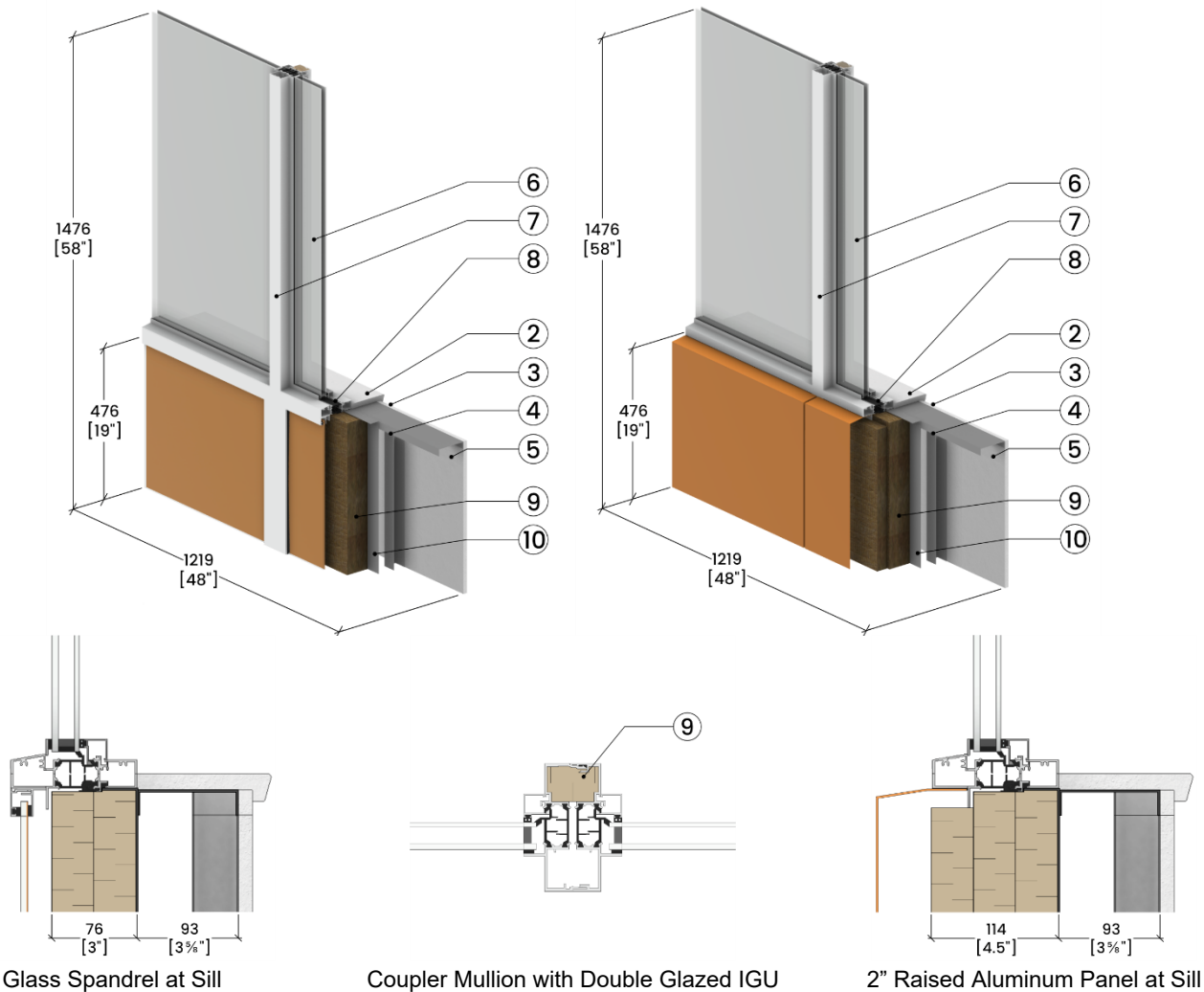


Detail 1.1.5

Starline 9200 Series Window Wall System – Spandrel Clear Field with No Interior Insulation



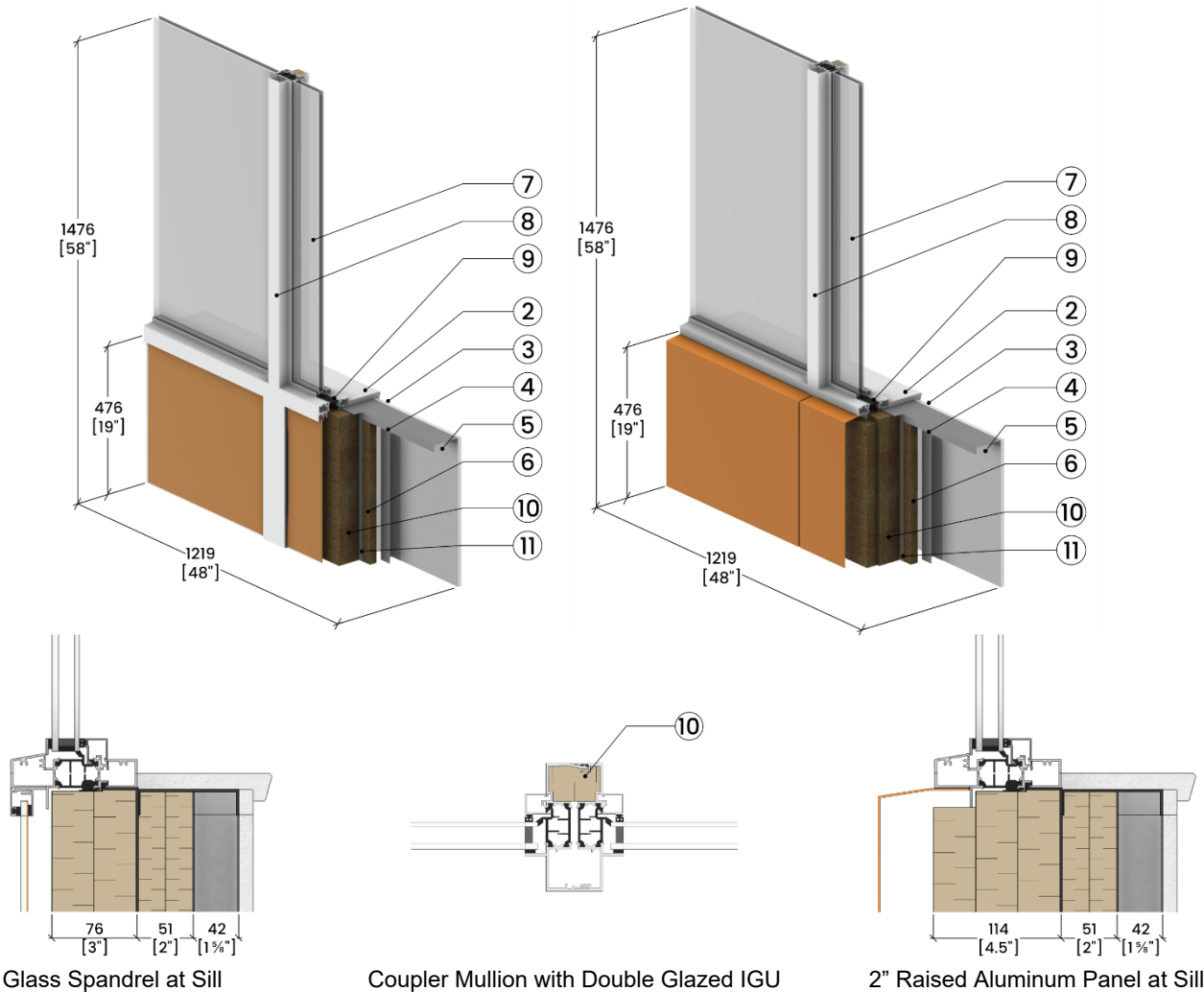
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft ² ·hr·°F (W/m K)	Nominal Resistance hr·ft ² ·°F/Btu (m ² K/W)	Density lb/ft ³ (kg/m ³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film ¹	-	-	R-0.7 to R-1.1 (0.12 RSI to 0.2 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Air in Stud Cavity	3 1/2" (91)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	Glazing: double glazed IGU U _{COG} = 0.24 BTU/hr·ft ² ·°F (1.38 W/m ² K)					
7	Aluminum Frame ²	-	1110 (160)	-	171 (2739)	0.21 (900)
8	Polyamide Thermal Break	-	1.7 (0.25)	-	92 (1476)	0.48 (2000)
9	Backpan and Frame Insulation	Varies	0.24 (0.034)	Varies	4.5 (7.2)	0.20 (850)
10	Steel Backpan	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	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

