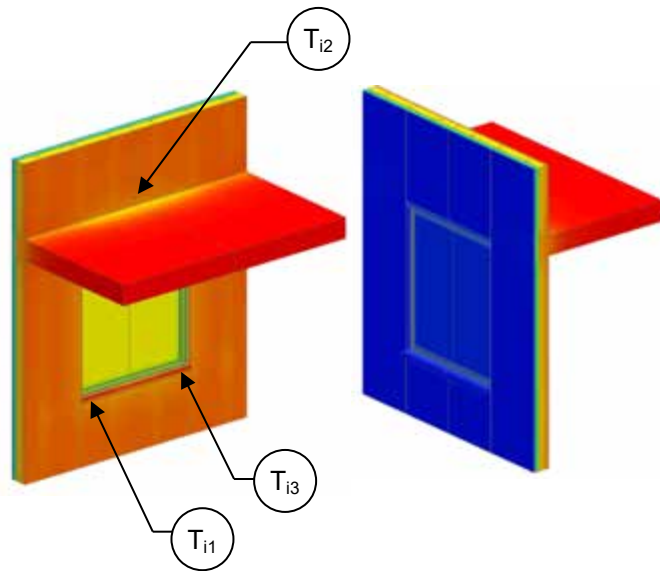
### Temperature Indices

	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

<sup>2</sup>For 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.) Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value, without slab and window
Transmittance / Resistance	U <sub>s</sub> , R <sub>s</sub> , U <sub>g</sub>	U and R-values for s = wall + slab g = glazing
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ <sub>s</sub> , ψ <sub>g</sub>	Incremental increase in transmittance per linear length of s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sub>centre of glazing</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ <sub>g</sub> <sup>2</sup> Btu/ft <sup>2</sup> ·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 <sub>s</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>s</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ <sub>s</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sub>i1</sub>	0.60	0.62	0.63	Min T on sheathing, below window sill
T <sub>i2</sub>	0.87	0.90	0.92	Max T on sheathing, at slab intersection away from window
T <sub>i3</sub>	0.59	0.59	0.59	Min T on window frame, at corner of window at glass

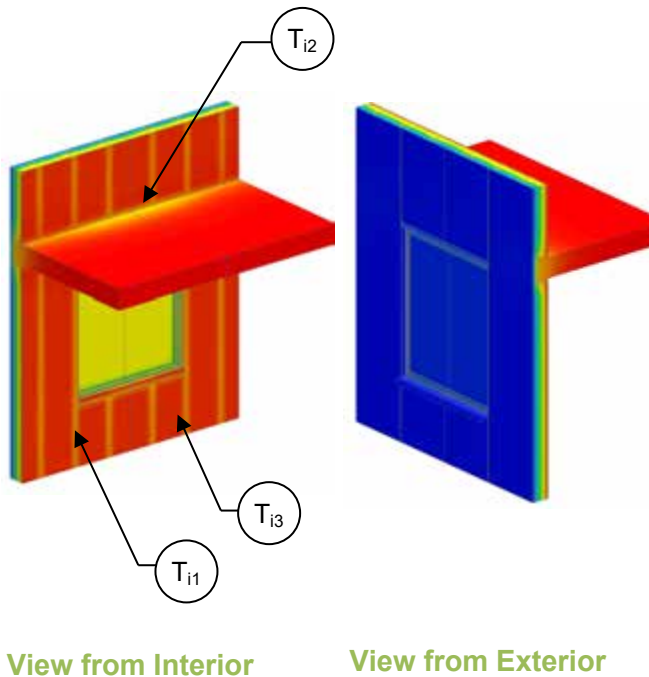
<sup>2</sup>For the linear transmittance, use the window perimeter



# Detail 5.3.4

## Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly with R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_g$	Incremental increase in transmittance per linear length of s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_g^2$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

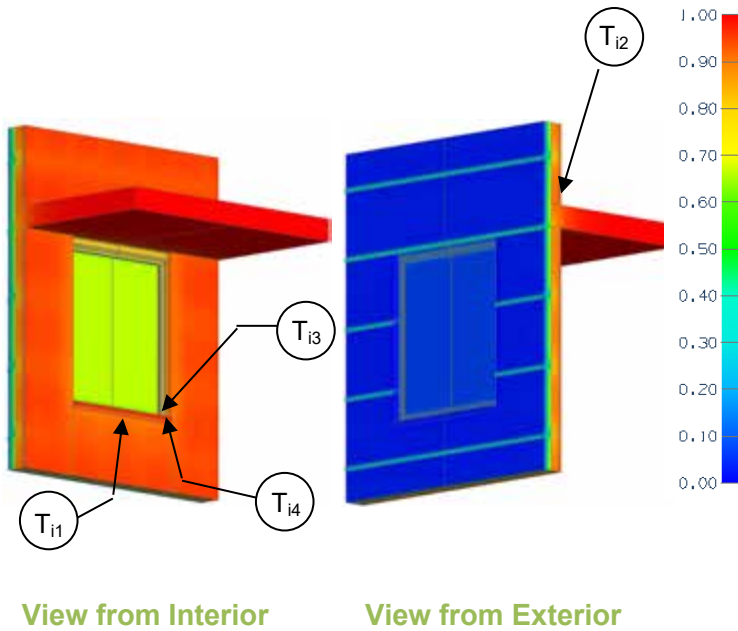
	R7.5	R15	
$T_{i1}$	0.39	0.51	Min T on sheathing, below window sill between studs
$T_{i2}$	0.85	0.90	Max T on sheathing, along steel tracks at slab
$T_{i3}$	0.56	0.57	Min T on window frame, at corner of window at glass

<sup>2</sup>For the linear transmittance, use the window perimeter

# Detail 5.3.5

## 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 – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_g$	Incremental increase in transmittance per linear length of s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_g^2$ Btu/ft <sup>2</sup> ·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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

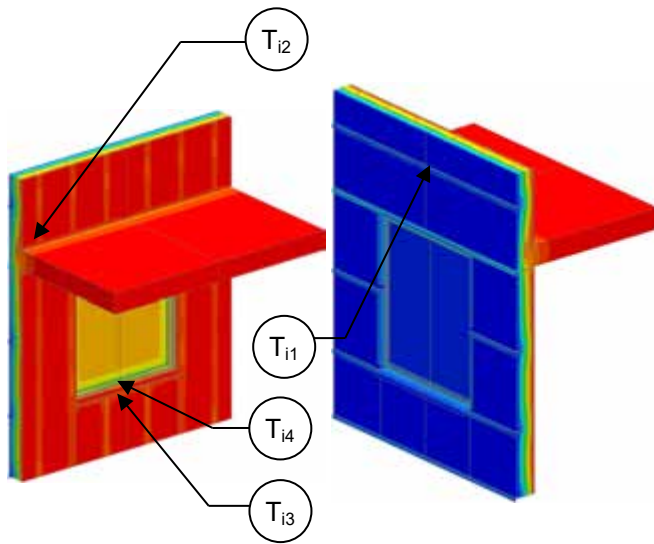
### Temperature Indices

	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

<sup>2</sup>For the linear transmittance, use the window perimeter

# Detail 5.3.6

## 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 and R-12 Batt Insulation in Stud Cavity – Window and Intermediate Floor Intersection



View from Interior

View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-14.4 (2.54 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_g$	Incremental increase in transmittance per linear length of s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_g^2$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

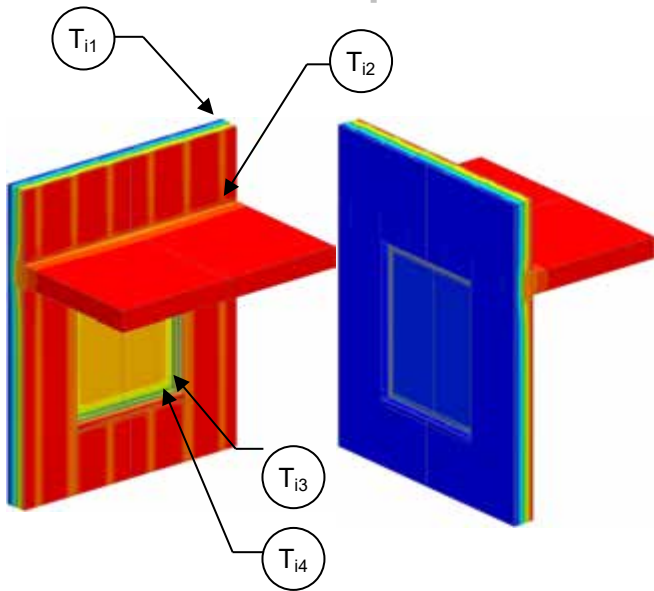
### Temperature Indices

	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

<sup>2</sup>For the linear transmittance, use the window perimeter

# Detail 5.3.7

## 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 and R-12 Batt Insulation in Stud Cavity – Window and Intermediate Floor Intersection



View from Interior

View from Exterior

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_g$	Incremental increase in transmittance per linear length of s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_g^2$ Btu/ft <sup>2</sup> ·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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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

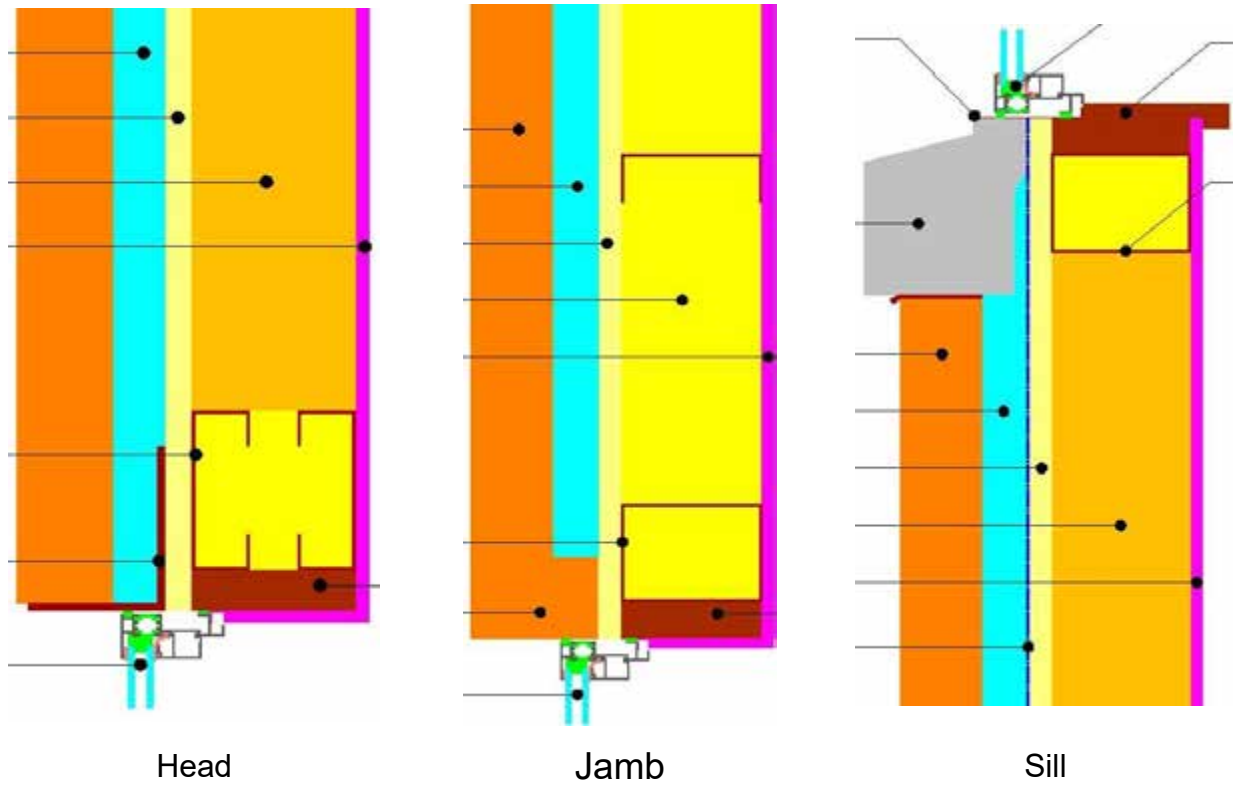
	R10	R15	
$T_{i1}$	0.34	0.38	Min T on sheathing, along studs behind girt away from window/slab
$T_{i2}$	0.79	0.81	Max T on sheathing, at slab floor, between studs, away from window
$T_{i3}$	0.59	0.59	Min T on window frame, at bottom corner
$T_{i4}$	0.58	0.58	Min T on window glass, at corners

<sup>2</sup>For the linear transmittance, use the window perimeter

# Detail 5.3.8

## Interior Insulated Steel Frame Wall Assembly with Brick Cladding - Window Intersection

Detail referenced from work done by Passive House Academy



### Thermal Performance

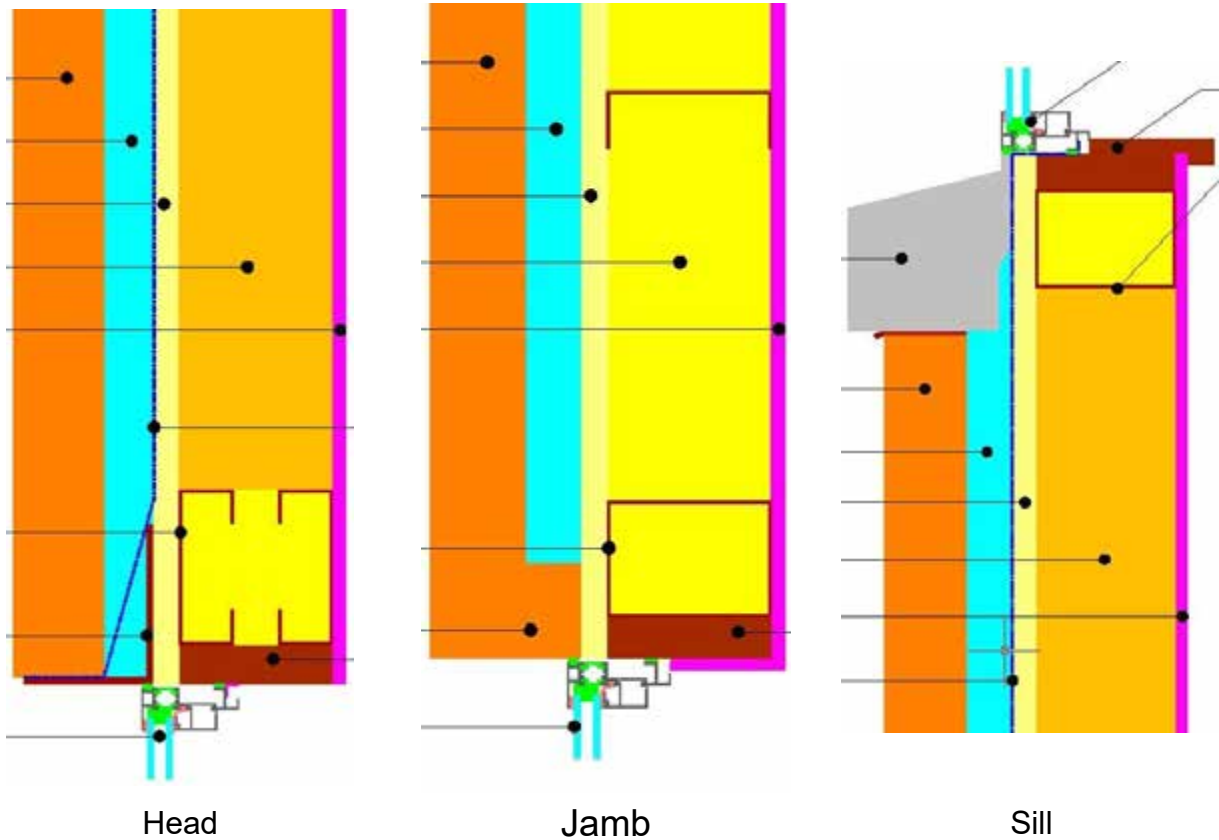
Condition	Clear Wall R-Value ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Clear Wall U-Value Btu/ ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	Linear Transmittance (Ψ) Btu/hr ft F (W/m K)
Wall Clear Field	R-22.6 (3.98)	0.044 (0.251)	-
Typical Jamb			0.110 (0.191)
Typical Head			0.143 (0.247)
Typical Sill			0.278 (0.481)
Typical Overall Window			0.160 (0.278)



# Detail 5.3.9

## Interior Insulated Steel Frame Wall Assembly with Brick Cladding - Window Intersection Aligned with Insulation

Detail referenced from work done by Passive House Academy

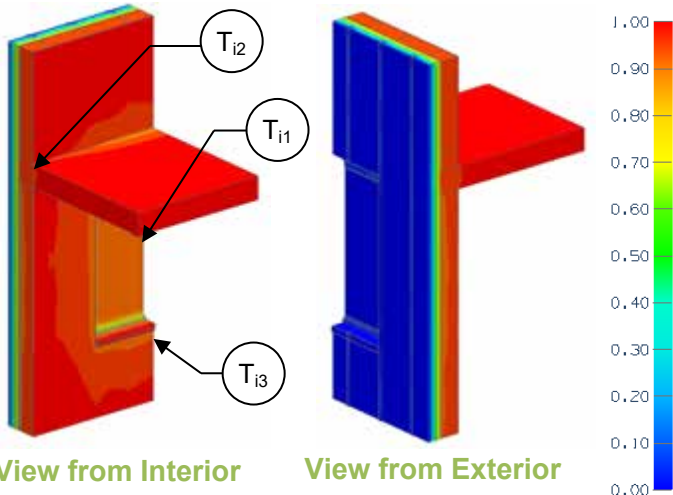


### Thermal Performance

Condition	Clear Wall R-Value ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Clear Wall U-Value Btu/ ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 5.3.10

**Exterior Insulated 6" x 1 5/8" 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 <sub>1D</sub>	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>w</sub> , R <sub>w</sub> , U <sub>g</sub>	"clear wall" U- and R-value: w = wall without intermediate floor g = glazing
Transmittance / Resistance	U <sub>floor</sub> , R <sub>floor</sub> , U <sub>t</sub> , R <sub>t</sub>	U and R-values for: floor = wall + intermediate floor t = combined wall + floor + window
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

U <sub>centre of glass</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.142 (0.81)	0.303 (1.72)

## Nominal (1D) vs. Assembly Performance Indicators

### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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 <sub>floor</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>floor</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	ψ <sub>floor</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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

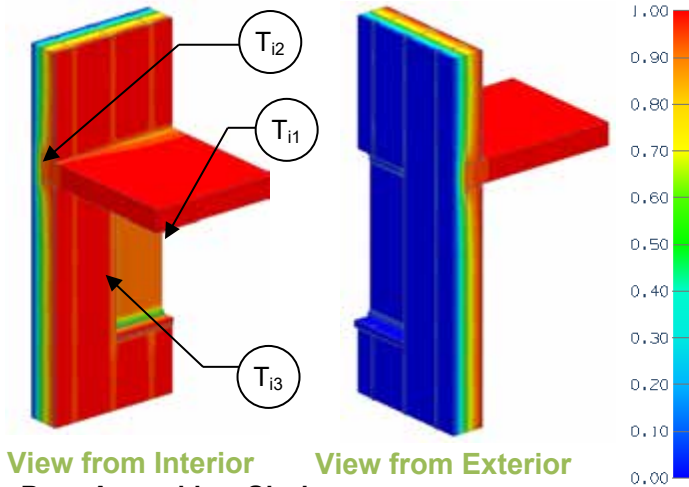
Exterior Insulation 1D R-Value (RSI)	R <sub>t</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>t</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	ψ <sub>Head</sub> Btu/ft <sup>2</sup> · hr · °F (W/m K)	ψ <sub>Sill</sub> Btu/ft <sup>2</sup> · hr · °F (W/m K)	ψ <sub>Jamb</sub> Btu/ft <sup>2</sup> · hr · °F (W/m K)	ψ <sub>Total</sub> Btu/ft <sup>2</sup> · 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 <sub>11</sub>	0.44	0.44	0.44	0.44	Min T on window frame, centre of window head
T <sub>12</sub>	0.84	0.87	0.89	0.90	Max T on interior surface of sheathing, along bottom track
T <sub>13</sub>	0.58	0.58	0.59	0.60	Min T on interior surface of sheathing, along window sill track

# Detail 5.3.11

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and R-19 Batt Insulation in Stud Cavity – Triple Glazed Aluminum Window & Intermediate Floor Intersection with Window Thermal Break Positioned in Steel Framing**



View from Interior View from Exterior

**Base Assembly – Glazing**

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.142 (0.81)	0.303 (1.72)

**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	$U_{\text{floor}}, R_{\text{floor}}, U_t, R_t$	U and R-values for: floor = wall + intermediate floor t = combined wall + floor + window
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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**

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ 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)

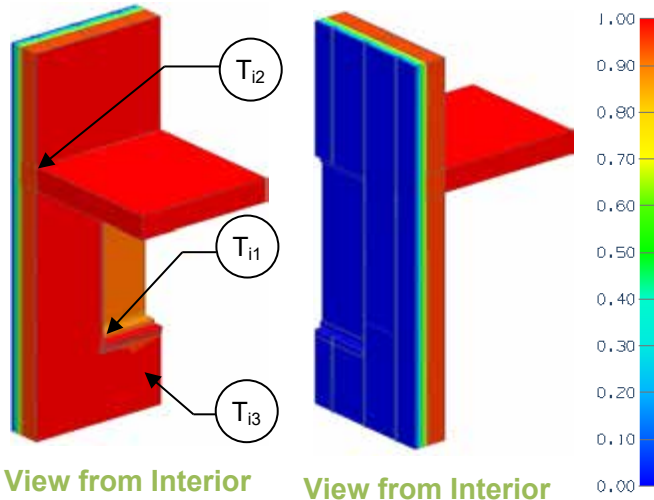
**Temperature Indices**

	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 5.3.12

**Exterior Insulated 6" x 1 5/8" 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

View from Interior View from Interior  
Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.142 (0.81)	0.199 (1.13)

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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

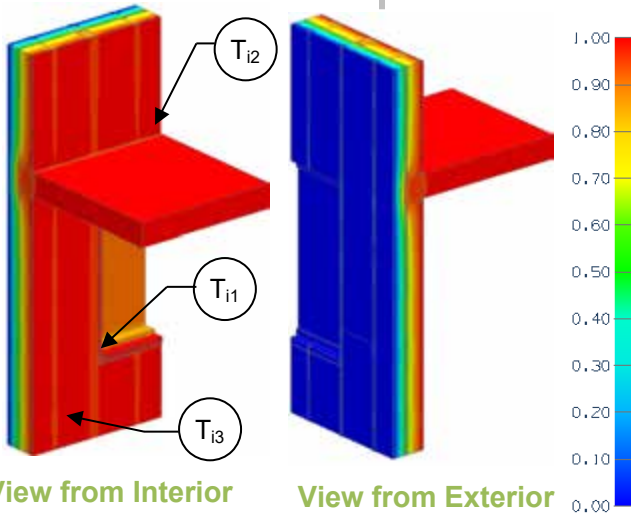
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ 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 5.3.13

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

### View from Interior View from Exterior

#### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.142 (0.81)	0.199 (1.13)

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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

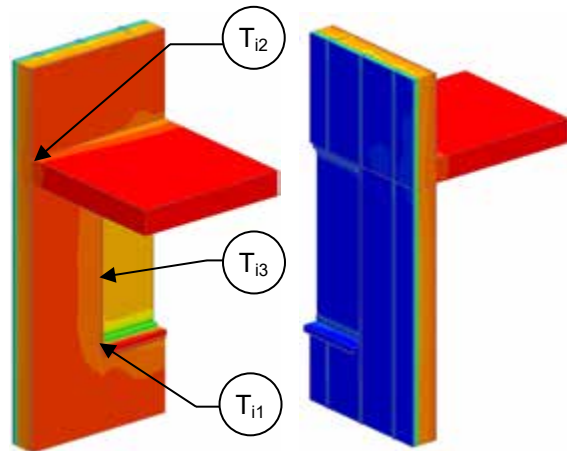
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ 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 5.3.14

## Owens Corning Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Double Glazed Aluminum Window and Intermediate Floor Intersection



View from Interior View from Exterior

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.396 (2.25)

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.3 (0.58 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 + floor + window
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.0 (1.77)	0.100 (0.57)
R-21.0 (3.70)	R-24.3 (4.28)	R-17.6 (3.10)	0.057 (0.32)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-9.7 (1.72)	0.103 (0.58)	0.020 (0.034)
R-17.0 (3.00)	0.059 (0.33)	0.013 (0.023)

#### Window Transition Transmittance

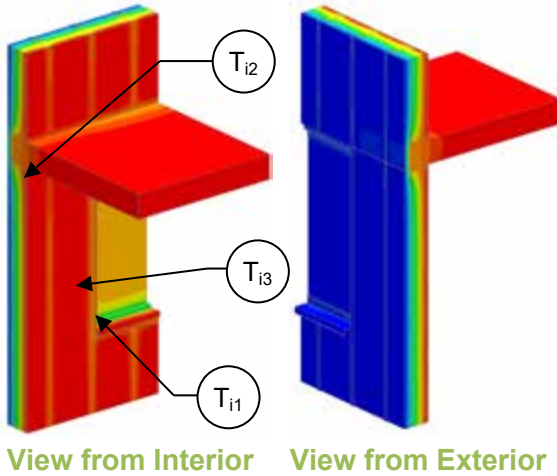
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-8.4 (1.48)	R-4.8 (0.84)	0.210 (1.19)	0.276 (0.478)	0.215 (0.373)	0.124 (0.214)	0.182 (0.315)
R-21.0 (3.70)	R-5.4 (0.96)	0.184 (1.04)	0.298 (0.516)	0.248 (0.429)	0.143 (0.248)	0.216 (0.374)

### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.54	0.57	Min T on window frame, at bottom corner at edge of glass
$T_{i2}$	0.83	0.89	Max T on interior surface of sheathing, along bottom track
$T_{i3}$	0.37	0.38	Min T on interior surface of sheathing, at bracket along jamb

# Detail 5.3.15

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-20 Batt in Stud Cavity – Double Glazed Aluminum Window and Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.396 (2.25)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-18.3 (3.23)	0.055 (0.31)
R-21.0 (3.70)	R-43.4 (7.64)	R-25.8 (4.54)	0.039 (0.22)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-15.3 (2.69)	0.065 (0.37)	0.076 (0.132)
R-22.5 (3.96)	0.045 (0.25)	0.040 (0.069)

#### Window Transition Transmittance

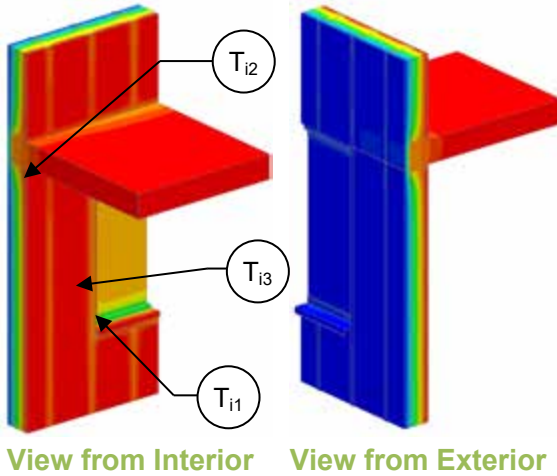
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-8.4 (1.48)	R-5.8 (1.02)	0.173 (0.99)	0.308 (0.533)	0.146 (0.253)	0.094 (0.163)	0.159 (0.274)
R-21.0 (3.70)	R-6.2 (1.10)	0.161 (0.91)	0.303 (0.525)	0.158 (0.273)	0.102 (0.176)	0.164 (0.283)

### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.50	0.50	Min T on window frame, at bottom corner at edge of glass
$T_{i2}$	0.80	0.86	Max T on interior surface of sheathing, along bottom track
$T_{i3}$	0.28	0.28	Min T on interior surface of sheathing, at bracket along jamb

# Detail 5.3.16

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-22.5 Batt in Stud Cavity – Double Glazed Aluminum Window and Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-24.9 (4.38 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.396 (2.25)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-33.3 (5.86)	R-19.0 (3.34)	0.053 (0.30)
R-21.0 (3.70)	R-45.9 (8.08)	R-26.4 (4.64)	0.038 (0.22)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-15.6 (2.75)	0.064 (0.36)	0.079 (0.136)
R-22.8 (4.02)	0.044 (0.25)	0.041 (0.071)

#### Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-8.4 (1.48)	R-5.8 (1.02)	0.172 (0.98)	0.310 (0.536)	0.146 (0.252)	0.094 (0.163)	0.159 (0.275)
R-21.0 (3.70)	R-6.3 (1.10)	0.160 (0.91)	0.304 (0.526)	0.157 (0.271)	0.101 (0.175)	0.163 (0.282)

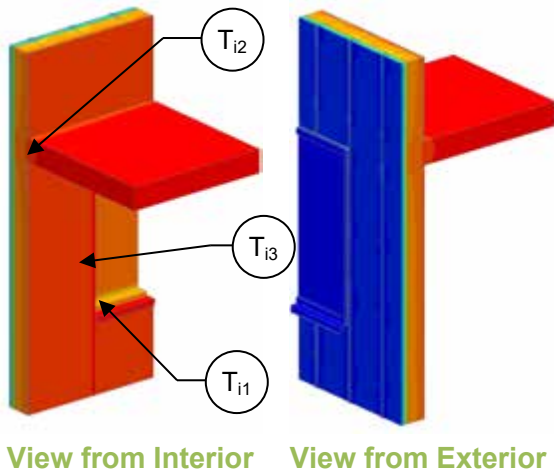
### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.50	0.50	Min T on window frame, at bottom corner at edge of glass
$T_{i2}$	0.79	0.86	Max T on interior surface of sheathing, along bottom track
$T_{i3}$	0.27	0.28	Min T on interior surface of sheathing, at bracket along jamb



# Detail 5.3.17

## Owens Corning Exterior Insulated 6" x 1 5/8" 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 and 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	$U_w, R_w, U_g$	"clear wall" U- and R-value: w = wall without intermediate floor g = glazing
Transmittance / Resistance	$U_{floor}, R_{floor}, U_t, R_t$	U and R-values for: floor = wall + intermediate floor t = combined wall + floor + window
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.220 (1.25)	0.208 (1.18)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.0 (1.77)	0.100 (0.57)
R-21.0 (3.70)	R-24.3 (4.28)	R-17.6 (3.10)	0.057 (0.32)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-9.7 (1.72)	0.103 (0.58)	0.020 (0.034)
R-17.0 (3.00)	0.059 (0.33)	0.013 (0.023)

#### Window Transition Transmittance

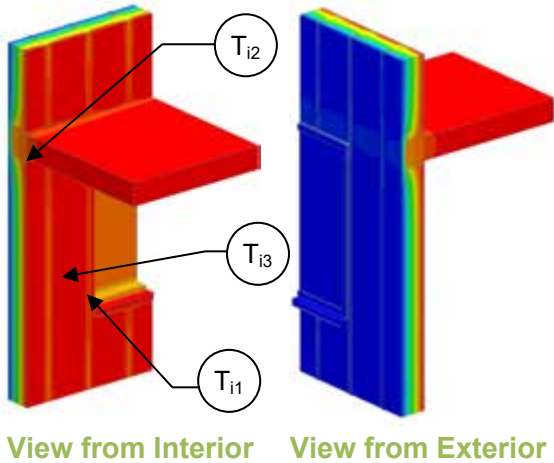
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-8.4 (1.48)	R-7.5 (1.32)	0.133 (0.76)	0.050 (0.086)	0.033 (0.057)	0.043 (0.075)	0.033 (0.056)
R-21.0 (3.70)	R-9.4 (1.65)	0.107 (0.61)	0.045 (0.078)	0.052 (0.090)	0.047 (0.082)	0.062 (0.107)

### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.71	0.71	Min T on window frame, at bottom corner at edge of glass
$T_{i2}$	0.86	0.91	Max T on interior surface of sheathing, along bottom track
$T_{i3}$	0.69	0.66	Min T on interior surface of sheathing, at bracket along jamb

# Detail 5.3.18

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-20 Batt in Stud Cavity – Triple Glazed Aluminum Window and Intermediate Floor Intersection**



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_g$	"clear wall" U- and R-value: w = wall without intermediate floor g = glazing
Transmittance / Resistance	$U_{floor}, R_{floor}, U_t, R_t$	U and R-values for: floor = wall + intermediate floor t = combined wall + floor + window
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.220 (1.25)	0.208 (1.18)

## Nominal (1D) vs. Assembly Performance Indicators

### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-18.3 (3.23)	0.055 (0.31)
R-21.0 (3.70)	R-43.4 (7.64)	R-25.8 (4.54)	0.039 (0.22)

### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-15.3 (2.69)	0.065 (0.37)	0.076 (0.132)
R-22.5 (3.96)	0.045 (0.25)	0.040 (0.069)

### Window Transition Transmittance

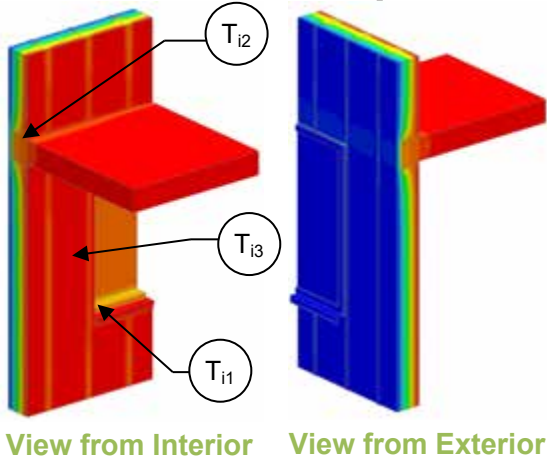
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-8.4 (1.48)	R-9.7 (1.70)	0.103 (0.59)	0.093 (0.162)	0.033 (0.057)	0.045 (0.078)	0.044 (0.077)
R-21.0 (3.70)	R-10.9 (1.92)	0.092 (0.52)	0.063 (0.109)	0.043 (0.075)	0.043 (0.075)	0.052 (0.091)

## Temperature Indices

	R8.4	R21	
$T_{i1}$	0.70	0.70	Min T on window frame, at bottom corner at edge of glass
$T_{i2}$	0.84	0.89	Max T on interior surface of sheathing, along bottom track
$T_{i3}$	0.36	0.47	Min T on interior surface of sheathing, between studs

# Detail 5.3.19

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-22.5 Batt in Stud Cavity – Triple Glazed Aluminum Window and Intermediate Floor Intersection**



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-24.9 (4.38 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_g$	"clear wall" U- and R-value: w = wall without intermediate floor g = glazing
Transmittance / Resistance	$U_{floor}, R_{floor}, U_t, R_t$	U and R-values for: floor = wall + intermediate floor t = combined wall + floor + window
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.220 (1.25)	0.208 (1.18)

## Nominal (1D) vs. Assembly Performance Indicators

### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-33.3 (5.86)	R-19.0 (3.34)	0.053 (0.30)
R-21.0 (3.70)	R-45.9 (8.08)	R-26.4 (4.64)	0.038 (0.22)

### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-15.6 (2.75)	0.064 (0.36)	0.079 (0.136)
R-22.8 (4.02)	0.044 (0.25)	0.041 (0.071)

### Window Transition Transmittance

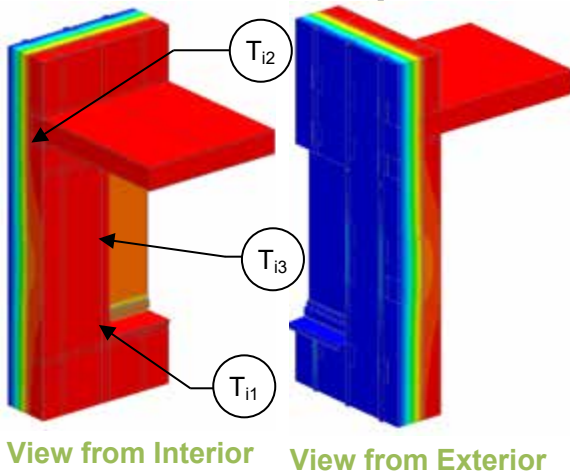
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-8.4 (1.48)	R-9.7 (1.70)	0.103 (0.59)	0.095 (0.165)	0.033 (0.057)	0.045 (0.079)	0.045 (0.078)
R-21.0 (3.70)	R-10.9 (1.92)	0.092 (0.52)	0.064 (0.111)	0.045 (0.078)	0.043 (0.075)	0.053 (0.091)

## Temperature Indices

	R8.4	R21	
$T_{i1}$	0.70	0.70	Min T on window frame, at bottom corner at edge of glass
$T_{i2}$	0.84	0.89	Max T on interior surface of sheathing, along bottom track
$T_{i3}$	0.34	0.46	Min T on interior surface of sheathing, between studs

# Detail 5.3.20

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP and Thermally Broken Vertical Brackets and Rail System Supporting Metal Cladding – Triple Glazed Vinyl Window and 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	$U_w$ , $R_w$ , $U_g$	"clear wall" U- and R-value: w = wall without intermediate floor g = glazing
Transmittance / Resistance	$U_{floor}$ , $R_{floor}$ , $U_t$ , $R_t$	U and R-values for: floor = wall + intermediate floor t = combined wall + floor + window
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

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

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.126 (0.72)	0.178 (1.01)

### Scenario

Scenario	
A	With support bracket
B	Without support bracket

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-42 (7.40)	R-45.2 (7.96)	R-40.0 (7.04)	0.025 (0.14)

#### Intermediate Floor Linear Transmittance

$R_{floor}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{floor}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{floor}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-39.5 (6.96)	0.025 (0.14)	0.002 (0.003)

#### Window Transition Transmittance

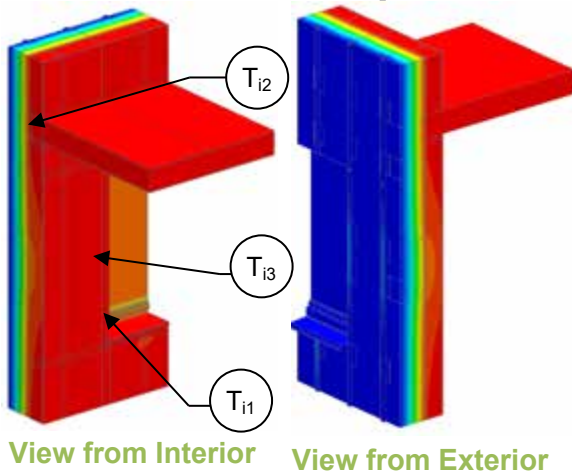
Scenario	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{Head}$ Btu/ft · hr · °F (W/m K)	$\psi_{Sill}$ Btu/ft · hr · °F (W/m K)	$\psi_{Jamb}$ Btu/ft · hr · °F (W/m K)	$\psi_{Total}$ Btu/ft · hr · °F (W/m K)
A	R-11.7 (2.06)	0.085 (0.49)	0.026 (0.046)	0.048 (0.083)	0.051 (0.088)	0.045 (0.078)
B	R-11.8 (2.07)	0.085 (0.48)	0.026 (0.046)	0.036 (0.062)	0.051 (0.088)	0.043 (0.074)

### Temperature Indices

	A	B	
$T_{i1}$	0.62	0.62	Min T on window frame, at bottom corner at edge of glass
$T_{i2}$	0.97	0.97	Max T on interior surface of sheathing, along top track
$T_{i3}$	0.77	0.77	Min T on interior surface of sheathing, at bracket along jamb

# Detail 5.3.21

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



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>w</sub> , R <sub>w</sub> , U <sub>g</sub>	"clear wall" U- and R-value: w = wall without intermediate floor g = glazing
Transmittance / Resistance	U <sub>floor</sub> , R <sub>floor</sub> , U <sub>t</sub> , R <sub>t</sub>	U and R-values for: floor = wall + intermediate floor t = combined wall + floor + window
Linear Transmittance	ψ	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

U <sub>centre of glass</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.126 (0.72)	0.178 (1.01)

### Scenario

Scenario	
A	With support bracket
B	Without support bracket

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-42 (7.40)	R-45.2 (7.96)	R-40.0 (7.04)	0.025 (0.14)

#### Intermediate Floor Linear Transmittance

R <sub>floor</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>floor</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	ψ <sub>floor</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-39.5 (6.96)	0.025 (0.14)	0.002 (0.003)

#### Window Transition Transmittance

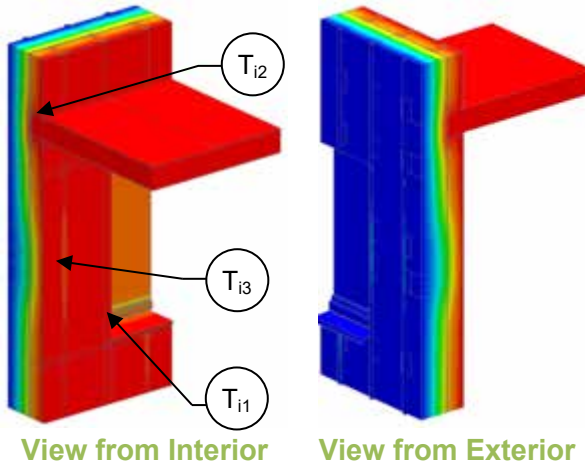
Scenario	R <sub>t</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>t</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	ψ <sup>Head</sup> Btu/ft · hr · °F (W/m K)	ψ <sup>Sill</sup> Btu/ft · hr · °F (W/m K)	ψ <sup>Jamb</sup> Btu/ft · hr · °F (W/m K)	ψ <sup>Total</sup> Btu/ft · hr · °F (W/m K)
A	R-12.0 (2.11)	0.084 (0.48)	0.020 (0.035)	0.044 (0.075)	0.029 (0.051)	0.035 (0.061)
B	R-12.0 (2.12)	0.083 (0.47)	0.020 (0.035)	0.030 (0.052)	0.029 (0.051)	0.032 (0.056)

### Temperature Indices

	A	B	
T <sub>i1</sub>	0.62	0.61	Min T on window frame, at bottom corner at edge of glass
T <sub>i2</sub>	0.96	0.96	Max T on interior surface of sheathing, along top track
T <sub>i3</sub>	0.73	0.73	Min T on interior surface of sheathing, at bracket along jamb

# Detail 5.3.22

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



### Thermal Performance Indicators

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

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.126 (0.72)	0.178 (1.01)

### Scenario

Scenario	
A	With support bracket
B	Without support bracket

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-42 (7.40)	R-63.3 (11.15)	R-48.3 (8.51)	0.021 (0.12)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-45.0 (7.92)	0.022 (0.13)	0.008 (0.015)

#### Window Transition Transmittance

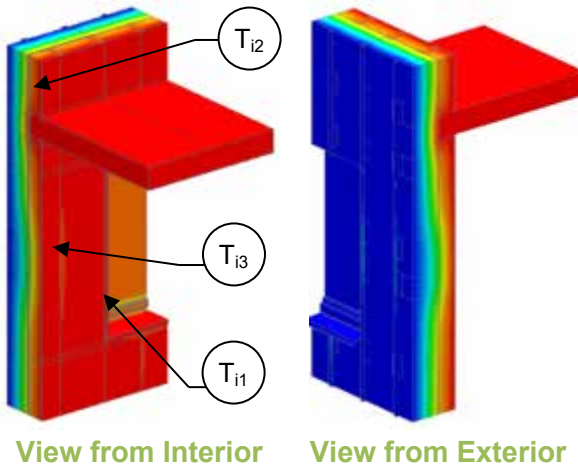
Scenario	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
A	R-12.5 (2.21)	0.080 (0.45)	0.027 (0.047)	0.057 (0.099)	0.063 (0.109)	0.053 (0.091)
B	R-12.6 (2.22)	0.079 (0.45)	0.027 (0.047)	0.047 (0.081)	0.063 (0.109)	0.050 (0.087)

### Temperature Indices

	A	B	
$T_{i1}$	0.62	0.61	Min T on window frame, at bottom corner at edge of glass
$T_{i2}$	0.96	0.96	Max T on interior surface of sheathing, along bottom track
$T_{i3}$	0.42	0.42	Min T on interior surface of sheathing, at aluminum bracket

# Detail 5.3.23

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



## Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-21.3 (3.75 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>w</sub> , R <sub>w</sub> , U <sub>g</sub>	"clear wall" U- and R-value: w = wall without intermediate floor g = glazing
Transmittance / Resistance	U <sub>floor</sub> , R <sub>floor</sub> , U <sub>t</sub> , R <sub>t</sub>	U and R-values for: floor = wall + intermediate floor t = combined wall + floor + window
Linear Transmittance	ψ	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

U <sub>centre of glass</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.126 (0.72)	0.178 (1.01)

### Scenario

Scenario	
A	With support bracket
B	Without support bracket

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-42 (7.40)	R-63.3 (11.15)	R-48.3 (8.51)	0.021 (0.12)

#### Intermediate Floor Linear Transmittance

R <sub>floor</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>floor</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	ψ <sub>floor</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-45.0 (7.92)	0.022 (0.13)	0.008 (0.015)

#### Window Transition Transmittance

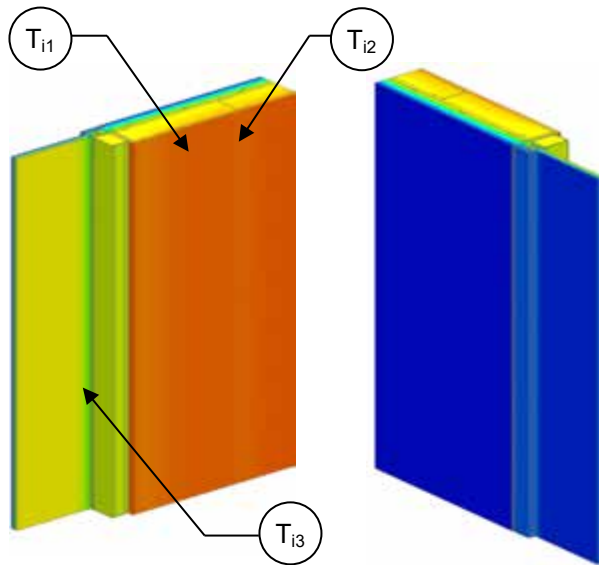
Scenario	R <sub>t</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>t</sub> Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	ψ <sub>Head</sub> Btu/ft · hr · °F (W/m K)	ψ <sub>Sill</sub> Btu/ft · hr · °F (W/m K)	ψ <sub>Jamb</sub> Btu/ft · hr · °F (W/m K)	ψ <sub>Total</sub> Btu/ft · hr · °F (W/m K)
A	R-12.9 (2.28)	0.077 (0.44)	0.021 (0.036)	0.049 (0.084)	0.039 (0.068)	0.040 (0.069)
B	R-13.0 (2.29)	0.077 (0.44)	0.021 (0.036)	0.040 (0.069)	0.039 (0.068)	0.037 (0.065)

### Temperature Indices

	A	B	
T <sub>11</sub>	0.61	0.61	Min T on window frame, at bottom corner at edge of glass
T <sub>12</sub>	0.95	0.95	Max T on interior surface of sheathing, along bottom track
T <sub>13</sub>	0.41	0.41	Min T on interior surface of sheathing, at aluminum bracket

# 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

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-2.7 (0.47 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>g</sub> , U <sub>w</sub> , R <sub>w</sub>	“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 <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of curtain wall transition

<sup>1</sup>Assumptions 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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sub>centre of glazing</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	U <sub>g</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.476 (2.7)

#### Curtain Wall Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

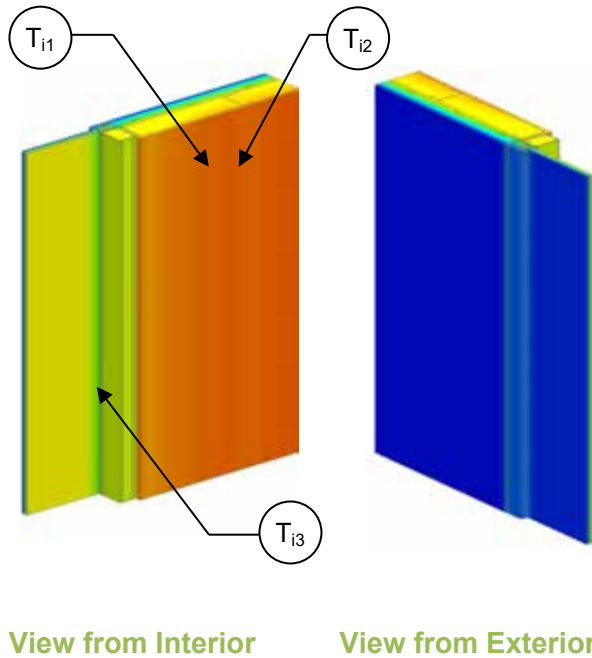
### Temperature Indices

	R7.5	R11.3	R15	
T <sub>i1</sub>	0.62	0.64	0.65	Min T on sheathing, between studs
T <sub>i2</sub>	0.81	0.86	0.89	Max T on sheathing, along studs
T <sub>i3</sub>	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 with R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of curtain wall transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

$U_{\text{centre of glazing}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.476 (2.7)

#### Curtain Wall Transition Linear Transmittance

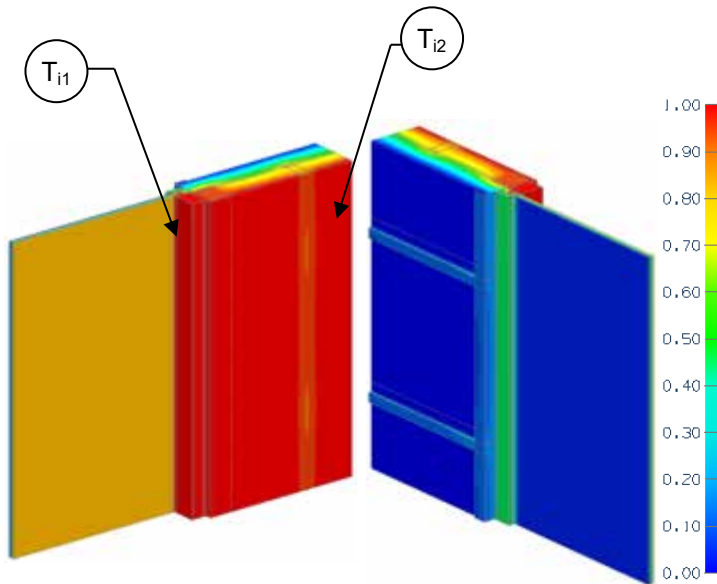
Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-4.5 (0.79)	0.224 (1.27)	0.043 (0.074)
R-15 (2.64)	R-4.7 (0.83)	0.211 (1.20)	0.039 (0.067)

### 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 with R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of curtain wall transition

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Thermal image shown is for the Aerogel detail

View from Interior<sup>2</sup>

View from Exterior<sup>2</sup>

### Scenario

Scenario	Curtain Wall Transition
A	Conventional
B	With Aerogel

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.429 (2.44)

#### Curtain Wall Transition Linear Transmittance

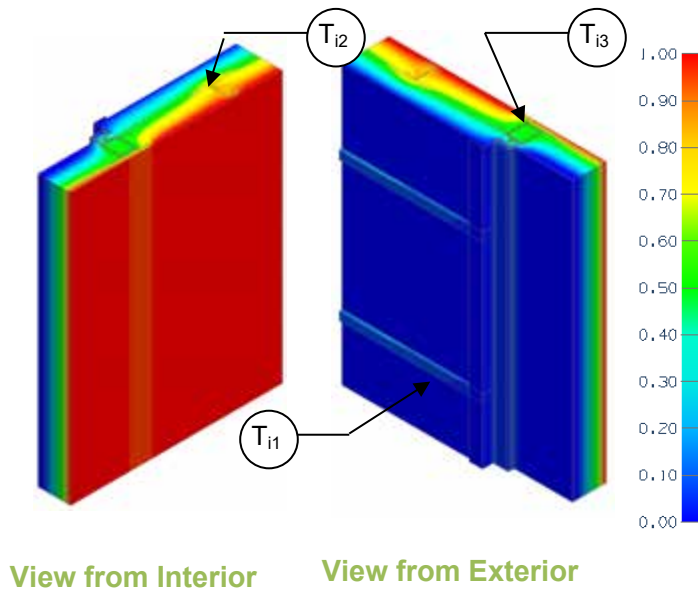
Scenario	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
A	R-3.8 (0.67)	0.262 (1.49)	0.069 (0.12)
B	R-3.8 (0.68)	0.260 (1.48)	0.019 (0.03)

### Temperature Indices

	A	B	
$T_{i1}$	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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of transition joint

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_{ow}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{ow}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_{ocw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{ocw}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-18.3 (3.22)	R-4.4 (0.78)	0.226 (1.29)

### Transition Joint Linear Transmittance

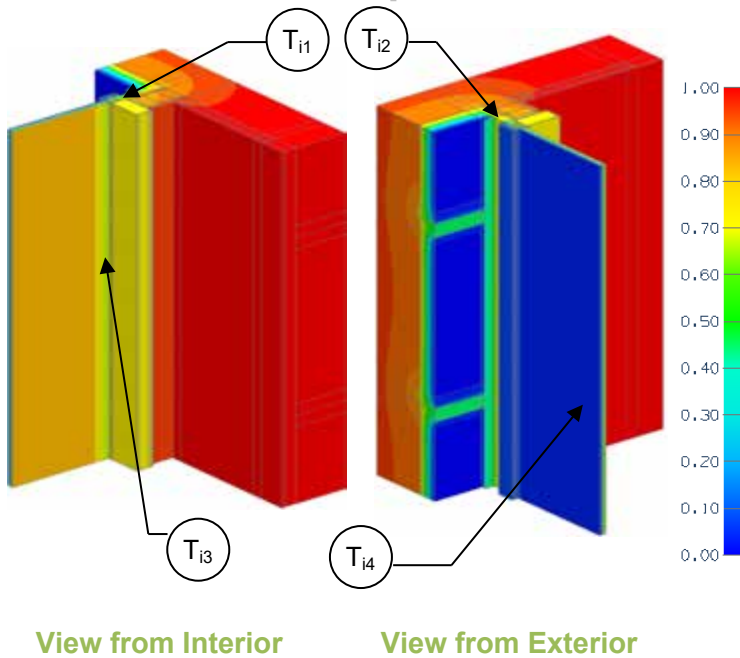
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-6.5 (1.14)	0.154 (0.88)	0.088 (0.151)
R-15 (2.64)	R-7.1 (1.25)	0.140 (0.80)	0.088 (0.151)
R-25 (4.40)	R-7.4 (1.30)	0.135 (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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of inside corner

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.305 (1.73)	0.441 (2.51)

#### Corner Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
R-15 (2.64)	R-2.5 (0.44)	0.405 (2.30)	0.159 (0.275)
R-20 (3.52)	R-2.5 (0.45)	0.394 (2.24)	0.144 (0.250)
R-25 (4.40)	R-2.6 (0.46)	0.384 (2.18)	0.128 (0.222)

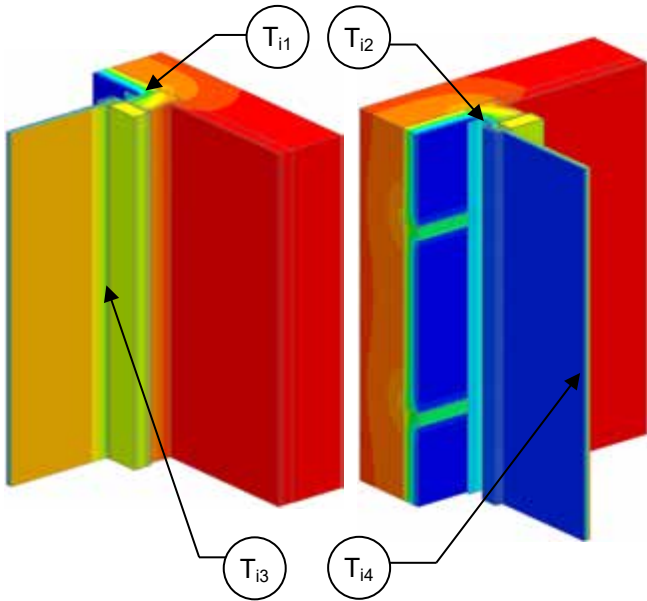
### Temperature Indices

	R15	R20	R25	
T <sub>i1</sub>	0.70	0.70	0.71	Min T on sheathing, along jamb
T <sub>i2</sub>	0.83	0.85	0.86	Max T on sheathing, between studs
T <sub>i3</sub>	0.65	0.65	0.65	Min T on jamb, along glazing
T <sub>i4</sub>	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of inside corner

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Exterior Insulated Concrete Wall

Wall Exterior Insulation 1D R-Value (RSI)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.305 (1.73)	0.441 (2.51)

#### Corner Linear Transmittance

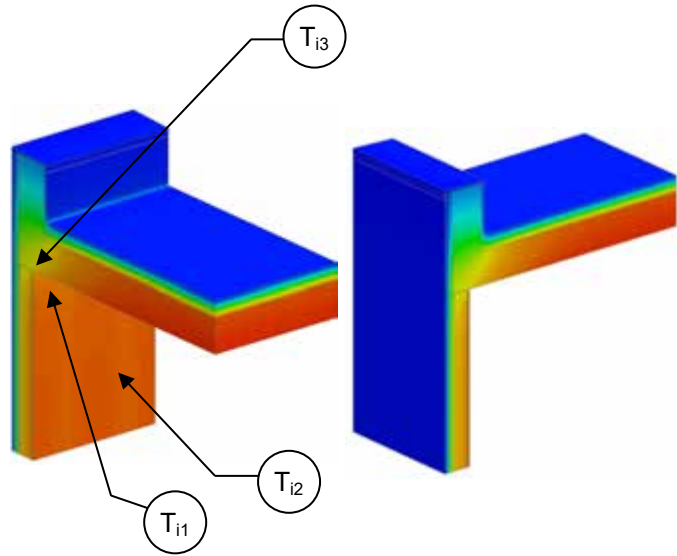
Wall Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-15 (2.64)	R-2.3 (0.40)	0.438 (2.49)	0.234 (0.404)
R-20 (3.52)	R-2.4 (0.42)	0.421 (2.39)	0.204 (0.353)
R-25 (4.40)	R-2.5 (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



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-9.7 (1.7)	0.103 (0.59)	0.295 (0.511)
R-11.3 (1.98)	R-11.2 (1.97)	0.089 (0.51)	0.273 (0.472)
R-15 (2.64)	R-12.2 (2.15)	0.082 (0.47)	0.263 (0.456)

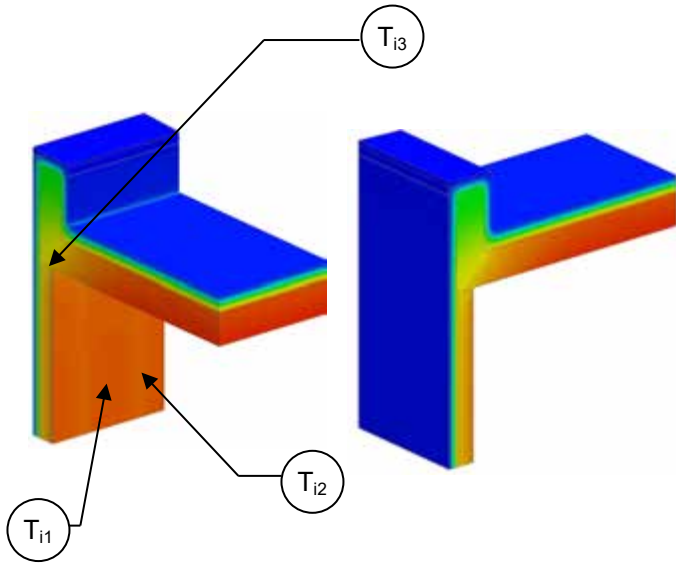
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-10.6 (1.87)	0.094 (0.54)	0.220 (0.380)
R-11.3 (1.98)	R-13.0 (2.29)	0.077 (0.44)	0.168 (0.291)
R-15 (2.64)	R-14.9 (2.63)	0.067 (0.38)	0.138 (0.238)

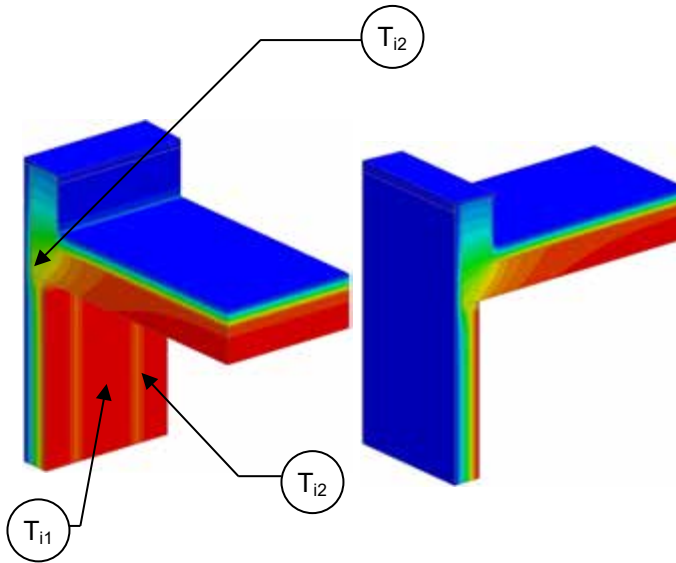
### Temperature Indices

	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 with R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-11.5 (2.02)	0.087 (0.49)	0.297 (0.514)
R-15 (2.64)	R-13.3 (2.35)	0.075 (0.43)	0.260 (0.451)

#### Temperature Indices

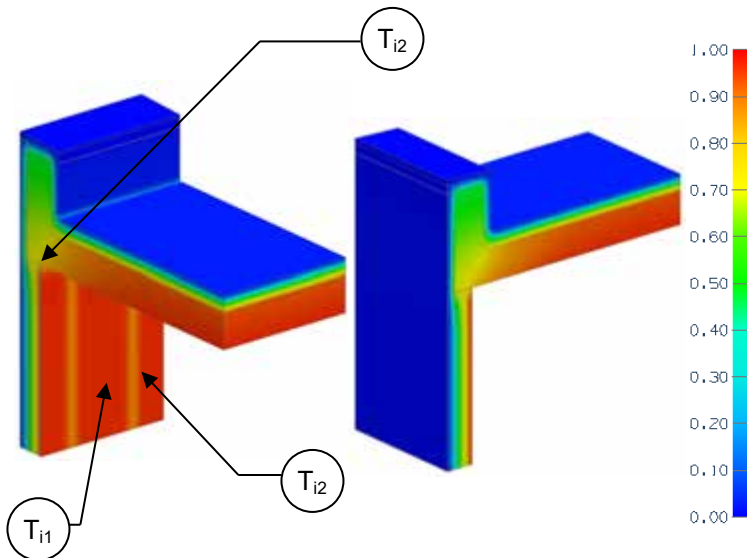
	R7.5	R15	
$T_{i1}$	0.41	0.58	Min T on sheathing, between studs
$T_{i2}$	0.68	0.77	Max T on sheathing, along steel studs
$T_{i3}$	0.75	0.78	Min T on concrete ceiling, at drywall intersection, exposed to interior air



# Detail 5.5.4

## Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly with R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-7.5 (1.32)	R-12.7 (2.24)	0.078 (0.45)	0.225 (0.390)
R-15 (2.64)	R-15.1 (2.66)	0.066 (0.38)	0.186 (0.323)

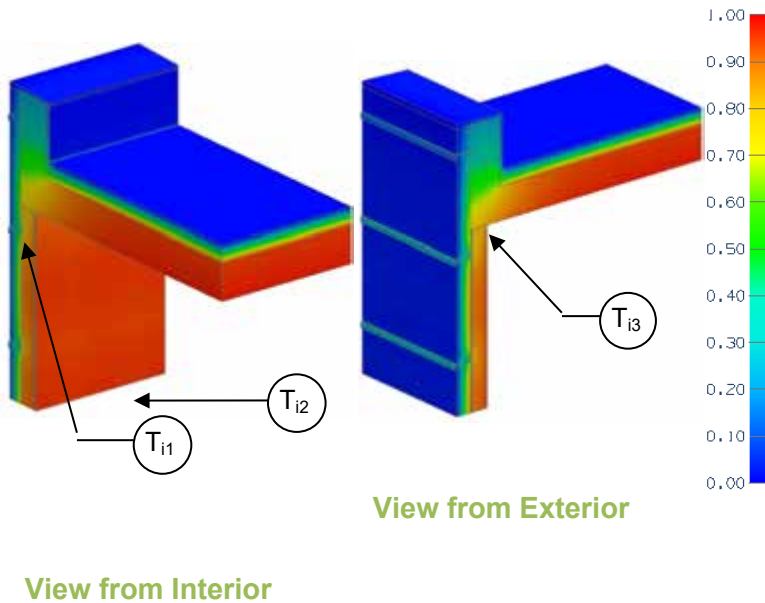
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

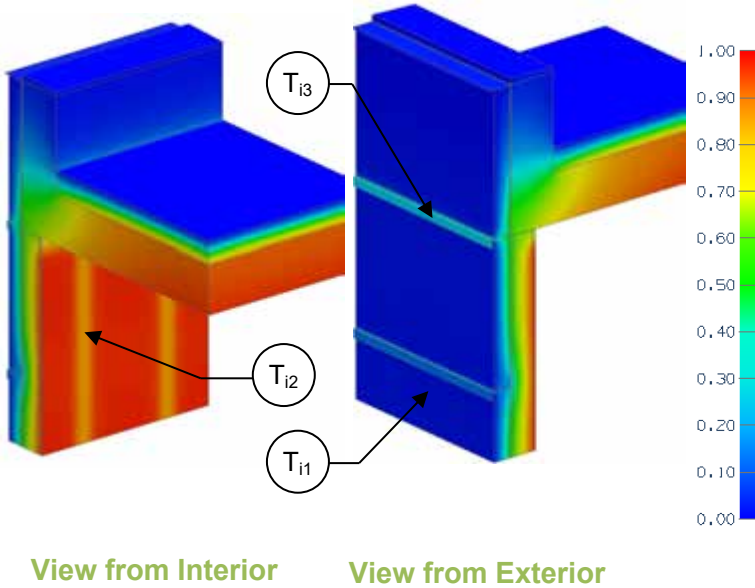
### Temperature Indices

	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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

#### Parapet Linear Transmittance

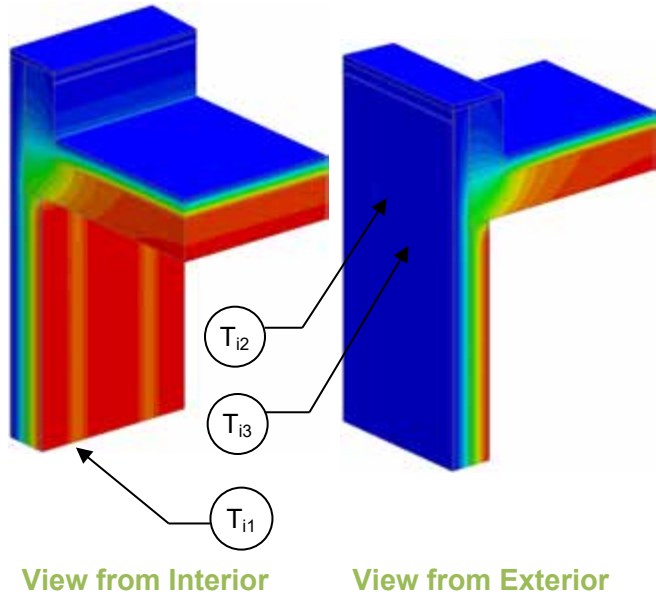
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-7.9 (1.39)	0.127 (0.72)	0.448 (0.776)
R-15 (2.64)	R-8.2 (1.44)	0.122 (0.70)	0.444 (0.768)

### 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

#### Parapet Linear Transmittance

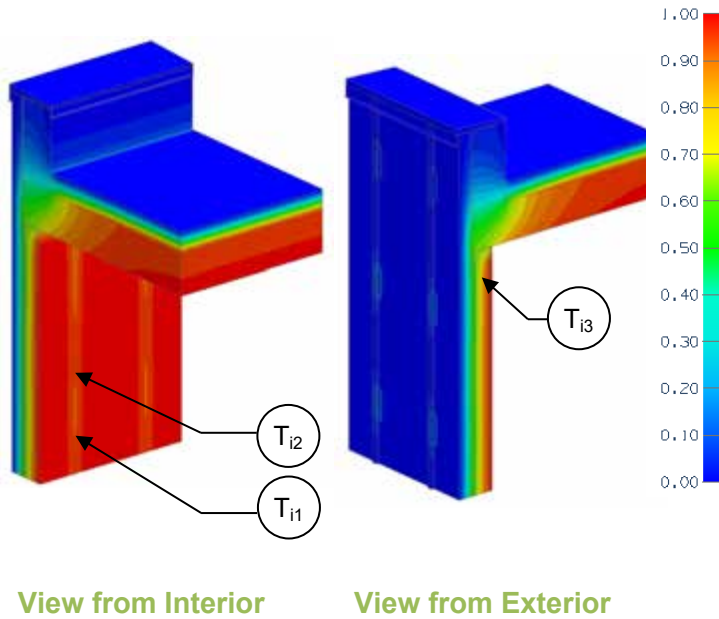
Wall Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-7.8 (1.37)	0.129 (0.73)	0.454 (0.785)
R-15 (2.64)	R-8.1 (1.42)	0.124 (0.70)	0.445 (0.770)

### 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 and R-12 Batt Insulation in Stud Cavity –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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

#### Parapet Linear Transmittance

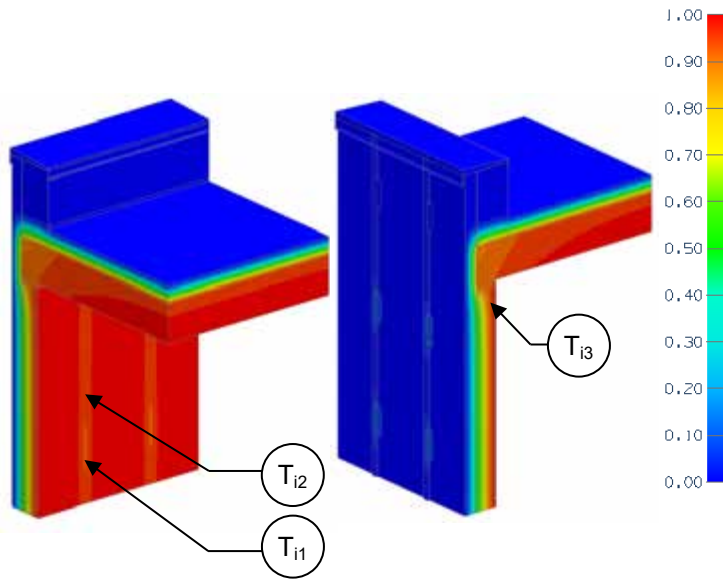
Wall Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-9.6 (1.69)	0.104 (0.59)	0.396 (0.686)

### 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 and R-12 Batt Insulation in Stud Cavity – Concrete Roof Deck at Isokorb AXT1 Thermally Broken Concrete Parapet**



View from Interior

View from Exterior

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

### Parapet Linear Transmittance

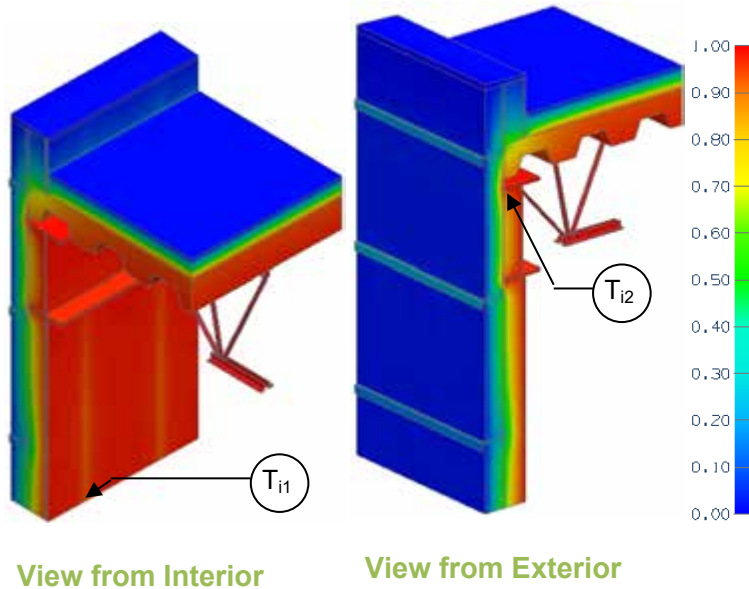
Wall Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-17.4 (3.06)	0.058 (0.33)	0.058 (0.100)

## 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

#### Parapet Linear Transmittance

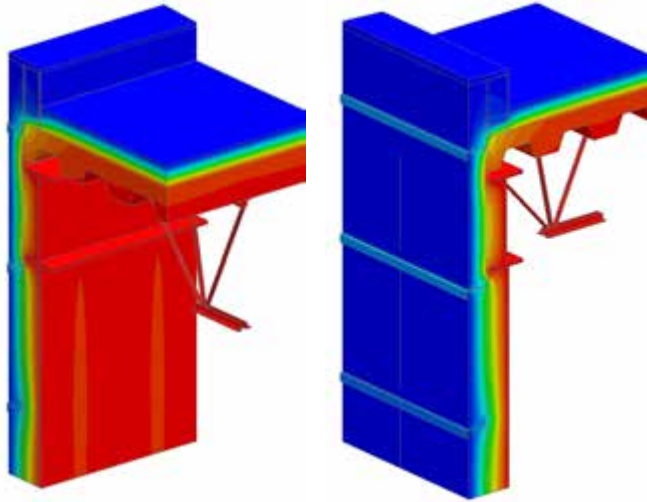
Wall Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-5 (0.88)	R-9.8 (1.73)	0.102 (0.58)	0.289 (0.500)
R-10 (1.76)	R-11.7 (2.05)	0.086 (0.49)	0.227 (0.393)
R-15 (2.64)	R-12.8 (2.26)	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 and R-12 Batt Insulation in Stud Cavity – 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
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

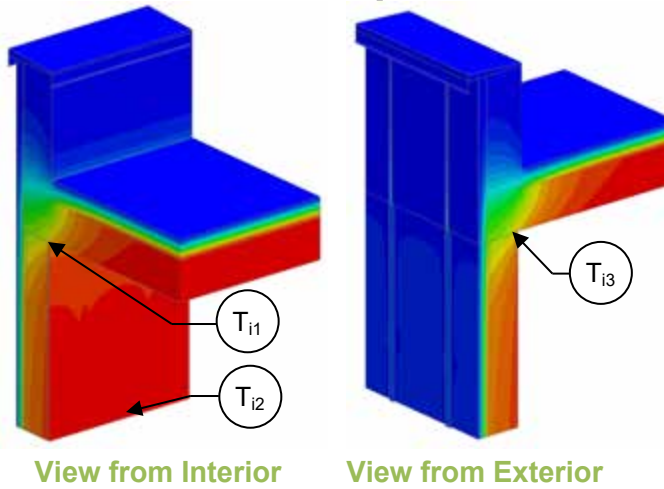
### Parapet Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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

## Owens Corning Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Concrete Parapet and Roof Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.3 (0.58 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.0 (1.77)	0.100 (0.57)
R-21.0 (3.70)	R-24.3 (4.28)	R-17.6 (3.10)	0.057 (0.32)

### Base Assembly - Roof

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

### Parapet Linear Transmittance

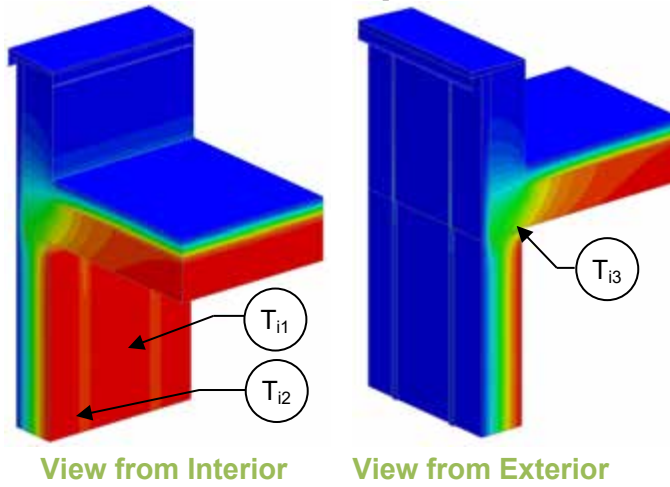
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-7.2 (1.28)	0.138 (0.78)	0.405 (0.701)
R-21.0 (3.70)	R-8.6 (1.51)	0.117 (0.66)	0.407 (0.704)

### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.58	0.62	Min T on sheathing at roof slab, at clip
$T_{i2}$	0.80	0.89	Max T on sheathing away from roof slab, between studs
$T_{i3}$	0.72	0.74	Min T on roof slab exposed to interior air, at gypsum between studs

# Detail 5.5.13

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-20 Batt in Stud Cavity – Concrete Parapet and Roof Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-18.3 (3.23)	0.055 (0.31)
R-21.0 (3.70)	R-43.4 (7.64)	R-25.8 (4.54)	0.039 (0.22)

### Base Assembly - Roof

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

### Parapet Linear Transmittance

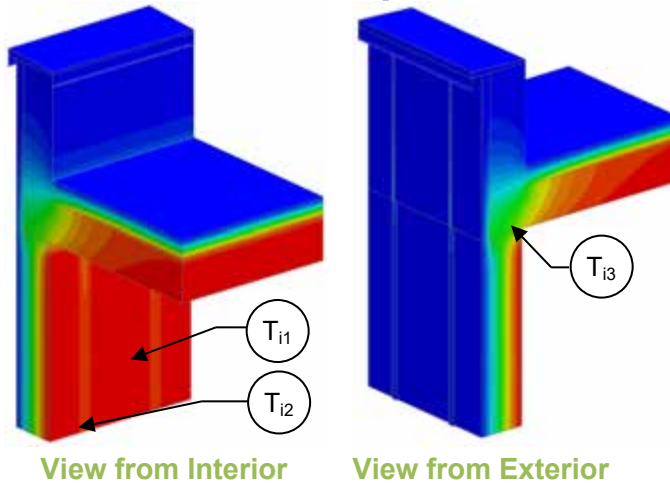
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-8.9 (1.57)	0.112 (0.64)	0.388 (0.671)
R-21.0 (3.70)	R-9.7 (1.71)	0.103 (0.59)	0.379 (0.657)

### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.35	0.54	Min T on sheathing at roof slab, away from roof slab, between studs at clip
$T_{i2}$	0.60	0.73	Max T on sheathing away from roof slab, at studs
$T_{i3}$	0.67	0.69	Min T on roof slab exposed to interior air, at gypsum between studs

# Detail 5.5.14

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-22.5 Batt in Stud Cavity – Concrete Parapet and Roof Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-24.9 (4.38 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-33.3 (5.86)	R-19.0 (3.34)	0.053 (0.30)
R-21.0 (3.70)	R-45.9 (8.08)	R-26.4 (4.64)	0.038 (0.22)

#### Base Assembly - Roof

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

#### Parapet Linear Transmittance

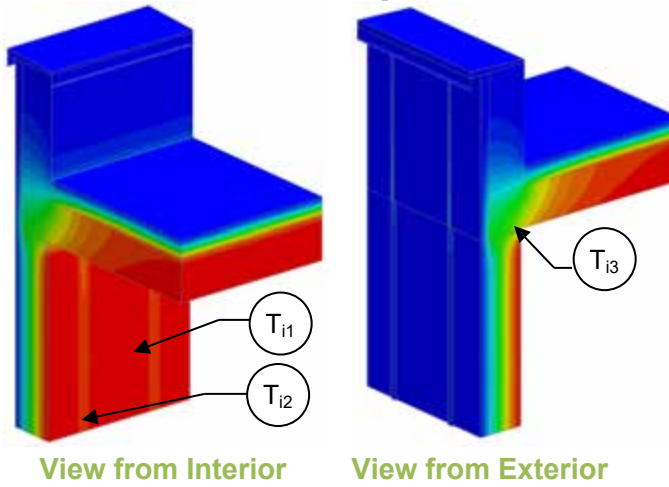
Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-9.0 (1.58)	0.111 (0.63)	0.388 (0.671)
R-21.0 (3.70)	R-9.7 (1.72)	0.103 (0.58)	0.379 (0.656)

### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.33	0.52	Min T on sheathing at roof slab, away from roof slab, between studs at clip
$T_{i2}$	0.60	0.72	Max T on sheathing away from roof slab, at studs
$T_{i3}$	0.67	0.69	Min T on roof slab exposed to interior air, at gypsum between studs

# Detail 5.5.15

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-24 Batt in Stud Cavity – Concrete Parapet and Roof Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-26.4 (4.65 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>r</sub> , R <sub>r</sub> , U <sub>w</sub> , R <sub>w</sub>	"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 <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sub>1Dw</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-34.8 (6.13)	R-19.3 (3.40)	0.052 (0.29)
R-21.0 (3.70)	R-47.4 (8.34)	R-26.7 (4.71)	0.037 (0.21)

### Base Assembly - Roof

Roof Insulation 1DR-Value (RSI)	R <sub>r</sub> ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	U <sub>r</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

### Parapet Linear Transmittance

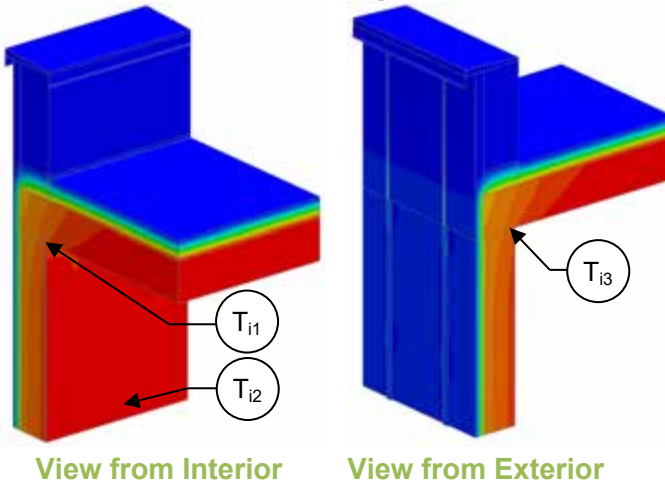
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-9.0 (1.59)	0.111 (0.63)	0.388 (0.672)
R-21.0 (3.70)	R-9.8 (1.72)	0.102 (0.58)	0.379 (0.657)

### Temperature Indices

	R8.4	R21	
T <sub>i1</sub>	0.32	0.50	Min T on sheathing at roof slab, away from roof slab, between studs at clip
T <sub>i2</sub>	0.59	0.71	Max T on sheathing away from roof slab, at studs
T <sub>i3</sub>	0.67	0.69	Min T on roof slab exposed to interior air, at gypsum between studs

# Detail 5.5.16

## Owens Corning Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.3 (0.58 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>r</sub> , R <sub>r</sub> , U <sub>w</sub> , R <sub>w</sub>	"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 <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sub>1Dw</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-11.7 (2.06)	R-10.0 (1.77)	0.100 (0.57)
R-21.0 (3.70)	R-24.3 (4.28)	R-17.6 (3.10)	0.057 (0.32)

### Base Assembly - Roof

Roof Insulation 1DR-Value (RSI)	R <sub>r</sub> ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	U <sub>r</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

### Parapet Linear Transmittance

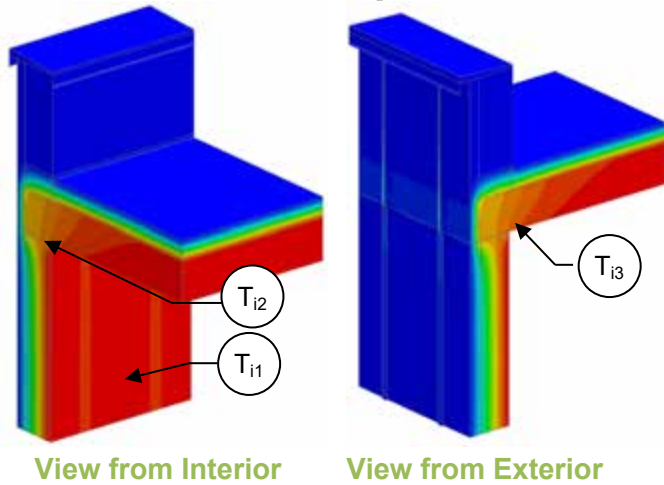
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-10.6 (1.87)	0.094 (0.53)	0.130 (0.225)
R-21.0 (3.70)	R-14.4 (2.54)	0.069 (0.39)	0.112 (0.194)

### Temperature Indices

	R8.4	R21	
T <sub>11</sub>	0.71	0.76	Min T on sheathing at roof slab, at clip
T <sub>12</sub>	0.81	0.90	Max T on sheathing away from roof slab, between studs
T <sub>13</sub>	0.86	0.89	Min T on roof slab exposed to interior air, at gypsum between studs

# Detail 5.5.17

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-20 Batt in Stud Cavity – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet**



## Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-30.8 (5.42)	R-18.3 (3.23)	0.055 (0.31)
R-21.0 (3.70)	R-43.4 (7.64)	R-25.8 (4.54)	0.039 (0.22)

### Base Assembly - Roof

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

### Parapet Linear Transmittance

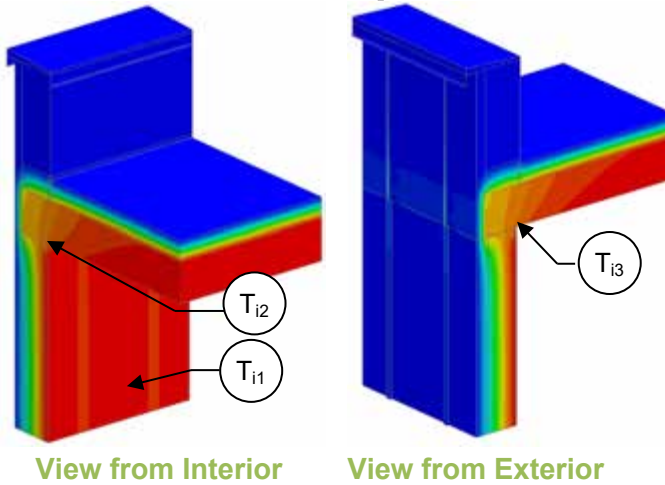
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-13.8 (2.43)	0.073 (0.41)	0.139 (0.241)
R-21.0 (3.70)	R-16.6 (2.92)	0.060 (0.34)	0.113 (0.196)

## Temperature Indices

	R8.4	R21	
$T_{i1}$	0.35	0.53	Min T on sheathing away from roof slab, between studs at clip
$T_{i2}$	0.72	0.78	Max T on sheathing at roof slab, between studs
$T_{i3}$	0.84	0.87	Min T on roof slab exposed to interior air, at gypsum between studs

# Detail 5.5.18

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-22.5 Batt in Stud Cavity – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet**



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-24.9 (4.38 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-33.3 (5.86)	R-19.0 (3.34)	0.053 (0.30)
R-21.0 (3.70)	R-45.9 (8.08)	R-26.4 (4.64)	0.038 (0.22)

#### Base Assembly - Roof

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

#### Parapet Linear Transmittance

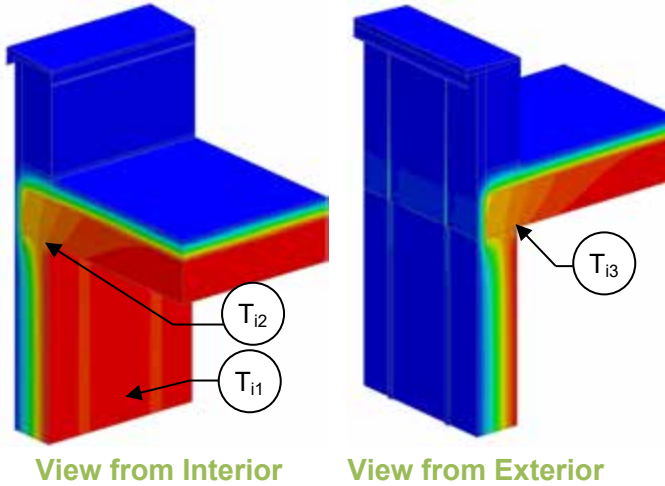
Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-13.9 (2.46)	0.072 (0.41)	0.140 (0.242)
R-21.0 (3.70)	R-16.7 (2.94)	0.060 (0.34)	0.113 (0.196)

### Temperature Indices

	R8.4	R21	
$T_{i1}$	0.33	0.51	Min T on sheathing away from roof slab, between studs at clip
$T_{i2}$	0.72	0.78	Max T on sheathing at roof slab, between studs
$T_{i3}$	0.84	0.87	Min T on roof slab exposed to interior air, at gypsum between studs

# Detail 5.5.19

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and Owens Corning R-24 Batt in Stud Cavity – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet**



## Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-26.4 (4.65 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-34.8 (6.13)	R-19.3 (3.40)	0.052 (0.29)
R-21.0 (3.70)	R-47.4 (8.34)	R-26.7 (4.71)	0.037 (0.21)

### Base Assembly - Roof

Roof Insulation 1DR-Value (RSI)	$R_r$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.4 (1.48)	R-14.0 (2.47)	0.071 (0.41)	0.141 (0.244)
R-21.0 (3.70)	R-16.7 (2.94)	0.060 (0.34)	0.115 (0.199)

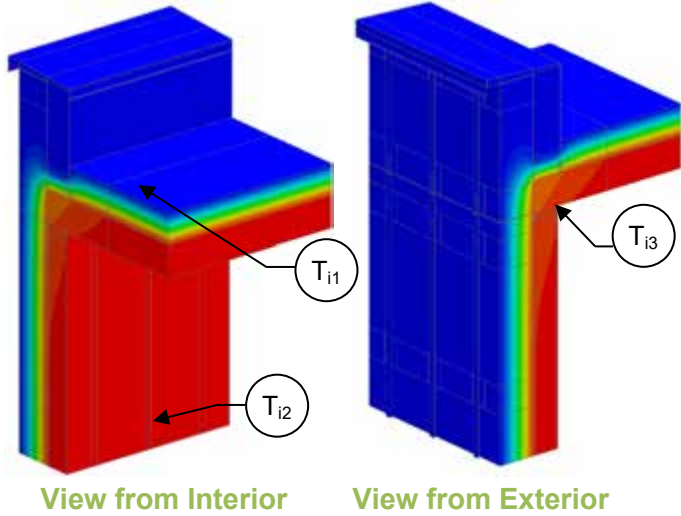
## Temperature Indices

	R8.4	R21	
$T_{i1}$	0.32	0.51	Min T on sheathing away from roof slab, between studs at clip
$T_{i2}$	0.72	0.78	Max T on sheathing at roof slab, between studs
$T_{i3}$	0.84	0.87	Min T on roof slab exposed to interior air, at gypsum between studs



# Detail 5.5.20

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System Supporting Metal Cladding – Concrete Roof Deck at Isokorb AXT Thermally Broken Concrete Parapet



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	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: r = roof w = wall
Transmittance / Resistance	$U, R$	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Scenario

Scenario	
A	Sloped Roof
B	Concrete Topping
C	Insulation Between AXT Module at the Same Height as Roof Insulation

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-42.0 (7.40)	R-45.2 (7.96)	R-40.0 (7.04)	0.025 (0.14)

#### Base Assembly - Roof

Roof Insulation 1D R-Value (RSI)	$R_r$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-40 (7.01)	R-41.9 (7.39)	0.024 (0.14)

#### Parapet Linear Transmittance

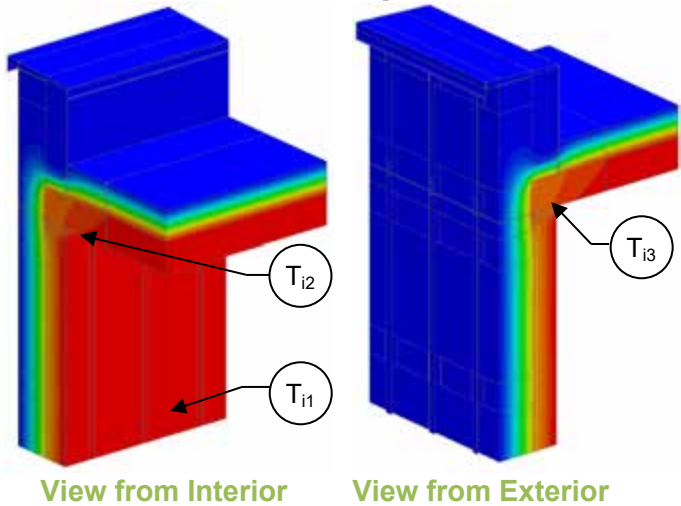
Scenario	Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
A	R-42.0 (7.40)	R-23.1 (4.07)	0.043 (0.25)	0.099 (0.171)
B	R-42.0 (7.40)	R-25.4 (4.48)	0.039 (0.22)	0.078 (0.136)
C	R-42.0 (7.40)	R-27.4 (4.83)	0.036 (0.21)	0.063 (0.110)

### Temperature Indices

	A	B	C	
$T_{i1}$	0.88	0.91	0.92	Min T on sheathing at roof slab, aligned with Isokorb AXT Thermal Break
$T_{i2}$	0.95	0.95	0.95	Max T on sheathing away from roof slab, beside studs
$T_{i3}$	0.91	0.94	0.94	Min T on roof slab exposed to interior air, at gypsum, aligned with Isokorb AXT Thermal Break

# Detail 5.5.21

**Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System Supporting Metal Cladding and R-19 Batt in Stud Cavity – Concrete Roof Deck at Isokorb AXT Thermally Broken Concrete Parapet**



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Scenario

Scenario	
A	Sloped Roof
B	Concrete Topping
C	Insulation Between AXT Module at the Same Height as Roof Insulation

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-42.0 (7.40)	R-63.3 (11.15)	R-48.3 (8.51)	0.021 (0.12)

#### Base Assembly - Roof

Roof Insulation 1D R-Value (RSI)	$R_r$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-40 (7.01)	R-41.9 (7.39)	0.024 (0.14)

#### Parapet Linear Transmittance

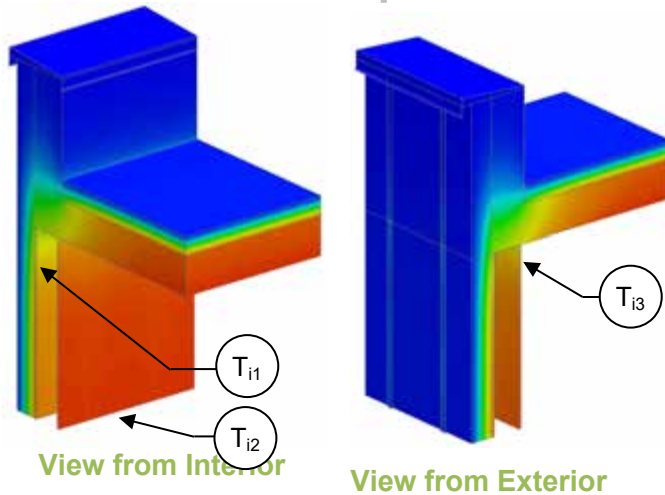
Scenario	Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
A	R-42.0 (7.40)	R-24.1 (4.25)	0.041 (0.24)	0.099 (0.171)
B	R-42.0 (7.40)	R-26.6 (4.68)	0.038 (0.21)	0.079 (0.137)
C	R-42.0 (7.40)	R-28.7 (5.05)	0.035 (0.20)	0.064 (0.111)

### Temperature Indices

	A	B	C	
$T_{11}$	0.77	0.77	0.77	Min T on sheathing away from roof slab, between studs
$T_{12}$	0.88	0.89	0.90	Max T on sheathing at roof slab, at studs, not aligned with Isokorb AXT Thermal Break
$T_{13}$	0.90	0.92	0.93	Min T on roof slab exposed to interior air, at gypsum, aligned with Isokorb AXT Thermal Break

# Detail 5.5.22

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Concrete Parapet and Roof Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.3 (0.58 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-20.1 (3.54)	R-14.7 (2.59)	0.068 (0.39)
R-21.0 (3.70)	R-24.3 (4.28)	R-17.0 (3.00)	0.059 (0.33)
R-25.2 (4.44)	R-28.5 (5.02)	R-19.1 (3.37)	0.052 (0.30)
R-29.4 (5.18)	R-32.7 (5.76)	R-21.0 (3.71)	0.048 (0.27)

#### Base Assembly - Roof

Roof Insulation 1DR-Value (RSI)	$R_r$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-21.9 (3.86)	0.046 (0.26)
R-40.0 (7.04)	R-41.9 (7.39)	0.024 (0.14)

#### Parapet Linear Transmittance

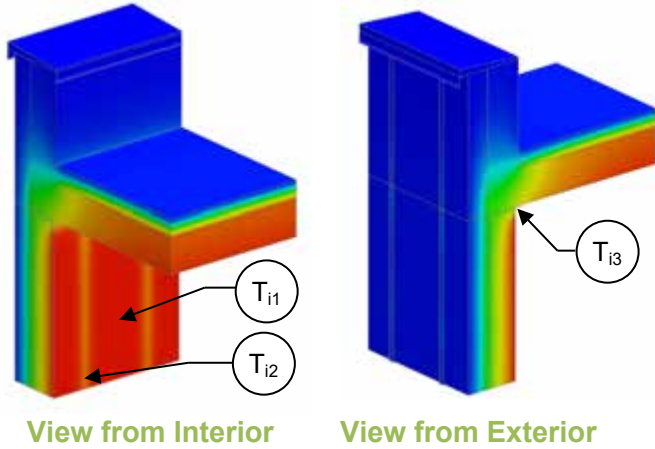
Exterior Insulation 1D R-Value (RSI)	R-20 Roof Insulation			R-40 Roof Insulation		
	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-16.8 (2.96)	R-8.2 (1.45)	0.122 (0.69)	0.403 (0.698)	R-9.6 (1.70)	0.104 (0.59)	0.359 (0.621)
R-21.0 (3.70)	R-8.5 (1.51)	0.117 (0.66)	0.404 (0.699)	R-10.1 (1.78)	0.099 (0.56)	0.357 (0.619)
R-25.2 (4.44)	R-8.8 (1.55)	0.114 (0.65)	0.404 (0.699)	R-10.5 (1.84)	0.095 (0.54)	0.357 (0.617)
R-29.4 (5.18)	R-9.0 (1.58)	0.111 (0.63)	0.404 (0.700)	R-10.8 (1.89)	0.093 (0.53)	0.356 (0.616)

### Temperature Indices

	R-20 Roof Insulation				R-40 Roof Insulation				
	R16.8	R21.0	R25.2	R29.4	R16.8	R21.0	R25.2	R29.4	
$T_{11}$	0.60	0.61	0.61	0.62	0.63	0.64	0.65	0.65	Min T on sheathing away from roof slab, at clip
$T_{12}$	0.87	0.89	0.90	0.91	0.87	0.89	0.91	0.91	Max T on sheathing away from roof slab, between studs
$T_{13}$	0.79	0.79	0.79	0.80	0.82	0.82	0.82	0.83	Min T on roof slab exposed to interior air, at gypsum between studs

# Detail 5.5.23

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and R-20 Batt in Stud Cavity – Concrete Parapet and Roof Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-39.2 (6.90)	R-22.9 (4.03)	0.044 (0.25)
R-21.0 (3.70)	R-43.4 (7.64)	R-25.2 (4.44)	0.040 (0.23)
R-25.2 (4.44)	R-47.6 (8.38)	R-27.3 (4.81)	0.037 (0.21)
R-29.4 (5.18)	R-51.8 (9.12)	R-29.2 (5.15)	0.034 (0.19)

