APPENDIX A – CATALOGUE MATERIAL DATA SHEETS

CATALOGUE INDEX

Introduction **A.0.i**

1.0 Window Wall **A.1.i**

2.0 Conventional Curtain Wall **A.2.i**

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4.0 High Performance Curtain Wall **A.4.i**

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Introduction

Introduction

Appendix A contains the catalogue of material data information sheets for all the details available for this guide. The purpose is to provide this information such that designers will be able to easily reference their project details to a modeled detail within the catalogue or to be able to make estimations based on the information provided. The catalogue is divided into 9 sections, based on construction type:

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

Within each section contains a variety of clear field and interface details. The catalogue contains details modeled by Morrison Hershfield Ltd. for this guide, along with previous modeling, including ASHRAE 1365-RP and other proprietary systems.

Each material data sheet is meant to be standalone and contains all the information needed for that particular detail. 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.
It should be noted that, as they are standalone, there are not necessarily a matching clear field data sheet for every detail. Additionally, some assemblies shown in the data sheets 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. The thermal results information in each results data sheet in Appendix B is given for all interface details contained within a single assembly detail.

Air Films and Contact Resistances

In thermal modeling, beyond the assembly material properties, assemblies are also affected by air films and contact resistances. From ASHRAE 1365-RP, the modeling was extensively calibrated with air films and contact resistances and is shown below in Tables A.1 and A.2. More information on assumptions and other modeling parameters can be found in Section 5 of ASHRAE 1365-RP.

Table A.1. Air film resistances

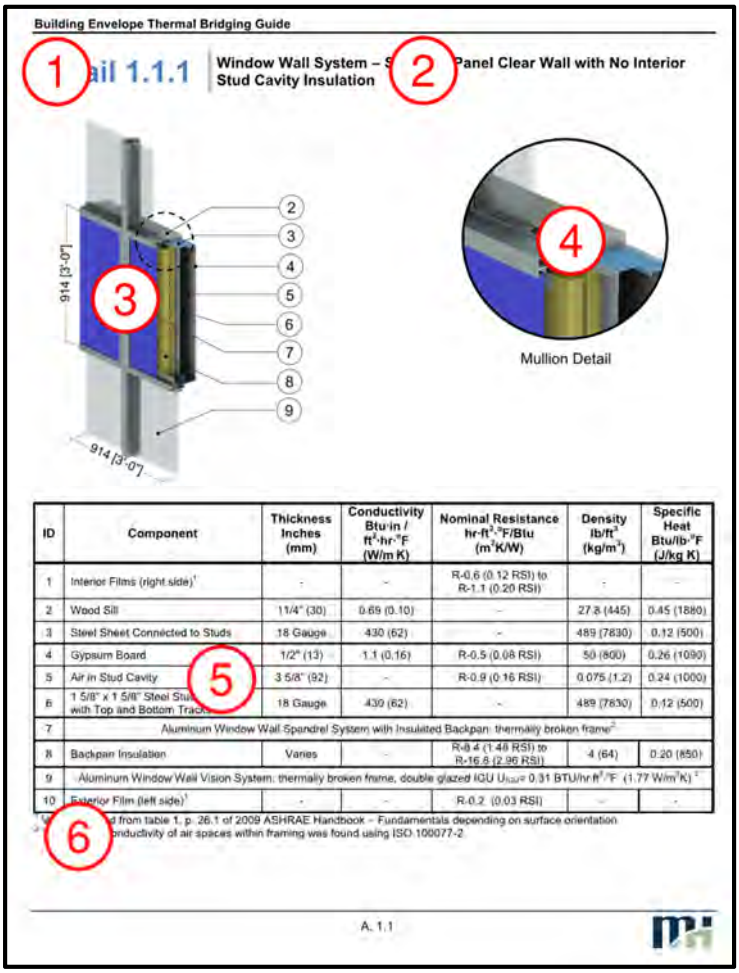
Location	Description of Condition	Heat Transfer Coefficient Btu/h·ft²·°F (W/m² K)
Exterior wall surface with generic cladding	Heat transfer coefficient to account for vented air space and cladding; surface is not directly exposed to wind	1.5 (8.3)
Exterior brick veneer and Precast Concrete surface	Surface exposed to 15 mph (24 km/h) wind	6.0 (34)
Exterior roof surface	Horizontal roof surface exposed to 15 mph (24 km/h) wind	6.0 (34)
Interior wall surface	Vertical surface exposed to indoor air and surfaces	1.5 (8.3)
Interior ceiling surface	Horizontal surface exposed to indoor air and surfaces with upward heat flow	1.6 (9.3)
Interior floor surface	Horizontal surface exposed to indoor air and surface with downward heat flow	1.1 (6.1)

Table A.2. Contact resistances

Location	Contact Resistance hr·ft²·°F /Btu (m² °C/W)
Steel flanges at sheathing interfaces	0.17 (0.030)
Insulation interfaces	0.057 (0.010)
Steel to concrete interfaces	0.057 (0.010)
Steel to steel interfaces	0.011 (0.0020)

Material Data Sheets

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



1) Detail Name

Each detail is named based on position within the catalogue index. The first number **1.**x.x indicates the construction type according to the main index (ie 1 is Window-Wall, 5 is Steel-Framed, 8 is Wood-Framed and Timber, etc). The second number x.**1.**x indicates detail group (ie. 1 is clear field values, 2 may be all slabs and 3 may be all parapets). The last number x.x.**1.** is simply the order in which the detail appears within that grouping (ie slab detail 1, slab detail 2 etc).

2) Detail Description

Each material data sheet has a basic description that denotes the construction system or type, along with additional detail identifiers such as limited dimension information, transmittance type and insulation locations

3) Detail Image

An isometric image of each detail is provided that includes cut away sections to view interior portions of the assembly. The images include dimensional information on the modeled assembly, along with ID numbers of key components. Each image is shown from the exterior side.

4) Close Up Image

Some material data sheets also contain close up images for further information on key components in an assembly. These callouts are usually from the same angle as the full assembly, however when an interior feature cannot be seen from that angle, the close up image may indicate it is from an interior view.

5) Material Information

For each component ID number given in the Detail Image, the material data sheets contain a description, thickness, thermal conductivity, nominal resistance (if applicable), material density and specific heat. For full systems that may contain multiple parts, such as window wall, a general description is given. Material properties were taken from standard tabulated values (typically measured at 24°C or 75°F).

6) Additional References

References for the conductivity of air spaces and other information are provided underneath the material tables.

7) 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 data sheet. To return to the index, simply click on the Building Envelope Thermal Bridging Guide header.

1.0 Window Wall

Detail 1.1.1 ..... **A.1.1**

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

Detail 1.1.2 ..... **A.1.2**

Window Wall System – Spandrel Panel Clear Wall with Interior Spray Foam Insulation

Detail 1.2.1 ..... **A.1.3**

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

Detail 1.2.2 ..... **A.1.4**

Window Wall System – Intermediate Floor Intersection with Spandrel Bypass and Interior Spray Foam Insulation

Detail 1.2.3 ..... **A.1.5**

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

Detail 1.2.4 ..... **A.1.6**

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

Detail 1.2.5 ..... **A.1.7**

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

Detail 1.2.6 ..... **A.1.8**

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

Detail 1.2.7 ..... **A.1.9**

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

Detail 1.2.8 ..... **A.1.10**

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

Detail 1.2.9 ..... **A.1.11**

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

Detail 1.2.10 ..... **A.1.12**

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

Detail 1.3.1 ..... **A.1.13**

Window Wall System – Uninsulated Concrete Parapet & Roof Intersection

Detail 1.3.2 ..... **A.1.14**

Window Wall System – Partially Insulated Concrete Parapet & Roof Intersection

Detail 1.4.1 ..... A.1.15

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

Detail 1.4.2 ..... A.1.16

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

Detail 1.5.1 ..... A.1.17

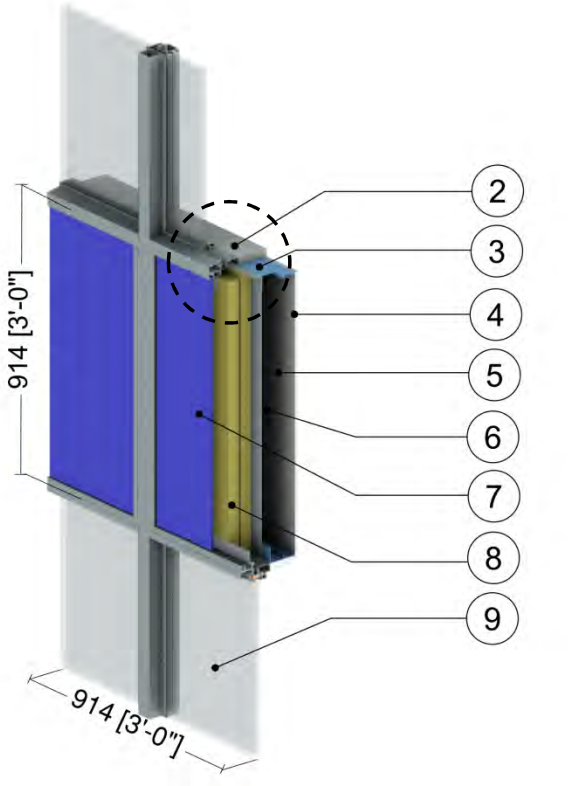
Window Wall System with Insulated Spandrel Panel – Uninsulated Interior Concrete Wall and Intermediate Floor Intersection

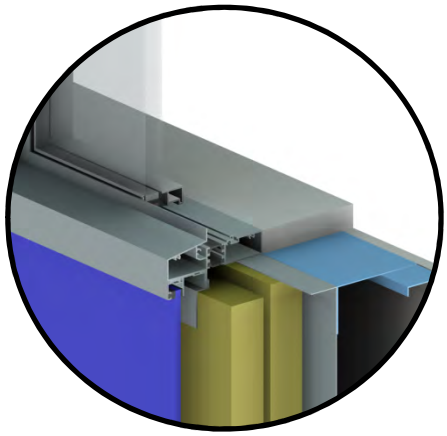
Detail 1.5.2 ..... A.1.18

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

Detail 1.1.1

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





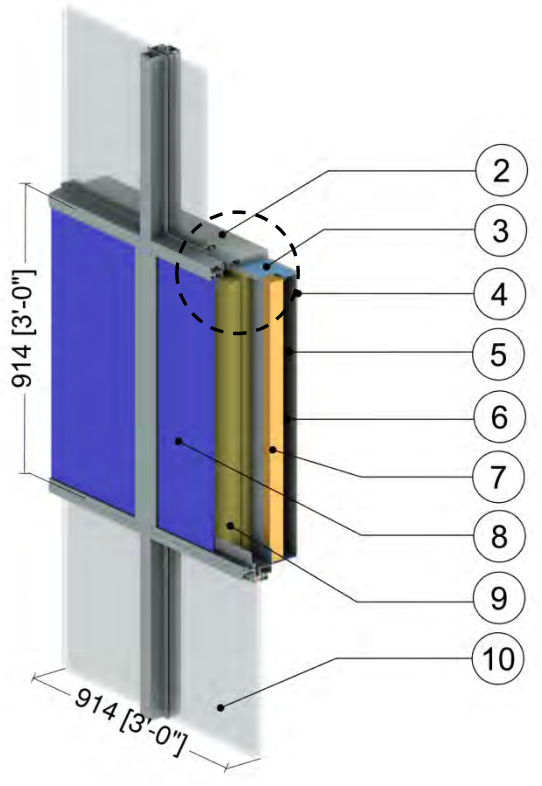
Mullion Detail

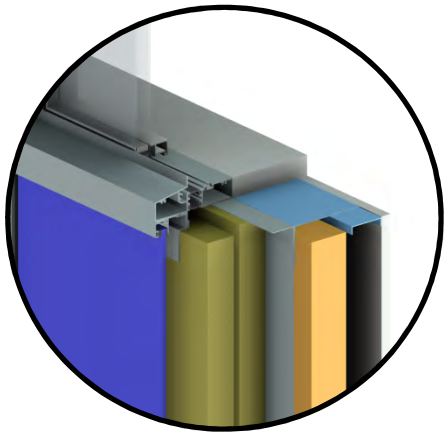
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions[2]					
8	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
9	Aluminum Window Wall Vision System: thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
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 1.1.2

Window Wall System – Spandrel Panel Clear Wall with Interior Spray Foam Insulation





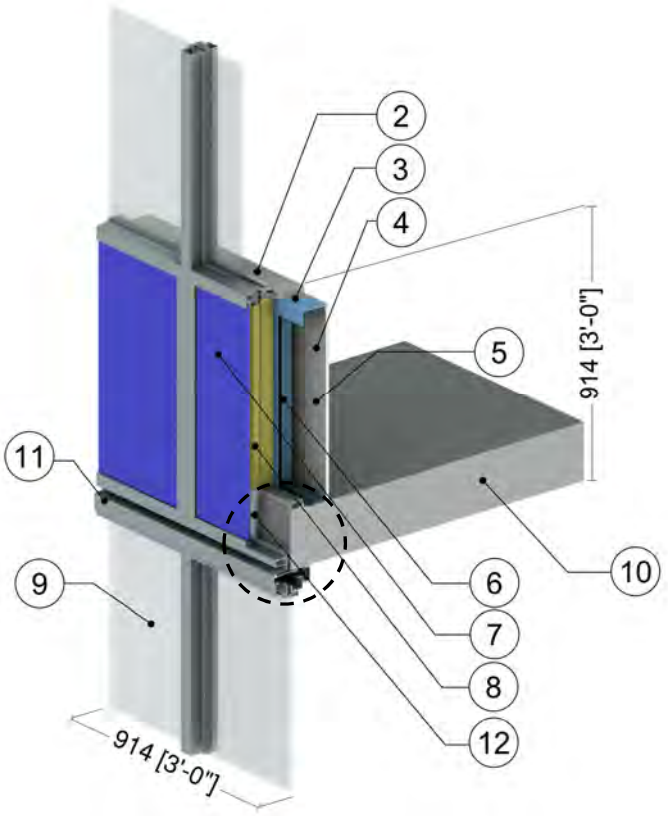
Mullion Detail

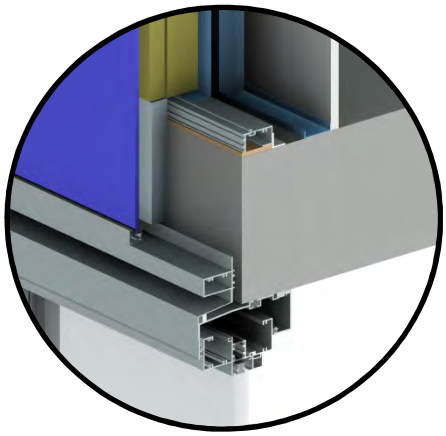
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Metal Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Continuous Spray Foam Insulation	2" (51)	0.17 (0.024)	R-12 (2.11 RSI)	2.8 (39)	0.35 (1470)
8	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions[2]					
9	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
10	Aluminum Window Wall Vision System: thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
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 1.2.1

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





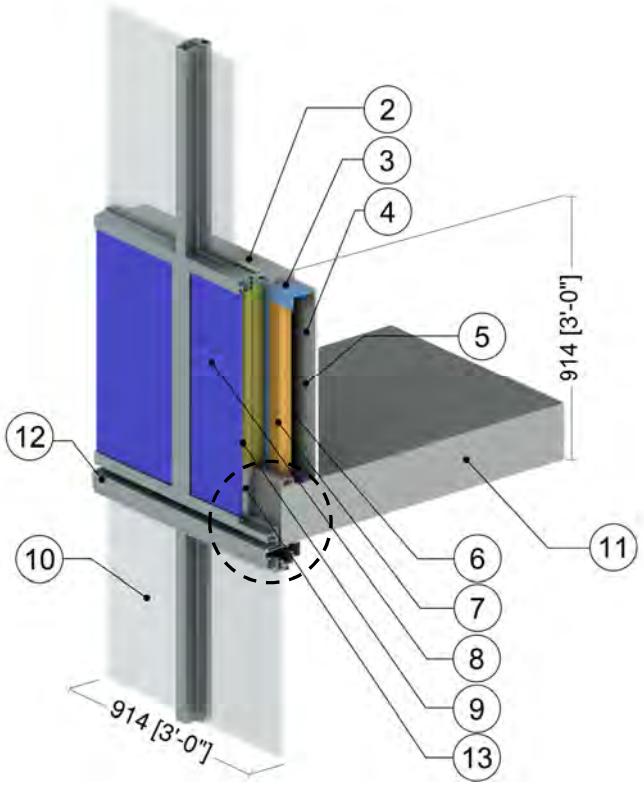
Bypass Detail with Deflection Header and 1/2" (12mm) Air Gap Behind Horizontal Mullion

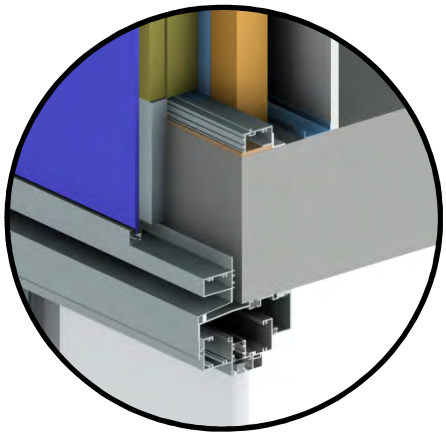
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions[2]					
8	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
9	Aluminum Window Wall Vision System: thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
12	Bypass Insulation	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
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 1.2.2

Window Wall System – Intermediate Floor Intersection with Spandrel Bypass and Interior Spray Foam Insulation





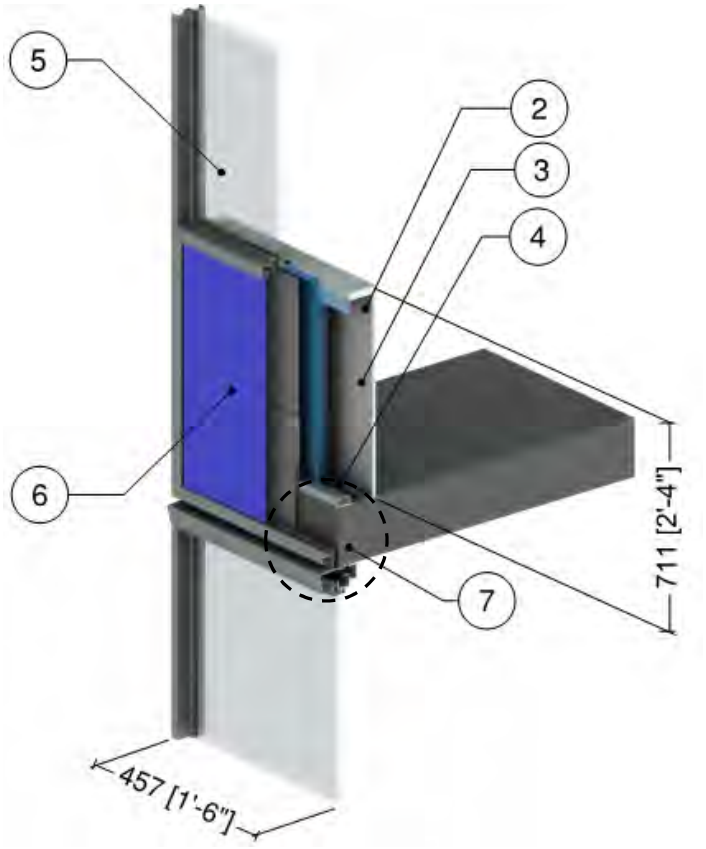
Bypass Detail with Deflection Header and 1/2" (12mm) Air Gap Behind Horizontal Mullion

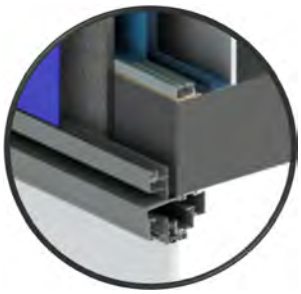
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Continuous Spray Foam Insulation	2" (51)	0.17 (0.024)	R-12 (2.11 RSI)	2.8 (39)	0.35 (1470)
8	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions[2]					
9	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
10	Aluminum Window Wall Vision System: thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
11	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
13	Bypass Insulation	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
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 100077-2

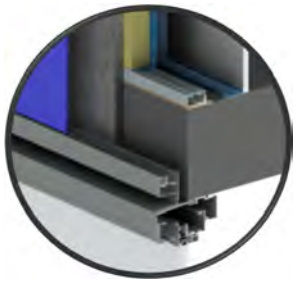
Detail 1.2.3

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





G1 – 3/4” (19 mm) AIM adhered to Frame without Backpan Insulation



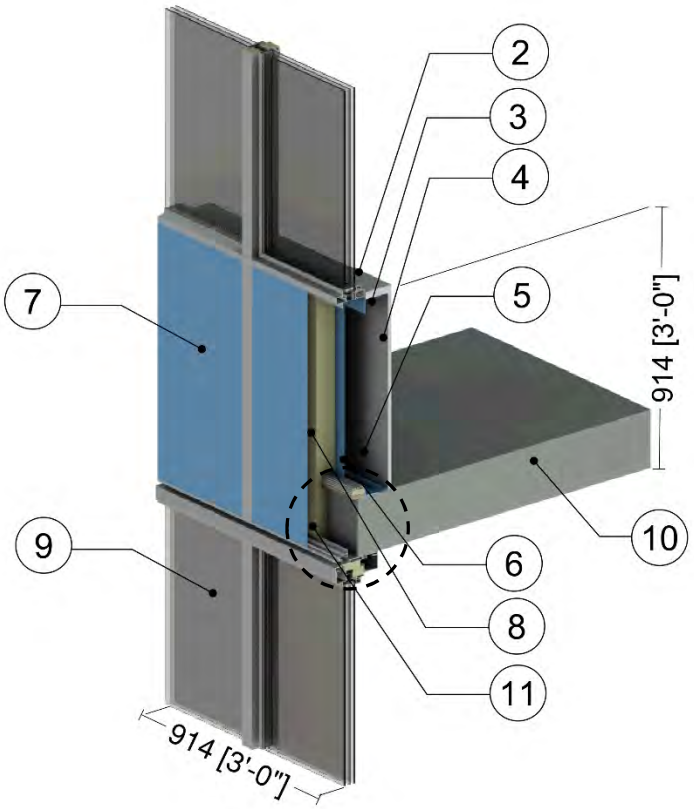
G2 – 3/4” (19 mm) AIM adhered to Frame with 2” (51 mm) Backpan Insulation

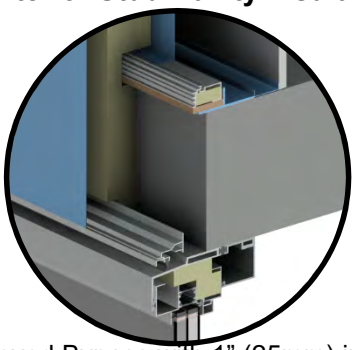
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Window Wall Vision Section: double glazed IGU with silicone warm edge spacer[2]					
6	Aluminum Window Wall Spandrel Section with varied insulation (see G1 to G2 above)[2,3]					
7	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	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
[3] For a window to wall ratio of 40%
AIM = Architectural Insulation Module

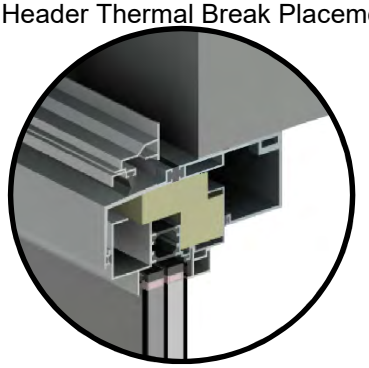
Detail 1.2.4

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





A. Improved Bypass with 1" (25mm) insulation behind horizontal mullion, *Standard* Deflection Header Thermal Break Placement



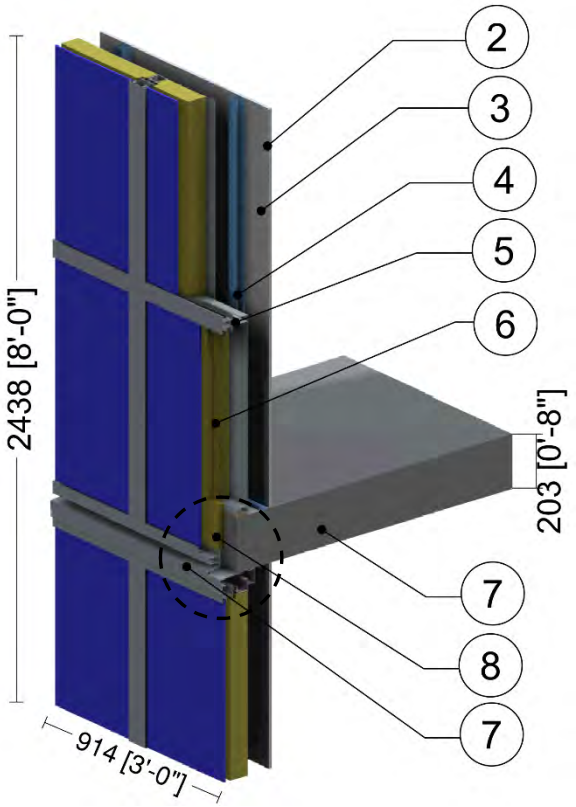
B. Improved Bypass with 1" (25mm) insulation behind horizontal mullion, and Deflection Header Thermal Break in line with Bypass Insulation

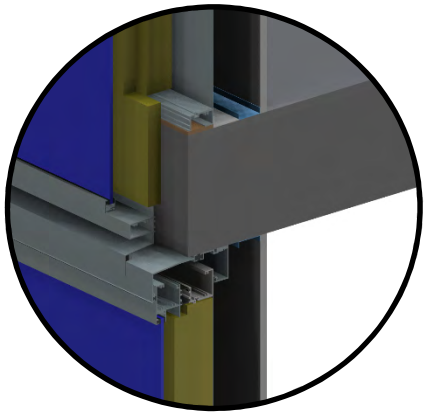
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	3 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame with insulation within mullions, additional bypass insulation and two deflection header thermal break scenarios, A) Standard, B) Inline with Slab Insulation[2]					
8	Backpan Insulation	3" (76)	0.24 (0.034)	R-12.6 (2.22 RSI)	4 (64)	0.20 (850)
9	Aluminum Window Wall Vision System: thermally broken frame[2], triple glazed IGU U_{COG}= 0.14 BTU/hr·ft²·°F (0.81 W/m²K)					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Bypass Insulation	2" (51)	0.24 (0.034)	R-8.4 (1.48 RSI)	4 (64)	0.20 (850)
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 1.2.5

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





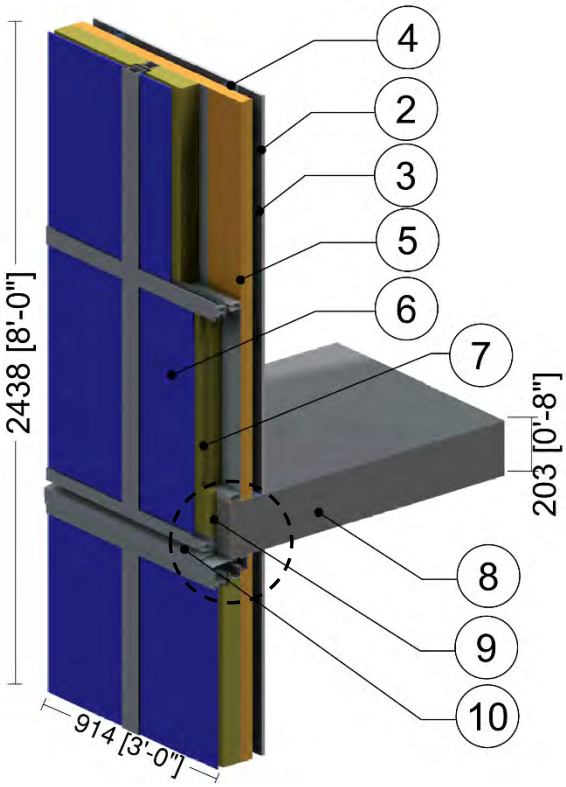
Bypass Detail with Deflection Header and 1/2" (12mm) Air Gap Behind Horizontal Mullion

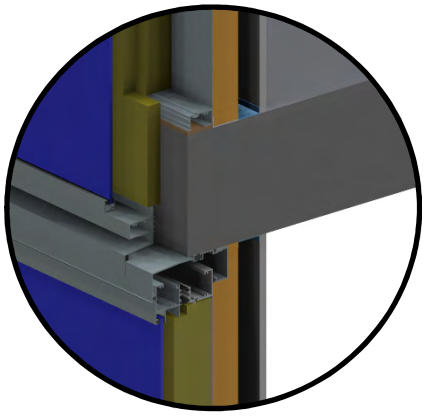
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Full Height Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions [2]					
6	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Bypass Insulation	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
9	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
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 1.2.6

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





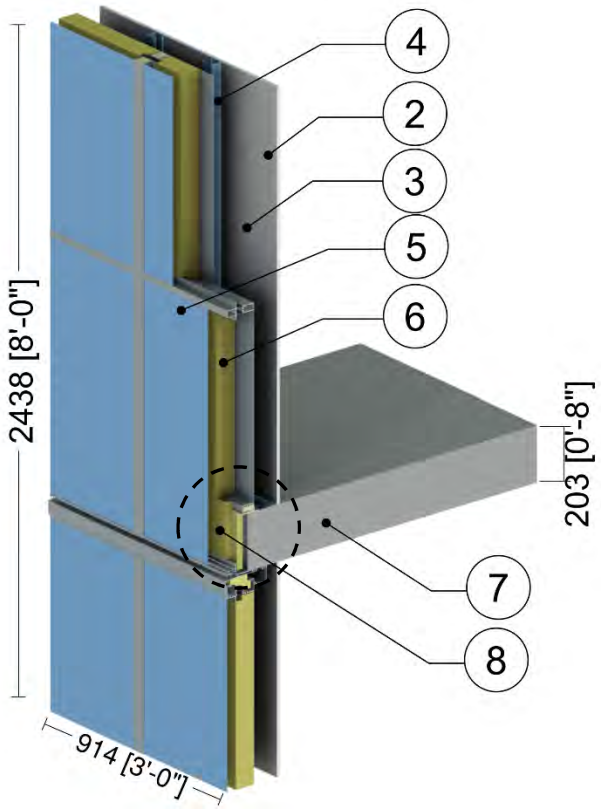
Bypass Detail with Deflection Header and 1/2" (12mm) Air Gap Behind Horizontal Mullion

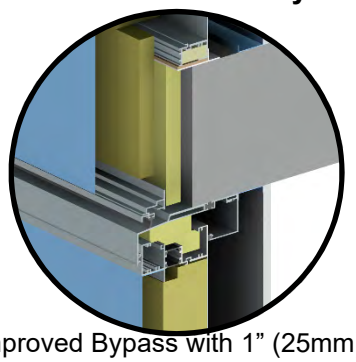
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Continuous Spray Foam Insulation	2" (51)	0.17 (0.024)	R-12 (2.11 RSI)	2.8 (39)	0.35 (1470)
6	Full Height Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions[2]					
7	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Bypass Insulation	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
10	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
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

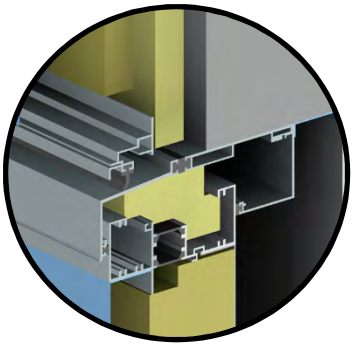
Detail 1.2.7

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





A. Improved Bypass with 1" (25mm) insulation behind horizontal mullion, *Standard* Deflection Header Thermal Break Placement



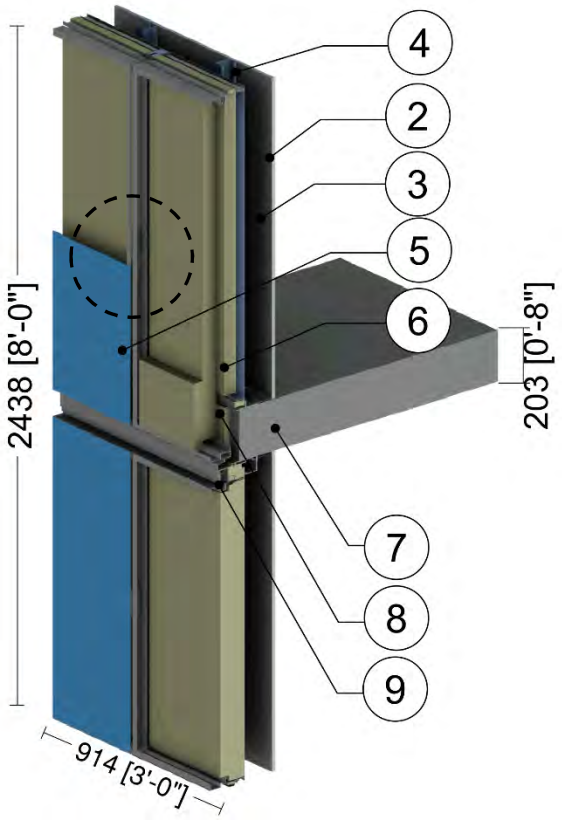
B. Improved Bypass with 1" (25mm) insulation behind horizontal mullion, and Deflection Header Thermal Break in line with Bypass Insulation

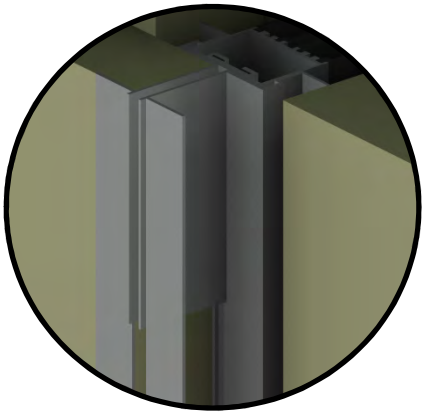
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Full Height Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame with insulation within mullions, additional bypass insulation and two deflection header thermal break scenarios, A) Standard, B) Inline with Slab Insulation [2]					
6	Backpan Insulation	3" (76)	0.24 (0.034)	R-12.6 (2.22 RSI)	4 (64)	0.20 (850)
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Bypass Insulation	2" (51)	0.24 (0.034)	R-8.4 (1.48 RSI)	4 (64)	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
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 1.2.8

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





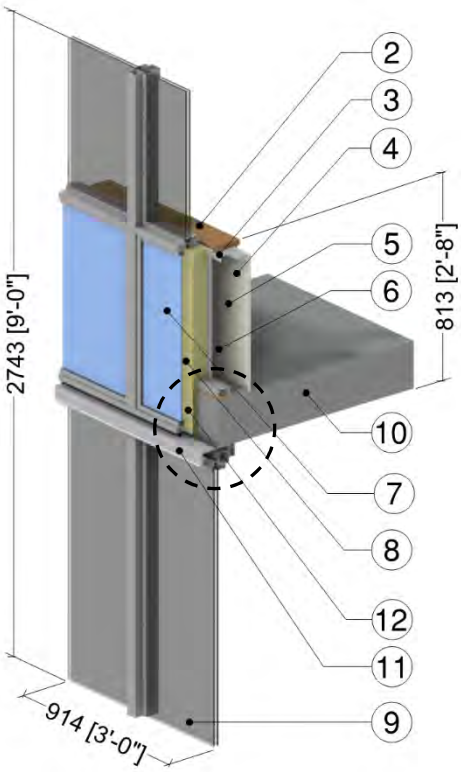
Spandrel Clip and Insulation outboard of vertical mullions

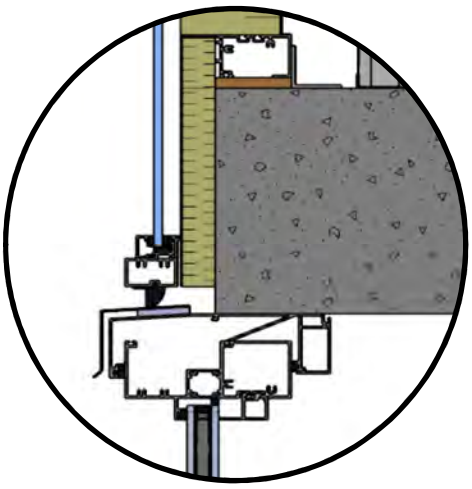
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Full Height Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame with hybrid clip system on mullions holding up metal panel, allowing for extended amounts of insulation in the backpan and 1" of insulation in front of the mullions[2]					
6	Backpan Insulation	5.5" (140)	0.24 (0.034)	R-23.1 (4.07 RSI)	4 (64)	0.20 (850)
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Bypass Insulation	5.25" (133)	0.24 (0.034)	R-22.1 (3.88 RSI)	4 (64)	0.20 (850)
9	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
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 1.2.9

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





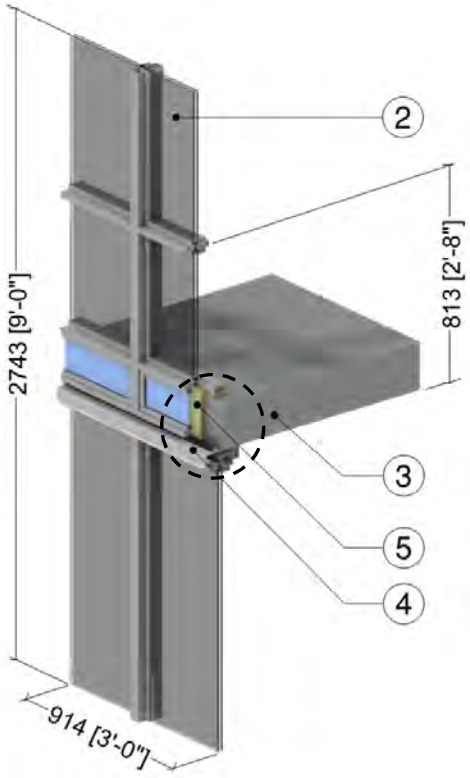
Bypass Detail with Deflection Header

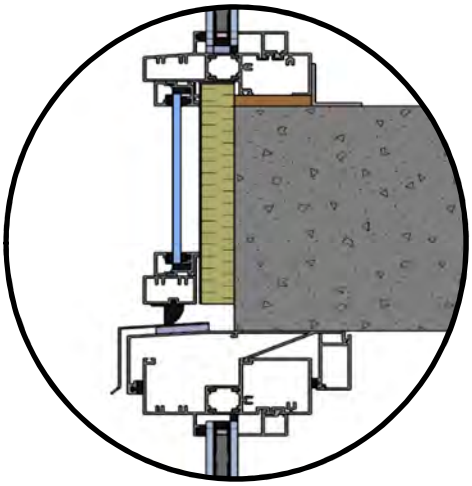
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Wood Sill	1" (25)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Steel Track Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions[2]					
8	Backpan Insulation	3" (76)	0.24 (0.034)	R-12.6 (2.22 RSI)	1.8 (28)	0.29 (1220)
9	Aluminum Window Wall Vision System: thermally broken frame[2], double glazed IGU U_{COG} = 0.242 BTU/hr·ft²·°F (1.37 W/m²K)					
10	Concrete Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
12	Bypass Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	1.8 (28)	0.29 (1220)
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 1.2.10

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





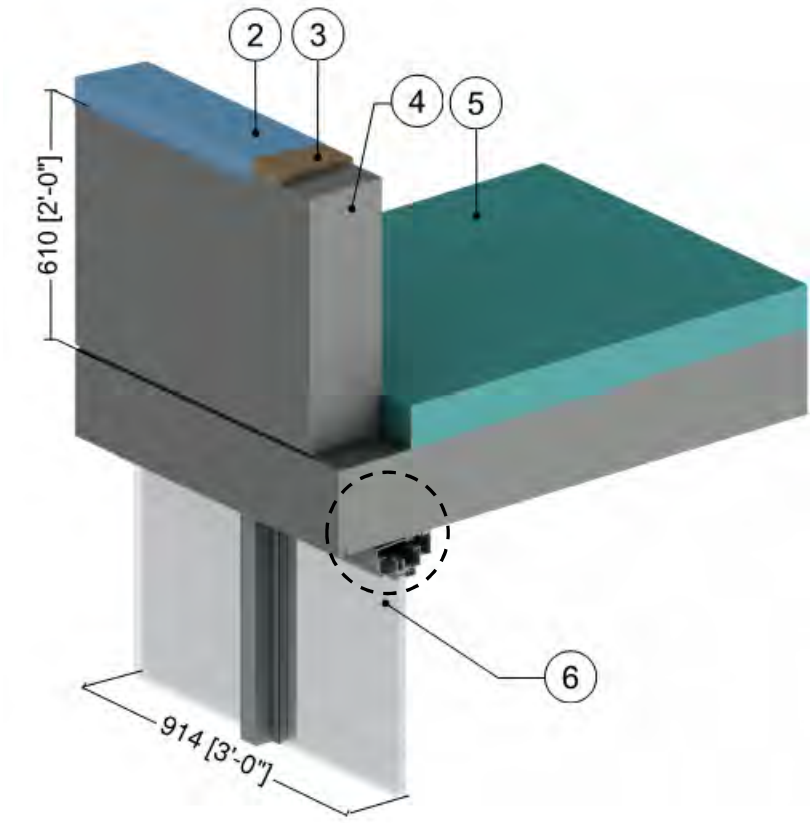
Bypass Detail with Deflection Header

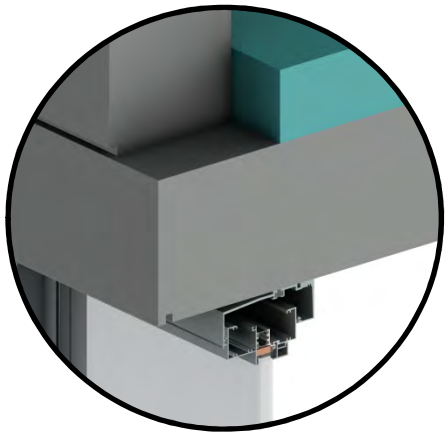
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Aluminum Window Wall Vision System: thermally broken frame[2], double glaze IGU U_{COG} = 0.242 BTU/hr·ft²·°F (1.37 W/m²K)					
3	Concrete Floor Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
4	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
5	Bypass Insulation	1” (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	1.8 (28)	0.29 (1220)
6	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 1.3.1

Window Wall System – Uninsulated Concrete Parapet & Roof Intersection





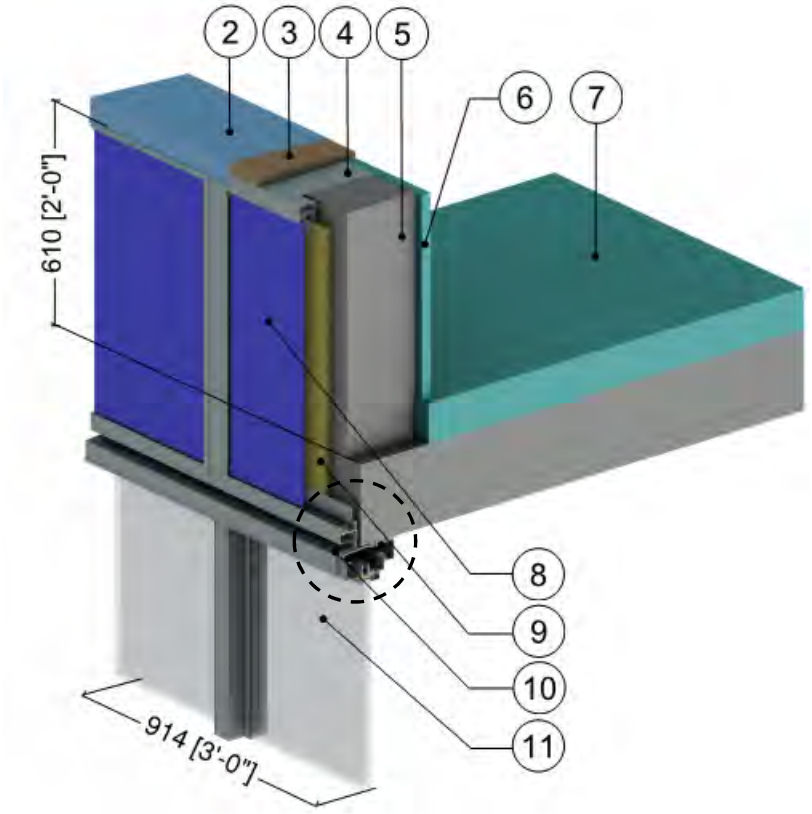
Parapet Intersection Detail

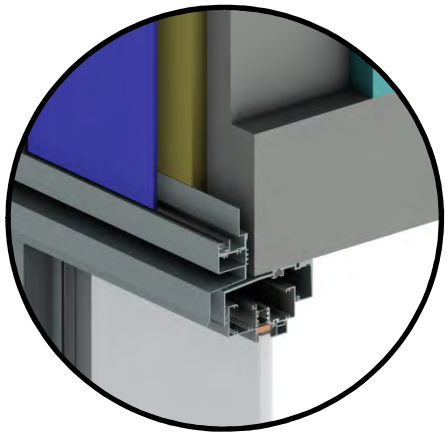
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Parapet Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
3	Wood Blocking	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
4	Concrete Slab and Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
5	Roof Insulation	4" (102)	0.20 (0.029)	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
6	Aluminum Window Wall Vision System: thermally broken frame[2], no insulation in mullions, double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
7	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 1.3.2

Window Wall System – Partially Insulated Concrete Parapet & Roof Intersection





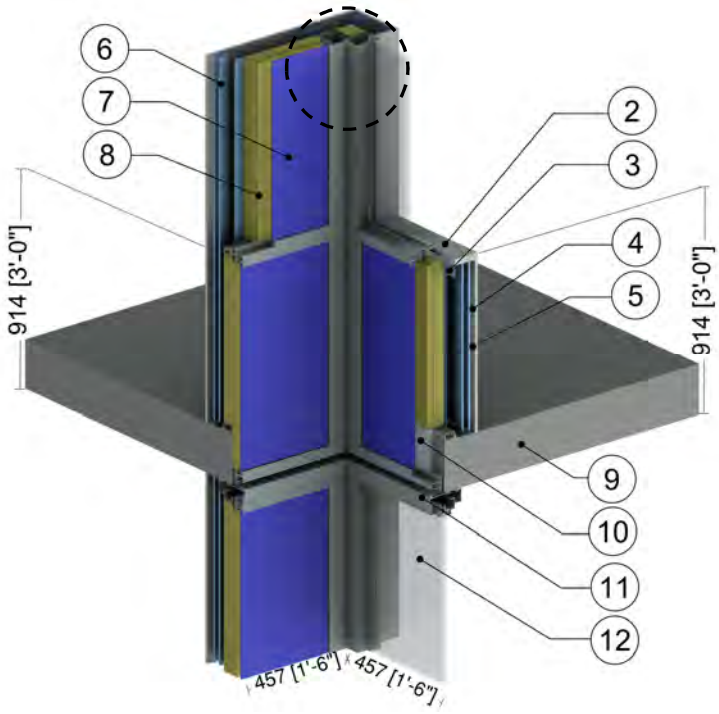
Parapet Intersection Detail

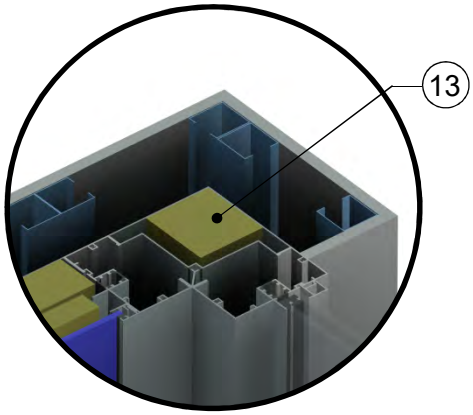
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Parapet Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
3	Wood Blocking	1 1/4" (30)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
4	Steel Connector Plate	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Slab and Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Parapet Bypass Insulation	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
7	Roof Insulation	4" (102)	0.20 (0.029)	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
8	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions[2]					
9	Window Wall Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
10	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
11	Aluminum Window Wall Vision System: thermally broken frame[2], no insulation in mullions, double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
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 1.4.1

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





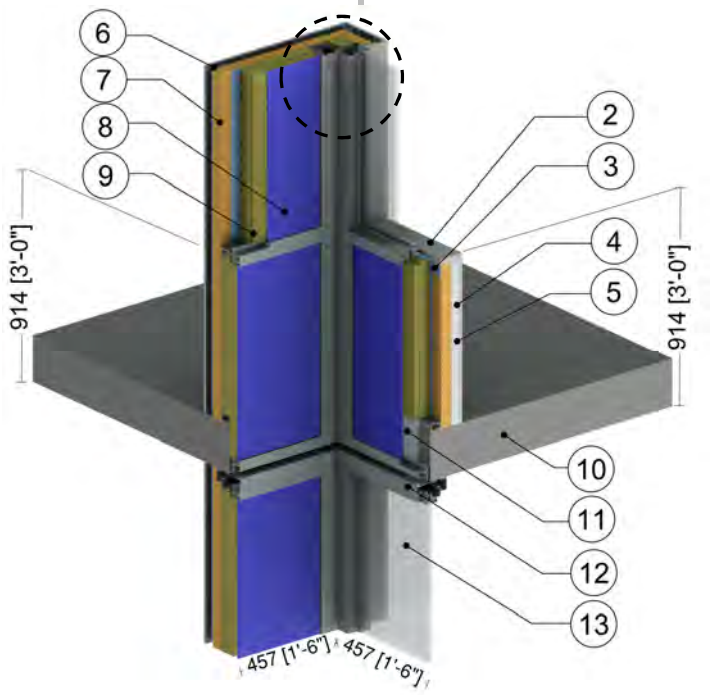
Corner Post Detail

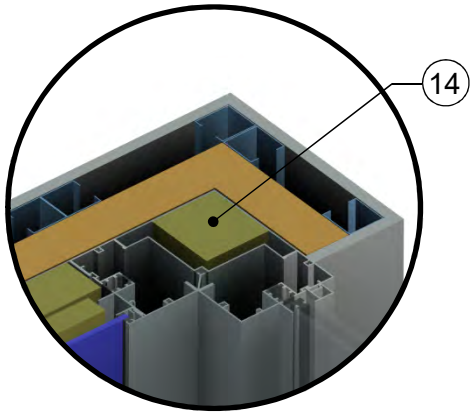
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Full Height Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions[2]					
8	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Bypass Insulation	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
11	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
12	Aluminum Window Wall Vision System: thermally broken frame[2], no insulation in mullions, double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
13	Post Insulation	3" (76)	0.24 (0.034)	R-12.6 (2.22 RSI)	4 (64)	0.20 (850)
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 100077-2

Detail 1.4.2

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





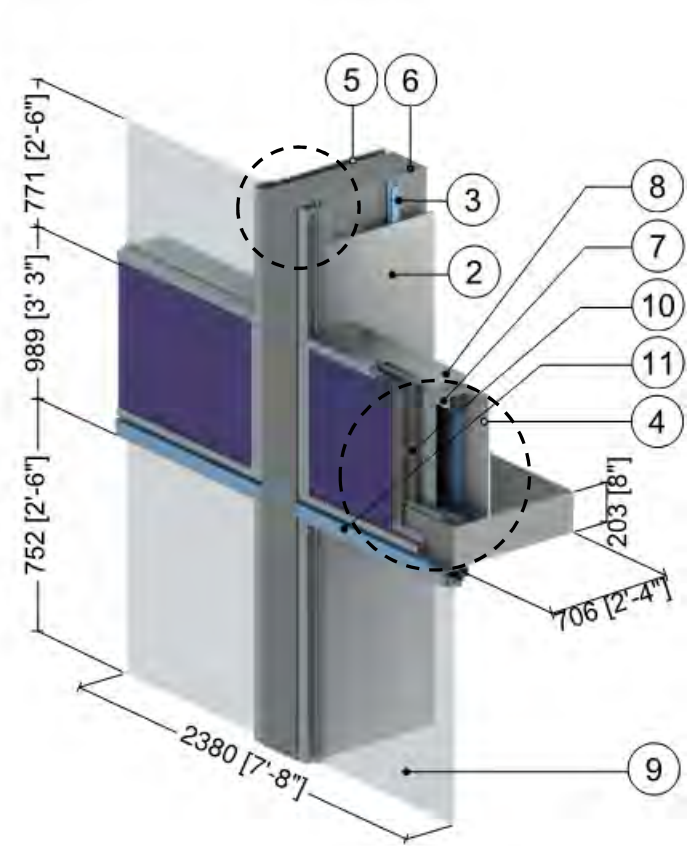
Corner Post Detail

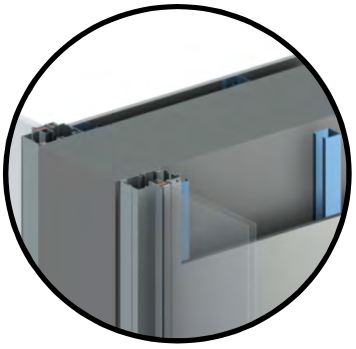
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Continuous Spray Foam Insulation	2" (51)	0.17 (0.024)	R-12 (2.11 RSI)	2.8 (39)	0.35 (1470)
8	Full Height Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame, no insulation in mullions[2]					
9	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Bypass Insulation	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
12	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
13	Aluminum Window Wall Vision System: thermally broken frame[2], no insulation in mullions, double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
14	Post Insulation	3" (76)	0.24 (0.034)	R-12.6 (2.22 RSI)	4 (64)	0.20 (850)
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

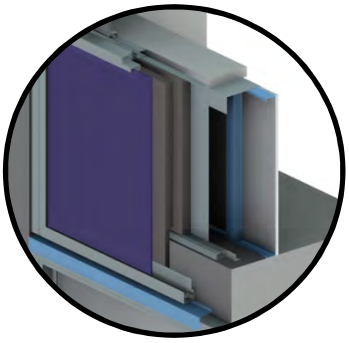
Detail 1.5.1

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





Concrete Wall Intersection Detail with no Interior Insulation



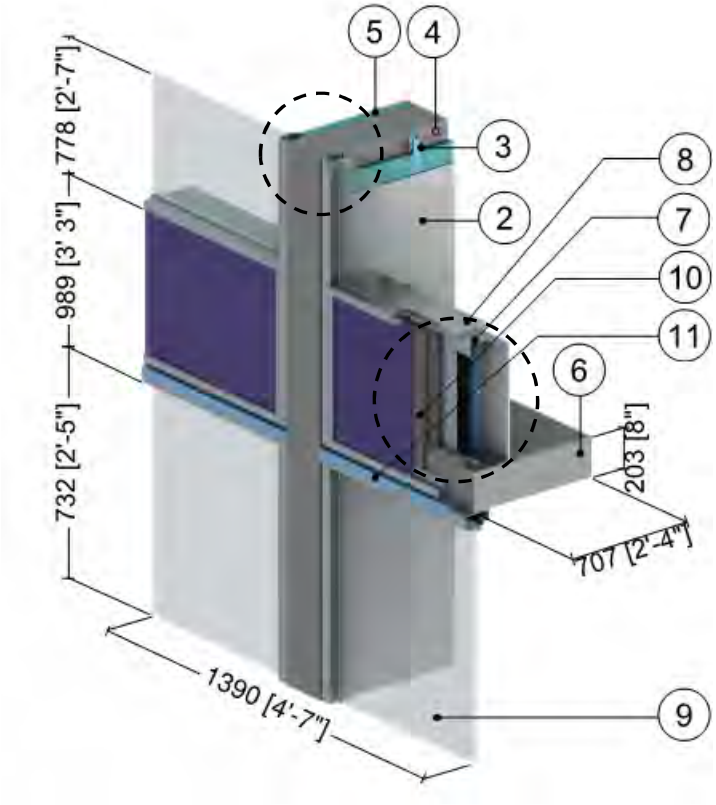
Spandrel Bypass Detail

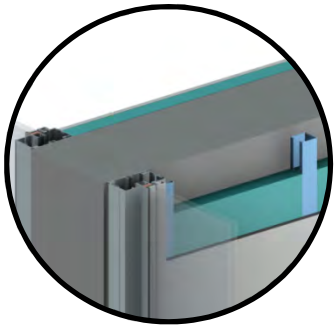
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Sill Stud Cavity	3 5/8" (92)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Air in Partition Wall Cavity	1 5/8" (41)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
6	Concrete Wall/Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Aluminum Window Wall Vision System: thermally broken frame[2], no insulation in mullions, double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
10	Backpan insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
11	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
12	Exterior Air 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

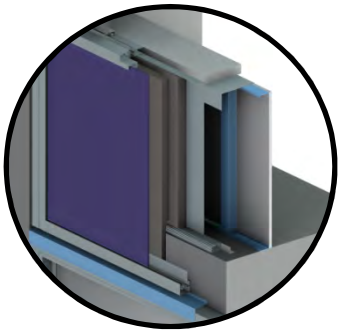
Detail 1.5.2

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





Interior Concrete Wall Intersection Detail with Interior Insulation



Spandrel Bypass 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 Film[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 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 with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Sill Stud Cavity	3 5/8" (92)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Rigid Insulation	1" (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall/Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Aluminum Window Wall Vision System: thermally broken frame[2], no insulation in mullions, double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
10	Backpan insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	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

2.0 Conventional Curtain Wall

Detail 2.1.1 ..... **A.2.1**

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

Detail 2.1.2 ..... **A.2.2**

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

Detail 2.1.3 ..... **A.2.3**

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

Detail 2.1.4 ..... **A.2.4**

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

Detail 2.1.5 ..... **A.2.5**

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

Detail 2.1.6 ..... **A.2.6**

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

Detail 2.1.7 ..... **A.2.7**

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

Detail 2.1.8 ..... **A.2.8**

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

Detail 2.1.9 ..... **A.2.9**

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

Detail 2.1.10 ..... **A.2.10**

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

Detail 2.1.11 ..... **A.2.11**

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

Detail 2.1.12 ..... **A.2.12**

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

Detail 2.1.13 ..... **A.2.13**

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

Detail 2.1.14 ..... **A.2.14**

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

Detail 2.2.1 ..... **A.2.15**

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

Detail 2.2.2 ..... **A.2.16**

Conventional Curtain Wall System – Insulated Spandrel & Roof Intersection

Detail 2.2.3 ..... **A.2.17**

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

Detail 2.2.4 ..... **A.2.18**

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

Detail 2.3.1 ..... **A.2.19**

Conventional Curtain Wall System with Insulated Spandrel Panel– Uninsulated Jamb Intersection with Vision Section

Detail 2.3.2 ..... **A.2.20**

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

Detail 2.3.3 ..... **A.2.21**

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

Detail 2.4.1 ..... **A.2.22**

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

Detail 2.4.2 ..... **A.2.23**

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

Detail 2.4.3 ..... A.2.24

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

Detail 2.4.4 ..... A.2.25

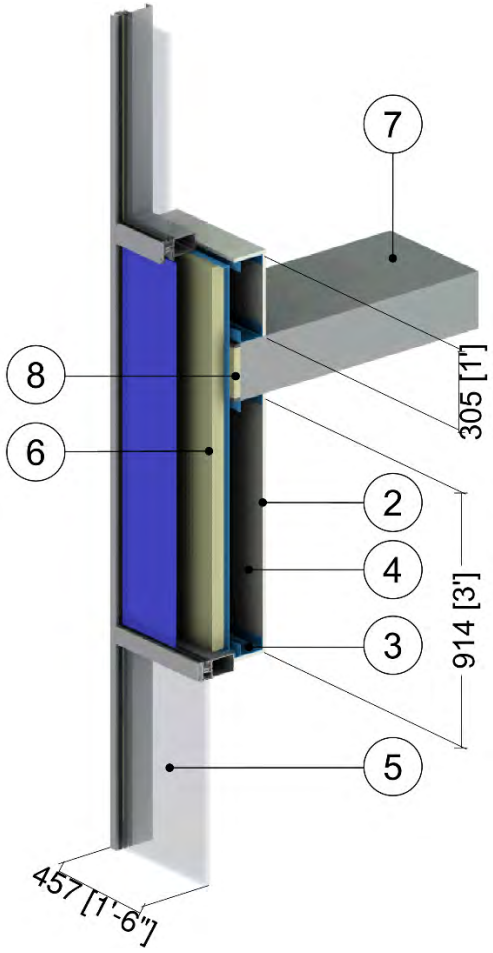
Conventional Curtain Wall with Insulated Spandrel Panel & 5 5/8” x 1 5/8” Steel Stud (16” o.c.) - Beam Intersection Connected to Steel Beam with Additional Mullions

Detail 2.5.1 ..... A.2.26

Conventional Curtain Wall System - At-Grade Slab Transition

Detail 2.1.1

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

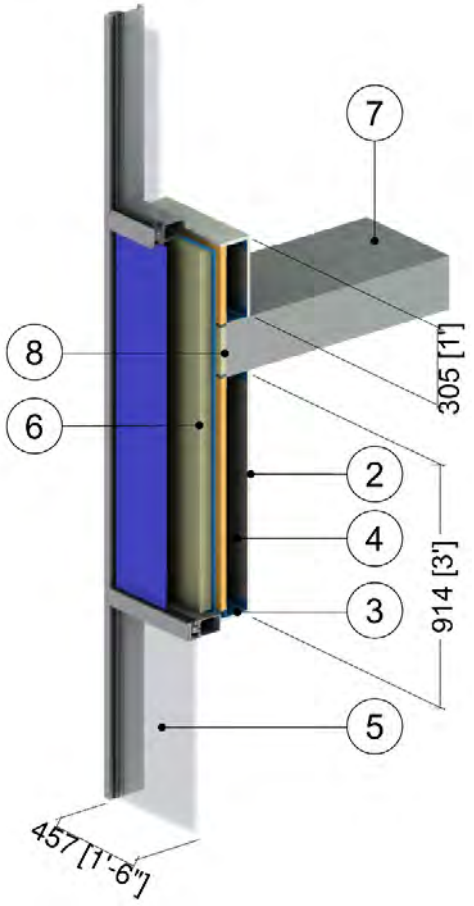


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 5/8" (118)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Conventional curtain wall system with insulated back pan (Pressure plates with minimal thermal break)[2]					
6	Backpan Insulation	Varies	-	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	1.8 (28)	0.29 (1220)
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Firestop Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	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 & surface emissivity. Window values supplemented by ISO 1007-2, Annex B.
[2] The thermal conductivity of air spaces within curtain wall framing was found using ISO 10077-2.

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

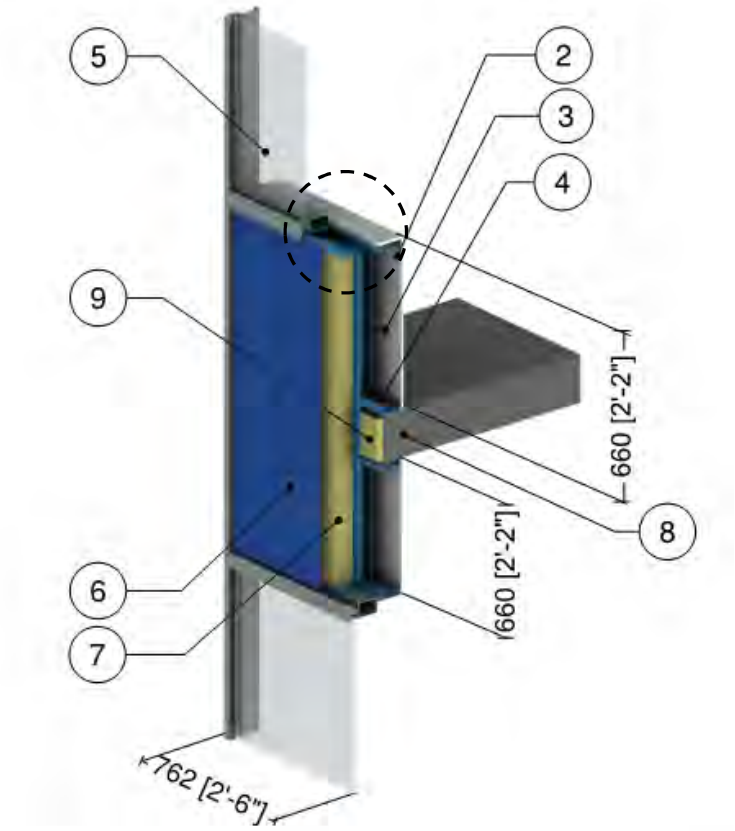


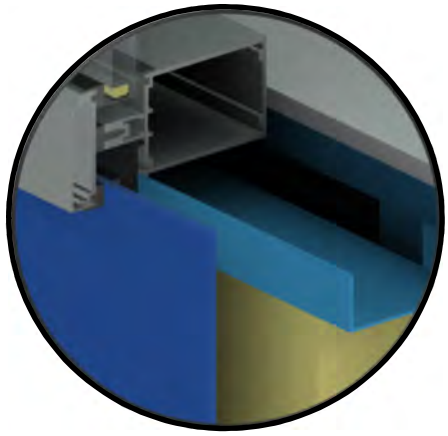
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	2 5/8" (67)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Conventional curtain wall system with insulated back pan (Pressure plates with minimal thermal break)[2]					
6	Backpan Insulation	Varies	-	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	1.8 (28)	0.29 (1220)
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Firestop Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
9	Spray Foam Insulation	2" (51)	0.17 (0.024)	R-12.0 (2.11 RSI)	2.4 (39)	0.35 (1470)
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 & surface emissivity. Window values supplemented by ISO 1007-2, Annex B.
[2] The thermal conductivity of air spaces within curtain wall framing was found using ISO 10077-2.