² The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 1.1.6

Starline 9200 Series Window Wall System – Spandrel Clear Field with Interior Insulation



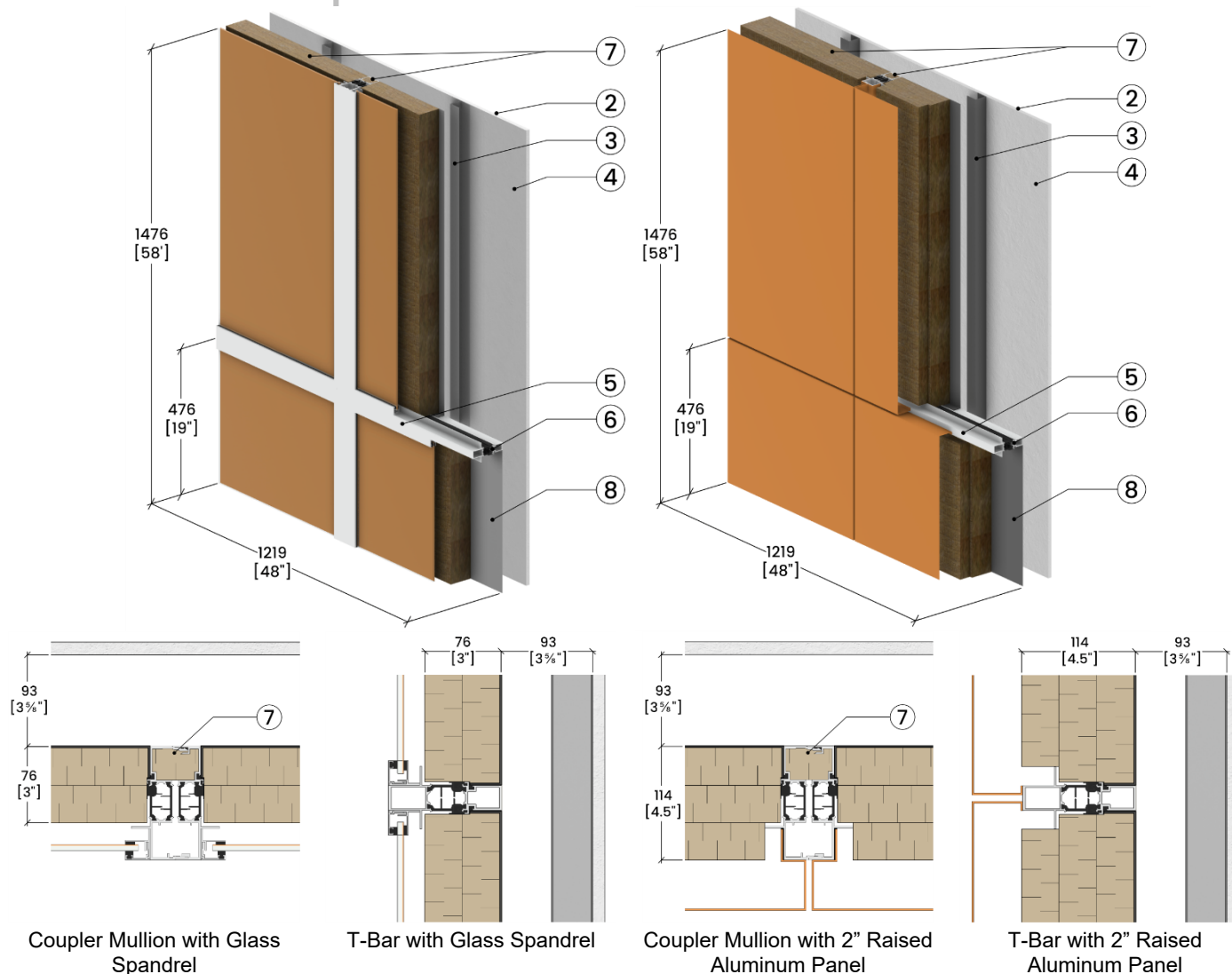
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft ² ·hr·°F (W/m K)	Nominal Resistance hr·ft ² ·°F/Btu (m ² K/W)	Density lb/ft ³ (kg/m ³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film ¹	-	-	R-0.7 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Air in Stud Cavity	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	Insulation in Stud Cavity	1" or 2" (25 or 51)	0.24 (0.034)	R-4.2 or R-8.4 (0.92 RSI to 1.48 RSI)	4.5 (7.2)	0.20 (850)
7	Glazing: double glazed IGU U _{COG} = 0.24 BTU/hr·ft ² ·°F (1.38 W/m ² K)					
8	Aluminum Frame ²	-	1110 (160)	-	171 (2739)	0.21 (900)
9	Polyamide Thermal Break	-	1.7 (0.25)	-	92 (1476)	0.48 (2000)
10	Backpan and Frame Insulation	Varies	0.24 (0.034)	Varies	4.5 (7.2)	0.20 (850)
11	Steel Backpan	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	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

² The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 1.1.7

Starline 9200 Series Window Wall System – Full Height Spandrel Clear Field with No Interior Insulation



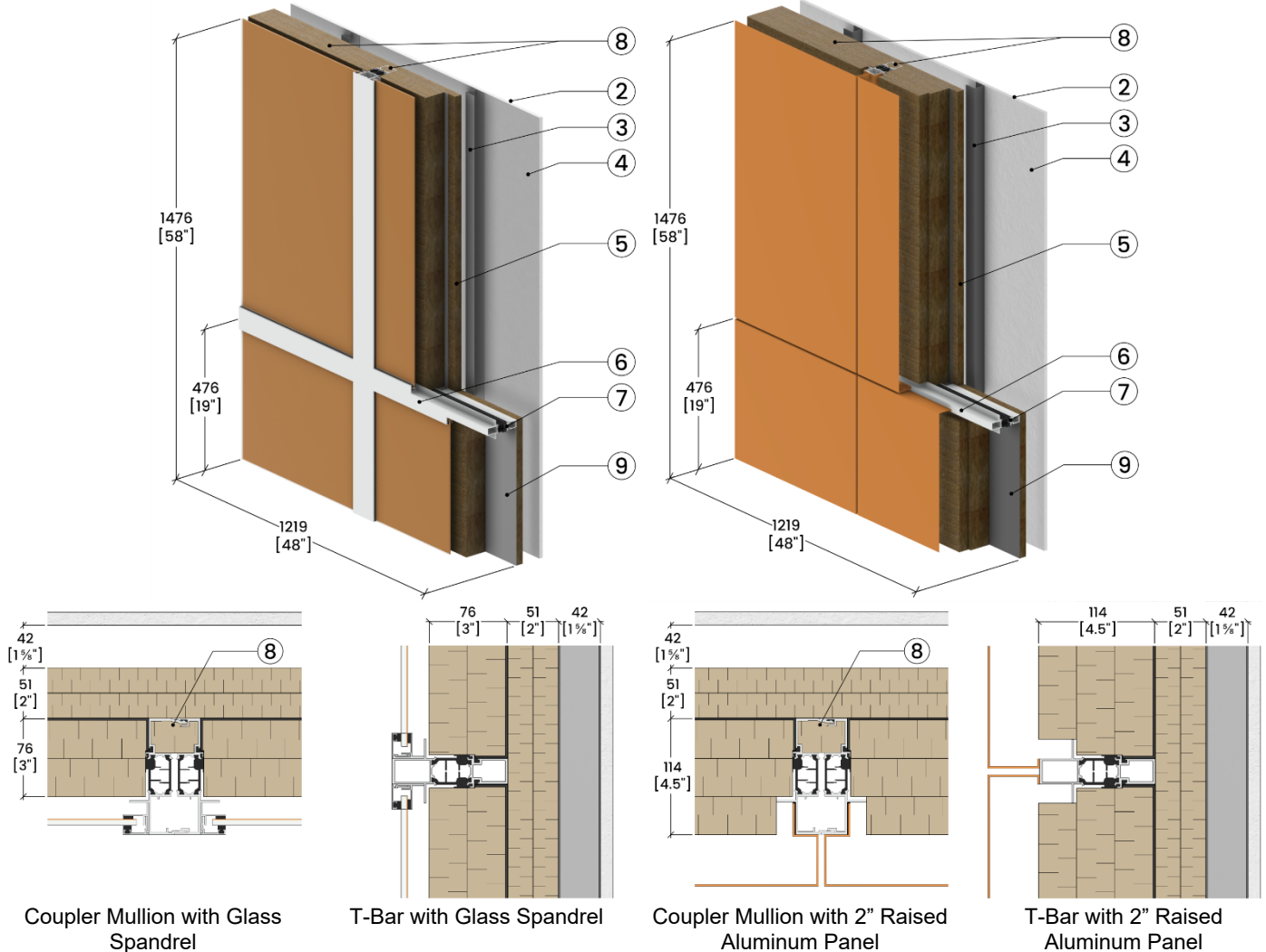
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft ² ·hr·°F (W/m K)	Nominal Resistance hr·ft ² ·°F/Btu (m ² K/W)	Density lb/ft ³ (kg/m ³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film ¹	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16" o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 1/2" (91)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Aluminum Frame ²	-	1110 (160)	-	171 (2739)	0.21 (900)
6	Polyamide Thermal Break	-	1.7 (0.25)	-	92 (1476)	0.48 (2000)
7	Backpan and Frame Insulation	Varies	0.24 (0.034)	Varies	4.5 (7.2)	0.20 (850)
8	Steel Backpan	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
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