#### Base Assembly - Roof

Roof Insulation 1DR-Value (RSI)	$R_r$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-21.9 (3.86)	0.046 (0.26)
R-40.0 (7.04)	R-41.9 (7.39)	0.024 (0.14)

#### Parapet Linear Transmittance

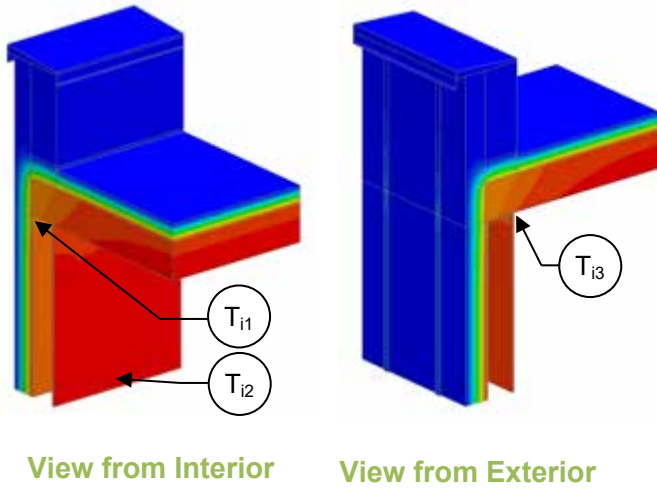
Exterior Insulation 1D R-Value (RSI)	R-20 Roof Insulation			R-40 Roof Insulation		
	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-16.8 (2.96)	R-9.5 (1.66)	0.106 (0.60)	0.381 (0.660)	R-11.2 (1.97)	0.089 (0.51)	0.345 (0.597)
R-21.0 (3.70)	R-9.7 (1.70)	0.103 (0.59)	0.379 (0.656)	R-11.5 (2.03)	0.087 (0.49)	0.342 (0.591)
R-25.2 (4.44)	R-9.8 (1.73)	0.102 (0.58)	0.378 (0.654)	R-11.8 (2.08)	0.085 (0.48)	0.339 (0.587)
R-29.4 (5.18)	R-10.0 (1.76)	0.100 (0.57)	0.377 (0.653)	R-12.0 (2.11)	0.083 (0.47)	0.338 (0.585)

#### Temperature Indices

	R-20 Roof Insulation				R-40 Roof Insulation				
	R16.8	R21.0	R25.2	R29.4	R16.8	R21.0	R25.2	R29.4	
$T_{i1}$	0.46	0.47	0.48	0.49	0.49	0.50	0.51	0.52	Min T on sheathing away from roof slab, at clip
$T_{i2}$	0.69	0.73	0.75	0.77	0.69	0.73	0.75	0.77	Max T on sheathing away from roof slab, at studs
$T_{i3}$	0.75	0.75	0.76	0.76	0.78	0.79	0.79	0.79	Min T on roof slab exposed to interior air, at gypsum between studs

# Detail 5.5.24

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.3 (0.58 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-20.1 (3.54)	R-14.7 (2.59)	0.068 (0.39)
R-21.0 (3.70)	R-24.3 (4.28)	R-17.0 (3.00)	0.059 (0.33)
R-25.2 (4.44)	R-28.5 (5.02)	R-19.1 (3.37)	0.052 (0.30)
R-29.4 (5.18)	R-32.7 (5.76)	R-21.0 (3.71)	0.048 (0.27)

#### Base Assembly - Roof

Roof Insulation 1DR-Value (RSI)	$R_r$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-21.9 (3.86)	0.046 (0.26)
R-40.0 (7.04)	R-41.9 (7.38)	0.024 (0.14)

#### Parapet Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R-20 Roof Insulation			R-40 Roof Insulation		
	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-16.8 (2.96)	R-13.2 (2.33)	0.076 (0.43)	0.116 (0.200)	R-15.2 (2.68)	0.066 (0.37)	0.121 (0.209)
R-21.0 (3.70)	R-14.3 (2.52)	0.070 (0.40)	0.111 (0.191)	R-16.6 (2.93)	0.060 (0.34)	0.116 (0.200)
R-25.2 (4.44)	R-15.1 (2.66)	0.066 (0.38)	0.107 (0.185)	R-17.8 (3.13)	0.056 (0.32)	0.112 (0.194)
R-29.4 (5.18)	R-15.8 (2.78)	0.063 (0.36)	0.105 (0.181)	R-18.7 (3.30)	0.053 (0.30)	0.109 (0.189)

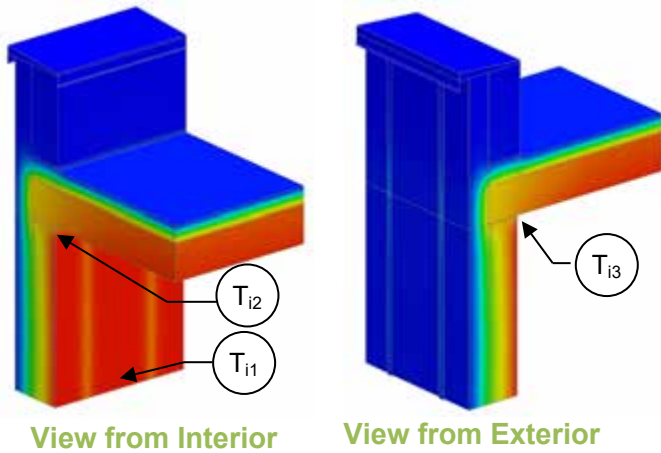
#### Temperature Indices

	R-20 Roof Insulation				R-40 Roof Insulation				
	R16.8	R21.0	R25.2	R29.4	R16.8	R21.0	R25.2	R29.4	
$T_{11}$	0.74	0.75	0.76	0.77	0.74	0.76	0.77	0.77	Min T on sheathing away from roof slab, at clip
$T_{12}$	0.88	0.90	0.91	0.92	0.88	0.90	0.91	0.92	Max T on sheathing away from roof slab, between studs
$T_{13}$	0.91	0.91	0.92	0.92	0.91	0.92	0.92	0.93	Min T on roof slab exposed to interior air, at gypsum between studs



# Detail 5.5.25

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Thermally Isolated Vertical Brackets and Rail System (24" o.c.) Supporting Metal Cladding and R-20 Batt in Stud Cavity – Concrete Roof Deck at Isokorb AXTI Thermal Broken Concrete Parapet



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.4 (3.94 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-39.2 (6.90)	R-22.9 (4.03)	0.044 (0.25)
R-21.0 (3.70)	R-43.4 (7.64)	R-25.2 (4.44)	0.040 (0.23)
R-25.2 (4.44)	R-47.6 (8.38)	R-27.3 (4.81)	0.037 (0.21)
R-29.4 (5.18)	R-51.8 (9.12)	R-29.2 (5.15)	0.034 (0.19)

#### Base Assembly - Roof

Roof Insulation 1DR-Value (RSI)	$R_r$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-21.9 (3.86)	0.046 (0.26)
R-40.0 (7.04)	R-41.9 (7.38)	0.024 (0.14)

#### Parapet Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R-20 Roof Insulation			R-40 Roof Insulation		
	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-16.8 (2.96)	R-15.5 (2.74)	0.064 (0.37)	0.123 (0.212)	R-18.3 (3.23)	0.055 (0.31)	0.129 (0.223)
R-21.0 (3.70)	R-16.3 (2.88)	0.061 (0.35)	0.116 (0.201)	R-19.4 (3.43)	0.051 (0.29)	0.122 (0.211)
R-25.2 (4.44)	R-17.0 (2.99)	0.059 (0.33)	0.111 (0.193)	R-20.4 (3.59)	0.049 (0.28)	0.117 (0.202)
R-29.4 (5.18)	R-17.5 (3.08)	0.057 (0.32)	0.108 (0.187)	R-21.1 (3.72)	0.047 (0.27)	0.113 (0.196)

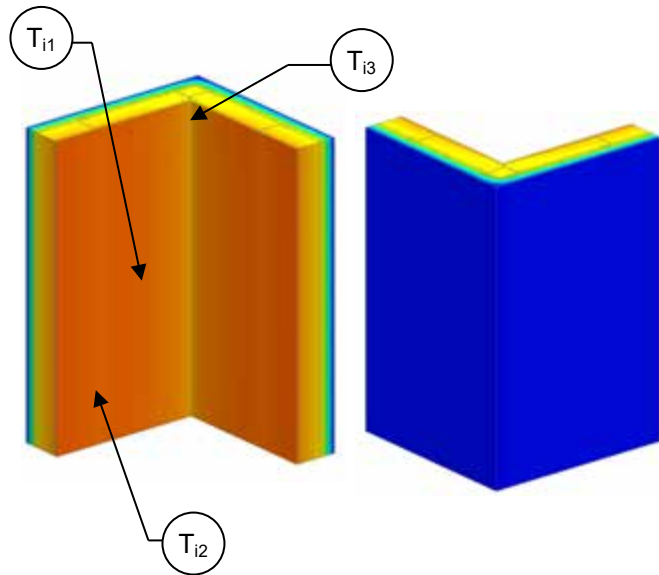
### Temperature Indices

	R-20 Roof Insulation				R-40 Roof Insulation				
	R16.8	R21.0	R25.2	R29.4	R16.8	R21.0	R25.2	R29.4	
$T_{i1}$	0.49	0.52	0.55	0.56	0.49	0.52	0.55	0.57	Min T on sheathing away from roof slab, at clip
$T_{i2}$	0.77	0.79	0.80	0.80	0.78	0.80	0.81	0.82	Max T on sheathing at roof slab, between studs
$T_{i3}$	0.89	0.89	0.90	0.90	0.90	0.90	0.90	0.91	Min T on roof slab exposed to interior air, at gypsum between studs



# Detail 5.6.1

## Exterior 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-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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

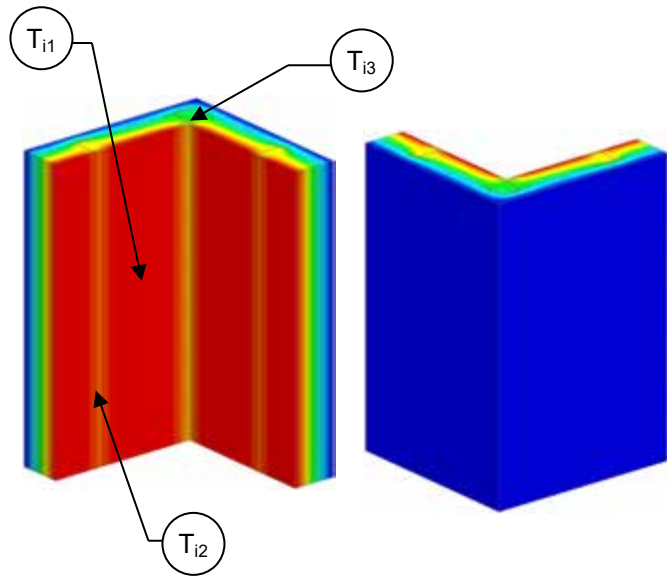
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 with R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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)

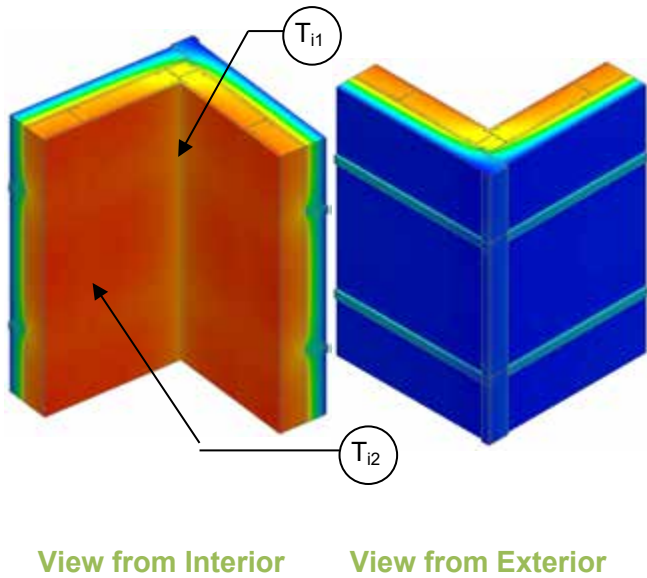
### Temperature Indices

	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

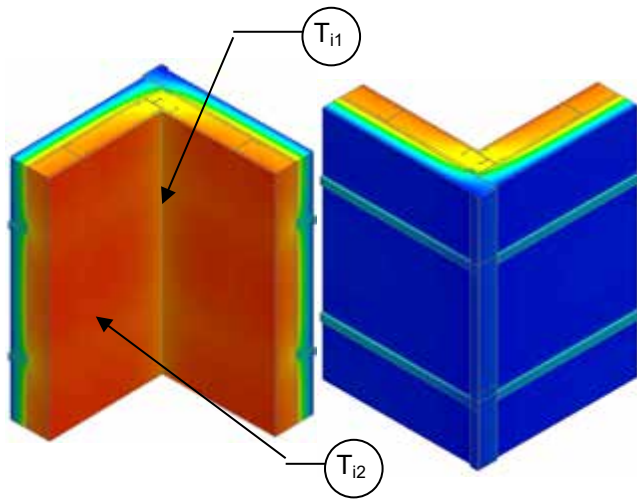
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

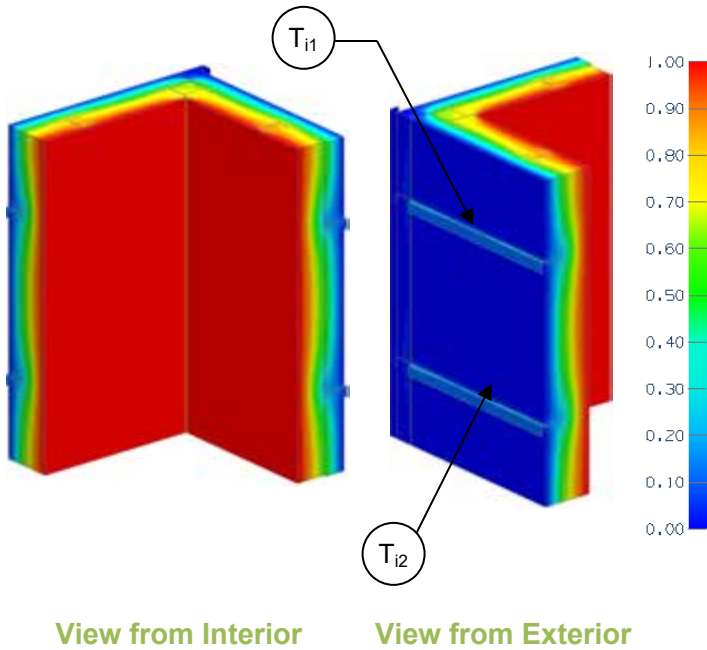
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

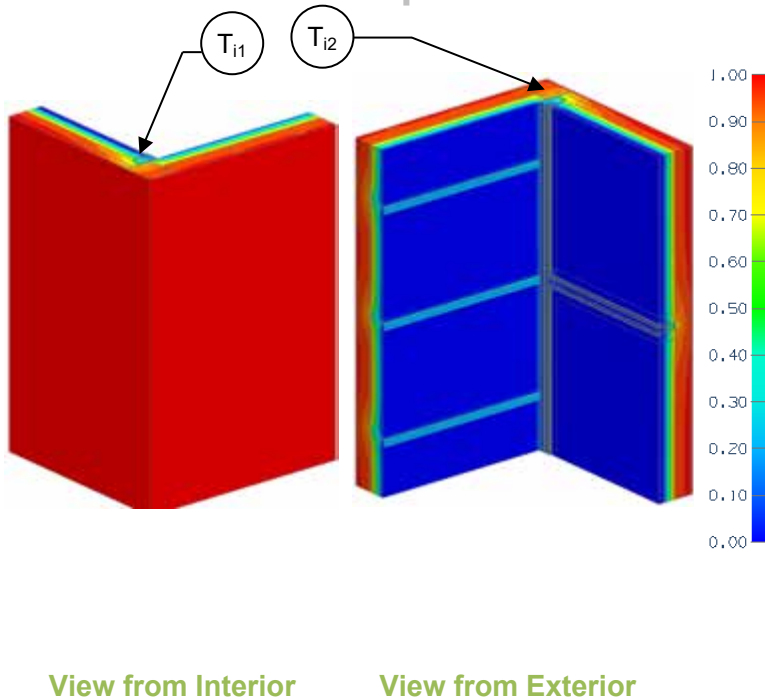
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-16.8 (2.96)	R-20.4 (3.60)	R-7.7 (1.36)	0.130 (0.74)

#### Corner Linear Transmittance

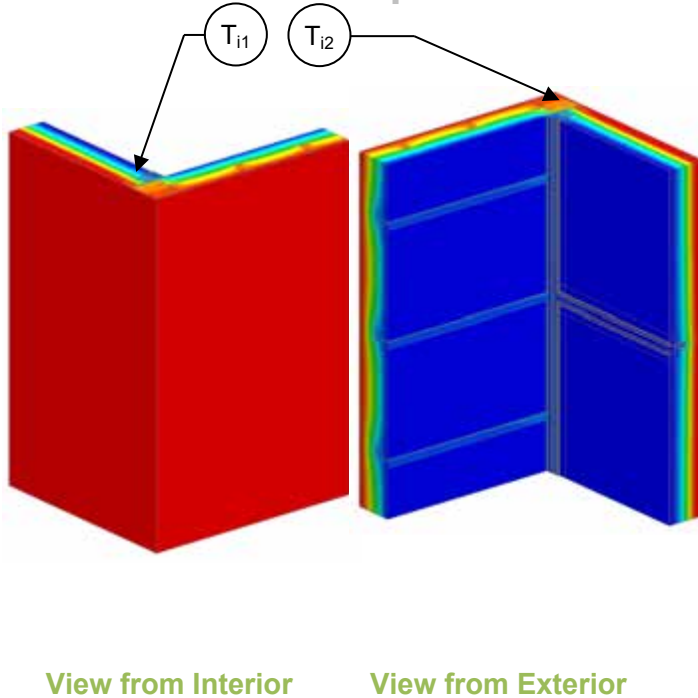
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-15 (2.64)	R-7.9 (1.38)	0.127 (0.72)	0.120 (0.207)
R-25 (4.40)	R-8.5 (1.49)	0.118 (0.67)	0.125 (0.217)

### 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	$U_w, R_w, U_s, R_w$	“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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

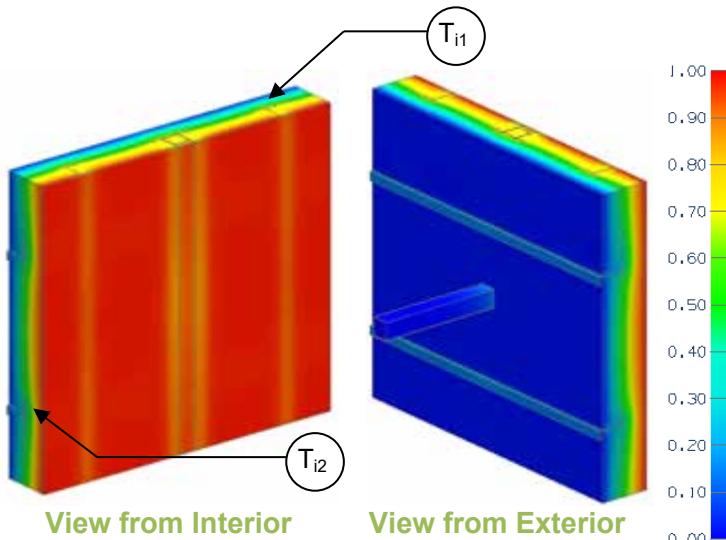
#### Temperature Indices

	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
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# 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of steel column
Point Transmittance	$\chi$	Incremental increase in transmittance for steel beam attached to post

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_c$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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

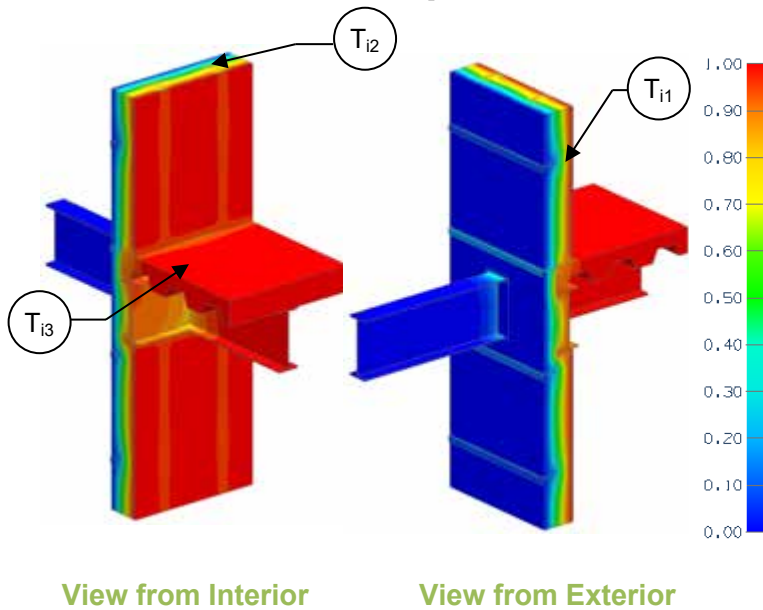
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-5 (0.88)	R- 11.0 (1.93)	0.091 (0.52)	0.16 (0.08)
R-15 (2.64)	R- 14.4 (2.54)	0.069 (0.39)	0.16 (0.08)
R-25 (4.40)	R-16.9 (2.97)	0.059 (0.34)	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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-29.3 (5.16)	R-18.6 (3.28)	0.054 (0.31)

##### Slab Linear Transmittance

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15.6 (2.74)	0.064 (0.36)	0.084 (0.146)

##### Beam Point Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-15 (2.64)	R-6.9 (1.21)	0.146 (0.83)	1.73 (0.92)

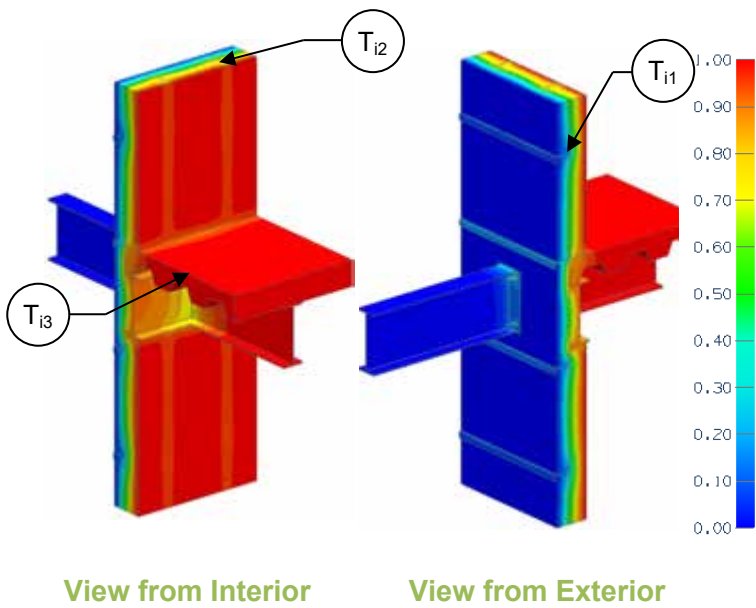
#### Temperature Indices

$T_{i1}$	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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-29.3 (5.16)	R-18.6 (3.28)	0.054 (0.31)

#### Beam Point Transmittance

Thermal Isolator Pad	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ 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

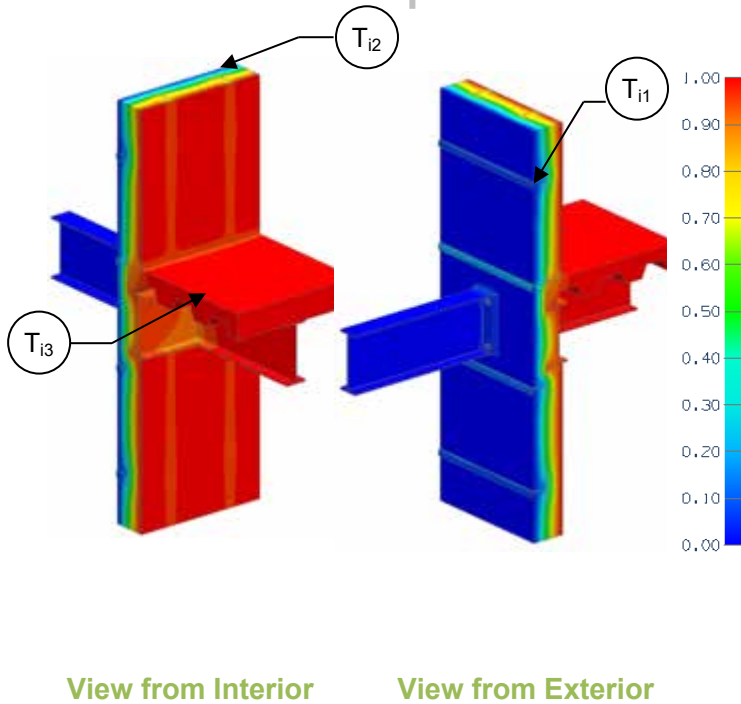
Wall Exterior Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr·°F (W/m K)
R-15 (2.64)	R-15.6 (2.74)	0.064 (0.36)	0.084 (0.146)

### 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)

#### Slab Transmittance

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15.6 (2.74)	0.064 (0.36)	0.084 (0.146)

#### Beam Point Transmittance

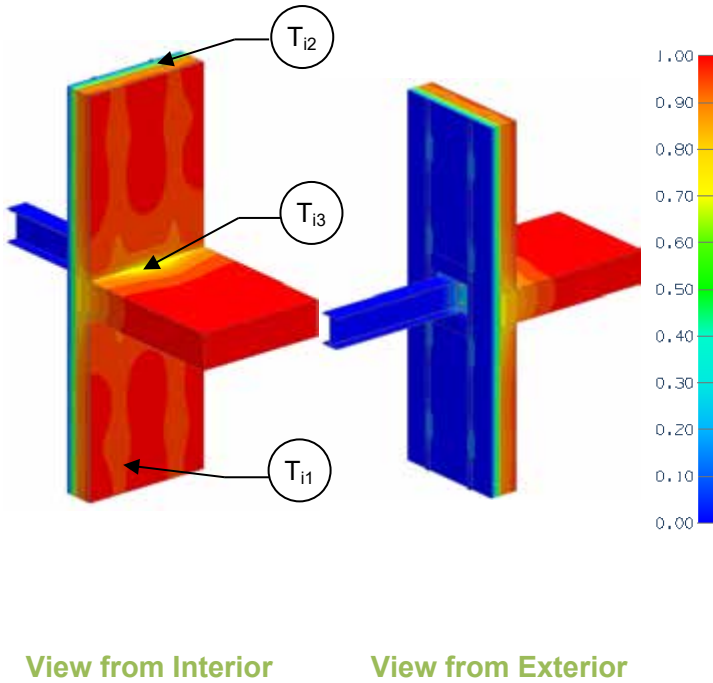
Wall Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-15 (2.64)	R-9.4 (1.65)	0.107 (0.61)	0.91 (0.48)

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-18.2 (3.20)	R-13.8 (2.44)	0.072 (0.41)

#### Slab Transmittance

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-12.7 (2.24)	0.079 (0.45)	0.052 (0.090)

#### Beam Point Transmittance

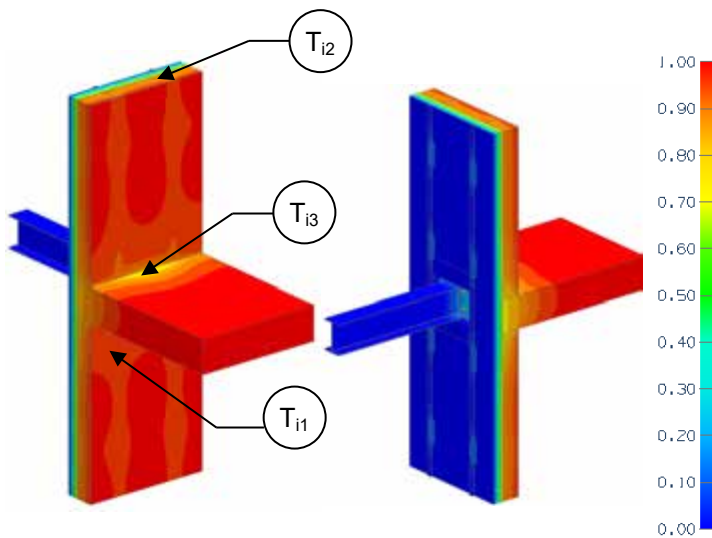
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-15 (2.64)	R-7.3 (1.28)	0.137 (0.78)	1.24 (0.66)

### 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



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-18.2 (3.20)	R-13.8 (2.44)	0.072 (0.41)

#### Slab Transmittance

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-12.7 (2.24)	0.079 (0.45)	0.052 (0.090)

#### Beam Point Transmittance

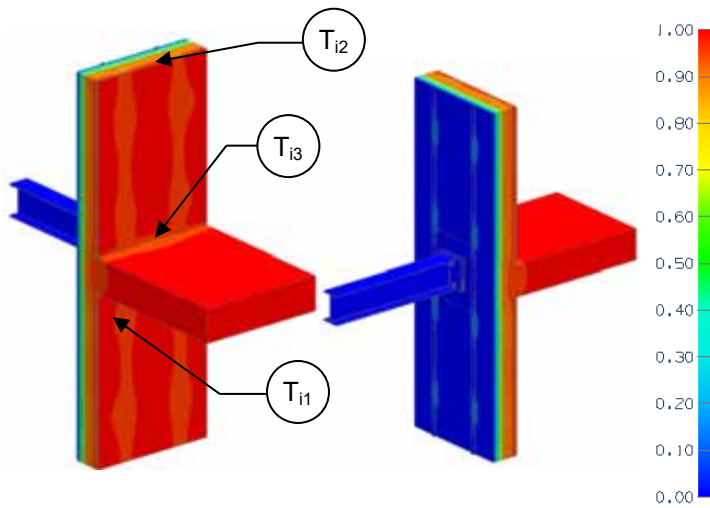
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-15 (2.64)	R-8.2 (1.45)	0.121 (0.69)	0.91 (0.48)

### 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



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-18.2 (3.20)	R-13.8 (2.44)	0.072 (0.41)

#### Slab Transmittance

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft hr °F (W/m K)
R-12.7 (2.24)	0.079 (0.45)	0.052 (0.090)

#### Beam Point Transmittance

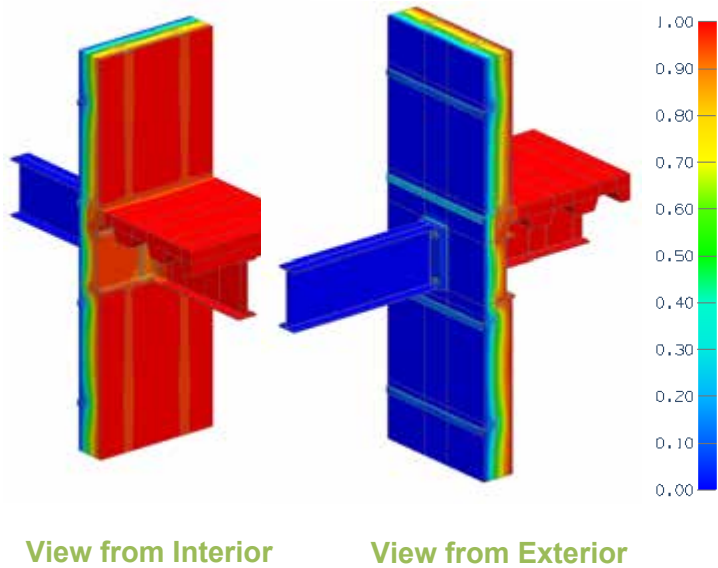
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-15 (2.64)	R-12.2 (2.14)	0.082 (0.47)	0.07 (0.04)

### 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 and R-12 Batt Insulation in Stud Cavity – 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	$\psi$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-29.2 (5.14)	R-18.5 (3.25)	0.054 (0.31)

#### Slab Linear Transmittance

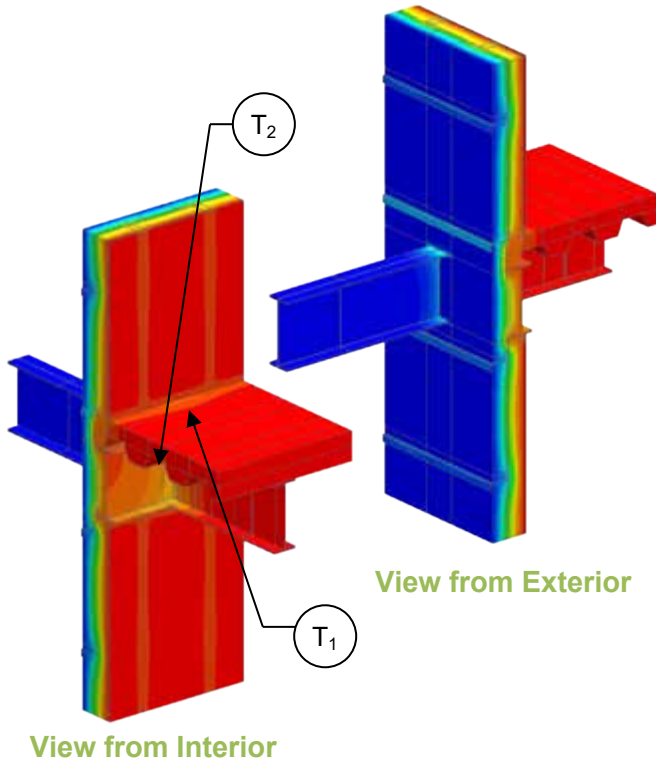
Wall Exterior Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-15.6 (2.74)	0.064 (0.36)	0.084 (0.146)

#### Beam Point Transmittance

Scenario	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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

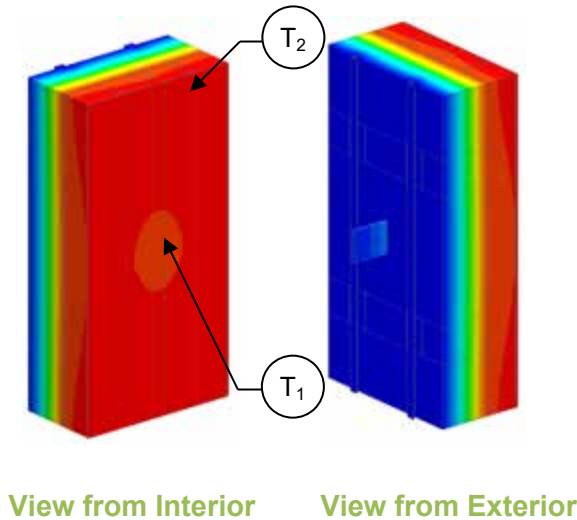
$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-8.4 (1.48)	0.119 (0.68)	1.17 (0.62)

### 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 5.7.10

## Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding – Structural Steel Column & Knife Edge Cable Support Intersection



### Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R<sub>1D</sub></td> <td>R-3.2 (0.56 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td>U<sub>o</sub>, R<sub>o</sub></td> <td>"clear wall" U- and R-value without column and knife edge</td> </tr> <tr> <td>Transmittance / Resistance</td> <td>U<sub>c</sub>, R<sub>c</sub></td> <td>U- and R-values for column</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 Index<sup>1</sup></td> <td>T<sub>i</sub></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 column</td> </tr> <tr> <td>Point Transmittance</td> <td>χ</td> <td>Incremental increase in transmittance for knife edge penetration</td> </tr> </table>	Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-3.2 (0.56 RSI) + exterior insulation	Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value without column and knife edge	Transmittance / Resistance	U <sub>c</sub> , R <sub>c</sub>	U- and R-values for column	Transmittance / Resistance	U, R	U- and R-values for overall assembly	Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature	Linear Transmittance	ψ	Incremental increase in transmittance per linear length of column	Point Transmittance	χ	Incremental increase in transmittance for knife edge penetration
Assembly 1D (Nominal) R-Value		R <sub>1D</sub>	R-3.2 (0.56 RSI) + exterior insulation																			
Transmittance / Resistance without Anomaly		U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value without column and knife edge																			
Transmittance / Resistance		U <sub>c</sub> , R <sub>c</sub>	U- and R-values for column																			
Transmittance / Resistance		U, R	U- and R-values for overall assembly																			
Surface Temperature Index <sup>1</sup>		T <sub>i</sub>	0 = exterior temperature 1 = interior temperature																			
Linear Transmittance		ψ	Incremental increase in transmittance per linear length of column																			
Point Transmittance		χ	Incremental increase in transmittance for knife edge penetration																			
0.90																						
0.80																						
0.70																						
0.60																						
0.50																						
0.40																						
0.30																						
0.20																						
0.10																						
0.00																						

<sup>1</sup>Assumptions 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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-42 (7.40)	R-45.2 (7.96)	R-40.0 (7.04)	0.025 (0.14)

#### Column Linear Transmittance

R <sub>c</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>c</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ Btu/ft hr °F (W/m K)
R-39.9 (7.04)	0.025 (0.14)	0.000009 (0.00015)

#### Knife Edge Point Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	χ Btu/hr °F (W/K)
R-42 (7.40)	R-22.4 (3.95)	0.045 (0.25)	0.278 (0.147)

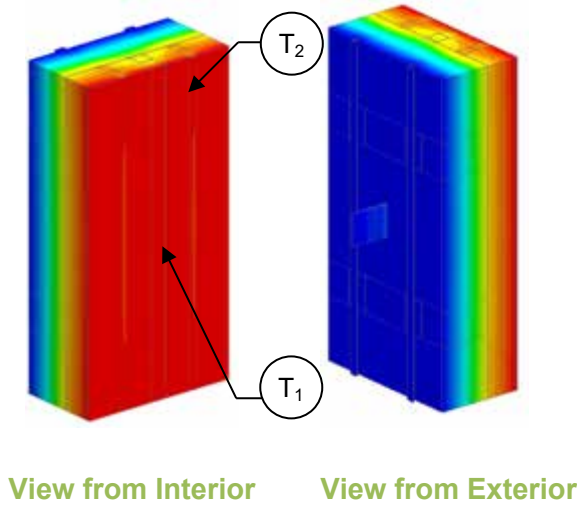
### Temperature Indices

T <sub>1</sub>	0.56	Min T on sheathing beside knife edge, at column
T <sub>2</sub>	0.94	Max T on sheathing, at studs, away from knife edge



# Detail 5.7.11

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding with R-19 Batt in Stud Cavity – Structural Steel Column & Knife Edge Cable Support Intersection



### Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td><math>R_{1D}</math></td> <td>R-21.3 (3.75 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td><math>U_o, R_o</math></td> <td>"clear wall" U- and R-value without column and knife edge</td> </tr> <tr> <td>Transmittance / Resistance</td> <td><math>U_c, R_c</math></td> <td>U- and R-values for column</td> </tr> <tr> <td>Transmittance / Resistance</td> <td><math>U, R</math></td> <td>U- and R-values for overall assembly</td> </tr> <tr> <td>Surface Temperature Index<sup>1</sup></td> <td><math>T_i</math></td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td><math>\psi</math></td> <td>Incremental increase in transmittance per linear length of column</td> </tr> <tr> <td>Point Transmittance</td> <td><math>\chi</math></td> <td>Incremental increase in transmittance for knife edge penetration</td> </tr> </table>	Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75 RSI) + exterior insulation	Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value without column and knife edge	Transmittance / Resistance	$U_c, R_c$	U- and R-values for column	Transmittance / Resistance	$U, R$	U- and R-values for overall assembly	Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of column	Point Transmittance	$\chi$	Incremental increase in transmittance for knife edge penetration	0.90
Assembly 1D (Nominal) R-Value		$R_{1D}$	R-21.3 (3.75 RSI) + exterior insulation																				
Transmittance / Resistance without Anomaly		$U_o, R_o$	"clear wall" U- and R-value without column and knife edge																				
Transmittance / Resistance		$U_c, R_c$	U- and R-values for column																				
Transmittance / Resistance		$U, R$	U- and R-values for overall assembly																				
Surface Temperature Index <sup>1</sup>		$T_i$	0 = exterior temperature 1 = interior temperature																				
Linear Transmittance		$\psi$	Incremental increase in transmittance per linear length of column																				
Point Transmittance		$\chi$	Incremental increase in transmittance for knife edge penetration																				
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																						

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-42 (7.40)	R-63.3 (11.15)	R-48.3 (8.51)	0.021 (0.12)

#### Column Linear Transmittance

$R_c$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_c$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-47.7 (8.40)	0.021 (0.12)	0.00070 (0.0012)

#### Knife Edge Point Transmittance

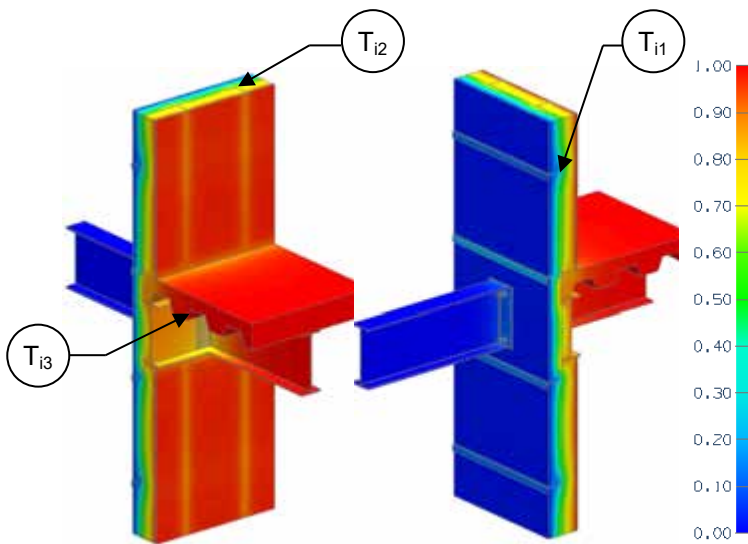
Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-42 (7.40)	R-32.9 (5.79)	0.030 (0.17)	0.134 (0.071)

### Temperature Indices

$T_1$	0.32	Min T on sheathing beside knife edge, at column
$T_2$	0.82	Max T on sheathing, at studs, away from knife edge

# Detail 5.7.12

## 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 and R-12 Batt Insulation in Stud Cavity – Structural Steel Floor Intersection with Thermal Isolator Pad



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 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-29.3 (5.16)	R-18.6 (3.28)	0.054 (0.31)

#### Beam Point Transmittance

Thermal Isolator Pad	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
25 mm pad, stainless steel bolts	R-8.6 (1.51)	0.117 (0.66)	1.11 (0.59)
25 mm pad, steel bolts	R-7.6 (1.33)	0.132 (0.75)	1.44 (0.77)
38 mm pad, stainless steel bolts	R-8.9 (1.56)	0.113 (0.64)	1.02 (0.54)
38 mm pad, steel bolts	R-7.6 (1.34)	0.132 (0.75)	1.43 (0.76)
50 mm pad, stainless steel bolts	R-9.3 (1.64)	0.107 (0.61)	0.91 (0.49)
50 mm pad, steel bolts	R-7.9 (1.38)	0.127 (0.72)	1.34 (0.71)

#### Slab Linear Transmittance

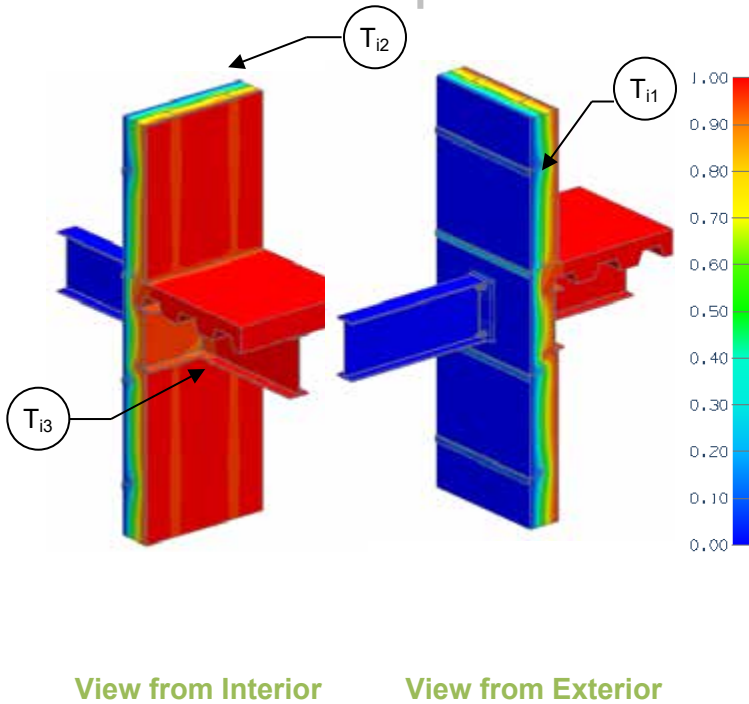
Wall Exterior Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr·°F (W/m K)
R-15 (2.64)	R-15.6 (2.74)	0.064 (0.36)	0.084 (0.146)

### Temperature Indices

	25 mm pad, stainless bolts	25 mm pad, steel bolts	38 mm pad, stainless bolts	38 mm pad, steel bolts	50 mm pad, stainless bolts	50 mm pad, steel bolts	
$T_{i1}$	0.33	0.33	0.33	0.33	0.33	0.33	Min T on sheathing away from slab, between studs at girts
$T_{i2}$	0.74	0.74	0.74	0.74	0.74	0.74	Max T on sheathing away from slab, between girts at studs
$T_{i3}$	0.83	0.79	0.84	0.79	0.85	0.80	Min T on beam exposed to interior air, top flange at I-beam intersection

# Detail 5.7.13

**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 and R-12 Batt Insulation in Stud Cavity – Structural Steel Floor Intersection with Isokorb KST System 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor slab
Point Transmittance	$\chi$	Incremental increase in transmittance for beam penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-29.3 (5.16)	R-18.6 (3.28)	0.054 (0.31)

### Slab Transmittance

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15.6 (2.74)	0.064 (0.36)	0.084 (0.146)

### Beam Point Transmittance

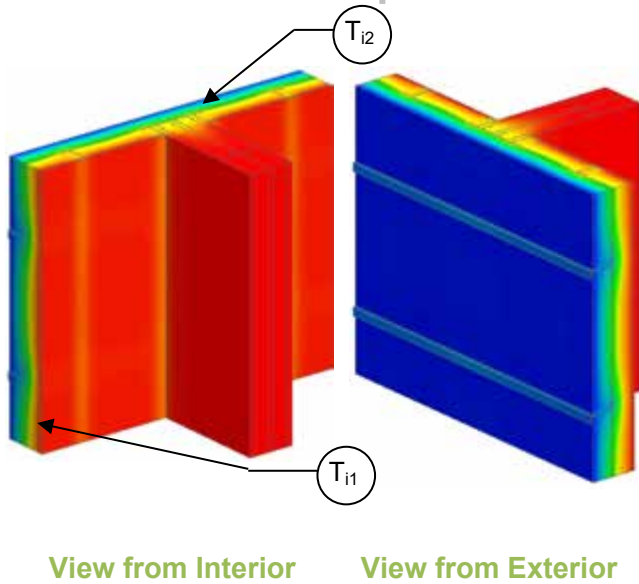
Wall Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-15 (2.64)	R-11.6 (2.05)	0.086 (0.49)	0.457 (0.243)

## Temperature Indices

$T_{i1}$	0.33	Min T on sheathing away from slab, between studs at girts
$T_{i2}$	0.78	Max T on sheathing away from slab, between girts at studs
$T_{i3}$	0.83	Min T on beam exposed to interior air, bottom flange at I-beam intersection

# 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 and R-12 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of inner wall

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

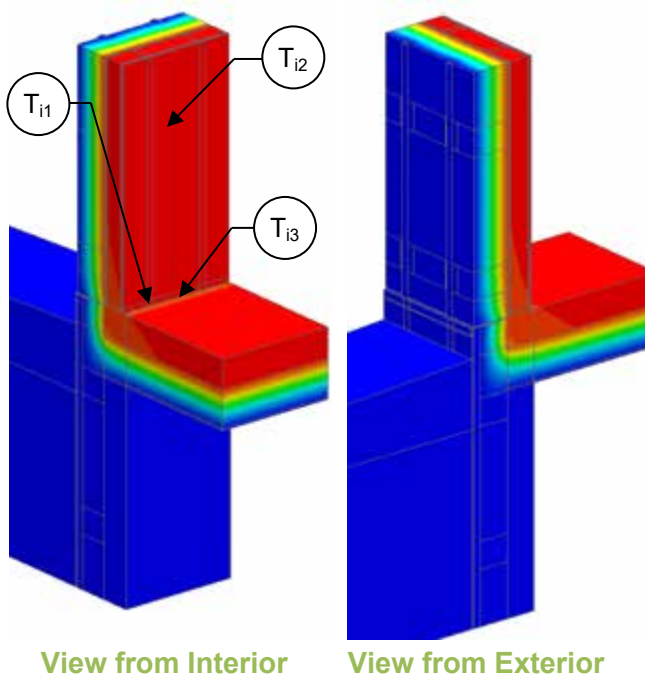
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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

## Detail 5.8.2

### Exterior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding – At-Grade Foundation Wall Intersection



#### Thermal Performance Indicators

1.00	Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56 RSI) + exterior insulation for wall
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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
0.60	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

#### Scenario

Scenario	
A	Without Thermal Break
B	With Thermal Break

#### Nominal (1D) vs. Assembly Performance Indicators

##### Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-42.0 (7.40)	R-45.2 (7.96)	R-40.0 (7.04)	0.025 (0.14)

##### Foundation Linear Transmittance

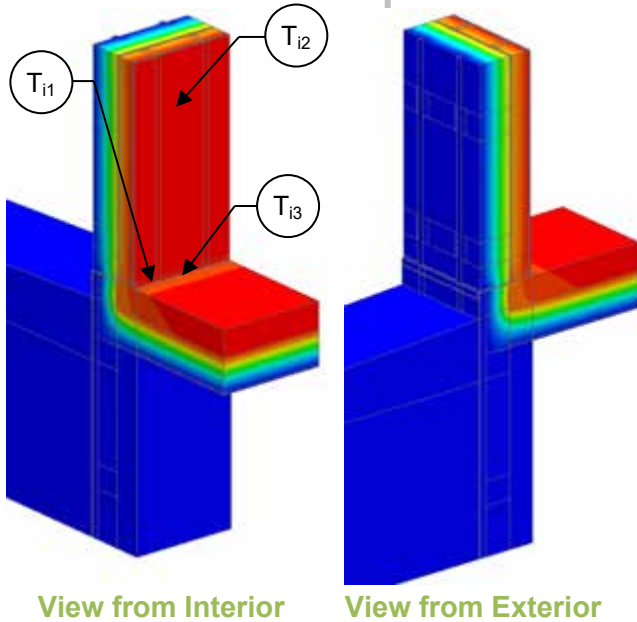
Scenario	Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
A	R-42.0 (7.40)	R-6.5 (1.15)	0.154 (0.87)	0.292 (0.506)
B	R-42.0 (7.40)	R-12.3 (2.17)	0.081 (0.46)	0.059 (0.102)

#### Temperature Indices

	A	B	
$T_{11}$	0.74	0.91	Min T on interior sheathing surface at slab intersection, at studs
$T_{12}$	0.95	0.95	Min T on interior sheathing surface away from slab, between studs at clips
$T_{13}$	0.80	0.94	Min T on floor, at drywall intersection

# Detail 5.8.3

## Exterior and Interior Insulated 6" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding and R19 Batt Insulation in Stud Cavity – At-Grade Foundation Wall Intersection



### Thermal Performance Indicators

1.00	Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
0.60	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation
0.50			
0.40			
0.30			
0.20			
0.10			
0.00			

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Scenario

Scenario	
A	Without Thermal Break
B	With Thermal Break

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-42.0 (7.40)	R-63.3 (11.15)	R-48.3 (8.51)	0.021 (0.12)

#### Foundation Linear Transmittance

Scenario	Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
A	R-42.0 (7.40)	R-7.2 (1.26)	0.140 (0.79)	0.271 (0.468)
B	R-42.0 (7.40)	R-13.6 (2.39)	0.074 (0.42)	0.058 (0.101)

### Temperature Indices

	A	B	
$T_{i1}$	0.65	0.88	Min T on interior sheathing surface at slab intersection, at studs
$T_{i2}$	0.75	0.75	Min T on interior sheathing surface away from slab, between studs at clips
$T_{i3}$	0.75	0.92	Min T on floor, at drywall intersection

## 6.0 Metal Buildings

<b>Detail 6.1.1</b> .....	<b>B.6.1</b>
Vertical Insulated Metal Panel – Clear Wall with Vertical Connection Joint and Support Girt/Hat Track Backup Wall	
<b>Detail 6.1.2</b> .....	<b>B.6.2</b>
Vertical Insulated Metal Panel - Metal Stack Joint and Support Girt Back/Hat Track Backup Wall	
<b>Detail 6.1.3</b> .....	<b>B.6.3</b>
Horizontal Insulated Metal Panel – Clear Wall with Horizontal Connection Joint and Steel Stud Backup Wall	
<b>Detail 6.1.4</b> .....	<b>B.6.4</b>
Horizontal Insulated Metal Panel – Vertical Gasket Joint with Steel Stud Backup Wall	
<b>Detail 6.1.5</b> .....	<b>B.6.5</b>
Structural Sheet Steel Wall with Cladding Supported by Notched Z-Bar – Clear Wall	
<b>Detail 6.1.6</b> .....	<b>B.6.6</b>
Structural Sheet Steel Wall with Cladding Supported by Intermittent Notched Z-Bar – Clear Wall	
<b>Detail 6.1.7</b> .....	<b>B.6.7</b>
Structural Sheet Steel Wall with Cladding Supported by Thermal Chairs – Clear Wall	
<b>Detail 6.1.8</b> .....	<b>B.6.8</b>
2 Hour Fire Rated Structural Steel Sheet Wall with Cladding Supported by Notched Z-bar with Ceramic Blanket – Clear Wall	
<b>Detail 6.2.1</b> .....	<b>B.6.9</b>
Vertical Insulated Metal Panel Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Support Girt/Hat Track Backup Wall	
<b>Detail 6.2.2</b> .....	<b>B.6.10</b>
Horizontal Insulated Metal Panel Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Steel Stud Backup Wall	
<b>Detail 6.3.1</b> .....	<b>B.6.11</b>
Vertical Insulated Metal Panel – Window Glazing Transition with Steel Support Framing	
<b>Detail 6.3.2</b> .....	<b>B.6.12</b>
Horizontal Insulated Metal Panel – Window Glazing Transition with Steel Support Framing	
<b>Detail 6.4.1</b> .....	<b>B.6.13</b>
Vertical Insulated Metal Panel - Steel Roof Deck with Open Web Steel Joist & Parapet Intersection	



**Detail 6.4.2** .....**B.6.14**  
Horizontal Insulated Metal Panel - Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

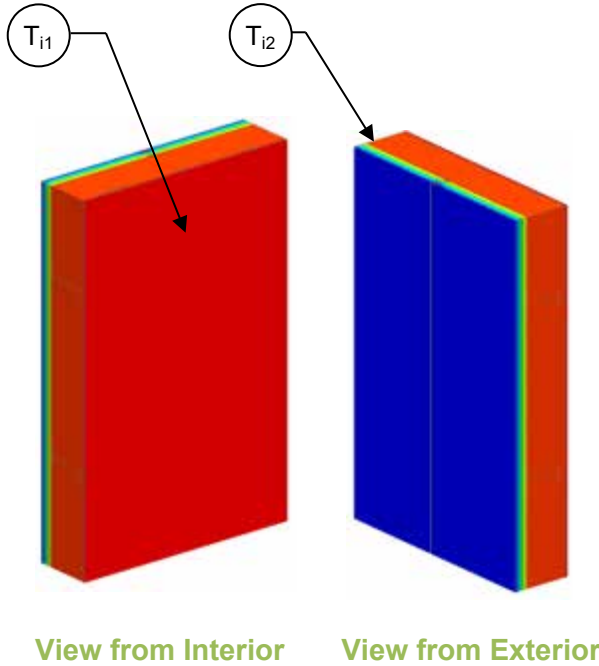
**Detail 6.5.1** .....**B.6.15**  
Vertical Insulated Metal Panel - Corner Intersection with Post and Support Girt/Hat Track Backup Wall

**Detail 6.5.2** .....**B.6.16**  
Horizontal Insulated Metal Panel – Corner Intersection with Post and Steel Stud Backup Wall



# Detail 6.1.1

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



### Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td><math>R_{1D}</math></td> <td>Nominal thermal resistance value of panel and backup wall</td> </tr> <tr> <td>Transmittance / Resistance without anomalies</td> <td><math>U_o, R_o</math></td> <td>"clear wall" U and R-value</td> </tr> <tr> <td>Surface Temperature Index<sup>1</sup></td> <td><math>T_i</math></td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td><math>\psi</math></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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature	Linear Transmittance	$\psi$	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 <sup>1</sup>		$T_i$	0 = exterior temperature 1 = interior temperature										
Linear Transmittance	$\psi$	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													

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>The linear transmittance of the panel joint can be used with the  $R_{1D}$  value to find the clear field values for any size of panel

### Nominal (1D) vs. Assembly Performance Indicators

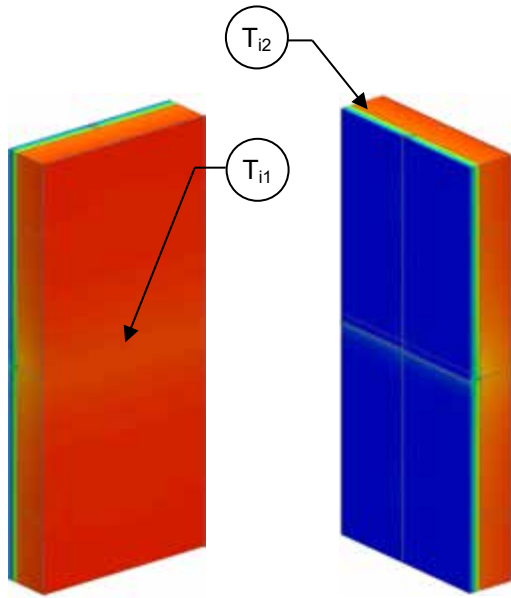
Insulated Panel 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi^2$ Btu/ft ·hr ·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-21.4 (3.80)	0.047 (0.27)	0.013 (0.023)

### 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 6.1.2

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



View from Interior

View from Exterior

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of stack joint

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>The 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi^2$ 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)

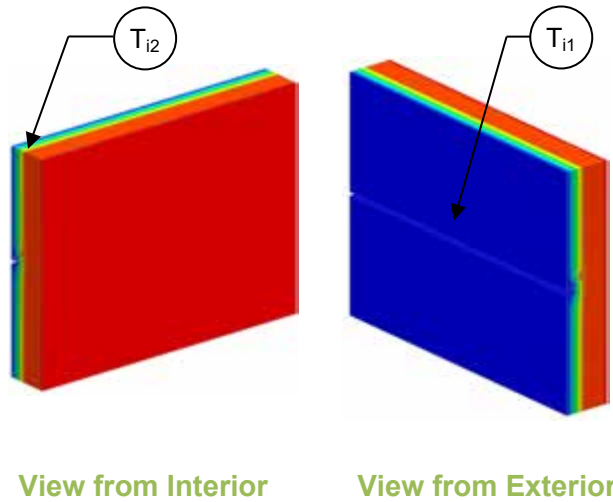
### Temperature Indices

$T_{i1}$	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 6.1.3

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of connection joint

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

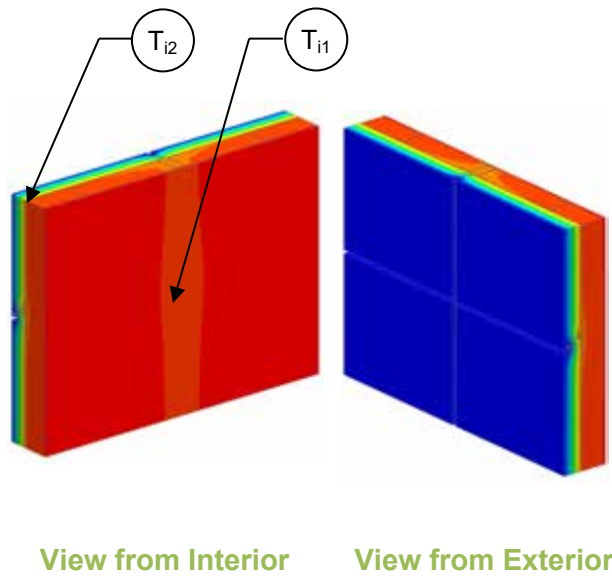
Insulated Panel 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
R-21.0 (3.70)	R-23.2 (4.09)	R-19.5 (3.43)	0.052 (0.29)	0.025 (0.042)

#### 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 6.1.4

## Horizontal Insulated Metal Panel – Vertical Gasket Joint with Steel Stud Backup Wall



### Thermal Performance Indicators

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

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

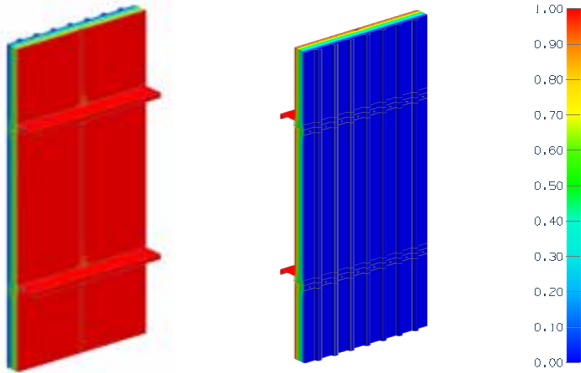
Insulated Panel 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 6.1.5

## 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Liner		Z-Bar	
			$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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

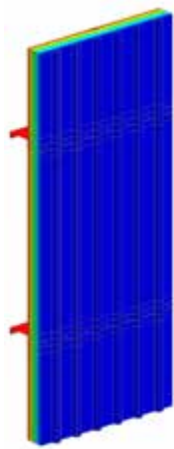
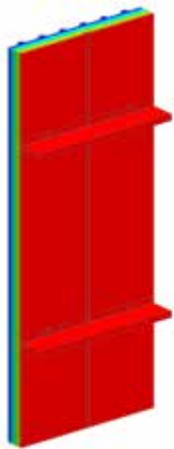
Tape Thickness (in)	Tape R-Value (RSI)	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0	R-0 (0.00)	R-25 (4.44)	R-25.9 (4.59)	R-21.4 (3.78)	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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	Exterior Insulation 1D R-Value (RSI)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	Exterior Insulation 1D R-Value (RSI)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 6.1.6

## Structural Sheet Steel Wall with Cladding Supported by Intermittent 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

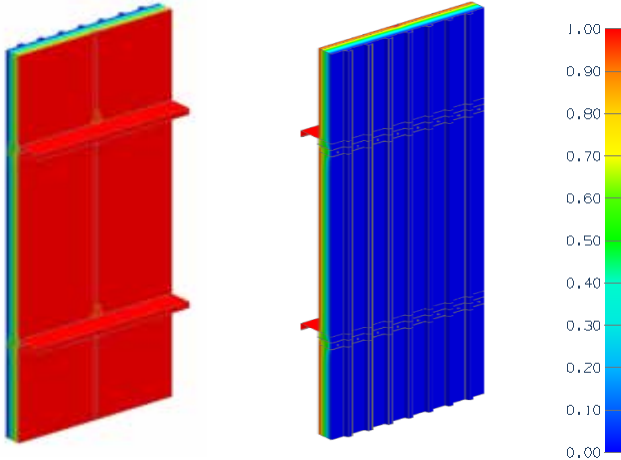
View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Vertical Spacing of Z-bar	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 6.1.7

## Structural Sheet Steel Wall with Cladding Supported by Thermal Chairs – 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 (in)	Horizontal Thermal Chair Spacing (in)	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

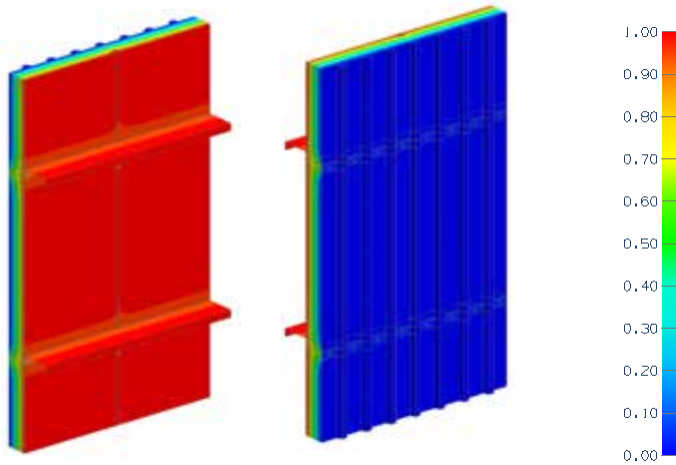
#### Sensitivity Analysis – Impact of Steel Chair and Notched U-Channel Thickness for Horizontal Spacing at 24” o.c. and Vertical Spacing of Thermal Chair at 60” o.c.

Steel Thickness	Exterior Insulation 1D R-Value (RSI)	Thermal Chair $R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Thermal Chair		U-Channel	
			$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 6.1.8

## 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

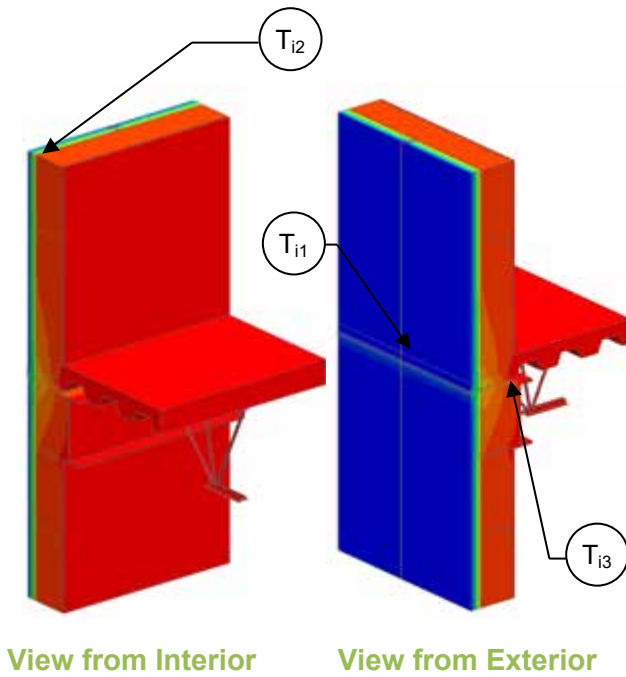
View from Interior    View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Vertical Spacing of Z-bar	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
60	R-25 (4.44)	R-25.9 (4.59)	R-14.2 (2.51)	0.070 (0.400)

# Detail 6.2.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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)

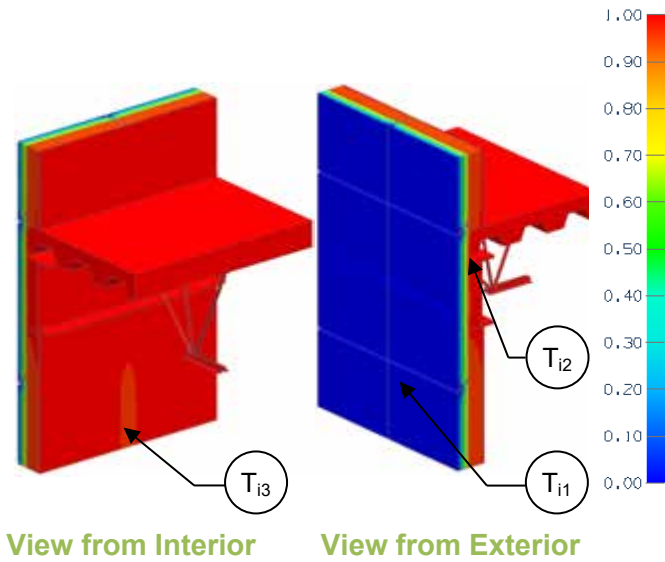
### Temperature Indices

$T_{i1}$	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 6.2.2

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

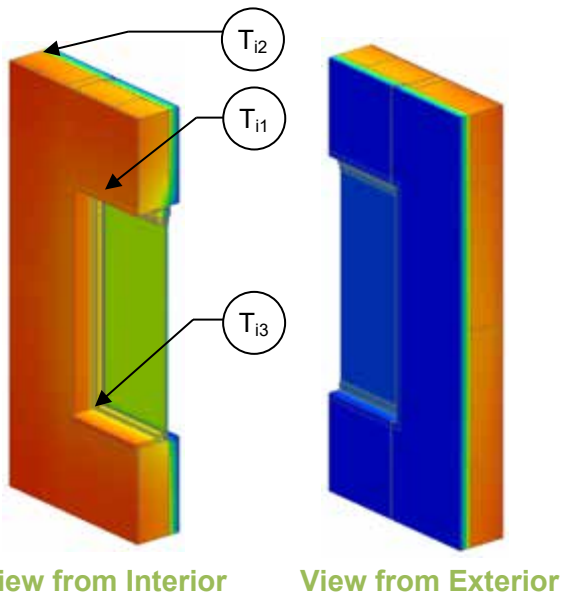
Insulated Panel 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 6.3.1

## Vertical Insulated Metal Panel – Window Glazing Transition with Steel Support Framing



### Thermal Performance Indicators

0.00	Assembly 1D (Nominal) R-Value	$R_{1D}$	Nominal thermal resistance value of wall
0.10	Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear wall” U and R-value
0.20	Transmittance / Resistance	U, R	U- and R-values for overall assembly
0.30	Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
0.40	Linear Transmittance	$\psi$	Incremental increase in transmittance per length of glazing transition
0.50			
0.60			
0.70			
0.80			
0.90			
1.00			

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-21.0 (3.70)	R-23.2 (4.09)	R-21.4 (3.80)	0.047 (0.27)

#### Window Transition Transmittance

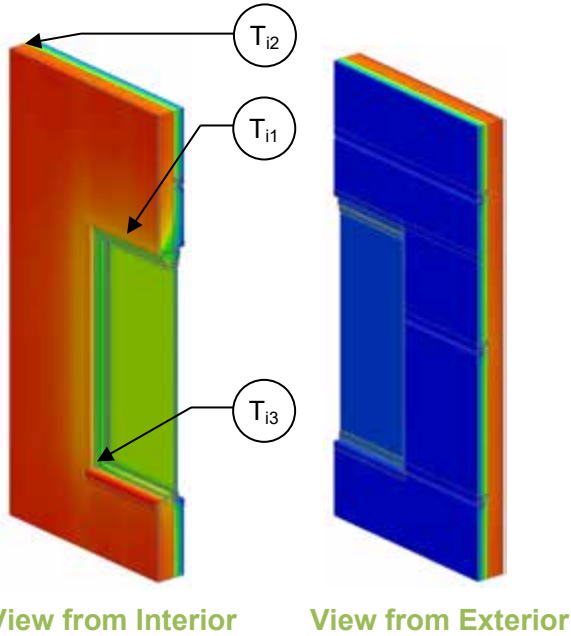
R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-7.1 (1.25)	0.414 (0.80)	0.292 (0.505)

### 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 6.3.2

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-7.5 (1.32)	0.133 (0.75)	0.263 (0.454)

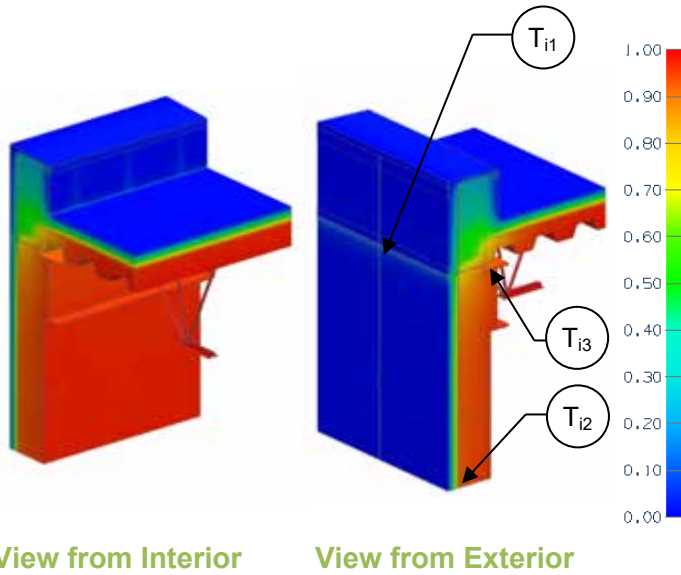
### Temperature Indices

$T_{i1}$	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 6.4.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

#### Parapet Transmittance

Insulated Panel 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

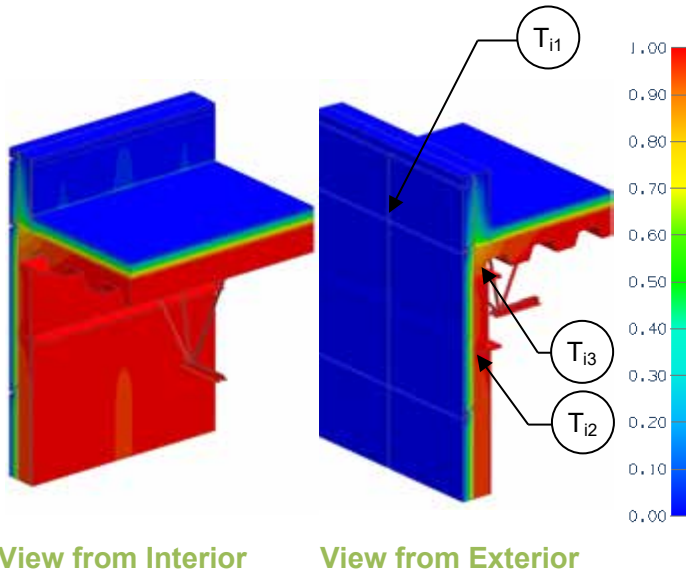
### Temperature Indices

$T_{i1}$	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 6.4.2

## Horizontal Insulated Metal Panel - Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

### Thermal Performance Indicators



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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

#### Parapet Transmittance

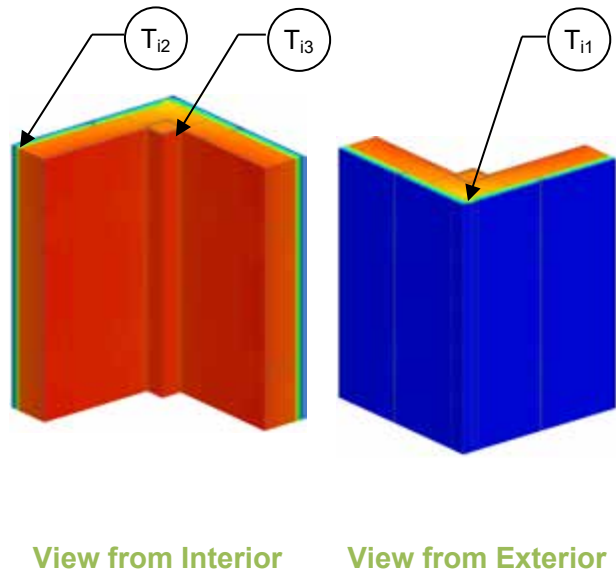
Insulated Panel 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-21.0 (3.70)	R-11.6 (2.04)	0.087 (0.49)	0.237 (0.410)

### 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 6.5.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of corner

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

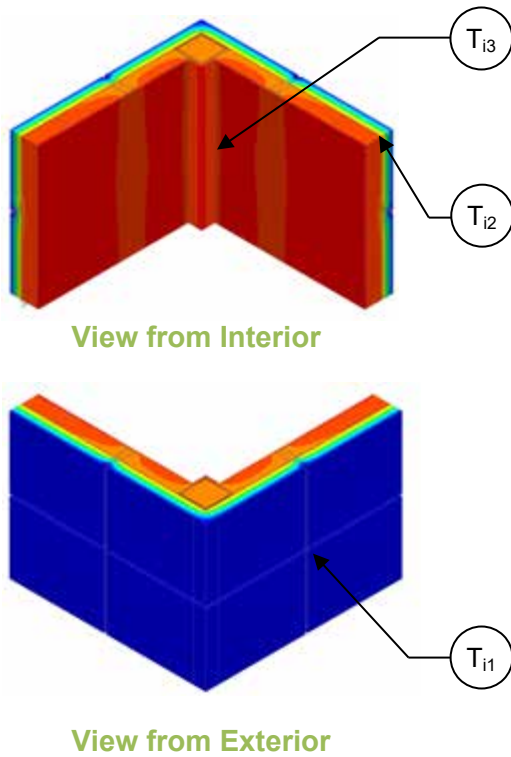
### Temperature Indices

$T_{i1}$	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 6.5.2

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of corner

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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



## 7.0 Concrete and Mass Masonry Construction

<b>Detail 7.1.1</b> .....	<b>B.7.1</b>
Exterior Insulated Concrete Drained EIFS Wall Assembly - Clear Wall	
<b>Detail 7.1.2</b> .....	<b>B.7.2</b>
Exterior Insulated Concrete Mass Wall Assembly with 1/4 inch (6 mm) Stainless Steel Brackets Supporting 1-1/4" Stone Panels – Clear Wall	
<b>Detail 7.1.3</b> .....	<b>B.7.3</b>
Exterior Insulated Concrete Block Wall with Thermally Broken ISO Clip System with Horizontal Sub-Girt Supporting Cladding – Clear Wall	
<b>Detail 7.1.4</b> .....	<b>B.7.4</b>
Exterior Insulated Concrete Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall	
<b>Detail 7.1.5</b> .....	<b>B.7.5</b>
Exterior Insulated Concrete Block Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall	
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Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Zinc 2-Seal Anchor Supporting Brick Veneer – Clear Wall	
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Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Wing Nut Anchor Supporting Brick Veneer – Clear Wall	
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Precast Sandwich Panel Wall Assembly with Concrete Panel Joints – Clear Wall	
<b>Detail 7.1.9</b> .....	<b>B.7.9</b>
Precast Sandwich Panel Wall Assembly with Tigerloc Thermally Broken Panel Joints – Clear Wall	
<b>Detail 7.1.10</b> .....	<b>B.7.10</b>
Precast Concrete Sandwich Panel Wall Assembly with FRP Connectors – Clear Wall Detail	
<b>Detail 7.1.11</b> .....	<b>B.7.11</b>
Exterior Insulated Concrete Block Wall with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall	
<b>Detail 7.1.12</b> .....	<b>B.7.12</b>
Exterior Insulated Concrete Block Wall with Vertical Clips Supporting Cladding – Clear Wall	
<b>Detail 7.1.13</b> .....	<b>B.7.13</b>
Exterior Insulated Concrete Block Wall Assembly with Brick Ties Supporting Brick Veneer – Clear Wall	
<b>Detail 7.1.14</b> .....	<b>B.7.14</b>

	Interior Insulated Concrete Mass Wall with 1 5/8" Steel Stud (16" o.c.) Supporting Interior Finish Wall Assembly – Clear Wall	
<b>Detail 7.1.15</b>	.....	<b>B.7.15</b>
	Precast Sandwich Panel Wall Assembly with Steel Connectors and 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Clear Wall	
<b>Detail 7.1.16</b>	.....	<b>B.7.16</b>
	Exterior Insulated Concrete Mass Wall Assembly with 3/8 inch (9.5 mm Stainless Steel Brackets Supporting 3" Stone Panels – Clear Wall	
<b>Detail 7.1.17</b>	.....	<b>B.7.17</b>
	Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip (16" o.c. Horizontal) Supporting Metal Cladding - Clear Wall	
<b>Detail 7.1.18</b>	.....	<b>B.7.18</b>
	Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip (24" o.c. Horizontal) Supporting Metal Cladding - Clear Wall	
<b>Detail 7.1.19</b>	.....	<b>B.7.19</b>
	Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-SPF 202 and ACS-S Thermal Clip (16" o.c. Horizontal) Supporting Metal Cladding - Clear Wall	
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<b>Detail 7.1.22</b>	.....	<b>B.7.22</b>
	Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip (24" o.c. Horizontal) Supporting Metal Cladding - Clear Wall	
<b>Detail 7.1.23</b>	.....	<b>B.7.23</b>
	Exterior Insulated Concrete Block Wall Assembly with Mineral Wool and ACS-S Thermal Clip (16" o.c. Horizontal) Supporting Metal Cladding - Clear Wall	
<b>Detail 7.1.24</b>	.....	<b>B.7.24</b>
	Exterior Insulated Concrete Block Wall Assembly with Mineral Wool and ACS-S Thermal Clip (24" o.c. Horizontal) Supporting Metal Cladding - Clear Wall	
<b>Detail 7.1.25</b>	.....	<b>B.7.25</b>

Exterior Insulated Concrete Block Wall Assembly with Protected SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip (16" o.c. Horizontal) Supporting Metal Cladding - Clear Wall	
<b>Detail 7.1.26</b> .....	<b>B.7.26</b>
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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 – Clear Wall	
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<b>Detail 7.2.2</b> .....	<b>B.7.29</b>
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	
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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	
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Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors at 24" o.c. – Intermediate Floor Intersection	

<b>Detail 7.2.10</b> .....	<b>B.7.37</b>
Precast Sandwich Panel Wall Assembly with Steel Connectors at 16" o.c. – Intermediate Floor Intersection	
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Precast Sandwich Panel Wall Assembly with Steel Connectors at 36" o.c. – Intermediate Floor Intersection	
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Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony	
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Owens Corning Exterior Insulated Concrete Block Wall Assembly with Shelf Angle and Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer – Intermediate Floor Intersection	
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Precast Sandwich Panel Wall Assembly with Steel Connectors at 24" (o.c.), and 3 5/8" Steel Stud (16" o.c.) – Window Intersection	
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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	
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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	
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Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer with Insulation Interrupted at Window Perimeter – Double Glazed Aluminum Window and Intermediate Floor Intersection	
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Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer with Reduced Insulation at Jambs – Triple Glazed Aluminum High Performance Window and Intermediate Floor Intersection	
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Interior Insulated Multi-Wythe Brick Masonry Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish– Aluminum Window Intersection with Insulation at Window Perimeter	
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Interior Insulated Brick Masonry Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Aluminum Window Intersection with Aerogel Blanket at Window Perimeter	
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Exterior Insulated Concrete Drained EIFS Wall Assembly – Conventional Curtain Wall Transition	
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<b>Detail 7.4.4</b> .....	<b>B.7.80</b>
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<b>Detail 7.4.5</b> .....	<b>B.7.81</b>
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<b>Detail 7.5.1</b> .....	<b>B.7.84</b>
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Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Paraloc Thermally Broken Parapet Intersection	
<b>Detail 7.5.10</b> .....	<b>B.7.93</b>
Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Roof to Wall Intersection with Wood-Framed Parapet	
<b>Detail 7.5.11</b> .....	<b>B.7.94</b>
Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer – Roof to Wall Intersection with Uninsulated Parapet	
<b>Detail 7.5.12</b> .....	<b>B.7.95</b>
Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer – Roof to Wall Intersection with Insulation Wrapped Around Parapet	
<b>Detail 7.5.13</b> .....	<b>B.7.96</b>

Window Wall System – Double Glazed Insulated Frame at Concrete Precast Panel Parapet & Roof Intersection	
<b>Detail 7.5.14</b> .....	<b>B.7.97</b>
Window Wall System – Double Glazed Insulated Frame at Isokorb AXTI Thermally Broken Concrete Parapet & Roof Intersection	
<b>Detail 7.5.15</b> .....	<b>B.7.98</b>
Window Wall System – Triple Glazed Insulated Frame at Concrete Precast Panel Parapet & Roof Intersection	
<b>Detail 7.5.16</b> .....	<b>B.7.99</b>
Window Wall System – Triple Glazed Insulated Frame at Isokorb AXTI Thermally Broken Concrete Parapet & Roof Intersection	
<b>Detail 7.6.1</b> .....	<b>B.7.100</b>
Exterior Insulated Concrete Drained EIFS Wall Assembly – Corner Intersection	
<b>Detail 7.6.2</b> .....	<b>B.7.101</b>
Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Outside Corner	
<b>Detail 7.7.1</b> .....	<b>B.7.102</b>
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	
<b>Detail 7.7.2</b> .....	<b>B.7.103</b>
Insulated Concrete Floor Slab – Concrete Column Intersection	
<b>Detail 7.7.3</b> .....	<b>B.7.104</b>
Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) – Concrete Slab and Foundation Intersection	
<b>Detail 7.7.4</b> .....	<b>B.7.105</b>
Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) - Concrete Slab and Foundation Wall Intersection	
<b>Detail 7.7.5</b> .....	<b>B.7.106</b>
Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) – Thermally Broken Concrete Slab and Foundation Intersection	
<b>Detail 7.7.6</b> .....	<b>B.7.107</b>
Insulated Slab on Grade – Steel Column	
<b>Detail 7.7.7</b> .....	<b>B.7.108</b>
Insulated Slab on Grade – Armatherm 500 Thermal Break under Column	
<b>Detail 7.7.8</b> .....	<b>B.7.109</b>
Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Base of Wall at Foundation with Insulation Skirt	
<b>Detail 7.7.9</b> .....	<b>B.7.110</b>

Owens Corning Exterior Insulated Concrete Block Wall Assembly with Steel Shelf Angle and Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Insulation Below Floor – Slab on Grade and Foundation Intersection

**Detail 7.7.10 .....B.7.111**

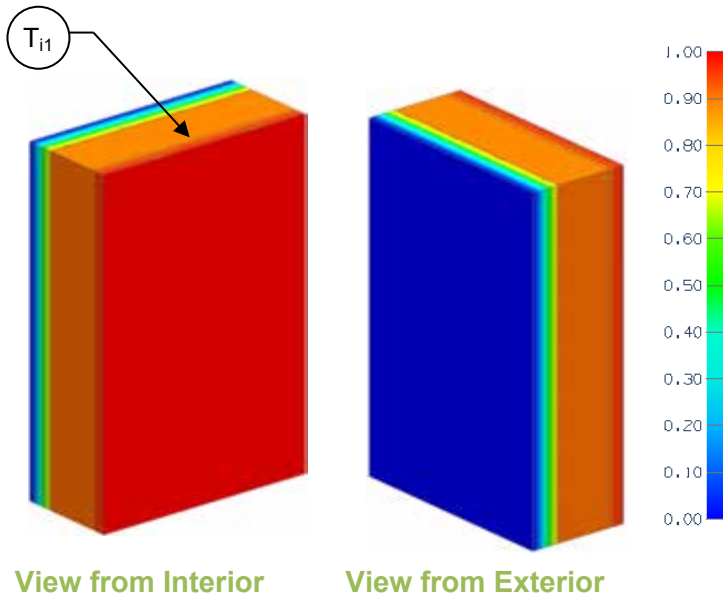
Owens Corning Exterior Insulated Concrete Block Wall Assembly with Stainless Steel Shelf Angle and Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Insulation Below Floor – Slab on Grade and Foundation Intersection

**Detail 7.8.1 .....B.7.112**

Precast Sandwich Panel Wall Assembly – Emloc Thermally Broken Embedment Detail

# Detail 7.1.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

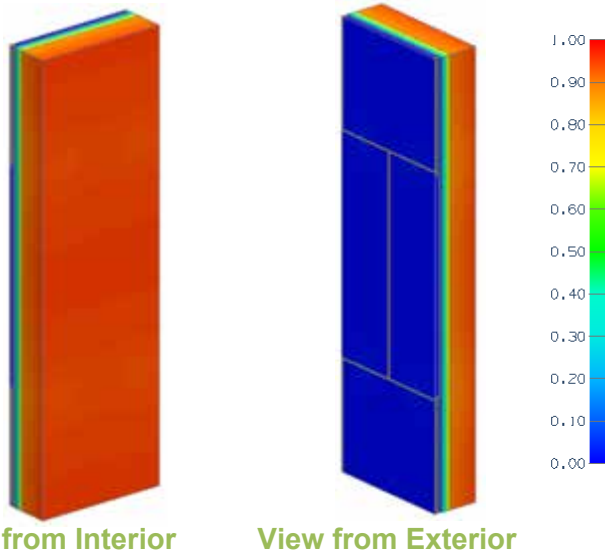
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)

### Temperature Indices

$T_{i1}$	0.89	Consistent temperature along interior concrete surface
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# Detail 7.1.2

## Exterior Insulated Concrete Mass Wall Assembly with 1/4 inch (6 mm) Stainless Steel Brackets Supporting 1-1/4" Stone Panels – Clear Wall



### Thermal Performance Indicators

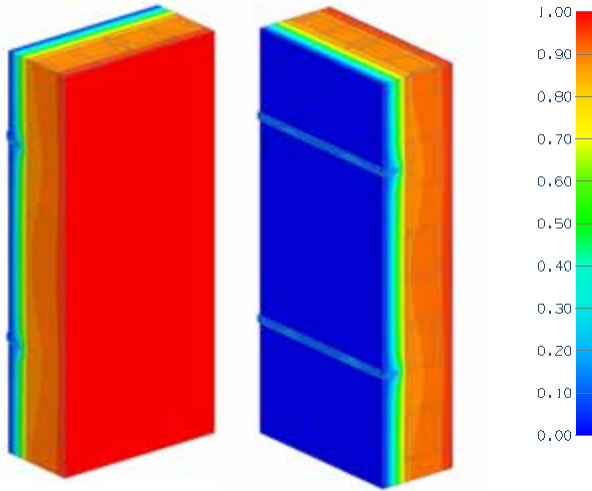
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-1.9 (0.34 RSI) + insulation
Transmittance / Resistance	$U_o, R_o$	“clear field” U- and R-value
Point Transmittance	$\chi$	Incremental increase in transmittance for one bracket

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
R-5 (0.88)	R-6.9 (1.22)	R-6.6 (1.16)	0.151 (0.86)	0.062 (0.033)
R-15 (2.64)	R-16.9 (2.98)	R-15.0 (2.65)	0.067 (0.38)	0.058 (0.031)
R-25 (4.40)	R-26.9 (4.74)	R-23.1 (4.06)	0.043 (0.25)	0.048 (0.025)

# Detail 7.1.3

## 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

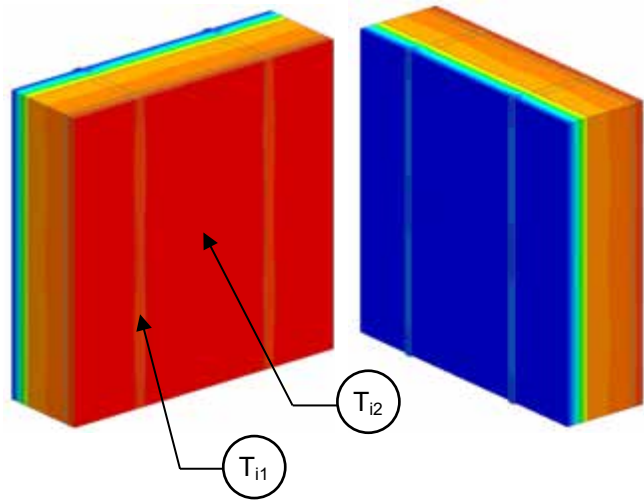
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-4.2 (0.74 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ / $R_o$	“Clear wall” U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Horizontal Clip Spacing	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Clip Spacing		36" Vertical Clip Spacing		48" Vertical Clip Spacing		60" Vertical Clip Spacing	
			$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 7.1.4

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 (0.34)
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

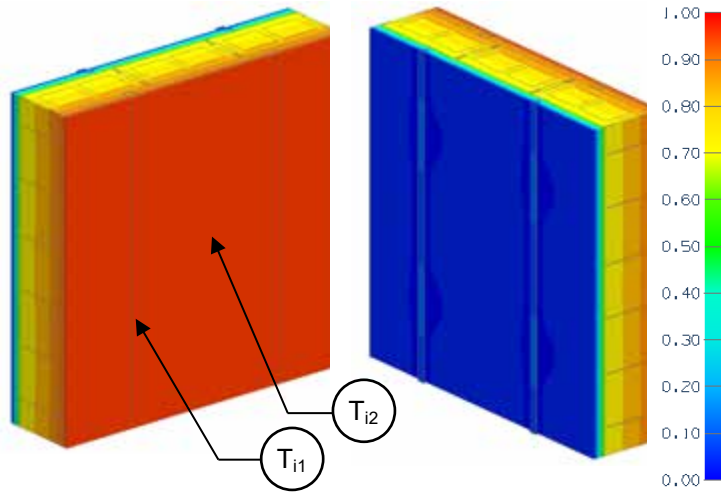
	R8.4	R12.6	R16.8	R21	R25.1	
$T_{i1}$	0.80	0.84	0.86	0.88	0.89	Min T on interior concrete surface, at clip
$T_{i2}$	0.81	0.85	0.87	0.89	0.90	Max T on interior concrete surface, away from clips



# Detail 7.1.5

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

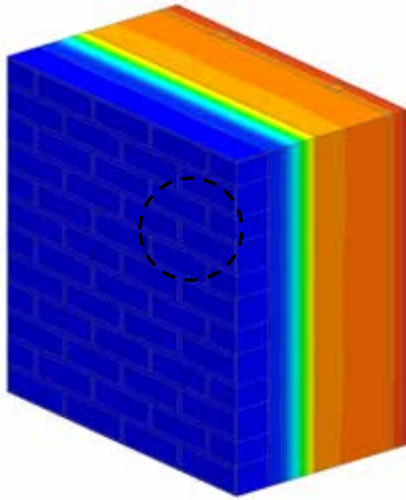
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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

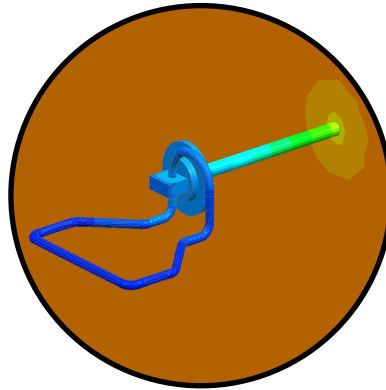
	R8.4	R12.6	R16.8	R21	R25.1	
$T_{i1}$	0.81	0.85	0.87	0.88	0.89	Min T on interior concrete surface, at clip
$T_{i2}$	0.82	0.86	0.88	0.89	0.90	Max T on interior concrete surface, away from clips

# Detail 7.1.6

## 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



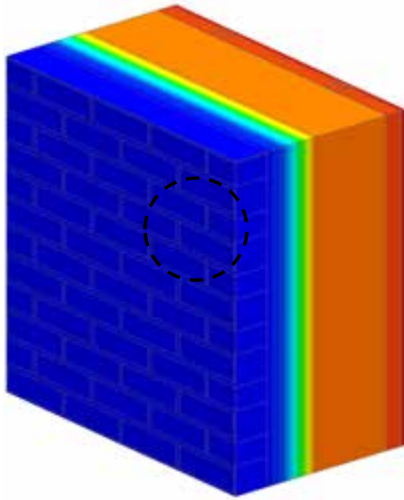
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-4.3 (0.76 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	“Clear wall” U- and R-value: a = without batt insulation

### Nominal (1D) vs. Assembly Performance Indicators

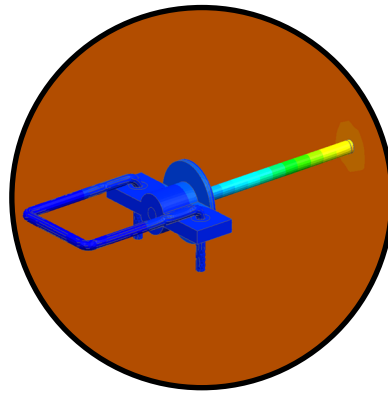
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8” Vertical Clip Spacing		16” Vertical Clip Spacing		24” Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 7.1.7

## Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Wing Nut Anchor Supporting Brick Veneer – Clear Wall

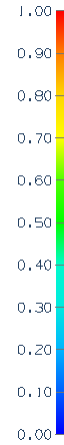


View of Exterior



View of Anchoring Tie

### Thermal Performance Indicators



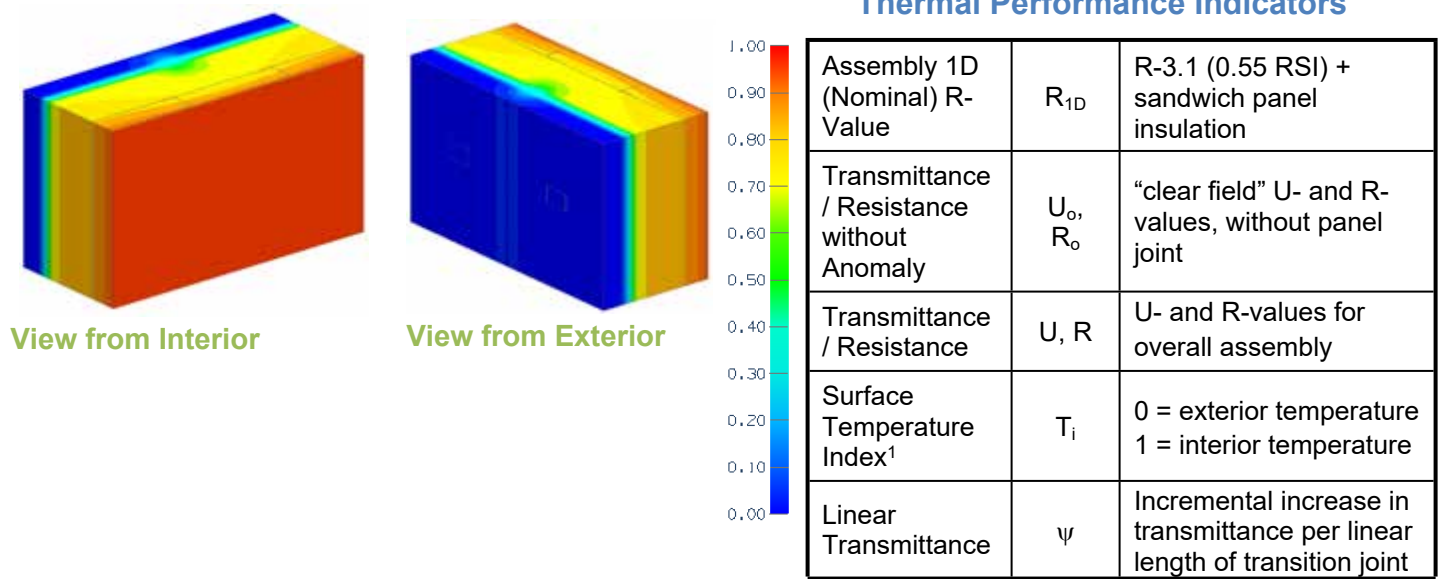
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-4.4 (0.76 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" $U_o$ and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	8" Vertical Clip Spacing		16" Vertical Clip Spacing		24" Vertical Clip Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 7.1.8

### Precast Sandwich Panel Wall Assembly with Concrete Panel Joints – Clear Wall



<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

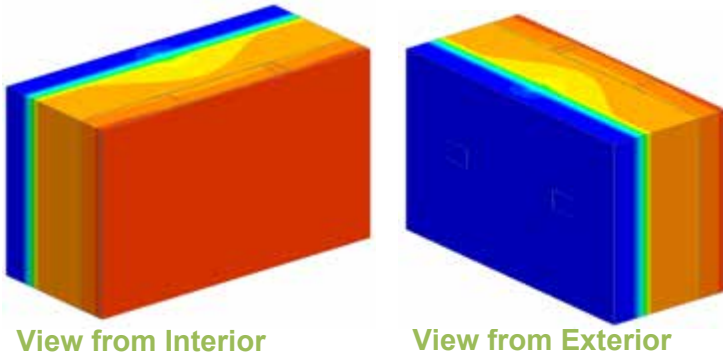
Sandwich Panel Insulation 1D R-value (RSI)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.1 (2.31)	R-12.8 (2.26)	0.078 (0.44)
R-15 (2.64)	R-18.1 (3.19)	R-17.7 (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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 7.1.9