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





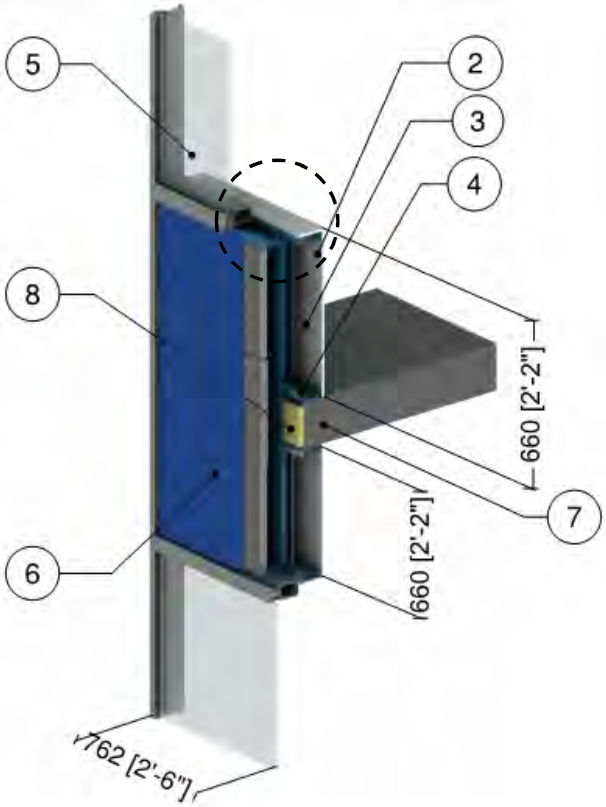
Aluminum Spacer

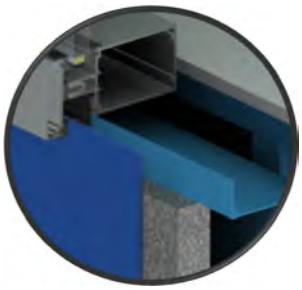
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: double glazed IGU with aluminum spacer[2]					
6	Conventional Curtain Wall Spandrel Section with Backpan Insulation[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3] For a window to wall ratio of 50%

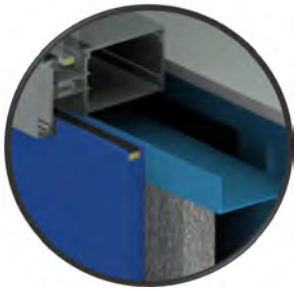
Detail 2.1.4

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

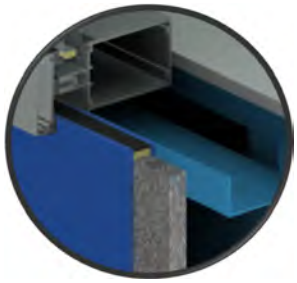




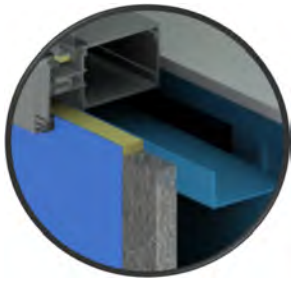
A1 – 1.5" (38 mm) AIM Adhered to Monolithic Glass



A2 – 1.5" (38 mm) AIM Adhered to Double Glazed IGU



A3 – Aluminum Spacer, 0.75" (19 mm) AIM between Glass



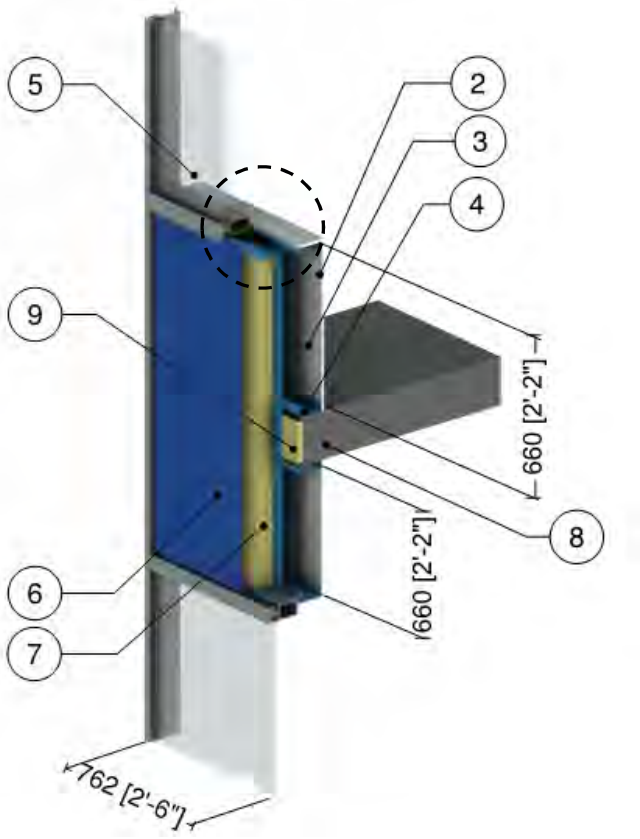
A4 – Rigid Insulation Spacer, 1" (25 mm) AIM between Metal Skins

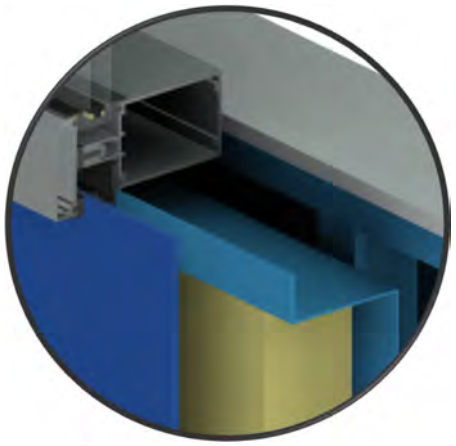
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: double glazed IGU[2]					
6	Conventional Curtain Wall Spandrel Section with varied insulation (see A1 to A4 above)[2,3]					
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	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
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2
[3] For a window to wall ratio of 50%
AIM = Architectural Insulation Module

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





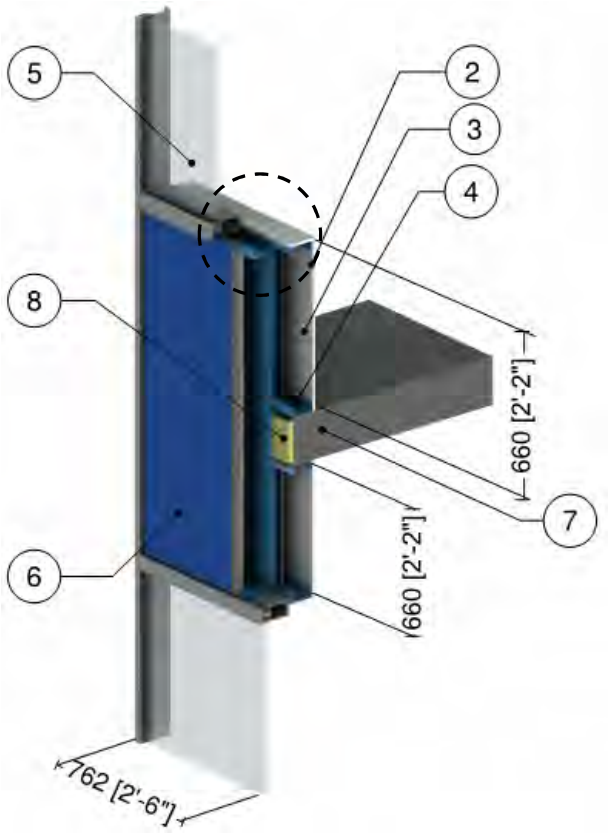
Silicone Warm Edge Spacer

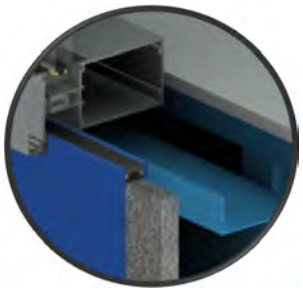
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: double glazed IGU silicone warm edge spacer[2]					
6	Conventional Curtain Wall Spandrel Section with Backpan Insulation[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3] For a window to wall ratio of 50%

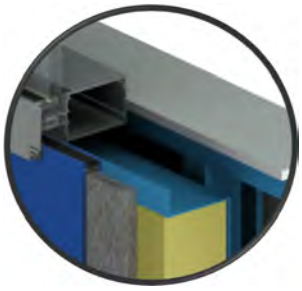
Detail 2.1.6

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





B1 – Vertical & Horizontal Pressure Plates, Warm Edge Spacer, 0.75” (19 mm) AIM between Glass



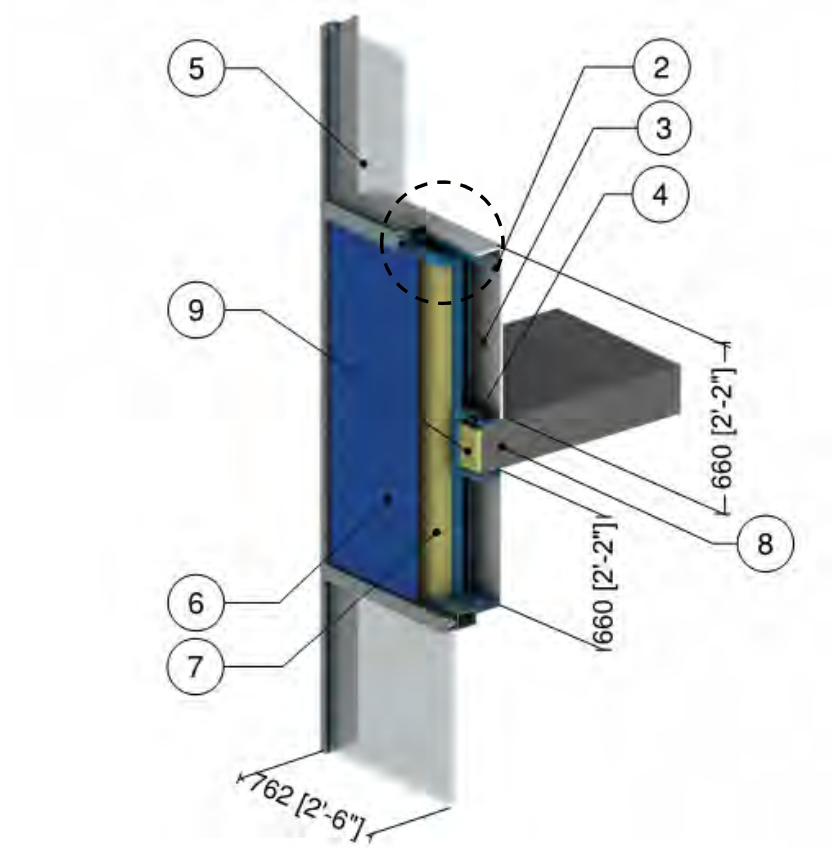
B2 – Vertical Structural Silicone & Horizontal Pressure Plates, Warm Edge Spacer, 0.75” (19 mm) AIM between Glass with 4” (100 mm) Backpan Insulation

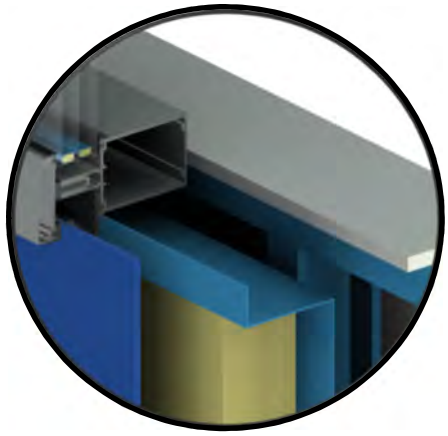
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: double glazed IGU with silicone warm edge spacer[2]					
6	Conventional Curtain Wall Spandrel Section with varied insulation (see B1 to B2 above)[2,3]					
7	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Mineral Wool Insulation	1” (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	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
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2
[3]For a window to wall ratio of 50%
AIM = Architectural Insulation Module

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





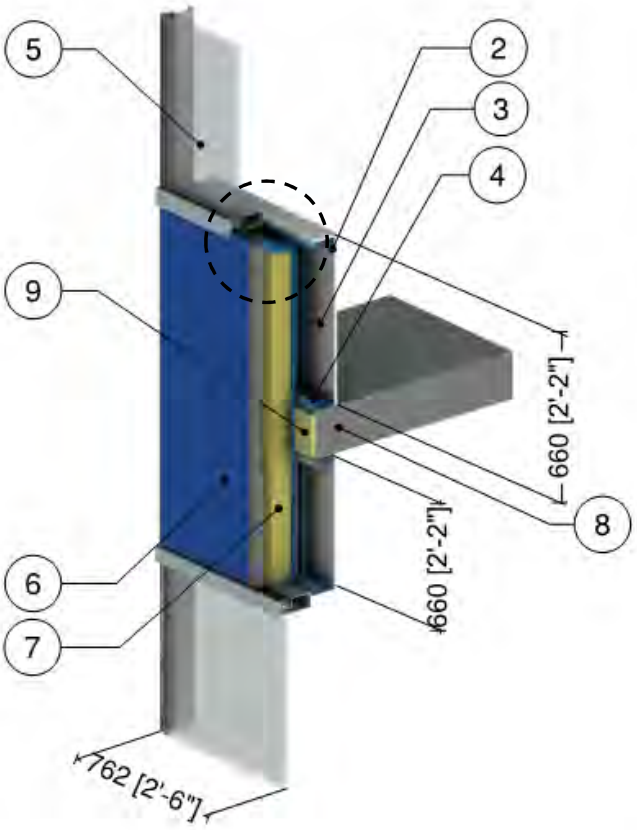
Triple Glazed IGU with Aluminum Spacer

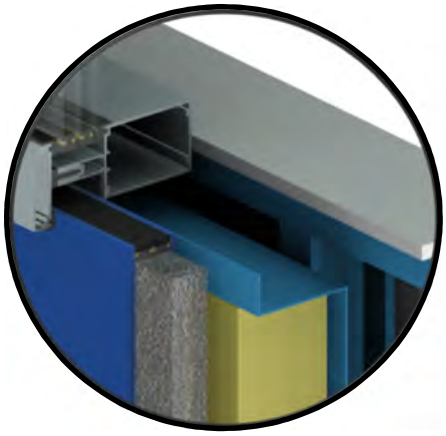
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: triple glazed IGU with aluminum spacer[2]					
6	Conventional Curtain Wall Spandrel Section with Backpan Insulation[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3]For a window to wall ratio of 50%

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





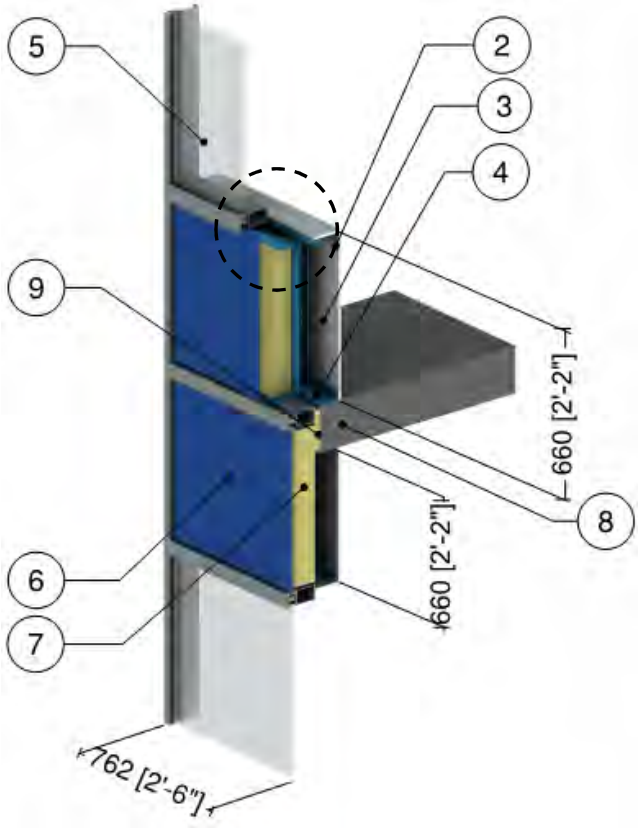
Triple Glazed IGU with Silicone Warm Edge Spacer

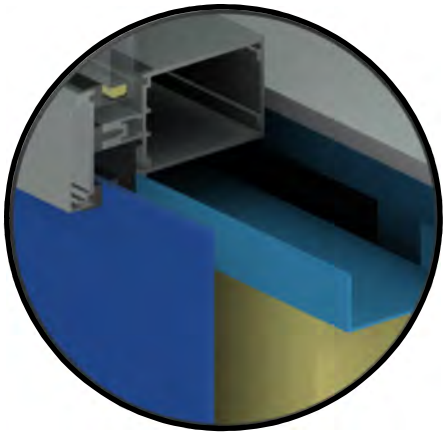
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: triple glazed IGU with silicone warm edge spacer[2]					
6	Conventional Curtain Wall Spandrel Section with 1.5" (38) AIM between Glass and Backpan Insulation[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3]For a window to wall ratio of 50%
AIM = Architectural Insulation Module

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





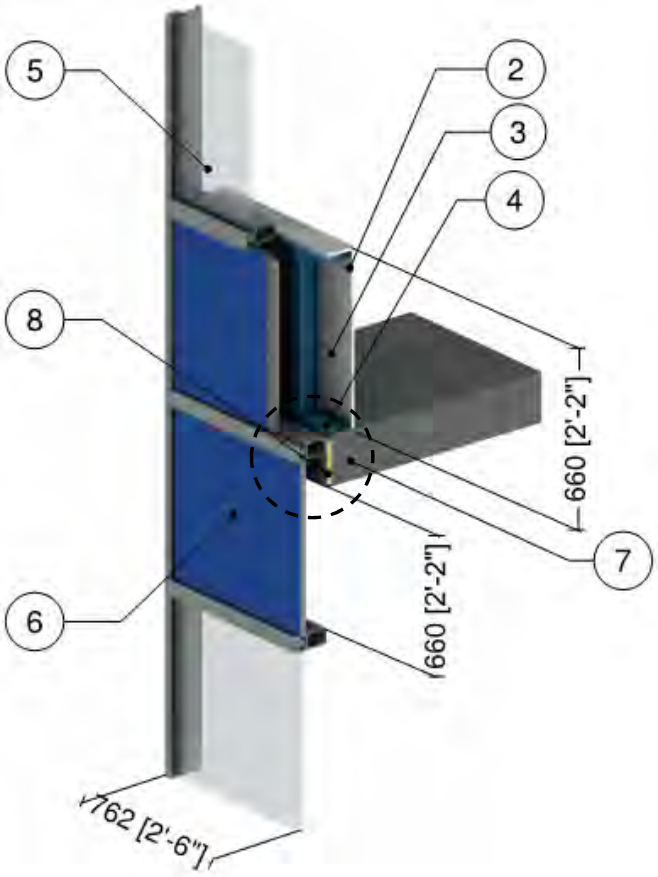
Double Glazed IGU
with Aluminum Spacer

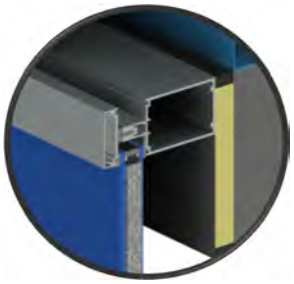
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: double glazed IGU with aluminum spacer[2]					
6	Conventional Curtain Wall Spandrel with Intermediate Mullion Section and Backpan Insulation[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3] For a window to wall ratio of 50%

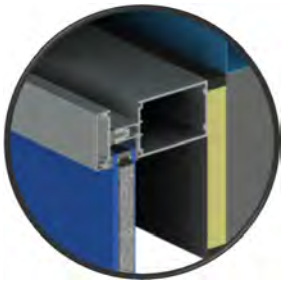
Detail 2.1.10

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

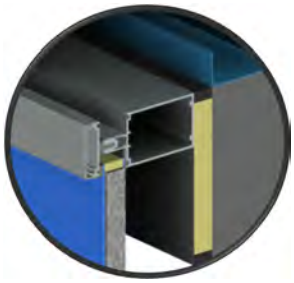




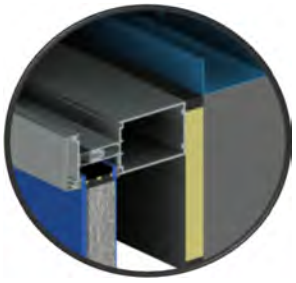
D1 – Vertical & Horizontal Pressure Plates, Warm Edge Spacer, 0.75” (19 mm) AIM Between Glass



D2 – Vertical Structural Silicone & Horizontal Pressure Plates, Warm Edge Spacer, 0.75” (19 mm) AIM between Glass



D3 – Vertical Structural Silicone & Horizontal Pressure Plates, Rigid Insulation Spacer, 1” (25 mm) AIM between Metal Skins



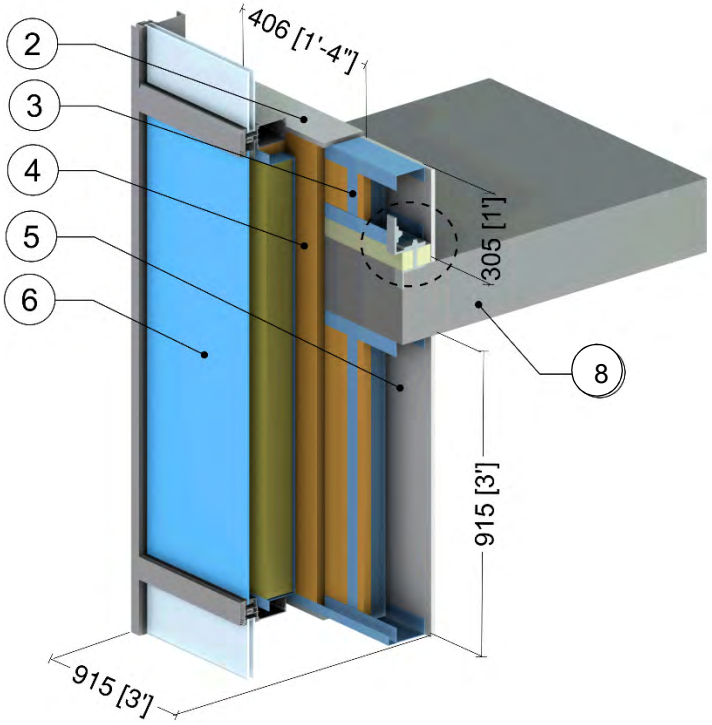
D4 – Vertical Structural Silicone & Horizontal Pressure Plates, Warm Edge Spacer, 1.5” (38 mm) AIM between Glass

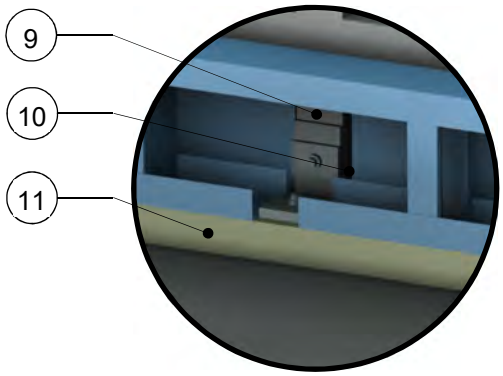
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: double glazed (D1 to D3) or Triple Glazed (D4) IGU[2]					
6	Conventional Curtain Wall Spandrel Section with varied insulation (see D1 to D4 above)[2,3]					
7	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Mineral Wool Insulation	1” (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	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
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2
[3] For a window to wall ratio of 50%
AIM = Architectural Insulation Module

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





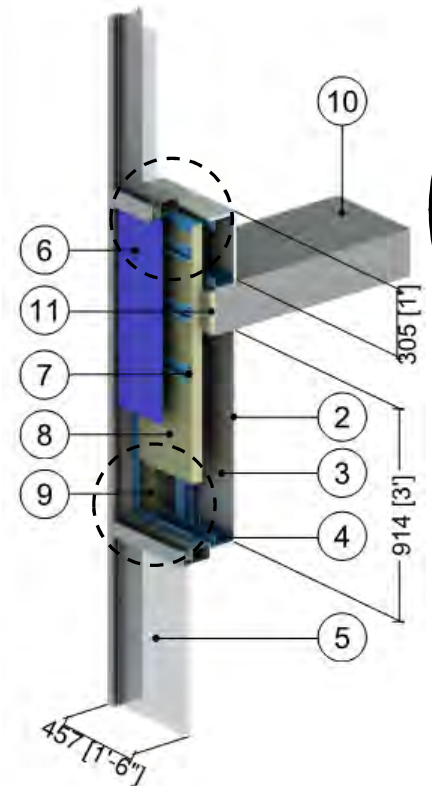
Anchor Detail

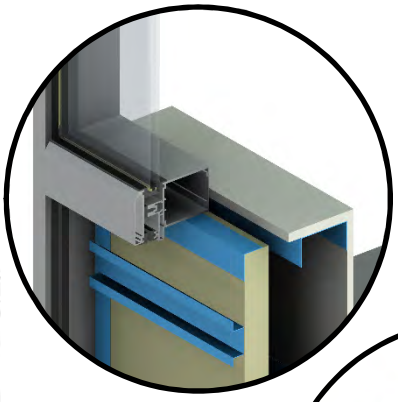
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Spray Foam Insulation	2" (51)	0.17 (0.025)	-	2.4 (39)	0.35 (1470)
5	Air in Stud Cavity	2 5/8" (67)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	Conventional curtain wall system with insulated back pan (Pressure plates with minimal thermal break)[2]					
7	Backpan Insulation	-	-	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Steel Anchor at vertical mullions	-	347 (50)	-	489 (7830)	0.12 (500)
10	Armatherm FRR	3/8" (10)	1.4 (0.20)	-	85 (5.3)	-
11	Armatherm 500	2" (50)	0.32 (0.05)	R-6.2 (1.09 RSI)	-	-
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 & surface emissivity. Window values supplemented by ISO 1007-2, Annex B.
[2] The thermal conductivity of air spaces was found using ISO 100077-2

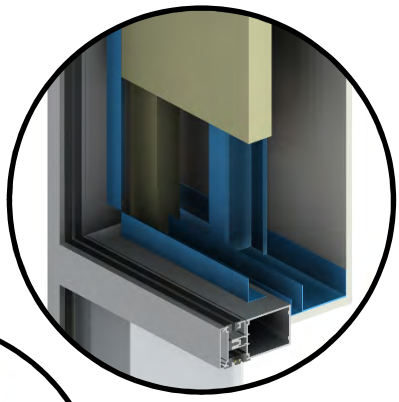
Detail 2.1.12

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

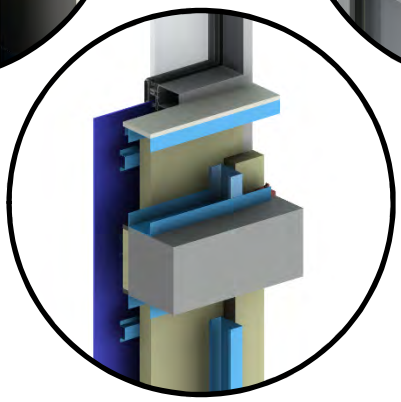




Stiffener Channel



Perimeter Angles



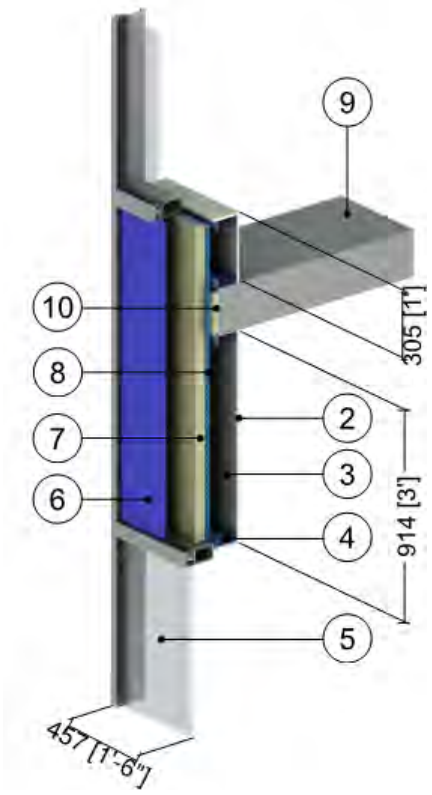
Mullion Wrap

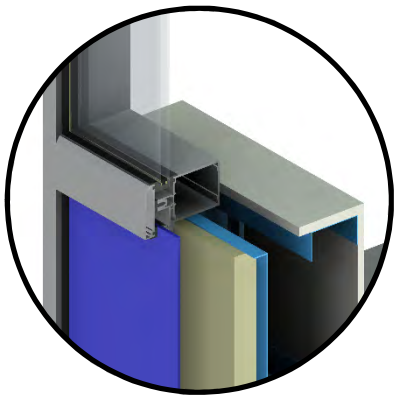
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: double glazed IGU with warm edge spacer[2]					
6	Conventional Curtain Wall Spandrel Section with Spandrel Insulation[2]					
7	Spandrel Insulation Stiffeners	22 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Spandrel Insulation	2" (51)	-	R-8.4 (1.48 RSI)	1.8 (28)	0.29 (1220)
9	Mullion Wrap Insulation	With and Without	-	R-8.4 (1.48 RSI)	1.8 (28)	0.29 (1220)
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Mineral Wool Insulation	1"	0.24 (0.034)	-	1.8 (28)	0.29 (1220)
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

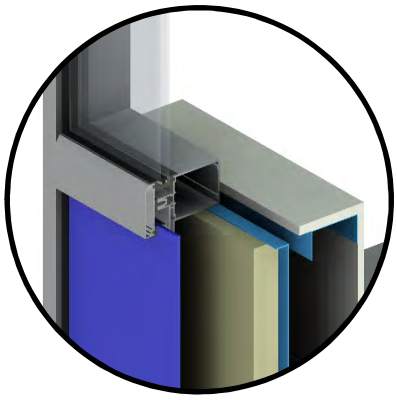
Detail 2.1.13

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





Metal Back Pan Connected Inset in Frame



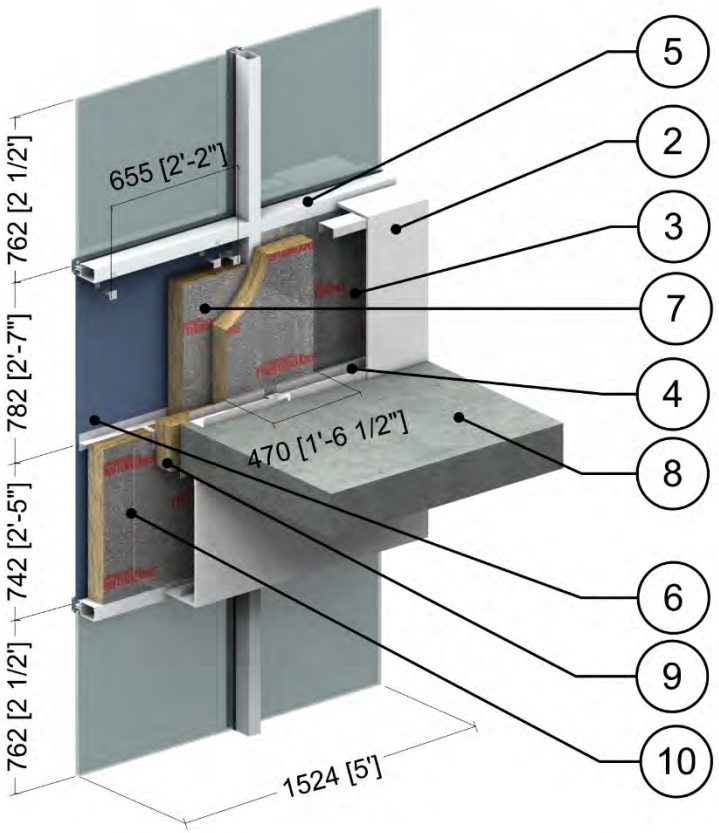
Metal Back Pan Connected at Interior of Frame

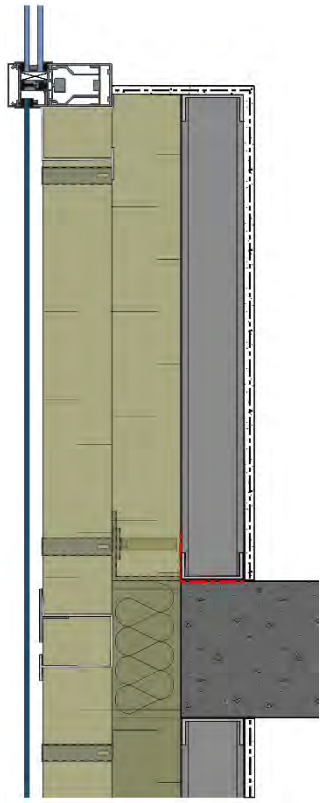
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Conventional Curtain Wall Vision Section: double glazed IGU with warm edge spacer[2]					
6	Conventional Curtain Wall Spandrel Section with Insulated Metal Back Pan[2]					
7	Backpan Insulation	Varies	-	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	1.8 (28)	0.29 (1220)
8	Metal Back Pan	22 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Mineral Wool Insulation	1"	0.24 (0.034)	-	1.8 (28)	0.29 (1220)
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 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



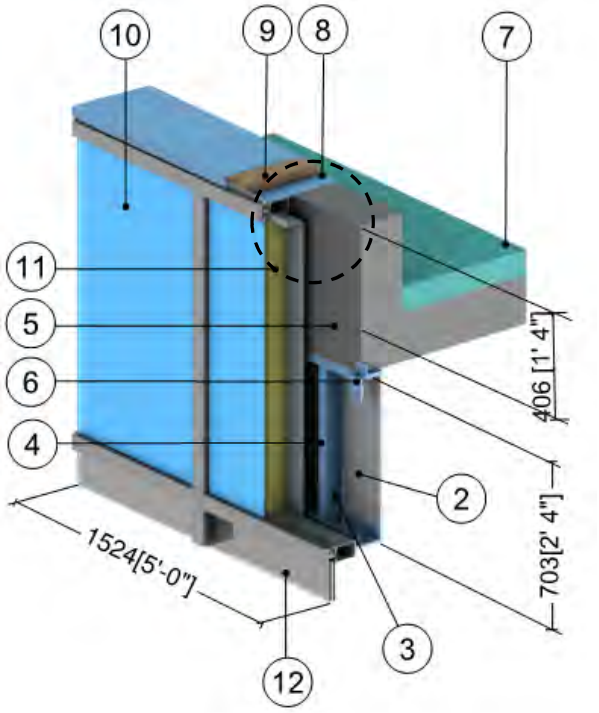


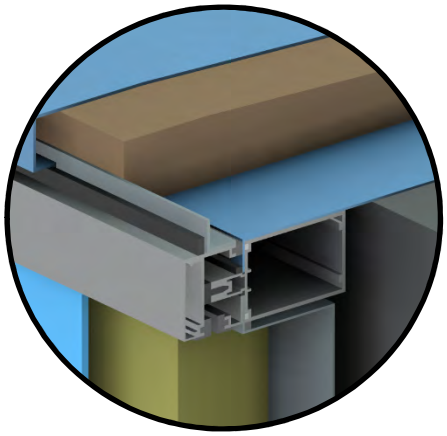
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)
1	Interior Films[1]	-	-	R-0.6 (0.12 RSI) to R-1.1 (0.20 RSI)	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)
5	5' (1.5m) x 5' (1.5m) Aluminum window: thermally broken, double glazed IGU[2] U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)				
6	5' (1.5m) x 5' (1.5m) Conventional Curtain Wall Spandrel Section with Thermafiber Impasse System[2]				
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Spandrel Insulation	4" (102)	0.24 (0.034)	R-16.8 (2.96 RSI)	4.5 (72)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)
9	Safing Mineral Wool Insulation	3" (76)	0.24 (0.034)	-	4.5 (72)
10	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Mullion Cover Insulation	2" (51)	0.24 (0.034)	R-8.4 (1.48 RSI)	4.5 (72)
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 2.2.1

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





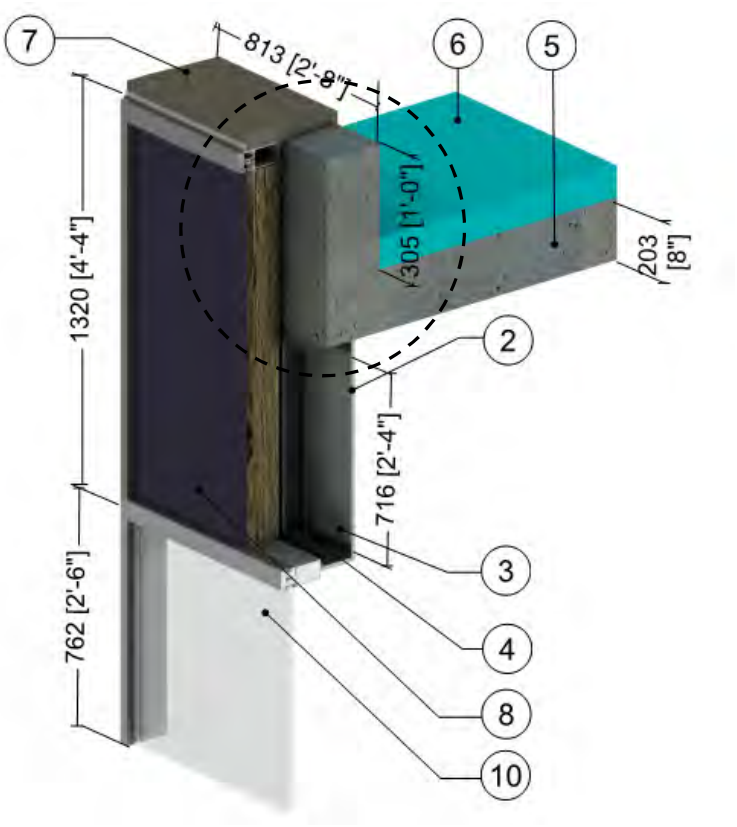
Parapet Cap Detail

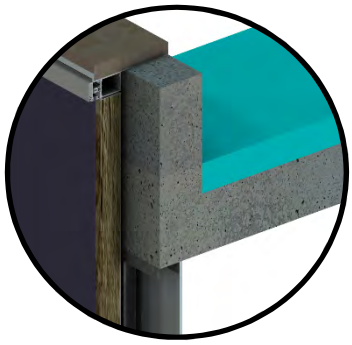
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Slab & Parapet	8" (203)	12.5 (1.8)	R-0.6 (0.11 RSI)	140 (2250)	0.20 (850)
6	Anchor at Vertical Mullions	-	347 (50)	-	489 (7830)	0.12 (500)
7	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
8	Parapet Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Wood Blocking	-	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
10	Conventional Curtain Wall Spandrel System with Insulated Backpan: minimal thermally broken frame[2]					
11	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
12	Conventional Curtain Wall Vision System : minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
13	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
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 100077-2

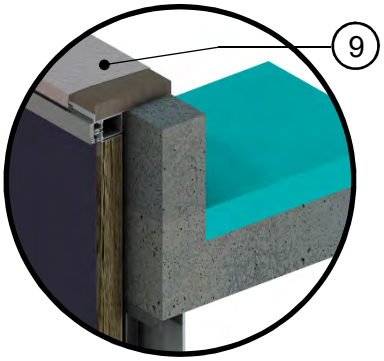
Detail 2.2.2

Conventional Curtain Wall System – Insulated Spandrel & Roof Intersection





Without Aerogel Detail



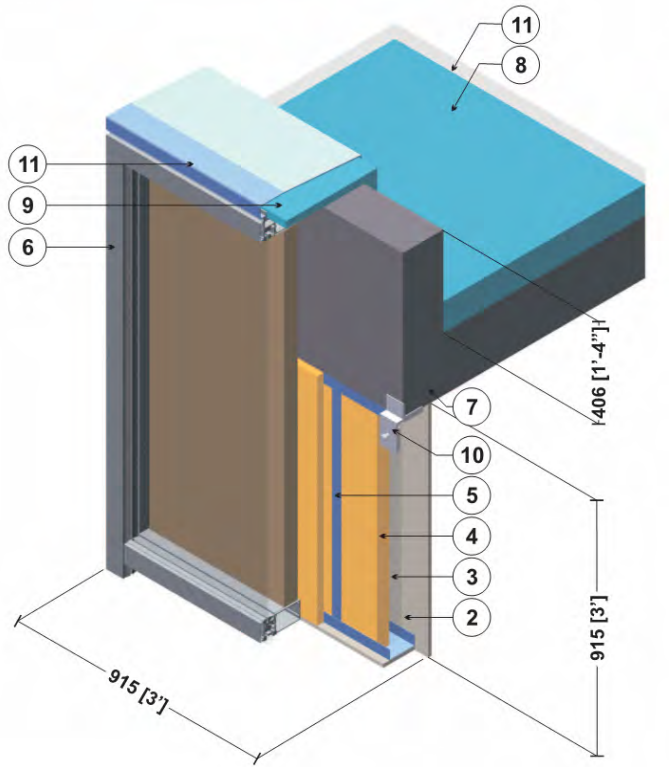
With Aerogel Detail

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-0.6 (0.12 RSI) to R-0.9 (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	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Slab & Parapet	8" (203)	12.5 (1.8)	R-0.6 (0.11 RSI)	140 (2250)	0.20 (850)
6	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
7	Wood Blocking	-	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Conventional Curtain Wall Spandrel System with Insulated Backpan: minimal thermally broken frame[2]					
9	Aerogel Blanket	0.4" (10)	0.086 (0.015)	R-3.8 (0.67 RSI)	-	-
10	Conventional Curtain Wall Vision System : minimal thermally broken frame[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
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 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

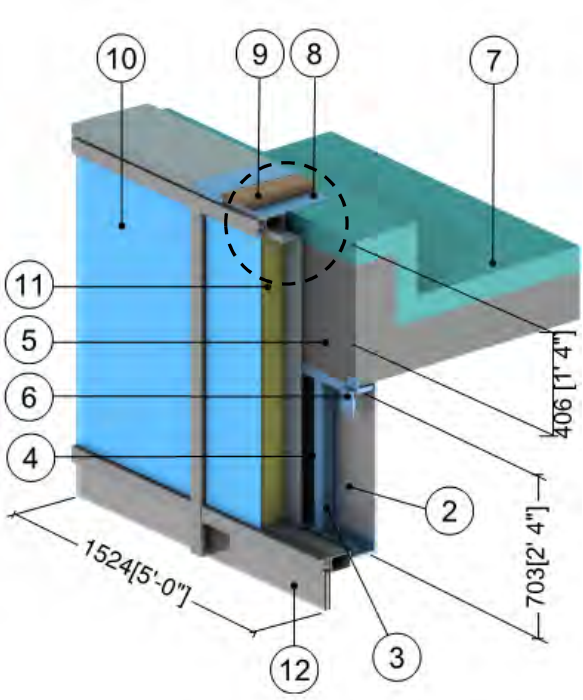


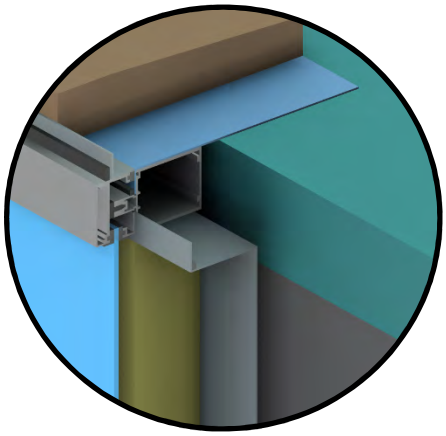
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	2 5/8" (67)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Spray Foam Insulation	2" (51)	0.17 (0.025)	-	2.8 (39)	0.35 (1470)
5	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Conventional curtain wall system with insulated back pan (Pressure plates with minimal thermal break)[2]					
7	Concrete Slab & Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
9	Parapet Insulation	1" (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
10	Steel Anchor at vertical mullions	-	347 (50)	-	489 (7830)	0.12 (500)
11	Metal cap flashing/ finish roof materials is incorporated into exterior heat transfer coefficient					
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 & surface emissivity. Window values supplemented by ISO 1007-2, Annex B.
[2] The thermal conductivity of air spaces within curtain wall framing was found using ISO 10077-2

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





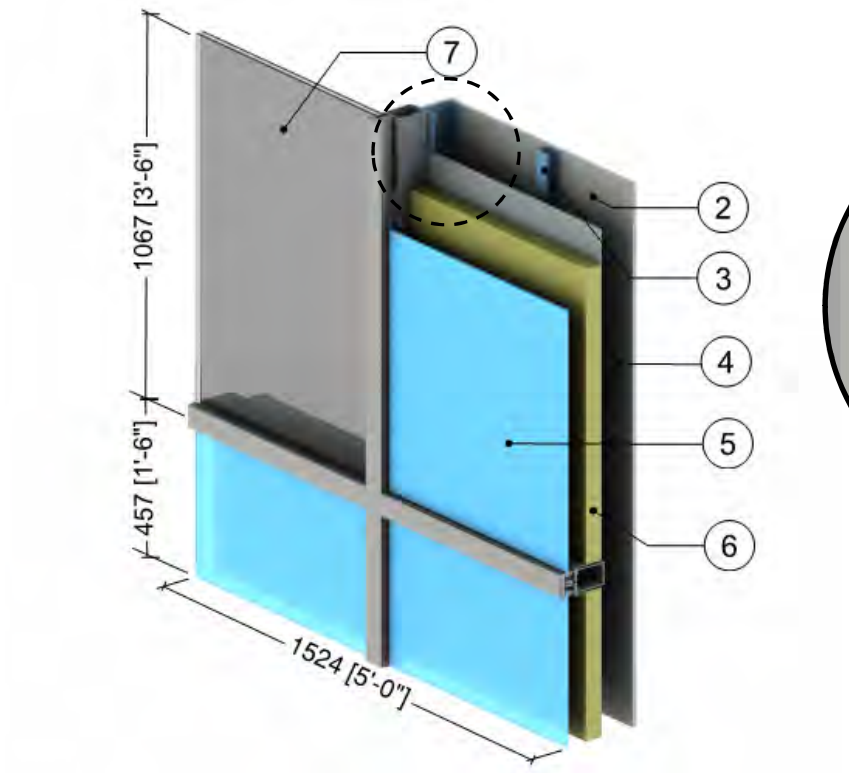
Parapet Cap Detail

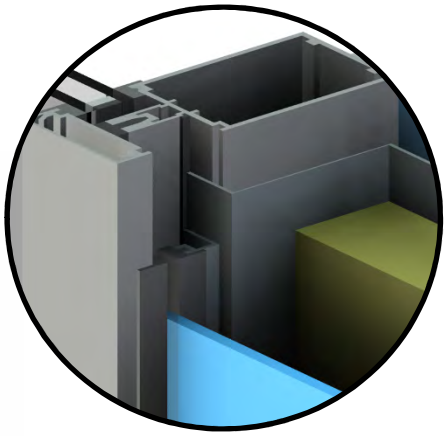
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Slab & Parapet	8" (203)	12.5 (1.8)	R-0.6 (0.11 RSI)	140 (2250)	0.20 (850)
6	Anchor at Vertical Mullions	-	347 (50)	-	489 (7830)	0.12 (500)
7	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
8	Parapet Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Wood Blocking		0.69 (0.10)	-	27.8 (445)	0.45 (1880)
10	Conventional Curtain Wall Spandrel System with Insulated Backpan: minimal thermally broken frame[2]					
11	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
12	Conventional Curtain Wall Vision System : minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
13	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
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 100077-2

Detail 2.3.1

Conventional Curtain Wall System with Insulated Spandrel Panel– Uninsulated Jamb Intersection with Vision Section





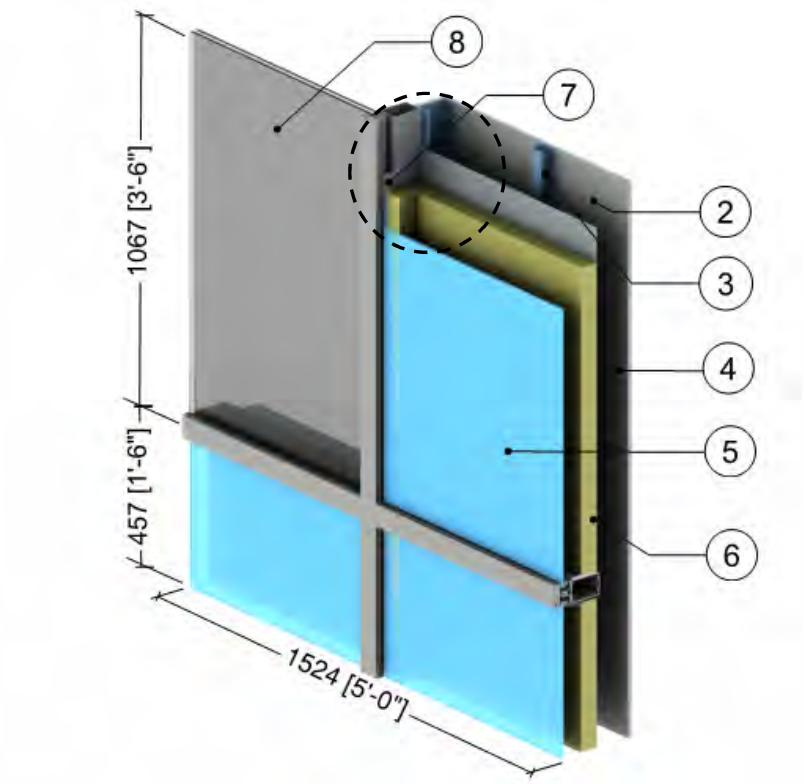
Transition Detail

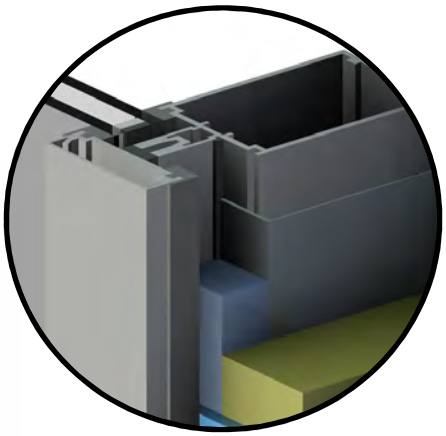
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
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 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Conventional Curtain Wall Spandrel System with Insulated Backpan: minimal thermally broken frame[2]					
6	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
7	Conventional Curtain Wall Vision System : minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	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 2.3.2

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





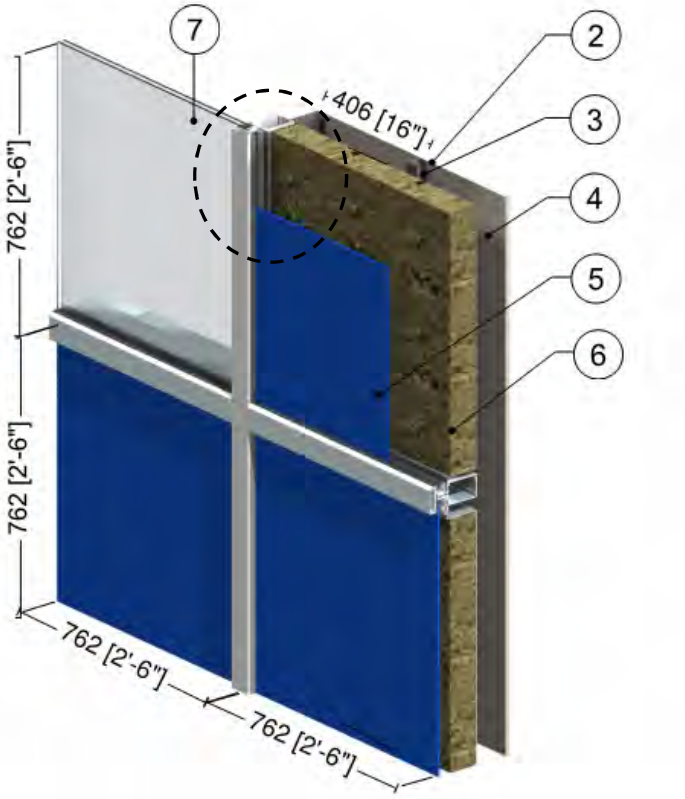
Transition Detail

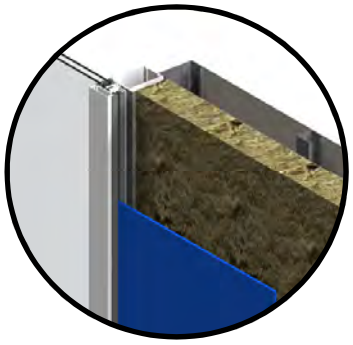
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
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 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Conventional Curtain Wall Spandrel System with Insulated Backpan: minimal thermally broken frame[2]					
6	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
7	Curtain Wall Insulation	1" (25)	0.24 (0.034)	R-4.0 (0.7 RSI)	4 (64)	0.20 (850)
8	Conventional Curtain Wall Vision System : minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
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

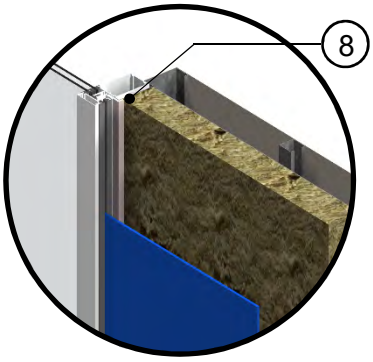
Detail 2.3.3

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





Without Aerogel Detail



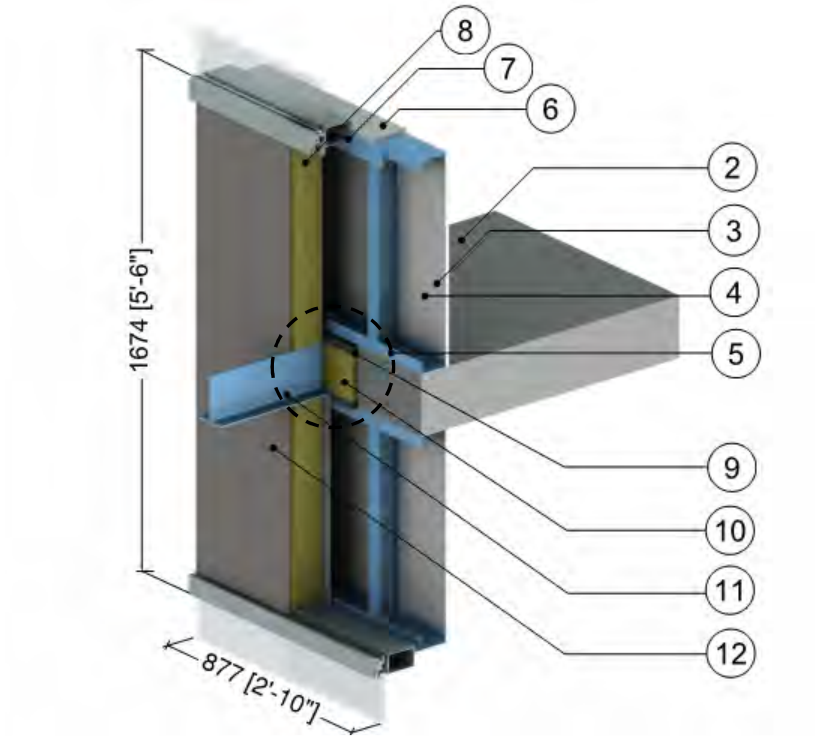
With Aerogel Detail

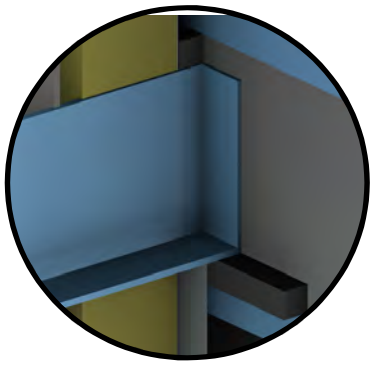
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (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 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Conventional Curtain Wall Spandrel System with Insulated Backpan: minimal thermally broken frame[2]					
6	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
7	Conventional Curtain Wall Vision System : minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	Aerogel Blanket	0.4" (10)	0.086 (0.015)	R-3.8 (0.67 RSI)	-	-
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 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





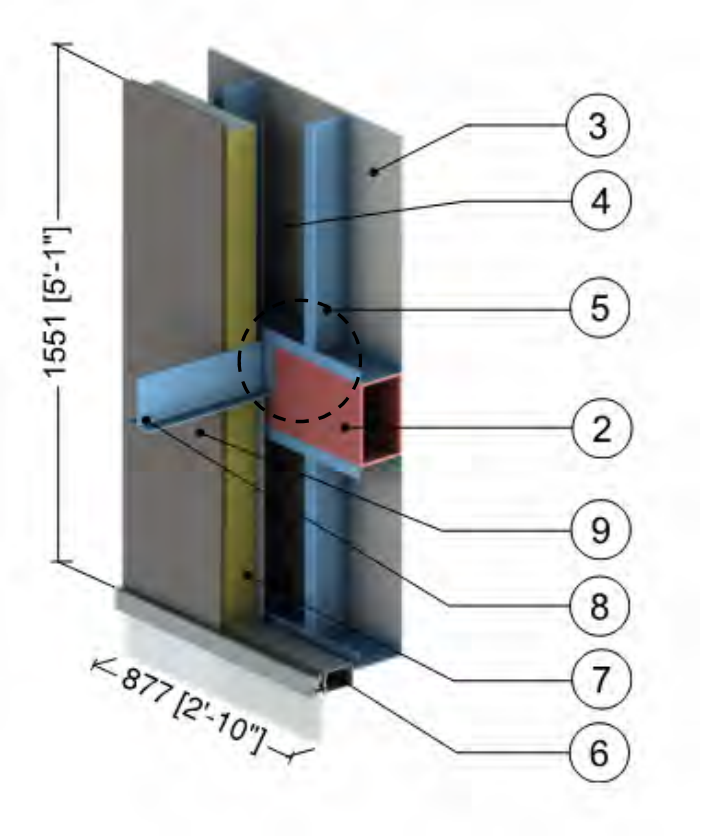
Beam Intersection Detail
(Insulation on slab not shown)

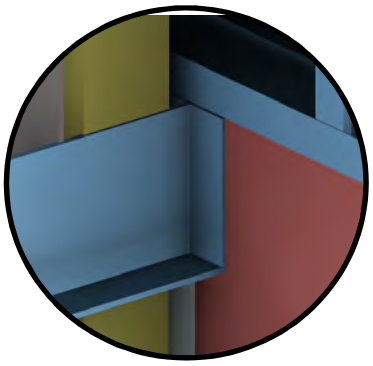
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air Cavity	4 5/8" (117)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	3 5/8" x 1 5/8" Steel Studs (16" o.c.) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	31 (500)	0.45 (1880)
7	Conventional Curtain wall system:minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.5 RSI to 3.0 RSI)	4 (64)	0.20 (850)
9	Silicone Sealant	1" (25)	2.4 (0.35)	-	174 (2800)	0.17 (700)
10	Semi-Rigid Insulation	1" (25)	0.24 (0.034)	-	4 (64)	0.20 (850)
11	Steel Beam (W6x12)	-	347 (50)	-	489 (7830)	0.12 (500)
12	Composite Metal Panel	3/16" (4)	347 (50)	-	489 (7830)	0.12 (500)
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 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





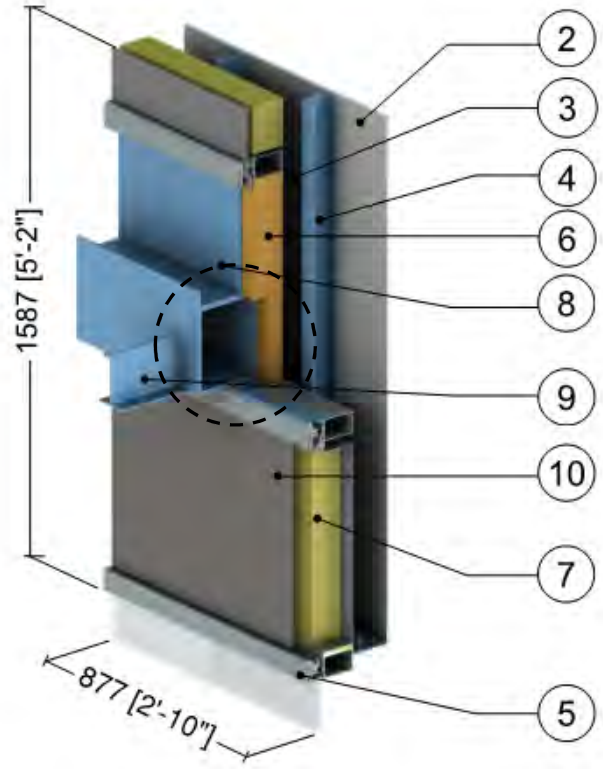
Beam Intersection Detail

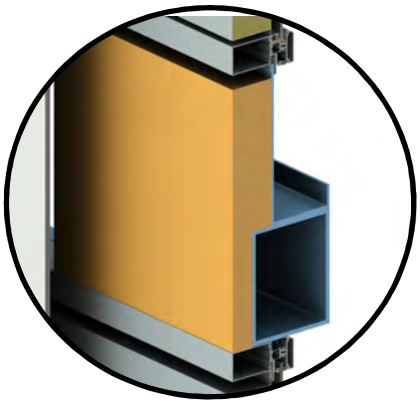
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Structural Steel Beam (10" x 6" x 3/8" HSS)	-	347 (50)	-	489 (7830)	0.12 (500)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air Cavity	5 5/8" (168)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	5 5/8" x 1 5/8" Steel Studs (16" o.c.) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Curtain wall system: minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
7	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.5 RSI to 3.0 RSI)	4 (64)	0.20 (850)
8	Steel Beam (W6x12)	-	347 (50)	-	489 (7830)	0.12 (500)
9	Composite Metal Panel	3/16" (4)	347 (50)	-	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 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





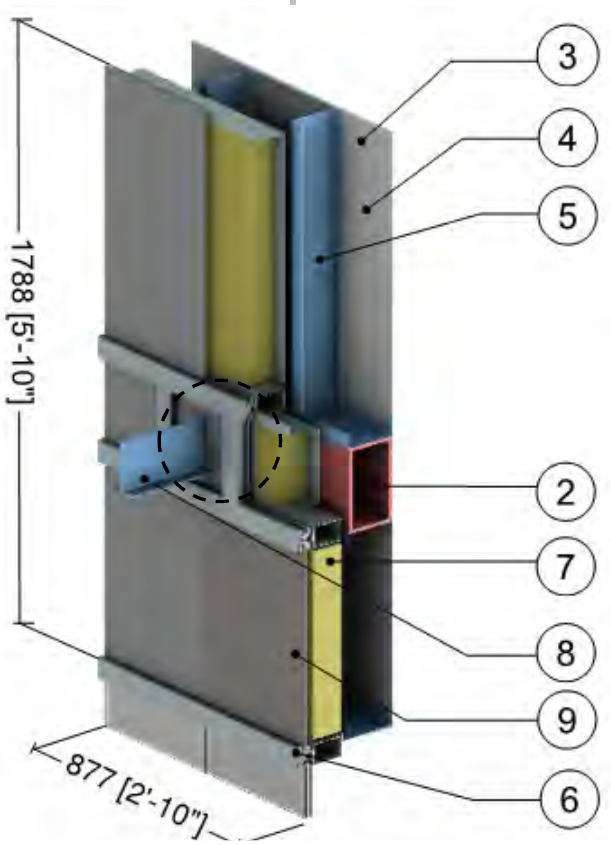
Gutter Intersection Detail

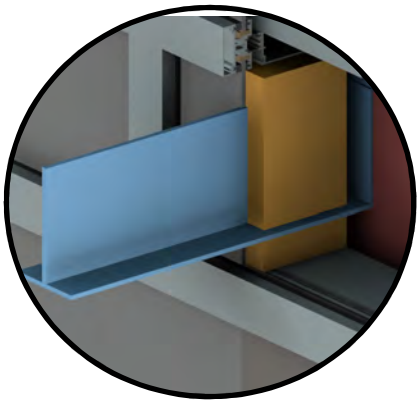
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air Cavity	4 5/8" (117)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16" o.c.) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Curtain wall system: minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
6	Polyurethane Foam Insulation	4" (102)	0.17 (0.024)	R-24 (4.20 RSI)	1.8 (28)	0.29 (1220)
7	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.5 RSI to 3.0 RSI)	4 (64)	0.20 (850)
8	Steel Beam (HSS 8x10x3/8) & Gutter	-	347 (50)	-	489 (7830)	0.12 (500)
9	Steel Beam (W6x12)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Composite Metal Panel	3/16" (4)	347 (50)	-	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 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





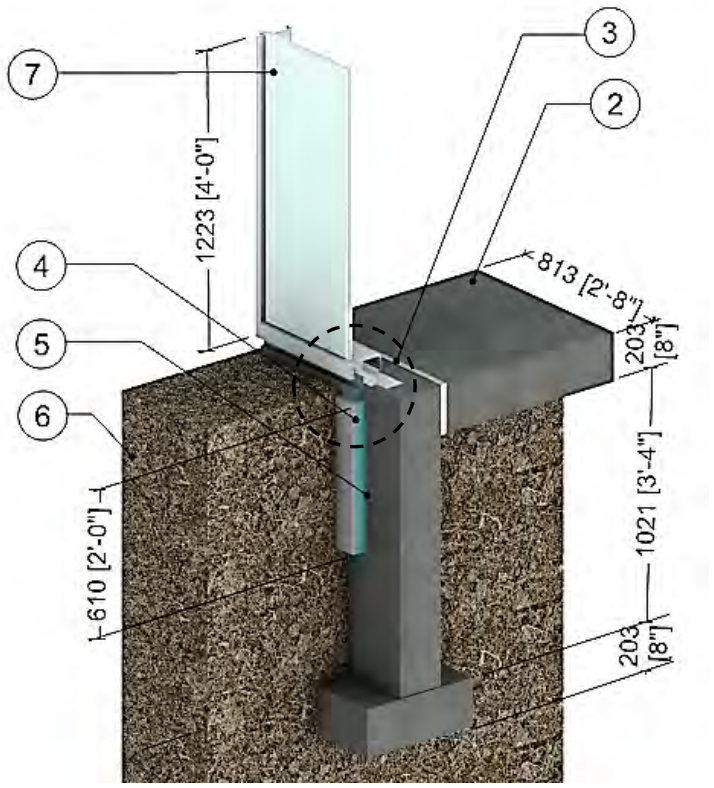
Beam Intersection Detail
(Mullions, cladding and insulation not shown)

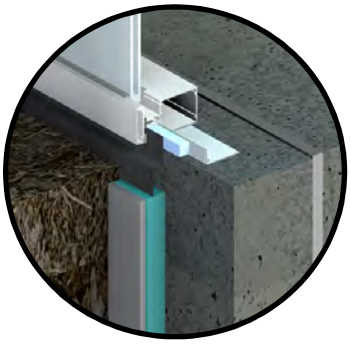
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Structural Steel Beam (10" x 6" x 3/8" HSS)	-	347 (50)	-	489 (7830)	0.12 (500)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air Cavity	6 5/8" (117)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	5 5/8" x 1 5/8" Steel Studs (16" o.c.) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Curtain wall system: minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
7	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.5 RSI to 3.0 RSI)	4 (64)	0.20 (850)
8	Steel Beam (W6 x12)	-	347 (50)	-	489 (7830)	0.12 (500)
9	Composite Metal Panel	3/16" (4)	347 (50)	-	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

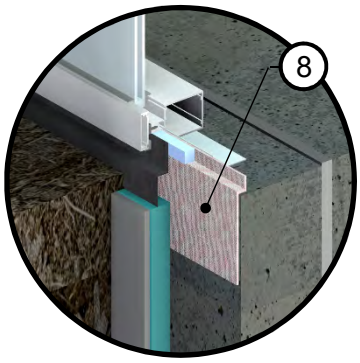
Detail 2.5.1

Conventional Curtain Wall System - At-Grade Slab Transition





Without Aerogel Detail



With Aerogel 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-0.6 to R-0.9 (0.12 to 0.16 RSI)	-	-
2	Concrete Slab on Grade	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Silicone Sealant	1/2" (13)	2.4 (3.5)	-	-	-
4	Foundation Insulation	2" (50)	-	R-10 (1.8 RSI)	1.8 (28)	0.29 (1220)
5	Concrete Footing	3 5/8" (92)	12.5 (1.8)	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	Soil	-	-	-	-	-
7	Conventional Curtain Wall Vision System : minimal thermally broken frame[2], double glazed IGU U_{COG}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	Aerogel Blanket	0.4" (10)	0.086 (0.015)	R-3.8 (0.67 RSI)	-	-
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

3.0 Unitized Curtain Wall

Detail 3.1.1 ..... **A.3.1**

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

Detail 3.1.2 ..... **A.3.2**

Unitized Curtain Wall System – Spandrel Clear Wall & Interior Spray Foam Insulation

Detail 3.2.1 ..... **A.3.3**

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

Detail 3.2.2 ..... **A.3.4**

Unitized Curtain Wall System – Intermediate Floor Intersection & Interior Spray Foam Insulation

Detail 3.2.3 ..... **A.3.5**

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

Detail 3.2.4 ..... **A.3.6**

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

Detail 3.2.5 ..... **A.3.7**

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

Detail 3.2.6 ..... **A.3.8**

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

Detail 3.3.1 ..... **A.3.9**

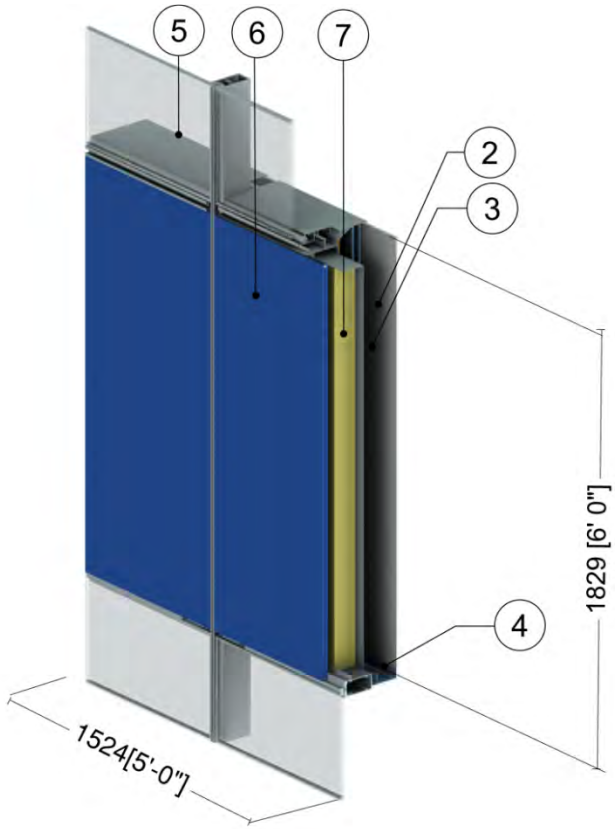
Unitized Curtain Wall System – Window Wall Transition

Detail 3.3.2 ..... **A.3.10**

Unitized Curtain Wall System – Window Wall Transition with Foam Insulation

Detail 3.1.1

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

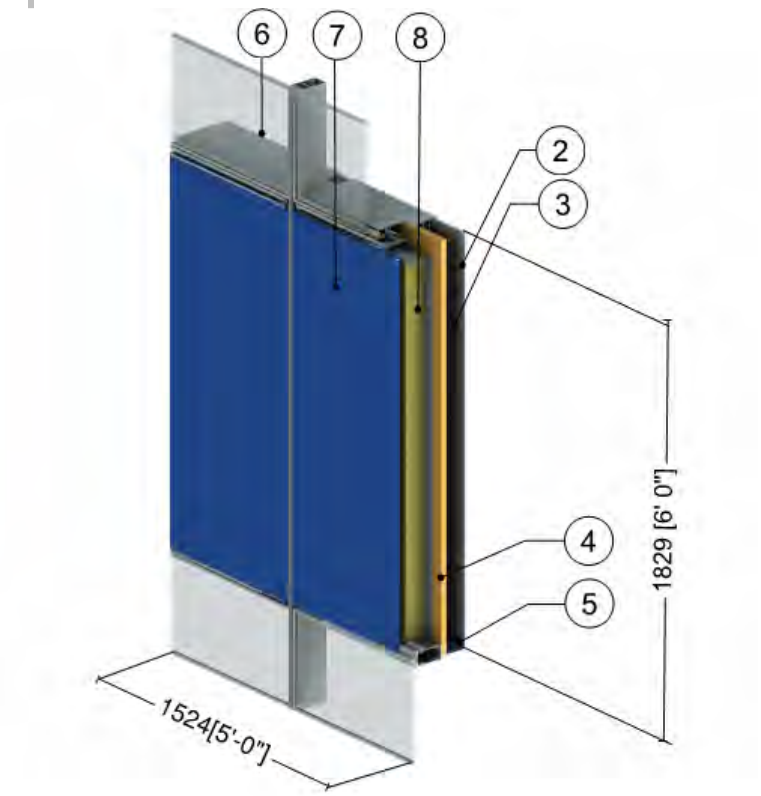


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air Cavity	4 5/8" (117)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Unitized Curtain Wall Vision System: structural silicone joints[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
6	Unitized Curtain Wall Spandrel System with Insulated Backpan: structural silicone joints[2]					
7	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
8	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 3.1.2

Unitized Curtain Wall System – Spandrel Clear Wall & Interior Spray Foam Insulation

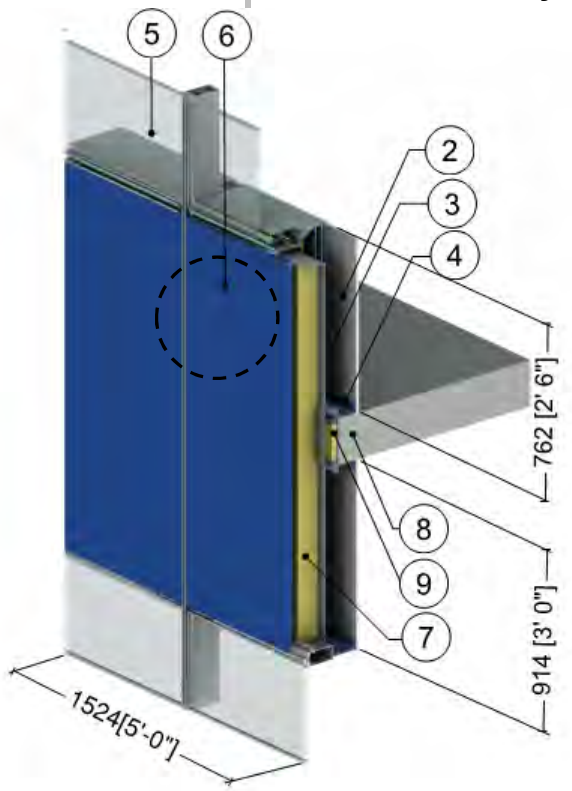


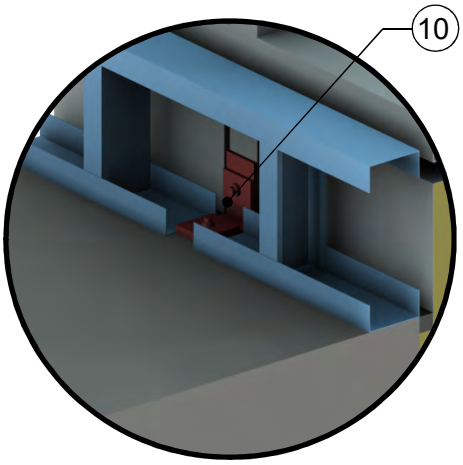
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air Cavity	2 5/8" (67)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Spray Foam Insulation	2" (51)	0.17 (0.025)	R-11.5 (2.0 RSI)	2.8 (39)	0.35 (1470)
5	3 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Unitized Curtain Wall Vision System: structural silicone joints[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
7	Unitized Curtain Wall Spandrel System with Insulated Backpan: structural silicone joints[2]					
8	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	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
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 3.2.1

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





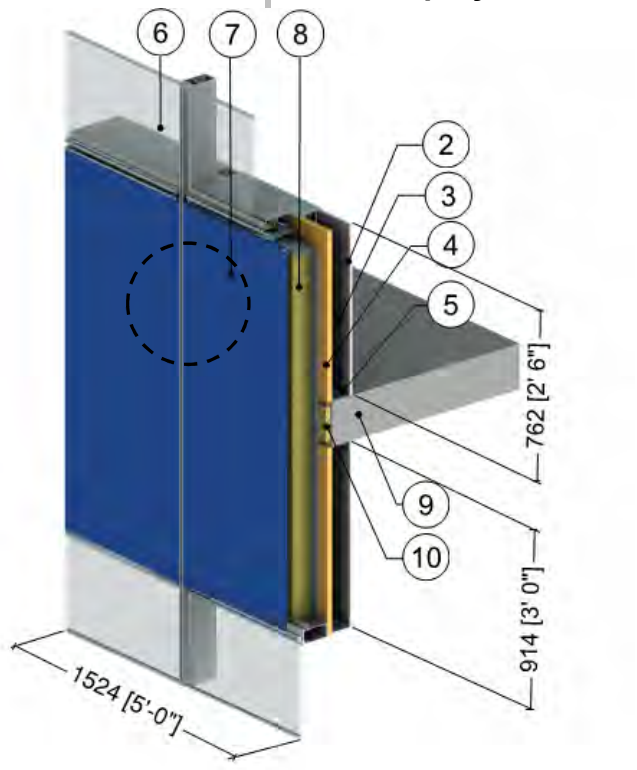
Connection Detail from Interior

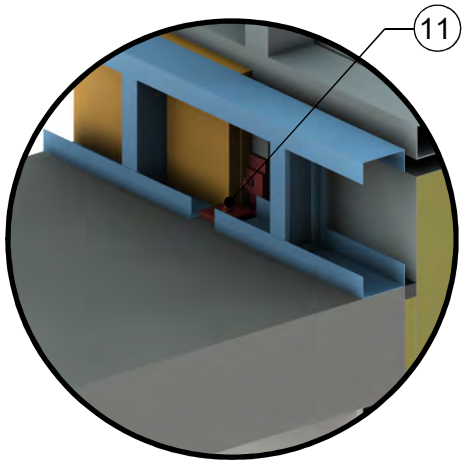
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air Cavity	2 5/8" (67)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Unitized Curtain Wall Vision System: structural silicone joints[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
6	Unitized Curtain Wall Spandrel System with Insulated Backpan: structural silicone joints[2]					
7	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
10	Steel Connection Bracket	-	347 (50)	-	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 3.2.2

Unitized Curtain Wall System – Intermediate Floor Intersection & Interior Spray Foam Insulation





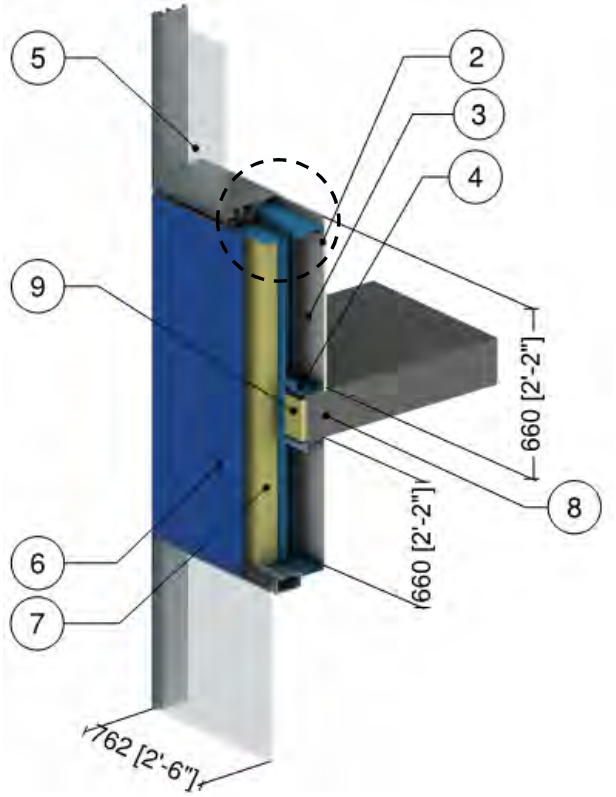
Connection Detail from Interior

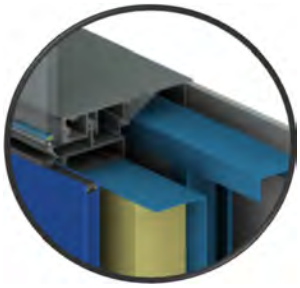
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air Cavity	2 5/8" (67)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Spray Foam Insulation	2" (51)	0.17 (0.024)	R-12.0 (2.1 RSI)	2.8 (39)	0.35 (1470)
5	3 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Unitized Curtain Wall Vision System: structural silicone joints[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
7	Unitized Curtain Wall Spandrel System with Insulated Backpan: structural silicone joints[2]					
8	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
11	Steel Connection Bracket	-	347 (50)	-	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

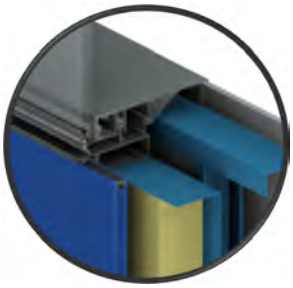
Detail 3.2.3

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





H0.1 – Double Glazed IGU with Aluminum Spacer



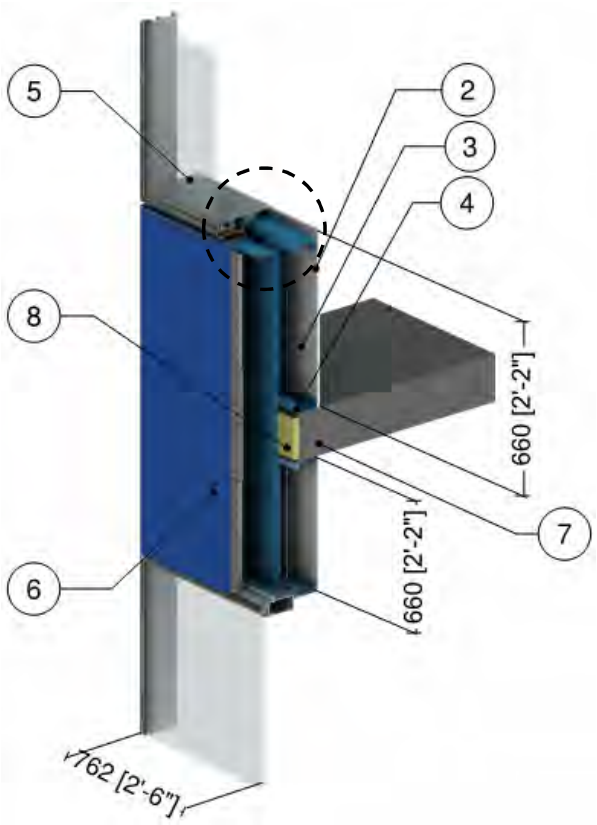
H0.2 – Double Glazed IGU with Silicone Warm Edge Spacer