² The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 1.1.8

Starline 9200 Series Window Wall System – Full Height Spandrel Clear Field with Interior Insulation



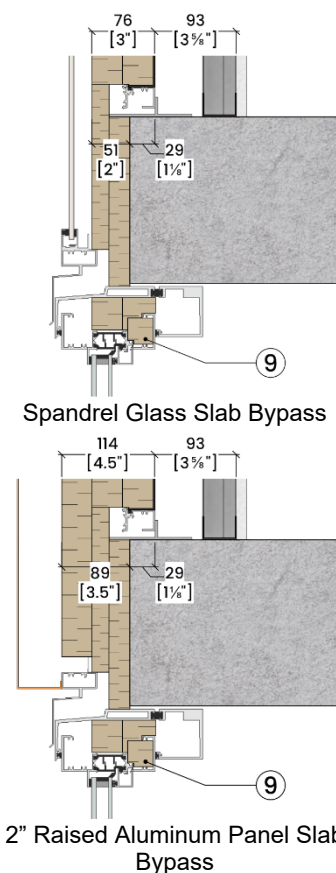
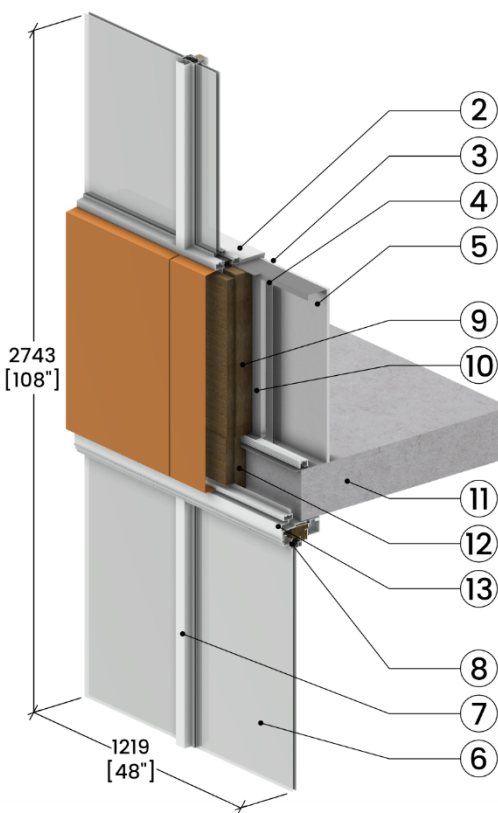
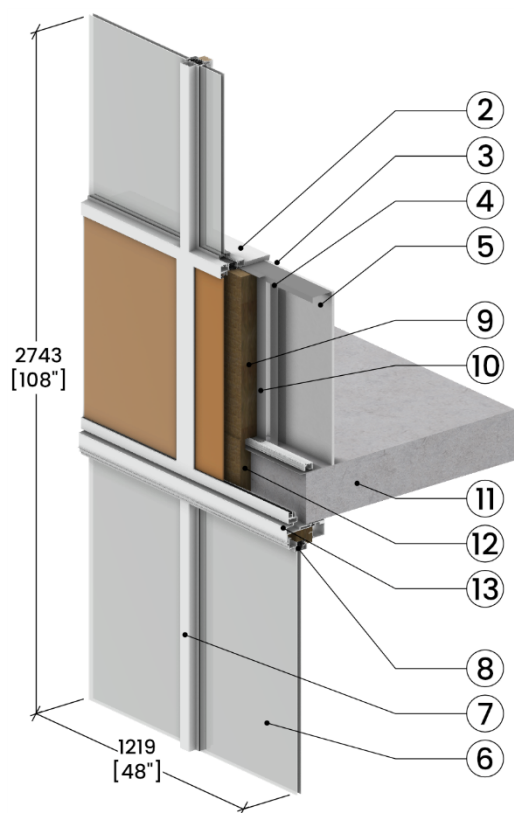
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft ² ·hr·°F (W/m K)	Nominal Resistance hr·ft ² ·°F/Btu (m ² K/W)	Density lb/ft ³ (kg/m ³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film ¹	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16" o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 1/2" (91)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Insulation in Stud Cavity	1" or 2" (25 or 51)	0.24 (0.034)	R-4.2 or R-8.4 (0.92 RSI to 1.48 RSI)	4.5 (7.2)	0.20 (850)
6	Aluminum Frame ²	-	1110 (160)	-	171 (2739)	0.21 (900)
7	Polyamide Thermal Break	-	1.7 (0.25)	-	92 (1476)	0.48 (2000)
8	Backpan and Frame Insulation	Varies	0.24 (0.034)	Varies	4.5 (7.2)	0.20 (850)
9	Steel Backpan	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	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

² The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 1.2.5

Starline 9200 Series Window Wall System – Intermediate Floor Intersection with Thermally Enhanced Bypass and No Interior Insulation