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of transition joint

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

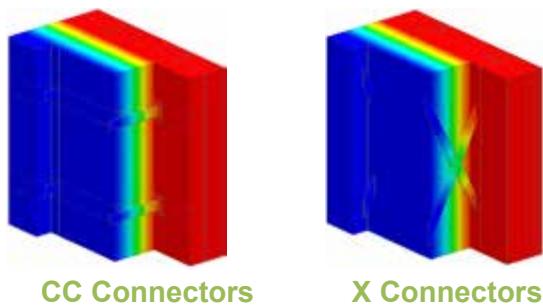
Sandwich Panel Insulation 1D R-value (RSI)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.1 (2.31)	R-12.8 (2.26)	0.078 (0.44)
R-15 (2.64)	R-18.1 (3.19)	R-17.7 (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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

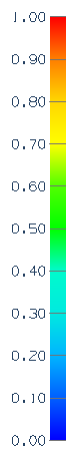
## Detail 7.1.10

### Precast Concrete Sandwich Panel Wall Assembly with FRP Connectors – Clear Wall Detail



CC Connectors

X Connectors



#### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.76 (0.49 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without connectors or joint
Transmittance / Resistance	$U, R$	U- and R-values for the overall assembly
Linear Transmittance	$\Psi$	Incremental increase in transmittance for vertical joints
Point Transmittance	$\chi$	Incremental increase in transmittance for connector

#### Scenarios

Scenario	Connector Arrangement
A	CC Connectors, 16" x 16" spacing
B	X Connectors, 16" x 32" spacing

#### Nominal (1D) vs. Assembly Performance Indicators

##### Base Assembly – Wall

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
5	R-40 (7.04)	R-42.8 (7.53)	R-42.3 (7.45)	0.024 (0.13)
6	R-48 (8.45)	R-50.8 (8.94)	R-50.3 (8.86)	0.020 (0.11)
7	R-56 (9.86)	R-58.8 (10.35)	R-58.3 (10.27)	0.017 (0.10)

##### Connector Point Transmittance

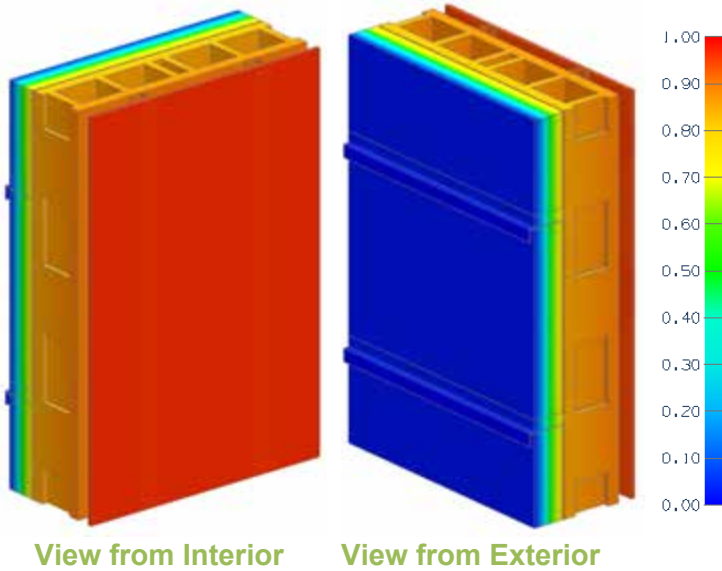
Scenario	Wall Insulation R-Value/in	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
A	5	R-39.5 (6.96)	0.025 (0.14)	0.0008 (0.0016)
	6	R-46.3 (8.16)	0.022 (0.12)	0.0008 (0.0016)
	7	R-53.0 (9.33)	0.019 (0.11)	0.0009 (0.0016)
B	5	R-40.1 (7.07)	0.025 (0.14)	0.0013 (0.0024)
	6	R-47.3 (8.33)	0.021 (0.12)	0.0012 (0.0023)
	7	R-54.4 (9.58)	0.018 (0.10)	0.0012 (0.0023)

##### Vertical Joint Linear Transmittance

Wall Insulation R-Value/in	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\Psi$ Btu/ft·hr·°F (W/mK)
5	R-39.4 (6.94)	0.025 (0.14)	0.0001 (0.0002)
6	R-46.0 (8.10)	0.022 (0.12)	0.0004 (0.0007)
7	R-52.4 (9.22)	0.019 (0.11)	0.0006 (0.0010)

# Detail 7.1.11

## Exterior Insulated Concrete Block Wall with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.98 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value

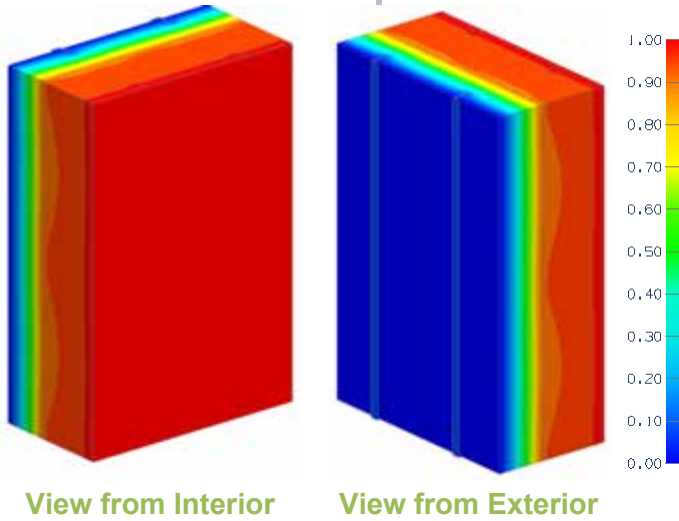
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-15.6 (2.74)	R-13.5 (2.37)	0.074 (0.42)
R-15.0 (2.64)	R-20.6 (3.62)	R-18.2 (3.20)	0.055 (0.31)
R-20.0 (3.52)	R-25.6 (4.50)	R-22.9 (4.04)	0.044 (0.25)
R-25.0 (4.40)	R-30.6 (5.38)	R-27.6 (4.86)	0.036 (0.21)

# Detail 7.1.12

## Exterior Insulated Concrete Block Wall with Vertical Clips Supporting Cladding – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.9 (0.69) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without connectors or joint

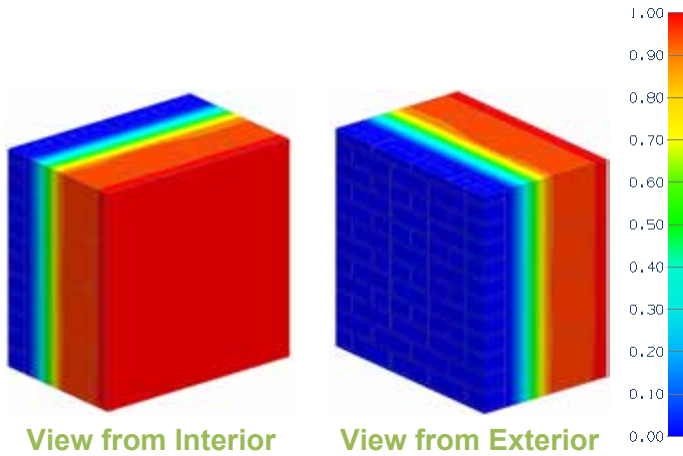
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-8.4 (1.48)	R-12.3 (2.17)	R-10.2 (1.79)	0.098 (0.56)
R-12.6 (2.22)	R-16.5 (2.91)	R-12.2 (2.14)	0.082 (0.47)
R-16.8 (2.96)	R-20.7 (3.65)	R-14.4 (2.53)	0.070 (0.40)
R-21.0 (3.70)	R-24.9 (4.39)	R-16.2 (2.85)	0.062 (0.35)
R-25.2 (4.44)	R-29.1 (5.13)	R-17.9 (3.16)	0.056 (0.32)
R-29.4 (5.18)	R-33.3 (5.87)	R-19.6 (3.45)	0.051 (0.29)



# Detail 7.1.13

## Exterior Insulated Concrete Block Wall Assembly with Brick Ties Supporting Brick Veneer – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.99) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without connectors or joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

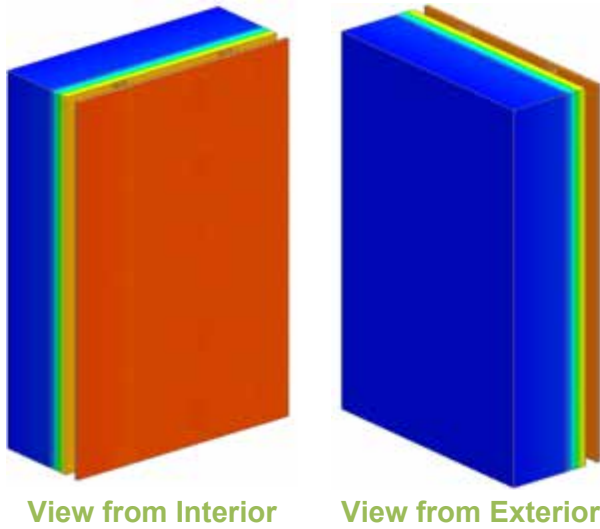
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-10.6 (1.87)	R-10.4 (1.83)	0.096 (0.55)
R-10.0 (1.76)	R-15.6 (2.75)	R-14.2 (2.50)	0.070 (0.40)
R-15.0 (2.64)	R-20.6 (3.63)	R-17.8 (3.13)	0.056 (0.32)
R-20.0 (3.52)	R-25.6 (4.51)	R-20.8 (3.66)	0.048 (0.27)
R-25.0 (4.40)	R-30.6 (5.39)	R-23.7 (4.17)	0.042 (0.24)
R-30.0 (5.28)	R-35.6 (6.27)	R-26.8 (4.71)	0.037 (0.21)
R-35.0 (6.16)	R-40.6 (7.15)	R-29.4 (5.17)	0.034 (0.19)
R-40.0 (7.04)	R-45.6 (8.04)	R-31.9 (5.61)	0.031 (0.18)

# Detail 7.1.14

## Interior Insulated Concrete Mass Wall with 1 5/8" Steel Stud (16" o.c.) Supporting Interior Finish Wall Assembly – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.9 (0.51 RSI) + interior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"clear wall" U- and R-value

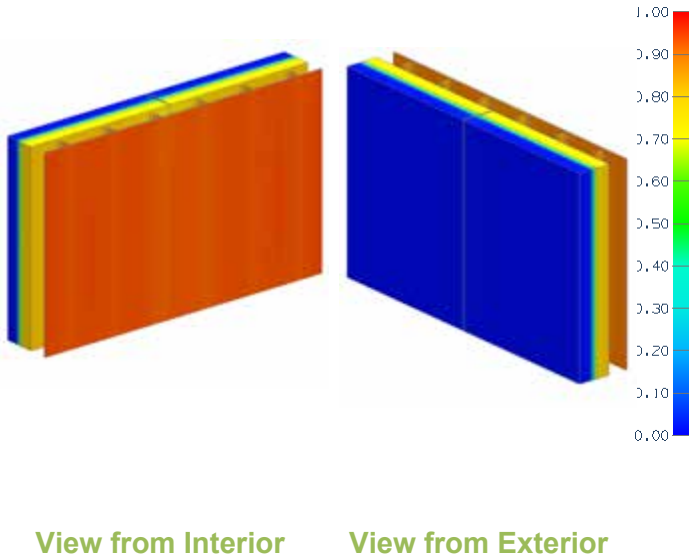
### Nominal (1D) vs. Assembly Performance Indicators

Interior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-12.9 (2.27)	R-12.9 (2.26)	0.078 (0.44)
R-12.5 (2.20)	R-15.4 (2.71)	R-15.4 (2.70)	0.065 (0.37)
R-15 (2.64)	R-17.9 (3.15)	R-17.9 (3.14)	0.056 (0.32)

# Detail 7.1.15

## Precast Sandwich Panel Wall Assembly with Steel Connectors and 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Clear Wall

### 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 panel joints
Transmittance / Resistance	$U_j, R_j$	U and R values for: j = panel joint
Linear Transmittance	$\Psi_j$	Incremental increase in transmittance per linear length of: j = panel joint

### Nominal (1D) vs. Assembly Performance Indicators

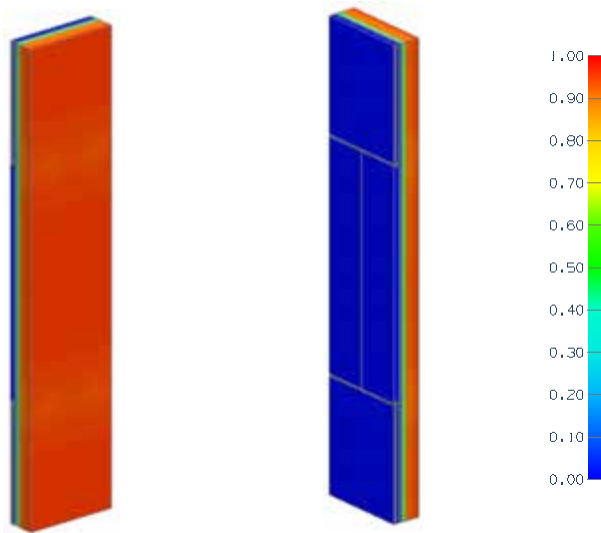
#### Base Assembly – Panel without Joints

Steel Connector Spacing in (mm)	Sandwich Panel Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
16 (406)	R-10 (1.76)	R-13.9 (2.45)	R-12.0 (2.11)	0.083 (0.47)
24 (610)	R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)
24 (610)	R-15 (2.64)	R-18.9 (3.33)	R-17.2 (3.03)	0.058 (0.33)
24 (610)	R-20 (3.52)	R-23.9 (4.21)	R-22.4 (3.94)	0.045 (0.25)
36 (914)	R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)
48 (1220)	R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)

#### Panel Joint Linear Transmittances

Panel Perimeter	Steel Connector Spacing in (mm)	Sandwich Panel Insulation 1D R-value (RSI)	$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
Concrete	24 (610)	R-10 (1.76)	R-6.2 (1.10)	0.160 (0.91)	0.653 (1.130)
Insulation	16 (406)	R-10 (1.76)	R-11.6 (2.03)	0.087 (0.49)	0.026 (0.046)
	24 (610)	R-10 (1.76)	R-11.7 (2.05)	0.086 (0.49)	0.026 (0.046)
	36 (914)	R-10 (1.76)	R-12.0 (2.11)	0.084 (0.48)	0.036 (0.062)
	48 (1220)	R-10 (1.76)	R-12.1 (2.12)	0.083 (0.47)	0.030 (0.052)

# Detail 7.1.16 Exterior Insulated Concrete Mass Wall Assembly with 3/8 inch (9.5 mm) Stainless Steel Brackets Supporting 3” Stone Panels – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

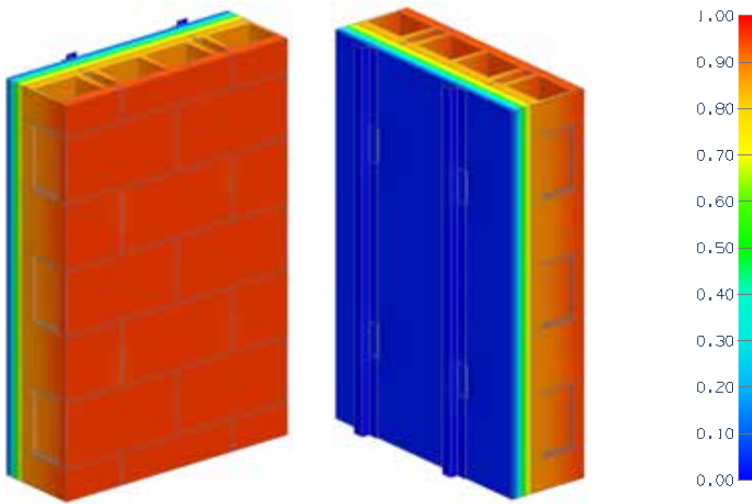
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.0 (0.35 RSI) + insulation
Transmittance / Resistance	$U_o, R_o$	“clear field” U- and R-value
Point Transmittance	$\chi$	Incremental increase in transmittance for one bracket

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
R-5 (0.88)	R-7.0 (1.23)	R-6.7 (1.18)	0.149 (0.84)	0.109 (0.057)
R-15 (2.64)	R-17.0 (2.99)	R-15.7 (2.77)	0.064 (0.36)	0.096 (0.051)
R-25 (4.40)	R-27.0 (4.75)	R-24.5 (4.31)	0.041 (0.23)	0.077 (0.041)

# Detail 7.1.17

## Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip (16" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



View from Interior      View from Exterior

### Thermal Performance Indicators

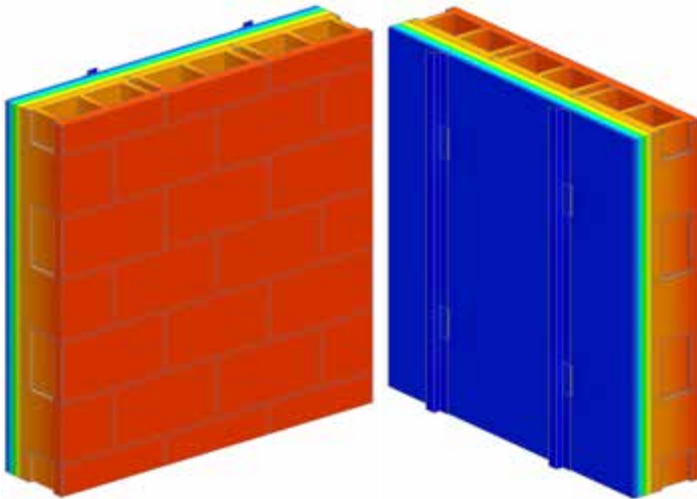
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.87 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15.0 (2.64)	R-17.9 (3.15)	R-16.7 (2.94)	0.060 (0.34)	R-17.0 (2.99)	0.059 (0.33)	R-17.1 (3.02)	0.058 (0.33)
R-20.0 (3.52)	R-22.9 (4.03)	R-21.1 (3.71)	0.047 (0.27)	R-21.6 (3.80)	0.046 (0.26)	R-21.8 (3.85)	0.046 (0.26)
R-25.0 (4.40)	R-27.9 (4.91)	R-25.3 (4.46)	0.039 (0.22)	R-26.0 (4.59)	0.038 (0.22)	R-26.5 (4.66)	0.038 (0.21)
R-30.0 (5.28)	R-32.9 (5.79)	R-29.6 (5.22)	0.034 (0.19)	R-30.6 (5.39)	0.033 (0.19)	R-31.1 (5.48)	0.032 (0.18)
R-35.0 (6.16)	R-37.9 (6.67)	R-33.8 (5.94)	0.030 (0.17)	R-34.9 (6.16)	0.029 (0.16)	R-35.6 (6.27)	0.028 (0.16)

# Detail 7.1.18

## Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip (24" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

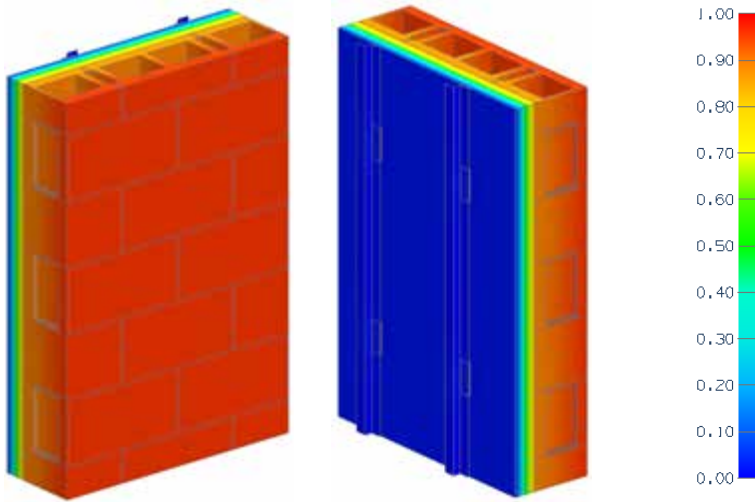
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.87 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-15.0 (2.64)	R-17.9 (3.15)	R-17.0 (2.99)	0.059 (0.33)	R-17.2 (3.03)	0.058 (0.33)	R-17.3 (3.05)	0.058 (0.33)
R-20.0 (3.52)	R-22.9 (4.03)	R-21.6 (3.80)	0.046 (0.26)	R-21.9 (3.86)	0.046 (0.26)	R-22.1 (3.89)	0.045 (0.26)
R-25.0 (4.40)	R-27.9 (4.91)	R-26.0 (4.59)	0.038 (0.22)	R-26.6 (4.68)	0.038 (0.21)	R-26.8 (4.72)	0.037 (0.21)
R-30.0 (5.28)	R-32.9 (5.79)	R-30.6 (5.39)	0.033 (0.19)	R-31.2 (5.50)	0.032 (0.18)	R-31.6 (5.57)	0.032 (0.18)
R-35.0 (6.16)	R-37.9 (6.67)	R-35.0 (6.16)	0.029 (0.16)	R-35.8 (6.30)	0.028 (0.16)	R-36.2 (6.38)	0.028 (0.16)

# Detail 7.1.19

## Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-SPF 202 and ACS-S Thermal Clip (16" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



View from Interior      View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.87 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

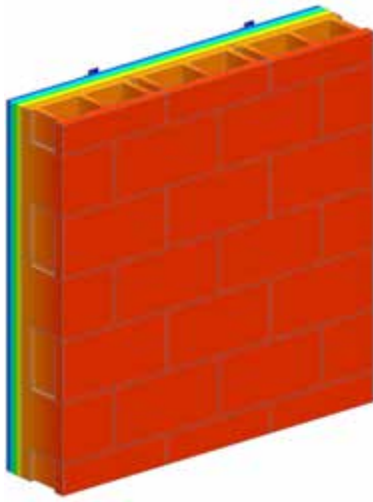
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.2 (1.09)	R-9.1 (1.60)	R-8.7 (1.53)	0.115 (0.65)	R-8.7 (1.54)	0.115 (0.65)	R-8.7 (1.54)	0.115 (0.65)
R-12.4 (2.18)	R-15.3 (2.69)	R-14.3 (2.52)*	0.070 (0.40)*	R-14.5 (2.56)*	0.069 (0.39)*	R-14.6 (2.57)*	0.068 (0.39)*
R-18.6 (3.28)	R-21.5 (3.78)	R-19.8 (3.49)	0.051 (0.29)	R-20.2 (3.56)	0.049 (0.28)	R-20.5 (3.60)	0.049 (0.28)
R-24.8 (4.37)	R-27.7 (4.87)	R-25.1 (4.42)	0.040 (0.23)	R-25.8 (4.55)	0.039 (0.22)	R-26.2 (4.61)	0.038 (0.22)
R-31.0 (5.46)	R-33.9 (5.97)	R-30.2 (5.32)	0.033 (0.19)	R-31.2 (5.50)	0.032 (0.18)	R-31.8 (5.61)	0.031 (0.18)
R-37.2 (6.55)	R-40.1 (7.06)	R-35.4 (6.23)	0.028 (0.16)	R-36.7 (6.47)	0.027 (0.15)	R-37.5 (6.60)	0.027 (0.15)

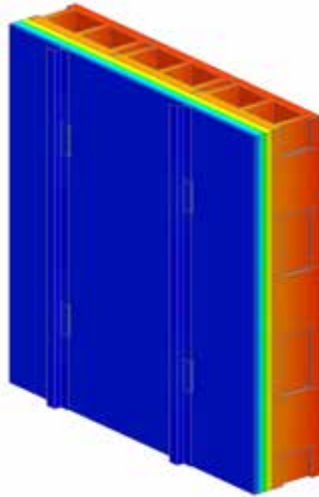
\*Indicates interpolated value

# Detail 7.1.20

## Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-SPF 202 and ACS-S Thermal Clip (24" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



View from Interior



View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.87 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

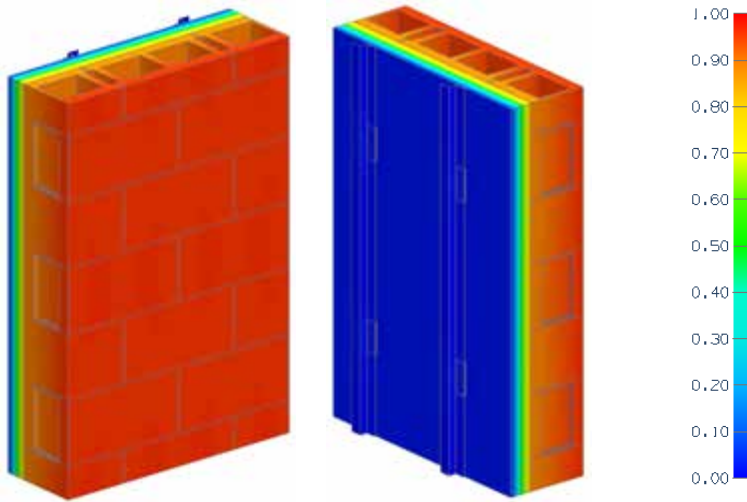
Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.2 (1.09)	R-9.1 (1.60)	R-8.7 (1.53)	0.115 (0.65)	R-8.7 (1.54)	0.114 (0.65)	R-8.7 (1.54)	0.114 (0.65)
R-12.4 (2.18)	R-15.3 (2.69)	R-14.5 (2.56)*	0.069 (0.39)*	R-14.7 (2.58)*	0.068 (0.39)*	R-14.7 (2.59)*	0.068 (0.39)*
R-18.6 (3.28)	R-21.5 (3.78)	R-20.2 (3.56)	0.049 (0.28)	R-20.5 (3.62)	0.049 (0.28)	R-20.7 (3.64)	0.048 (0.27)
R-24.8 (4.37)	R-27.7 (4.87)	R-25.8 (4.55)	0.039 (0.22)	R-26.3 (4.63)	0.038 (0.22)	R-26.6 (4.68)	0.038 (0.21)
R-31.0 (5.46)	R-33.9 (5.97)	R-31.2 (5.50)	0.032 (0.18)	R-32.0 (5.63)	0.031 (0.18)	R-32.4 (5.70)	0.031 (0.18)
R-37.2 (6.55)	R-40.1 (7.06)	R-36.7 (6.47)	0.027 (0.15)	R-37.7 (6.64)	0.027 (0.15)	R-38.2 (6.73)	0.026 (0.15)

\*Indicates interpolated value



# Detail 7.1.21

## Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip (16" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



View from Interior      View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.87 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

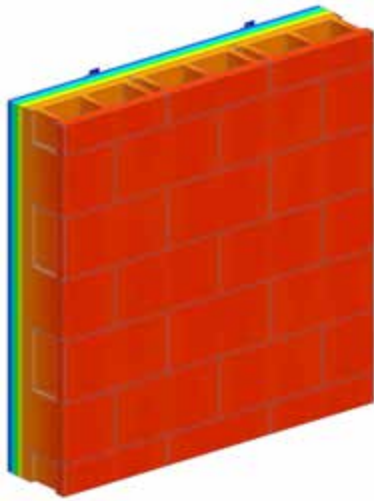
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.5 (1.14)	R-9.4 (1.65)	R-9.0 (1.59)	0.111 (0.63)	R-9.1 (1.60)	0.110 (0.63)	R-9.1 (1.60)	0.110 (0.63)
R-13.0 (2.29)	R-15.9 (2.79)	R-14.9 (2.62)*	0.067 (0.38)*	R-15.1 (2.66)*	0.066 (0.38)*	R-15.2 (2.68)*	0.066 (0.37)*
R-16.3 (2.86)	R-19.1 (3.37)	R-17.8 (3.13)*	0.056 (0.32)*	R-18.1 (3.19)*	0.055 (0.31)*	R-18.3 (3.22)*	0.055 (0.31)*
R-19.5 (3.43)	R-22.4 (3.94)	R-20.6 (3.63)	0.048 (0.28)	R-21.1 (3.72)	0.047 (0.27)	R-21.3 (3.76)	0.047 (0.27)
R-22.8 (4.01)	R-25.6 (4.51)	R-23.4 (4.12)*	0.043 (0.24)*	R-24.0 (4.23)*	0.042 (0.24)*	R-24.3 (4.29)*	0.041 (0.23)*
R-26.0 (4.58)	R-28.9 (5.08)	R-26.2 (4.61)	0.038 (0.22)	R-26.9 (4.75)	0.037 (0.21)	R-27.4 (4.82)	0.037 (0.21)
R-29.3 (5.15)	R-32.1 (5.66)	R-28.9 (5.09)*	0.035 (0.20)*	R-29.8 (5.25)*	0.034 (0.19)*	R-30.3 (5.34)*	0.033 (0.19)*
R-32.5 (5.72)	R-35.4 (6.23)	R-31.5 (5.55)	0.032 (0.18)	R-32.6 (5.75)	0.031 (0.17)	R-33.3 (5.86)	0.030 (0.17)
R-35.8 (6.30)	R-38.6 (6.80)	R-34.3 (6.03)*	0.029 (0.17)*	R-35.5 (6.26)*	0.028 (0.16)*	R-36.2 (6.38)*	0.028 (0.16)*
R-39.0 (6.87)	R-41.9 (7.37)	R-36.9 (6.50)	0.027 (0.15)	R-38.4 (6.76)	0.026 (0.15)	R-39.2 (6.90)	0.026 (0.14)

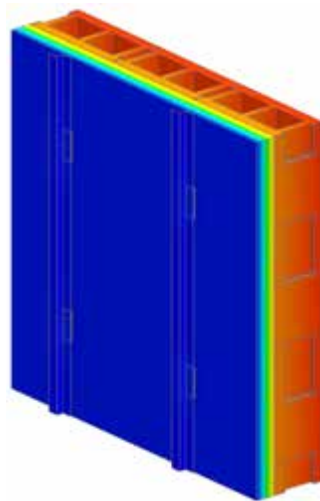
\*Indicates interpolated value

# Detail 7.1.22

## Exterior Insulated Concrete Block Wall Assembly with SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip (24" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



View from Interior



View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.87 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

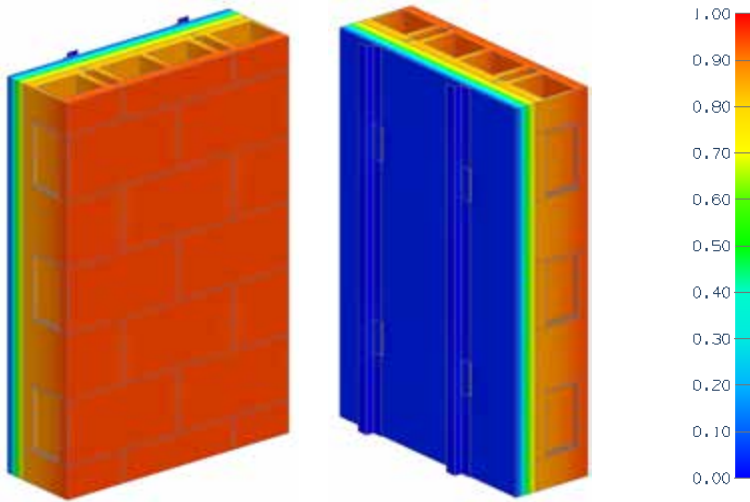
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.5 (1.14)	R-9.4 (1.65)	R-9.1 (1.59)	0.110 (0.63)	R-9.1 (1.60)	0.110 (0.63)	R-9.1 (1.60)	0.110 (0.63)
R-13.0 (2.29)	R-15.9 (2.79)	R-15.1 (2.66)*	0.066 (0.38)*	R-15.3 (2.69)*	0.065 (0.37)*	R-15.4 (2.70)*	0.065 (0.37)*
R-16.3 (2.86)	R-19.1 (3.37)	R-18.1 (3.19)*	0.055 (0.31)*	R-18.4 (3.23)*	0.054 (0.31)*	R-18.5 (3.25)*	0.054 (0.31)*
R-19.5 (3.43)	R-22.4 (3.94)	R-21.1 (3.72)	0.047 (0.27)	R-21.4 (3.77)	0.047 (0.26)	R-21.6 (3.80)	0.046 (0.26)
R-22.8 (4.01)	R-25.6 (4.51)	R-24.0 (4.23)*	0.042 (0.24)*	R-24.5 (4.31)*	0.041 (0.23)*	R-24.7 (4.34)*	0.041 (0.23)*
R-26.0 (4.58)	R-28.9 (5.08)	R-27.0 (4.75)	0.037 (0.21)	R-27.5 (4.84)	0.036 (0.21)	R-27.8 (4.89)	0.036 (0.20)
R-29.3 (5.15)	R-32.1 (5.66)	R-29.8 (5.25)*	0.034 (0.19)*	R-30.5 (5.37)*	0.033 (0.19)*	R-30.8 (5.43)*	0.032 (0.18)*
R-32.5 (5.72)	R-35.4 (6.23)	R-32.6 (5.75)	0.031 (0.17)	R-33.4 (5.88)	0.030 (0.17)	R-33.8 (5.96)	0.030 (0.17)
R-35.8 (6.30)	R-38.6 (6.80)	R-35.5 (6.26)*	0.028 (0.16)*	R-36.4 (6.41)*	0.027 (0.16)*	R-36.9 (6.50)*	0.027 (0.15)*
R-39.0 (6.87)	R-41.9 (7.37)	R-38.4 (6.76)	0.026 (0.15)	R-39.4 (6.93)	0.025 (0.14)	R-40.0 (7.04)	0.025 (0.14)

\*Indicates interpolated value

# Detail 7.1.23

## Exterior Insulated Concrete Block Wall Assembly with Mineral Wool and ACS-S Thermal Clip (16" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



View from Interior      View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.87 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ / $R_o$	"Clear wall" U- and R-value

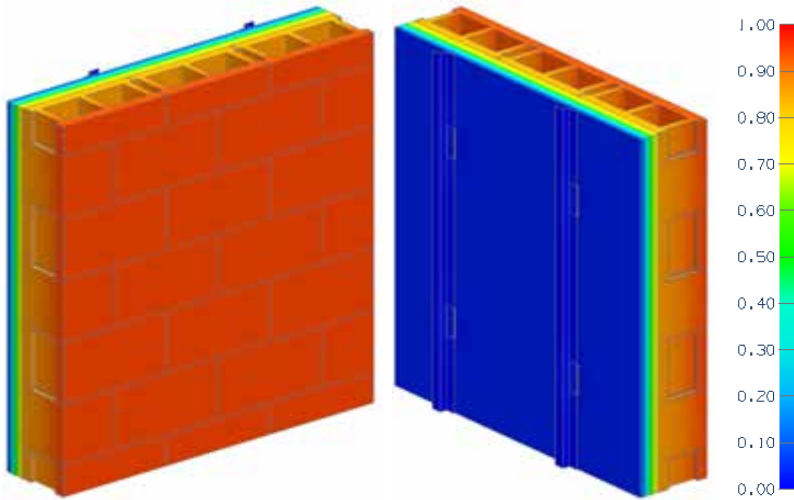
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.9 (2.27)	R-15.8 (2.78)	R-14.8 (2.61)	0.068 (0.38)	R-15.0 (2.65)	0.067 (0.38)	R-15.2 (2.67)	0.066 (0.37)
R-17.2 (3.03)	R-20.1 (3.53)	R-18.6 (3.28)*	0.054 (0.31)*	R-19.0 (3.34)*	0.053 (0.30)*	R-19.2 (3.38)*	0.052 (0.30)*
R-21.5 (3.79)	R-24.4 (4.29)	R-22.4 (3.94)	0.045 (0.25)	R-22.9 (4.04)	0.044 (0.25)	R-23.2 (4.09)	0.043 (0.24)
R-25.8 (4.54)	R-28.7 (5.05)	R-26.1 (4.60)	0.038 (0.22)	R-26.9 (4.73)	0.037 (0.21)	R-27.3 (4.80)	0.037 (0.21)
R-30.1 (5.30)	R-33.0 (5.81)	R-29.8 (5.24)	0.034 (0.19)	R-30.7 (5.40)	0.033 (0.19)	R-31.2 (5.49)	0.032 (0.18)
R-34.4 (6.06)	R-37.3 (6.56)	R-33.5 (5.90)	0.030 (0.17)	R-34.6 (6.09)	0.029 (0.16)	R-35.2 (6.20)	0.028 (0.16)

\*Indicates interpolated value

# Detail 7.1.24

## Exterior Insulated Concrete Block Wall Assembly with Mineral Wool and ACS-S Thermal Clip (24" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.87 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

View from Interior

View from Exterior

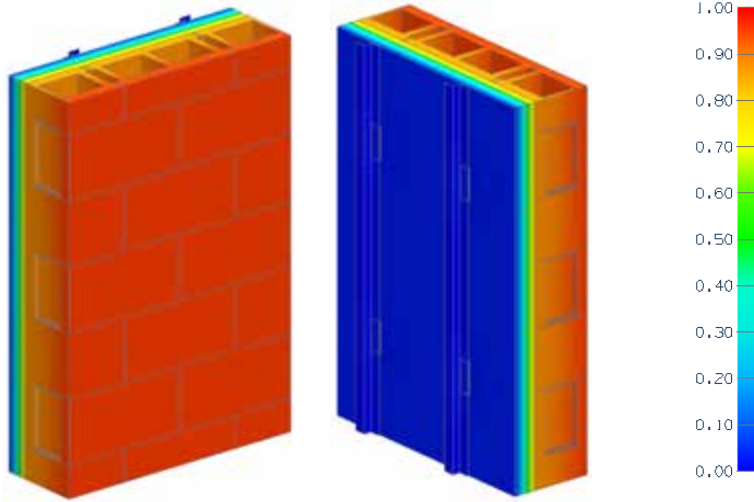
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.9 (2.27)	R-15.8 (2.78)	R-15.0 (2.65)	0.066 (0.38)	R-15.2 (2.68)	0.066 (0.37)	R-15.3 (2.69)	0.065 (0.37)
R-17.2 (3.03)	R-20.1 (3.53)	R-19.0 (3.35)*	0.053 (0.30)*	R-19.3 (3.39)*	0.052 (0.29)*	R-19.4 (3.42)*	0.052 (0.29)*
R-21.5 (3.79)	R-24.4 (4.29)	R-22.9 (4.04)	0.044 (0.25)	R-23.3 (4.11)	0.043 (0.24)	R-23.5 (4.14)	0.043 (0.24)
R-25.8 (4.54)	R-28.7 (5.05)	R-26.9 (4.73)	0.037 (0.21)	R-27.3 (4.82)	0.037 (0.21)	R-27.6 (4.87)	0.036 (0.21)
R-30.1 (5.30)	R-33.0 (5.81)	R-30.7 (5.41)	0.033 (0.19)	R-31.3 (5.52)	0.032 (0.18)	R-31.7 (5.58)	0.032 (0.18)
R-34.4 (6.06)	R-37.3 (6.56)	R-34.6 (6.09)	0.029 (0.16)	R-35.4 (6.23)	0.028 (0.16)	R-35.8 (6.30)	0.028 (0.16)

\*Indicates interpolated value

# Detail 7.1.25

## Exterior Insulated Concrete Block Wall Assembly with Protected SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip (16" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



View from Interior      View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.9 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

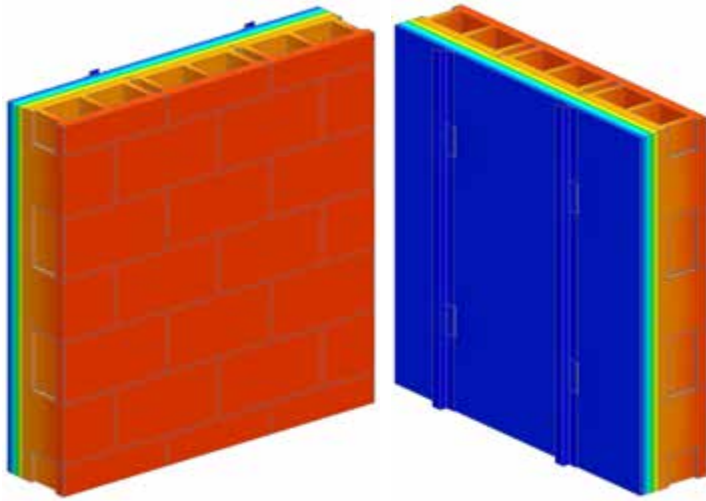
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-15.1 (2.66)	R-18.0 (3.16)	R-17.0 (2.99)	0.059 (0.33)	R-17.2 (3.04)	0.058 (0.33)	R-17.4 (3.06)	0.058 (0.33)
R-18.4 (3.23)	R-21.2 (3.74)	R-19.8 (3.49)*	0.050 (0.29)*	R-20.2 (3.56)*	0.050 (0.28)*	R-20.4 (3.59)*	0.049 (0.28)*
R-21.6 (3.80)	R-24.5 (4.31)	R-22.6 (3.99)	0.044 (0.25)	R-23.2 (4.08)	0.043 (0.25)	R-23.4 (4.12)	0.043 (0.24)
R-24.9 (4.38)	R-27.7 (4.88)	R-25.4 (4.47)*	0.039 (0.22)*	R-26.1 (4.59)*	0.038 (0.22)*	R-26.4 (4.65)*	0.038 (0.22)*
R-28.1 (4.95)	R-31.0 (5.45)	R-28.1 (4.95)	0.036 (0.20)	R-28.9 (5.10)	0.035 (0.20)	R-29.4 (5.17)	0.034 (0.19)
R-31.4 (5.52)	R-34.2 (6.03)	R-30.9 (5.44)*	0.032 (0.18)*	R-31.9 (5.61)*	0.031 (0.18)*	R-32.4 (5.70)*	0.031 (0.18)*
R-34.6 (6.09)	R-37.5 (6.60)	R-33.6 (5.92)	0.030 (0.17)	R-34.7 (6.12)	0.029 (0.16)	R-35.3 (6.22)	0.028 (0.16)
R-37.9 (6.67)	R-40.7 (7.17)	R-36.3 (6.38)*	0.028 (0.16)*	R-37.6 (6.62)*	0.027 (0.15)*	R-38.3 (6.74)*	0.026 (0.15)*
R-41.1 (7.24)	R-44.0 (7.74)	R-38.9 (6.85)	0.026 (0.15)	R-40.4 (7.12)	0.025 (0.14)	R-41.2 (7.26)	0.024 (0.14)

\*Indicates interpolated value

# Detail 7.1.26

## Exterior Insulated Concrete Block Wall Assembly with Protected SOPREMA SOPRA-ISO V ALU and ACS-S Thermal Clip (24" o.c. Horizontal) Supporting Metal Cladding - Clear Wall



### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.9 (0.51 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

View from Interior

View from Exterior

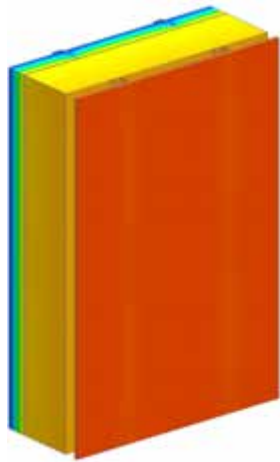
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-15.1 (2.66)	R-18.0 (3.16)	R-17.2 (3.04)	0.058 (0.33)	R-17.4 (3.07)	0.057 (0.33)	R-17.5 (3.09)	0.057 (0.32)
R-18.4 (3.23)	R-21.2 (3.74)	R-20.2 (3.56)*	0.050 (0.28)*	R-20.5 (3.61)*	0.049 (0.28)*	R-20.6 (3.63)*	0.049 (0.28)*
R-21.6 (3.80)	R-24.5 (4.31)	R-23.2 (4.08)	0.043 (0.25)	R-23.5 (4.14)	0.043 (0.24)	R-23.7 (4.17)	0.042 (0.24)
R-24.9 (4.38)	R-27.7 (4.88)	R-26.1 (4.59)*	0.038 (0.22)*	R-26.5 (4.67)*	0.038 (0.21)*	R-26.8 (4.72)*	0.037 (0.21)*
R-28.1 (4.95)	R-31.0 (5.45)	R-28.9 (5.10)	0.035 (0.20)	R-29.5 (5.20)	0.034 (0.19)	R-29.8 (5.25)	0.034 (0.19)
R-31.4 (5.52)	R-34.2 (6.03)	R-31.9 (5.61)*	0.031 (0.18)*	R-32.6 (5.73)*	0.031 (0.17)*	R-32.9 (5.80)*	0.030 (0.17)*
R-34.6 (6.09)	R-37.5 (6.60)	R-34.7 (6.12)	0.029 (0.16)	R-35.6 (6.27)	0.028 (0.16)	R-36.0 (6.34)	0.028 (0.16)
R-37.9 (6.67)	R-40.7 (7.17)	R-37.6 (6.62)*	0.027 (0.15)*	R-38.5 (6.79)*	0.026 (0.15)*	R-39.0 (6.87)*	0.026 (0.15)*
R-41.1 (7.24)	R-44.0 (7.74)	R-40.4 (7.12)	0.025 (0.14)	R-41.5 (7.31)	0.024 (0.14)	R-42.0 (7.40)	0.024 (0.14)

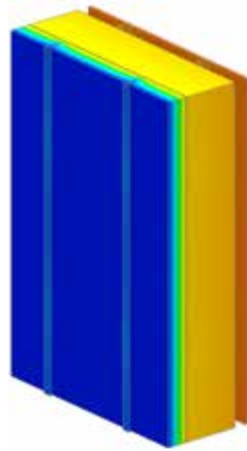
\*Indicates interpolated value

# Detail 7.1.27

**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 – Clear Wall**



View from Interior



View from Exterior



### Thermal Performance Indicators

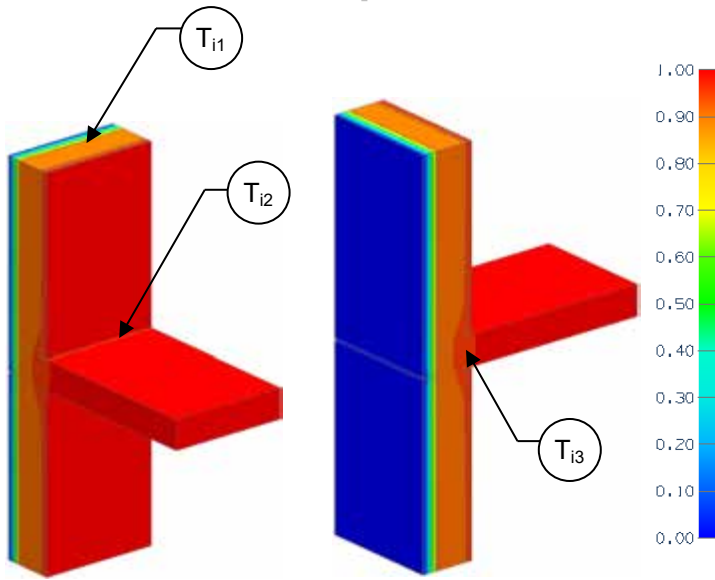
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.4 (0.59 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

# Detail 7.2.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

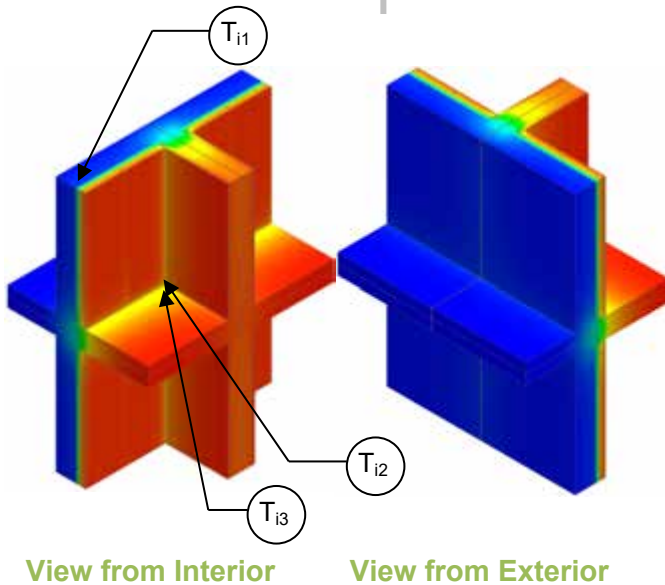
### Temperature Indices

$T_{i1}$	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 7.2.2

## 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

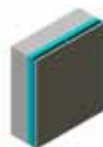
Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	Nominal thermal resistance of exterior wall
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value of just concrete wall and steel stud assembly
Transmittance / Resistance	U <sub>s</sub> , R <sub>s</sub> , U <sub>i</sub> , R <sub>i</sub>	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 <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ <sub>s</sub> , ψ <sub>i</sub>	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

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

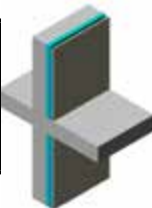
#### Base Assembly – Wall

R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-13.9 (2.44)	R-13.5 (2.37)	0.074 (0.42)



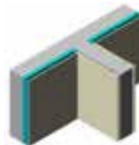
#### Slab Linear Transmittance

R <sub>s</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>s</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ <sub>s</sub> Btu/ft hr °F (W/m K)
R-7.0 (1.22)	0.144 (0.82)	0.465 (0.805)



#### Interior Linear Transmittance

R <sub>i</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>i</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ <sub>i</sub> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	χ <sup>2</sup> Btu/ft hr °F (W/K)
R-4.4 (0.77)	0.228 (1.30)	-0.48 (-0.25)

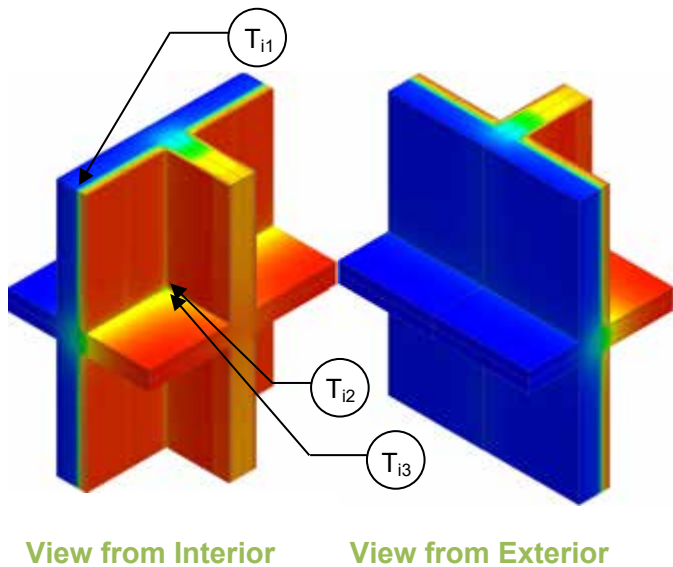
<sup>2</sup>Values are negative for a correction factor. See section 6 in ASHRAE 1365-RP for clarification.

### Temperature Indices

T <sub>i1</sub>	0.06	Min T on concrete wall, between studs, away from wall and slab
T <sub>i2</sub>	0.35	Max T on concrete wall, at corner intersection
T <sub>i3</sub>	0.59	Min T on interior surface, at corner intersection

# Detail 7.2.3

## 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

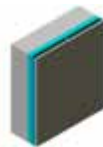
Assembly 1D (Nominal) R-Value	$R_{1D}$	Nominal thermal resistance of exterior wall
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value of just concrete wall and steel stud assembly
Transmittance / Resistance	$U_s, R_s, U_i, R_i$	U and R values for: s = concrete wall + slab i = concrete wall + interior wall
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_i$	Incremental increase in transmittance per linear length of: s = slab i = interior wall
Point Transmittance	$\chi$	Incremental increase in transmittance for inner wall and slab intersection

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

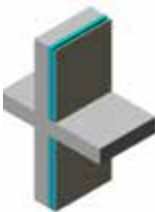
#### Base Assembly – Wall

$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-13.9 (2.44)	R-13.5 (2.37)	0.074 (0.42)



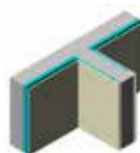
#### Slab Linear Transmittance

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_s$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_i$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_i$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi^2$ Btu/ft hr °F (W/K)
R-6.1 (1.07)	0.164 (0.93)	-0.29 (-0.16)

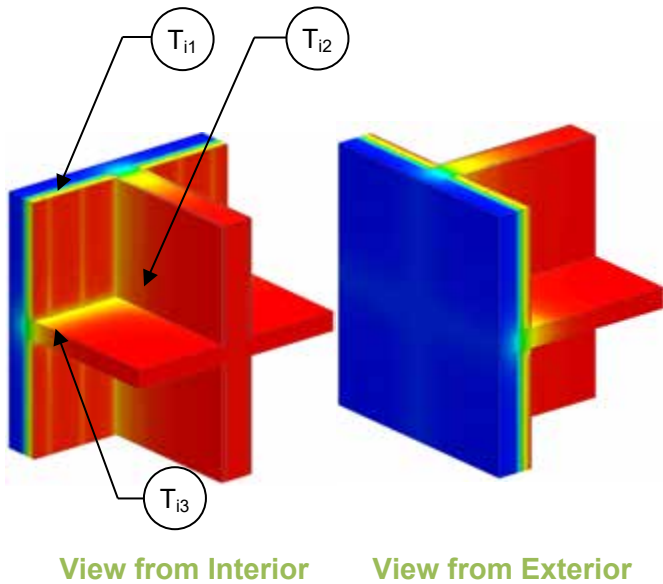
<sup>2</sup>Values are negative for a correction factor. See section 6 in ASHRAE-1365 RP for clarification.

### 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 7.2.4

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_i$	Incremental increase in transmittance per linear length of: s = slab i = interior wall
Point Transmittance	$\chi$	Incremental increase in transmittance for inner wall and slab intersection

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_i$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_i$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi^2$ Btu/ft <sup>2</sup> ·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)

<sup>2</sup>Values are negative for a correction factor. See section 6 in ASHRAE-1365 RP for clarification.

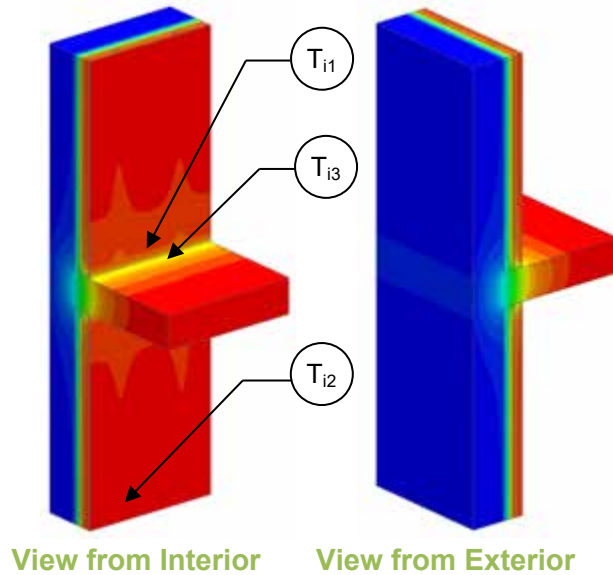
### Temperature Indices

	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 7.2.5

### 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

1.00	Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.9 (0.51 RSI) + interior 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
0.60	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

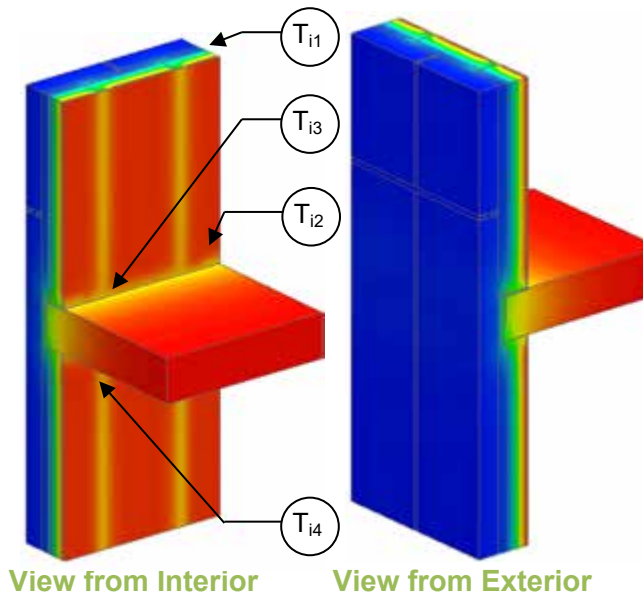
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-12.5 (2.20)	R-15.4 (2.71)	R-15.4 (2.70)	0.065 (0.37)	R-8.1 (1.43)	0.123 (0.70)	0.500 (0.865)

#### Temperature Indices

$T_{i1}$	0.85	Min T on insulation away from slab, between studs
$T_{i2}$	0.87	Max T on insulation away from slab, at studs
$T_{i3}$	0.58	Min T on slab exposed to interior air, at insulation between studs

# Detail 7.2.6

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

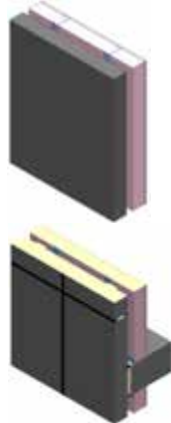
### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-14.5 (2.55)	R-8.5 (1.49)	0.118 (0.67)

#### Slab Linear Transmittance<sup>2</sup>

$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-6.2 (1.09)	0.161 (0.91)	0.286 (0.495)



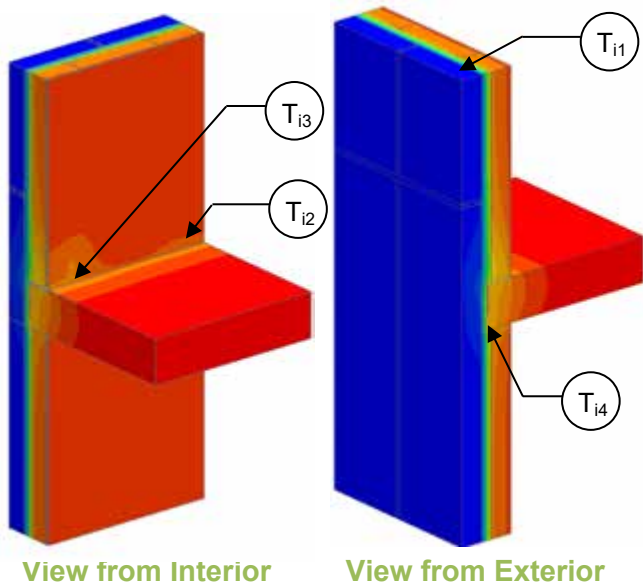
<sup>2</sup> Panel edges (caulked joints between panels) had negligible linear transmittance effects so values not presented

### 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 7.2.7

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-13.0 (2.29)	R-12.9 (2.26)	0.078 (0.44)



#### Slab Linear Transmittance<sup>2</sup>

$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-9.1 (1.60)	0.110 (0.63)	0.218 (0.377)



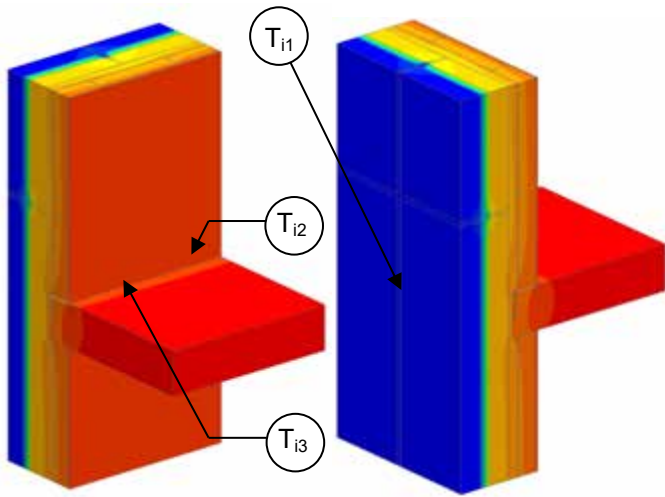
<sup>2</sup> Panel edges (caulked joints between panels) had negligible linear transmittance effects so values not presented

### 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 7.2.8

## Precast Sandwich Panel Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Intermediate Floor Intersection



View from Interior

View from Exterior

### 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 concrete slab
Transmittance / Resistance	$U_j, R_j, U_s, R_s$	U and R values for: j = concrete wall with panel joint f = concrete wall panel joint + concrete slab
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_j, \psi_s$	Incremental increase in transmittance per linear length of: j = panel joint s = concrete slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)

#### Panel Joint Linear Transmittance

$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_j$ Btu/ft hr °F (W/m K)
R-11.7 (2.05)	0.086 (0.49)	0.026 (0.046)

#### Slab Linear Transmittance

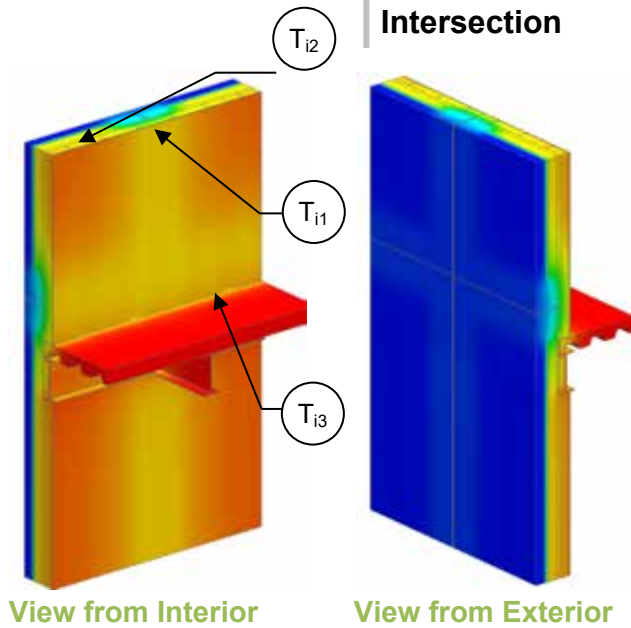
$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft hr °F (W/m K)
R-8.8 (1.54)	0.114 (0.65)	0.118 (0.205)

### 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 7.2.9

## Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors at 24" o.c. – Intermediate Floor Intersection



### Thermal Performance Indicators

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 floor
Transmittance / Resistance	$U_j, R_j, U_f, R_f$	U and R values for: j = wall with panel joint f = concrete wall panel joint + floor
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_j, \psi_f$	Incremental increase in transmittance per linear length of: j = panel joint f = floor

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.0 (2.11)	0.083 (0.47)

#### Panel Joint Linear Transmittance

$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_j$ Btu/ft ·hr·°F (W/m K)
R-6.2 (1.10)	0.160 (0.91)	0.635 (1.130)

#### Floor Linear Transmittance

Sandwich Panel Insulation 1D R-Value (RSI)	$R_f$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_f$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_f$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-4.7 (0.83)	0.213 (1.21)	0.738 (1.277)

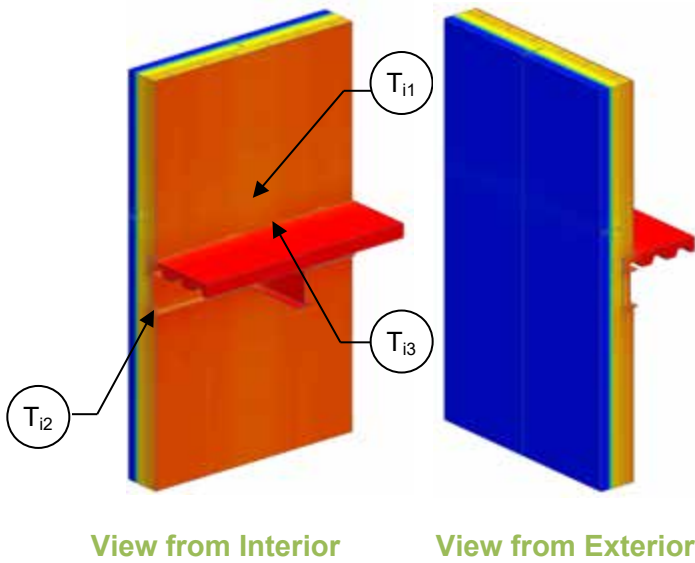
### Temperature Indices

$T_{i1}$	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 7.2.10

## 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 panel joints and floor
Transmittance / Resistance	$U_j, R_j, U_f, R_f$	U and R values for: j = concrete wall with panel joint f = concrete wall panel joint + floor
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_j, \Psi_f$	Incremental increase in transmittance per linear length of: j = panel joint f = floor

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.0 (2.11)	0.083 (0.47)

#### Panel Joint Linear Transmittance

$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_j$ Btu/ft ·hr·°F (W/m K)
R-11.6 (2.03)	0.087 (0.49)	0.026 (0.046)

#### Floor Linear Transmittance

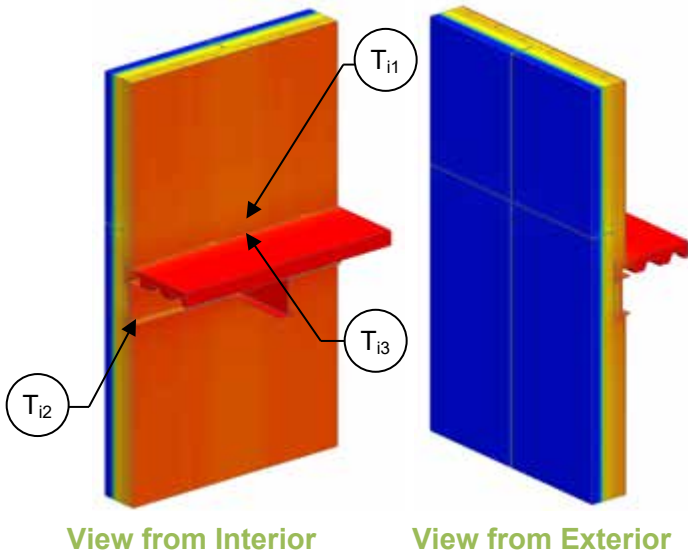
Sandwich Panel Insulation 1D R-Value (RSI)	$R_f$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_f$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_f$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-11.2 (1.97)	0.089 (0.51)	0.039 (0.067)

### 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 7.2.11

## 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 floor
Transmittance / Resistance	$U_j, R_j, U_f, R_f$	U and R values for: j = concrete wall with panel joint s = concrete wall panel joint + floor
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_j, \Psi_f$	Incremental increase in transmittance per linear length of: j = panel joint f = floor

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)

#### Panel Joint Linear Transmittance

$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_j$ Btu/ft ·hr·°F (W/m K)
R-12.0 (2.11)	0.084 (0.48)	0.036 (0.062)

#### Floor Linear Transmittance

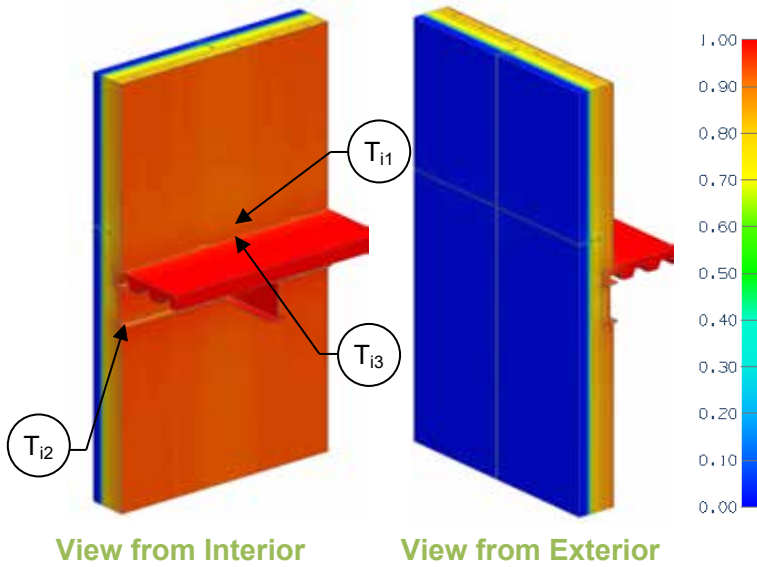
Sandwich Panel Insulation 1D R-Value (RSI)	$R_f$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_f$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_f$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-11.4 (2.00)	0.088 (0.50)	0.062 (0.107)

### 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 7.2.12

## 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 floor
Transmittance / Resistance	$U_j, R_j, U_f, R_f$	U and R values for: j = concrete wall with panel joint f = concrete wall panel joint + floor
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_j, \psi_s$	Incremental increase in transmittance per linear length of: j = panel joint f = floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly

Sandwich Panel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)

#### Panel Joint Linear Transmittance

$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_j$ Btu/ft ·hr·°F (W/m K)
R-12.1 (2.12)	0.083 (0.47)	0.030 (0.052)

#### Floor Linear Transmittance

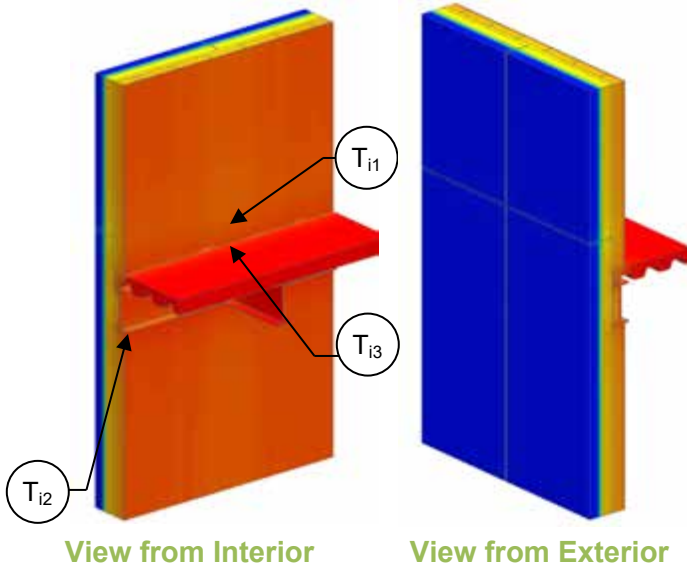
Sandwich Panel Insulation 1D R-Value (RSI)	$R_f$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_f$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_f$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-11.6 (2.05)	0.086 (0.49)	0.043 (0.074)

### 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 7.2.13

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length steel framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

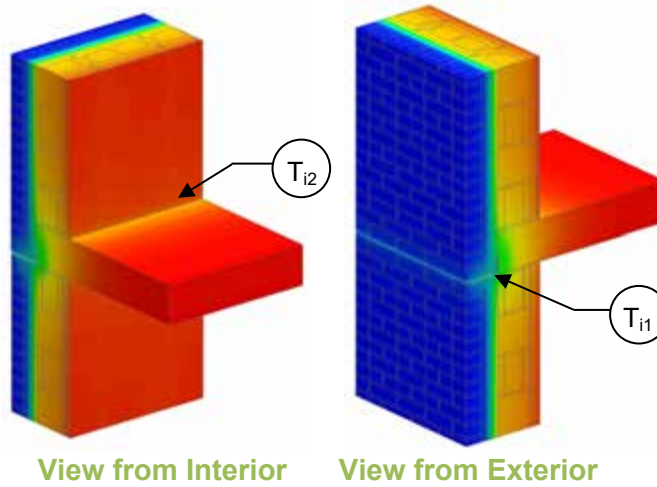
Sandwich Panel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 7.2.14

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length of shelf angle and slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

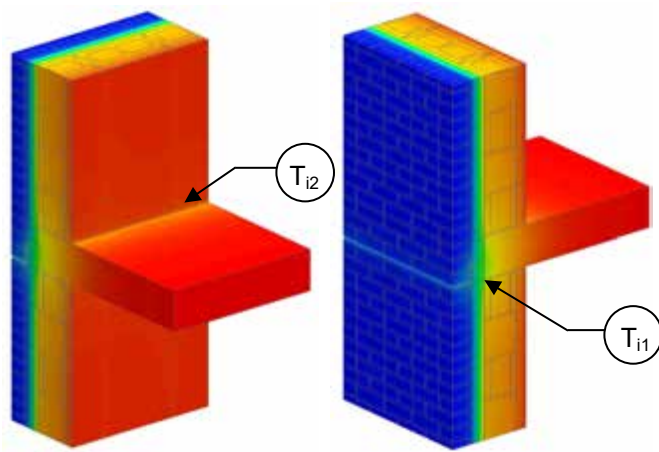
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ 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 7.2.15

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of shelf angle and slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

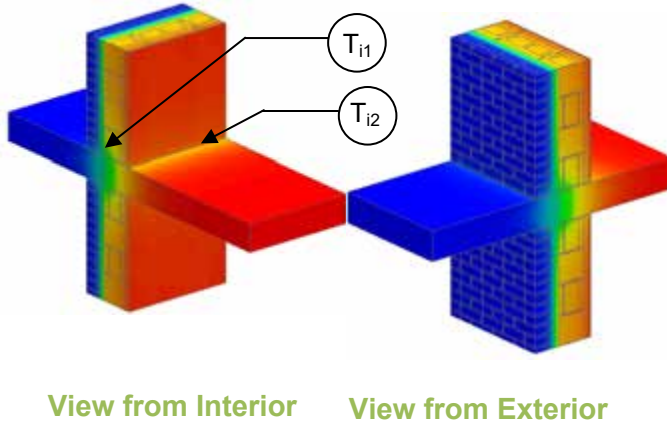
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 7.2.16

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

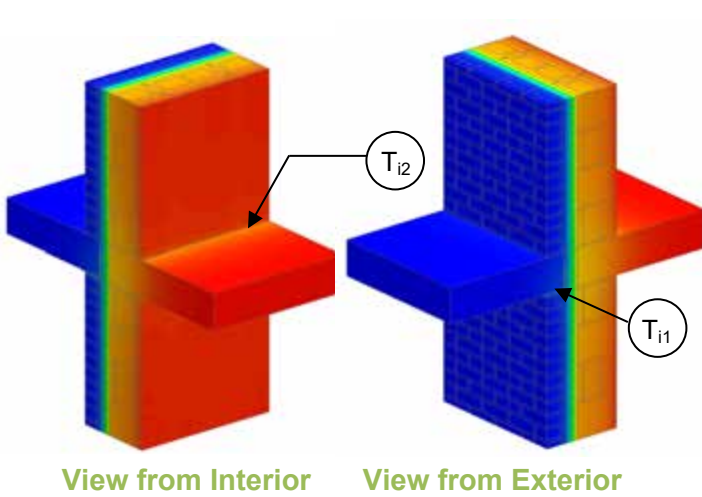
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 7.2.17

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

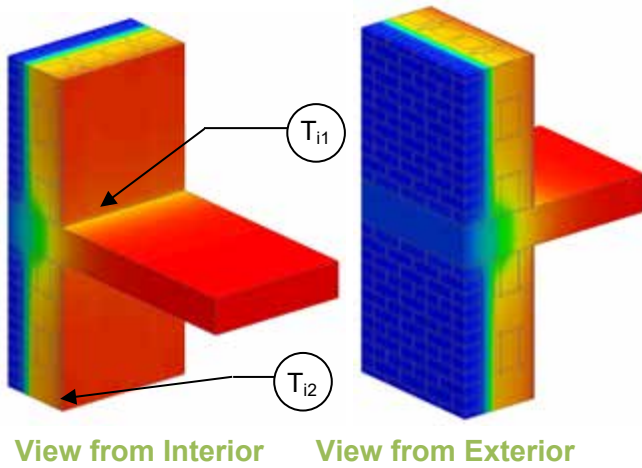
### Temperature Indices

	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 7.2.18

## Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony



### Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td><math>R_{1D}</math></td> <td>R- 5.6 (0.98 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td><math>U_o, R_o</math></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 Index<sup>1</sup></td> <td><math>T_i</math></td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td><math>\psi</math></td> <td>Incremental increase in transmittance per linear length of slab</td> </tr> </table>	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab
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 <sup>1</sup>		$T_i$	0 = exterior temperature 1 = interior temperature													
Linear Transmittance		$\psi$	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																

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

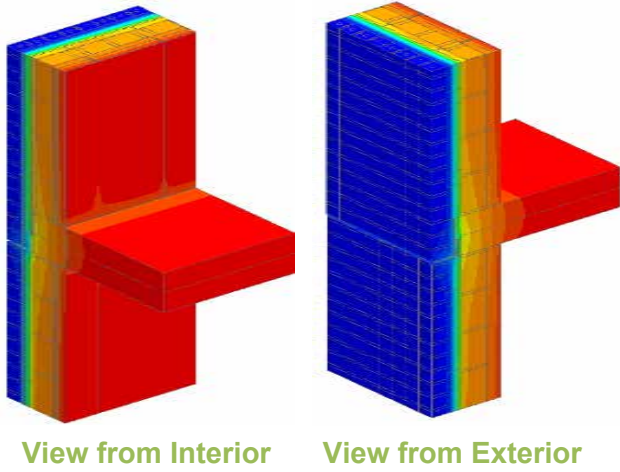
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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 7.2.19

## Exterior Insulated Concrete Block Wall Assembly with Thermally Broken Shelf Angle & Brick Ties Supporting Brick Veneer – Slab Intersection



### Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td><math>R_{1D}</math></td> <td>R-5.6 (0.98 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td><math>U_o, R_o</math></td> <td>“clear wall” U- and R-value without slab and shelf angle</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 Index</td> <td><math>T_i</math></td> <td>0 = exterior temperature 1 = interior temperature</td> </tr> <tr> <td>Linear Transmittance</td> <td><math>\psi</math></td> <td>Incremental increase in transmittance per linear length of slab with shelf angle</td> </tr> </table>	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	$T_i$	0 = exterior temperature 1 = interior temperature	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab with shelf angle
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		$T_i$	0 = exterior temperature 1 = interior temperature													
Linear Transmittance		$\psi$	Incremental increase in transmittance per linear length of slab with shelf angle													
0.90																
0.80																
0.70																
0.60																
0.50																
0.40																
0.30																
0.20																
0.10																
0.00																

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

### Scenario

Scenario	Flashing and Shelf Angle
A	Self-Adhered Membrane Flashing with Steel Shelf Angle and Bolts
B	Self-Adhered Membrane Flashing with Stainless Steel Shelf Angle and Bolts

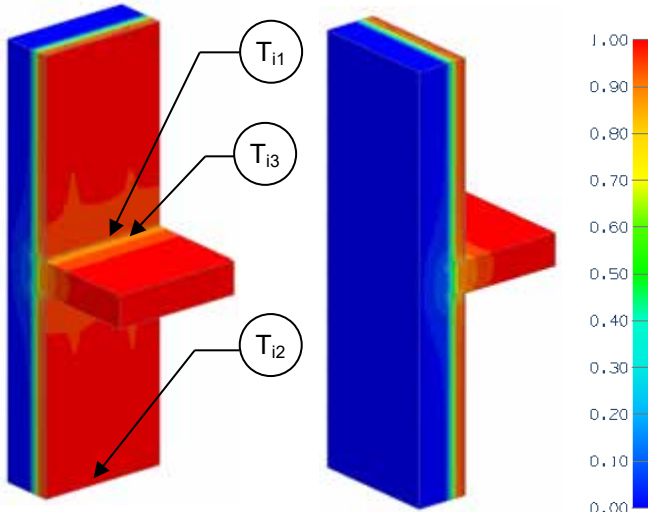
### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
A	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)
B	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 7.2.20

## 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) + interior 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

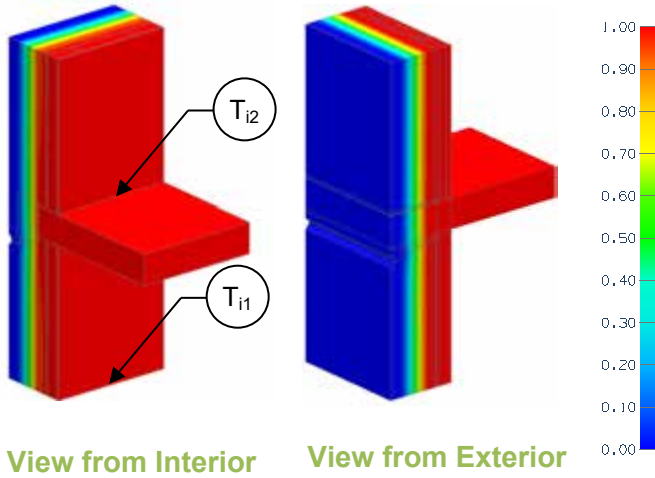
Interior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-12.5 (1.76)	R-15.4 (2.71)	R-15.4 (2.70)	0.065 (0.37)	R-10.8 (1.90)	0.093 (0.53)	0.239 (0.414)

### Temperature Indices

$T_{i1}$	0.85	Min T on insulation away from slab, between studs
$T_{i2}$	0.89	Max T on insulation away from slab, at studs
$T_{i3}$	0.75	Min T on slab exposed to interior air, at insulation between studs

# Detail 7.2.21

## Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Intermediate Floor Intersection with Inner Wythe Supported by Concrete Floor



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.76 (0.49 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear field" U- and R-value
Transmittance / Resistance	U, R	U- and R-values for the overall assembly
Linear Transmittance	$\Psi$	Incremental increase in transmittance for intermediate slab

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
5	R-40 (7.04)	R-42.8 (7.53)	R-42.3 (7.45)	0.024 (0.134)
6	R-48 (8.45)	R-50.8 (8.94)	R-50.3 (8.86)	0.020 (0.113)
7	R-56 (9.86)	R-58.8 (10.35)	R-58.3 (10.27)	0.017 (0.097)

#### Slab Linear Transmittance

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ Btu/ft·hr·°F (W/mK)
5	R-42.8 (7.53)	R-41.4 (7.30)	0.024 (0.137)	0.0036 (0.0061)
6	R-50.8 (8.94)	R-47.9 (8.44)	0.021 (0.118)	0.0071 (0.0123)
6*	R-50.8 (8.94)	R-48.3 (8.52)	0.021 (0.117)	0.0057 (0.0099)
7	R-58.8 (10.35)	R-54.0 (9.52)	0.019 (0.105)	0.0098 (0.0169)

\*With additional R-4 aerogel insulation at slab edge detail

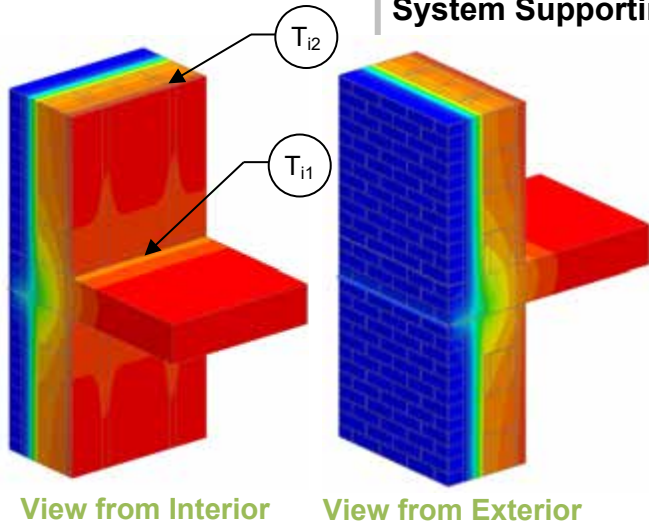
### Temperature Indices

	R42.8	R50.8	R50.8*	R58.8	
$T_{11}$	0.95	0.96	0.96	0.97	Min T on interior precast sandwich panel away from slab, between studs
$T_{12}$	0.96	0.97	0.97	0.97	Min T on slab exposed to interior air, at interior precast sandwich panel, between studs

\*With additional R-4 aerogel insulation at slab edge detail

## Detail 7.2.22

### Owens Corning Exterior Insulated Concrete Block Wall Assembly with Shelf Angle and Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer – Intermediate Floor Intersection



#### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.99 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of shelf angle and slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

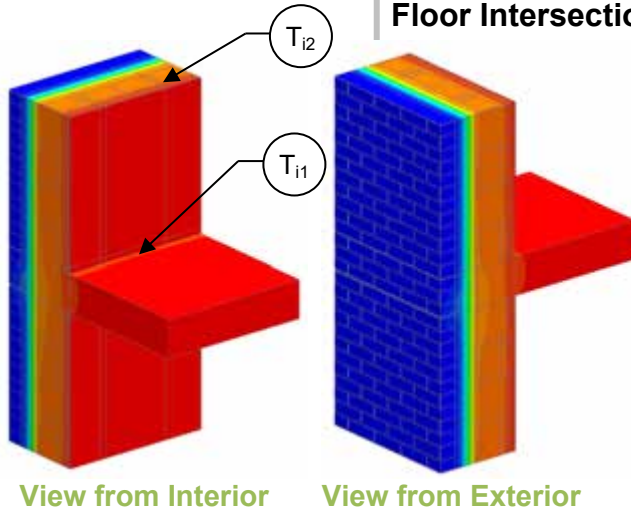
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-15.6 (2.75)	R-13.4 (2.36)	0.075 (0.42)	R-8.3 (1.46)	0.121 (0.69)	0.277 (0.480)
R-20.0 (3.52)	R-25.6 (4.51)	R-20.0 (3.52)	0.050 (0.28)	R-10.1 (1.78)	0.099 (0.56)	0.292 (0.506)

#### Temperature Indices

	R10	R20	
$T_{i1}$	0.77	0.80	Min T on slab exposed to interior air, between studs
$T_{i2}$	0.85	0.86	Max T on concrete block away from slab, at studs

# Detail 7.2.23

## Owens Corning Exterior Insulated Concrete Block Wall Assembly with Stainless Steel Stand-off Shelf Angle and Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer – Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.99 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of shelf angle and slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

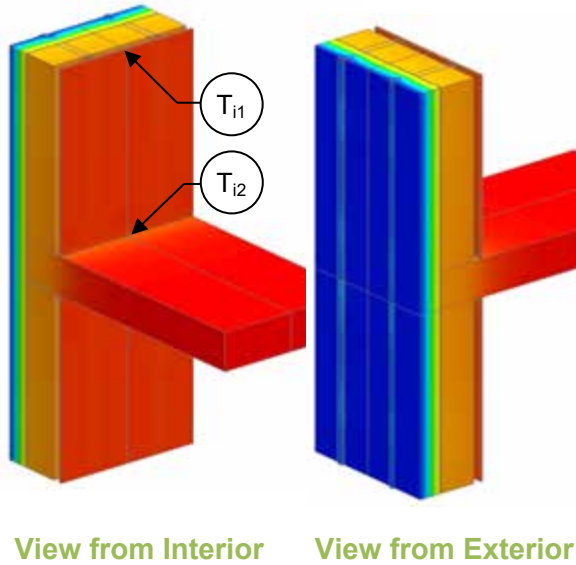
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-15.6 (2.75)	R-13.4 (2.36)	0.075 (0.42)	R-11.7 (2.06)	0.085 (0.49)	0.064 (0.112)
R-20.0 (3.52)	R-25.6 (4.51)	R-20.0 (3.52)	0.050 (0.28)	R-16.9 (2.98)	0.059 (0.34)	0.054 (0.093)

### Temperature Indices

	R10	R20	
$T_{i1}$	0.85	0.90	Min T on slab exposed to interior air, between studs
$T_{i2}$	0.88	0.92	Max T on concrete block away from slab, at studs

# Detail 7.2.24

## 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 – Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.4 (0.59 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

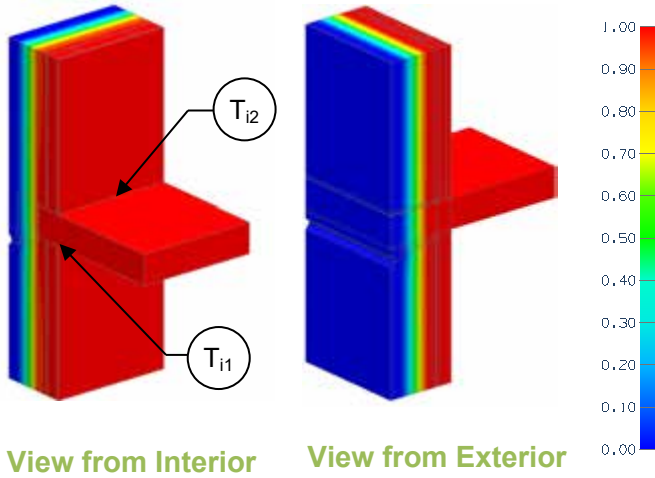
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.4 (2.35)	R-10.9 (1.92)	0.092 (0.52)	R-10.4 (1.84)	0.096 (0.55)	0.030 (0.052)
R-15 (2.64)	R-18.4 (3.23)	R-13.3 (2.34)	0.075 (0.43)	R-12.6 (2.22)	0.079 (0.45)	0.030 (0.051)
R-20 (3.52)	R-23.4 (4.11)	R-15.9 (2.80)	0.063 (0.36)	R-15.0 (2.65)	0.066 (0.38)	0.026 (0.045)
R-25 (4.40)	R-28.4 (4.99)	R-18.3 (3.22)	0.055 (0.31)	R-17.3 (3.05)	0.058 (0.33)	0.022 (0.037)

### Temperature Indices

	R10	R15	R20	R25	
$T_{i1}$	0.82	0.85	0.88	0.90	Min T on concrete away from slab, between studs
$T_{i2}$	0.87	0.89	0.91	0.92	Min T on slab exposed to interior air, at concrete, at studs

# Detail 7.2.25

## Insulated Precast Concrete Sandwich Panel Wall Assembly – Intermediate Floor Intersection with Inner Wythe Supported by Concrete Floor



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.9 (0.69 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value
Transmittance / Resistance	U, R	U- and R-values for the overall assembly
Linear Transmittance	$\Psi$	Incremental increase in transmittance for intermediate slab

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Precast Clear Wall

Sandwich Panel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)
R-15 (2.64)	R-18.9 (3.33)	R-17.2 (3.03)	0.058 (0.33)
R-20 (3.52)	R-23.9 (4.21)	R-22.4 (3.94)	0.045 (0.25)

#### Slab Linear Transmittance – With Flashing

Wall Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ Btu/ft·hr·°F (W/mK)
R-10.0 (1.76)	R-11.7 (2.07)	0.085 (0.48)	0.043 (0.074)
R-15.0 (2.64)	R-15.7 (2.76)	0.064 (0.36)	0.041 (0.071)
R-20.0 (3.52)	R-19.5 (3.44)	0.051 (0.29)	0.047 (0.082)

#### Slab Linear Transmittance – Without Flashing

Wall Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ Btu/ft·hr·°F (W/mK)
R-10.0 (1.76)	R-12.3 (2.17)	0.081 (0.46)	0.013 (0.023)
R-15.0 (2.64)	R-16.6 (2.93)	0.060 (0.34)	0.015 (0.025)
R-20.0 (3.52)	R-21.9 (3.86)	0.046 (0.26)	0.007 (0.011)

### Temperature Indices

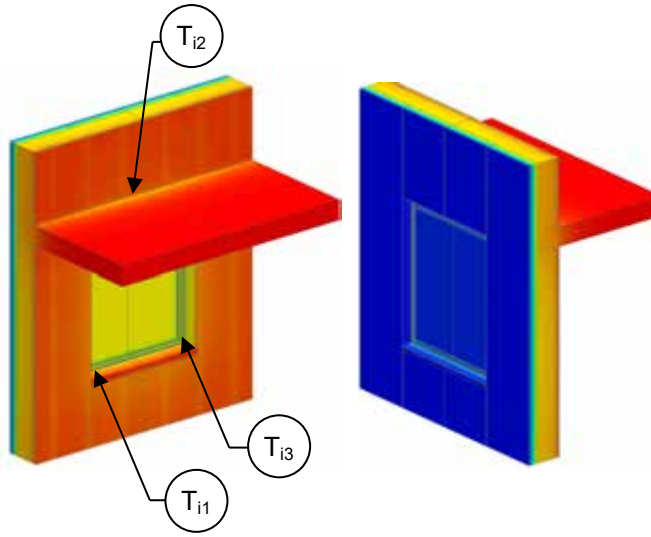
	With flashing			Without flashing			
	R10	R15	R20	R10	R15	R20	
$T_{i1}$	0.93	0.95	0.96	0.94	0.96	0.97	Min T on concrete ceiling slab at gypsum wall.
$T_{i2}$	0.93	0.95	0.95	0.94	0.96	0.97	Min T on concrete floor slab at gypsum wall.