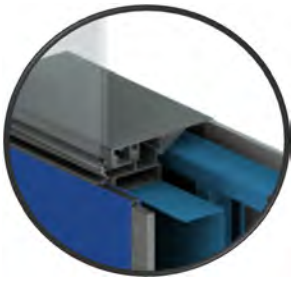
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Unitized Curtain Wall Vision Section: double glazed IGU with aluminum spacer (H0.1) or warm edge spacer (H0.2)[2]					
6	Unitized Curtain Wall Spandrel Section with backpan insulation[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3] For a window to wall ratio of 50%

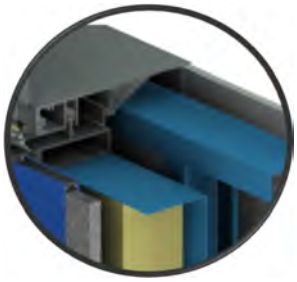
Detail 3.2.4

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

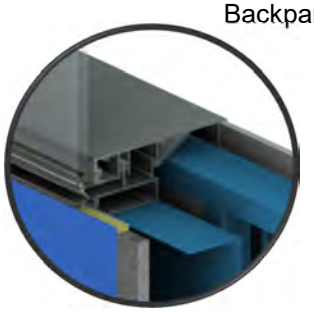




H1 – Warm Edge Spacer, 0.75” (19 mm) AIM between Glass



H2 – Warm Edge Spacer, 0.75” (19 mm) AIM between Glass with 4” (100 mm) Backpan Insulation



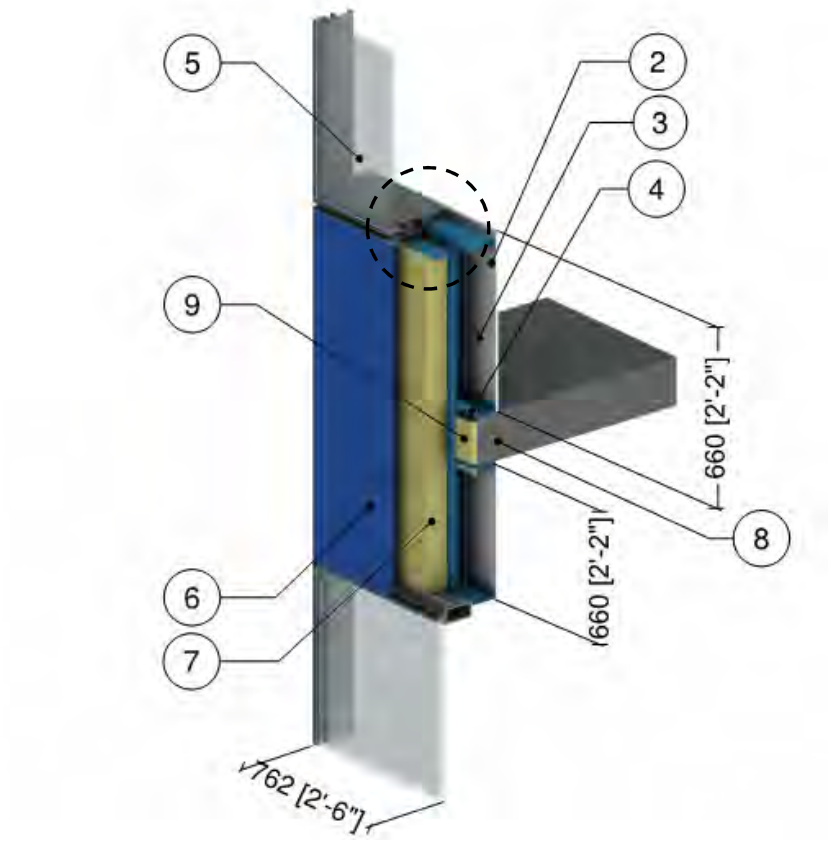
H3 – Rigid Insulation Spacer, 1” (25 mm) AIM between Metal Skins

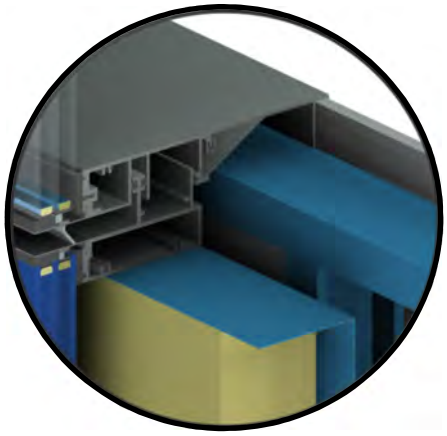
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Unitized Curtain Wall Vision Section: double glazed IGU with silicone warm edge spacer[2]					
6	Unitized Curtain Wall Spandrel Section with varied insulation (see H1 to H3 above)[2,3]					
7	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Mineral Wool Insulation	1” (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	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
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2
[3] For a window to wall ratio of 50%
AIM = Architectural Insulation Module

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





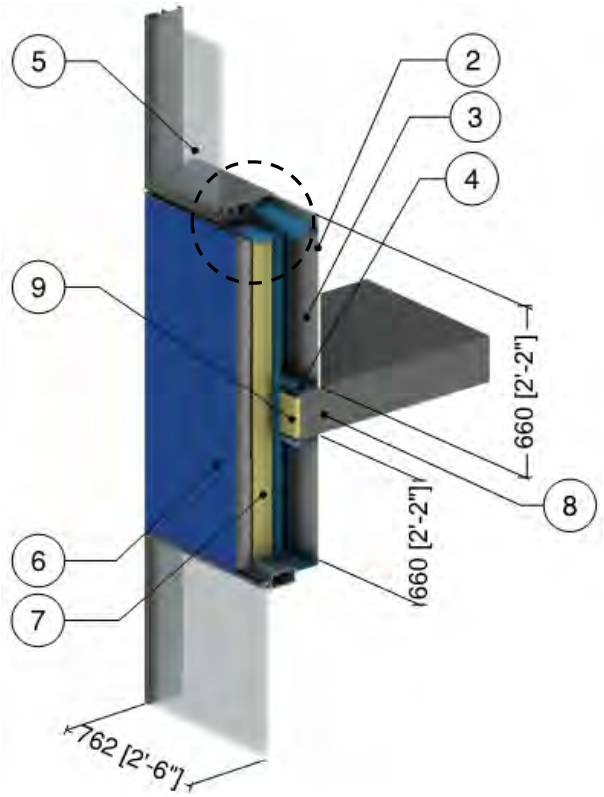
Triple Glazed IGU with Aluminum Spacer

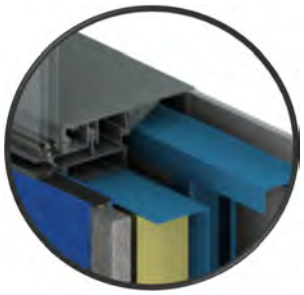
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Unitized Curtain Wall Vision Section: triple glazed IGU with aluminum spacer[2]					
6	Unitized Curtain Wall Spandrel Section with Backpan Insulation[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3] For a window to wall ratio of 50%

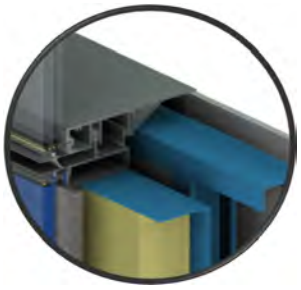
Detail 3.2.6

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





I1 – Warm Edge Spacer, 1.5" (38 mm) AIM between Glass



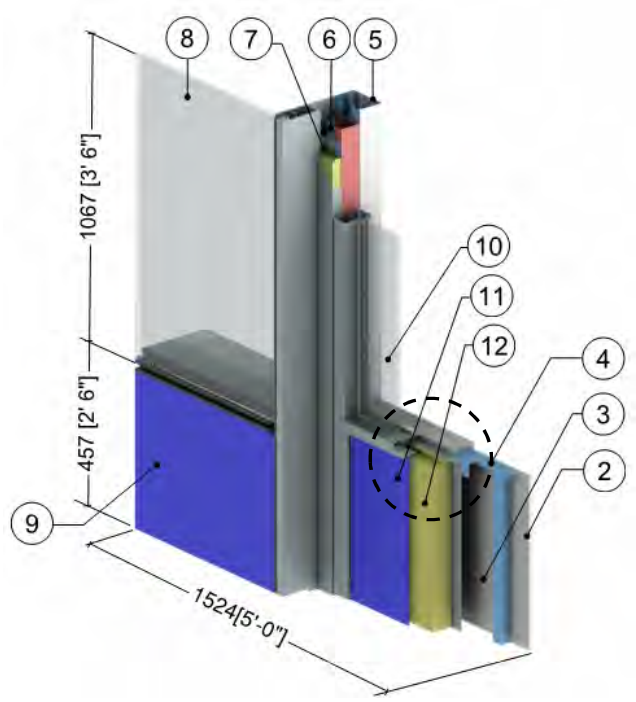
I2 – Warm Edge Spacer, Shadow AIM with 5/8" (16 mm) AIM between Glass

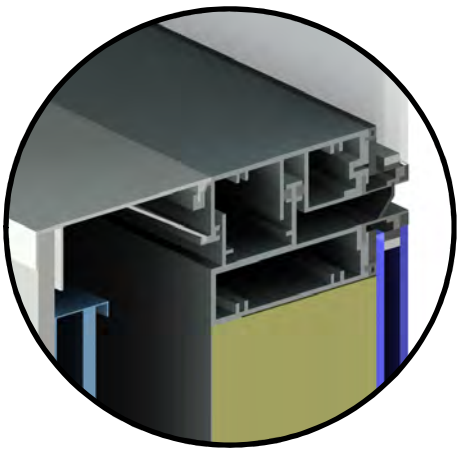
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Unitized Curtain Wall Vision Section: triple glazed IGU with silicone warm edge spacer[2]					
6	Unitized Curtain Wall Spandrel Section with varied insulation (see I1 to I2 above)[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3] For a window to wall ratio of 50%
AIM = Architectural Insulation Module

Detail 3.3.1

Unitized Curtain Wall System – Window Wall Transition





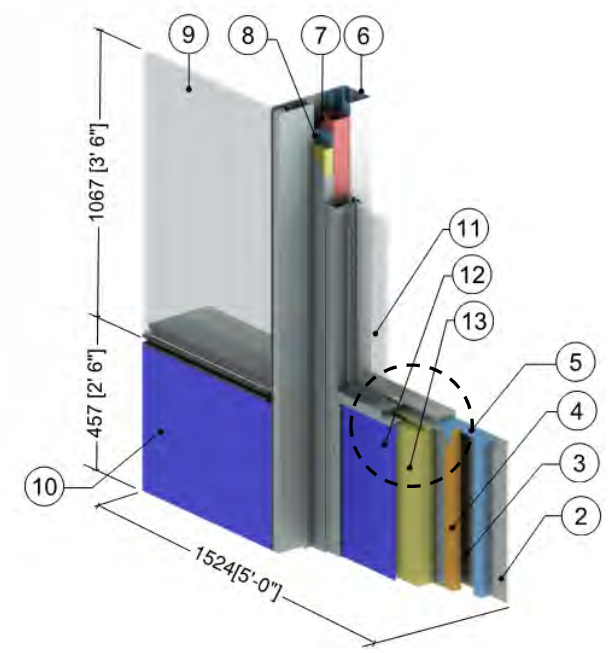
Unitized Curtain Wall Detail

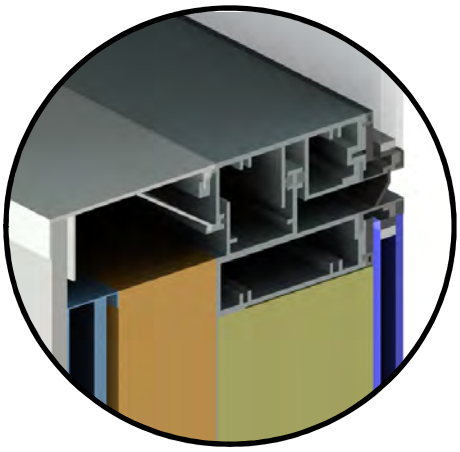
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 1/8" (79)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	3" x 3" x 1/8" HSS Column	1/8" (3.2)	430 (62)	-	489 (7830)	0.12 (500)
7	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Unitized Curtain Wall Vision System: structural silicone joints[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
9	Unitized Curtain Wall Spandrel System with Insulated Backpan: structural silicone joints[2]					
10	Aluminum Window Wall Vision System: thermally broken frame[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
11	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame[2]					
12	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
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 3.3.2

Unitized Curtain Wall System – Window Wall Transition with Foam Insulation





Unitized Curtain Wall 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-0.6 to R-1.1 (0.12 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Continuous Spray Foam Insulation	11/2" (38)	0.17 (0.024)	R-9.0 (1.58 RSI)	2.8 (39)	0.35 (1470)
5	1 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	3" x 3" x 1/8" HSS Column	1/8" (3.2)	430 (62)	-	489 (7830)	0.12 (500)
8	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Unitized Curtain Wall Vision System: structural silicone joints[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
10	Unitized Curtain Wall Spandrel System with Insulated Backpan: structural silicone joints[2]					
11	Aluminum Window Wall Vision System: thermally broken frame[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
12	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame[2]					
13	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
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 100077-2

4.0 High Performance Curtain Wall

Detail 4.1.1 ..... **A.4.1**

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

Detail 4.1.2 ..... **A.4.2**

High Performance Curtain Wall System – Spandrel Clear Wall & Interior Spray Foam Insulation

Detail 4.2.1 ..... **A.4.3**

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

Detail 4.2.2 ..... **A.4.4**

High Performance Curtain Wall System – Intermediate Floor Intersection & Interior Spray Foam Insulation

Detail 4.2.3 ..... **A.4.5**

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

Detail 4.2.4 ..... **A.4.6**

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

Detail 4.2.5 ..... **A.4.7**

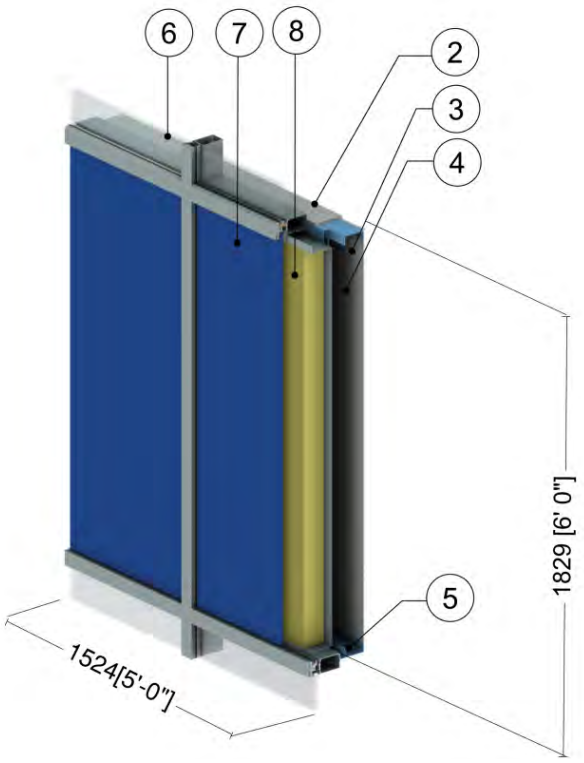
High Performance Curtain Wall System with Vertical and Horizontal Pressure Plates, Intermediate Mullion and 5’ x 5’ Spandrel Section – Insulated Backpan and Intermediate Floor Intersection

Detail 4.2.6 ..... **A.4.8**

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

Detail 4.1.1

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

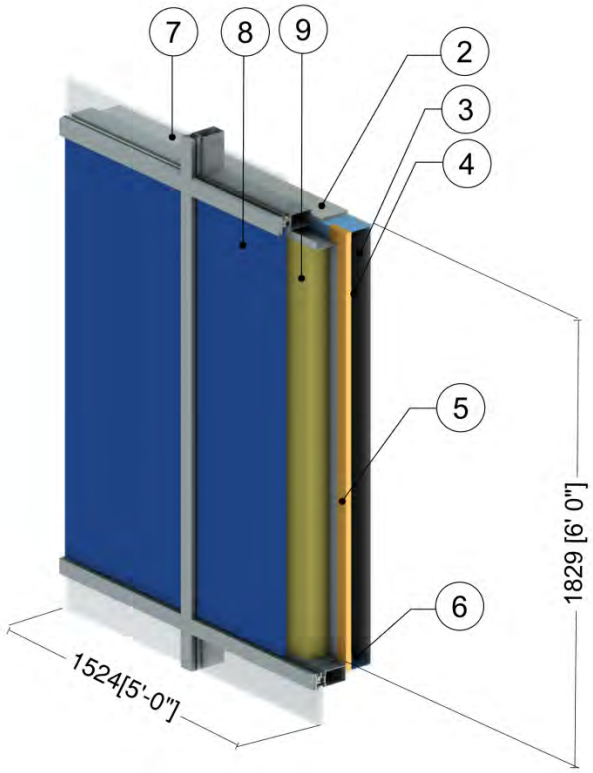


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air Cavity	4 5/8" (117)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	3 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	High Perf. Curtain Wall Vision System: thermally broken frame[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82W/m²K)					
7	High Perf. Curtain Wall Spandrel System with Insulated Backpan: thermally broken frame[2]					
8	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	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
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 4.1.2

High Performance Curtain Wall System – Spandrel Clear Wall & Interior Spray Foam Insulation

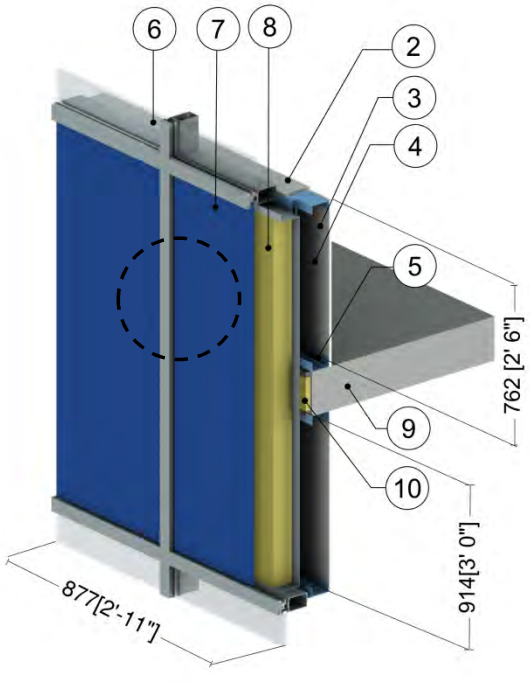


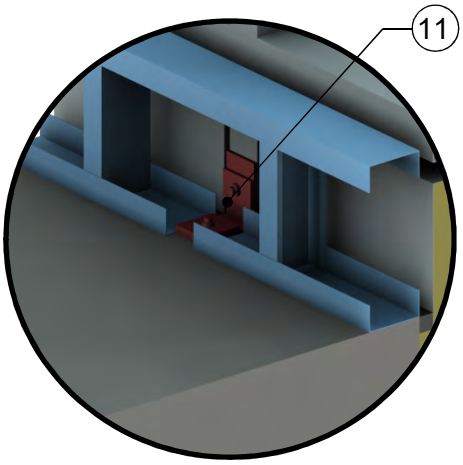
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air Cavity	4 5/8" (117)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Spray Foam Insulation	2" (51)	0.17 (0.025)	R-11.5 (2.0 RSI)	2.8 (39)	0.35 (1470)
6	3 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	High Perf. Curtain Wall Vision System: thermally broken frame[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82W/m²K)					
8	High Perf. Curtain Wall Spandrel System with Insulated Backpan: thermally broken frame[2]					
9	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
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 4.2.1

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





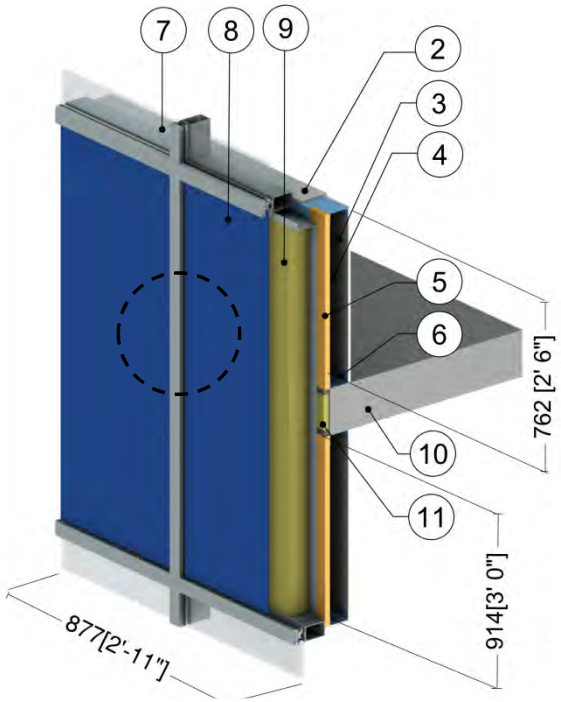
Connection Detail from Interior

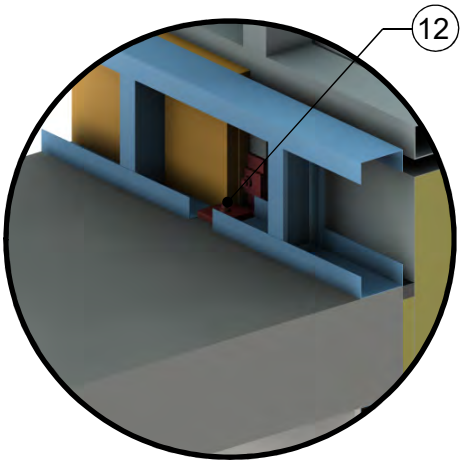
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air Cavity	2 5/8" (67)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	3 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	High Perf. Curtain Wall Vision System: thermally broken frame[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82W/m²K)					
7	High Perf. Curtain Wall Spandrel System with Insulated Backpan: thermally broken frame[2]					
8	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
11	Steel Connection Bracket	-	347 (50)	-	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 4.2.2

High Performance Curtain Wall System – Intermediate Floor Intersection & Interior Spray Foam Insulation





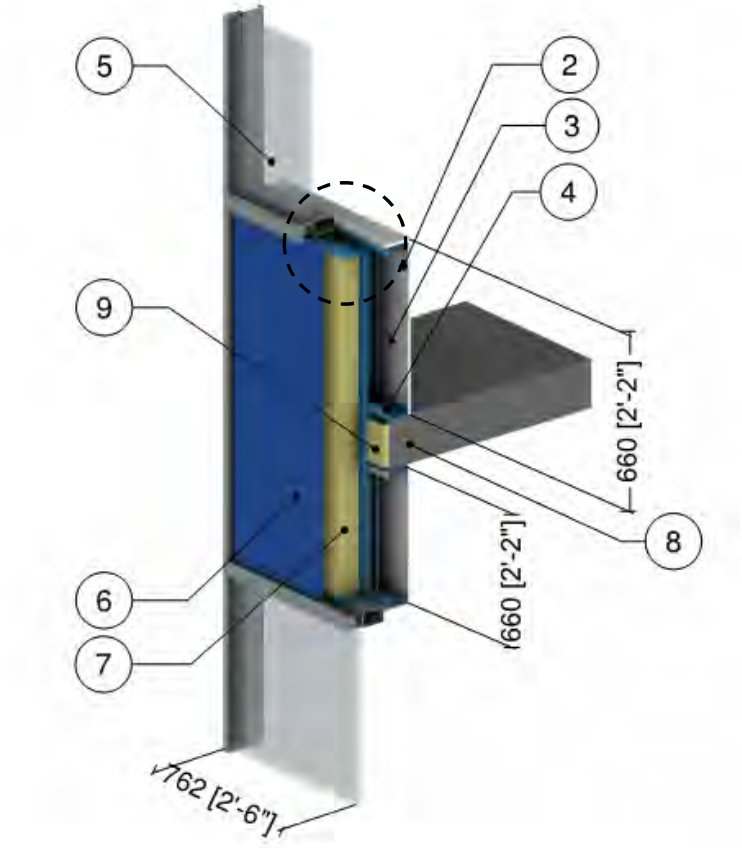
Connection Detail from Interior

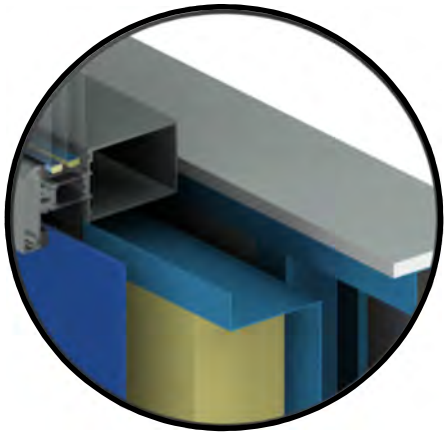
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	1 1/2" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air Cavity	2 5/8" (67)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Spray Foam Insulation	2" (51)	0.17 (0.025)	R-11.5 (2.0 RSI)	2.8 (39)	0.35 (1470)
6	3 5/8" x 1 5/8" Steel Studs (16"o.c) w/ Top & Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	High Perf. Curtain Wall Vision System: thermally broken frame[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82W/m²K)					
8	High Perf. Curtain Wall Spandrel System with Insulated Backpan: thermally broken frame[2]					
9	Backpan Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 to 2.96 RSI)	4 (64)	0.20 (850)
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
12	Steel Connection Bracket	-	347 (50)	-	489 (7830)	0.12 (500)
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 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





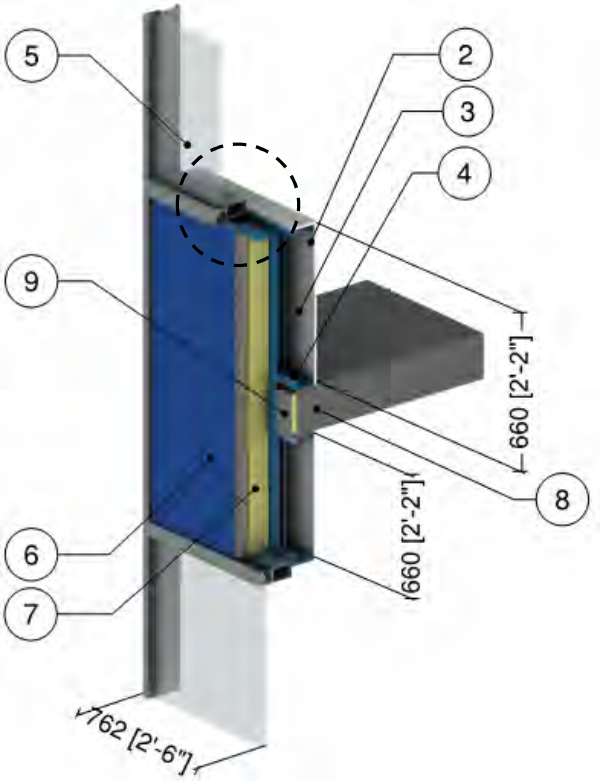
Triple Glazed IGU with Aluminum Spacer

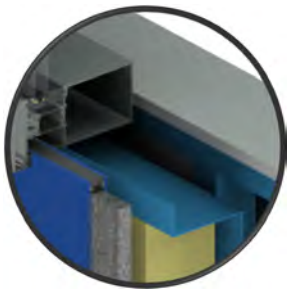
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	High Performance Curtain Wall Vision Section: triple glazed IGU with aluminum spacer[2]					
6	High Performance Curtain Wall Spandrel Section with Backpan Insulation[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3] For a window to wall ratio of 50%

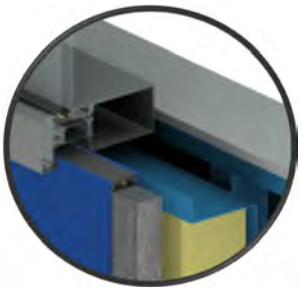
Detail 4.2.4

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

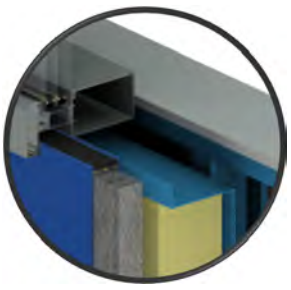




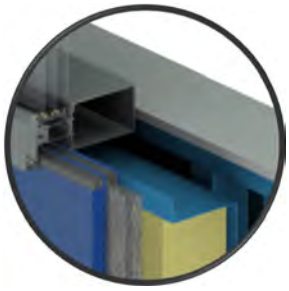
E1 – Warm Edge Spacer, 0.75" (19 mm) AIM between Glass



E2 – Warm Edge Spacer, 1.5" (38 mm) AIM between Glass



E3 – Warm Edge Spacer, 1.5" (38 mm) AIM between Glass



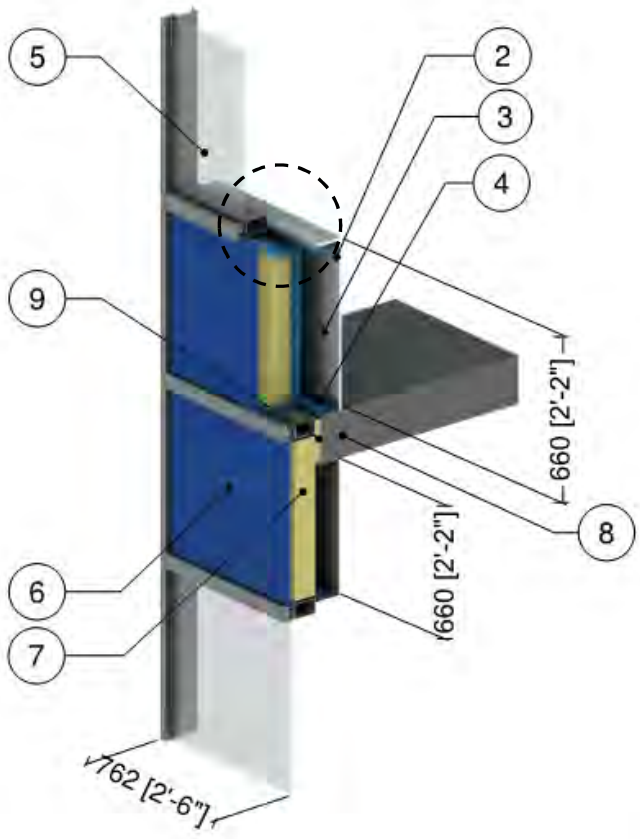
E4 – Warm Edge Sapcer, Shadow AIM with 5/8" (16 mm) AIM in Secondary Unit

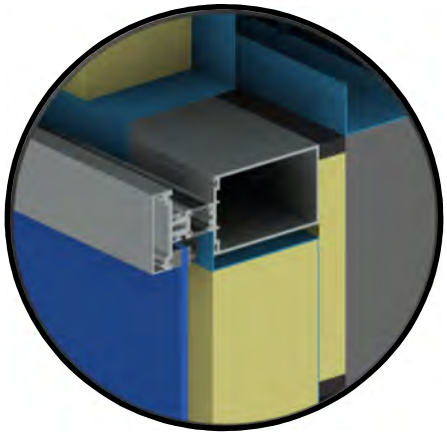
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	High Performance Curtain Wall Vision Section: double glazed (E1 & E2) or triple glazed (E3 & E4) IGU with warm edge spacer[2]					
6	High Performance Curtain Wall Spandrel Section with varied insulation (see E1 to E4 above)[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3] For a window to wall ratio of 50%
AIM = Architectural Insulation Module

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





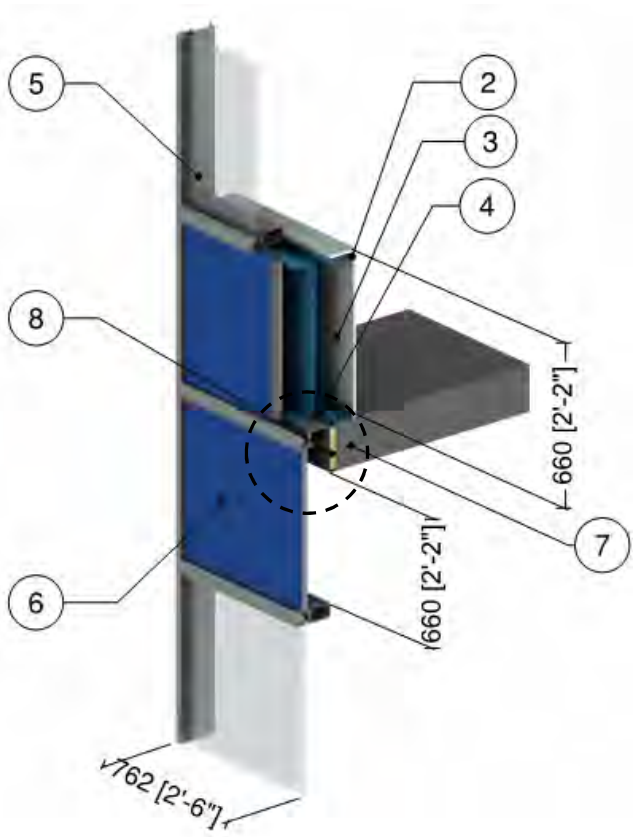
Double Glazed IGU with Silicone Warm Edge Spacer

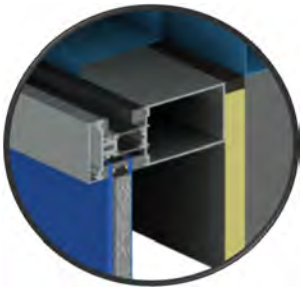
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	High Performance Curtain Wall Vision Section: double glazed IGU with silicone warm edge spacer[2]					
6	High Performance Curtain Wall Spandrel Section with Backpan Insulation[2,3]					
7	Backpan Insulation	4" (100)	0.24 (0.034)	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	0.20 (850)
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
[3] For a window to wall ratio of 50%

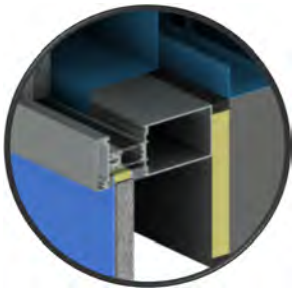
Detail 4.2.6

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

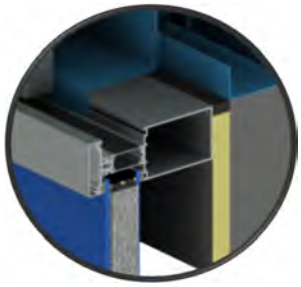




F1 – Warm Edge Spacer, 0.75" (19 mm) AIM between Glass



F2 – Rigid Insulation Spacer, 1" (25 mm) AIM between Metal Skins



F3 – Warm Edge Spacer, 1.5" (38 mm) AIM between Glass

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-0.6 (0.12 RSI) to R-1.1 (0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	High Performance Curtain Wall Vision Section: double glazed (F1 & F2) or triple glazed (F3) IGU with warm edge spacer[2]					
6	High Performance Curtain Wall Spandrel Section with varied insulation (see F1 to F3 above)[2,3]					
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Mineral Wool Insulation	1" (25)	0.24 (0.034)	R-4.2 (0.74 RSI)	4 (64)	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
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2
[3] For a window to wall ratio of 50%
AIM = Architectural Insulation Module

5.0 Steel-Frame Construction

Detail 5.1.1 ..... **A.5.1**

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

Detail 5.1.2 ..... **A.5.2**

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

Detail 5.1.3 ..... **A.5.3**

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

Detail 5.1.4 ..... **A.5.4**

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

Detail 5.1.5 ..... **A.5.5**

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

Detail 5.1.6 ..... **A.5.6**

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 – Clear Wall

Detail 5.1.7 ..... **A.5.7**

Exterior and Interior Insulated 6” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Vertical Z-Girts (16” o.c.) – Clear Wall

Detail 5.1.8 ..... **A.5.8**

Exterior and Interior Insulated 6” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Vertical Z-Girts (16” o.c.) – Clear Wall

Detail 5.1.9 ..... **A.5.9**

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

Detail 5.1.10 ..... **A.5.10**

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 Max Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall

Detail 5.1.11 ..... **A.5.11**

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

Detail 5.1.12 ..... **A.5.12**

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

Detail 5.1.13 ..... **A.5.13**

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 – Clear Wall

Detail 5.1.14 ..... A.5.14

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 – Clear Wall

Detail 5.1.15 ..... A.5.15

Exterior and Interior Insulated 6” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-Girts (24” o.c.) – Clear Wall

Detail 5.1.16 ..... A.5.16

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

Detail 5.1.17 ..... A.5.17

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

Detail 5.1.18 ..... A.5.18

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

Detail 5.1.19 ..... A.5.19

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 – Clear Wall

Detail 5.1.20 ..... A.5.20

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 – Clear Wall

Detail 5.1.21 ..... A.5.21

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

Detail 5.1.22 ..... A.5.22

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 – Clear Wall

Detail 5.1.23 ..... A.5.23

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

Detail 5.1.24 ..... A.5.24

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

Detail 5.1.25 ..... A.5.25

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

Detail 5.1.26 ..... A.5.26

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

Detail 5.1.27 ..... A.5.27

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

Detail 5.1.28 ..... A.5.28

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 Exterior Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall

Detail 5.1.29 ..... A.5.29

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

Detail 5.1.30 ..... A.5.30

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

Detail 5.1.31 ..... A.5.31

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

Detail 5.1.32 ..... A.5.32

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

Detail 5.1.33 ..... A.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 ..... A.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 ..... A.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 ..... A.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.) – Clear Wall

Detail 5.1.37 ..... A.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.) – Clear Wall

Detail 5.1.38 ..... A.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 ..... A.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 ..... A.5.40

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

Detail 5.1.41 ..... A.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 ..... A.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 ..... A.5.43

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

Detail 5.1.44 ..... A.5.44

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

Detail 5.1.45 ..... A.5.45

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

Detail 5.1.46 ..... **A.5.46**

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

Detail 5.1.47 ..... **A.5.47**

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

Detail 5.1.48 ..... **A.5.48**

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 – Clear Wall

Detail 5.1.49 ..... **A.5.49**

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

Detail 5.1.50 ..... **A.5.50**

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 – Clear Wall

Detail 5.1.51 ..... **A.5.51**

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

Detail 5.1.52 ..... **A.5.52**

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

Detail 5.1.53 ..... **A.5.53**

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

Detail 5.1.54 ..... **A.5.54**

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

Detail 5.1.55 ..... **A.5.55**

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

Detail 5.1.56 ..... **A.5.56**

Exterior and Interior Insulated 6″ x 1/58” 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

Detail 5.1.57 ..... **A.5.57**

Owens Corning 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

Detail 5.1.58 ..... A.5.58

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

Detail 5.1.59 ..... A.5.59

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

Detail 5.1.60 ..... A.5.60

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

Detail 5.1.61 ..... A.5.61

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-22.5 Batt Insulation in Stud Cavity – Clear Wall

Detail 5.1.62 ..... A.5.62

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-24 Batt Insulation in Stud Cavity – Clear Wall

Detail 5.1.63 ..... A.5.63

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

Detail 5.1.64 ..... A.5.64

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

Detail 5.1.65 ..... A.5.65

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

Detail 5.1.66 ..... A.5.66

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

Detail 5.1.67 ..... A.5.67

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

Detail 5.1.68 ..... A.5.68

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

Detail 5.1.69 ..... A.5.69

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

Detail 5.1.70 ..... A.5.70

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

Detail 5.1.71 ..... A.5.71

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

Detail 5.1.72 ..... A.5.72

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

Detail 5.1.73 ..... A.5.73

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

Detail 5.1.74 ..... A.5.74

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 Anchor Supporting Brick Veneer – Clear Wall

Detail 5.1.75 ..... A.5.75

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

Detail 5.1.76 ..... A.5.76

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

Detail 5.1.77 ..... A.5.77

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

Detail 5.1.78 ..... A.5.78

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

Detail 5.1.79 ..... A.5.79

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

Detail 5.1.80 ..... A.5.80

Exterior Insulated 6” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with ECO Cladding Alpha Vci Vertical System – Clear Wall

Detail 5.1.81 ..... A.5.81

Exterior and Interior Insulated 6” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with ECO Cladding Alpha Vci Vertical System – Clear Wall

Detail 5.1.82 ..... A.5.82

Exterior Insulated 6” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with ECO Cladding Alpha Hci Horizontal System – Clear Wall

Detail 5.1.83 ..... A.5.83

Exterior and Interior Insulated 6” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with ECO Cladding Alpha Hci Horizontal System – Clear Wall

Detail 5.1.84 ..... A.5.84

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

Detail 5.1.85 ..... A.5.85

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 – Clear Wall

Detail 5.1.86 ..... A.5.86

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

Detail 5.1.87 ..... A.5.87

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 – Clear Wall

Detail 5.1.88 ..... A.5.88

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

Detail 5.1.89 ..... A.5.89

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

Detail 5.1.90 ..... A.5.90

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

Detail 5.1.91 ..... A.5.91

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

Detail 5.1.92 ..... A.5.92

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

Detail 5.1.93 ..... A.5.93

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

Detail 5.1.94 ..... A.5.94

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

Detail 5.1.95 ..... A.5.95

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

Detail 5.1.96 ..... A.5.96

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

Detail 5.1.97 ..... A.5.97

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

Detail 5.1.98 ..... A.5.98

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

Detail 5.1.99 ..... A.5.99

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

Detail 5.1.100 ..... A.5.100

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

Detail 5.1.101 ..... A.5.101

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

Detail 5.1.102 ..... A.5.102

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

Detail 5.1.103 ..... A.5.103

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

Detail 5.1.104 ..... A.5.104

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

Detail 5.1.105 ..... A.5.105

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

Detail 5.1.106 ..... A.5.106

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

Detail 5.1.107 ..... A.5.107

Exterior Insulated 6” x 1 5/8” 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

Detail 5.1.108 ..... A.5.108

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

Detail 5.1.109 ..... A.5.109

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

Detail 5.1.110 ..... A.5.110

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

Detail 5.1.111 ..... A.5.111

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

Detail 5.1.112 ..... A.5.112

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

Detail 5.1.113 ..... A.5.113

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

Detail 5.1.114 ..... A.5.114

Exterior and Interior Insulated Wall Assembly with Brick Ties Supporting Brick Veneer

Detail 5.2.1 ..... A.5.115

Exterior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Intermediate Floor Intersection

Detail 5.2.2 ..... A.5.116

Exterior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Intermediate Floor Intersection with Top Side Insulation

Detail 5.2.3 ..... A.5.117

Exterior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Intermediate Floor Intersection with Top & Under Side Insulation

Detail 5.2.4 ..... A.5.118

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Uninsulated Curb

Detail 5.2.5 ..... A.5.119

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Uninsulated Curb

Detail 5.2.6 ..... A.5.120

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Insulated Curb

Detail 5.2.7 ..... A.5.121

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Insulated Curb

Detail 5.2.8 ..... A.5.122

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Vertical Z Girts (16” o.c.) Supporting Stucco Cladding – Uninsulated Intermediate Floor Intersection

Detail 5.2.9 ..... A.5.123

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Isokorb CM20 Thermally Broken Slab Projection without Concrete Curb

Detail 5.2.10 ..... A.5.124

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Isokorb CM20 Thermally Broken Slab Projection without Concrete Curb

Detail 5.2.11 ..... A.5.125

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Uninsulated Curb

Detail 5.2.12 ..... A.5.126

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Uninsulated Curb

Detail 5.2.13 ..... A.5.127

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Insulated Curb

Detail 5.2.14 ..... A.5.128

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Insulated Curb

Detail 5.2.15 ..... A.5.129

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Intermediate Floor Intersection

Detail 5.2.16 ..... A.5.130

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Intermediate Floor Intersection

Detail 5.2.17 ..... **A.5.131**

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

Detail 5.2.18 ..... **A.5.132**

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

Detail 5.2.19 ..... **A.5.133**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Vertical Z-girts (16” o.c.) Supporting Stucco Cladding – Steel Framed Floor with Cross Cavity Flashing

Detail 5.2.20 ..... **A.5.134**

Exterior Insulated 3 5/8’’ x 1 5/8’’ Steel Stud (16’’ o.c.) Wall Assembly with Fiberglass Spacer and Through Insulation Fasteners Supporting Cladding – Insulated Intermediate Floor Intersection

Detail 5.2.21 ..... **A.5.135**

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

Detail 5.2.22 ..... **A.5.136**

Exterior Insulated 3 5/8” x 1/58” Steel Stud (16”o.c.) Wall Assembly with TAC Fiber Reinforced Plastic Girts Supporting Cladding – Intermediate Floor Intersection

Detail 5.2.23 ..... **A.5.137**

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

Detail 5.2.24 ..... **A.5.138**

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

Detail 5.2.25 ..... **A.5.139**

Interior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Structural Steel Framed Floor Intersection

Detail 5.2.26 ..... **A.5.140**

Exterior and Interior Insulated Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection

Detail 5.2.27 ..... **A.5.141**

Exterior and Interior Insulated Wall Assembly with Spaced Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection

Detail 5.2.28 ..... A.5.142

Exterior and Interior Insulated Wall Assembly with Stainless Steel Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection

Detail 5.2.29 ..... A.5.143

Exterior and Interior Insulated Wall Assembly with Thermally Broken Steel Shelf Angle & Brick Ties Supporting Brick Veneer – Slab Intersection

Detail 5.2.30 ..... A.5.144

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud Wall Assembly with Horizontal Z-girts Supporting Metal Cladding – Armatherm 500 Thermally Broken Slab Projection with Insulated Curb

Detail 5.2.31 ..... A.5.145

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud Wall Assembly with Armatherm Z-girts Supporting Metal Cladding – Armatherm 500-080 Thermally Broken Slab Projection with Insulated Curb

Detail 5.2.32 ..... A.5.146

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Nvelope – Eko Thermobracket and NV1 Clip System Supporting Cladding – Intermediate Floor Intersection

Detail 5.2.33 ..... A.5.147

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 – Intermediate Floor Intersection

Detail 5.2.34 ..... A.5.148

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

Detail 5.2.35 ..... A.5.149

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

Detail 5.2.36 ..... A.5.150

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

Detail 5.2.37 ..... A.5.151

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

Detail 5.2.38 ..... A.5.152

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

Detail 5.2.39 ..... A.5.153

Exterior and Interior Insulated 6'' x 1 /58" 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

Detail 5.2.40 ..... A.5.154

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

Detail 5.2.41 ..... A.5.155

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

Detail 5.2.42 ..... A.5.156

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

Detail 5.2.43 ..... A.5.157

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

Detail 5.2.44 ..... A.5.158

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb K65-V8 Thermally Broken Slab Projection with Insulated Curb

Detail 5.2.45 ..... A.5.159

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb K10-V6 Thermally Broken Slab Projection with Insulated Curb

Detail 5.2.46 ..... A.5.160

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Horizontal Z-girts (24" o.c.) Supporting Metal Cladding – Isokorb KXT65-V8 Thermally Broken Slab Projection with Insulated Curb

Detail 5.2.47 ..... A.5.161

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Isokorb KXT15-V6 Thermally Broken Slab Projection with Insulated Curb

Detail 5.3.1 ..... A.5.162

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection

Detail 5.3.2 ..... A.5.163

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection

Detail 5.3.3 ..... A.5.164

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection

Detail 5.3.4 ..... A.5.165

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Window with Aerogel and Floor Slab Intersection

Detail 5.3.5 ..... A.5.166

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 & Intermediate Floor Intersection

Detail 5.3.6 ..... A.5.167

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Window and Intermediate Floor Intersection

Detail 5.3.7 ..... A.5.168

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Vertical Z Girts (16” o.c.) Supporting Stucco Cladding – Window and Intermediate Floor Intersection

Detail 5.3.8 ..... A.5.169

Interior Insulated Steel Frame Wall Assembly with Brick Cladding – Window Intersection

Detail 5.3.9 ..... A.5.170

Interior Insulated Steel Frame Wall Assembly with Brick Cladding – Window Intersection Aligned with Insulation

Detail 5.3.10 ..... A.5.171

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

Detail 5.3.11 ..... A.5.172

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 – Triple Glazed Aluminum Window & Intermediate Floor Intersection with Window Thermal Break Positioned in Steel Framing

Detail 5.3.12 ..... A.5.173

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

Detail 5.3.13 ..... A.5.174

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 – Triple Glazed Aluminum Curtain Wall & Intermediate Floor Intersection with Window Thermal Break Positioned in the Exterior Insulation

Detail 5.3.14 ..... A.5.175

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

Detail 5.3.15 ..... A.5.176

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 ..... A.5.177

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 ..... A.5.178

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 ..... A.5.179

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 ..... A.5.180

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 ..... A.5.181

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

Detail 5.3.21 ..... A.5.182

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 ..... A.5.183

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 ..... A.5.184

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

Detail 5.4.1 ..... A.5.185

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Conventional Curtain Wall Transition

Detail 5.4.2 ..... A.5.186

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Conventional Curtain Wall Transition

Detail 5.4.3 ..... A.5.187

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly – Curtain Wall Transition

Detail 5.4.4 ..... A.5.188

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

Detail 5.4.5 ..... A.5.189

Exterior Insulated Concrete Wall and Steel Stud Assembly Supporting Metal Cladding – Curtain Wall Transition Intersection

Detail 5.4.6 ..... A.5.190

Exterior Insulated Concrete Wall and Steel Stud Assembly Supporting Metal Cladding with Cavity Insulation – Curtain Wall Transition Intersection

Detail 5.5.1 ..... A.5.191

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection

Detail 5.5.2 ..... A.5.192

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection

Detail 5.5.3 ..... **A.5.193**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection

Detail 5.5.4 ..... **A.5.194**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection

Detail 5.5.5 ..... **A.5.195**

Exterior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24” o.c.) Supporting Metal Cladding – Concrete Parapet & Slab Intersection

Detail 5.5.6 ..... **A.5.196**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Concrete Parapet and Slab Intersection

Detail 5.5.7 ..... **A.5.197**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Vertical Z Girts (16” o.c.) Supporting Stucco Cladding – Concrete Parapet & Slab Intersection

Detail 5.5.8 ..... **A.5.198**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Intermittent Vertical Z Girts (16” o.c.) Supporting Metal Cladding – Concrete Roof Deck at Continuous Concrete Parapet

Detail 5.5.9 ..... **A.5.199**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Intermittent Vertical Z Girts (16” o.c.) Supporting Metal Cladding – Concrete Roof Deck at Isokorb AXT1 Thermally Broken Concrete Parapet

Detail 5.5.10 ..... **A.5.200**

Exterior and Interior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

Detail 5.5.11 ..... **A.5.201**

Exterior and Interior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection with Thermal Break under Parapet Stud Cavity

Detail 5.5.12 ..... **A.5.202**

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

Detail 5.5.13 ..... A.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-20 Batt in Stud Cavity – Concrete Parapet and Roof Intersection

Detail 5.5.14 ..... A.5.204

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

Detail 5.5.15 ..... A.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-24 Batt in Stud Cavity – Concrete Parapet and Roof Intersection

Detail 5.5.16 ..... A.5.206

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 ..... A.5.207

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 ..... A.5.208

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 ..... A.5.209

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 ..... A.5.210

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 – Concrete Roof Deck at Isokorb AXT Thermally Broken Concrete Parapet

Detail 5.5.21 ..... A.5.211

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 – Concrete Roof Deck at Isokorb AXT Thermally Broken Concrete Parapet

Detail 5.6.1 ..... **A.5.212**

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

Detail 5.6.2 ..... **A.5.213**

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

Detail 5.6.3 ..... **A.5.214**

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

Detail 5.6.4 ..... **A.5.215**

Exterior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Corner Intersection with Alternative Framing

Detail 5.6.5 ..... **A.5.216**

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

Detail 5.6.6 ..... **A.5.217**

Window Wall System – Transition to Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding & No Interior Stud Cavity Insulation

Detail 5.6.7 ..... **A.5.218**

Window Wall System – Transition to Exterior Insulated Steel Stud Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding & Interior Sprayfoam and Fibreglass Batt Insulation

Detail 5.7.1 ..... **A.5.219**

Exterior and Interior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Structural Steel Column & Cantilever Beam Intersection (Canopy Support)

Detail 5.7.2 ..... **A.5.220**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Uninterrupted Beam

Detail 5.7.3 ..... **A.5.221**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Isolator Pad

Detail 5.7.4 ..... **A.5.222**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Isokorb S22 Thermally Broken Beam

Detail 5.7.5 ..... A.5.223

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Intermittent Vertical Z-girts (16” o.c.) Supporting Metal Cladding – Concrete Floor to Steel Beam Connection

Detail 5.7.6 ..... A.5.224

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Intermittent Vertical Z-girts (16” o.c.) Supporting Metal Cladding – Concrete Floor to Steel Beam with a Thermal Isolator Pad Connection

Detail 5.7.7 ..... A.5.225

Exterior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Intermittent Vertical Z-girts (16” o.c.) Supporting Metal Cladding – Concrete Floor to Steel Beam with Isokorb KS14 Connection

Detail 5.7.8 ..... A.5.226

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Beam Thermal Break

Detail 5.7.9 ..... A.5.227

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Aerolon Coating

Detail 5.7.10 ..... A.5.228

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

Detail 5.7.11 ..... A.5.229

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

Detail 5.7.12 ..... A.5.230

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Thermal Isolator Pad

Detail 5.7.13 ..... A.5.231

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Isokorb KST System Thermally Broken Beam

Detail 5.8.1 ..... A.5.232

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

Detail 5.8.2 ..... A.5.233

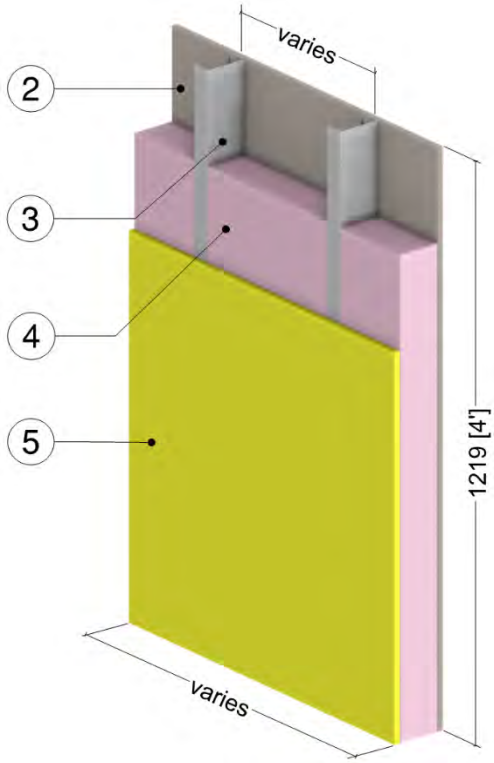
Exterior Insulated 6″ x 1 5/8” Steel Stud (16″ o.c.) Wall Assembly with FRP Vertical Brackets and Rail System Supporting Metal Cladding – At-Grade Foundation Wall Intersection

Detail 5.8.3 ..... A.5.234

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

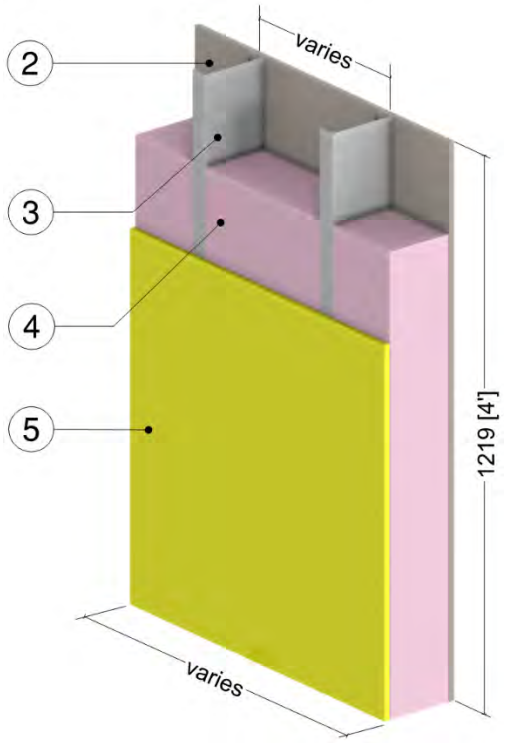


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air or Fiberglass Batt Insulation in Stud Cavity	3 5/8” (92)	-	R-0.9 to R-13 (0.16 to 2.29 RSI)	varies	varies
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Metal cladding with 1/2" (13 mm) vented air space is incorporated into exterior heat transfer coefficient					
7	Exterior Film[1]	-	-	R-0.7 (0.012 RSI)	-	-

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

Detail 5.1.2

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

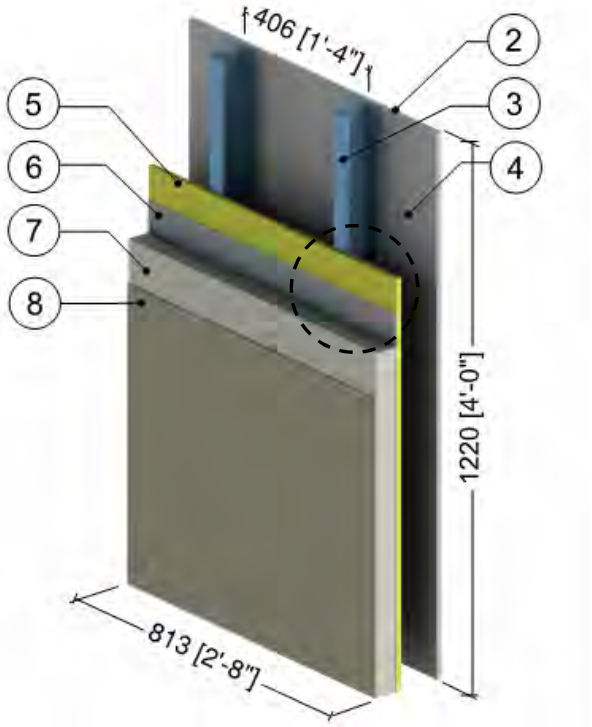


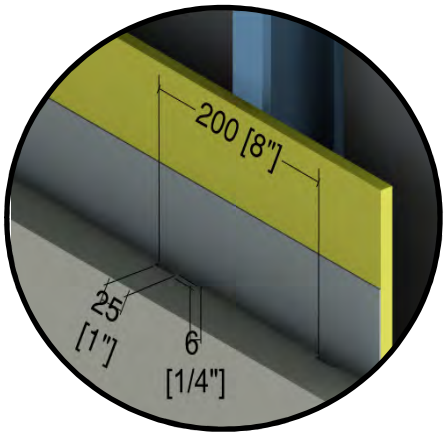
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air or Fiberglass Batt Insulation in Stud Cavity	6” (152)	-	R-0.9 to R-24 (0.16 to 4.23 RSI)	varies	varies
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Metal cladding with 1/2" (13 mm) vented air space is incorporated into exterior heat transfer coefficient					
7	Exterior Film[1]	-	-	R-0.7 (0.012 RSI)	-	-

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

Detail 5.1.3

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





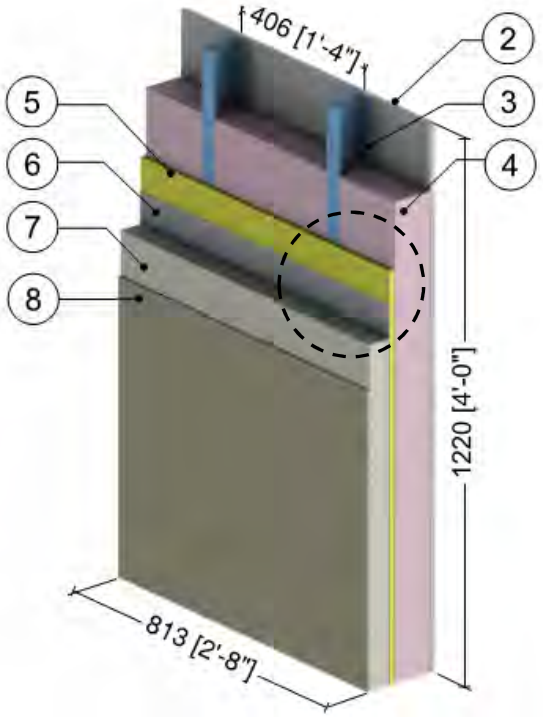
1” (25 mm)
Drained EIFS
Detail

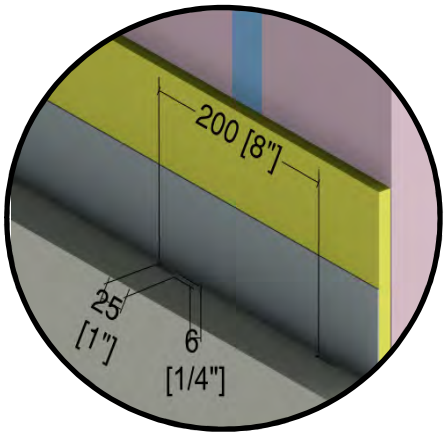
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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 4” (50 to 100)	0.27 (0.039)	R-7.5 to R-15 (1.32 to 2.64 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

Detail 5.1.4

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





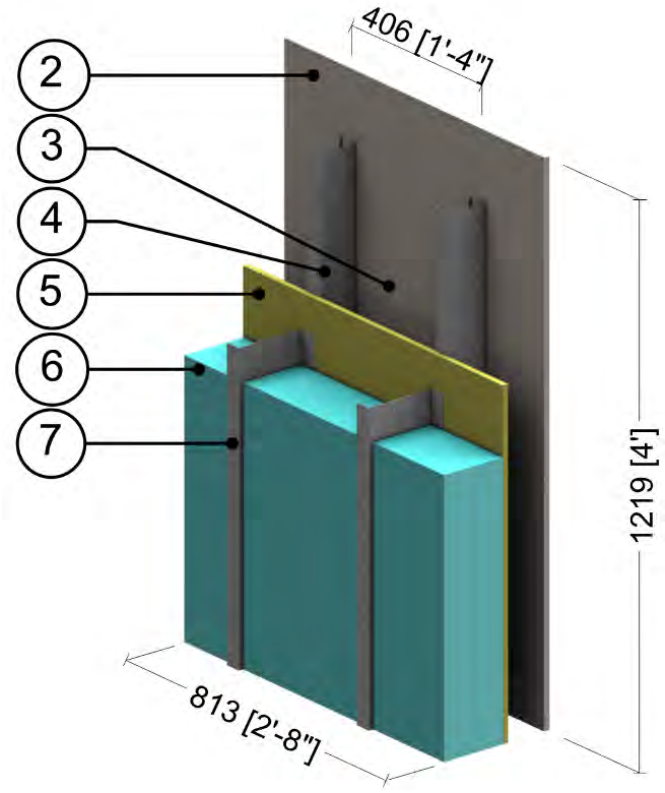
1” (25 mm) Drained EIFS Detail

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

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

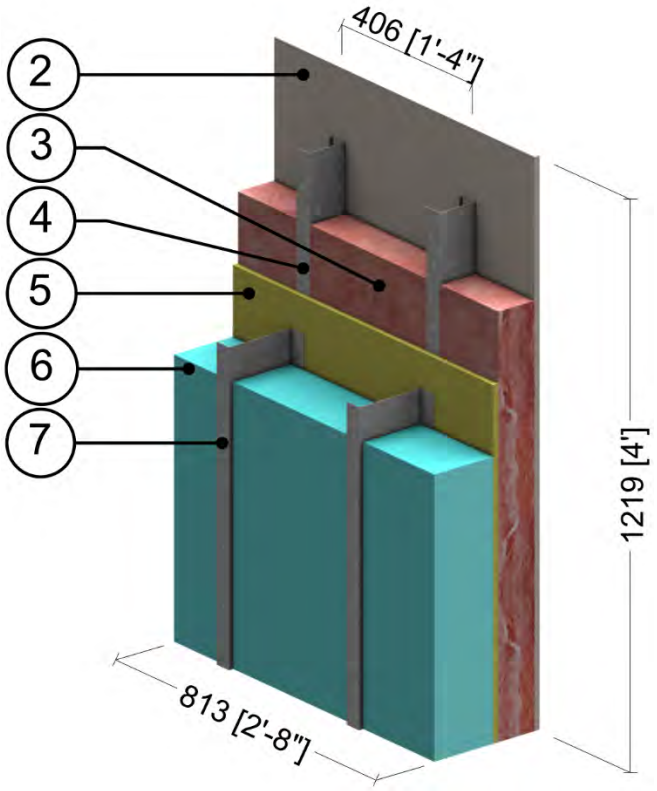


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-40 (0.88 to 7.0 RSI)	1.8 (28)	0.29 (1220)
7	Vertical Z-Girts w/ 1 1/2" Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall

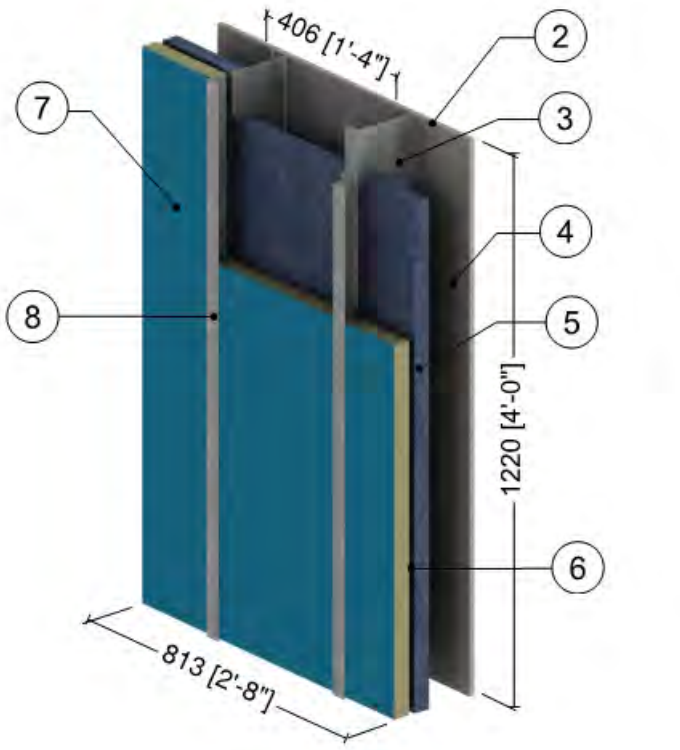


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6” (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.9 (14)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	0.20 (0.029)	R-20 to R-30 (3.52 to 5.28 RSI)	1.8 (28)	0.29 (1220)
7	Vertical Z-Girts w/ 1 1/2” Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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.) – Clear Wall

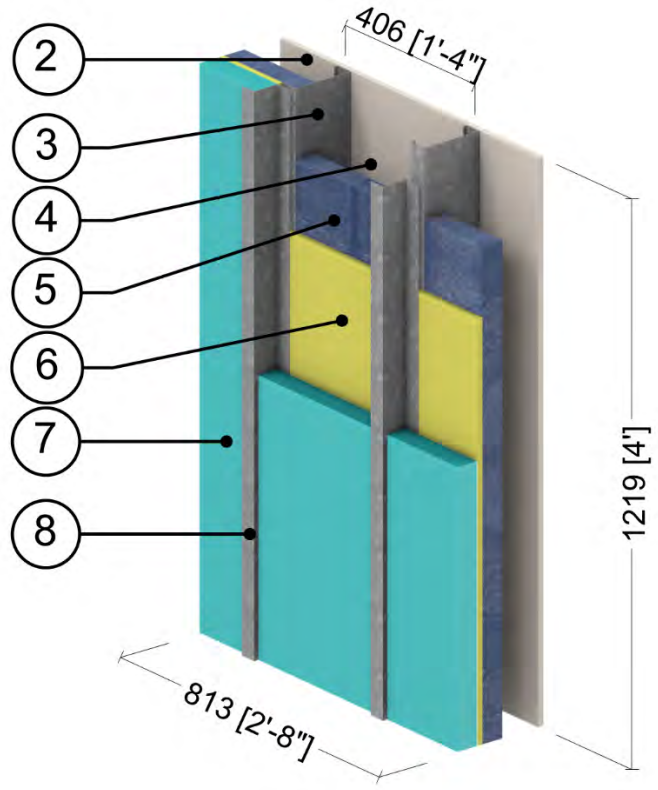


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	0.09 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 1/2” (114)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Spray Foam Insulation	1 1/2” (38)	-	R-9.8 (1.73 RSI)	-	-
6	Exterior Sheathing	5/8" (16)	0.09 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
7	Exterior Polyisocyanurate Insulation	1 1/2" (38)	-	R-10.1 (1.78 RSI)	-	-
8	Vertical Z-Girts (16” o.c.)	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
9	Metal Cladding with vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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.) – Clear Wall

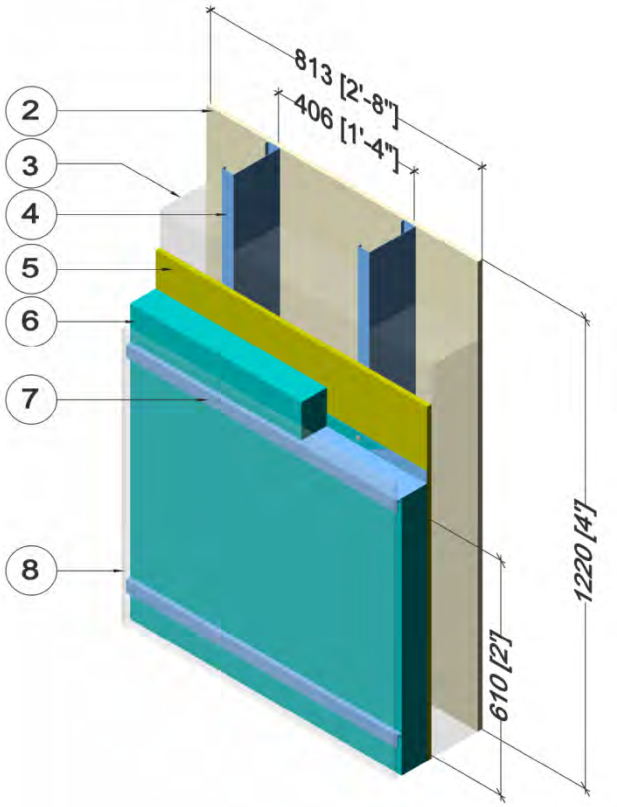


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs (16”o.c.)	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4” (102)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Spray Foam Insulation	2” (51)	0.17 (0.025)	R-11.4 (2.01 RSI)	2.8 (39)	0.35 (1470)
6	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
7	Exterior Insulation	Varies	0.20 (0.029)	R-10 to R-30 (1.76 to 5.28 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Z-Girts (16” o.c.)	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

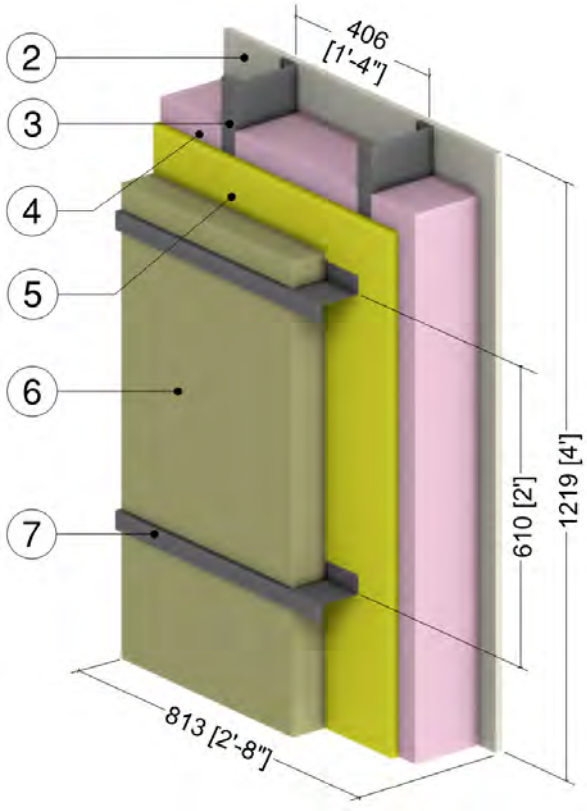


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-Girts w/ 1 1/2” Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.10

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 Max Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall

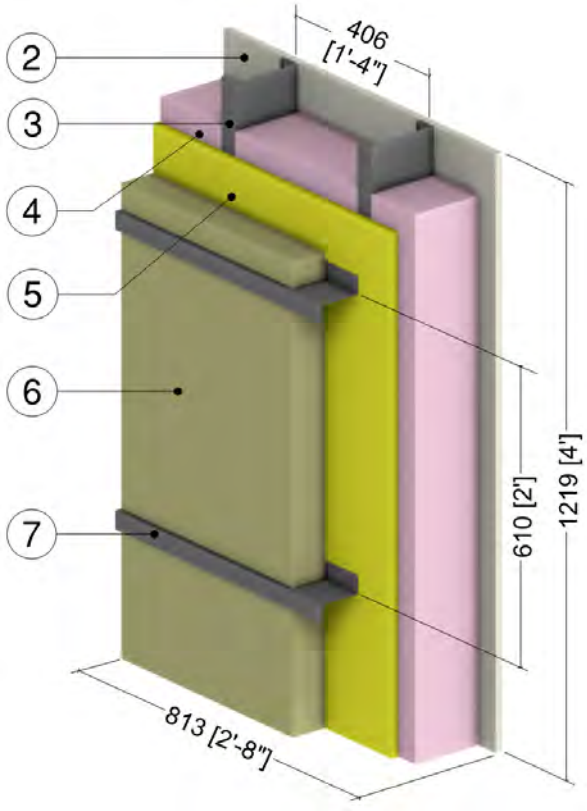


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Max Mineral Wool Semi Rigid Insulation	Varies	0.25 (0.036)	R-4 to R-24 (0.70 to 4.23 RSI)	11 (176)	0.20 (850)
7	Horizontal Z-Girts with 1-1/2” Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