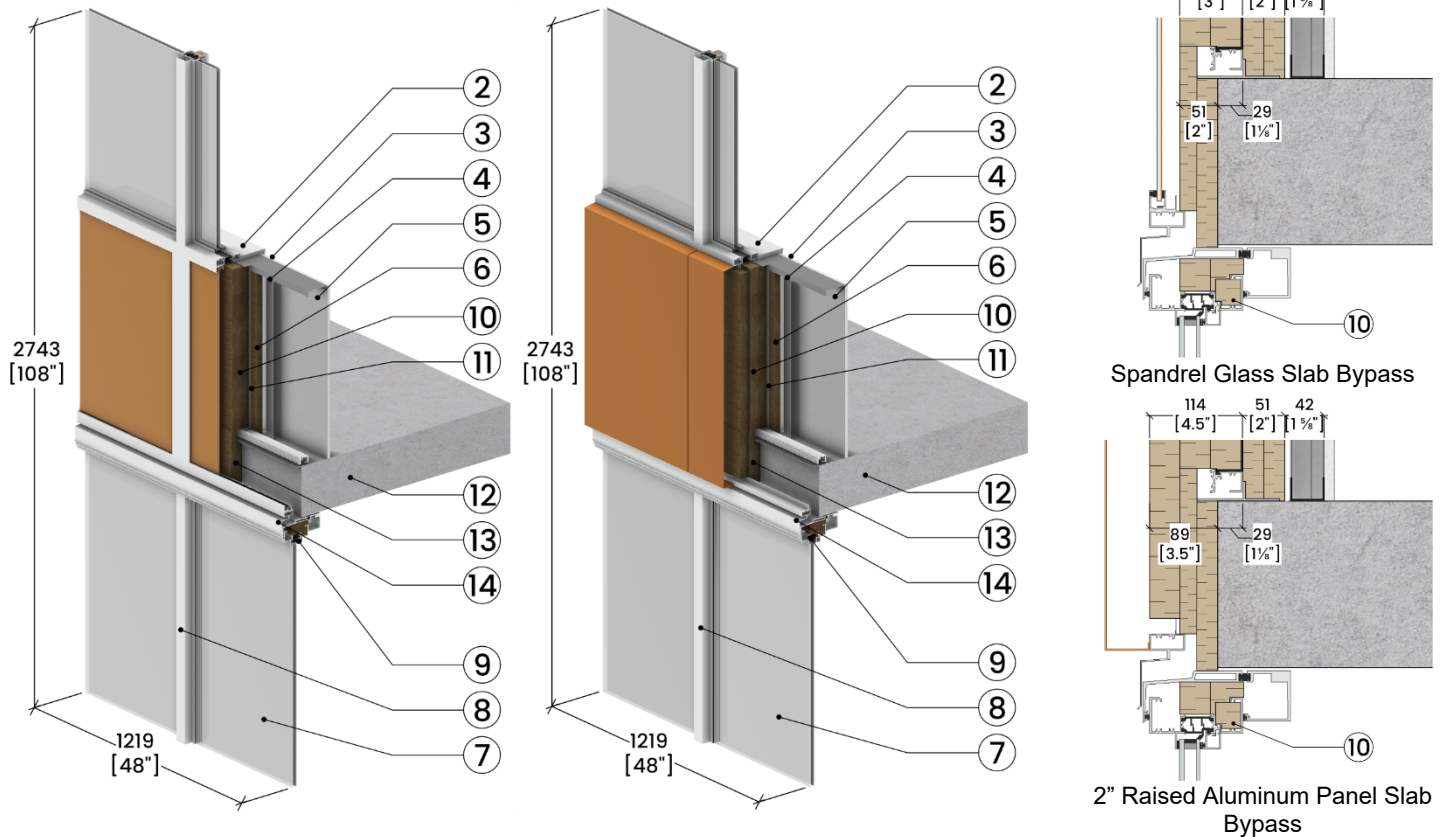
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft ² ·hr·°F (W/m K)	Nominal Resistance hr·ft ² ·°F/Btu (m ² K/W)	Density lb/ft ³ (kg/m ³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film ¹	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Air in Stud Cavity	3 1/2" (91)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	Glazing: double glazed IGU U _{COG} = 0.24 BTU/hr·ft ² ·°F (1.38 W/m ² K)					
7	Aluminum Frame ²	-	1110 (160)	-	171 (2739)	0.21 (900)
8	Polyamide Thermal Break	-	1.7 (0.25)	-	92 (1476)	0.48 (2000)
9	Backpan and Frame Insulation	Varies	0.24 (0.034)	Varies	4.5 (7.2)	0.20 (850)
10	Steel Backpan	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Bypass Insulation	2" or 3.5" (51 or 89)	0.24 (0.034)	R-8.4 or R-14.7 (1.48 RSI to 2.59 RSI)	4.5 (7.2)	0.20 (850)
13	Aluminum Flashing	14 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
14	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

² The thermal conductivity of air spaces within framing was found using ISO 10077-2

Detail 1.2.6

Starline 9200 Series Window Wall System – Intermediate Floor Intersection with Thermally Enhanced Bypass and Interior Insulation



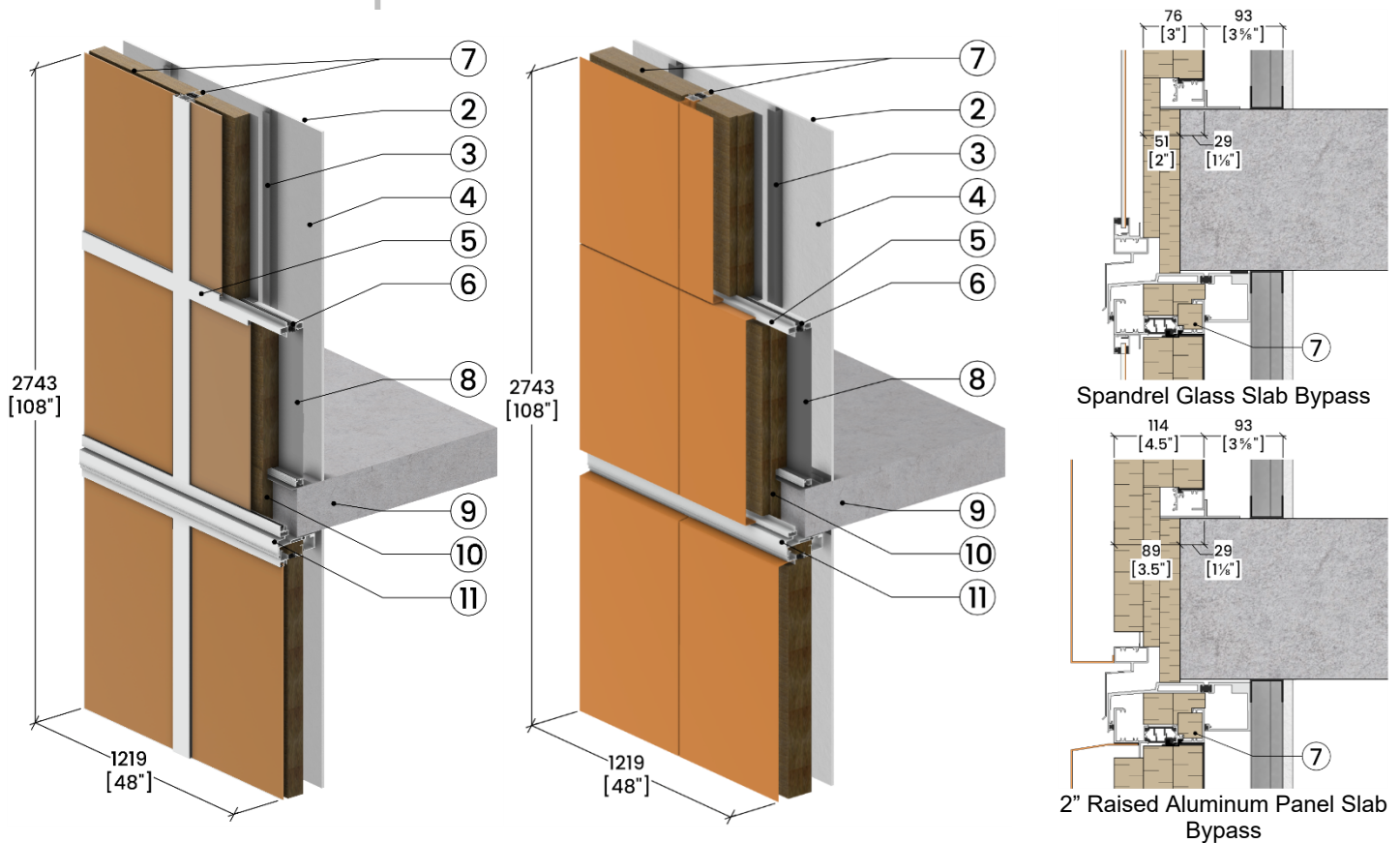
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft ² ·hr·°F (W/m K)	Nominal Resistance hr·ft ² ·°F/Btu (m ² K/W)	Density lb/ft ³ (kg/m ³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film ¹	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Air in Stud Cavity	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	Insulation in Stud Cavity	1" or 2" (25 or 51)	0.24 (0.034)	R-4.2 or R-8.4 (0.92 RSI to 1.48 RSI)	4.5 (7.2)	0.20 (850)
7	Glazing: double glazed IGU U _{COG} = 0.24 BTU/hr·ft ² ·°F (1.38 W/m ² K)					
8	Aluminum Frame ²	-	1110 (160)	-	171 (2739)	0.21 (900)
9	Polyamide Thermal Break	-	1.7 (0.25)	-	92 (1476)	0.48 (2000)
10	Backpan and Frame Insulation	Varies	0.24 (0.034)	Varies	4.5 (7.2)	0.20 (850)
11	Steel Backpan	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Bypass Insulation	2" or 3.5" (51 or 89)	0.24 (0.034)	R-8.4 or R-14.7 (1.48 RSI to 2.59 RSI)	4.5 (7.2)	0.20 (850)
14	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
15	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

² The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 1.2.7

Starline 9200 Series Window Wall System – Full Height Spandrel at Intermediate Floor Intersection with Thermally Enhanced Bypass and No Interior Insulation