# Detail 7.3.1

## Exterior Insulated Concrete 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-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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_g$	Incremental increase in transmittance per linear length of: s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Slab Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_g^2$ Btu/ft hr °F (W/m K)
R-5.6 (0.98)	0.179 (1.02)	0.177 (0.307)

### Temperature Indices

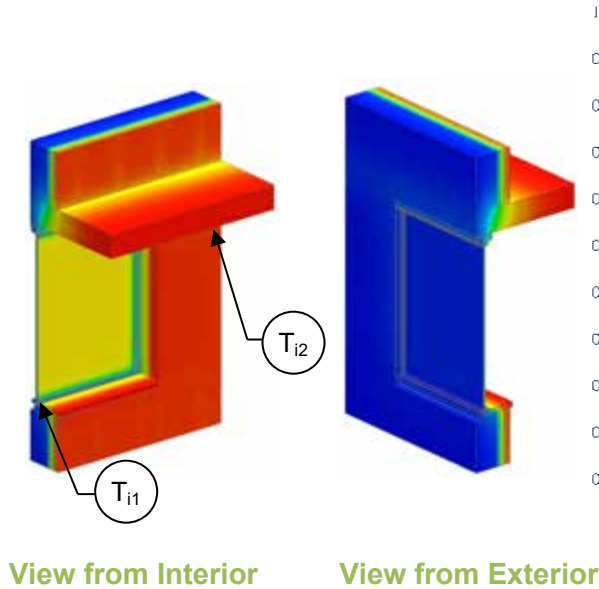
$T_{i1}$	0.73	Min T on concrete interior surface, below window sill between studs
$T_{i2}$	0.89	Max T on concrete, at floor slab intersection away from window
$T_{i3}$	0.60	Min T on window frame, at corner of glass

<sup>2</sup>For the linear transmittance, use the window perimeter

# Detail 7.3.2

## 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 (0.51 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s$ , $\psi_g$	Incremental increase in transmittance per linear length of: s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-12.9 (2.27)	R-12.9 (2.26)	0.078 (0.44)
R-15 (2.64)	R-17.9 (3.15)	R-17.9 (3.14)	0.056 (0.32)

#### Slab Linear Transmittance

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_g^2$ Btu/ft <sup>2</sup> ·hr ·°F (W/m K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_g^2$ Btu/ft <sup>2</sup> ·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)

<sup>2</sup>For 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

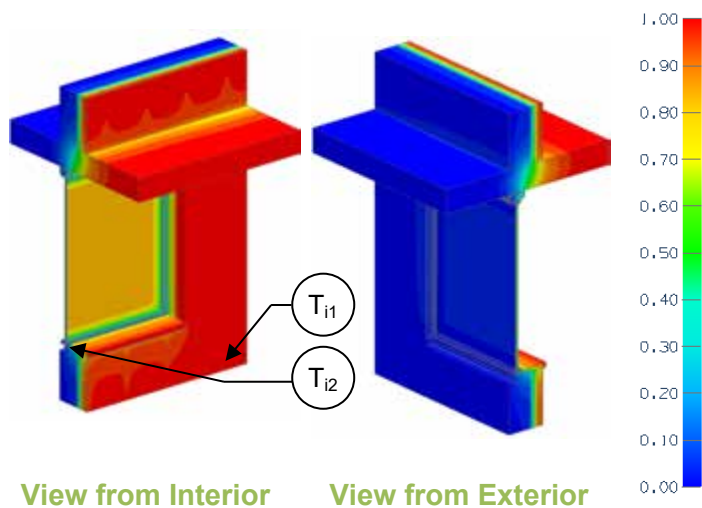
#### Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)



# Detail 7.3.3

## 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



View from Interior

View from Exterior

**Scenario**

Scenario	Sill Sheet Steel
A, B	None
C, D	Yes

**Base Assembly – Glazing**

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

### 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 <sup>1</sup>	$T_i$	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

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_h$ Btu/ft · hr · °F (W/m K)	$\Psi_l$ Btu/ft · hr · °F (W/m K)	$\Psi_j$ Btu/ft · hr · °F (W/m K)	$\Psi_g$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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)

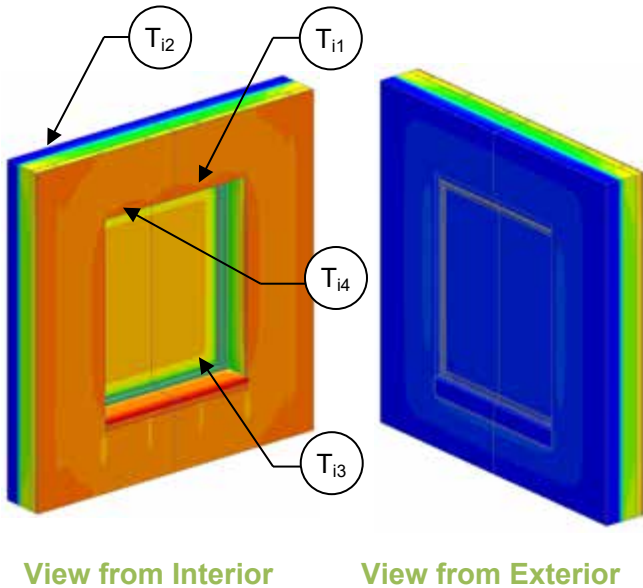
### Temperature Indices

	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 7.3.4

## 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 g = glazing
Transmittance / Resistance	$U_j, R_j, U_t, R_t$	U and R-values for: j = sandwich panel with concrete perimeter t = sandwich panel with concrete perimeter + glazing
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_j, \psi_t$	Incremental increase in transmittance per linear length of: j = concrete perimeter t = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)

#### Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Linear Transmittance

Sandwich Panel Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_t^2$ Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-1.9 (0.33)	0.536 (3.04)	0.789 (1.366)

<sup>2</sup>For the linear transmittance, use the window perimeter

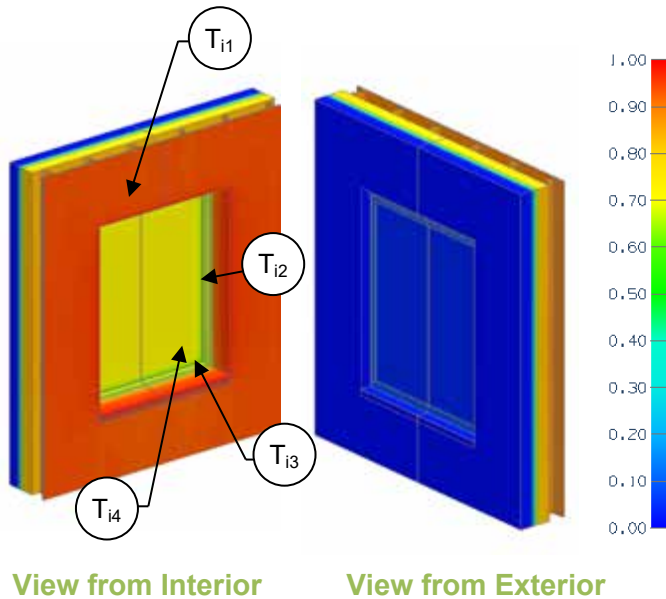
### Temperature Indices

$T_{i1}$	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 7.3.5

## Precast Sandwich Panel Wall Assembly with Steel Connectors at 24" (o.c.), and 3 5/8" Steel Stud (16" 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 g = glazing
Transmittance / Resistance	$U_t$ , $R_t$	U and R-values for combined wall and window
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_h$ , $\Psi_j$ , $\Psi_l$ , $\Psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)
R-15 (2.64)	R-18.9 (3.33)	R-17.2 (3.03)	0.058 (0.33)
R-20 (3.52)	R-23.9 (4.21)	R-22.4 (3.94)	0.045 (0.25)

#### Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Transmittance

Sandwich Panel Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_h$ Btu/ft ·hr ·°F (W/m K)	$\Psi_l$ Btu/ft ·hr ·°F (W/m K)	$\Psi_j$ Btu/ft ·hr ·°F (W/m K)	$\Psi_g$ Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-5.1 (0.91)	0.195 (1.11)	0.051 (0.089)	0.058 (0.101)	0.021 (0.036)	0.040 (0.069)
R-15 (2.64)	R-5.6 (0.99)	0.179 (1.01)	0.048 (0.082)	0.060 (0.103)	0.015 (0.025)	0.034 (0.059)
R-20 (3.52)	R-6.0 (1.06)	0.167 (0.95)	0.033 (0.057)	0.062 (0.107)	0.013 (0.022)	0.025 (0.044)

#### Window Transition Transmittance – No Flashing

Sandwich Panel Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_h$ Btu/ft ·hr ·°F (W/m K)	$\Psi_l$ Btu/ft ·hr ·°F (W/m K)	$\Psi_j$ Btu/ft ·hr ·°F (W/m K)	$\Psi_g$ Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	5.2 (0.92)	0.192 (1.09)	0.051 (0.089)	0.024 (0.042)	0.021 (0.036)	0.031 (0.054)
R-15 (2.64)	5.7 (1.00)	0.176 (1.00)	0.048 (0.082)	0.025 (0.042)	0.015 (0.025)	0.026 (0.044)
R-20 (3.52)	6.1 (1.07)	0.164 (0.93)	0.033 (0.057)	0.024 (0.043)	0.013 (0.022)	0.017 (0.029)

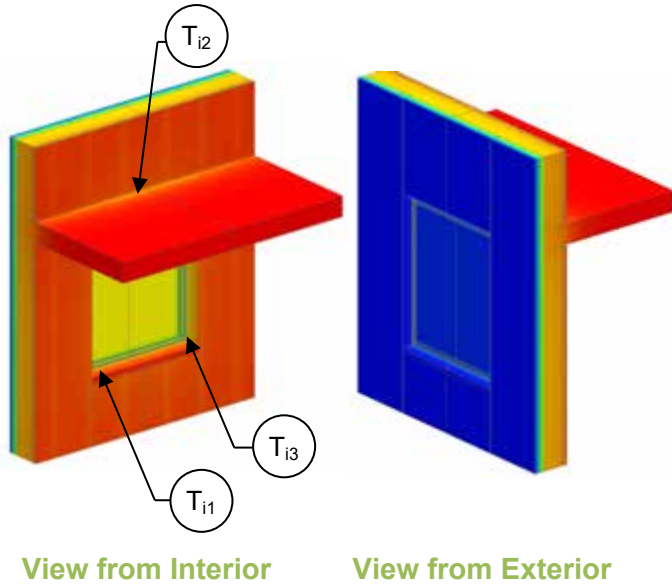
### Temperature Indices

	R10	R15	R20	
$T_{11}$	0.83	0.87	0.92	Min T on concrete wall, centered above window head
$T_{12}$	0.85	0.89	0.89	Max T on concrete wall, at steel stud and window frame
$T_{13}$	0.55 (0.57)	0.55 (0.57)	0.54 (0.56)	Min T on window frame, at bottom corner (no flashing)
$T_{14}$	0.62 (0.66)	0.62 (0.66)	0.62 (0.66)	Min T on window glass, in lower corner (no flashing)



# Detail 7.3.6

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_s, \Psi_g$	Incremental increase in transmittance per linear length of s = slab g = glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Slab Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_g^2$ Btu/ft hr °F (W/m K)
R-6.1 (1.07)	0.164 (0.93)	0.106 (0.184)

### Temperature Indices

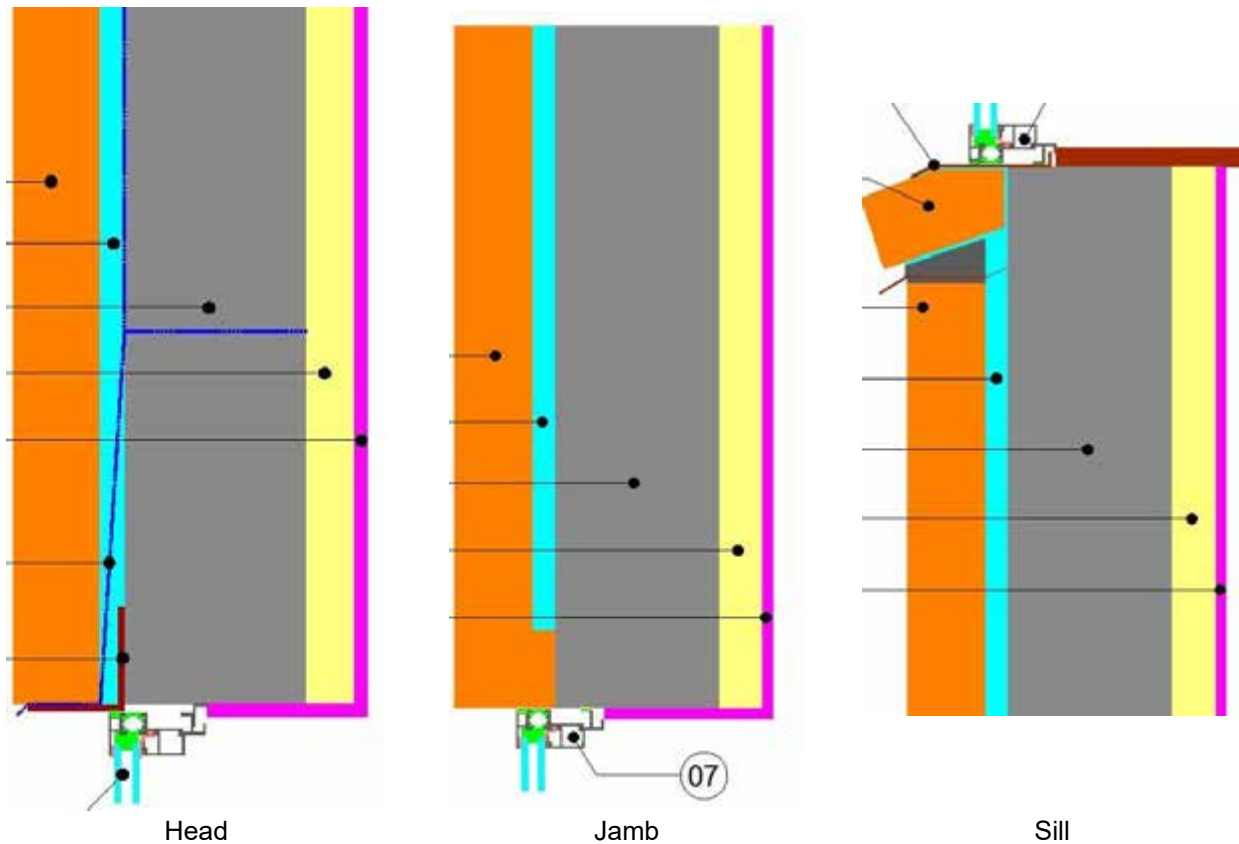
$T_{i1}$	0.82	Min T on concrete interior surface, below window sill between studs
$T_{i2}$	0.91	Max T on concrete, at floor slab intersection away from window
$T_{i3}$	0.59	Min T on window frame, at corner of glass

<sup>2</sup>For the linear transmittance, use the window perimeter

## Detail 7.3.7

### Interior Insulated Concrete Block or Concrete Wall Assembly with Brick Cladding - Window Intersection

Detail referenced from work done by Passive House Academy



### Thermal Performance

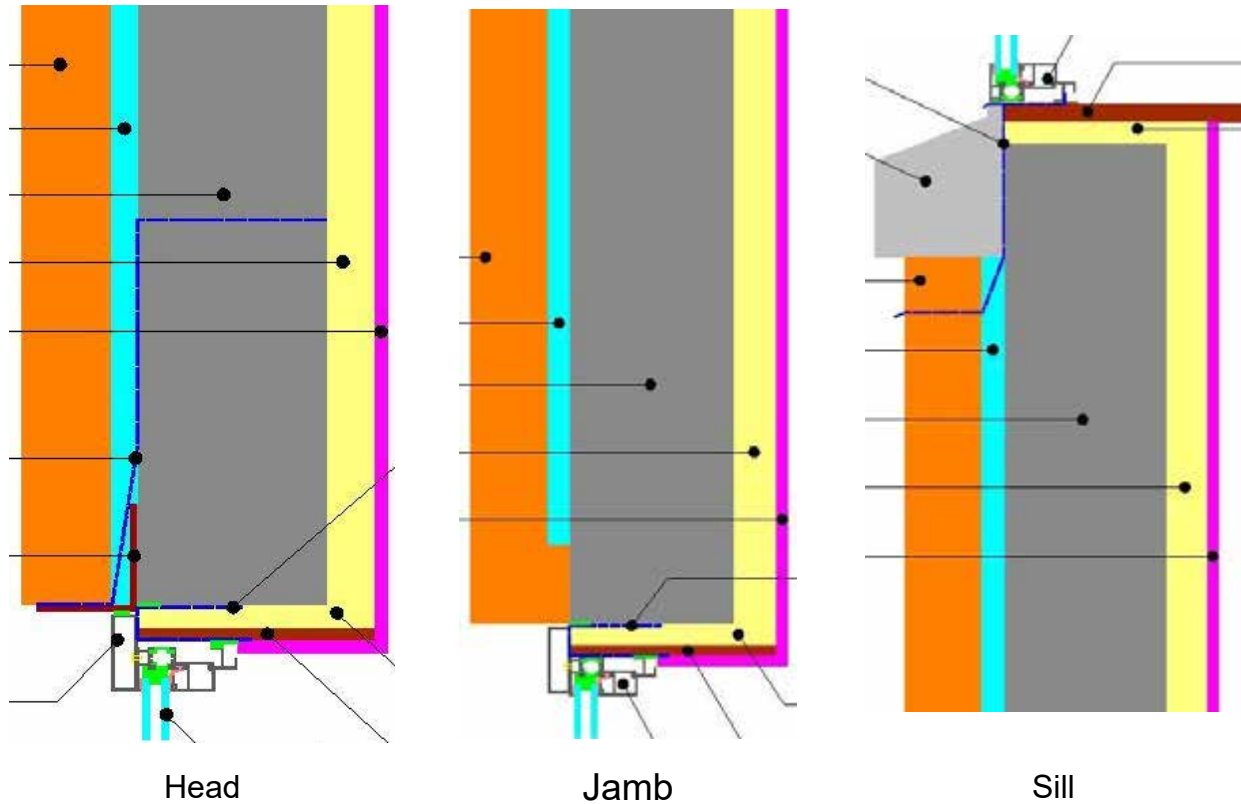
Condition	Clear Wall R-Value ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Clear Wall U-Value Btu / ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	Linear Transmittance (Ψ) Btu/hr ft °F (W/m K)
Wall Clear Field	R-16.0 (2.85)	0.063 (0.351)	-
Typical Jamb			0.308 (0.533)
Typical Head			0.315 (0.546)
Typical Sill			0.322 (0.558)
Typical Overall Window			0.313 (0.543)



## Detail 7.3.8

### 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



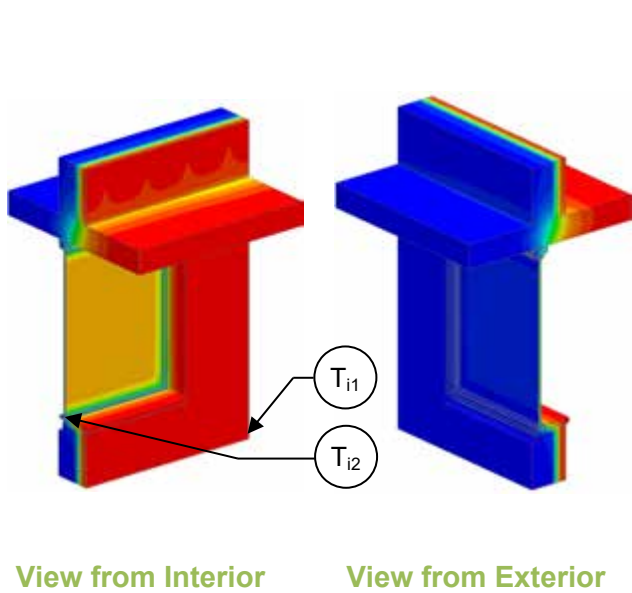
### Thermal Performance

Condition	Clear Wall R-Value ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Clear Wall U-Value Btu / ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 7.3.9

## 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



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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance <sup>2</sup>	$\psi_h, \psi_j, \psi_l, \psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP  
<sup>2</sup>For performance of base assembly and slab linear transmittances, refer to Detail 7.3.3

### 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_h$ Btu/ft·hr·°F (W/m K)	$\psi_l$ Btu/ft·hr·°F (W/m K)	$\psi_j$ Btu/ft·hr·°F (W/m K)	$\psi_g$ 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)

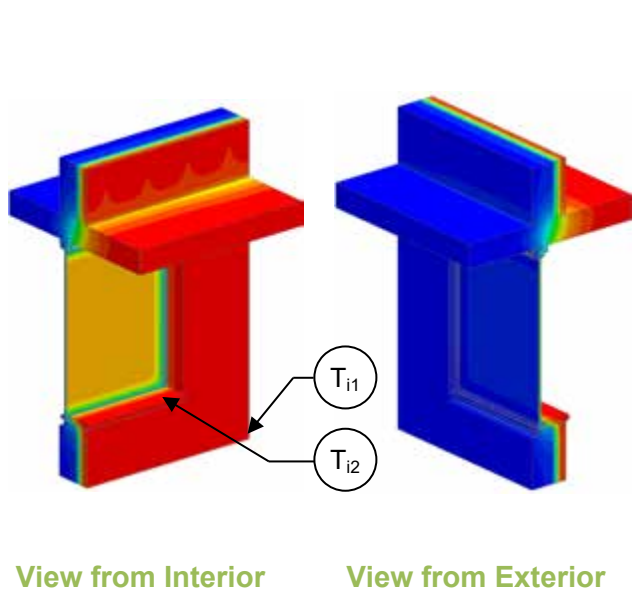
### Temperature Indices

	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 7.3.10

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance <sup>2</sup>	$\psi_h, \psi_j, \psi_l, \psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP  
<sup>2</sup>For performance of base assembly and slab linear transmittances, refer to Detail 7.3.3

### 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_h$ Btu/ft·hr·°F (W/m K)	$\psi_l$ Btu/ft·hr·°F (W/m K)	$\psi_j$ Btu/ft·hr·°F (W/m K)	$\psi_g$ 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)

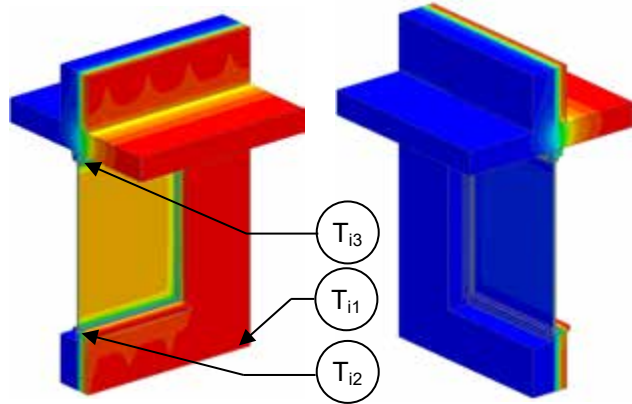
### Temperature Indices

	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 7.3.11

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance <sup>2</sup>	$\psi_h, \psi_j, \psi_l, \psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>For performance of base assembly and slab linear transmittances, refer to Detail 7.3.3

### Scenario

Scenario	Sill Shim Insulation
A, B	None
C, D	Yes

### Nominal (1D) vs. Assembly Performance Indicators

#### Window Transition Transmittance

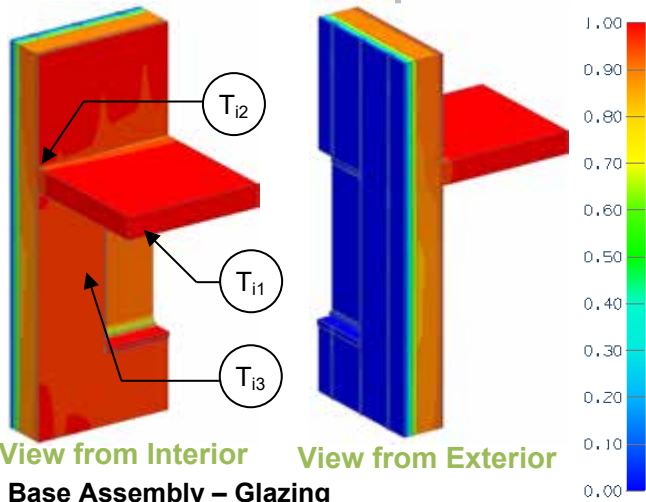
Scenario	Interior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_h$ Btu/ft·hr·°F (W/m K)	$\psi_l$ Btu/ft·hr·°F (W/m K)	$\psi_j$ Btu/ft·hr·°F (W/m K)	$\psi_g$ Btu/ft·hr·°F (W/m K)
A	R-10 (1.76)	R-3.8 (0.68)	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 7.3.12

**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**



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.142 (0.81)	0.301 (1.72)

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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

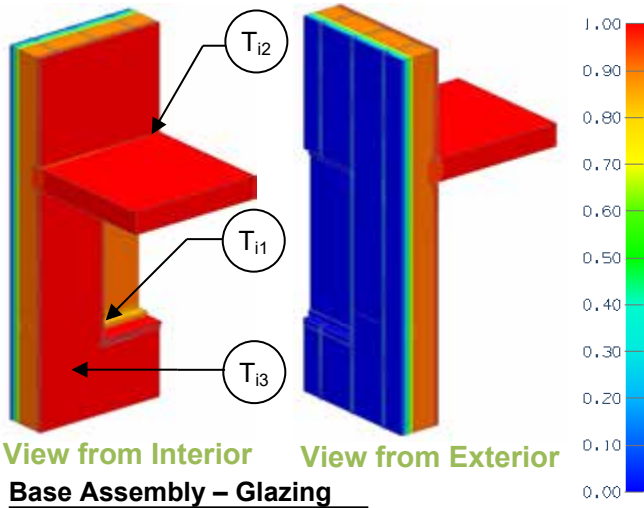
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · 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 7.3.13

**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**



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

View from Interior View from Exterior

#### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.142 (0.81)	0.303 (1.72)

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ 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)

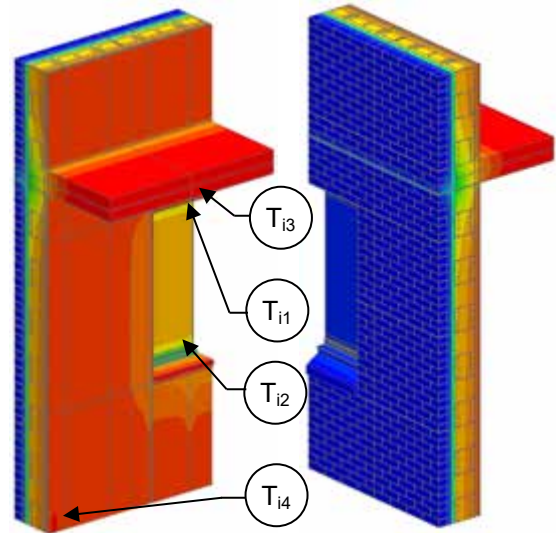
### Temperature Indices

	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 7.3.14

## Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Vener Anchoring System Supporting Brick Veneer with Insulation Interrupted at Window Perimeter – Double Glazed Aluminum Window and Intermediate Floor Intersection



View from Interior View from Exterior

### Base Assembly – Glazing

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

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-15.6 (2.75)	R-13.4 (2.36)	0.075 (0.42)
R-20.0 (3.52)	R-25.6 (4.51)	R-20.0 (3.52)	0.050 (0.28)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-8.3 (1.46)	0.121 (0.69)	0.277 (0.480)
R-10.1 (1.78)	0.099 (0.56)	0.292 (0.506)

#### Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-10.0 (1.76)	R-5.7 (1.00)	0.177 (0.28)	0.141 (0.24)	0.395 (0.68)	0.244 (0.42)	0.431 (0.746)
R-20.0 (3.52)	R-7.1 (1.24)	0.142 (0.28)	0.362 (0.63)	0.131 (0.23)	0.076 (0.13)	0.148 (0.257)

### Temperature Indices

	R10	R20	
$T_{i1}$	0.53	0.43	Min T at centre of window head
$T_{i2}$	0.47	0.62	Min T at centre of window sill
$T_{i3}$	0.74	0.75	Min T on interior surface of CMU at ceiling
$T_{i4}$	0.85	0.90	Max T on interior surface of CMU at steel studs, away from floor

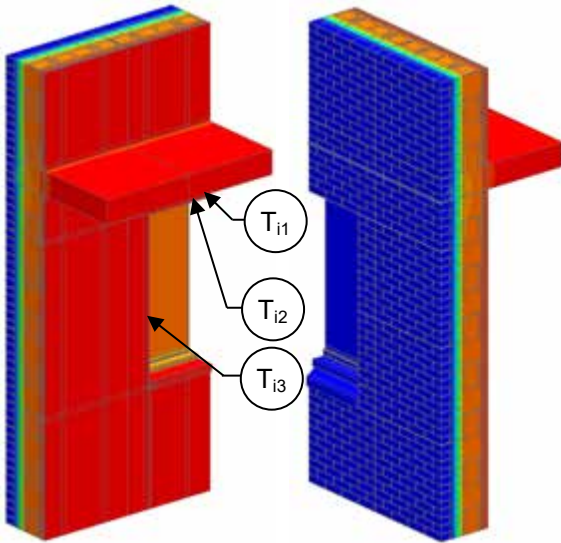
### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.99 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 + floor + window
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

# Detail 7.3.15

## Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Vener Anchoring System Supporting Brick Veneer with Reduced Insulation at Jamb – Triple Glazed Aluminum High Performance Window and Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.99 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior View from Exterior

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.220 (1.25)	0.204 (1.16)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Steel Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-15.6 (2.75)	R-13.4 (2.36)	0.075 (0.42)
R-20.0 (3.52)	R-25.6 (4.51)	R-20.0 (3.52)	0.050 (0.28)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-11.7 (2.06)	0.085 (0.48)	0.064 (0.112)
R-16.9 (2.98)	0.059 (0.34)	0.054 (0.093)

#### Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-10.0 (1.76)	R-9.6 (1.69)	0.104 (0.42)	0.053 (0.09)	0.020 (0.03)	0.082 (0.14)	0.051 (0.088)
R-20.0 (3.52)	R-12.1 (2.12)	0.083 (0.28)	0.142 (0.25)	0.015 (0.03)	0.058 (0.10)	0.058 (0.101)

### Temperature Indices

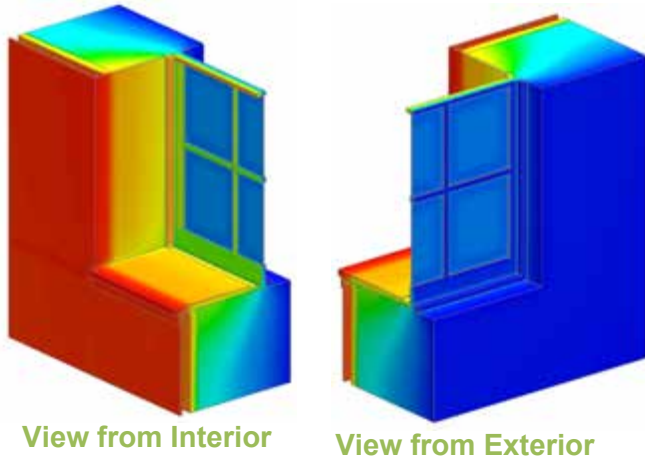
	R10	R20	
$T_{i1}$	0.81	0.77	Min T on window frame, at centre of window head
$T_{i3}$	0.86	0.90	Min T on interior surface of CMU at ceiling
$T_{i4}$	0.91	0.92	Max T on interior surface of CMU, at Jamb



# Detail 7.3.16

## Interior Insulated Multi-Wythe Brick Masonry Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Wood Window Intersection with Un-Insulated Window Perimeter

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.7 (1.00 RSI) + interior insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_g$	“clear wall” U- and R-value: w = brick wall g = glazing
Transmittance / Resistance	U R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-0 (0.0)	R-5.7 (1.00)	R-5.6 (0.98)	0.180 (1.02)
R-6 (1.76)	R-11.7 (2.06)	R-11.6 (2.04)	0.086 (0.49)
R-12 (2.11)	R-17.7 (3.12)	R-17.6 (3.09)	0.057 (0.32)

#### Base Assembly – Glazing

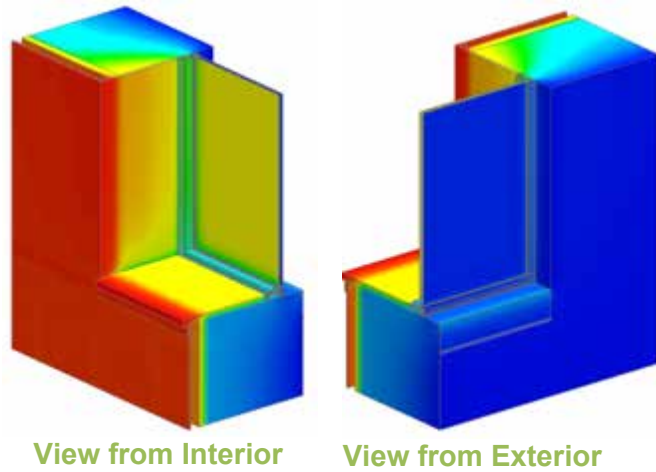
$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
1.04 (5.92)	0.79 (4.47)

#### Window Transition Linear Transmittance

Interior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-0 (0.0)	R-2.3 (0.41)	0.428 (2.43)	0.172 (0.297)
R-6 (1.76)	R-2.6 (0.45)	0.390 (2.21)	0.260 (0.451)
R-12 (2.11)	R-2.6 (0.47)	0.378 (2.15)	0.292 (0.506)

# Detail 7.3.17

## Interior Insulated Multi-Wythe Brick Masonry Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Aluminum Window Intersection with Un-insulated window Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.7 (1.00 RSI) + interior insulation
Transmittance / Resistance without Anomaly	$U_w$ , $R_w$ , $U_g$	“clear wall” U- and R-value: w = brick wall g = glazing
Transmittance / Resistance	U R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-0 (0.0)	R-5.7 (1.00)	R-5.6 (0.98)	0.180 (1.02)
R-6 (1.76)	R-11.7 (2.06)	R-11.6 (2.04)	0.086 (0.49)
R-12 (2.11)	R-17.7 (3.12)	R-17.6 (3.09)	0.057 (0.32)

#### Base Assembly – Glazing

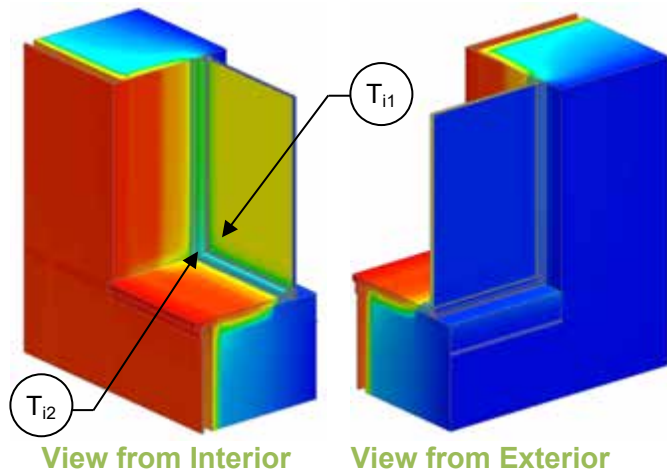
$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.385 (2.19)

#### Window Transition Linear Transmittance

Interior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-0 (0.0)	R-3.0 (0.53)	0.334 (1.89)	0.319 (0.552)
R-6 (1.76)	R-3.5 (0.61)	0.289 (1.64)	0.386 (0.668)
R-12 (2.11)	R-3.6 (0.64)	0.275 (1.56)	0.407 (0.704)

# Detail 7.3.18

## Interior Insulated Multi-Wythe Brick Masonry Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish– Aluminum Window Intersection with Insulation at Window Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.7 (1.00 RSI) + interior insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_g$	“clear wall” U- and R-value: w = brick wall g = glazing
Transmittance / Resistance	U R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12 (2.11)	R-17.7 (3.12)	R-17.6 (3.09)	0.057 (0.32)

#### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.385 (2.19)

#### Window Transition Linear Transmittance

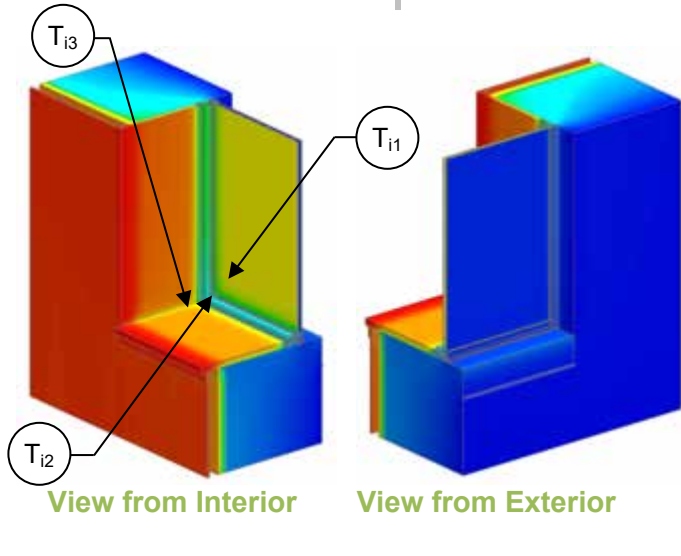
Window Perimeter Scenario	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
Case A: Window on Brick with Insulation at Window Perimeter	R-4.4 (0.78)	0.226 (1.29)	0.225 (0.389)
Case B: Window on Wood Block with Insulation at Window Perimeter	R-4.5 (0.80)	0.221 (1.25)	0.203 (0.352)

### Temperature Indices

	Case A	Case B	
$T_{i1}$	0.52	0.57	Min T on window glass, in lower corner
$T_{i2}$	0.65	0.66	Min T on window frame, in lower corner

# Detail 7.3.19

## Interior Insulated Brick Masonry Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Aluminum Window Intersection with Aerogel Blanket at Window Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.7 (1.00 RSI) + interior insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_g$	“clear wall” U- and R-value: w = brick wall g = glazing
Transmittance / Resistance	U R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of glazing transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-12 (2.11)	R-17.7 (3.12)	R-17.6 (3.09)	0.057 (0.32)

#### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.385 (2.19)

#### Window Transition Linear Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-4.3 (0.76)	0.233 (1.32)	0.249 (0.432)

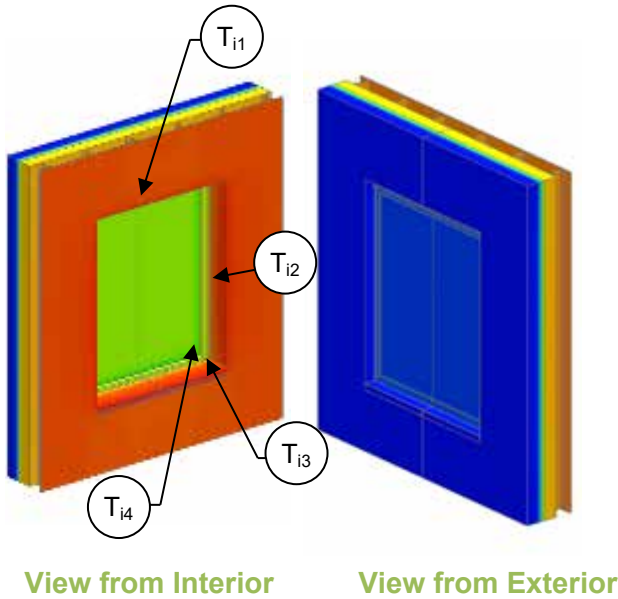
### Temperature Indices

$T_{i1}$	0.36	Min T on window glass, in lower corner
$T_{i2}$	0.63	Min T on window frame, in lower corner
$T_{i3}$	0.20	Min T on brick at window sill, in lower corner

# Detail 7.3.20

## Precast Sandwich Panel Wall Assembly with PVC at Panel Perimeter, Steel Connectors at 24" (o.c.), and 3 5/8" Steel Stud (16" 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 g = glazing
Transmittance / Resistance	$U_t$ , $R_t$	U and R-values for combined wall and window
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_h$ , $\Psi_j$ , $\Psi_l$ , $\Psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)
R-15 (2.64)	R-18.9 (3.33)	R-17.2 (3.03)	0.058 (0.33)
R-20 (3.52)	R-23.9 (4.21)	R-22.4 (3.94)	0.045 (0.25)

#### Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Transmittance

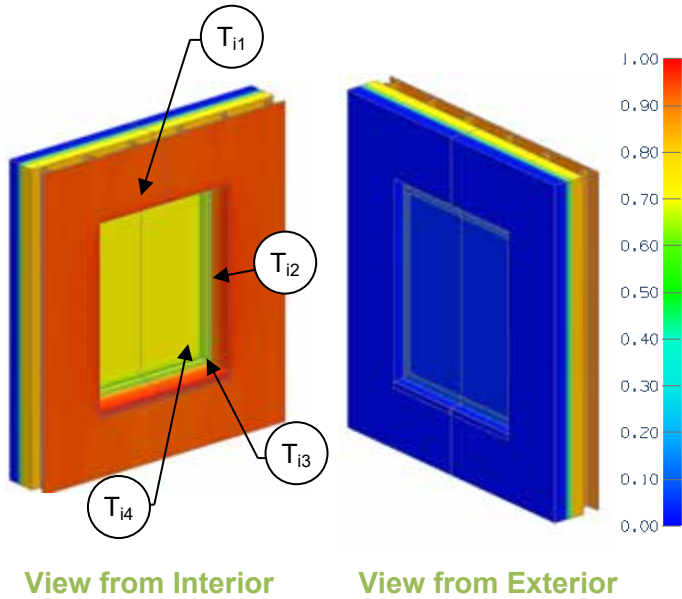
Sandwich Panel Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_h$ Btu/ft ·hr ·°F (W/m K)	$\Psi_l$ Btu/ft ·hr ·°F (W/m K)	$\Psi_j$ Btu/ft ·hr ·°F (W/m K)	$\Psi_g$ Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-5.1 (0.90)	0.197 (1.12)	0.057 (0.098)	0.063 (0.109)	0.027 (0.047)	0.047 (0.081)
R-15 (2.64)	R-5.5 (0.98)	0.180 (1.02)	0.052 (0.090)	0.063 (0.110)	0.020 (0.035)	0.040 (0.069)
R-20 (3.52)	R-5.9 (0.96)	0.168 (0.96)	0.039 (0.067)	0.065 (0.112)	0.017 (0.030)	0.030 (0.051)

### Temperature Indices

	R10	R15	R20	
$T_{i1}$	0.82	0.87	0.91	Min T on concrete wall, centered above window head
$T_{i2}$	0.85	0.89	0.88	Max T on concrete wall, at steel stud and window frame
$T_{i3}$	0.55	0.54	0.54	Min T on window frame, at bottom corner
$T_{i4}$	0.62	0.62	0.62	Min T on window glass, in lower corner

# Detail 7.3.21

## Precast Sandwich Panel Wall Assembly with Wood at Panel Perimeter, Steel Connectors at 24" (o.c.), and 3 5/8" Steel Stud (16" 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 g = glazing
Transmittance / Resistance	$U_t$ , $R_t$	U and R-values for combined wall and window
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_h$ , $\Psi_j$ , $\Psi_l$ , $\Psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)
R-15 (2.64)	R-18.9 (3.33)	R-17.2 (3.03)	0.058 (0.33)
R-20 (3.52)	R-23.9 (4.21)	R-22.4 (3.94)	0.045 (0.25)

#### Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Transmittance

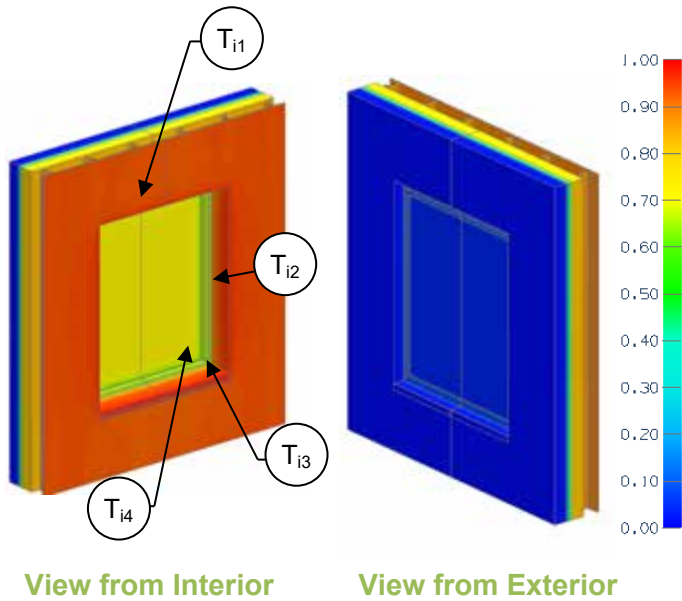
Sandwich Panel Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_h$ Btu/ft ·hr ·°F (W/m K)	$\Psi_l$ Btu/ft ·hr ·°F (W/m K)	$\Psi_j$ Btu/ft ·hr ·°F (W/m K)	$\Psi_g$ Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-5.0 (0.88)	0.201 (1.14)	0.068 (0.118)	0.073 (0.126)	0.041 (0.072)	0.061 (0.105)
R-15 (2.64)	R-5.5 (0.96)	0.183 (1.04)	0.062 (0.107)	0.070 (0.121)	0.033 (0.057)	0.051 (0.088)
R-20 (3.52)	R-5.8 (1.03)	0.171 (0.97)	0.048 (0.083)	0.071 (0.122)	0.028 (0.048)	0.040 (0.069)

### Temperature Indices

	R10	R15	R20	
$T_{i1}$	0.81	0.86	0.91	Min T on concrete wall, centered above window head
$T_{i2}$	0.87	0.91	0.89	Max T on concrete wall, at steel stud and window frame
$T_{i3}$	0.58	0.57	0.56	Min T on window frame, at bottom corner
$T_{i4}$	0.62	0.62	0.61	Min T on window glass, in lower corner

# Detail 7.3.22

## Precast Sandwich Panel Wall Assembly with Gypsum Board at Panel Perimeter, Steel Connectors at 24" (o.c.), and 3 5/8" Steel Stud (16" 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 g = glazing
Transmittance / Resistance	$U_t, R_t$	U and R-values for combined wall and window
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_h, \psi_j, \psi_l, \psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)
R-15 (2.64)	R-18.9 (3.33)	R-17.2 (3.03)	0.058 (0.33)
R-20 (3.52)	R-23.9 (4.21)	R-22.4 (3.94)	0.045 (0.25)

#### Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Transmittance

Sandwich Panel Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_h$ Btu/ft ·hr ·°F (W/m K)	$\psi_l$ Btu/ft ·hr ·°F (W/m K)	$\psi_j$ Btu/ft ·hr ·°F (W/m K)	$\psi_g$ Btu/ft ·hr ·°F (W/m K)
R-10.0 (1.76)	R-4.9 (0.87)	0.203 (1.15)	0.073 (0.126)	0.076 (0.132)	0.046 (0.079)	0.068 (0.117)
R-15.0 (2.64)	R-5.4 (0.95)	0.185 (1.05)	0.066 (0.113)	0.074 (0.128)	0.037 (0.064)	0.056 (0.097)
R-20.0 (3.52)	R-5.8 (1.03)	0.172 (0.97)	0.052 (0.090)	0.073 (0.127)	0.031 (0.054)	0.042 (0.072)

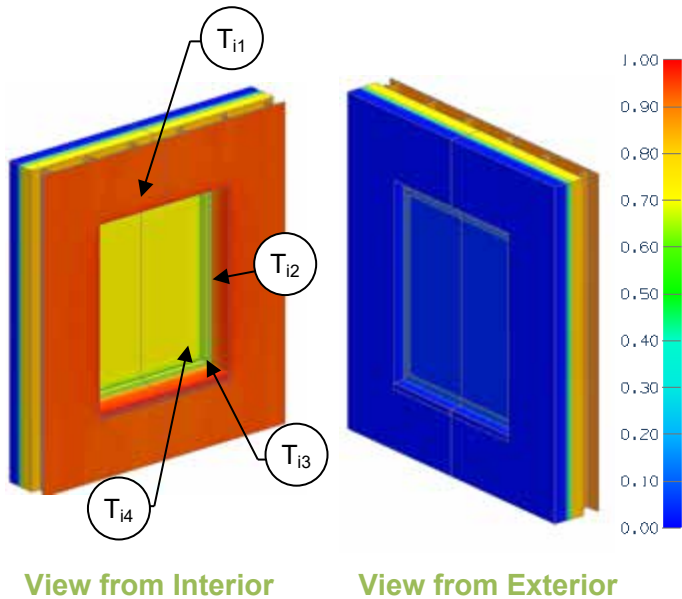
### Temperature Indices

	R10	R15	R20	
$T_{i1}$	0.81	0.86	0.90	Min T on concrete wall, centered above window head
$T_{i2}$	0.86	0.91	0.90	Max T on concrete wall, at steel stud and window frame
$T_{i3}$	0.57	0.57	0.57	Min T on window frame, at bottom corner
$T_{i4}$	0.62	0.62	0.61	Min T on window glass, in lower corner

# Detail 7.3.23

## Precast Sandwich Panel Wall Assembly, Steel Connectors at 24" (o.c.), and 3 5/8" Steel Stud (16" 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 g = glazing
Transmittance / Resistance	$U_t, R_t$	U and R-values for combined wall and window
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_h, \Psi_j, \Psi_l, \Psi_g$	Incremental increase in transmittance per linear length of: h = head j = jamb l = sill g = overall glazing

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)
R-15.0 (2.64)	R-18.9 (3.33)	R-17.2 (3.03)	0.058 (0.33)
R-20.0 (3.52)	R-23.9 (4.21)	R-22.4 (3.94)	0.045 (0.25)

#### Base Assembly - Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

#### Window Transition Transmittance

Sandwich Panel Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_h$ Btu/ft ·hr ·°F (W/m K)	$\Psi_l$ Btu/ft ·hr ·°F (W/m K)	$\Psi_j$ Btu/ft ·hr ·°F (W/m K)	$\Psi_g$ Btu/ft ·hr ·°F (W/m K)
R-10.0 (1.76)	R-5.0 (0.89)	0.198 (1.13)	0.055 (0.095)	0.074 (0.127)	0.029 (0.050)	0.052 (0.091)
R-15.0 (2.64)	R-5.5 (0.97)	0.182 (1.03)	0.062 (0.107)	0.097 (0.167)	0.027 (0.046)	0.044 (0.076)
R-20.0 (3.52)	R-5.6 (0.99)	0.179 (1.01)	0.071 (0.123)	0.133 (0.230)	0.042 (0.072)	0.065 (0.113)

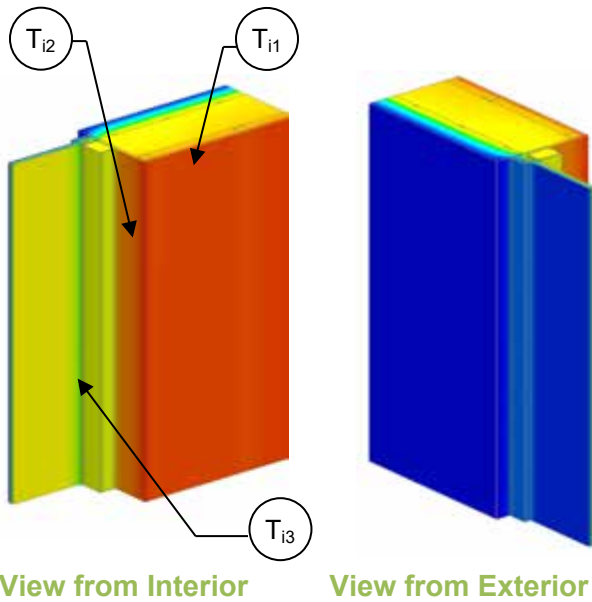
### Temperature Indices

	R10	R15	R20	
$T_{i1}$	0.81	0.87	0.87	Min T on concrete wall, centered above window head
$T_{i2}$	0.87	0.93	0.87	Max T on concrete wall, at steel stud and window frame
$T_{i3}$	0.58	0.57	0.57	Min T on window frame, at bottom corner
$T_{i4}$	0.62	0.62	0.62	Min T on window glass, in lower corner



# Detail 7.4.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length of curtain wall transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-15 (2.64)	R-18.0 (3.17)	R-17.6 (3.10)	0.057 (0.32)

#### Base Assembly – Curtain Wall Glazing

$U_{\text{centre of glazing}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.476 (2.70)

#### Curtain Wall Transition Linear Transmittance

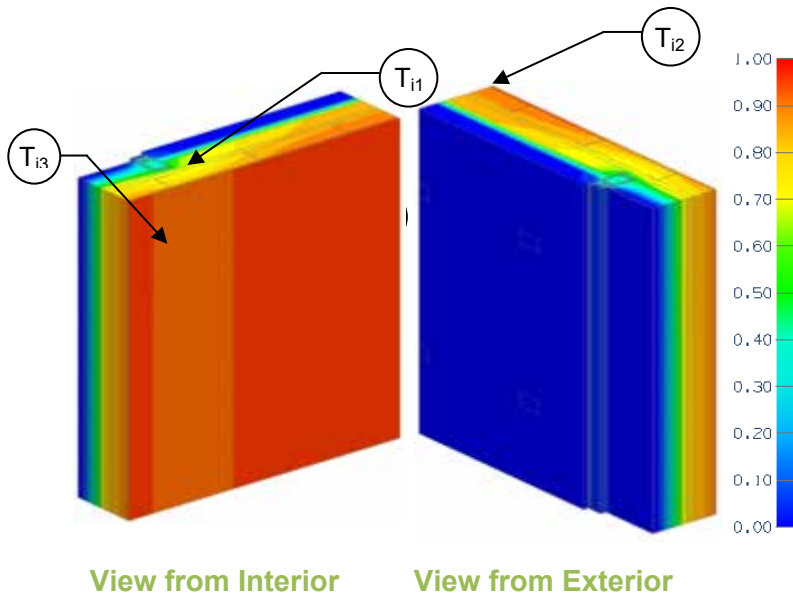
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-4.4 (0.78)	0.227 (1.29)	0.059 (0.103)

### 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 7.4.2

## Precast Sandwich Panel Wall Assembly with 3 5/8" Steel Stud (16" o.c.) – Curtain Wall Spandrel Transition



### Thermal Performance Indicators

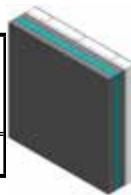
Assembly 1D (Nominal) R-Value	$R_{1Dw}$ , $R_{1Dcw}$	Nominal thermal resistance of two base assemblies: w = concrete wall cw = curtain wall
Transmittance / Resistance without Anomaly	$U_w$ , $R_w$ , $U_{cw}$ , $R_{cw}$	“clear wall” U- and R-value for the two base assemblies
Transmittance / Resistance	U, R	U- and R-values for overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of transition joint

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

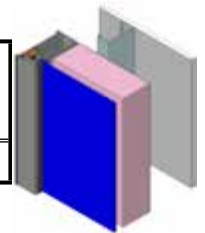
#### Base Assembly – Wall

$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)



#### Base Assembly – Curtain Wall<sup>2</sup>

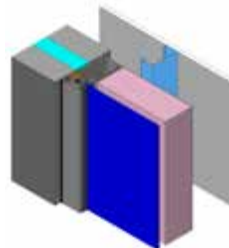
$R_{1Dcw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_{cw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{cw}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-19.2 (3.38)	R-5.7 (1.01)	0.175 (0.99)



<sup>2</sup> R-15 back pan insulation

#### Transition Joint Linear Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.0 (1.41)	0.125 (0.71)	0.082 (0.142)

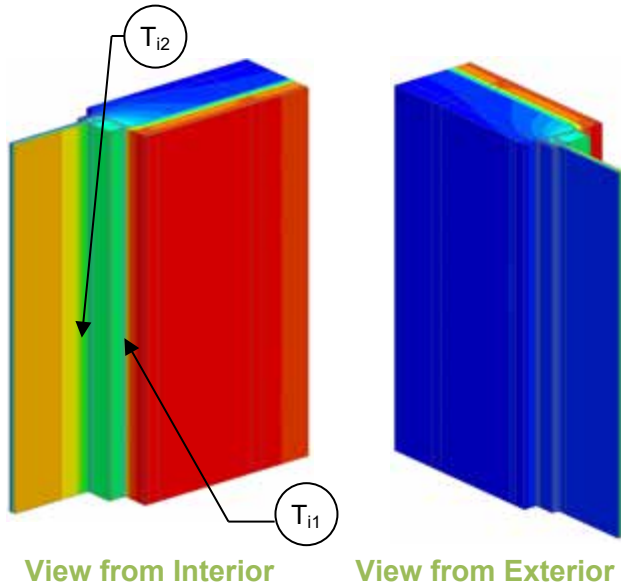


### Temperature Indices

$T_{i1}$	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 7.4.3

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of curtain wall transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.476 (2.70)

#### Curtain Wall Transition Linear Transmittance

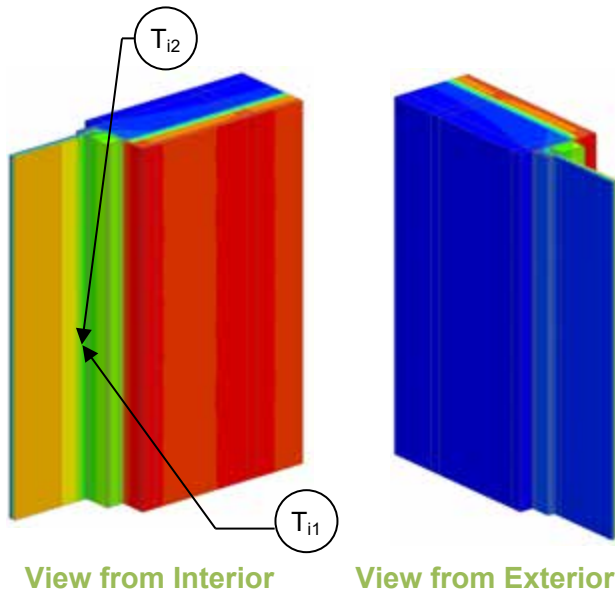
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10 (1.76)	R-3.7 (0.64)	0.274 (1.55)	0.171 (0.295)

### Temperature Indices

$T_{i1}$	0.44	Min T on frame
$T_{i2}$	0.43	Min T on glazing

# Detail 7.4.4

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of curtain wall transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.476 (2.70)

#### Curtain Wall Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10 (1.76)	R-4.2 (0.74)	0.237 (1.34)	0.050 (0.086)

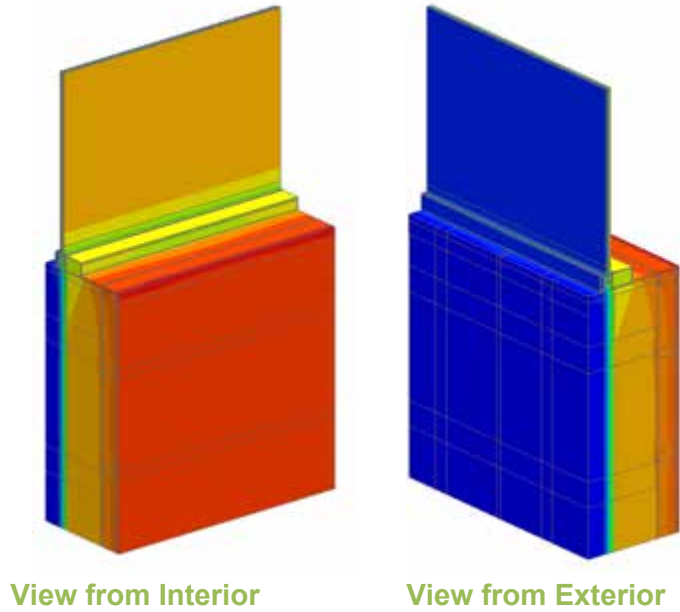
### Temperature Indices

$T_{i1}$	0.52	Min T on frame
$T_{i2}$	0.50	Min T on glazing

# Detail 7.4.5

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_j, \Psi_{cw}$	Incremental increase in transmittance per linear length of anomaly

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.32 (1.82)	0.389 (2.21)

#### Panel Joint Linear Transmittance

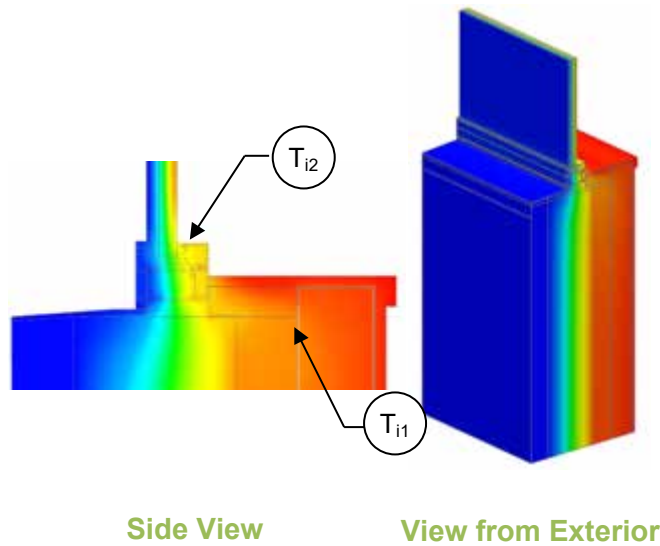
Sandwich Panel Insulation 1D R-value (RSI)	$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\Psi_j$ Btu/ft·hr·°F (W/m K)
R-10 (1.76)	R-9.3 (1.65)	0.107 (0.61)	0.099 (0.17)
R-15 (2.64)	R-12.0 (2.11)	0.084 (0.47)	0.092 (0.16)
R-20 (3.52)	R-14.5 (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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{cw}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\Psi_{cw}$ 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 7.4.6

## Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – High Performance Aluminum Window Sill Detail



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.76 (0.49 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_g, R_g$	“clear field” U- and R-value w = wall g = glazing
Transmittance / Resistance	U, R	U- and R-values for the overall assembly
Linear Transmittance	$\Psi$	Incremental increase in transmittance for sill detail

### Scenarios

Scenario	Sill Detail Insulation
A	Spray foam below frame and mineral wool behind frame
B	Aerogel below frame and mineral wool behind frame
C	Spray foam below frame and no insulation behind frame

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
5	R-40 (7.04)	R-42.8 (7.53)	R-42.3 (7.45)	0.024 (0.13)
6	R-48 (8.45)	R-50.8 (8.94)	R-50.3 (8.86)	0.020 (0.11)
7	R-56 (9.86)	R-58.8 (10.35)	R-58.3 (10.27)	0.017 (0.10)

#### Base Assembly – Glazing

$U_{\text{centre of glazing}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_{\text{frame}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\Psi_{\text{spacer}}$ Btu/ft·hr·°F (W/m K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.123 (0.70)	0.261 (1.48)	0.040 (0.069)	0.172 (0.98)

### Sill Linear Transmittance

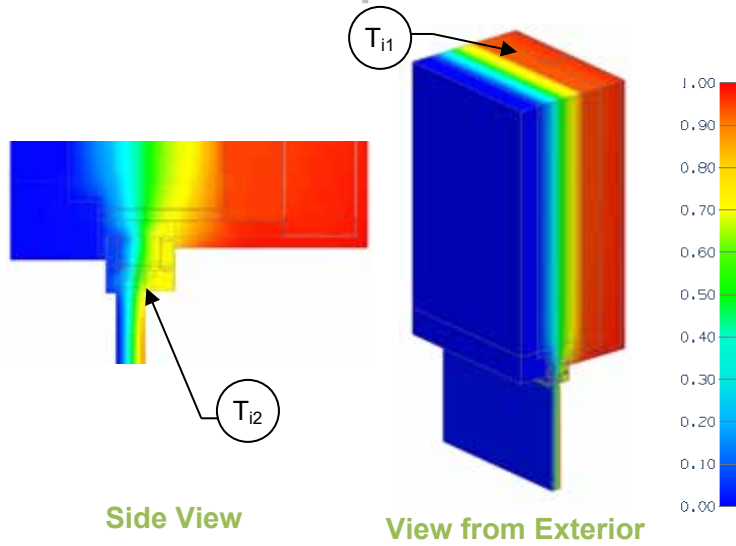
Scenario	Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\Psi$ Btu/ft·hr·°F (W/mK)
A	5	R-42.8 (7.53)	R-13.7 (2.41)	0.073 (0.42)	0.009 (0.016)
	6	R-50.8 (8.94)	R-14.1 (2.49)	0.071 (0.40)	0.010 (0.018)
	7	R-58.8 (10.35)	R-14.5 (2.55)	0.069 (0.39)	0.011 (0.019)
B	6	R-50.8 (8.94)	R-14.2 (2.50)	0.070 (0.40)	0.008 (0.015)
C	6	R-50.8 (8.94)	R-14.0 (2.46)	0.072 (0.41)	0.014 (0.023)

### Temperature Indices

	A R42.8	A R50.8	A R58.8	B R50.8	C R50.8	
$T_{i1}$	0.91	0.91	0.92	0.92	0.92	Min T on interior concrete precast sandwich panel surface, below window between studs
$T_{i2}$	0.80	0.80	0.80	0.81	0.83	Min T on window frame, at edge of glass

# Detail 7.4.7

## Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – High Performance Aluminum Window Head Detail



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.76 (0.49 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_g, R_g$	“clear field” U- and R-value w = wall g = glazing
Transmittance / Resistance	U, R	U- and R-values for the overall assembly
Linear Transmittance	$\Psi$	Incremental increase in transmittance for sill detail

### Scenarios

Scenario	Head/Jamb Detail Insulation
A	Spray Foam around opening
B	Aerogel around opening

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
5	R-40 (7.04)	R-42.8 (7.53)	R-42.3 (7.45)	0.024 (0.13)
6	R-48 (8.45)	R-50.8 (8.94)	R-50.3 (8.86)	0.020 (0.11)
7	R-56 (9.86)	R-58.8 (10.35)	R-58.3 (10.27)	0.017 (0.10)

#### Base Assembly – Glazing

$U_{\text{centre of glazing}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_{\text{frame}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_{\text{spacer}}$ Btu/ft ·hr ·°F (W/m K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.123 (0.70)	0.261 (1.48)	0.040 (0.069)	0.172 (0.98)

### Head and Jamb Linear Transmittance

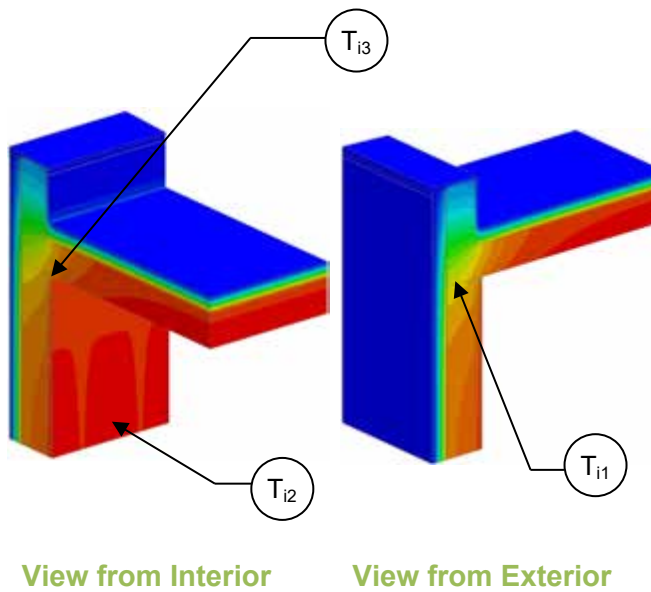
Scenario	Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ Btu/ft·hr·°F (W/mK)
A	5	R-42.8 (7.53)	R-13.9 (2.44)	0.072 (0.41)	0.004 (0.007)
	6	R-50.8 (8.94)	R-14.4 (2.53)	0.070 (0.40)	0.004 (0.007)
	7	R-58.8 (10.35)	R-14.7 (2.60)	0.068 (0.39)	0.005 (0.008)
B	6	R-50.8 (8.94)	R-14.4 (2.54)	0.069 (0.39)	0.003 (0.006)

### Temperature Indices

	A R42.8	A R50.8	A R58.8	B R50.8	
$T_{i1}$	0.95	0.96	0.96	0.96	Min T on interior concrete precast sandwich panel surface, away from window between studs
$T_{i2}$	0.77	0.77	0.77	0.77	Min T on window frame, at edge of glass

# Detail 7.5.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-12.2 (2.14)	0.082 (0.47)	0.252 (0.436)

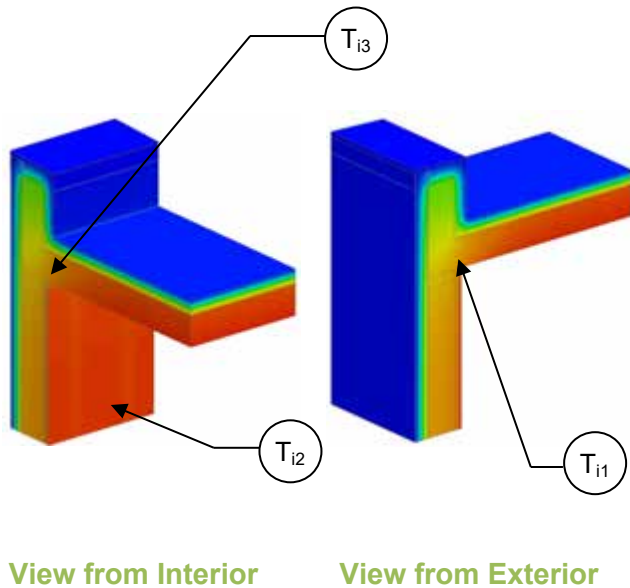
### Temperature Indices

$T_{i1}$	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 7.5.2

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-15 (2.64)	R-14.5 (2.55)	0.069 (0.39)	0.146 (0.253)

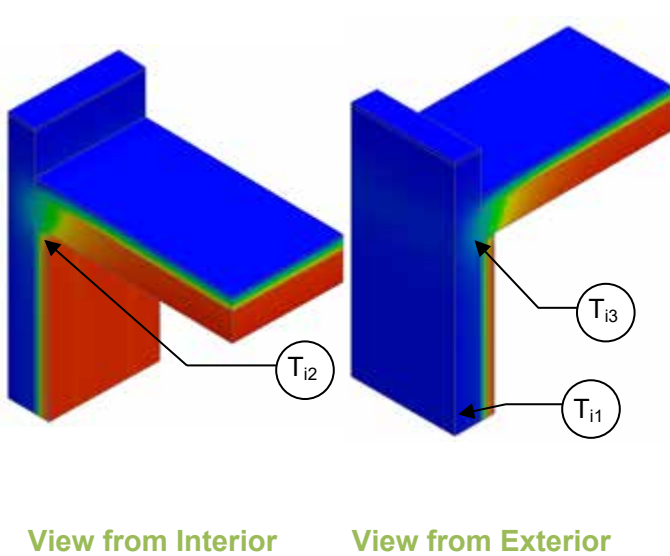
### Temperature Indices

$T_{i1}$	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 7.5.3

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

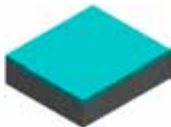
#### Base Assembly – Wall

$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)



#### Parapet Linear Transmittance

$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.94 (1.57)	0.112 (0.64)	0.449 (0.777)

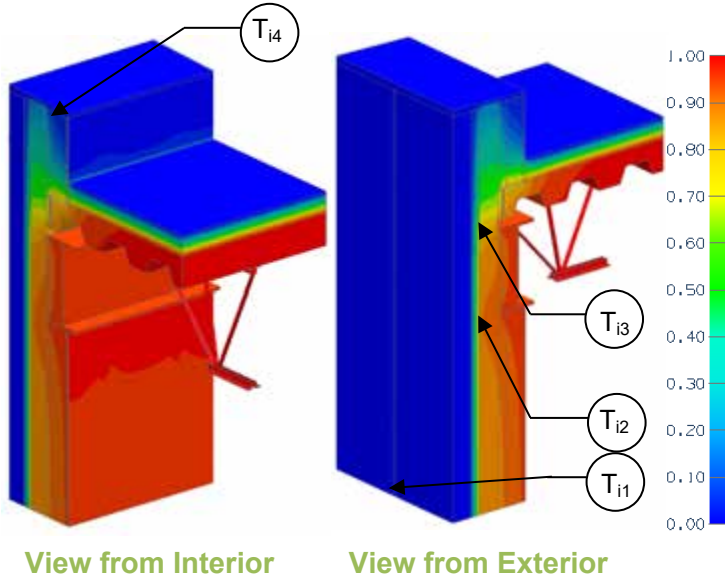


### Temperature Indices

$T_{i1}$	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 7.5.4

## 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

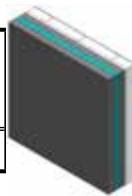
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	$U_r, R_r, U_w, R_w$	"clear field" U- and R-values: r = roof w = wall
Transmittance / Resistance	$U_j, R_j, U_p, R_p$	U- and R-values for: j = panel joint p = parapet
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_j, \Psi_p$	Incremental increase in transmittance per linear length of anomaly

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)



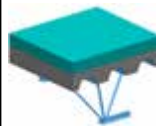
#### Panel Joint Linear Transmittance

$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\Psi_j$ Btu/ft hr °F (W/m K)
R-11.7(2.05)	0.086 (0.49)	0.026 (0.046)



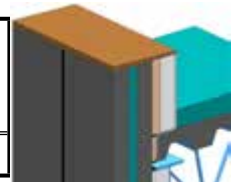
#### Base Assembly - Roof

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



#### Parapet Linear Transmittance

$R_p$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_p$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\Psi_p$ Btu/ft hr °F (W/m K)
R-8.2 (1.43)	0.123 (0.70)	0.375 (0.650)



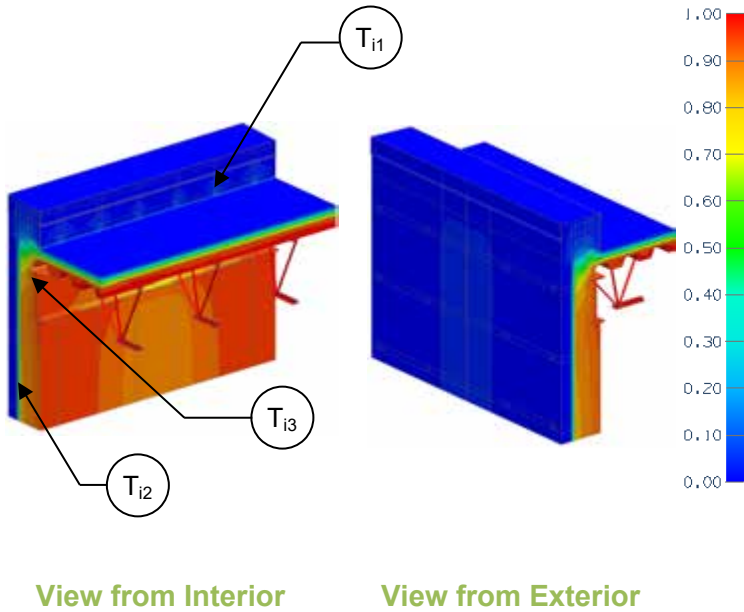
### Temperature Indices

$T_{i1}$	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 7.5.5

## 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-values: r = roof w = sandwich panel
Transmittance / Resistance	$U_j, R_j, U_p, R_p$	U and R-values for: j = sandwich panel with panel joint p = parapet
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_j, \psi_p$	Incremental increase in transmittance per linear length of: j = panel joint p = parapet transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)

#### Panel Joint Linear Transmittance

$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_j$ Btu/ft ·hr·°F (W/m K)
R-6.2 (1.10)	0.160 (0.91)	0.653 (1.130)

#### Base Assembly – Roof

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

#### Parapet Linear Transmittance

Sandwich Panel Insulation 1D R-Value (RSI)	$R_p$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_p$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_p$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-5.6 (0.99)	0.178 (1.01)	0.483 (0.836)

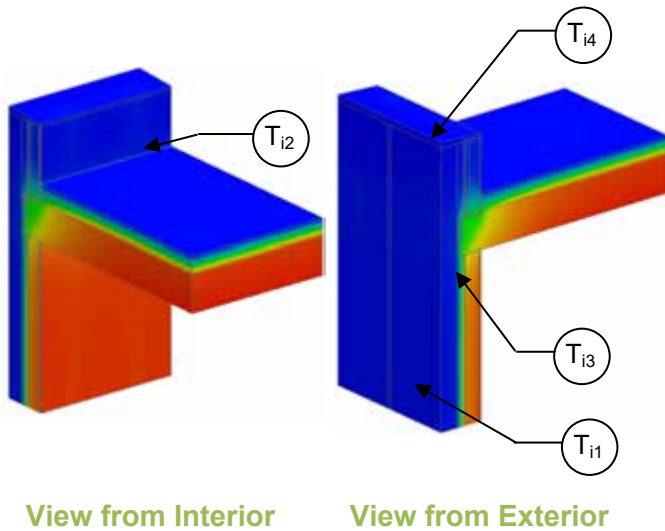
### Temperature Indices

$T_{i1}$	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 7.5.6

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

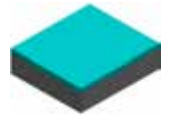
#### Base Assembly – Wall

$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-13.0 (2.29)	R-12.9 (2.26)	0.078 (0.44)



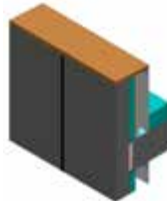
#### Base Assembly - Roof

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



#### Parapet Linear Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-9.1 (1.60)	0.110 (0.63)	0.334 (0.579)



<sup>2</sup> Panel edges (caulked joints between panels) had negligible linear transmittance effects so values not presented

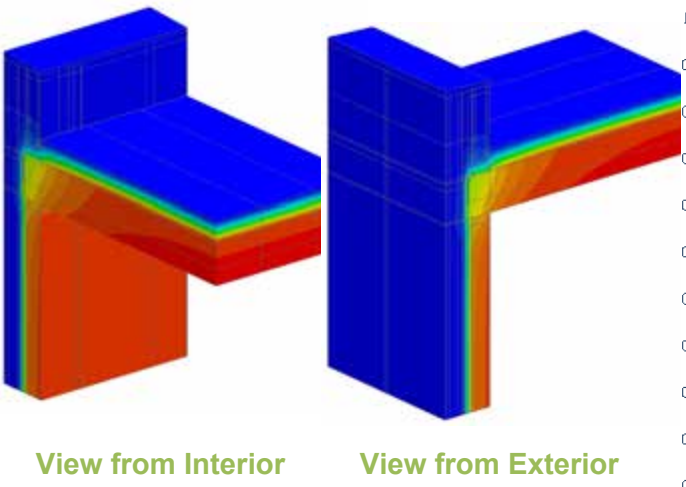
### Temperature Indices

$T_{i1}$	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 7.5.7

## 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	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Scenario

Scenario	
A	Armatherm 500 beneath stud cavity
B	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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	0.046 (0.26)

### Parapet Linear Transmittance

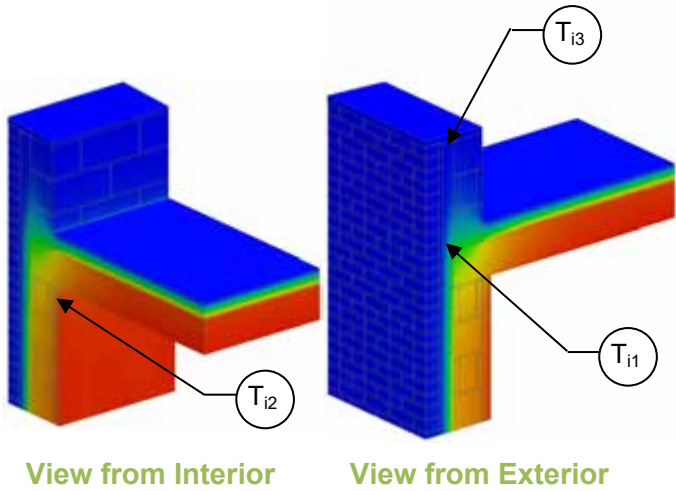
Scenario	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
A	R-10.6 (1.86)	0.095 (0.54)	0.227 (0.393)
B	R-10.7 (1.89)	0.093 (0.53)	0.125 (0.216)

Panel edges (caulked joints between panels) had negligible linear transmittance effects so values not presented

# Detail 7.5.8

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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

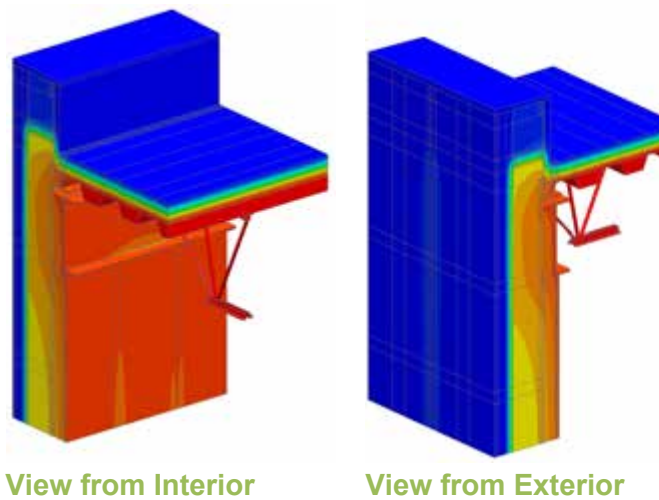
	R5	R15	R25	
$T_{i1}$	0.57	0.66	0.68	Min T on exterior face of concrete block wall, at roof/gypsum intersection and air filled blocks
$T_{i2}$	0.78	0.81	0.82	Min T on interior surfaces, at ceiling/gypsum intersection, at studs
$T_{i3}$	0.01	0.01	0.01	Min T on concrete block parapet, at wood block and air filled concrete blocks



# Detail 7.5.9

## 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
Linear Transmittance	$\Psi_j, \Psi_p$	Incremental increase in transmittance per linear length of anomaly

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Sandwich Panel Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_j$ 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

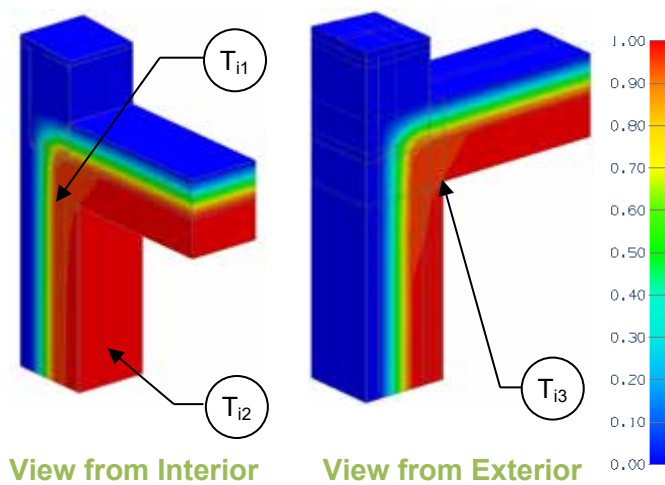
Sandwich Panel Insulation 1D R-value (RSI)	$R_p$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_p$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_p$ Btu/ft ·hr ·°F (W/m K)
R-10 (1.76)	R-9.1 (1.60)	0.110 (0.63)	0.184 (0.319)
R-15 (2.64)	R-11.1 (1.96)	0.090 (0.51)	0.145 (0.250)
R-20 (3.52)	R-13.0 (2.28)	0.077 (0.44)	0.120 (0.208)



# Detail 7.5.10

## Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Roof to Wall Intersection with Wood-Framed Parapet

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.76 (0.49 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_w, R_w, U_r, R_r$	“clear field” U- and R-value w = wall r = roof
Transmittance / Resistance	U, R	U- and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
5	R-40 (7.04)	R-42.8 (7.53)	R-42.3 (7.45)	0.024 (0.134)
6	R-48 (8.45)	R-50.8 (8.94)	R-50.3 (8.86)	0.020 (0.113)
7	R-56 (9.86)	R-58.8 (10.35)	R-58.3 (10.27)	0.017 (0.097)

#### Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-48 (8.45)	R-50.0 (8.81)	R-50.0 (8.81)	0.020 (0.114)

#### Parapet Linear Transmittance

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ Btu/ft·hr·°F (W/mK)
5	R-42.8 (7.53)	R-47.2 (8.32)	0.021 (0.120)	-0.0066 (-0.0115)
6	R-50.8 (8.94)	R-50.4 (8.87)	0.020 (0.113)	-0.0008 (-0.0014)
7	R-58.8 (10.35)	R-52.9 (9.33)	0.019 (0.107)	0.0034 (0.0059)

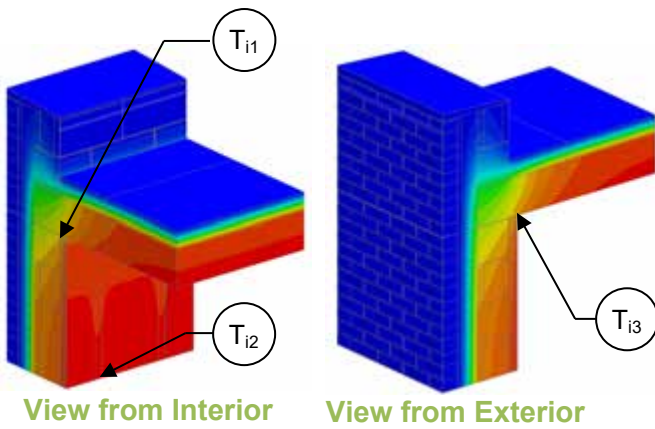
\*Clear Wall and Roof areas measured to the outside of the insulation

### Temperature Indices

	R42.8	R50.8	R58.8	
$T_{i1}$	0.93	0.93	0.93	Min T on interior concrete precast sandwich panel surface, at concrete roof slab intersection
$T_{i2}$	0.95	0.96	0.96	Max T on interior concrete precast sandwich panel surface, between studs
$T_{i3}$	0.95	0.95	0.95	Min T on concrete ceiling, at drywall intersection, exposed to interior air

# Detail 7.5.11

## Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Vener Anchoring System Supporting Brick Veneer – Roof to Wall Intersection with Uninsulated Parapet



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.99 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-15.6 (2.75)	R-13.4 (2.36)	0.075 (0.42)
R-20.0 (3.52)	R-25.6 (4.51)	R-20.0 (3.52)	0.050 (0.28)

#### Base Assembly - Roof

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

#### Parapet Linear Transmittance

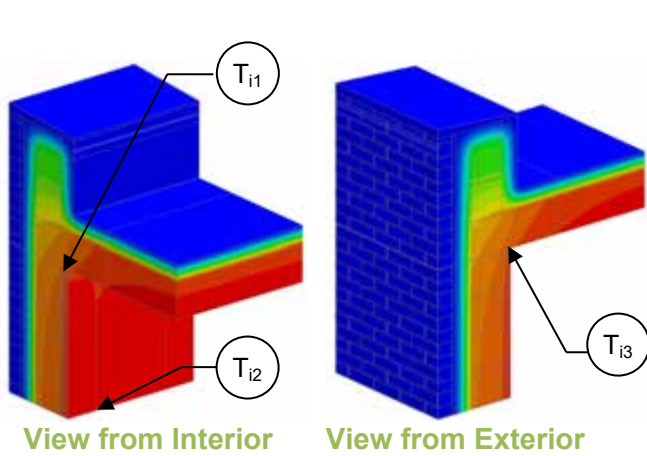
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-8.9 (1.56)	0.113 (0.64)	0.292 (0.505)
R-20.0 (3.52)	R-10.0 (1.75)	0.100 (0.57)	0.290 (0.502)

### Temperature Indices

	R10	R20	
$T_{i1}$	0.72	0.74	Min T on interior CMU surface, at concrete roof slab intersection
$T_{i2}$	0.85	0.89	Max T on interior CMU surface, at studs and away from concrete roof slab intersection
$T_{i3}$	0.78	0.79	Min T on concrete ceiling, at drywall intersection, exposed to interior air

# Detail 7.5.12

## Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Vener Anchoring System Supporting Brick Veneer – Roof to Wall Intersection with Insulation Wrapped Around Parapet



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.99 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-15.6 (2.75)	R-13.4 (2.36)	0.075 (0.42)
R-20.0 (3.52)	R-25.6 (4.51)	R-20.0 (3.52)	0.050 (0.28)

#### Base Assembly - Roof

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

#### Parapet Linear Transmittance

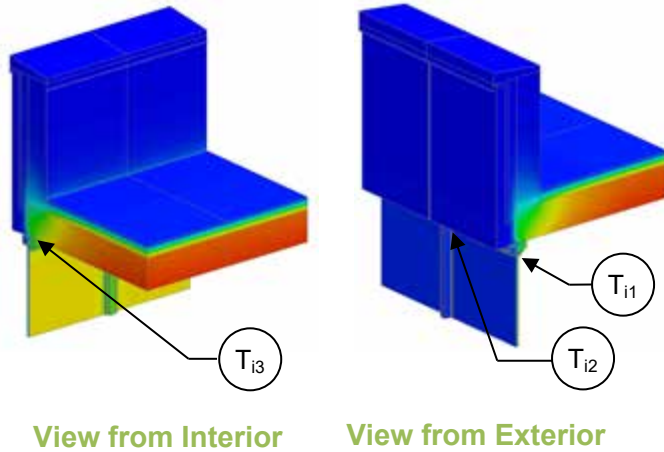
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-11.5 (2.03)	0.087 (0.49)	0.150 (0.260)
R-20.0 (3.52)	R-14.4 (2.53)	0.070 (0.40)	0.121 (0.209)

### Temperature Indices

	R10	R20	
$T_{i1}$	0.81	0.85	Min T on interior CMU surface, at concrete roof slab intersection
$T_{i2}$	0.86	0.90	Max T on interior CMU surface, at studs and away from concrete roof slab intersection
$T_{i3}$	0.85	0.88	Min T on concrete ceiling, at drywall intersection, exposed to interior air

# Detail 7.5.13

## Window Wall System – Double Glazed Insulated Frame at Concrete Precast Panel Parapet & Roof Intersection



### Thermal Performance Indicators

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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Roof

Roof Insulation 1DR-Value (RSI)	$R_r$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-21.9 (3.86)	0.046 (0.26)
R-40.0 (7.04)	R-41.9 (7.38)	0.024 (0.14)

#### Base Assembly – Glazing

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

#### Parapet Linear Transmittance

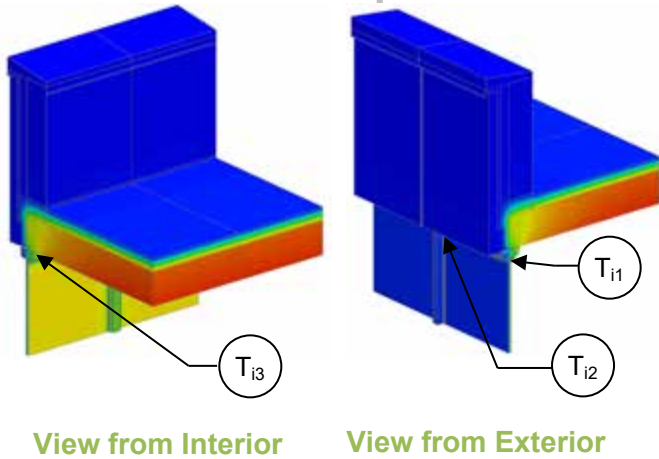
Parapet Insulation 1D R-Value (RSI)	R-20 Roof Insulation			R-40 Roof Insulation		
	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-4.1 (0.72)	0.245 (1.39)	0.354 (0.613)	R-4.4 (0.77)	0.228 (1.30)	0.336 (0.582)
R-15.0 (2.64)	R-4.1 (0.72)	0.244 (1.39)	0.351 (0.608)	R-4.4 (0.77)	0.227 (1.29)	0.332 (0.575)
R-20.0 (3.52)	R-4.1 (0.72)	0.244 (1.39)	0.351 (0.607)	R-4.4 (0.78)	0.227 (1.29)	0.331 (0.572)

### Temperature Indices

	R-20 Roof Insulation			R-40 Roof Insulation			
	R10.0	R15.0	R20.0	R10.0	R15.0	R20.0	
$T_{i1}$	0.49	0.49	0.49	0.50	0.50	0.50	Min T on frame, along head at edge of glazing
$T_{i2}$	0.61	0.61	0.61	0.61	0.61	0.61	Min T on glazing, at corner of glazing
$T_{i3}$	0.54	0.54	0.54	0.56	0.56	0.56	Min T on slab, along head of window wall close to centre mullion

# Detail 7.5.14

## Window Wall System – Double Glazed Insulated Frame at Isokorb AXTI Thermally Broken Concrete Parapet & Roof Intersection



### Thermal Performance Indicators

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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Roof

Roof Insulation 1DR-Value (RSI)	$R_r$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-21.9 (3.86)	0.046 (0.26)
R-40.0 (7.04)	R-41.9 (7.38)	0.024 (0.14)

#### Base Assembly – Glazing

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

#### Parapet Linear Transmittance

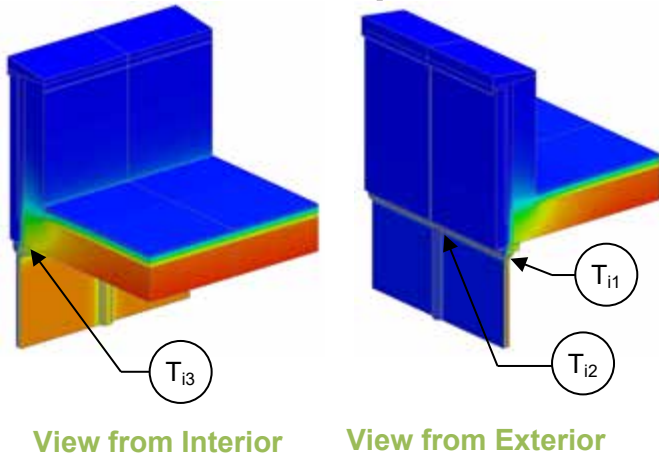
Parapet Insulation 1D R-Value (RSI)	R-20 Roof Insulation			R-40 Roof Insulation		
	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-4.7 (0.83)	0.211 (1.20)	0.160 (0.277)	R-5.0 (0.88)	0.201 (1.14)	0.176 (0.305)
R-15.0 (2.64)	R-4.7 (0.84)	0.211 (1.20)	0.156 (0.270)	R-5.0 (0.88)	0.200 (1.13)	0.170 (0.294)
R-20.0 (3.52)	R-4.8 (0.84)	0.211 (1.20)	0.154 (0.267)	R-5.0 (0.88)	0.199 (1.13)	0.168 (0.292)

### Temperature Indices

	R-20 Roof Insulation			R-40 Roof Insulation			
	R10.0	R15.0	R20.0	R10.0	R15.0	R20.0	
$T_{i1}$	0.53	0.53	0.53	0.53	0.53	0.53	Min T on frame, along head at edge of glazing
$T_{i2}$	0.62	0.62	0.62	0.62	0.62	0.62	Min T on glazing, at corner of glazing
$T_{i3}$	0.61	0.61	0.61	0.61	0.62	0.62	Min T on slab, along head of window wall close to centre mullion

# Detail 7.5.15

## Window Wall System – Triple Glazed Insulated Frame at Concrete Precast Panel Parapet & Roof Intersection



### Thermal Performance Indicators

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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Roof

Roof Insulation 1DR-Value (RSI)	$R_r$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-21.9 (3.86)	0.046 (0.26)
R-40.0 (7.04)	R-41.9 (7.38)	0.024 (0.14)

#### Base Assembly – Glazing

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

#### Parapet Linear Transmittance

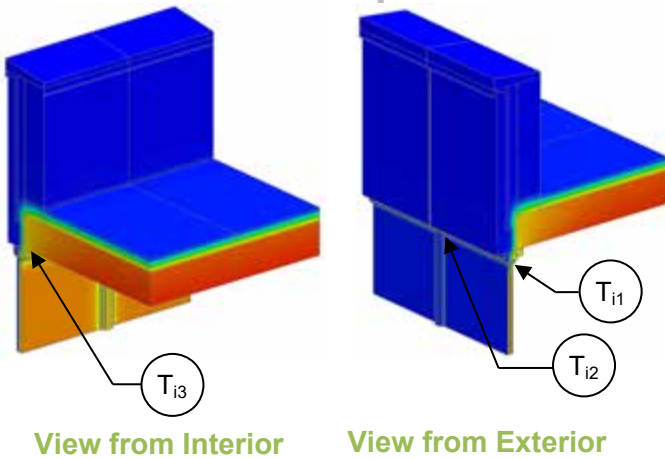
Parapet Insulation 1D R-Value (RSI)	R-20 Roof Insulation			R-40 Roof Insulation		
	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-5.3 (0.94)	0.188 (1.06)	0.374 (0.647)	R-5.9 (1.04)	0.169 (0.96)	0.344 (0.595)
R-15.0 (2.64)	R-5.3 (0.94)	0.187 (1.06)	0.371 (0.642)	R-5.9 (1.04)	0.169 (0.96)	0.342 (0.591)
R-20.0 (3.52)	R-5.4 (0.94)	0.187 (1.06)	0.369 (0.639)	R-6.0 (1.05)	0.168 (0.95)	0.338 (0.585)

### Temperature Indices

	R-20 Roof Insulation			R-40 Roof Insulation			
	R10.0	R15.0	R20.0	R10.0	R15.0	R20.0	
$T_{i1}$	0.64	0.64	0.64	0.65	0.65	0.65	Min T on frame, along head at edge of glazing
$T_{i2}$	0.67	0.67	0.67	0.67	0.67	0.67	Min T on glazing, at corner of glazing
$T_{i3}$	0.65	0.65	0.65	0.67	0.67	0.66	Min T on slab, along head of window wall close to centre mullion

# Detail 7.5.16

## Window Wall System – Triple Glazed Insulated Frame at Isokorb AXTI Thermally Broken Concrete Parapet & Roof Intersection



### Thermal Performance Indicators

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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per length of parapet

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Roof

Roof Insulation 1DR-Value (RSI)	$R_r$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-21.9 (3.86)	0.046 (0.26)
R-40.0 (7.04)	R-41.9 (7.38)	0.024 (0.14)

#### Base Assembly – Glazing

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

#### Parapet Linear Transmittance

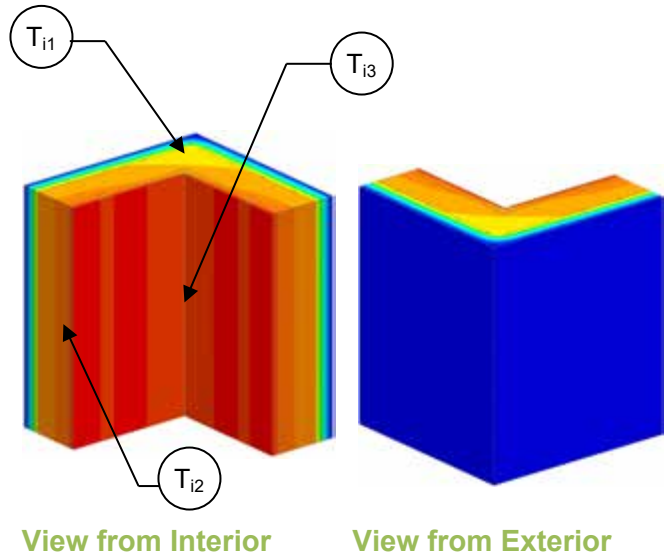
Parapet Insulation 1D R-Value (RSI)	R-20 Roof Insulation			R-40 Roof Insulation		
	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-10.0 (1.76)	R-6.9 (1.21)	0.145 (0.82)	0.126 (0.219)	R-7.5 (1.32)	0.134 (0.76)	0.138 (0.239)
R-15.0 (2.64)	R-6.9 (1.22)	0.145 (0.82)	0.122 (0.211)	R-7.5 (1.32)	0.133 (0.76)	0.134 (0.232)
R-20.0 (3.52)	R-7.0 (1.22)	0.144 (0.82)	0.118 (0.204)	R-7.6 (1.33)	0.132 (0.75)	0.130 (0.225)

### Temperature Indices

	R-20 Roof Insulation			R-40 Roof Insulation			
	R10.0	R15.0	R20.0	R10.0	R15.0	R20.0	
$T_{i1}$	0.69	0.69	0.69	0.69	0.69	0.69	Min T on frame, along head at edge of glazing
$T_{i2}$	0.67	0.67	0.67	0.67	0.67	0.67	Min T on glazing, at corner of glazing
$T_{i3}$	0.73	0.73	0.74	0.74	0.74	0.74	Min T on slab, along head of window wall close to centre mullion

# Detail 7.6.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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)

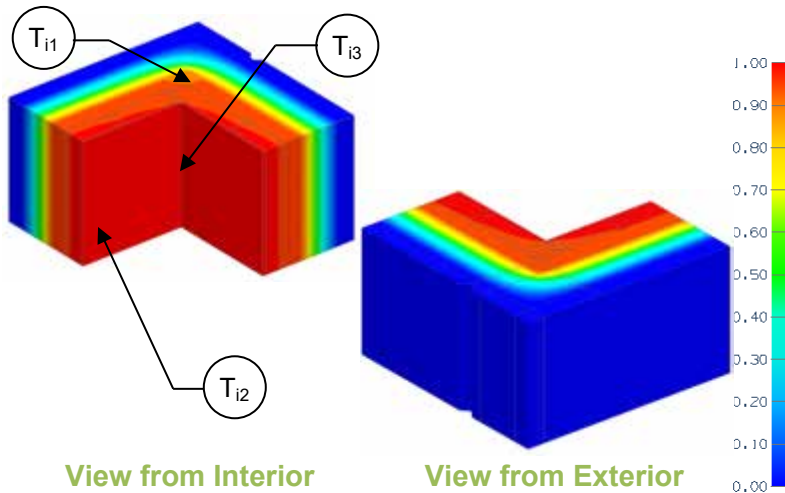
### Temperature Indices

$T_{i1}$	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 7.6.2

## Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Outside Corner



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.76 (0.49 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value
Transmittance / Resistance	U, R	U- and R-values for the overall assembly
Linear Transmittance	$\psi$	Incremental increase in transmittance for corners

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
5	R-40 (7.04)	R-42.8 (7.53)	R-42.3 (7.45)	0.024 (0.134)
6	R-48 (8.45)	R-50.8 (8.94)	R-50.3 (8.86)	0.020 (0.113)
7	R-56 (9.86)	R-58.8 (10.35)	R-58.3 (10.27)	0.017 (0.097)

#### Corner Linear Transmittance

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/mK)
5	R-42.8 (7.53)	R-52.6 (9.27)	0.019 (0.108)	-0.0272 (-0.0471)
6	R-50.8 (8.94)	R-62.0 (10.92)	0.016 (0.092)	-0.0221 (-0.0382)
7	R-58.8 (10.35)	R-71.4 (12.57)	0.014 (0.080)	-0.0184 (-0.0319)

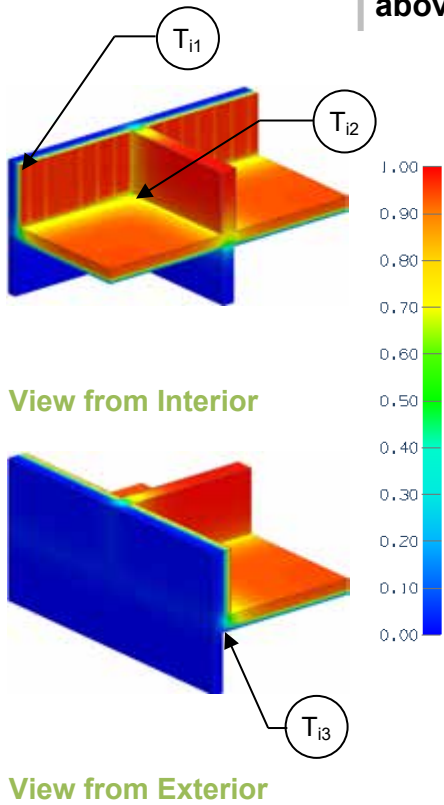
\*Clear Wall area measured to the outside of the insulation

### Temperature Indices

	R42.8	R50.8	R58.8	
$T_{i1}$	0.90	0.92	0.93	Min T on interior concrete precast sandwich panel surface, at corner
$T_{i2}$	0.94	0.95	0.96	Max T on interior concrete precast sandwich panel surface, between studs away from corner
$T_{i3}$	0.96	0.96	0.97	Min T on drywall, at corner

# Detail 7.7.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_i, \psi_s, \psi_p$	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	$\chi$	Incremental increase in transmittance for inner wall and slab intersection

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_i$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_i$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_f$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-22.2 (3.91)	0.045 (0.26)

#### Interior Wall Linear Transmittance at Slab

$R_p$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_p$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_p$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi^2$ 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)

<sup>2</sup>Values are negative for a correction factor. See section 6 in ASHRAE 1365-RP for clarification.