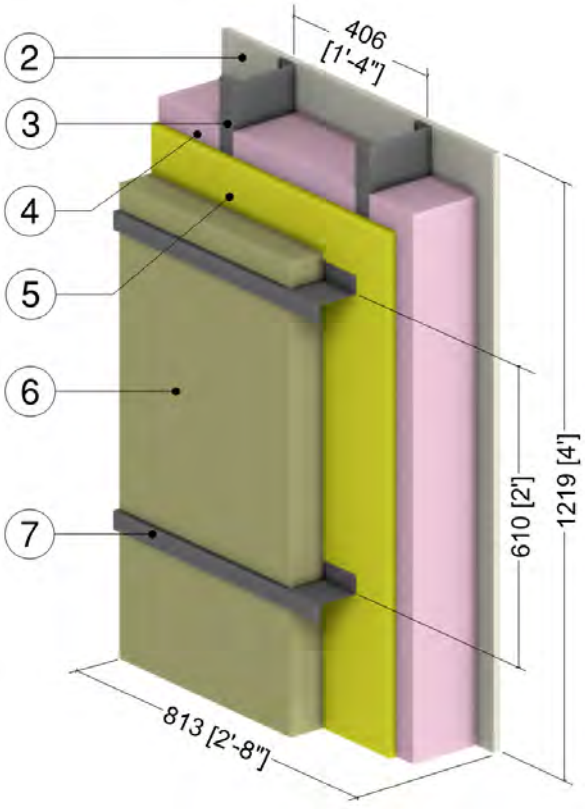


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Plus 110 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.035)	R-4.1 to R-24.6 (0.72 to 4.33 RSI)	8 (128)	0.20 (850)
7	Horizontal Z-Girts with 1-1/2” Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

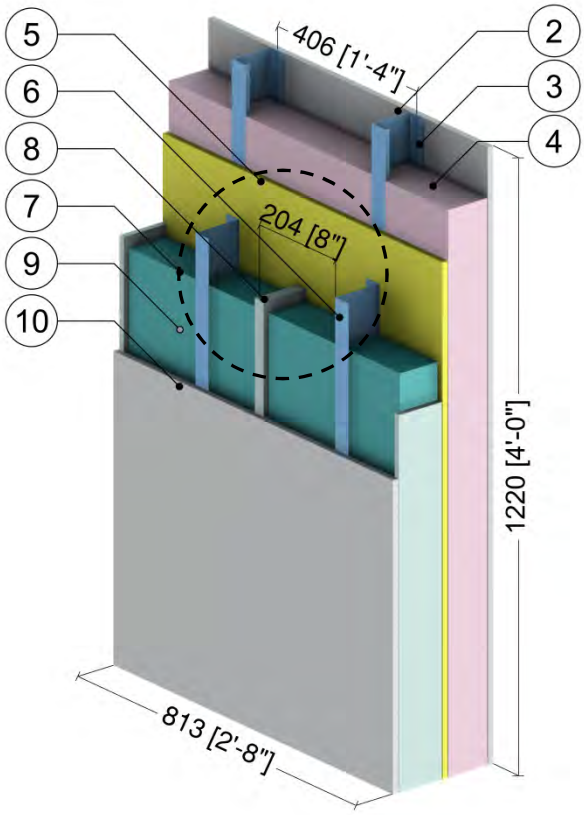


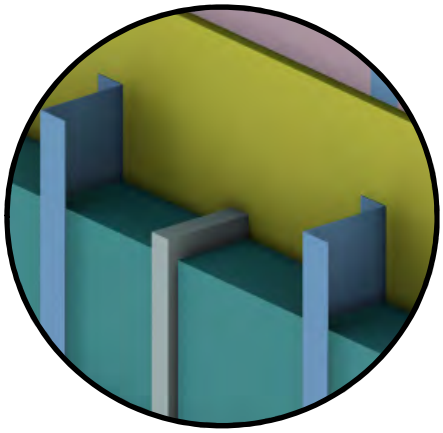
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-4.2 to R-25.2 (0.74 to 4.44 RSI)	4.5 (72)	0.20 (850)
7	Horizontal Z-Girts with 1-1/2” Flange	18 gauge	430 (62)	-	489 (7830	0.12 (500)
8	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall





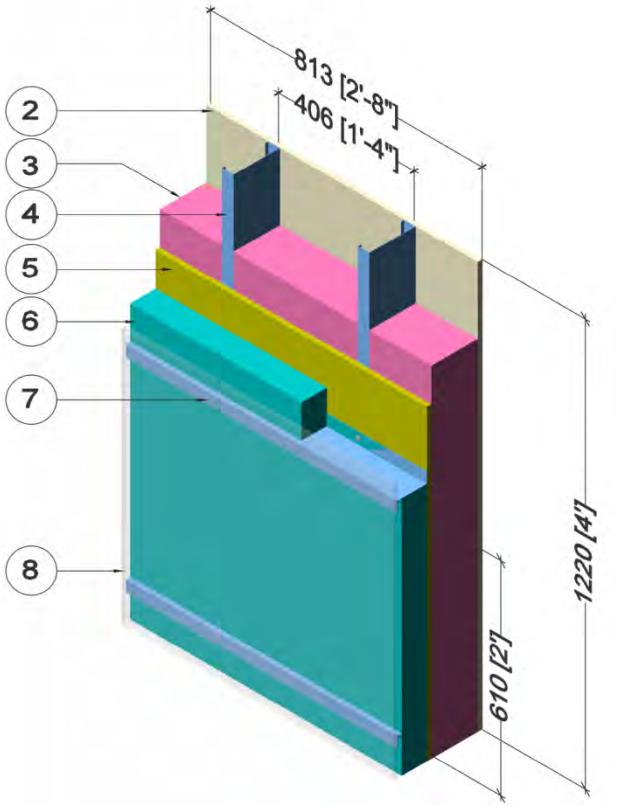
Bracing Detail

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 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	3 5/8” x 1 5/8” Steel Studs	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	Vertical Z-Girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	Varies	-	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
8	Rigid Insulation Bracing	Varies	0.2 (0.029)	-	1.8 (28)	0.29 (1220)
9	Rainscreen Cavity	1/2” (13)	-	R-0.5 (0.09 RSI)	0.075 (1.2)	0.24 (1000)
10	Stucco Cement with Breather Board	1/2” (13)	6 (0.9)	R-0.1 (0.01 RSI)	120 (1922)	0.20 (850)
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

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 – Clear Wall

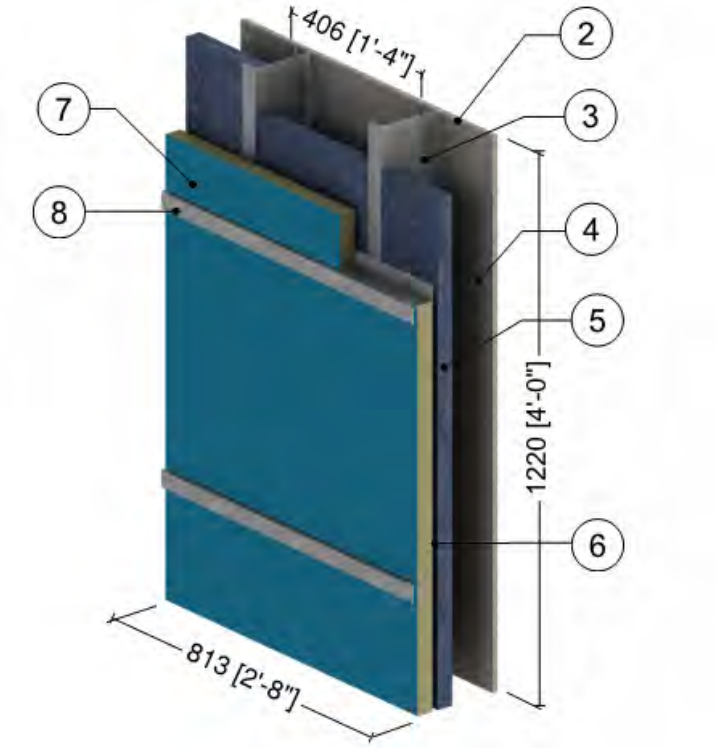


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.31 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-girts w/ 1 1/2" Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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.) – Clear Wall

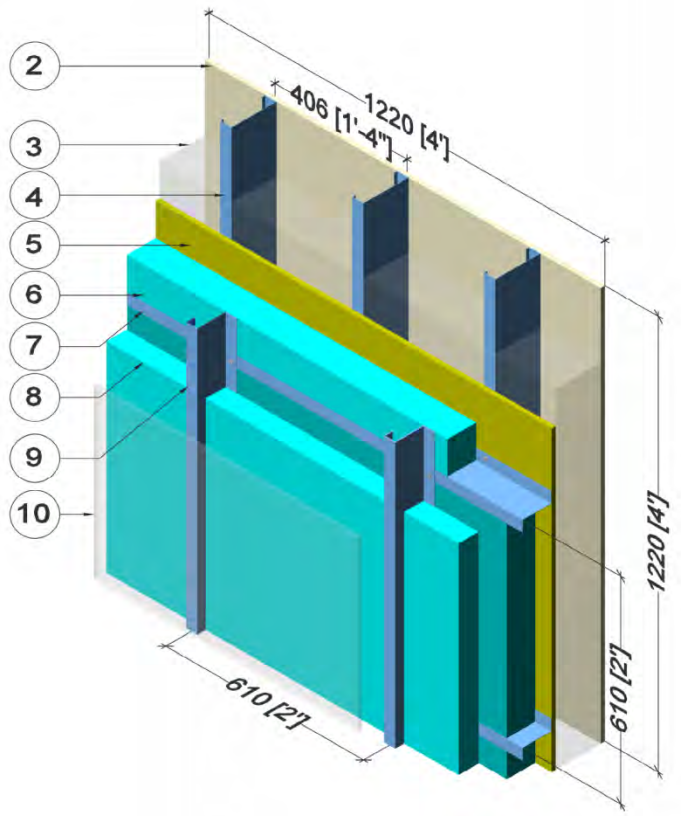


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 1/2” (114)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Spray Foam Insulation	1 1/2” (38)	-	R-9.8 (1.73 RSI)	-	-
6	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
7	Exterior Polyisocyanurate Insulation	1 1/2" (38)	-	R-10.1 (1.78 RSI)	-	-
8	Horizontal Z-Girts (24” o.c.)	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
9	Metal Cladding with vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

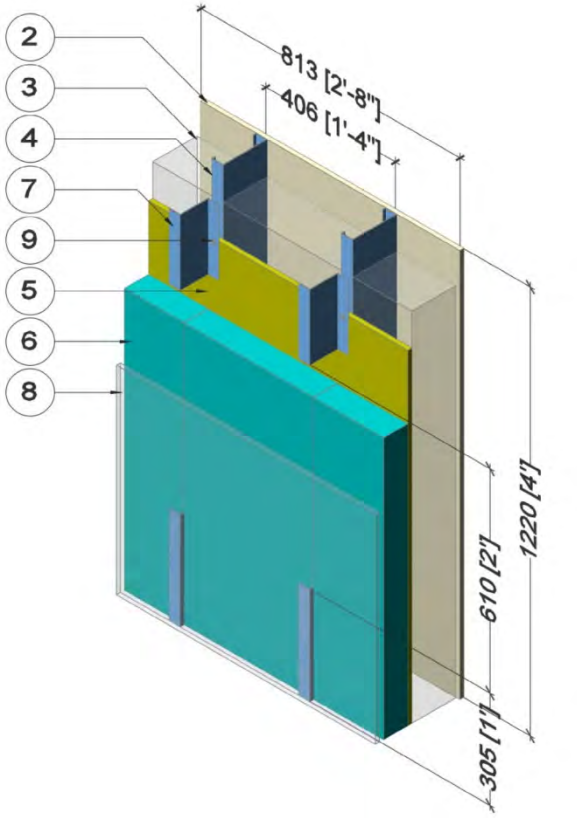


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 1000)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation – Horizontal Z-Girts	Varies	-	R-5 to R-25 (0.88 to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-Girts w/ 1 1/2" flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Exterior Insulation – Vertical Z-girts	1" (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
9	Vertical Z-Girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

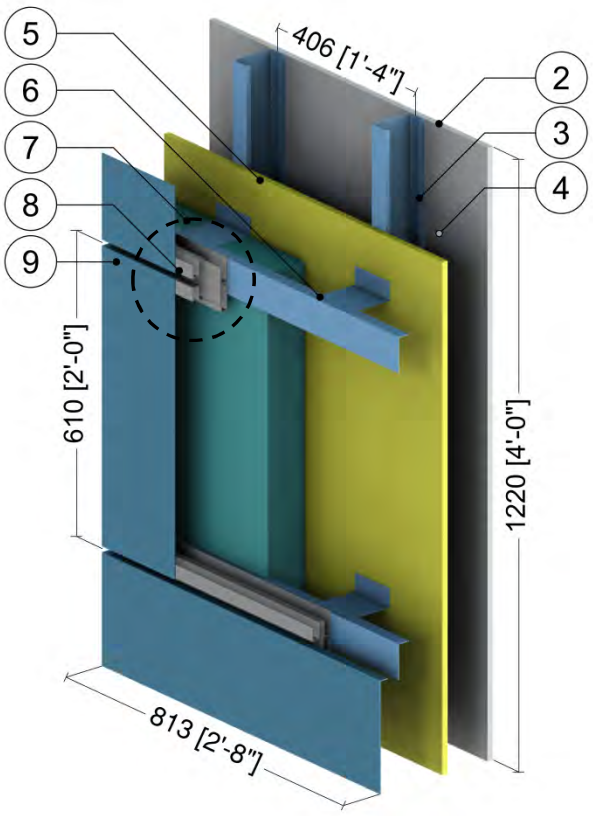


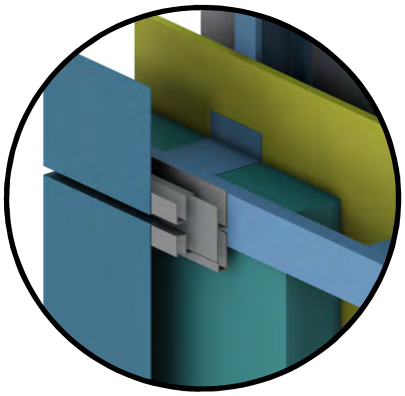
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Intermittent vertical Z-Girts w/ 1 1/2" Flange[2]	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] Vertical spacing of the girts Varies at 12" (304mm), 24" (610mm) & 36" (915mm)

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





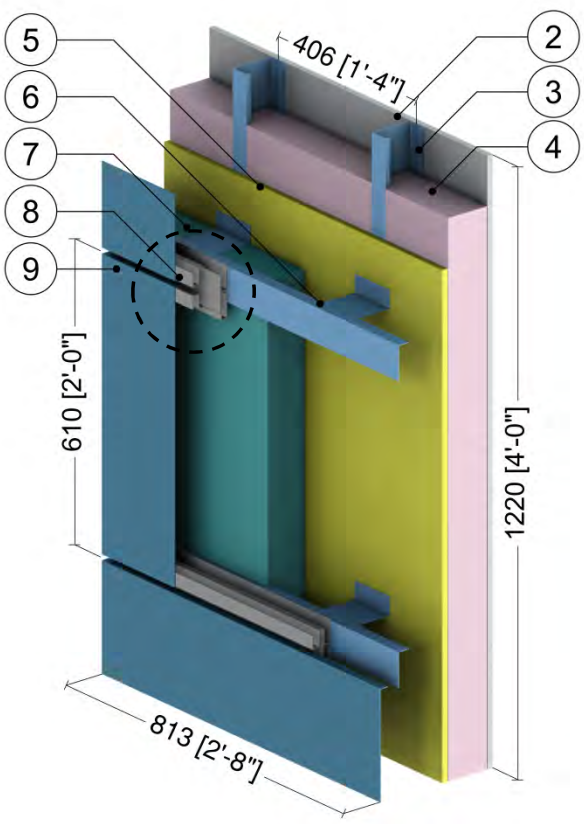
Panel Clip Detail

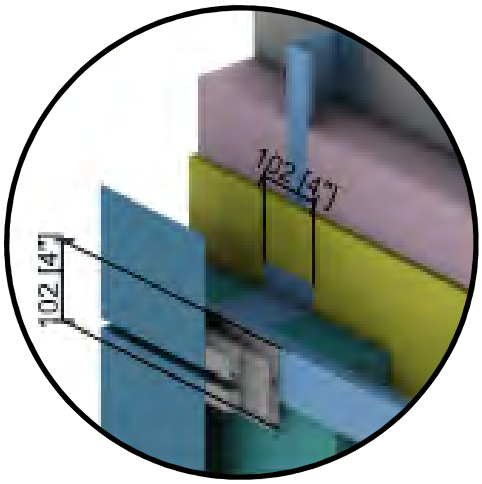
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
6	Horizontal Clips w/ 1 1/2” Horizontal Rail	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	Varies	-	R-15 to R-25 (2.64 to 4.4 RSI)	1.8 (28)	0.29 (1220)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall





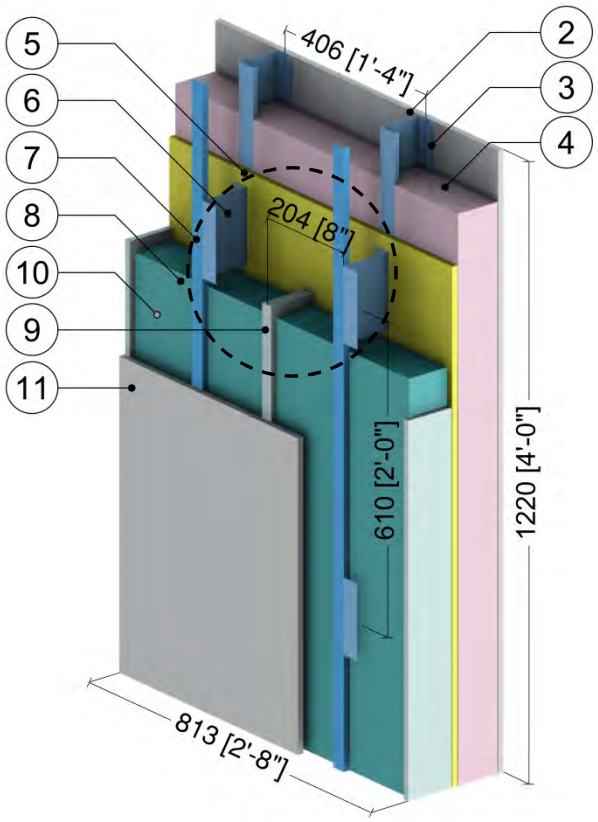
Panel Clip Detail

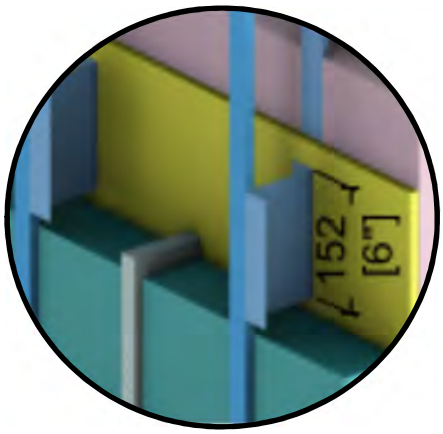
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	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	Horizontal Clips w/ 1 1/2" Horizontal Rail	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	Varies	-	R-10 to R-20 (1.76 to 3.5 RSI)	1.8 (28)	0.29 (1220)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall





Bracing Detail

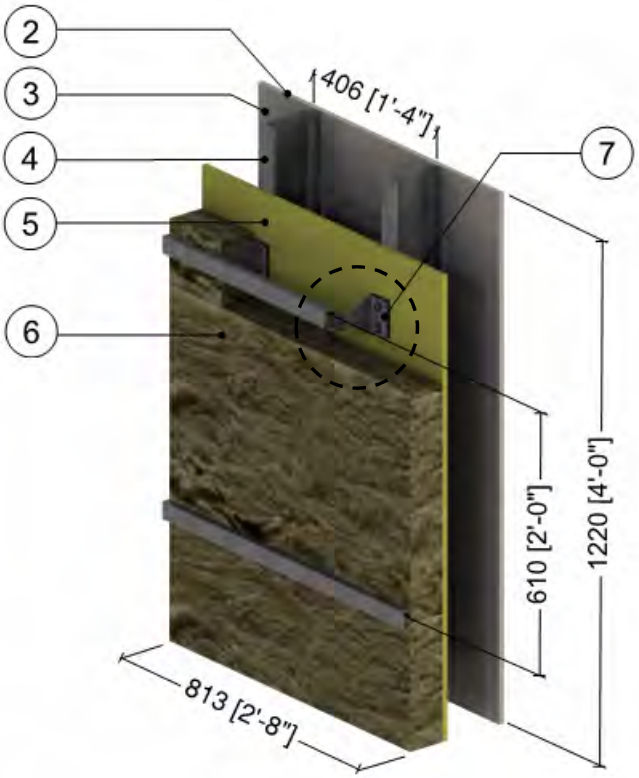
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ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	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	Vertical Z-Clips with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Vertical Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Exterior Insulation	Varies	-	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
9	Rigid Insulation Bracing	Varies	0.2 (0.029)	-	1.8 (28)	0.29 (1220)
10	Rainscreen Cavity	1/2” (13)	-	R-0.5 (0.09 RSI)	0.075 (1.2)	0.24 (1000)
11	Stucco Cement with Breather Board	1/2” (13)	6 (0.9)	R-0.1 (0.01 RSI)	120 (1922)	0.20 (850)
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

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





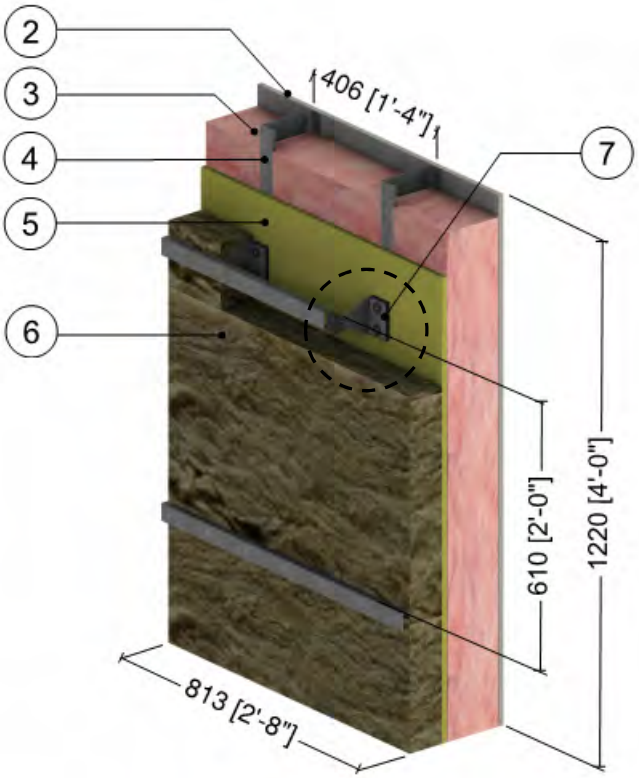
ThermaBracket Detail

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	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	0.24 (0.034)	R-8.4 to R-25.2 (1.48 to 4.44 RSI)	1.8 (28)	0.29 (1220)
7	ThermaBrackets (24” o.c. vertically)	18 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall





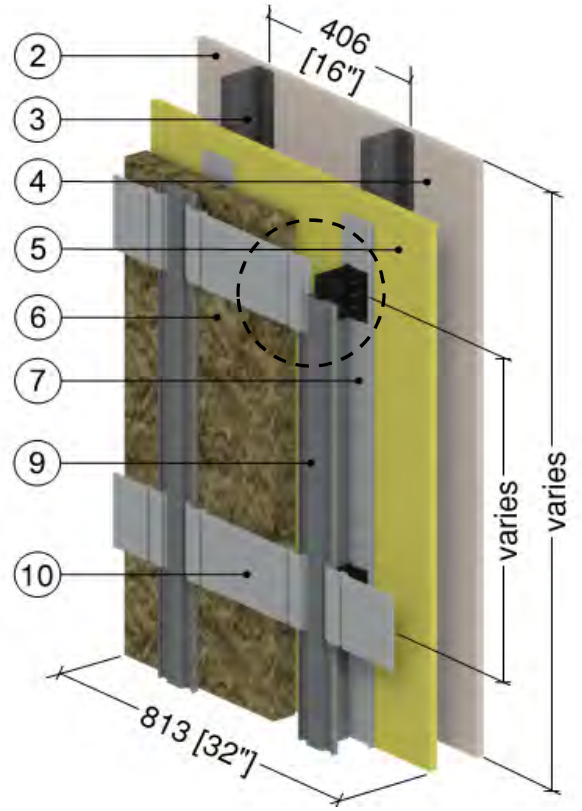
ThermaBracket Detail

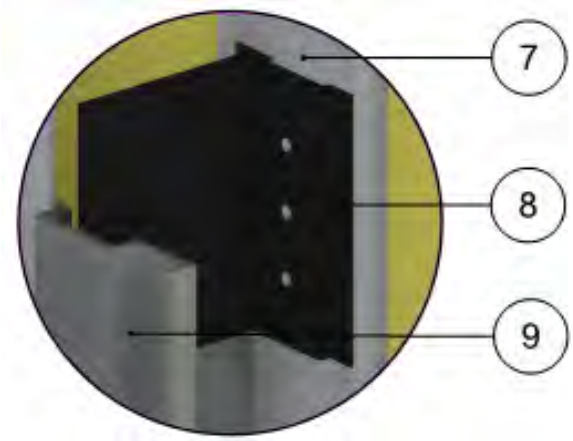
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6” (152)	-	R-19 (3.35 RSI)	0.9 (14)	0.17 (710)
4	6” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	0.24 (0.034)	R-8.4 to R-25.2 (1.48 to 4.44 RSI)	1.8 (28)	0.29 (1220)
7	ThermaBrackets (24” o.c. vertically)	18 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





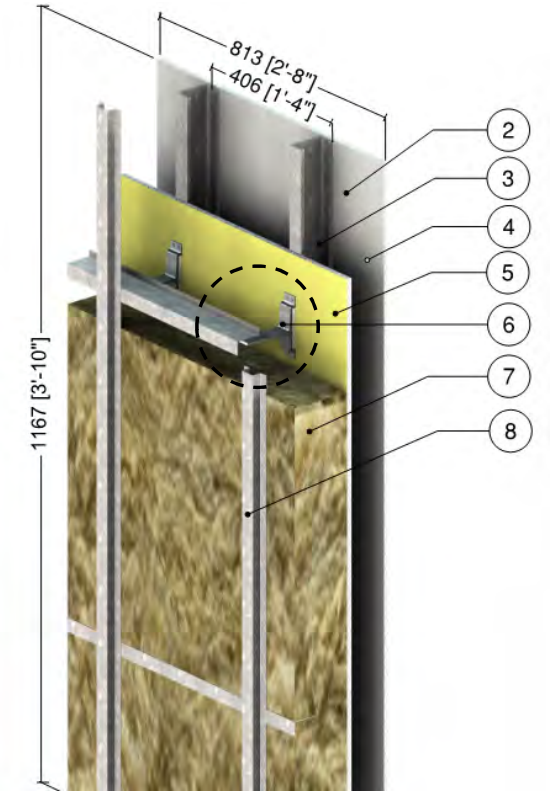
Clip Detail

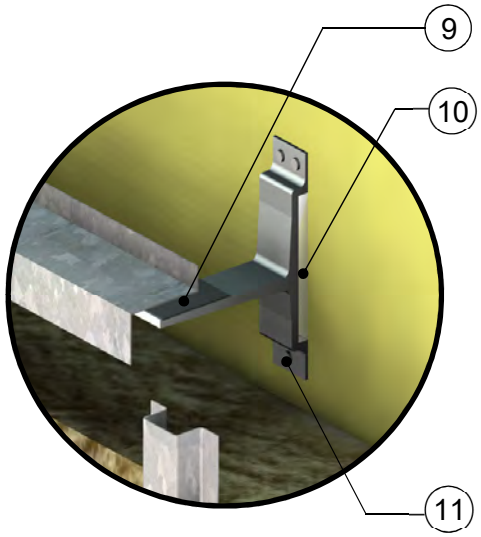
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	2” to 4” (51 to 102)	0.24 (0.034)	R-8.4 to R-16.8 (1.48 RSI to 2.96 RSI)	4 (64)	0.20 (850)
7	Aluminum Base Track, 16” o.c. horizontally	1/8” (3.3)	1422 (205)	-	171 (2739)	0.21 (900)
8	Therme Polyamide Clip	-	1.73 (0.25)	-	-	-
9	Aluminum T-Track, 16” o.c. horizontally	1/8” (3.3)	1422 (205)	-	171 (2739)	0.21 (900)
10	Aluminum Wall Mount Supports	1/8” (3.3)	1422 (205)	-	171 (2739)	0.21 (900)
11	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.24

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





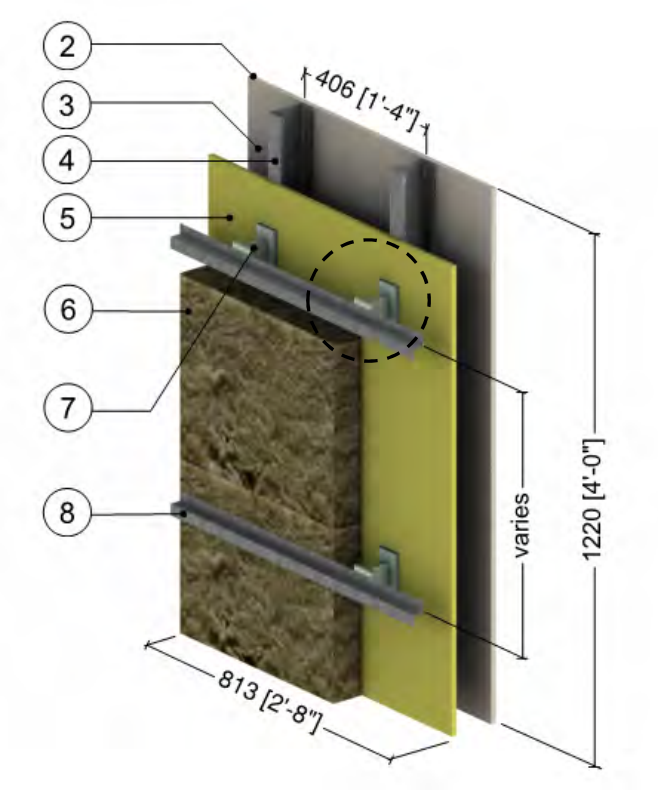
Clip Detail

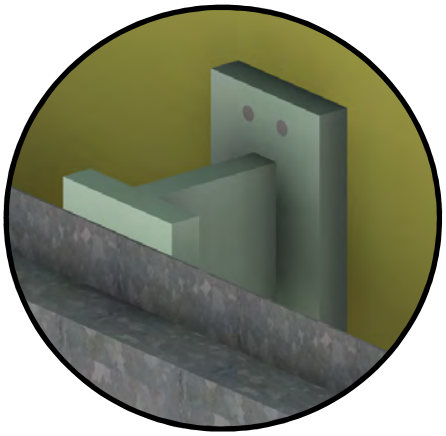
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Engineered Assemblies Aluminum Panel Clip (models T100 T125 150)	1/5" to 3/8'' (5 to 10)	1110 (160)	-	-	-
7	Exterior Insulation	Varies	0.24 (0.034)	R-16.8 to R-25.2 (2.96 to 4.44 RSI)	1.8 (28)	0.29 (1220)
8	Vertical/Horizontal Steel Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Cork/Neoprene pad	1/16" (1.5)	0.329 (0.058)	R-0.15 (0.03 RSI)	-	-
10	Aerogel	3/8" (10)	0.086 (0.015)	R-3.9 (0.68 RSI)		
11	Steel Fasteners	5/16" (8) Ø	347 (50)	-	489 (7830)	0.12 (500)
12	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
13	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.25

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





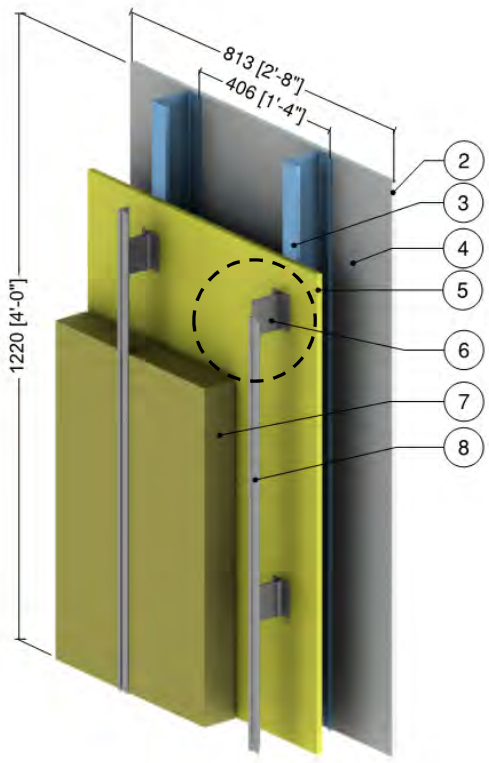
Fiber Reinforced Clip Detail

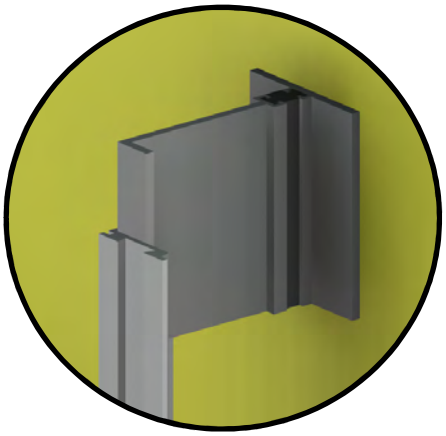
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	0.24 (0.034)	R-12.6 to R-25.2 (2.22 to 4.40 RSI)	489 (7830)	0.12 (500)
7	Fiber Reinforced Plastic (FRP) Girts	-	2.4 (0.35)	-	-	-
8	Horizontal Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





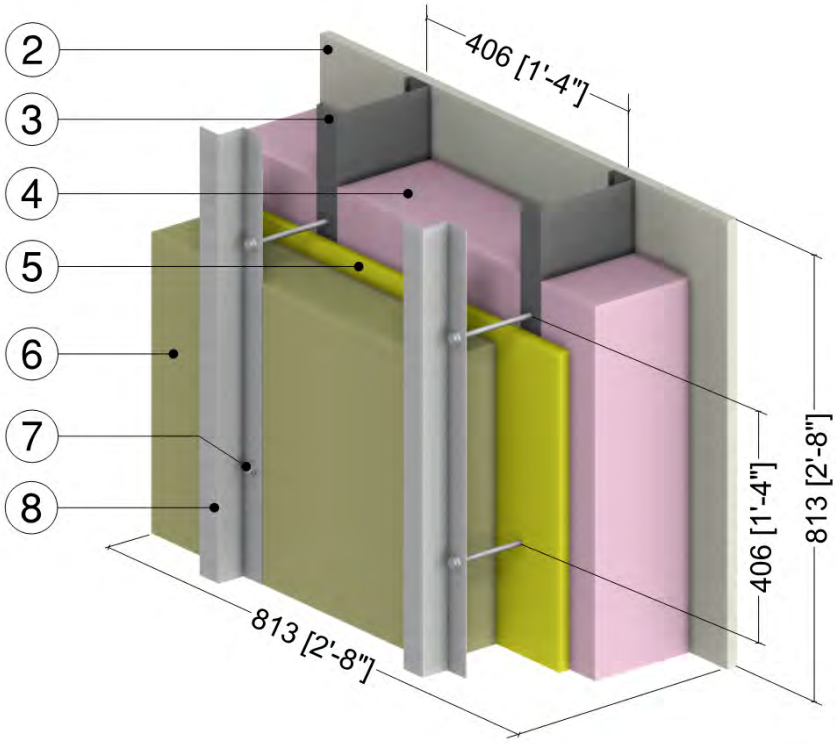
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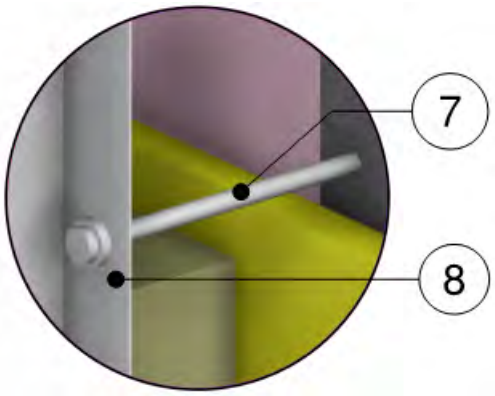
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Longboard Aluminum Panel Clip	1/5" to 3/8'' (5 to 10)	1110 (160)	-	-	-
7	Exterior Insulation	Varies	-	R-12.6 to R-25.2 (2.22 to 4.44 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Steel Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





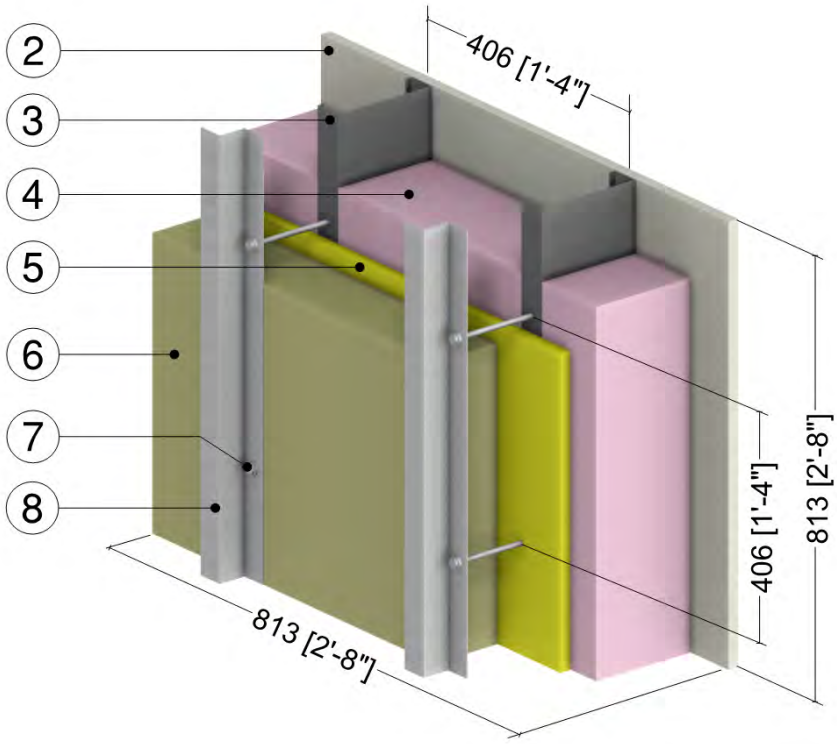
Fastener Detail

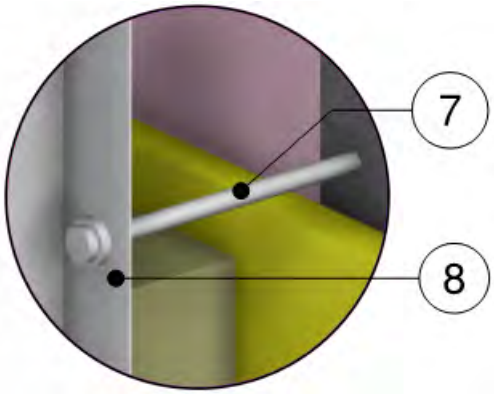
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.28 (0.041)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Max Mineral Wool Semi Rigid Insulation	Varies	0.25 (0.036)	R-4.0 to R-16.0 (0.70 to 2.82 RSI)	11 (176)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 Exterior Insulation and R-20 Batt Insulation in Stud Cavity – Clear Wall





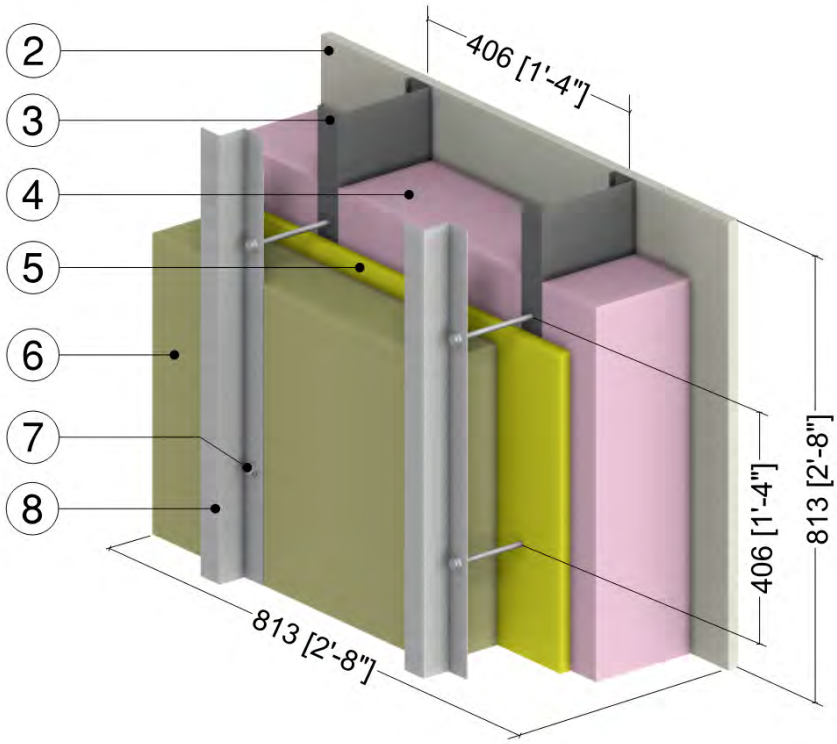
Fastener Detail

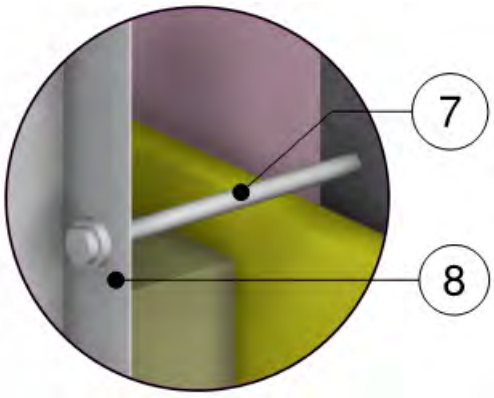
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.28 (0.041)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Plus 110 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.035)	R-4.1 to R-16.4 (0.72 to 2.89 RSI)	8 (128)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.29

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





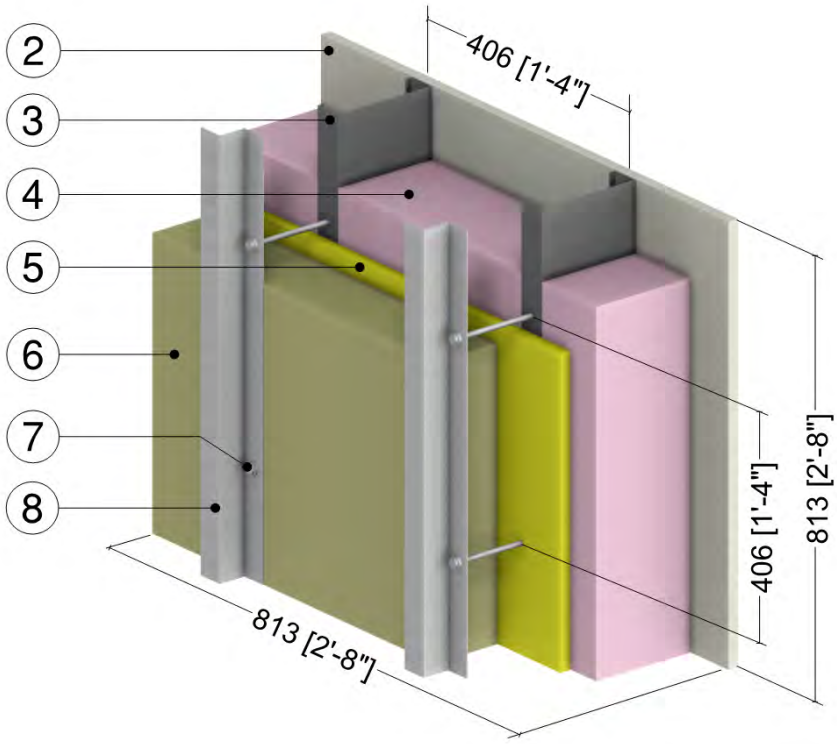
Fastener Detail

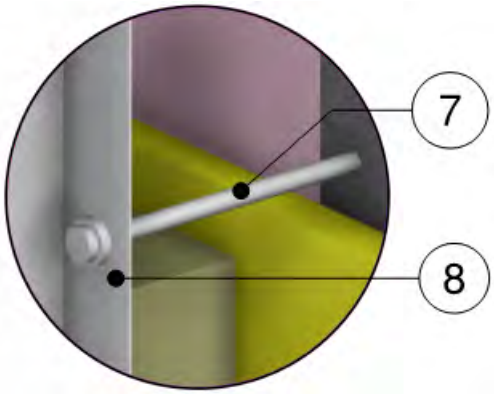
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.28 (0.041)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4.5 (72)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





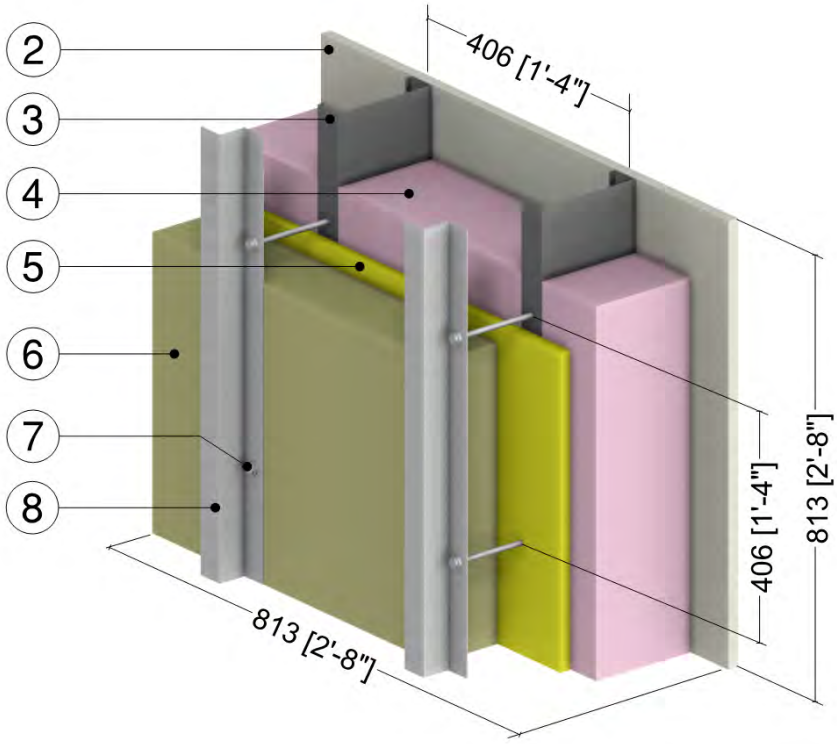
Fastener Detail

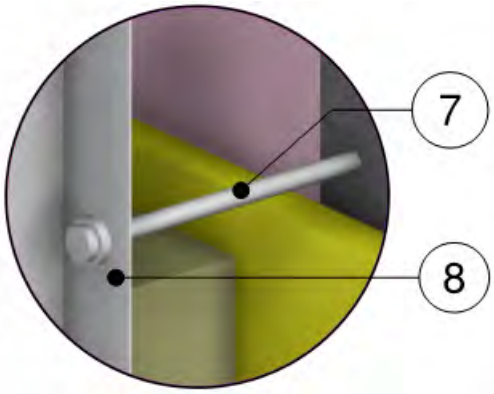
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.27 (0.039)	R-22 (3.87 RSI)	0.91 (14.5)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Max Mineral Wool Semi Rigid Insulation	Varies	0.25 (0.036)	R-4.0 to R-16.0 (0.70 to 2.82 RSI)	11 (176)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





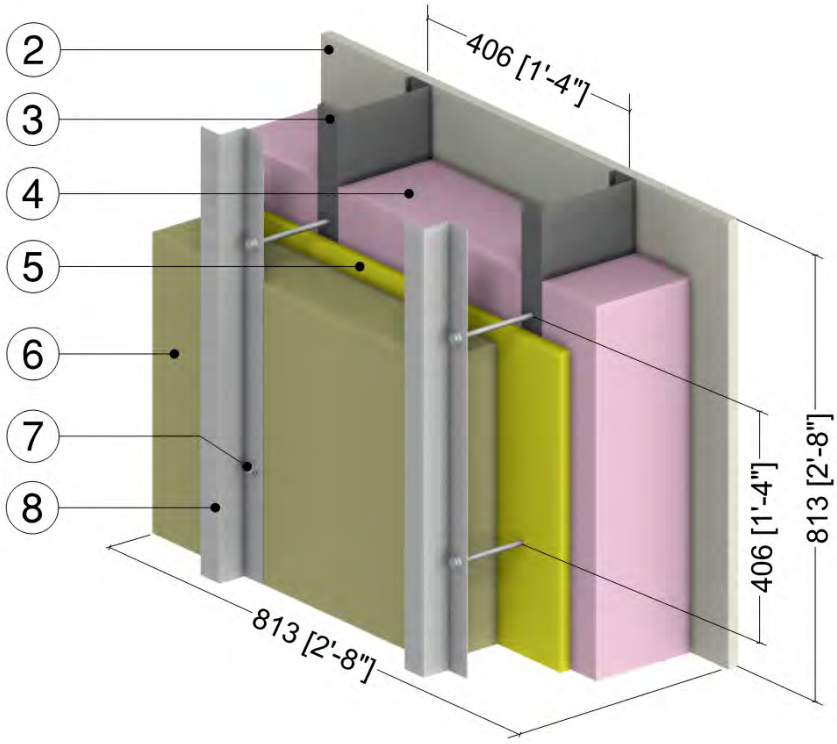
Fastener Detail

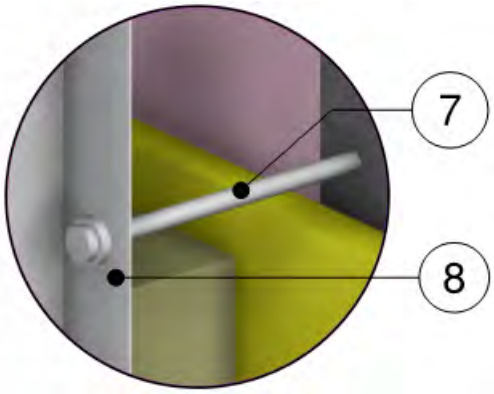
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.27 (0.039)	R-22 (3.87 RSI)	0.91 (14.5)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Plus 110 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.035)	R-4.1 to R-16.4 (0.72 to 2.89 RSI)	8 (128)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





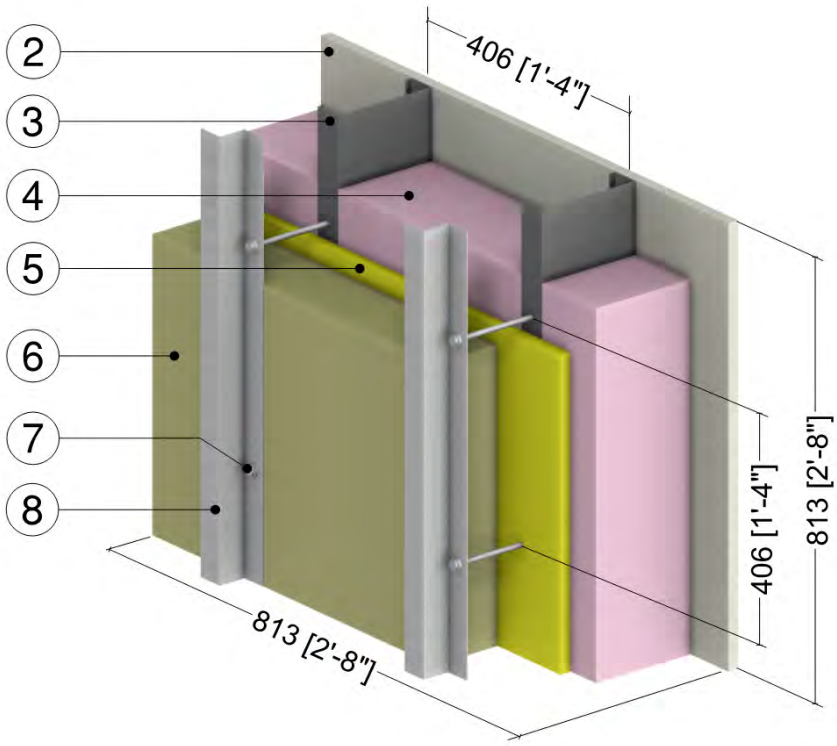
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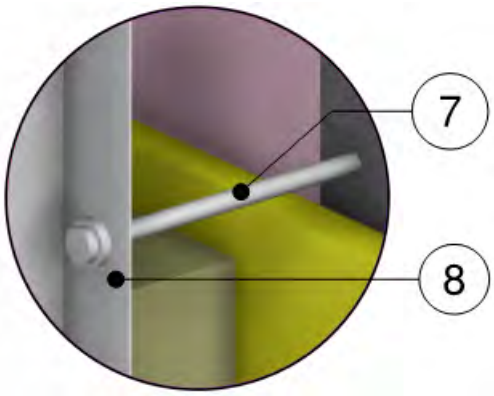
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.27 (0.039)	R-22 (3.87 RSI)	0.91 (14.5)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4.5 (72)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





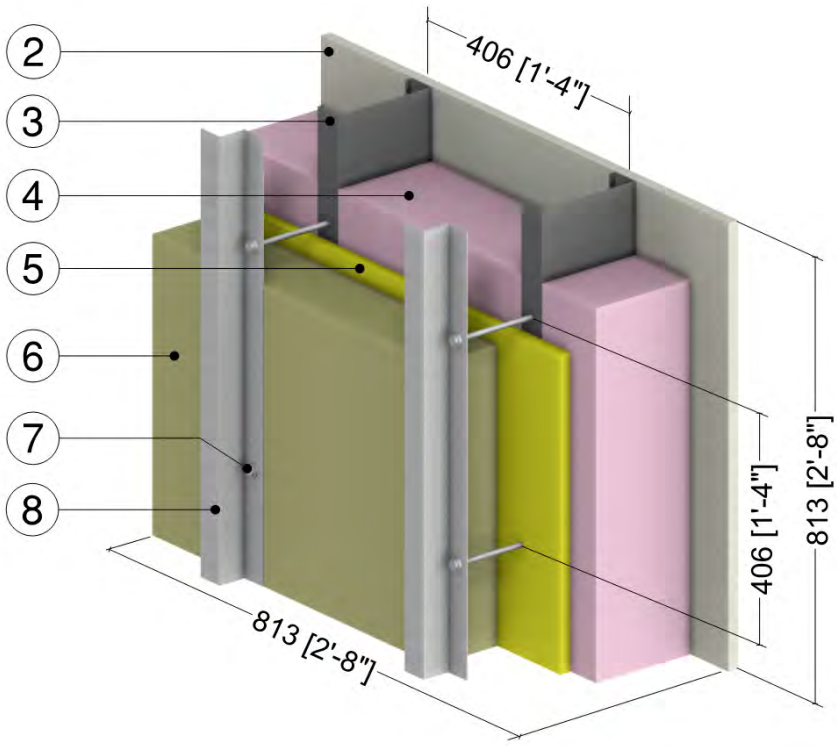
Fastener Detail

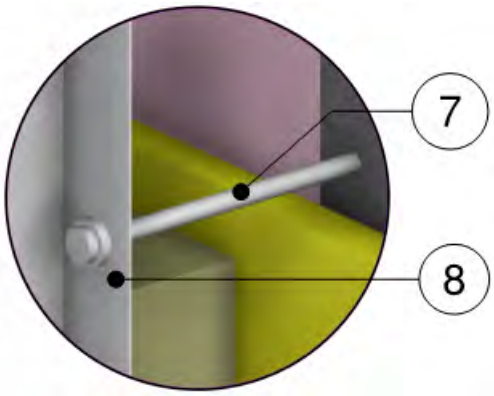
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.25 (0.036)	R-24 (4.23 RSI)	1.42 (22.7)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Max Mineral Wool Semi Rigid Insulation	Varies	0.25 (0.036)	R-4.0 to R-16.0 (0.70 to 2.82 RSI)	11 (176)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





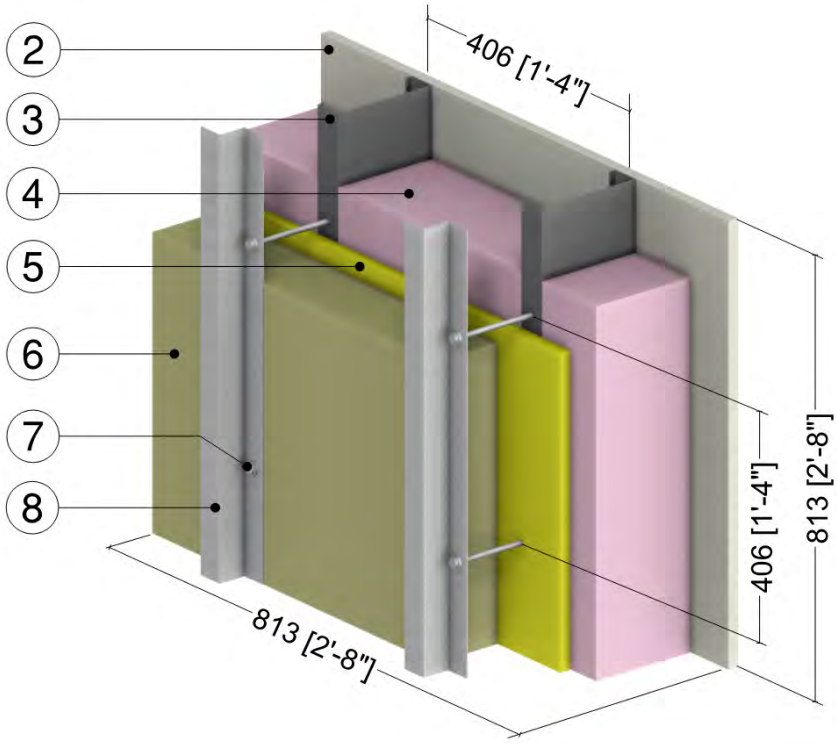
Fastener Detail

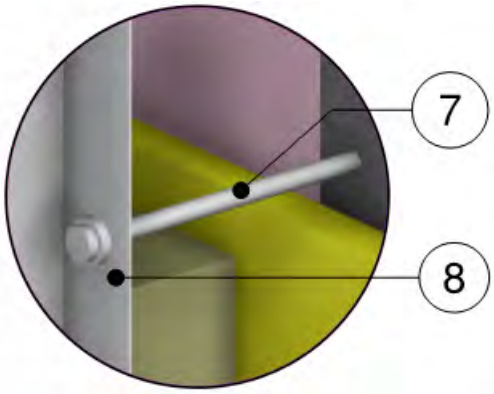
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.25 (0.036)	R-24 (4.23 RSI)	1.42 (22.7)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Plus 110 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.035)	R-4.1 to R-16.4 (0.72 to 2.89 RSI)	8 (128)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





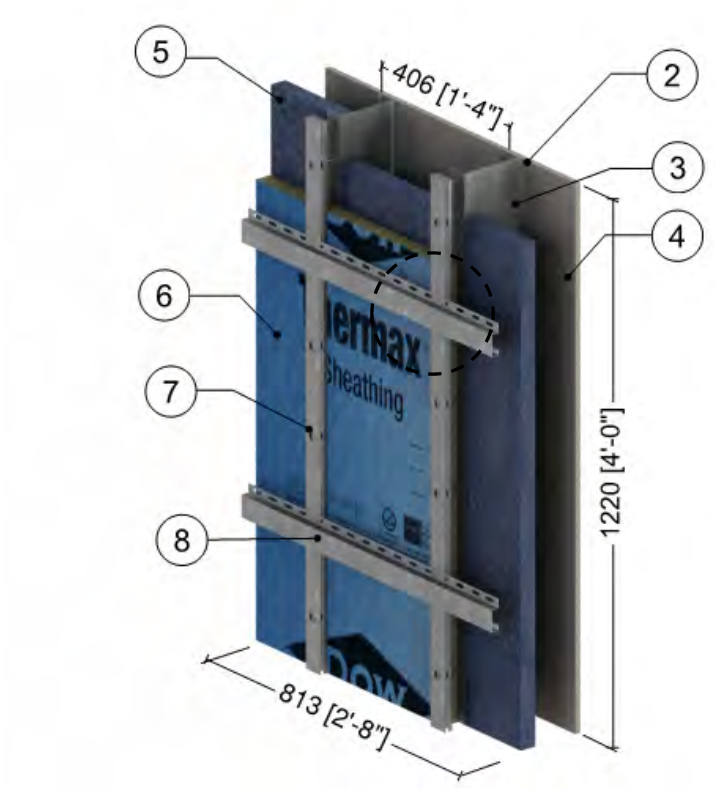
Fastener Detail

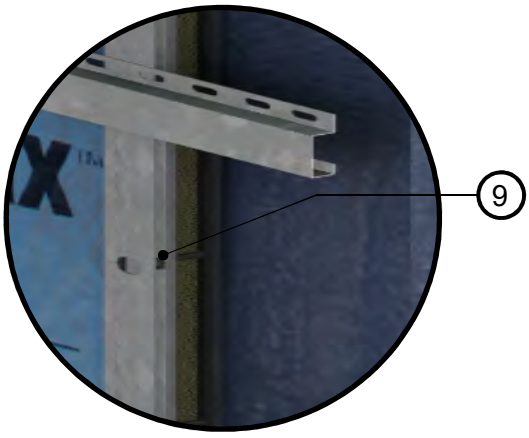
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.25 (0.036)	R-24 (4.23 RSI)	1.42 (22.7)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4.5 (72)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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.) – Clear Wall





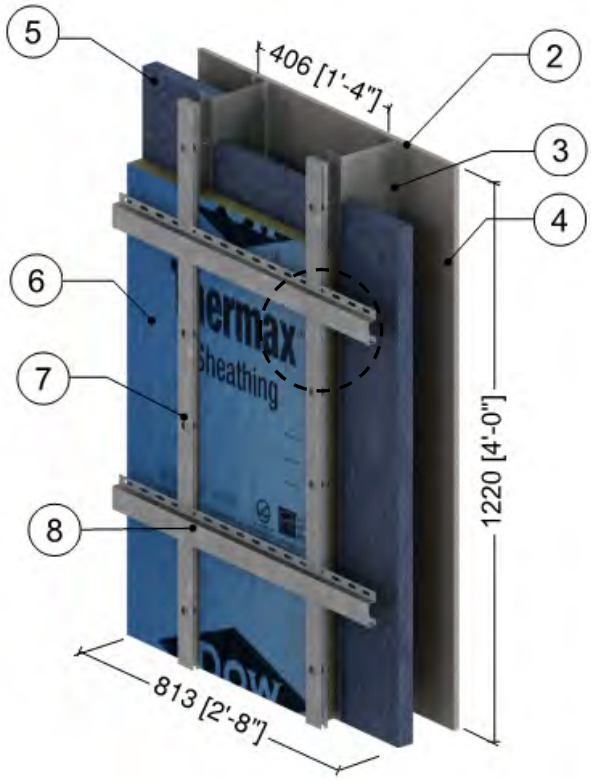
Isolator Detail

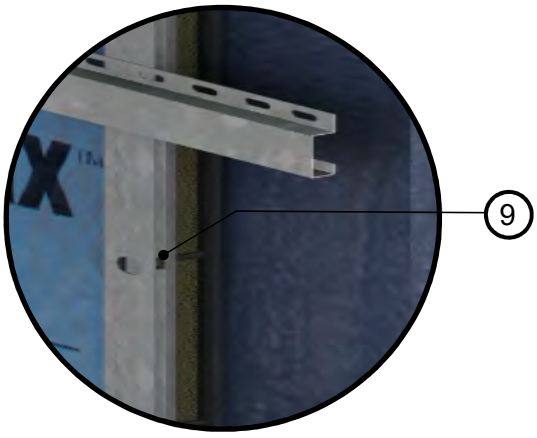
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 1/2” (114)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Spray Foam Insulation	1 1/2” (38)	-	R-9.8 (1.73 RSI)	-	-
6	Exterior Polyisocyanurate Insulation	Varies	-	R-10.1 to R-19.0 (1.78 to 3.35 RSI)	-	-
7	#12 Stainless Steel Fasteners (8” o.c.)	0.21” (5.3) Ø	12 (20)	-	489 (7830)	0.12 (500)
8	Steel Vertical and Horizontal Rails	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
9	Isolator	3/16” (4)	0.12 (0.21)	-	-	-
10	Metal Cladding with vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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.) – Clear Wall





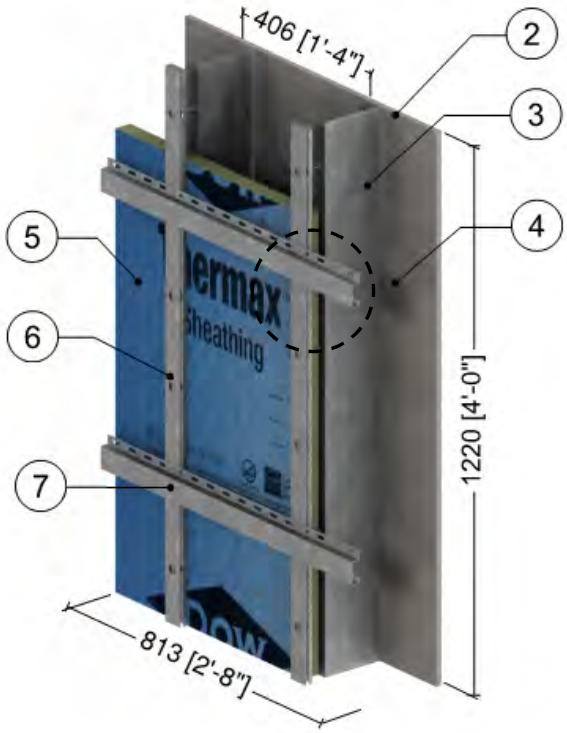
Isolator Detail

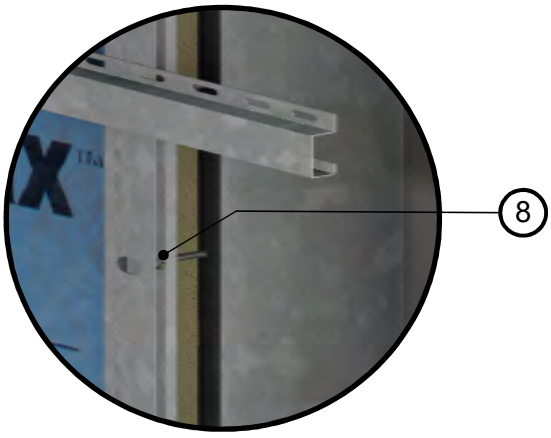
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 1/2” (114)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Spray Foam Insulation	1 1/2” (38)	-	R-9.8 (1.73 RSI)	-	-
6	Exterior Polyisocyanurate Insulation	Varies	-	R-10.1 to R-19.0 (1.78 to 3.35 RSI)	-	-
7	#12 Stainless Steel Fasteners (16” o.c.)	0.21” (5.3) Ø	12 (20)	-	489 (7830)	0.12 (500)
8	Steel Vertical and Horizontal Rails	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
9	Isolator	3/16” (4)	0.12 (0.21)	-	-	-
10	Metal Cladding with vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





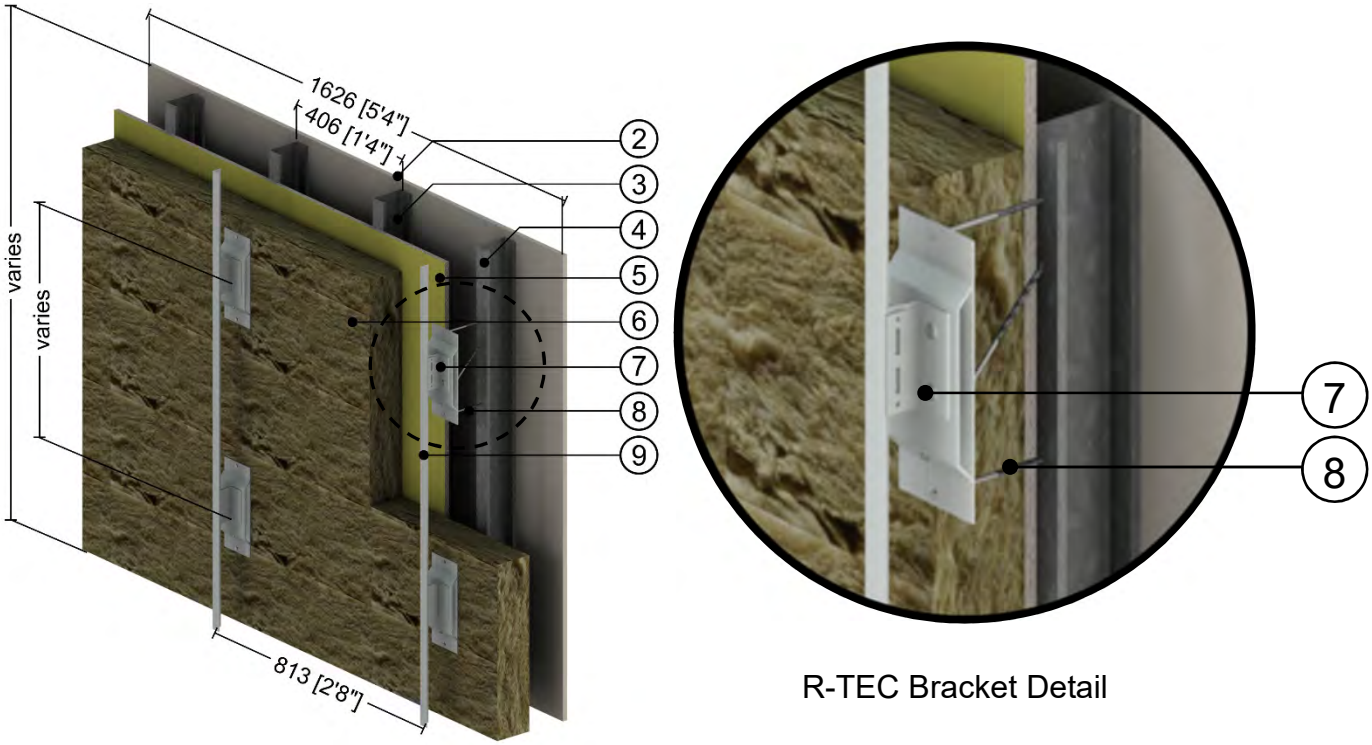
Isolator Detail

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	6” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 1/2” (114)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Polyisocyanurate Insulation	Varies	-	R-10.1 to R-19.0 (1.78 to 3.35 RSI)	-	-
6	#12 Stainless Steel Fasteners (8” o.c.)	0.21” (5.3) Ø	12 (20)	-	489 (7830)	0.12 (500)
7	Steel Vertical and Horizontal Rails	18 Gauge	250 (36)	-	489 (7830)	0.12 (500)
8	Isolator	3/16” (4)	0.12 (0.21)	-	-	-
9	Metal Cladding with vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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



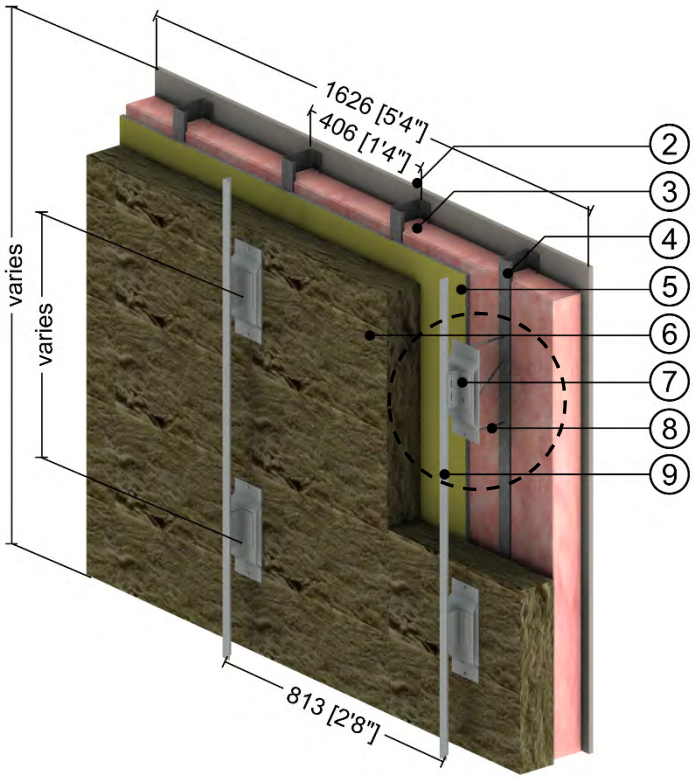
R-TEC Bracket Detail

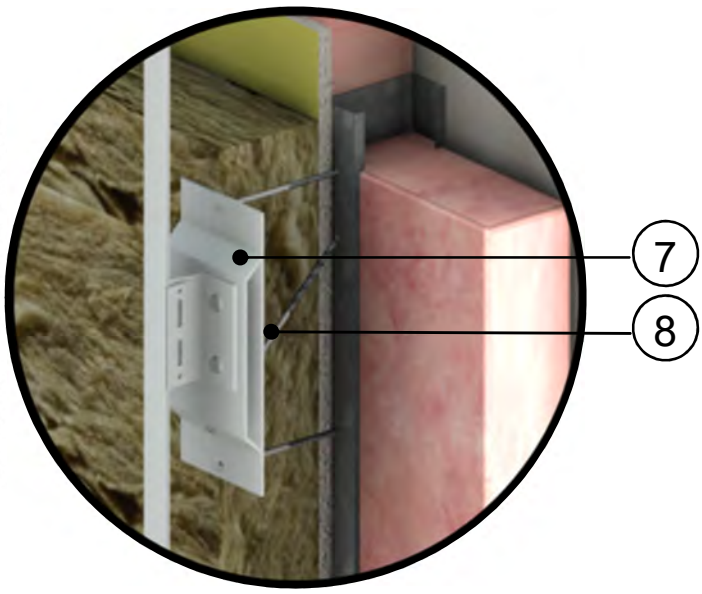
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	3” to 6” (76 to 152)	0.24 (0.034)	R-12.6 to R-25.2 (2.22 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	R-TEC CI Bracket Aluminum 6063	-	1390 (200)	-	168 (2700)	0.22 (900)
8	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.13 (530)
9	Vertical Sub-girt	0.09” (2.2)	1390 (200)	-	168 (2700)	0.22 (900)
10	Generic Cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.40