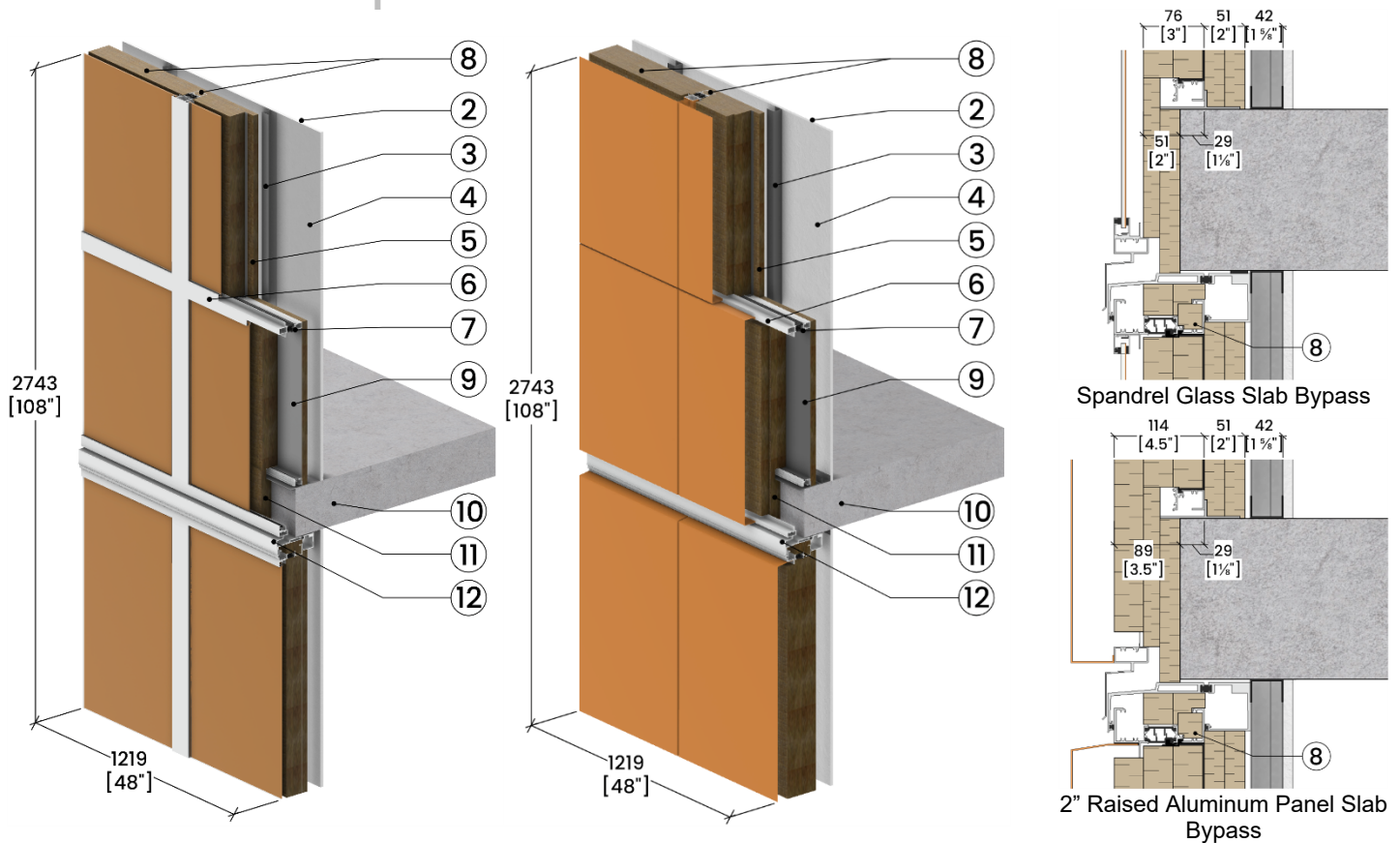
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft ² ·hr·°F (W/m K)	Nominal Resistance hr·ft ² ·°F/Btu (m ² K/W)	Density lb/ft ³ (kg/m ³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film ¹	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 1/2" (91)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Aluminum Frame ²	-	1110 (160)	-	171 (2739)	0.21 (900)
6	Polyamide Thermal Break	-	1.7 (0.25)	-	92 (1476)	0.48 (2000)
7	Backpan and Frame Insulation	Varies	0.24 (0.034)	Varies	4.5 (7.2)	0.20 (850)
8	Steel Backpan	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Bypass Insulation	2" or 3.5" (51 or 89)	0.24 (0.034)	R-8.4 or R-14.7 (1.48 RSI to 2.59 RSI)	4.5 (7.2)	0.20 (850)
11	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
12	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

² The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 1.2.8

Starline 9200 Series Window Wall System – Full Height Spandrel at Intermediate Floor Intersection with Thermally Enhanced Bypass and Interior Insulation



ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft ² ·hr·°F (W/m K)	Nominal Resistance hr·ft ² ·°F/Btu (m ² K/W)	Density lb/ft ³ (kg/m ³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film ¹	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Insulation in Stud Cavity	1" or 2" (25 or 51)	0.24 (0.034)	R-4.2 or R-8.4 (0.92 RSI to 1.48 RSI)	4.5 (7.2)	0.20 (850)
6	Aluminum Frame ²	-	1110 (160)	-	171 (2739)	0.21 (900)
7	Polyamide Thermal Break	-	1.7 (0.25)	-	92 (1476)	0.48 (2000)
8	Backpan and Frame Insulation	Varies	0.24 (0.034)	Varies	4.5 (7.2)	0.20 (850)
9	Steel Backpan	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Bypass Insulation	2" or 3.5" (51 or 89)	0.24 (0.034)	R-8.4 or R-14.7 (1.48 RSI to 2.59 RSI)	4.5 (7.2)	0.20 (850)
12	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
13	Exterior Film ¹	-	-	R-0.2 (0.03 RSI)	-	-

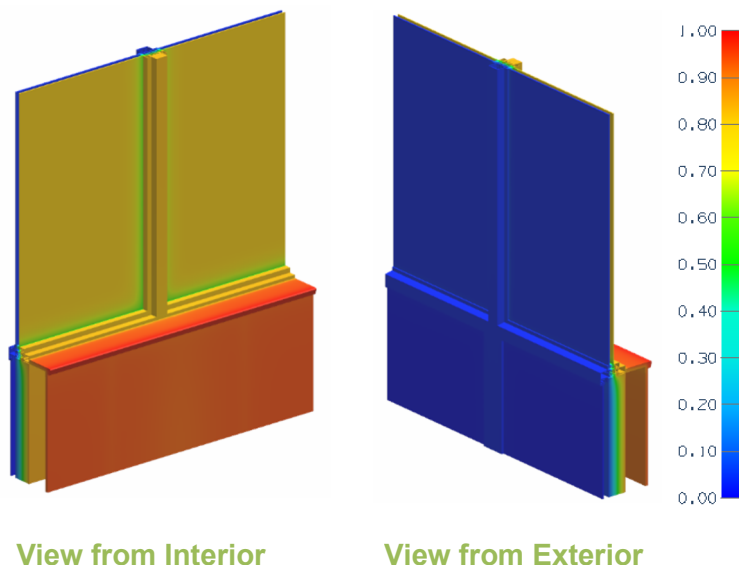
¹ Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation

² The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 1.1.5

Starline 9200 Series Window Wall System – Spandrel Clear Field with No Interior Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-value	R_{1D}	R-3.1 (0.55 RSI) + backpan and inboard insulation
Transmittance / Resistance	U_g	U-value and R-value for glazing, including framing
	$R_{o,sill}$ $U_{o,sill}$	U-value and R-value for horizontal spandrel section (2D)
	U, R	U-value and R-value for overall assembly
	R_w U_w	Clear field U-value and R-value for spandrel, including the sill interface
Linear Transmittance	Ψ_{sill}	Increase in heat flow in relation to $U_{o,sill}$ and U_g

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

Nominal (1D) vs. Assembly Performance Indicators

Sill Transmittance

Spandrel Scenario	$R_{o,sill}$ ft ² ·hr·°F/Btu (m ² K / W)	$U_{o,sill}$ Btu/ft ² ·hr·°F (W/m ² K)	Ψ_{sill} Btu/ft·hr·°F (W/m K)
Baseline Spandrel Glass	R-12.9 (2.27)	0.078 (0.441)	0.013 (0.022)
2" raised Aluminum Panel	R-16.4 (2.90)	0.061 (0.345)	0.015 (0.027)

Base Assembly – Glazing

$U_{centre\ of\ glazing}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.244 (1.38)	0.283 (1.61)