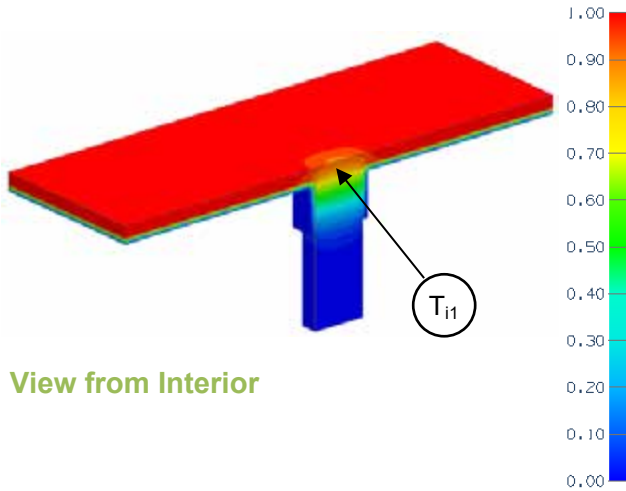
### Temperature Indices

	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 7.7.2

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for concrete column

<sup>1</sup>Assumptions 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

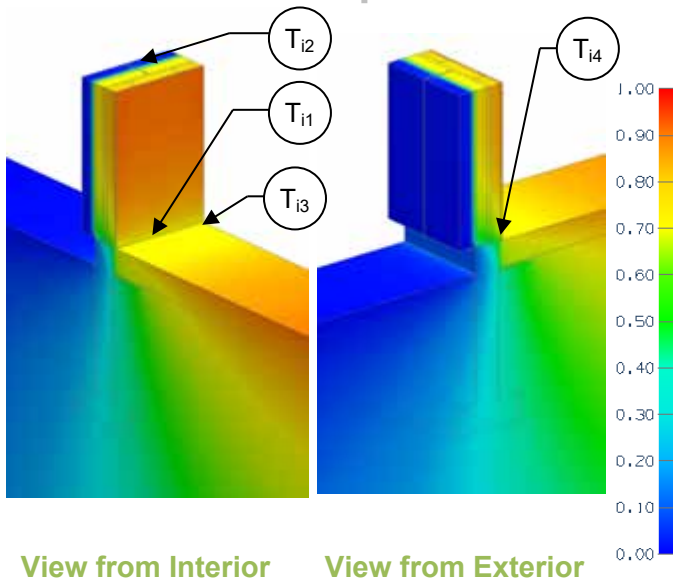
	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ 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)	1.40 (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)	0.62 (0.33)

### Temperature Indices

	A	B	
$T_{i1}$	0.62	0.79	Min T on concrete floor at column

# Detail 7.7.3

## 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
Transmittance / Resistance	$U_j, R_j$	U and R values with panel joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_j, \psi_t$	Incremental increase in transmittance per linear length of: j = panel joint t = assembly with foundation
Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = assembly with foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>For on grade transition calculation, see Appendix B introduction

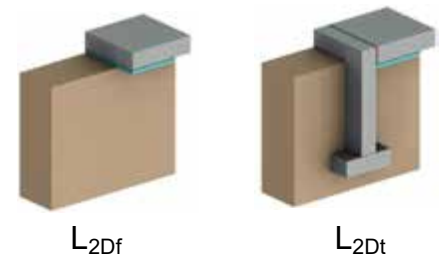
### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Sandwich Panel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_j$ Btu/ft·hr·°F (W/m K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)	R-11.7 (2.05)	0.086 (0.49)	0.026 (0.046)

#### 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)	$\psi_t$ Btu/ft·hr·°F (W/m K)
R-5 (0.88)	12 (305)	1.18 (2.04)	1.97 (3.41)	0.451 (0.781)
R-5 (0.88)	24 (610)	1.12 (1.94)	1.93 (3.34)	0.466 (0.807)
R-5 (0.88)	36 (914)	1.07 (1.86)	1.89 (3.27)	0.470 (0.814)
R-5 (0.88)	48 (1219)	1.04 (1.80)	1.86 (3.22)	0.474 (0.820)

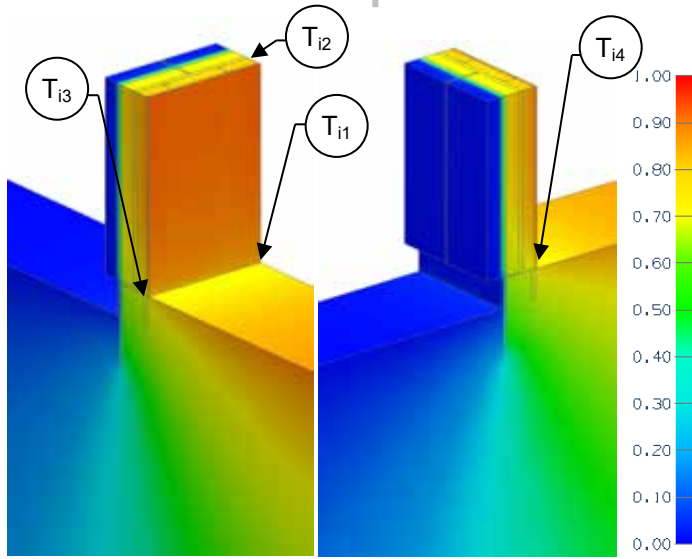


### Temperature Indices

$T_{i1}$	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 7.7.4

## Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) - Concrete Slab and Foundation Wall Intersection



View from Interior

View from Exterior

### 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 and panel joint
Transmittance / Resistance	$U_j, R_j$	U and R values with panel joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_j, \psi_t$	Incremental increase in transmittance per linear length of: j = panel joint t = assembly with foundation
Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = assembly with foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>For on grade transition calculation, see Appendix B introduction

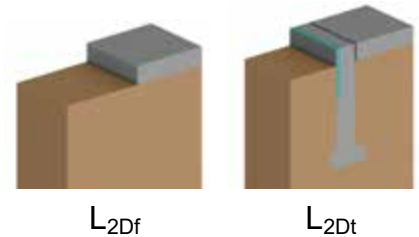
### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Sandwich Panel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_j$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)	R-11.7 (2.05)	0.086 (0.49)	0.026 (0.046)

#### 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)	$\psi_t$ Btu/ft ·hr·°F (W/m K)
R-5 (0.88)	12 (305)	1.19 (2.06)	1.71 (2.96)	0.175 (0.303)
R-5 (0.88)	24 (610)	1.10 (1.90)	1.63 (2.82)	0.188 (0.325)
R-5 (0.88)	36 (914)	1.04 (1.81)	1.58 (2.73)	0.190 (0.330)



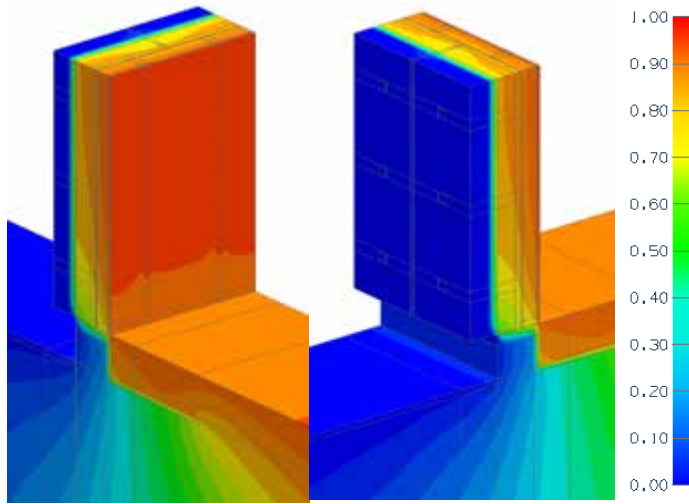
### Temperature Indices

$T_{i1}$	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 7.7.5

## 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

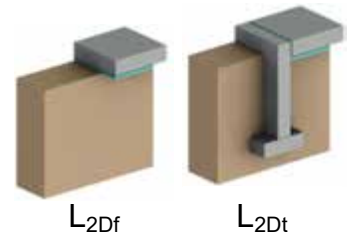
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.9 (0.69 RSI) + sandwich panel insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value, without foundation and panel joint
Transmittance / Resistance	$U_j, R_j$	U and R values for with panel joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = floor + wall + foundation
Linear Transmittance	$\psi_j, \psi_t$	Incremental increase in transmittance per linear length of: j = panel joint t = assembly with foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Calculation 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

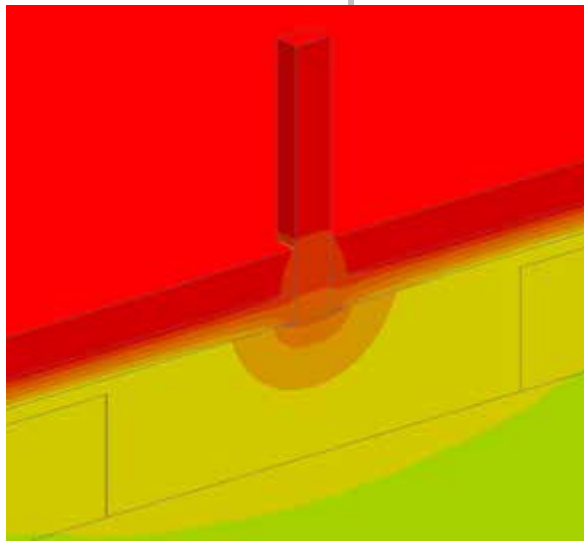
Sandwich Panel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_j$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_j$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_j$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-13.9 (2.45)	R-12.6 (2.22)	0.079 (0.45)	R-11.7 (2.05)	0.086 (0.49)	0.026 (0.046)

#### 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)	$\psi_t$ Btu/ft ·hr·°F (W/m K)
1	R-5 (0.88)	12 (305)	1.18 (2.04)	1.97 (3.41)	0.451 (0.781)
2	R-5 (0.88)	12 (305)	1.18 (2.04)	1.88 (3.25)	0.360 (0.622)
3	R-5 (0.88)	12 (305)	1.18 (2.04)	1.83 (3.17)	0.313 (0.541)
4	R-5 (0.88)	12 (305)	1.18 (2.04)	1.74 (3.01)	0.221 (0.382)
5	R-5 (0.88)	12 (305)	1.18 (2.04)	1.71 (2.96)	0.190 (0.330)
	R-5 (0.88)	24 (610)	1.12 (1.94)	1.65 (2.85)	0.184 (0.319)
	R-5 (0.88)	36 (914)	1.07 (1.86)	1.60 (2.77)	0.183 (0.316)
	R-5 (0.88)	48 (1219)	1.04 (1.80)	1.57 (2.71)	0.182 (0.315)

# Detail 7.7.6

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for column and footing

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Floor

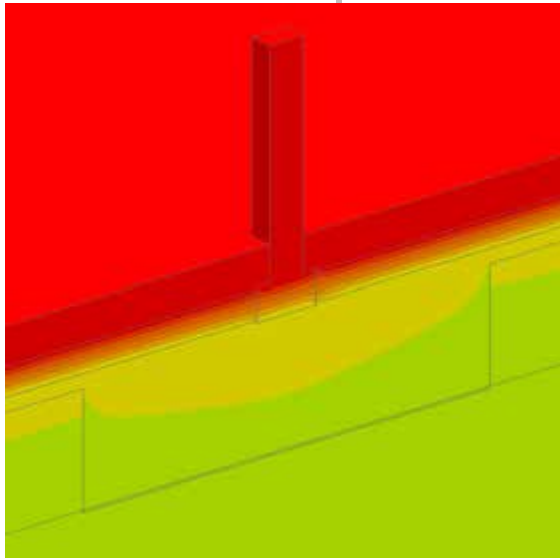
Slab Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-30 (5.26)	R-31.7 (5.57)	R-31.7 (5.57)	0.03 (0.179)

#### Column Point Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
R-29.9 (5.26)	0.03 (0.190)	1.64 (0.864)

# Detail 7.7.7

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for column and footing

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-30 (5.26)	R-31.7 (5.57)	R-31.7 (5.57)	0.03 (0.179)

#### Column Point Transmittance

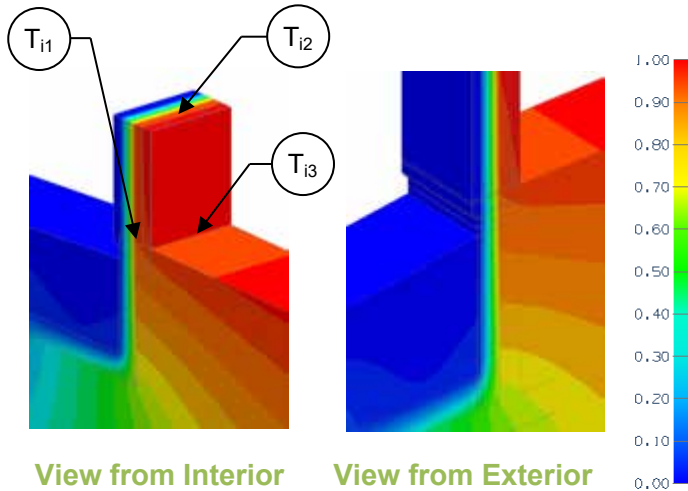
R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
R-31.5 (5.55)	0.03 (0.180)	0.151 (0.079)



# Detail 7.7.8

## Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Base of Wall at Foundation with Insulation Skirt

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.76 (0.49 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value
Transmittance / Resistance	$U, R$	U- and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Foundation Transmittance	$L$	Heat Loss of slab on grade per unit width of slab
Linear Transmittance	$\Psi$	Incremental increase in transmittance for base of wall detail at foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

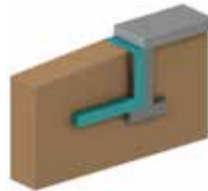
### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
5	R-40 (7.04)	R-42.8 (7.53)	R-42.3 (7.45)	0.024 (0.134)
6	R-48 (8.45)	R-50.8 (8.94)	R-50.3 (8.86)	0.020 (0.113)
7	R-56 (9.86)	R-58.8 (10.35)	R-58.3 (10.27)	0.017 (0.097)

#### Base Assembly – Foundation

Foundation Insulation R-Value/in	Foundation Insulation 1D R-Value (RSI)	$L$ Btu/ft·hr·°F (W/mK)
6	R-48 (8.45)	0.64 (1.11)



#### Base of Wall at Foundation Linear Transmittance

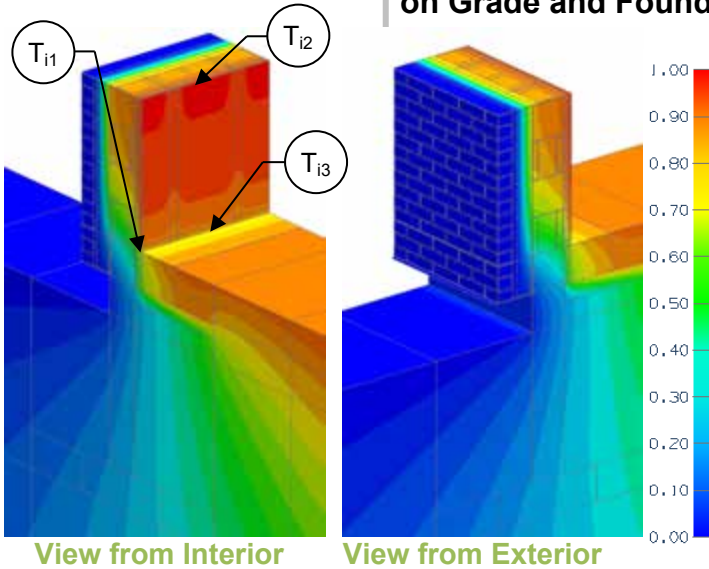
Wall Insulation R-Value/in	Wall Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ Btu/ft·hr·°F (W/mK)
5	R-42.8 (7.53)	R-4.5 (0.80)	0.220 (1.251)	0.0030 (0.0053)
6	R-50.8 (8.94)	R-4.6 (0.81)	0.217 (1.230)	0.0033 (0.0057)
7	R-58.8 (10.35)	R-4.7 (0.82)	0.214 (1.216)	0.0041 (0.0070)

### Temperature Indices

	R42.8	R50.8	R58.8	
$T_{i1}$	0.91	0.91	0.91	Min T on interior concrete precast sandwich panel surface, at slab intersection
$T_{i2}$	0.95	0.96	0.96	Max T on interior concrete precast sandwich panel surface, between studs and away from slab
$T_{i3}$	0.92	0.92	0.92	Min T on floor, at drywall intersection

# Detail 7.7.9

## Owens Corning Exterior Insulated Concrete Block Wall Assembly with Steel Shelf Angle and Heckmann Pos-I-Tie Vener Anchoring System Supporting Brick Veneer and Insulation Below Floor – Slab on Grade and Foundation Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.99 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = floor + wall + foundation
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Calculation method follows ISO 10211:2007, 10.4.3

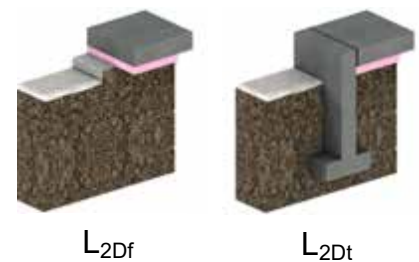
### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Sandwich Panel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-15.6 (2.75)	R-13.4 (2.36)	0.075 (0.42)
R-20.0 (3.52)	R-25.6 (4.51)	R-20.0 (3.52)	0.050 (0.28)

#### 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)	$\psi$ Btu/ft·hr·°F (W/m K)
R-17.5 (3.08)	24 (610)	1.25 (2.16)	1.75 (3.02)	0.301 (0.521)
R-17.5 (3.08)	24 (610)	1.25 (2.16)	1.70 (2.95)	0.322 (0.557)

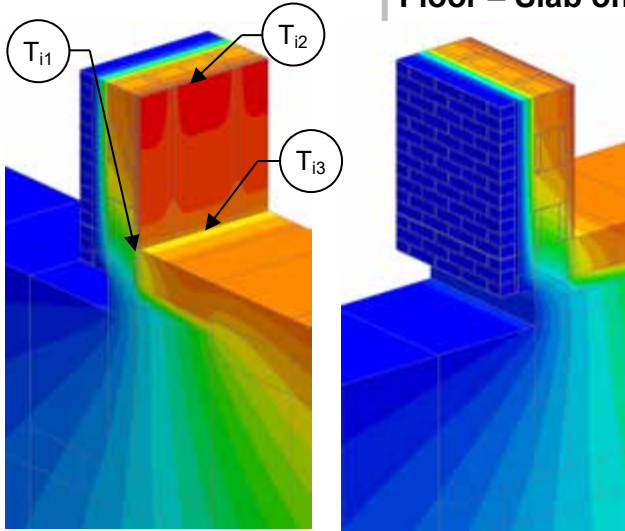


### Temperature Indices

	R10	R20	
$T_{i1}$	0.55	0.56	Min T on interior CMU surface, at slab intersection
$T_{i2}$	0.82	0.86	Max T on interior CMU surface, between studs and away from slab
$T_{i3}$	0.69	0.70	Min T on floor, at drywall intersection

# Detail 7.7.10

## Owens Corning Exterior Insulated Concrete Block Wall Assembly with Stainless Steel Shelf Angle and Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Insulation Below Floor – Slab on Grade and Foundation Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

1.00	Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.6 (0.99 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
0.60	Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = floor + wall + foundation
0.50	Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation
0.40			
0.30			
0.20			
0.10			
0.00			

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>Calculation method follows ISO 10211:2007, 10.4.3

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Sandwich Panel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-15.6 (2.75)	R-13.4 (2.36)	0.075 (0.42)
R-20.0 (3.52)	R-25.6 (4.51)	R-20.0 (3.52)	0.050 (0.28)

#### 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)	$\psi$ Btu/ft·hr·°F (W/m K)
R-17.5 (3.08)	24 (610)	1.25 (2.16)	1.68 (2.90)	0.230 (0.399)
R-17.5 (3.08)	24 (610)	1.25 (2.16)	1.62 (2.81)	0.241 (0.418)



$L_{2Df}$

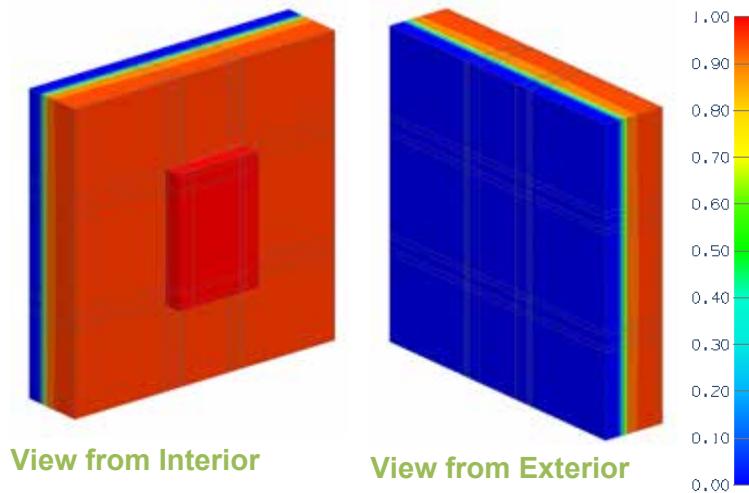
$L_{2Dt}$

### Temperature Indices

	R10	R20	
$T_{i1}$	0.61	0.63	Min T on interior CMU surface, at slab intersection
$T_{i2}$	0.83	0.87	Max T on interior CMU surface, between studs and away from slab
$T_{i3}$	0.73	0.74	Min T on floor, at drywall intersection

# Detail 7.8.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for embedment

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ 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)

## 8.0 Wood-Frame and Timber Construction

<b>Detail 8.1.1</b> .....	<b>B.8.1</b>
Interior Insulated 2x4 Wood Stud Wall Assembly – Clear Wall	
<b>Detail 8.1.2</b> .....	<b>B.8.2</b>
Interior Insulated 2x6 Wood Stud Wall Assembly – Clear Wall	
<b>Detail 8.1.3</b> .....	<b>B.8.3</b>
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Interior Insulated Cross Laminated Timber (CLT) Spandrel with ISO-CONNECT  
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- Detail 8.1.20** .....**B.8.20**  
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- Detail 8.1.21** .....**B.8.21**  
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- Detail 8.1.22** .....**B.8.22**  
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- Detail 8.1.23** .....**B.8.23**  
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- Detail 8.1.25** .....**B.8.25**

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall	
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Exterior and Interior Insulated 2x4 Wood Stud (16" o.c.) Wall Assembly with Protected SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-13 Cellulose Insulation in Stud Cavity - Clear Wall	
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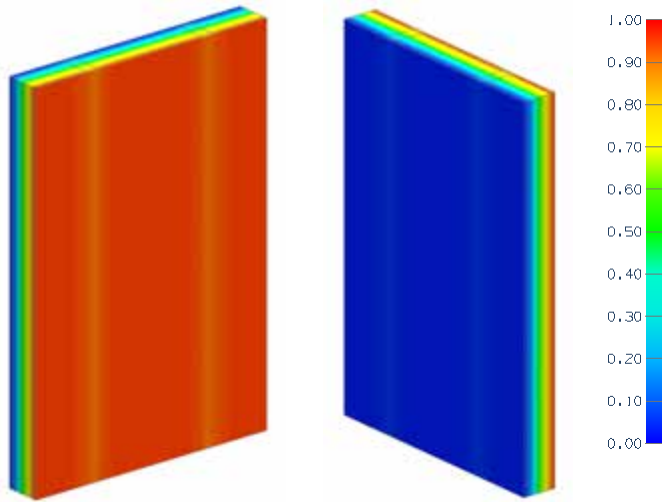
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<b>Detail 8.7.2</b> .....	<b>B.8.103</b>
Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Wood Strapping and Continuous Rigid Insulation Supporting Fiber Cement Board – Cross Laminated Timber Floor Intersection with Flashing Bypassing Exterior Insulation	
<b>Detail 8.7.3</b> .....	<b>B.8.104</b>
Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – One-Hour Fire Wall Intersection	

# Detail 8.1.1

## Interior Insulated 2x4 Wood Stud Wall Assembly – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + interior insulation or R-0.9 (0.16 RSI) for air in stud cavity
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value

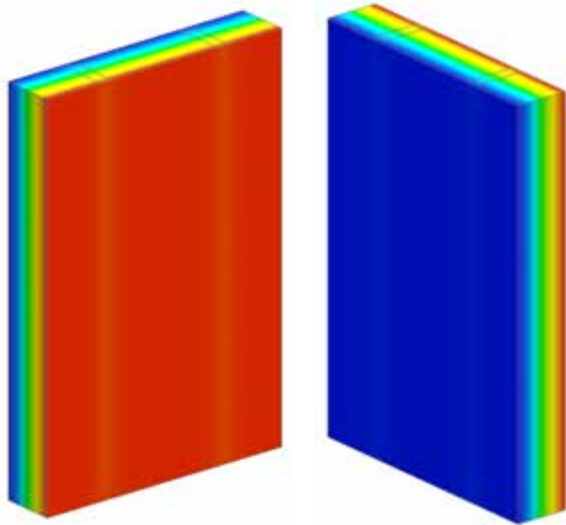
### Nominal (1D) vs. Assembly Performance Indicators

Stud Spacing	Stud Cavity Insulation	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
16" o.c.	Air	R-3.4 (0.61)	R-3.7 (0.65)	0.272 (1.54)
	R-12.0 (2.11)	R-14.5 (2.56)	R-13.4 (2.37)	0.074 (0.42)
	R-13.0 (2.29)	R-15.5 (2.74)	R-14.2 (2.50)	0.071 (0.40)
24" o.c.	Air	R-3.4 (0.61)	R-3.6 (0.64)	0.275 (1.56)
	R-12.0 (2.11)	R-14.5 (2.56)	R-13.8 (2.43)	0.072 (0.41)
	R-13.0 (2.29)	R-15.5 (2.74)	R-14.6 (2.58)	0.068 (0.39)



# Detail 8.1.2

## Interior Insulated 2x6 Wood Stud Wall Assembly – Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

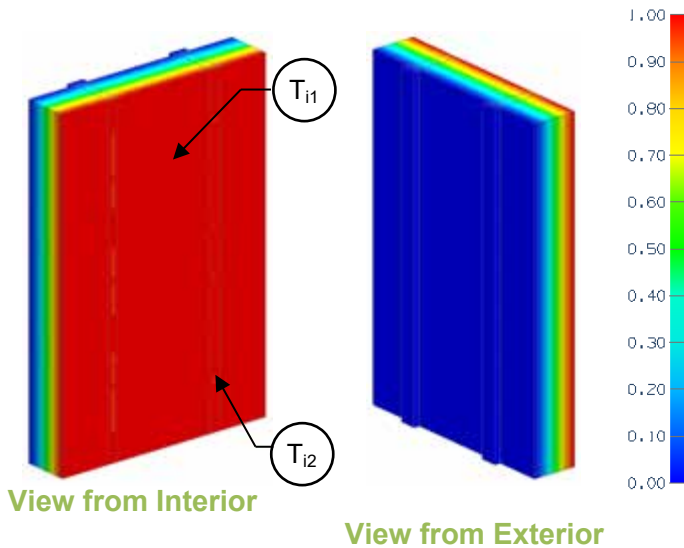
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + interior insulation or R-0.9 (0.16 RSI) for air in stud cavity
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Stud Spacing	Stud Cavity Insulation	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
16" o.c.	Air	R-3.4 (0.61)	R-3.7 (0.65)	0.270 (1.54)
	R-19.0 (3.35)	R-21.5 (3.79)	R-19.6 (3.45)	0.051 (0.29)
	R-22.0 (3.87)	R-24.5 (4.32)	R-21.8 (3.83)	0.046 (0.26)
	R-24.0 (4.23)	R-26.5 (4.67)	R-23.1 (4.07)	0.043 (0.25)
	R-26.0 (4.58)	R-28.5 (5.03)	R-24.5 (4.31)	0.041 (0.23)
	R-28.0 (4.93)	R-30.5 (5.38)	R-25.7 (4.53)	0.039 (0.22)
	R-30.0 (5.28)	R-32.5 (5.73)	R-27.0 (4.75)	0.037 (0.21)
24" o.c.	Air	R-3.4 (0.61)	R-3.6 (0.64)	0.274 (1.56)
	R-19.0 (3.35)	R-21.5 (3.79)	R-20.2 (3.57)	0.049 (0.28)
	R-22.0 (3.87)	R-24.5 (4.32)	R-22.6 (3.99)	0.044 (0.25)
	R-24.0 (4.23)	R-26.5 (4.67)	R-24.2 (4.26)	0.041 (0.23)
	R-26.0 (4.58)	R-28.5 (5.03)	R-25.7 (4.53)	0.039 (0.22)
	R-28.0 (4.93)	R-30.5 (5.38)	R-27.2 (4.79)	0.037 (0.21)
	R-30.0 (5.28)	R-32.5 (5.73)	R-28.6 (5.05)	0.035 (0.20)

## Detail 8.1.3

### Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity - Clear Wall



#### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.80 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

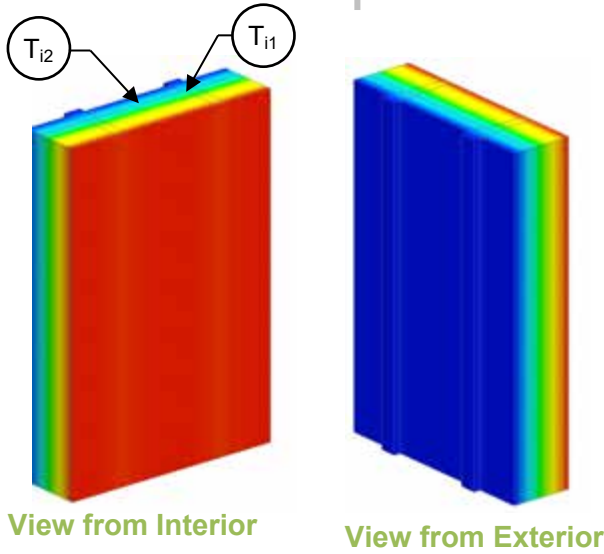
$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-21.5 (3.80)	R-19.7 (3.47)	0.051 (0.29)

#### Temperature Indices

$T_{i1}$	0.06	Min T on sheathing, between studs
$T_{i2}$	0.12	Max T on sheathing, along studs

# Detail 8.1.4

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.7 (3.81 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

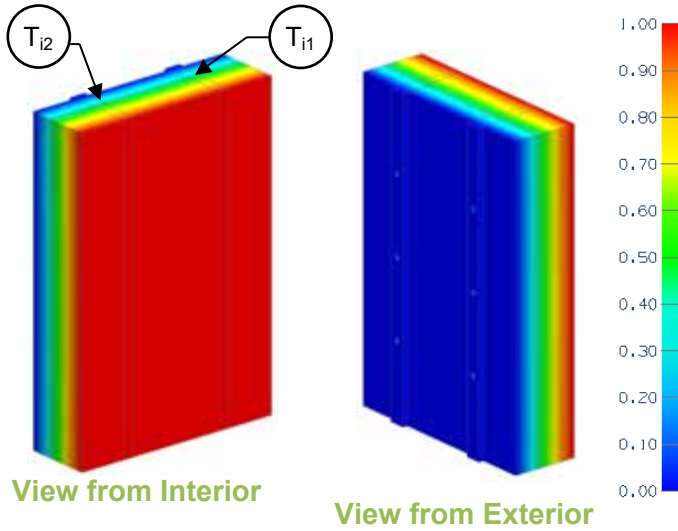
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5 (0.88)	R-26.5 (4.67)	R-23.8 (4.19)	0.042 (0.24)
R-10 (1.76)	R-31.5 (5.55)	R-27.6 (4.86)	0.036 (0.21)
R-15 (2.64)	R-36.5 (6.44)	R-31.3 (5.51)	0.032 (0.18)
R-20 (3.52)	R-41.5 (7.32)	R-34.9 (6.15)	0.029 (0.16)
R-25 (4.40)	R-46.5 (8.20)	R-38.6 (6.79)	0.026 (0.15)

### Temperature Indices

	R5	R10	R15	R20	R25	
$T_{i1}$	0.23	0.33	0.41	0.47	0.52	Min T on sheathing, adjacent to studs
$T_{i2}$	0.24	0.35	0.43	0.50	0.54	Max T on sheathing, between studs at centre of stud cavity

# Detail 8.1.5

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.80 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

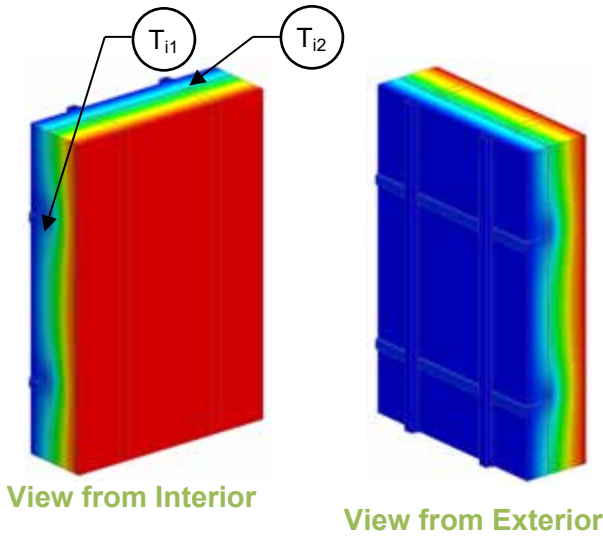
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-26.5 (4.68)	R-24.6 (4.32)	0.041 (0.23)
R-10.0 (1.76)	R-31.5 (5.56)	R-29.2 (5.14)	0.034 (0.20)
R-15.0 (2.64)	R-36.5 (6.44)	R-33.6 (5.92)	0.030 (0.17)
R-20.0 (3.52)	R-41.5 (7.32)	R-37.8 (6.66)	0.026 (0.15)
R-25.0 (4.40)	R-46.5 (8.20)	R-41.9 (7.37)	0.024 (0.14)

### Temperature Indices

	R5	R10	R15	R20	R25	
$T_{i1}$	0.25	0.35	0.41	0.46	0.50	Min T on sheathing, at fasteners along studs
$T_{i2}$	0.32	0.42	0.50	0.57	0.59	Max T on sheathing, between fasteners along studs

# Detail 8.1.6

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Horizontal Metal Z-Girts (24" o.c.) Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5 (0.88)	R-26.5 (4.67)	R-23.4 (4.12)	0.043 (0.24)
R-10 (1.76)	R-31.5 (5.55)	R-26.4 (4.64)	0.038 (0.22)
R-15 (2.64)	R-36.5 (6.44)	R-28.7 (5.06)	0.035 (0.20)
R-20 (3.52)	R-41.5 (7.32)	R-30.8 (5.42)	0.032 (0.18)
R-25 (4.40)	R-46.5 (8.20)	R-32.6 (5.73)	0.031 (0.17)

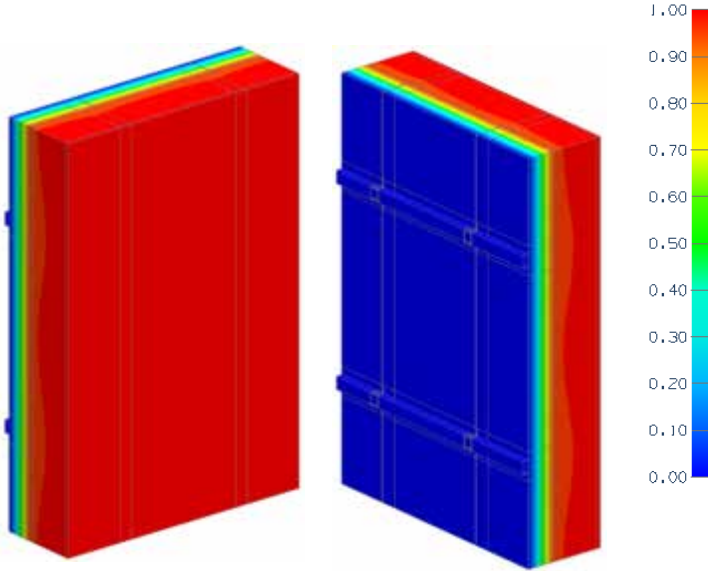
### Temperature Indices

	R5	R10	R15	R20	R25	
$T_{i1}$	0.12	0.15	0.18	0.20	0.22	Min T on sheathing, along horizontal Z-girts
$T_{i2}$	0.30	0.41	0.48	0.53	0.56	Max T on sheathing, at studs between horizontal Z-girts

# Detail 8.1.7

## 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

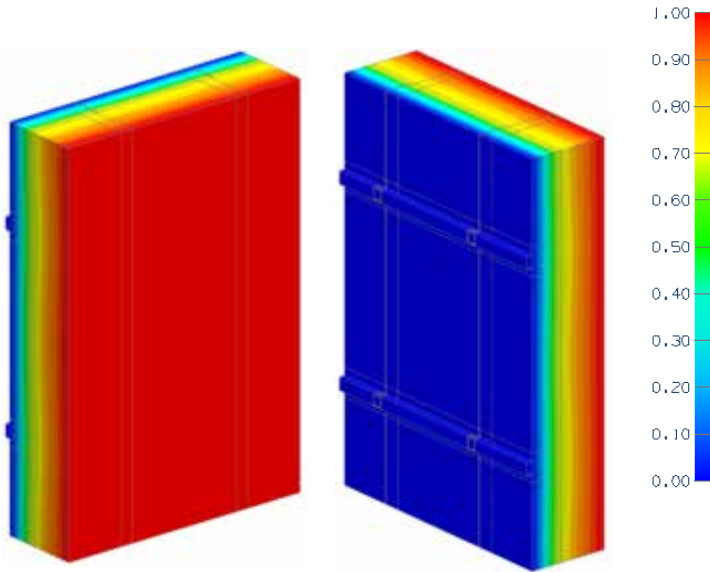
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 8.1.8

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Knight MFI-System (24" o.c.) Supporting Cladding and R-19 Batt Insulation in Stud Cavity – 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

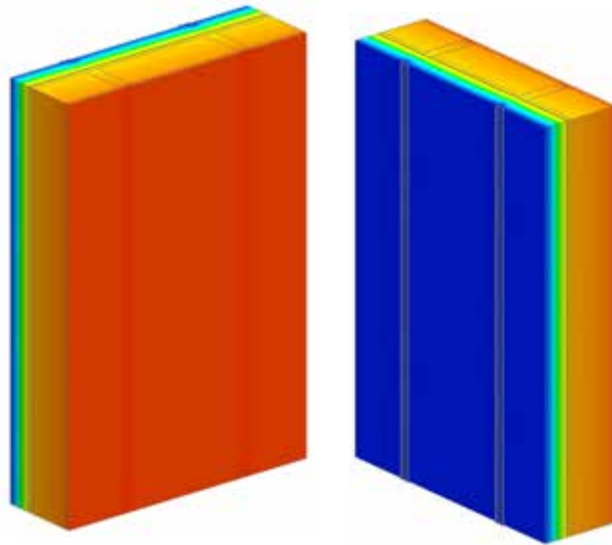
View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 8.1.9

## 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

<sup>1</sup>If 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_a$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_a$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.6 (2.22)	R-15.2 (2.68)	R-15.4 (2.73)	0.065 (0.37)

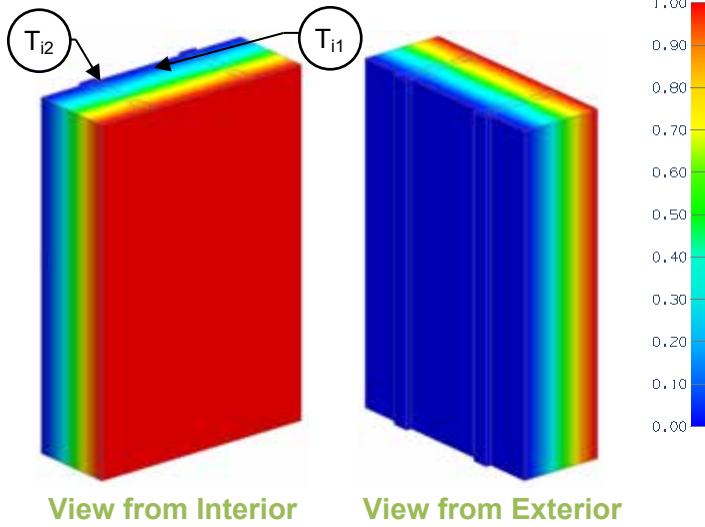
#### Clear Wall – With Fiberglass Batt Insulation in Stud Cavity

Exterior Insulation 1D R-Value (RSI)	$R_{1Db}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_b$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_b$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.6 (2.22)	R-33.2 (5.85)	31.3 (5.49)	0.032 (0.18)



# Detail 8.1.10

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-2.5 (0.44 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear field" U- and R-value, without connectors or joint
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

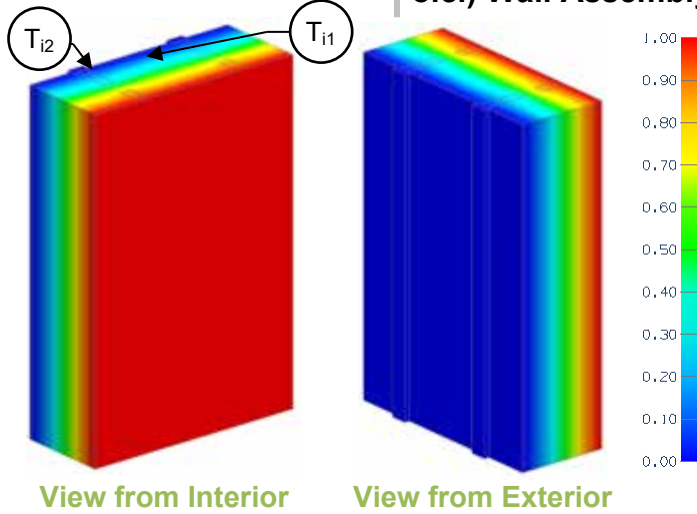
Insulation R/in	Fill Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
3.5	R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
4	R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
5	R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
6	R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

### Temperature Indices

	R38.5	R44	R55	R66	
T <sub>i1</sub>	0.029	0.028	0.024	0.020	Min T on sheathing, between studs
T <sub>i2</sub>	0.070	0.068	0.064	0.061	Max T on sheathing, at studs

# Detail 8.1.11

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 3" Gap – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without connectors or joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

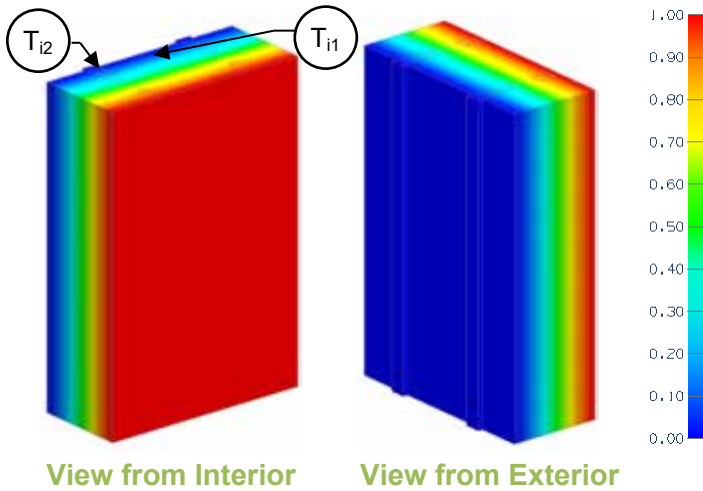
Insulation R/in	Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
3.5	R-42.0 (7.40)	R-44.5 (7.84)	R-41.6 (7.32)	0.024 (0.14)
4	R-48.0 (8.45)	R-50.5 (8.90)	R-46.4 (8.18)	0.022 (0.12)
5	R-60.0 (10.57)	R-62.5 (11.01)	R-55.9 (9.84)	0.018 (0.10)
6	R-72.0 (12.68)	R-74.5 (13.13)	R-65.0 (11.45)	0.015 (0.09)

### Temperature Indices

	R42	R48	R60	R72	
$T_{i1}$	0.027	0.025	0.022	0.018	Min T on sheathing, between studs
$T_{i2}$	0.064	0.061	0.058	0.055	Max T on sheathing, at studs

# Detail 8.1.12

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 4" Gap – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without connectors or joint
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

### Nominal (1D) vs. Assembly Performance Indicators

Insulation R/in	Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
3.5	R-45.5 (8.01)	R-48.0 (8.46)	R-45.1 (7.94)	0.022 (0.13)
4	R-52.0 (9.16)	R-54.5 (9.60)	R-50.5 (8.89)	0.020 (0.11)
5	R-65.0 (11.45)	R-67.5 (11.89)	R-60.9 (10.73)	0.016 (0.09)
6	R-78.0 (13.74)	R-80.5 (14.18)	R-71.1 (12.52)	0.014 (0.08)

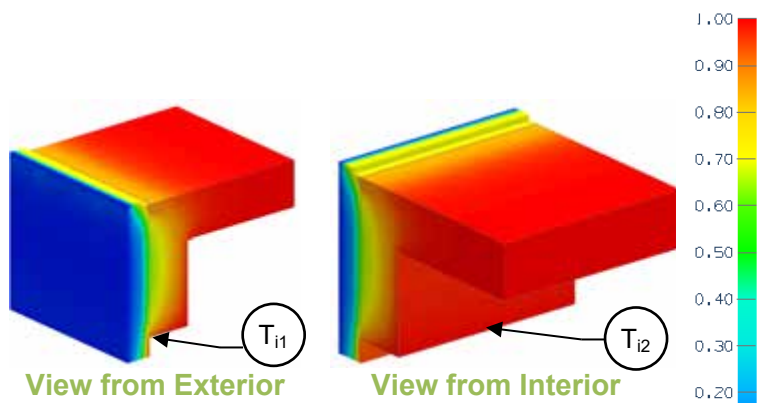
### Temperature Indices

	R45.5	R52	R65	R78	
$T_{i1}$	0.025	0.023	0.020	0.017	Min T on sheathing, between studs
$T_{i2}$	0.059	0.056	0.053	0.050	Max T on sheathing, at studs

# Detail 8.1.13

## Interior Insulated Cross Laminated Timber (CLT) Spandrel with ISO-CONNECT Anchor – Anchor Point Transmittance

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value at Beam	$R_{1D}$	R-15.4 (2.71 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	U- and R-values for the assembly without connector
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Point Transmittance	$\chi$	Incremental increase in transmittance per connector

### Assembly Performance Indicators

#### Base Assembly – Without Connector

ISO-CONNECT Spacing	Spandrel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
36" o.c.	R-8.4 (1.48)	R-23.8 (4.18)	R-13.7 (2.41)	0.073 (0.42)
	R-16.8 (2.96)	R-32.2 (5.66)	R-16.8 (2.96)	0.059 (0.34)
	R-25.2 (4.44)	R-40.6 (7.14)	R-18.9 (3.34)	0.053 (0.30)
	R-33.6 (5.92)	R-49.0 (8.62)	R-20.3 (3.58)	0.049 (0.28)

#### Connector Point Transmittance

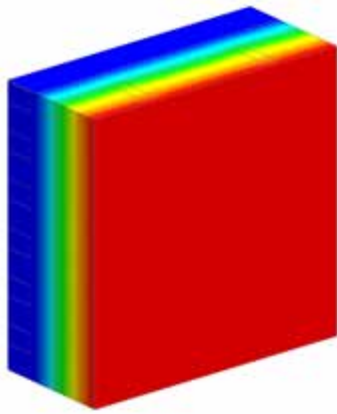
ISO-CONNECT Spacing	Spandrel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
36" o.c.	R-8.4 (1.48)	R-23.8 (4.18)	R-13.0 (2.29)	0.077 (0.44)	0.031 (0.016)
	R-16.8 (2.96)	R-32.2 (5.66)	R-15.6 (2.76)	0.064 (0.36)	0.038 (0.020)
	R-25.2 (4.44)	R-40.6 (7.14)	R-17.3 (3.05)	0.058 (0.33)	0.042 (0.022)
	R-33.6 (5.92)	R-49.0 (8.62)	R-18.5 (3.25)	0.054 (0.31)	0.041 (0.022)

### Temperature Indices

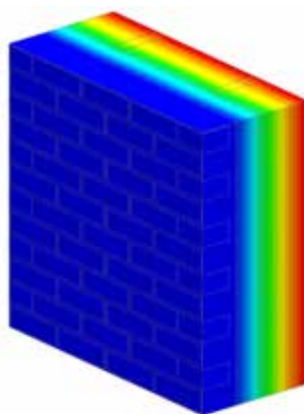
	R-8.4	R-16.8	R-25.2	R-33.6	
$T_{i1}$	0.90	0.94	0.96	0.97	Min T on beam, at insulation, between connectors
$T_{i2}$	0.90	0.93	0.94	0.95	Min T on beam, at insulation, along connector

# Detail 8.1.14

## Exterior and Interior Insulated 2"x6" Wood Stud (16" o.c. and 24" o.c.) Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Owens Corning R-19 Batt Insulation in Stud Cavity – Clear Wall



View from Interior



View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-22.6 (3.98 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	"clear wall" U- and R-value

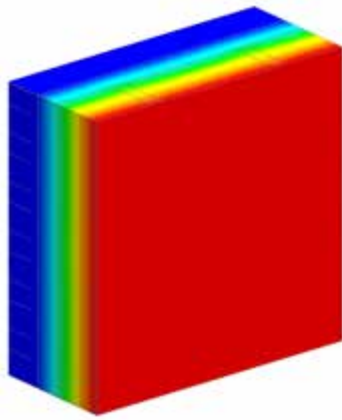
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

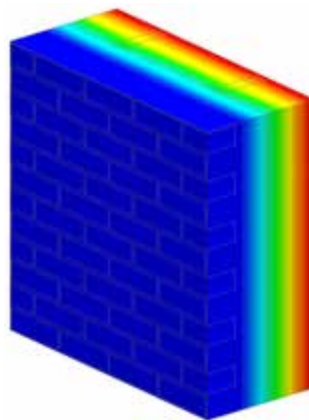
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c. Stud Spacing		24" o.c. Stud Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-32.6 (5.74)	R-29.6 (5.21)	0.034 (0.19)	R-30.6 (5.39)	0.033 (0.19)
R-15.0 (2.64)	R-37.6 (6.62)	R-33.6 (5.92)	0.030 (0.17)	R-35.0 (6.16)	0.029 (0.16)
R-20.0 (3.52)	R-42.6 (7.50)	R-37.4 (6.59)	0.027 (0.15)	R-39.1 (6.89)	0.026 (0.15)

# Detail 8.1.15

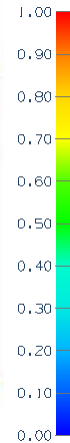
**Exterior and Interior Insulated 2"x6" Wood Stud (16" o.c. and 24" o.c.) Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Owens Corning R-22 Batt Insulation in Stud Cavity – Clear Wall**



View from Interior



View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-25.6 (4.51 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	"clear wall" U- and R-value

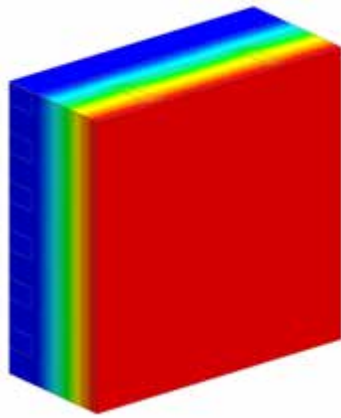
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

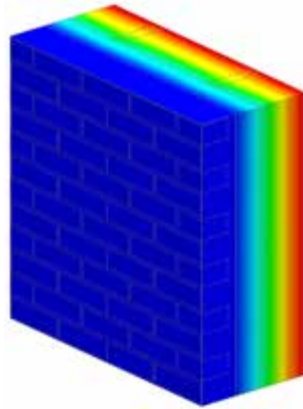
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c. Stud Spacing		24" o.c. Stud Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-35.6 (6.27)	R-31.7 (5.58)	0.032 (0.18)	R-33.0 (5.82)	0.030 (0.17)
R-15.0 (2.64)	R-40.6 (7.15)	R-35.8 (6.30)	0.028 (0.16)	R-37.3 (6.58)	0.027 (0.15)
R-20.0 (3.52)	R-45.6 (8.03)	R-39.6 (6.97)	0.025 (0.14)	R-41.3 (7.28)	0.024 (0.14)

# Detail 8.1.16

**Exterior and Interior Insulated 2"x6" Wood Stud (16" o.c. and 24" o.c.) Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Owens Corning R-24 Batt Insulation in Stud Cavity – Clear Wall**



View from Interior



View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-27.6 (4.86 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o$ , $R_o$	"clear wall" U- and R-value

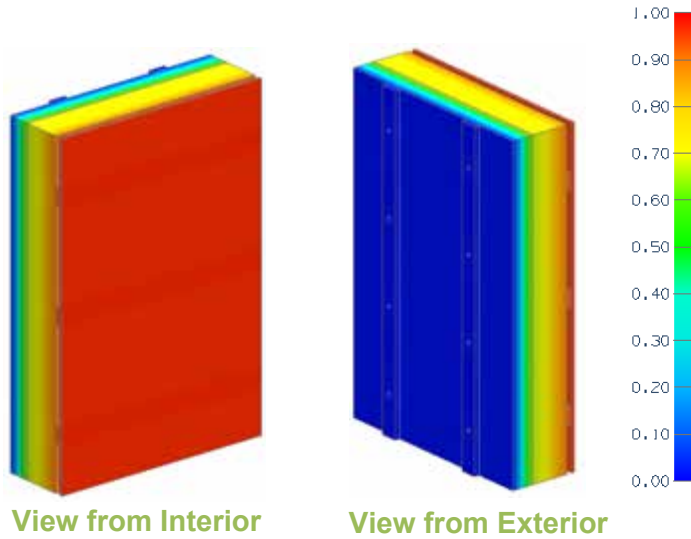
<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	16" o.c. Stud Spacing		24" o.c. Stud Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10.0 (1.76)	R-37.6 (6.62)	R-33.2 (5.84)	0.030 (0.17)	R-34.7 (6.11)	0.029 (0.16)
R-15.0 (2.64)	R-42.6 (7.50)	R-37.1 (6.53)	0.027 (0.15)	R-39.0 (6.86)	0.026 (0.15)
R-20.0 (3.52)	R-47.6 (8.38)	R-41.0 (7.22)	0.024 (0.14)	R-42.9 (7.56)	0.023 (0.13)

# Detail 8.1.17

## Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-9.9 (1.74 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	“clear wall” U- and R-value

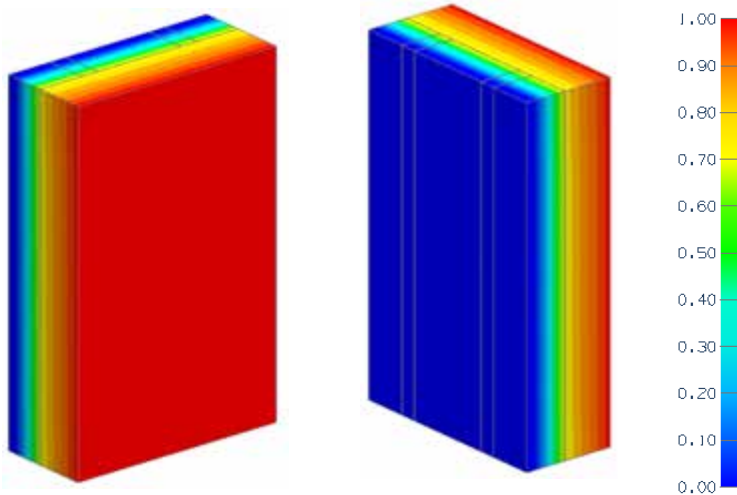
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-0.0 (0.00)	R-9.9 (1.74)	R-10.0 (1.77)	0.100 (0.57)
R-15.0 (2.64)	R-24.9 (4.38)	R-24.7 (4.35)	0.040 (0.23)
R-20.0 (3.52)	R-29.9 (5.26)	R-29.4 (5.17)	0.034 (0.19)
R-25.0 (4.40)	R-34.9 (6.14)	R-33.9 (5.98)	0.029 (0.17)



# Detail 8.1.18

## Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Wood Strapping and Continuous Rigid Insulation Supporting Fiber Cement Board



View from Interior

View from Exterior

### Thermal Performance Indicators

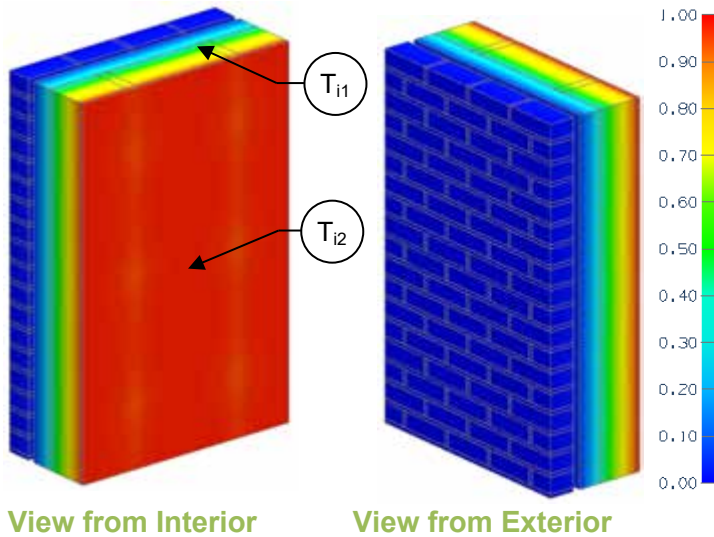
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-10.5 (1.85 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear wall” U- and R-value, without CLT floor slab

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-0.0 (0.00)	R-10.5 (1.84)	R-9.9 (1.75)	0.101 (0.57)
R-15.0 (2.64)	R-25.5 (4.49)	R-24.5 (4.31)	0.041 (0.23)
R-20.0 (3.52)	R-30.5 (5.37)	R-28.6 (5.05)	0.035 (0.20)
R-25.0 (4.40)	R-35.5 (6.25)	R-31.1 (5.48)	0.032 (0.18)

# Detail 8.1.19

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Brick Ties Supporting Brick Veneer and R-19 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

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
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

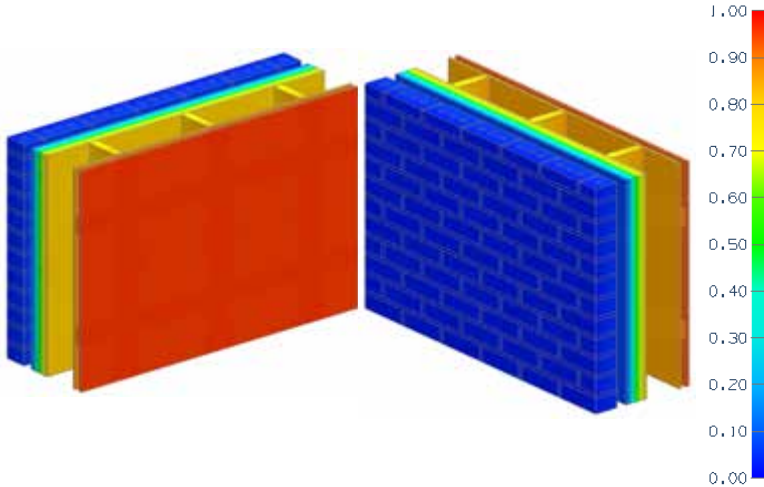
Exterior Insulation 1D R-Value (RSI)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-0 (0.00)	R-27.4 (4.83)	R-19.8 (3.49)	0.050 (0.29)
R-5 (0.88)	R-32.4 (5.71)	R-24.1 (4.25)	0.041 (0.24)
R-10 (1.76)	R-37.4 (6.59)	R-28.0 (4.93)	0.036 (0.20)
R-15 (2.64)	R-42.4 (7.47)	R-31.5 (5.54)	0.032 (0.18)

### Temperature Indices

	R0	R5	R10	R15	
$T_{i1}$	0.18	0.28	0.34	0.39	T on sheathing, at studs near brick ties
$T_{i2}$	0.15	0.33	0.42	0.50	T on sheathing, at studs between brick ties

# Detail 8.1.20

## Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall with Interior OSB and Wood Furring Assembly & Brick Ties Supporting Brick Veneer – Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.3 (0.93 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value

View from Interior

View from Exterior

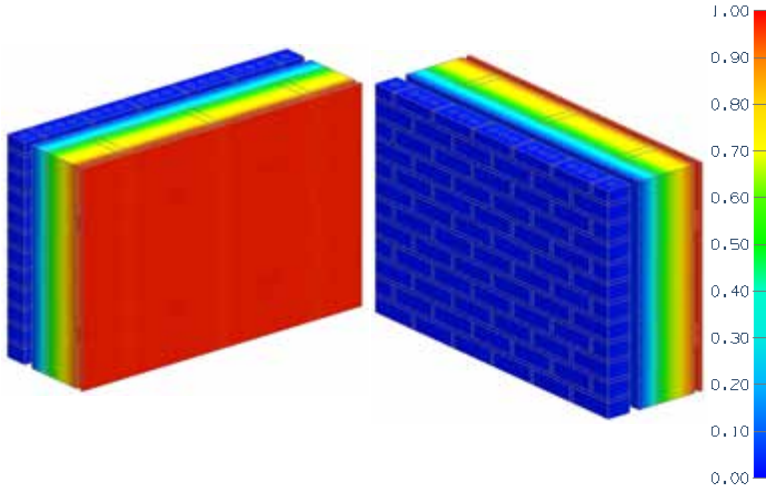
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-15.3 (2.69)	R-14.3 (2.52)	0.070 (0.40)
R-15 (2.64)	R-20.3 (3.57)	R-17.9 (3.15)	0.056 (0.32)
R-20 (3.52)	R-25.3 (4.45)	R-21.1 (3.72)	0.047 (0.27)
R-25 (4.40)	R-30.3 (5.33)	R-24.1 (4.24)	0.041 (0.24)
R-30 (5.28)	R-35.3 (6.21)	R-26.9 (4.73)	0.037 (0.21)

# Detail 8.1.21

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall with Interior OSB and Wood Furring Assembly & Brick Ties Supporting Brick Veneer – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-23.4 (4.12 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value

View from Interior

View from Exterior

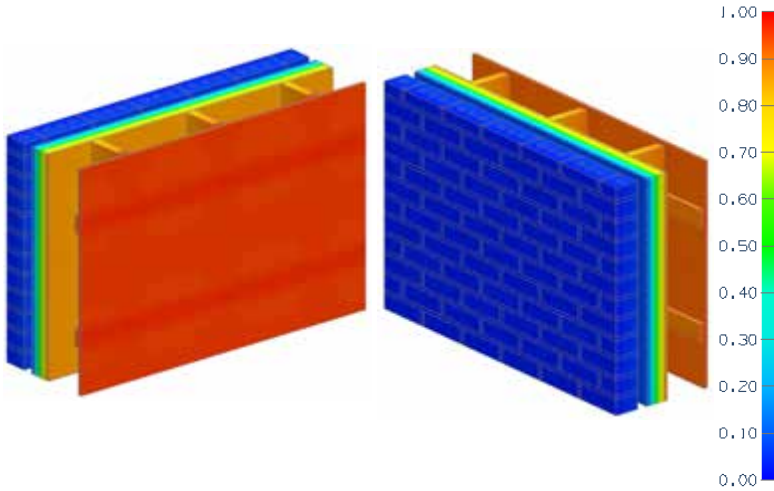
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5 (0.88)	R-28.4 (5.00)	R-26.2 (4.62)	0.038 (0.22)
R-10 (1.76)	R-33.4 (5.88)	R-30.3 (5.34)	0.033 (0.19)
R-15 (2.64)	R-38.4 (6.76)	R-34.0 (5.99)	0.029 (0.17)
R-20 (3.52)	R-43.4 (7.64)	R-37.4 (6.58)	0.027 (0.15)
R-25 (4.40)	R-48.4 (8.52)	R-40.5 (7.12)	0.025 (0.14)
R-30 (5.28)	R-53.4 (9.40)	R-43.4 (7.65)	0.023 (0.13)

# Detail 8.1.22

## Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall with Interior Wood Furring Assembly & Brick Ties Supporting Brick Veneer – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-4.0 (0.70 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value

View from Interior

View from Exterior

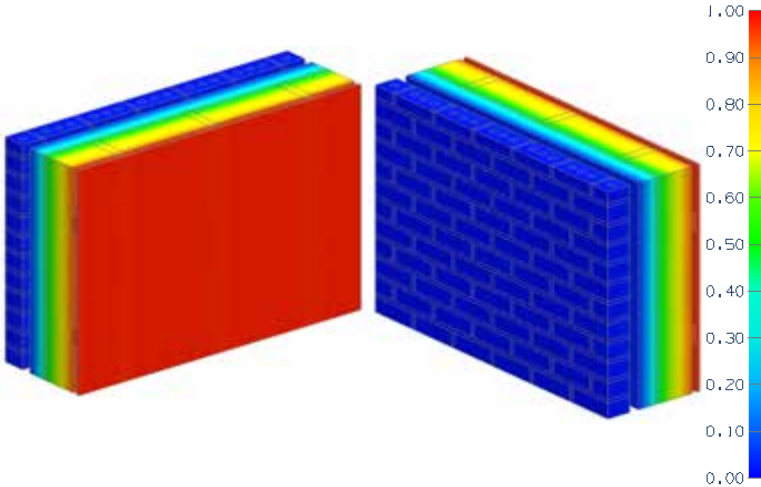
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-10 (1.76)	R-14.0 (2.46)	R-13.0 (2.29)	0.077 (0.44)
R-15 (2.64)	R-19.0 (3.35)	R-16.6 (2.92)	0.060 (0.34)
R-20 (3.52)	R-24.0 (4.23)	R-19.8 (3.49)	0.050 (0.29)
R-25 (4.40)	R-29.0 (5.11)	R-22.8 (4.02)	0.044 (0.25)
R-30 (5.28)	R-34.0 (5.99)	R-25.6 (4.50)	0.039 (0.22)

# Detail 8.1.23

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall with Interior Wood Furring Assembly & Brick Ties Supporting Brick Veneer – Clear Wall

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-23.0 (4.05 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value

View from Interior

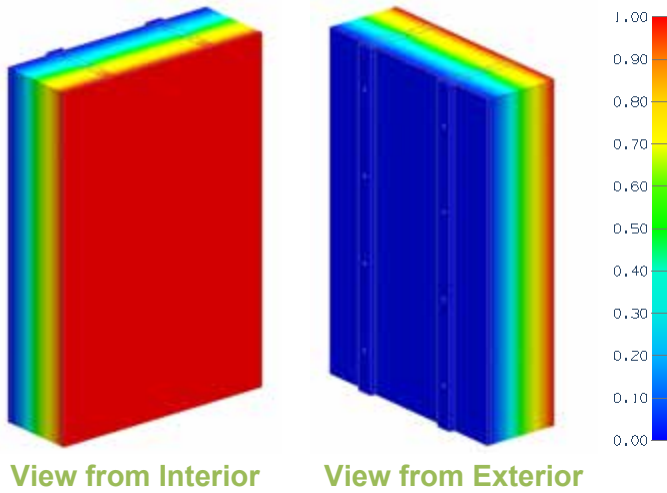
View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5 (0.88)	R-28.0 (4.93)	R-25.8 (4.54)	0.039 (0.22)
R-10 (1.76)	R-33.0 (5.81)	R-29.8 (5.26)	0.034 (0.19)
R-15 (2.64)	R-38.0 (6.69)	R-33.5 (5.91)	0.030 (0.17)
R-20 (3.52)	R-43.0 (7.57)	R-36.9 (6.50)	0.027 (0.15)
R-25 (4.40)	R-48.0 (8.45)	R-40.0 (7.05)	0.025 (0.14)
R-30 (5.28)	R-53.0 (9.33)	R-42.9 (7.56)	0.023 (0.13)

# Detail 8.1.24

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 1" Gap – Clear Wall



### Thermal Performance Indicators

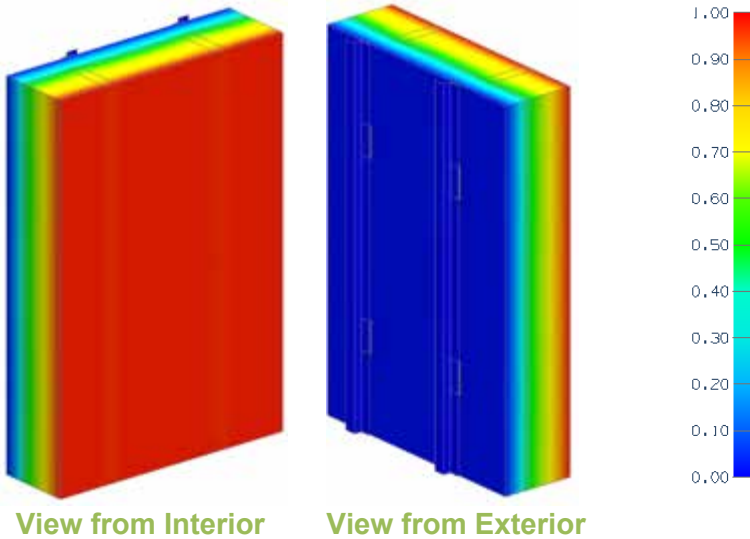
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear field" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Insulation R/in	Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
3.5	R-35.0 (6.16)	R-37.5 (6.61)	R-34.5 (6.07)	0.029 (0.16)
4	R-40.0 (7.04)	R-42.5 (7.49)	R-38.3 (6.74)	0.026 (0.15)
5	R-50.0 (8.81)	R-52.5 (9.25)	R-45.6 (8.02)	0.022 (0.12)
6	R-60.0 (10.57)	R-62.5 (11.01)	R-52.5 (9.24)	0.019 (0.11)

# Detail 8.1.25

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

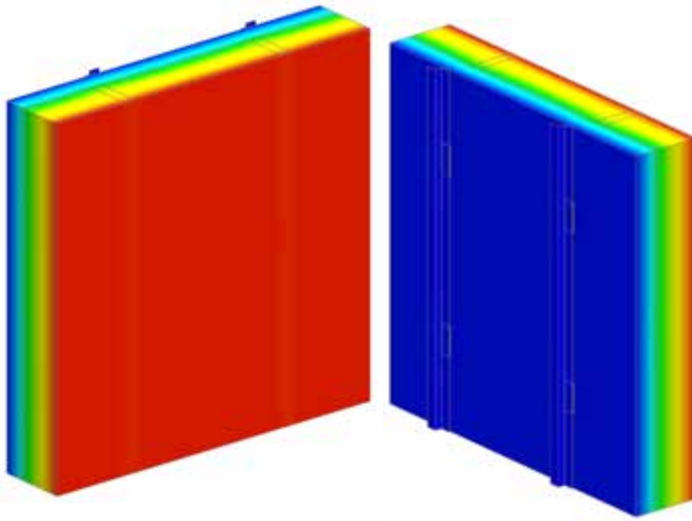
Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-26.5 (4.67)	R-24.5 (4.31)	0.041 (0.23)	R-24.5 (4.31)	0.041 (0.23)	R-24.5 (4.31)	0.041 (0.23)
R-7.5 (1.32)	R-29.0 (5.11)	R-26.8 (4.71)*	0.037 (0.21)*	R-26.9 (4.73)*	0.037 (0.21)*	R-26.9 (4.74)*	0.037 (0.21)*
R-10.0 (1.76)	R-31.5 (5.55)	R-29.1 (5.12)*	0.034 (0.20)*	R-29.2 (5.15)*	0.034 (0.19)*	R-29.3 (5.16)*	0.034 (0.19)*
R-15.0 (2.64)	R-36.5 (6.44)	R-33.6 (5.92)	0.030 (0.17)	R-33.9 (5.97)	0.029 (0.17)	R-34.1 (6.00)	0.029 (0.17)
R-20.0 (3.52)	R-41.5 (7.32)	R-38.0 (6.69)*	0.026 (0.15)*	R-38.5 (6.78)*	0.026 (0.15)*	R-38.8 (6.83)*	0.026 (0.15)*
R-25.0 (4.40)	R-46.5 (8.20)	R-42.3 (7.45)	0.024 (0.13)	R-43.0 (7.58)	0.023 (0.13)	R-43.4 (7.64)	0.023 (0.13)
R-30.0 (5.28)	R-51.5 (9.08)	R-46.6 (8.21)*	0.021 (0.12)*	R-47.5 (8.37)*	0.021 (0.12)*	R-48.0 (8.46)*	0.021 (0.12)*
R-35.0 (6.16)	R-56.5 (9.96)	R-50.8 (8.94)	0.020 (0.11)	R-52.0 (9.15)	0.019 (0.11)	R-52.6 (9.26)	0.019 (0.11)

\*Indicates interpolated value



# Detail 8.1.26

## Exterior and Interior Insulated 2x6 Wood Stud (24" o.c.) Wall Assembly with SOPREMA SOPRA-XPS 20 and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

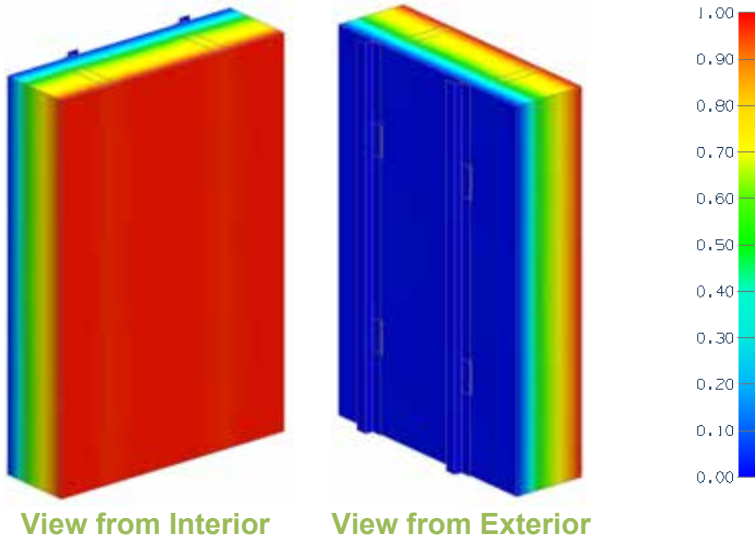
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-26.5 (4.67)	R-25.2 (4.43)	0.040 (0.23)	R-25.2 (4.43)	0.040 (0.23)	R-25.3 (4.46)	0.040 (0.22)
R-7.5 (1.32)	R-29.0 (5.11)	R-27.5 (4.85)*	0.036 (0.21)*	R-27.6 (4.86)*	0.036 (0.21)*	R-27.7 (4.89)*	0.036 (0.20)*
R-10.0 (1.76)	R-31.5 (5.55)	R-29.9 (5.26)*	0.033 (0.19)*	R-30.0 (5.28)*	0.033 (0.19)*	R-30.2 (5.31)*	0.033 (0.19)*
R-15.0 (2.64)	R-36.5 (6.44)	R-34.6 (6.09)	0.029 (0.16)	R-34.8 (6.13)	0.029 (0.16)	R-35.0 (6.17)	0.029 (0.16)
R-20.0 (3.52)	R-41.5 (7.32)	R-39.1 (6.89)*	0.026 (0.15)*	R-39.5 (6.96)*	0.025 (0.14)*	R-39.8 (7.01)*	0.025 (0.14)*
R-25.0 (4.40)	R-46.5 (8.20)	R-43.7 (7.69)	0.023 (0.13)	R-44.2 (7.78)	0.023 (0.13)	R-44.6 (7.85)	0.022 (0.13)
R-30.0 (5.28)	R-51.5 (9.08)	R-48.2 (8.48)*	0.021 (0.12)*	R-48.8 (8.60)*	0.020 (0.12)*	R-49.3 (8.68)*	0.020 (0.12)*
R-35.0 (6.16)	R-56.5 (9.96)	R-52.6 (9.26)	0.019 (0.11)	R-53.4 (9.41)	0.019 (0.11)	R-54.0 (9.51)	0.019 (0.11)

\*Indicates interpolated value

# Detail 8.1.27

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-SPF 202 and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ / $R_o$	"Clear wall" U- and R-value

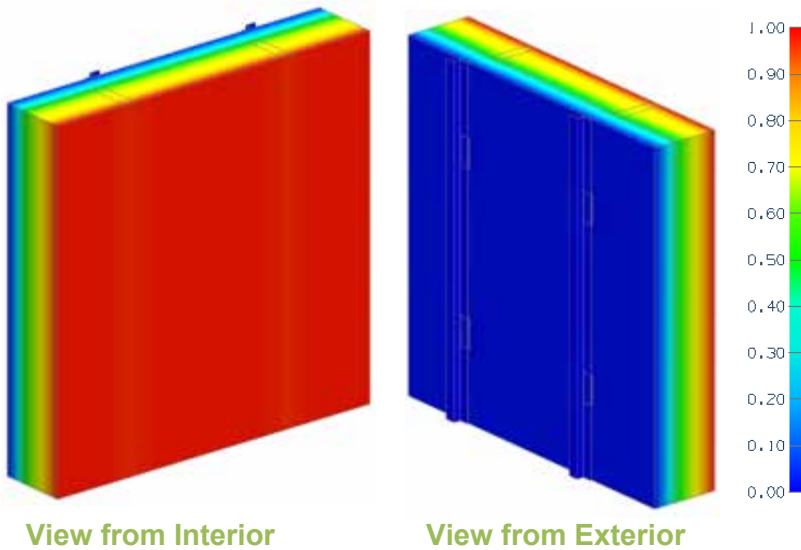
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.2 (1.09)	R-27.7 (4.89)	R-25.6 (4.50)	0.039 (0.22)	R-25.6 (4.51)	0.039 (0.22)	R-25.6 (4.51)	0.039 (0.22)
R-12.4 (2.18)	R-33.9 (5.98)	R-31.2 (5.49)*	0.032 (0.18)*	R-31.4 (5.53)*	0.032 (0.18)*	R-31.5 (5.55)*	0.032 (0.18)*
R-18.6 (3.28)	R-40.1 (7.07)	R-36.7 (6.47)	0.027 (0.15)	R-37.1 (6.54)	0.027 (0.15)	R-37.4 (6.58)	0.027 (0.15)
R-24.8 (4.37)	R-46.3 (8.16)	R-42.0 (7.40)*	0.024 (0.14)*	R-42.7 (7.53)*	0.023 (0.13)*	R-43.1 (7.59)*	0.023 (0.13)*
R-31.0 (5.46)	R-52.5 (9.25)	R-47.2 (8.31)	0.021 (0.12)	R-48.2 (8.49)	0.021 (0.12)	R-48.8 (8.59)	0.021 (0.12)
R-37.2 (6.55)	R-58.7 (10.35)	R-52.4 (9.22)*	0.019 (0.11)*	R-53.7 (9.46)*	0.019 (0.11)*	R-54.4 (9.59)*	0.018 (0.10)*
R-43.4 (7.64)	R-64.9 (11.44)	R-57.4 (10.11)	0.017 (0.10)	R-59.1 (10.41)	0.017 (0.10)	R-60.0 (10.56)	0.017 (0.09)

\*Indicates interpolated value

# Detail 8.1.28

## Exterior and Interior Insulated 2x6 Wood Stud (24" o.c.) Wall Assembly with SOPREMA SOPRA-SPF 202 and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ / $R_o$	"Clear wall" U- and R-value

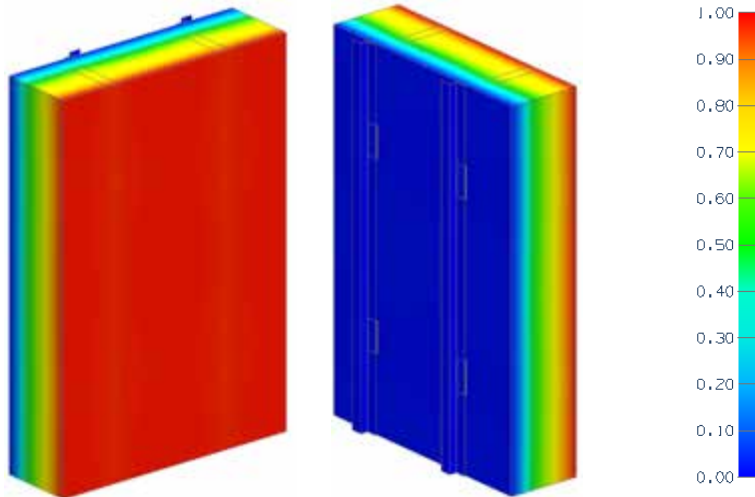
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.2 (1.09)	R-27.7 (4.89)	R-26.3 (4.63)	0.038 (0.22)	R-26.3 (4.63)	0.038 (0.22)	R-26.4 (4.65)	0.038 (0.21)
R-12.4 (2.18)	R-33.9 (5.98)	R-32.0 (5.64)*	0.031 (0.18)*	R-32.2 (5.68)*	0.031 (0.18)*	R-32.4 (5.71)*	0.031 (0.18)*
R-18.6 (3.28)	R-40.1 (7.07)	R-37.7 (6.64)	0.027 (0.15)	R-38.1 (6.71)	0.026 (0.15)	R-38.4 (6.76)	0.026 (0.15)
R-24.8 (4.37)	R-46.3 (8.16)	R-43.0 (7.58)*	0.023 (0.13)*	R-43.9 (7.73)*	0.023 (0.13)*	R-44.3 (7.80)*	0.023 (0.13)*
R-31.0 (5.46)	R-52.5 (9.25)	R-48.1 (8.48)	0.021 (0.12)	R-49.6 (8.74)	0.020 (0.11)	R-50.1 (8.83)	0.020 (0.11)
R-37.2 (6.55)	R-58.7 (10.35)	R-53.3 (9.39)*	0.019 (0.11)*	R-55.3 (9.74)*	0.018 (0.10)*	R-55.9 (9.85)*	0.018 (0.10)*
R-43.4 (7.64)	R-64.9 (11.44)	R-58.2 (10.26)	0.017 (0.10)	R-60.9 (10.73)	0.016 (0.09)	R-61.7 (10.86)	0.016 (0.09)

\*Indicates interpolated value

# Detail 8.1.29

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior      View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

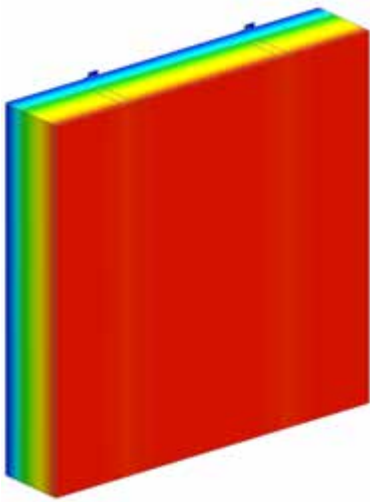
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.0 (1.06)	R-27.5 (4.85)	R-25.4 (4.48)	0.039 (0.22)	R-25.5 (4.48)	0.039 (0.22)	R-25.5 (4.49)	0.039 (0.22)
R-9.0 (1.59)	R-30.5 (5.38)	R-28.2 (4.96)*	0.035 (0.20)*	R-28.3 (4.98)*	0.035 (0.20)*	R-28.4 (4.99)*	0.035 (0.20)*
R-12.0 (2.11)	R-33.5 (5.91)	R-30.9 (5.44)*	0.032 (0.18)*	R-31.1 (5.48)*	0.032 (0.18)*	R-31.2 (5.50)*	0.032 (0.18)*
R-15.0 (2.64)	R-36.5 (6.44)	R-33.6 (5.92)*	0.030 (0.17)*	R-33.9 (5.97)*	0.030 (0.17)*	R-34.1 (6.00)*	0.029 (0.17)*
R-18.0 (3.17)	R-39.5 (6.96)	R-36.3 (6.39)	0.028 (0.16)	R-36.7 (6.46)	0.027 (0.15)	R-36.9 (6.50)	0.027 (0.15)
R-21.0 (3.70)	R-42.5 (7.49)	R-38.9 (6.85)*	0.026 (0.15)*	R-39.4 (6.94)*	0.025 (0.14)*	R-39.7 (6.99)*	0.025 (0.14)*
R-24.0 (4.23)	R-45.5 (8.02)	R-41.5 (7.30)*	0.024 (0.14)*	R-42.1 (7.42)*	0.024 (0.13)*	R-42.5 (7.48)*	0.024 (0.13)*
R-27.0 (4.76)	R-48.5 (8.55)	R-44.0 (7.76)*	0.023 (0.13)*	R-44.8 (7.89)*	0.022 (0.13)*	R-45.2 (7.97)*	0.022 (0.13)*
R-30.0 (5.28)	R-51.5 (9.08)	R-46.5 (8.20)	0.021 (0.12)	R-47.5 (8.36)	0.021 (0.12)	R-48.0 (8.45)	0.021 (0.12)
R-33.0 (5.81)	R-54.5 (9.61)	R-49.1 (8.64)*	0.020 (0.12)*	R-50.2 (8.83)*	0.020 (0.11)*	R-50.7 (8.94)*	0.020 (0.11)*
R-36.0 (6.34)	R-57.5 (10.13)	R-51.6 (9.08)*	0.019 (0.11)*	R-52.8 (9.30)*	0.019 (0.11)*	R-53.5 (9.42)*	0.019 (0.11)*
R-39.0 (6.87)	R-60.5 (10.66)	R-54.0 (9.51)*	0.019 (0.11)*	R-55.4 (9.76)*	0.018 (0.10)*	R-56.2 (9.89)*	0.018 (0.10)*
R-42.0 (7.40)	R-63.5 (11.19)	R-56.4 (9.94)	0.018 (0.10)	R-58.0 (10.22)	0.017 (0.10)	R-58.9 (10.37)	0.017 (0.10)

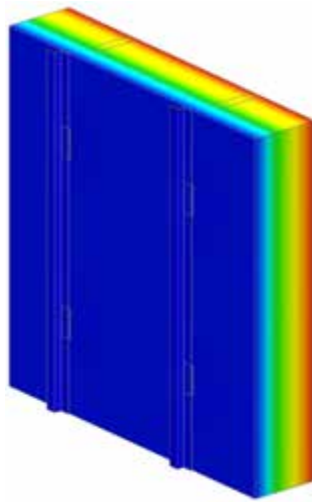
\*Indicates interpolated value

# Detail 8.1.30

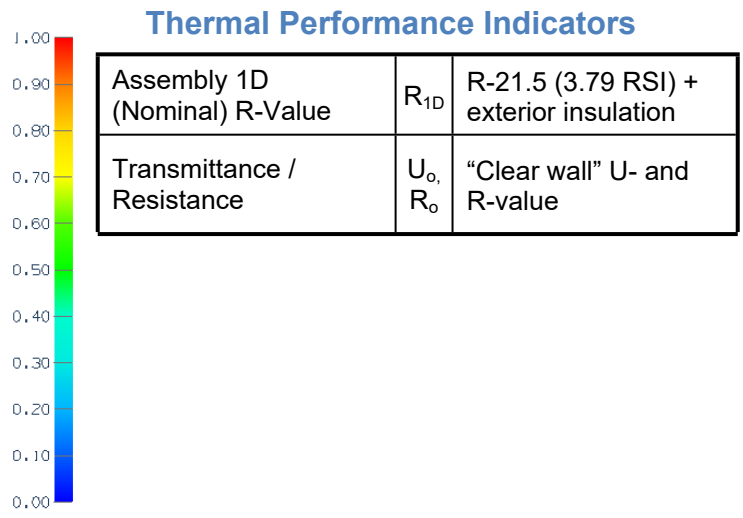
## Exterior and Interior Insulated 2x6 Wood Stud (24" o.c.) Wall Assembly with SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior



View from Exterior



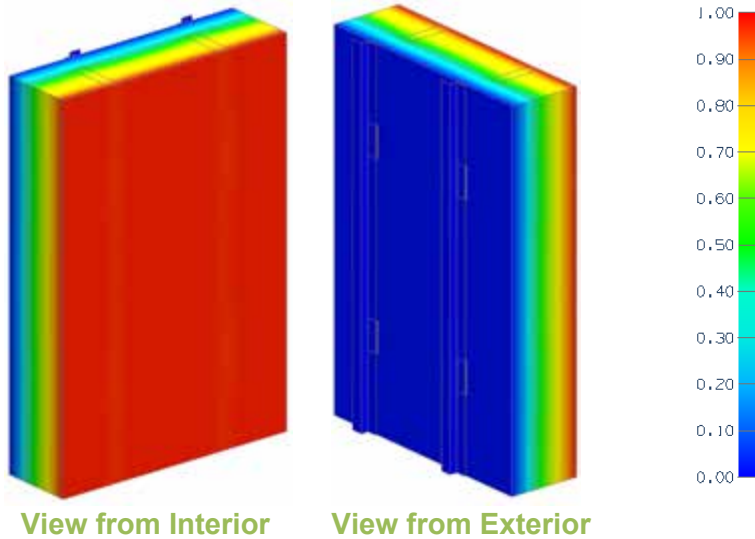
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-6.0 (1.06)	R-27.5 (4.85)	R-26.1 (4.60)	0.038 (0.22)	R-26.2 (4.61)	0.038 (0.22)	R-26.3 (4.63)	0.038 (0.22)
R-9.0 (1.59)	R-30.5 (5.38)	R-28.9 (5.10)*	0.035 (0.20)*	R-29.0 (5.12)*	0.034 (0.20)*	R-29.2 (5.14)*	0.034 (0.19)*
R-12.0 (2.11)	R-33.5 (5.91)	R-31.7 (5.58)*	0.032 (0.18)*	R-31.9 (5.62)*	0.031 (0.18)*	R-32.1 (5.66)*	0.031 (0.18)*
R-15.0 (2.64)	R-36.5 (6.44)	R-34.4 (6.06)*	0.029 (0.17)*	R-34.8 (6.12)*	0.029 (0.16)*	R-35.0 (6.16)*	0.029 (0.16)*
R-18.0 (3.17)	R-39.5 (6.96)	R-37.2 (6.55)	0.027 (0.15)	R-37.6 (6.63)	0.027 (0.15)	R-37.9 (6.67)	0.026 (0.15)
R-21.0 (3.70)	R-42.5 (7.49)	R-39.7 (7.00)*	0.025 (0.14)*	R-40.4 (7.12)*	0.025 (0.14)*	R-40.7 (7.18)*	0.025 (0.14)*
R-24.0 (4.23)	R-45.5 (8.02)	R-42.3 (7.45)*	0.024 (0.13)*	R-43.3 (7.62)*	0.023 (0.13)*	R-43.6 (7.68)*	0.023 (0.13)*
R-27.0 (4.76)	R-48.5 (8.55)	R-44.9 (7.90)*	0.022 (0.13)*	R-46.0 (8.11)*	0.022 (0.12)*	R-46.4 (8.18)*	0.022 (0.12)*
R-30.0 (5.28)	R-51.5 (9.08)	R-47.3 (8.33)	0.021 (0.12)	R-48.8 (8.60)	0.020 (0.12)	R-49.3 (8.68)	0.020 (0.12)
R-33.0 (5.81)	R-54.5 (9.61)	R-49.9 (8.79)*	0.020 (0.11)*	R-51.6 (9.09)*	0.019 (0.11)*	R-52.1 (9.18)*	0.019 (0.11)*
R-36.0 (6.34)	R-57.5 (10.13)	R-52.4 (9.22)*	0.019 (0.11)*	R-54.3 (9.57)*	0.018 (0.10)*	R-54.9 (9.67)*	0.018 (0.10)*
R-39.0 (6.87)	R-60.5 (10.66)	R-54.8 (9.65)*	0.018 (0.10)*	R-57.1 (10.05)*	0.018 (0.10)*	R-57.7 (10.16)*	0.017 (0.10)*
R-42.0 (7.40)	R-63.5 (11.19)	R-57.2 (10.07)	0.017 (0.10)	R-59.8 (10.53)	0.017 (0.09)	R-60.5 (10.65)	0.017 (0.09)

\*Indicates interpolated value

# Detail 8.1.31

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Mineral Wool and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ / $R_o$	"Clear wall" U- and R-value

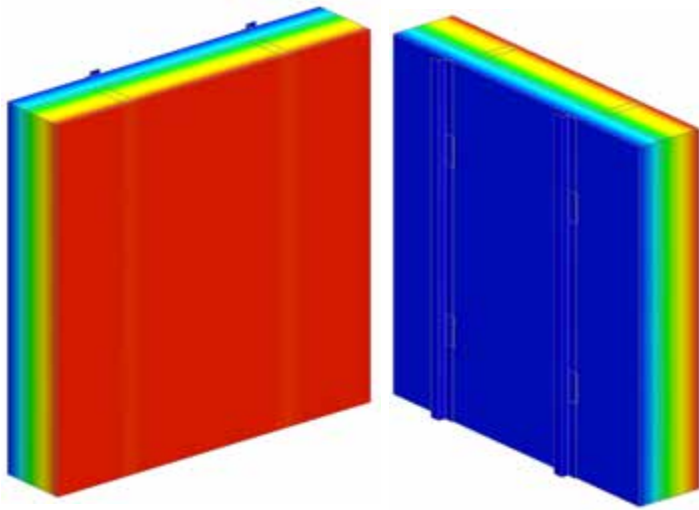
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.3 (0.76)	R-25.8 (4.55)	R-23.8 (4.19)	0.042 (0.24)	R-23.8 (4.19)	0.042 (0.24)	R-23.8 (4.19)	0.042 (0.24)
R-8.6 (1.51)	R-30.1 (5.31)	R-27.8 (4.89)*	0.036 (0.20)*	R-27.9 (4.91)*	0.036 (0.20)*	R-27.9 (4.92)*	0.036 (0.20)*
R-12.9 (2.27)	R-34.4 (6.07)	R-31.7 (5.58)	0.032 (0.18)	R-31.9 (5.63)	0.031 (0.18)	R-32.1 (5.65)	0.031 (0.18)
R-17.2 (3.03)	R-38.7 (6.82)	R-35.5 (6.26)*	0.028 (0.16)*	R-35.9 (6.33)*	0.028 (0.16)*	R-36.1 (6.36)*	0.028 (0.16)*
R-21.5 (3.79)	R-43.0 (7.58)	R-39.3 (6.92)	0.025 (0.14)	R-39.9 (7.02)	0.025 (0.14)	R-40.2 (7.07)	0.025 (0.14)
R-25.8 (4.54)	R-47.3 (8.34)	R-43.1 (7.59)*	0.023 (0.13)*	R-43.8 (7.72)*	0.023 (0.13)*	R-44.2 (7.78)*	0.023 (0.13)*
R-30.1 (5.30)	R-51.6 (9.09)	R-46.8 (8.25)*	0.021 (0.12)*	R-47.7 (8.40)*	0.021 (0.12)*	R-48.2 (8.49)*	0.021 (0.12)*
R-34.4 (6.06)	R-55.9 (9.85)	R-50.5 (8.90)	0.020 (0.11)	R-51.6 (9.09)	0.019 (0.11)	R-52.1 (9.18)	0.019 (0.11)

\*Indicates interpolated value

# Detail 8.1.32

## Exterior and Interior Insulated 2x6 Wood Stud (24" o.c.) Wall Assembly with Mineral Wool and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ / $R_o$	"Clear wall" U- and R-value

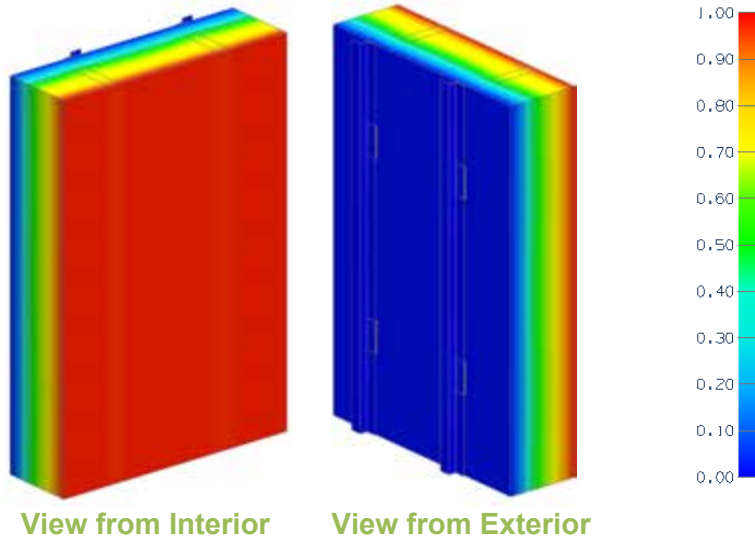
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.3 (0.76)	R-25.8 (4.55)	R-24.5 (4.31)	0.041 (0.23)	R-24.5 (4.31)	0.041 (0.23)	R-24.6 (4.33)	0.041 (0.23)
R-8.6 (1.51)	R-30.1 (5.31)	R-28.5 (5.02)*	0.035 (0.20)*	R-28.6 (5.04)*	0.035 (0.20)*	R-28.8 (5.07)*	0.035 (0.20)*
R-12.9 (2.27)	R-34.4 (6.07)	R-32.5 (5.72)	0.031 (0.17)	R-32.8 (5.77)	0.031 (0.17)	R-33.0 (5.81)	0.030 (0.17)
R-17.2 (3.03)	R-38.7 (6.82)	R-36.2 (6.38)*	0.028 (0.16)*	R-36.9 (6.49)*	0.027 (0.15)*	R-37.1 (6.54)*	0.027 (0.15)*
R-21.5 (3.79)	R-43.0 (7.58)	R-40.0 (7.04)	0.025 (0.14)	R-40.9 (7.21)	0.024 (0.14)	R-41.2 (7.26)	0.024 (0.14)
R-25.8 (4.54)	R-47.3 (8.34)	R-43.7 (7.70)*	0.023 (0.13)*	R-45.0 (7.92)*	0.022 (0.13)*	R-45.3 (7.99)*	0.022 (0.13)*
R-30.1 (5.30)	R-51.6 (9.09)	R-47.3 (8.34)*	0.021 (0.12)*	R-49.0 (8.63)*	0.020 (0.12)*	R-49.4 (8.71)*	0.020 (0.11)*
R-34.4 (6.06)	R-55.9 (9.85)	R-50.9 (8.97)	0.020 (0.11)	R-53.0 (9.33)	0.019 (0.11)	R-53.5 (9.42)	0.019 (0.11)

\*Indicates interpolated value

# Detail 8.1.33

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Protected SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

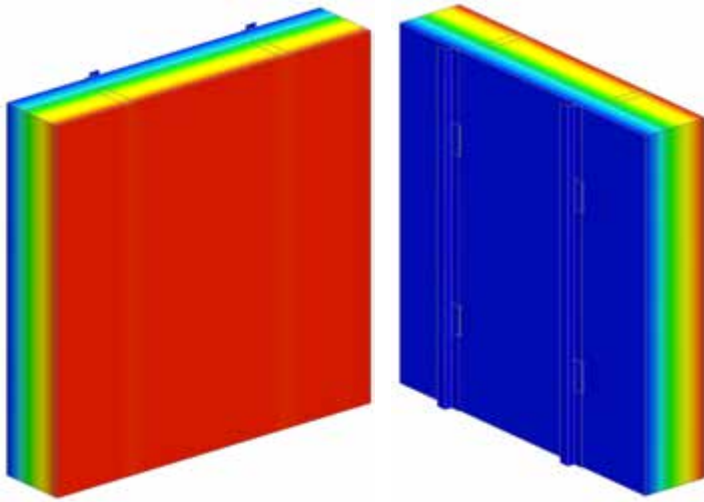
Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-14.6 (2.57)	R-36.1 (6.36)	R-33.4 (5.88)	0.030 (0.17)	R-33.7 (5.93)	0.030 (0.17)	R-33.8 (5.96)	0.030 (0.17)
R-17.6 (3.10)	R-39.1 (6.89)	R-36.1 (6.35)*	0.028 (0.16)*	R-36.4 (6.42)*	0.027 (0.16)*	R-36.6 (6.45)*	0.027 (0.16)*
R-20.6 (3.63)	R-42.1 (7.42)	R-38.7 (6.82)	0.026 (0.15)	R-39.2 (6.90)	0.026 (0.14)	R-39.4 (6.94)	0.025 (0.14)
R-23.6 (4.16)	R-45.1 (7.95)	R-41.3 (7.27)*	0.024 (0.14)*	R-41.9 (7.38)*	0.024 (0.14)*	R-42.2 (7.43)*	0.024 (0.13)*
R-26.6 (4.68)	R-48.1 (8.48)	R-43.8 (7.72)	0.023 (0.13)	R-44.6 (7.85)	0.022 (0.13)	R-45.0 (7.92)	0.022 (0.13)
R-29.6 (5.21)	R-51.1 (9.01)	R-46.4 (8.17)*	0.022 (0.12)*	R-47.3 (8.33)*	0.021 (0.12)*	R-47.7 (8.41)*	0.021 (0.12)*
R-32.6 (5.74)	R-54.1 (9.54)	R-48.9 (8.61)*	0.020 (0.12)*	R-49.9 (8.80)*	0.020 (0.11)*	R-50.5 (8.89)*	0.020 (0.11)*
R-35.6 (6.27)	R-57.1 (10.06)	R-51.4 (9.05)*	0.019 (0.11)*	R-52.6 (9.26)*	0.019 (0.11)*	R-53.2 (9.37)*	0.019 (0.11)*
R-38.6 (6.80)	R-60.1 (10.59)	R-53.9 (9.49)	0.019 (0.11)	R-55.2 (9.73)	0.018 (0.10)	R-55.9 (9.85)	0.018 (0.10)

\*Indicates interpolated value



# Detail 8.1.34

## Exterior and Interior Insulated 2x6 Wood Stud (24" o.c.) Wall Assembly with Protected SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-19 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ , $R_o$	"Clear wall" U- and R-value

