Thermal Bridging

EIFS has you covered

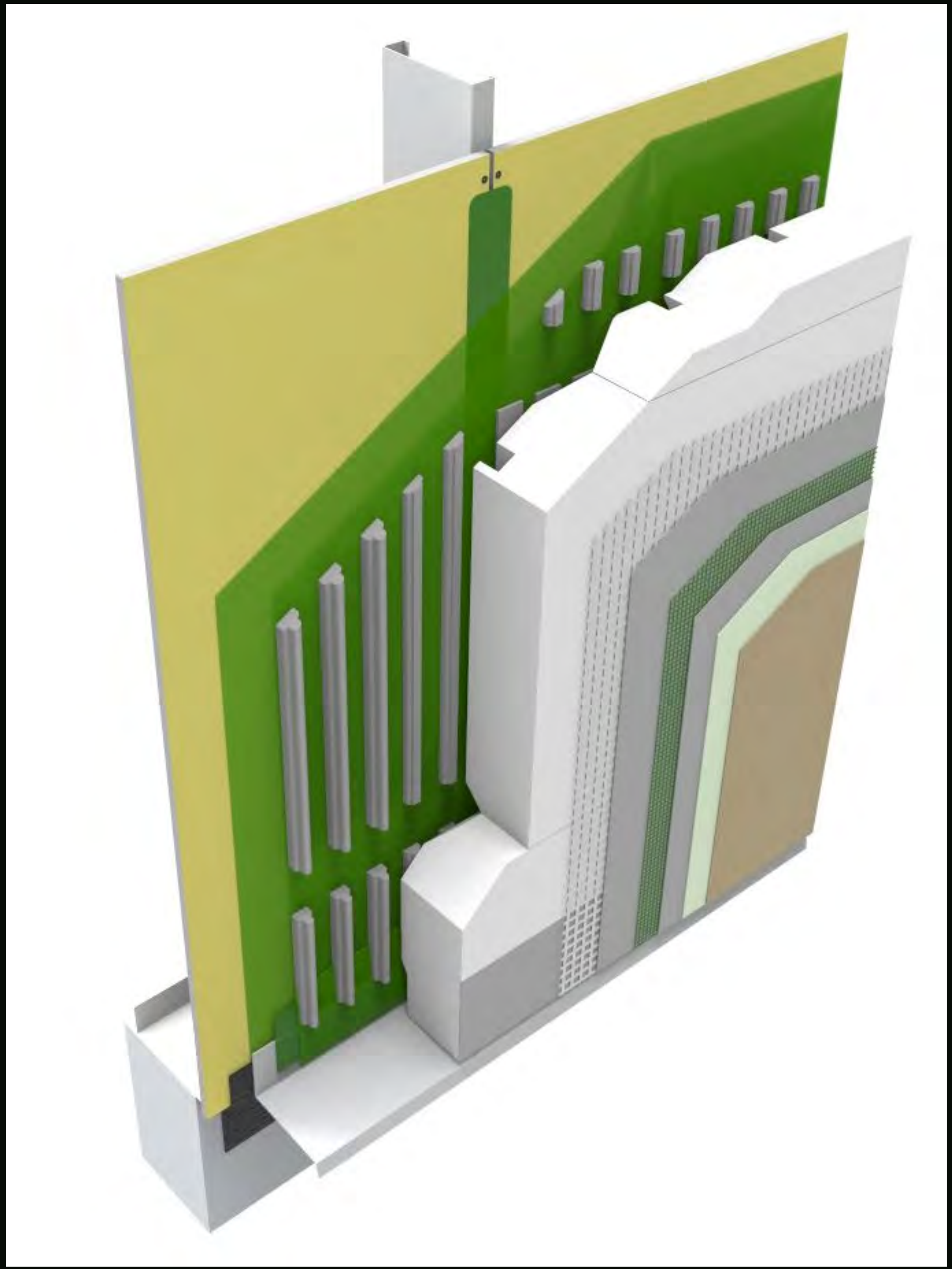
Introduction

- Thank you ABEC
- Thank you for the support provided to *Doctors Without Borders !*

©

Where we're going

- EIFS is a method of construction
- Climate
- Codes
- Effective insulation
- Thermal bridging
- Detailing
- Durability and resilience



©

EIFS

Not just Ontario Beige

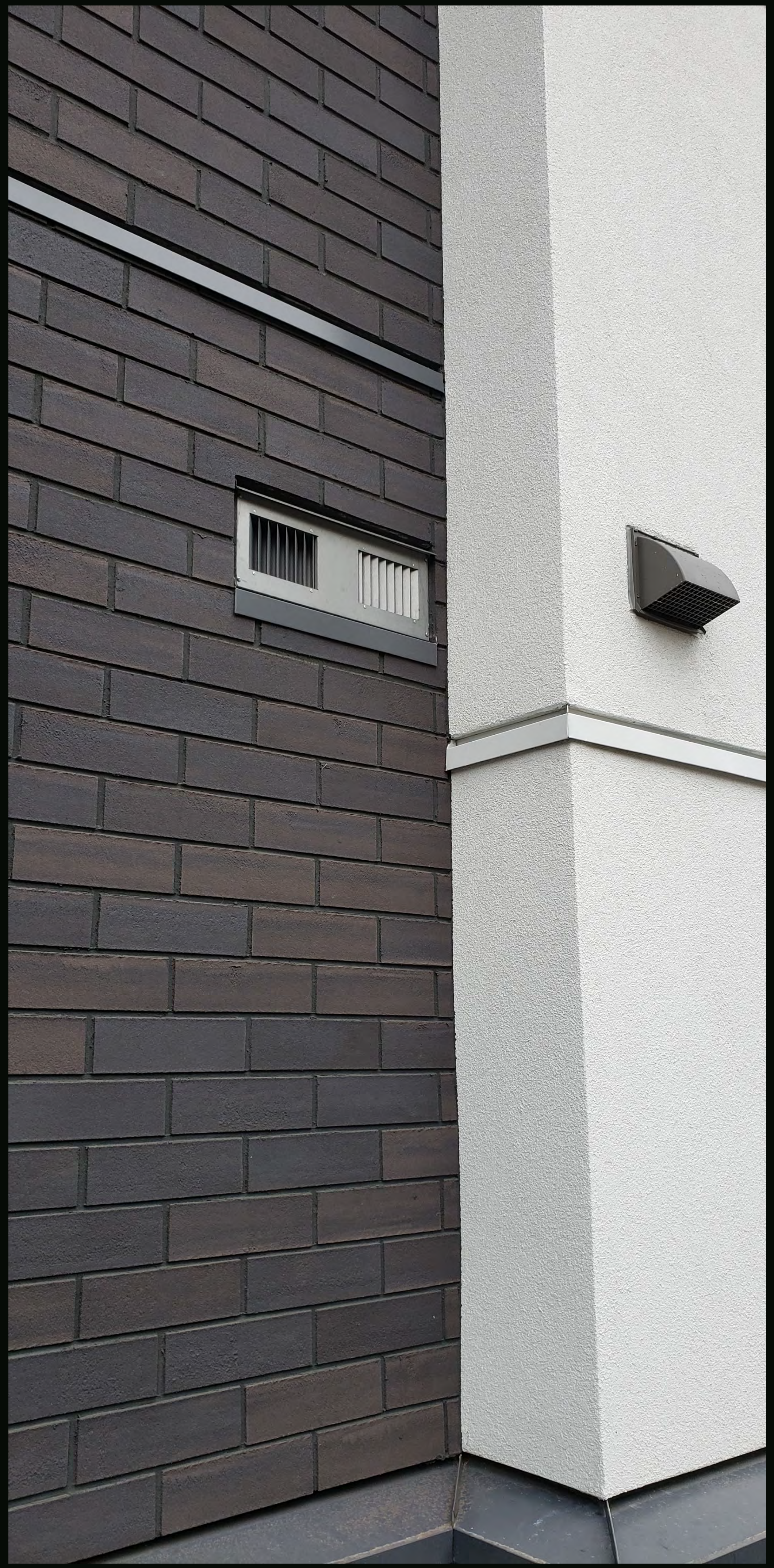
- Move away from textured finish

Thanks to Sto Canada for the photos

©

EIFS
Not just Ontario Beige

- Move away from textured finish



Thanks to Sto Canada for the photos

©

EIFS
Not just Ontario Beige

- Move away from textured finish

Thanks to Sto Canada for the photos

©

EIFS

Not just Ontario Beige

- Move away from textured finish
- Cure for the winter blahs …

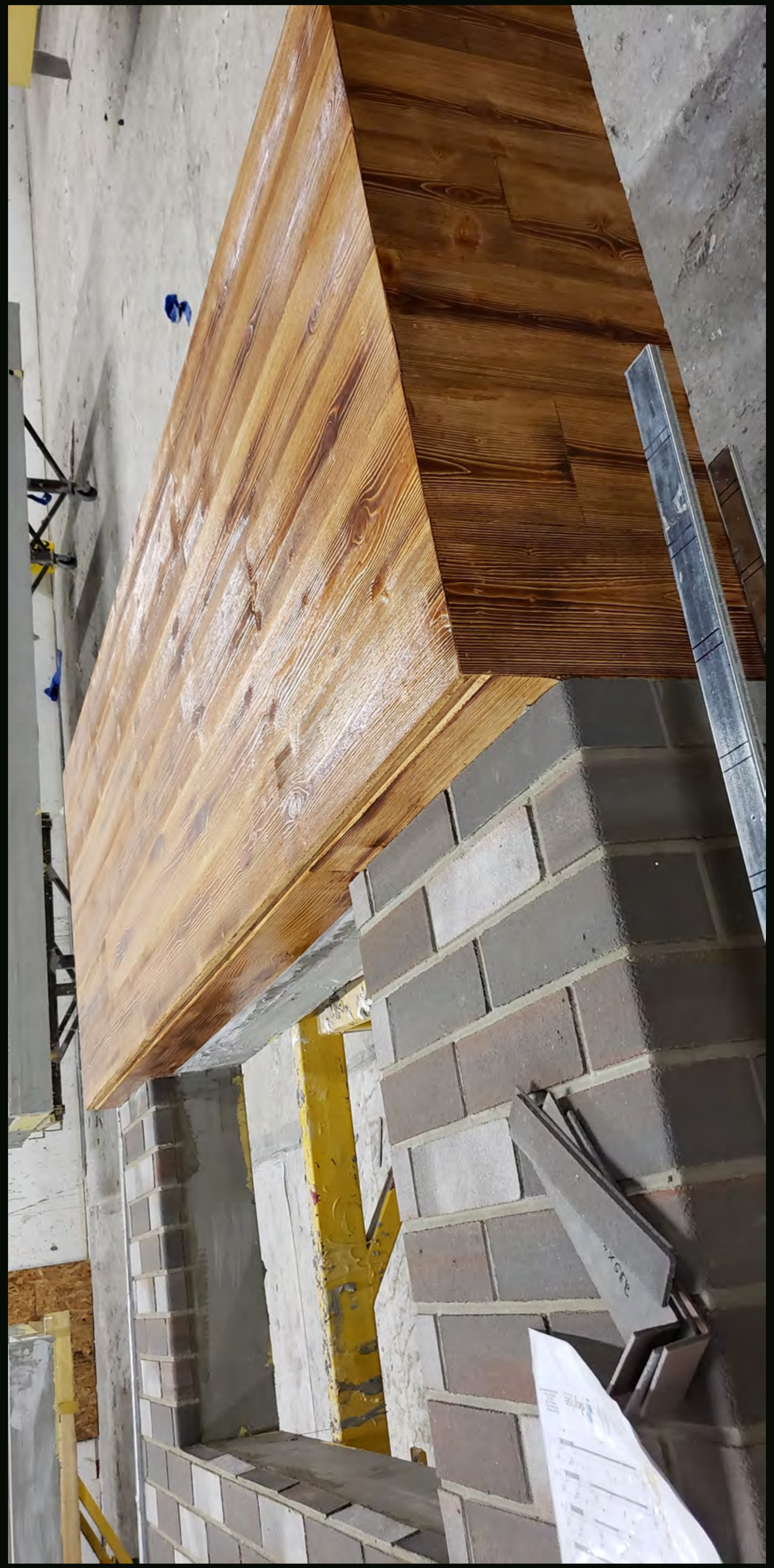
Thanks to Sto Canada for the photos

©

EIFS

Not just Ontario Beige

- Move away from textured finish
- Cure for the winter blahs …
- Prefabricate !



Thanks to Sto Canada for the photos

©

EIFS
Not just Ontario Beige

- Move away from textured finish
- Cure for the winter blahs …
- Prefabricate !

Thanks to Sto Canada for the photos

©

EIFS

Not just Ontario Beige

- Move away from textured finish
- Cure for the winter blahs …
- Prefabricate !

Thanks to Sto Canada for the photos

©

Climate
Developing Crisis

- Atmosphere is warming
- How much you ask ?
- 8 x 10^{21} Joules per year …
- 4 Hiroshima sized bombs / second

www.skepticalscience.com/4-Hiroshima-bombs-worth-of-heat-per-second.html

©

Developing Crisis

Weather

- More extreme weather events
- Insurance is the canary in the coal mine
- Insurance losses have doubled every 5 to 10 years since 1980
- Limited coverage for flood
- Financial risk assessment

©

Trade-offs in construction

©

Condo Refugees

Power outage

- Glass condos intolerably cold after 48 hours

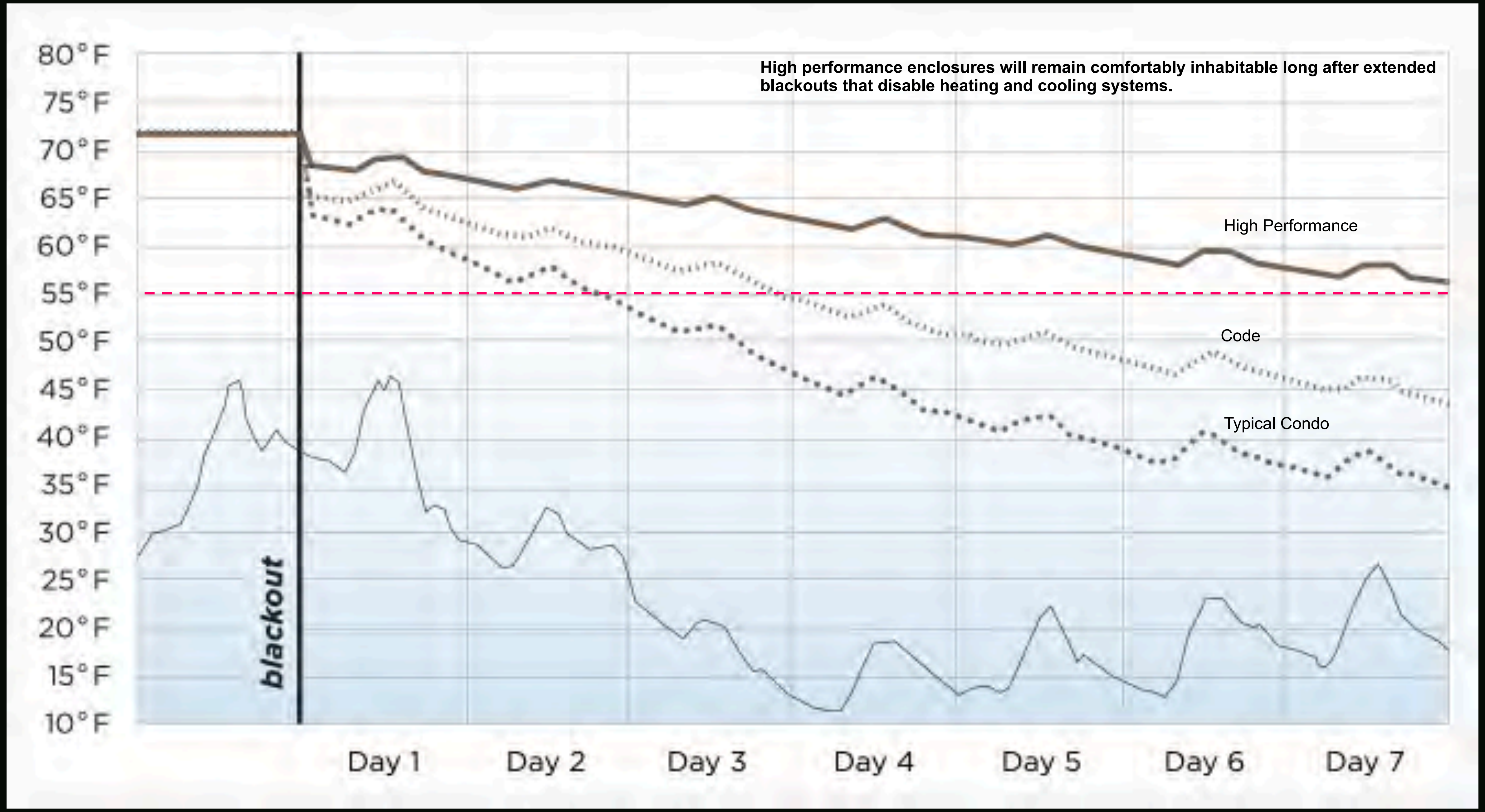
Toronto's window wall landscape

©

Condo Refugees

Power outage

- Glass condos intolerably cold after 48 hours
- High performance claddings provide a good measure of comfort for many days
- EIFS with 40% windows openings



Graph, Dr. Ted Kesik, U of T

©

Code

“Code is the worst you can build without going to jail”

©

National Energy Code of Canada for Buildings 2017

Climate Strategy

- Objectives

"An objective of this code is to limit the probability that, as a result of the design or construction of the *building,* resources will be used in a manner that will have an unacceptable effect on the environment. The risks of unacceptable effect on the environment due to use of resources addressed in this Code are those caused by excessive use of energy."

NECB 2017 Sentence 2.2.1.1.(1)

National Energy Code of Canada for Buildings 2017

Climate Strategy

"…unacceptable effect on the environment …caused by excessive use of energy…"

©

Thermal Bridging

National Energy Code of Canada for Buildings 2017

3.1.1.5.(5)(a)(ii)

"The thermal characteristics of *building* assemblies other than *fenestration* and doors shall be determined from ISO 14683, 'Thermal bridges in building construction – Linear thermal transmittance – Simplified methods and default values'".

This ISO standard was used to develop the models in the Building Envelope Thermal Bridging Guide.

©

Code Development

Possible objectives …

- No trade-offs against HVAC, lighting and plug loads
- Get the envelope right, then deal with the mechanical systems
- Reduce fenestration to 30 to 40%

©
JOHN R.S. EDGAR CONSULTING

Thermal Transmittance

©

Thermal Bridging

©

Thermal Bridging

Fasteners

©

Thermal Bridging

Fasteners

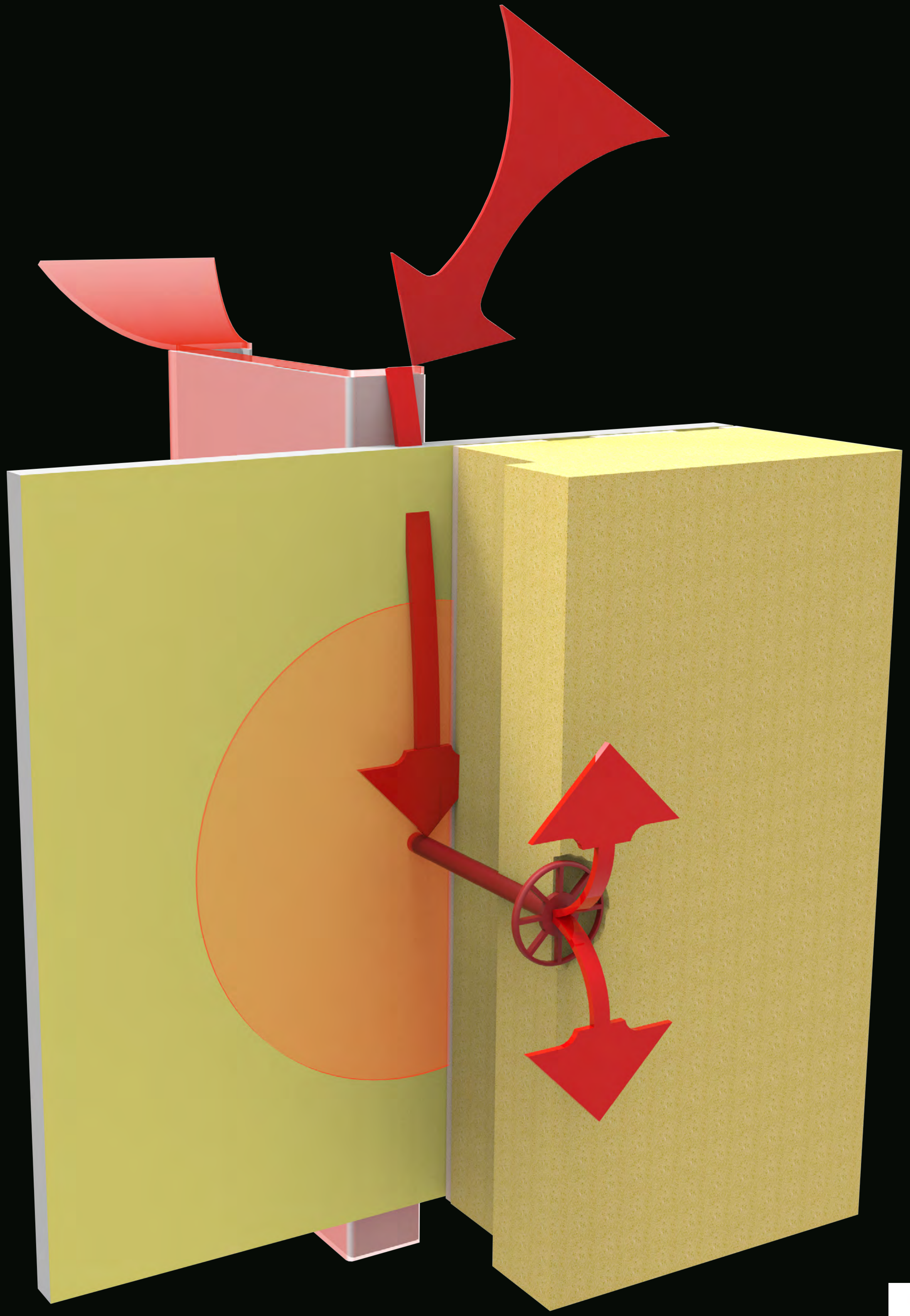
- Ratio of fastener diameter to wall area is very small

©

Thermal Bridging
Fasteners

- Ratio of fastener diameter to wall area is very small
- Thermal bridge insignificant …
- More significant than we thought
- Why is the wall spotted ?