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





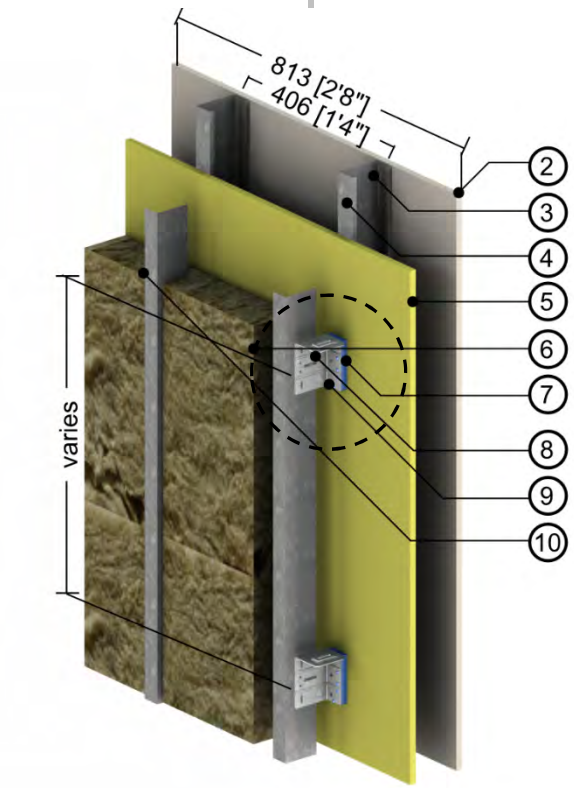
R-TEC Bracket Detail

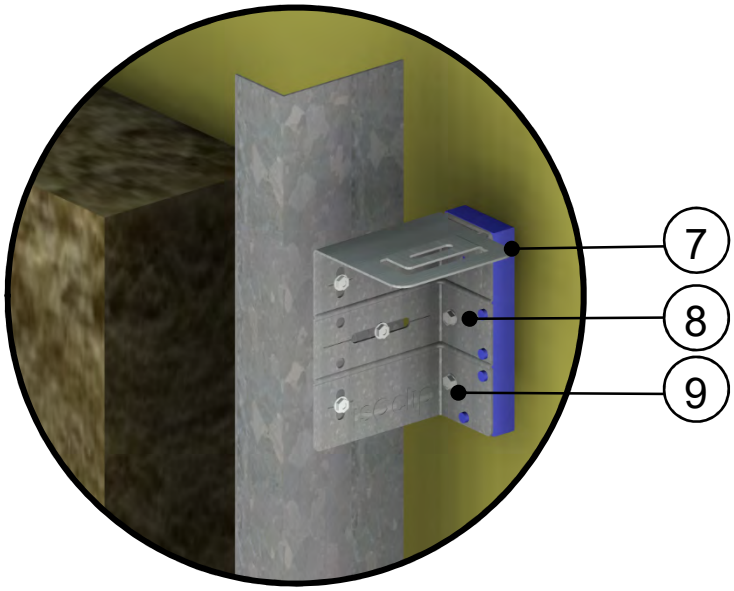
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8” (92)	0.28 (0.040)	R-13 (2.29 RSI)	0.9 (14)	0.17 (710)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	3” to 6” (76 to 152)	0.24 (0.034)	R-12.6 to R-25.2 (2.22 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	R-TEC CI Bracket Aluminum 6063	-	1390 (200)	-	168 (2700)	0.22 (900)
8	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.13 (530)
9	Vertical Sub-girt	0.09” (2.2)	1390 (200)	-	168 (2700)	0.22 (900)
10	Generic Cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





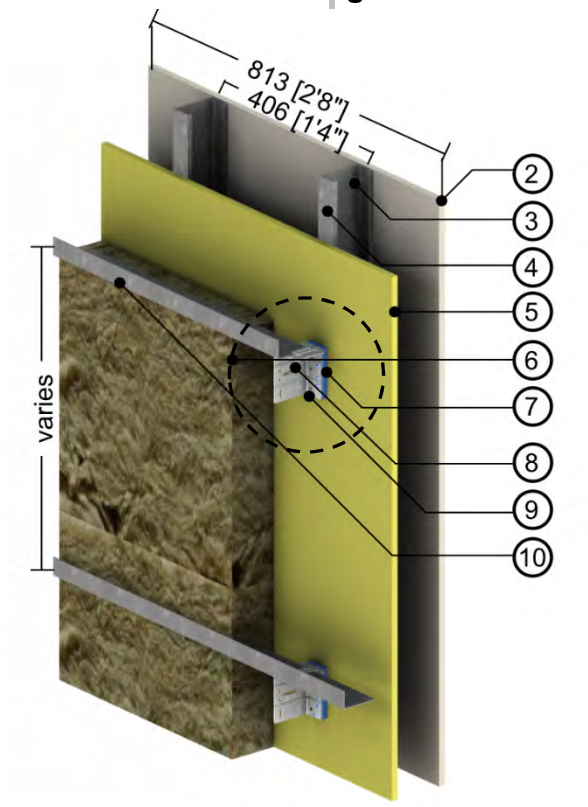
ISO Clip Detail

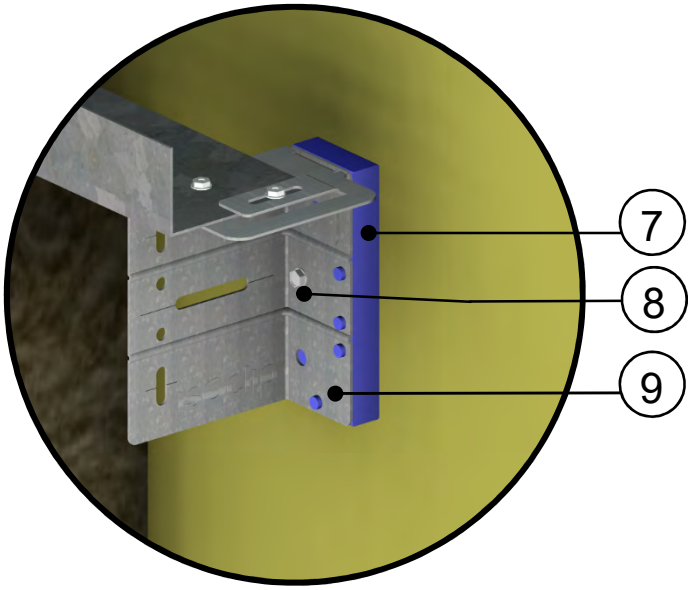
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	4” to 6” (102 to 152)	0.24 (0.034)	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	ISO Clip - HDPE Isolator	1/2" (12.7)	3.1 (0.45)	-	-	-
8	ISO Clip - Galvanized Metal	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	#14 Steel Fasteners	1/4" (6) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	Vertical Sub-girt	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Generic Cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





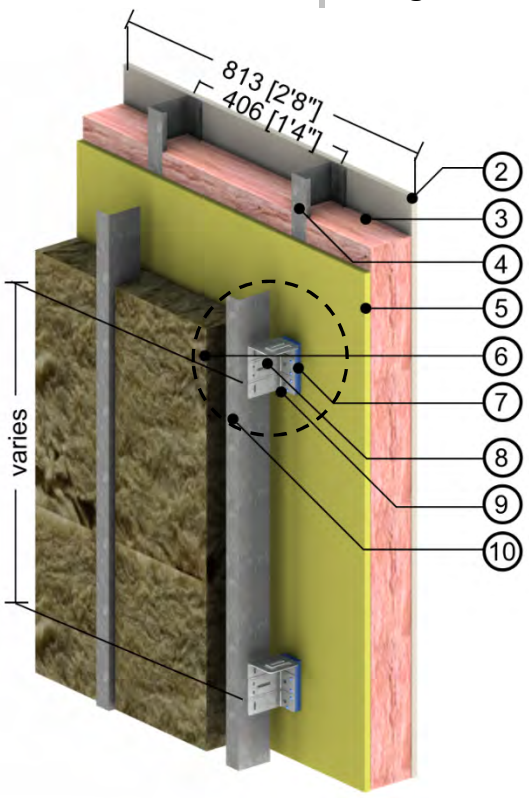
ISO Clip Detail

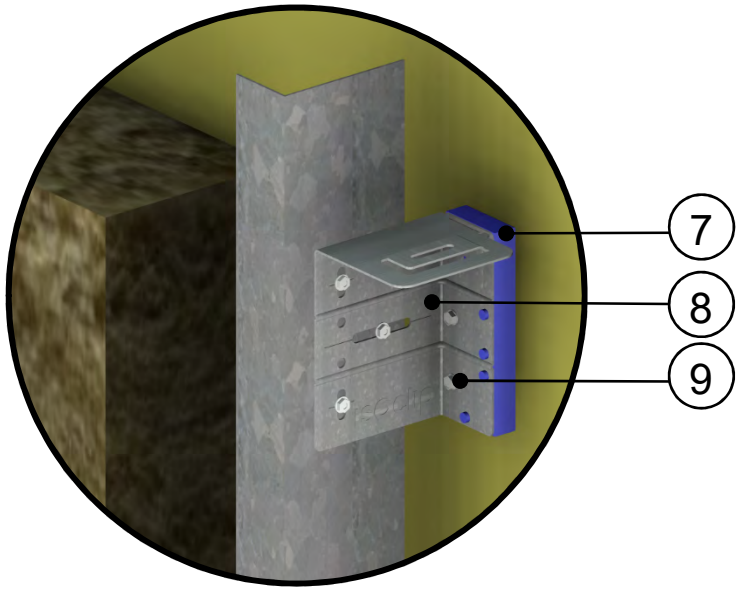
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	4” to 6” (102 to 152)	0.24 (0.034)	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	ISO Clip - HDPE Isolator	1/2" (12.7)	3.1 (0.45)	-	-	-
8	#14 Steel Fasteners	1/4" (6) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	ISO Clip - Galvanized Metal	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Horizontal Sub-girt	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Generic Cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.43

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





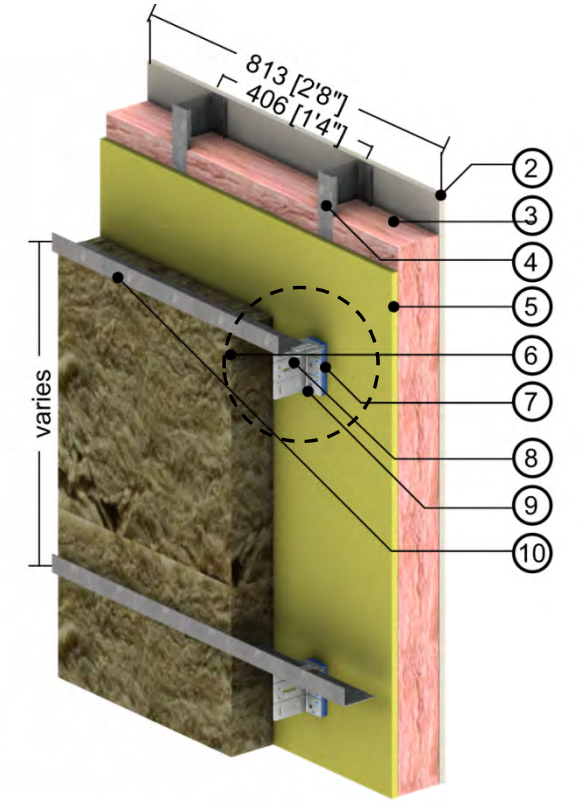
ISO Clip Detail

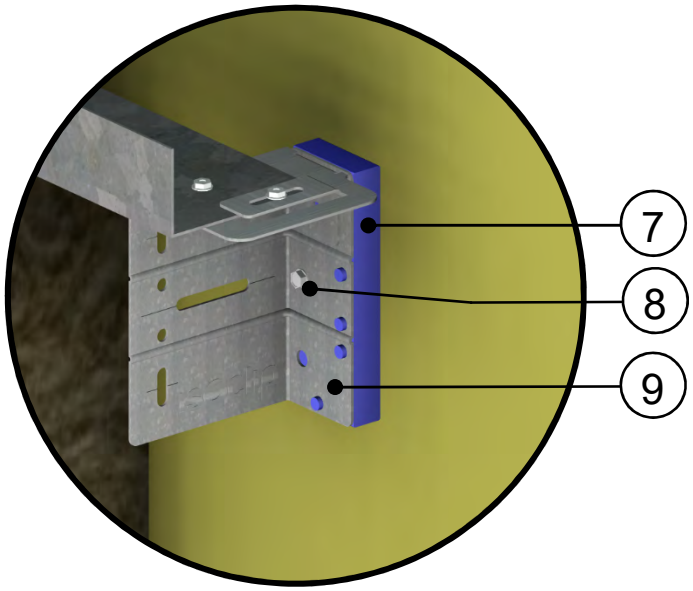
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8” (92)	0.31 (0.044)	R-12 (2.2 RSI)	0.9 (14)	0.17 (710)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	4” to 6” (102 to 152)	0.24 (0.034)	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	ISO Clip - HDPE Isolator	1/2" (12.7)	3.1 (0.45)	-	-	-
8	ISO Clip - Galvanized Metal	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	#14 Steel Fasteners	1/4" (6) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	Vertical Sub-girt	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Generic Cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.44

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





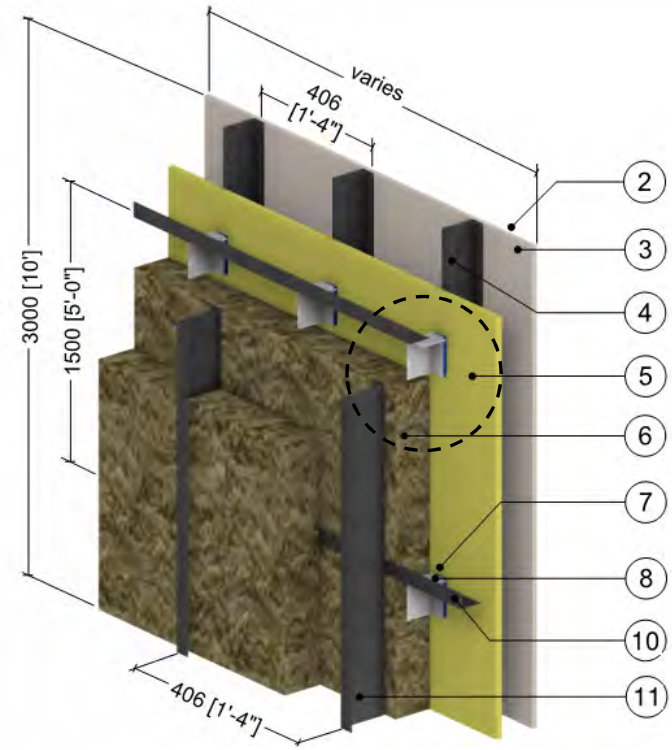
ISO Clip Detail

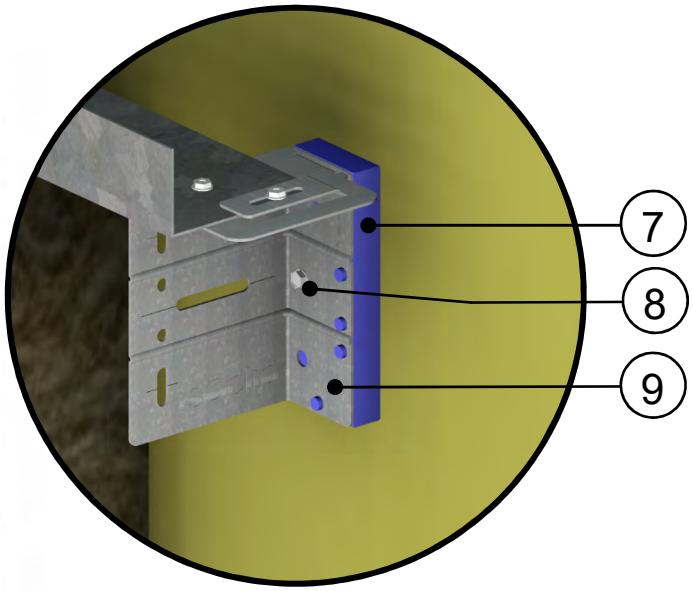
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8” (92)	0.31 (0.044)	R-12 (2.2 RSI)	0.9 (14)	0.17 (710)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	4” to 6” (102 to 152)	0.24 (0.034)	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	ISO Clip - HDPE Isolator	1/2" (12.7)	3.1 (0.45)	-	-	-
8	#14 Steel Fasteners	1/4" (6) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	ISO Clip - Galvanized Metal	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Horizontal Sub-girt	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Generic Cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





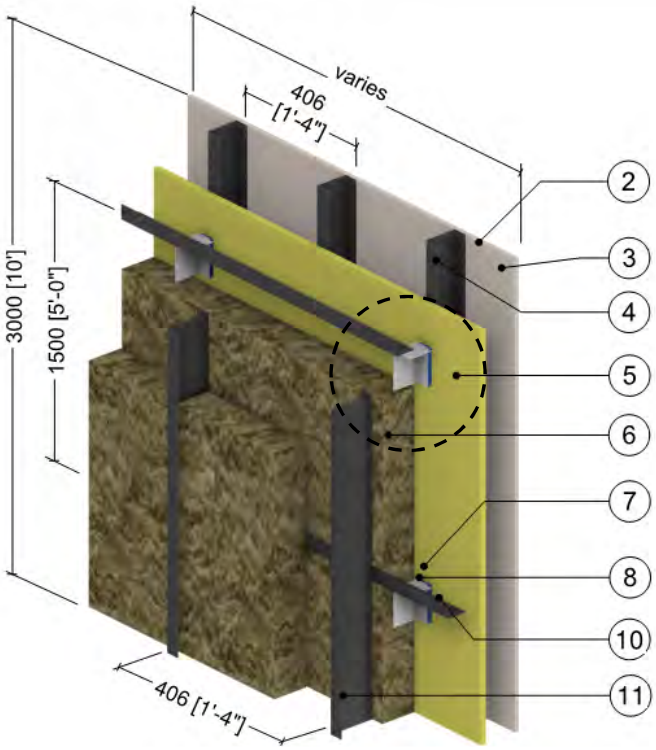
ISO Clip Detail

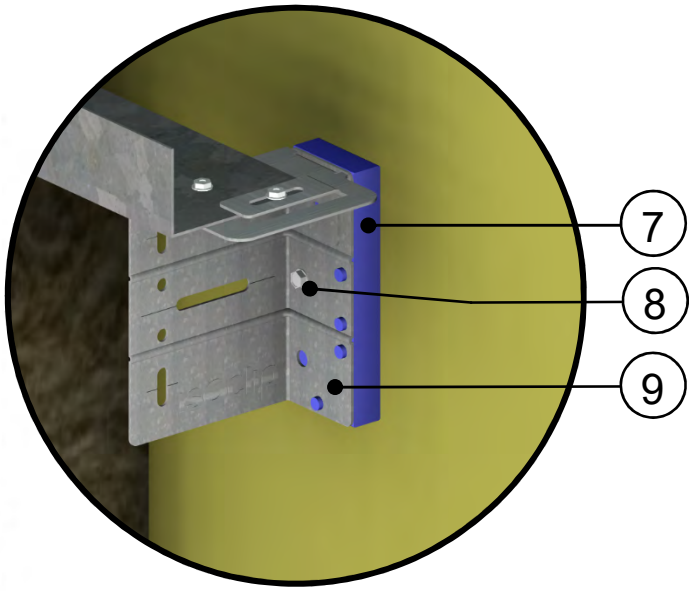
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	4” to 6” (102 to 152)	0.24 (0.034)	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	ISO Clip - HDPE Isolator	1/2" (12.7)	3.1 (0.45)	-	-	-
8	Fasteners	1/4" (6) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	ISO Clip - Galvanized Metal	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Horizontal Sub-girt	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Vertical Sub-girt	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Generic Cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





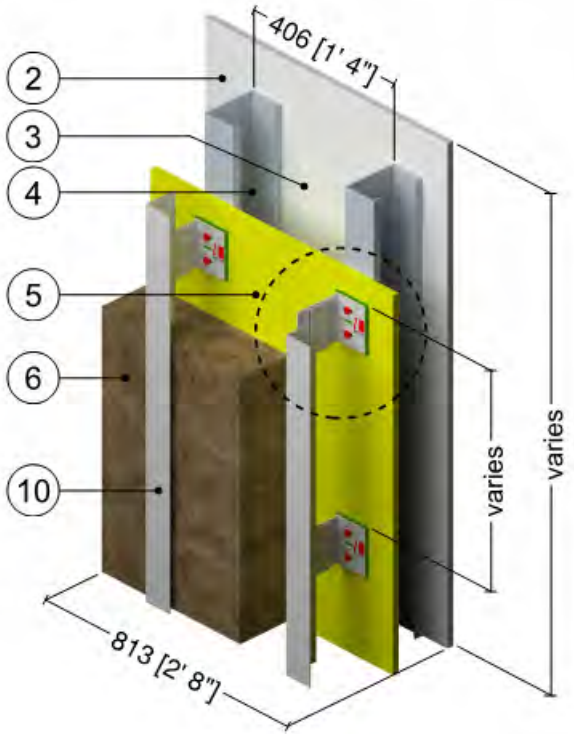
ISO Clip Detail

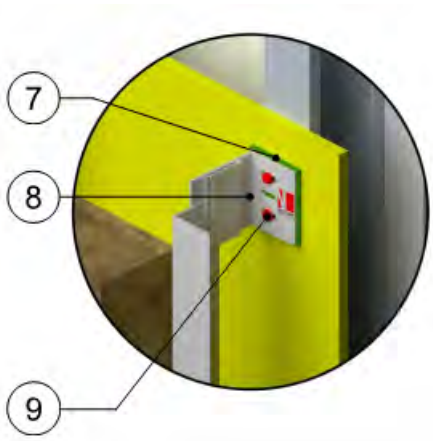
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	4” to 6” (102 to 152)	0.24 (0.034)	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	ISO Clip - HDPE Isolator	1/2" (12.7)	3.1 (0.45)	-	-	-
8	Fasteners	1/4" (6) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	ISO Clip - Galvanized Metal	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Horizontal Sub-girt	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Vertical Sub-girt	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Generic Cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





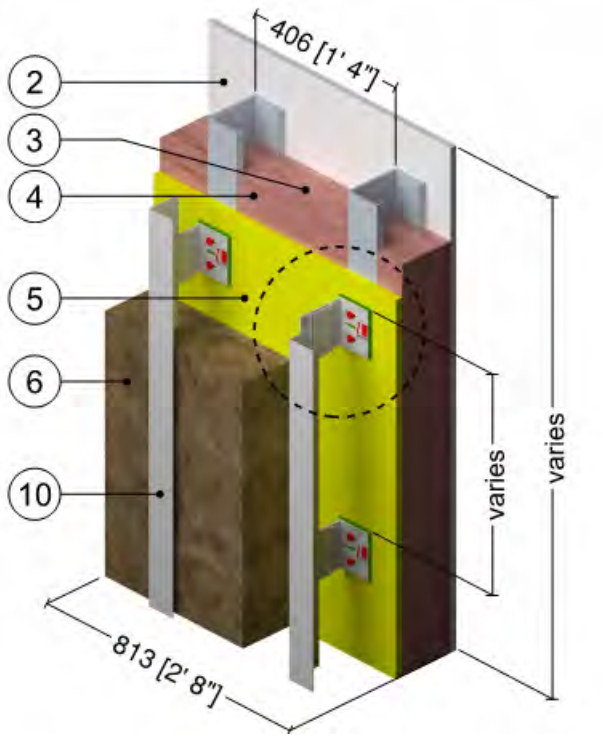
NVI Clip Detail

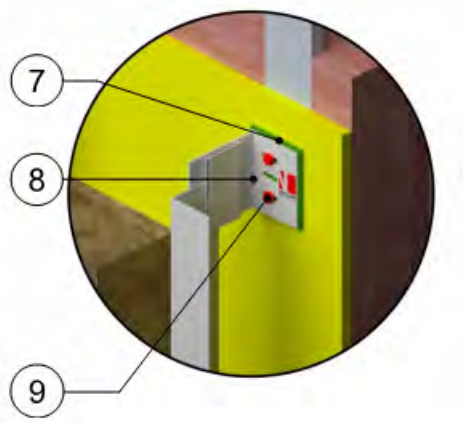
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	3” to 6” (76 to 152)	0.24 (0.034)	R-12.6 to R-25.2 (2.22 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	NV1 Clip Isolator	0.2" (5)	0.82 (0.117)	-	87 (1400)	0.20 (840)
8	NV1 Clip Extrusion – Aluminum 6005A alloy	Varies	1340 (193)	-	169 (2700)	0.22 (900)
9	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
10	Vertical Sub-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
11	Generic Cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall





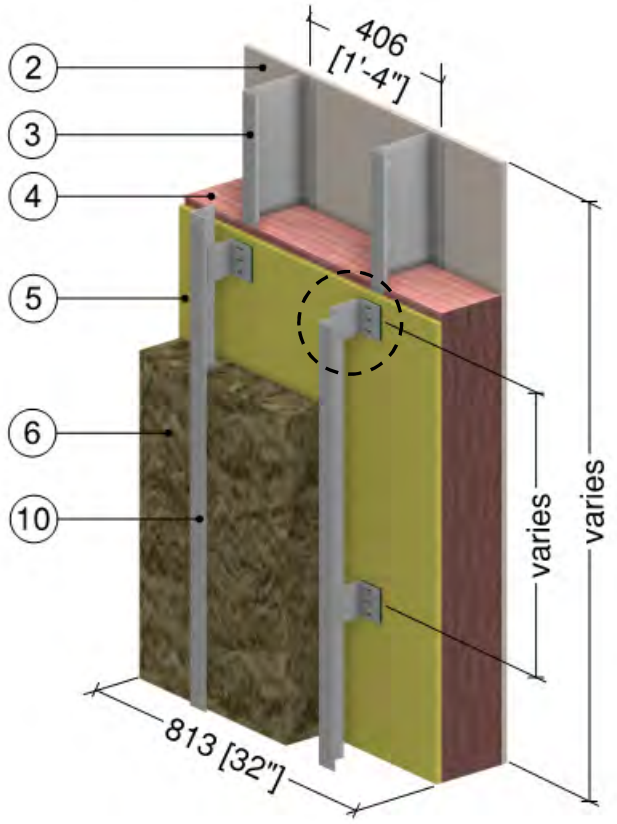
NVI Clip Detail

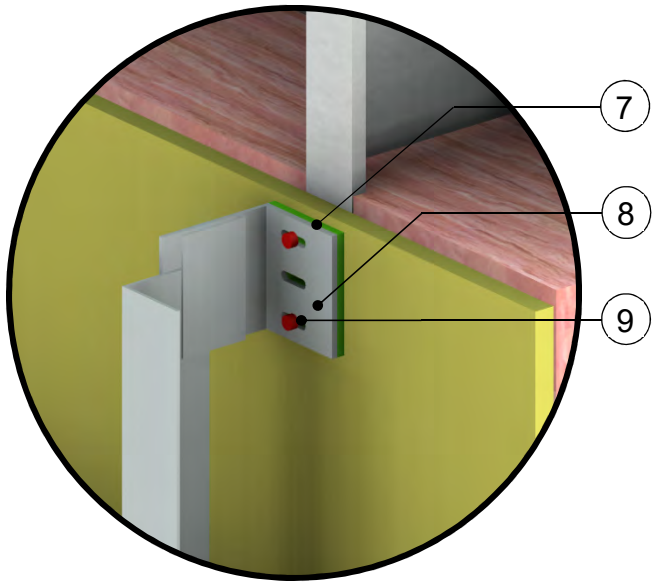
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.31 (0.044)	R-12 (2.2 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	2" to 6" (50 152)	0.24 (0.034)	R-8.4 to R-25.2 (1.48 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	NV1 Clip Isolator	0.2" (5)	0.82 (0.117)	-	87 (1400)	0.20 (840)
8	NV1 Clip Extrusion – Aluminum 6005A alloy	Varies	1340 (193)	-	169 (2700)	0.22 (900)
9	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
10	Vertical Sub-girt	0.09" (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
11	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall





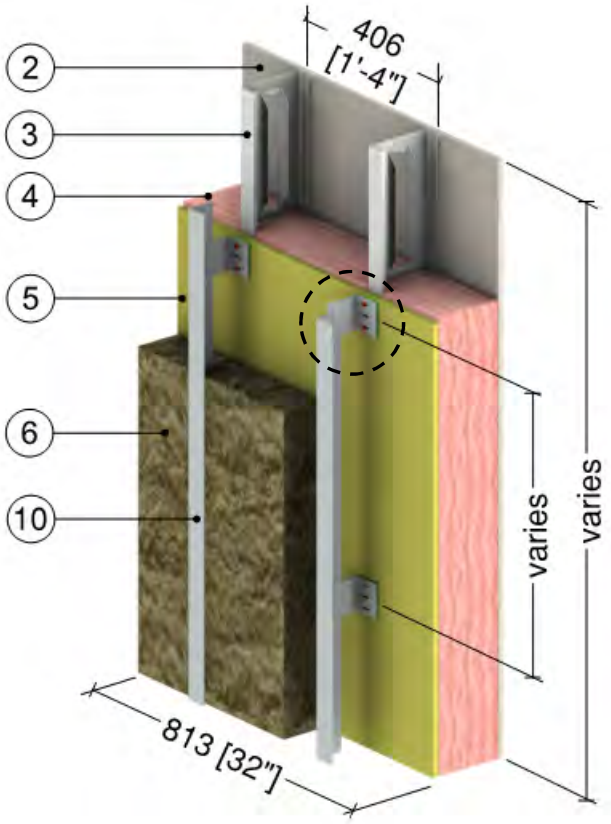
Nvelope NVI Clip Detail

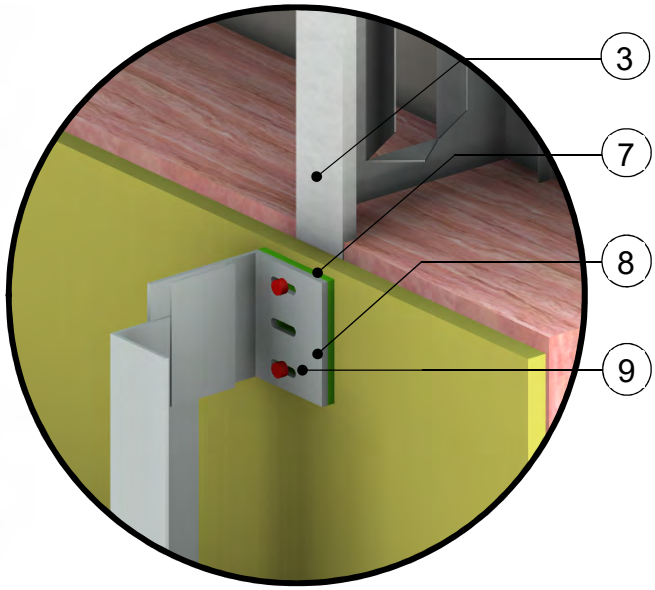
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6” (152)	0.31 (0.045)	R-19 (3.35 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	Exterior Mineral Wool Insulation	1.5” to 4” (38 to 102)	0.24 (0.034)	R-6.3 to R-16.8 (1.11 RSI to 2.96 RSI)	4 (64)	0.20 (850)
7	Nvelope Clip Isolator	0.2" (5)	0.82 (0.117)	-	-	-
8	Nvelope Clip Extrusion – Aluminum 6005A alloy	Varies	1340 (193)	-	169 (2700)	0.22 (900)
9	#14 Stainless Steel Fastener	1/4" (6) ∅	118 (17)	-	500 (8000)	0.13 (530)
10	Vertical Aluminum Sub-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
11	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall





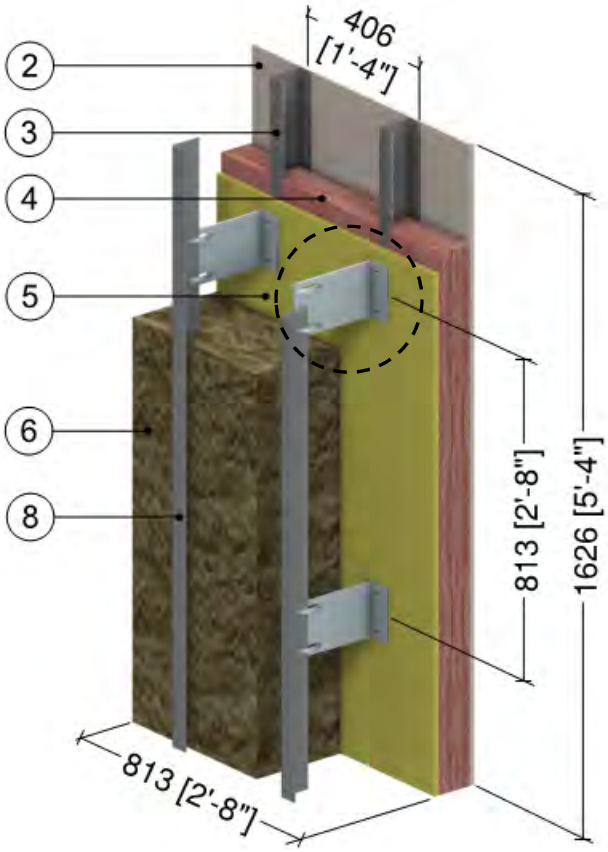
Nvelope NVI Clip Detail

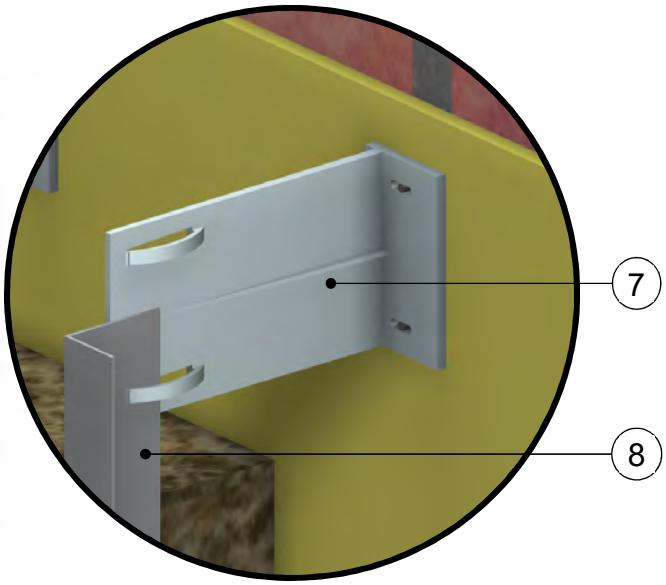
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Slotted Steel R-Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6” (152)	0.31 (0.045)	R-19 (3.35 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	Exterior Mineral Wool Insulation	1.5” to 4” (38 to 102)	0.24 (0.034)	R-6.3 to R-16.8 (1.11 RSI to 2.96 RSI)	4 (64)	0.20 (850)
7	Nvelope Clip Isolator	0.2" (5)	0.82 (0.117)	-	-	-
8	Nvelope Clip Extrusion – Aluminum 6005A alloy	Varies	1340 (193)	-	169 (2700)	0.22 (900)
9	#14 Stainless Steel Fastener	1/4" (6) ∅	118 (17)	-	500 (8000)	0.13 (530)
10	Vertical Aluminum Sub-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
11	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 Thermobracket Clip System Supporting Cladding – Clear Wall





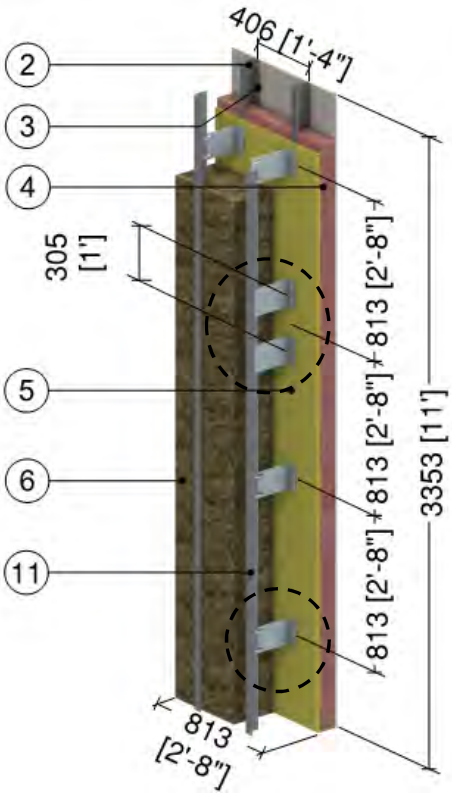
Nvelope Eko Clip Detail

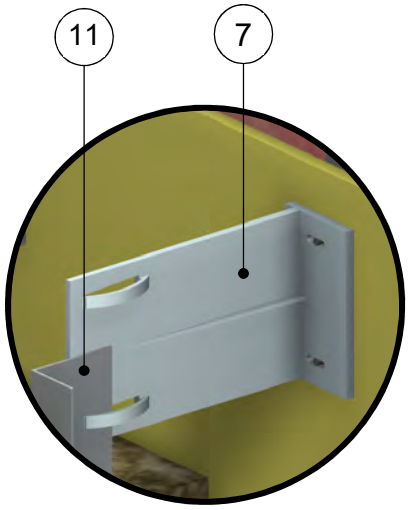
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.28 (0.040)	R-13 (2.29 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	Exterior Mineral Wool Insulation	10” (254)	0.24 (0.034)	R-42.0 (7.40 RSI)	4 (64)	0.20 (850)
7	Nvelope Eko Thermobracket (Polymer Composite)	-	4.86 (0.70)	-	-	-
8	Vertical Aluminum Sub-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
9	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

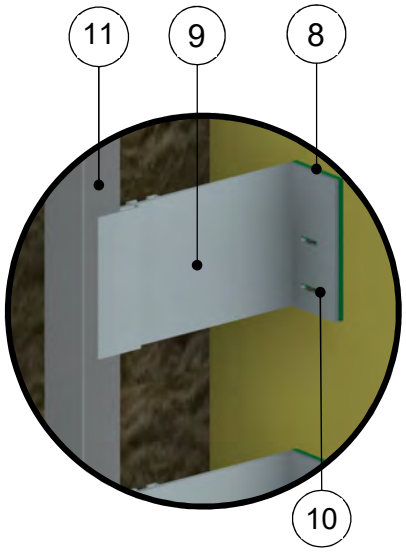
Detail 5.1.52

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





Nvelope Eko Thermobracket Clip Detail



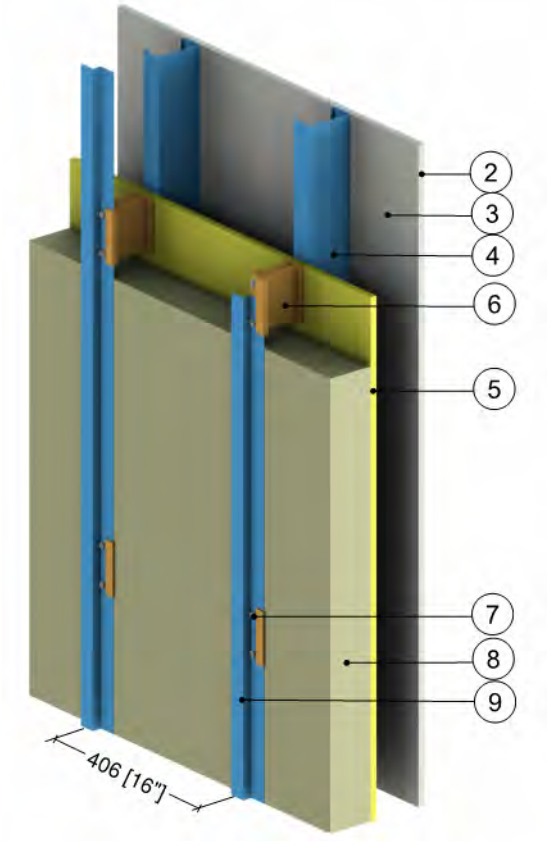
Nvelope NV1 Clip Detail

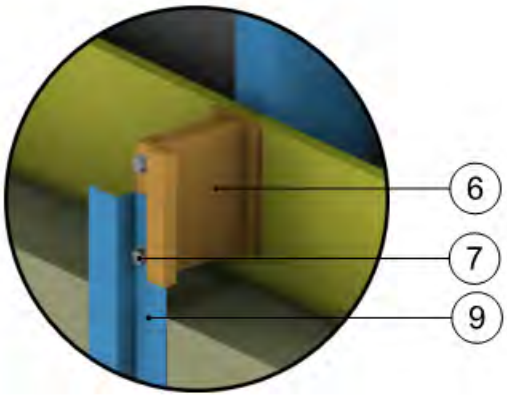
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.28 (0.040)	R-13 (2.29 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	Exterior Mineral Wool Insulation	10” (254)	0.24 (0.034)	R-42.0 (7.40 RSI)	4 (64)	0.20 (850)
7	Nvelope Eko Thermobracket (Polymer Composite)	-	4.86 (0.70)	-	-	-
8	Nvelope Clip Isolator	0.2" (5)	0.82 (0.117)	-	-	-
9	Nvelope Clip Extrusion – Aluminum 6005A alloy	Varies	1340 (193)	-	169 (2700)	0.22 (900)
10	#14 Stainless Steel Fastener	1/4" (6) ∅	118 (17)	-	-	-
11	Vertical Aluminum Sub-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
12	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
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

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





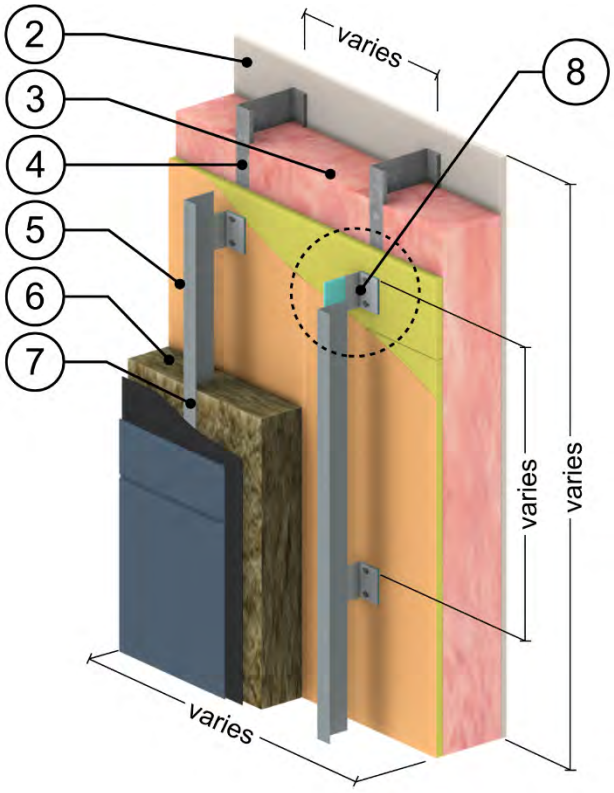
Cascadia Clip Fiberglass Thermal Spacer Detail

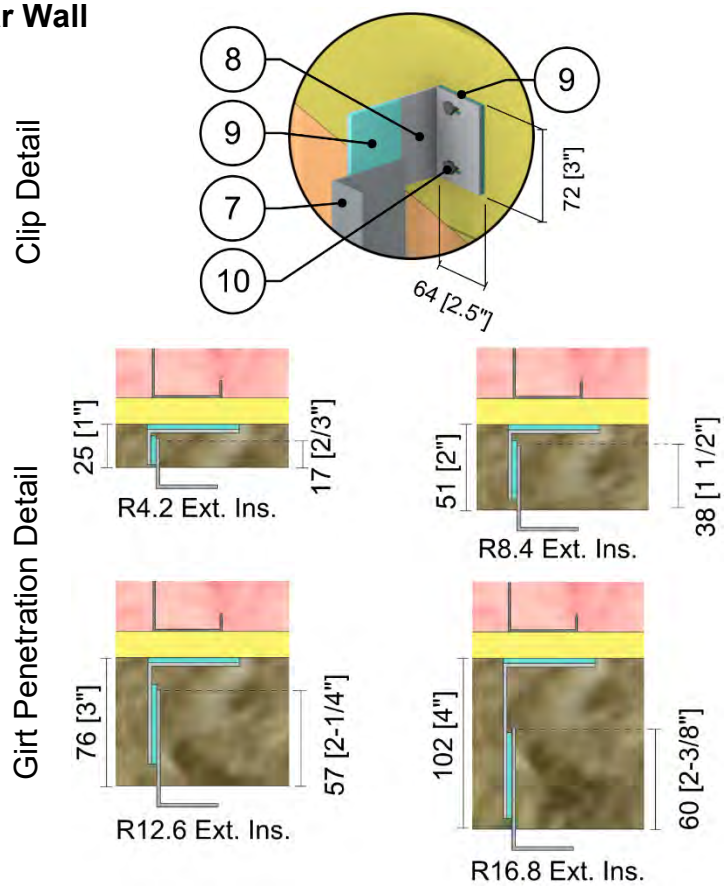
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
6	Cascadia Clip	Varies	2.07 (0.299)	-	-	-
7	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
8	Exterior Mineral Wool Insulation	Varies	-	R-8.4 to R-33.6 (1.48 to 5.92 RSI)	4 (64)	0.20 (850)
9	Vertical Z-girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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



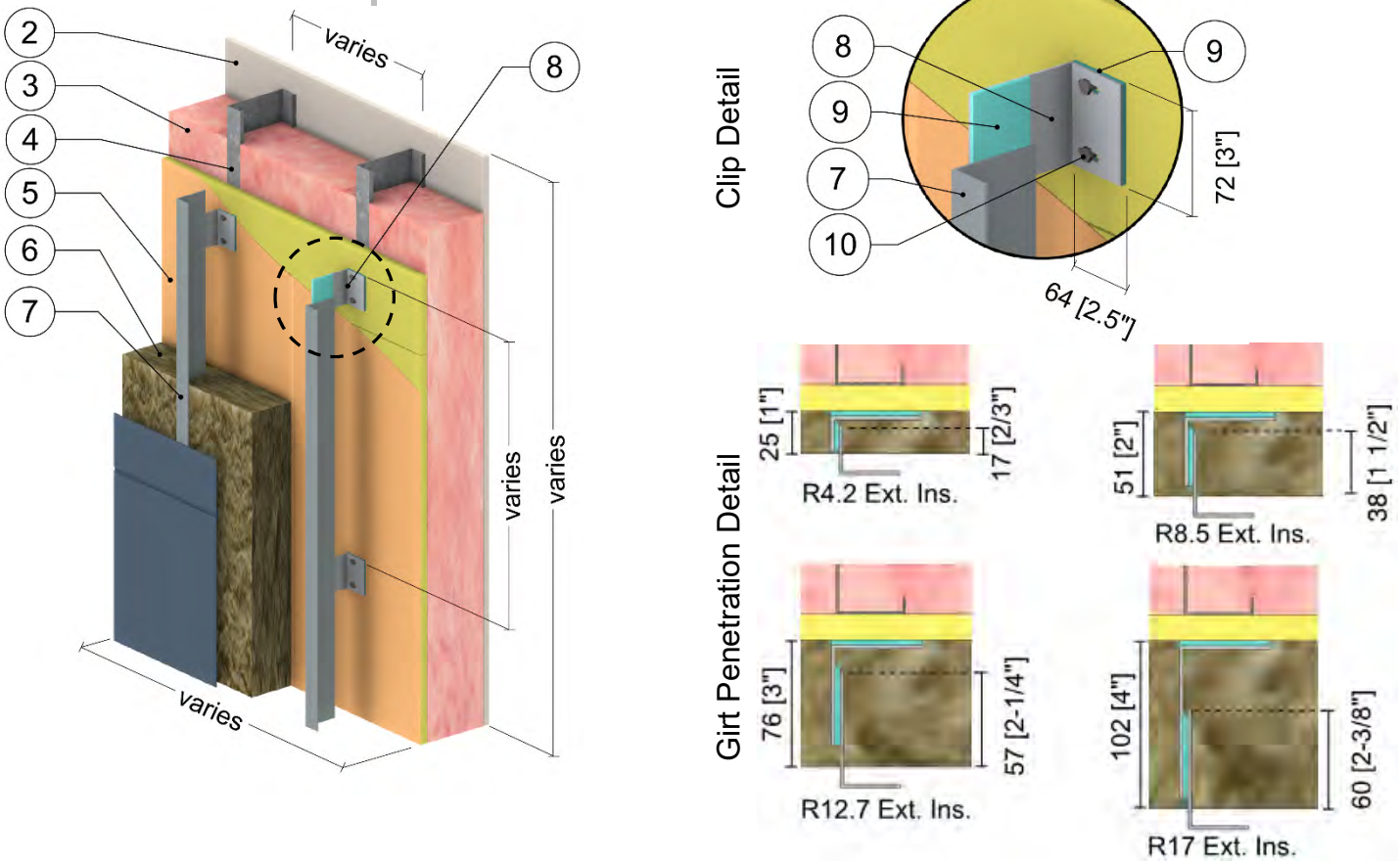


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	6” (152)	0.30 (0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-4.2 to R-16.8 (0.75 to 3.0 RSI)	4.5 (72)	0.20 (850)
7	Vertical Aluminum L-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
8	Aluminum Clip	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	HDPE Isolator	1/8” (3)	3.5 (0.5)	-	59 (950)	0.48 (2000)
10	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

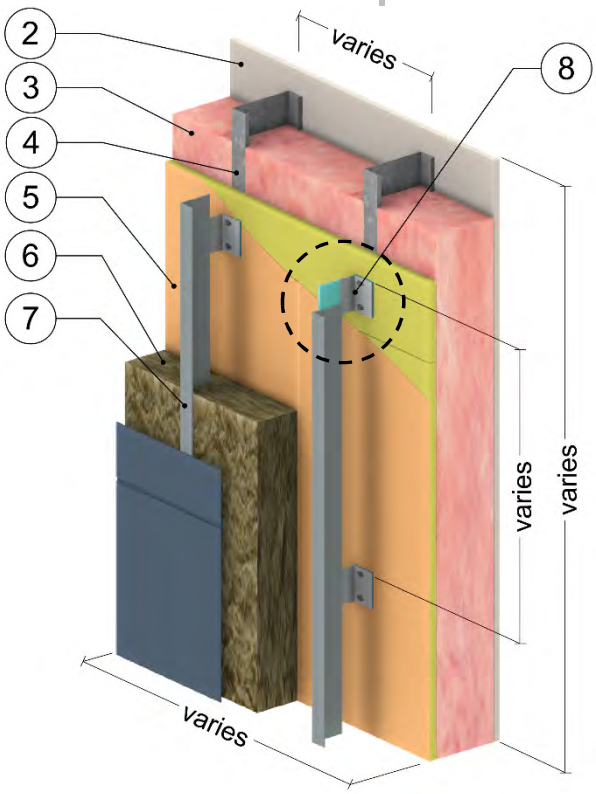


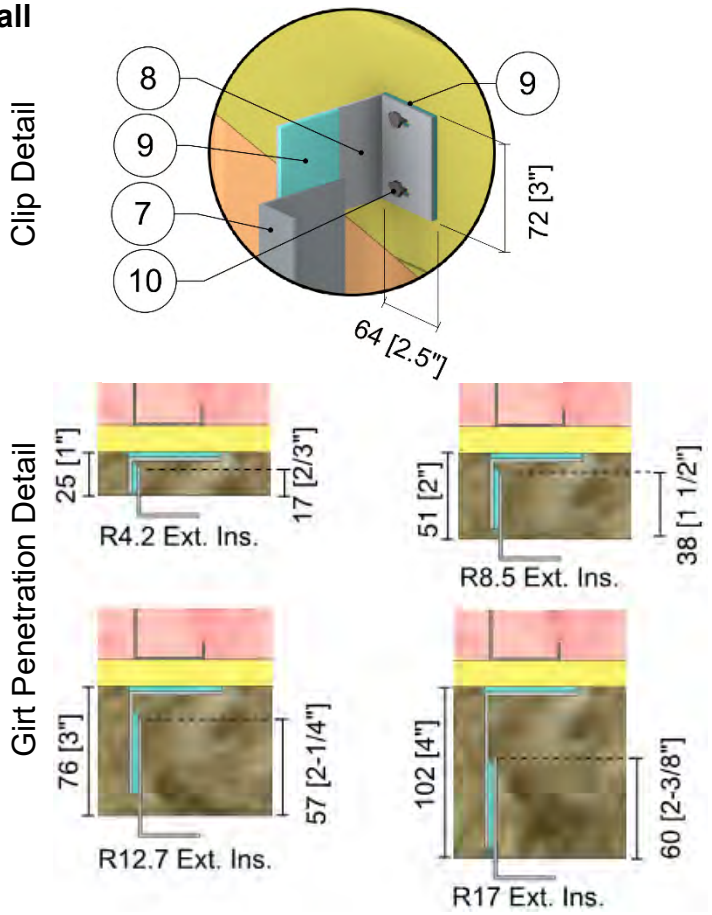
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	6" (152)	0.26 (0.038)	R-22.5 (4.0 RSI)	0.99 (15.9)	0.17 (710)
4	6" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-4.2 to R-16.8 (0.75 to 2.96 RSI)	4.5 (72)	0.20 (850)
7	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
8	Aluminum Clip	0.09" (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
9	HDPE Isolator	1/8" (3)	3.5 (0.5)	-	59 (950)	0.48 (2000)
10	Stainless Steel Fastener	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.56

Exterior and Interior Insulated 6" x 1/58" 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



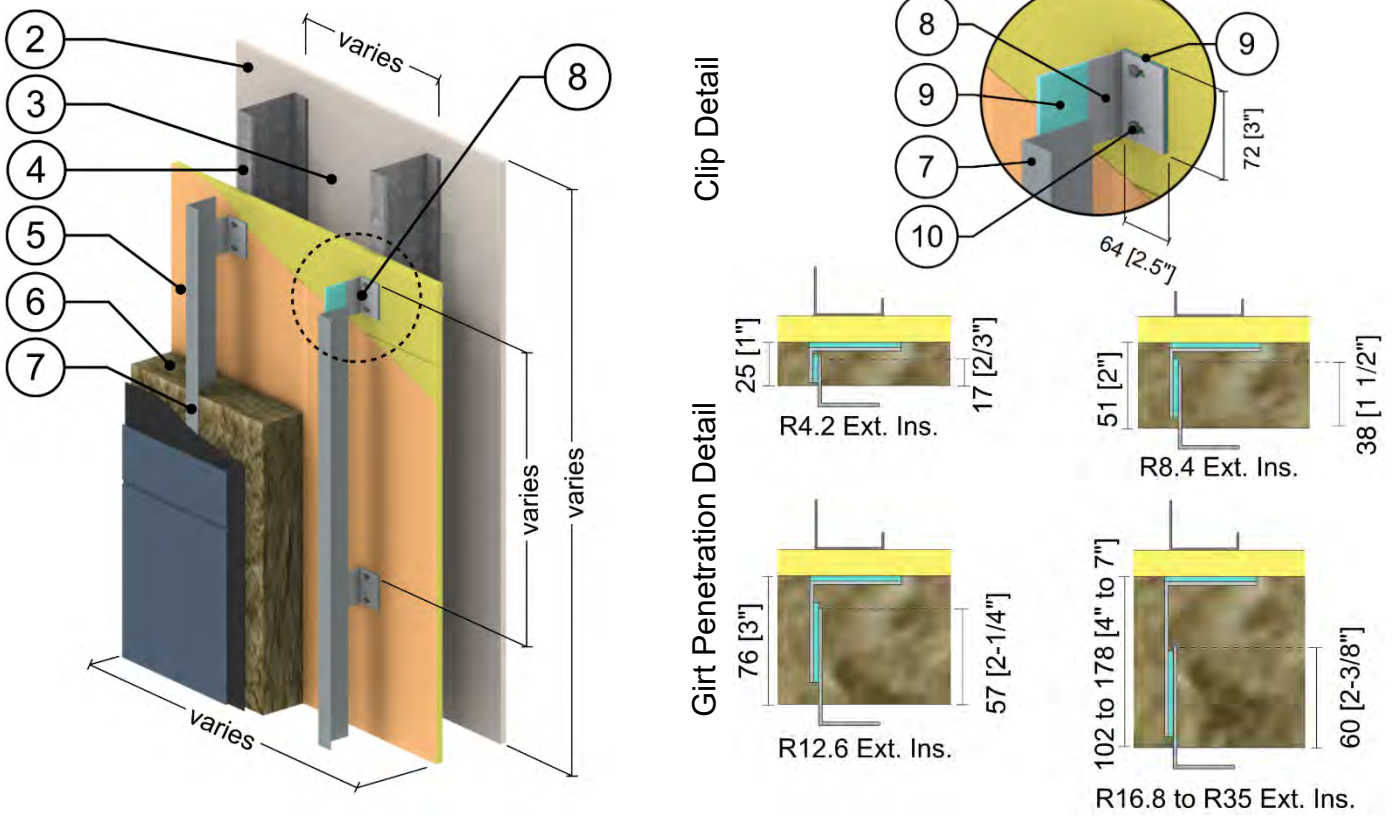


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	6" (152)	0.25 (0.036)	R-24 (4.2 RSI)	1.42 (22.7)	0.17 (710)
4	6" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulating Sheathing	Varies	0.24 (0.034)	R-4.2 (0.75) to R-16.8 (2.96 RSI)	4.5 (72)	0.20 (850)
7	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
8	Aluminum Clip	0.09" (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
9	HDPE Isolator	1/8" (3)	3.5 (0.5)	-	59 (950)	0.48 (2000)
10	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.57

Owens Corning 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

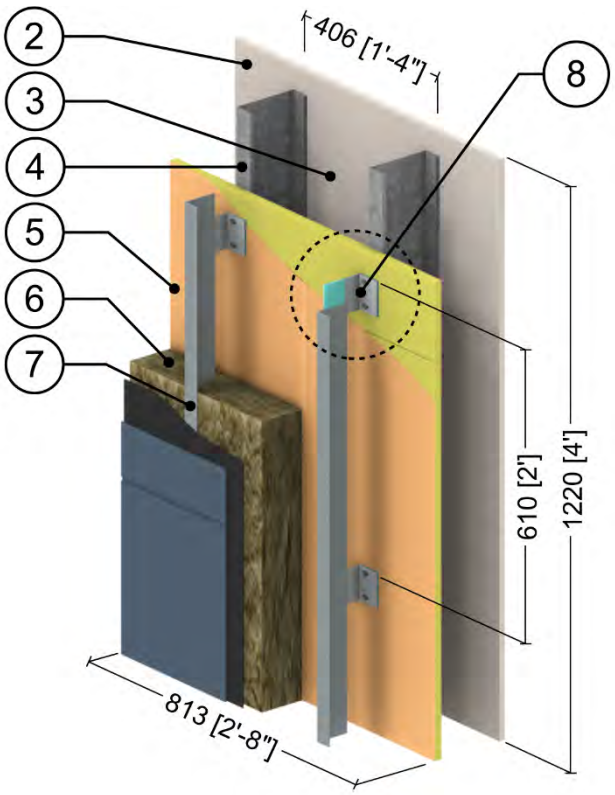


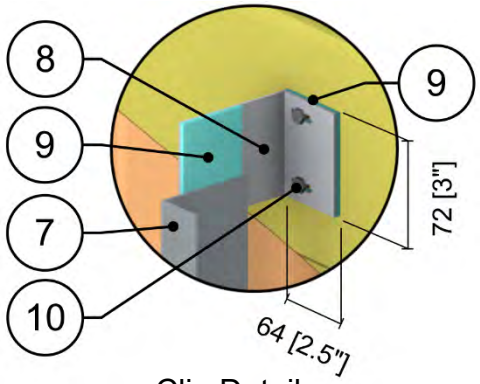
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	56” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	0.24 (0.034)	R-4.2 to R-29.4 (0.74 to 5.18 RSI)	-	-
7	Vertical Aluminum L-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
8	Aluminum Clip	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	HDPE Isolator	1/8” (3)	3.5 (0.5)	-	59 (950)	0.48 (2000)
10	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

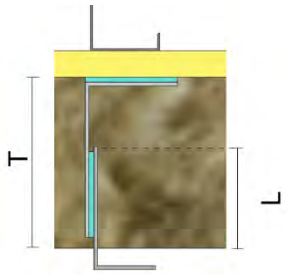
Detail 5.1.58

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





Clip Detail



T	L
2”	1.5”
5”	2-3/8”

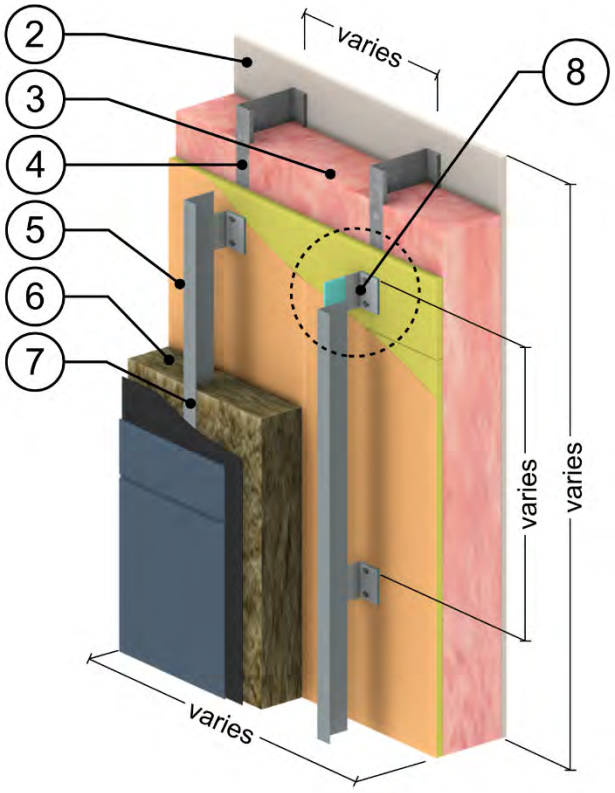
Girt Penetration Detail

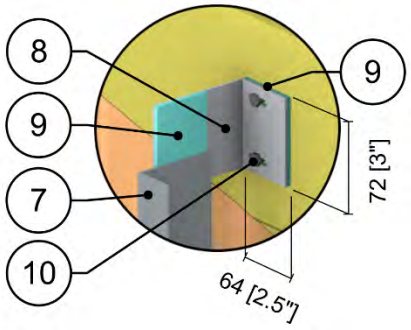
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-8.4 to R-21.0 (1.11 to 3.70 RSI)	4.5 (72)	0.20 (850)
7	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
8	Aluminum Bracket	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	HDPE Isolator	1/8” (3)	3.5 (0.5)	-	59 (950)	0.48 (2000)
10	Stainless Steel Fastener	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

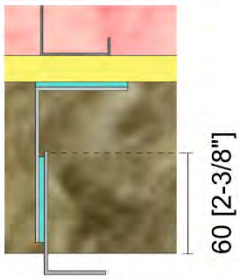
Detail 5.1.59

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





Clip Detail



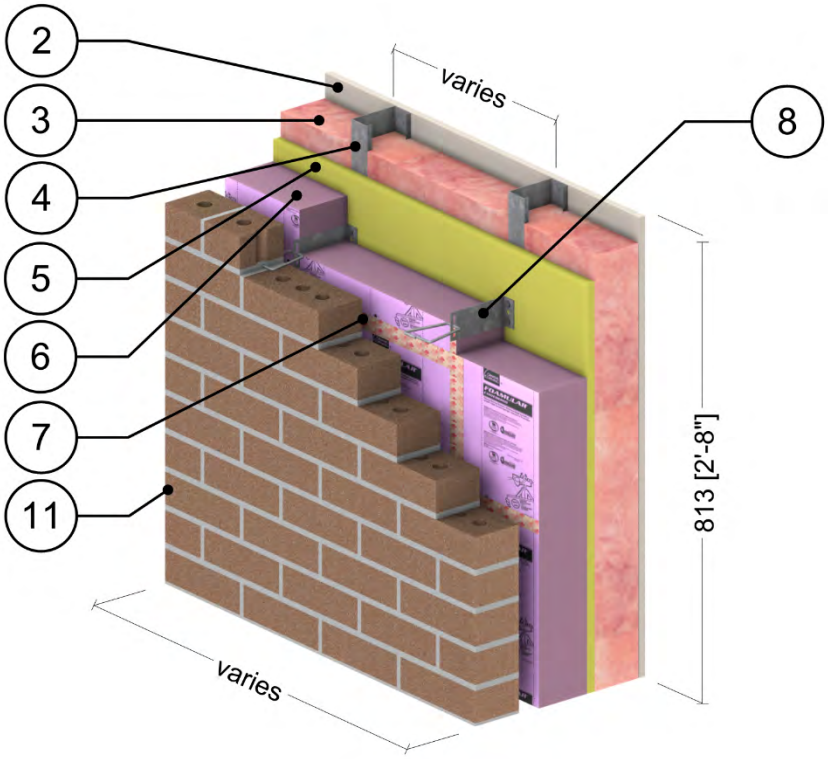
Girt Penetration Detail

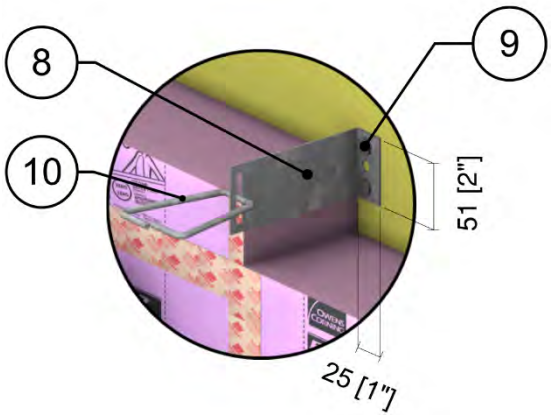
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6” (152)	0.30(0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-16.8 to R-29.4 (2.96 to 5.18 RSI)	4.5 (72)	0.20 (850)
7	Vertical Aluminum L-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
8	Aluminum Clip	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	HDPE Isolator	1/8” (3)	3.5 (0.5)	-	59 (950)	0.48 (2000)
10	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





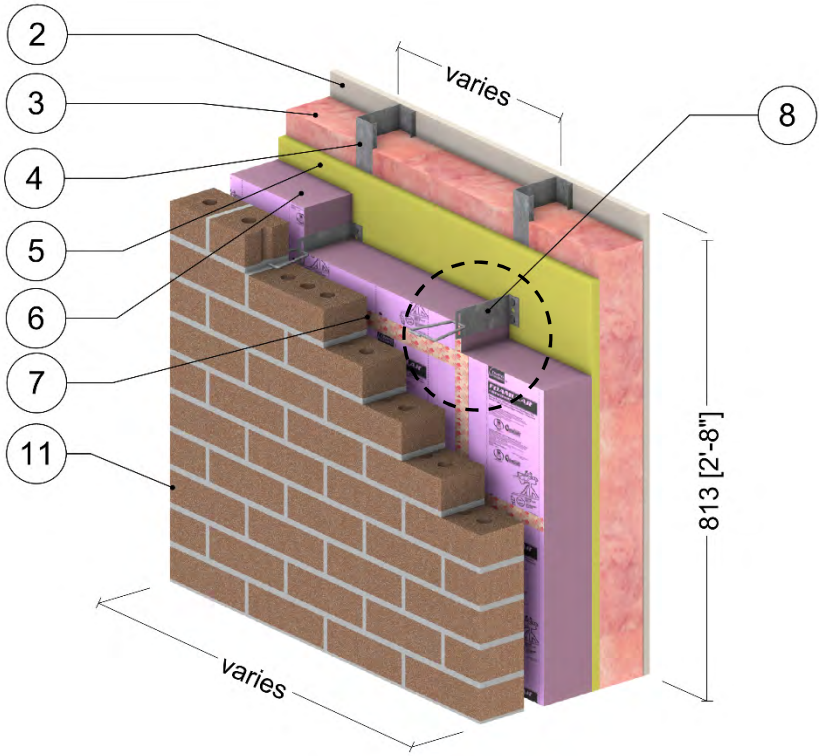
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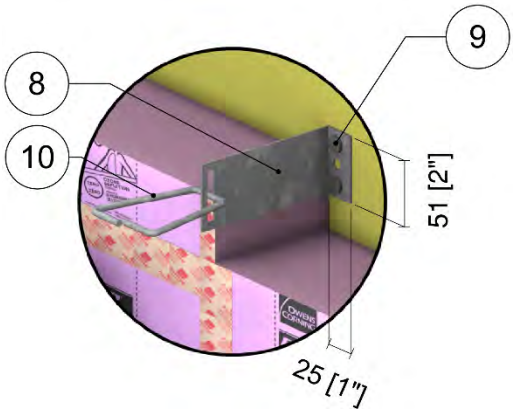
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	6” (152)	0.30 (0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Foamular CodeBord/C-200 Extruded Polystyrene Rigid Insulation (XPS) Type 3	Varies	0.20 (0.029)	R-5 to R-15 (0.88 to 2.64 RSI)	Varies	0.29 (1220)
7	Vented Air Cavity	1 1/2" (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
8	Galvanized Steel Veneer Anchor	Varies	430 (62)	-	489 (7830)	0.12 (500)
9	Galvanized Steel Fasteners	0.28” (7) Ø	430 (62)	-	489 (7830)	0.12 (500)
10	Galvanized Steel Wire Pintle	-	430 (62)	-	489 (7830)	0.12 (500)
11	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
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

Detail 5.1.61

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-22.5 Batt Insulation in Stud Cavity – Clear Wall





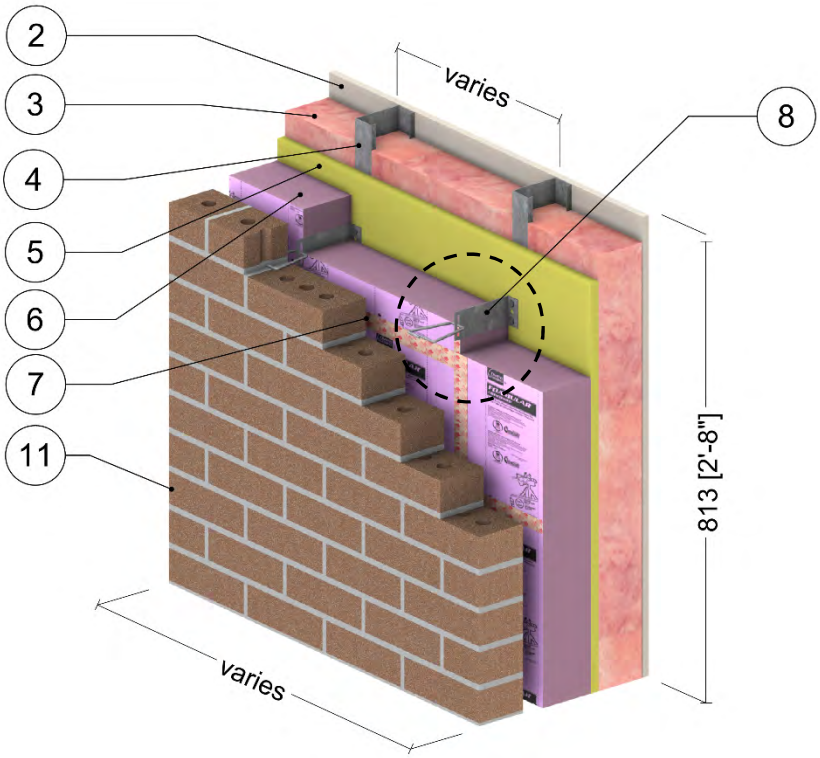
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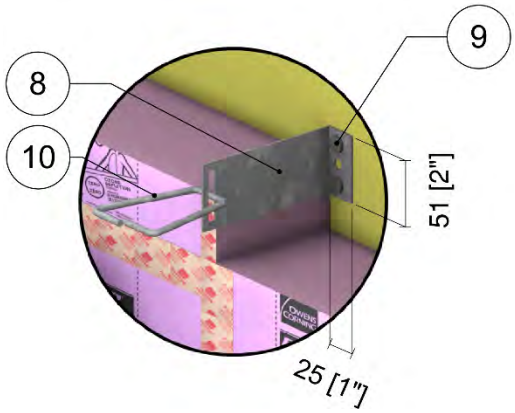
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	6” (152)	0.26 (0.038)	R-22.5 (4.0 RSI)	0.99 (15.9)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Foamular CodeBord/C-200 Extruded Polystyrene Rigid Insulation (XPS) Type 3	Varies	0.20 (0.029)	R-5 to R-15 (0.88 to 2.64 RSI)	Varies	0.29 (1220)
7	Vented Air Cavity	1 1/2" (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
8	Galvanized Steel Veneer Anchor	Varies	430 (62)	-	489 (7830)	0.12 (500)
9	Galvanized Steel Fasteners	0.28” (7) Ø	430 (62)	-	489 (7830)	0.12 (500)
10	Galvanized Steel Wire Pintle	-	430 (62)	-	489 (7830)	0.12 (500)
11	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
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

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 Steel Brick Anchors Supporting Brick Veneer and Owens Corning R-24 Batt Insulation in Stud Cavity – Clear Wall