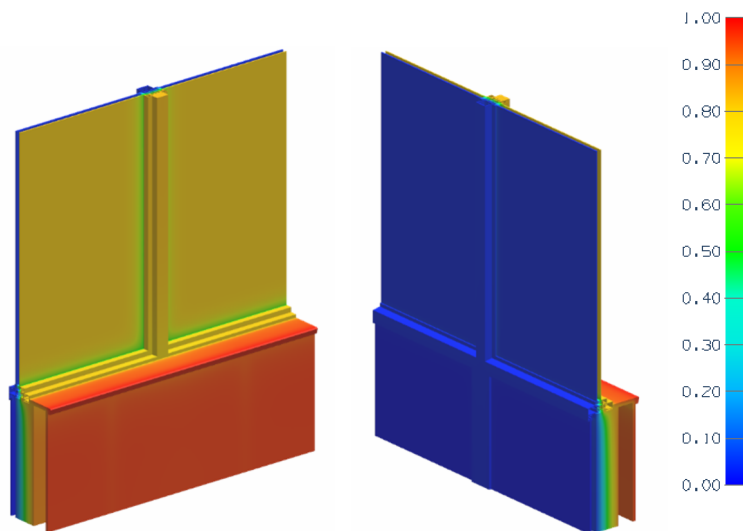
Spandrel Section and Overall Assembly

Spandrel Scenario	R_{1D} ft ² ·hr·°F/Btu (m ² K / W)	R ft ² ·hr·°F/Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	R_w ft ² ·hr·°F/Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
Baseline Spandrel Glass	R-15.7 (2.77)	R-4.6 (0.80)	0.219 (1.245)	R-11.6 (2.05)	0.086 (0.487)
2" raised Aluminum Panel	R-22.0 (3.88)	R-4.7 (0.82)	0.214 (1.214)	R-14.1 (2.49)	0.071 (0.401)

Detail 1.1.6

Starline 9200 Series Window Wall System – Spandrel Clear Field with Interior Insulation

Thermal Performance Indicators



View from Interior

View from Exterior

Assembly 1D (Nominal) R-value	R_{1D}	R-3.1 (0.55 RSI) + backpan and inboard insulation
Transmittance / Resistance	U_g	U-value and R-value for glazing, including framing
	$R_{o,sill}$ $U_{o,sill}$	U-value and R-value for horizontal spandrel section (2D)
	U, R	U-value and R-value for overall assembly
	R_w U_w	Clear field U-value and R-value for spandrel, including the sill interface
Linear Transmittance	Ψ_{sill}	Increase in heat flow in relation to $U_{o,sill}$ and U_g

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

Nominal (1D) vs. Assembly Performance Indicators

Sill Transmittance

Spandrel Scenario	Inboard Insulation 1D R-Value (RSI)	$R_{o,sill}$ ft ² ·hr·°F/Btu (m ² K / W)	$U_{o,sill}$ Btu/ft ² ·hr·°F (W/m ² K)	Ψ_{sill} Btu/ft ² ·hr·°F (W/m K)
Baseline Spandrel Glass	R-4.2 (0.74)	R-17.2 (3.04)	0.058 (0.329)	0.026 (0.045)
	R-8.4 (1.48)	R-21.5 (3.78)	0.047 (0.264)	0.038 (0.065)
2" Raised Aluminum Panel	R-4.2 (0.74)	R-21.0 (3.69)	0.048 (0.271)	0.023 (0.040)
	R-8.4 (1.48)	R-25.1 (4.42)	0.040 (0.226)	0.030 (0.051)

Base Assembly – Glazing

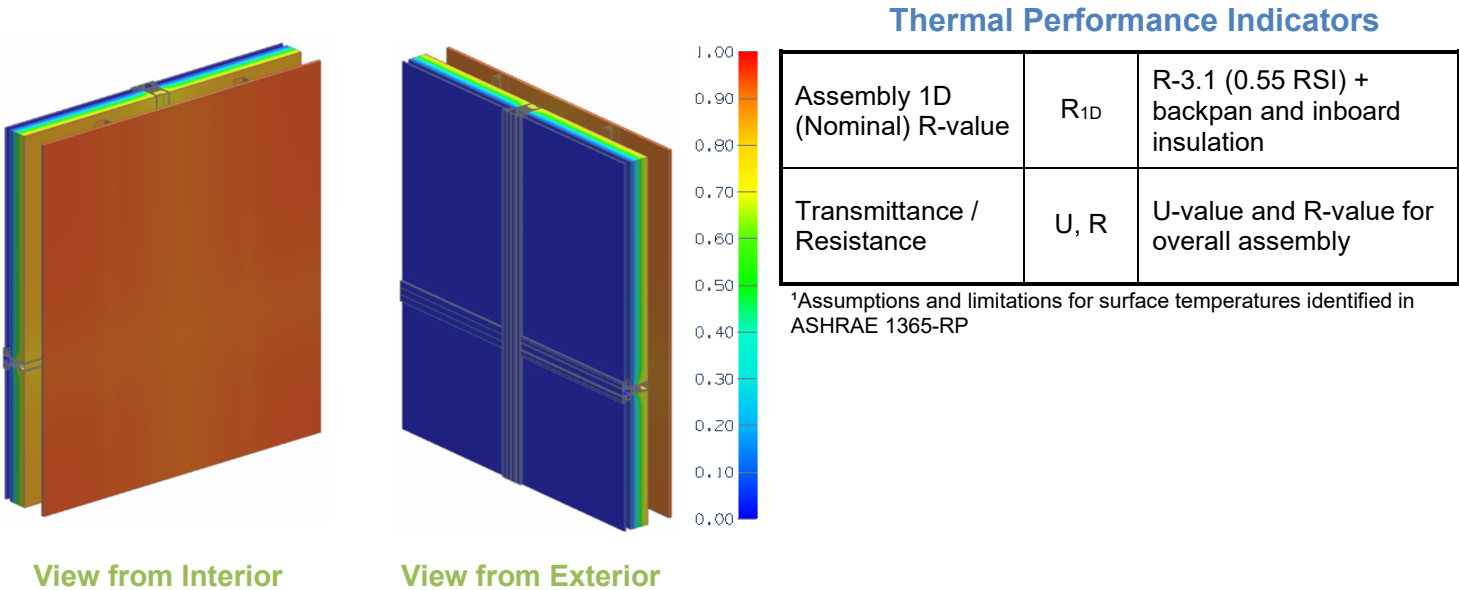
$U_{\text{centre of glazing}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.244 (1.38)	0.283 (1.61)

Spandrel Section and Overall Assembly

Spandrel Scenario	Inboard Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F/Btu (m ² K / W)	R ft ² ·hr·°F/Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)	R_w ft ² ·hr·°F/Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
Baseline Spandrel Glass	R-4.2 (0.74)	R-19.9 (3.51)	R-4.6 (0.82)	0.215 (1.223)	R-13.5 (2.38)	0.074 (0.420)
	R-8.4 (1.48)	R-24.1 (4.25)	R-4.7 (0.82)	0.214 (1.215)	R-14.4 (2.54)	0.069 (0.394)
2" Raised Aluminum Panel	R-4.2 (0.74)	R-26.2 (4.62)	R-4.7 (0.83)	0.212 (1.202)	R-16.0 (2.82)	0.062 (0.355)
	R-8.4 (1.48)	R-30.4 (5.36)	R-4.8 (0.84)	0.210 (1.195)	R-17.0 (2.99)	0.059 (0.334)

Detail 1.1.7

Starline 9200 Series Window Wall System – Full Height Spandrel
Clear Field with No Interior Insulation



Starline 9200 Series Window Wall System – Full Height Spandrel Clear Field with Interior Insulation



Assembly 1D (Nominal) R-value	R _{1D}	R-3.1 (0.55 RSI) + backpan and inboard insulation
Transmittance / Resistance	U, R	U-value and R-value for overall assembly