Thermal Bridging

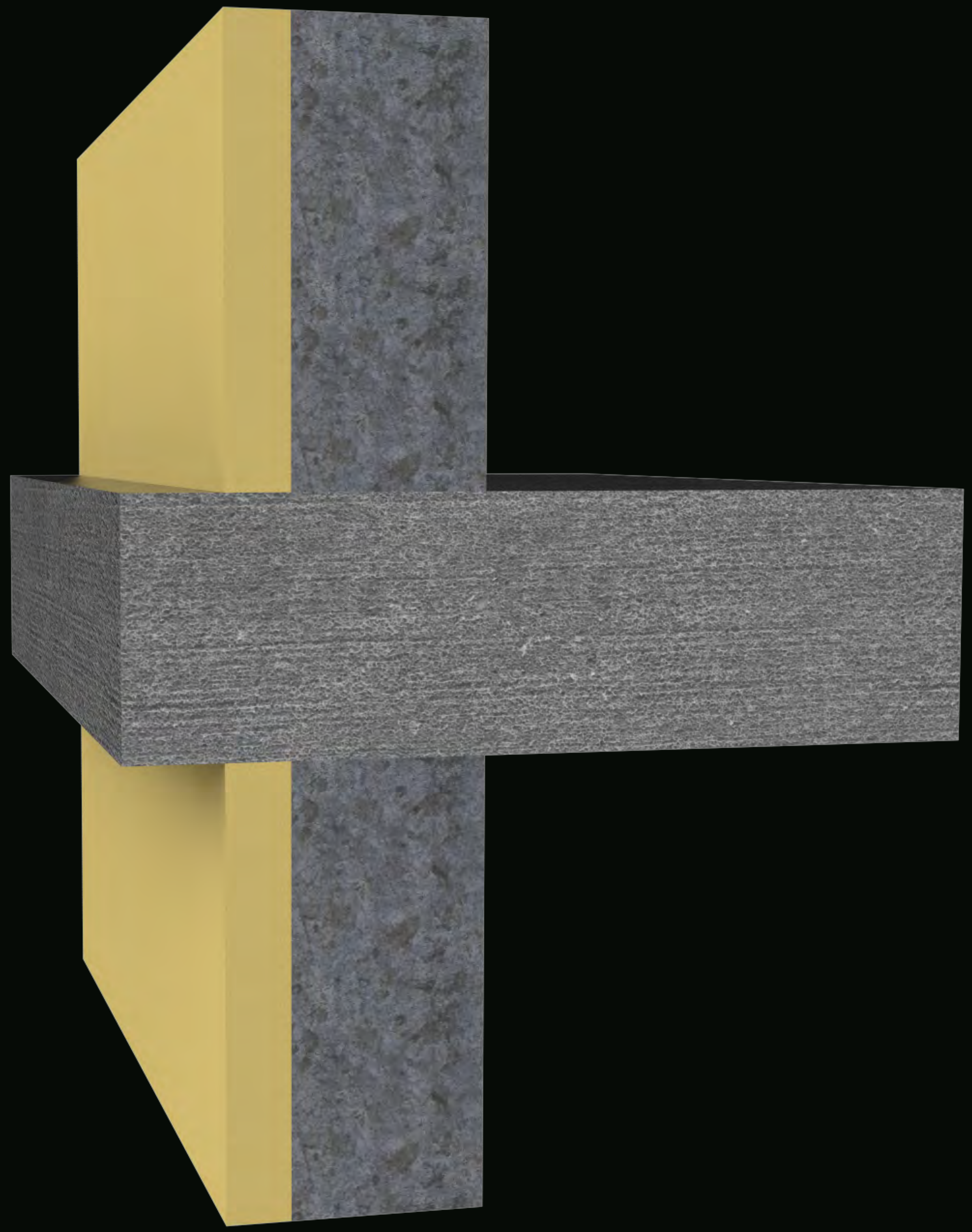


- Thermal transfer from stud and sheathing
- Screws on interior are colder

©

Heat flow at slab edge

Parallel path method

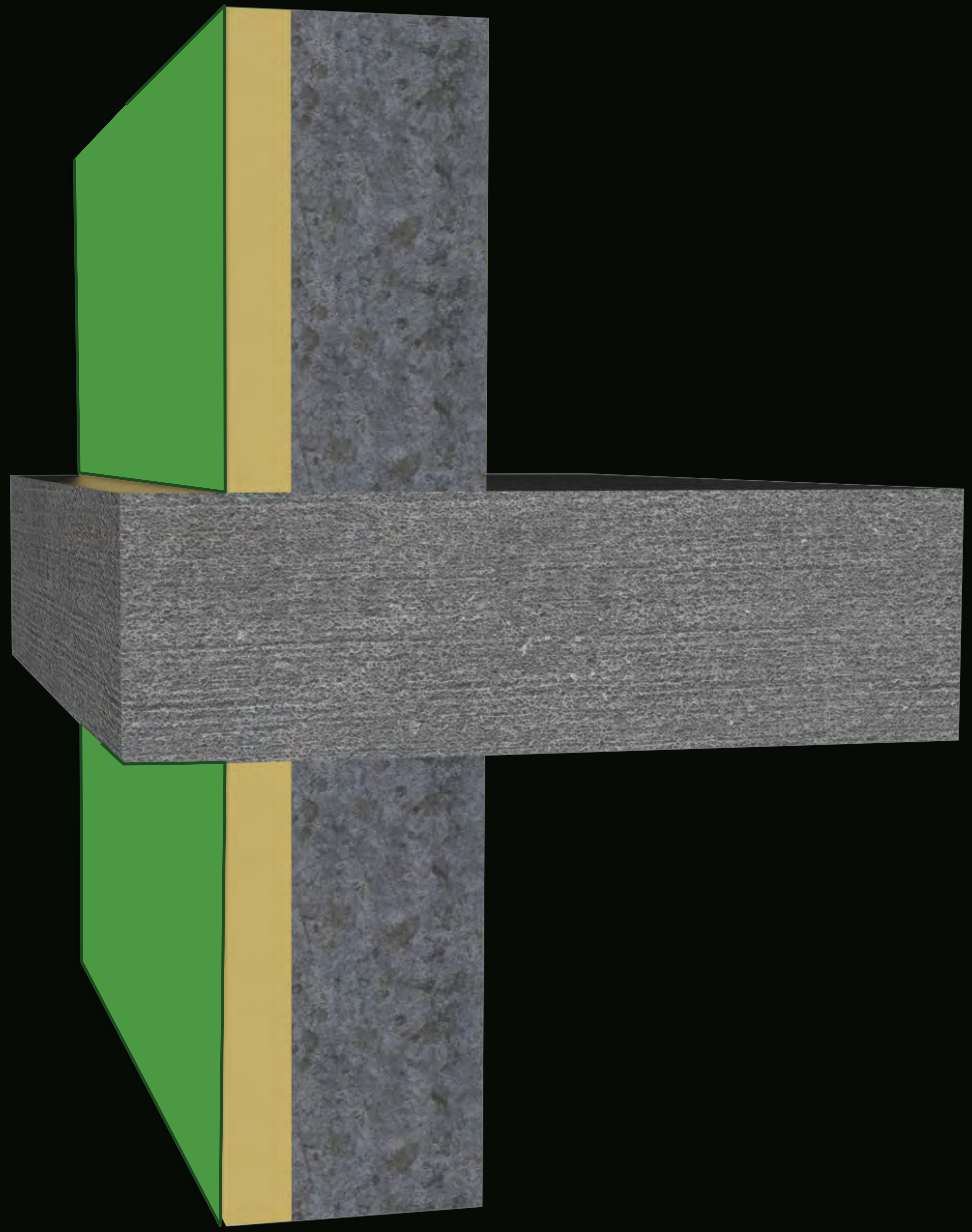


©

Heat flow at slab edge

Parallel path method

- Area of wall [Green]

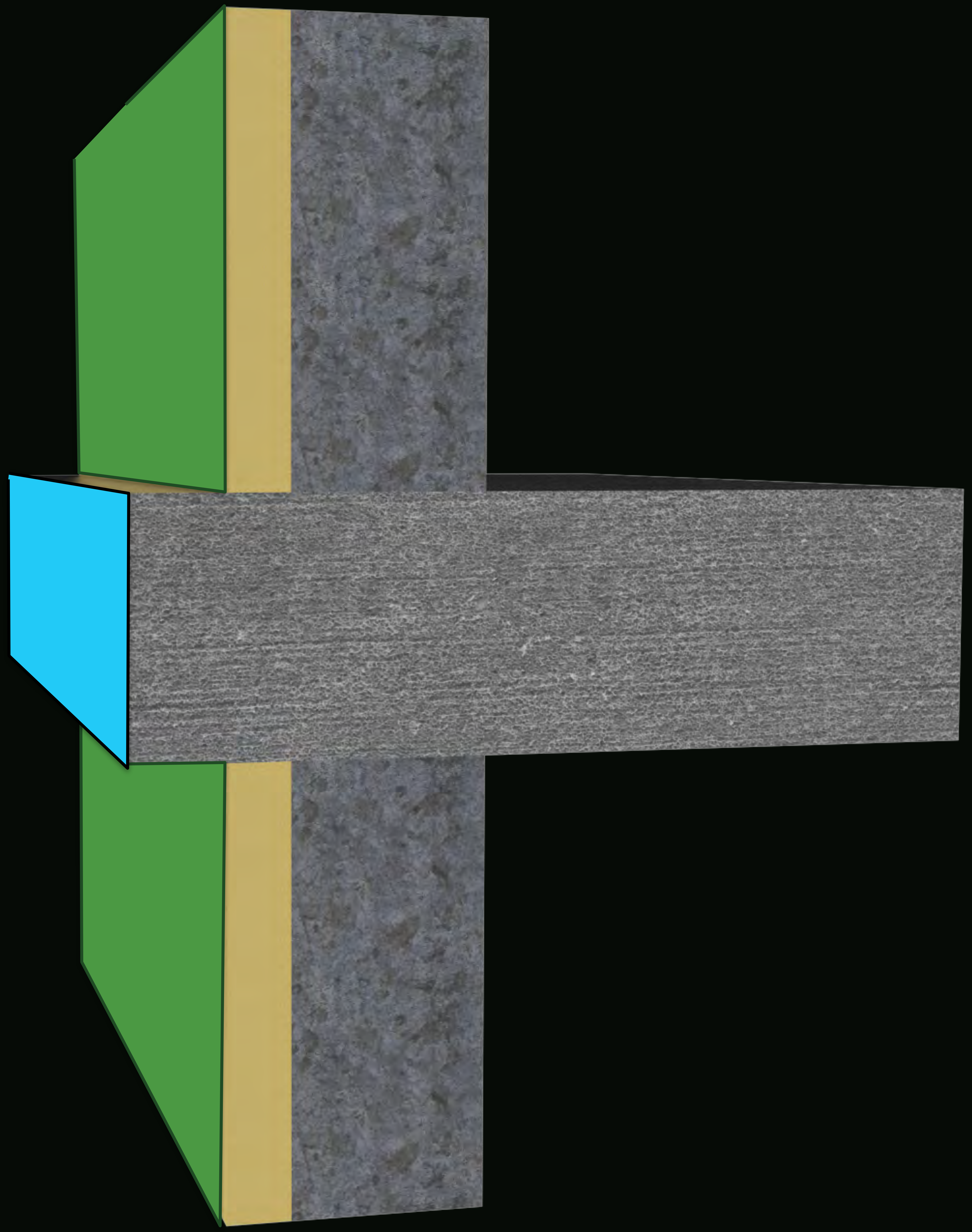


©

Heat flow at slab edge

Parallel path method

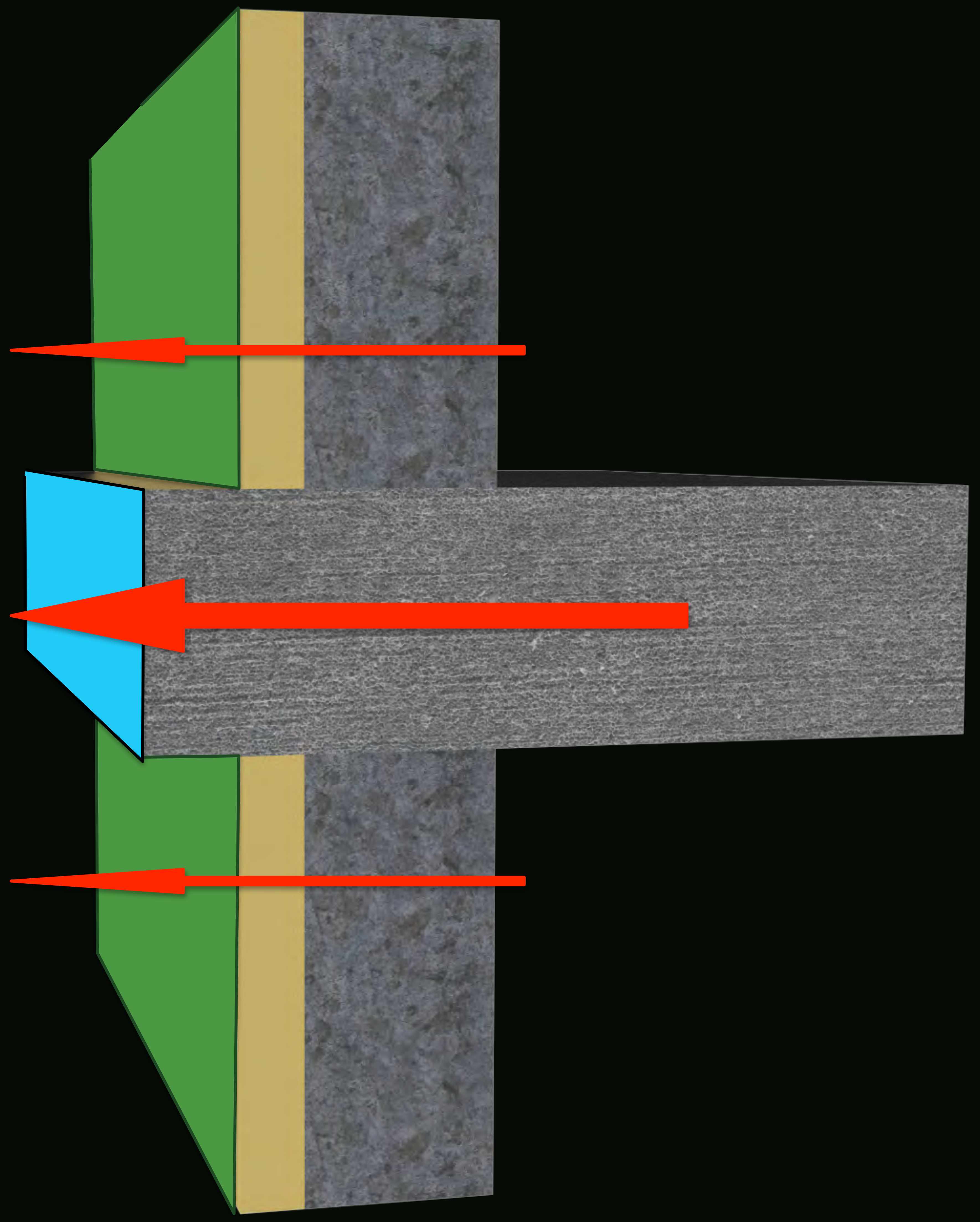
- Area of wall [Green]
- Area of slab edge [Blue]



©

Heat flow at slab edge

Parallel path method



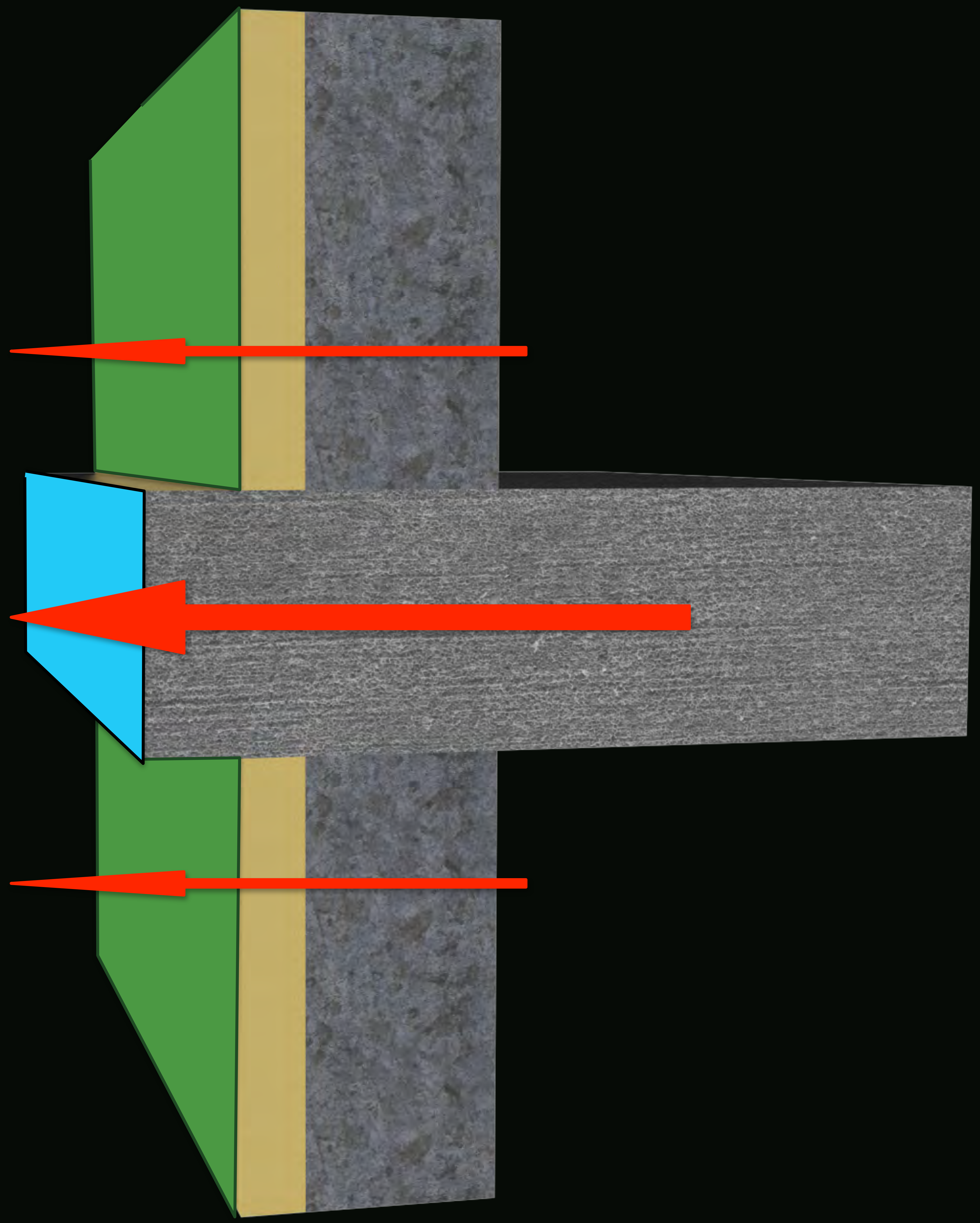
- Area of wall [Green]
- Area of slab edge [Blue]
- Assume heat flow is parallel

©

Heat flow at slab edge

Parallel path method

- Area of wall [Green]
- Area of slab edge [Blue]
- Assume heat flow is parallel
- Ratio of slab edge to wall is small

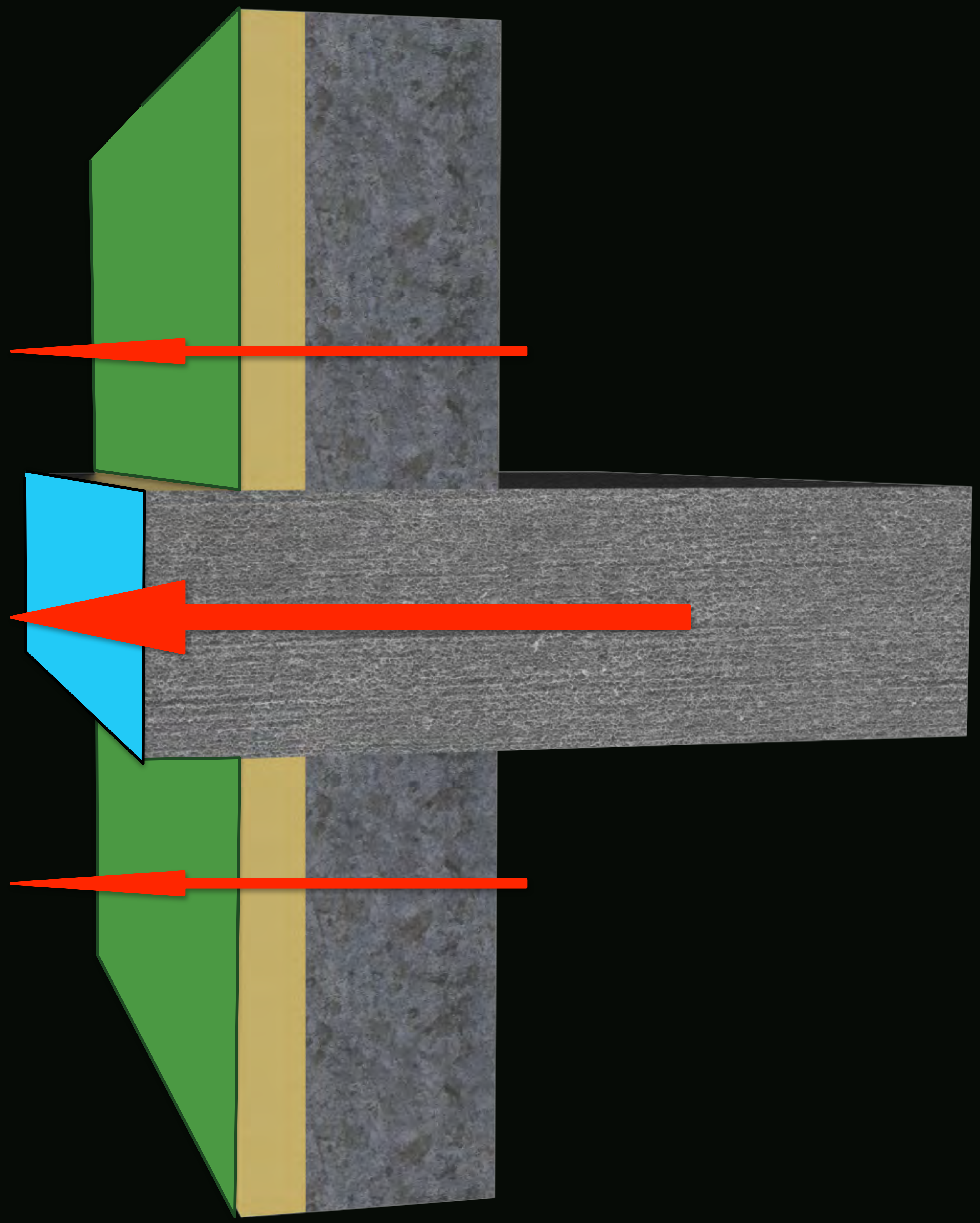


©

Heat flow at slab edge

Parallel path method

- Area of wall [Green]
- Area of slab edge [Blue]
- Assume heat flow is parallel
- Ratio of slab edge to wall is small
- Is the energy loss acceptable ?

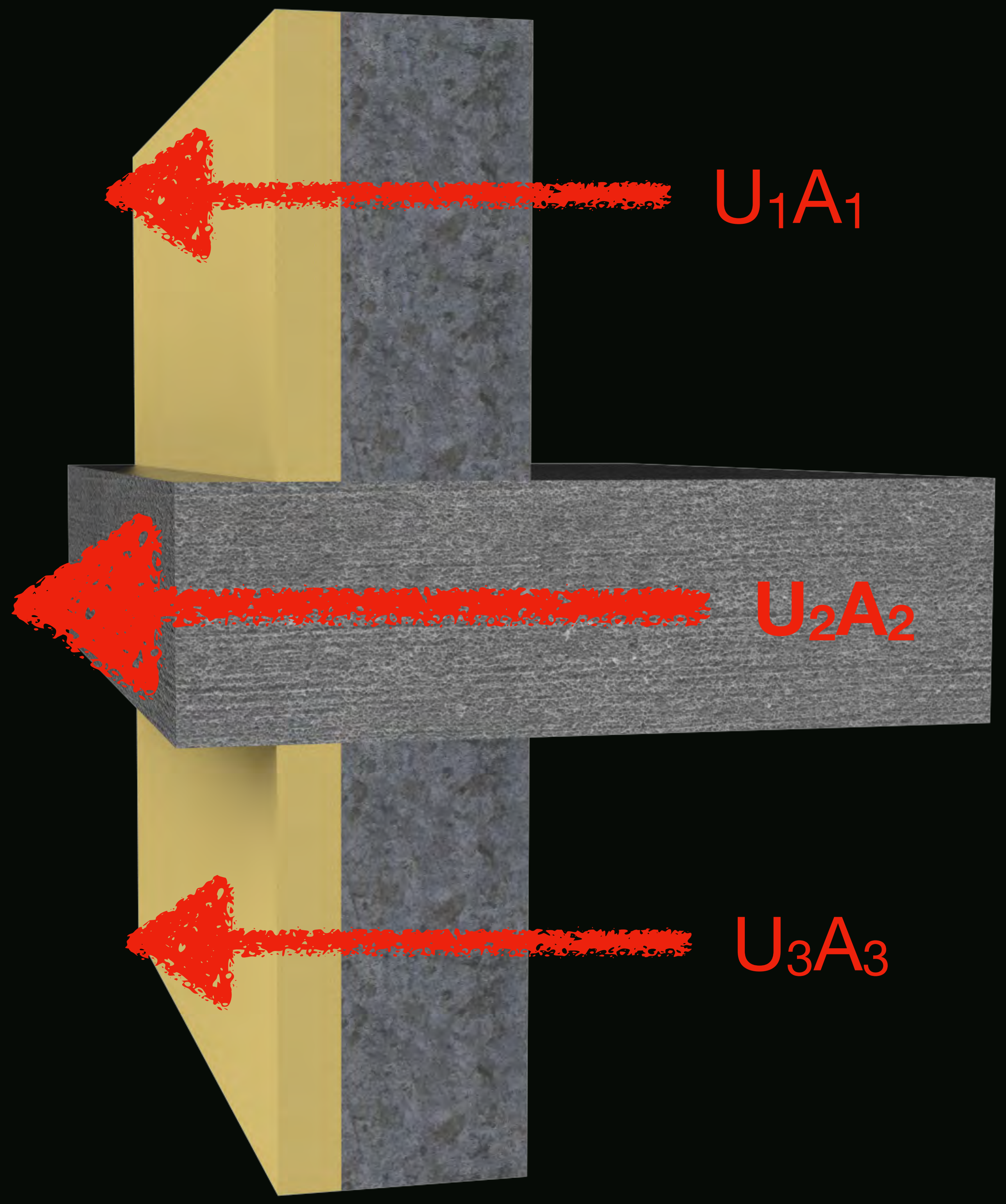


©

Calculate U_{total}

Parallel flow method

- Area above slab
- Slab area
- Area below slab
- U value of material
- Temperature difference
- Presto - formula for U_{total}