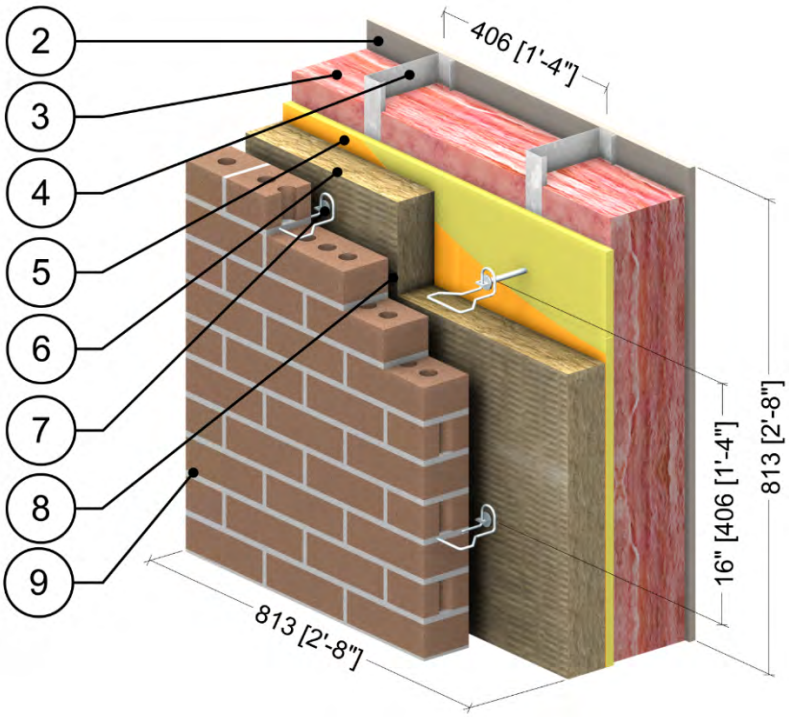
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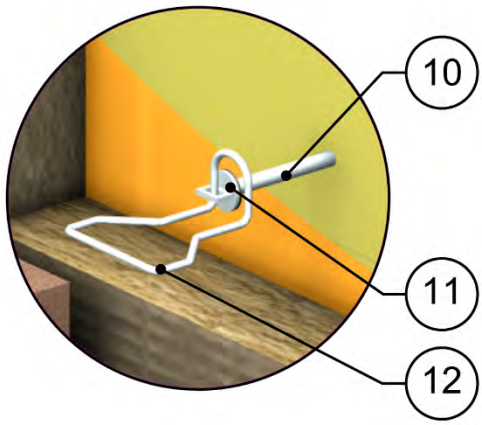
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	6” (152)	0.25 (0.036)	R-24 (4.2 RSI)	1.42 (22.7)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Foamular CodeBord/C-200 Extruded Polystyrene Rigid Insulation (XPS) Type 3	Varies	0.20 (0.029)	R-5 to R-15 (0.88 to 2.64 RSI)	Varies	0.29 (1220)
7	Vented Air Cavity	1 1/2" (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
8	Galvanized Steel Veneer Anchor	Varies	430 (62)	-	489 (7830)	0.12 (500)
9	Galvanized Steel Fasteners	0.28" (7) Ø	430 (62)	-	489 (7830)	0.12 (500)
10	Galvanized Steel Wire Pintle	-	430 (62)	-	489 (7830)	0.12 (500)
11	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
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

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





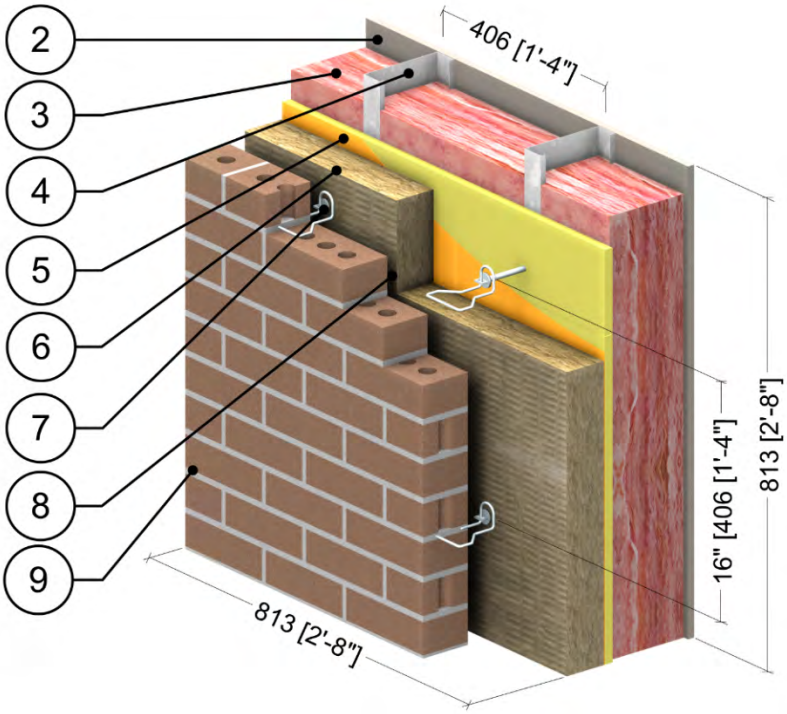
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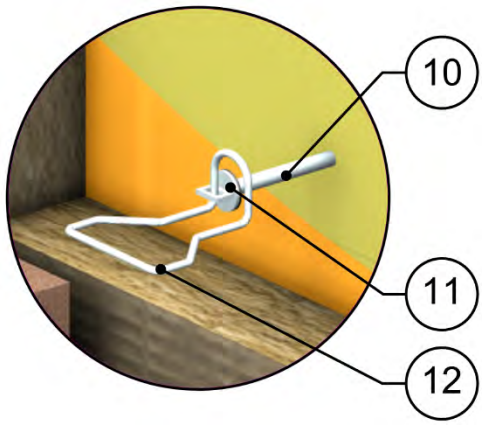
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	6” (152)	0.30 (0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-6.3 to R-21.0 (1.11 to 3.70 RSI)	4.5 (72)	0.29 (1220)
7	Heckmann Pos-I-Tie Masonry Tie 16” (406) o.c.	Varies	-	-	-	-
8	Vented Air Cavity[2]	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Zinc Barrel	-	726 (105)	-	412 (6600)	-
11	Rubber Washer (EPDM)	1/16” (1.59)	1.7 (0.25)	-	62 (997)	-
12	Galvanized Steel Wire Pintle	3/16” (5) Ø	645 (93)	-	489 (7830)	0.12 (500)
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 was found using ISO 100077-2

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





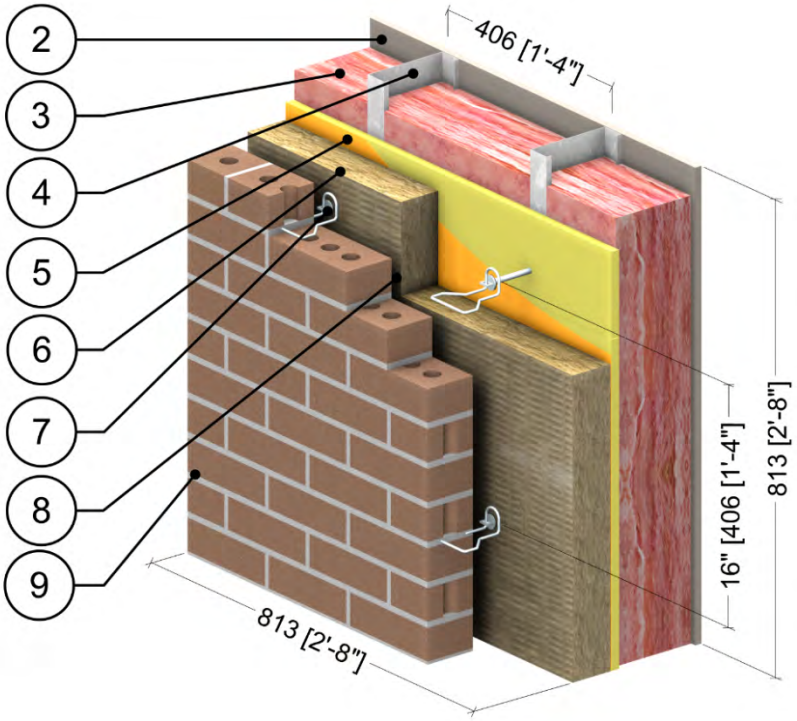
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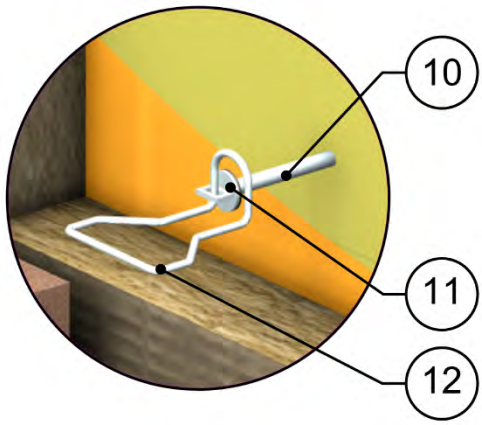
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	6” (152)	0.26 (0.038)	R-22.5 (4.0 RSI)	0.99 (15.9)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-6.3 to R-21.0 (1.11 to 3.70 RSI)	4.5 (72)	0.29 (1220)
7	Heckmann Pos-I-Tie Masonry Tie 16” (406) o.c.	Varies	-	-	-	-
8	Vented Air Cavity[2]	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Zinc Barrel	-	726 (105)	-	412 (6600)	-
11	Rubber Washer (EPDM)	1/16” (1.59)	1.7 (0.25)	-	62 (997)	-
12	Galvanized Steel Wire Pintle	3/16” (5) Ø	645 (93)	-	489 (7830)	0.12 (500)
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 was found using ISO 100077-2

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





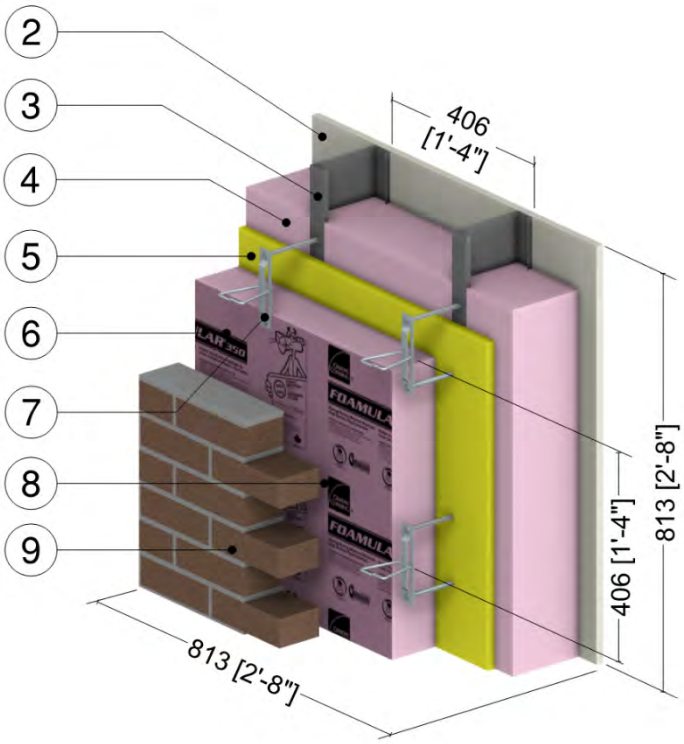
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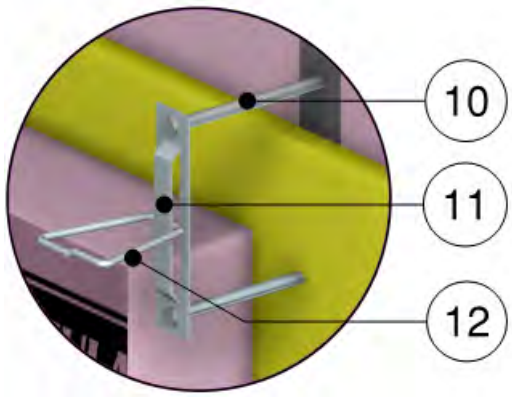
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	6” (152)	0.25 (0.036)	R-24 (4.2 RSI)	1.42 (22.7)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-6.3 to R-21.0 (1.11 to 3.70 RSI)	4.5 (72)	0.29 (1220)
7	Heckmann Pos-I-Tie Masonry Tie 16” (406) o.c.	Varies	-	-	-	-
8	Vented Air Cavity[2]	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Zinc Barrel	-	726 (105)	-	412 (6600)	-
11	Rubber Washer (EPDM)	1/16” (1.59)	1.7 (0.25)	-	62 (997)	-
12	Galvanized Steel Wire Pintle	3/16” (5) Ø	645 (93)	-	489 (7830)	0.12 (500)
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 was found using ISO 100077-2

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





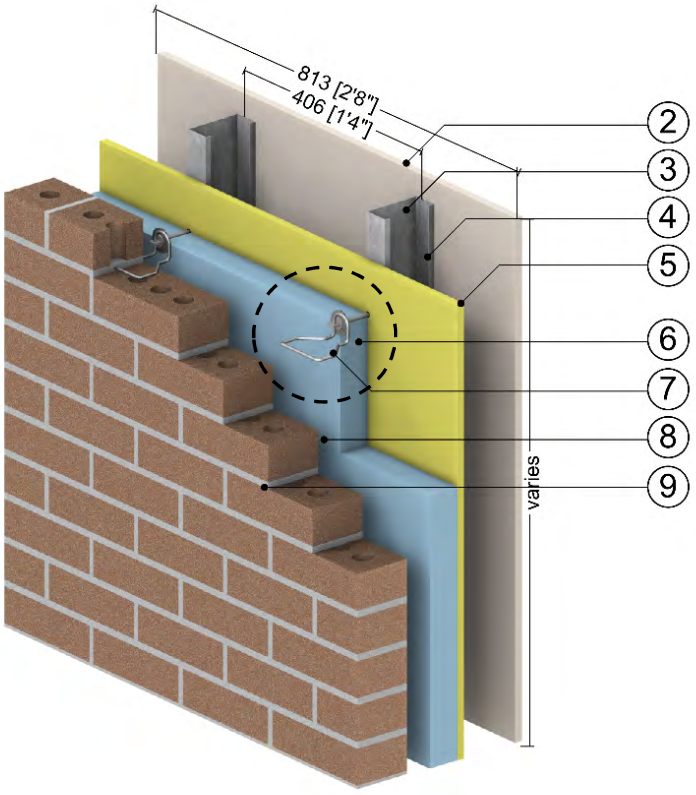
X-Seal Byna-Lok Anchor Detail

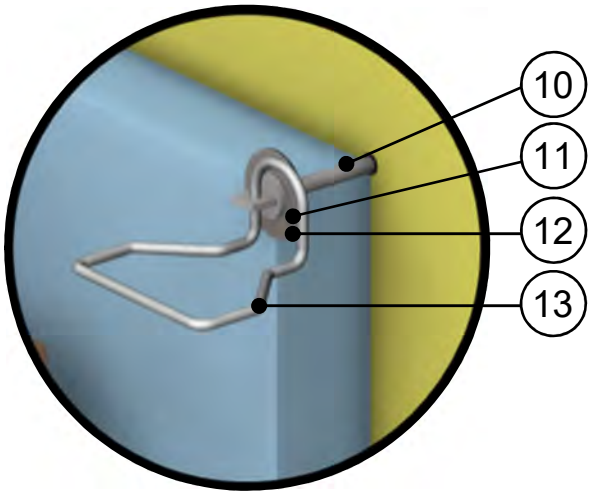
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	FOAMULAR 250 extruded polystyrene insulation (XPS, Type IV)	Varies	0.20 (0.029)	R-5 to R-25 (0.88 to 4.40 RSI)	1.55 (25)	0.29 (1220)
7	Hohmann and Barnard X-Seal Byna-Lok Anchor	1” to 4” (25 to 102)	347 (50)	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.70 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3-5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	X-Seal Steel Veneer Anchor	0.31” (8) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	Byna-Lok Steel Tie	-	347 (50)	-	489 (7830)	0.12 (500)
12	Steel Wire	-	347 (50)	-	489 (7830)	0.12 (500)
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

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





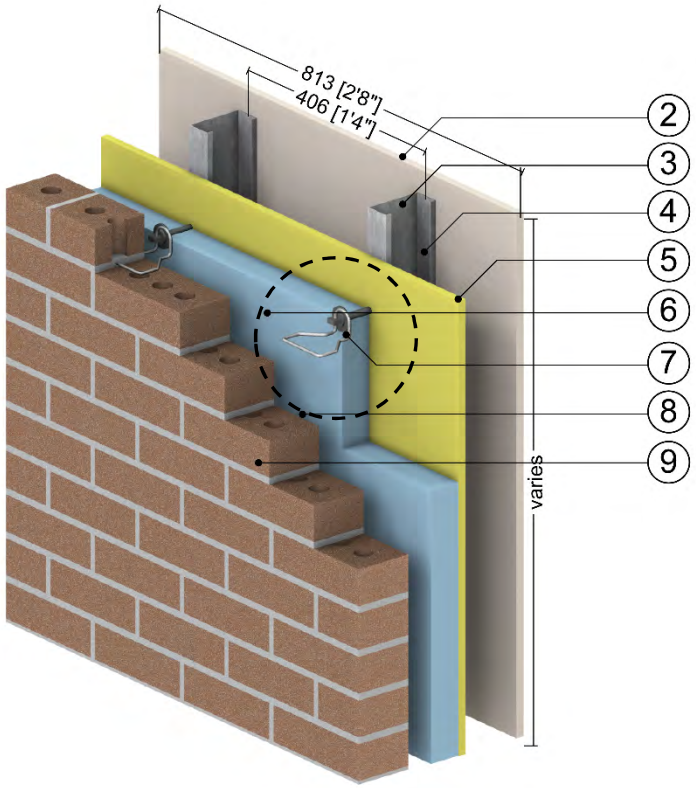
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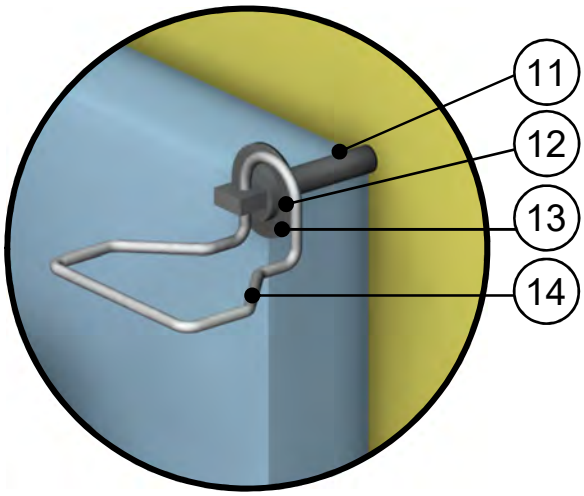
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Zinc Barrel	-	784 (113)	-	-	-
11	Steel Washer	1.5” (38) Ø	347 (50)	-	489 (7830)	0.12 (500)
12	Rubber Washer (EPDM)	-	1.7 (0.25)	-	-	-
13	Galvanized Steel Wire Pintle	3/16” (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
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

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





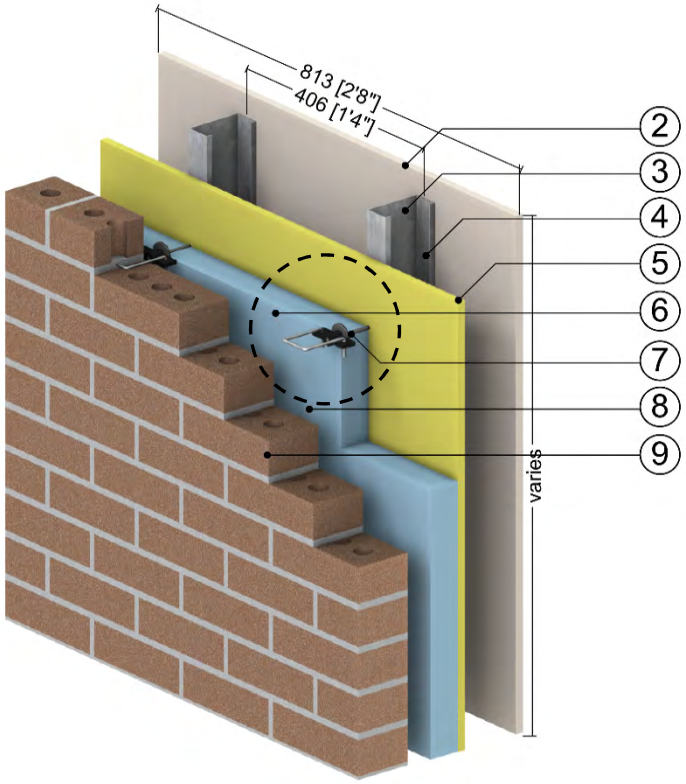
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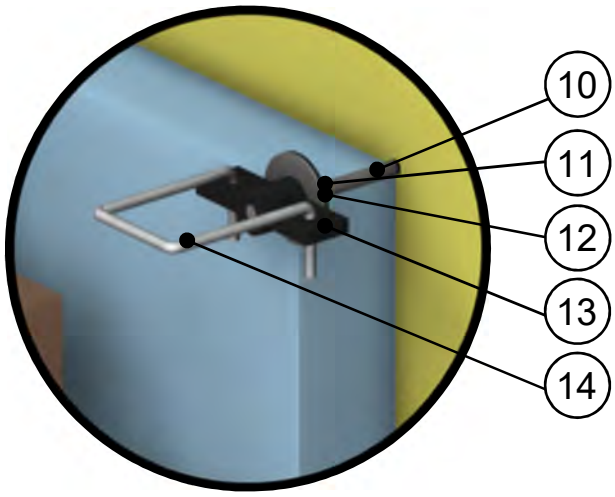
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Stainless Steel Barrel	-	118 (17)	-	489 (7830)	0.12 (500)
11	Nylon Coating	Varies	1.7 (0.25)	-	-	-
12	Steel Washer	1.5” (38) Ø	347 (50)	-	489 (7830)	0.12 (500)
13	Rubber Washer (EPDM)	-	1.7 (0.25)	-	-	-
14	Galvanized Steel Wire Pintle	3/16” (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
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

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





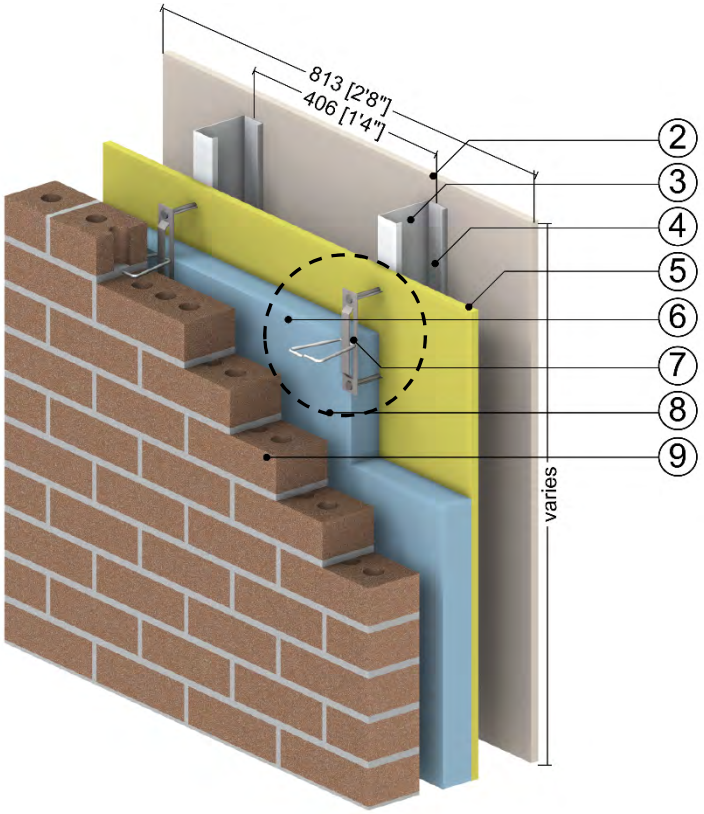
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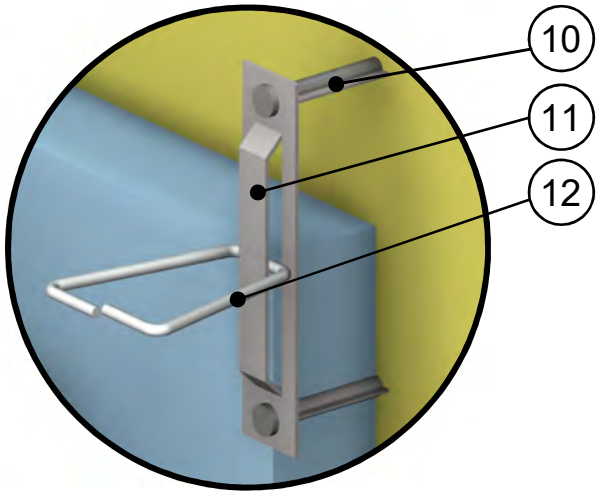
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation (Mineral Wool)	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Stainless Steel Barrel	-	118 (17)	-	489 (7830)	0.12 (500)
11	Steel Washer	1.5” (38) Ø	347 (50)	-	489 (7830)	0.12 (500)
12	Rubber Washer (EPDM)	-	1.7 (0.25)	-	-	-
13	Steel Wing Nut with Plastic Coating	Varies	347 (50)	-	489 (7830)	0.12 (500)
14	Galvanized Steel Wire Pintle	3/16” (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
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

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





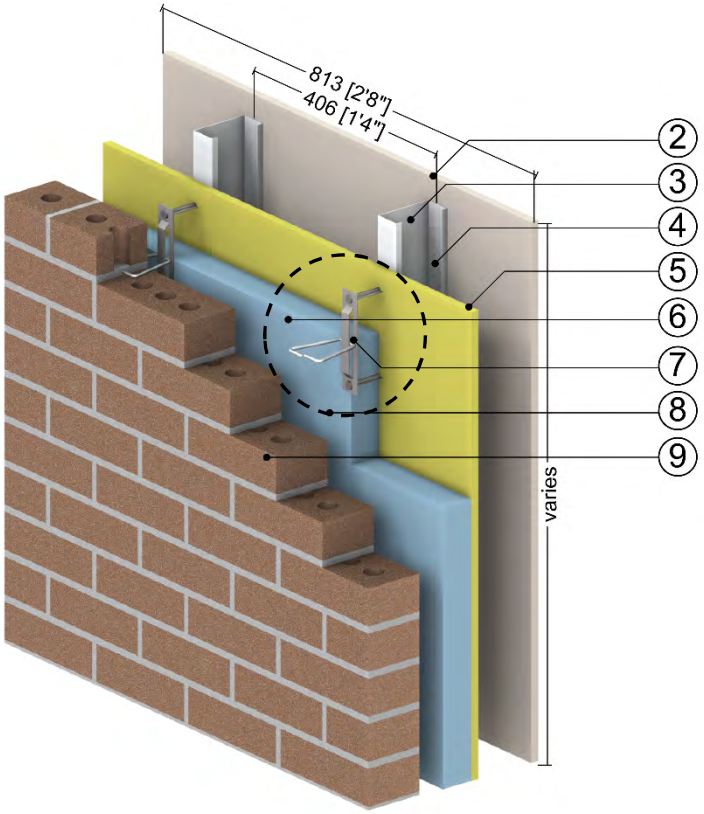
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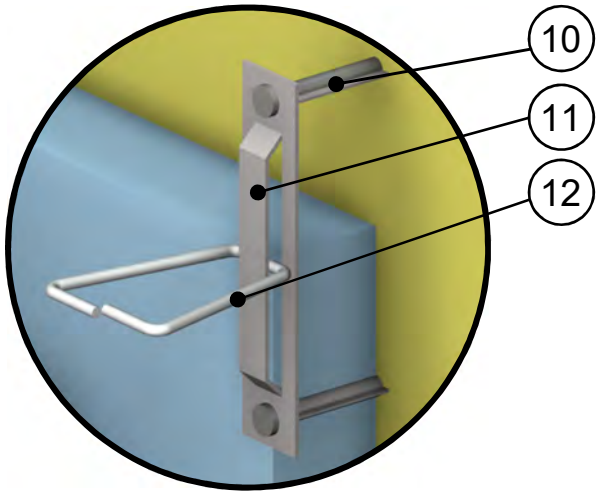
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Steel Fasteners	0.31” (8) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Veneer Anchor	-	347 (50)	-	489 (7830)	0.12 (500)
12	Steel Triangle Tie	-	347 (50)	-	489 (7830)	0.12 (500)
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

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





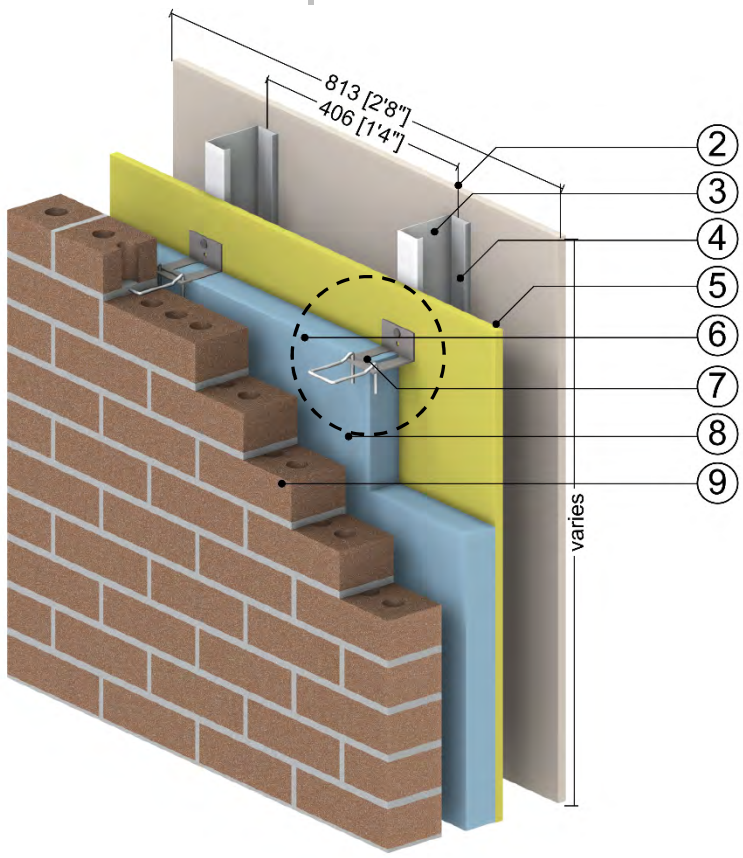
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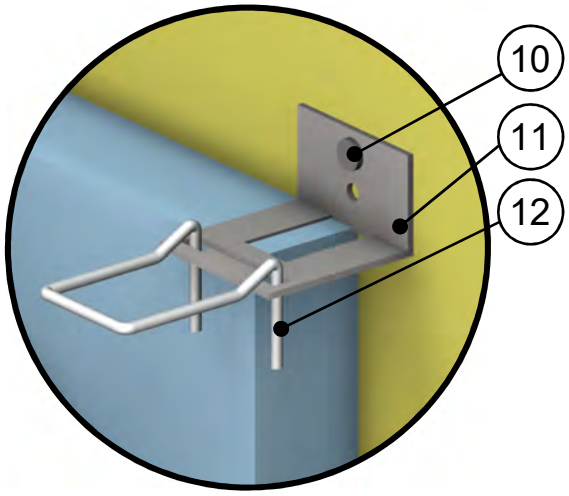
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Stainless Steel Fasteners	0.31” (8) Ø	118 (17)	-	489 (7830)	0.12 (500)
11	Stainless Steel Tie	-	118 (17)	-	489 (7830)	0.12 (500)
12	Stainless Steel Triangle Tie	-	118 (17)	-	489 (7830)	0.12 (500)
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

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





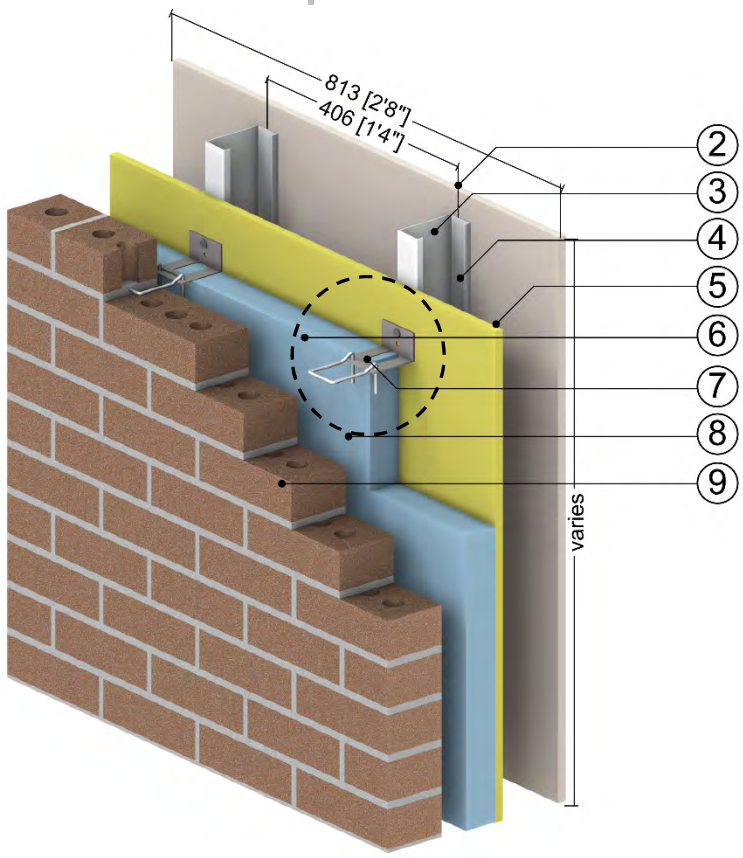
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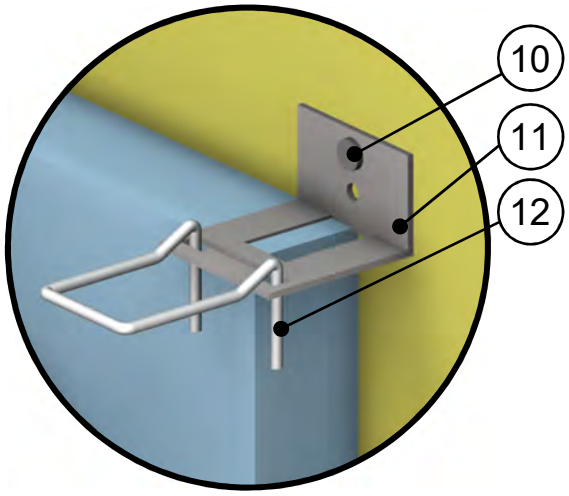
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Steel Fasteners	0.28” (7) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Veneer Anchor	-	347 (50)	-	489 (7830)	0.12 (500)
12	Steel Wire Pintle	-	347 (50)	-	489 (7830)	0.12 (500)
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

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





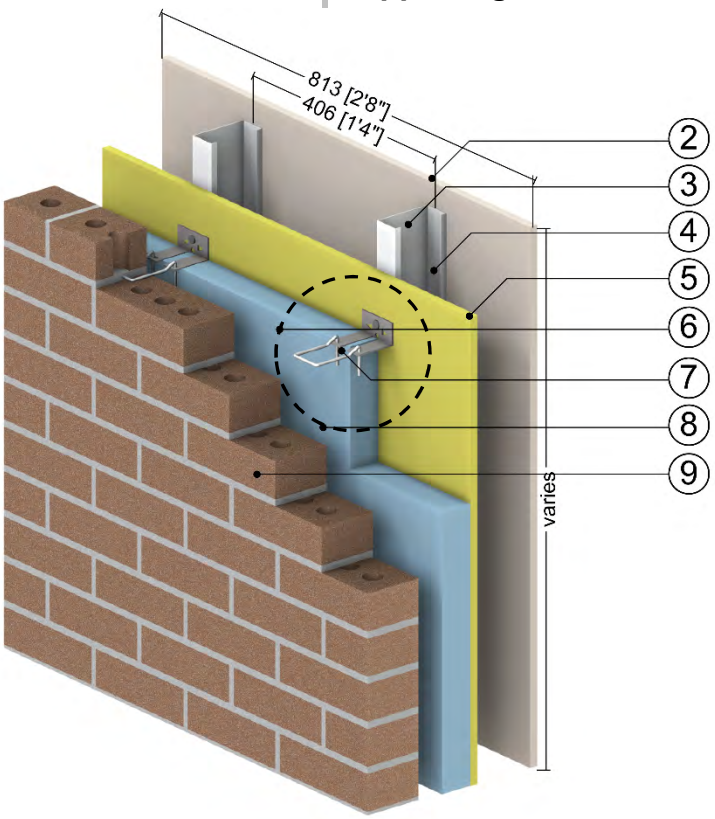
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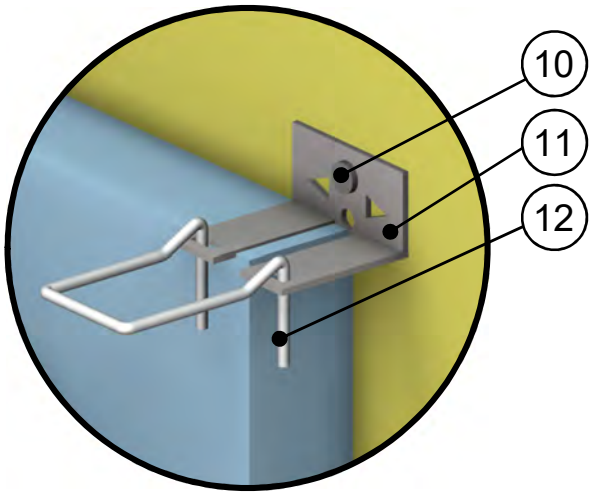
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Stainless Steel Fasteners	0.28” (7) Ø	118 (17)	-	489 (7830)	0.12 (500)
11	Stainless Steel Veneer Anchor	-	118 (17)	-	489 (7830)	0.12 (500)
12	Stainless Steel Wire Pintle	-	118 (17)	-	489 (7830)	0.12 (500)
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

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 Anchor Supporting Brick Veneer – Clear Wall





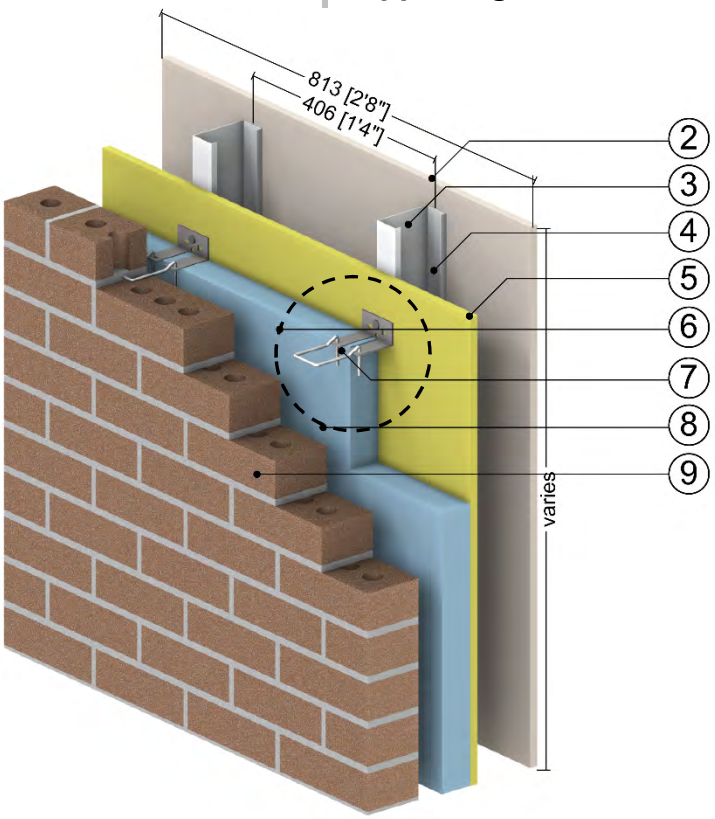
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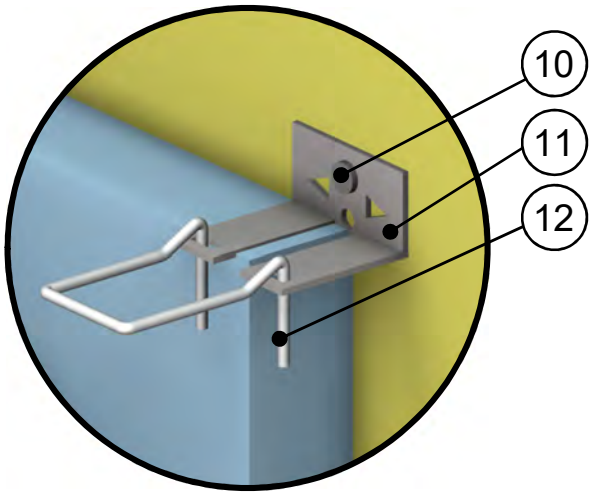
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Steel Fasteners	0.31” (8) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Veneer Anchor	-	347 (50)	-	489 (7830)	0.12 (500)
12	Steel Wire Pintle	-	347 (50)	-	489 (7830)	0.12 (500)
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

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





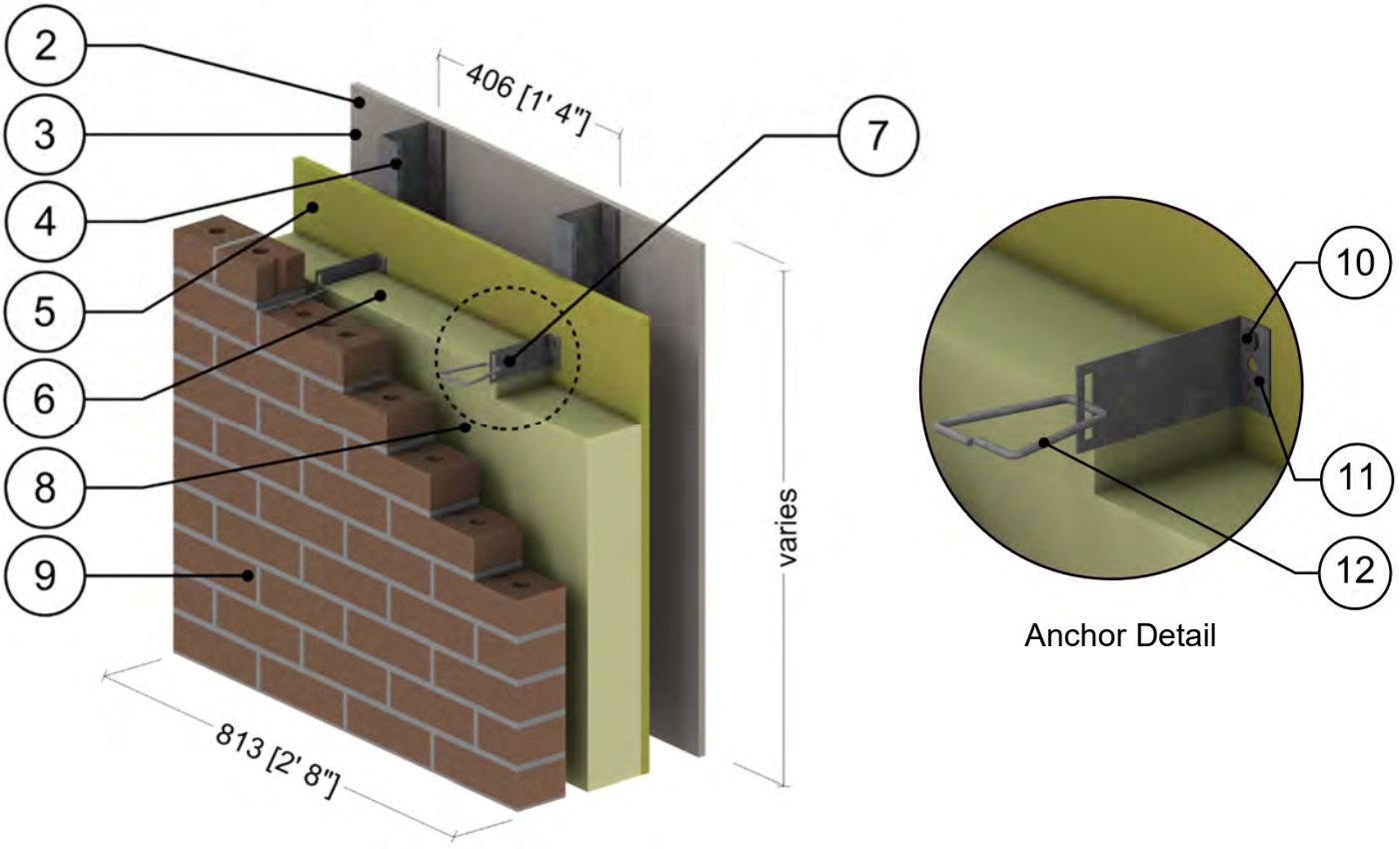
Anchor Detail

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 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	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Stainless Steel Fasteners	0.31” (8) Ø	118 (17)	-	489 (7830)	0.12 (500)
11	Stainless Steel Veneer Anchor	-	118 (17)	-	489 (7830)	0.12 (500)
12	Stainless Steel Wire Pintle	-	118 (17)	-	489 (7830)	0.12 (500)
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

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



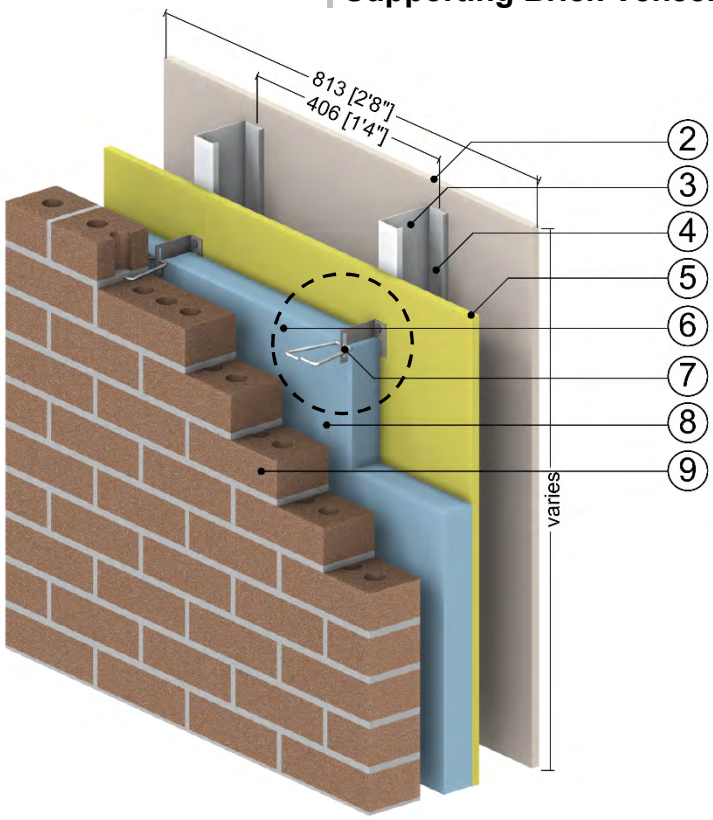
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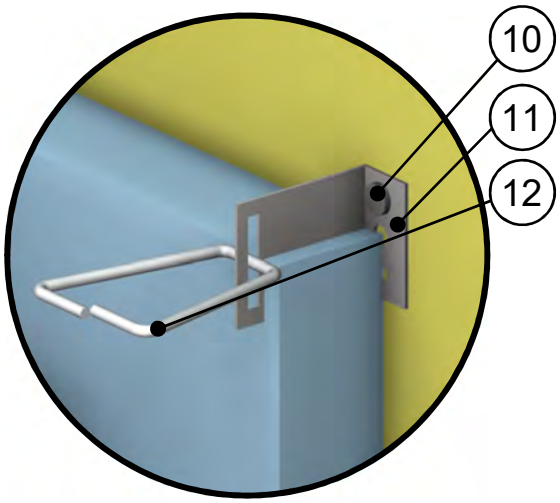
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-4.2 to R-29.4 (0.74 to 5.18 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 7” (25 to 178)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Steel Fasteners	0.28” (7) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Veneer Anchor	-	347 (50)	-	489 (7830)	0.12 (500)
12	Steel Wire Pintle	-	347 (50)	-	489 (7830)	0.12 (500)
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

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





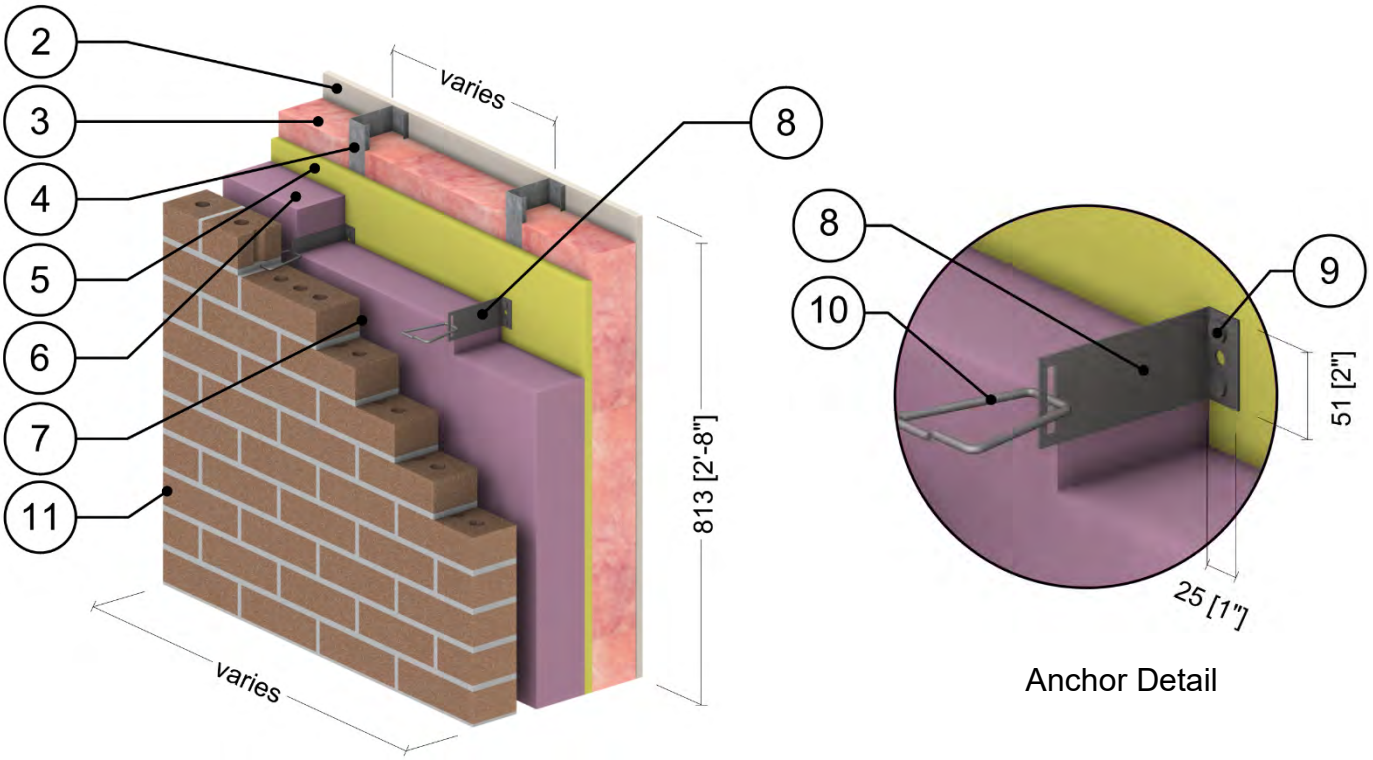
Anchor Detail

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 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	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	1” to 4” (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1” to 4” (25 to 102)	Varies	-	-	-
8	Vented Air Cavity	1.5” (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Stainless Steel Fasteners	0.28” (7) Ø	118 (17)	-	489 (7830)	0.12 (500)
11	Stainless Steel Veneer Anchor	-	118 (17)	-	489 (7830)	0.12 (500)
12	Stainless Steel Wire Pintle	-	118 (17)	-	489 (7830)	0.12 (500)
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

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



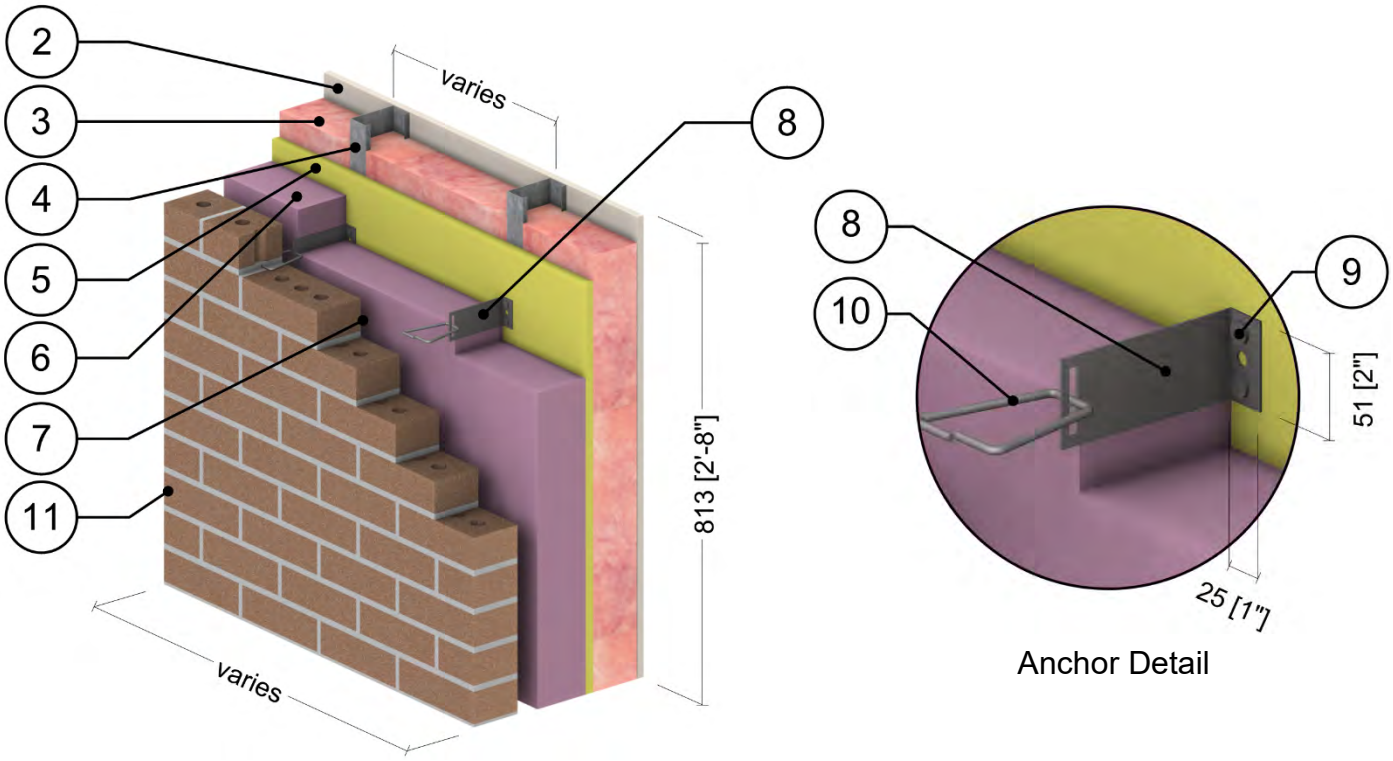
Anchor Detail

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	Fiberglass Batt Insulation	6” (152)	0.30 (0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	1” to 7” (25 to 178)	0.20 (0.029)	R-5 to R-35 (0.88 to 6.16 RSI)	1.8 (28)	0.29 (1220)
7	Vented Air Cavity	1 1/2" (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
8	Stainless Steel Veneer Anchor	Varies	118 (17)	-	500 (8000)	0.12 (500)
9	Stainless Steel Fasteners	0.28” (7) Ø	118 (17)	-	500 (8000)	0.12 (500)
10	Stainless Steel Wire Pintle	-	118 (17)	-	500 (8000)	0.12 (500)
11	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
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

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

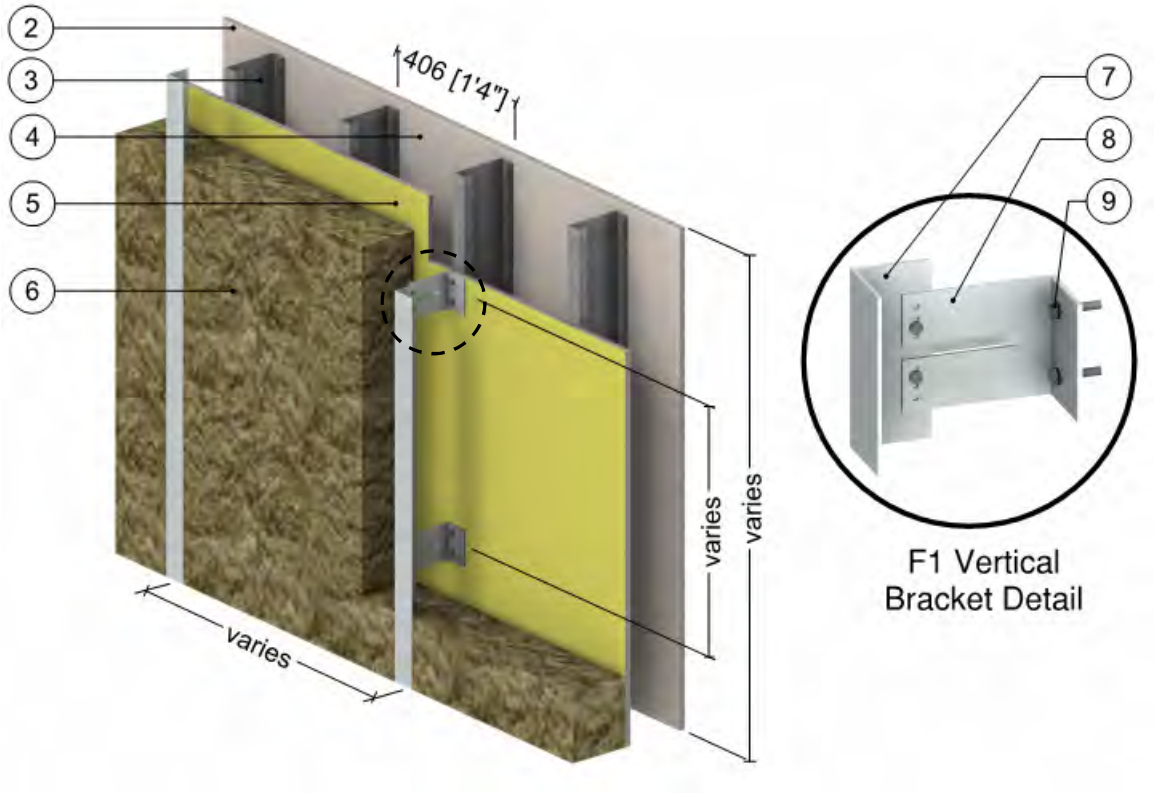


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6” (152)	0.30 (0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Rigid Insulation	Varies	0.20 (0.029)	R-20 to R-35 (3.52 to 6.16 RSI)	Varies	0.29 (1220)
7	Vented Air Cavity	1 1/2" (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
8	Galvanized Steel Veneer Anchor	Varies	430 (62)	-	489 (7830)	0.12 (500)
9	Galvanized Steel Fasteners	0.28” (7) Ø	430 (62)	-	489 (7830)	0.12 (500)
10	Galvanized Steel Wire Pintle	-	430 (62)	-	489 (7830)	0.12 (500)
11	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
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

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

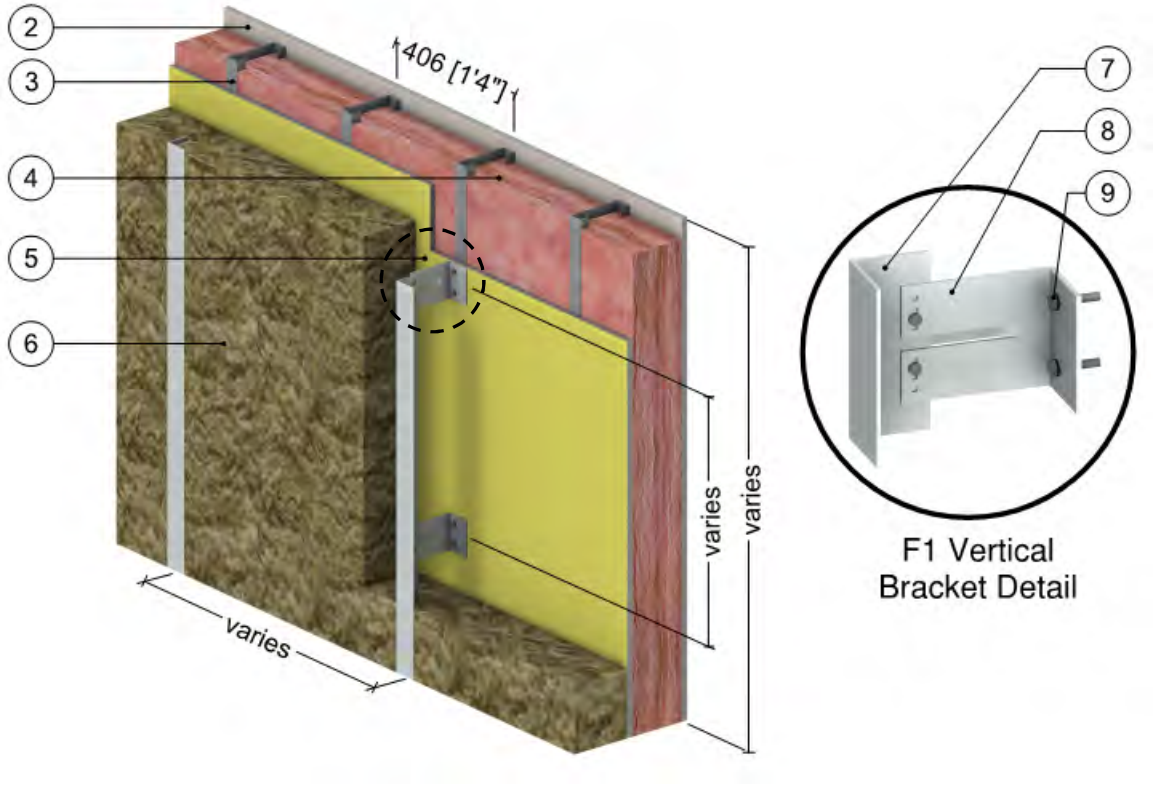


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8” (15)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	2” to 6” (51 to 152)	0.24 (0.034)	R-8.4 to R-25.2 (1.48 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	L Angle Aluminum 6063	-	1450 (209)	-	168 (2700)	0.22 (900)
8	ECO Cladding Alpha V Bracket Aluminum 6063	-	1450 (209)	-	168 (2700)	0.22 (900)
9	#14 Stainless Steel Fasteners	1/4" (6) ∅	118 (17)	-	500 (8000)	0.13 (530)
10	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall

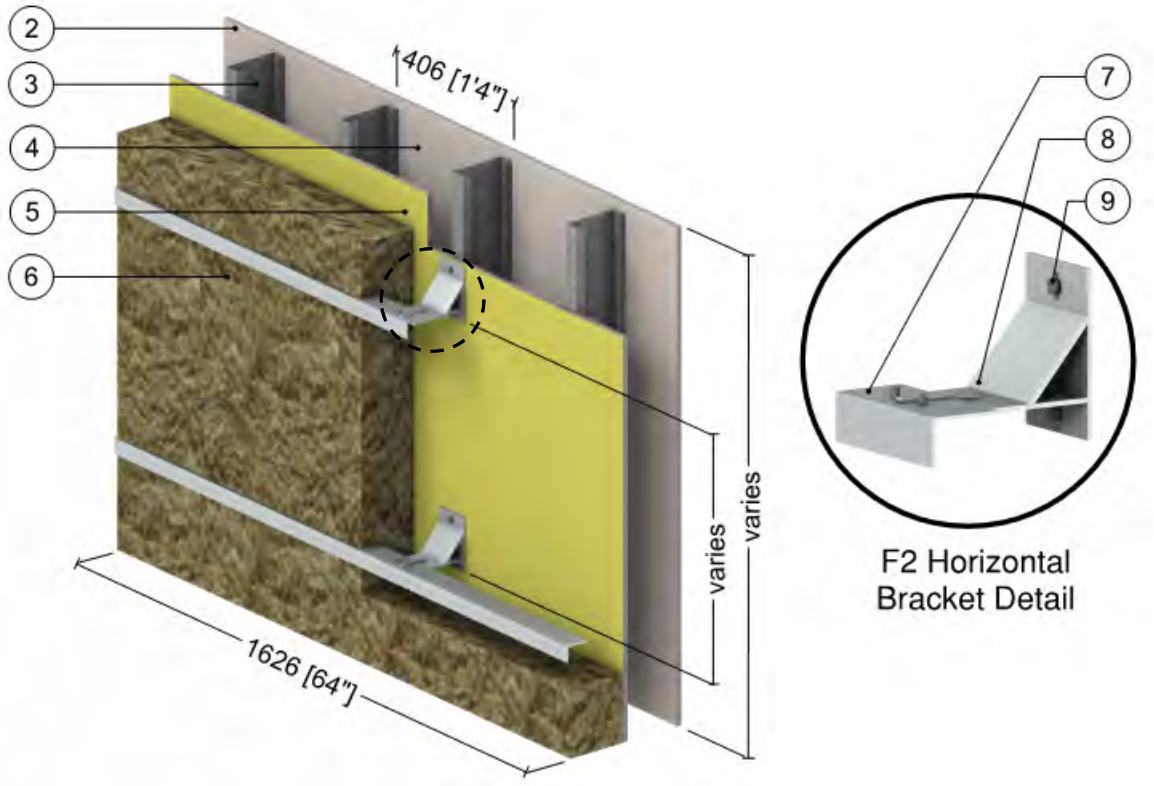


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6” (152)	-	R-19 (3.35 RSI)	0.9 (14)	0.17 (710)
5	Exterior Sheathing	5/8” (15)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	2” to 6” (51 to 152)	0.24 (0.034)	R-8.4 to R-25.2 (1.48 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	L Angle Aluminum 6063	-	1450 (209)	-	168 (2700)	0.22 (900)
8	ECO Cladding Alpha V Bracket Aluminum 6063	-	1450 (209)	-	168 (2700)	0.22 (900)
9	#14 Stainless Steel Fasteners	1/4" (6) ∅	118 (17)	-	500 (8000)	0.13 (530)
10	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

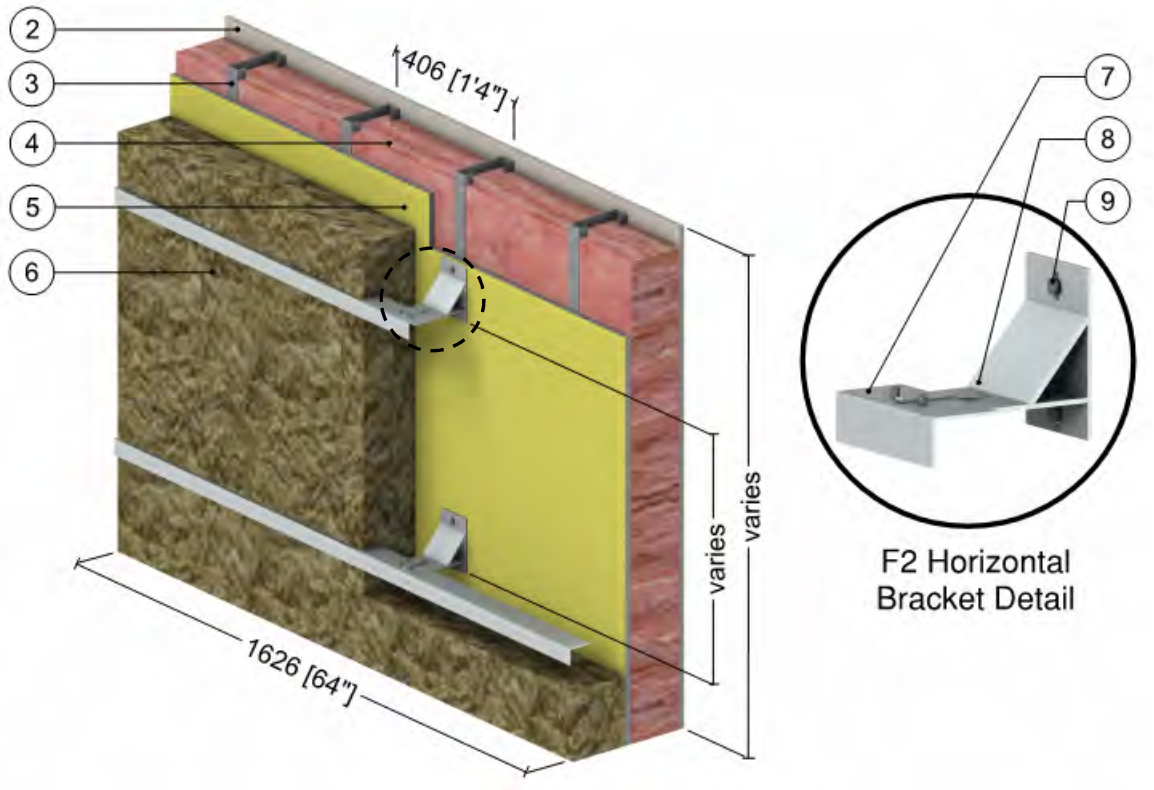


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8” (15)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	2” to 6” (51 to 152)	0.24 (0.034)	R-8.4 to R-25.2 (1.48 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	L Angle Aluminum 6063	-	1450 (209)	-	168 (2700)	0.22 (900)
8	ECO Cladding Alpha H Bracket Aluminum 6063	-	1450 (209)	-	168 (2700)	0.22 (900)
9	#14 Stainless Steel Fasteners	1/4" (6) ∅	118 (17)	-	500 (8000)	0.13 (530)
10	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall

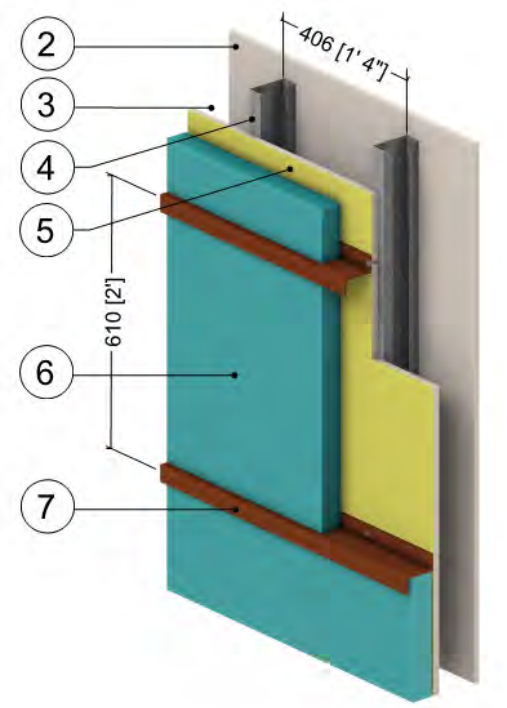


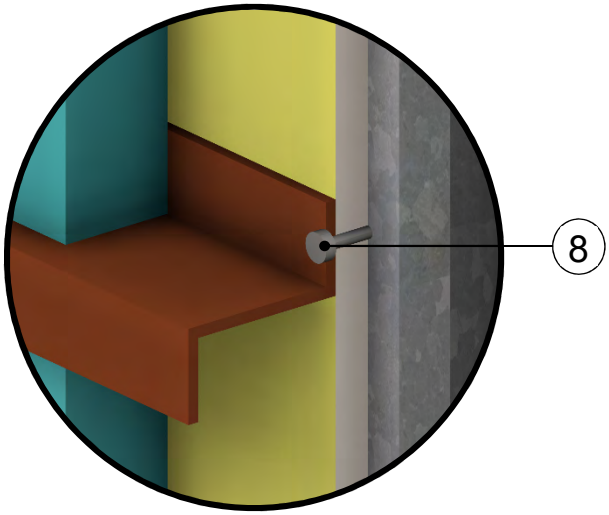
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6” (152)	-	R-19 (3.35 RSI)	0.9 (14)	0.17 (710)
5	Exterior Sheathing	5/8” (15)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	2” to 6” (51 to 152)	0.24 (0.034)	R-8.4 to R-25.2 (1.48 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	L Angle Aluminum 6063	-	1450 (209)	-	168 (2700)	0.22 (900)
8	ECO Cladding Alpha H Bracket Aluminum 6063	-	1450 (209)	-	168 (2700)	0.22 (900)
9	#14 Stainless Steel Fasteners	1/4" (6) ∅	118 (17)	-	500 (8000)	0.13 (530)
10	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





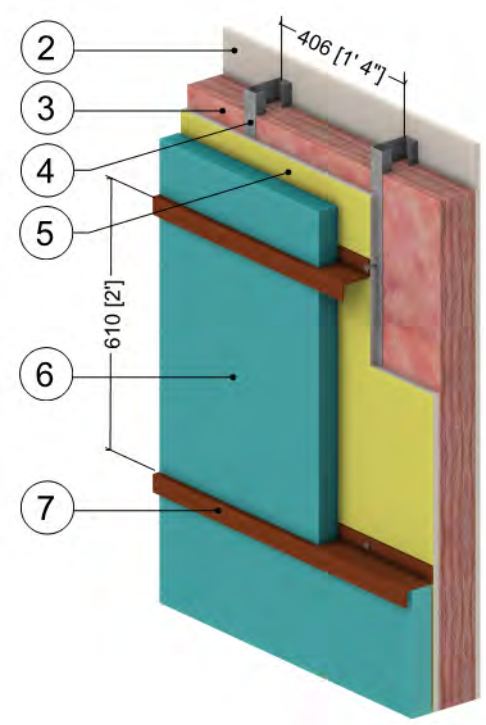
FRR Girt Detail

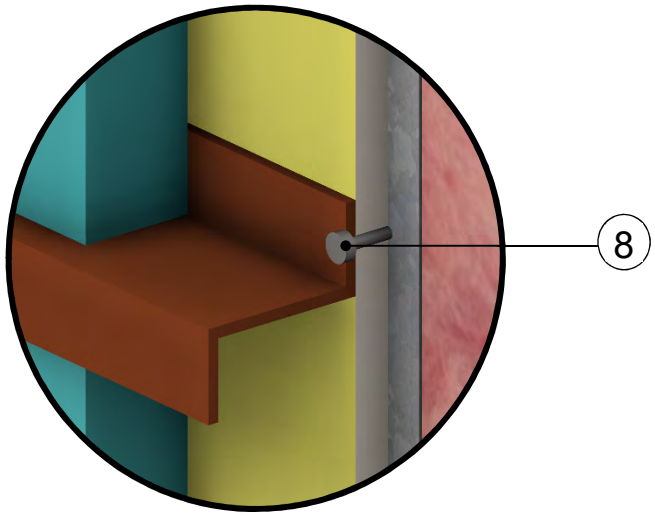
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5.0 to R-35.0 (0.88 RSI to 6.16 RSI)	4 (64)	0.20 (850)
7	Armadillo FRR Girt	-	1.4 (0.2)	-	85 (5.3)	-
8	#12 Steel Fasteners (16" o.c.)	7/32" (5.5) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall