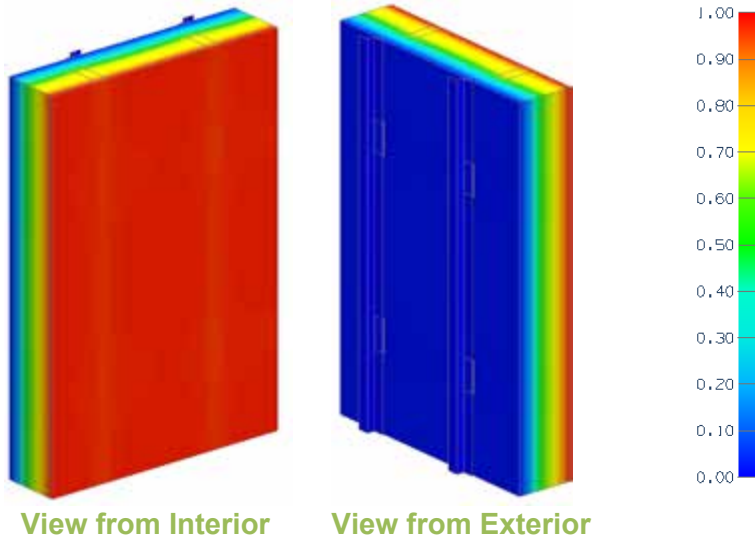
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-14.6 (2.57)	R-36.1 (6.36)	R-34.1 (6.01)	0.029 (0.17)	R-34.5 (6.08)	0.029 (0.16)	R-34.7 (6.12)	0.029 (0.16)
R-17.6 (3.10)	R-39.1 (6.89)	R-37.0 (6.51)*	0.027 (0.15)*	R-37.3 (6.58)*	0.027 (0.15)*	R-37.6 (6.62)*	0.027 (0.15)*
R-20.6 (3.63)	R-42.1 (7.42)	R-39.8 (7.01)	0.025 (0.14)	R-40.2 (7.07)	0.025 (0.14)	R-40.5 (7.13)	0.025 (0.14)
R-23.6 (4.16)	R-45.1 (7.95)	R-42.5 (7.49)*	0.024 (0.13)*	R-43.0 (7.57)*	0.023 (0.13)*	R-43.3 (7.63)*	0.023 (0.13)*
R-26.6 (4.68)	R-48.1 (8.48)	R-45.2 (7.97)	0.022 (0.13)	R-45.8 (8.06)	0.022 (0.12)	R-46.1 (8.13)	0.022 (0.12)
R-29.6 (5.21)	R-51.1 (9.01)	R-48.0 (8.45)*	0.021 (0.12)*	R-48.5 (8.55)*	0.021 (0.12)*	R-49.0 (8.63)*	0.020 (0.12)*
R-32.6 (5.74)	R-54.1 (9.54)	R-50.6 (8.92)*	0.020 (0.11)*	R-51.3 (9.04)*	0.019 (0.11)*	R-51.8 (9.13)*	0.019 (0.11)*
R-35.6 (6.27)	R-57.1 (10.06)	R-53.3 (9.38)*	0.019 (0.11)*	R-54.1 (9.52)*	0.018 (0.11)*	R-54.6 (9.62)*	0.018 (0.10)*
R-38.6 (6.80)	R-60.1 (10.59)	R-55.9 (9.84)	0.018 (0.10)	R-56.8 (10.01)	0.018 (0.10)	R-57.5 (10.12)	0.017 (0.10)

\*Indicates interpolated value

# Detail 8.1.35

## Exterior and Interior Insulated 2x4 Wood Stud (16" o.c.) Wall Assembly with Protected SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-13 Cellulose Insulation in Stud Cavity - Clear Wall



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-15.5 (2.74 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ / $R_o$	"Clear wall" U- and R-value

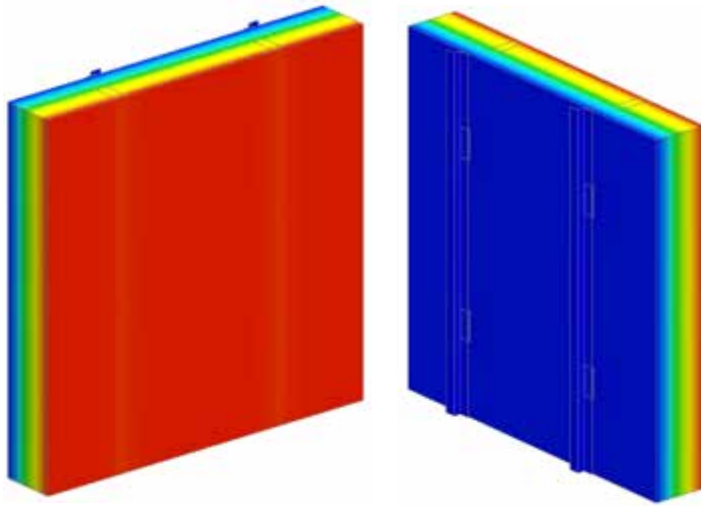
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-14.6 (2.57)	R-30.1 (5.31)	R-28.0 (4.94)	0.036 (0.20)	R-28.3 (4.99)	0.035 (0.20)	R-28.5 (5.01)	0.035 (0.20)
R-17.6 (3.10)	R-39.1 (6.89)	R-30.7 (5.41)*	0.033 (0.18)*	R-31.1 (5.47)*	0.032 (0.18)*	R-31.3 (5.51)*	0.032 (0.18)*
R-20.6 (3.63)	R-36.1 (6.36)	R-33.3 (5.87)	0.030 (0.17)	R-33.8 (5.96)	0.030 (0.17)	R-34.1 (6.00)	0.029 (0.17)
R-23.6 (4.16)	R-45.1 (7.95)	R-35.9 (6.32)*	0.028 (0.16)*	R-36.5 (6.43)*	0.027 (0.16)*	R-36.8 (6.49)*	0.027 (0.15)*
R-26.6 (4.68)	R-42.1 (7.42)	R-38.5 (6.77)	0.026 (0.15)	R-39.2 (6.91)	0.025 (0.14)	R-39.6 (6.98)	0.025 (0.14)
R-29.6 (5.21)	R-51.1 (9.01)	R-41.0 (7.22)*	0.024 (0.14)*	R-41.9 (7.38)*	0.024 (0.14)*	R-42.4 (7.46)*	0.024 (0.13)*
R-32.6 (5.74)	R-54.1 (9.54)	R-43.5 (7.67)*	0.023 (0.13)*	R-44.6 (7.85)*	0.022 (0.13)*	R-45.1 (7.95)*	0.022 (0.13)*
R-35.6 (6.27)	R-57.1 (10.06)	R-46.0 (8.11)*	0.022 (0.12)*	R-47.2 (8.32)*	0.021 (0.12)*	R-47.9 (8.43)*	0.021 (0.12)*
R-38.6 (6.80)	R-54.1 (9.54)	R-48.5 (8.54)	0.021 (0.12)	R-49.9 (8.79)	0.020 (0.11)	R-50.6 (8.91)	0.020 (0.11)

\*Indicates interpolated value

# Detail 8.1.36

## Exterior and Interior Insulated 2x4 Wood Stud (24" o.c.) Wall Assembly with Protected SOPREMA SOPRA-ISO V PLUS and ACS-S Thermal Clip Supporting Metal Cladding with R-13 Cellulose Insulation in Stud Cavity - Clear Wall



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-15.5 (2.74 RSI) + exterior insulation
Transmittance / Resistance	$U_o$ / $R_o$	"Clear wall" U- and R-value

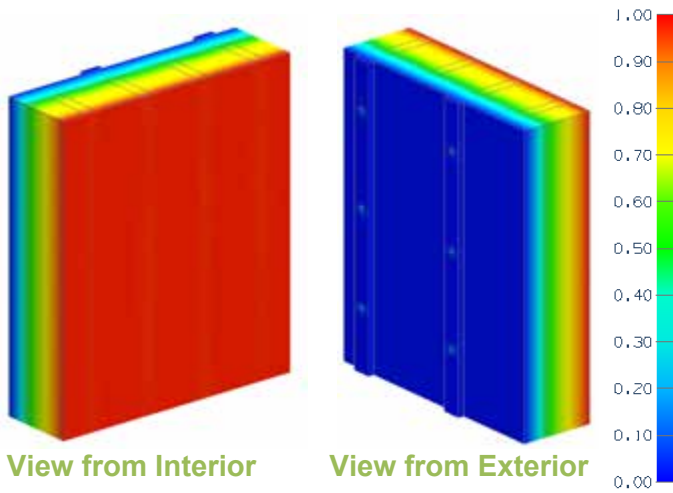
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	24" Vertical Spacing		36" Vertical Spacing		48" Vertical Spacing	
		$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-14.6 (2.57)	R-30.1 (5.31)	R-28.6 (5.03)	0.035 (0.20)	R-29.0 (5.10)	0.035 (0.20)	R-29.1 (5.13)	0.034 (0.19)
R-17.6 (3.10)	R-39.1 (6.89)	R-31.4 (5.54)*	0.032 (0.18)*	R-31.8 (5.60)*	0.031 (0.18)*	R-32.0 (5.63)*	0.031 (0.18)*
R-20.6 (3.63)	R-36.1 (6.36)	R-34.3 (6.04)	0.029 (0.17)	R-34.6 (6.10)	0.029 (0.16)	R-34.8 (6.14)	0.029 (0.16)
R-23.6 (4.16)	R-45.1 (7.95)	R-37.0 (6.51)*	0.027 (0.15)*	R-37.4 (6.59)*	0.027 (0.15)*	R-37.7 (6.64)*	0.027 (0.15)*
R-26.6 (4.68)	R-42.1 (7.42)	R-39.7 (6.99)	0.025 (0.14)	R-40.2 (7.08)	0.025 (0.14)	R-40.5 (7.14)	0.025 (0.14)
R-29.6 (5.21)	R-51.1 (9.01)	R-42.4 (7.47)*	0.024 (0.13)*	R-43.0 (7.57)*	0.023 (0.13)*	R-43.4 (7.64)*	0.023 (0.13)*
R-32.6 (5.74)	R-54.1 (9.54)	R-45.1 (7.94)*	0.022 (0.13)*	R-45.8 (8.06)*	0.022 (0.12)*	R-46.2 (8.14)*	0.022 (0.12)*
R-35.6 (6.27)	R-57.1 (10.06)	R-47.7 (8.40)*	0.021 (0.12)*	R-48.5 (8.55)*	0.021 (0.12)*	R-49.0 (8.63)*	0.020 (0.12)*
R-38.6 (6.80)	R-54.1 (9.54)	R-50.3 (8.86)	0.020 (0.11)	R-51.3 (9.03)	0.020 (0.11)	R-51.8 (9.13)	0.019 (0.11)

\*Indicates interpolated value

# Detail 8.1.37

## Exterior and Interior Insulated 2x6 Wood Stud (8" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – Clear Wall



### Thermal Performance Indicators

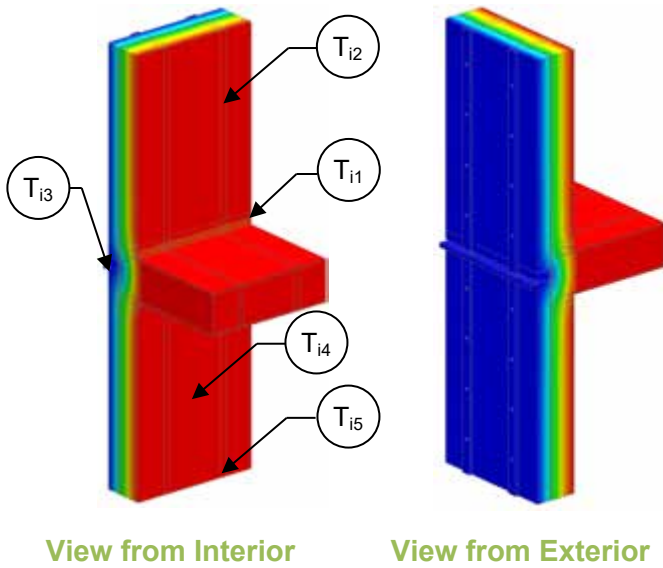
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.80 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear wall" U- and R-value

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-0.0 (0.00)	R-21.5 (3.80)	R-18.1 (3.19)	0.055 (0.31)
R-5.0 (0.88)	R-26.5 (4.68)	R-23.1 (4.07)	0.043 (0.25)
R-15.0 (2.64)	R-36.5 (6.44)	R-32.6 (5.75)	0.031 (0.17)

# Detail 8.2.1

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity - Rim Joist and Floor Intersection with Metal Flashing Bypassing Exterior Insulation



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

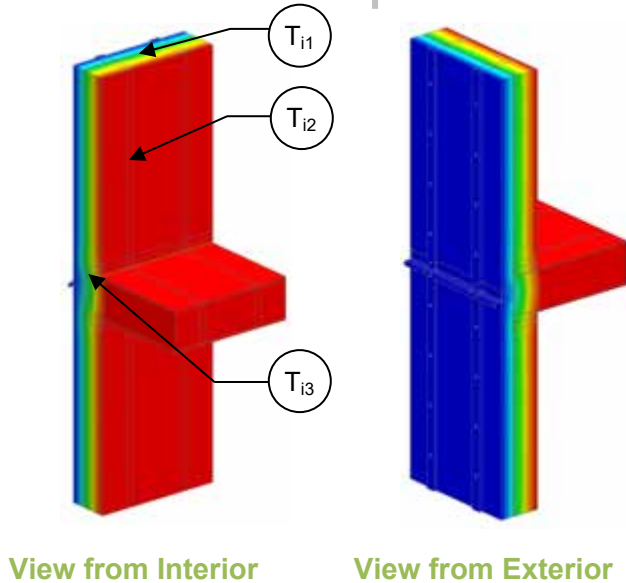
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
R-0 (0.00)	R-21.5 (3.80)	R-19.7 (3.47)	0.051 (0.29)	R-17.0 (3.00)	0.059 (0.33)	0.070 (0.122)
R-5 (0.88)	R-26.5 (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-31.5 (5.56)	R-29.2 (5.14)	0.034 (0.20)	R-25.3 (4.46)	0.039 (0.22)	0.046 (0.080)
R-15 (2.64)	R-36.5 (6.44)	R-33.6 (5.92)	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 8.2.2

### Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity - Rim Joist and Floor Intersection without Metal Flashing Bypassing Exterior Insulation



#### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-21.5 (3.80 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value, without floor
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

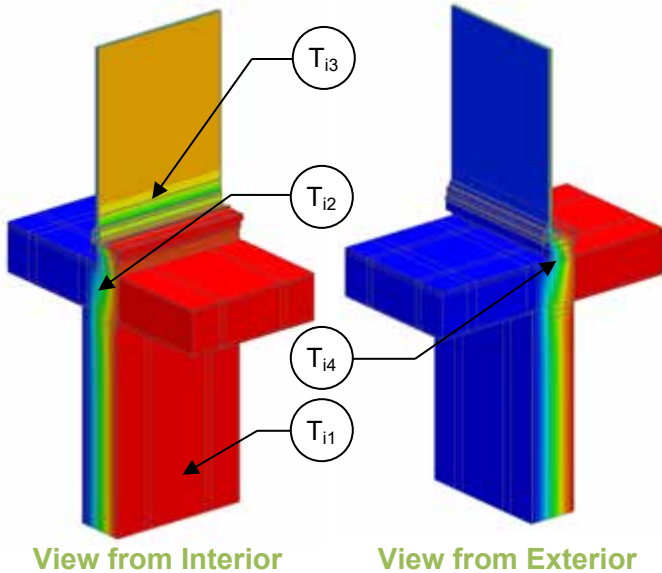
Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ Btu/ft ·hr·°F (W/m K)
R-5 (0.88)	R-26.5 (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-31.5 (5.56)	R-29.2 (5.14)	0.034 (0.20)	R-26.1 (4.6)	0.038 (0.22)	0.035 (0.061)
R-15 (2.64)	R-36.5 (6.44)	R-33.6 (5.92)	0.030 (0.17)	R-30.1 (5.3)	0.033 (0.19)	0.031 (0.054)

#### Temperature Indices

	R5	R10	R15	
T <sub>i1</sub>	0.25	0.38	0.46	Min T on sheathing, between studs at centre of stud cavity
T <sub>i2</sub>	0.35	0.47	0.54	Max T on sheathing, at studs between fasteners
T <sub>i3</sub>	0.33	0.43	0.61	Min T on rim joist, between floor joists

## Detail 8.2.3

### Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of balcony

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.323 (1.83)

#### Balcony Transition Linear Transmittance

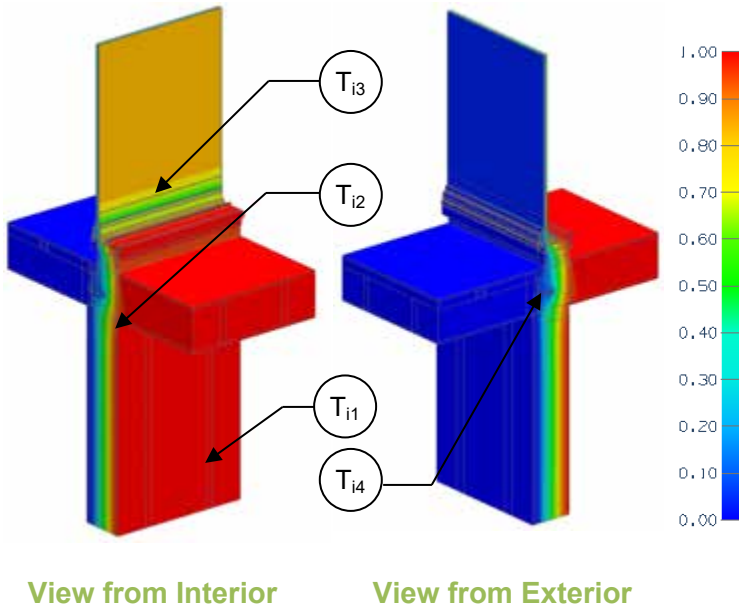
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
R-10 (1.76)	R-5.9 (1.04)	0.170 (0.97)	0.072 (0.125)
R-15 (2.64)	R-6.0 (1.06)	0.166 (0.95)	0.067 (0.115)

### 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 8.2.4

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of balcony

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.323 (1.83)

#### Balcony Transition Linear Transmittance

Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

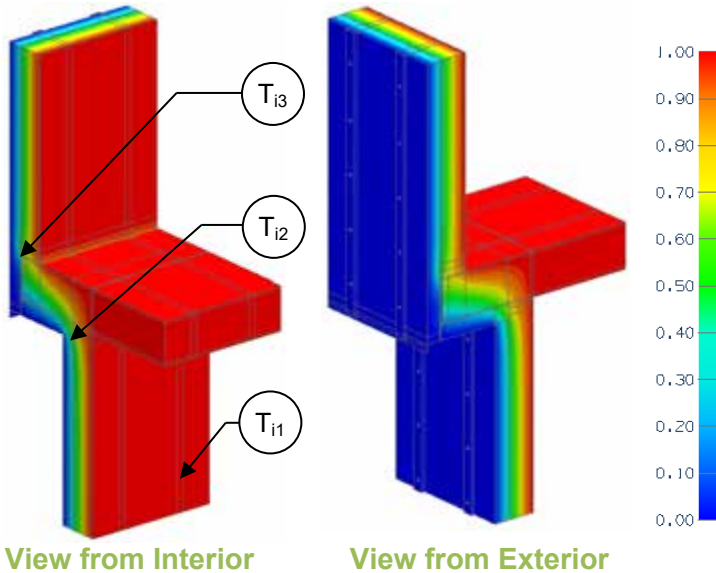
### Temperature Indices

	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 8.2.5

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of soffit

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_f$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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)

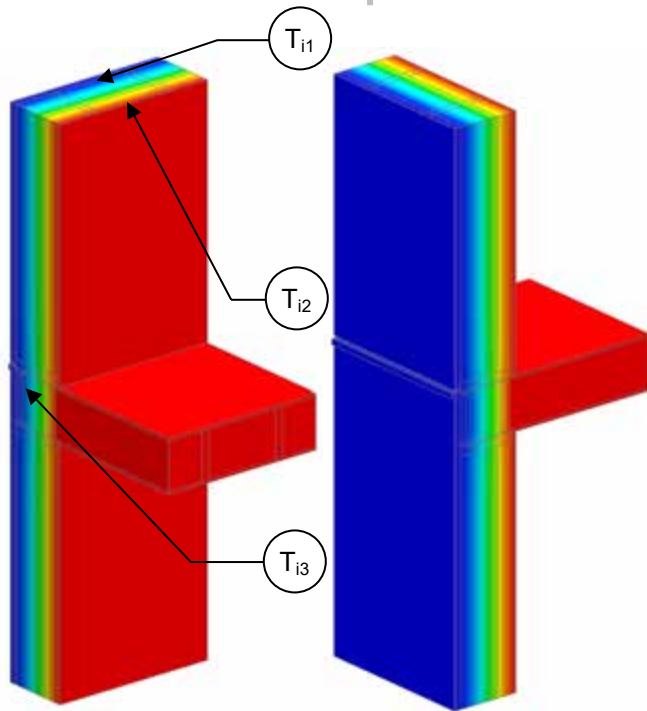
### Temperature Indices

	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 8.2.6

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap – Rim Joist and Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + fill 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

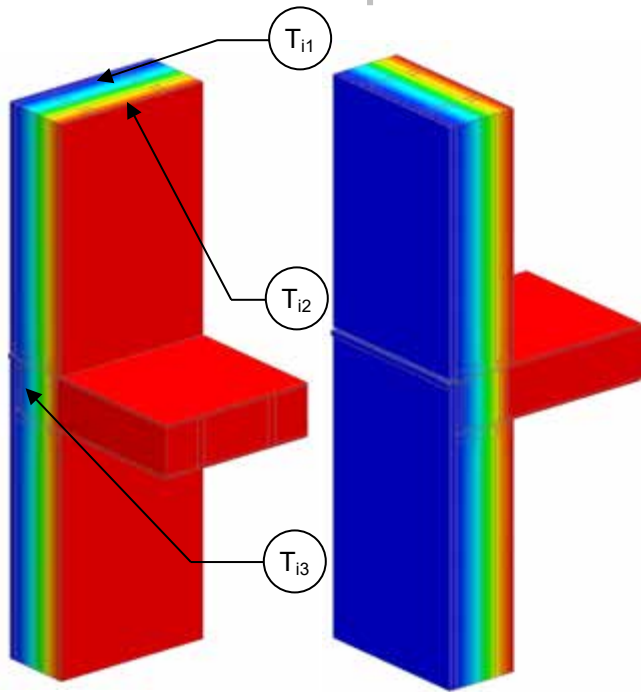
Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)	R-36.4 (6.42)	0.027 (0.16)	0.010 (0.018)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)	R-40.1 (7.07)	0.025 (0.14)	0.012 (0.020)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)	R-47.2 (8.31)	0.021 (0.12)	0.013 (0.023)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)	R-53.7 (9.46)	0.019 (0.11)	0.014 (0.025)

### Temperature Indices

	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.03	0.03	0.02	0.02	Min T on sheathing, between studs at centre of stud cavity
$T_{i2}$	0.95	0.95	0.95	0.96	Min T on gypsum, between studs at centre of stud cavity
$T_{i3}$	0.09	0.09	0.08	0.07	Min T on rim joist, between floor joists

# Detail 8.2.7

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 3" Gap – Rim Joist and Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + fill 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

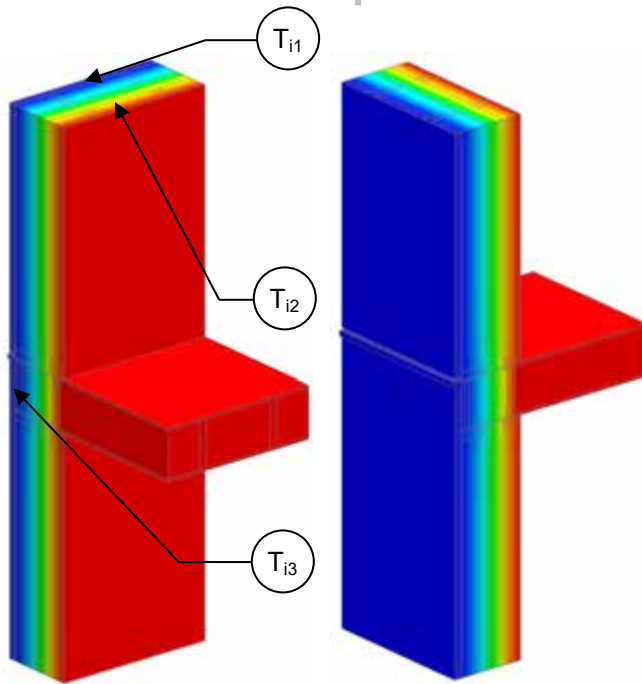
Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-42.0 (7.40)	R-44.5 (7.84)	R-41.6 (7.32)	0.024 (0.14)	R-39.9 (7.02)	0.025 (0.14)	0.009 (0.016)
R-48.0 (8.45)	R-50.5 (8.90)	R-46.4 (8.18)	0.022 (0.12)	R-44.1 (7.76)	0.023 (0.13)	0.010 (0.017)
R-60.0 (10.57)	R-62.5 (11.01)	R-55.9 (9.84)	0.018 (0.10)	R-52.1 (9.17)	0.019 (0.11)	0.011 (0.020)
R-72.0 (12.68)	R-74.5 (13.13)	R-65.0 (11.45)	0.015 (0.09)	R-59.6 (10.49)	0.017 (0.10)	0.012 (0.021)

### Temperature Indices

	R42.0	R48.0	R60.0	R72.0	
$T_{i1}$	0.03	0.02	0.02	0.02	Min T on sheathing, between studs at centre of stud cavity
$T_{i2}$	0.95	0.96	0.96	0.96	Min T on gypsum, between studs at centre of stud cavity
$T_{i3}$	0.08	0.08	0.07	0.06	Min T on rim joist, between floor joists

# Detail 8.2.8

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 4" Gap – Rim Joist and Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + fill 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

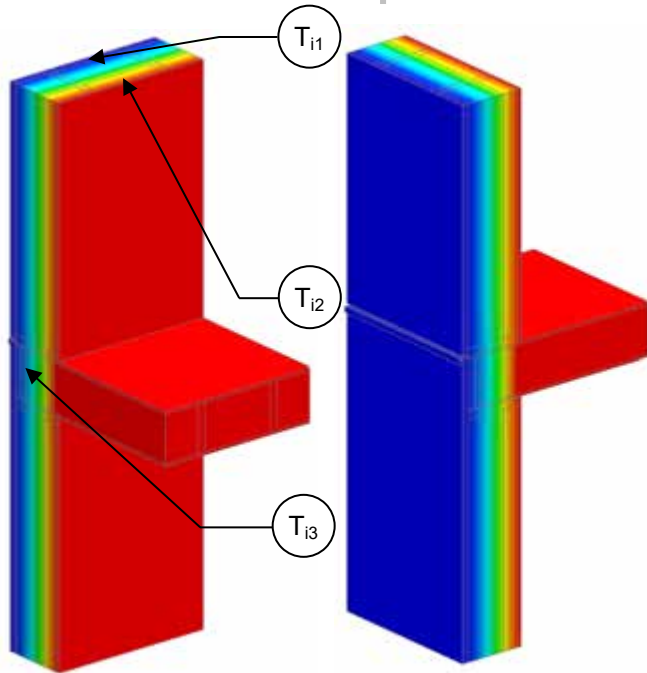
Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-45.5 (8.01)	R-48.0 (8.46)	R-45.1 (7.94)	0.022 (0.13)	R-43.3 (7.62)	0.023 (0.13)	0.008 (0.014)
R-52.0 (9.16)	R-54.5 (9.60)	R-50.5 (8.89)	0.020 (0.11)	R-48.0 (8.45)	0.021 (0.12)	0.009 (0.016)
R-65.0 (11.45)	R-67.5 (11.89)	R-60.9 (10.73)	0.016 (0.09)	R-56.9 (10.03)	0.018 (0.10)	0.010 (0.018)
R-78.0 (13.74)	R-80.5 (14.18)	R-71.1 (12.52)	0.014 (0.08)	R-65.3 (11.51)	0.015 (0.09)	0.011 (0.019)

### Temperature Indices

	R45.5	R52.0	R65.0	R78.0	
$T_{i1}$	0.02	0.02	0.02	0.02	Min T on sheathing, between studs at centre of stud cavity
$T_{i2}$	0.96	0.96	0.96	0.96	Min T on gypsum, between studs at centre of stud cavity
$T_{i3}$	0.07	0.07	0.07	0.06	Min T on rim joist, between floor joists

# Detail 8.2.9

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap – Insulated Rim Joist and Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + fill 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

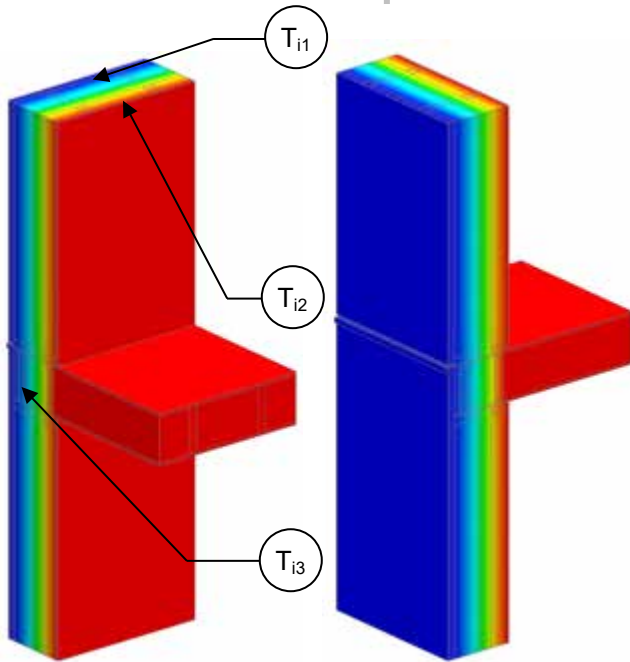
Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)	R-36.6 (6.44)	0.027 (0.16)	0.009 (0.016)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)	R-40.3 (7.09)	0.025 (0.14)	0.011 (0.019)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)	R-47.3 (8.32)	0.021 (0.12)	0.013 (0.022)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)	R-53.8 (9.47)	0.019 (0.11)	0.014 (0.025)

### Temperature Indices

	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.03	0.03	0.02	0.02	Min T on sheathing, between studs at centre of stud cavity
$T_{i2}$	0.95	0.95	0.95	0.96	Min T on gypsum, between studs at centre of stud cavity
$T_{i3}$	0.15	0.14	0.14	0.13	Min T on rim joist, between floor joists

# Detail 8.2.10

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 3" Gap – Insulated Rim Joist and Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + fill 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

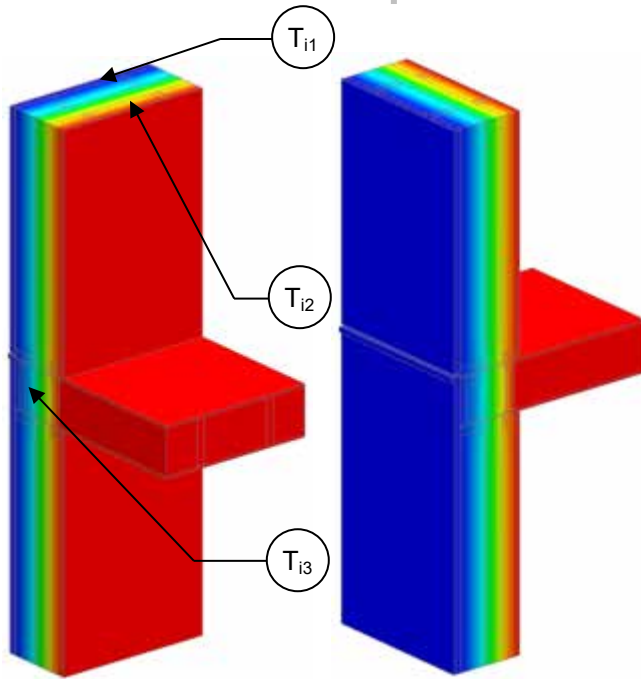
Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-42.0 (7.40)	R-44.5 (7.84)	R-41.6 (7.32)	0.024 (0.14)	R-40.0 (7.04)	0.025 (0.14)	0.008 (0.014)
R-48.0 (8.45)	R-50.5 (8.90)	R-46.4 (8.18)	0.022 (0.12)	R-44.2 (7.78)	0.023 (0.13)	0.010 (0.017)
R-60.0 (10.57)	R-62.5 (11.01)	R-55.9 (9.84)	0.018 (0.10)	R-52.2 (9.18)	0.019 (0.11)	0.011 (0.019)
R-72.0 (12.68)	R-74.5 (13.13)	R-65.0 (11.45)	0.015 (0.09)	R-59.6 (10.50)	0.017 (0.10)	0.012 (0.021)

### Temperature Indices

	R42.0	R48.0	R60.0	R72.0	
$T_{i1}$	0.03	0.03	0.02	0.02	Min T on sheathing, between studs at centre of stud cavity
$T_{i2}$	0.96	0.96	0.96	0.96	Min T on gypsum, between studs at centre of stud cavity
$T_{i3}$	0.14	0.13	0.13	0.12	Min T on rim joist, between floor joists

# Detail 8.2.11

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 4" Gap – Insulated Rim Joist and Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + fill 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

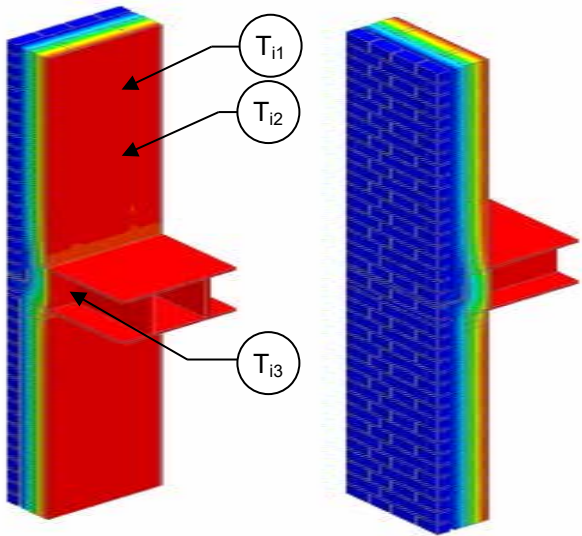
Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-45.5 (8.01)	R-48.0 (8.46)	R-45.1 (7.94)	0.022 (0.13)	R-43.4 (7.65)	0.023 (0.13)	0.007 (0.013)
R-52.0 (9.16)	R-54.5 (9.60)	R-50.5 (8.89)	0.020 (0.11)	R-48.1 (8.47)	0.021 (0.12)	0.009 (0.015)
R-65.0 (11.45)	R-67.5 (11.89)	R-60.9 (10.73)	0.016 (0.09)	R-57.0 (10.04)	0.018 (0.10)	0.010 (0.017)
R-78.0 (13.74)	R-80.5 (14.18)	R-71.1 (12.52)	0.014 (0.08)	R-65.4 (11.51)	0.015 (0.09)	0.011 (0.019)

### Temperature Indices

	R45.5	R52.0	R65.0	R78.0	
$T_{i1}$	0.03	0.02	0.02	0.02	Min T on sheathing, between studs at centre of stud cavity
$T_{i2}$	0.96	0.96	0.96	0.96	Min T on gypsum, between studs at centre of stud cavity
$T_{i3}$	0.13	0.12	0.11	0.11	Min T on rim joist, between floor joists

# Detail 8.2.12

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer and R-19 Batt Insulation in Stud Cavity – Intermediate Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-27.4 (4.83 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value, without floor
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

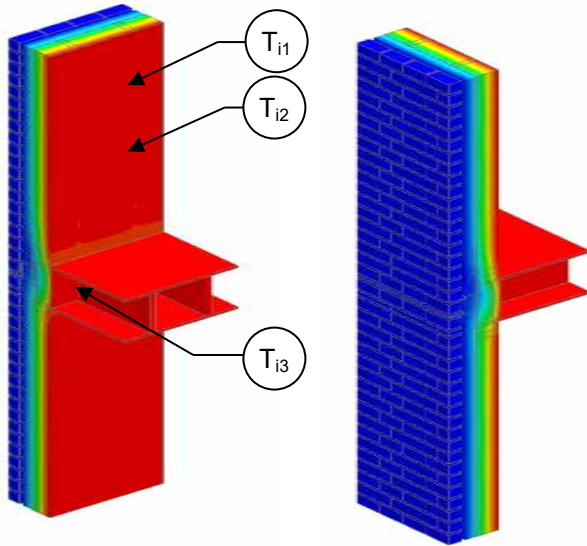
### Temperature Indices

	R0	R10	
T <sub>i1</sub>	0.19	0.32	T on sheathing, at studs near brick ties
T <sub>i2</sub>	0.15	0.42	T on sheathing, at studs between brick ties
T <sub>i3</sub>	0.43	0.49	Min T on rim joist, between floor joists



# Detail 8.2.13

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer and R-19 Batt Insulation in Stud Cavity – Intermediate Floor Intersection



### Thermal Performance Indicators

1.00	<table border="1"> <tr> <td>Assembly 1D (Nominal) R-Value</td> <td>R<sub>1D</sub></td> <td>R-27.4 (4.83 RSI) + exterior insulation</td> </tr> <tr> <td>Transmittance / Resistance without Anomaly</td> <td>U<sub>o</sub>, R<sub>o</sub></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 Index<sup>1</sup></td> <td>T<sub>i</sub></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 <sub>1D</sub>	R-27.4 (4.83 RSI) + exterior insulation	Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value, without floor	Transmittance / Resistance	U, R	U and R-values for the overall assembly	Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	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 <sub>1D</sub>	R-27.4 (4.83 RSI) + exterior insulation													
Transmittance / Resistance without Anomaly		U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value, without floor													
Transmittance / Resistance		U, R	U and R-values for the overall assembly													
Surface Temperature Index <sup>1</sup>		T <sub>i</sub>	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																

<sup>1</sup>Assumptions 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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

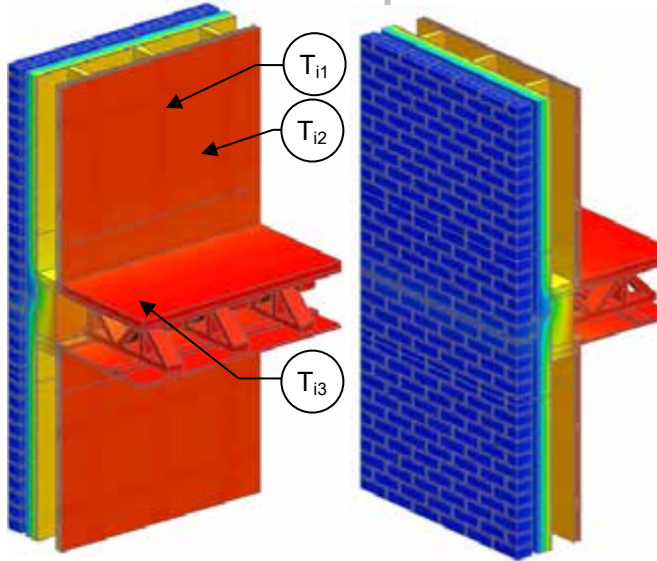
### Temperature Indices

	R0	R10	
T <sub>i1</sub>	0.19	0.34	T on sheathing, at studs near brick ties
T <sub>i2</sub>	0.15	0.42	T on sheathing, at studs between brick ties
T <sub>i3</sub>	0.24	0.30	Min T on rim joist, at fasteners



# Detail 8.2.14

## Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall with Interior OSB and Wood Furring Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer – CLT and Wood Truss Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-5.3 (0.93 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

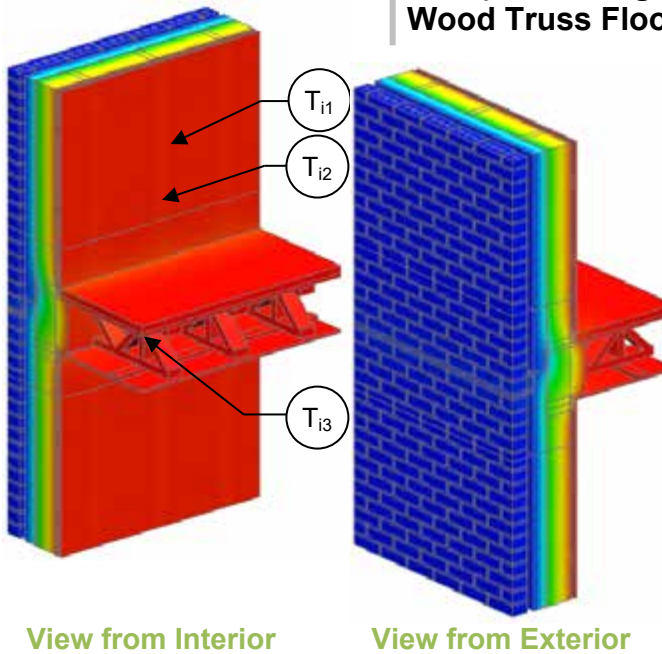
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-15.3 (2.69)	R-14.3 (2.52)	0.070 (0.40)	R-13.8 (2.44)	0.072 (0.41)	0.019 (0.032)
R-15 (2.64)	R-20.3 (3.57)	R-17.9 (3.15)	0.056 (0.32)	R-16.7 (2.95)	0.060 (0.34)	0.030 (0.052)
R-20 (3.52)	R-25.3 (4.45)	R-21.1 (3.72)	0.047 (0.27)	R-19.2 (3.38)	0.052 (0.30)	0.037 (0.064)
R-25 (4.40)	R-30.3 (5.33)	R-24.1 (4.24)	0.041 (0.24)	R-21.4 (3.77)	0.047 (0.27)	0.041 (0.071)
R-30 (5.28)	R-35.3 (6.21)	R-26.9 (4.73)	0.037 (0.21)	R-23.4 (4.12)	0.043 (0.24)	0.044 (0.076)

### Temperature Indices

	R10	R15	R20	R25	R30	
$T_{i1}$	0.62	0.66	0.69	0.71	0.73	Min T on sheathing, at studs near brick ties
$T_{i2}$	0.76	0.81	0.84	0.86	0.88	Max T on sheathing, between studs and brick ties
$T_{i3}$	0.88	0.88	0.89	0.90	0.90	Min T on CLT, near wood joists, behind shelf angle fasteners

# Detail 8.2.15

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall with Interior OSB and Wood Furring Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer – CLT and Wood Truss Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-23.4 (4.12 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value, without floor
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

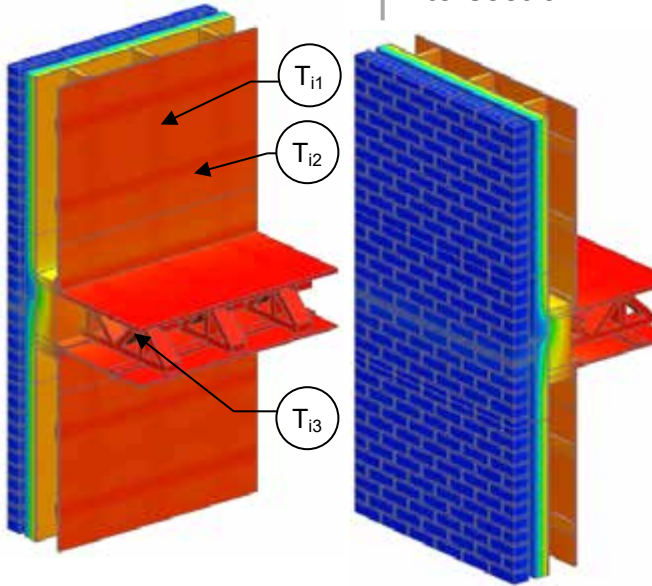
Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ Btu/ft ·hr·°F (W/m K)
R-5 (0.88)	R-28.4 (5.00)	R-26.2 (4.62)	0.038 (0.22)	R-23.7 (4.18)	0.042 (0.24)	0.031 (0.054)
R-10 (1.76)	R-33.4 (5.88)	R-30.3 (5.34)	0.033 (0.19)	R-27.0 (4.75)	0.037 (0.21)	0.032 (0.056)
R-15 (2.64)	R-38.4 (6.76)	R-34.0 (5.99)	0.029 (0.17)	R-29.7 (5.23)	0.034 (0.19)	0.033 (0.057)
R-20 (3.52)	R-43.4 (7.64)	R-37.4 (6.58)	0.027 (0.15)	R-32.1 (5.66)	0.031 (0.18)	0.034 (0.059)
R-25 (4.40)	R-48.4 (8.52)	R-40.5 (7.12)	0.025 (0.14)	R-34.3 (6.04)	0.029 (0.17)	0.035 (0.060)
R-30 (5.28)	R-53.4 (9.40)	R-43.4 (7.65)	0.023 (0.13)	R-36.3 (6.39)	0.028 (0.16)	0.035 (0.061)

### Temperature Indices

	R5	R10	R15	R20	R25	R30	
T <sub>i1</sub>	0.21	0.26	0.30	0.33	0.36	0.39	Min T on sheathing, at studs near brick ties
T <sub>i2</sub>	0.30	0.41	0.48	0.53	0.56	0.60	Max T on sheathing, at studs, between brick ties
T <sub>i3</sub>	0.43	0.46	0.47	0.49	0.50	0.51	Min T on CLT, near wood joists, behind shelf angle fasteners

# Detail 8.2.16

## Exterior Insulated 2x6 Wood Stud (16" o.c.) Wall with Interior Wood Furring Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer – CLT and Wood Truss Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-4.0 (0.70 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value, without floor
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions 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 <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-14.0 (2.46)	R-13.0 (2.29)	0.077 (0.44)	R-12.8 (2.25)	0.078 (0.44)	0.012 (0.021)
R-15 (2.64)	R-19.0 (3.35)	R-16.6 (2.92)	0.060 (0.34)	R-15.7 (2.77)	0.064 (0.36)	0.026 (0.046)
R-20 (3.52)	R-24.0 (4.23)	R-19.8 (3.49)	0.050 (0.29)	R-18.2 (3.21)	0.055 (0.31)	0.034 (0.059)
R-25 (4.40)	R-29.0 (5.11)	R-22.8 (4.02)	0.044 (0.25)	R-20.5 (3.61)	0.049 (0.28)	0.039 (0.068)
R-30 (5.28)	R-34.0 (5.99)	R-25.6 (4.50)	0.039 (0.22)	R-22.5 (3.96)	0.044 (0.25)	0.042 (0.073)

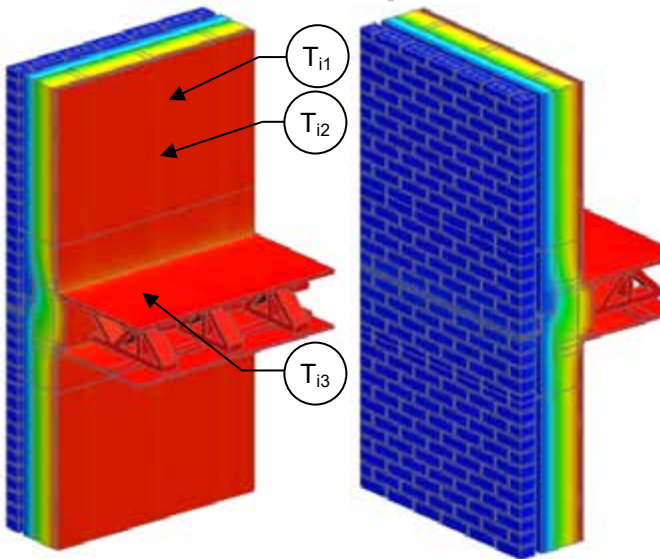
### Temperature Indices

	R10	R15	R20	R25	R30	
T <sub>i1</sub>	0.69	0.72	0.74	0.76	0.78	Min T on sheathing, at studs near brick ties
T <sub>i2</sub>	0.84	0.87	0.90	0.91	0.92	Max T on sheathing, between studs and brick ties
T <sub>i3</sub>	0.90	0.90	0.91	0.91	0.92	Min T on CLT, near wood joists, behind shelf angle fasteners



# Detail 8.2.17

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall with Interior Wood Furring Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer – CLT and Wood Truss Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-23.0 (4.05 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	U <sub>o</sub> , R <sub>o</sub>	"clear wall" U- and R-value, without floor
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Linear Transmittance	ψ	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

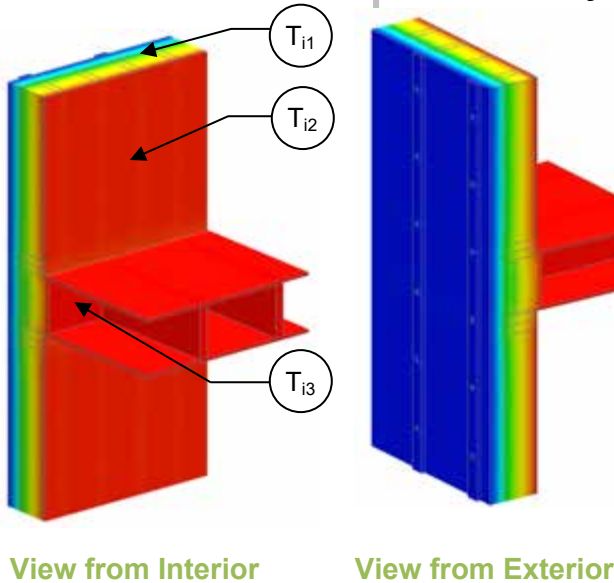
Exterior Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>o</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>o</sub> Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	ψ Btu/ft ·hr·°F (W/m K)
R-5 (0.88)	R-28.0 (4.93)	R-25.8 (4.54)	0.039 (0.22)	R-23.6 (4.15)	0.042 (0.24)	0.029 (0.050)
R-10 (1.76)	R-33.0 (5.81)	R-29.8 (5.26)	0.034 (0.19)	R-26.8 (4.72)	0.037 (0.21)	0.030 (0.052)
R-15 (2.64)	R-38.0 (6.69)	R-33.5 (5.91)	0.030 (0.17)	R-29.6 (5.21)	0.034 (0.19)	0.031 (0.054)
R-20 (3.52)	R-43.0 (7.57)	R-36.9 (6.50)	0.027 (0.15)	R-32.1 (5.65)	0.031 (0.18)	0.032 (0.055)
R-25 (4.40)	R-48.0 (8.45)	R-40.0 (7.05)	0.025 (0.14)	R-34.3 (6.04)	0.029 (0.17)	0.033 (0.057)
R-30 (5.28)	R-53.0 (9.33)	R-42.9 (7.56)	0.023 (0.13)	R-36.3 (6.39)	0.028 (0.16)	0.033 (0.058)

### Temperature Indices

	R5	R10	R15	R20	R25	R30	
T <sub>i1</sub>	0.21	0.26	0.30	0.33	0.37	0.39	Min T on sheathing, at studs near brick ties
T <sub>i2</sub>	0.31	0.42	0.48	0.53	0.57	0.61	Max T on sheathing, at studs, between brick ties
T <sub>i3</sub>	0.46	0.48	0.49	0.51	0.52	0.53	Min T on CLT, near wood joists, behind shelf angle fasteners

# Detail 8.2.18

## Exterior and Interior Insulated 2x6 Wood Stud (8" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-0.0 (0.00)	R-21.5 (3.80)	R-18.1 (3.19)	0.055 (0.31)	R-17.5 (3.08)	0.057 (0.32)	0.018 (0.032)
R-5.0 (0.88)	R-26.5 (4.68)	R-23.1 (4.07)	0.043 (0.25)	R-22.6 (3.97)	0.044 (0.25)	0.011 (0.018)
R-15.0 (2.64)	R-36.5 (6.44)	R-32.6 (5.75)	0.031 (0.17)	R-32.1 (5.66)	0.031 (0.18)	0.005 (0.008)

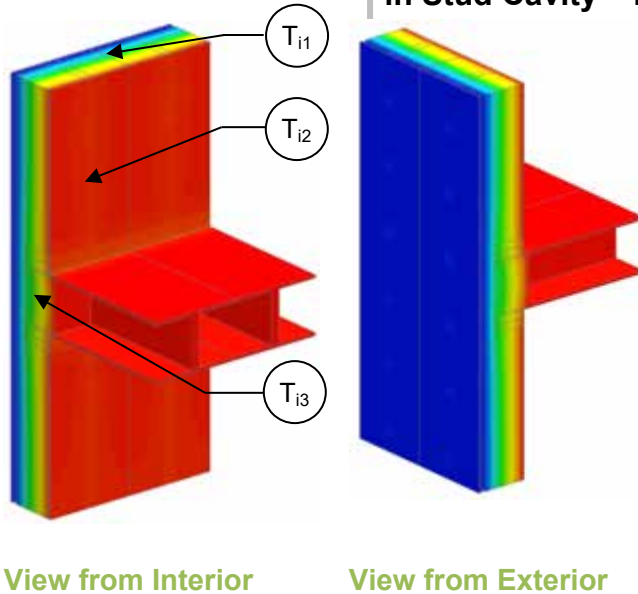
### Temperature Indices

	R0	R5	R15	
$T_{i1}$	0.07	0.26	0.48	Min T on sheathing, between studs at centre of stud cavity
$T_{i2}$	0.14	0.31	0.53	Max T on sheathing, at studs, between fasteners
$T_{i3}$	0.20	0.38	0.58	Min T on rim joist, between floor joists



# Detail 8.2.19

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – Intermediate Floor Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of wood framed floor

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

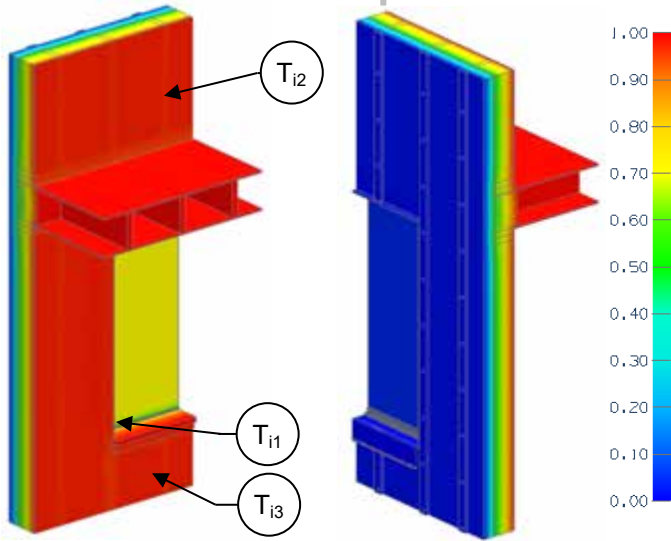
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
R-5 (0.88)	R-26.6 (4.68)	R-24.6 (4.33)	0.041 (0.23)	R-23.4 (4.12)	0.043 (0.24)	0.020 (0.034)
R-10 (1.76)	R-31.6 (5.57)	R-29.2 (5.14)	0.034 (0.19)	R-27.9 (4.91)	0.036 (0.20)	0.016 (0.027)
R-15 (2.64)	R-36.6 (6.45)	R-33.7 (5.93)	0.030 (0.17)	R-32.8 (5.78)	0.030 (0.17)	0.007 (0.012)

### Temperature Indices

	R5	R10	R15	
$T_{i1}$	0.26	0.37	0.46	Min T on sheathing, between studs at centre of stud cavity
$T_{i2}$	0.31	0.42	0.53	Max T on sheathing, at studs, between fasteners
$T_{i3}$	0.38	0.49	0.57	Min T on rim joist, between floor joists

# Detail 8.3.1

## 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



View from Interior View from Exterior

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.331 (1.88)

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.80 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 + floor + window
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-26.5 (4.68)	R-24.6 (4.32)	0.041 (0.23)
R-15.0 (2.64)	R-36.5 (6.44)	R-33.6 (5.92)	0.030 (0.17)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-23.4 (4.12)	0.043 (0.24)	0.020 (0.035)
R-32.8 (5.78)	0.031 (0.17)	0.007 (0.012)

#### Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-5.0 (0.88)	R-8.2 (1.44)	0.122 (0.69)	0.025 (0.042)	0.035 (0.061)	0.028 (0.049)	0.032 (0.055)
R-15.0 (2.64)	R-8.8 (1.55)	0.114 (0.65)	0.036 (0.062)	0.035 (0.061)	0.029 (0.050)	0.035 (0.061)

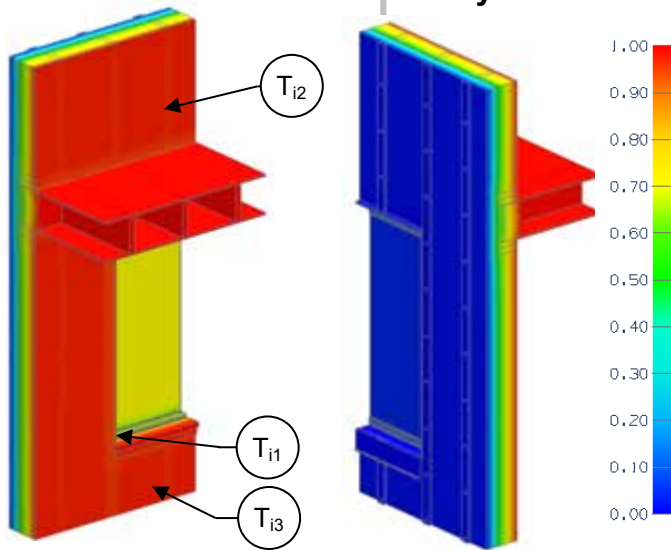
### Temperature Indices

	R5	R15	
$T_{i1}$	0.44	0.44	Min T on window frame, at bottom corner
$T_{i2}$	0.37	0.50	Max T on interior surface of sheathing
$T_{i3}$	0.25	0.44	Min T on interior surface sheathing



# Detail 8.3.2

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – Aluminum Window Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.80 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

View from Interior  
Base Assembly – Glazing

View from Exterior

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-0.0 (0.00)	R-21.5 (3.80)	R-19.7 (3.47)	0.051 (0.29)
R-5.0 (0.88)	R-26.5 (4.68)	R-24.6 (4.32)	0.041 (0.23)
R-15.0 (2.64)	R-36.5 (6.44)	R-33.6 (5.92)	0.030 (0.17)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-17.0 (3.00)	0.059 (0.33)	0.070 (0.122)
R-23.4 (4.12)	0.043 (0.24)	0.020 (0.035)
R-32.8 (5.78)	0.031 (0.17)	0.007 (0.012)

#### Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-0.0 (0.00)	R-6.9 (1.21)	0.146 (0.83)	-0.028 (-0.049)	0.016 (0.028)	0.028 (0.049)	0.001 (0.001)
R-5.0 (0.88)	R-7.3 (1.29)	0.136 (0.77)	0.016 (0.027)	0.011 (0.019)	0.025 (0.043)	0.017 (0.030)
R-15.0 (2.64)	R-7.8 (1.38)	0.128 (0.73)	0.029 (0.049)	0.012 (0.021)	0.026 (0.045)	0.022 (0.040)

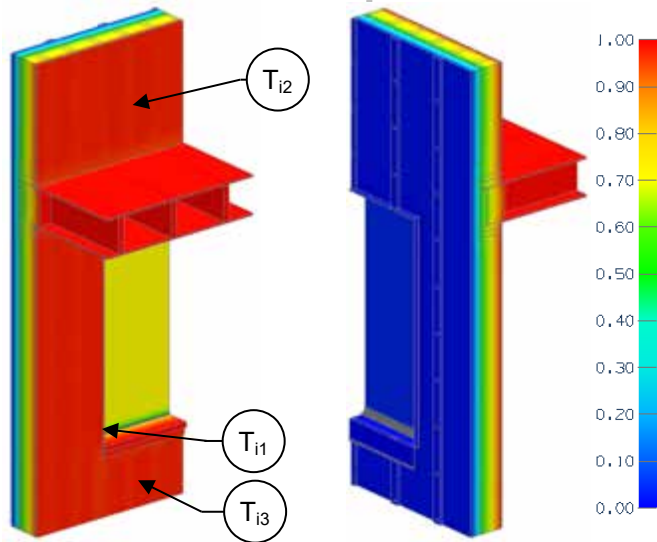
### Temperature Indices

	R0	R5	R15	
$T_{i1}$	0.62	0.63	0.58	Min T on window frame, at bottom corner
$T_{i2}$	0.12	0.33	0.49	Max T on interior surface of sheathing at studs
$T_{i3}$	0.07	0.25	0.43	Min T on interior surface sheathing between wood studs



# Detail 8.3.3

## 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



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.80 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

View from Interior  
Base Assembly – Glazing

View from Exterior

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.331 (1.88)

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-0.0 (0.00)	R-21.5 (3.80)	R-18.1 (3.19)	0.055 (0.31)
R-5.0 (0.88)	R-26.5 (4.68)	R-23.1 (4.07)	0.043 (0.25)
R-15.0 (2.64)	R-36.5 (6.44)	R-32.6 (5.75)	0.031 (0.17)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-17.5 (3.08)	0.057 (0.32)	0.018 (0.032)
R-22.6 (3.97)	0.044 (0.25)	0.011 (0.018)
R-32.1 (5.66)	0.031 (0.18)	0.005 (0.008)

#### Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-0.0 (0.00)	R-7.1 (1.25)	0.141 (0.80)	0.027 (0.046)	0.040 (0.069)	0.036 (0.062)	0.020 (0.035)
R-5.0 (0.88)	R-7.7 (1.35)	0.130 (0.74)	0.037 (0.065)	0.035 (0.061)	0.028 (0.049)	0.032 (0.056)
R-15.0 (2.64)	R-8.3 (1.46)	0.121 (0.69)	0.041 (0.071)	0.036 (0.062)	0.028 (0.049)	0.034 (0.058)

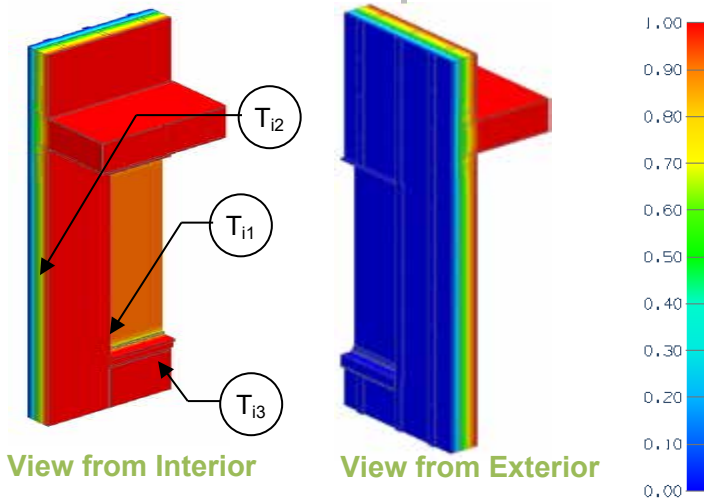
### Temperature Indices

	R0	R5	R15	
$T_{i1}$	0.42	0.43	0.50	Min T on window frame, at bottom corner
$T_{i2}$	0.14	0.30	0.51	Max T on interior surface of sheathing at studs
$T_{i3}$	0.07	0.28	0.46	Min T on interior surface sheathing under sill between wood studs



# Detail 8.3.4

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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-12.9 (2.28)	0.077 (0.44)
R-15 (2.64)	R-18.2 (3.20)	R-17.1 (3.01)	0.059 (0.33)

### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-8.7 (1.53)	0.115 (0.65)	-0.025 (-0.043)
R-13.2 (2.33)	0.076 (0.43)	-0.016 (-0.028)
R-18.2 (3.20)	0.055 (0.31)	-0.035 (-0.061)

### Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-5 (0.88)	R-7.9 (1.40)	0.126 (0.72)	-0.028 (-0.049)	0.003 (0.006)	0.008 (0.015)	0.000 (0.000)
R-10 (1.76)	R-10.0 (1.76)	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 (2.00)	0.088 (0.50)	0.035 (0.061)	0.019 (0.034)	0.021 (0.036)	0.032 (0.056)

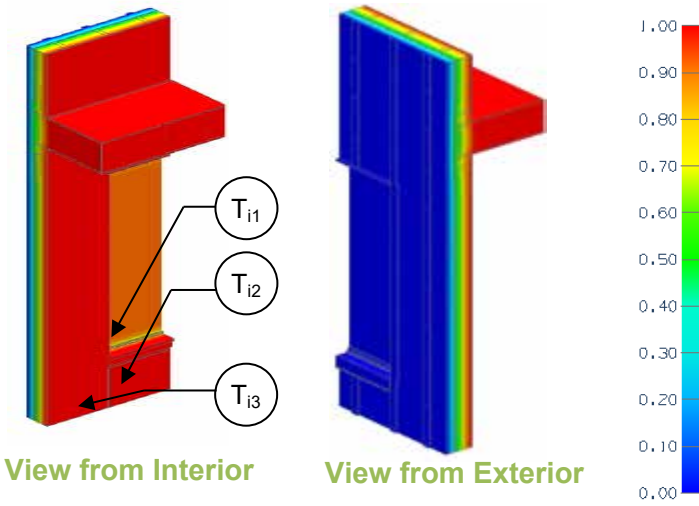
## Temperature Indices

	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 8.3.5

**Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – Triple Glazed Flange Mounted Vinyl Window Intersection with Window Positioned in Wood Framing**



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (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 <sup>1</sup>	$T_i$	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-5 (0.88)	R-26.5 (4.68)	R-24.6 (4.32)	0.041 (0.23)
R-10 (1.76)	R-31.5 (5.57)	R-29.2 (5.14)	0.034 (0.19)
R-15 (2.64)	R-36.5 (6.45)	R-33.6 (5.92)	0.030 (0.17)

### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-23.4 (4.12)	0.043 (0.24)	0.020 (0.034)
R-27.9 (4.91)	0.036 (0.20)	0.016 (0.027)
R-32.8 (5.78)	0.030 (0.17)	0.007 (0.012)

### Window Transition Transmittance

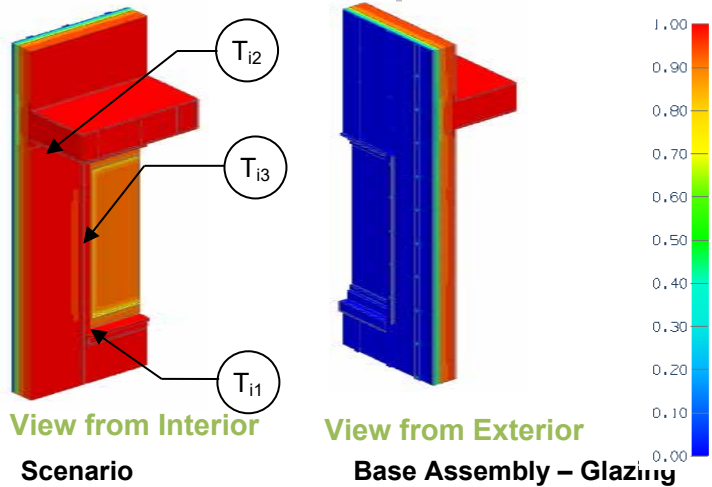
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-5 (0.88)	R-13.0 (2.29)	0.077 (0.44)	0.023 (0.038)	0.015 (0.026)	0.019 (0.033)	0.018 (0.031)
R-10 (1.76)	R-14.0 (2.46)	0.071 (0.41)	0.021 (0.036)	0.015 (0.026)	0.020 (0.034)	0.018 (0.031)
R-15 (2.64)	R-14.7 (2.59)	0.068 (0.39)	0.027 (0.047)	0.016 (0.028)	0.021 (0.036)	0.022 (0.038)

## Temperature Indices

	R5	R10	R15	
$T_{11}$	0.62	0.63	0.64	Min T on window frame, at bottom corner
$T_{12}$	0.33	0.43	0.49	Max T on interior surface of sheathing, below window adjacent to wood studs
$T_{13}$	0.25	0.35	0.41	Min T on interior surface of sheathing, adjacent to wood stud

# Detail 8.3.6

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions 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 <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.142 (0.81)	0.182 (1.03)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ 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)

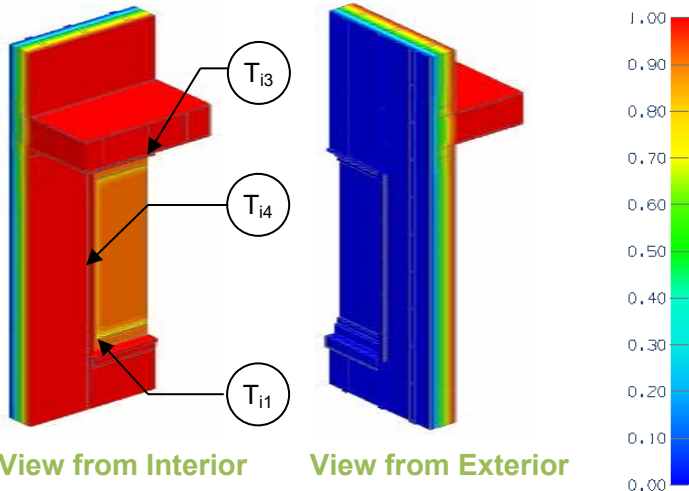
### Temperature Indices

	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 8.3.7

**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 and R-19 Batt Insulation in Stud Cavity – Triple Glazed High Performance Vinyl Window Intersection (Insulated Frames)**



## Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (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 <sup>1</sup>	$T_i$	0 = exterior temperature, 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions 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 <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.142 (0.81)	0.182 (1.03)

## Nominal (1D) vs. Assembly Performance Indicators

### Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-5 (0.88)	R-26.5 (4.68)	R-24.6 (4.33)	0.041 (0.23)
R-10 (1.76)	R-31.5 (5.57)	R-29.2 (5.14)	0.034 (0.20)
R-15 (2.64)	R-36.5 (6.45)	R-33.6 (5.93)	0.030 (0.17)

### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-23.4 (4.12)	0.043 (0.24)	0.020 (0.035)
R-27.9 (4.91)	0.036 (0.20)	0.016 (0.027)
R-32.8 (5.78)	0.030 (0.17)	0.007 (0.012)

### Window Transition Transmittance

	Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
A	R-5 (0.88)	R-12.5 (2.19)	0.080 (0.46)	0.034 (0.059)	0.019 (0.032)	0.018 (0.032)	0.015 (0.026)
	R-10 (1.76)	R-13.4 (2.35)	0.075 (0.43)	0.028 (0.049)	0.020 (0.035)	0.018 (0.031)	0.014 (0.025)
	R-15 (2.64)	R-14.1 (2.48)	0.071 (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 (2.21)	0.080 (0.45)	0.032 (0.056)	0.019 (0.033)	0.017 (0.029)	0.012 (0.021)
	R-10 (1.76)	R-13.5 (2.38)	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-14.2 (2.51)	0.070 (0.40)	0.023 (0.041)	0.015 (0.026)	0.017 (0.029)	0.013 (0.022)

## Temperature Indices

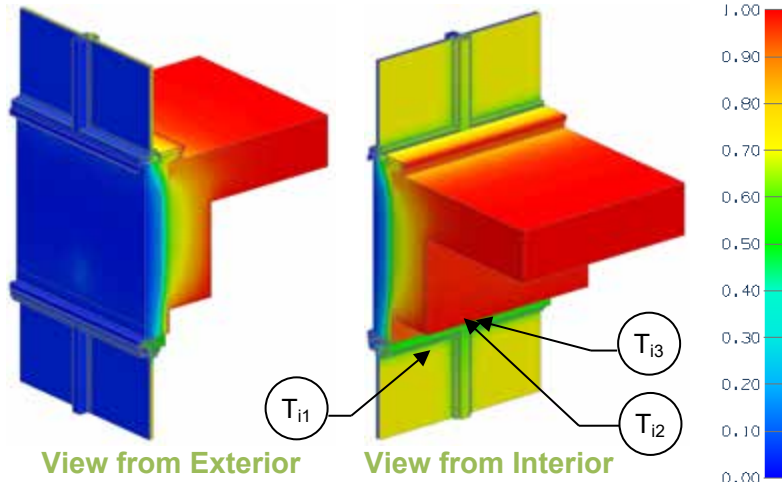
	R5	R10	R15	
$T_{i1}$	0.69	0.69	0.69	Min T on window frame, at bottom corner at edge of glazing
$T_{i2}$	0.75	0.84	0.88	Max T on interior surface of sheathing, at centre of wall away from wood studs
$T_{i3}$	0.63	0.71	0.77	Min T on interior surface of sheathing, below window sill adjacent to wood stud



# Detail 8.3.8

## Interior Insulated Cross Laminated Timber (CLT) Spandrel at Window and Dowel Laminated Timber (DLT) – Intermediate Floor Intersection with Edge of Floor and Glulam Beam Aligned

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value at Beam	$R_{1D}$	R-15.4 (2.71 RSI) + insulation
Transmittance without Anomaly	$U_{g \text{ top}}$ $U_{g \text{ bottom}}$ $U_g$	U-value for aluminum window including framing g top = sill g bottom = head g = combined sill + head
Transmittance / Resistance	$U_o, R_o$ $U_s, R_s$ $U_t, R_t$	U and R-values for o = spandrel with floor without glazing s = spandrel including window to wall interface t = combined glazing + spandrel
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of window to wall interface

### Assembly Performance Indicators

#### Base Assembly – Aluminum Window

Mullion Spacing	$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_{g \text{ top}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_{g \text{ bottom}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
24" o.c.	0.321 (1.82)	0.428 (2.43)	0.524 (2.97)	0.478 (2.71)
36" o.c.	0.321 (1.82)	0.407 (2.31)	0.462 (2.63)	0.436 (2.47)

#### Window to Wall Linear Transmittance

ISO-CONNECT Spacing	Spandrel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
24" o.c.	R-8.4 (1.48)	R-23.8 (4.18)	R-12.6 (2.22)	0.079 (0.45)	R-11.1 (1.95)	0.090 (0.51)	R-3.8 (0.68)	0.261 (1.48)	0.015 (0.026)
	R-16.8 (2.96)	R-32.2 (5.66)	R-15.0 (2.64)	0.067 (0.38)	R-12.7 (2.25)	0.078 (0.45)	R-3.9 (0.69)	0.254 (1.44)	0.015 (0.027)
	R-25.2 (4.44)	R-40.6 (7.14)	R-16.4 (2.89)	0.061 (0.35)	R-13.8 (2.43)	0.073 (0.41)	R-4.0 (0.70)	0.251 (1.42)	0.016 (0.027)
36" o.c.	R-8.4 (1.48)	R-23.8 (4.18)	R-13.0 (2.29)	0.077 (0.44)	R-12.3 (2.16)	0.081 (0.46)	R-3.7 (0.65)	0.271 (1.54)	0.006 (0.010)
	R-16.8 (2.96)	R-32.2 (5.66)	R-15.6 (2.76)	0.064 (0.36)	R-14.6 (2.58)	0.068 (0.39)	R-3.8 (0.67)	0.264 (1.50)	0.006 (0.010)
	R-25.2 (4.44)	R-40.6 (7.14)	R-17.3 (3.05)	0.058 (0.33)	R-16.0 (2.82)	0.062 (0.35)	R-3.8 (0.67)	0.262 (1.49)	0.006 (0.010)
	R-33.6 (5.92)	R-49.0 (8.62)	R-18.5 (3.25)	0.054 (0.31)	R-17.0 (3.00)	0.059 (0.33)	R-3.8 (0.68)	0.260 (1.48)	0.006 (0.010)

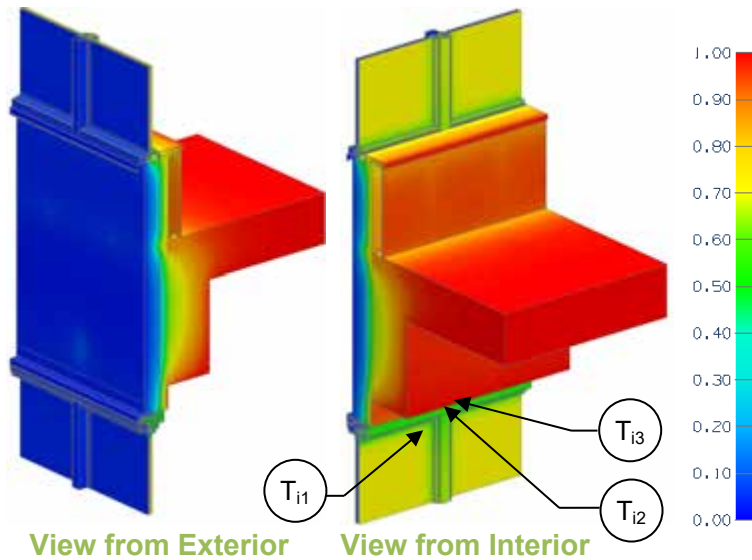
### Temperature Indices

	24" o.c.			36" o.c.				
	R8.4	R16.8	R25.2	R8.4	R16.8	R25.2	R33.6	
T <sub>1</sub>	0.51	0.51	0.51	0.51	0.51	0.51	0.51	Min T on window glass, at top corner of window head
T <sub>2</sub>	0.52	0.52	0.52	0.53	0.53	0.53	0.53	Min T on window frame, on vertical mullion at deflection header
T <sub>3</sub>	0.90	0.93	0.94	0.89	0.93	0.94	0.95	Min T on beam, at plywood closure, along connector



# Detail 8.3.9

## Full Height Interior Insulated Cross Laminated Timber (CLT) Spandrel at Window and Dowel Laminated Timber (DLT) – Intermediate Floor Intersection with Edge of Floor and Glulam Beam Aligned



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value at Beam	$R_{1D}$	R-15.4 (2.71 RSI) + insulation
Transmittance without Anomaly	$U_{g \text{ top}}$ $U_{g \text{ bottom}}$ $U_g$	U-value for aluminum window including framing g top = sill g bottom = head g = combined sill + head
Transmittance / Resistance	$U_o, R_o$ $U_s, R_s$ $U_t, R_t$	U and R-values for o = spandrel with floor without glazing s = spandrel including window to wall interface t = combined glazing + spandrel
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of window to wall interface

### Assembly Performance Indicators

#### Base Assembly – Aluminum Window

Mullion Spacing	$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_{g \text{ top}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_{g \text{ bottom}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
36" o.c.	0.321 (1.82)	0.407 (2.31)	0.462 (2.63)	0.436 (2.47)

#### Window to Wall Linear Transmittance

ISO-CONNECT Spacing	Spandrel Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft <sup>2</sup> ·hr·°F (W/m K)
36" o.c.	R-8.4 (1.48)	R-23.8 (4.18)	R-13.1 (2.31)	0.076 (0.43)	R-8.5 (1.50)	0.117 (0.67)	R-3.5 (0.61)	0.287 (1.63)	0.008 (0.014)
	R-16.8 (2.96)	R-32.2 (5.66)	R-16.6 (2.93)	0.060 (0.34)	R-10.8 (1.90)	0.093 (0.53)	R-3.6 (0.64)	0.276 (1.57)	0.007 (0.011)
	R-25.2 (4.44)	R-40.6 (7.14)	R-19.2 (3.38)	0.052 (0.30)	R-12.4 (2.19)	0.080 (0.46)	R-3.7 (0.65)	0.270 (1.53)	0.006 (0.010)
	R-33.6 (5.92)	R-49.0 (8.62)	R-21.2 (3.74)	0.047 (0.27)	R-13.7 (2.41)	0.073 (0.42)	R-3.7 (0.66)	0.267 (1.51)	0.006 (0.010)

### Temperature Indices

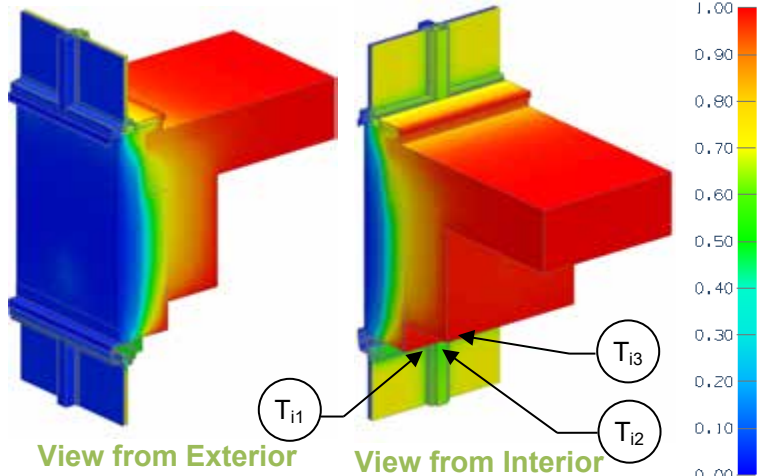
	R-8.4	R-16.8	R-25.2	R-33.6	
$T_{i1}$	0.52	0.52	0.52	0.52	Min T on window glass, at top corner of window head
$T_{i2}$	0.53	0.53	0.53	0.53	Min T on window frame, on vertical mullion at deflection header
$T_{i3}$	0.89	0.92	0.94	0.95	Min T on beam, at plywood closure, along connector



# Detail 8.3.10

## Interior Insulated Cross Laminated Timber (CLT) Spandrel at Window and Dowel Laminated Timber (DLT) – Intermediate Floor Intersection with Edge of Floor and Glulam Beam Not Aligned

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value at Beam	$R_{1D}$	R-40.6 (7.15 RSI)
Transmittance without Anomaly	$U_{g \text{ top}}$ $U_{g \text{ bottom}}$ $U_g$	U-value for aluminum window including framing g top = sill g bottom = head g = combined sill + head
Transmittance / Resistance	$U_o, R_o$ $U_s, R_s$ $U_t, R_t$	U and R-values for o = spandrel with floor without glazing s = spandrel including window to wall interface t = combined glazing + spandrel
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of window to wall interface

### Assembly Performance Indicators

#### Base Assembly – Aluminum Window

Mullion Spacing	$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_{g \text{ top}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_{g \text{ bottom}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
24" o.c.	0.321 (1.82)	0.428 (2.43)	0.524 (2.97)	0.478 (2.71)

#### Window to Wall Linear Transmittance

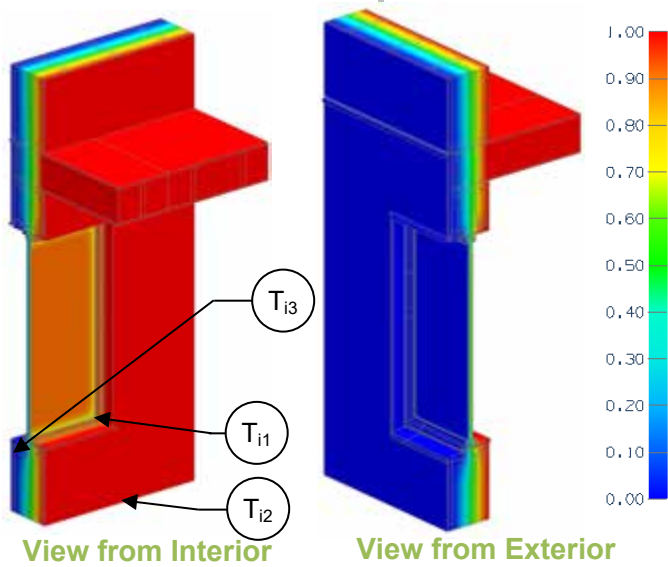
ISO-CONNECT Spacing	Floor Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi$ Btu/ft · hr · °F (W/m K)
24" o.c.	R-8.4 (1.48)	R-40.6 (7.15)	R-15.3 (2.69)	0.066 (0.37)	R-13.0 (2.30)	0.077 (0.44)	R-4.0 (0.70)	0.253 (1.44)	0.015 (0.026)
	R-12.6 (2.22)	R-40.6 (7.15)	R-15.8 (2.78)	0.063 (0.36)	R-13.5 (2.37)	0.074 (0.42)	R-4.0 (0.70)	0.252 (1.43)	0.015 (0.025)
	R-16.8 (2.96)	R-40.6 (7.15)	R-16.2 (2.85)	0.062 (0.35)	R-13.8 (2.44)	0.072 (0.41)	R-4.0 (0.70)	0.250 (1.42)	0.014 (0.024)

### Temperature Indices

	R-8.4	R-16.8	R-33.6	
$T_{i1}$	0.51	0.51	0.51	Min T on window glass, at top corner of window head
$T_{i2}$	0.52	0.52	0.52	Min T on window frame, on vertical mullion at deflection header
$T_{i3}$	0.93	0.93	0.93	Min T on beam, at plywood closure, along connector

# Detail 8.3.11

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) and 2" Gap – Triple Glazed Flanged Fiberglass Window Intersection with Wood Blocking and Un-insulated Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.888)	0.180 (1.020)

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-36.4 (6.42)	0.027 (0.16)	0.010 (0.018)
R-40.1 (7.07)	0.025 (0.14)	0.012 (0.020)
R-47.2 (8.31)	0.021 (0.12)	0.013 (0.023)
R-53.7 (9.46)	0.019 (0.11)	0.014 (0.025)

### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-38.5 (6.78)	R-13.7 (2.41)	0.073 (0.42)	0.033 (0.057)	0.048 (0.083)	0.037 (0.064)	0.041 (0.072)
R-44.0 (7.75)	R-14.0 (2.46)	0.072 (0.41)	0.033 (0.057)	0.049 (0.084)	0.038 (0.066)	0.042 (0.073)
R-55.0 (9.69)	R-14.5 (2.55)	0.069 (0.39)	0.034 (0.059)	0.050 (0.086)	0.039 (0.068)	0.044 (0.075)
R-66.0 (11.62)	R-14.9 (2.62)	0.067 (0.38)	0.034 (0.060)	0.050 (0.087)	0.040 (0.069)	0.044 (0.077)

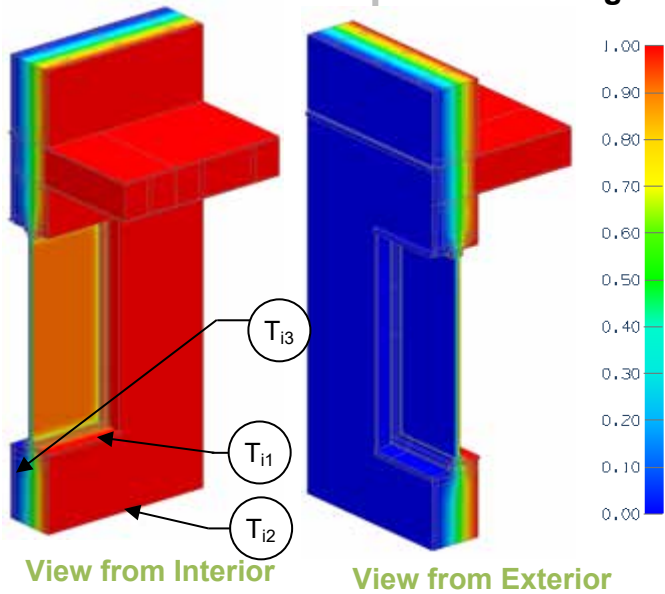
### Temperature Indices

	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.66	0.66	0.66	0.66	Min T on window frame, at bottom corner
$T_{i2}$	0.07	0.07	0.07	0.06	Max T on interior surface of sheathing at studs
$T_{i3}$	0.01	0.01	0.01	0.01	Min T on interior surface sheathing below window sill between wood stud



# Detail 8.3.12

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) and 3" Gap – Triple Glazed Flanged Fiberglass Window Intersection with Wood Blocking and Un-insulated Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.888)	0.180 (1.020)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-42.0 (7.40)	R-44.5 (7.84)	R-41.6 (7.32)	0.024 (0.14)
R-48.0 (8.45)	R-50.5 (8.90)	R-46.4 (8.18)	0.022 (0.12)
R-60.0 (10.57)	R-62.5 (11.01)	R-55.9 (9.84)	0.018 (0.10)
R-72.0 (12.68)	R-74.5 (13.13)	R-65.0 (11.45)	0.015 (0.09)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-39.9 (7.02)	0.025 (0.14)	0.009 (0.016)
R-44.1 (7.76)	0.023 (0.13)	0.010 (0.017)
R-52.1 (9.17)	0.019 (0.11)	0.011 (0.020)
R-59.6 (10.49)	0.017 (0.10)	0.012 (0.021)

#### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-42.0 (7.40)	R-13.9 (2.46)	0.072 (0.41)	0.035 (0.060)	0.049 (0.084)	0.039 (0.067)	0.043 (0.074)
R-48.0 (8.45)	R-14.3 (2.51)	0.070 (0.40)	0.035 (0.061)	0.049 (0.085)	0.039 (0.068)	0.044 (0.075)
R-60.0 (10.57)	R-14.8 (2.61)	0.068 (0.38)	0.036 (0.062)	0.050 (0.087)	0.040 (0.070)	0.044 (0.077)
R-72.0 (12.68)	R-15.2 (2.67)	0.066 (0.37)	0.036 (0.063)	0.041 (0.088)	0.041 (0.071)	0.045 (0.078)

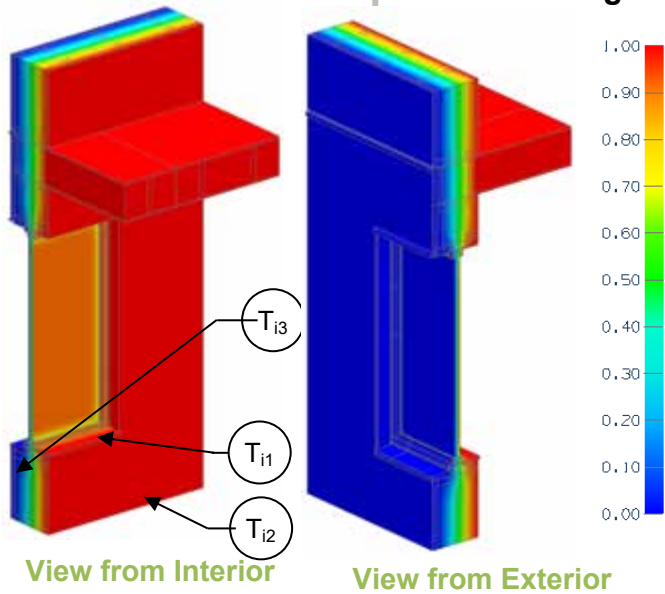
### Temperature Indices

	R42.0	R48.0	R60.0	R72.0	
$T_{i1}$	0.66	0.66	0.66	0.66	Min T on window frame, at bottom corner
$T_{i2}$	0.07	0.06	0.06	0.05	Max T on interior surface of sheathing at studs
$T_{i3}$	0.01	0.01	0.01	0.01	Min T on interior surface sheathing below window sill between wood stud



# Detail 8.3.13

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) and 4" Gap – Triple Glazed Flanged Fiberglass Window Intersection with Wood Blocking and Un-insulated Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.888)	0.180 (1.020)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-45.5 (8.01)	R-48.0 (8.46)	R-45.1 (7.94)	0.022 (0.13)
R-52.0 (9.16)	R-54.5 (9.60)	R-50.5 (8.89)	0.020 (0.11)
R-65.0 (11.45)	R-67.5 (11.89)	R-60.9 (10.73)	0.016 (0.09)
R-78.0 (13.74)	R-80.5 (14.18)	R-71.1 (12.52)	0.014 (0.08)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-43.3 (7.62)	0.023 (0.13)	0.008 (0.014)
R-48.0 (8.45)	0.021 (0.12)	0.009 (0.016)
R-56.9 (10.03)	0.018 (0.10)	0.010 (0.018)
R-65.3 (11.51)	0.015 (0.09)	0.011 (0.019)

#### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-45.5 (8.01)	R-14.2 (2.50)	0.070 (0.40)	0.037 (0.063)	0.049 (0.085)	0.040 (0.069)	0.044 (0.076)
R-52.0 (9.16)	R-14.5 (2.56)	0.069 (0.39)	0.037 (0.064)	0.050 (0.086)	0.040 (0.070)	0.044 (0.077)
R-65.0 (11.45)	R-15.0 (2.65)	0.066 (0.38)	0.038 (0.065)	0.050 (0.087)	0.041 (0.071)	0.045 (0.078)
R-78.0 (13.74)	R-15.4 (2.71)	0.065 (0.37)	0.038 (0.066)	0.051 (0.088)	0.041 (0.072)	0.046 (0.079)

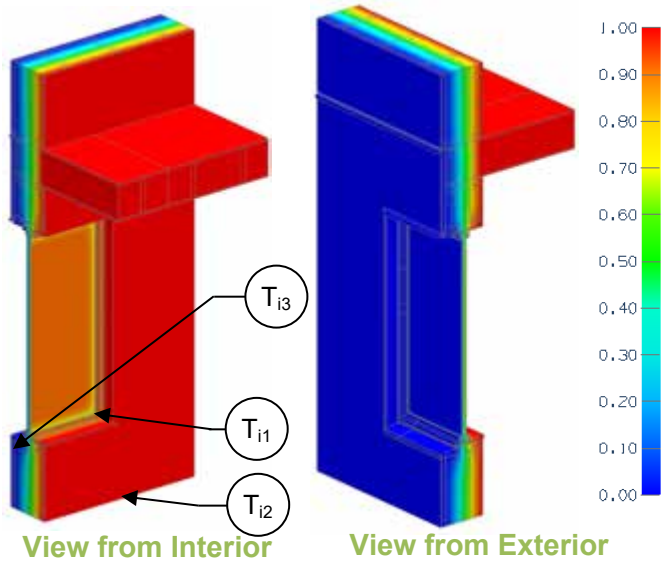
### Temperature Indices

	R45.5	R52.0	R65.0	R78.0	
$T_{i1}$	0.66	0.66	0.66	0.66	Min T on window frame, at bottom corner
$T_{i2}$	0.06	0.06	0.05	0.05	Max T on interior surface of sheathing at studs
$T_{i3}$	0.01	0.01	0.01	0.01	Min T on interior surface sheathing below window sill between wood stud



# Detail 8.3.14

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) and 2" Gap – Triple Glazed Flanged Fiberglass Window Intersection with Wood Blocking and Insulated Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.888)	0.180 (1.020)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-36.4 (6.42)	0.027 (0.16)	0.010 (0.018)
R-40.1 (7.07)	0.025 (0.14)	0.012 (0.020)
R-47.2 (8.31)	0.021 (0.12)	0.013 (0.023)
R-53.7 (9.46)	0.019 (0.11)	0.014 (0.025)

### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-38.5 (6.78)	R-13.9 (2.45)	0.072 (0.41)	0.029 (0.049)	0.044 (0.077)	0.031 (0.054)	0.036 (0.062)
R-44.0 (7.75)	R-14.2 (2.51)	0.070 (0.40)	0.029 (0.050)	0.045 (0.078)	0.032 (0.055)	0.037 (0.064)
R-55.0 (9.69)	R-14.8 (2.60)	0.068 (0.38)	0.030 (0.051)	0.046 (0.080)	0.033 (0.058)	0.038 (0.066)
R-66.0 (11.62)	R-15.2 (2.67)	0.066 (0.37)	0.030 (0.052)	0.047 (0.082)	0.034 (0.059)	0.039 (0.067)

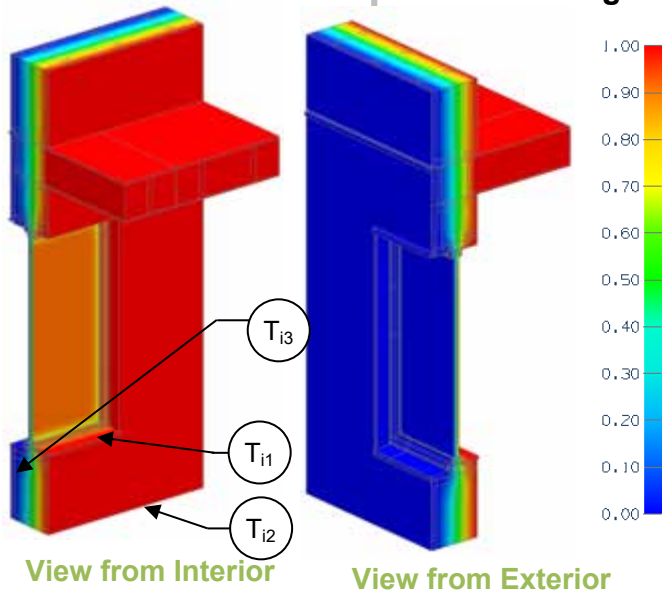
### Temperature Indices

	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.66	0.66	0.66	0.66	Min T on window frame, at bottom corner
$T_{i2}$	0.07	0.07	0.07	0.07	Max T on interior surface of sheathing at studs
$T_{i3}$	0.02	0.02	0.02	0.02	Min T on interior surface sheathing below window sill between wood stud



# Detail 8.3.15

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) and 3" Gap – Triple Glazed Flanged Fiberglass Window Intersection with Wood Blocking and Insulated Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.888)	0.180 (1.020)

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-42.0 (7.40)	R-44.5 (7.84)	R-41.6 (7.32)	0.024 (0.14)
R-48.0 (8.45)	R-50.5 (8.90)	R-46.4 (8.18)	0.022 (0.12)
R-60.0 (10.57)	R-62.5 (11.01)	R-55.9 (9.84)	0.018 (0.10)
R-72.0 (12.68)	R-74.5 (13.13)	R-65.0 (11.45)	0.015 (0.09)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-39.9 (7.02)	0.025 (0.14)	0.009 (0.016)
R-44.1 (7.76)	0.023 (0.13)	0.010 (0.017)
R-52.1 (9.17)	0.019 (0.11)	0.011 (0.020)
R-59.6 (10.49)	0.017 (0.10)	0.012 (0.021)

#### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-42.0 (7.40)	R-14.3 (2.51)	0.070 (0.40)	0.029 (0.050)	0.044 (0.077)	0.031 (0.054)	0.036 (0.062)
R-48.0 (8.45)	R-14.6 (2.57)	0.069 (0.39)	0.029 (0.051)	0.045 (0.078)	0.032 (0.055)	0.037 (0.063)
R-60.0 (10.57)	R-15.1 (2.66)	0.066 (0.38)	0.030 (0.052)	0.046 (0.080)	0.033 (0.057)	0.038 (0.065)
R-72.0 (12.68)	R-15.5 (2.73)	0.064 (0.37)	0.030 (0.052)	0.047 (0.081)	0.034 (0.058)	0.038 (0.066)

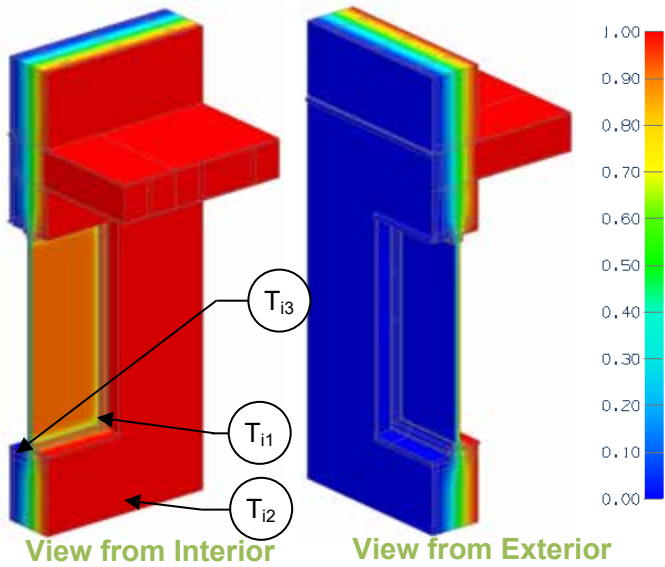
### Temperature Indices

	R42.0	R48.0	R60.0	R72.0	
$T_{i1}$	0.66	0.66	0.66	0.66	Min T on window frame, at bottom corner
$T_{i2}$	0.07	0.06	0.06	0.06	Max T on interior surface of sheathing at studs
$T_{i3}$	0.02	0.02	0.01	0.01	Min T on interior surface sheathing below window sill between wood stud