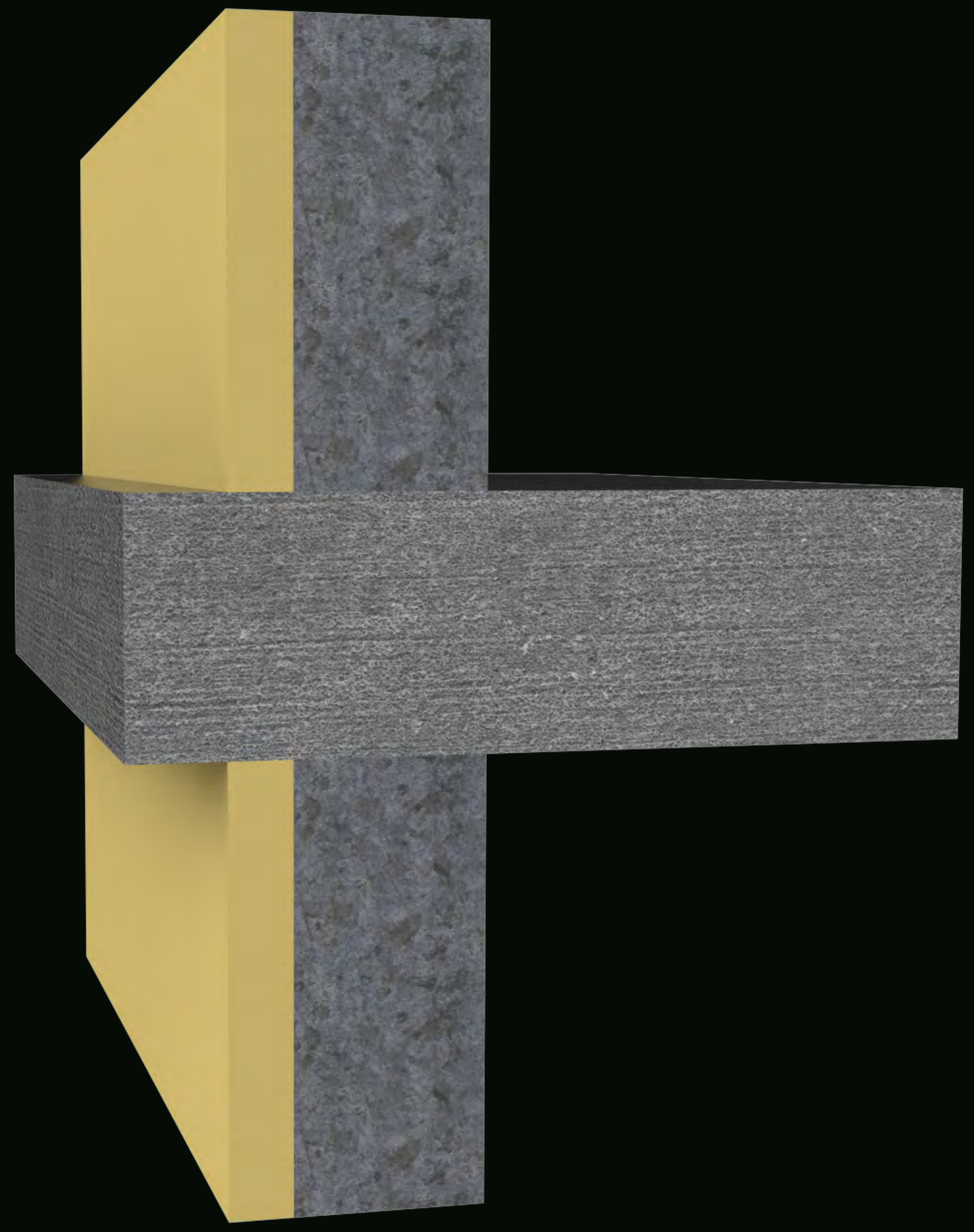


$$U_{Total} = \frac{(U_1A_1 + U_2A_2 + U_3A_3 \ldots)}{(A_1 + A_2 + A_3 \ldots)} \cdot \Delta T$$

©

Calculate U_{Total}

Reality is complicated



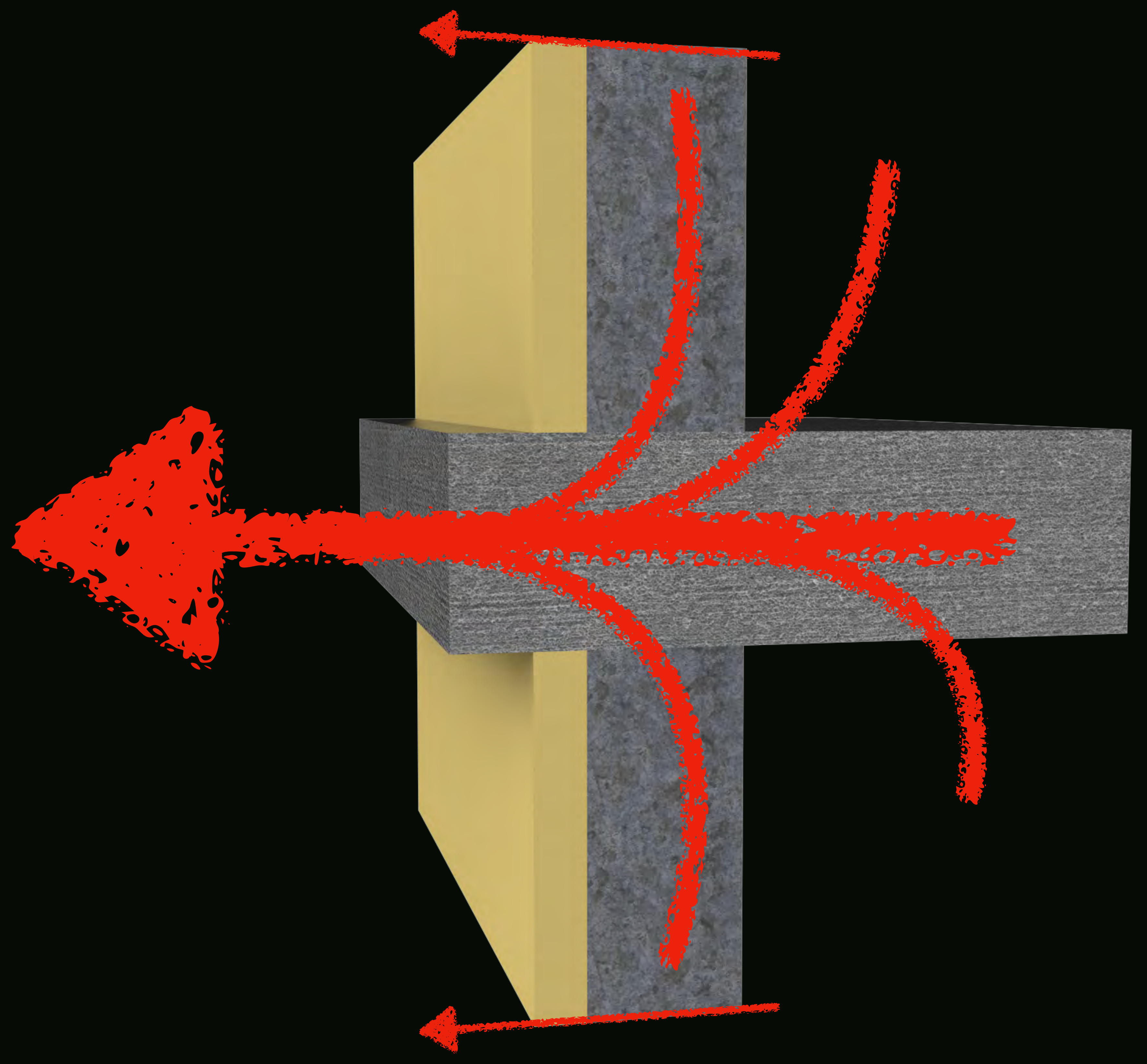
©

Calculate U_{Total}

Reality is complicated

- Heat flows in all directions from hot to cold
- Parts of the insulation above and below the slab have minimal insulating value
- It's complicated …

… or is it ?



©

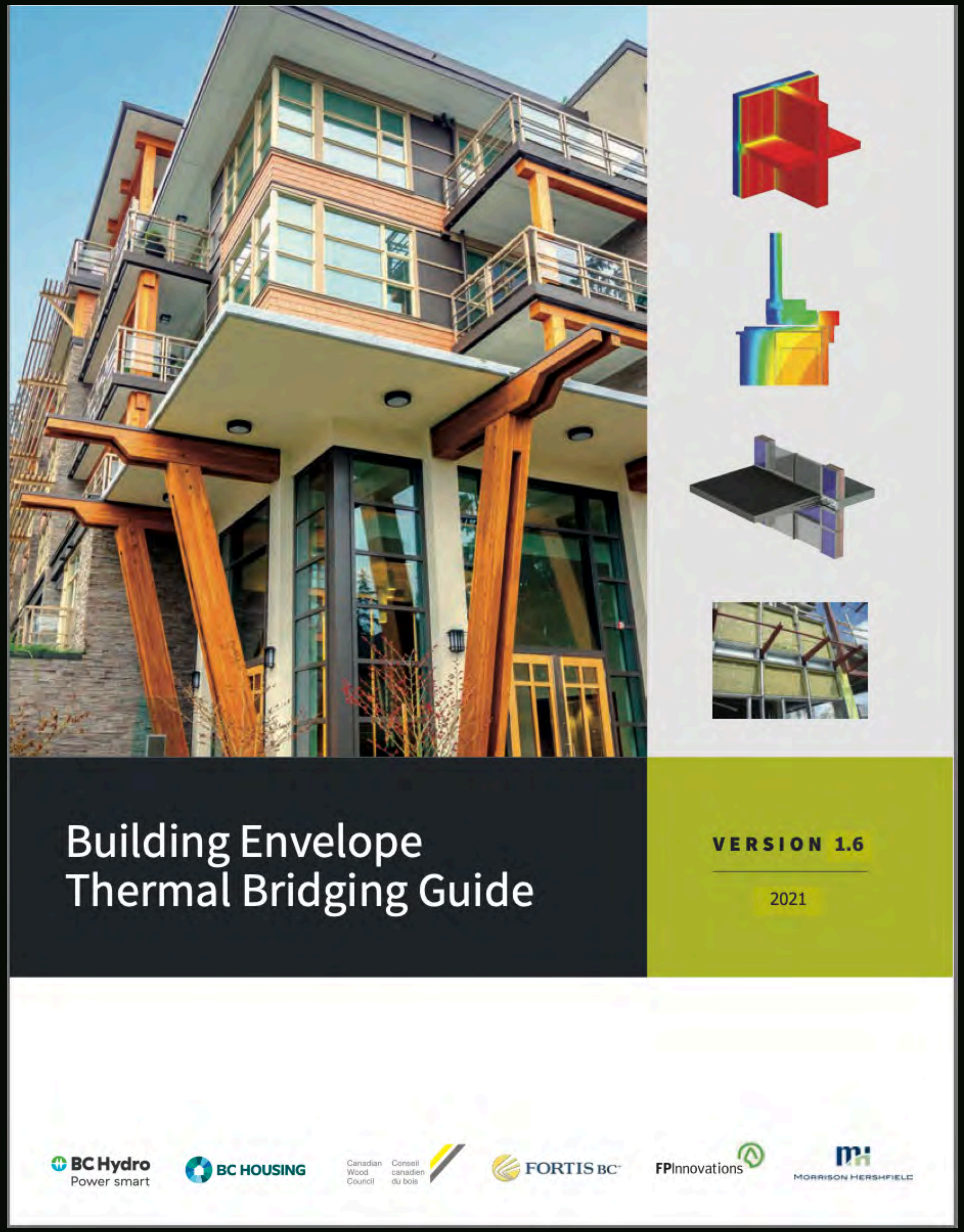
BC Hydro Building Envelope Thermal Bridging Guide

©

Guide

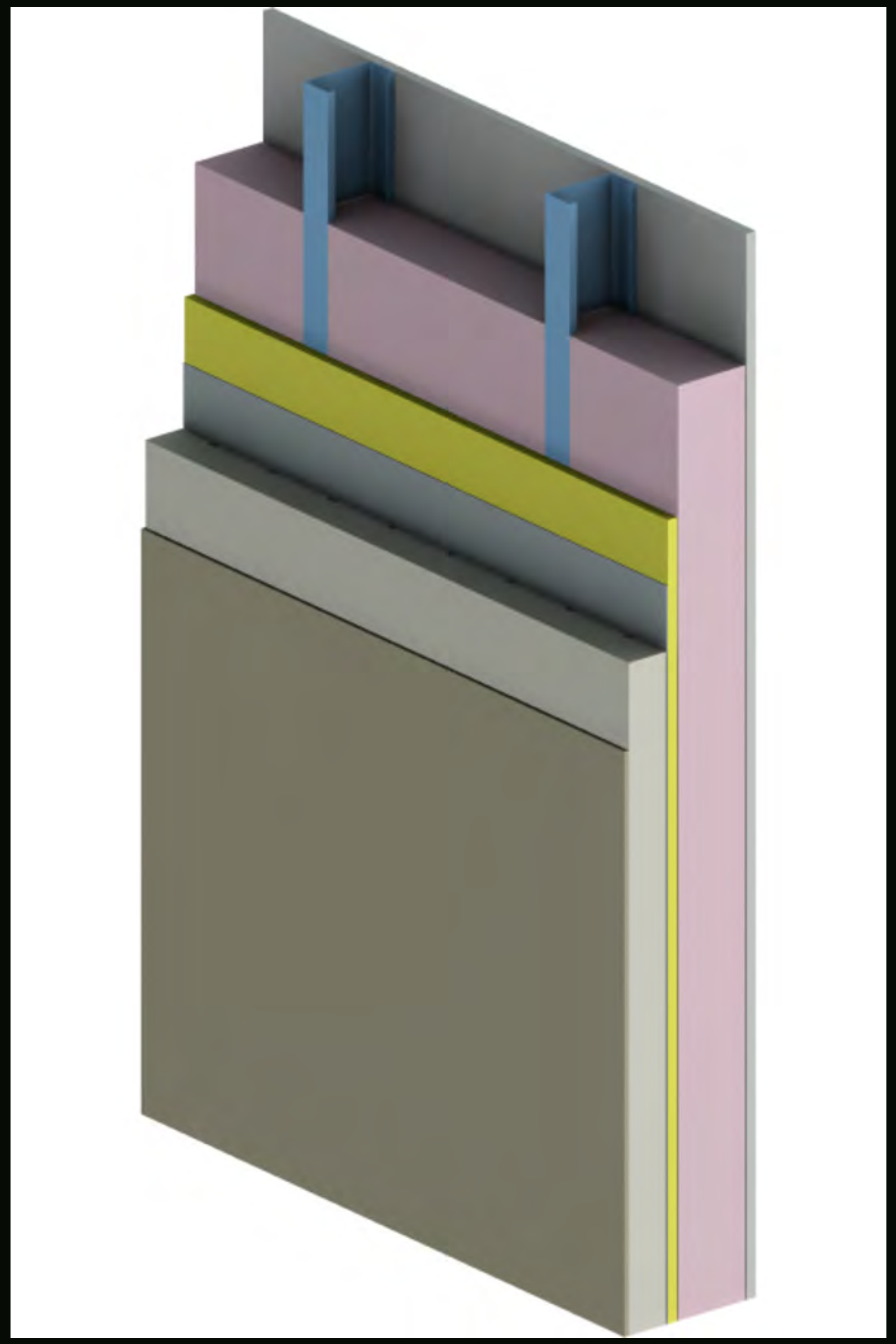
Prepared by Morrison Hershfield

- Download this guide
- Foundational information for using the Thermal Bridging Guide
- Calculation methods based on ISO 14683:2017 – Thermal bridges in building construction
- Hard work already done !