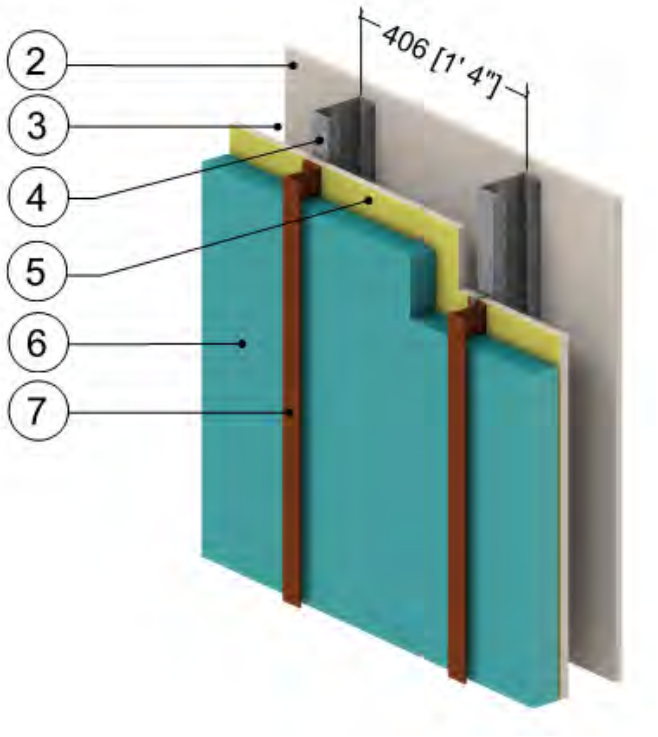
FRR Girt Detail

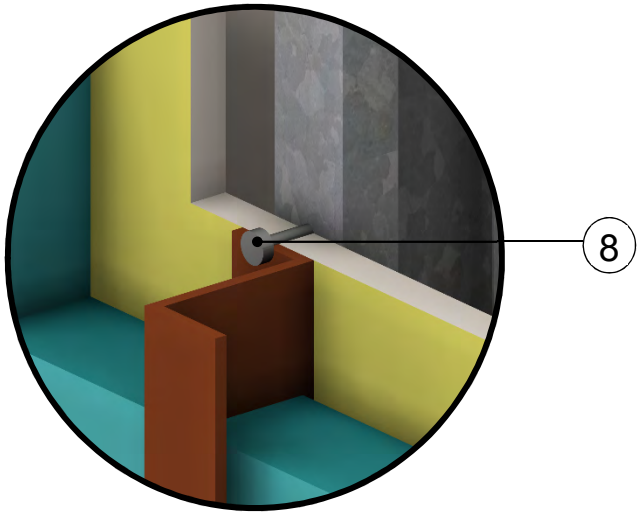
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	-	R-13.0 (2.29 RSI)	4 (64)	0.20 (850)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5.0 to R-35.0 (0.88 RSI to 6.16 RSI)	4 (64)	0.20 (850)
7	Armadillo FRR Girt	-	1.4 (0.2)	-	85 (5.3)	-
8	#12 Steel Fasteners (16" o.c.)	7/32" (5.5) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





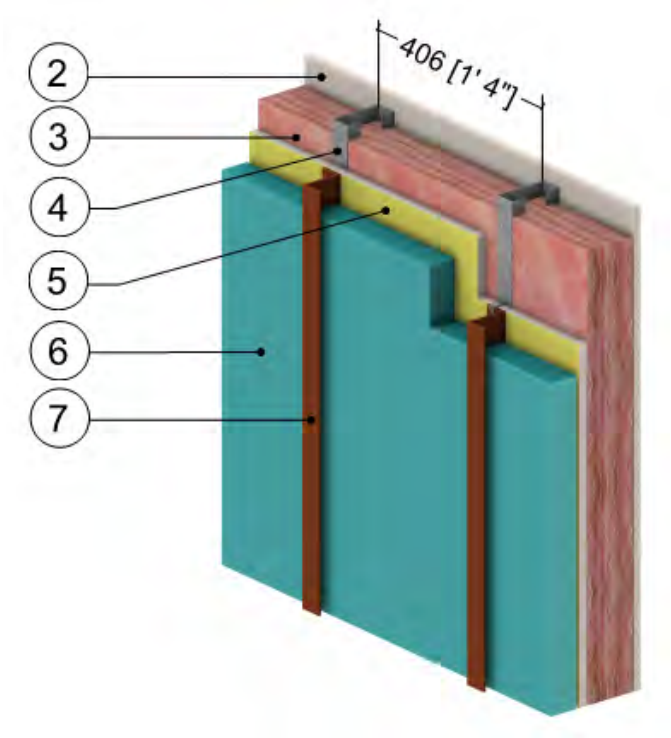
FRR Girt Detail

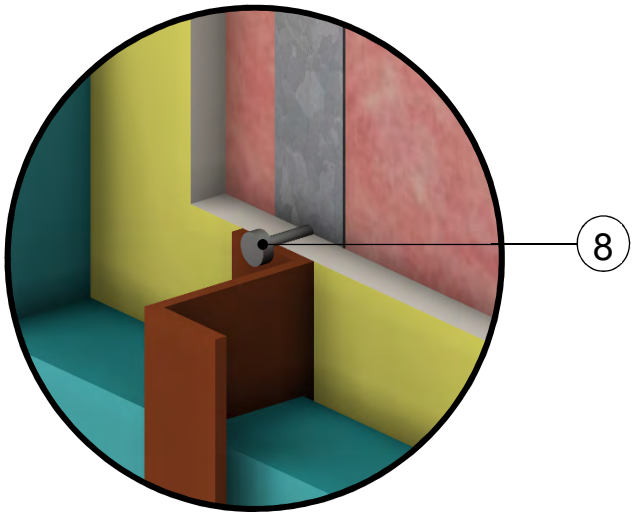
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5.0 to R-35.0 (0.88 RSI to 6.16 RSI)	4 (64)	0.20 (850)
7	Armadillo FRR Girt	-	1.4 (0.2)	-	85 (5.3)	-
8	#12 Steel Fasteners (16" o.c.)	7/32" (5.5) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Clear Wall





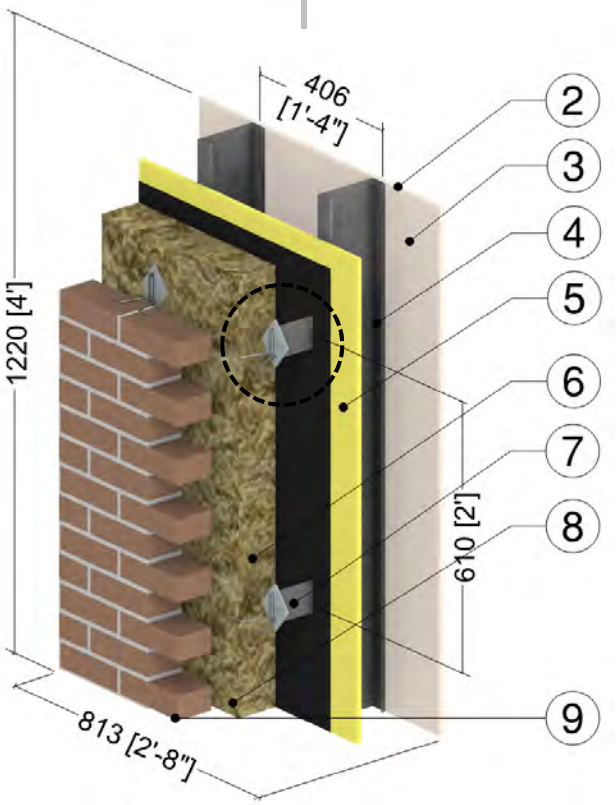
FRR Girt Detail

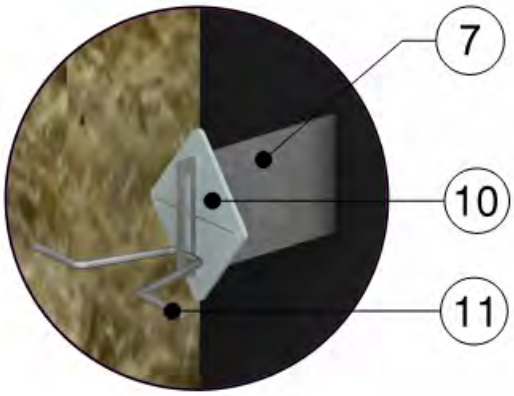
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	-	R-13.0 (2.29 RSI)	4 (64)	0.20 (850)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5.0 to R-35.0 (0.88 RSI to 6.16 RSI)	4 (64)	0.20 (850)
7	Armadillo FRR Girt	-	1.4 (0.2)	-	85 (5.3)	-
8	#12 Steel Fasteners (16" o.c.)	7/32" (5.5) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





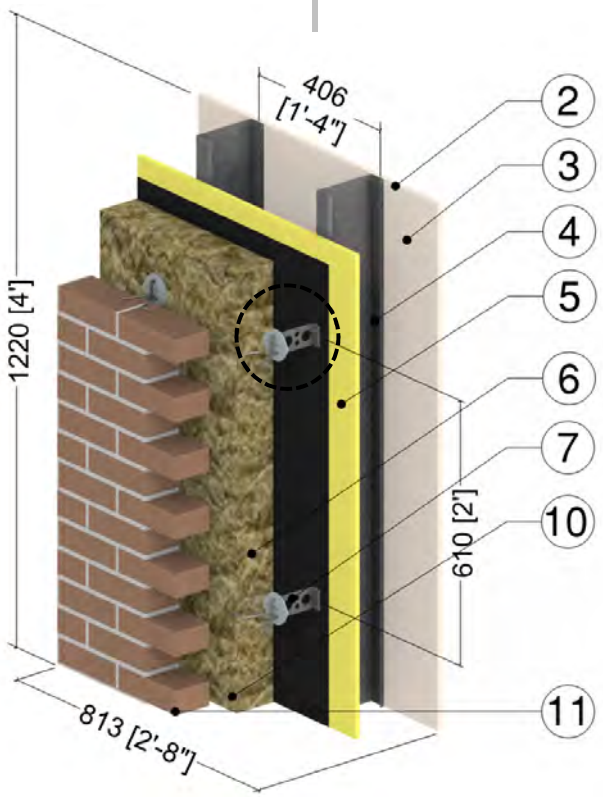
Brick Tie

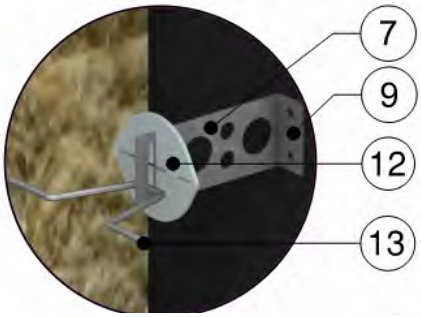
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	4" (102)	varies	R-16.8 (2.96 RSI) to R-24.0 (4.23 RSI)	varies	varies
7	Brick Ties	4" (102)	430 (62)	-	445 (7130)	0.09 (390)
8	Vented Air Cavity	1" (25)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Insulation Support	1/8" (3)	2.9 (0.42)	-	-	-
11	Brick Tie Wire	-	430 (62)	-	445 (7130)	0.09 (390)
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

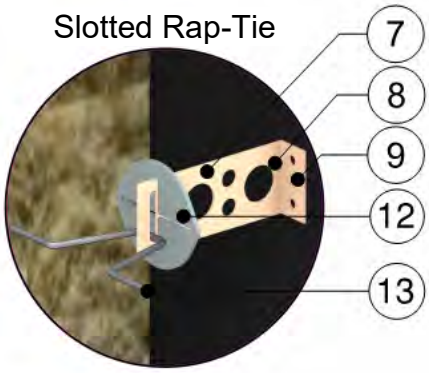
Detail 5.1.89

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





Slotted Rap-Tie



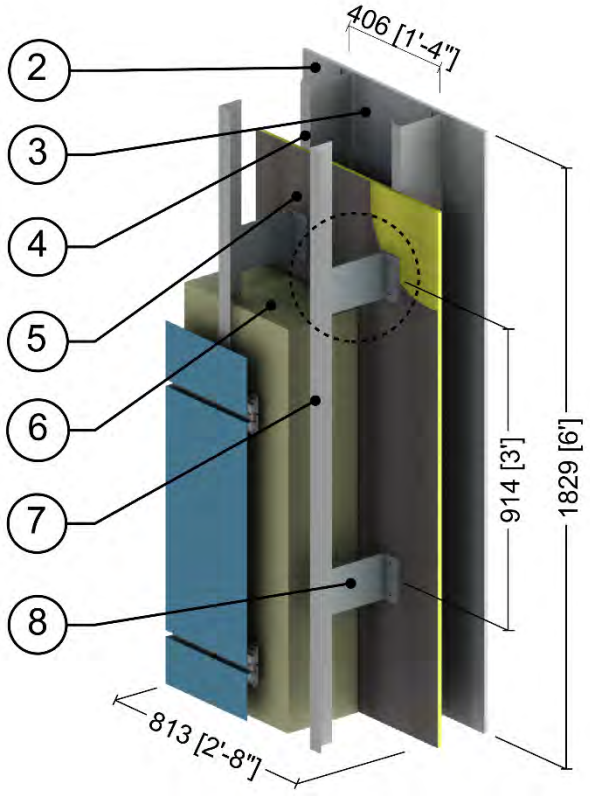
Slotted Rap-Tie with Aerogel Coating

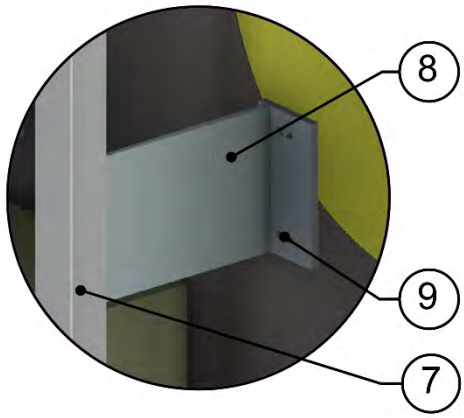
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	4" (102)	varies	R-16.8 (2.96 RSI) to R-24.0 (4.23 RSI)	varies	varies
7	FERO Slotted Rap-Ties	4" (102)	430 (62)	-	445 (7130)	0.09 (390)
8	Aerogel Coating	1/8" (3)	0.24 (0.035)	-	-	-
9	Tie Fastener	5/16" (8) Ø	118 (17)	-	489 (7830)	0.12 (500)
10	Vented Air Cavity	1" (25)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
11	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
12	Insulation Support	1/8" (3)	2.9 (0.42)	-	-	-
13	Brick Tie Wire	-	430 (62)	-	445 (7130)	0.09 (390)
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

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





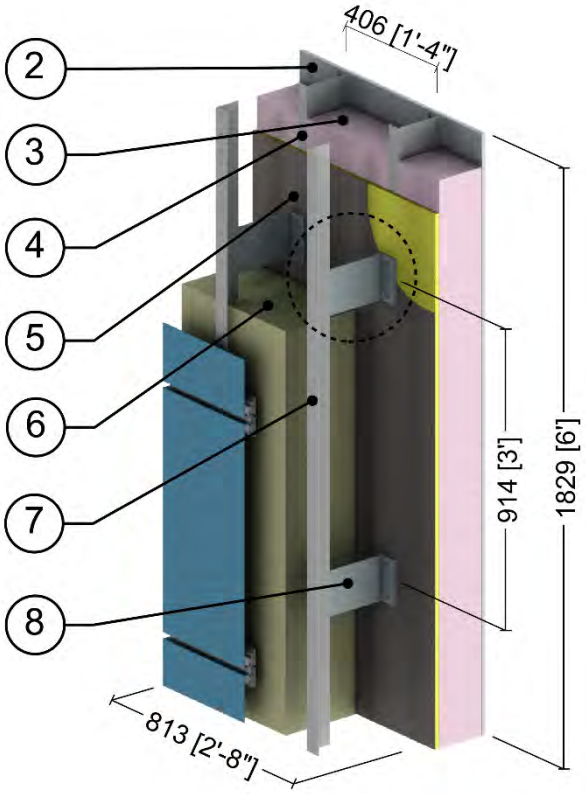
Clip Detail

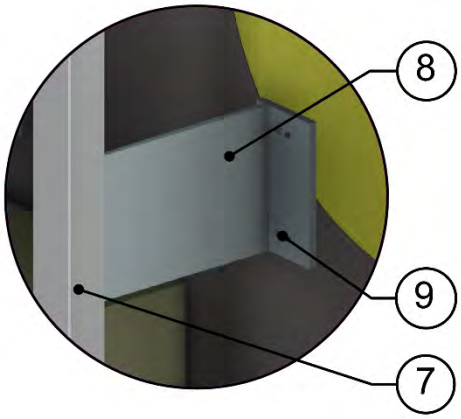
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-25.2 to R-42.0 (4.44 to 7.40 RSI)	4 (64)	0.20 (850)
7	Vertical Aluminum L-girt	0.10” (2.5)	1339 (193)	-	169 (2700)	0.22 (900)
8	Fiber Reinforced Plastic Clip	0.22” (5.5)	4.9 (0.7)	-	-	-
9	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
10	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





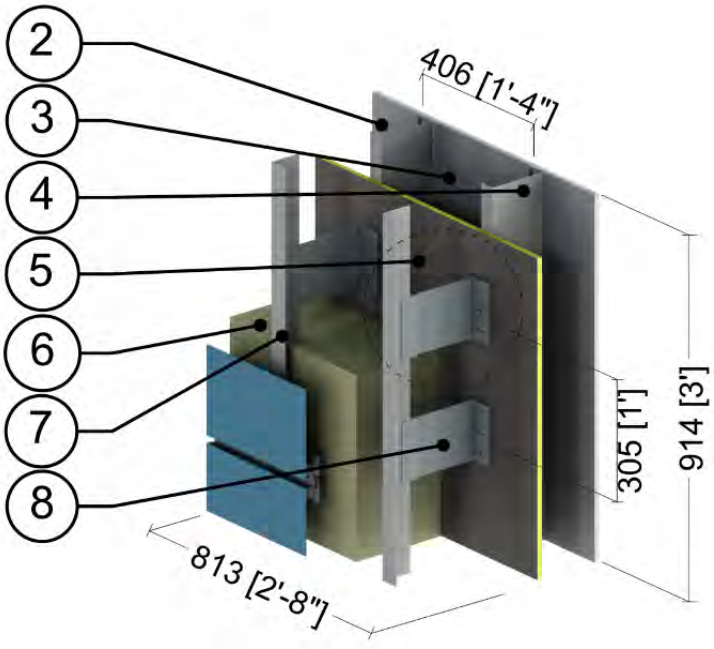
Clip Detail

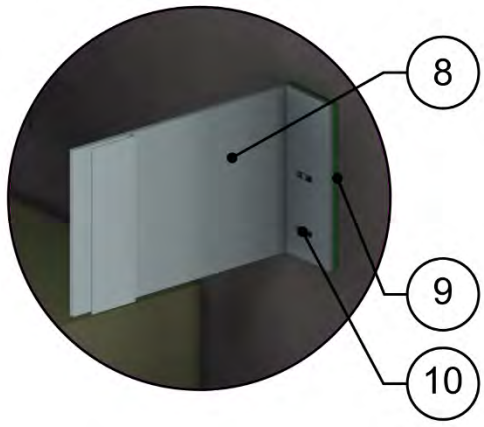
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6” (152)	0.32 (0.046)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-25.2 to R-42.0 (4.44 to 7.40 RSI)	4 (64)	0.20 (850)
7	Vertical Aluminum L-girt	0.10” (2.5)	1339 (193)	-	169 (2700)	0.22 (900)
8	Fiber Reinforced Plastic Clip	0.22” (5.5)	4.9 (0.7)	-	-	-
9	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
10	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





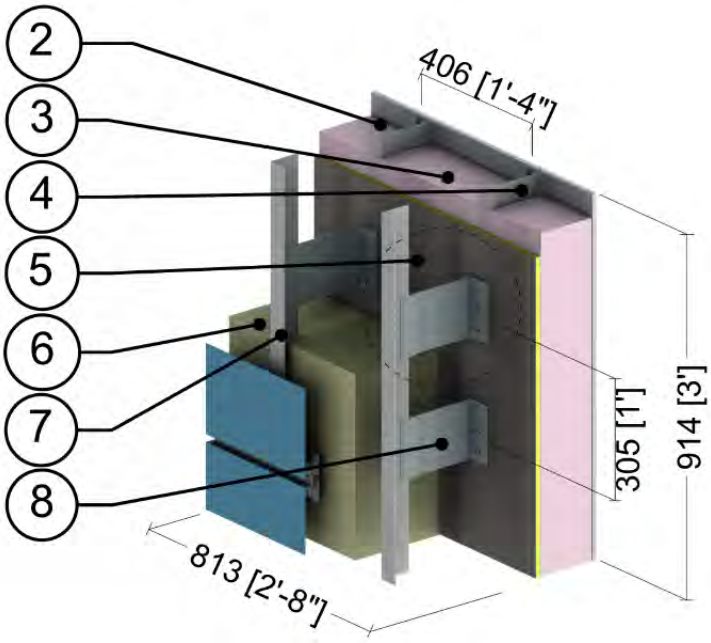
Bracket Detail

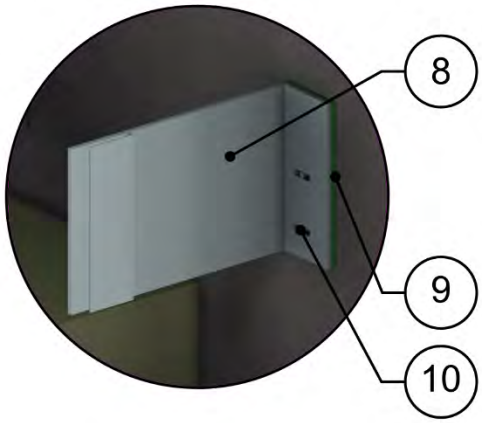
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6" (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-25.2 to R-42.0 (4.44 to 7.40 RSI)	4 (64)	0.20 (850)
7	Vertical Aluminum L-girt	0.10" (2.5)	1339 (193)	-	169 (2700)	0.22 (900)
8	Aluminum Bracket	Varies	1339 (193)	-	169 (2700)	0.22 (900)
9	Isolator Pad	0.2" (5)	0.82 (0.117)	-	87 (1400)	0.20 (840)
10	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





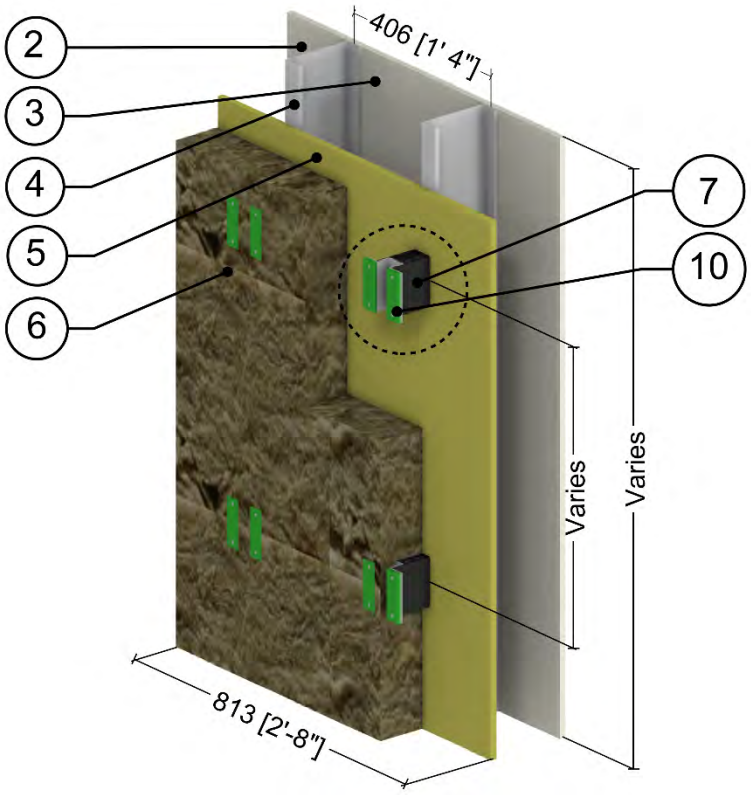
Bracket Detail

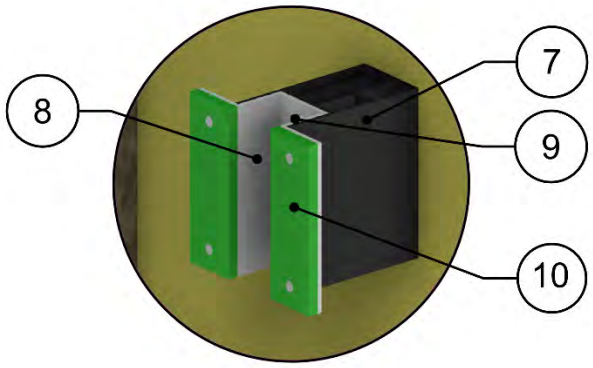
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6" (152)	0.32 (0.046)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	6" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-25.2 to R-42.0 (4.44 to 7.40 RSI)	4 (64)	0.20 (850)
7	Vertical Aluminum L-girt	0.10" (2.5)	1339 (193)	-	169 (2700)	0.22 (900)
8	Aluminum Bracket	Varies	1340 (193)	-	169 (2700)	0.22 (900)
9	Isolator Pad	0.2" (5)	0.82 (0.117)	-	87 (1400)	0.20 (840)
10	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





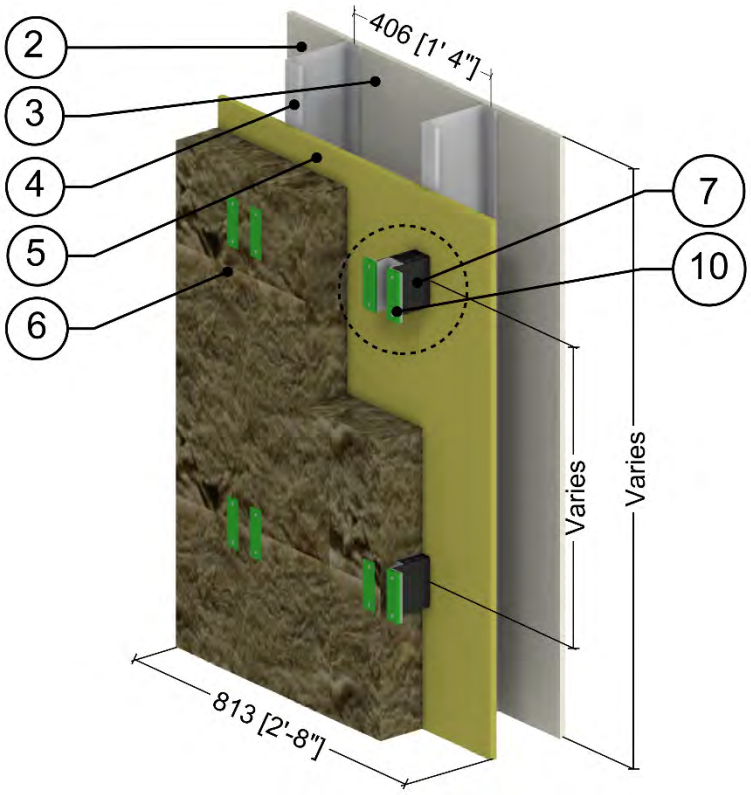
Clip Detail

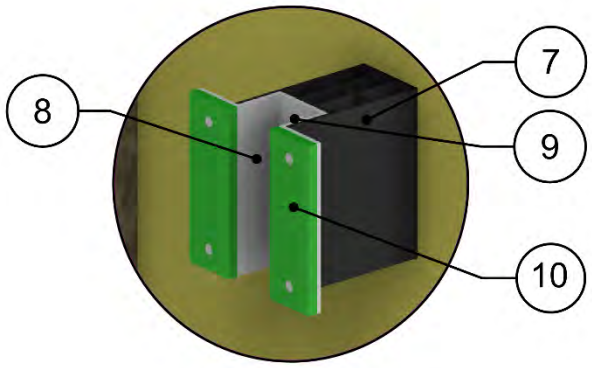
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	-	R-8.4 to R-33.6 (1.48 to 5.92 RSI)	4 (64)	0.20 (850)
7	Polyamide Thermal Break	Varies	1.7 (0.25)	-	-	-
8	Aluminum C-Channel	-	1390 (200)	-	168 (2700)	0.22 (900)
9	Fasteners	1/4" (6) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	Spacer Shims	1/4” (6)	1.7 (0.25)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





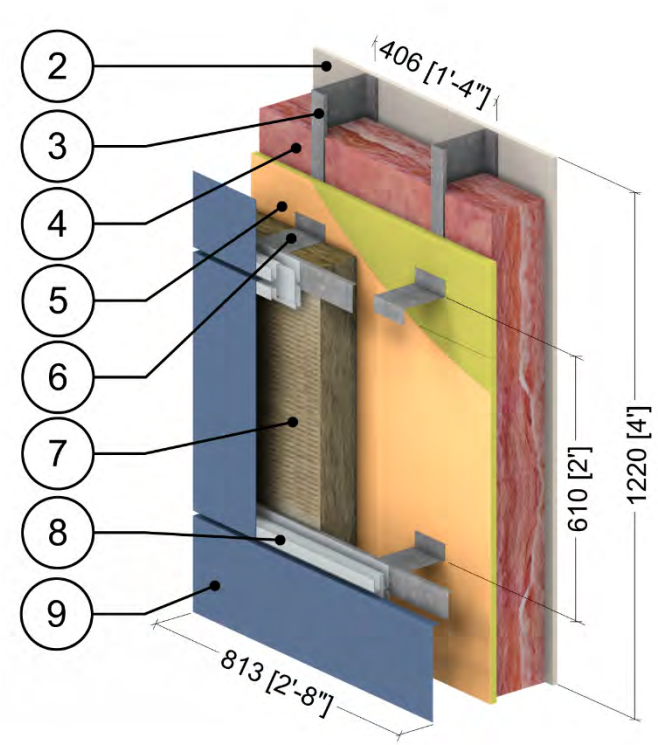
Clip Detail

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 (0.09 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	-	R-8.4 to R-33.6 (1.48 to 5.92 RSI)	4 (64)	0.20 (850)
7	Polyamide Thermal Break	Varies	1.7 (0.25)	-	-	-
8	Aluminum C-Channel	-	1390 (200)	-	168 (2700)	0.22 (900)
9	Fasteners	1/4" (6) Ø	111 (16)	-	500 (8000)	0.12 (500)
10	Spacer Shims	1/4” (6)	1.7 (0.25)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

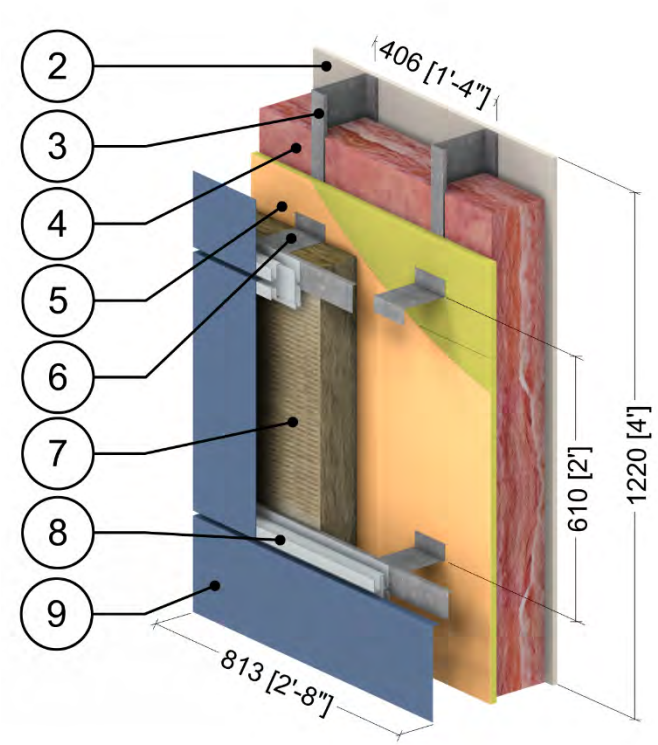


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	-	R-20 (3.52 RSI)	varies	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Horizontal Clips w/ 1 1/2" horizontal rail	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-6.3 to R-21.0 (1.11 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

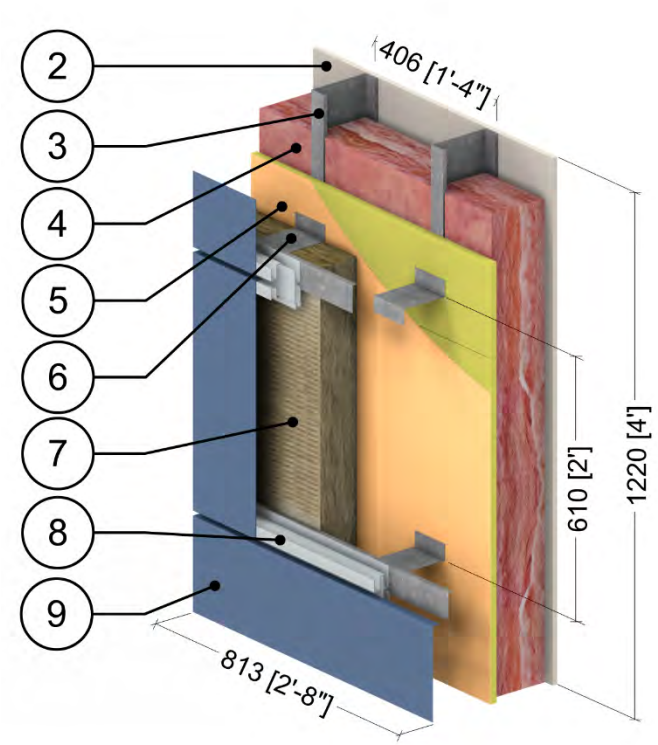


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.26 (0.038)	R-22.5 (4.0 RSI)	0.99 (15.9)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Horizontal Clips w/ 1 1/2" horizontal rail	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-6.3 to R-21.0 (1.11 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

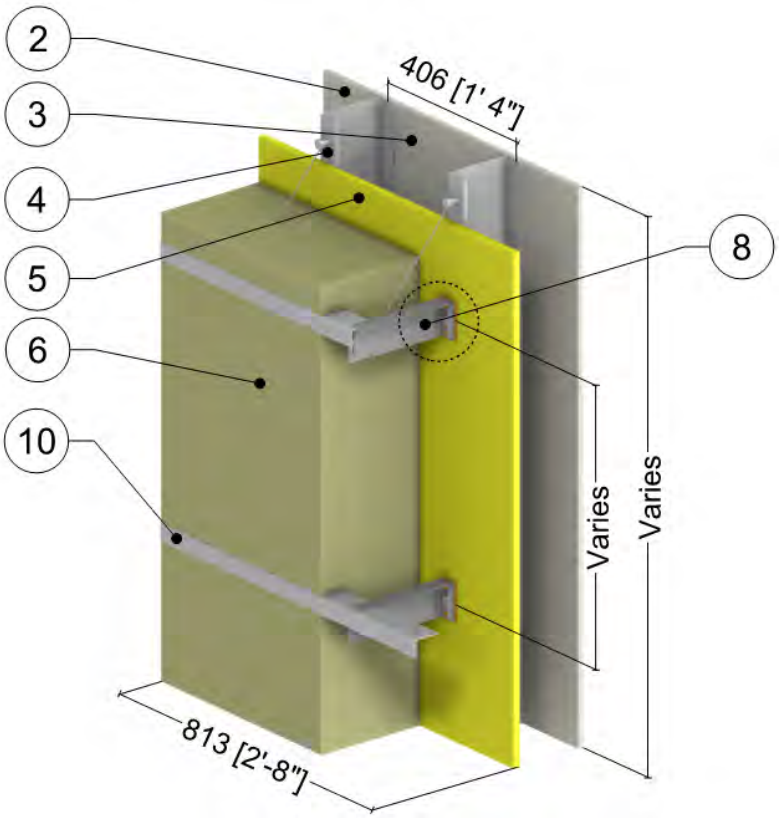


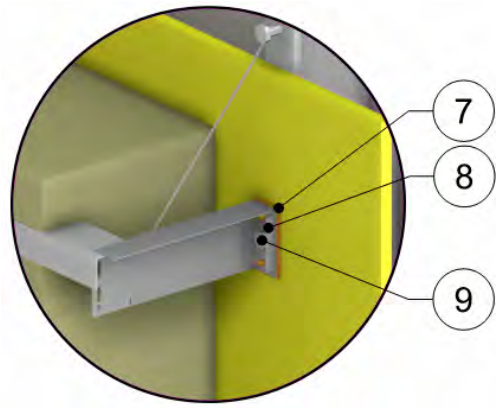
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.25 (0.036)	R-24 (4.2 RSI)	1.42 (22.7)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Horizontal Clips w/ 1 1/2" horizontal rail	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-6.3 to R-21.0 (1.11 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





Console Detail

Exterior Insulation Thickness for Console Sizes

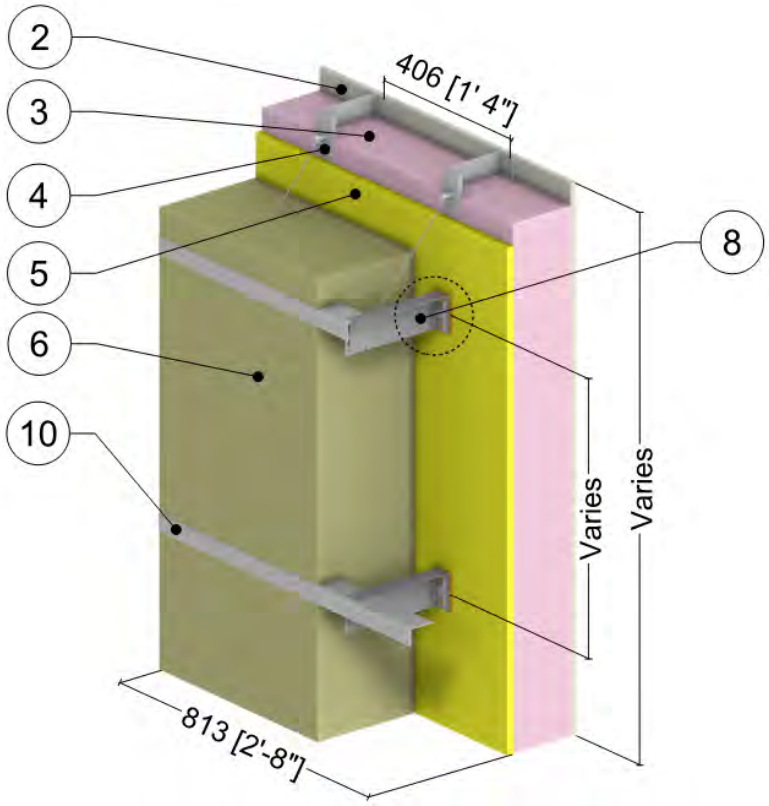
Crossfix Console Size	Exterior Insulation Thickness in (mm)
40	2 (51)
80	3.5 (89)
120	5 (127)
200	8.5 (216)
240	10 (254)
320	13 (330)
400	16 (406)

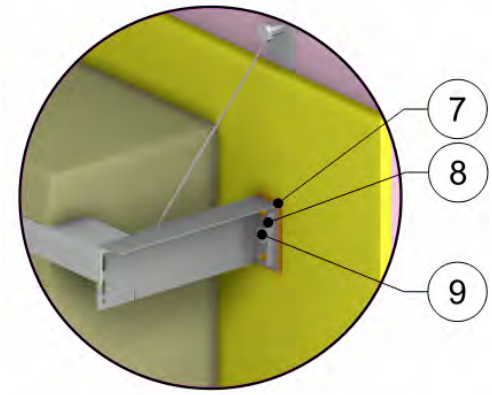
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-67.2 (1.48 to 11.84 RSI)	4 (64)	0.20 (850)
7	Thermostop	0.2” (5)	2.2 (0.32)	-	69 (1100)	0.36 (1500)
8	EJOT Console and Components	0.06” (1.5)	112 (16)	-	499 (8000)	0.12 (500)
9	Fastener	0.22" (5.5) Ø	112 (16)	-	499 (8000)	0.12 (500)
10	Rail	0.08” (2)	1110 (160)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





Console Detail

Exterior Insulation Thickness for Console Sizes

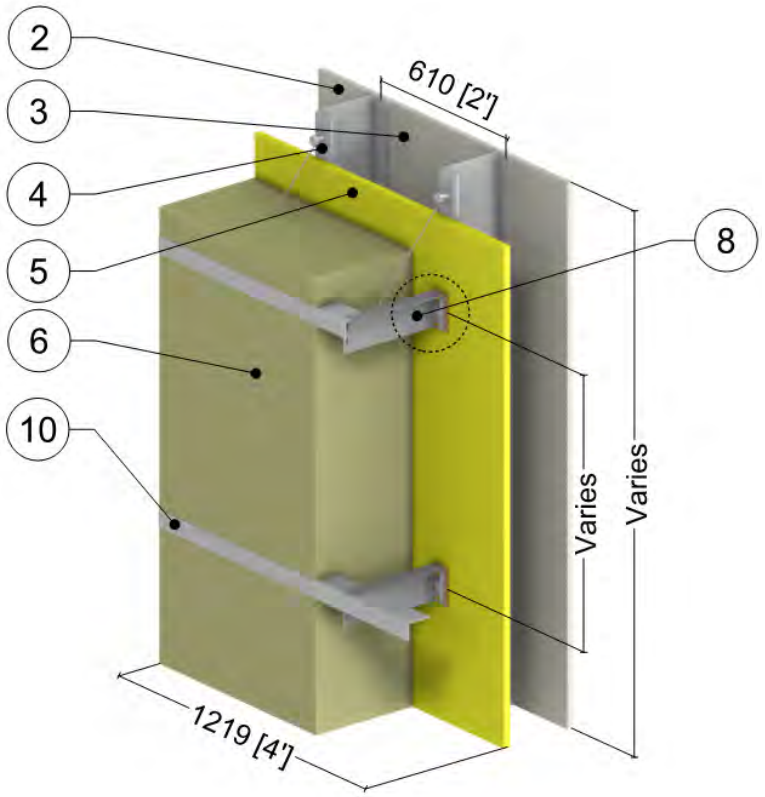
Crossfix Console Size	Exterior Insulation Thickness in (mm)
40	2 (51)
80	3.5 (89)
120	5 (127)
200	8.5 (216)
240	10 (254)
320	13 (330)
400	16 (406)

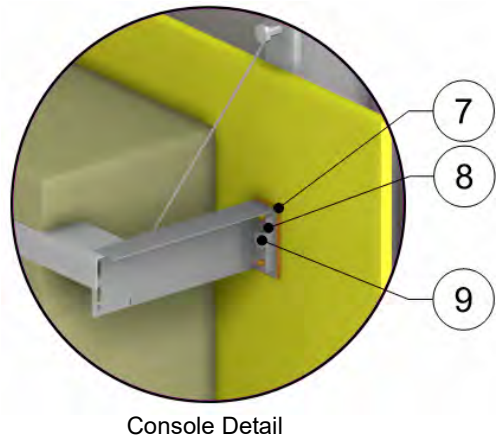
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6” (152)	0.30 (0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-67.2 (1.48 to 11.84 RSI)	4 (64)	0.20 (850)
7	Thermostop	0.2” (5)	2.2 (0.32)	-	69 (1100)	0.36 (1500)
8	EJOT Console and Components	0.06” (1.5)	112 (16)	-	499 (8000)	0.12 (500)
9	Fastener	0.22" (5.5) Ø	112 (16)	-	499 (8000)	0.12 (500)
10	Rail	0.08” (2)	1110 (160)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





Console Detail

Exterior Insulation Thickness for Console Sizes

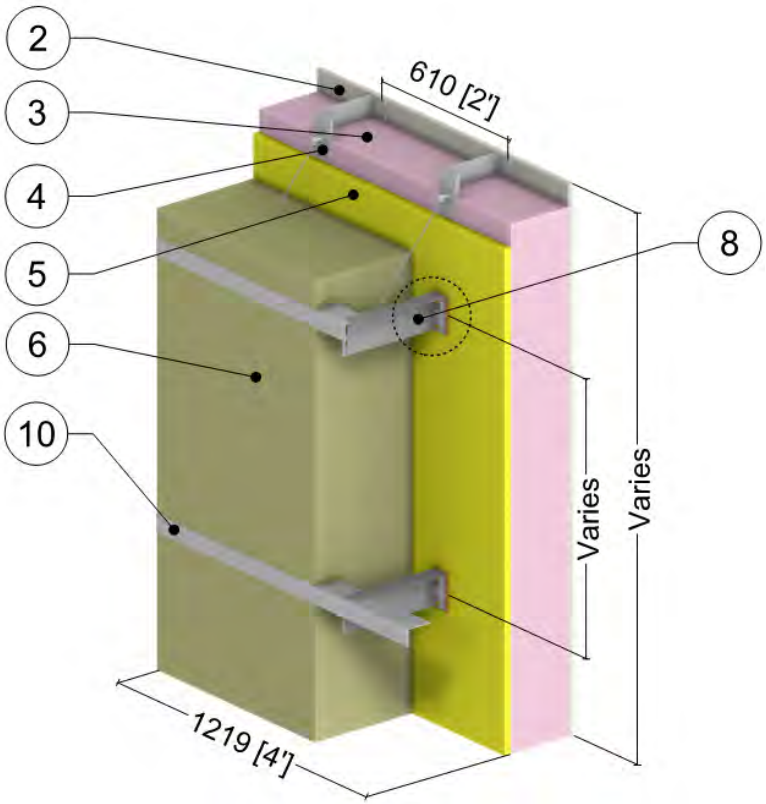
Crossfix Console Size	Exterior Insulation Thickness in (mm)
40	2 (51)
80	3.5 (89)
120	5 (127)
200	8.5 (216)
240	10 (254)
320	13 (330)
400	16 (406)

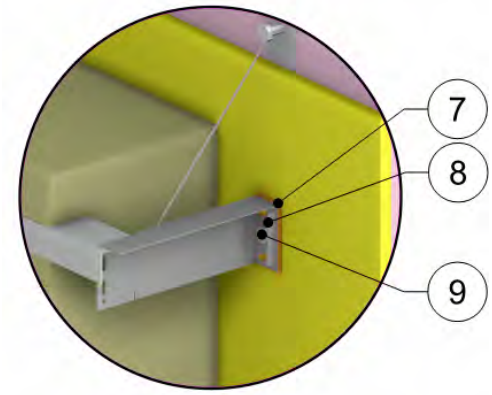
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-67.2 (1.48 to 11.84 RSI)	4 (64)	0.20 (850)
7	Thermostop	0.2” (5)	2.2 (0.32)	-	69 (1100)	0.36 (1500)
8	EJOT Console and Components	0.06” (1.5)	112 (16)	-	499 (8000)	0.12 (500)
9	Fastener	0.22" (5.5) Ø	112 (16)	-	499 (8000)	0.12 (500)
10	Rail	0.08” (2)	1110 (160)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





Console Detail

Exterior Insulation Thickness for Console Sizes

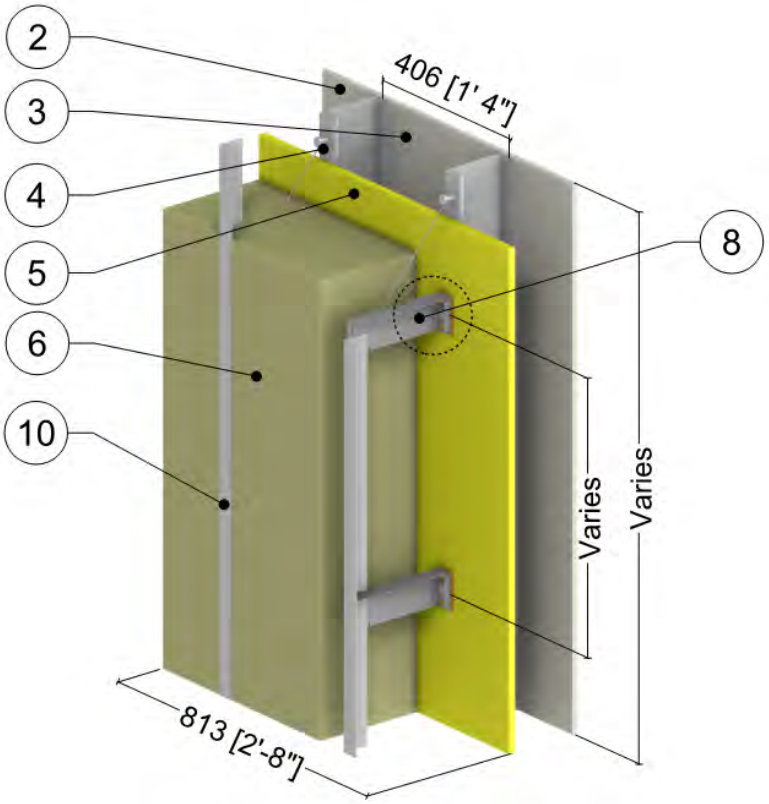
Crossfix Console Size	Exterior Insulation Thickness in (mm)
40	2 (51)
80	3.5 (89)
120	5 (127)
200	8.5 (216)
240	10 (254)
320	13 (330)
400	16 (406)

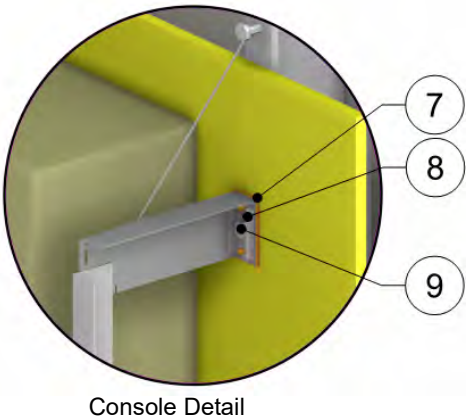
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6” (152)	0.30 (0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-67.2 (1.48 to 11.84 RSI)	4 (64)	0.20 (850)
7	Thermostop	0.2” (5)	2.2 (0.32)	-	69 (1100)	0.36 (1500)
8	EJOT Console and Components	0.06” (1.5)	112 (16)	-	499 (8000)	0.12 (500)
9	Fastener	0.22" (5.5) Ø	112 (16)	-	499 (8000)	0.12 (500)
10	Rail	0.08” (2)	1110 (160)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





Console Detail

Exterior Insulation Thickness for Console Sizes

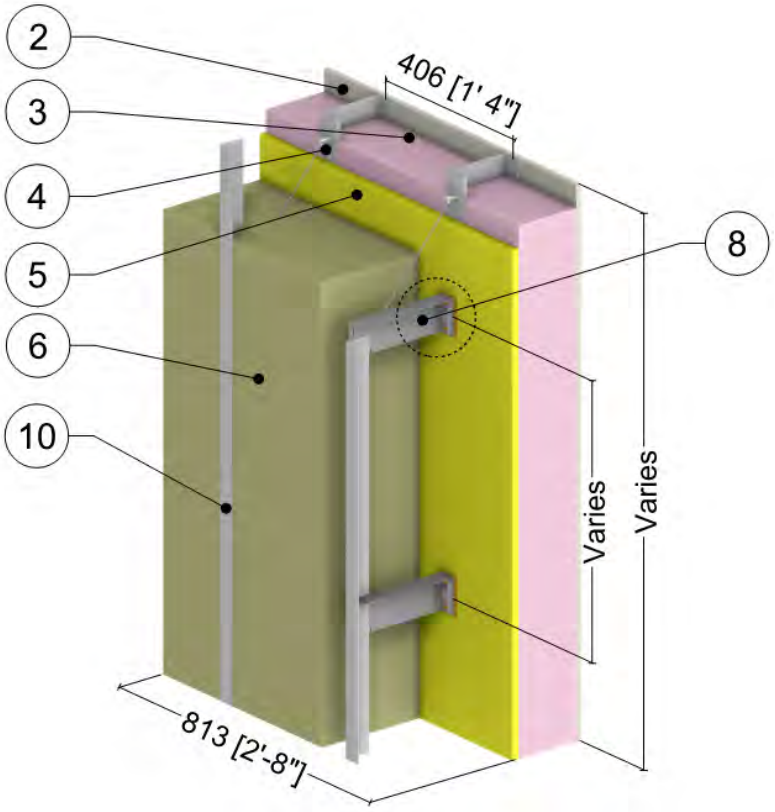
Crossfix Console Size	Exterior Insulation Thickness in (mm)
40	2 (51)
80	3.5 (89)
120	5 (127)
200	8.5 (216)
240	10 (254)
320	13 (330)
400	16 (406)

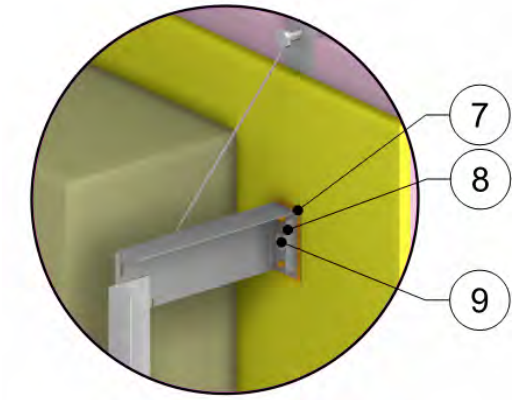
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-67.2 (1.48 to 11.84 RSI)	4 (64)	0.20 (850)
7	Thermostop	0.2” (5)	2.2 (0.32)	-	69 (1100)	0.36 (1500)
8	EJOT Console and Components	0.06” (1.5)	112 (16)	-	499 (8000)	0.12 (500)
9	Fastener	0.22" (5.5) Ø	112 (16)	-	499 (8000)	0.12 (500)
10	Rail	0.08” (2)	1110 (160)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





Console Detail

Exterior Insulation Thickness for Console Sizes

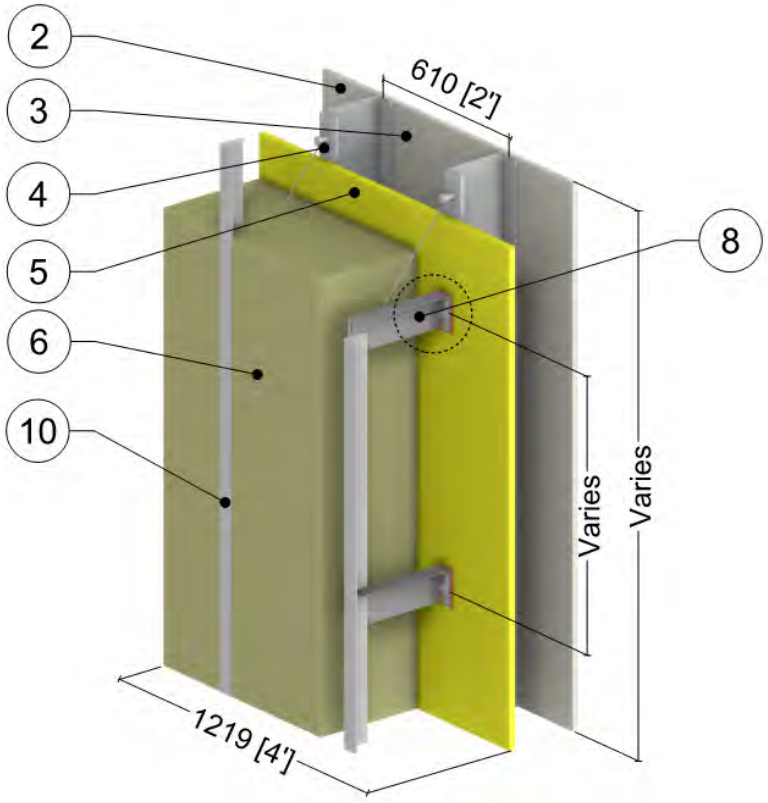
Crossfix Console Size	Exterior Insulation Thickness in (mm)
40	2 (51)
80	3.5 (89)
120	5 (127)
200	8.5 (216)
240	10 (254)
320	13 (330)
400	16 (406)

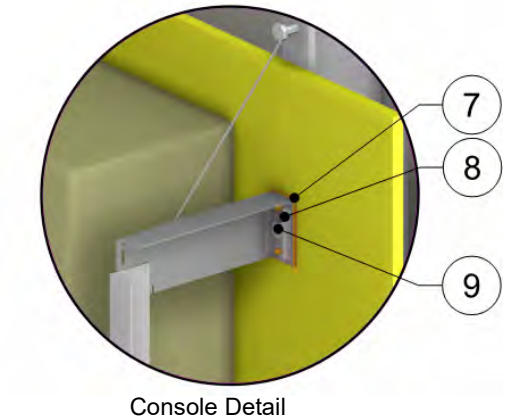
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6” (152)	0.30 (0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-67.2 (1.48 to 11.84 RSI)	4 (64)	0.20 (850)
7	Thermostop	0.2” (5)	2.2 (0.32)	-	69 (1100)	0.36 (1500)
8	EJOT Console and Components	0.06” (1.5)	112 (16)	-	499 (8000)	0.12 (500)
9	Fastener	0.22" (5.5) Ø	112 (16)	-	499 (8000)	0.12 (500)
10	Rail	0.08” (2)	1110 (160)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





Console Detail

Exterior Insulation Thickness for Console Sizes

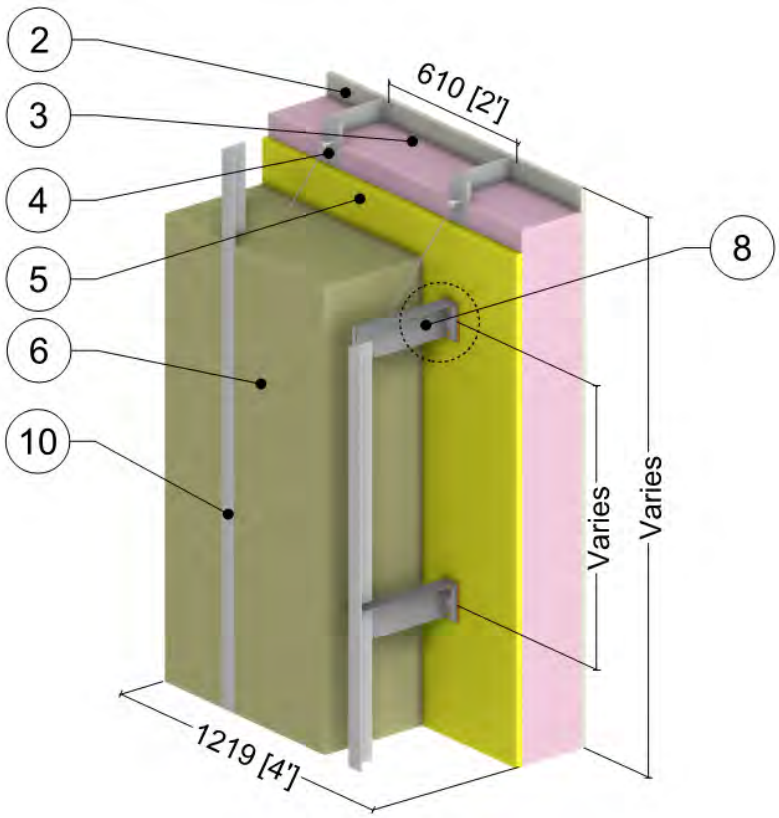
Crossfix Console Size	Exterior Insulation Thickness in (mm)
40	2 (51)
80	3.5 (89)
120	5 (127)
200	8.5 (216)
240	10 (254)
320	13 (330)
400	16 (406)

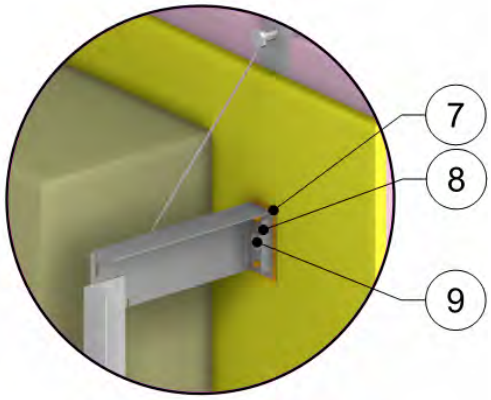
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-67.2 (1.48 to 11.84 RSI)	4 (64)	0.20 (850)
7	Thermostop	0.2” (5)	2.2 (0.32)	-	69 (1100)	0.36 (1500)
8	EJOT Console and Components	0.06” (1.5)	112 (16)	-	499 (8000)	0.12 (500)
9	Fastener	0.22" (5.5) Ø	112 (16)	-	499 (8000)	0.12 (500)
10	Rail	0.08” (2)	1110 (160)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





Console Detail

Exterior Insulation Thickness for Console Sizes

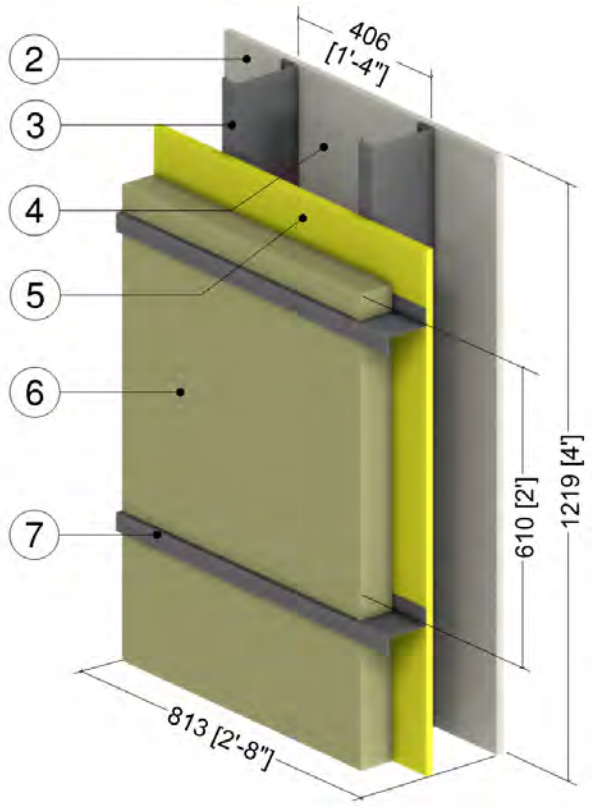
Crossfix Console Size	Exterior Insulation Thickness in (mm)
40	2 (51)
80	3.5 (89)
120	5 (127)
200	8.5 (216)
240	10 (254)
320	13 (330)
400	16 (406)

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 Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	6” (152)	0.30 (0.043)	R-20 (3.5 RSI)	0.55 (8.8)	0.17 (710)
4	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-67.2 (1.48 to 11.84 RSI)	4 (64)	0.20 (850)
7	Thermostop	0.2” (5)	2.2 (0.32)	-	69 (1100)	0.36 (1500)
8	EJOT Console and Components	0.06” (1.5)	112 (16)	-	499 (8000)	0.12 (500)
9	Fastener	0.22" (5.5) Ø	112 (16)	-	499 (8000)	0.12 (500)
10	Rail	0.08” (2)	1110 (160)	-	-	-
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.107

Exterior Insulated 6” x 1 5/8” 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

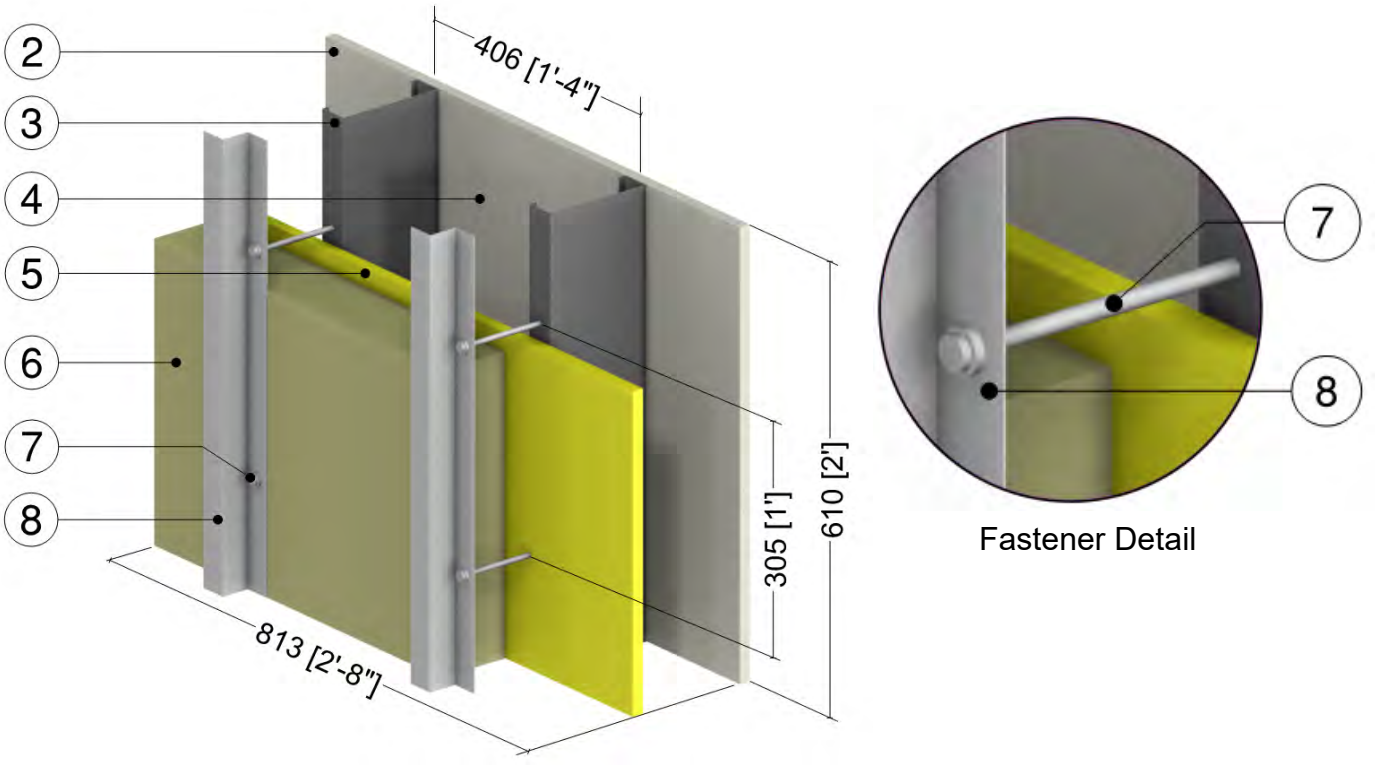


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Max Mineral Wool Semi Rigid Insulation	Varies	0.25 (0.036)	R-4 to R-24 (0.70 to 4.23 RSI)	11 (176)	0.20 (850)
7	Horizontal Z-Girts with 1-1/2” Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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



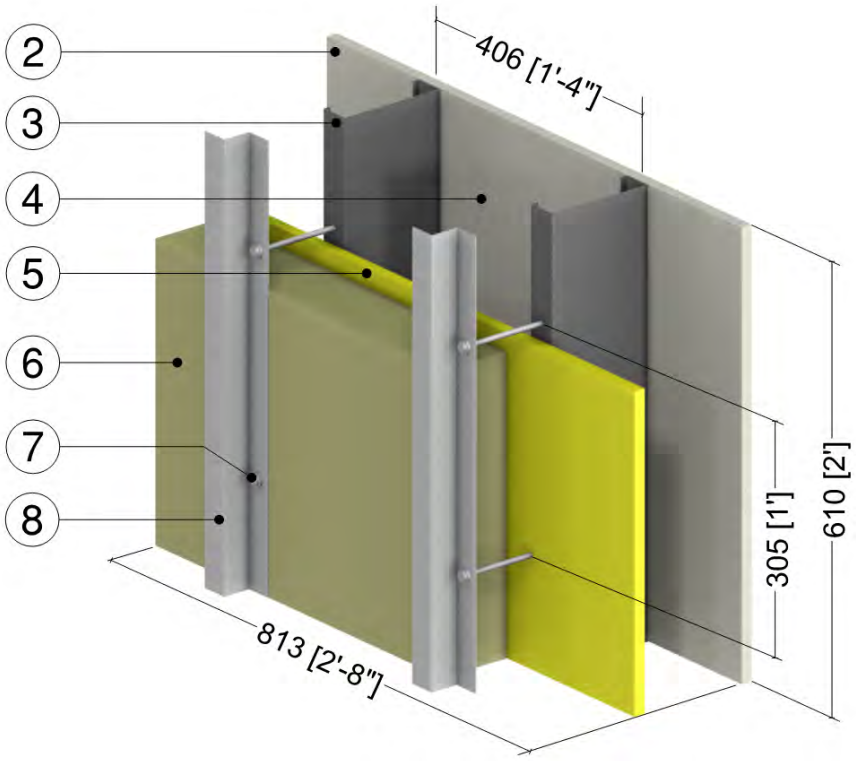
Fastener Detail

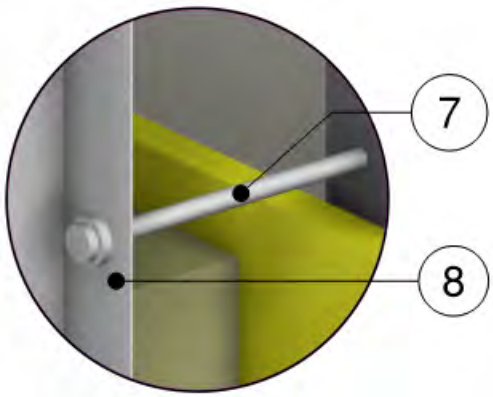
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Max Mineral Wool Semi Rigid Insulation	Varies	0.25 (0.036)	R-4.0 to R-16.0 (0.70 to 2.82 RSI)	11 (176)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





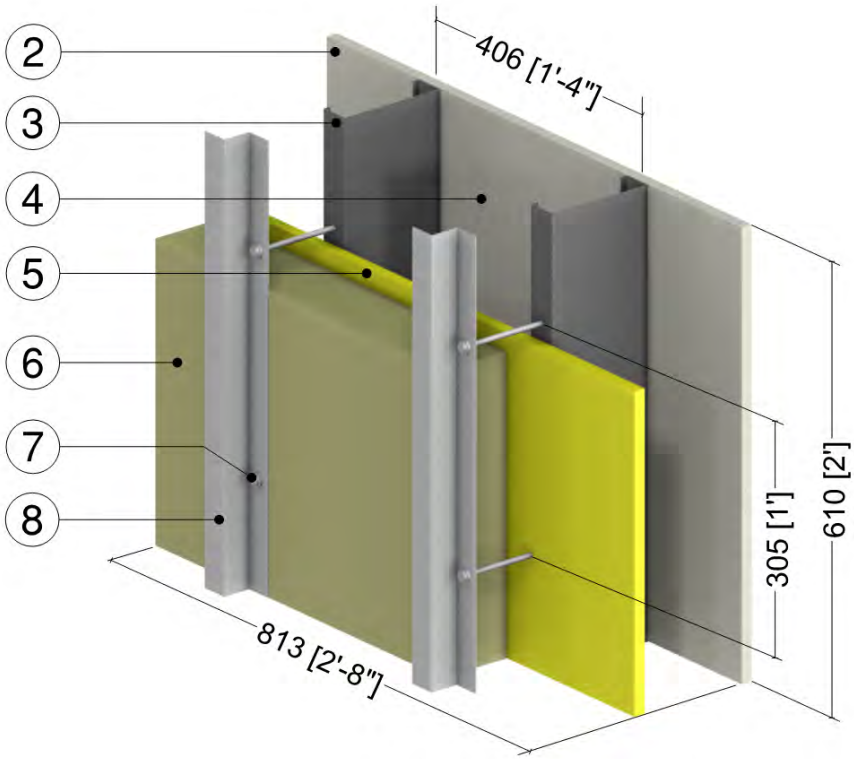
Fastener Detail

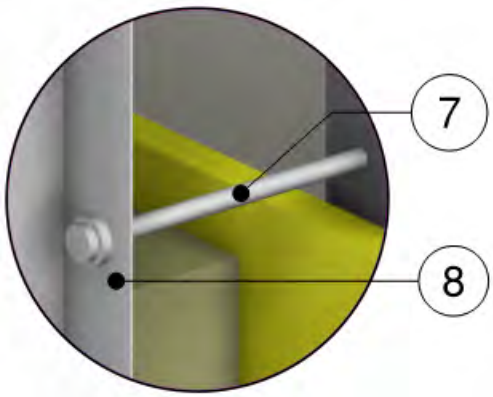
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier Ci HC 80/45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4.5 (72)	0.20 (850)
7	#12 Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