# Detail 8.3.16

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) and 4" Gap – Triple Glazed Flanged Fiberglass Window Intersection with Wood Blocking and Insulated Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.888)	0.180 (1.020)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-45.5 (8.01)	R-48.0 (8.46)	R-45.1 (7.94)	0.022 (0.13)
R-52.0 (9.16)	R-54.5 (9.60)	R-50.5 (8.89)	0.020 (0.11)
R-65.0 (11.45)	R-67.5 (11.89)	R-60.9 (10.73)	0.016 (0.09)
R-78.0 (13.74)	R-80.5 (14.18)	R-71.1 (12.52)	0.014 (0.08)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-43.3 (7.62)	0.023 (0.13)	0.008 (0.014)
R-48.0 (8.45)	0.021 (0.12)	0.009 (0.016)
R-56.9 (10.03)	0.018 (0.10)	0.010 (0.018)
R-65.3 (11.51)	0.015 (0.09)	0.011 (0.019)

### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-45.5 (8.01)	R-14.6 (2.56)	0.069 (0.39)	0.029 (0.050)	0.045 (0.078)	0.031 (0.054)	0.036 (0.062)
R-52.0 (9.16)	R-14.9 (2.62)	0.067 (0.38)	0.030 (0.051)	0.046 (0.079)	0.032 (0.055)	0.037 (0.063)
R-65.0 (11.45)	R-15.4 (2.72)	0.065 (0.37)	0.030 (0.053)	0.047 (0.081)	0.033 (0.057)	0.038 (0.065)
R-78.0 (13.74)	R-15.8 (2.78)	0.063 (0.36)	0.031 (0.053)	0.047 (0.082)	0.033 (0.058)	0.038 (0.066)

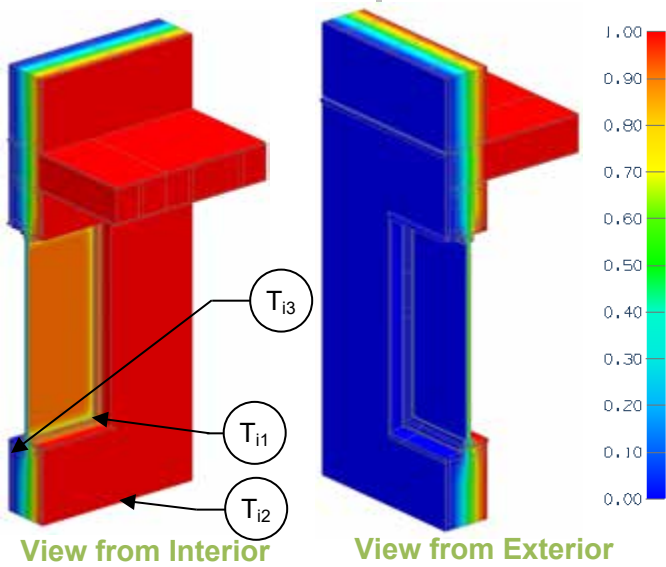
### Temperature Indices

	R45.5	R52.0	R65.0	R78.0	
$T_{11}$	0.66	0.66	0.66	0.66	Min T on window frame, at bottom corner
$T_{12}$	0.06	0.06	0.06	0.05	Max T on interior surface of sheathing at studs
$T_{13}$	0.01	0.01	0.01	0.01	Min T on interior surface sheathing below window sill between wood stud



# Detail 8.3.17

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) Wall and 2" Gap – Triple Glazed Rebated Fiberglass Window Intersection and Un-Insulated Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + cavity 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.89)	0.180 (1.02)

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-36.4 (6.42)	0.027 (0.16)	0.010 (0.018)
R-40.1 (7.07)	0.025 (0.14)	0.012 (0.020)
R-47.2 (8.31)	0.021 (0.12)	0.013 (0.023)
R-53.7 (9.46)	0.019 (0.11)	0.014 (0.025)

### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)
R-38.5 (6.78)	R-13.4 (2.36)	0.075 (0.42)	0.043 (0.075)	0.045 (0.078)	0.052 (0.091)	0.048 (0.083)
R-44.0 (7.75)	R-13.7 (2.42)	0.073 (0.41)	0.043 (0.075)	0.046 (0.079)	0.053 (0.091)	0.048 (0.083)
R-55.0 (9.69)	R-14.3 (2.51)	0.070 (0.40)	0.043 (0.075)	0.046 (0.079)	0.054 (0.093)	0.048 (0.084)
R-66.0 (11.62)	R-14.7 (2.58)	0.068 (0.39)	0.044 (0.075)	0.046 (0.080)	0.054 (0.094)	0.049 (0.084)

### Temperature Indices

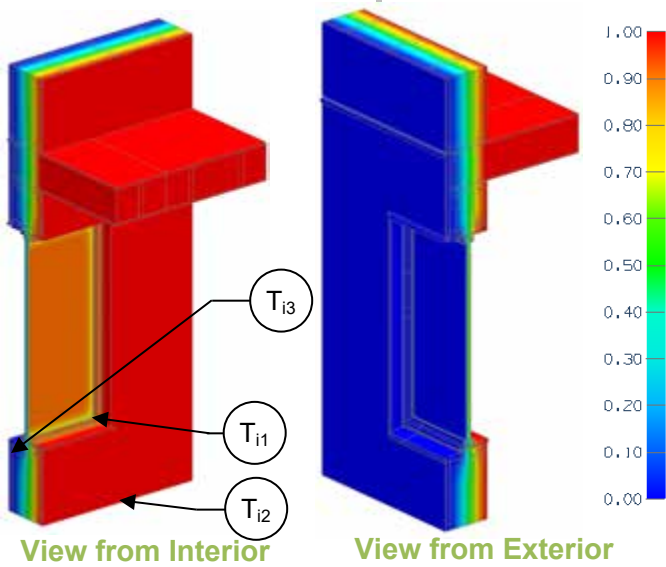
	R38.5	R44.0	R55.0	R66.0	
$T_{11}$	0.65	0.65	0.65	0.65	Min T on window frame, at bottom corner
$T_{12}$	0.08	0.07	0.07	0.07	Max T on interior surface of exterior sheathing at studs
$T_{13}$	0.01	0.01	0.01	0.01	Min T on interior surface of exterior sheathing below window sill





# Detail 8.3.18

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) Wall and 3" Gap – Triple Glazed Rebated Fiberglass Window Intersection and Un-insulated Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + cavity 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.89)	0.180 (1.02)

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-42.0 (7.40)	R-44.5 (7.84)	R-41.6 (7.32)	0.024 (0.14)
R-48.0 (8.45)	R-50.5 (8.90)	R-46.4 (8.18)	0.022 (0.12)
R-60.0 (10.57)	R-62.5 (11.01)	R-55.9 (9.84)	0.018 (0.10)
R-72.0 (12.68)	R-74.5 (13.13)	R-65.0 (11.45)	0.015 (0.09)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-39.9 (7.02)	0.025 (0.14)	0.009 (0.016)
R-44.1 (7.76)	0.023 (0.13)	0.010 (0.017)
R-52.1 (9.17)	0.019 (0.11)	0.011 (0.020)
R-59.6 (10.49)	0.017 (0.10)	0.012 (0.021)

### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-42.0 (7.40)	R-13.7 (2.41)	0.073 (0.41)	0.046 (0.080)	0.046 (0.079)	0.054 (0.093)	0.049 (0.085)
R-48.0 (8.45)	R-14.0 (2.47)	0.071 (0.40)	0.047 (0.081)	0.046 (0.080)	0.054 (0.094)	0.049 (0.085)
R-60.0 (10.57)	R-14.5 (2.56)	0.069 (0.39)	0.047 (0.081)	0.046 (0.080)	0.055 (0.094)	0.050 (0.086)
R-72.0 (12.68)	R-14.9 (2.63)	0.067 (0.38)	0.047 (0.081)	0.046 (0.080)	0.055 (0.095)	0.050 (0.086)

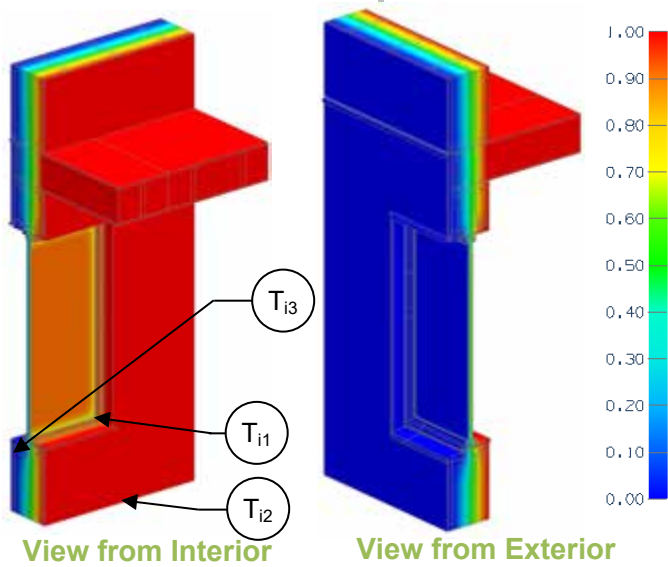
### Temperature Indices

	R42.0	R48.0	R60.0	R72.0	
$T_{11}$	0.65	0.65	0.65	0.65	Min T on window frame, at bottom corner
$T_{12}$	0.07	0.07	0.06	0.06	Max T on interior surface of exterior sheathing at studs
$T_{13}$	0.01	0.01	0.01	0.01	Min T on interior surface of exterior sheathing below window sill



# Detail 8.3.19

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) Wall and 4" Gap – Triple Glazed Rebated Fiberglass Window Intersection and Un-insulated Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + cavity 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.89)	0.180 (1.02)

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-45.5 (8.01)	R-48.0 (8.46)	R-45.1 (7.94)	0.022 (0.13)
R-52.0 (9.16)	R-54.5 (9.60)	R-50.5 (8.89)	0.020 (0.11)
R-65.0 (11.45)	R-67.5 (11.89)	R-60.9 (10.73)	0.016 (0.09)
R-78.0 (13.74)	R-80.5 (14.18)	R-71.1 (12.52)	0.014 (0.08)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-43.3 (7.62)	0.023 (0.13)	0.008 (0.014)
R-48.0 (8.45)	0.021 (0.12)	0.009 (0.016)
R-56.9 (10.03)	0.018 (0.10)	0.010 (0.018)
R-65.3 (11.51)	0.015 (0.09)	0.011 (0.019)

### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)
R-45.5 (8.01)	R-13.9 (2.45)	0.072 (0.41)	0.049 (0.085)	0.047 (0.081)	0.055 (0.095)	0.050 (0.087)
R-52.0 (9.16)	R-14.2 (2.51)	0.070 (0.40)	0.049 (0.086)	0.047 (0.081)	0.055 (0.096)	0.051 (0.088)
R-65.0 (11.45)	R-14.8 (2.60)	0.068 (0.38)	0.050 (0.086)	0.047 (0.081)	0.056 (0.096)	0.051 (0.088)
R-78.0 (13.74)	R-15.1 (2.67)	0.066 (0.38)	0.050 (0.086)	0.047 (0.081)	0.056 (0.097)	0.051 (0.088)

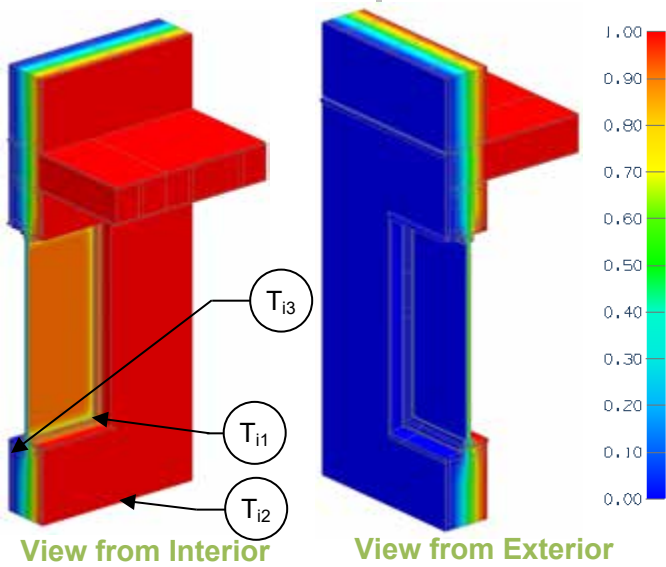
### Temperature Indices

	R45.5	R52.0	R65.0	R78.0	
$T_{11}$	0.65	0.65	0.65	0.65	Min T on window frame, at bottom corner
$T_{12}$	0.06	0.06	0.06	0.05	Max T on interior surface of exterior sheathing at studs
$T_{13}$	0.01	0.01	0.01	0.01	Min T on interior surface of exterior sheathing below window sill



# Detail 8.3.20

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) Wall and 2" Gap – Triple Glazed Rebated Fiberglass Window Intersection with Insulation at Window Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + cavity 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.89)	0.180 (1.02)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-36.4 (6.42)	0.027 (0.16)	0.010 (0.018)
R-40.1 (7.07)	0.025 (0.14)	0.012 (0.020)
R-47.2 (8.31)	0.021 (0.12)	0.013 (0.023)
R-53.7 (9.46)	0.019 (0.11)	0.014 (0.025)

### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft <sup>2</sup> · hr · °F (W/m K)
R-38.5 (6.78)	R-14.4 (2.53)	0.070 (0.40)	0.022 (0.038)	0.026 (0.046)	0.028 (0.048)	0.025 (0.044)
R-44.0 (7.75)	R-14.7 (2.60)	0.068 (0.39)	0.022 (0.037)	0.027 (0.046)	0.028 (0.049)	0.026 (0.044)
R-55.0 (9.69)	R-15.4 (2.70)	0.065 (0.37)	0.021 (0.037)	0.027 (0.047)	0.029 (0.050)	0.026 (0.045)
R-66.0 (11.62)	R-15.8 (2.79)	0.063 (0.36)	0.022 (0.037)	0.027 (0.047)	0.029 (0.050)	0.026 (0.045)

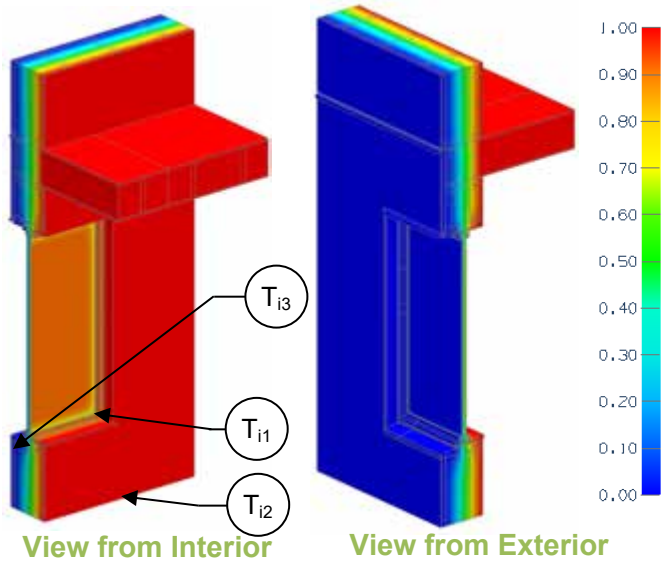
### Temperature Indices

	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.67	0.67	0.67	0.67	Min T on window frame, at bottom corner
$T_{i2}$	0.08	0.07	0.07	0.07	Max T on interior surface of exterior sheathing at studs
$T_{i3}$	0.01	0.01	0.01	0.00	Min T on interior surface of exterior sheathing below window sill



# Detail 8.3.21

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) Wall and 3" Gap – Triple Glazed Rebated Fiberglass Window Intersection with Insulation at Window Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + cavity 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.89)	0.180 (1.02)

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-42.0 (7.40)	R-44.5 (7.84)	R-41.6 (7.32)	0.024 (0.14)
R-48.0 (8.45)	R-50.5 (8.90)	R-46.4 (8.18)	0.022 (0.12)
R-60.0 (10.57)	R-62.5 (11.01)	R-55.9 (9.84)	0.018 (0.10)
R-72.0 (12.68)	R-74.5 (13.13)	R-65.0 (11.45)	0.015 (0.09)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-39.9 (7.02)	0.025 (0.14)	0.009 (0.016)
R-44.1 (7.76)	0.023 (0.13)	0.010 (0.017)
R-52.1 (9.17)	0.019 (0.11)	0.011 (0.020)
R-59.6 (10.49)	0.017 (0.10)	0.012 (0.021)

### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-42.0 (7.40)	R-14.7 (2.60)	0.068 (0.39)	0.023 (0.039)	0.026 (0.046)	0.028 (0.048)	0.025 (0.044)
R-48.0 (8.45)	R-15.1 (2.67)	0.066 (0.38)	0.023 (0.040)	0.027 (0.046)	0.028 (0.048)	0.025 (0.044)
R-60.0 (10.57)	R-15.7 (2.77)	0.064 (0.36)	0.023 (0.039)	0.027 (0.046)	0.028 (0.049)	0.026 (0.045)
R-72.0 (12.68)	R-16.2 (2.86)	0.062 (0.35)	0.023 (0.039)	0.027 (0.046)	0.028 (0.049)	0.026 (0.044)

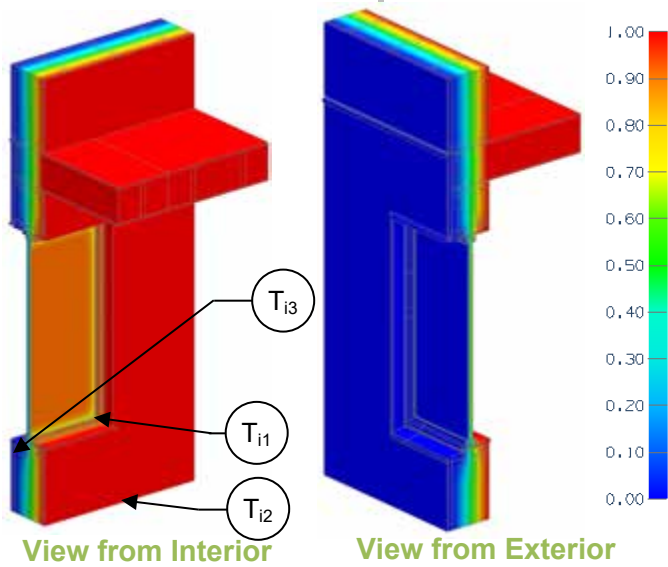
### Temperature Indices

	R42.0	R48.0	R60.0	R72.0	
$T_{11}$	0.67	0.67	0.67	0.67	Min T on window frame, at bottom corner
$T_{12}$	0.07	0.07	0.06	0.06	Max T on interior surface of exterior sheathing at studs
$T_{13}$	0.00	0.00	0.00	0.00	Min T on interior surface of exterior sheathing below window sill



# Detail 8.3.22

## Double Framed Wall with 2x6 and 2x4 Wood Studs (16" o.c.) Wall and 4" Gap – Triple Glazed Rebated Fiberglass Window Intersection with Insulation at Window Perimeter



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + cavity 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

### Base Assembly – Glazing

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.156 (0.89)	0.180 (1.02)

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-45.5 (8.01)	R-48.0 (8.46)	R-45.1 (7.94)	0.022 (0.13)
R-52.0 (9.16)	R-54.5 (9.60)	R-50.5 (8.89)	0.020 (0.11)
R-65.0 (11.45)	R-67.5 (11.89)	R-60.9 (10.73)	0.016 (0.09)
R-78.0 (13.74)	R-80.5 (14.18)	R-71.1 (12.52)	0.014 (0.08)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-43.3 (7.62)	0.023 (0.13)	0.008 (0.014)
R-48.0 (8.45)	0.021 (0.12)	0.009 (0.016)
R-56.9 (10.03)	0.018 (0.10)	0.010 (0.018)
R-65.3 (11.51)	0.015 (0.09)	0.011 (0.019)

### Window Transition Transmittance

Fill Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-45.5 (8.01)	R-15.1 (2.65)	0.066 (0.38)	0.024 (0.041)	0.027 (0.046)	0.028 (0.048)	0.025 (0.044)
R-52.0 (9.16)	R-15.5 (2.72)	0.065 (0.37)	0.024 (0.041)	0.027 (0.046)	0.028 (0.048)	0.026 (0.044)
R-65.0 (11.45)	R-16.1 (2.83)	0.062 (0.35)	0.024 (0.041)	0.027 (0.046)	0.028 (0.048)	0.025 (0.044)
R-78.0 (13.74)	R-16.5 (2.91)	0.060 (0.34)	0.023 (0.041)	0.027 (0.046)	0.028 (0.048)	0.025 (0.044)

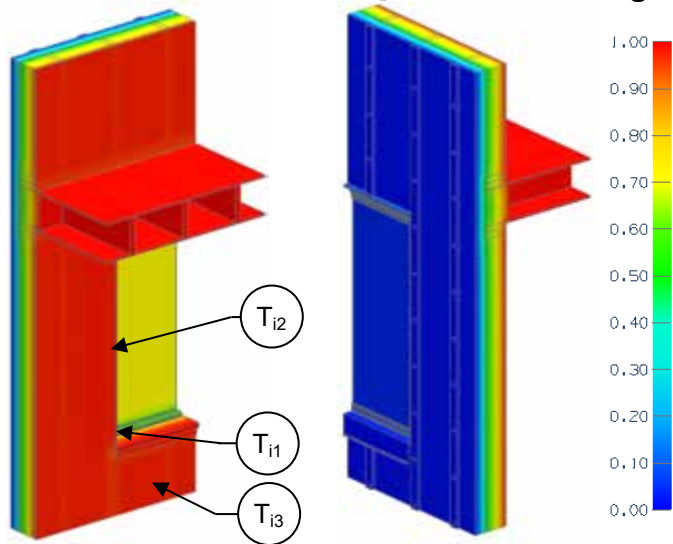
### Temperature Indices

	R45.5	R52.0	R65.0	R78.0	
$T_{i1}$	0.67	0.67	0.67	0.67	Min T on window frame, at bottom corner
$T_{i2}$	0.06	0.06	0.06	0.05	Max T on interior surface of exterior sheathing at studs
$T_{i3}$	0.00	0.00	0.00	0.00	Min T on interior surface of exterior sheathing below window sill



# Detail 8.3.23

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Double Glazed Aluminum Window Intersection Aligned with Exterior Insulation



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.80 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi$	Incremental increase in transmittance per linear length

View from Interior  
Base Assembly – Glazing

View from Exterior

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.400 (2.27)

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wood Stud Clear Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-26.5 (4.68)	R-24.6 (4.32)	0.041 (0.23)
R-15.0 (2.64)	R-36.5 (6.44)	R-33.6 (5.93)	0.030 (0.17)

#### Intermediate Floor Linear Transmittance

$R_{\text{floor}}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{floor}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-23.4 (4.12)	0.043 (0.24)	0.020 (0.035)
R-32.8 (5.78)	0.031 (0.17)	0.007 (0.012)

#### Window Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\Psi_{\text{Head}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Sill}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Jamb}}$ Btu/ft · hr · °F (W/m K)	$\Psi_{\text{Total}}$ Btu/ft · hr · °F (W/m K)
R-5.0 (0.88)	R-6.8 (1.19)	0.148 (0.84)	0.081 (0.140)	0.049 (0.086)	0.064 (0.110)	0.067 (0.116)
R-15.0 (2.64)	R-7.2 (1.27)	0.138 (0.78)	0.091 (0.157)	0.049 (0.084)	0.060 (0.103)	0.067 (0.117)

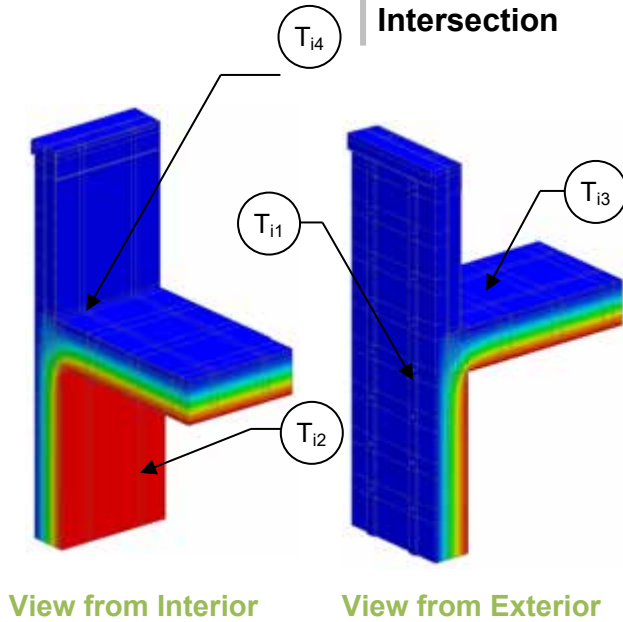
### Temperature Indices

	R5	R15	
$T_{i1}$	0.55	0.56	Min T on window frame, at bottom corner
$T_{i2}$	0.43	0.56	Max T on interior surface of sheathing at studs beside jamb
$T_{i3}$	0.25	0.46	Min T on interior surface sheathing between wood studs



# Detail 8.4.1

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

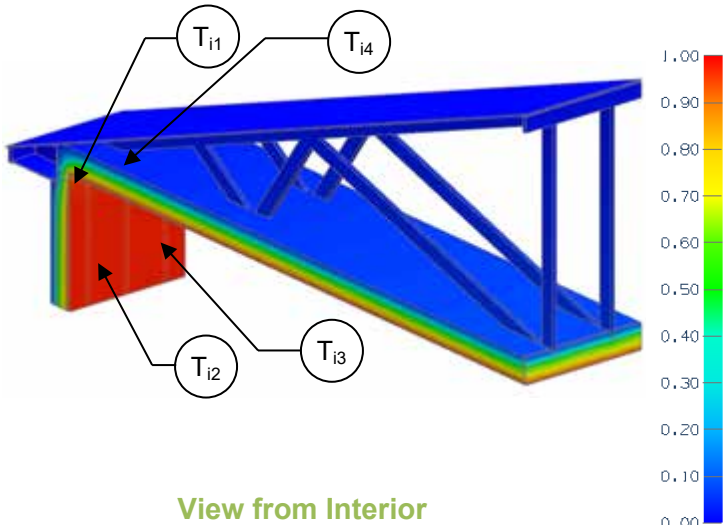
### Temperature Indices

	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 8.4.2

### Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of soffit line

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-30 (5.28)	R-31.5 (5.55)	0.032 (0.18)

##### Soffit Line Linear Transmittance

Wall Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-0 (0.00)	R-27.4 (4.83)	0.036 (0.21)	0.035 (0.060)
R-7.5 (1.32)	R-29.0 (5.11)	0.034 (0.20)	0.042 (0.073)
R-15 (2.64)	R-29.9 (5.27)	0.033 (0.19)	0.047 (0.081)

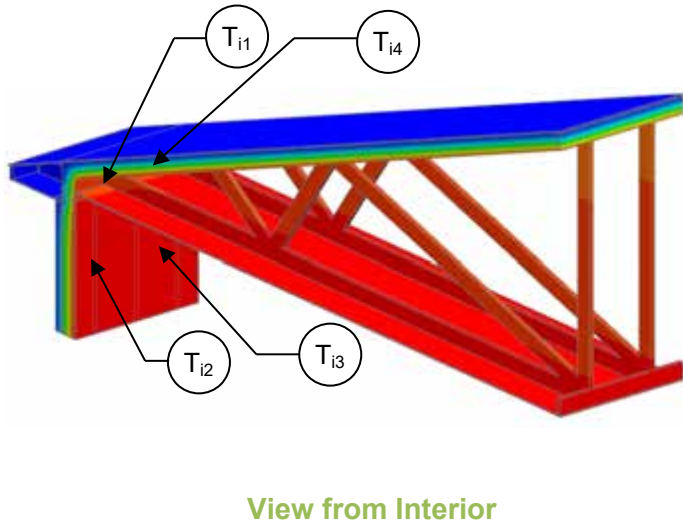
#### Temperature Indices

	R0	R7.5	R15	
$T_{i1}$	-	0.11	0.14	Min T on sheathing, between studs at top plate
$T_{i2}$	-	0.33	0.50	Max T on sheathing, along studs between fasteners
$T_{i3}$	0.07	-	-	Min T on sheathing, between studs
$T_{i4}$	0.12	-	-	Max T on sheathing, at top plate and truss intersection



# Detail 8.4.3

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of soffit line

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-30 (5.28)	R-27.0 (4.76)	0.037 (0.21)

#### Soffit Line Linear Transmittance

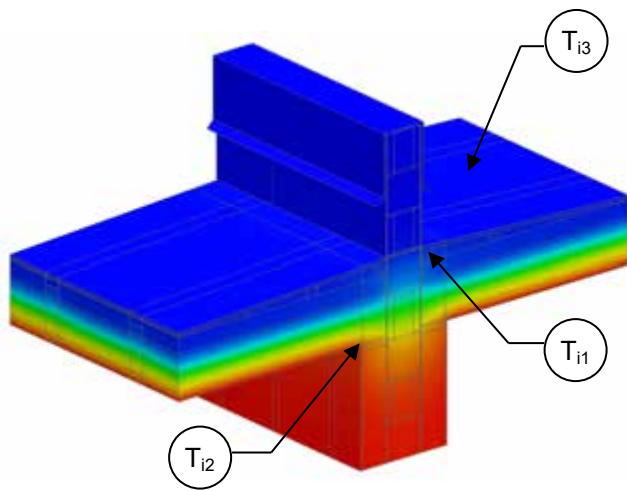
Wall Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-0 (0.00)	R-24.2 (4.27)	0.041 (0.23)	0.045 (0.079)
R-7.5 (1.32)	R-25.5 (4.48)	0.039 (0.22)	0.053 (0.092)
R-15 (2.64)	R-26.1 (4.60)	0.038 (0.22)	0.059 (0.102)

### Temperature Indices

	R0	R7.5	R15	
$T_{11}$	-	0.12	0.14	Min T on sheathing, between studs at top plate
$T_{12}$	-	0.33	0.47	Max T on sheathing, along studs between fasteners
$T_{13}$	0.07	-	-	Min T on sheathing, between studs
$T_{14}$	0.21	-	-	Max T on sheathing, at top plate and truss intersection

# Detail 8.4.4

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of fire wall

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-30 (5.28)	R-33.1 (5.83)	R-31.8 (5.59)	0.031 (0.18)	R-26.2 (4.63)	0.038 (0.22)	0.057 (0.099)

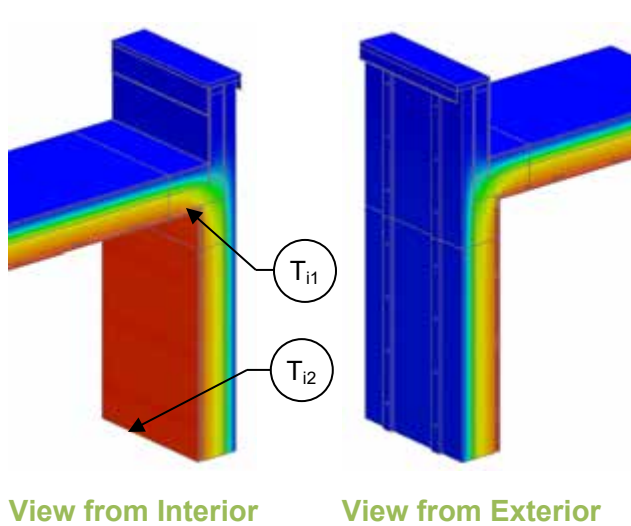
### Temperature Indices

$T_{i1}$	0.05	Min T on concrete block, at roof sheathing intersection
$T_{i2}$	0.76	Max T on concrete block, at roof joist intersection
$T_{i3}$	0.04	Min T on roof sheathing, between joists

# Detail 8.4.5

## Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Low-Slope Roof & Parapet Intersection

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-9.9 (1.74 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_r, R_r, U_w, R_w$	“clear field” U- and R-value r = roof w = CLT wall without parapet
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of parapet

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-15.0 (2.64)	R-24.9 (4.38)	R-24.7 (4.35)	0.040 (0.23)
R-20.0 (3.52)	R-29.9 (5.26)	R-29.4 (5.17)	0.034 (0.19)
R-25.0 (4.40)	R-34.9 (6.14)	R-33.9 (5.98)	0.029 (0.17)

#### Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	$R_r$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-28.1 (4.96)	0.036 (0.20)
R-30.0 (5.28)	R-38.1 (6.72)	0.026 (0.15)
R-40.0 (7.04)	R-48.1 (8.48)	0.021 (0.12)
R-50.0 (8.81)	R-58.1 (10.24)	0.017 (0.10)

#### Parapet Linear Transmittance

Roof Insulation 1D R-Value (RSI)	R-15 Wall Insulation			R-20 Wall Insulation			R-25 Wall Insulation		
	R ft <sup>2</sup> ·hr·°F/Btu (m <sup>2</sup> K/W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)	R ft <sup>2</sup> ·hr·°F/Btu (m <sup>2</sup> K/W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)	R ft <sup>2</sup> ·hr·°F/Btu (m <sup>2</sup> K/W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-20.0 (3.52)	R-24.2 (4.27)	0.041 (0.23)	0.030 (0.053)	R-26.4 (4.64)	0.038 (0.22)	0.030 (0.051)	R-28.1 (4.95)	0.036 (0.20)	0.029 (0.051)
R-30.0 (5.28)	R-27.4 (4.83)	0.036 (0.21)	0.029 (0.051)	R-30.2 (5.31)	0.033 (0.19)	0.028 (0.049)	R-32.5 (5.72)	0.031 (0.17)	0.028 (0.048)
R-40.0 (7.04)	R-29.6 (5.22)	0.034 (0.19)	0.029 (0.050)	R-32.9 (5.80)	0.030 (0.17)	0.027 (0.047)	R-35.8 (6.30)	0.028 (0.16)	0.026 (0.046)
R-50.0 (8.81)	R-31.3 (5.51)	0.032 (0.18)	0.029 (0.050)	R-35.0 (6.16)	0.029 (0.16)	0.027 (0.047)	R-38.3 (6.74)	0.026 (0.15)	0.026 (0.045)

### Temperature Indices

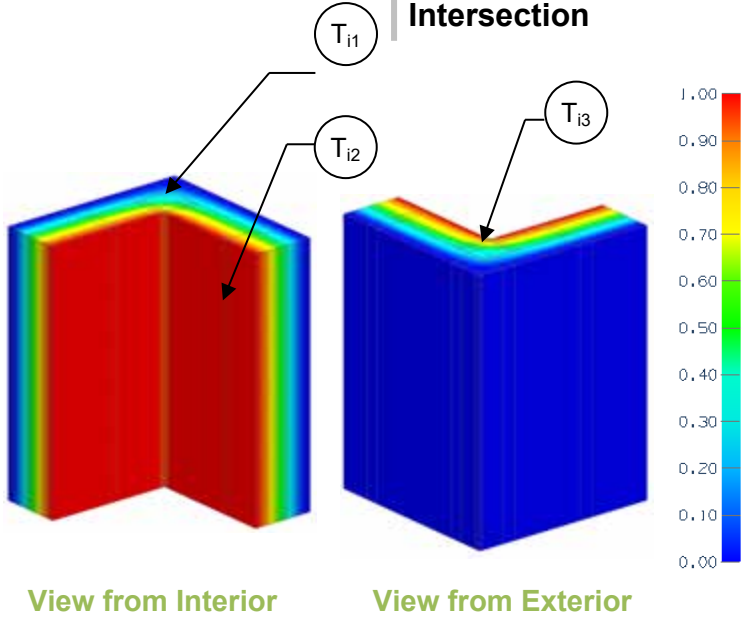
	R15 Wall / R20 Roof	R20 Wall / R30 Roof	R25 Wall / R50 Roof	
$T_{11}$	0.74	0.78	0.82	Min T on CLT, at wall to roof corner
$T_{12}$	0.92	0.93	0.94	Max T on CLT on wall away from corner

Temperature indices for all other scenarios can be interpolated



# Detail 8.5.1

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping Supporting and Continuous Insulation Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – Corner Intersection



### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

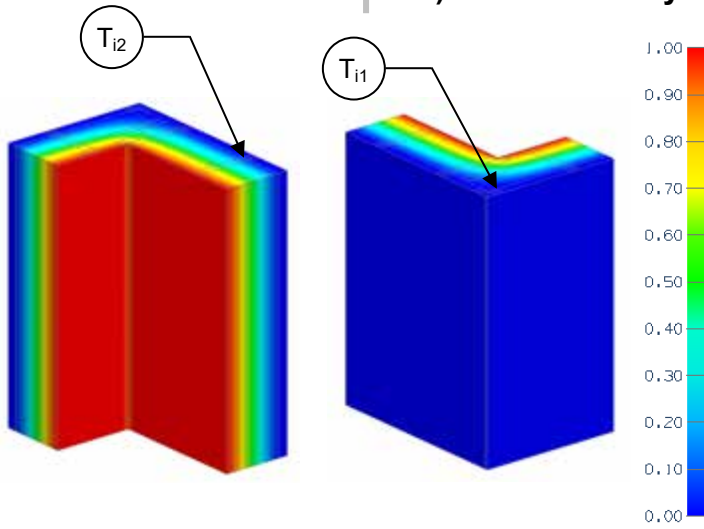
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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 8.5.2

### Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 1" Gap – Corner Intersection



View from Interior

View from Exterior

#### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + fill 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of corner

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

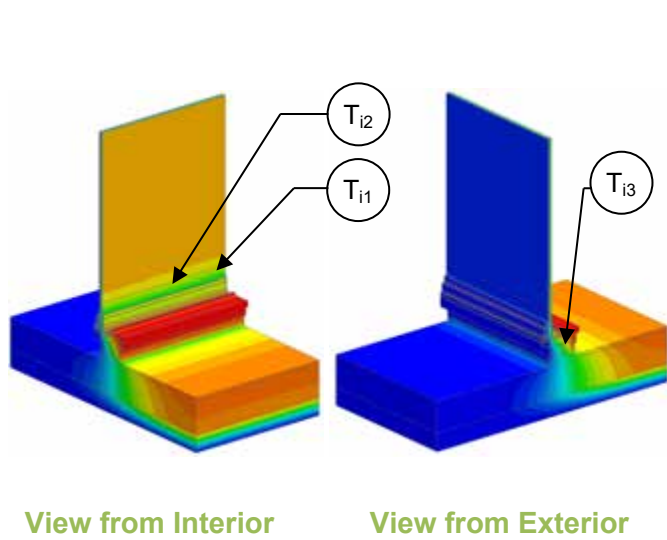
Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-35.0 (6.16)	R-37.5 (6.61)	R-34.5 (6.07)	0.029 (0.16)	R-28.4 (5.01)	0.035 (0.20)	0.020 (0.034)
R-40.0 (7.04)	R-42.5 (7.49)	R-38.3 (6.74)	0.026 (0.15)	R-31.3 (5.52)	0.032 (0.18)	0.019 (0.032)
R-50.0 (8.81)	R-52.5 (9.25)	R-45.6 (8.02)	0.022 (0.12)	R-36.8 (6.48)	0.027 (0.15)	0.017 (0.029)
R-60.0 (10.57)	R-62.5 (11.01)	R-52.5 (9.24)	0.019 (0.11)	R-41.8 (7.36)	0.024 (0.14)	0.016 (0.027)

#### Temperature Indices

	R35	R40	R50	R60	
$T_{i1}$	0.01	0.01	0.01	0.01	Min T on sheathing, at corner intersection, beside studs
$T_{i2}$	0.08	0.08	0.07	0.07	Max T on sheathing, at studs

# Detail 8.6.1

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of floor to sliding door transition

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_f$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_f$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.323 (1.83)

#### Sliding Door Sill/ Curb to Floor Linear Transmittance

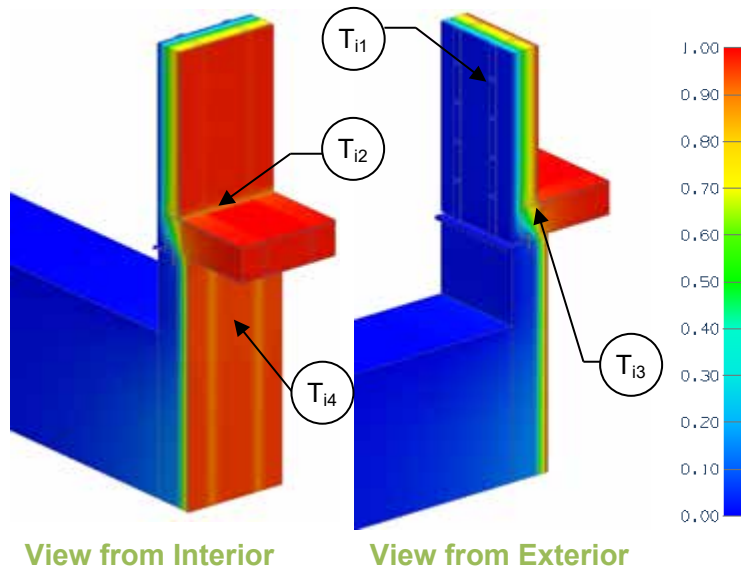
Wall Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-20 (3.52)	R-3.5 (0.621)	0.284 (1.61)	0.320 (0.554)

### 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 8.6.2

**Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Continuous Insulation and Wood Strapping Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_{fw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{fw}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-19 (3.34)	R-20.8 (3.67)	R-12.7 (2.23)	0.079 (0.449)

#### Foundation Linear Transmittance

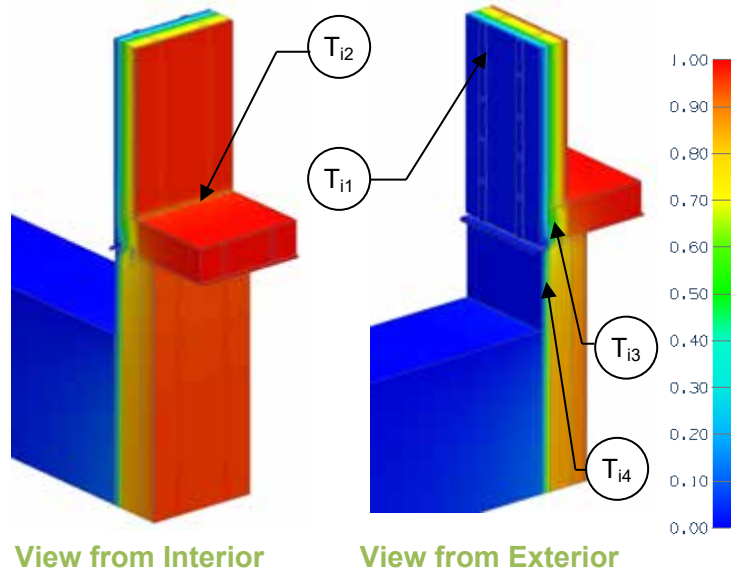
Exterior Insulation 1D R-Value (RSI)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
R-5 (0.88)	R-15.9 (2.81)	0.063 (0.36)	0.046 (0.080)
R-10 (1.76)	R-16.7 (2.94)	0.060 (0.34)	0.047 (0.082)
R-15 (2.64)	R-17.2 (3.03)	0.058 (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 8.6.3

**Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Continuous Insulation and Wood Strapping Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

#### Base Assembly – Foundation Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1Dw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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)

Foundation Insulation 1D R-Value (RSI)	$R_{1Dfw}$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$R_{fw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{fw}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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

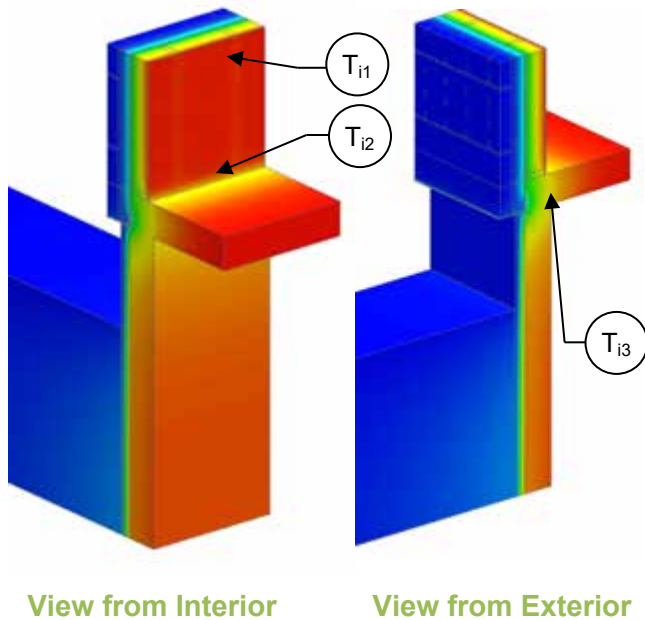
	R5	R10	R15	
$T_{i1}$	0.25	0.36	0.43	Min T on sheathing, along studs at fasteners
$T_{i2}$	0.39	0.49	0.55	Max T on sheathing, along studs between fasteners and at bottom plate
$T_{i3}$	0.48	0.50	0.51	Min T on floor foundation sill plate, at rim joist
$T_{i4}$	0.82	0.82	0.82	Min T on foundation wall, at midsection between floor and grade between studs





# Detail 8.6.4

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer and R-19 Batt Insulation in Stud Cavity – Exterior Insulated At-Grade Foundation Wall Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1Dw}$ , $R_{1Dfw}$	R-27.4 (4.83 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-5 (0.88)	R-32.4 (5.71)	R-24.1 (4.25)	0.041 (0.24)
R-10 (1.76)	R-37.4 (6.59)	R-28.0 (4.93)	0.036 (0.20)
R-15 (2.64)	R-42.4 (7.47)	R-31.5 (5.54)	0.032 (0.18)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$R_{1Dfw}$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$R_{fw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{fw}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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)

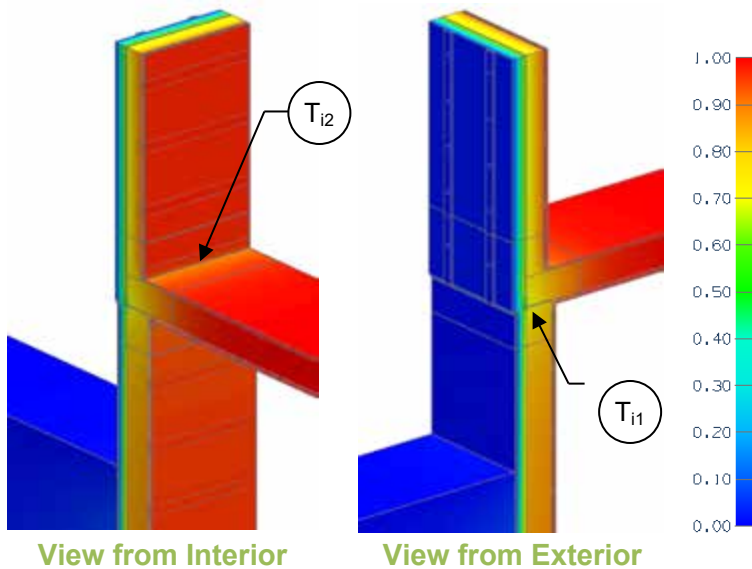
### Temperature Indices

	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 8.6.5

## Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Concrete Slab and Exterior Insulated At-Grade Foundation Wall Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1DCLT}$ , $R_{1Dfw}$	R-9.9 (1.74 RSI) + exterior insulation for CLT wall R-3.6 (0.64 RSI) + insulation for foundation CLT = CLT wall fw = foundation wall
Transmittance / Resistance without Anomaly	$U_{CLT}$ , $R_{CLT}$ , $U_{fw}$ , $R_{fw}$	“clear field” U- and R-value
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Above Grade Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1DCLT}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_{CLT}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{CLT}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-15.0 (2.64)	R-24.9 (4.38)	R-24.7 (4.35)	0.040 (0.23)
R-20.0 (3.52)	R-29.9 (5.26)	R-29.4 (5.17)	0.034 (0.19)
R-25.0 (4.40)	R-34.9 (6.14)	R-33.9 (5.98)	0.029 (0.17)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$R_{1Dfw}$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$R_{fw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{fw}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5.0 (0.88)	R-8.6 (1.52)	R-8.3 (1.46)	0.121 (0.69)
R-10.0 (1.76)	R-11.5 (2.03)	R-13.3 (2.34)	0.075 (0.43)
R-15.0 (2.64)	R-17.0 (3.00)	R-18.3 (3.22)	0.055 (0.31)
R-20.0 (3.52)	R-23.0 (4.05)	R-23.3 (4.10)	0.043 (0.24)

### Foundation Linear Transmittance

Foundation Insulation 1D R-Value (RSI)	R-15 Wall Insulation			R-20 Wall Insulation			R-25 Wall Insulation		
	R ft <sup>2</sup> ·hr·°F/Btu (m <sup>2</sup> K/W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)	R ft <sup>2</sup> ·hr·°F/Btu (m <sup>2</sup> K/W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)	R ft <sup>2</sup> ·hr·°F/Btu (m <sup>2</sup> K/W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-5.0 (0.88)	R-10.7 (1.89)	0.093 (0.53)	0.365 (0.632)	R-11.0 (1.95)	0.091 (0.51)	0.344 (0.595)	R-11.3 (1.99)	0.089 (0.50)	0.330 (0.570)
R-10.0 (1.76)	R-14.3 (2.51)	0.070 (0.40)	0.337 (0.584)	R-14.8 (2.61)	0.067 (0.38)	0.315 (0.545)	R-15.2 (2.68)	0.066 (0.37)	0.300 (0.519)
R-15.0 (2.64)	R-16.9 (2.98)	0.059 (0.34)	0.320 (0.555)	R-17.8 (3.14)	0.056 (0.32)	0.296 (0.512)	R-18.5 (3.25)	0.054 (0.31)	0.280 (0.484)
R-20.0 (3.52)	R-18.9 (3.32)	0.053 (0.30)	0.318 (0.551)	R-20.3 (3.58)	0.049 (0.28)	0.282 (0.488)	R-21.2 (3.73)	0.047 (0.27)	0.264 (0.457)

### Temperature Indices

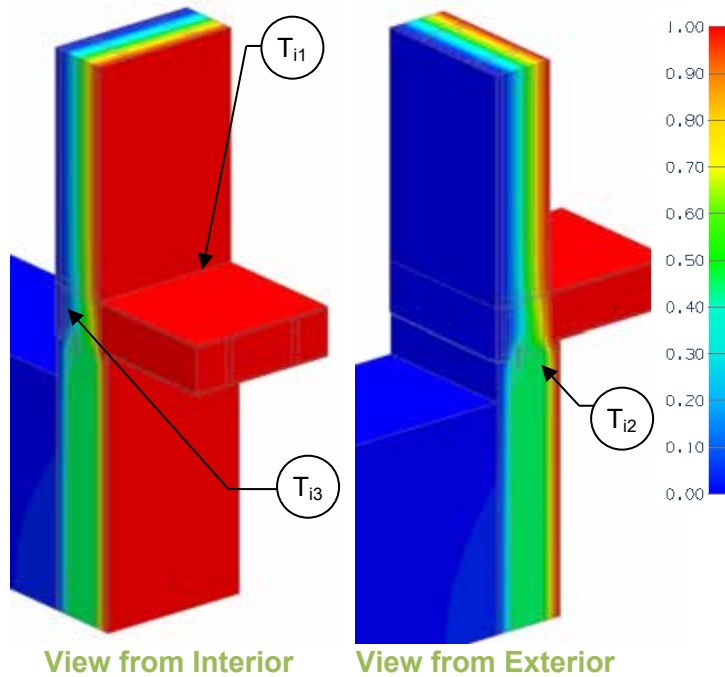
	R15 Wall / R5 Foundation	R20 Wall / R15 Foundation	R25 Wall / R20 Foundation	
$T_{i1}$	0.76	0.82	0.85	Min T on floor at CLT
$T_{i2}$	0.74	0.84	0.87	Min T on foundation wall, at midsection between floor and grade between wood strapping

Temperature indices for all other scenarios can be interpolated



# Detail 8.6.6

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap – Rim Joist and Split Insulated At-Grade Foundation Wall Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1Dw}$ , $R_{1Dfw}$	R-2.5 (0.44 RSI) + exterior insulation for double framed wall R-6.6 (1.15 RSI) + insulation for foundation w = double 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$R_{1Dfw}$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$R_{fw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{fw}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-32.5 (5.72)	R-39.1 (6.88)	R-34.1 (6.01)	0.029 (0.17)

#### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-35.5 (6.26)	0.028 (0.16)	0.010 (0.017)
R-44.0 (7.75)	R-46.5 (8.19)	R-37.2 (6.55)	0.027 (0.15)	0.011 (0.019)
R-55.0 (9.69)	R-57.5 (10.13)	R-39.9 (7.03)	0.025 (0.14)	0.013 (0.022)
R-66.0 (11.62)	R-68.5 (12.07)	R-42.0 (7.40)	0.024 (0.14)	0.014 (0.024)

### Temperature Indices

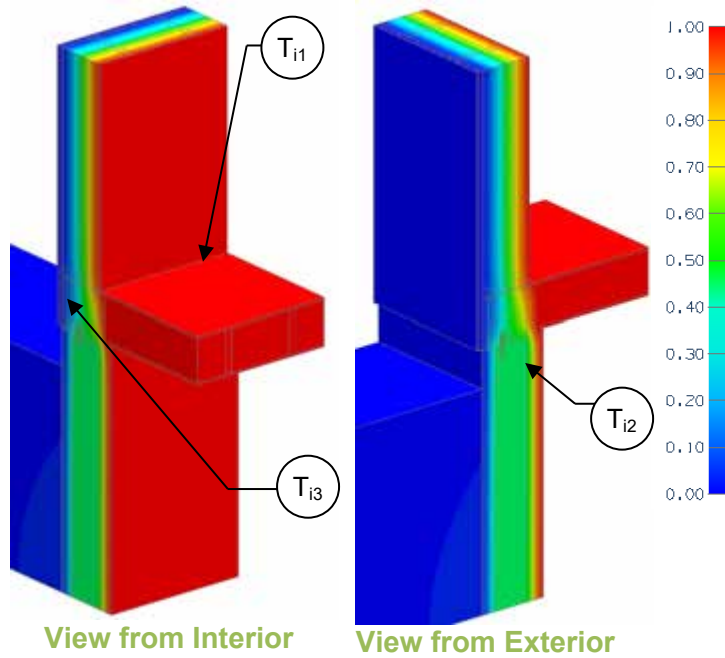
	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.93	0.93	0.93	0.94	Min T on gypsum, at studs on floor
$T_{i2}$	0.47	0.47	0.47	0.47	Min T on foundation wall, at midsection between floor and grade between studs
$T_{i3}$	0.10	0.09	0.08	0.07	Min T on rim joist, between floor joists

Temperature indices for all other scenarios can be interpolated



# Detail 8.6.7

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap – Insulated Rim Joist and Split Insulated At-Grade Foundation Wall Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1Dw}$ , $R_{1Dfw}$	R-2.5 (0.44 RSI) + exterior insulation for double framed wall R-6.6 (1.15 RSI) + insulation for foundation w = double 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$R_{1Dfw}$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$R_{fw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{fw}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-32.5 (5.72)	R-39.1 (6.88)	R-34.1 (6.01)	0.029 (0.17)

#### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-36.2 (6.37)	0.028 (0.16)	0.005 (0.009)
R-44.0 (7.75)	R-46.5 (8.19)	R-37.8 (6.66)	0.026 (0.15)	0.007 (0.012)
R-55.0 (9.69)	R-57.5 (10.13)	R-40.6 (7.15)	0.025 (0.14)	0.009 (0.015)
R-66.0 (11.62)	R-68.5 (12.07)	R-42.7 (7.53)	0.023 (0.13)	0.010 (0.018)

### Temperature Indices

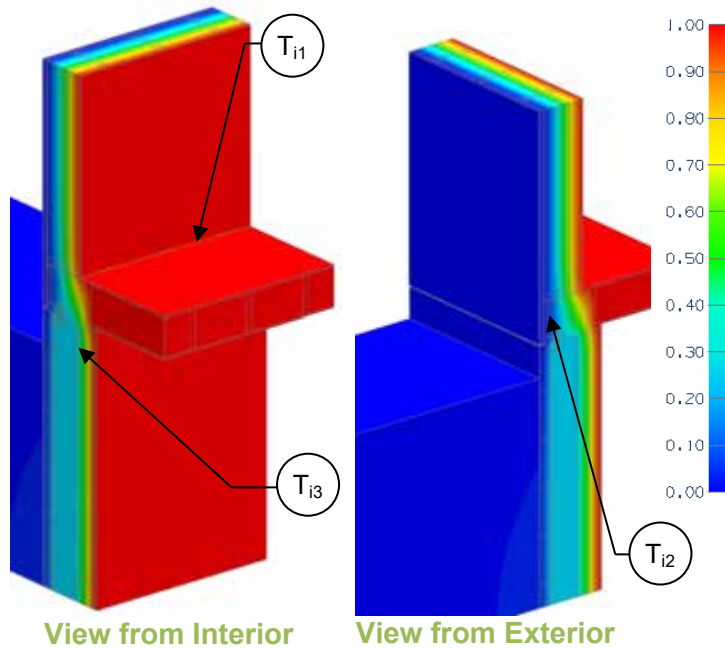
	R38.5	R44.0	R55.0	R66.0	
$T_{11}$	0.92	0.92	0.93	0.93	Min T on gypsum, at studs on floor
$T_{12}$	0.49	0.49	0.49	0.49	Min T on foundation wall, at midsection between floor and grade between studs
$T_{13}$	0.21	0.20	0.18	0.16	Min T on rim joist, between floor joists

Temperature indices for all other scenarios can be interpolated



# Detail 8.6.8

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap and R28 ICF Foundation Wall – Rim Joist and Split Insulated At-Grade Foundation Wall Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1Dw}$ , $R_{1Dfw}$	R-2.5 (0.44 RSI) + exterior insulation for double framed wall R-7.1 (1.25 RSI) + insulation for foundation w = double 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$R_{1Dfw}$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$R_{fw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{fw}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-42.5 (7.49)	R-49.6 (8.73)	R-43.9 (7.74)	0.023 (0.13)

#### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-41.0 (7.23)	0.024 (0.14)	0.004 (0.008)
R-44.0 (7.75)	R-46.5 (8.19)	R-43.1 (7.59)	0.023 (0.13)	0.006 (0.010)
R-55.0 (9.69)	R-57.5 (10.13)	R-46.5 (8.20)	0.021 (0.12)	0.007 (0.012)
R-66.0 (11.62)	R-68.5 (12.07)	R-49.2 (8.67)	0.020 (0.12)	0.008 (0.014)

### Temperature Indices

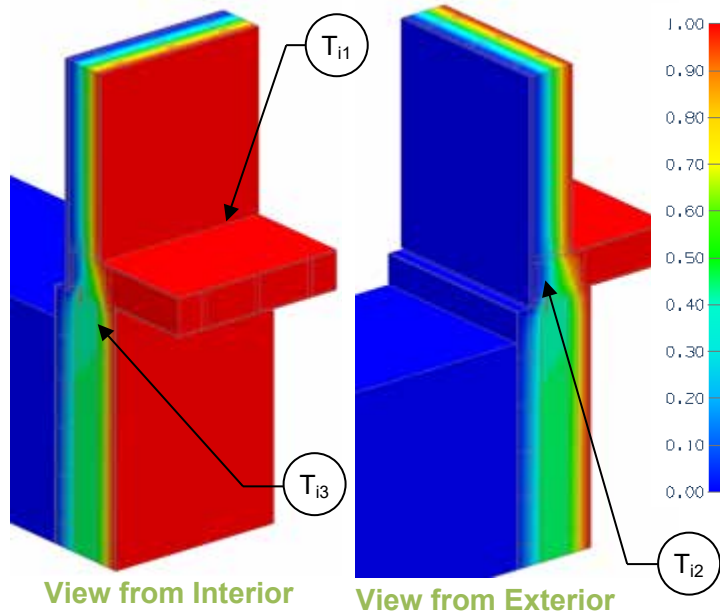
	R38.5	R44.0	R55.0	R66.0	
$T_{11}$	0.91	0.91	0.91	0.91	Min T on gypsum, at studs on floor
$T_{12}$	0.33	0.33	0.33	0.32	Min T on foundation wall, at midsection between floor and grade between studs
$T_{13}$	0.09	0.08	0.07	0.06	Min T on rim joist, between floor joists

Temperature indices for all other scenarios can be interpolated



# Detail 8.6.9

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap and R43 ICF Foundation Wall – Rim Joist and Split Insulated At-Grade Foundation Wall Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1Dw}$ , $R_{1Dfw}$	R-2.5 (0.44 RSI) + exterior insulation for double framed wall R-7.1 (1.25 RSI) + insulation for foundation w = double 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$R_{1Dfw}$ ft <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$R_{fw}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{fw}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-58.5 (10.30)	R-65.6 (11.55)	R-60.2 (10.61)	0.017 (0.09)

#### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-45.8 (8.07)	0.022 (0.12)	0.009 (0.015)
R-44.0 (7.75)	R-46.5 (8.19)	R-48.4 (8.52)	0.021 (0.12)	0.010 (0.018)
R-55.0 (9.69)	R-57.5 (10.13)	R-52.7 (9.29)	0.019 (0.11)	0.012 (0.020)
R-66.0 (11.62)	R-68.5 (12.07)	R-56.2 (9.89)	0.018 (0.10)	0.013 (0.022)

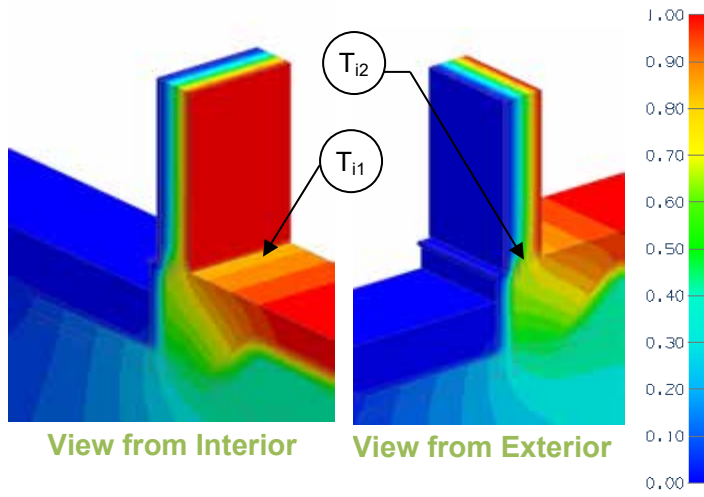
### Temperature Indices

	R38.5	R44.0	R55.0	R66.0	
$T_{11}$	0.91	0.91	0.92	0.92	Min T on gypsum, at studs on floor
$T_{12}$	0.44	0.44	0.44	0.44	Min T on foundation wall, at midsection between floor and grade between studs
$T_{13}$	0.10	0.09	0.07	0.07	Min T on rim joist, between floor joists

Temperature indices for all other scenarios can be interpolated



# Detail 8.6.10 Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap and Partially Wrapped R-22.5 Raft Slab Insulation – Slab on Grade Foundation Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + exterior insulation for double framed wall
Transmittance / Resistance without Anomaly	$U_w, R_w$	"clear field" U- and R-value
Transmittance / Resistance	$U, R$	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = floor + wall + foundation
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>For on grade transition calculation, see Appendix B introduction

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$L_{2Df}$ Btu/ft ·hr ·°F (W/m K)
R-22.5 (3.96)	1.015 (0.586)

#### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$L_{2Dt}$ Btu/ft ·hr ·°F (W/m K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-23.9 (4.21)	0.238 (1.35)	1.240 (0.717)	0.037 (0.022)
R-44.0 (7.75)	R-46.5 (8.19)	R-24.2 (4.27)	0.234 (1.33)	1.223 (0.706)	0.039 (0.023)
R-55.0 (9.69)	R-57.5 (10.13)	R-24.8 (4.36)	0.229 (1.30)	1.196 (0.691)	0.041 (0.024)
R-66.0 (11.62)	R-68.5 (12.07)	R-25.2 (4.43)	0.226 (1.28)	1.178 (0.681)	0.042 (0.024)

### Temperature Indices

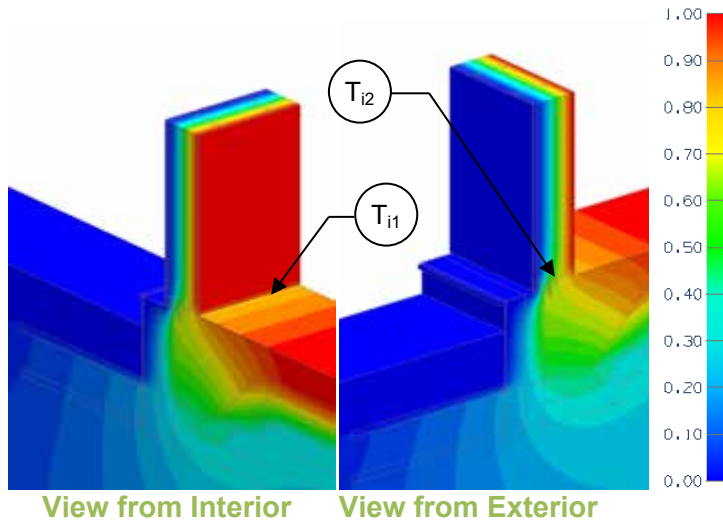
	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.78	0.78	0.78	0.78	Min T on gypsum, at studs on floor
$T_{i2}$	0.68	0.68	0.68	0.68	Min T on concrete floor, at edge

Temperature indices for all other scenarios can be interpolated



# Detail 8.6.11

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap and Partially Wrapped R-45 Raft Slab Insulation – Slab on Grade Foundation Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	R <sub>1D</sub>	R-2.5 (0.44 RSI) + exterior insulation for double framed wall
Transmittance / Resistance without Anomaly	U <sub>w</sub> , R <sub>w</sub>	"clear field" U- and R-value
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature
Foundation Transmittance <sup>2</sup>	L <sub>2Df</sub> , L <sub>2Dt</sub>	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

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>For on grade transition calculation, see Appendix B introduction

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R <sub>w</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U <sub>w</sub> Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	L <sub>2Df</sub> Btu/ft·hr·°F (W/m K)
R-45.0 (7.93)	0.844 (0.488)

#### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	R <sub>1D</sub> ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	L <sub>2Dt</sub> Btu/ft·hr·°F (W/m K)	ψ Btu/ft·hr·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-27.5 (4.84)	0.206 (1.17)	1.077 (0.622)	0.046 (0.026)
R-44.0 (7.75)	R-46.5 (8.19)	R-28.0 (4.93)	0.203 (1.15)	1.059 (0.612)	0.047 (0.027)
R-55.0 (9.69)	R-57.5 (10.13)	R-28.7 (5.05)	0.198 (1.12)	1.033 (0.597)	0.048 (0.028)
R-66.0 (11.62)	R-68.5 (12.07)	R-29.2 (5.14)	0.194 (1.10)	1.015 (0.586)	0.049 (0.029)

### Temperature Indices

	R38.5	R44.0	R55.0	R66.0	
T <sub>i1</sub>	0.78	0.78	0.78	0.78	Min T on gypsum, at studs on floor
T <sub>i2</sub>	0.68	0.68	0.68	0.68	Min T on concrete floor, at edge

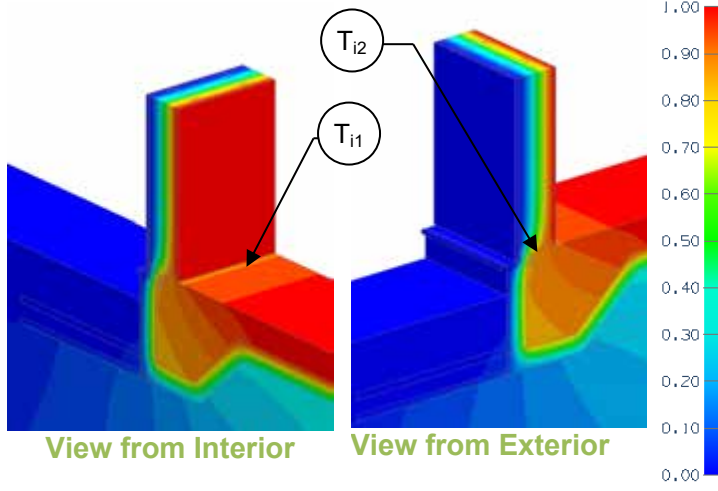
Temperature indices for all other scenarios can be interpolated





# Detail 8.6.12 Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap and Fully Wrapped R-22.5 Raft Slab Insulation – Slab on Grade Foundation Intersection

## Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + exterior insulation for double framed wall
Transmittance / Resistance without Anomaly	$U_w, R_w$	"clear field" U- and R-value
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = floor + wall + foundation
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>For on grade transition calculation, see Appendix B introduction

## Nominal (1D) vs. Assembly Performance Indicators

### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$L_{2Df}$ Btu/ft ·hr ·°F (W/m K)
R-22.5 (3.96)	0.753 (0.435)

### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$L_{2Dt}$ Btu/ft ·hr ·°F (W/m K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-29.8 (5.25)	0.191 (1.08)	0.995 (0.575)	0.053 (0.031)
R-44.0 (7.75)	R-46.5 (8.19)	R-30.4 (5.35)	0.187 (1.06)	0.976 (0.564)	0.054 (0.031)
R-55.0 (9.69)	R-57.5 (10.13)	R-31.2 (5.50)	0.182 (1.03)	0.950 (0.549)	0.056 (0.032)
R-66.0 (11.62)	R-68.5 (12.07)	R-31.8 (5.60)	0.178 (1.01)	0.931 (0.538)	0.056 (0.033)

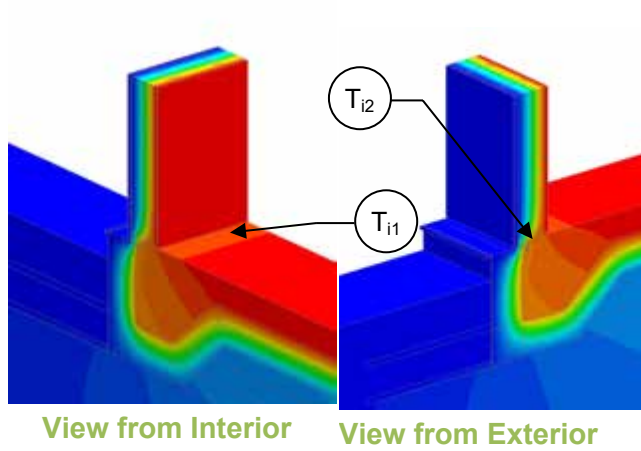
## Temperature Indices

	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.87	0.87	0.88	0.88	Min T on gypsum, at studs on floor
$T_{i2}$	0.80	0.80	0.81	0.81	Min T on concrete floor, at edge

Temperature indices for all other scenarios can be interpolated

# Detail 8.6.13

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap and Fully Wrapped R-45 Raft Slab Insulation – Slab on Grade Foundation Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + exterior insulation for double framed wall
Transmittance / Resistance without Anomaly	$U_w, R_w$	"clear field" U- and R-value
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = floor + wall + foundation
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>For on grade transition calculation, see Appendix B introduction

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$L_{2Df}$ Btu/ft ·hr ·°F (W/m K)
R-45.0 (7.93)	0.474 (0.274)

#### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$L_{2Dt}$ Btu/ft ·hr ·°F (W/m K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-40.4 (7.12)	0.141 (0.80)	0.734 (0.424)	0.071 (0.041)
R-44.0 (7.75)	R-46.5 (8.19)	R-41.4 (7.30)	0.137 (0.78)	0.715 (0.413)	0.073 (0.042)
R-55.0 (9.69)	R-57.5 (10.13)	R-43.0 (7.58)	0.132 (0.75)	0.689 (0.398)	0.074 (0.043)
R-66.0 (11.62)	R-68.5 (12.07)	R-44.2 (7.79)	0.128 (0.73)	0.670 (0.387)	0.074 (0.043)

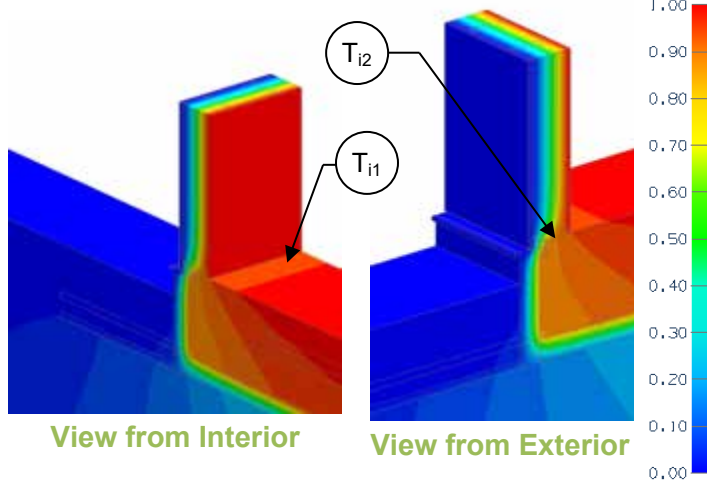
### Temperature Indices

	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.90	0.90	0.90	0.90	Min T on gypsum, at studs on floor
$T_{i2}$	0.84	0.84	0.84	0.84	Min T on concrete floor, at edge

Temperature indices for all other scenarios can be interpolated



# Detail 8.6.14 Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap and R-22.5 Slab Insulation with Gravel Base – Slab on Grade Foundation Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + exterior insulation for double framed wall
Transmittance / Resistance without Anomaly	$U_w, R_w$	“clear field” U- and R-value
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = floor + wall + foundation
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>For on grade transition calculation, see Appendix B introduction

## Nominal (1D) vs. Assembly Performance Indicators

### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$L_{2Df}$ Btu/ft ·hr ·°F (W/m K)
R-22.5 (3.96)	0.744 (0.430)

### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$L_{2Dt}$ Btu/ft ·hr ·°F (W/m K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-30.0 (5.28)	0.189 (1.07)	0.988 (0.571)	0.056 (0.032)
R-44.0 (7.75)	R-46.5 (8.19)	R-30.6 (5.38)	0.186 (1.05)	0.969 (0.560)	0.057 (0.033)
R-55.0 (9.69)	R-57.5 (10.13)	R-31.4 (5.54)	0.181 (1.03)	0.943 (0.545)	0.058 (0.034)
R-66.0 (11.62)	R-68.5 (12.07)	R-32.1 (5.65)	0.177 (1.01)	0.924 (0.534)	0.059 (0.034)

## Temperature Indices

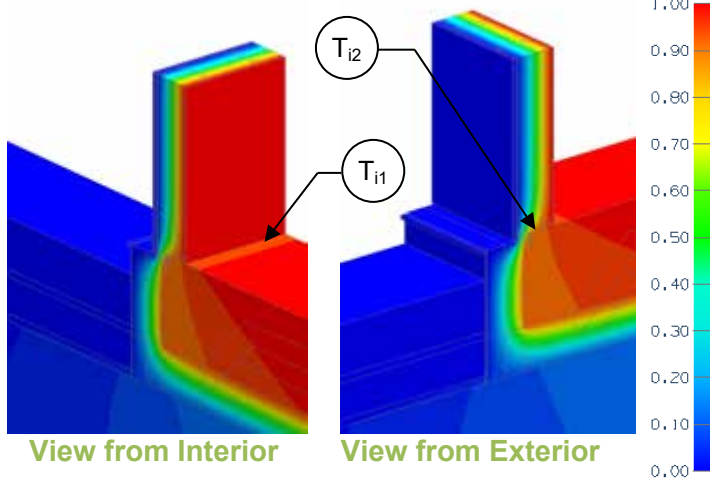
	R38.5	R44.0	R55.0	R66.0	
$T_{i1}$	0.89	0.89	0.89	0.89	Min T on gypsum, at studs on floor
$T_{i2}$	0.82	0.82	0.82	0.82	Min T on concrete floor, at edge

Temperature indices for all other scenarios can be interpolated



# Detail 8.6.15

## Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap and R-45 Slab Insulation with Gravel Base – Slab on Grade Foundation Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.5 (0.44 RSI) + exterior insulation for double framed wall
Transmittance / Resistance without Anomaly	$U_w, R_w$	"clear field" U- and R-value
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Foundation Transmittance <sup>2</sup>	$L_{2Df}, L_{2Dt}$	Heat loss of slab on grade per unit width of slab: f = floor t = floor + wall + foundation
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of foundation

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

<sup>2</sup>For on grade transition calculation, see Appendix B introduction

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Above Grade Wall

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-38.5 (6.78)	R-41.0 (7.23)	R-38.0 (6.70)	0.026 (0.15)
R-44.0 (7.75)	R-46.5 (8.19)	R-42.4 (7.47)	0.024 (0.13)
R-55.0 (9.69)	R-57.5 (10.13)	R-50.8 (8.94)	0.020 (0.11)
R-66.0 (11.62)	R-68.5 (12.07)	R-58.9 (10.37)	0.017 (0.10)

#### Base Assembly – Foundation Wall

Foundation Insulation 1D R-Value (RSI)	$L_{2Df}$ Btu/ft ·hr ·°F (W/m K)
R-45.0 (7.93)	0.466 (0.269)

#### Foundation Linear Transmittance

Fill Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$L_{2Dt}$ Btu/ft ·hr ·°F (W/m K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
R-38.5 (6.78)	R-41.0 (7.23)	R-40.7 (7.17)	0.140 (0.79)	0.728 (0.421)	0.075 (0.043)
R-44.0 (7.75)	R-46.5 (8.19)	R-41.8 (7.35)	0.136 (0.77)	0.710 (0.410)	0.075 (0.044)
R-55.0 (9.69)	R-57.5 (10.13)	R-43.4 (7.64)	0.131 (0.74)	0.683 (0.395)	0.077 (0.044)
R-66.0 (11.62)	R-68.5 (12.07)	R-44.6 (7.86)	0.127 (0.72)	0.664 (0.384)	0.077 (0.045)

### Temperature Indices

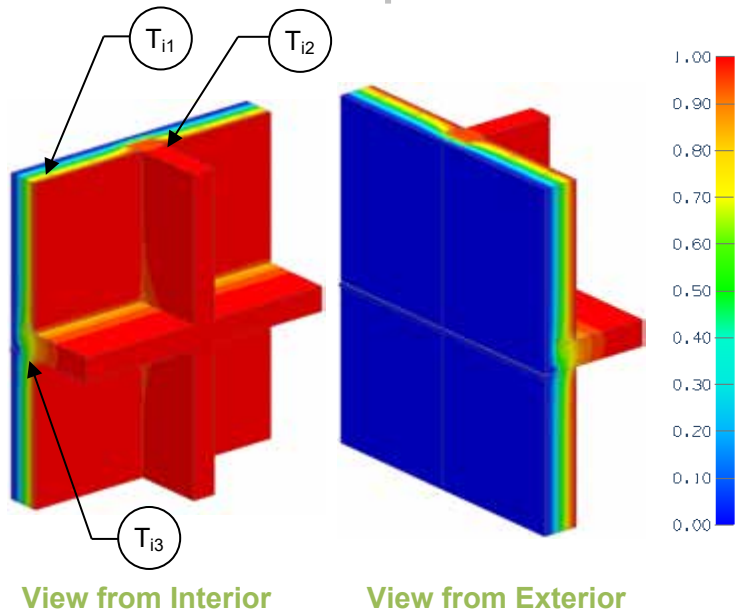
	R38.5	R44.0	R55.0	R66.0	
$T_{11}$	0.91	0.91	0.91	0.91	Min T on gypsum, at studs on floor
$T_{12}$	0.85	0.85	0.86	0.86	Min T on concrete floor, at edge

Temperature indices for all other scenarios can be interpolated



# Detail 8.7.1

## Exterior and Interior Insulated Wood Infill Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board and R-19 Batt Insulation in Stud Cavity – 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	$U_s, R_s, U_i, R_i, U_t, R_t$	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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_i$	Incremental increase in transmittance per linear length of s = slab i = interior wall
Point Transmittance	$\chi$	Incremental increase in transmittance for inner wall and slab intersection

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> hr °F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_i$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_i$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi^2$ Btu/·hr·°F (W/K)
R-10.9 (1.93)	0.091 (0.52)	-0.40 (-0.209)
R-12.6 (2.22)	0.079 (0.45)	-0.34 (-0.178)
R-13.8 (2.42)	0.073 (0.41)	-0.11 (-0.059)

### Temperature Indices

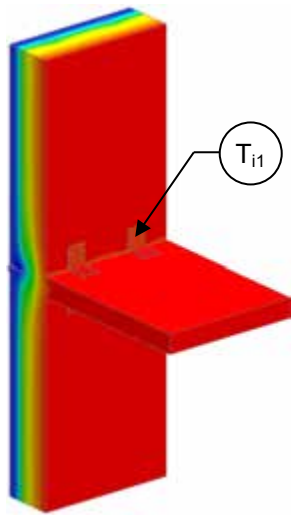
<sup>2</sup>Values are negative for a correction factor. See section 6 in ASHRAE 1365-RP for clarification.

	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

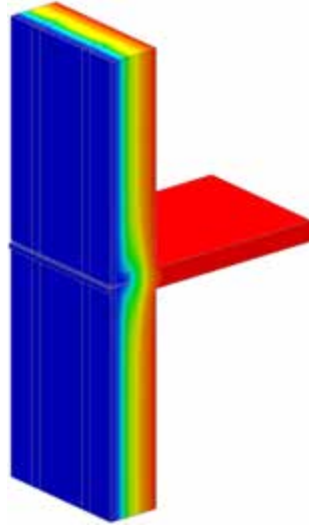


## Detail 8.7.2

### 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



View from Interior



View from Exterior



#### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of CLT floor slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

#### Nominal (1D) vs. Assembly Performance Indicators

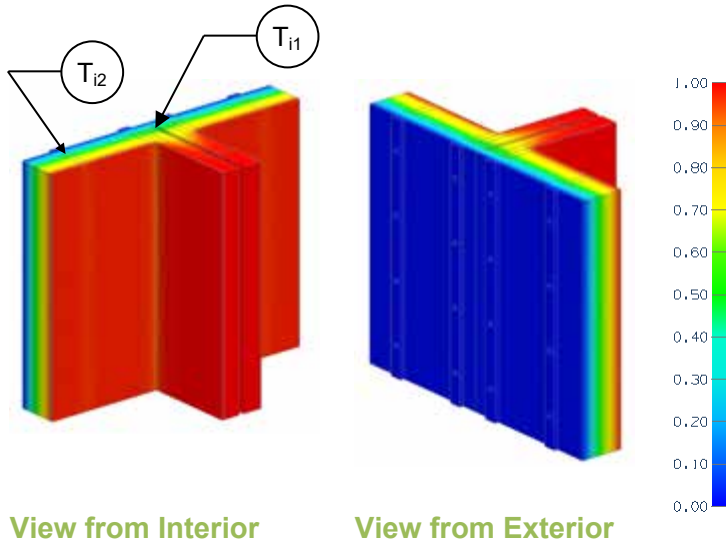
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ 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)	0.044 (0.075)
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)	0.049 (0.084)
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)	0.053 (0.092)

#### Temperature Indices

	R15	R20	R25	
$T_{i1}$	0.95	0.95	0.95	Min T on bolt head around edge touching bracket

# Detail 8.7.3

## Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – One-Hour Fire Wall Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.5 (3.79 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without fire wall
Transmittance / Resistance	$U, R$	U- and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of fire wall

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-0.0 (0.00)	R-21.5 (3.79)	R-19.7 (3.47)	0.051 (0.29)	R-18.6 (3.28)	0.054 (0.31)	0.0141 (0.0244)
R-5.0 (0.88)	R-26.5 (4.67)	R-24.6 (4.34)	0.041 (0.23)	R-23.7 (4.17)	0.042 (0.24)	0.0078 (0.0135)
R-10.0 (1.76)	R-31.5 (5.56)	R-29.2 (5.15)	0.034 (0.19)	R-28.3 (4.98)	0.035 (0.20)	0.0056 (0.0097)
R-15.0 (2.64)	R-36.5 (6.44)	R-33.6 (5.91)	0.030 (0.17)	R-32.5 (5.72)	0.031 (0.18)	0.0049 (0.0084)

### Temperature Indices

	R0	R5	R10	R15	
$T_{i1}$	0.12	0.33	0.45	0.50	Max T on sheathing, at fire wall and exterior wall intersection
$T_{i2}$	0.11	0.19	0.26	0.30	Min T on sheathing, at fastener

## 9.0 Doors and Balconies

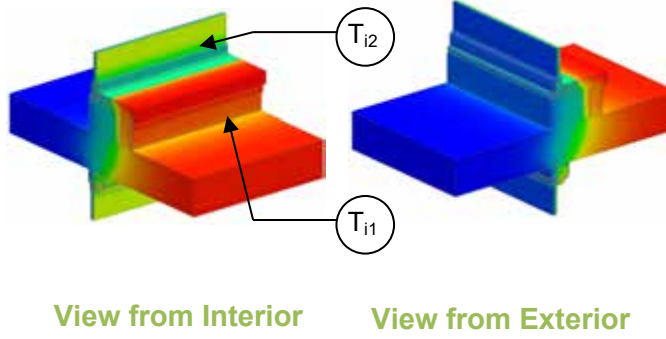


<b>Detail 9.1.1</b> .....	<b>B.9.1</b>
Interior Insulated Concrete Curb at Sliding Door Sill and Window Head – Intermediate Floor Intersection	
<b>Detail 9.1.2</b> .....	<b>B.9.2</b>
Non- Insulated Sliding Door Sill and Window Head – Intermediate Floor Intersection	
<b>Detail 9.1.3</b> .....	<b>B.9.3</b>
Interior Insulated Concrete Curb – Window-Wall and Intermediate Floor Intersection	
<b>Detail 9.1.4</b> .....	<b>B.9.4</b>
Exterior Insulated Concrete Curb at Sliding Door Sill and Head- Intermediate Floor Intersection	
<b>Detail 9.1.5</b> .....	<b>B.9.5</b>
Exterior Insulated Concrete Curb – Window-Wall and Recessed Intermediate Floor Intersection	
<b>Detail 9.1.6</b> .....	<b>B.9.6</b>
Window Wall System with Spandrel Panels and Sliding Door - Concrete Balcony and Curb Intersection	
<b>Detail 9.1.7</b> .....	<b>B.9.7</b>
Window-wall with Sliding Door and Insulated Spandrel Section – Concrete Intermediate Floor Intersection without Concrete Curb for Alternative Balcony Slab Connections	
<b>Detail 9.1.8</b> .....	<b>B.9.8</b>
Window Wall System with Spandrel Panels and Sliding Door - Thermally Broken Concrete Balcony and Curb Intersection	
<b>Detail 9.1.9</b> .....	<b>B.9.9</b>
Window Wall System with Spandrel Panels - Concrete Balcony and Bypass Intersection	
<b>Detail 9.1.10</b> .....	<b>B.9.10</b>
Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly - Door Sill with Exterior Slab Insulation	
<b>Detail 9.1.11</b> .....	<b>B.9.11</b>
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly - Door Sill with Exterior Slab Insulation	
<b>Detail 9.1.12</b> .....	<b>B.9.12</b>
Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb K65-V8 Thermal Break at Concrete Balcony and Curb Intersection	
<b>Detail 9.1.13</b> .....	<b>B.9.13</b>

Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb K10-V6 Thermal Break at Concrete Balcony and Curb Intersection	
<b>Detail 9.1.14</b> .....	<b>B.9.14</b>
Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb KXT65-V8 Thermal Break at Concrete Balcony and Curb Intersection	
<b>Detail 9.1.15</b> .....	<b>B.9.15</b>
Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb KXT15-V6 Thermal Break at Concrete Balcony and Curb Intersection	
<b>Detail 9.1.16</b> .....	<b>B.9.16</b>
Exterior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding and Sliding Door – Intermittently Attached Balcony and Sliding Door Intersection	
<b>Detail 9.1.17</b> .....	<b>B.9.17</b>
Exterior and Interior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding with R-19 Batt in Stud Cavity and Sliding Door – Intermittently Attached Balcony and Sliding Door Intersection	
<b>Detail 9.1.18</b> .....	<b>B.9.18</b>
Exterior Insulated 2" x 6" Steel Stud (16" o.c.) Wall Assembly with Vertical Clips (24" o.c.) Supporting Cladding and Sliding Door – Concrete Balcony and Curb Intersection	
<b>Detail 9.1.19</b> .....	<b>B.9.19</b>
Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c.) Wall Assembly with Vertical Clips (24" o.c.) Supporting Cladding with R-19 Batt in Stud Cavity and Sliding Door – Concrete Balcony and Curb Intersection	
<b>Detail 9.1.20</b> .....	<b>B.9.20</b>
Exterior Insulated 2" x 6" Steel Stud (16" o.c.) Wall Assembly with Vertical Clips (24" o.c.) Supporting Cladding and Sliding Door – Structural Thermal Break at Concrete Balcony and Curb Intersection	
<b>Detail 9.1.21</b> .....	<b>B.9.21</b>
Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c.) Wall Assembly with Vertical Clips (24" o.c.) Supporting Cladding with R-19 Batt in Stud Cavity and Sliding Door – Structural Thermal Break at Concrete Balcony and Curb Intersection	

# Detail 9.1.1

## Interior Insulated Concrete Curb at Sliding Door Sill and Window Head – Intermediate Floor Intersection



### Thermal Performance Indicators

Transmittance / Resistance <sup>1</sup>	U, R	U- and R-values for overall assembly
Surface Temperature Index <sup>2</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature

<sup>1</sup> Projected distance from bottom of slab to top of curb

<sup>2</sup> Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Thermal Transmittance

#### Sliding Door with Curb

R	U
ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-1.6 (0.29)	0.618 (3.509)

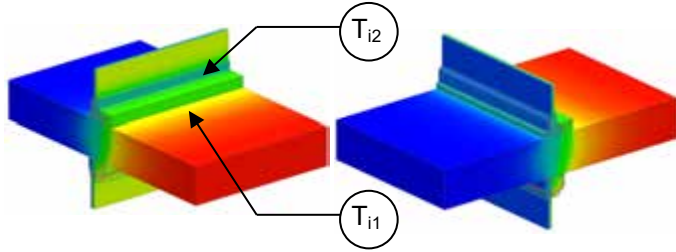
### Temperature Indices

T <sub>i1</sub>	0.83	Min T on interior concrete, at gypsum, at studs
T <sub>i2</sub>	0.44	Min T on glass, at gaskets



# Detail 9.1.2

## Non- Insulated Sliding Door Sill and Window Head – Intermediate Floor Intersection



View from Interior

View from Exterior

### Thermal Performance Indicators

Transmittance / Resistance <sup>1</sup>	U, R	U- and R-value
Surface Temperature Index <sup>2</sup>	T <sub>i</sub>	0 = exterior temperature 1 = interior temperature

<sup>1</sup> Projected distance from bottom of slab to top of curb

<sup>2</sup> Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Thermal Transmittance

#### Sliding Door without Curb

R	U
ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-1.2 (0.22)	0.807 (4.59)

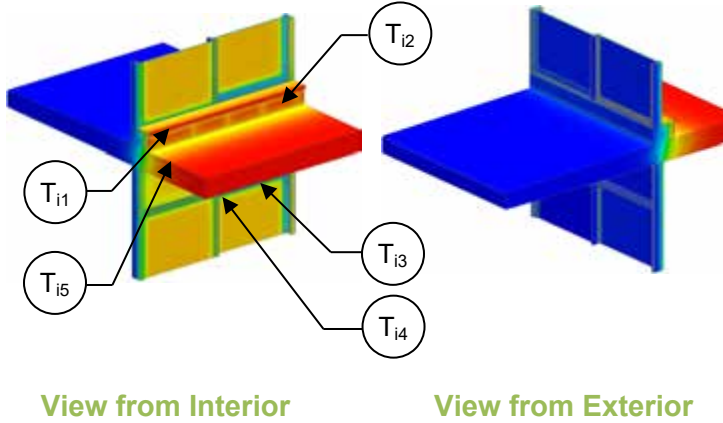
### Temperature Indices

T <sub>i1</sub>	0.58	Min T on interior concrete, at frame
T <sub>i2</sub>	0.48	Min T on glass, at gaskets



# Detail 9.1.3

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.486 (2.76)

#### Slab Linear Transmittance

Curb Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi^2$ 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 <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-1.2 (0.21)	0.832 (4.72)

<sup>2</sup>Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

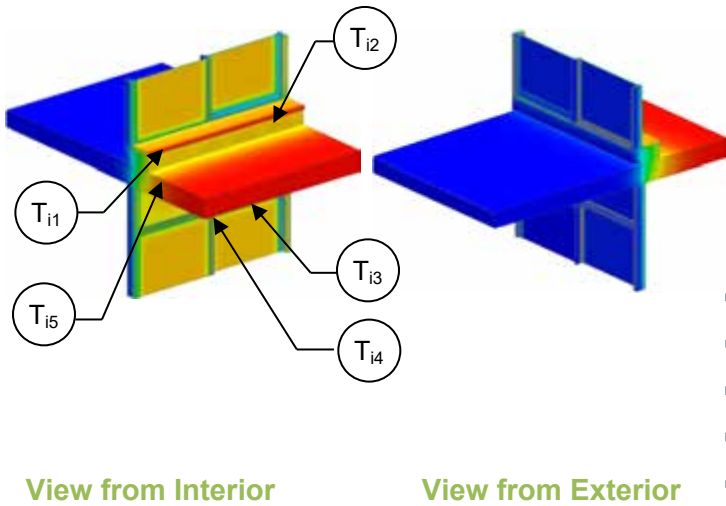
### Temperature Indices

$T_{i1}$	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 9.1.4

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.486 (2.76)

#### Slab Linear Transmittance

Curb Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi^2$ Btu/ft <sup>2</sup> ·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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-1.1 (0.19)	0.910 (5.17)
R-1.1 (0.19)	0.909 (5.16)

<sup>2</sup>Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

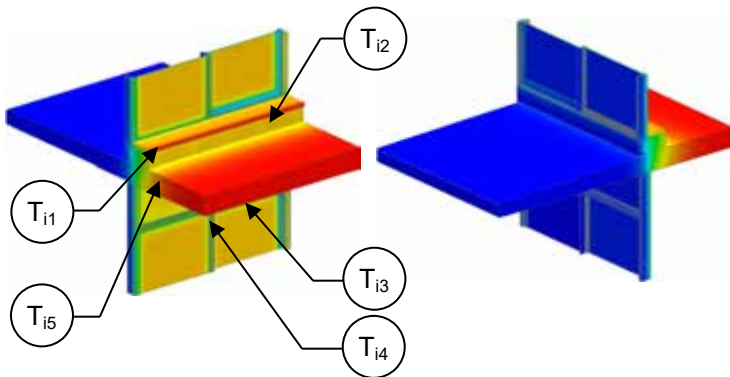
### Temperature Indices

	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 9.1.5

## Exterior Insulated Concrete Curb – Window-Wall and Recessed Intermediate Floor Intersection



View from Interior

View from Exterior

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions 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 <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
0.321 (1.82)	0.486 (2.76)

#### Slab Linear Transmittance

Curb Insulation 1D R-Value (RSI)	R ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi^2$ 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 <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-1.1 (0.20)	0.900 (5.11)
R-1.1 (0.20)	0.897 (5.09)

<sup>2</sup>Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing

### Temperature Indices

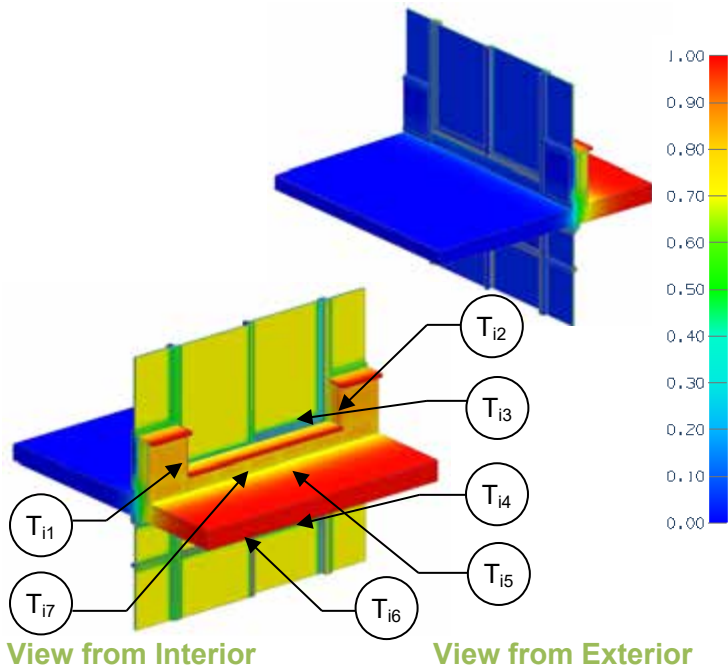
	R10	R15	
$T_{i1}$	0.50	0.50	Min T on concrete, between studs by wood block by fixed window
$T_{i2}$	0.58	0.58	Max T on concrete, between studs by sliding door
$T_{i3}$	0.16	0.16	Min T on window frame, middle of track at top of door (below slab)
$T_{i4}$	0.15	0.15	Min T on window glass, top middle corner of door glazing (below slab)
$T_{i5}$	0.50	0.50	Min T on slab, along spandrel head, on fixed window side



# Detail 9.1.6

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_w, \psi_s$	Incremental increase in transmittance per linear length of w = slab under spandrel s = slab under door

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.486 (2.76)

#### Balcony Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_s^2$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-1.8 (0.32)	0.551 (3.13)
R-1.8 (0.32)	0.551 (3.13)

<sup>2</sup>Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

### Temperature Indices

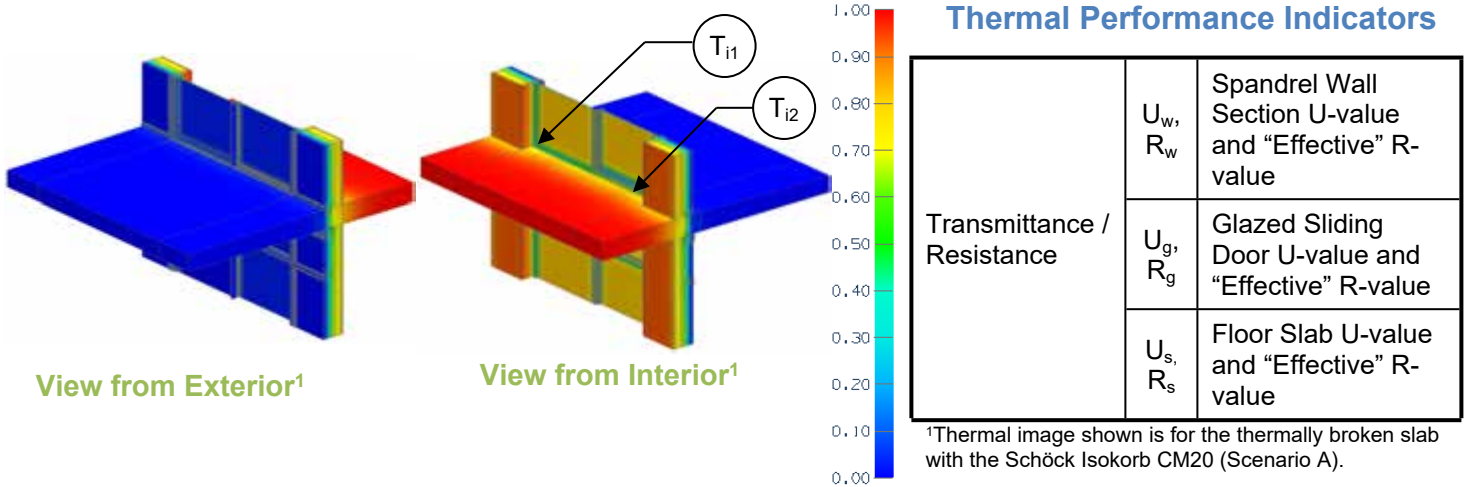
	R8.4	R12.6	
$T_{i1}$	0.47	0.53	Min T on backpan, along edge of backpan
$T_{i2}$	0.65	0.66	Max T on backpan, at centre of backpan
$T_{i3}$	0.24	0.24	Min T on upper frame, along sill of sliding door frame
$T_{i4}$	0.15	0.15	Min T on lower frame, along head of sliding door base frame
$T_{i5}$	0.21	0.21	Min T on upper glazing, at bottom corner of sliding door glazing near fixed frame
$T_{i6}$	0.20	0.20	Min T on lower glazing, at corner of sliding door frame near fixed frame
$T_{i7}$	0.52	0.52	Min T on slab, along head of lower sliding door