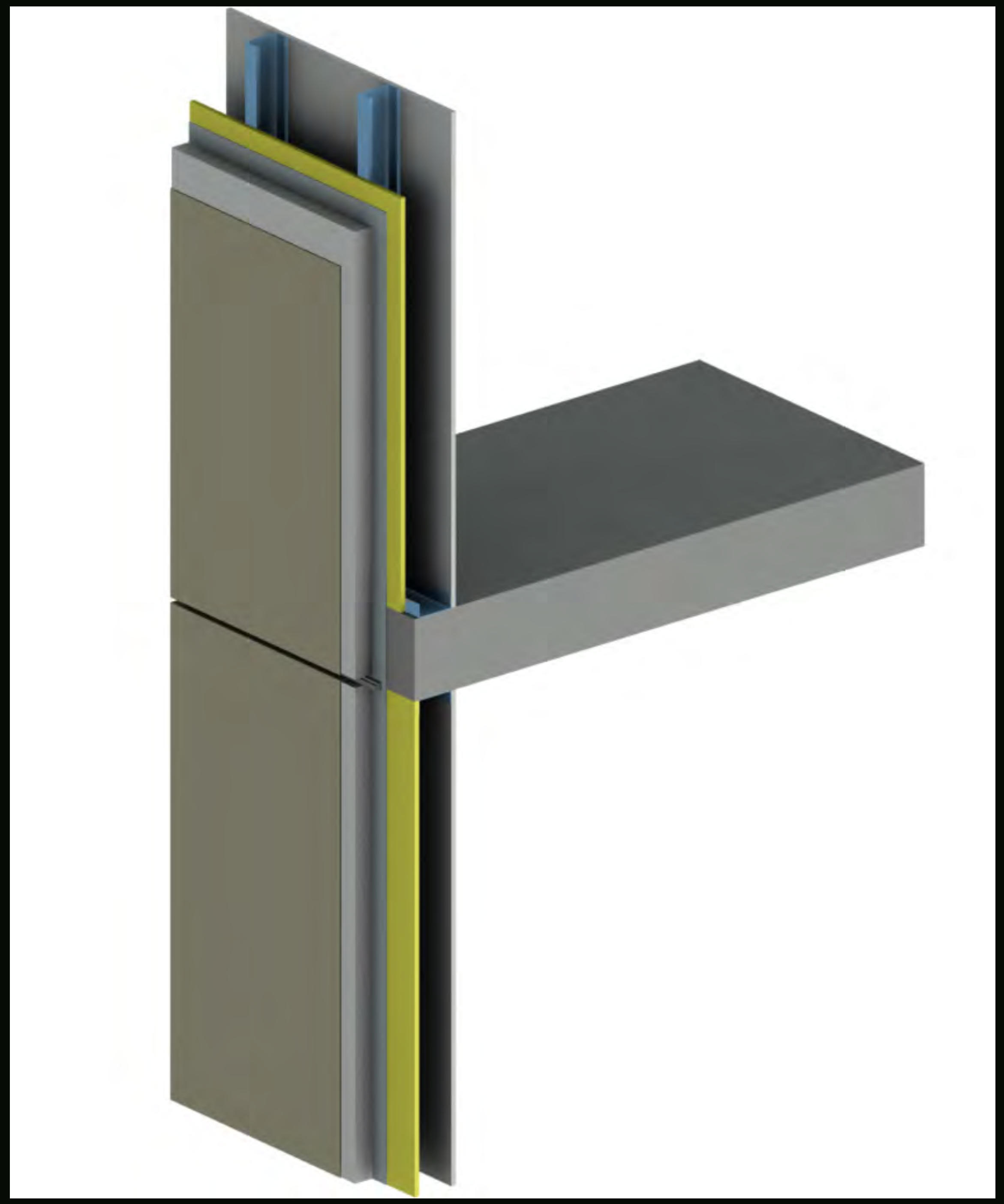
©

Types of Transmittances



Clear Field

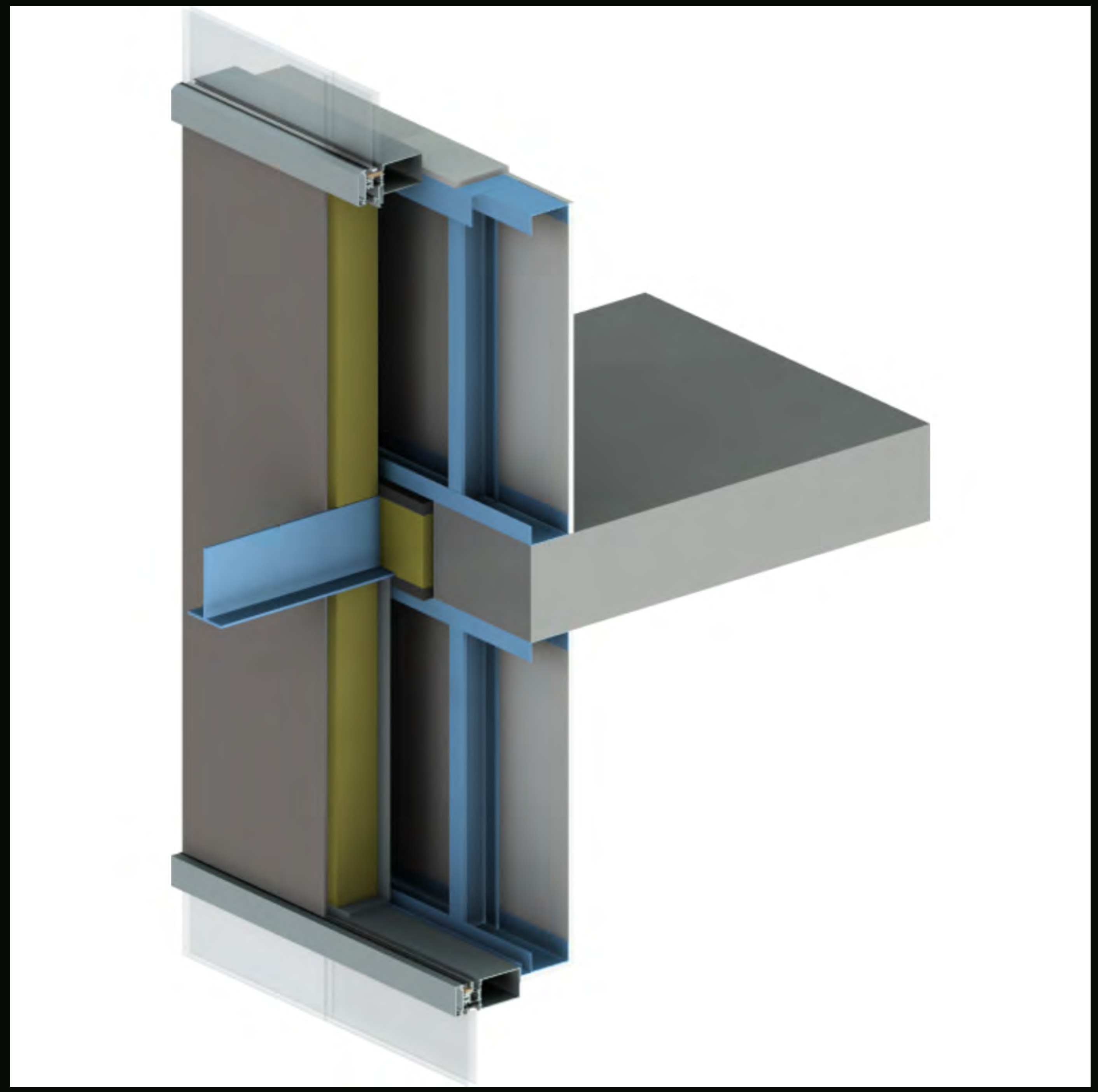
U_0 Watts / M^2 • °K



Linear

Ψ Watts / M • °K

psi



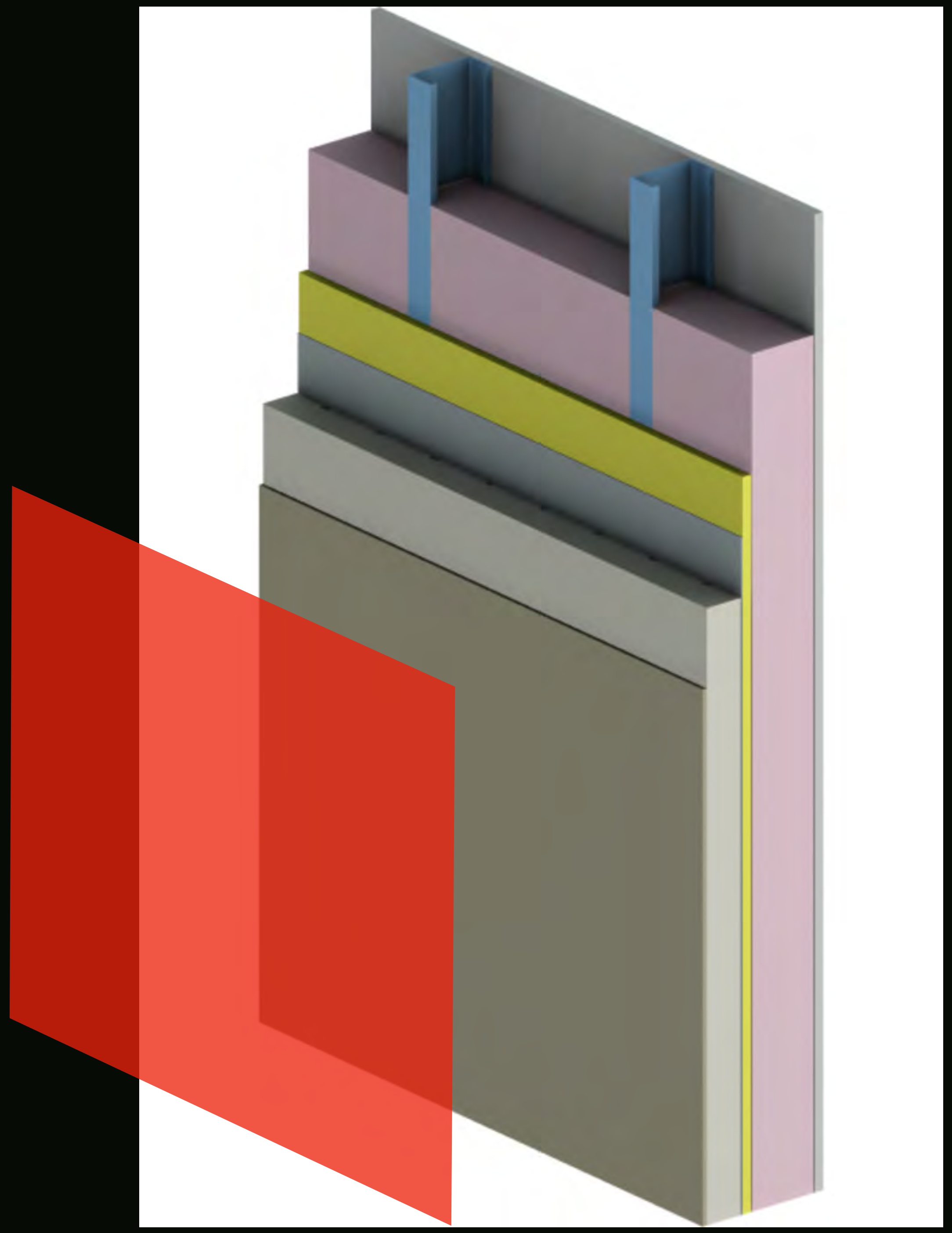
Point

χ Watts • °K

chi

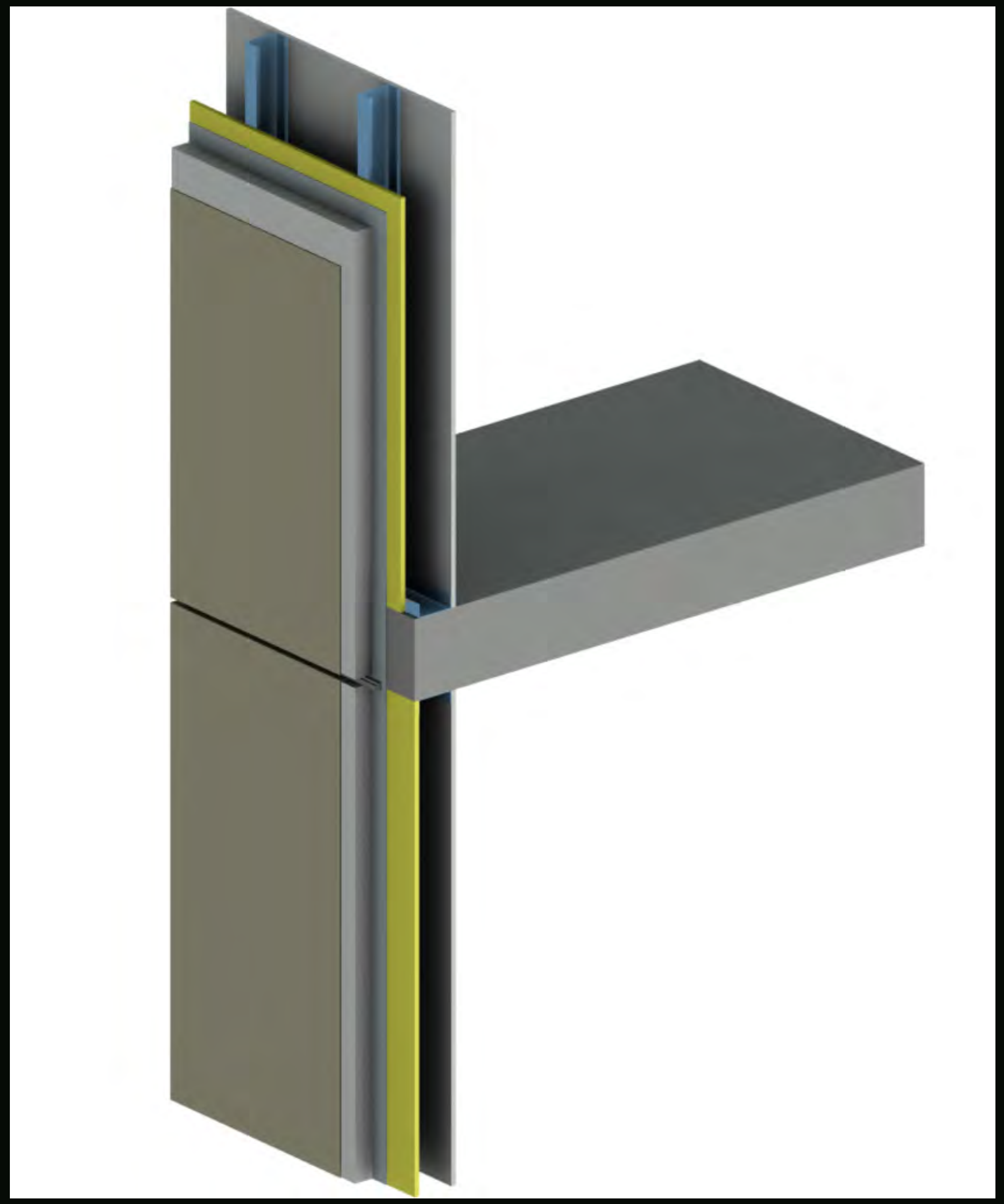
©

Types of Transmittances



Clear Field

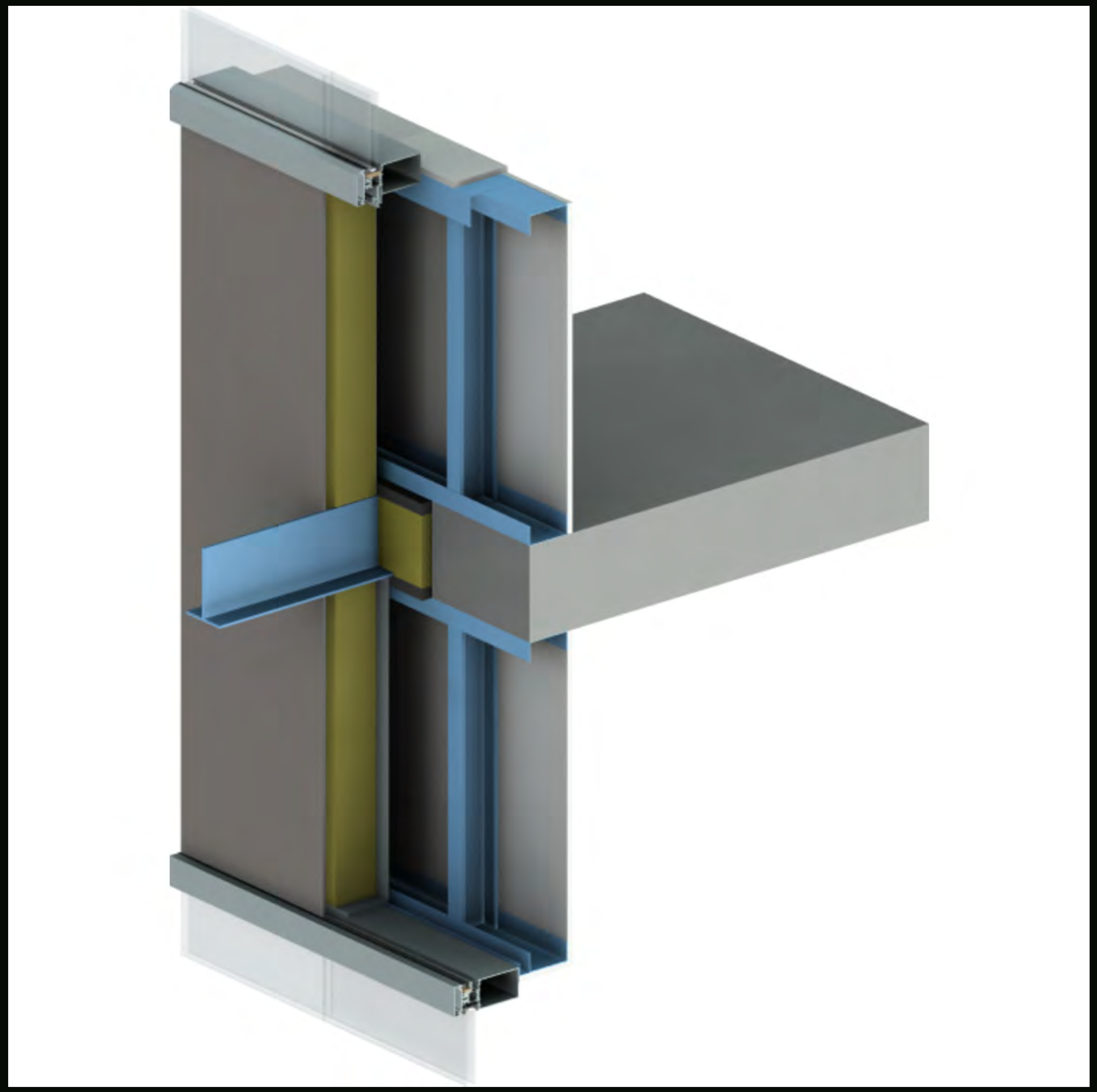
U_0 Watts / M² • °K



Linear

Ψ Watts / M • °K

psi



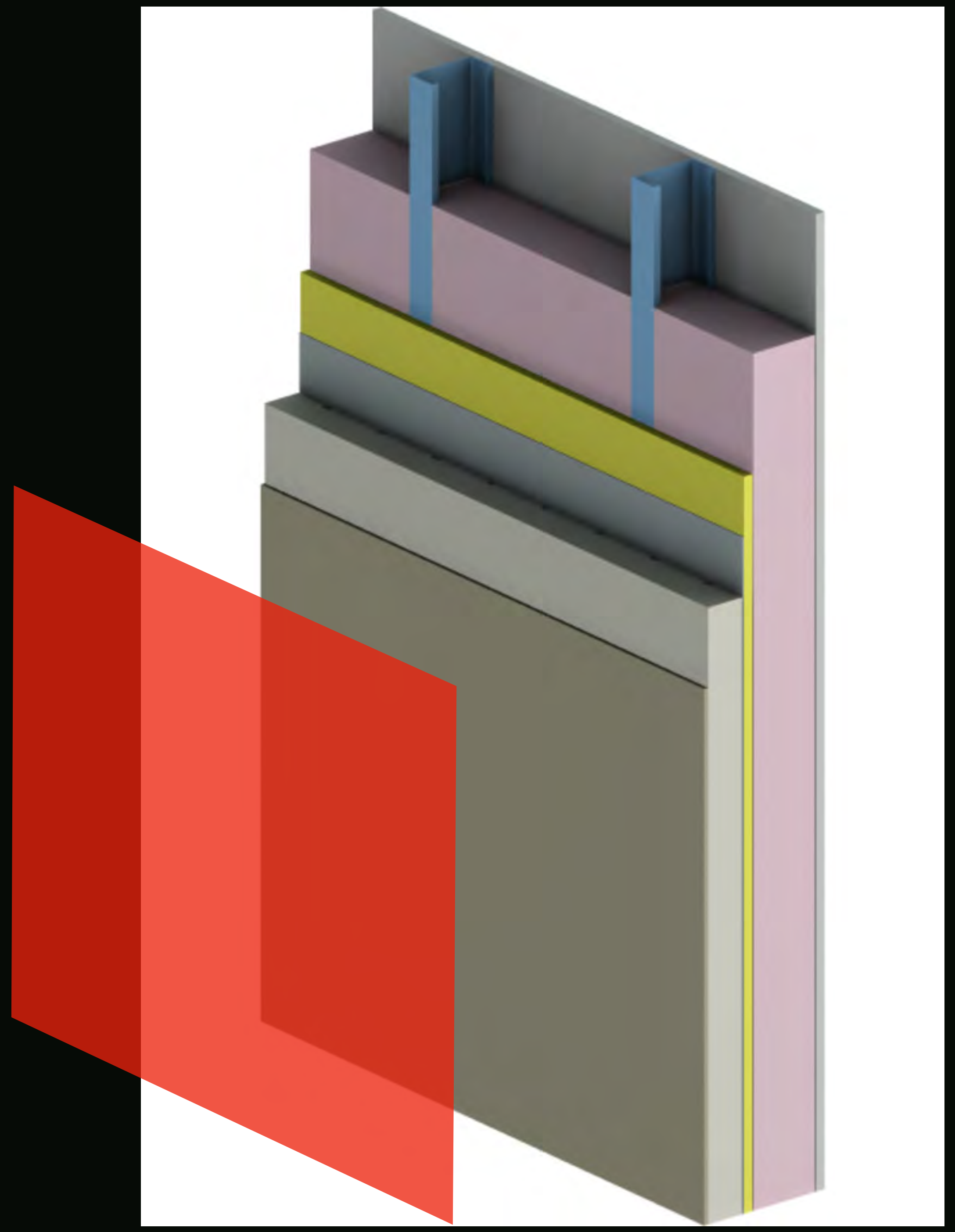
Point

χ Watts • °K

chi

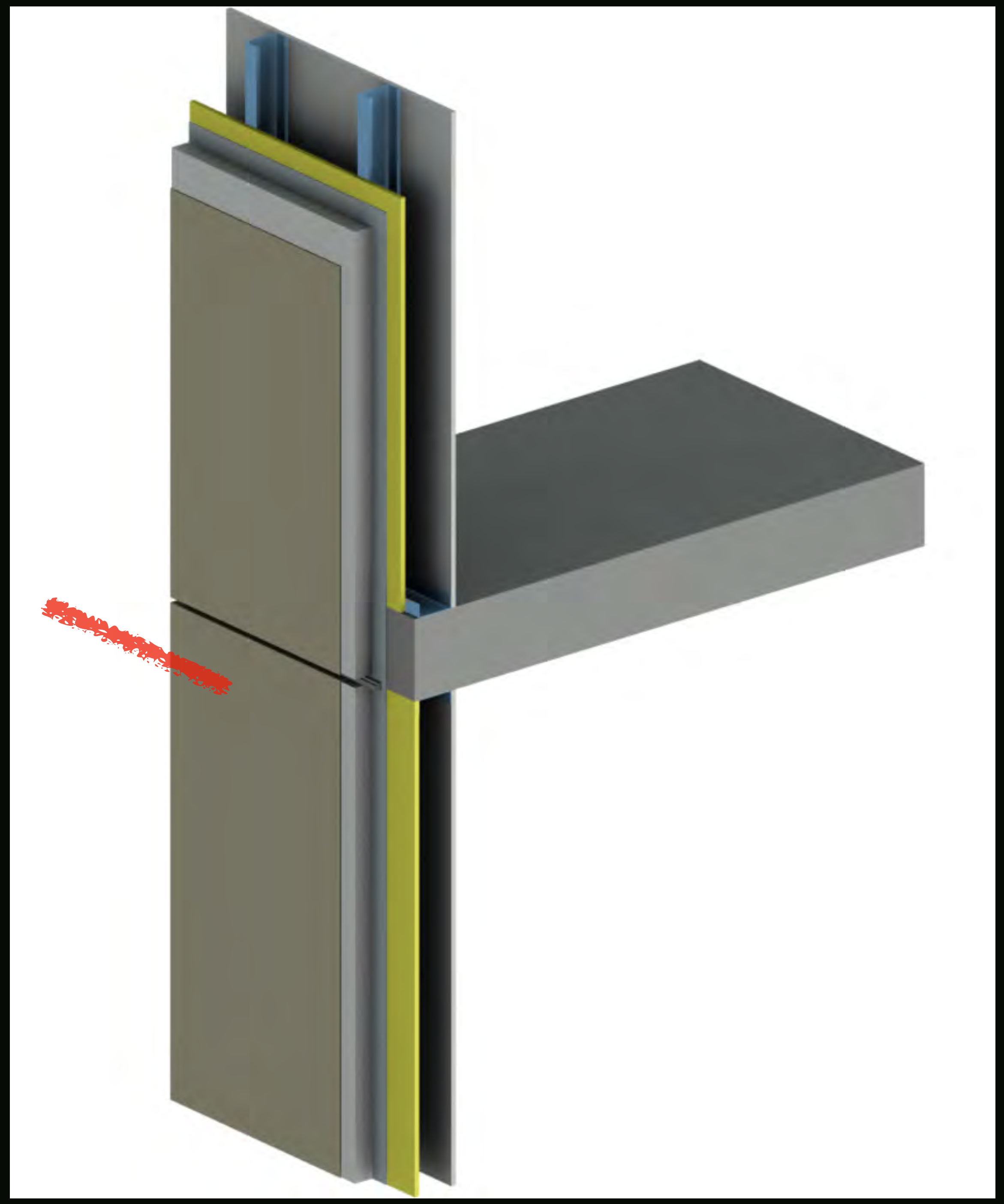
©

Types of Transmittances



Clear Field

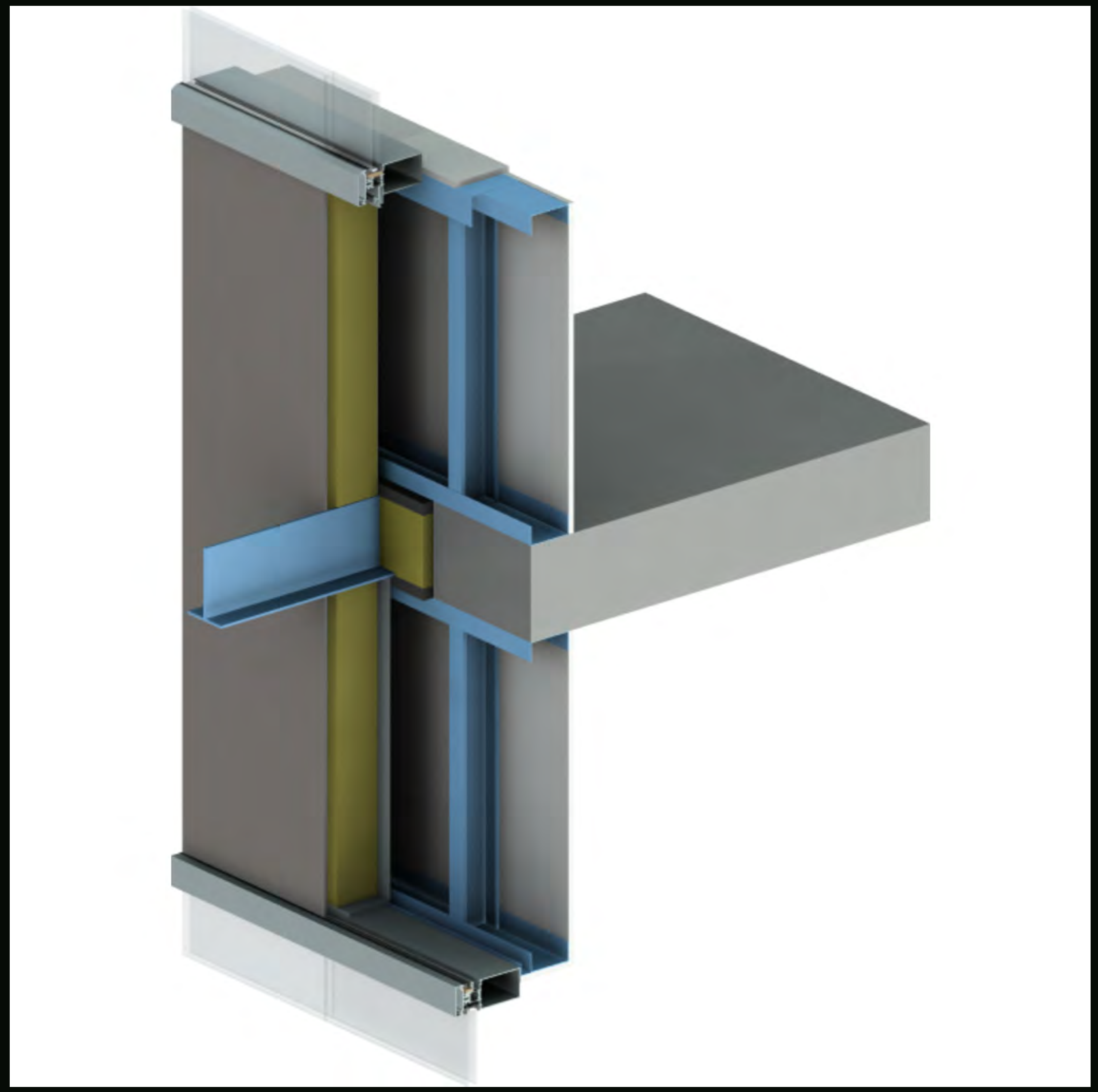
U_0 Watts / M² • °K



Linear

Ψ Watts / M • °K

psi



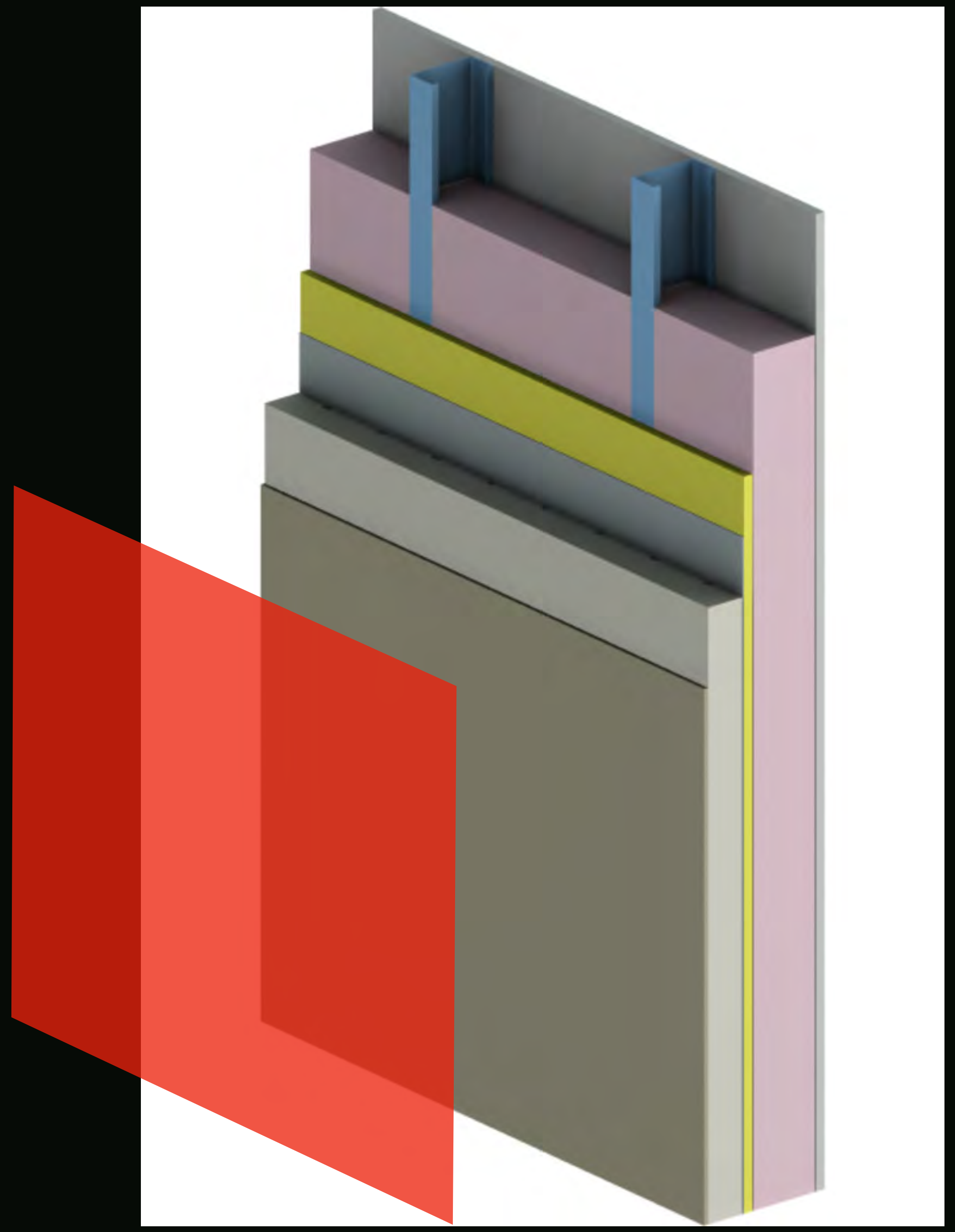
Point

χ Watts • °K

chi

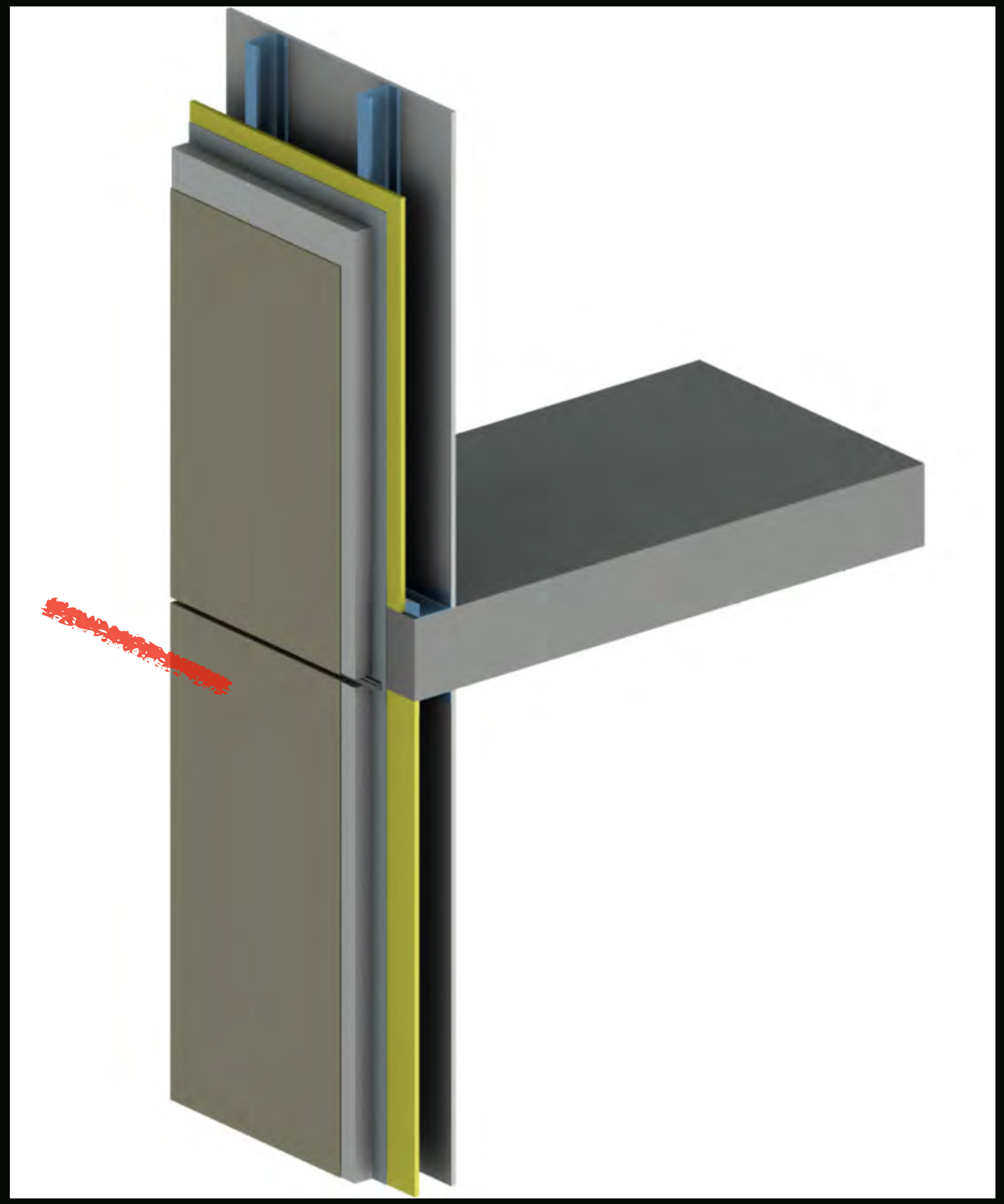
©

Types of Transmittances



Clear Field

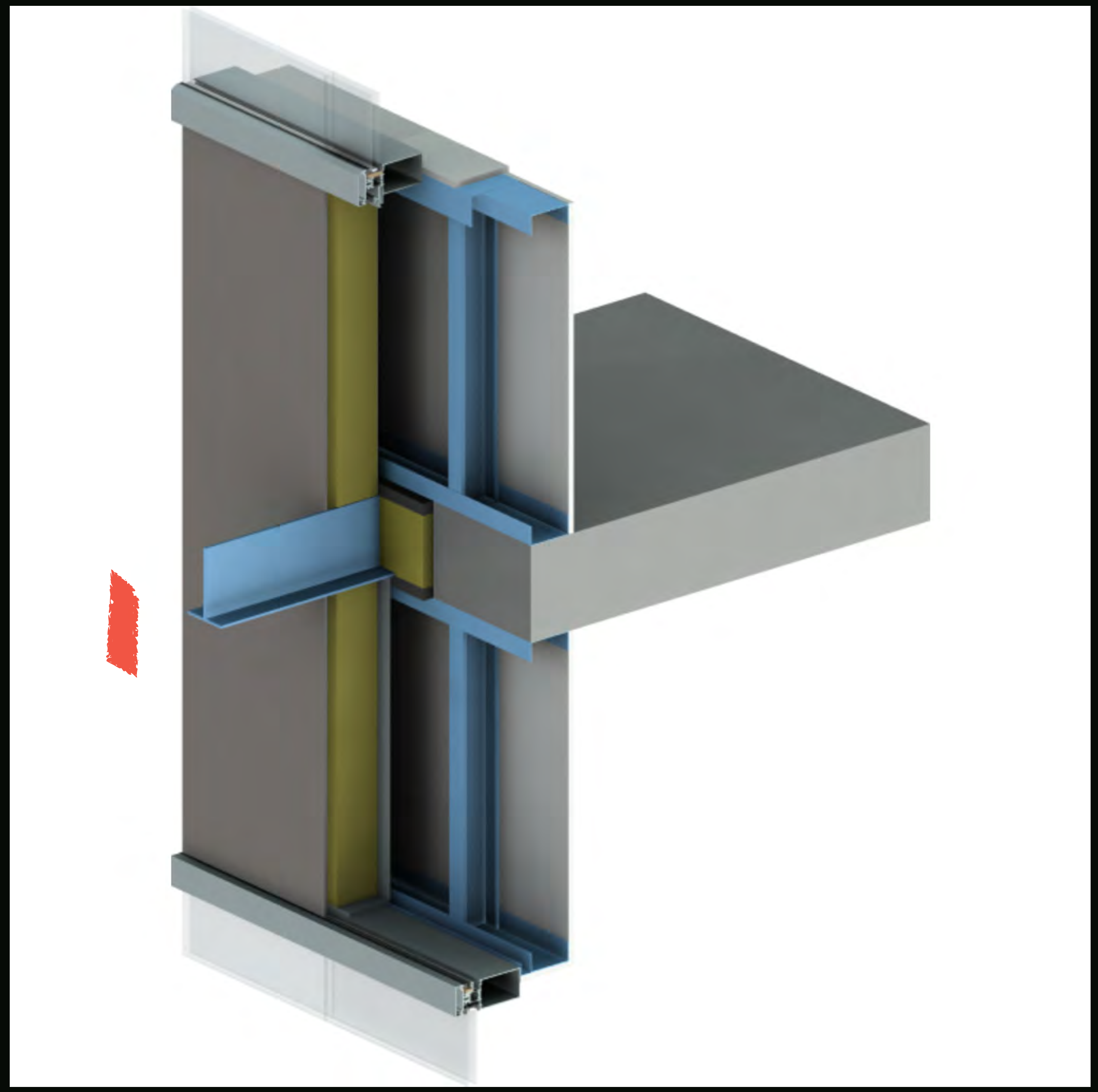
U_0 Watts / M² • °K



Linear

Ψ Watts / M • °K

psi



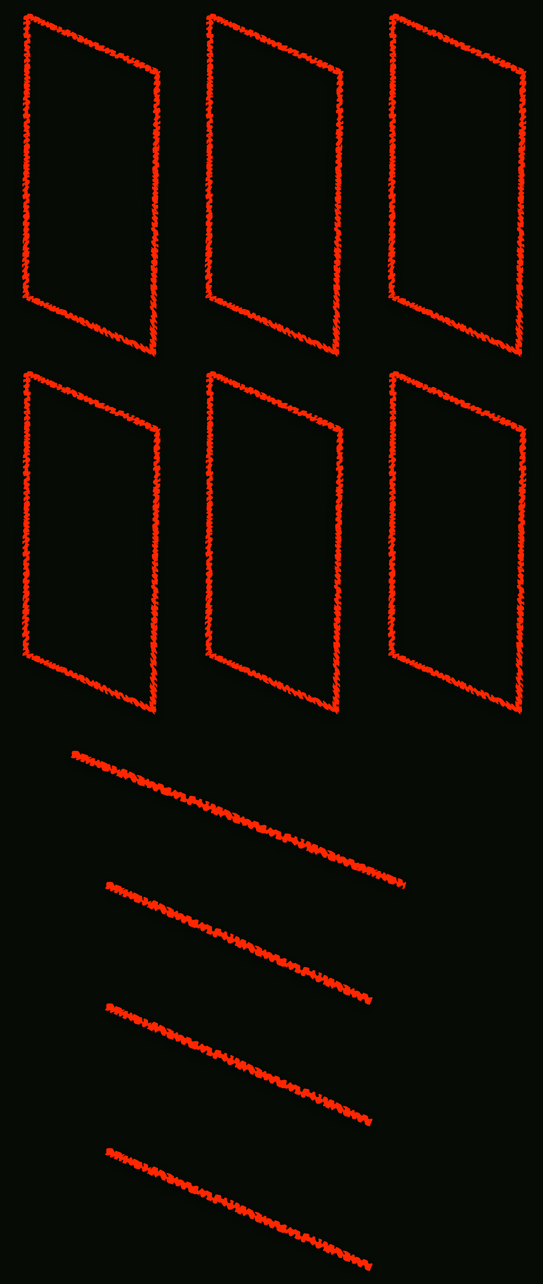
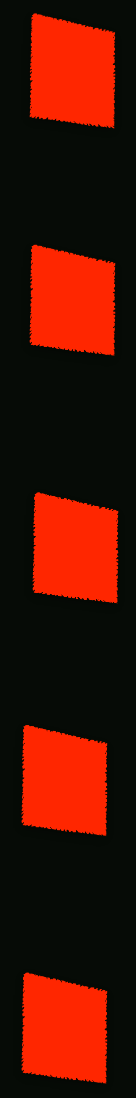
Point

χ Watts • °K

chi

©

Arithmetic

 +  +  = **Energy Loss**

Total Watts

Watts / M^2 • °K	Watts / M • °K	Watts • °K
U_0	Ψ	χ

©

Building Envelope Thermal Bridging Guide

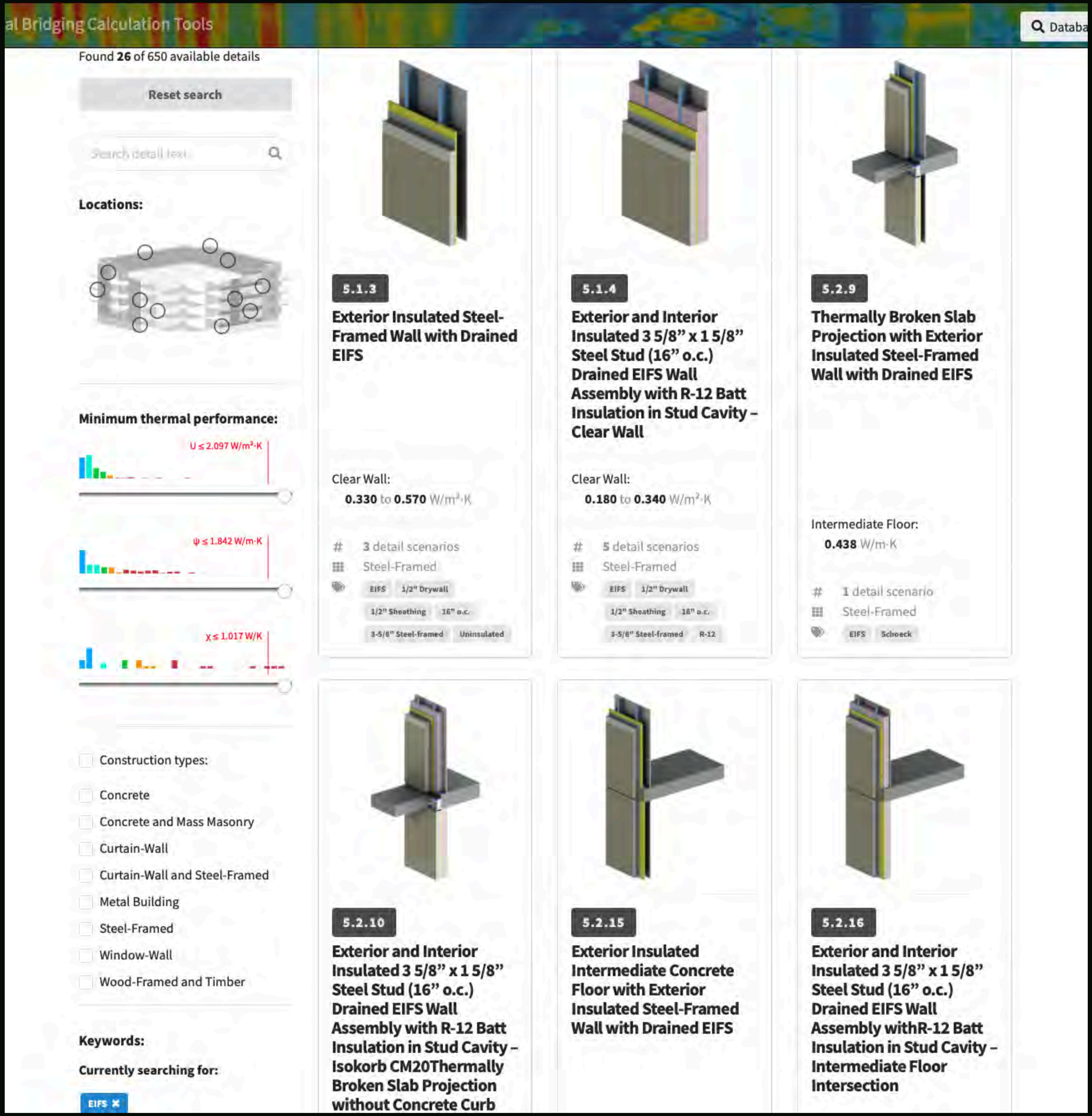
www.thermalenvelope.ca

©


Database | Collections | Help