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

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

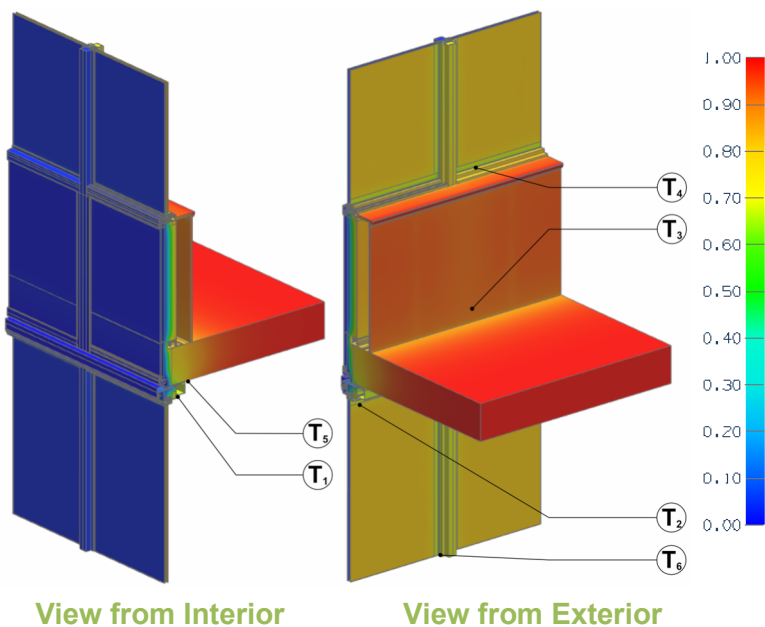
Spandrel Section and Overall Assembly

Spandrel Scenario	Inboard Insulation 1D R-Value (RSI)	R _{1D} ft ² ·hr·°F/Btu (m ² K / W)	R ft ² ·hr·°F/Btu (m ² K / W)	U Btu/ft ² ·hr·°F (W/m ² K)
Baseline Spandrel Glass	R-4.2 (0.74)	R-19.9 (3.51)	R-16.3 (2.88)	0.061 (0.347)
	R-8.4 (1.48)	R-24.1 (4.25)	R-20.6 (3.62)	0.049 (0.276)
2" Raised Aluminum Panel	R-4.2 (0.74)	R-26.2 (4.62)	R-18.2 (3.20)	0.055 (0.312)
	R-8.4 (1.48)	R-30.4 (5.36)	R-22.5 (3.95)	0.045 (0.253)

Detail 1.2.5

Starline 9200 Series Window Wall System – Intermediate Floor Intersection with Thermally Enhanced Bypass and No Interior Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-value	R_{1D}	R-3.1 (0.55 RSI) + backpan and inboard insulation
Transmittance / Resistance	U_g	U-value and R-value for glazing, including framing
	U_t	U-value and R-value for overall assembly
	R_t	
	U_s	U-value and R-value for spandrel with slab
	R_s	
	R_w	Clear field U-value and R-value for spandrel, including the sill interface
	U_w	
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

²Spandrel section includes interface with slab and vision glazing

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly

Spandrel Scenario	R_{1D} ft ² ·hr·°F/Btu (m ² K / W)	R_w ft ² ·hr·°F/Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
Baseline Spandrel Glass	R-15.7 (2.77)	R-11.6 (2.05)	0.086 (0.487)
2" raised Aluminum Panel	R-22.0 (3.88)	R-14.1 (2.49)	0.071 (0.401)

Base Assembly – Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.244 (1.38)	0.283 (1.61)

Slab and Overall Transmittance

Spandrel Scenario	R_t ft ² ·hr·°F/Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	Ψ Btu/ft·hr·°F (W/m K)
Baseline Spandrel Glass	R-4.0 (0.71)	0.248 (1.410)	0.314 (0.543)
2" raised Aluminum Panel	R-4.1 (0.73)	0.242 (1.377)	0.309 (0.535)

Spandrel Section with Slab²

R_s ft ² ·hr·°F/Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)
R-5.2 (0.92)	0.192 (1.090)
R-5.7 (1.00)	0.176 (1.002)

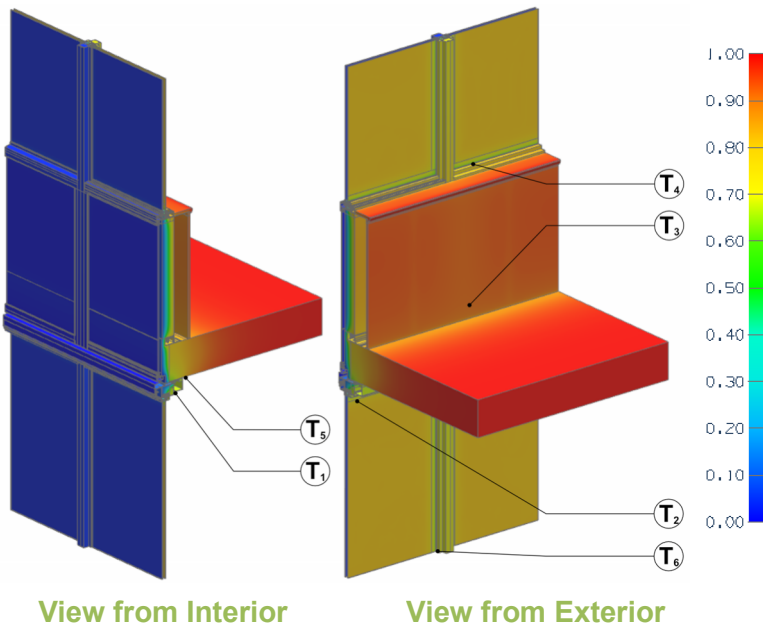
Temperature Indices

	Baseline Spandrel Glass	2" Raised Aluminum Panel	Temperature Locations
T_{i1}	0.66	0.67	Min T on deflection header, at center of deflection header
T_{i2}	0.71	0.71	Min T on edge of glass, at corner of glazing
T_{i3}	0.77	0.81	Min T on vertical coupler on inside surface, at concrete floor
T_{i4}	0.77	0.78	Min T on frame at sill, near vertical coupler
T_{i5}	0.79	0.80	Min T on underside of concrete floor, near deflection header
T_{i6}	0.73	0.72	Min T on vertical coupler, away from slab bypass

Detail 1.2.6

Starline 9200 Series Window Wall System – Intermediate Floor Intersection with Thermally Enhanced Bypass and Interior Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-value	R_{1D}	R-3.1 (0.55 RSI) + backpan and inboard insulation
Transmittance / Resistance	U_g	U-value and R-value for glazing, including framing
	U_t R_t	U-value and R-value for overall assembly
	U_s R_s	U-value and R-value for spandrel with slab
	R_w U_w	Clear field U-value and R-value for spandrel, including the sill interface
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

²Spandrel section includes interface with slab and vision glazing

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly

Spandrel Scenario	Inboard Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F/Btu (m ² K / W)	R_w ft ² ·hr·°F/Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
Baseline Spandrel Glass	R-4.2 (0.74)	R-19.9 (3.51)	R-13.5 (2.38)	0.074 (0.420)
	R-8.4 (1.48)	R-24.1 (4.25)	R-14.4 (2.54)	0.069 (0.394)
2" Raised Aluminum Panel	R-4.2 (0.74)	R-26.2 (4.62)	R-16.0 (2.82)	0.062 (0.355)
	R-8.4 (1.48)	R-30.4 (5.36)	R-17.0 (2.99)	0.059 (0.334)

Base Assembly – Glazing

$U_{\text{centre of glazing}}$ Btu/ft ² ·hr·°F (W/m ² K)	U_g Btu/ft ² ·hr·°F (W/m ² K)
0.244 (1.38)	0.283 (1.61)

Slab and Overall Transmittance

Spandrel Scenario	Inboard Insulation 1D R-Value (RSI)	R_t ft ² ·hr·°F/Btu (m ² K / W)	U_t Btu/ft ² ·hr·°F (W/m ² K)	Ψ Btu/ft·hr·°F (W/m K)
Baseline Spandrel Glass	R-4.2 (0.74)	R-4.1 (0.72)	0.245 (1.393)	0.324 (0.561)
	R-8.4 (1.48)	R-4.1 (0.72)	0.244 (1.386)	0.326 (0.565)
2" Raised Aluminum Panel	R-4.2 (0.74)	R-4.2 (0.73)	0.240 (1.365)	0.316 (0.547)
	R-8.4 (1.48)	R-4.2 (0.74)	0.239 (1.360)	0.319 (0.552)

Spandrel Section with Slab²

R_s ft ² ·hr·°F/Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)
R-5.4 (0.96)	0.184 (1.045)
R-5.5 (0.98)	0.180 (1.025)
R-5.9 (1.03)	0.171 (0.970)
R-5.9 (1.05)	0.168 (0.956)