# Detail 9.1.7

## 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 <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_w$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_g$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> 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)

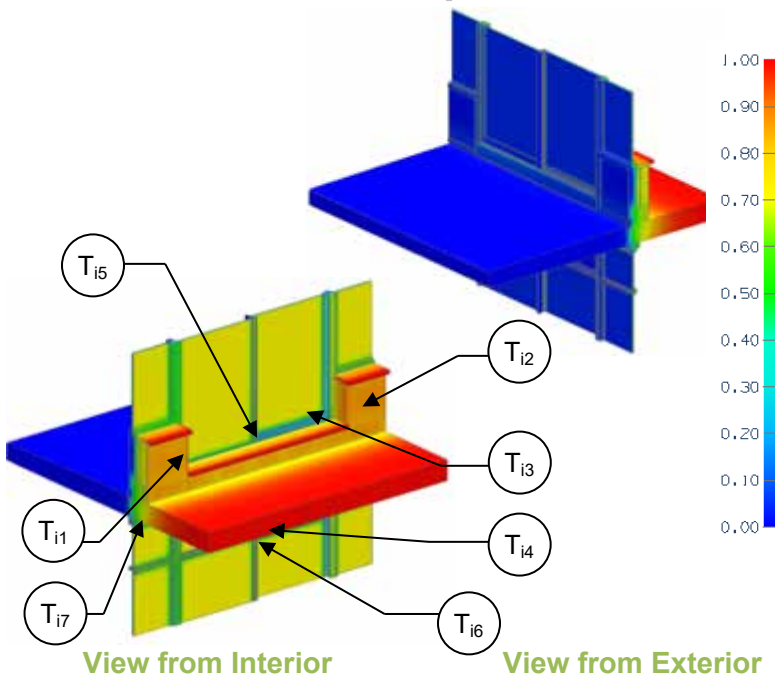
### Temperature Indices

	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 9.1.8

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\Psi_w, \Psi_s$	Incremental increase in transmittance per linear length of w = slab under spandrel s = slab under door

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_w$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_w$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.486 (2.76)

#### Balcony Linear Transmittance

Backpan Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi_s^2$ 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-2.4 (0.42)	0.421 (2.39)
R-2.4 (0.42)	0.422 (2.40)

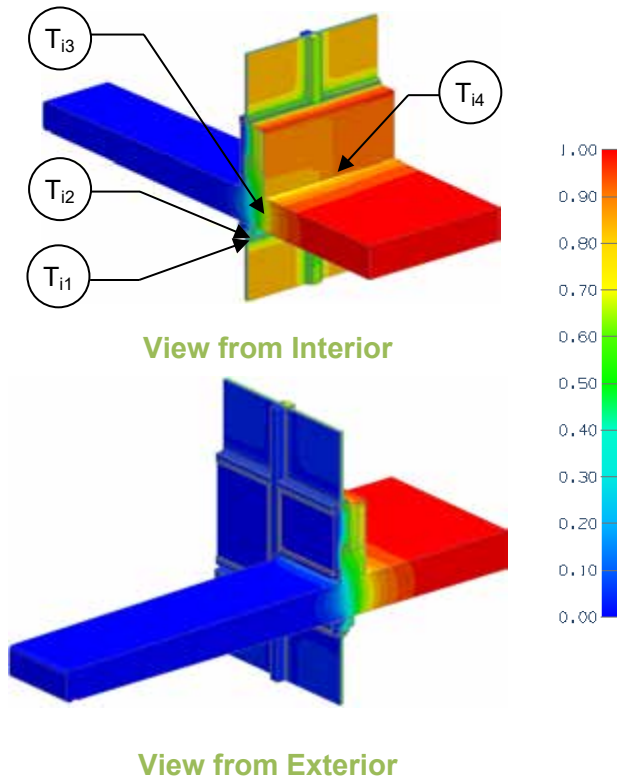
<sup>2</sup>Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

### 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 9.1.9

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi_s, \psi_i$	Incremental increase in transmittance per linear length of s = bypass i = balcony
Point Transmittance	$\chi$	Incremental increase in transmittance for inner wall and slab intersection

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_i$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_i$ 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

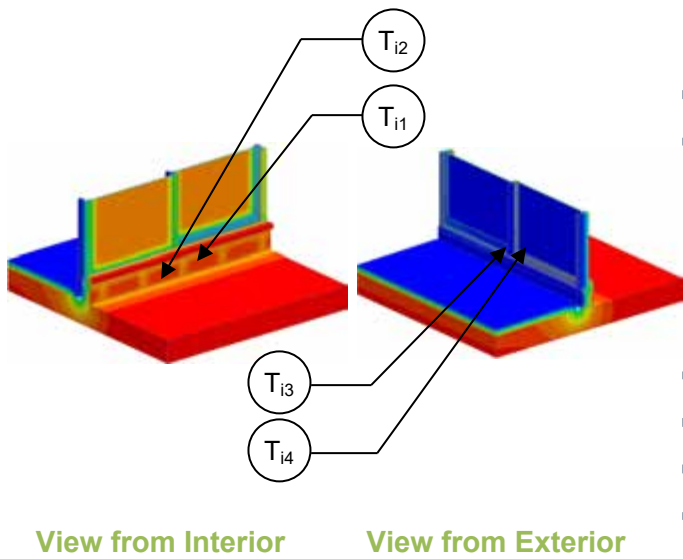
$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi_s$ Btu/ft·hr·°F (W/m K)
R-3.6 (0.64)	0.275 (1.56)	0.350 (0.606)
R-3.8 (0.68)	0.260 (1.48)	0.359 (0.622)

#### Intersection Point Transmittance

$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ 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 9.1.10

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of door sill

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_r$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.489 (2.78)

#### Door Sill Linear Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-3.0 (0.54)	0.329 (1.87)	0.395 (0.684)

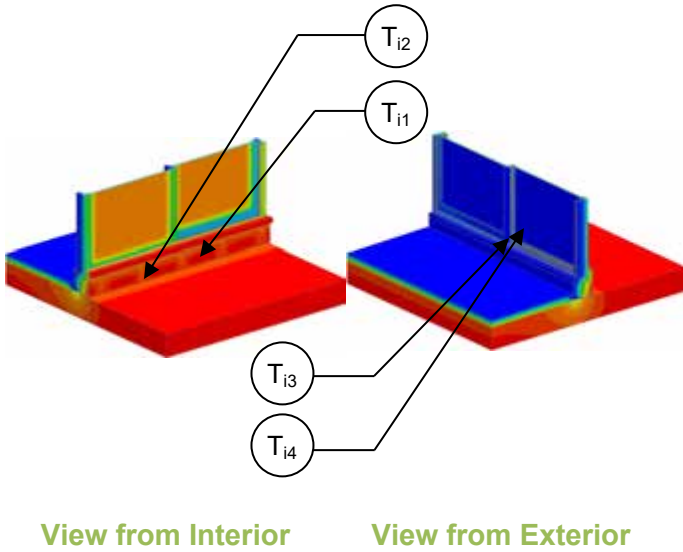
### Temperature Indices

$T_{i1}$	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 9.1.11

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of door sill

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_r$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_r$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	R-21.9 (3.86)	0.046 (0.26)

#### Base Assembly – Door

$U_{\text{center of glazing}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.489 (2.78)

#### Door Sill Linear Transmittance

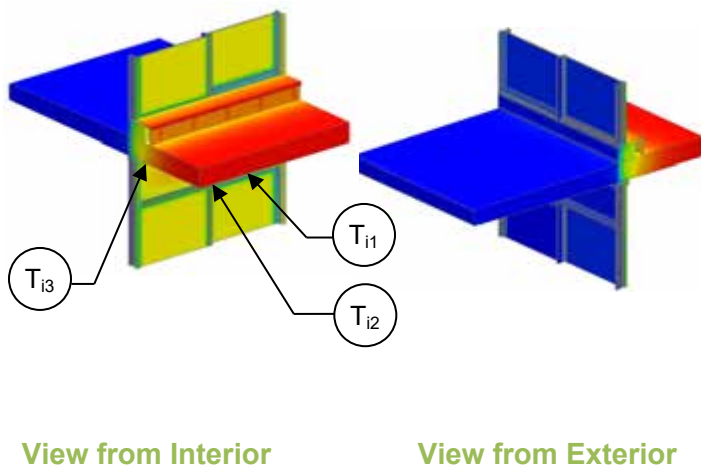
Sill Exterior Insulation 1D R-Value (RSI)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-10 (1.76)	R-3.6 (0.63)	0.279 (1.58)	0.104 (0.180)
R-15 (2.64)	R-3.6 (0.63)	0.278 (1.58)	0.097 (0.169)

### 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

# Detail 9.1.12

## Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb K65-V8 Thermal Break at Concrete Balcony and Curb 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 t = combined glazing + slab
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Scenarios

Scenario	Description
A	Window wall thermal break located at concrete slab, un-insulated glazing frame
B	Window wall thermal break located at Isokorb module, insulated glazing frame

### Assembly Performance Indicators

#### Base Assembly – Glazed Door

Scenario	$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
A	0.321 (1.82)	0.532 (3.02)
B	0.321 (1.82)	0.502 (2.85)

#### Slab Linear Transmittance

Scenario	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi^2$ Btu/ft · hr · °F (W/m K)
A	R-2.0 (0.35)	0.502 (2.85)	0.426 (0.738)
B	R-2.2 (0.38)	0.465 (2.64)	0.343 (0.594)

#### Balcony Only

	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
	R-2.8 (0.50)	0.355 (2.02)
	R-3.5 (0.62)	0.286 (1.62)

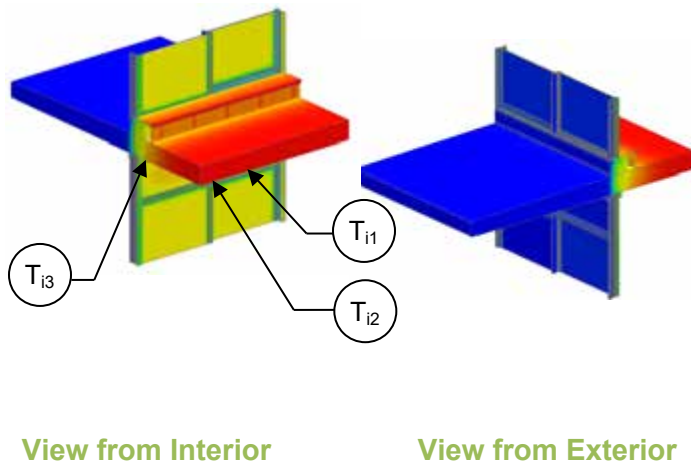
<sup>2</sup>Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

### Temperature Indices

	A	B	
$T_{i1}$	0.19	0.19	Min T on window frame, middle of track at top of door (below slab)
$T_{i2}$	0.51	0.51	Min T on window glass, top middle corner of door glazing (below slab)
$T_{i3}$	0.67	0.78	Min T on slab, along deflection header, on fixed window side

# Detail 9.1.13

## Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb K10-V6 Thermal Break at Concrete Balcony and Curb 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 t = combined glazing + slab
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Scenarios

Scenario	Description
A	Window wall thermal break located at concrete slab, un-insulated glazing frame
B	Window wall thermal break located at Isokorb module, insulated glazing frame

### Assembly Performance Indicators

#### Base Assembly – Glazed Door

Scenario	$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
A	0.321 (1.82)	0.532 (3.02)
B	0.321 (1.82)	0.502 (2.85)

#### Slab Linear Transmittance

Scenario	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi^2$ Btu/ft · hr · °F (W/m K)
A	R-2.0 (0.36)	0.495 (2.81)	0.379 (0.656)
B	R-2.2 (0.39)	0.456 (2.59)	0.283 (0.490)

#### Balcony Only

$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-3.2 (0.56)	0.316 (1.79)
R-4.2 (0.75)	0.236 (1.34)

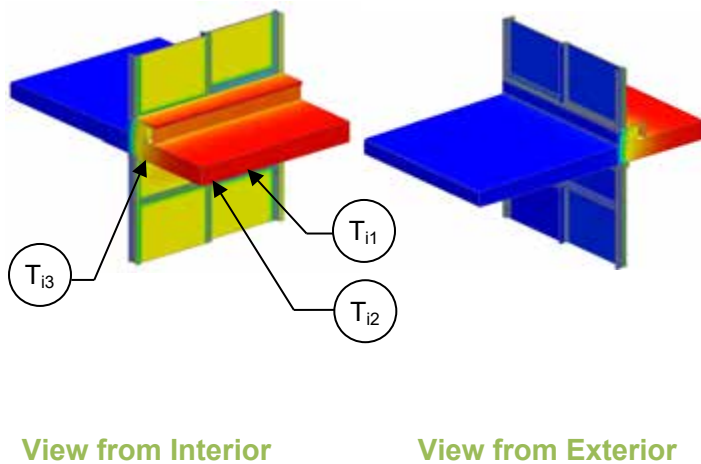
<sup>2</sup>Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

### Temperature Indices

	A	B	
$T_{i1}$	0.19	0.19	Min T on window frame, middle of track at top of door (below slab)
$T_{i2}$	0.51	0.51	Min T on window glass, top middle corner of door glazing (below slab)
$T_{i3}$	0.68	0.80	Min T on slab, along deflection header, on fixed window side

# Detail 9.1.14

## Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb KXT65-V8 Thermal Break at Concrete Balcony and Curb 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 t = combined glazing + slab
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Scenarios

Scenario	Description
A	Window wall thermal break located at concrete slab, un-insulated glazing frame
B	Window wall thermal break located at Isokorb module, insulated glazing frame

### Assembly Performance Indicators

#### Base Assembly – Glazed Door

Scenario	$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
A	0.321 (1.82)	0.532 (3.02)
B	0.321 (1.82)	0.502 (2.85)

#### Slab Linear Transmittance

Scenario	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi^2$ Btu/ft · hr · °F (W/m K)
A	R-2.1 (0.36)	0.485 (2.75)	0.306 (0.530)
B	R-2.2 (0.39)	0.456 (2.59)	0.283 (0.490)

#### Balcony Only

	$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
	R-3.9 (0.69)	0.255 (1.45)
	R-4.2 (0.75)	0.236 (1.34)

<sup>2</sup>Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

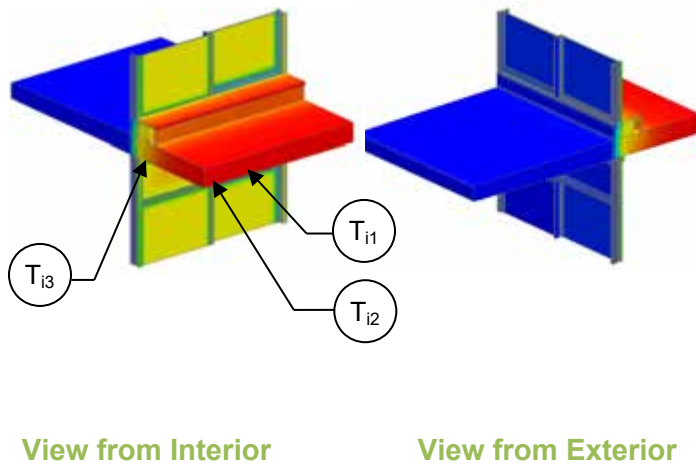
### Temperature Indices

	A	B	
$T_{i1}$	0.19	0.19	Min T on window frame, middle of track at top of door (below slab)
$T_{i2}$	0.51	0.51	Min T on window glass, top middle corner of door glazing (below slab)
$T_{i3}$	0.71	0.79	Min T on slab, along deflection header, on fixed window side



# Detail 9.1.15

## Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb KXT15-V6 Thermal Break at Concrete Balcony and Curb 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 t = combined glazing + slab
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of slab

<sup>1</sup>Assumptions and limitations for surface temperatures identified in ASHRAE 1365-RP

### Scenarios

Scenario	Description
A	Window wall thermal break located at concrete slab, un-insulated glazing frame
B	Window wall thermal break located at Isokorb module, insulated glazing frame

### Assembly Performance Indicators

#### Base Assembly – Glazed Door

Scenario	$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
A	0.321 (1.82)	0.532 (3.02)
B	0.321 (1.82)	0.502 (2.85)

#### Slab Linear Transmittance

Scenario	$R_t$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)	$\psi^2$ Btu/ft · hr · °F (W/m K)
A	R-2.1 (0.37)	0.478 (2.71)	0.256 (0.442)
B	R-2.2 (0.39)	0.448 (2.55)	0.226 (0.392)

#### Balcony Only

$R_s$ ft <sup>2</sup> · hr · °F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> · hr · °F (W/m <sup>2</sup> K)
R-4.7 (0.83)	0.213 (1.21)
R-5.3 (0.93)	0.189 (1.07)

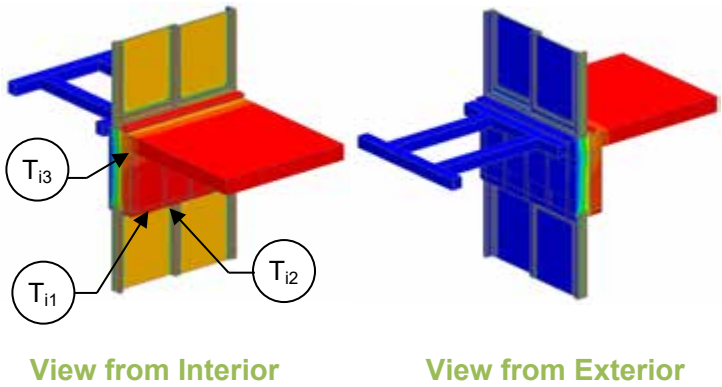
<sup>2</sup>Transmittance not based on an opaque wall clear field value. See Part 1 Dealing with Floor to Floor Glazing.

### Temperature Indices

	A	B	
$T_{i1}$	0.19	0.19	Min T on window frame, middle of track at top of door (below slab)
$T_{i2}$	0.51	0.51	Min T on window glass, top middle corner of door glazing (below slab)
$T_{i3}$	0.73	0.81	Min T on slab, along deflection header, on fixed window side

# Detail 9.1.16

## Exterior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding and Sliding Door – Intermittently Attached Balcony and Sliding Door Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56 RSI) + exterior insulation
Transmittance without Anomaly	$U_g$	U-value for glazed sliding door, including framing
Transmittance / Resistance	$U_t, R_t$	U and R-values for t = combined glazing + slab
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length
Point Transmittance	$\chi$	Incremental increase in transmittance for knife edge penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-42 (7.40)	R-45.2 (7.96)	R-40.0 (7.04)	0.025 (0.14)

#### Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.269 (1.53)	0.329 (1.87)

#### Balcony Transition Transmittance

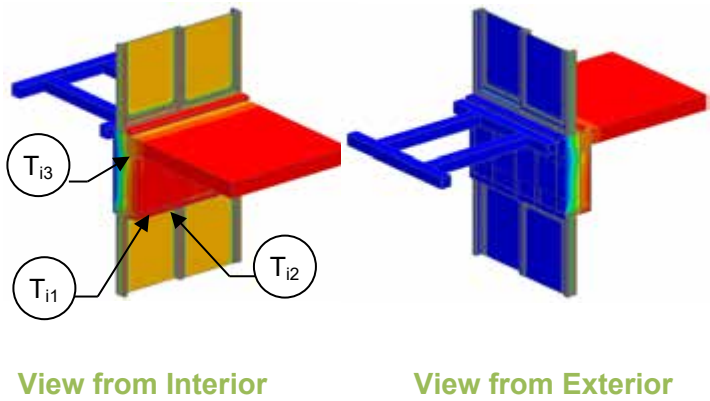
Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_{\text{Door_Head}}$ Btu/ft ·hr ·°F (W/m K)	$\psi_{\text{Door_Sill}}$ Btu/ft ·hr ·°F (W/m K)	$\chi_{\text{KnifeEdge}}$ Btu/hr °F (W/K)
R-42 (7.40)	R-3.8 (0.68)	0.260 (1.48)	0.044 (0.076)	0.024 (0.042)	0.514 (0.271)

### Temperature Indices

	A	
$T_{i1}$	0.48	Min T on window frame, middle of track at top of fixed window (below slab)
$T_{i2}$	0.55	Min T on window glass, top middle corner of door glazing (below slab)
$T_{i3}$	0.79	Min T on sheathing below slab, beside studs along track

# Detail 9.1.17

## Exterior and Interior Insulated 2"x6" Steel Stud (16" o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding with R-19 Batt in Stud Cavity and Sliding Door – Intermittently Attached Balcony and Sliding Door Intersection



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75 RSI) + exterior insulation
Transmittance without Anomaly	$U_g$	U-value for glazed sliding door, including framing
Transmittance / Resistance	$U_t, R_t$	U and R-values for t = combined glazing + slab
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length
Point Transmittance	$\chi$	Incremental increase in transmittance for knife edge penetration

<sup>1</sup>Assumptions 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-42 (7.40)	R-63.3 (11.15)	R-48.3 (8.51)	0.021 (0.12)

#### Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.269 (1.53)	0.329 (1.87)

#### Balcony Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi_{\text{Door_Head}}$ Btu/ft ·hr ·°F (W/m K)	$\psi_{\text{Door_Sill}}$ Btu/ft ·hr ·°F (W/m K)	$\chi_{\text{KnifeEdge}}$ Btu/hr °F (W/K)
R-42 (7.40)	R-3.9 (0.68)	0.258 (1.46)	0.041 (0.071)	0.035 (0.061)	0.495 (0.261)

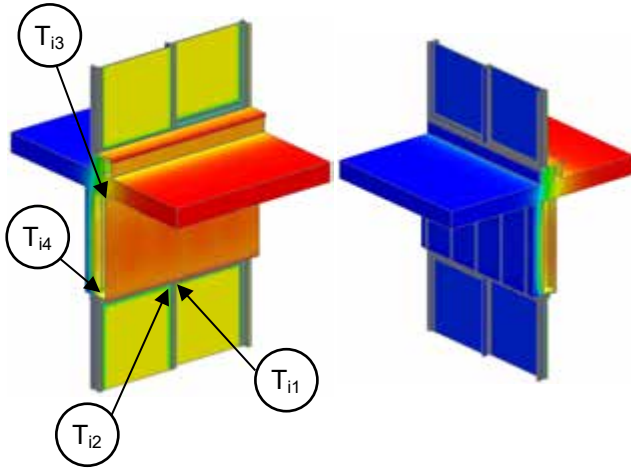
### Temperature Indices

	A	
$T_{i1}$	0.48	Min T on window frame, middle of track at top of fixed window (below slab)
$T_{i2}$	0.55	Min T on window glass, top middle corner of door glazing (below slab)
$T_{i3}$	0.60	Min T on sheathing below slab, beside studs along track

# Detail 9.1.18

## Exterior Insulated 2" x 6" Steel Stud (16" o.c.) Wall Assembly with Vertical Clips (24" o.c.) Supporting Cladding and Sliding Door – Concrete Balcony and Curb Intersection

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o, U_g$	U- and R-value for o = "clear wall" g = glazed sliding door, including framing
Transmittance / Resistance	$U_s, R_s, U_t, R_t$	U and R-values for s = balcony slab + curb t = combined glazing, wall + slab
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-7.4 (1.30)	R-6.9 (1.22)	0.144 (0.82)
R-8.4 (1.48)	R-11.6 (2.04)	R-9.8 (1.72)	0.102 (0.58)
R-12.6 (2.22)	R-15.8 (2.78)	R-12.0 (2.11)	0.083 (0.47)
R-16.8 (2.96)	R-20.0 (3.52)	R-14.5 (2.55)	0.069 (0.39)
R-21.0 (3.70)	R-24.2 (4.26)	R-16.7 (2.95)	0.060 (0.34)

#### Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.552 (3.13)

#### Balcony Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Door Head Btu/ft·hr·°F (W/m K)	$\psi$ Door Sill Btu/ft·hr·°F (W/m K)	$\psi$ Balcony Btu/ft·hr·°F (W/m K)
R-4.2 (0.74)	R-2.3 (0.41)	0.427 (2.43)	0.145 (0.251)	0.065 (0.112)	0.394 (0.682)
R-8.4 (1.48)	R-2.4 (0.42)	0.415 (2.35)	0.161 (0.279)		0.444 (0.769)
R-12.6 (2.22)	R-2.4 (0.43)	0.409 (2.32)	0.154 (0.267)		0.477 (0.825)
R-16.8 (2.96)	R-2.5 (0.44)	0.404 (2.30)	0.176 (0.305)		0.475 (0.822)
R-21.0 (3.70)	R-2.5 (0.44)	0.401 (2.28)	0.181 (0.313)		0.483 (0.836)

#### Balcony Only

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-3.0 (0.52)	0.338 (1.92)
R-2.6 (0.46)	0.381 (2.16)
R-2.4 (0.43)	0.409 (2.32)
R-2.5 (0.43)	0.407 (2.31)
R-2.4 (0.43)	0.414 (2.35)

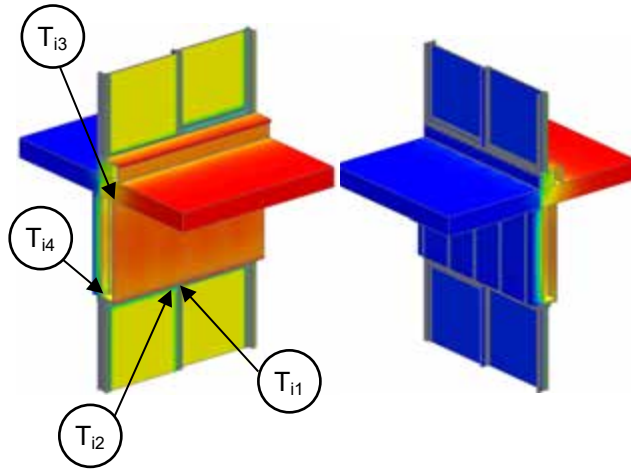
### Temperature Indices

	R4.2	R8.4	R12.6	R16.8	R21.0	
$T_{i1}$	0.13	0.13	0.13	0.13	0.13	Min T on window frame at centre mullion of sliding door
$T_{i2}$	0.44	0.44	0.44	0.44	0.44	Min T on window glass at 30 mm away from sight edge at fixed glazing
$T_{i3}$	0.75	0.72	0.73	0.74	0.75	Min T on slab at wall ceiling
$T_{i4}$	0.50	0.48	0.49	0.50	0.50	Min T on sheathing at sliding door head

# Detail 9.1.19

## Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c.) Wall Assembly with Vertical Clips (24" o.c.) Supporting Cladding with R-19 Batt in Stud Cavity and Sliding Door – Concrete Balcony and Curb Intersection

### Thermal Performance Indicators



View from Interior

View from Exterior

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o, U_g$	U- and R-value for o = "clear wall" g = glazed sliding door, including framing
Transmittance / Resistance	$U_s, R_s, U_t, R_t$	U and R-values for s = balcony slab + curb t = combined glazing, wall + slab
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-25.5 (4.49)	R-15.2 (2.67)	0.066 (0.37)
R-8.4 (1.48)	R-29.7 (5.23)	R-17.7 (3.12)	0.056 (0.32)
R-12.6 (2.22)	R-33.9 (5.97)	R-19.8 (3.48)	0.051 (0.29)
R-16.8 (2.96)	R-38.1 (6.71)	R-22.3 (3.92)	0.045 (0.26)
R-21.0 (3.70)	R-42.3 (7.45)	R-24.5 (4.32)	0.041 (0.23)

#### Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.552 (3.13)

#### Balcony Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ Door Head Btu/ft ·hr ·°F (W/m K)	$\Psi$ Door Sill Btu/ft ·hr ·°F (W/m K)	$\Psi$ Balcony Btu/ft ·hr ·°F (W/m K)
R-4.2 (0.74)	R-2.5 (0.44)	0.400 (2.27)	0.159 (0.276)	0.065 (0.112)	0.466 (0.807)
R-8.4 (1.48)	R-2.5 (0.44)	0.396 (2.25)	0.159 (0.275)		0.464 (0.804)
R-12.6 (2.22)	R-2.5 (0.45)	0.393 (2.23)	0.151 (0.262)		0.471 (0.815)
R-16.8 (2.96)	R-2.6 (0.45)	0.390 (2.28)	0.162 (0.280)		0.458 (0.793)
R-21.0 (3.70)	R-2.6 (0.45)	0.389 (2.21)	0.163 (0.282)		0.458 (0.793)

#### Balcony Only

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-2.5 (0.44)	0.399 (2.27)
R-2.5 (0.44)	0.398 (2.26)
R-2.5 (0.44)	0.404 (2.29)
R-2.5 (0.45)	0.393 (2.23)
R-2.5 (0.45)	0.393 (2.23)

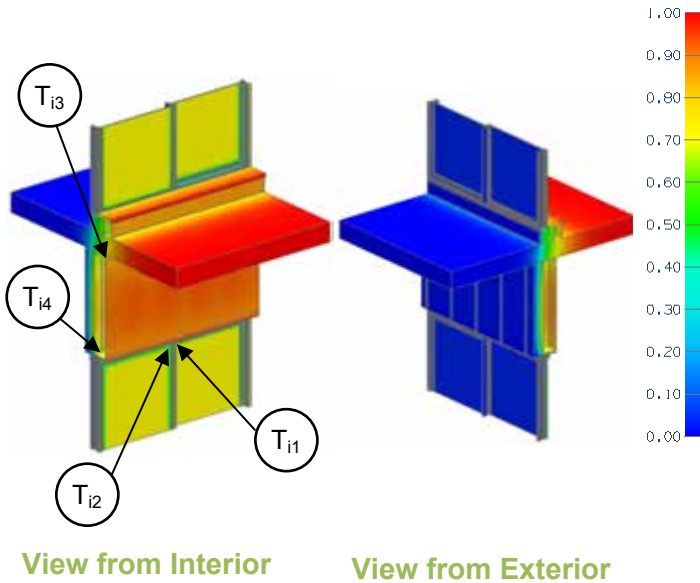
### Temperature Indices

	R4.2	R8.4	R12.6	R16.8	R21.0	
$T_{i1}$	0.13	0.13	0.13	0.13	0.13	Min T on window frame at centre mullion of sliding door
$T_{i2}$	0.43	0.43	0.43	0.43	0.43	Min T on window glass at 30 mm away from sight edge at fixed glazing
$T_{i3}$	0.71	0.69	0.70	0.71	0.71	Min T on slab at wall ceiling
$T_{i4}$	0.41	0.39	0.40	0.40	0.41	Min T on sheathing at sliding door head

# Detail 9.1.20

## Exterior Insulated 2" x 6" Steel Stud (16" o.c.) Wall Assembly with Vertical Clips (24" o.c.) Supporting Cladding and Sliding Door – Structural Thermal Break at Concrete Balcony and Curb Intersection

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.2 (0.56 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o, U_g$	U- and R-value for o = "clear wall" g = glazed sliding door, including framing
Transmittance / Resistance	$U_s, R_s, U_t, R_t$	U and R-values for s = balcony slab + curb t = combined glazing, wall + slab
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

View from Interior      View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-7.4 (1.30)	R-6.9 (1.22)	0.144 (0.82)
R-8.4 (1.48)	R-11.6 (2.04)	R-9.8 (1.72)	0.102 (0.58)
R-12.6 (2.22)	R-15.8 (2.78)	R-12.0 (2.11)	0.083 (0.47)
R-16.8 (2.96)	R-20.0 (3.52)	R-14.5 (2.55)	0.069 (0.39)
R-21.0 (3.70)	R-24.2 (4.26)	R-16.7 (2.95)	0.060 (0.34)

#### Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.552 (3.13)

#### Balcony Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Door Head Btu/ft ·hr ·°F (W/m K)	$\psi$ Door Sill Btu/ft ·hr ·°F (W/m K)	$\psi$ Balcony Btu/ft ·hr ·°F (W/m K)
R-4.2 (0.74)	R-2.5 (0.44)	0.399 (2.26)	0.145 (0.251)	0.065 (0.112)	0.094 (0.163)
R-8.4 (1.48)	R-2.6 (0.46)	0.386 (2.19)	0.161 (0.279)		0.144 (0.249)
R-12.6 (2.22)	R-2.6 (0.46)	0.382 (2.17)	0.154 (0.267)		0.193 (0.333)
R-16.8 (2.96)	R-2.6 (0.47)	0.378 (2.15)	0.176 (0.305)		0.200 (0.346)
R-21.0 (3.70)	R-2.7 (0.47)	0.376 (2.14)	0.181 (0.313)		0.218 (0.377)

#### Balcony Only

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-12.4 (2.18)	0.081 (0.46)
R-8.1 (1.43)	0.123 (0.70)
R-6.1 (1.07)	0.165 (0.94)
R-5.8 (1.03)	0.171 (0.97)
R-5.4 (0.94)	0.187 (1.06)

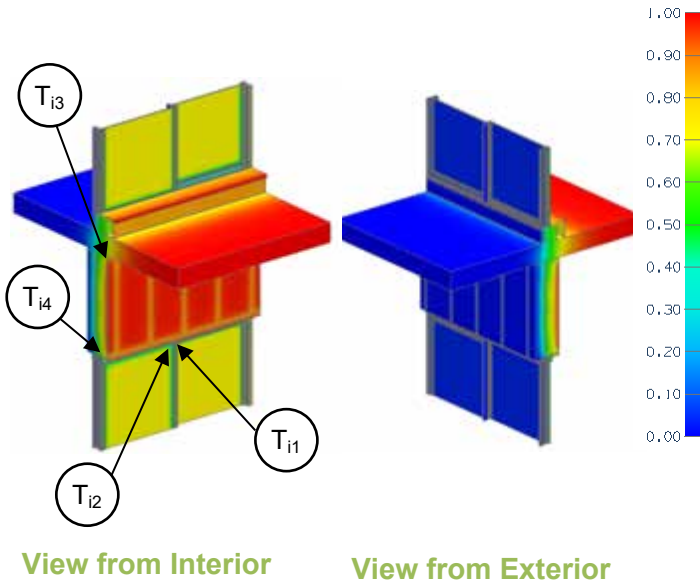
### Temperature Indices

	R4.2	R8.4	R12.6	R16.8	R21.0	
$T_{i1}$	0.13	0.13	0.13	0.13	0.13	Min T on window frame at centre mullion of sliding door
$T_{i2}$	0.44	0.44	0.44	0.44	0.44	Min T on window glass at 30 mm away from sight edge at fixed glazing
$T_{i3}$	0.84	0.84	0.84	0.84	0.84	Min T on slab at wall ceiling
$T_{i4}$	0.50	0.48	0.49	0.50	0.50	Min T on sheathing at sliding door head

# Detail 9.1.21

## Exterior and Interior Insulated 2" x 6" Steel Stud (16" o.c.) Wall Assembly with Vertical Clips (24" o.c.) Supporting Cladding with R-19 Batt in Stud Cavity and Sliding Door – Structural Thermal Break at Concrete Balcony and Curb Intersection

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-21.3 (3.75 RSI) + exterior insulation
Transmittance / Resistance without Anomaly	$U_o, R_o, U_g$	U- and R-value for o = "clear wall" g = glazed sliding door, including framing
Transmittance / Resistance	$U_s, R_s, U_t, R_t$	U and R-values for s = balcony slab + curb t = combined glazing, wall + slab
Surface Temperature Index	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length

View from Interior

View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Wall

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-4.2 (0.74)	R-25.5 (4.49)	R-15.2 (2.67)	0.066 (0.37)
R-8.4 (1.48)	R-29.7 (5.23)	R-17.7 (3.12)	0.056 (0.32)
R-12.6 (2.22)	R-33.9 (5.97)	R-19.8 (3.48)	0.051 (0.29)
R-16.8 (2.96)	R-38.1 (6.71)	R-22.3 (3.92)	0.045 (0.26)
R-21.0 (3.70)	R-42.3 (7.45)	R-24.5 (4.32)	0.041 (0.23)

#### Base Assembly – Glazed Door

$U_{\text{centre of glass}}$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.552 (3.13)

#### Balcony Transition Transmittance

Exterior Insulation 1D R-Value (RSI)	$R_t$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_t$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\Psi$ Door Head Btu/ft ·hr ·°F (W/m K)	$\Psi$ Door Sill Btu/ft ·hr ·°F (W/m K)	$\Psi$ Balcony Btu/ft ·hr ·°F (W/m K)
R-4.2 (0.74)	R-2.7 (0.47)	0.375 (2.13)	0.159 (0.276)	0.065 (0.112)	0.201 (0.347)
R-8.4 (1.48)	R-2.7 (0.47)	0.371 (2.11)	0.159 (0.275)		0.199 (0.344)
R-12.6 (2.22)	R-2.7 (0.48)	0.369 (2.10)	0.151 (0.262)		0.218 (0.377)
R-16.8 (2.96)	R-2.7 (0.48)	0.368 (2.09)	0.162 (0.280)		0.218 (0.378)
R-21.0 (3.70)	R-2.7 (0.48)	0.367 (2.08)	0.163 (0.282)		0.224 (0.388)

#### Balcony Only

$R_s$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_s$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-5.8 (1.02)	0.172 (0.98)
R-5.9 (1.03)	0.171 (0.97)
R-5.4 (0.94)	0.187 (1.06)
R-5.3 (0.94)	0.187 (1.06)
R-5.2 (0.92)	0.192 (1.09)

### Temperature Indices

	R4.2	R8.4	R12.6	R16.8	R21.0	
$T_{i1}$	0.13	0.13	0.13	0.13	0.13	Min T on window frame at centre mullion of sliding door
$T_{i2}$	0.43	0.43	0.43	0.43	0.43	Min T on window glass at 30 mm away from sight edge at fixed glazing
$T_{i3}$	0.82	0.82	0.82	0.82	0.82	Min T on slab at wall ceiling
$T_{i4}$	0.41	0.37	0.40	0.40	0.41	Min T on sheathing at sliding door head

## 10.0 Roofs



<b>Detail 10.1.1</b> .....	<b>B.10.1</b>
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (12" o.c.) Supporting Standing Seam Metal Roof – Clear Roof	
<b>Detail 10.1.2</b> .....	<b>B.10.2</b>
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24" o.c.) Supporting Standing Seam Metal Roof – Clear Roof	
<b>Detail 10.1.3</b> .....	<b>B.10.3</b>
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (36" o.c.) Supporting Standing Seam Metal Roof – Clear Roof	
<b>Detail 10.1.4</b> .....	<b>B.10.4</b>
Insulated Sheet Steel Roof Supported by Thermal Chairs – Baseline System – Clear Roof	
<b>Detail 10.1.5</b> .....	<b>B.10.5</b>
Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Scenarios – Clear Roof	
<b>Detail 10.1.6</b> .....	<b>B.10.6</b>
Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Insulation Type Scenarios – Clear Roof	
<b>Detail 10.1.7</b> .....	<b>B.10.7</b>
Insulated Standing Seam Roof Supported by Thermal Chairs – Clear Wall	
<b>Detail 10.1.8</b> .....	<b>B.10.8</b>
Standing Seam Roof with Draped Insulation – Clear Wall	
<b>Detail 10.1.9</b> .....	<b>B.10.9</b>
Exterior Insulated Low Sloped Roof (3.4 fasteners/m <sup>2</sup> , 0.3 fasteners/ft <sup>2</sup> ) – Clear Roof Assembly	
<b>Detail 10.1.10</b> .....	<b>B.10.10</b>
Exterior Insulated Sloped Metal Roof with Bearing Plates 18" x 48" spacing – Clear Roof Assembly	
<b>Detail 10.1.11</b> .....	<b>B.10.11</b>
Exterior Insulated Sloped Metal Roof with High Compressive Strength Mineral Wool Insulation and with Bearing Plates 18" x 48" spacing – Clear Roof Assembly	
<b>Detail 10.1.12</b> .....	<b>B.10.12</b>
Ventilated Wood Frame Low Sloped Roof – Clear Roof Assembly	
<b>Detail 10.1.13</b> .....	<b>B.10.13</b>
Exterior Insulated Low Sloped Roof (10.8 fasteners/m <sup>2</sup> , 1 fasteners/ft <sup>2</sup> )– Clear Roof Assembly	
<b>Detail 10.1.14</b> .....	<b>B.10.14</b>
Sloped Wood Framed Roof with Insulation at Ceiling	

<b>Detail 10.1.15</b> .....	<b>B.10.15</b>
Sloped Wood Framed Roof with Insulation at Roof Sheathing	
<b>Detail 10.1.16</b> .....	<b>B.10.16</b>
Exterior Insulated Low Sloped Roof with Fully Adhered Roof Membrane and Mineral Wool Insulation – Clear Roof Assembly	
<b>Detail 10.1.17</b> .....	<b>B.10.17</b>
Exterior Insulated Low Sloped Roof with Fully Adhered Roof Membrane and Mineral Wool and Polyisocyanurate Insulation – Clear Roof Assembly	
<b>Detail 10.2.1</b> .....	<b>B.10.18</b>
Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24” o.c.) Supporting Metal Roof – Ridge Intersection	
<b>Detail 10.2.2</b> .....	<b>B.10.19</b>
Insulated Concrete Slab – Concrete Curb or Wall Intersection	
<b>Detail 10.2.3</b> .....	<b>B.10.20</b>
Owens Corning Insulated Projected Membrane Roof – Floating Concrete Wall Intersection	
<b>Detail 10.2.4</b> .....	<b>21</b>
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	
<b>Detail 10.2.5</b> .....	<b>B.10.22</b>
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	
<b>Detail 10.2.6</b> .....	<b>B.10.23</b>
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	
<b>Detail 10.2.7</b> .....	<b>B.10.24</b>
Aluminum Framed Double Glazed Skylight – Exterior Insulated Concrete Curb Intersection	
<b>Detail 10.3.1</b> .....	<b>B.10.25</b>
Exterior Insulated Conventional Flat Roof – Roof Anchor	
<b>Detail 10.3.2</b> .....	<b>B.10.26</b>
Exterior Insulated Conventional Flat Roof – Armatherm Thermal Break under Roof Anchor	
<b>Detail 10.3.3</b> .....	<b>B.10.27</b>
Exterior Insulated Conventional Low-Sloped Roof – Roof Anchor	

**Detail 10.3.4** .....**B.10.28**  
Exterior Insulated Conventional Low-Sloped Roof – Thermal Break in Roof Anchor

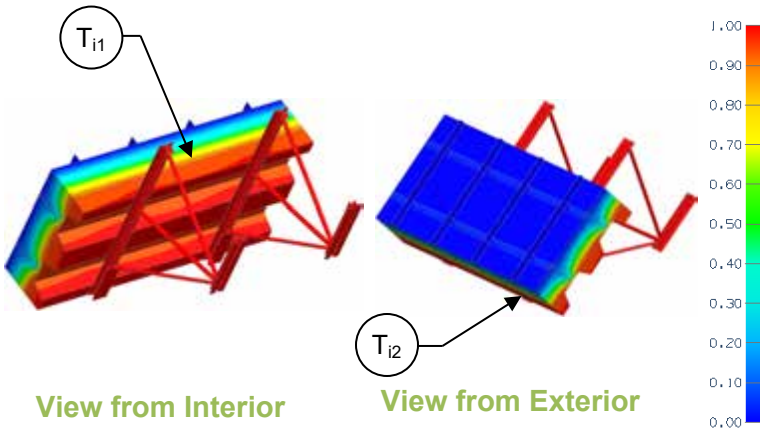
**Detail 10.4.1** .....**B.10.29**  
Exterior Insulated Low Sloped Roof with Fully Adhered Roof Membrane and Mineral Wool Insulation - Flange-Style Drain Penetration

**Detail 10.4.2** .....**B.10.30**  
Exterior Insulated Low Sloped Roof with Fully Adhered Roof Membrane and Mineral Wool and Polyisocyanurate Insulation - Flange-Style Drain Penetration



# Detail 10.1.1

## 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-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear field" U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Surface 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

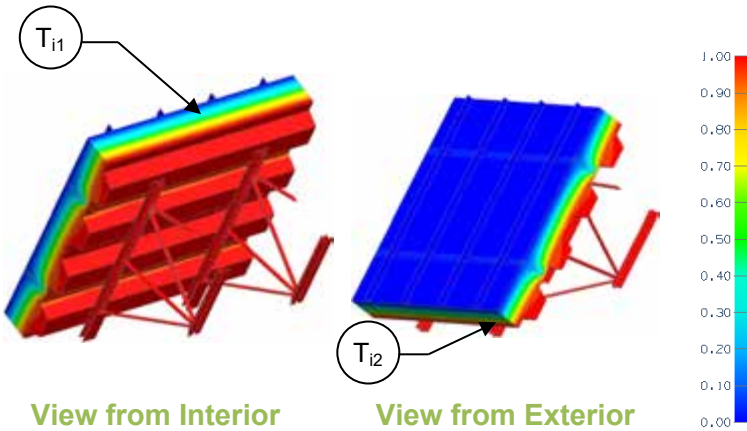
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-23 (4.05)	R-7.0 (1.24)	0.142 (0.81)
R-30 (5.28)	R-33 (5.81)	R-8.0 (1.41)	0.125 (0.71)
R-40 (7.04)	R-43 (7.57)	R-8.9 (1.56)	0.113 (0.64)

### 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 10.1.2

## 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-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	"clear field" U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Surface 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-23 (4.05)	R-10.6 (1.87)	0.094 (0.53)
R-30 (5.28)	R-33 (5.81)	R-12.8 (2.25)	0.078 (0.44)
R-40 (7.04)	R-43 (7.57)	R-14.7 (2.58)	0.068 (0.39)

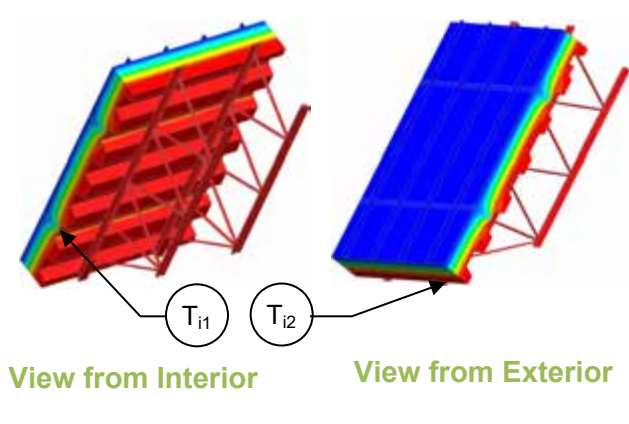
### Temperature Indices

	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 10.1.3

## 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-3.0 (0.53 RSI) + exterior insulation
Transmittance / Resistance	$U_o, R_o$	“clear field” U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Surface 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

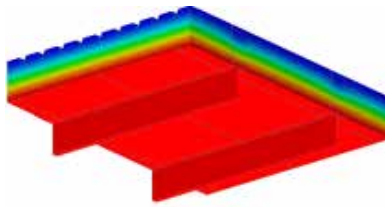
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-23 (4.05)	R-12.7 (2.25)	0.078 (0.45)
R-30 (5.28)	R-33 (5.81)	R-15.8 (2.79)	0.063 (0.36)
R-40 (7.04)	R-43 (7.57)	R-18.5 (3.25)	0.054 (0.31)

### Temperature Indices

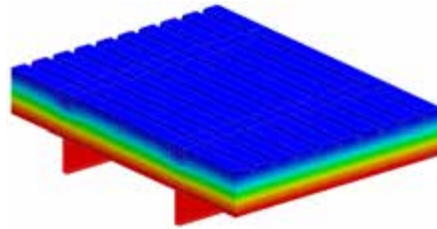
	R20	R30	R40	
$T_{i1}$	0.90	0.91	0.92	Min T on sheathing, at girt between joists
$T_{i2}$	0.97	0.98	0.98	Max T on sheathing, above end bearings away from girts

# Detail 10.1.4

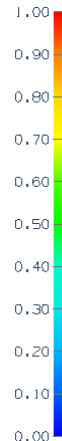
## Insulated Sheet Steel Roof Supported by Thermal Chairs – Baseline System – Clear Roof



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” $U$ - and R-value

### Nominal (1D) vs. Assembly Performance Indicators

#### Baseline System

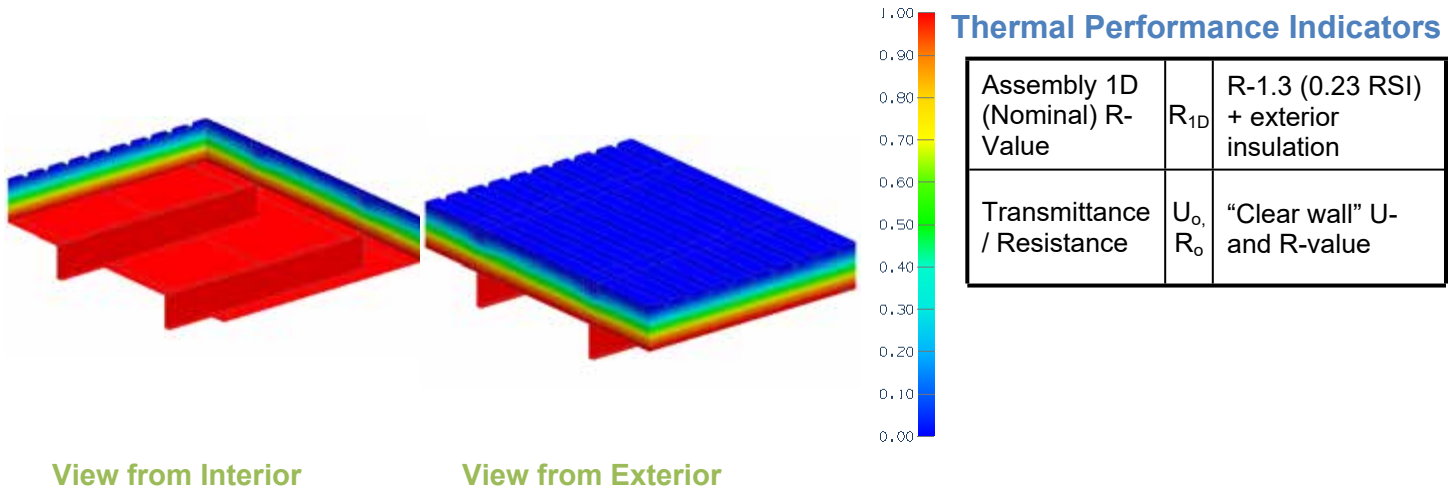
Chair Spacing (in)	Purlin Spacing (in)	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
24	48	R-45 (7.95)	R-46.3 (8.15)	R-30.5 (5.38)	0.033 (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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	Liner		Cladding		Chair		Purlins	
			$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 10.1.5

### Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Scenarios – Clear Roof



### 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

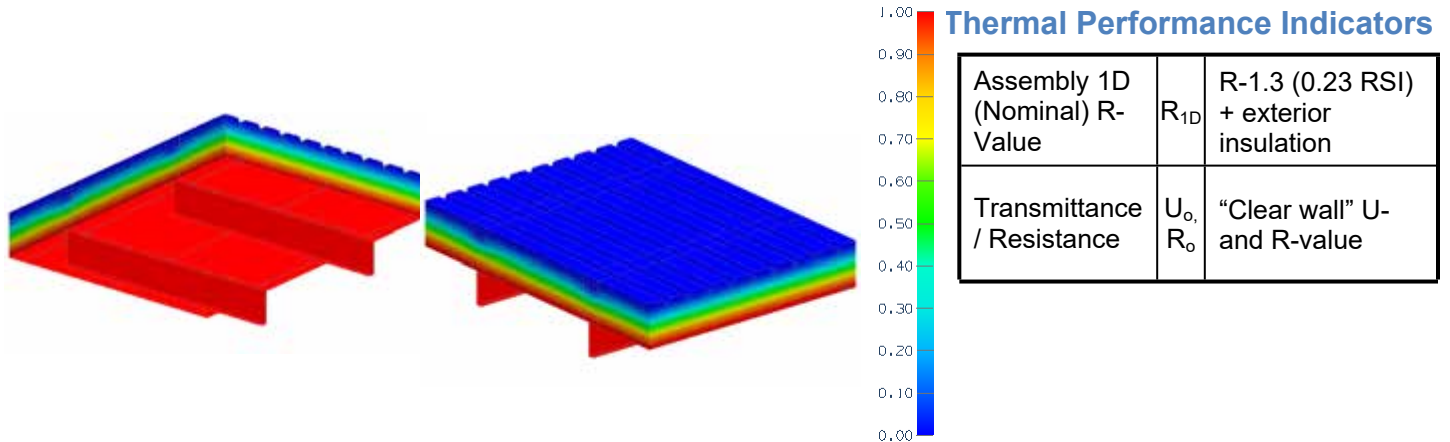
#### Sensitivity Analysis – Reduction in Thermal Chair area for 36”o.c. Chair Spacing and 48”o.c. Purlin Spacing

Thermal Chair Material	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 10.1.6

## Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Insulation Type Scenarios – Clear Roof



View from Interior

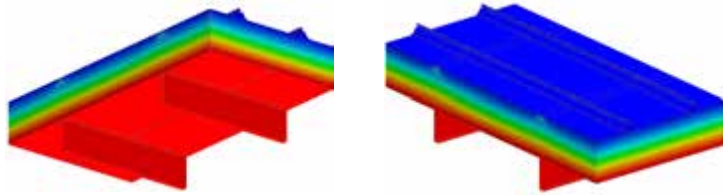
View from Exterior

### 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	Exterior Insulation 1D R-Value (RSI)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	Exterior Insulation 1D R-Value (RSI)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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)

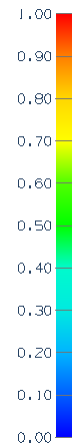
## Detail 10.1.7 | Insulated Standing Seam Roof Supported by Thermal Chairs – Clear Wall



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

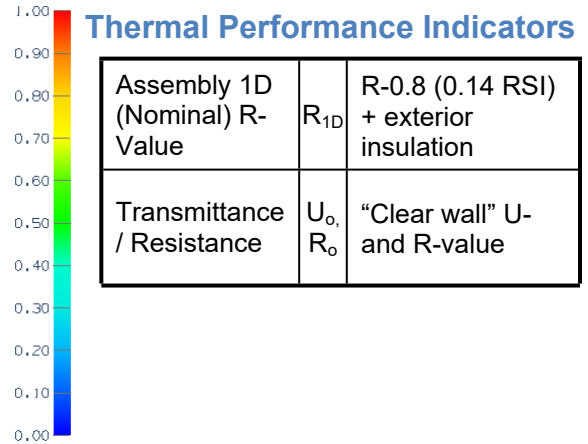
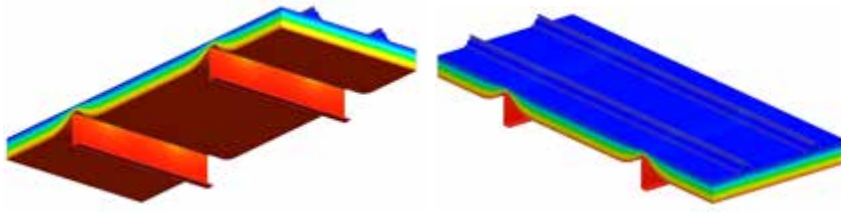
### Scenario

Scenario	Insulation Placement
A	Compressed R-19 batt between and over hat tracks
B	Compressed R-19 batt between and over hat tracks with 1” XPS thermal block
C	Compressed R-19 batt between hat tracks
D	Mineral Wool between hat tracks, no compressed insulation over hat tracks

### Nominal (1D) vs. Assembly Performance Indicators

Scenario	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
A	R-57.6 (10.1)	R-58.9 (10.33)	R-33.4 (5.87)	0.030 (0.170)
B	R-57.6 (10.1)	R-58.9 (10.33)	R-36.4 (6.40)	0.028 (0.156)
C	R-57.6 (10.1)	R-58.9 (10.33)	R-31.7 (5.59)	0.032 (0.179)
D	R-51.2 (9.0)	R-58.9 (10.33)	R-32.4 (5.71)	0.031 (0.175)

# Detail 10.1.8 Standing Seam Roof with Draped Insulation – Clear Wall



View from Interior

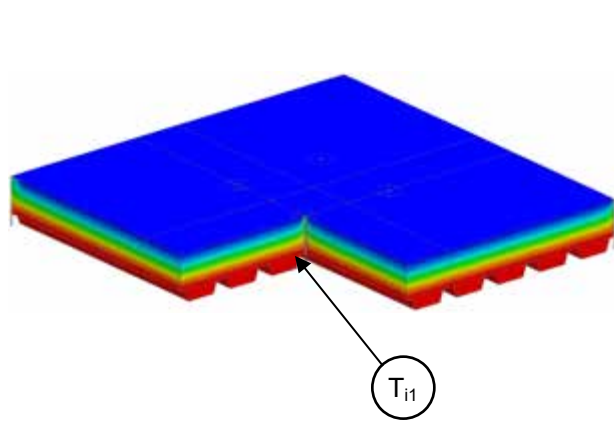
View from Exterior

## Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-19 (3.35)	R-19.8 (3.49)	R-15.7(2.77)	0.064 (0.361)

# Detail 10.1.9

## Exterior Insulated Low Sloped Roof (3.4 fasteners/m<sup>2</sup>, 0.3 fasteners/ft<sup>2</sup>) – Clear Roof Assembly



View from Exterior



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.6 (0.46 RSI) + Insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear wall” U- and R-value, without fastener
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for fasteners

<sup>1</sup>Surface 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	Fastener Size
A	Fully Fastened	#10
B	Fully Fastened	#14
C	Partially Fastened	#10
D	Partially Fastened	#14
E	Fully Adhered	-
F	Fully Fastened	#14
G	Fully Fastened	#14

### Nominal (1D) vs. Assembly Performance Indicators

	Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr·°F Hey (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
A	R-22.8 (4.02)	R-25.4 (4.48)	R-24.8 (4.36)	0.040 (0.23)	R-23.6 (4.16)	0.042 (0.24)	0.006 (0.003)
B	R-22.8 (4.02)	R-25.4 (4.48)	R-24.8 (4.36)	0.040 (0.23)	R-22.4 (3.95)	0.045 (0.25)	0.013 (0.007)
C	R-22.8 (4.02)	R-25.4 (4.48)	R-24.8 (4.36)	0.040 (0.23)	R-24.5 (4.32)	0.041 (0.23)	0.001 (0.001)
D	R-22.8 (4.02)	R-25.4 (4.48)	R-24.8 (4.36)	0.040 (0.23)	R-24.4 (4.30)	0.041 (0.23)	0.002 (0.001)
E	R-22.8 (4.02)	R-25.4 (4.48)	R-24.8 (4.36)	0.040 (0.23)	R-24.8 (4.36)	0.040 (0.23)	-
F	R-28.5 (5.02)	R-31.1 (5.48)	R-30.5 (5.36)	0.033 (0.19)	R-27.3 (4.81)	0.037 (0.21)	0.012 (0.006)
G	R-39.9 (7.03)	R-42.5 (7.49)	R-41.9 (7.37)	0.024 (0.14)	R-36.9 (6.50)	0.027 (0.15)	0.010 (0.005)

### Temperature Indices

	A	B	C	D	E	F	G	
$T_{i1}$	0.95	0.94	0.96	0.96	0.97	0.94	0.96	At fastener penetration through steel deck

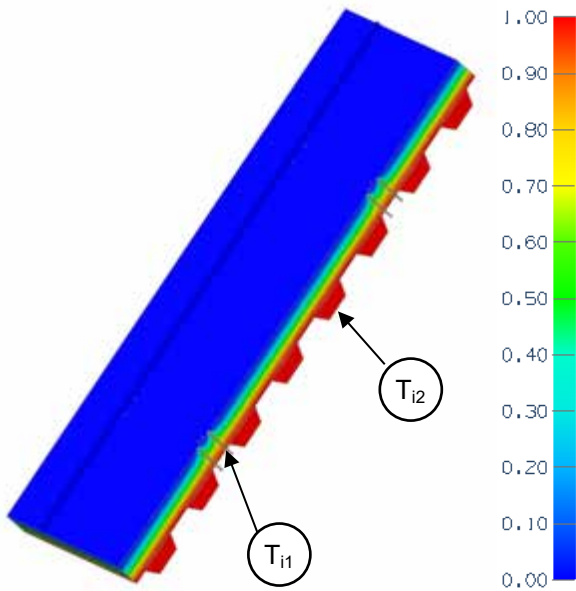
# Detail 10.1.10

## Exterior Insulated Sloped Metal Roof with Bearing Plates 18" x 48" spacing – Clear Roof Assembly

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-8.3 (1.44 RSI) + Insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value, without fastener
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for bearing plate with two fasteners

<sup>1</sup>Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.



### View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-22.8 (4.02)	R-31.1 (5.48)	R-28.2 (4.97)	0.035 (0.20)	R-27.3 (4.81)	0.037 (0.21)	0.0074 (0.0039)
R-34.2 (6.02)	R-42.5 (7.49)	R-39.8 (7.00)	0.025 (0.14)	R-37.8 (6.67)	0.026 (0.15)	0.0076 (0.0040)
R-45.6 (8.03)	R-53.9 (9.49)	R-51.1 (9.00)	0.020 (0.11)	R-48.3 (8.50)	0.021 (0.12)	0.0069 (0.0036)

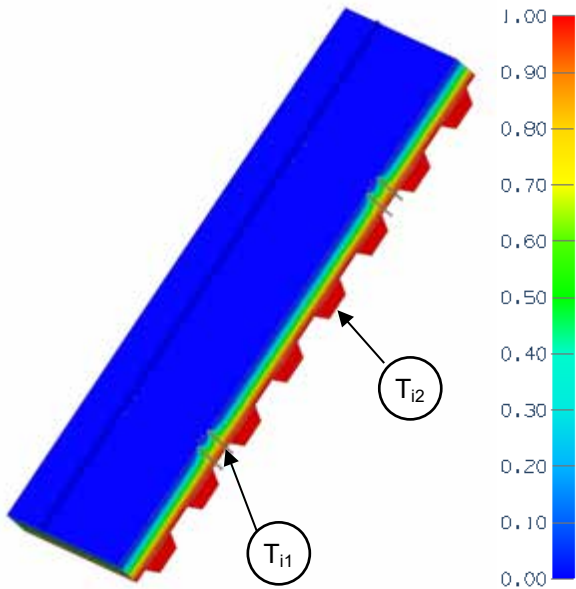
### Temperature Indices

	R22.8	R34.2	R45.6	
$T_{i1}$	0.95	0.96	0.97	Min T on steel deck, at fasteners
$T_{i2}$	0.97	0.98	0.99	Max T on steel deck, between fasteners

# Detail 10.1.11

## Exterior Insulated Sloped Metal Roof with High Compressive Strength Mineral Wool Insulation and with Bearing Plates 18" x 48" spacing – Clear Roof Assembly

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-7.3 (1.27 RSI) + Insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear wall" U- and R-value, without fastener
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for bearing plate with two fasteners

<sup>1</sup>Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

### View from Exterior

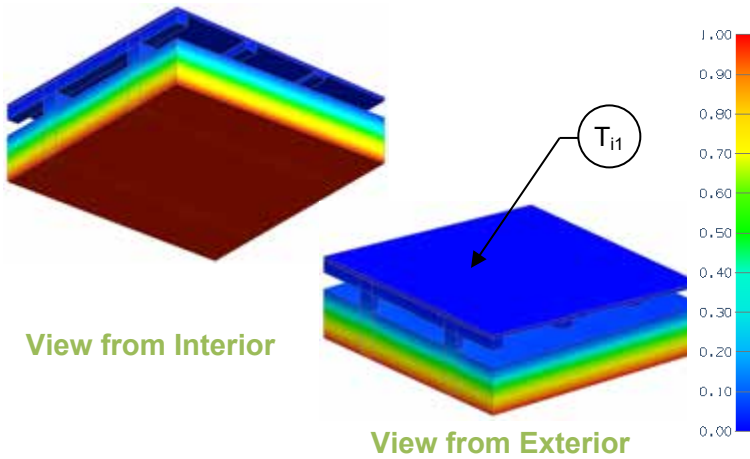
### Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-15.2 (2.68)	R-22.5 (3.96)	R-19.7 (3.47)	0.051 (0.29)	R-19.1 (3.37)	0.052 (0.30)	0.0084 (0.0044)
R-22.8 (4.02)	R-30.1 (5.3)	R-27.4 (4.82)	0.037 (0.21)	R-26.4 (4.64)	0.038 (0.22)	0.0086 (0.0045)
R-30.4 (5.35)	R-37.7 (6.64)	R-34.9 (6.15)	0.029 (0.16)	R-33.5 (5.89)	0.030 (0.17)	0.0077 (0.0040)

### Temperature Indices

	R15.2	R22.8	R30.4	
$T_{i1}$	0.937	0.949	0.955	Min T on steel deck, at fasteners
$T_{i2}$	0.963	0.973	0.979	Max T on steel deck, between fasteners

# Detail 10.1.12 | Ventilated Wood Frame Low Sloped Roof – Clear Roof Assembly



## Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.1 (0.54 RSI) + roof insulation
Transmittance / Resistance	$U_o, R_o$	“clear field” U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Surface 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

Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-20.0 (3.52)	R-23.1 (4.06)	R-22.1 (3.89)	0.045 (0.26)
R-30.0 (5.28)	R-33.1 (5.83)	R-31.8 (5.59)	0.031 (0.18)
R-40.0 (7.04)	R-43.1 (7.59)	R-40.9 (7.20)	0.024 (0.14)

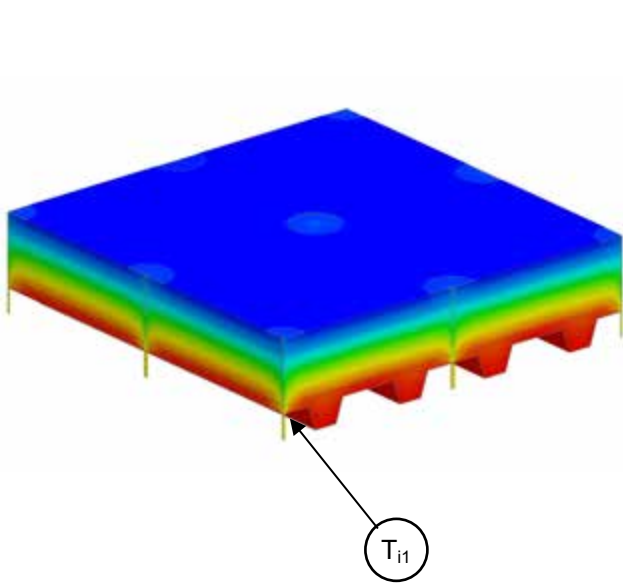
## Temperature Indices

	R20	R30	R40	
$T_{it}$	0.05	0.03	0.03	Min T on roof sheathing, between joists above wood truss

# Detail 10.1.13

## Exterior Insulated Low Sloped Roof (10.8 fasteners/m<sup>2</sup>, 1 fasteners/ft<sup>2</sup>)– Clear Roof Assembly

### Thermal Performance Indicators



Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.6 (0.46 RSI) + Insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear wall” U- and R-value, without fastener
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for fasteners

<sup>1</sup>Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

### View from Exterior

### Nominal (1D) vs. Assembly Performance Indicators

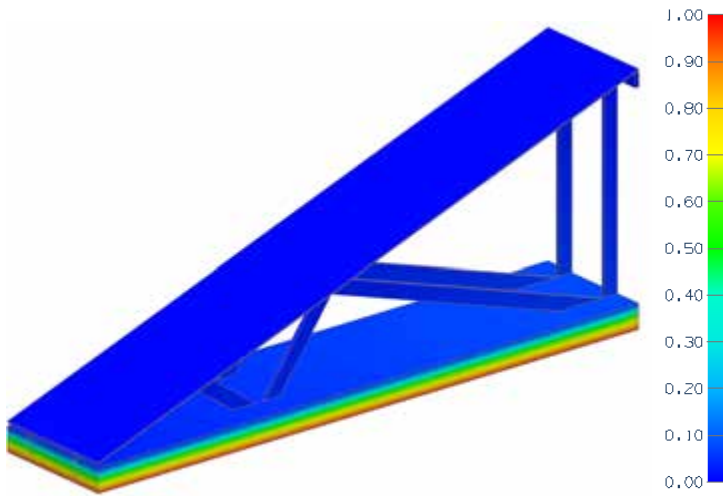
Exterior Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-22.8 (4.02)	R-25.8 (4.55)	R-24.8 (4.36)	0.040 (0.23)	R-18.0 (3.18)	0.055 (0.31)	0.015 (0.008)
R-28.5 (5.02)	R-31.5 (5.55)	R-30.5 (5.36)	0.033 (0.19)	R-21.6 (3.80)	0.046 (0.26)	0.013 (0.007)
R-39.9 (7.03)	R-42.9 (7.56)	R-41.9 (7.37)	0.024 (0.14)	R-28.6 (5.04)	0.035 (0.20)	0.011 (0.006)

### Temperature Indices

	R22.8	R28.5	R39.9	
$T_{i1}$	0.92	0.93	0.94	At fastener penetration through steel deck



# Detail 10.1.14 | Sloped Wood Framed Roof with Insulation at Ceiling



View from Exterior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.4 (0.60 RSI) + roof insulation
Transmittance / Resistance	$U_o$ , $R_o$	“clear roof” U- and R-value

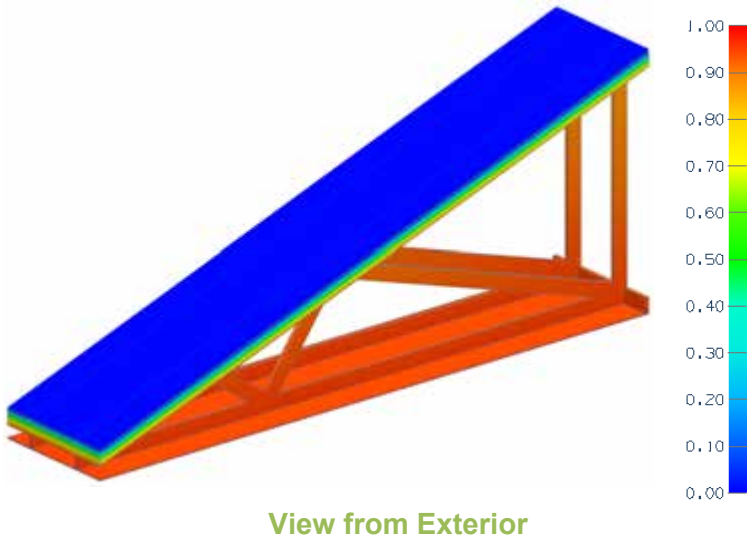
### Nominal (1D) vs. Assembly Performance Indicators

Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-30 (5.28)	R-33.4 (5.88)	R-31.5 (5.55)	0.032 (0.18)

# Detail 10.1.15 | Sloped Wood Framed Roof with Insulation at Roof Sheathing

## Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.4 (0.60 RSI) + roof insulation
Transmittance / Resistance	$U_o$ , $R_o$	"clear roof" U- and R-value

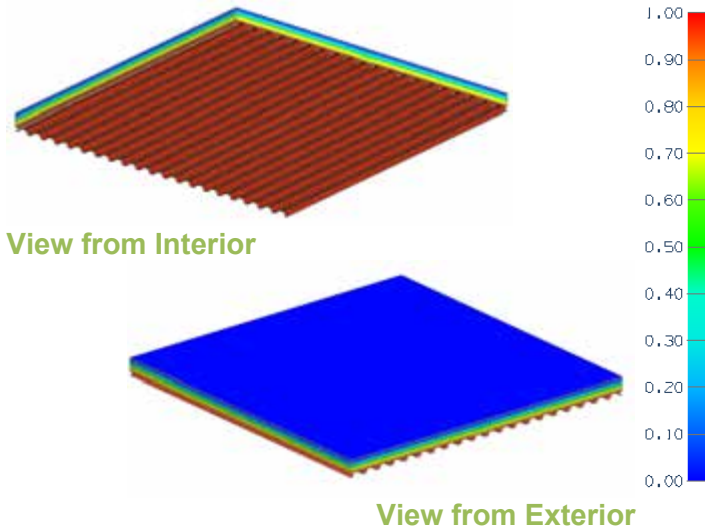


## Nominal (1D) vs. Assembly Performance Indicators

Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-30 (5.28)	R-33.4 (5.88)	R-27.0 (4.76)	0.037 (0.21)

# Detail 10.1.16

## Exterior Insulated Low Sloped Roof with Fully Adhered Roof Membrane and Mineral Wool Insulation – Clear Roof Assembly



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.5 (0.62 RSI) + Insulation
Transmittance / Resistance	$U_o, R_o$	“clear wall” U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

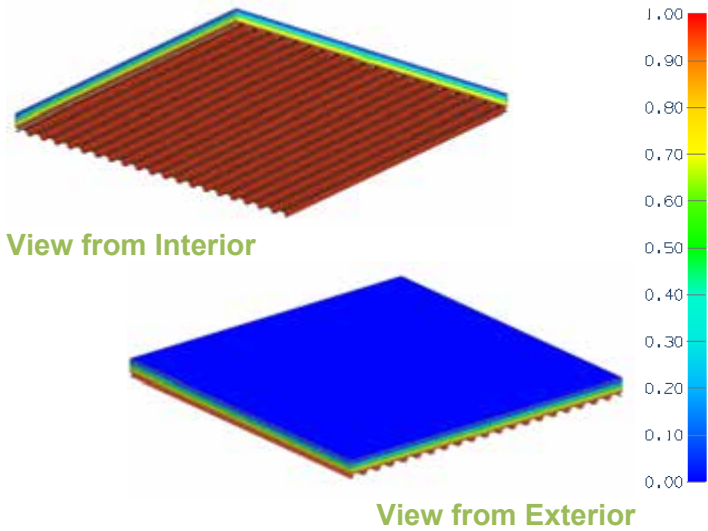
<sup>1</sup>Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

### Nominal (1D) vs. Assembly Performance Indicators

Bottom Layer Roof Insulation 1D R-Value (RSI)	Top Layer Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-9.9 (1.74)	R-9.9 (1.74)	R-23.4 (4.12)	R-22.7 (3.99)	0.044 (0.25)
R-19.9 (3.50)	R-9.9 (1.74)	R-33.4 (5.88)	R-32.6 (5.74)	0.031 (0.17)
R-29.8 (5.25)	R-9.9 (1.74)	R-43.3 (7.63)	R-42.5 (7.49)	0.024 (0.13)
R-39.8 (7.01)	R-9.9 (1.74)	R-53.3 (9.39)	R-52.5 (9.24)	0.019 (0.11)

# Detail 10.1.17

## Exterior Insulated Low Sloped Roof with Fully Adhered Roof Membrane and Mineral Wool and Polyisocyanurate Insulation – Clear Roof Assembly



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.5 (0.62 RSI) + Insulation
Transmittance / Resistance	$U_o, R_o$	“clear wall” U- and R-value
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Surface temperatures are a result of steady-state conductive heat flow with constant heat transfer coefficients. Limitations are identified in final report.

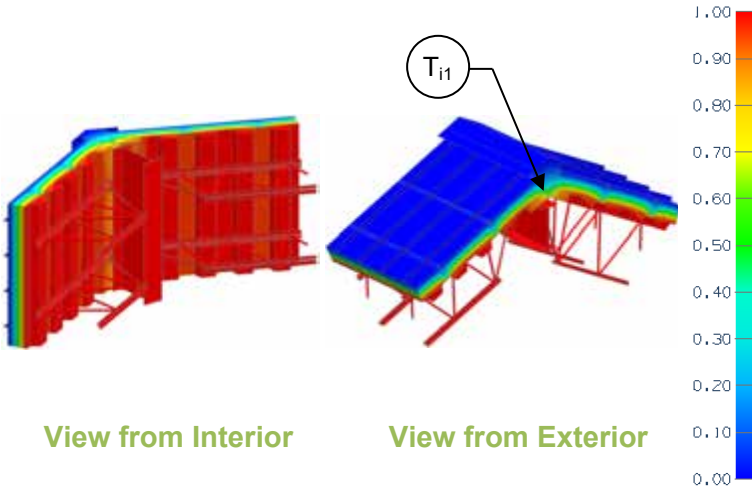
### Nominal (1D) vs. Assembly Performance Indicators

Bottom Layer Roof Insulation 1D R-Value (RSI)	Top Layer Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-11.4 (2.01)	R-9.9 (1.74)	R-24.9 (4.38)	R-24.1 (4.25)	0.041 (0.24)
R-22.8 (4.02)	R-9.9 (1.74)	R-36.3 (6.39)	R-35.5 (6.26)	0.028 (0.16)
R-34.2 (6.02)	R-9.9 (1.74)	R-47.7 (8.40)	R-46.9 (8.27)	0.021 (0.12)
R-45.6 (8.03)	R-9.9 (1.74)	R-59.1 (10.41)	R-58.3 (10.27)	0.017 (0.10)

# Detail 10.2.1

## 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-3.0 (0.53 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of ridge

<sup>1</sup>Surface 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr·°F (W/m K)
R-20 (3.52)	R-23 (4.05)	R-10.6 (1.87)	0.094 (0.53)	R-8.3 (1.46)	0.121 (0.69)	0.279 (0.483)
R-30 (5.28)	R-33 (5.81)	R-12.8 (2.25)	0.078 (0.44)	R-9.6 (1.69)	0.104 (0.59)	0.272 (0.471)

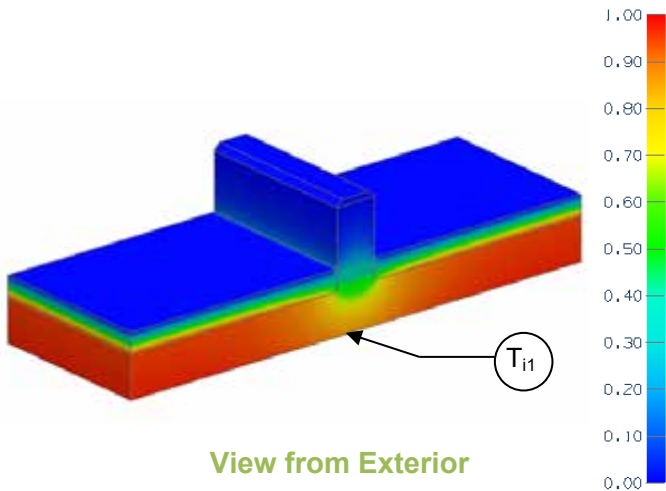
### Temperature Indices

	R20	R30	
$T_{i1}$	0.48	0.51	Min T on sheathing, along ridge

# Detail 10.2.2

## Insulated Concrete Slab – Concrete Curb or Wall Intersection

### Thermal Performance Indicators



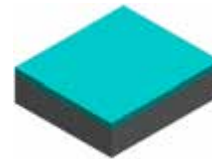
Assembly 1D (Nominal) R-Value	$R_{1D}$	R-1.9 (0.33 RSI) + Insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without concrete anomaly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of concrete anomaly

<sup>1</sup>Surface 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-20 (3.52)	R-21.9 (3.86)	R-21.9 (3.86)	0.046 (0.26)



#### Concrete Anomaly Linear Transmittance

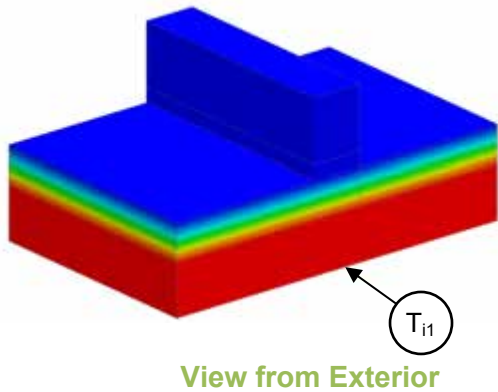
R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft hr °F (W/m K)
R-8.8 (1.54)	0.114 (0.65)	0.536 (0.927)

### Temperature Indices

$T_{i1}$	0.82	Min T on concrete, at center of anomaly
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# Detail 10.2.3

## Owens Corning 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of concrete anomaly

<sup>1</sup>Surface 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ 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)

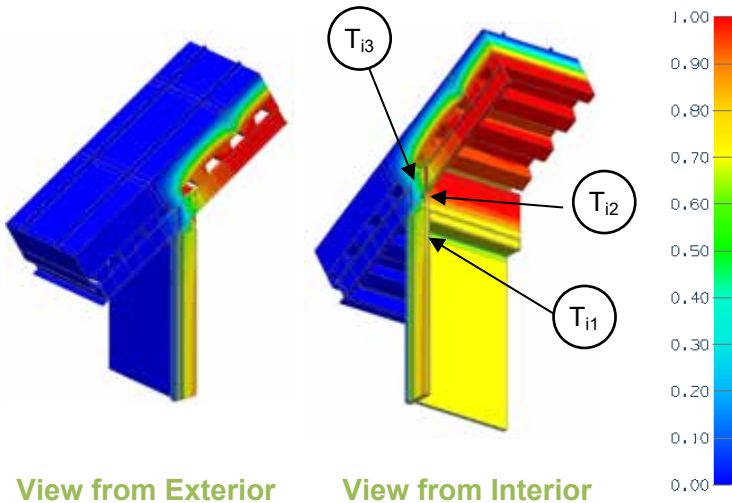
### Temperature Indices

$T_{i1}$	0.97	Min T on concrete, at center of anomaly
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# Detail 10.2.4

## 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

### 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of curtainwall

<sup>1</sup>Surface 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.344 (1.95)

#### Roof to Wall Linear Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
2.7 (0.48)	0.369 (2.10)	0.679 (1.177)

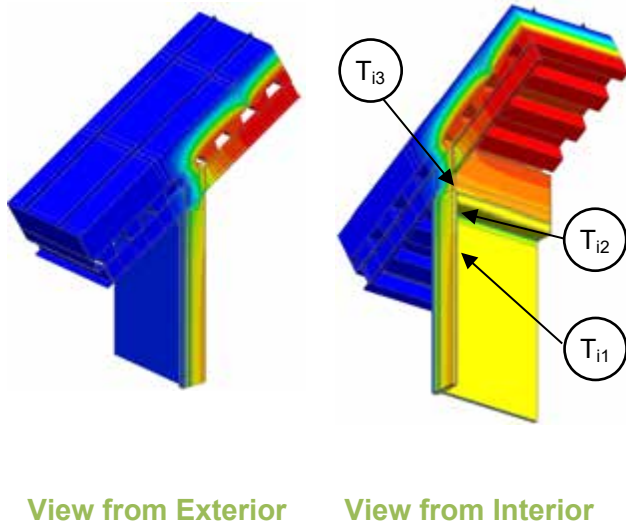
### Temperature Indices

$T_{i1}$	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 10.2.5

## 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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of curtainwall

<sup>1</sup>Surface 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.344 (1.95)

#### Roof to Wall Linear Transmittance

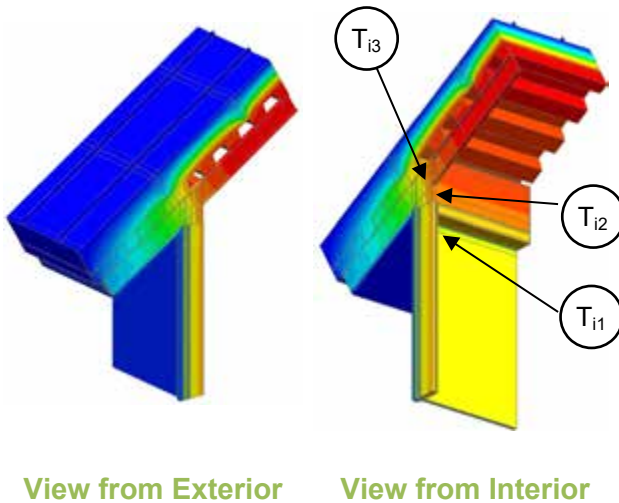
R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft·hr·°F (W/m K)
3.2 (0.56)	0.317 (1.80)	0.350 (0.607)

### 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 10.2.6

**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 <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Linear Transmittance	$\psi$	Incremental increase in transmittance per linear length of curtainwall

<sup>1</sup>Surface 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> 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 <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$U_g$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.321 (1.82)	0.344 (1.95)

#### Roof to Wall Linear Transmittance

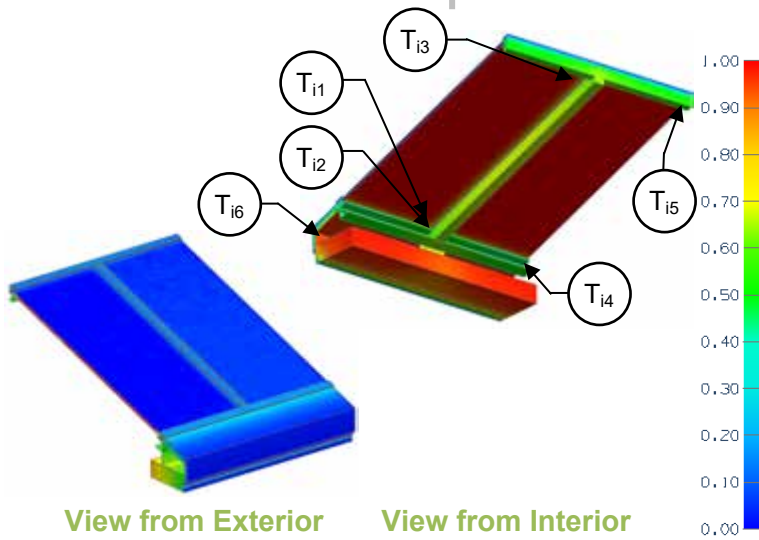
R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\psi$ Btu/ft ·hr ·°F (W/m K)
3.1 (0.55)	0.318 (1.81)	0.365 (0.633)

### 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 10.2.7

## Aluminum Framed Double Glazed Skylight – Exterior Insulated Concrete Curb Intersection



### Thermal Performance Indicators

Transmittance / Resistance	$U_{cog}, U_f$	U-value for cog = center of glass f = framing
Transmittance / Resistance	U, R	U and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature

<sup>1</sup>Surface 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

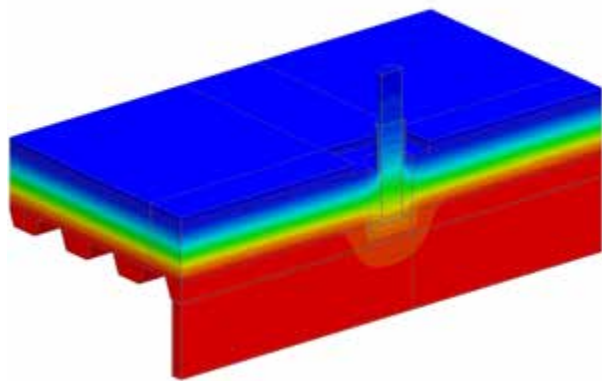
$U_{cog}$ Btu/ h ft <sup>2</sup> °F (W/m <sup>2</sup> K)	$U_{f\_Ridge}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{f\_Eaves}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_{f\_Rafter}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
0.234 (1.33)	1.81 (10.30)	2.06 (11.69)	1.28 (7.27)	R-2.7 (0.48)	0.369 (2.10)

### Temperature Indices

$T_{i1}$	0.67	At corner of glass, 30 mm away from glass edge
$T_{i2}$	0.52	At edge of glass of eaves, at rafter
$T_{i3}$	0.53	At edge of glass of ridge purlin, at rafter
$T_{i4}$	0.44	At eaves purlin, centre of skylight
$T_{i5}$	0.50	At ridge purlin, centre of skylight
$T_{i6}$	0.85	At drainage flashing, centre of skylight

# Detail 10.3.1 Exterior Insulated Conventional Flat Roof – Roof Anchor

## Thermal Performance Indicators



View from Exterior

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.7 (0.48 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without roof anchor
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for anchor

<sup>1</sup>Surface 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 <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-40 (7.04)	R-42.7 (7.53)	R-42.7 (7.53)	0.023 (0.133)

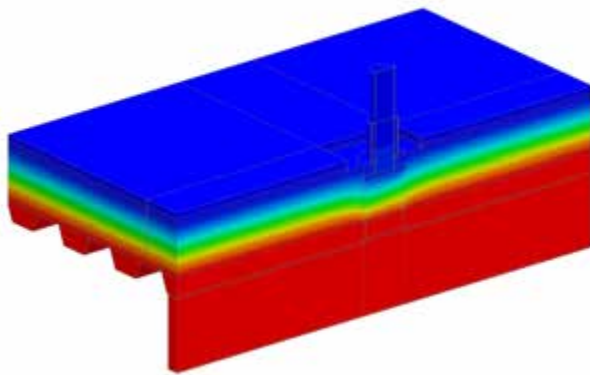
### Roof Anchor Point Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
R-26.0 (4.57)	0.039 (0.219)	0.640 (0.34)

# Detail 10.3.2

## 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-2.7 (0.48 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without roof anchor
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for anchor

<sup>1</sup>Surface 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

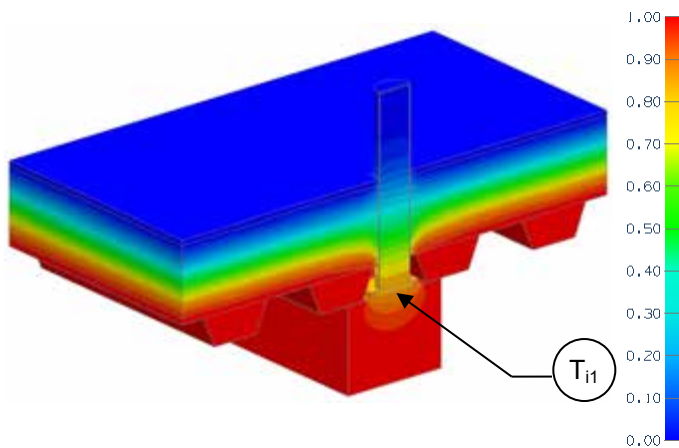
Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-40 (7.04)	R-42.7 (7.53)	R-42.7 (7.53)	0.023 (0.133)

#### Roof Anchor Point Transmittance

Scenario	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
A	R-27.6 (4.86)	0.036 (0.206)	0.542 (0.29)
B	R-37.5 (6.60)	0.027 (0.151)	0.130 (0.07)

# Detail 10.3.3

## Exterior Insulated Conventional Low-Sloped Roof – Roof Anchor



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.28 (0.40 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without connectors or joint
Transmittance / Resistance	U, R	U- and R-values for the overall assembly
Point Transmittance	$\chi$	Incremental increase in transmittance per connector

### Scenarios

Scenario	Roof Anchor
A	Without fill insulation
B	With fill insulation

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)
R-34.3 (6.03)	R-36.5 (6.44)	R-36.6 (6.45)	0.027 (0.155)

#### Roof Anchor Point Transmittance

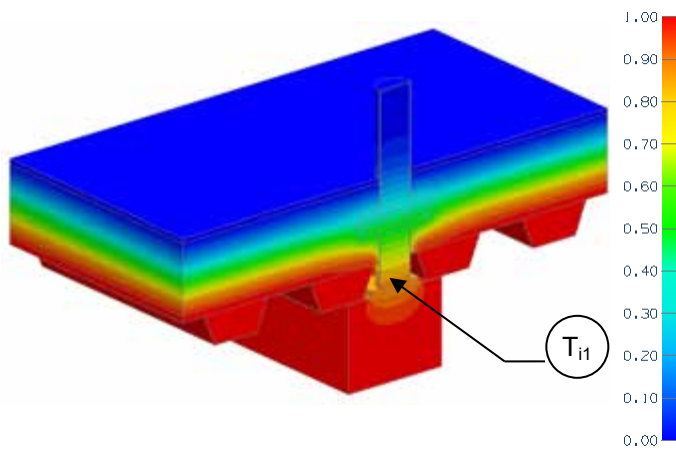
Scenario	R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
A	R-25.1 (4.41)	0.040 (0.227)	0.202 (0.106)
B	R-26.7 (4.70)	0.037 (0.213)	0.163 (0.086)

### Temperature Indices

	A	B	
$T_{i1}$	0.80	0.84	Min T on beam, at anchor

# Detail 10.3.4

## Exterior Insulated Conventional Low-Sloped Roof – Thermal Break in Roof Anchor



### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-2.28 (0.40 RSI) + insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	“clear field” U- and R-value, without connectors or joint
Transmittance / Resistance	$U, R$	U- and R-values for the overall assembly
Point Transmittance	$\chi$	Incremental increase in transmittance for connector

### Scenarios

Scenario	Roof Anchor
A	Without fill insulation
B	With fill insulation above thermal break

### Nominal (1D) vs. Assembly Performance Indicators

#### Base Assembly – Roof

Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-34.3 (6.03)	R-36.5 (6.44)	R-36.7 (6.47)	0.027 (0.155)

#### Roof Anchor Point Transmittance

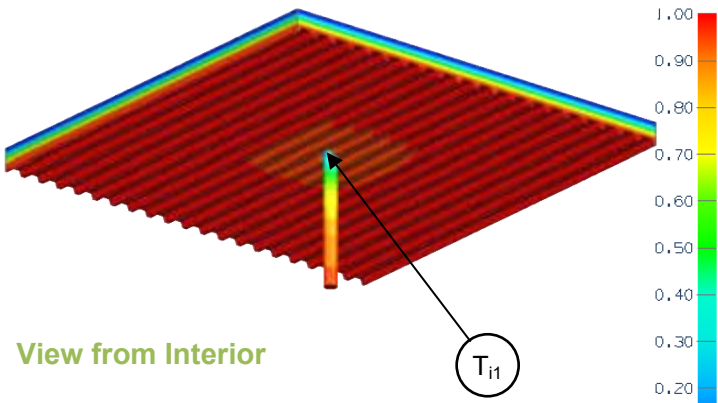
Scenario	$R$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr·°F (W/K)
A	R-25.8 (4.55)	0.039 (0.220)	0.184 (0.097)
B	R-26.2 (4.61)	0.038 (0.217)	0.175 (0.093)

### Temperature Indices

	A	B	
$T_{i1}$	0.82	0.83	Min T on beam, at anchor

# Detail 10.4.1

## Exterior Insulated Low Sloped Roof with Fully Adhered Roof Membrane and Mineral Wool Insulation - Flange-Style Drain Penetration



View from Interior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.5 (0.62 RSI) + Insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear field" U- and R-value, without roof drain
Transmittance / Resistance	$U, R$	U- and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for drain

<sup>1</sup>Surface 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

Bottom Layer Roof Insulation 1D R-Value (RSI)	Top Layer Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-9.9 (1.74)	R-9.9 (1.74)	R-23.4 (4.12)	R-22.7 (3.99)	0.044 (0.25)
R-19.9 (3.50)	R-9.9 (1.74)	R-33.4 (5.88)	R-32.6 (5.74)	0.031 (0.17)
R-29.8 (5.25)	R-9.9 (1.74)	R-43.3 (7.63)	R-42.5 (7.49)	0.024 (0.13)
R-39.8 (7.01)	R-9.9 (1.74)	R-53.3 (9.39)	R-52.5 (9.24)	0.019 (0.11)

#### Roof Drain Point Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr °F (W/K)
R-17.8 (3.13)	0.056 (0.32)	1.208 (0.637)
R-25.3 (4.46)	0.039 (0.22)	0.878 (0.463)
R-32.4 (5.71)	0.031 (0.18)	0.736 (0.388)
R-39.2 (6.90)	0.026 (0.14)	0.648 (0.342)

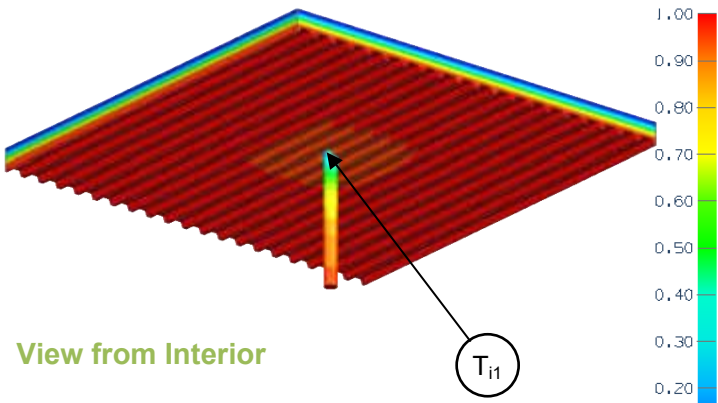
### Temperature Indices

	R-9.9 + R-9.9	R-19.9 + R-9.9	R-29.8 + R-9.9	R-39.8 + R-9.9	
$T_{i1}$	0.242	0.319	0.383	0.436	Drain penetration at steel deck



# Detail 10.4.2

## Exterior Insulated Low Sloped Roof with Fully Adhered Roof Membrane and Mineral Wool and Polyisocyanurate Insulation - Flange-Style Drain Penetration



View from Interior

### Thermal Performance Indicators

Assembly 1D (Nominal) R-Value	$R_{1D}$	R-3.5 (0.62 RSI) + Insulation
Transmittance / Resistance without Anomaly	$U_o, R_o$	"clear field" U- and R-value, without roof drain
Transmittance / Resistance	U, R	U- and R-values for the overall assembly
Surface Temperature Index <sup>1</sup>	$T_i$	0 = exterior temperature 1 = interior temperature
Point Transmittance	$\chi$	Incremental increase in transmittance for drain

<sup>1</sup>Surface 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

Bottom Layer Roof Insulation 1D R-Value (RSI)	Top Layer Roof Insulation 1D R-Value (RSI)	$R_{1D}$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$R_o$ ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	$U_o$ Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)
R-11.4 (2.01)	R-9.9 (1.74)	R-24.9 (4.38)	R-24.1 (4.25)	0.041 (0.24)
R-22.8 (4.02)	R-9.9 (1.74)	R-36.3 (6.39)	R-35.5 (6.26)	0.028 (0.16)
R-34.2 (6.02)	R-9.9 (1.74)	R-47.7 (8.40)	R-46.9 (8.27)	0.021 (0.12)
R-45.6 (8.03)	R-9.9 (1.74)	R-59.1 (10.41)	R-58.3 (10.27)	0.017 (0.10)

#### Roof Drain Point Transmittance

R ft <sup>2</sup> ·hr·°F / Btu (m <sup>2</sup> K / W)	U Btu/ft <sup>2</sup> ·hr ·°F (W/m <sup>2</sup> K)	$\chi$ Btu/hr ·°F (W/K)
R-18.9 (3.33)	0.053 (0.30)	1.145 (0.604)
R-27.3 (4.81)	0.037 (0.21)	0.849 (0.448)
R-35.1 (6.18)	0.029 (0.16)	0.720 (0.380)
R-42.5 (7.49)	0.024 (0.13)	0.636 (0.336)

### Temperature Indices

	R-11.4 + R9.9	R-22.8 + R-9.9	R-34.2 + R-9.9	R-45.6 + R-9.9	
$T_{i1}$	0.242	0.318	0.382	0.436	Drain penetration at steel deck