Thermal Envelope
Interactive Thermal Bridging Calculation Tools
Welcome to Thermal Envelope
Thermal Envelope helps practitioners account for thermal bridging by providing comprehensive evaluations and calculations for building envelope thermal performance in new and existing construction.
Hover over the building and click to explore the database

©

BETB Guide
EIFS



©

BETB Guide

EIFS

- 650 preloaded details with calculations
- EIFS Council of Canada supported guide and has 26 details included.
- All are EIFS with GDDC

©

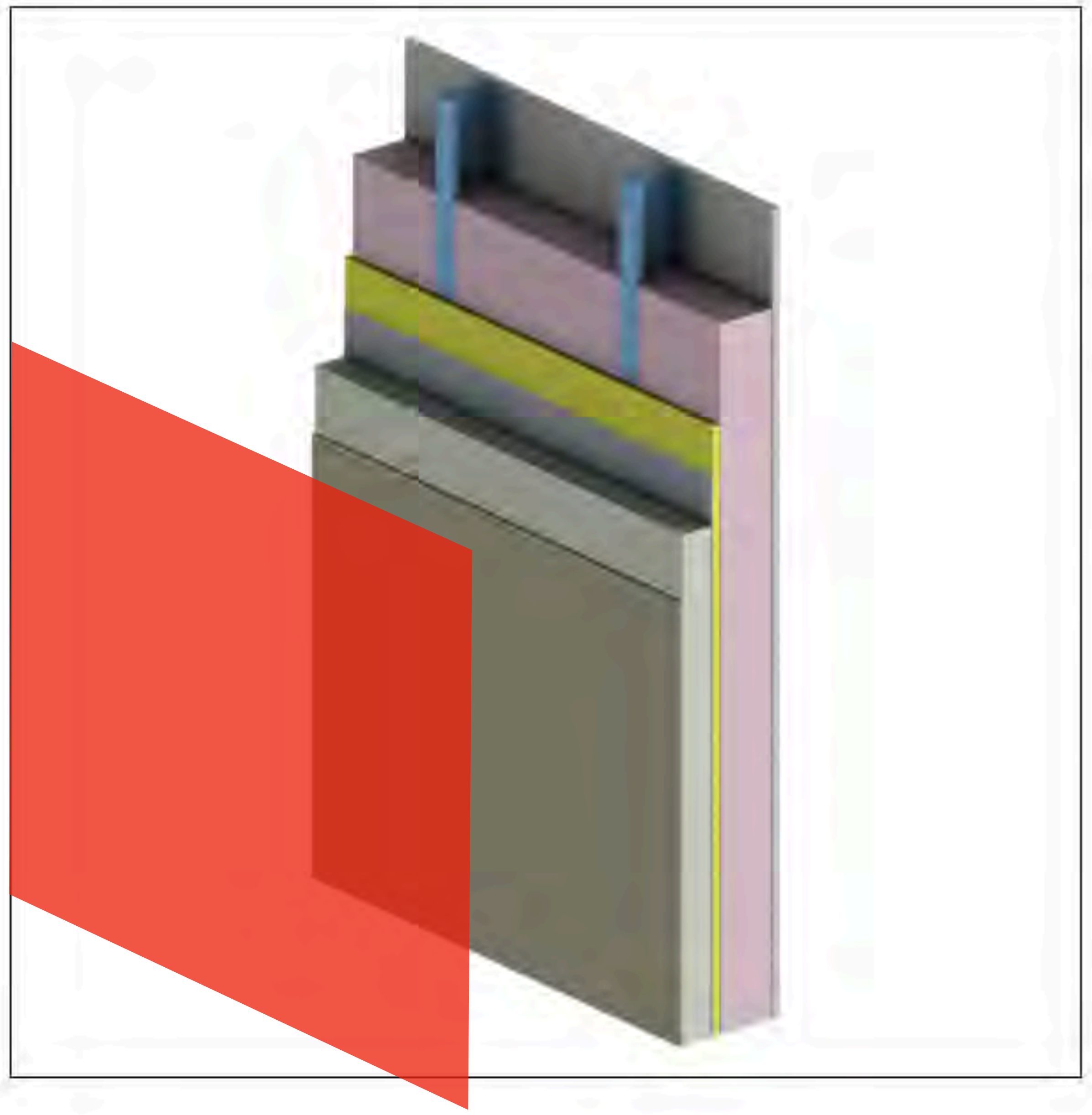
BETB Guide

EIFS

- 650 preloaded details with calculations
- EIFS Council of Canada supported guide and has 26 details included.
- All are EIFS with GDDC
- Pick example 5.1.4

©

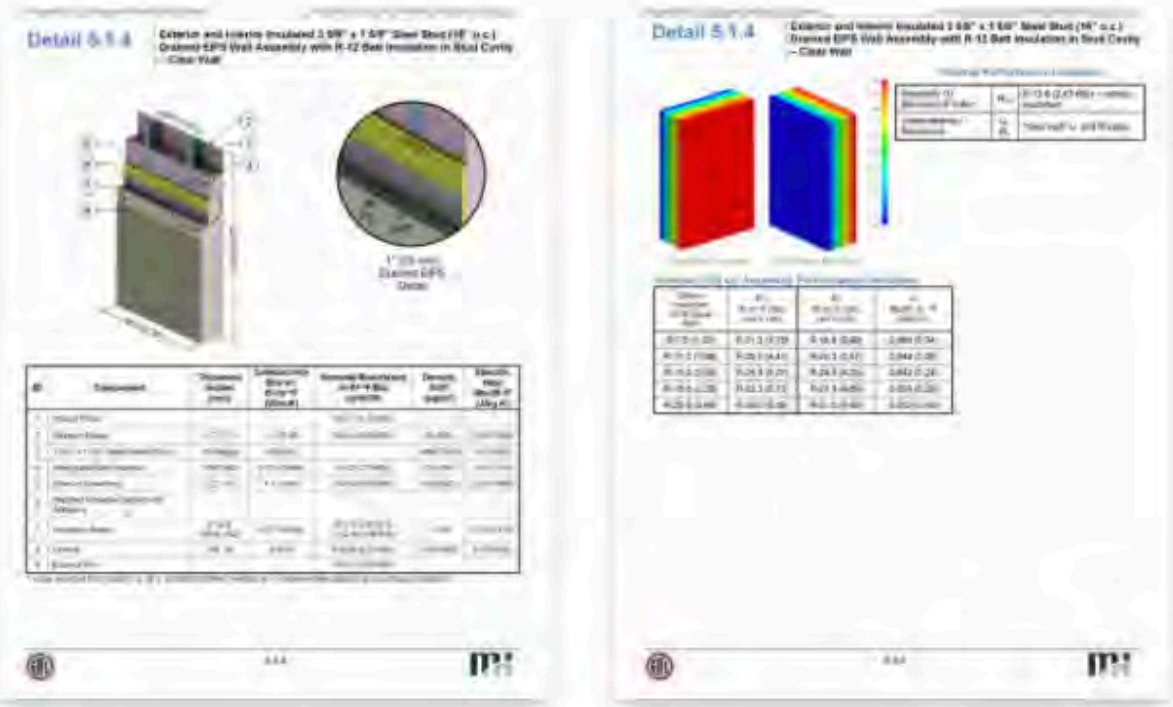
Detail **5.1.4** 1/2" Sheathing 16" o.c. 1/2" Drywall 3-5/8" Steel-framed R-12 EIFS



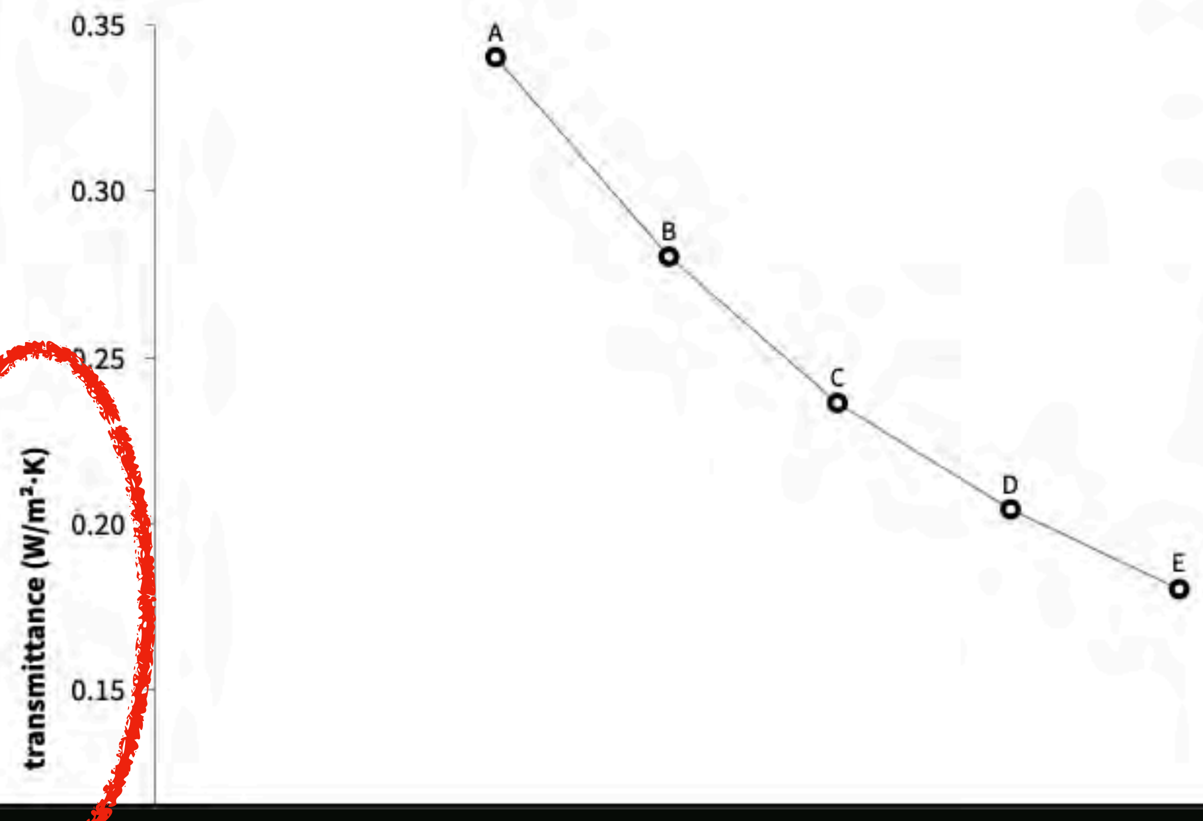
Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly with R-12 Batt Insulation in Stud Cavity – Clear Wall

Overall properties:

Transmittance ranges:	
Clear Wall	**0.180** to **0.340** W/m²·K
Construction types	Steel-Framed



Clear Wall Scenarios



Constant properties

The following parameters are constant across the scenarios for this detail.