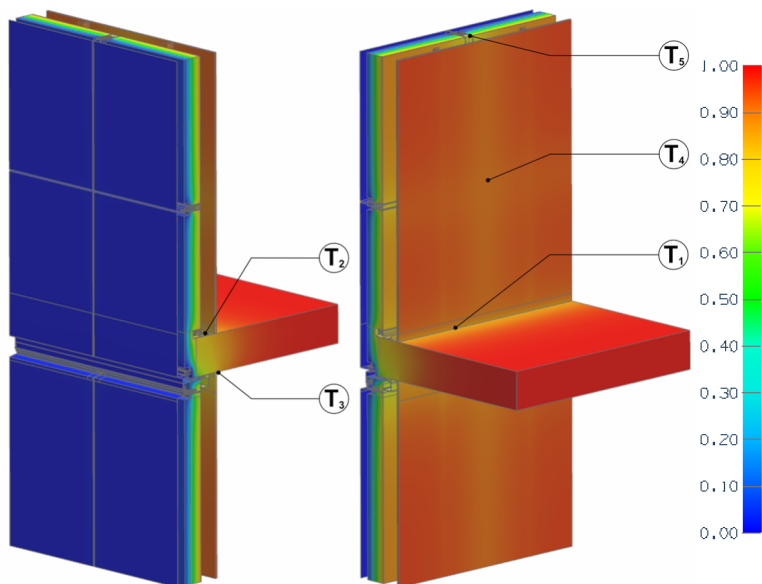
Temperature Indices

	Baseline Spandrel Glass		2" Raised Aluminum Panel		Temperature Locations
	R-4.2	R-8.4	R-4.2	R-8.4	
Ti ₁	0.67	0.66	0.66	0.66	Min T on deflection header, at center of deflection header
Ti ₂	0.71	0.71	0.71	0.71	Min T on edge of glass, at corner of glazing
Ti ₃	0.69	0.65	0.71	0.68	Min T on vertical coupler on inside surface, at concrete floor
Ti ₄	0.74	0.72	0.75	0.73	Min T on frame at sill, near vertical coupler
Ti ₅	0.78	0.77	0.79	0.78	Min T on underside of concrete floor, near deflection header
Ti ₆	0.73	0.73	0.72	0.72	Min T on vertical coupler, away from slab bypass

Detail 1.2.7

Starline 9200 Series Window Wall System – Full Height Spandrel at Intermediate Floor Intersection with Thermally Enhanced Bypass and No Interior Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-value	R_{1D}	R-3.1 (0.55 RSI) + backpan and inboard insulation
Transmittance / Resistance	U_s R_s	U-value and R-value for spandrel with slab
	R_w U_w	Clear field U-value and R-value for spandrel, including the sill interface
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly

Spandrel Scenario	R_{1D} ft ² ·hr·°F/Btu (m ² K / W)	R_w ft ² ·hr·°F/Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
Baseline Spandrel Glass	R-15.7 (2.77)	R-12.0 (2.11)	0.083 (0.474)
2" raised Aluminum Panel	R-22.0 (3.88)	R-13.7 (2.41)	0.073 (0.414)

Slab and Overall Transmittance

Spandrel Scenario	R_s ft ² ·hr·°F/Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	Ψ Btu/ft·hr·°F (W/m K)
Baseline Spandrel Glass	R-9.0 (1.59)	0.111 (0.629)	0.246 (0.427)
2" raised Aluminum Panel	R-9.2 (1.61)	0.109 (0.619)	0.325 (0.562)

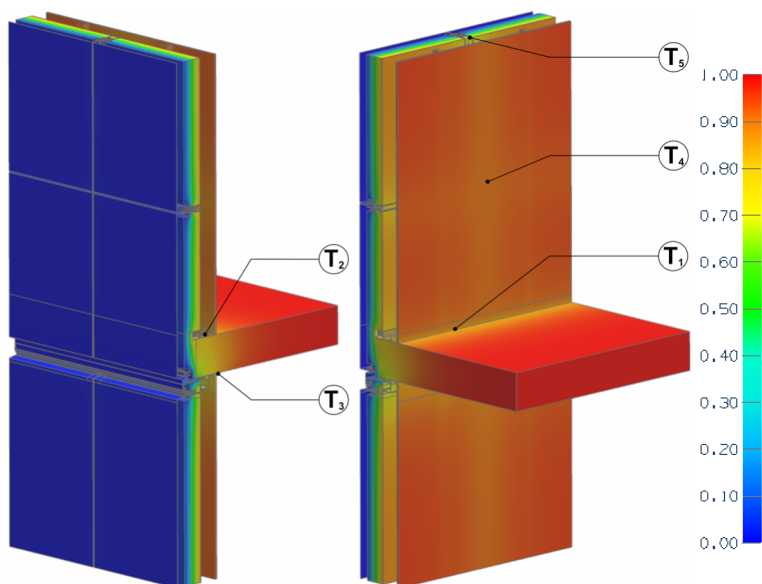
Temperature Indices

	Baseline Spandrel Glass	2" Raised Aluminum Panel	Temperature Locations
Ti ₁	0.86	0.85	Min T on topside of concrete slab, at inside surface of spandrel bypass
Ti ₂	0.78	0.78	Min T on inside face of T-angle
Ti ₃	0.70	0.71	Min T on underside of concrete floor, near deflection header
Ti ₄	0.76	0.68	Min T on vertical coupler inside surface, at horizontal mullion
Ti ₅	0.77	0.74	Min T on vertical coupler, away from slab bypass

Detail 1.2.8

Starline 9200 Series Window Wall System – Full Height Spandrel at Intermediate Floor Intersection with Thermally Enhanced Bypass and Interior Insulation

Thermal Performance Indicators



Assembly 1D (Nominal) R-value	R_{1D}	R-3.1 (0.55 RSI) + backpan and inboard insulation
Transmittance / Resistance	U_s R_s	U-value and R-value for spandrel with slab
	R_w U_w	Clear field U-value and R-value for spandrel, including the sill interface
Linear Transmittance	Ψ	Incremental increase in transmittance per linear length of slab
Surface Temperature Index ¹	T_i	0 = exterior temperature 1 = interior temperature

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

View from Interior

View from Exterior

Nominal (1D) vs. Assembly Performance Indicators

Base Assembly

Spandrel Scenario	Inboard Insulation 1D R-Value (RSI)	R_{1D} ft ² ·hr·°F/Btu (m ² K / W)	R_w ft ² ·hr·°F/Btu (m ² K / W)	U_w Btu/ft ² ·hr·°F (W/m ² K)
Baseline Spandrel Glass	R-4.2 (0.74)	R-19.9 (3.51)	R-16.3 (2.88)	0.061 (0.347)
	R-8.4 (1.48)	R-24.1 (4.25)	R-20.6 (3.62)	0.049 (0.276)
2" Raised Aluminum Panel	R-4.2 (0.74)	R-26.2 (4.62)	R-18.2 (3.20)	0.055 (0.312)
	R-8.4 (1.48)	R-30.4 (5.36)	R-22.5 (3.95)	0.045 (0.253)

Slab and Overall Transmittance

Spandrel Scenario	Inboard Insulation 1D R-Value (RSI)	R_s ft ² ·hr·°F/Btu (m ² K / W)	U_s Btu/ft ² ·hr·°F (W/m ² K)	Ψ Btu/ft·hr·°F (W/m K)
Baseline Spandrel Glass	R-4.2 (0.74)	10.9 (1.92)	0.092 (0.521)	0.275 (0.476)
	R-8.4 (1.48)	12.4 (2.18)	0.081 (0.458)	0.289 (0.500)
2" Raised Aluminum Panel	R-4.2 (0.74)	10.9 (1.93)	0.091 (0.519)	0.327 (0.566)
	R-8.4 (1.48)	12.2 (2.16)	0.082 (0.464)	0.334 (0.578)

Temperature Indices

	Baseline Spandrel Glass		2" Raised Aluminum Panel		Temperature Locations
	R-4.2	R-8.4	R-4.2	R-8.4	
Ti ₁	0.83	0.82	0.83	0.81	Min T on topside of concrete slab, at inside surface of spandrel bypass
Ti ₂	0.73	0.68	0.72	0.68	Min T on inside face of T-angle
Ti ₃	0.66	0.60	0.67	0.63	Min T on underside of concrete floor, near deflection header
Ti ₄	0.55	0.45	0.52	0.42	Min T on vertical coupler inside surface, at horizontal mullion
Ti ₅	0.55	0.45	0.52	0.42	Min T on vertical coupler, away from slab bypass