406 mm	horizontal spacing of framing and secondary attachments
RSI **2.11**	interior/cavity insulation

Scenarios Showing 5 of 5

sub-reference	exterior insulation	clear field effective R-value	clear field transmittance
A	**1.32**	**2.94**	**0.340**
B	**1.99**	**3.57**	**0.280**
C	**2.64**	**4.24**	**0.236**
D	**3.31**	**4.90**	**0.204**
E	**3.96**	**5.56**	**0.180**

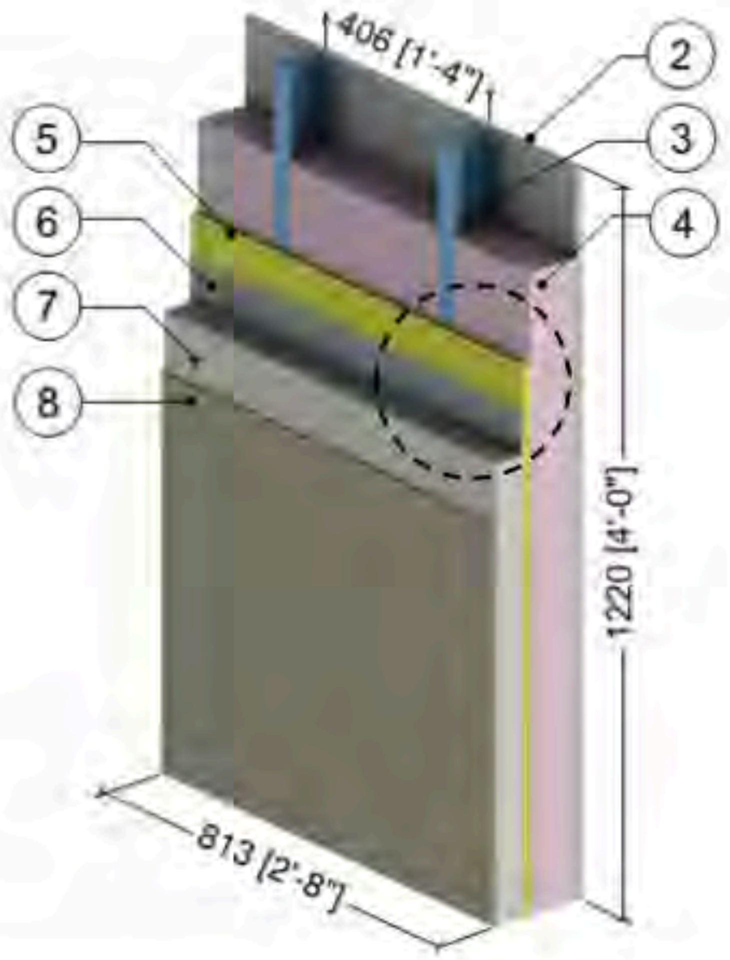
©

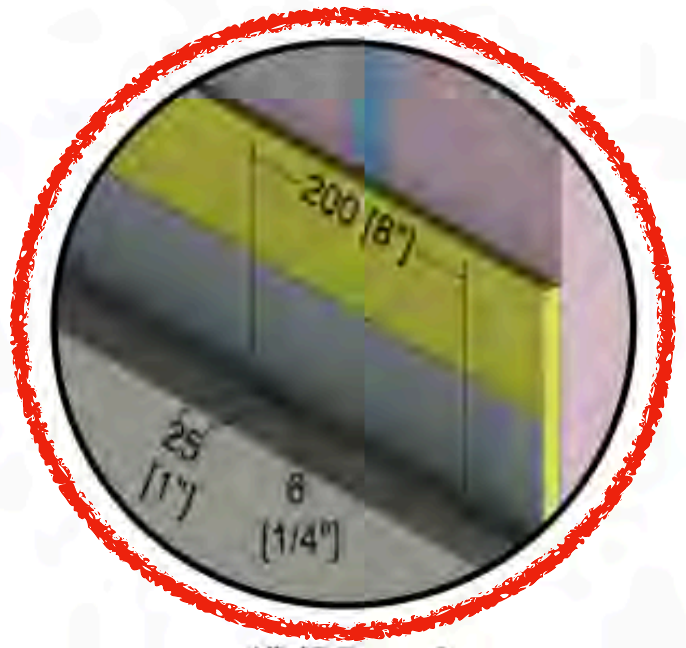
Nitty Gritty

- Detailed information for assembly
- Includes insulation thickness of 50 to 152 mm
- Identifies generic GDDC
- All EIFS are tested to meet ULC S 716.1 and ULC S134

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





1" (25 mm) Drained EIFS Detail

ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs (16"o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8" (92)	0.31 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Weather Resistive Barrier with Adhesive	-	-	-	-	-
7	Insulation Board	2" to 6' (50 to 152)	0.27 (0.038)	R-7.5 to R-22.5 (1.32 to 3.96 RSI)	1 (16)	0.35 (1470)
8	Lamina	1/8" (4)	6 (0.9)	R-0.04 (0.01 RSI)	120 (1922)	0.20 (850)
9	Exterior Film[1]	-	-	R-0.2 (0.03 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation

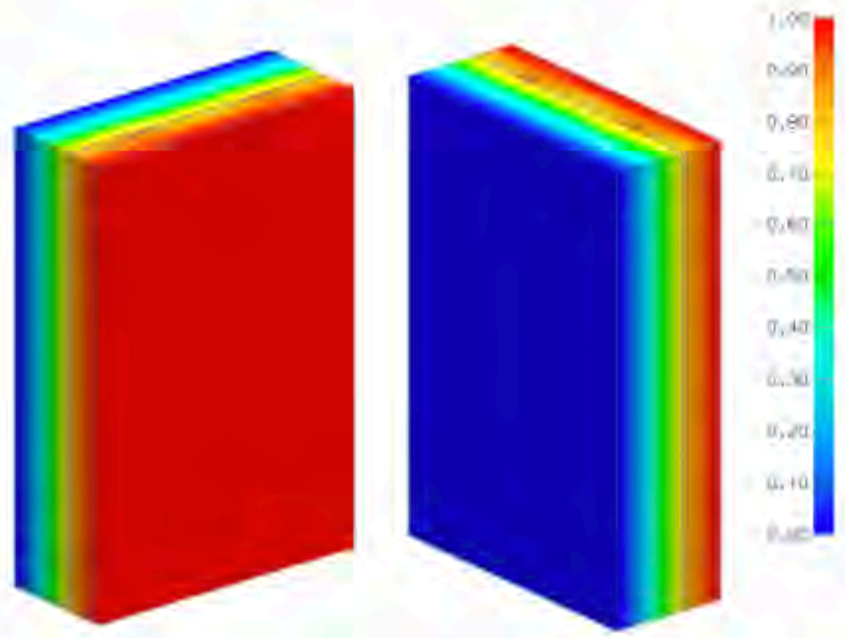
Thermal Transmittance

$U_0 = W/m^2 \cdot °K$

- Indication of thermal performance from modelling
- Effect of studs is minor
- Data from 5.1.3   (no batts)

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



View from Interior   View from Exterior

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

Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft²·hr·°F / Btu (m² K / W)	R_o ft²·hr·°F / Btu (m² K / W)	U_o Btu/ft² ·hr ·°F (W/m² 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)

Comparison: Detail 5.1.3 (no batts)

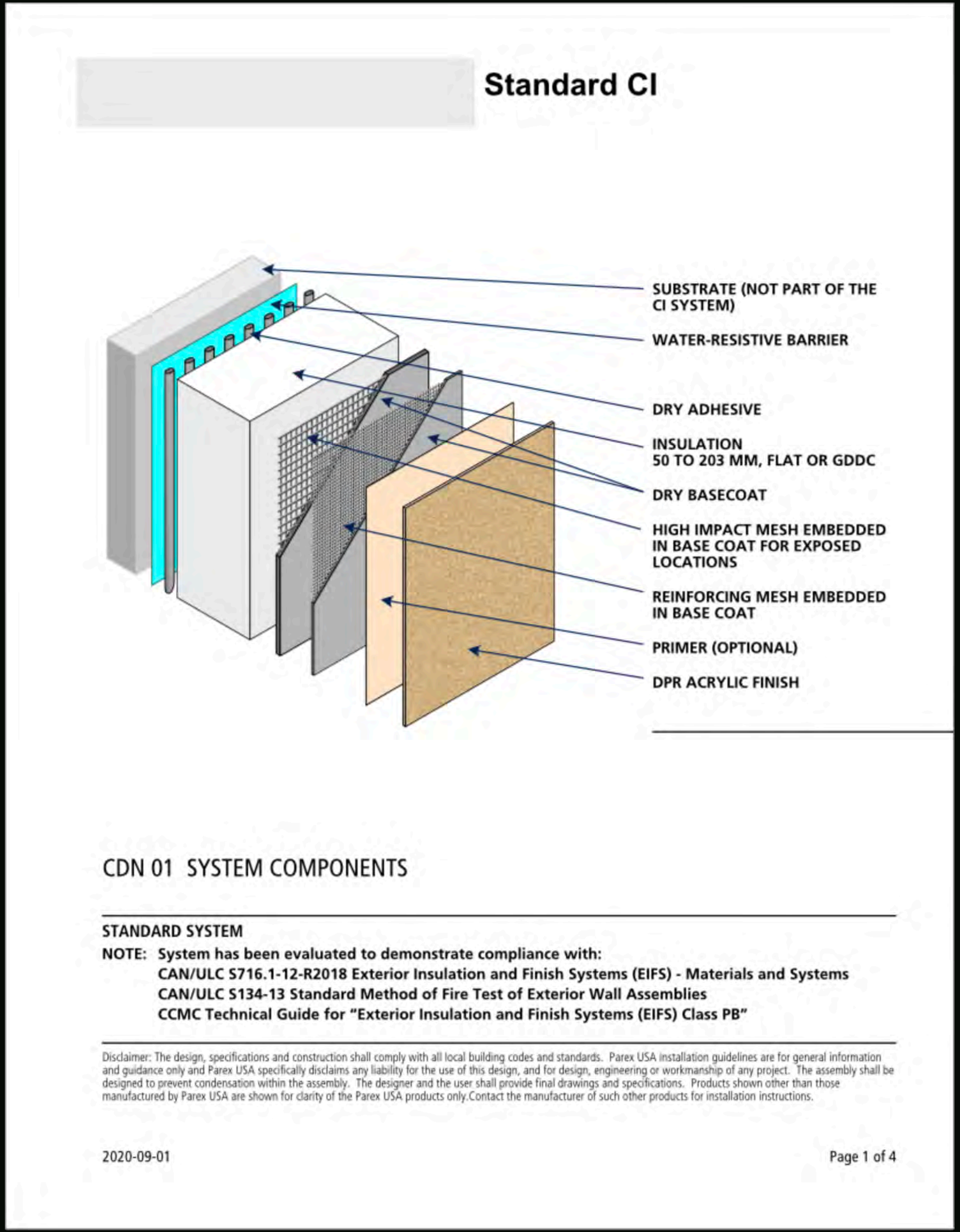
Nominal (1D) vs. Assembly Performance Indicators

Exterior Insulation 1D R-Value (RSI)	R_{1D} ft²·hr·°F / Btu (m² K / W)	R_o ft²·hr·°F / Btu (m² K / W)	U_o Btu/ft² ·hr ·°F (W/m² 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)

Manufacturer Details

Value added ?

- Generic details
- Page 1: Materials



Standard CI

SUBSTRATE (NOT PART OF THE CI SYSTEM)
WATER-RESISTIVE BARRIER
DRY ADHESIVE
INSULATION 50 TO 203 MM, FLAT OR GDDC
DRY BASECOAT
HIGH IMPACT MESH EMBEDDED IN BASE COAT FOR EXPOSED LOCATIONS
REINFORCING MESH EMBEDDED IN BASE COAT
PRIMER (OPTIONAL)
DPR ACRYLIC FINISH

CDN 01 SYSTEM COMPONENTS

STANDARD SYSTEM

NOTE: System has been evaluated to demonstrate compliance with:
CAN/ULC S716.1-12-R2018 Exterior Insulation and Finish Systems (EIFS) - Materials and Systems
CAN/ULC S134-13 Standard Method of Fire Test of Exterior Wall Assemblies
CCMC Technical Guide for "Exterior Insulation and Finish Systems (EIFS) Class PB"

Disclaimer: The design, specifications and construction shall comply with all local building codes and standards. Parex USA installation guidelines are for general information and guidance only and Parex USA specifically disclaims any liability for the use of this design, and for design, engineering or workmanship of any project. The assembly shall be designed to prevent condensation within the assembly. The designer and the user shall provide final drawings and specifications. Products shown other than those manufactured by Parex USA are shown for clarity of the Parex USA products only.Contact the manufacturer of such other products for installation instructions.

2020-09-01 Page 1 of 4

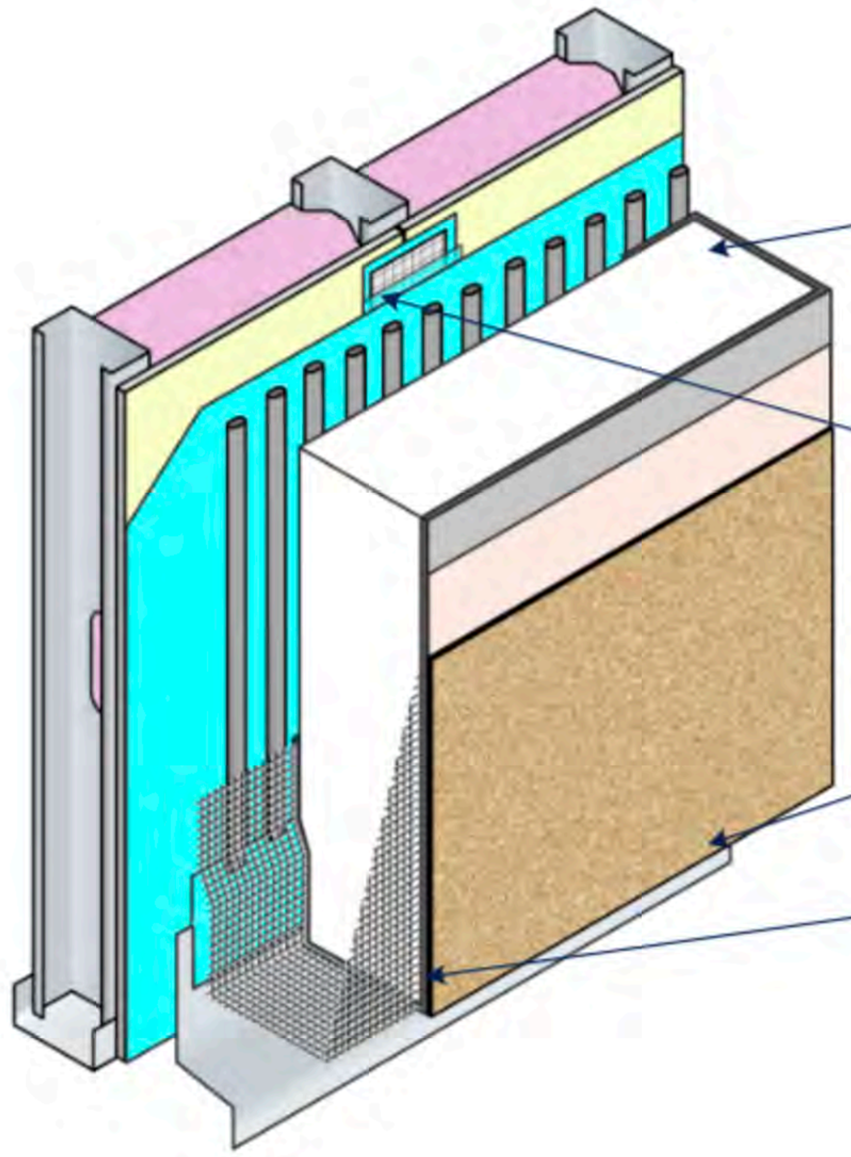
©

Manufacturer Details

Value added ?

- Generic details
- Page 1: Materials
- Page 2: Basic information

Standard CI



The Standard CI system is installed in accordance with ULC S716.2 and the Canadian Application Guide (April 2020).

The CI system insulation is evaluated to 203 mm thick. Additional cavity insulation may be used if desired. Around window openings additional insulation is recommended (See details CDN W1.05, W1.06 and W1.07)

The water-resistive barrier and joint treatment is part of the CI system. Accessories such as flashing or connecting membranes for other cladding assemblies are not part of the system

The system is designed to drain incidental moisture that penetrates the system to the exterior.

The CI system requires wrapping with base coat and reinforcing mesh at terminations to encapsulate the insulation and provide a surface to which sealant may be applied.

CDN G1.01 SYSTEM COMPONENTS

STANDARD CI SYSTEM

NOTE: When additional insulation is added to the cavity the designer must calculate the likelihood of condensation occurring in the interstitial spaces and whether a vapour barrier is required to minimize condensation. The wall structure, cavity insulation (if used), substrate, sealants and flashing are not part of the Standard CI system.

Disclaimer: The design, specifications and construction shall comply with all local building codes and standards. installation guidelines are for general information and guidance only and specifically disclaims any liability for the use of this design, and for design, engineering or workmanship of any project. The assembly shall be designed to prevent condensation within the assembly. The designer and the user shall provide final drawings and specifications. Products shown other than those manufactured by are shown for clarity of the products only.Contact the manufacturer of such other products for installation instructions.

2020-09-01 Page 2 of 4

©

Manufacturer Details

Value added ?

- Generic details
- Page 1: Materials
- Page 2: Basic information
- Page 3: Thermal performance
- Note: corners have a linear transmittance value Ψ

Standard CI

CLEAR WALL VALUE U_0 (W/m²K)			
Insulation thickness	Stud wall with cavity insulation	Stud wall without cavity insulation	Concrete wall
50 mm	0.34	0.57	—
75 mm	—	0.41	—
100 mm	0.24	0.33	0.32

OUTSIDE CORNERS Ψ (W/mK)			
Insulation thickness	Stud wall with cavity insulation	Stud wall without cavity insulation	Concrete wall
50 mm	0.067	0.105	—
75 mm	–	0.088	—
100 mm	0.054	0.076	0.147

Clear wall and linear transmittance values calculated for EIFS assemblies. "Thermal and Whole Building Energy Performance of Exterior Insulated Finishing Systems Assemblies', Appendix C , Morrison Hershfield Report No. 5130962 for the EIFS Council of Canada, May 26, 2014.

CDN G1.01 SYSTEM COMPONENTS

STANDARD WATERMASTER CI SYSTEM

NOTE: Thermal bridging data shows clear wall values. Morrison Hershfield Report No. 5130962.00 May 26, 2014 is available at: http://eifscouncil.org/downloads

Building Envelope Thermal Bridging Guide with a thermal calculator is available at: https://betb.ca

Disclaimer: The design, specifications and construction shall comply with all local building codes and standards. installation guidelines are for general information and guidance only and specifically disclaims any liability for the use of this design, and for design, engineering or workmanship of any project. The assembly shall be designed to prevent condensation within the assembly. The designer and the user shall provide final drawings and specifications. Products shown other than those manufactured by are shown for clarity of the products only.Contact the manufacturer of such other products for installation instructions.

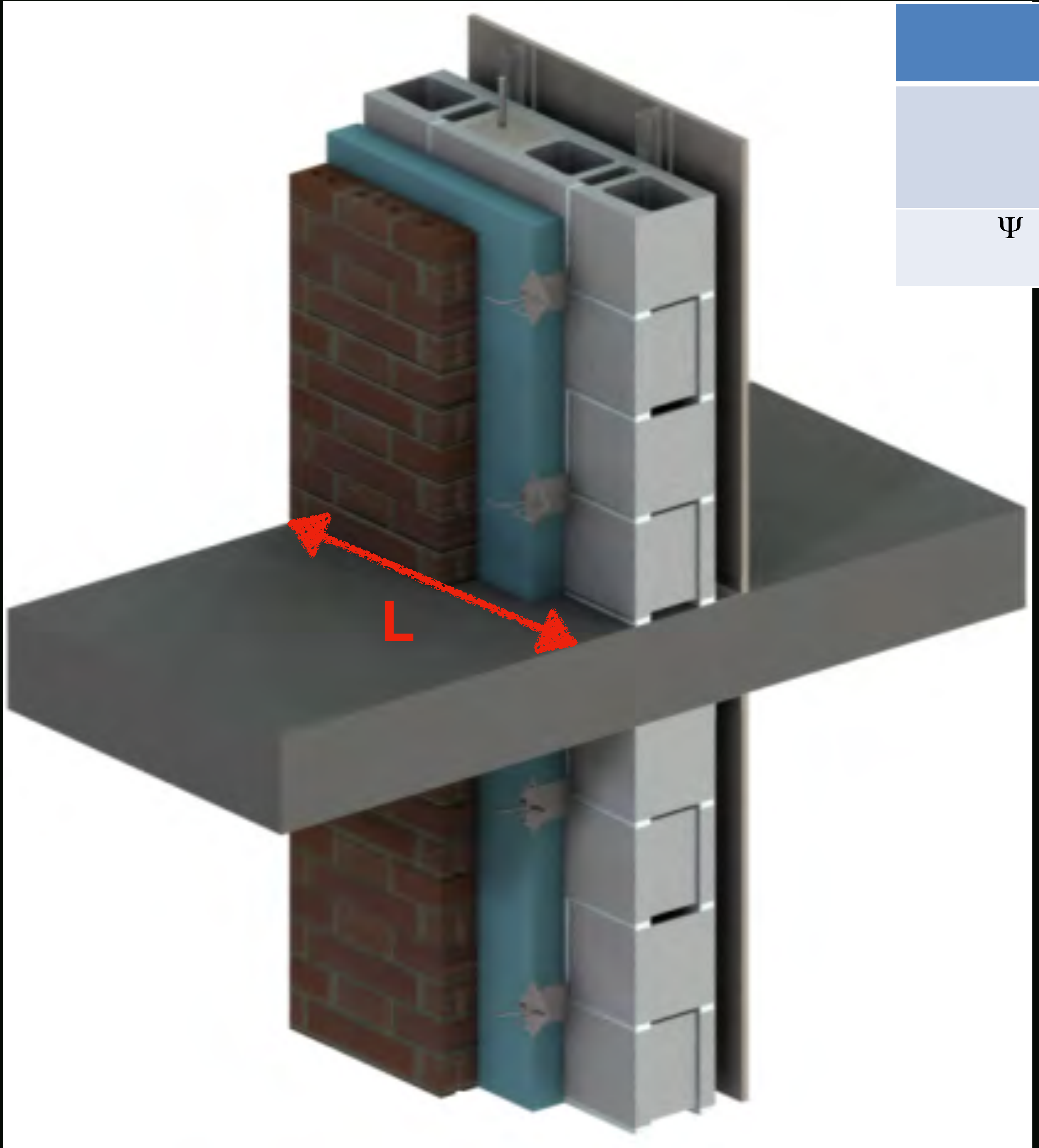
© JOHN R.S. EDGAR CONSULTING

Linear Transmittance

Ψ W / m·K°

- L x 0.59 x Δt

VS



Un-Insulated Balcony Slab		
	SI (W/m·K)	**IP** (BTU/hr·ftºF)
Ψ	0.59	0.34

©

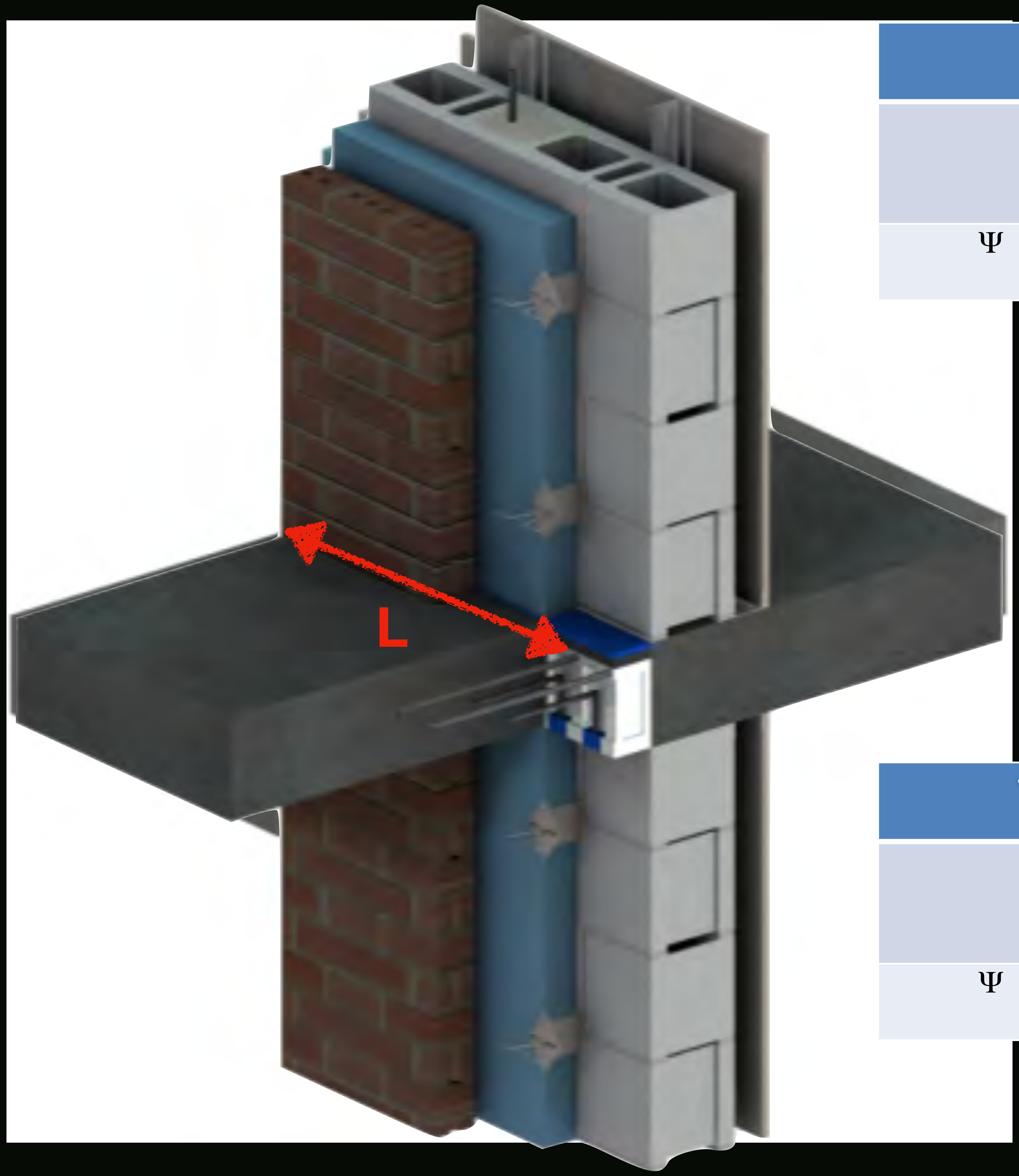
Linear Transmittance

Ψ W / m·K°

- L x 0.59 x Δt

vs

- L x 0.21 x Δt



Un-Insulated Balcony Slab		
	SI (W/m·K)	**IP** (BTU/hr·ft°F)
Ψ	0.59	0.34

Thermally Broken Balcony Slab		
	SI (W/m·K)	**IP** (BTU/hr·ft°F)
Ψ	0.21	0.12

©

Brick at slab

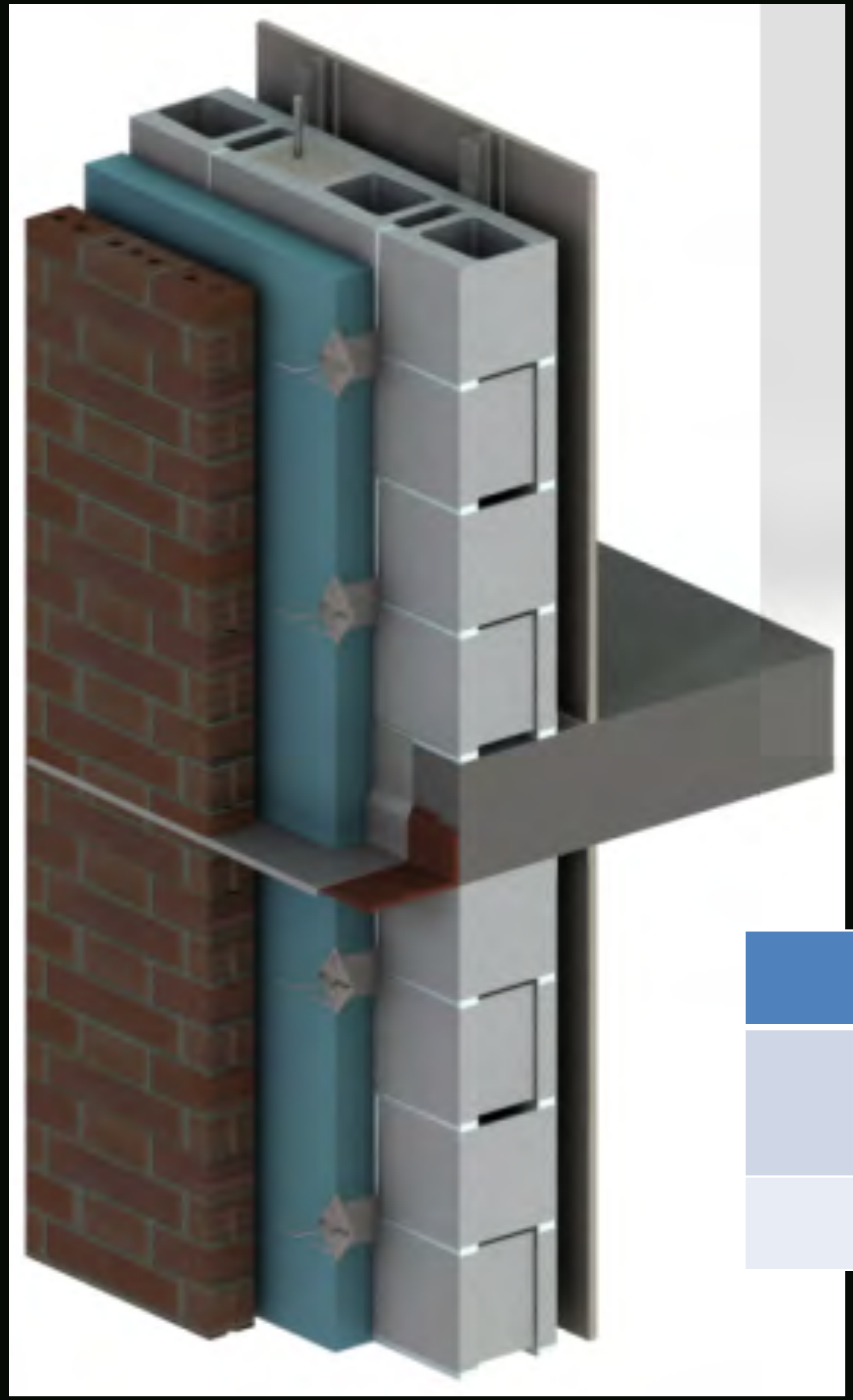
Shelf angle

'Parallel' method:

- Cross-section of steel = small
- Area of wall = large

New (code approved) method:

- Assume 10m x 3m elevation
- Angle 10m x 0.47 = 4.7 W / Δt
- Wall 30m² x 0.047 = 1.4 W / Δt



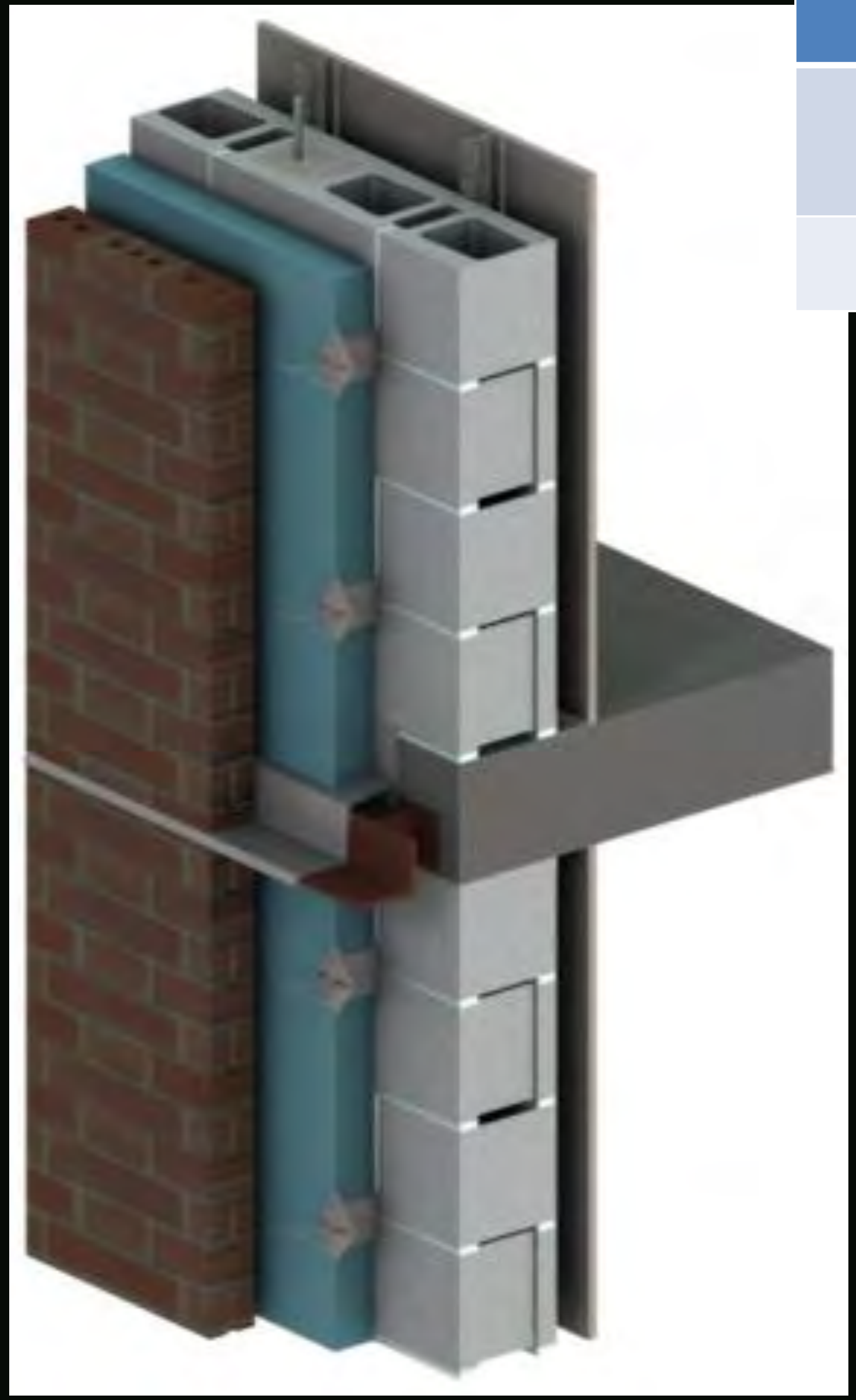
Shelf Angle		
	SI (W/m·K)	IP (BTU/hr·ft°F)
Ψ	0.47	0.27

©

Improved

Stand off shelf angle

- BETB Guide shows improved details
- Difficulty in getting projected shelf angles over 100 mm
- Gravity is the enemy of thermal performance



Spaced Shelf Angle		
	SI (W/m·K)	**IP** (BTU/hr·ft°F)
Ψ	0.31	0.18

© JOHN R.S. EDGAR CONSULTING

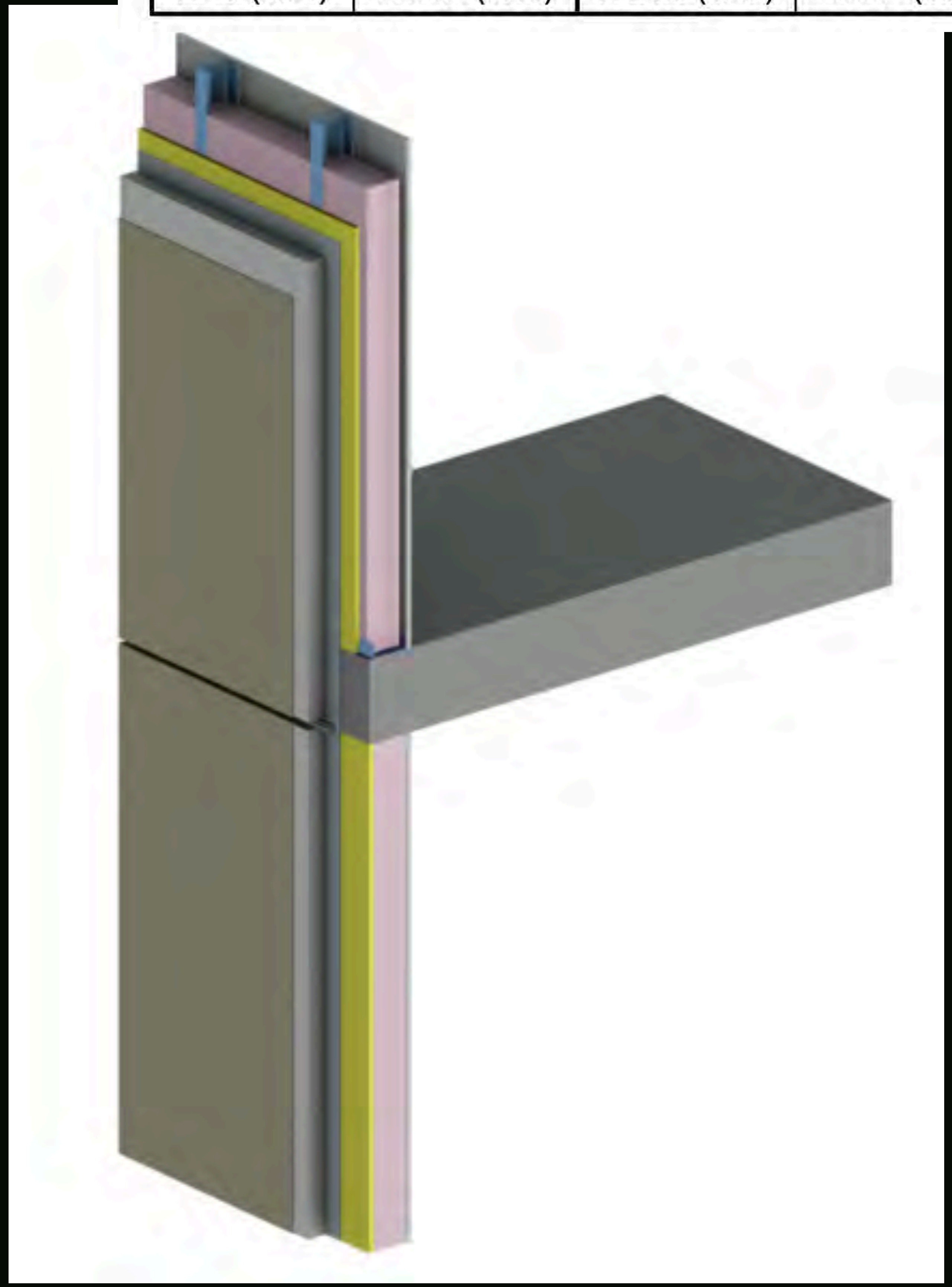
EIFS at floor slab

- Linear transmittance =

  0.032 W / m • °K

Nominal (1D) vs. Assembly Performance Indicators

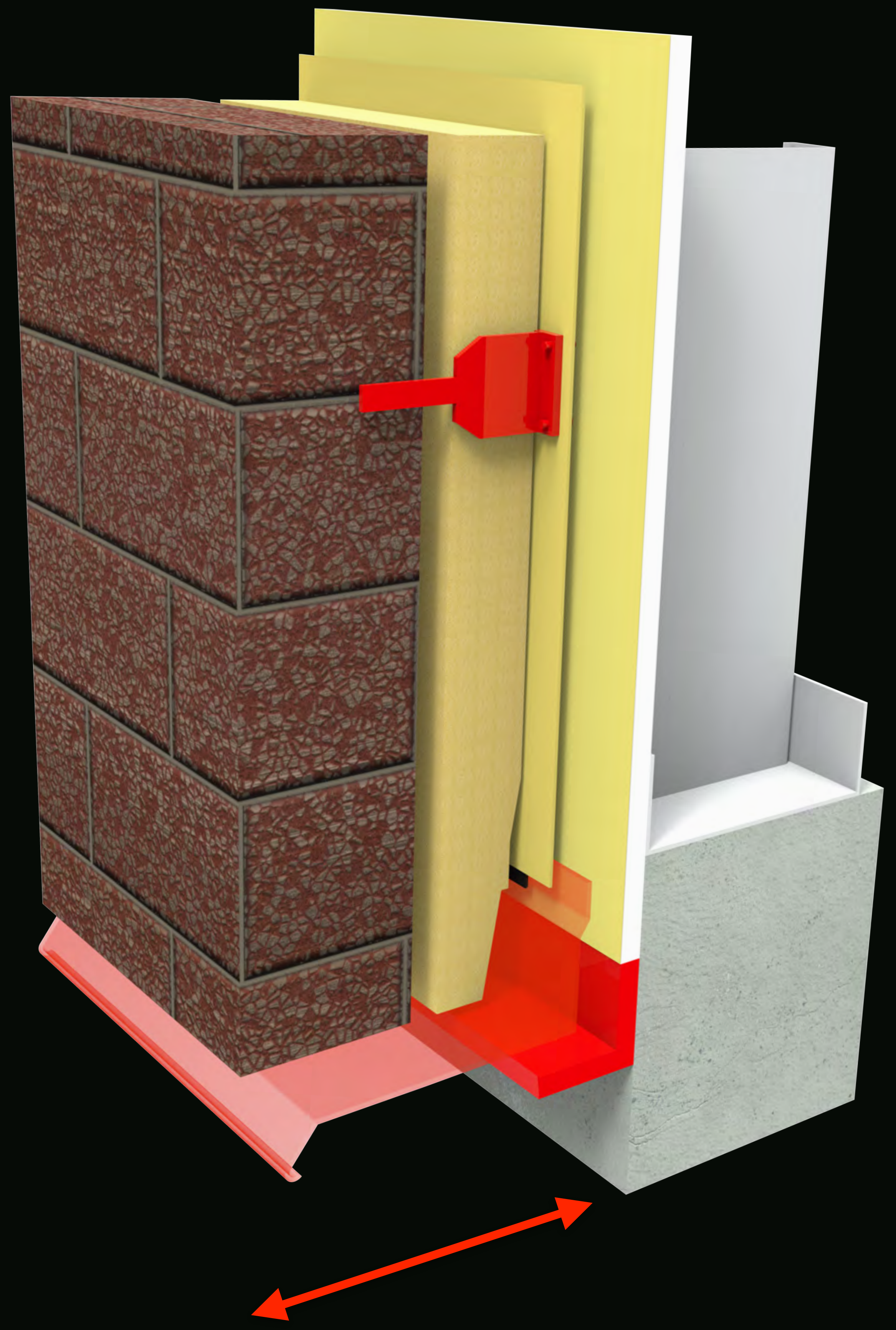
Exterior Insulation 1D R-Value (RSI)	R_{1D} ft²·hr·°F / Btu (m² K / W)	R_o ft²·hr·°F / Btu (m² K / W)	U_o Btu/ft² ·hr ·°F (W/m² K)	R ft²·hr·°F / Btu (m² K / W)	U Btu/ft² ·hr ·°F (W/m² K)	ψ Btu/ft ·hr ·°F (W/m K)
R-7.5 (1.32)	R-21.7 (3.83)	R-16.6 (2.93)	0.060 (0.34)	R-14.5 (2.55)	0.069 (0.39)	0.076 (0.132)
R-15 (2.64)	R-29.2 (5.15)	R-24.0 (4.23)	0.042 (0.24)	R-22.0 (3.88)	0.045 (0.26)	0.032 (0.056)

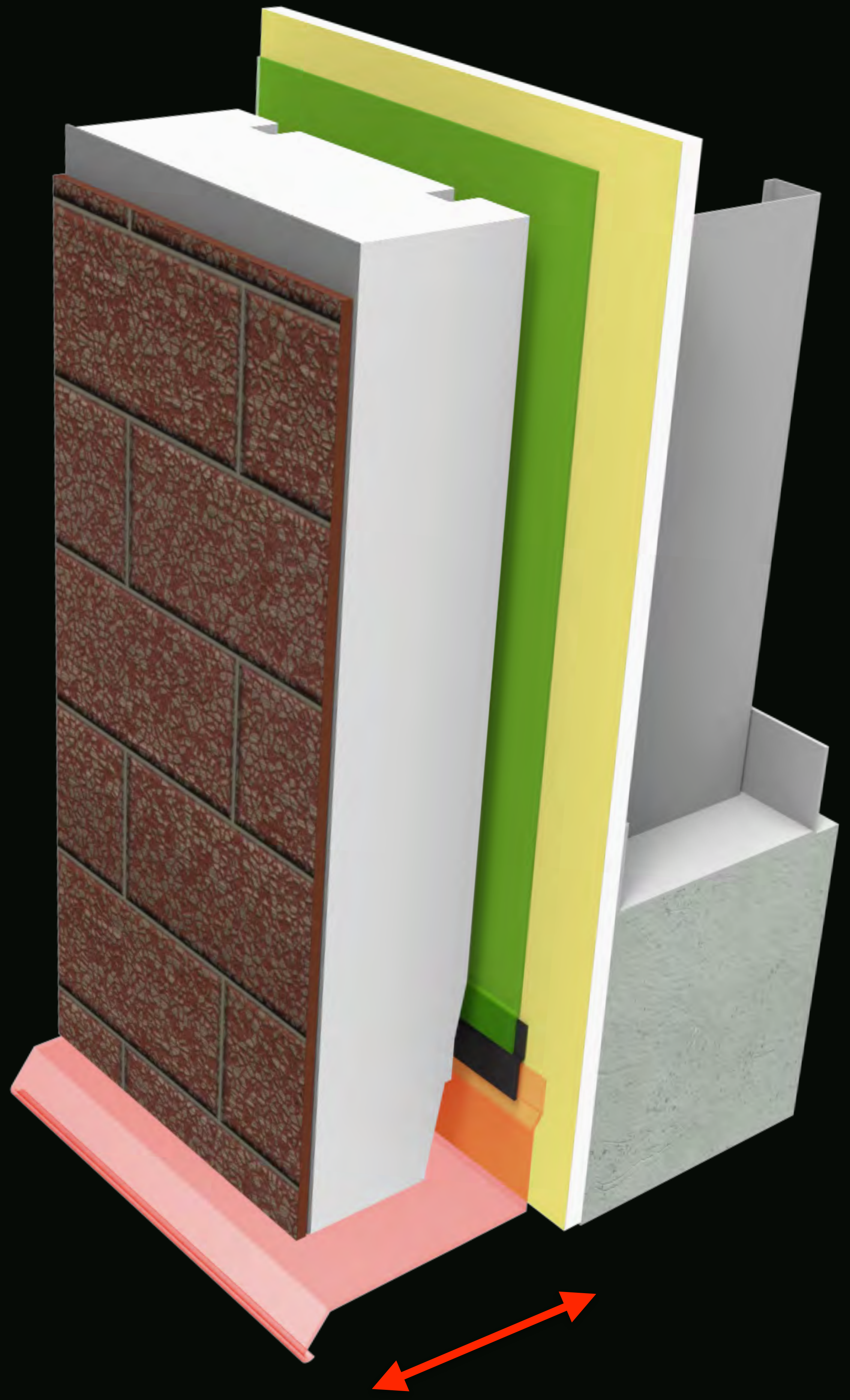


BETB Guide Detail 5.2.16

©

Differences





©

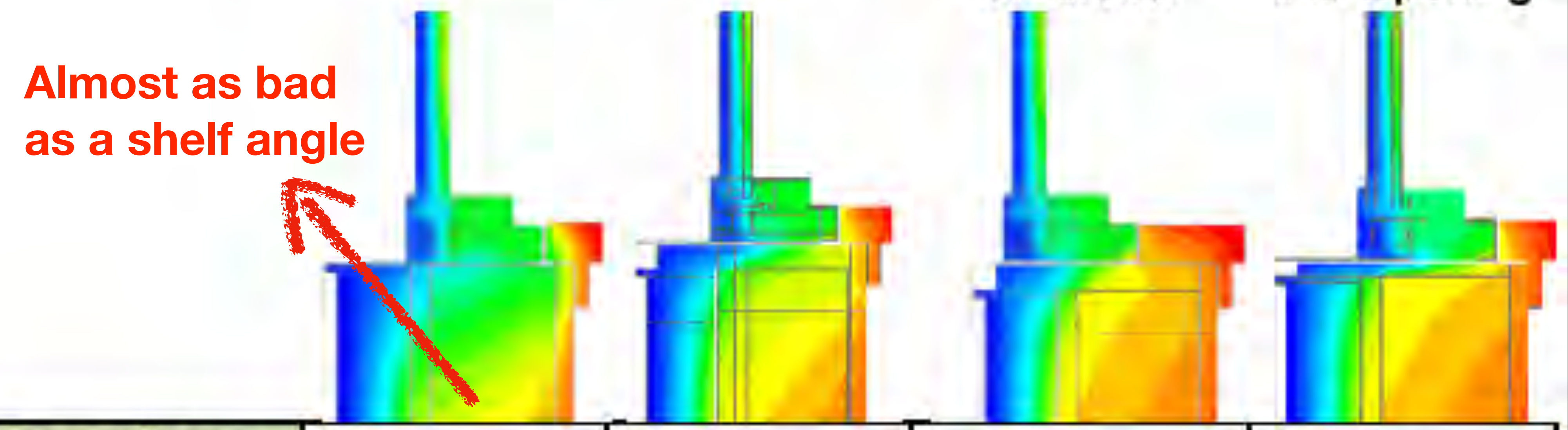
Details

©

Windows

Success is in the details

- EIFS value lost at window details
- more window perimeters than slab edges
- improvements are possible



	Base Case	Plywood Liner	Plywood Liner with Window at Exterior	R-4 Insulation Wrapped into Opening
Linear Transmittance (W/m K)	0.41	0.24	0.21	0.21
Glass Temperature Index at Edge (-)	0.465	0.464	0.460	0.456
Frame Temperature Index (-)	0.503	0.505	0.499	0.485

Empty Cavity

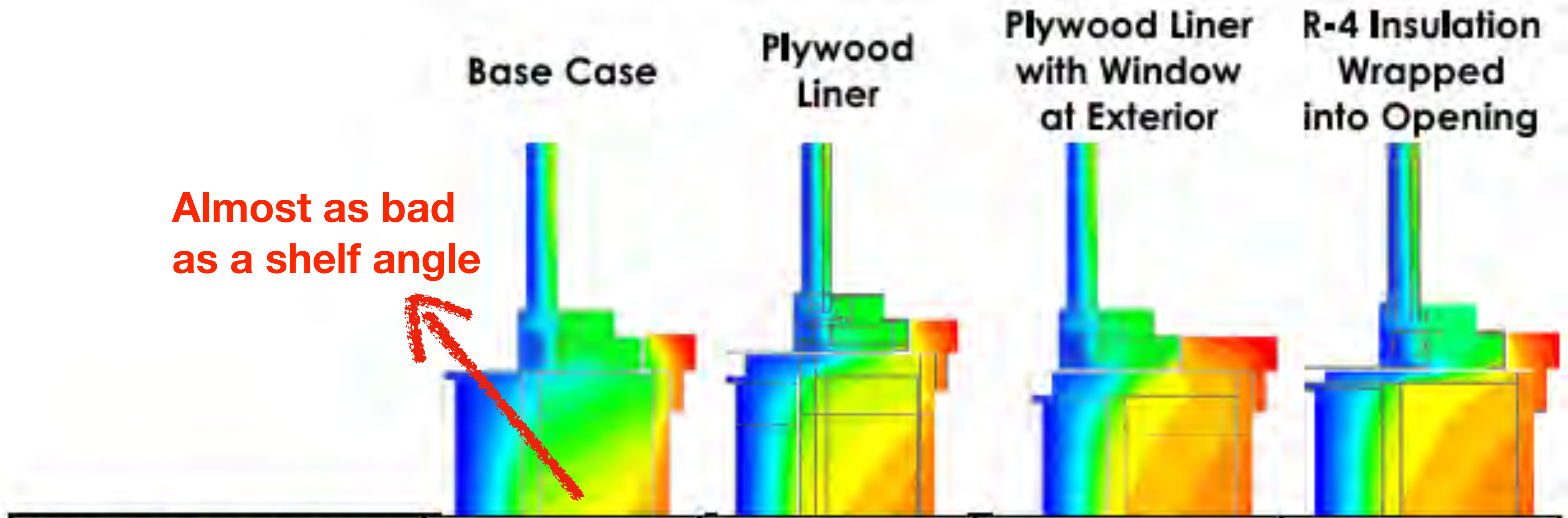
Insulated cavity

©

Windows

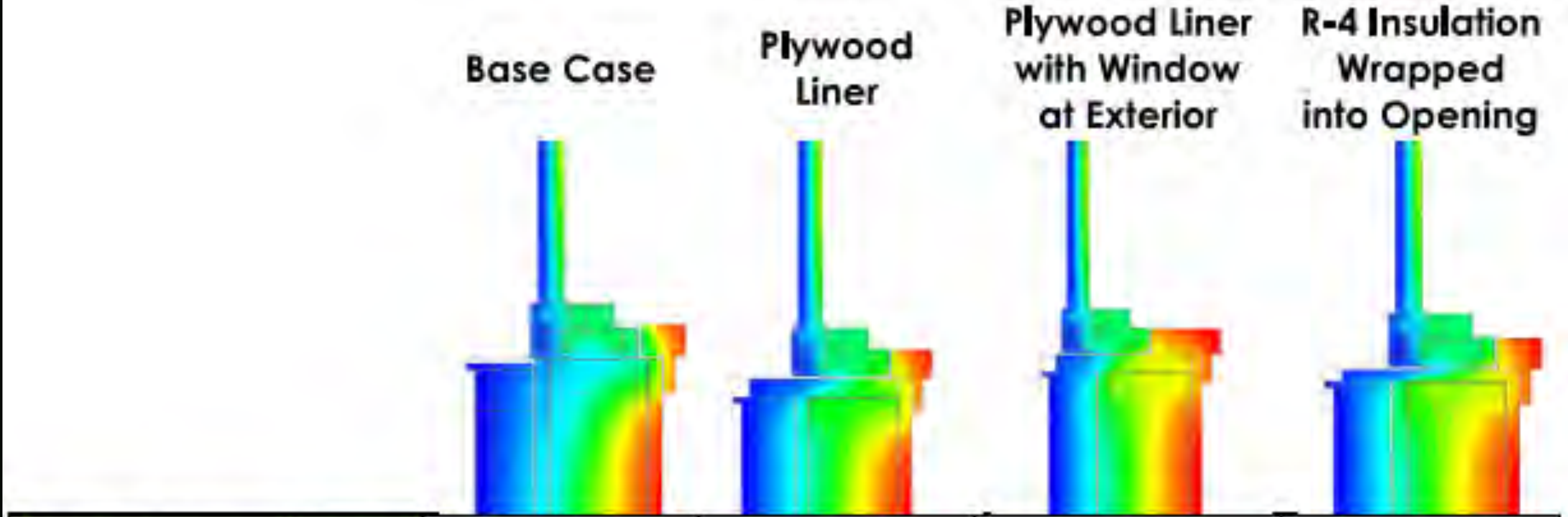
Success is in the details

- EIFS value lost at window details
- more window perimeters than slab edges
- improvements are possible



	Base Case	Plywood Liner	Plywood Liner with Window at Exterior	R-4 Insulation Wrapped into Opening
Linear Transmittance (W/m K)	0.41	0.24	0.21	0.21
Glass Temperature Index at Edge (-)	0.465	0.464	0.460	0.456
Frame Temperature Index (-)	0.503	0.505	0.499	0.485

Empty Cavity



	Base Case	Plywood Liner	Plywood Liner with Window at Exterior	R-4 Insulation Wrapped into Opening
Linear Transmittance (W/m K)	0.23	0.11	0.10	0.09
Glass Temperature Index at Edge (-)	0.465	0.457	0.456	0.453
Frame Temperature Index (-)	0.503	0.492	0.491	0.490

Insulated cavity

©

Manufacturer Detail

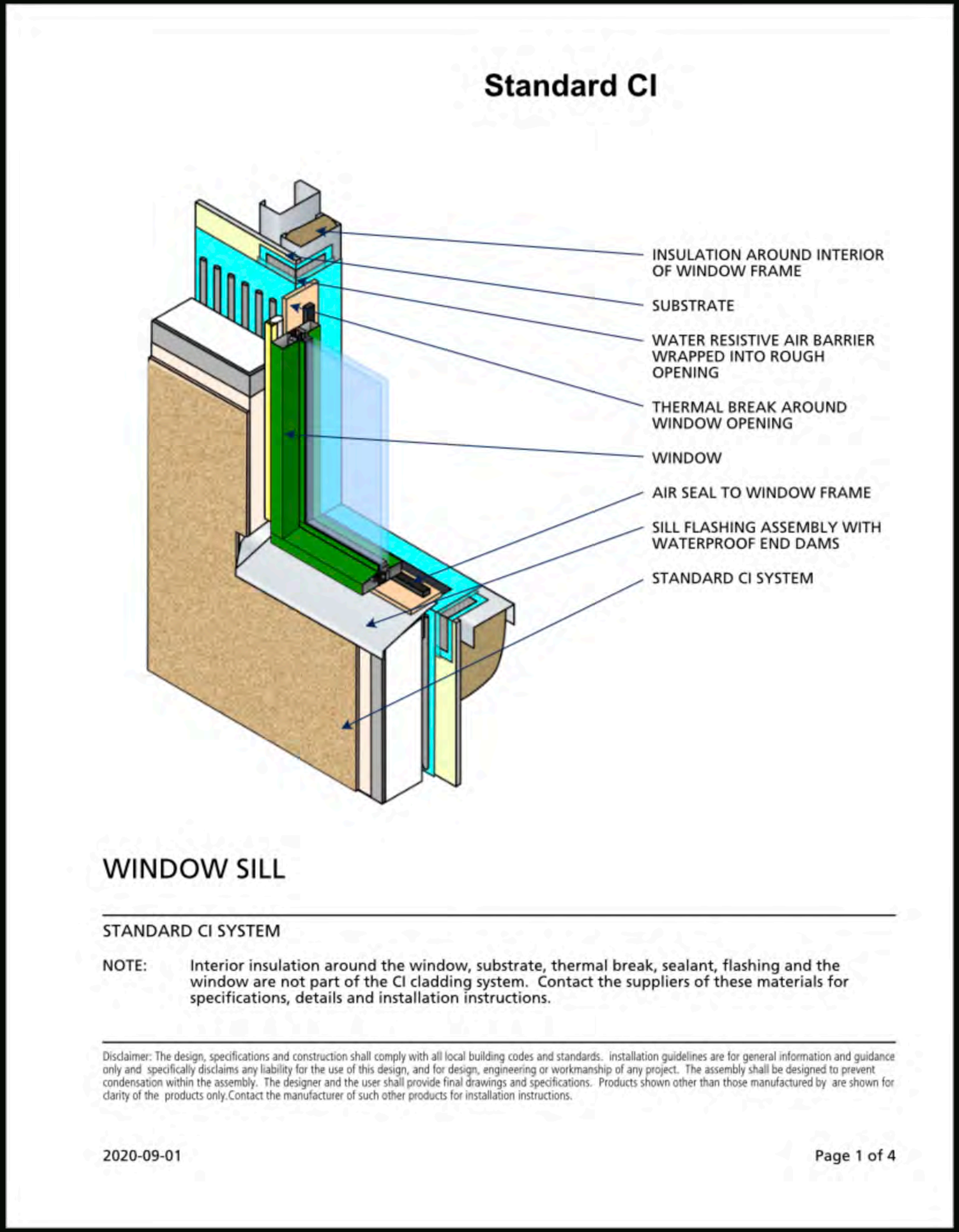
Window Sill

©

Manufacturer Detail

Window Sill

- Window corners are the meeting place for:
  - Thermal barriers
  - Air barriers
  - Water-resistive barriers
  - Drainage
  - Water-shedding surface
  - Different materials and their connections



Standard CI

WINDOW SILL

STANDARD CI SYSTEM

NOTE: Interior insulation around the window, substrate, thermal break, sealant, flashing and the window are not part of the CI cladding system. Contact the suppliers of these materials for specifications, details and installation instructions.

Disclaimer: The design, specifications and construction shall comply with all local building codes and standards. installation guidelines are for general information and guidance only and specifically disclaims any liability for the use of this design, and for design, engineering or workmanship of any project. The assembly shall be designed to prevent condensation within the assembly. The designer and the user shall provide final drawings and specifications. Products shown other than those manufactured by are shown for clarity of the products only.Contact the manufacturer of such other products for installation instructions.

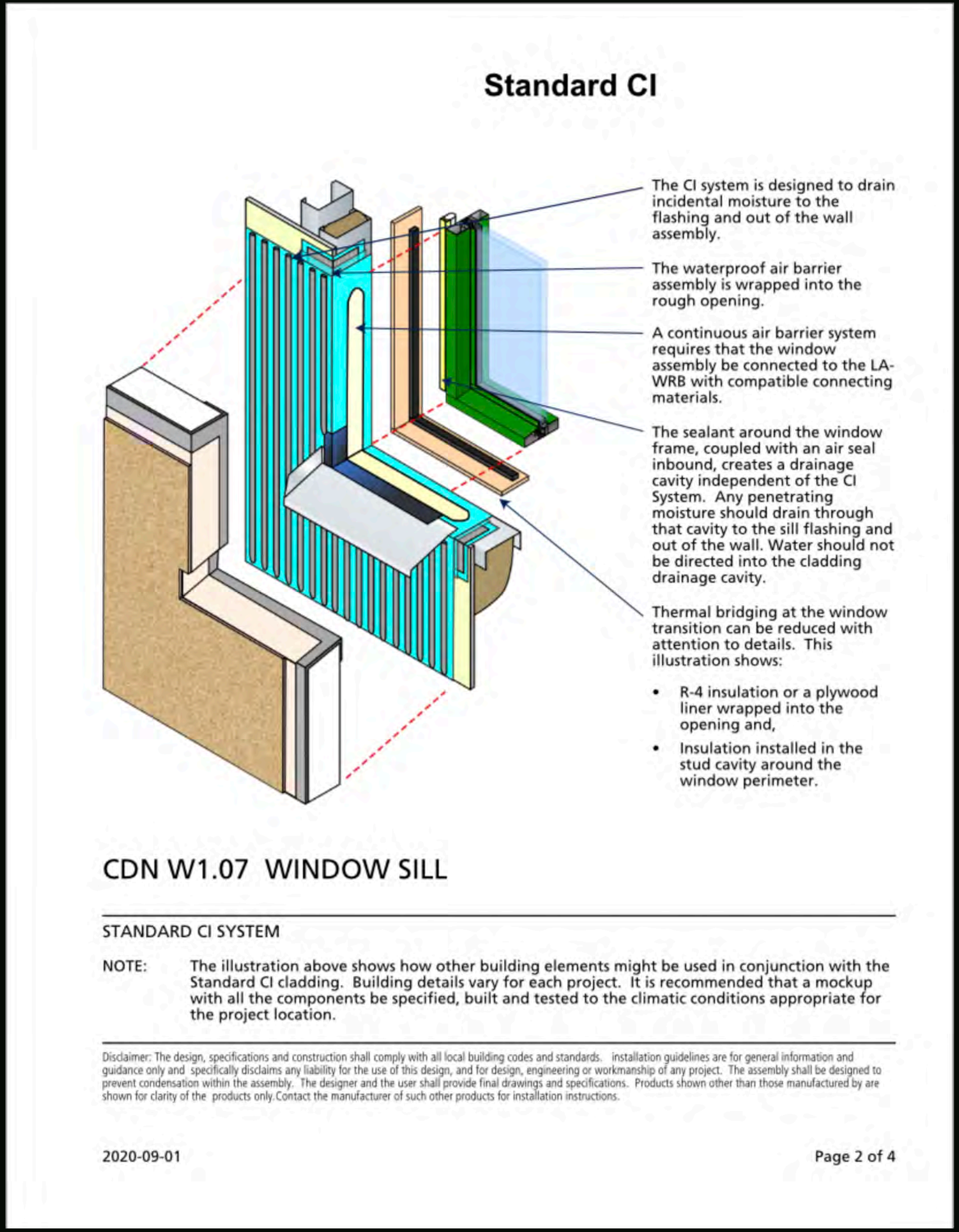
2020-09-01 Page 1 of 4

©

Manufacturer Detail

Window Sill

- Window corners are the meeting place for:
  - Thermal barriers
  - Air barriers
  - Water-resistive barriers
  - Drainage
  - Water-shedding surface
  - Different materials and their connections



Standard CI

CDN W1.07 WINDOW SILL

STANDARD CI SYSTEM

NOTE: The illustration above shows how other building elements might be used in conjunction with the Standard CI cladding. Building details vary for each project. It is recommended that a mockup with all the components be specified, built and tested to the climatic conditions appropriate for the project location.

Disclaimer: The design, specifications and construction shall comply with all local building codes and standards. installation guidelines are for general information and guidance only and specifically disclaims any liability for the use of this design, and for design, engineering or workmanship of any project. The assembly shall be designed to prevent condensation within the assembly. The designer and the user shall provide final drawings and specifications. Products shown other than those manufactured by are shown for clarity of the products only.Contact the manufacturer of such other products for installation instructions.

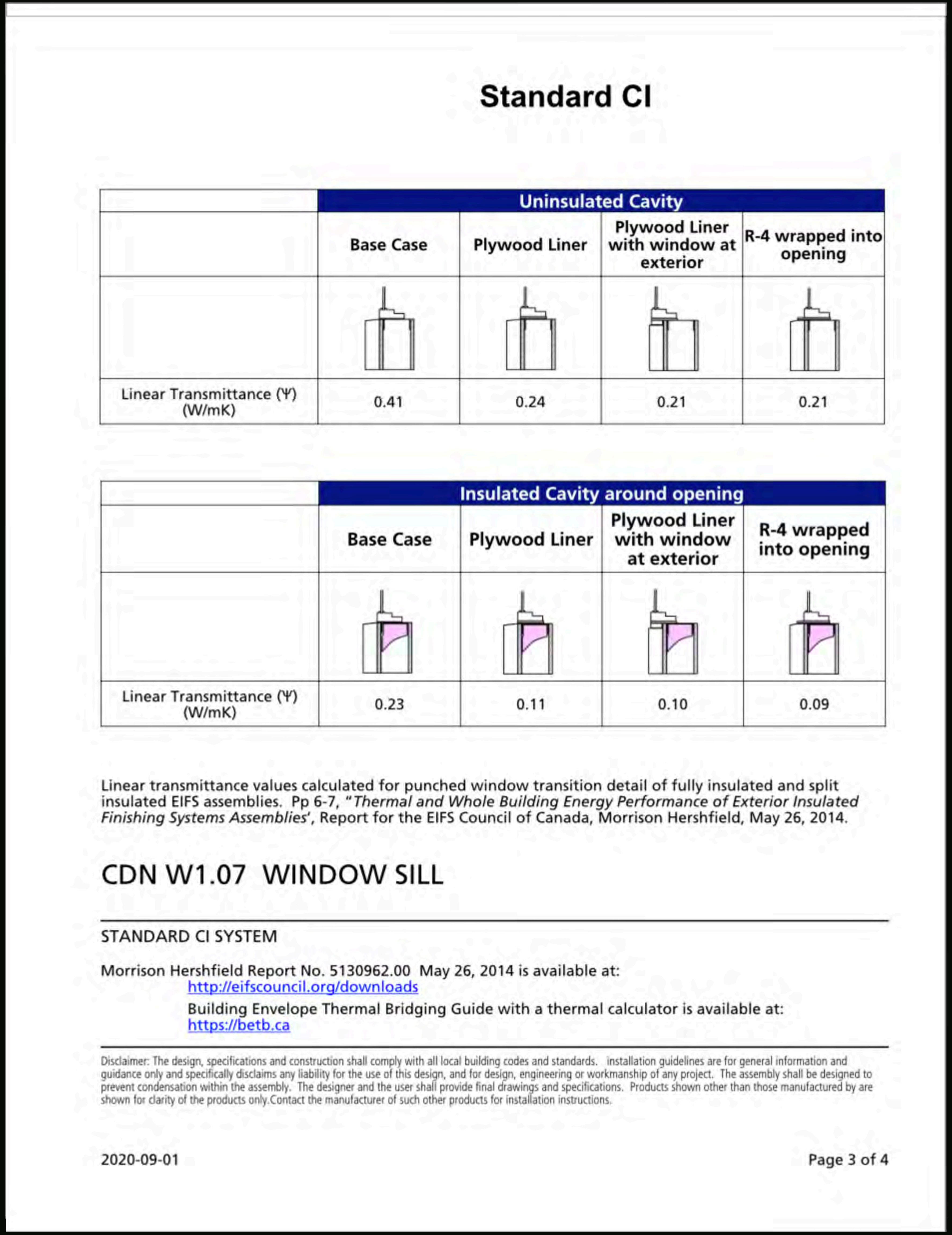
2020-09-01 Page 2 of 4

©

Manufacturer Detail

Window Sill

- Window corners are the meeting place for:
  - Thermal barriers
  - Air barriers
  - Water-resistive barriers
  - Drainage
  - Water-shedding surface
  - Different materials and their connections



Standard CI

	Uninsulated Cavity			
	Base Case	Plywood Liner	Plywood Liner with window at exterior	R-4 wrapped into opening
Linear Transmittance (Ψ) (W/mK)	0.41	0.24	0.21	0.21

	Insulated Cavity around opening			
	Base Case	Plywood Liner	Plywood Liner with window at exterior	R-4 wrapped into opening
Linear Transmittance (Ψ) (W/mK)	0.23	0.11	0.10	0.09

Linear transmittance values calculated for punched window transition detail of fully insulated and split insulated EIFS assemblies. Pp 6-7, "*Thermal and Whole Building Energy Performance of Exterior Insulated Finishing Systems Assemblies*', Report for the EIFS Council of Canada, Morrison Hershfield, May 26, 2014.

CDN W1.07 WINDOW SILL

STANDARD CI SYSTEM

Morrison Hershfield Report No. 5130962.00 May 26, 2014 is available at:
http://eifscouncil.org/downloads
Building Envelope Thermal Bridging Guide with a thermal calculator is available at:
https://betb.ca

Disclaimer: The design, specifications and construction shall comply with all local building codes and standards. installation guidelines are for general information and guidance only and specifically disclaims any liability for the use of this design, and for design, engineering or workmanship of any project. The assembly shall be designed to prevent condensation within the assembly. The designer and the user shall provide final drawings and specifications. Products shown other than those manufactured by are shown for clarity of the products only.Contact the manufacturer of such other products for installation instructions.

2020-09-01 Page 3 of 4

Durability and Resilience

©

Durability

EIFS

Durability
EIFS

- ULC S716.1 Materials and Systems
  - No other cladding assembly is tested as severely
  - No other waterproof air barrier is tested as severely
- ULC S716.2 Installation
- ULC S716.3 Design Application
- These are now ISO 17738 standards

©
JOHN R.S. EDGAR CONSULTING

Resilience

- To endure daily wear in the intended service circumstances
- To be easily repaired after a catastrophic occurrence without the need for complete replacement

©

Resilience

The Lido

©

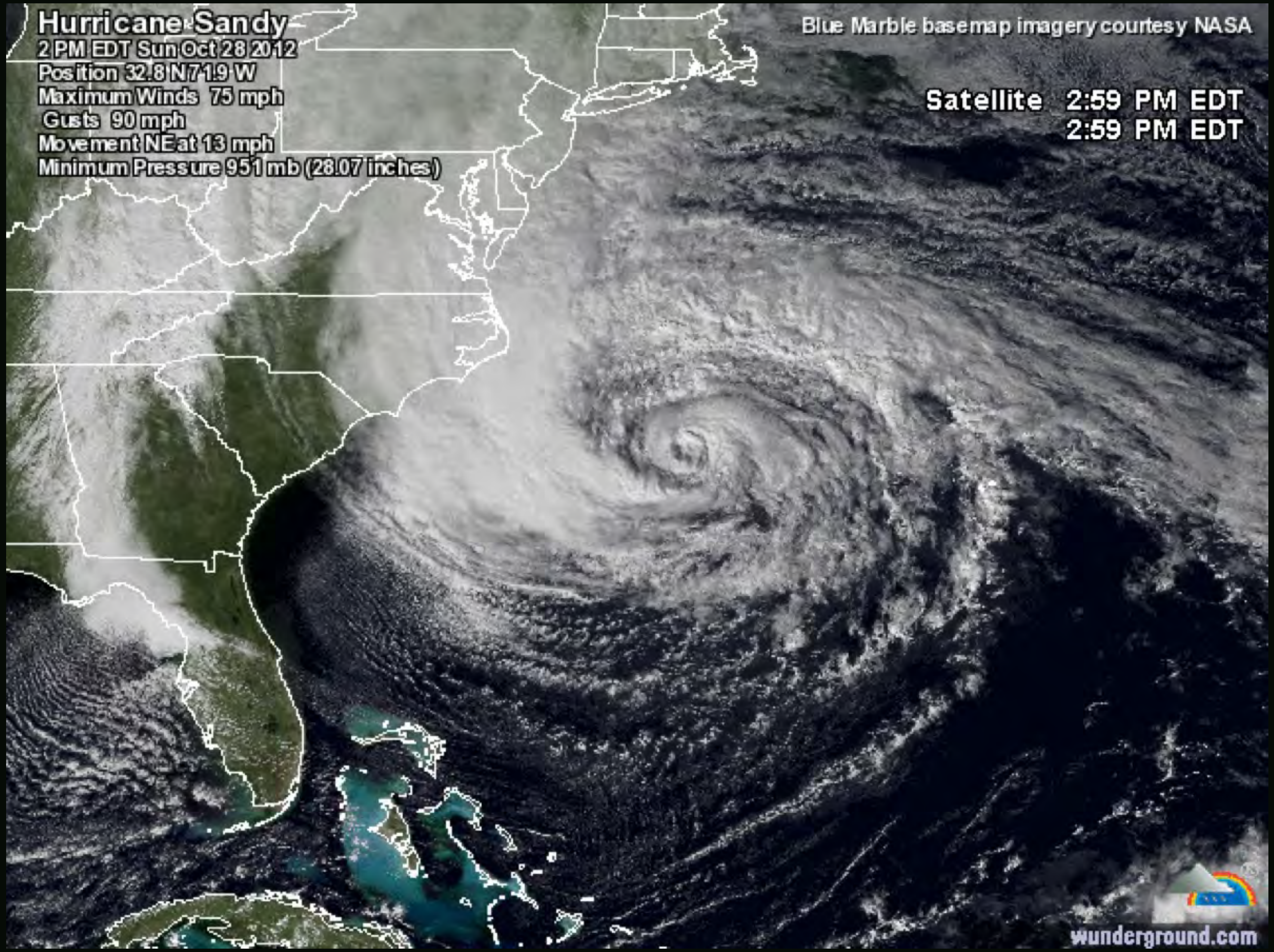
Resilience
The Lido

- Storied history on Long Island
- Retrofit with EIFS
- What could possibly go wrong?

©

Resilience
The Lido

- Storied history on Long Island
- Retrofit with EIFS
- What could possibly go wrong?



©

Resilience

The Lido

- Storied history on Long Island
- Retrofit with EIFS
- What could possibly go wrong?

©

Resilience
The Lido

- Storied history on Long Island
- Retrofit with EIFS
- What could possibly go wrong?

©

Resilience

The Lido

- Storied history on Long Island
- Retrofit with EIFS
- What could possibly go wrong?
- The Lido withstood the storm with minor damage and continued to be occupied
- Resilient

©

Where we've been

Where we've been

- EIFS = a method of construction
- Climate crisis
- Codes
- Effective insulation
- Thermal bridging
- Detailing
- Durability and resilience

©

Questions ?

©