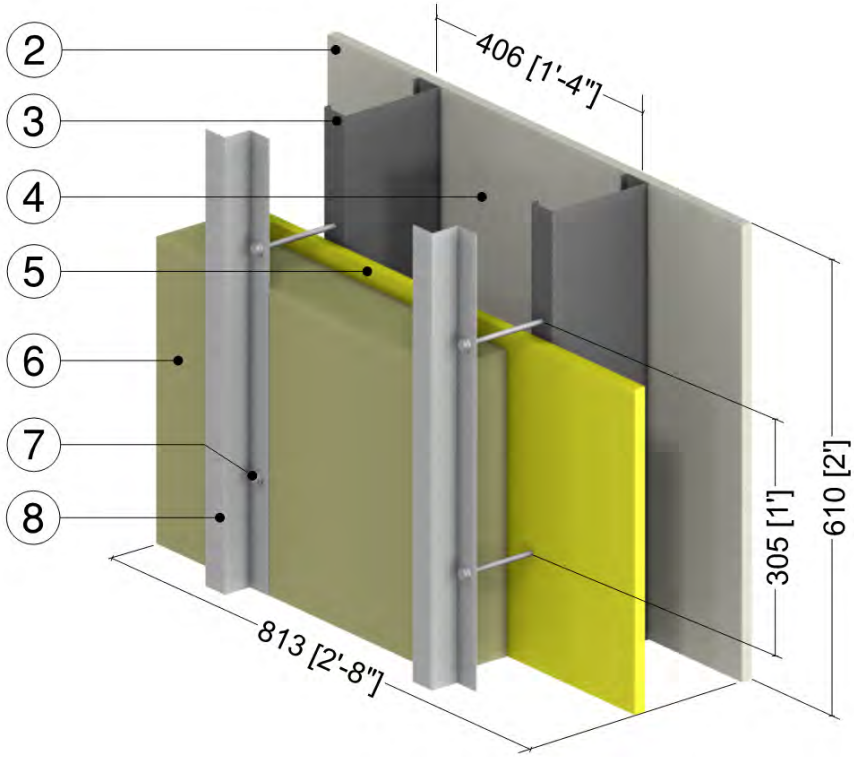
Fastener Detail

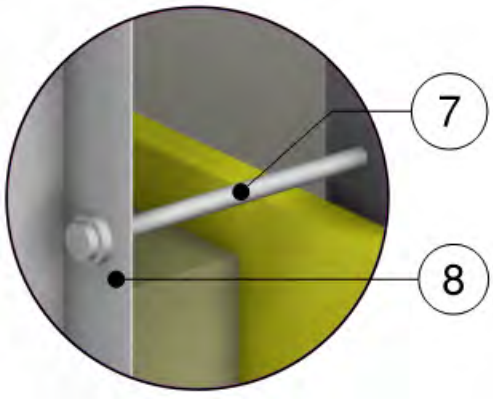
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Max Mineral Wool Semi Rigid Insulation	Varies	0.25 (0.036)	R-4.0 to R-16.0 (0.70 to 2.82 RSI)	11 (176)	0.20 (850)
7	#12 Stainless Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	118 (17)	-	500 (8000)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





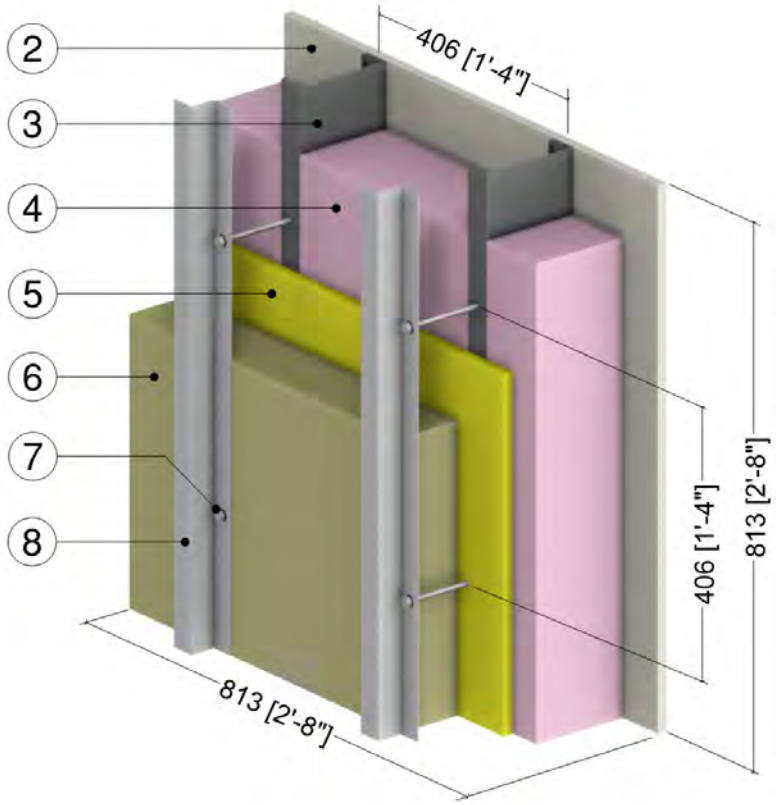
Fastener Detail

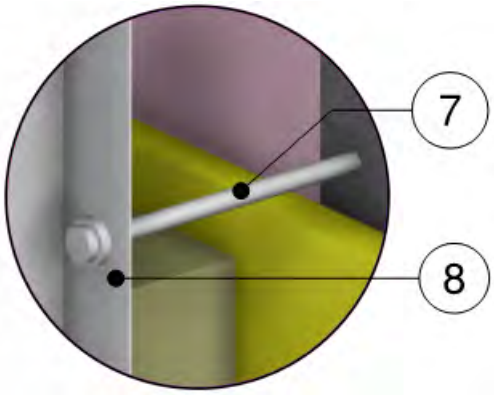
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier Ci HC 80/45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4.5 (72)	0.20 (850)
7	#12 Stainless Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	118 (17)	-	500 (8000)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





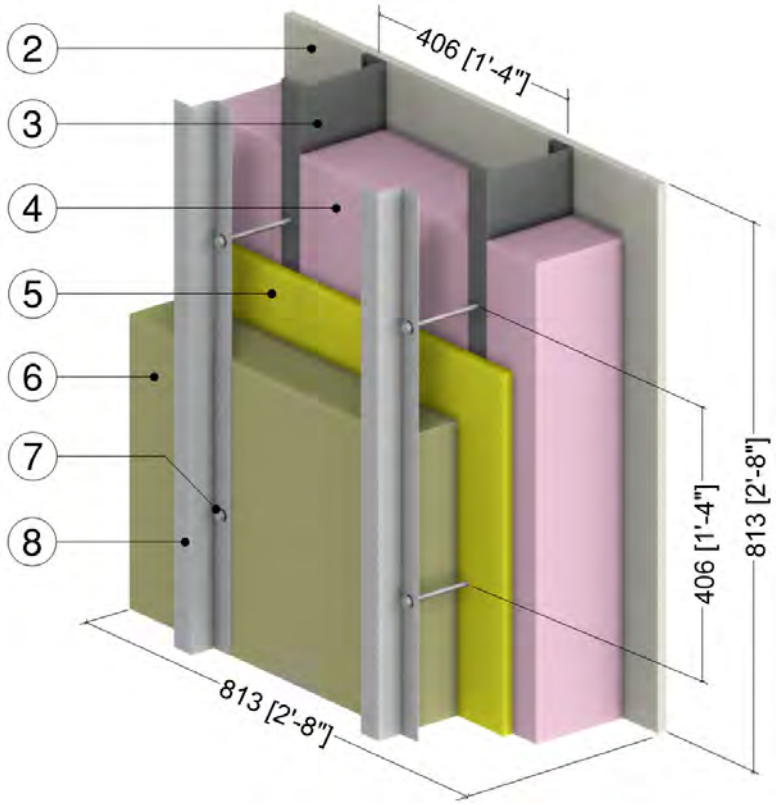
Fastener Detail

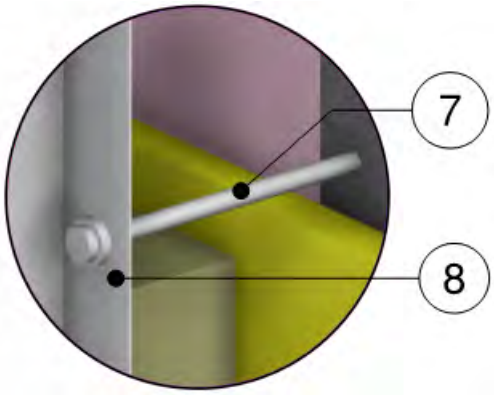
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.28 (0.041)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier HC Max Mineral Wool Semi Rigid Insulation	Varies	0.25 (0.036)	R-4.0 to R-16.0 (0.70 to 2.82 RSI)	11 (176)	0.20 (850)
7	#12 Stainless Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	118 (17)	-	500 (8000)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





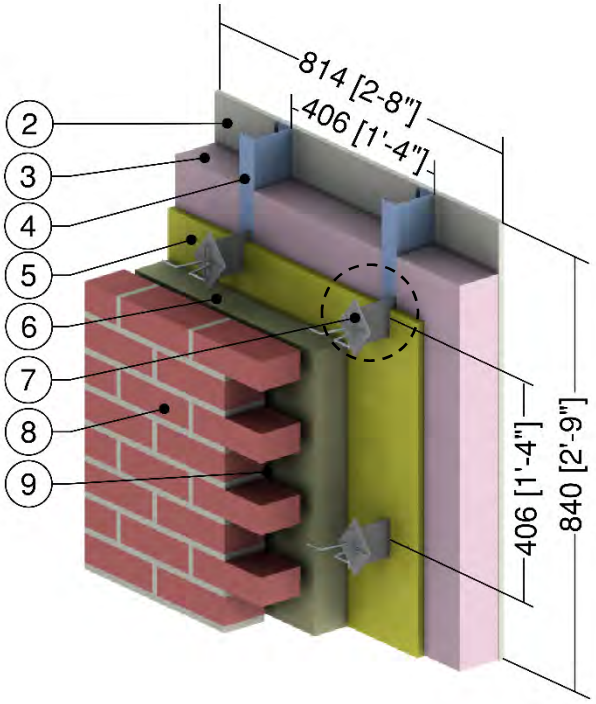
Fastener Detail

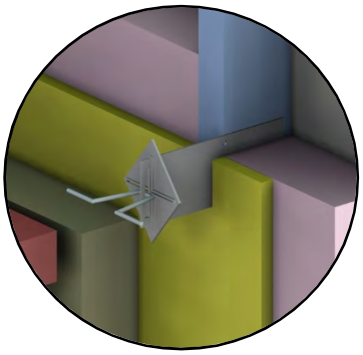
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.28 (0.041)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	ThermaFiber RainBarrier Ci HC 80/45 Mineral Wool Semi Rigid Insulation	Varies	0.24 (0.034)	R-4.2 to R-16.8 (0.74 to 2.96 RSI)	4.5 (72)	0.20 (850)
7	#12 Stainless Steel Fasteners (12” o.c.)	0.21” (5.3) Ø	118 (17)	-	500 (8000)	0.12 (500)
8	Vertical Z-Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” (13 mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.1.114

Exterior and Interior Insulated Wall Assembly with Brick Ties Supporting Brick Veneer





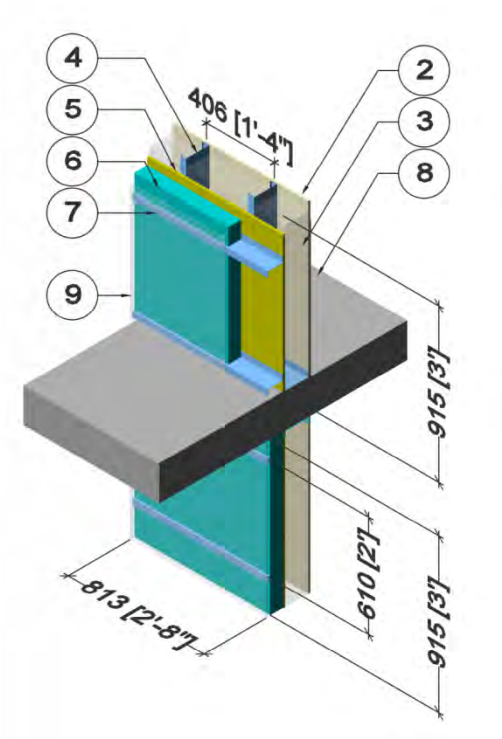
Brick Tie Detail

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 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	Fiberglass Batt Insulation	3 5/8" (92)	0.30 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Brick Ties	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
9	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

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

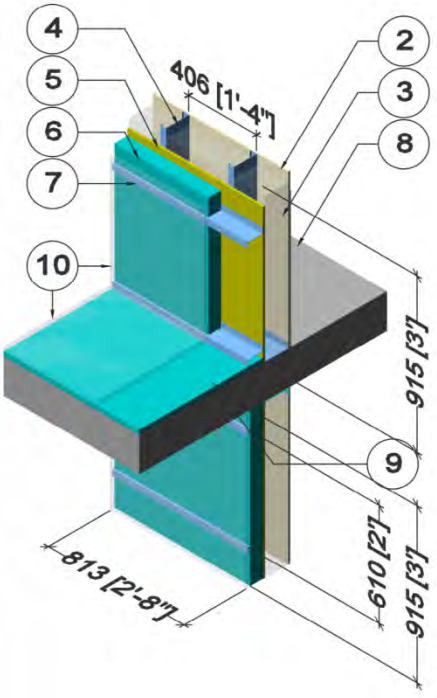


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-Girts w/ 1 1/2" Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

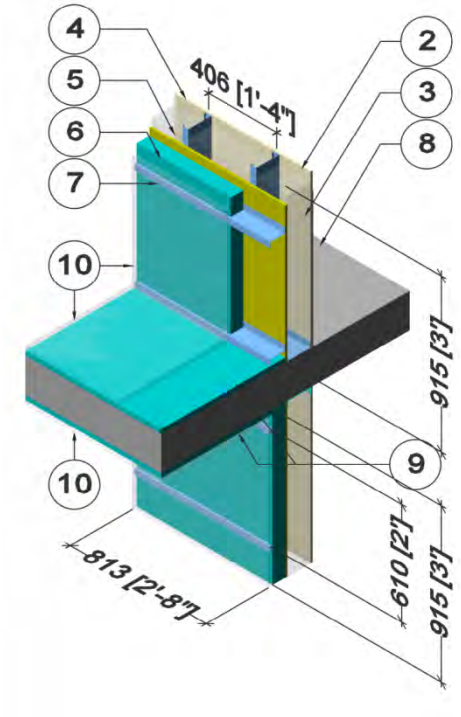


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	3" (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-Girts w/ 1 1/2" Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Concrete Slab	8" (203)	12 (1.8)	-	140 (2250)	0.20 (850)
9	Exterior Balcony Insulation[2]	1" (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
10	Metal cladding/flashing/ finished soffit/pavers with vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] Exterior Balcony Insulation Length varies at 0" (0mm), 7 7/8" (200mm), 15 3/4" (400mm), 31 1/2" (800mm) from wall

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

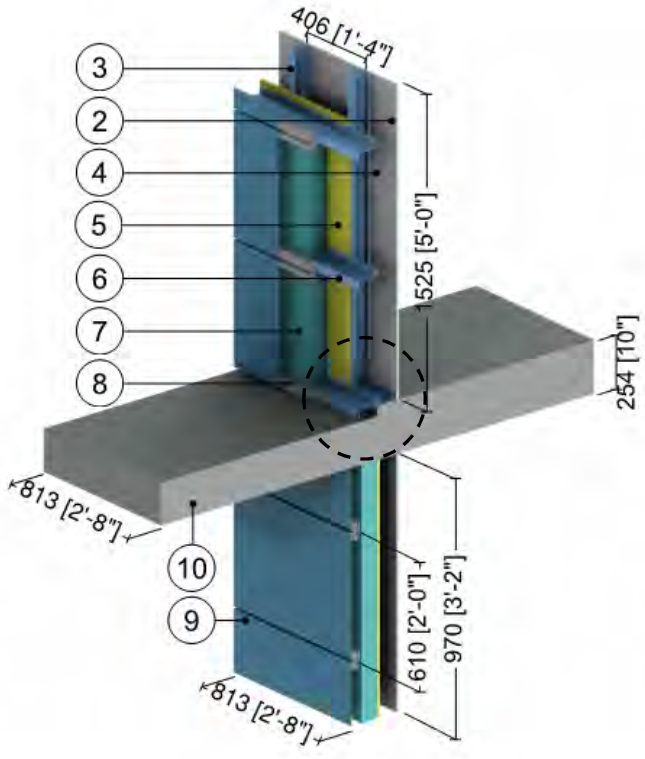


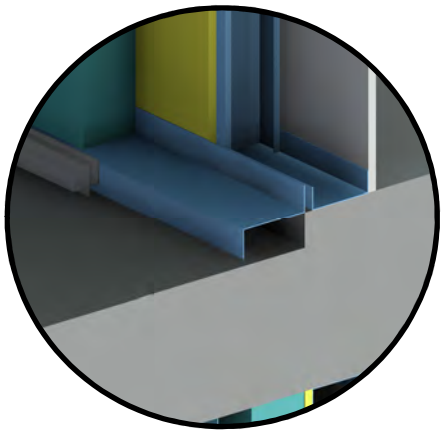
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	3" (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-Girts w/ 1 1/2" Flange	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Exterior Balcony & Soffit Insulation[2]	1" (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
10	Metal cladding/flashing/ finished soffit/pavers with vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] Exterior Balcony Insulation Length varies at 0" (0mm), 7 7/8" (200mm), 15 3/4" (400mm), 31 1/2" (800mm) from wall

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





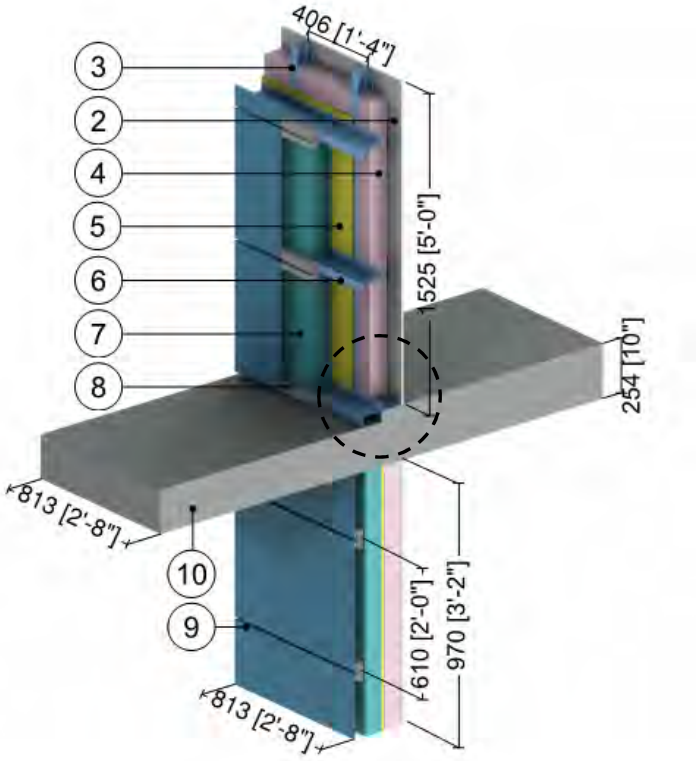
Balcony Stepdown Detail

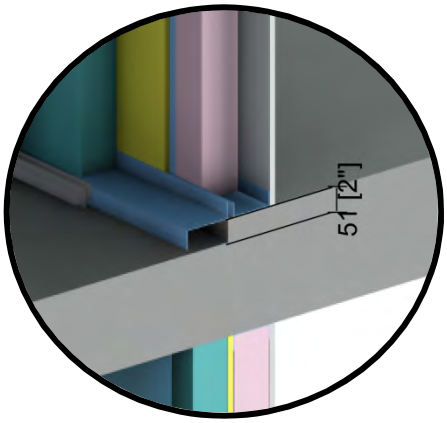
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-Girt with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8” (204)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to0.12 RSI)	-	-

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

Detail 5.2.5

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Uninsulated Curb





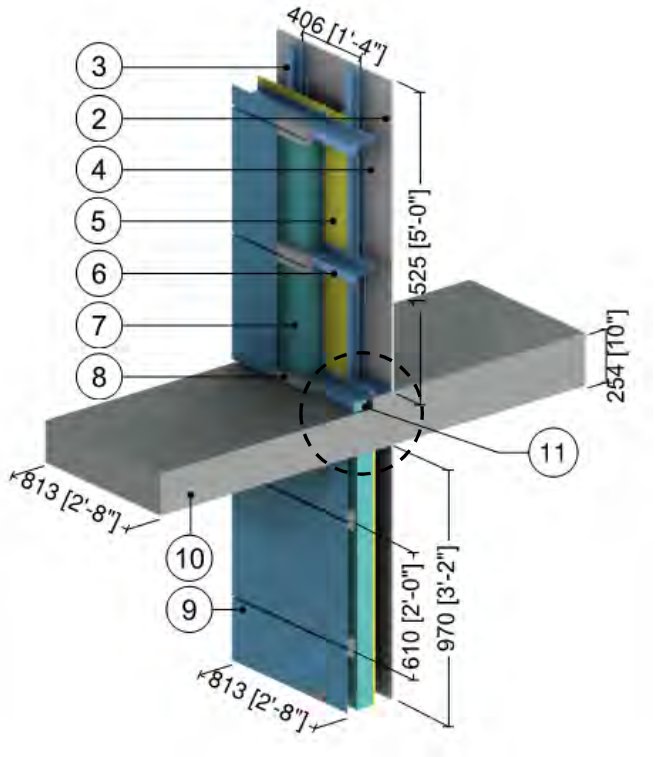
Balcony Stepdown Detail

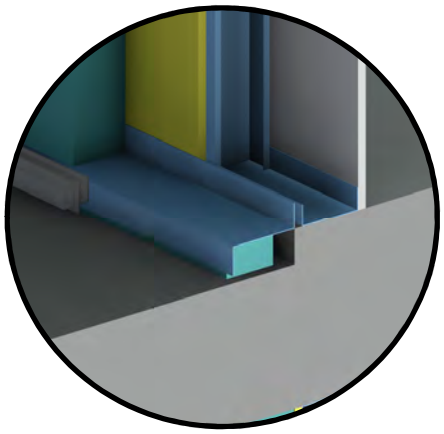
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (0.044)	R-12 (2.11 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	Horizontal Z-Girt with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8” (204)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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





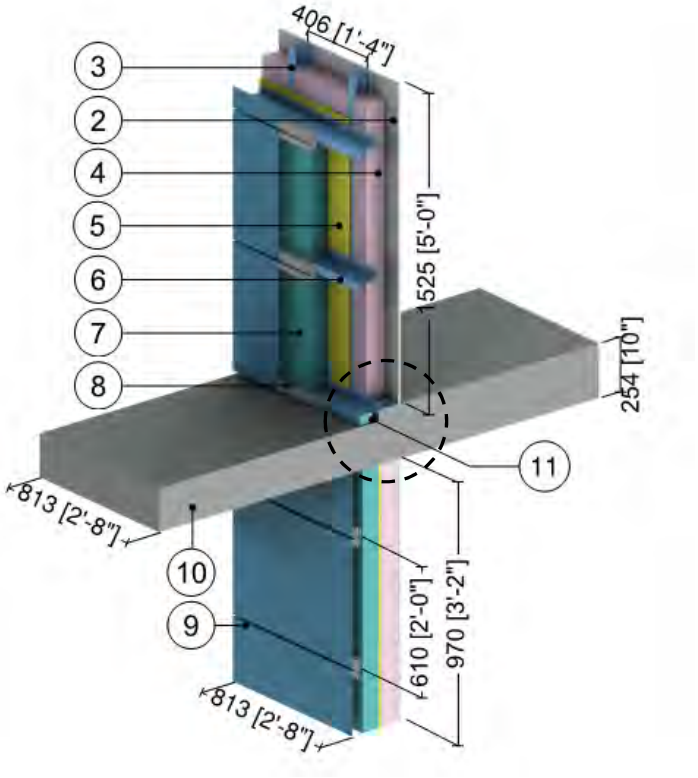
Balcony Stepdown Detail

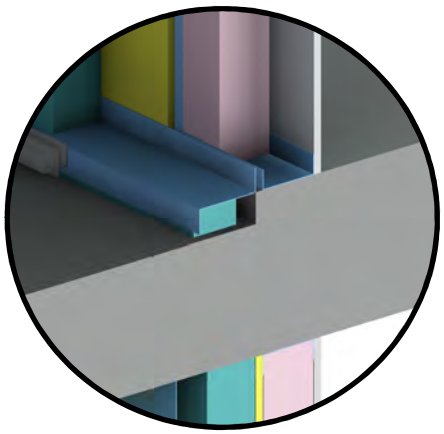
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-Girt with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8” (204)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Curb Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.2.7

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Uninsulated Intermediate Floor Intersection with Insulated Curb





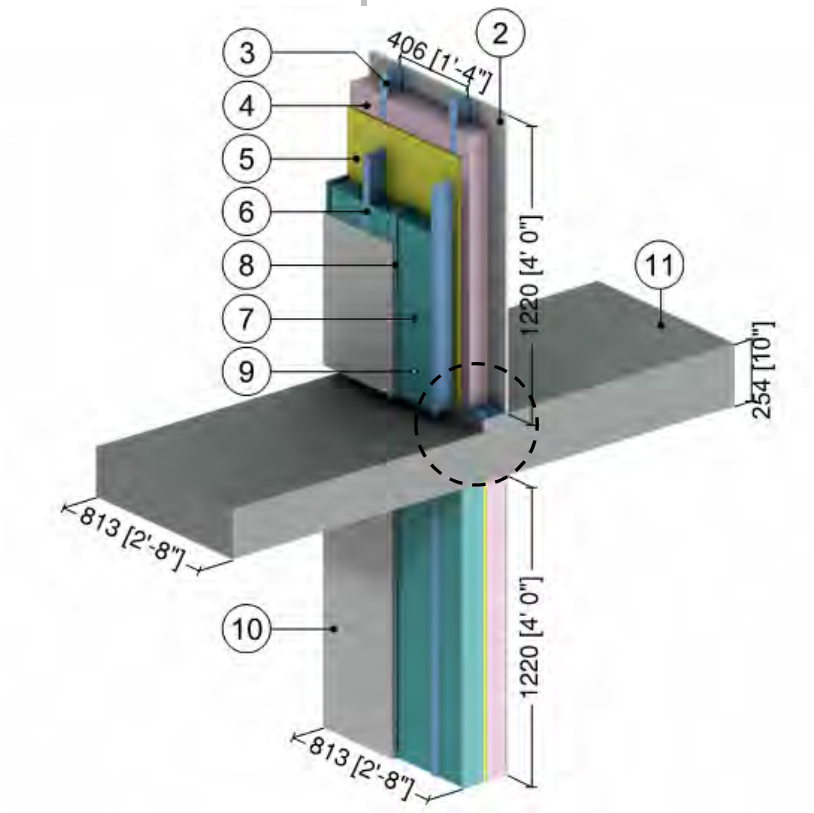
Balcony Stepdown Detail

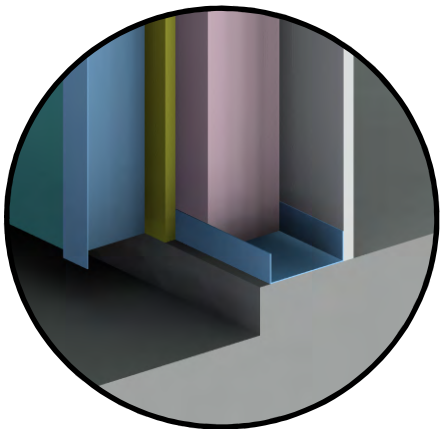
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (0.044)	R-12.0 (2.11 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	Horizontal Z-Girt with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8” (204)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Curb Insulation	-	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.2.8

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Vertical Z Girts (16” o.c.) Supporting Stucco Cladding – Uninsulated Intermediate Floor Intersection





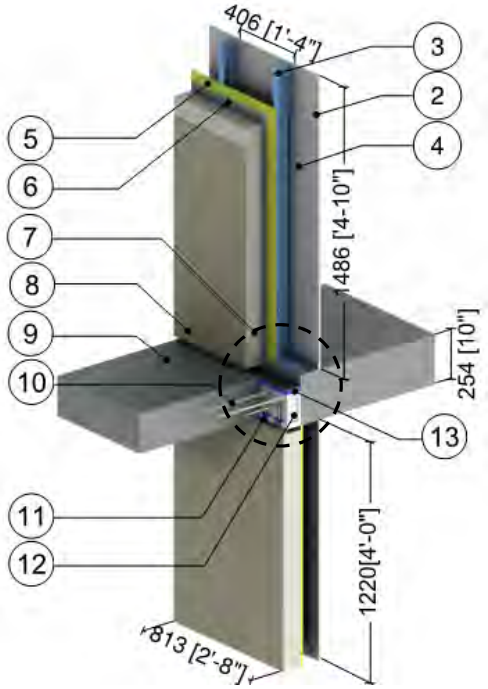
Balcony Stepdown Detail

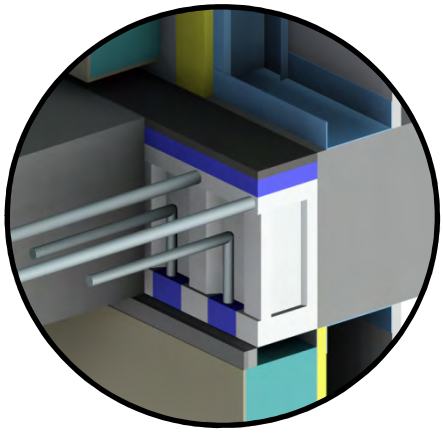
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (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	Vertical Z-Girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
8	Rigid Insulation Bracing	Varies	0.2 (0.29)	-	1.8 (28)	0.29 (1220)
9	Rainscreen Cavity	1/2” (13)	-	R-0.5 (0.09 RSI)	0.075 (1.2)	0.24 (1000)
10	Stucco Cement with Breather Board	1/2” (13)	6 (0.9)	R-0.1 (0.01 RSI)	120 (1922)	0.20 (850)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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

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





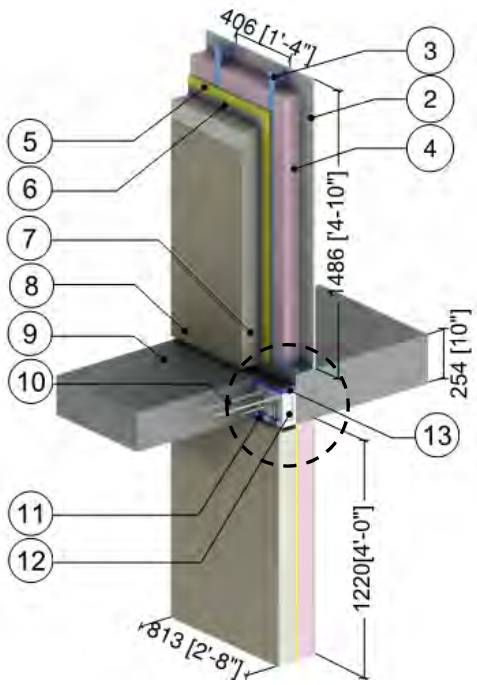
Thermally Broken Slab Detail
(Isokorb CM20)

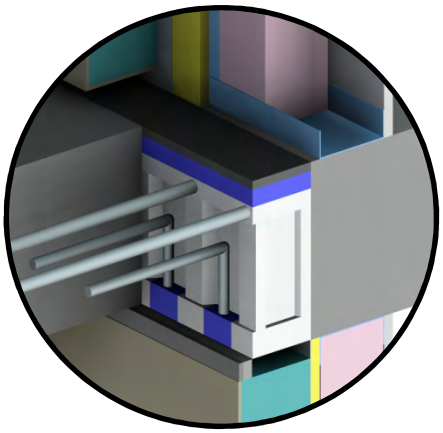
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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	4” (100)	0.27 (0.039)	R-14.6 (2.56 RSI)	1.0 (16)	0.35 (1470)
8	Lamina	1/8” (4)	6 (0.9)	R-0.04 (0.01 RSI)	120 (1922)	0.20 (850)
9	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
11	HDPE Plastic Sleeve	-	1.7 (0.25)	-	59 (950)	0.48 (2000)
	UHPC Concrete Mix	-	5.5 (0.80)	-	140 (2250)	0.20 (850)
12	Polystyrene Hard Foam Insulation	3 1/8” (80)	0.217 (0.031)	R-14.7 (2.58 RSI)	66 (1060)	0.35 (1500)
13	Cement Board	1/2” (13)	1.7 (0.25)	-	72 (1150)	0.20 (850)
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

Detail 5.2.10

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Isokorb CM20 Thermally Broken Slab Projection without Concrete Curb





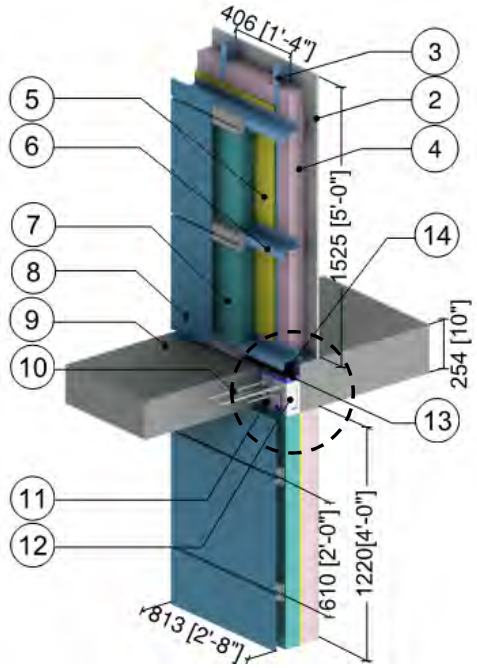
Thermally Broken Slab Detail
(Isokorb CM20)

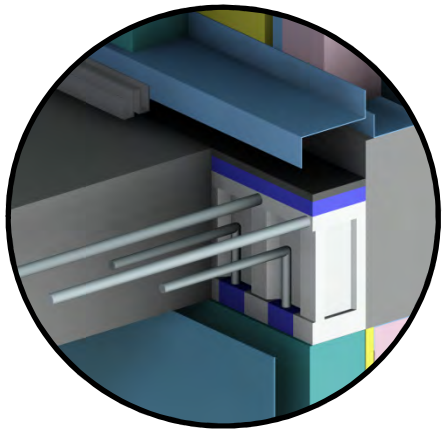
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.044)	R-12.0 (2.10 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	4” (100)	0.27 (0.039)	R-14.6 (2.56 RSI)	1.0 (16)	0.35 (1470)
8	Lamina	1/8” (4)	6 (0.9)	R-0.04 (0.01 RSI)	120 (1922)	0.20 (850)
9	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
11	HDPE Plastic Sleeve	-	1.7 (0.25)	-	59 (950)	0.48 (2000)
	UHPC Concrete Mix	-	5.5 (0.80)	-	140 (2250)	0.20 (850)
12	Polystyrene Hard Foam Insulation	3 1/8” (80)	0.217 (0.031)	R-14.7 (2.58 RSI)	66 (1060)	0.35 (1500)
13	Cement Board	1/2” (13)	1.7 (0.25)	-	72 (1150)	0.20 (850)
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

Detail 5.2.11

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Uninsulated Curb





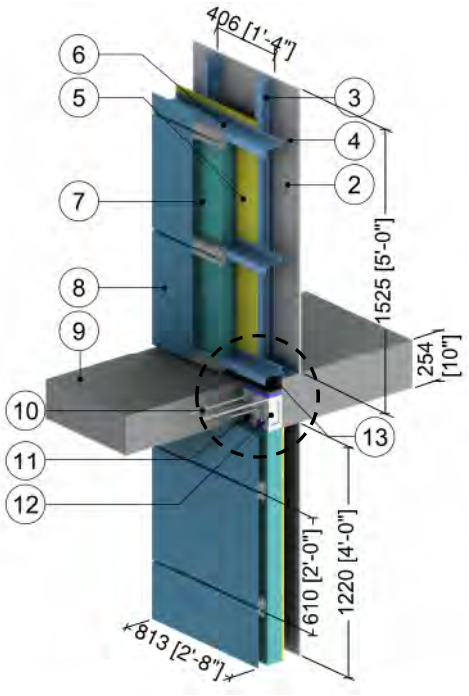
Thermally Broken Slab Detail
(Isokorb CM20)

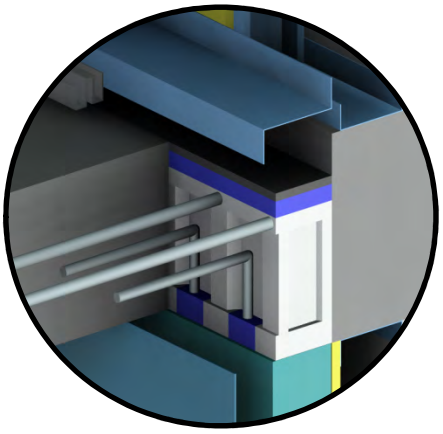
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.044)	R-12.0 (2.11 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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
11	HDPE Plastic Sleeve	-	1.7 (0.25)	-	59 (950)	0.48 (2000)
	UHPC Concrete Mix	-	5.5 (0.80)	-	140 (2250)	0.20 (850)
12	Polystyrene Hard Foam Insulation	3 1/8” (80)	0.2 (0.031)	R-14.7 (2.58 RSI)	66 (1060)	0.35 (1500)
13	Cement Board	1/2” (13)	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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





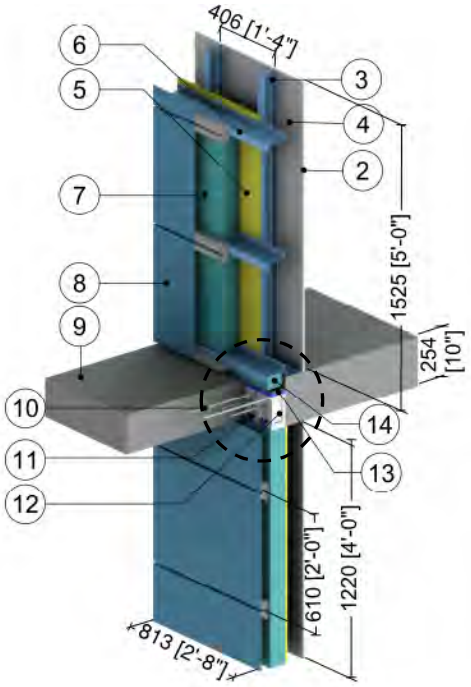
Thermally Broken Slab Detail
(Isokorb CM20)

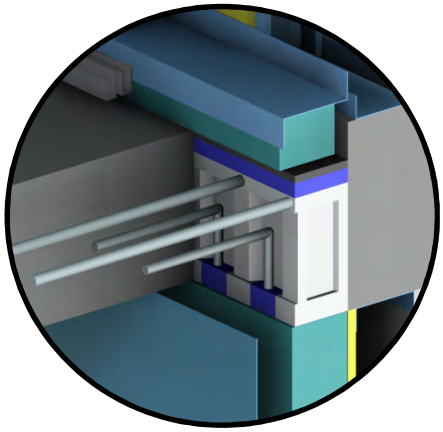
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
11	HDPE Plastic Sleeve	-	1.7 (0.25)	-	59 (950)	0.48 (2000)
	UHPC Concrete Mix	-	5.5 (0.80)	-	140 (2250)	0.20 (850)
12	Polystyrene Hard Foam Insulation	3” (76)	0.217 (0.031)	R-14.7 (2.58 RSI)	66 (1060)	0.35 (1500)
13	Cement Board	1/2” (13)	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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





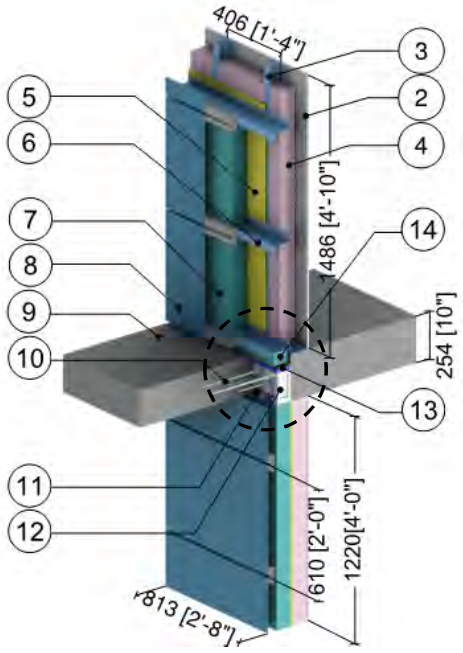
Thermally Broken Slab Detail
(Isokorb CM20)

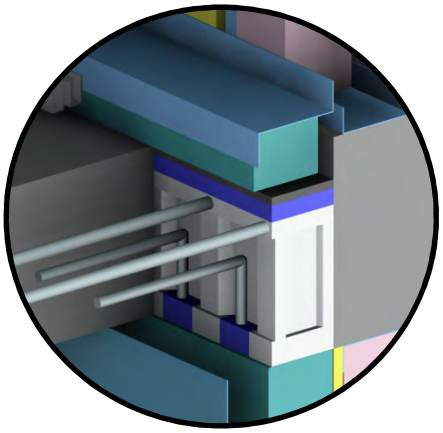
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
11	HDPE Plastic Sleeve	-	1.7 (0.25)	-	59 (950)	0.48 (2000)
	UHPC Concrete Mix	-	5.5 (0.80)	-	140 (2250)	0.20 (850)
12	Polystyrene Hard Foam Insulation	3 1/8” (80)	0.217 (0.031)	R-14.7 (2.58 RSI)	66 (1060)	0.35 (1500)
13	Cement Board	1/2” (13)	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Curb Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.2.14

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Isokorb CM20 Thermally Broken Slab Projection with Insulated Curb





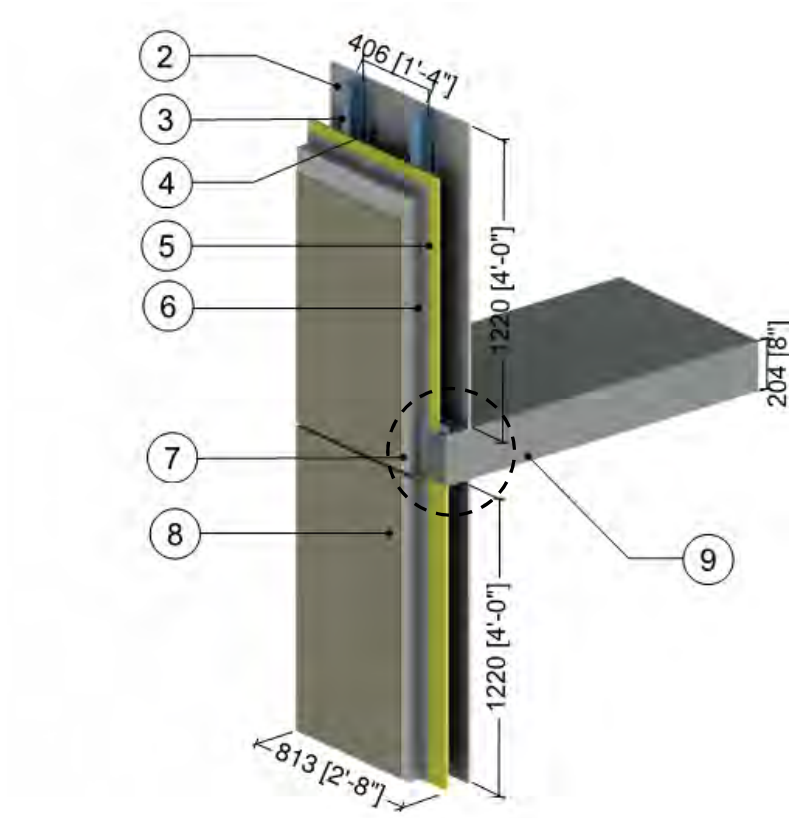
Thermally Broken Slab Detail
(Isokorb CM20)

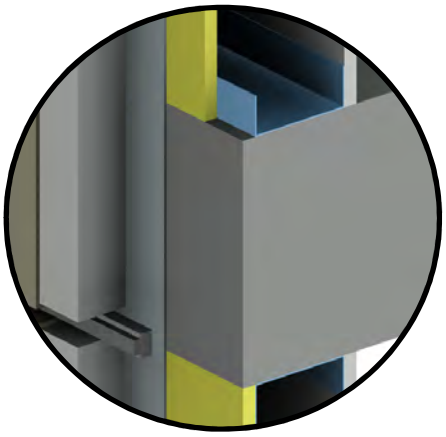
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.044)	R-12.0 (2.11 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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
11	HDPE Plastic Sleeve	-	1.7 (0.25)	-	59 (950)	0.48 (2000)
	UHPC Concrete Mix	-	5.5 (0.80)	-	140 (2250)	0.20 (850)
12	Polystyrene Hard Foam Insulation	3 1/8” (80)	0.217 (0.031)	R-14.7 (2.58 RSI)	66 (1060)	0.35 (1500)
13	Cement Board	1/2” (13)	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Curb Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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





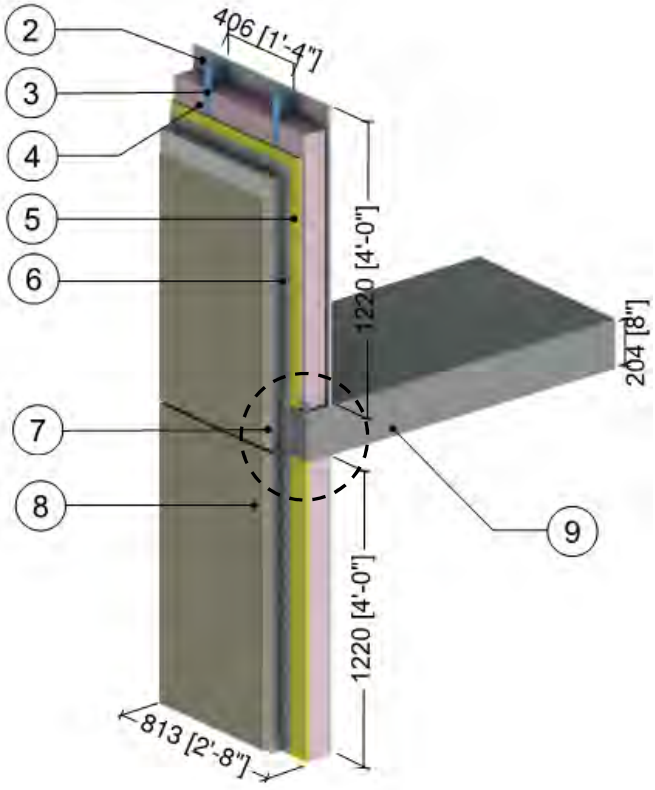
1” (25 mm)
Drained EIFS
at Slab Detail

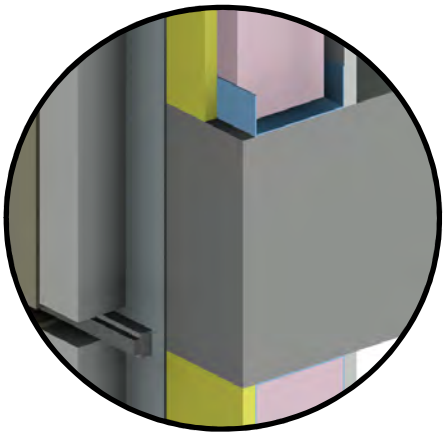
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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 4” (50 to 100)	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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

Detail 5.2.16

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Intermediate Floor Intersection





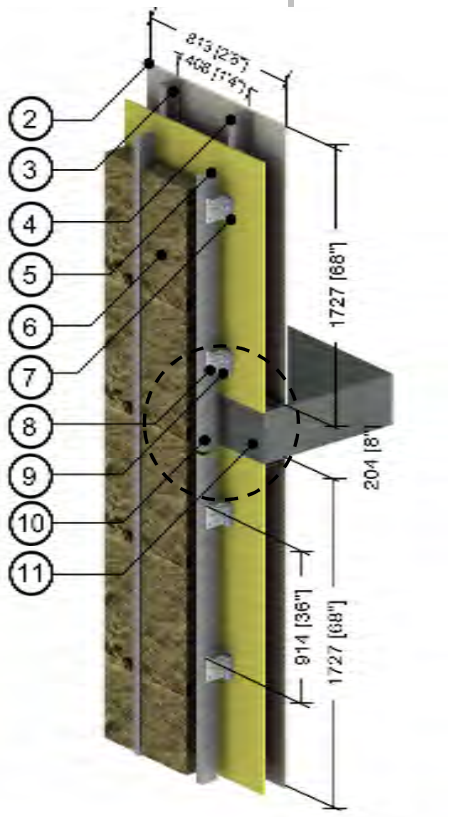
1” (25 mm)
Drained EIFS
at Slab Detail

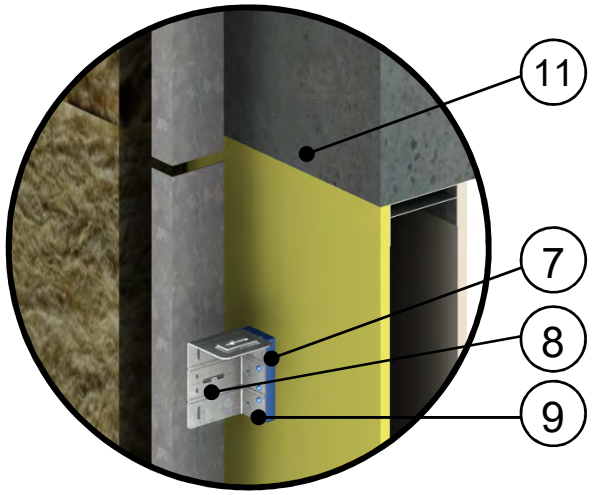
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 3 5/8” Steel Studs (16”o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (0.044)	R-12.0 (2.1 RSI)	0.9 (1.1)	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 4” (50 to 100)	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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	Concrete Slab	8” (203)	12 (1.8)	-	140 (2250)	0.20 (850)
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

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





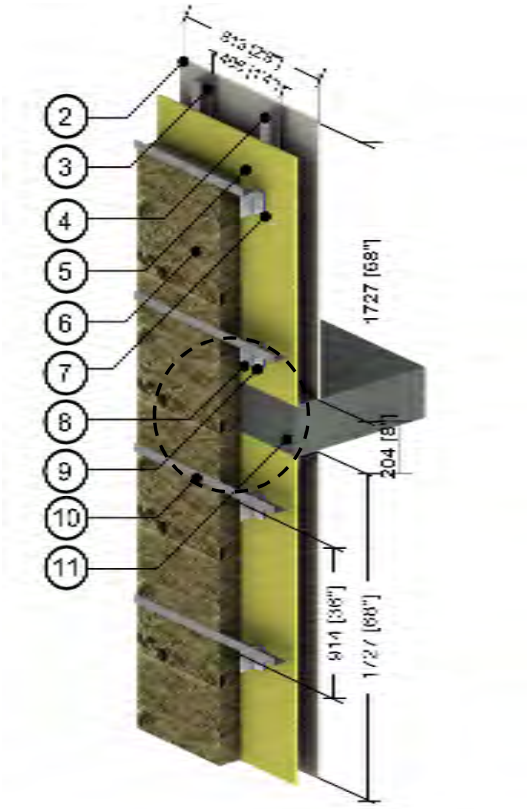
Concrete Floor Intersection

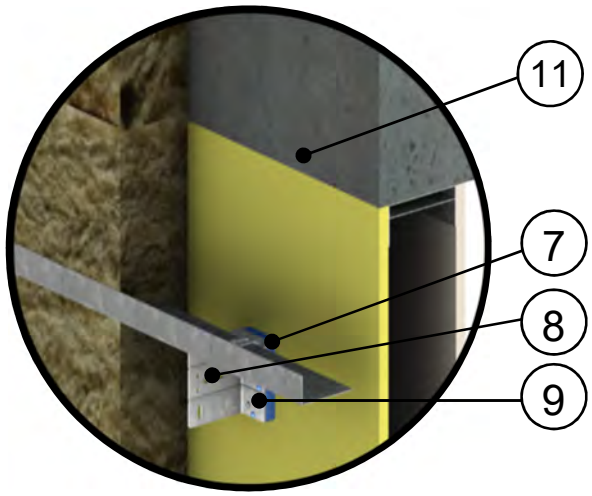
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	4” to 6” (102 to 152)	0.24 (0.034)	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	ISO Clip - HDPE Isolator	1/2" (12.7)	3.1 (0.45)	-	-	-
8	ISO Clip - Galvanized Metal	14 gauge	430 (62)	-	489 (7830)	0.12 (500)
9	#14 Steel Fasteners	1/4" (6) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	Vertical Sub-girt	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Generic Cladding with ½” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
13	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





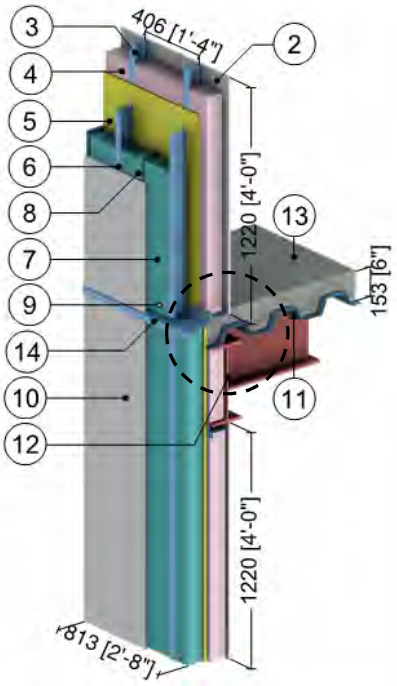
Concrete Floor Intersection

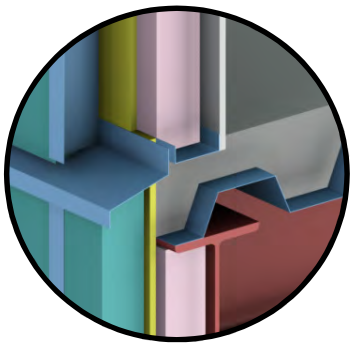
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Mineral Wool Insulation	4” to 6” (102 to 152)	0.24 (0.034)	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	ISO Clip - HDPE Isolator	1/2" (12.7)	3.1 (0.45)	-	-	-
8	ISO Clip - Galvanized Metal	14 gauge	430 (62)	-	489 (7830)	0.12 (500)
9	#14 Steel Fasteners	1/4" (6) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	Horizontal Sub-girt	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Generic Cladding with ½” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
13	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.2.19

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Vertical Z-girts (16” o.c.) Supporting Stucco Cladding – Steel Framed Floor with Cross Cavity Flashing





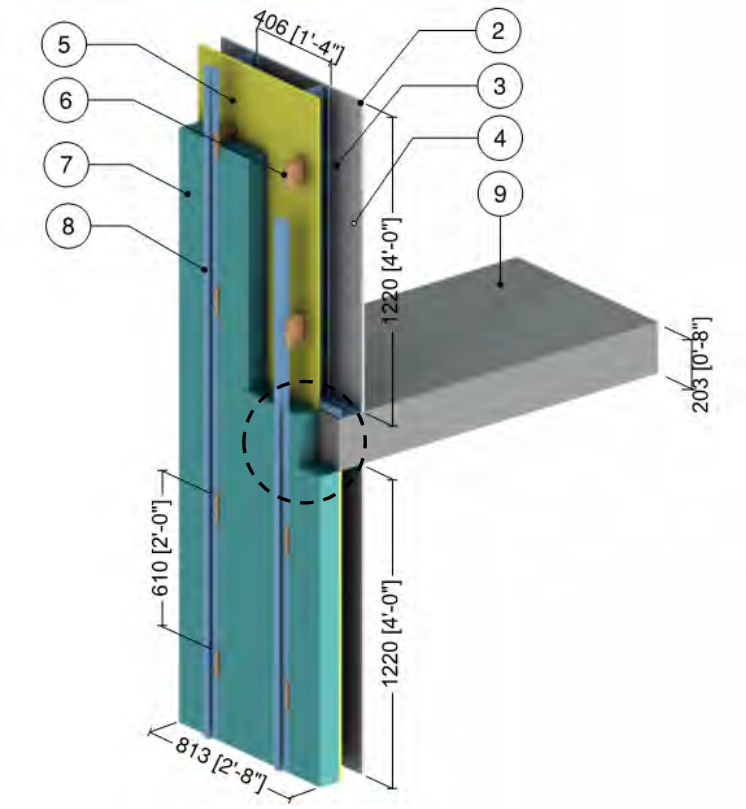
Slab Edge Detail

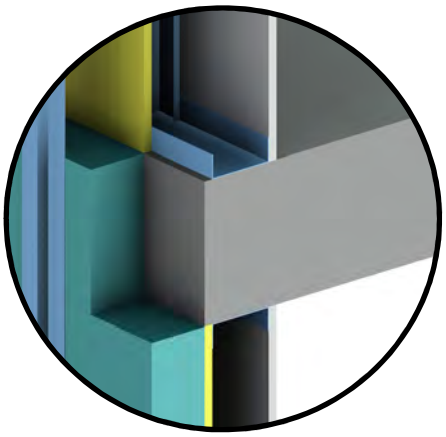
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (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	Vertical Z-girts with 11/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
8	Rigid Insulation Bracing	Varies	0.2 (0.029)	-	1.8 (28)	0.29 (1220)
9	Rainscreen Cavity	1/2” (13)	-	R-0.5 (0.09 RSI)	0.075 (1.2)	0.24 (1000)
10	Stucco Cement with Breather Board	1/2” (13)	6.3 (0.9)	R-0.1 (0.01 RSI)	120 (1922)	0.20 (850)
11	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
12	Steel Beam (W410)	-	347 (50)		489 (7830)	0.12 (500)
13	Concrete Topping	6” (203)	6.3 (0.9)	-	120 (1920)	0.20 (850)
14	Cross Cavity Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
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

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





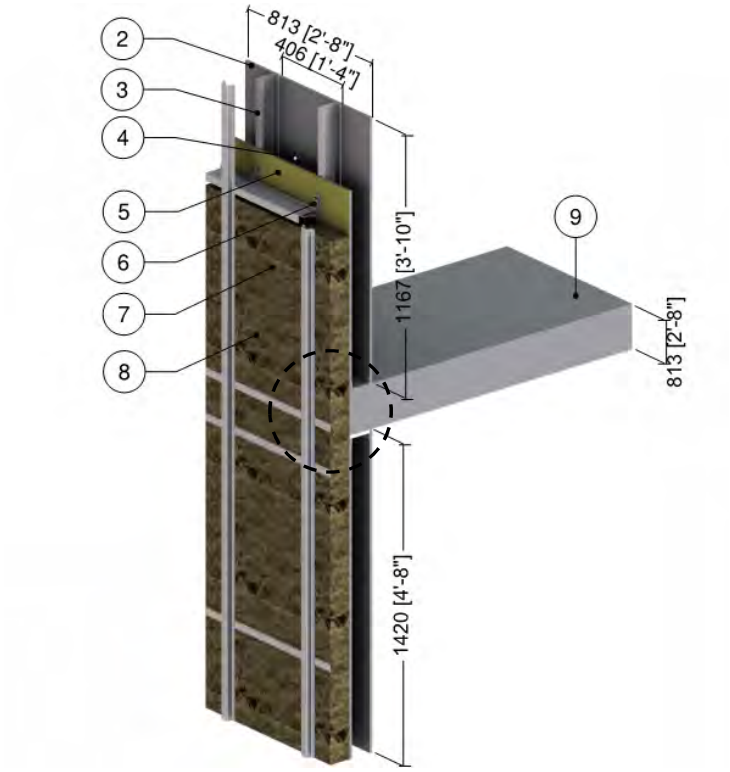
Slab Edge Detail

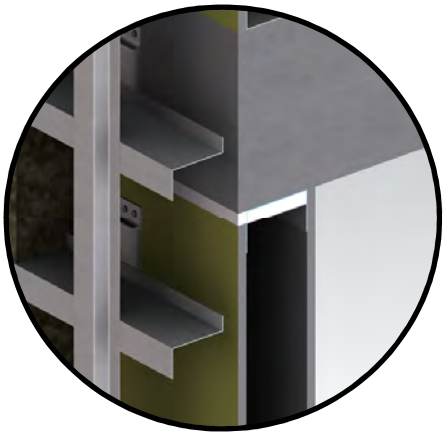
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Fiberglass Spacer	3 1/2" (89)	1.7 (0.299)			
6	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
7	Exterior Insulation	3 1/2'' (89)	-	R-15 (2.59 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Steel Z-girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





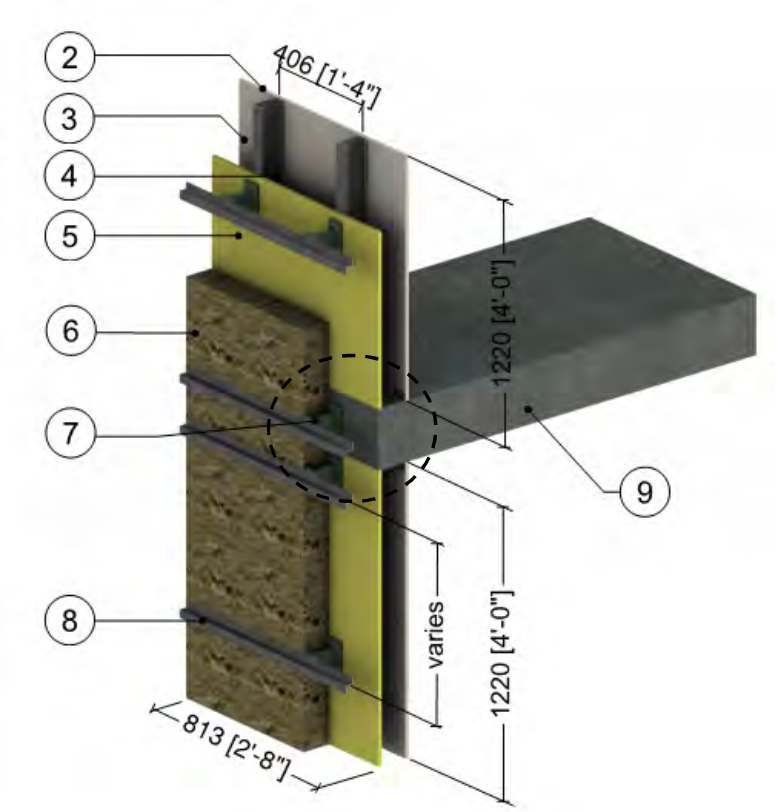
Slab Edge Detail

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 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	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Engineered Assemblies Aluminum Panel Clip (models T100 T125 150)	1/5" to 3/8" (5 to 10)	1109 (160)			
7	Exterior Insulation	Varies	-	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	1.8 (28)	0.29 (1220)
8	Vertical/Horizontal Steel Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Cork/Neoprene pad	1/16" (1.5)	0.329 (0.058)	R-0.15 (0.03 RSI)	-	-
11	Aerogel	3/8" (10)	0.086 (0.015)	R-3.9 (0.68 RSI)		
12	Steel Fasteners	5/16" (8) Ø	347 (50)	-	489 (7830)	0.12 (500)
13	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
14	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.2.22

Exterior Insulated 3 5/8” x 1/58” Steel Stud (16”o.c.) Wall Assembly with TAC Fiber Reinforced Plastic Girts Supporting Cladding – Intermediate Floor Intersection





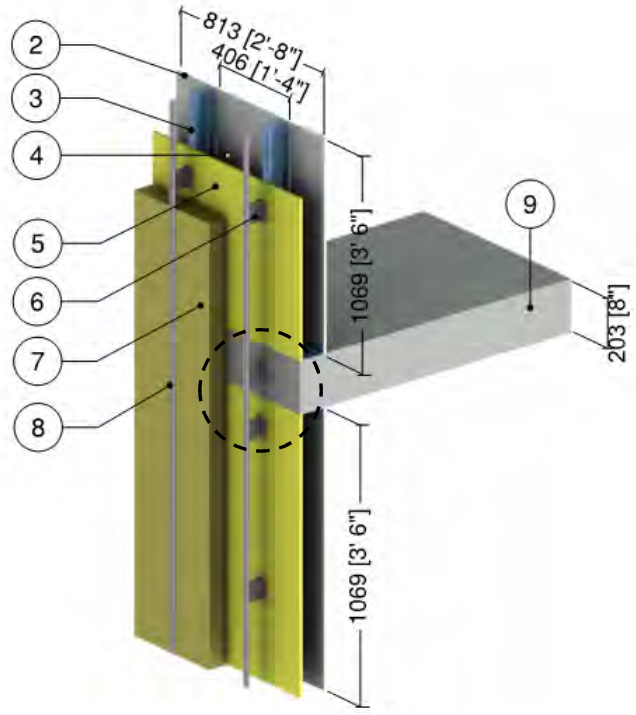
Slab Edge Detail

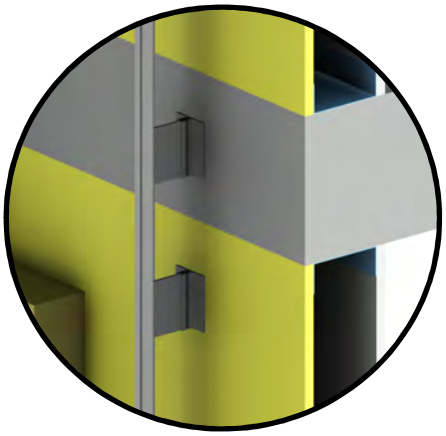
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	0.24 (0.034)	R-12.6 to R-25.2 (2.22 RSI to 4.40 RSI)	489 (7830)	0.12 (500)
7	Fiber Reinforced Plastic (FRP) Girts	-	2.4 (0.35)	-	-	-
8	Horizontal Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Concrete Slab	8” (203)	12 (1.8)	-	140 (2250)	0.20 (850)
10	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





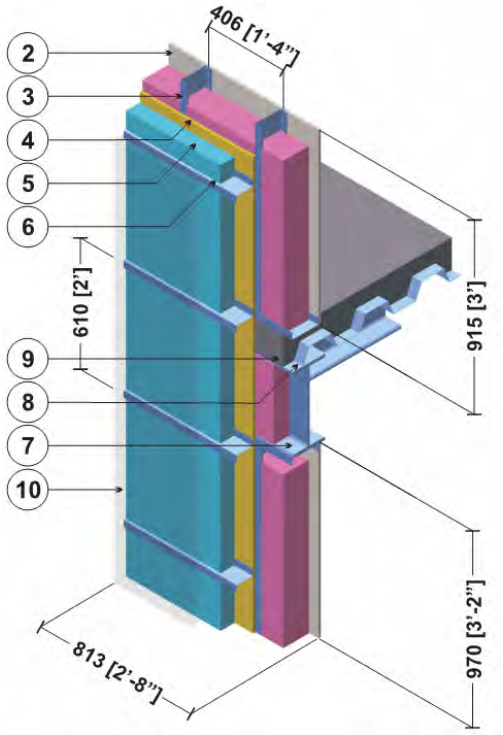
Slab Edge Detail

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 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	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Longboard Aluminum Panel Clip	1/5" to 3/8" (5 to 10)	1109 (160)	-	-	-
7	Exterior Insulation	Varies	0.24 (0.034)	R-12.6 to R-25.2 (2.22 RSI to 4.44 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Steel Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.2.24

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

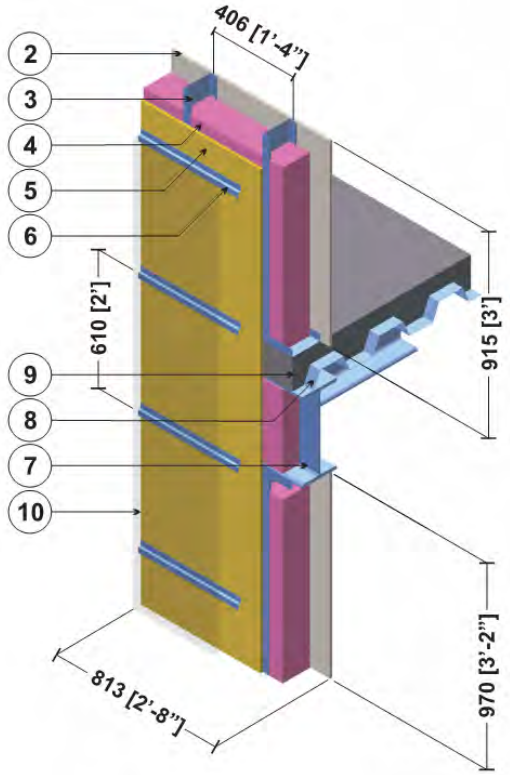


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
	Fiberglass Batt Insulation	3 5/8" (92)	0.30 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
6	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
8	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
9	Concrete Topping	6" (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
10	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.2.25

Interior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Structural Steel Framed Floor Intersection

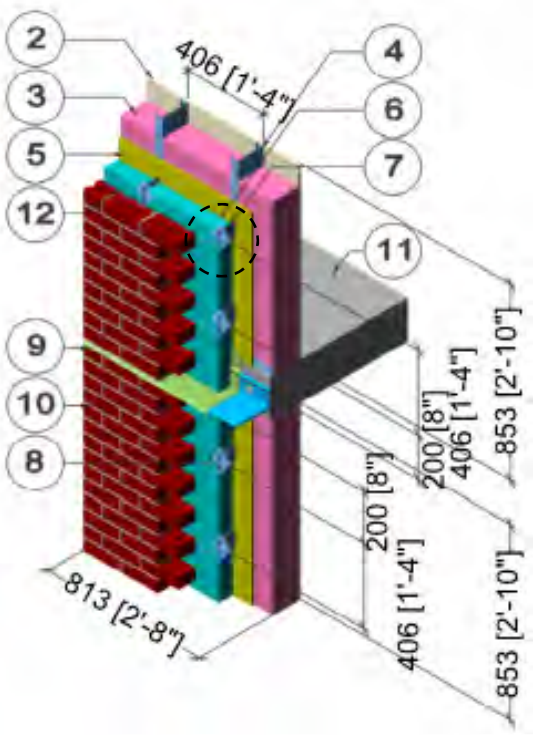


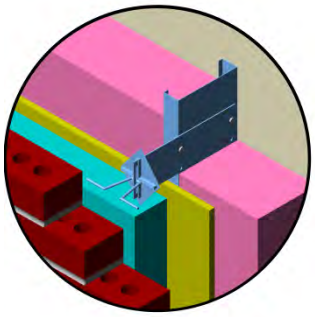
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Metal Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8" (92)	0.30 (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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
8	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
9	Concrete Topping	6" (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
10	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.2.26

Exterior and Interior Insulated Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection





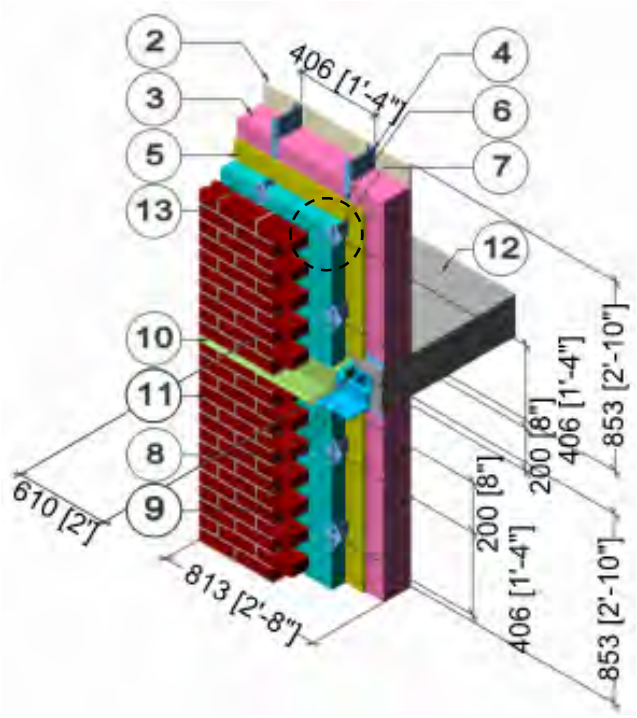
Brick Tie Detail

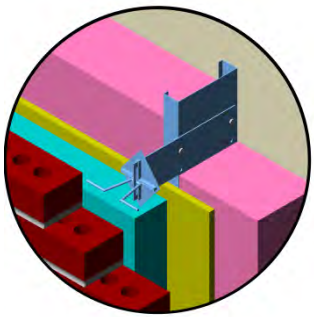
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.30 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Brick Ties	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
9	Flashing	20 Gauge	347 (50)	-	489 (7830)	0.12 (500)
10	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
11	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

Detail 5.2.27

Exterior and Interior Insulated Wall Assembly with Spaced Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection





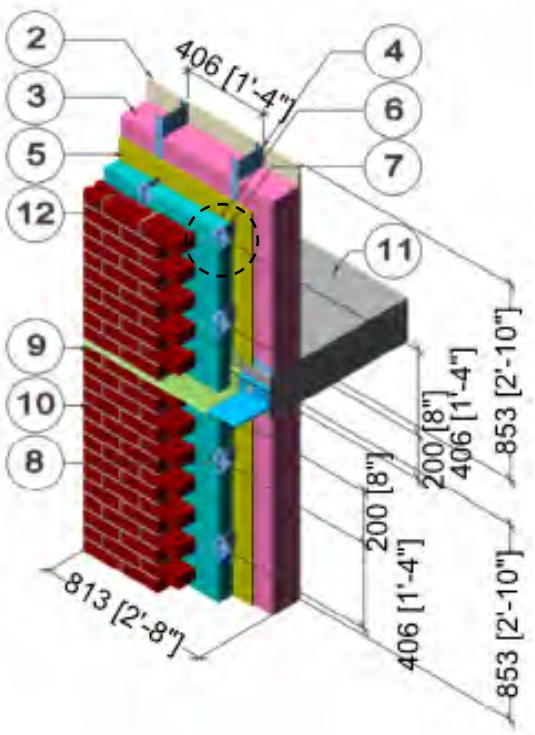
Brick Tie Detail

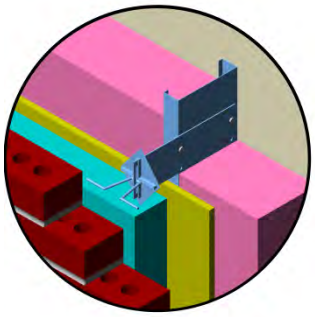
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.30 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Brick Ties	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Exterior Insulation Behind Shelf Angle	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
9	Spaced Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Flashing	20 Gauge	347 (50)	-	489 (7830)	0.12 (500)
11	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
12	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

Detail 5.2.28

Exterior and Interior Insulated Wall Assembly with Stainless Steel Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection





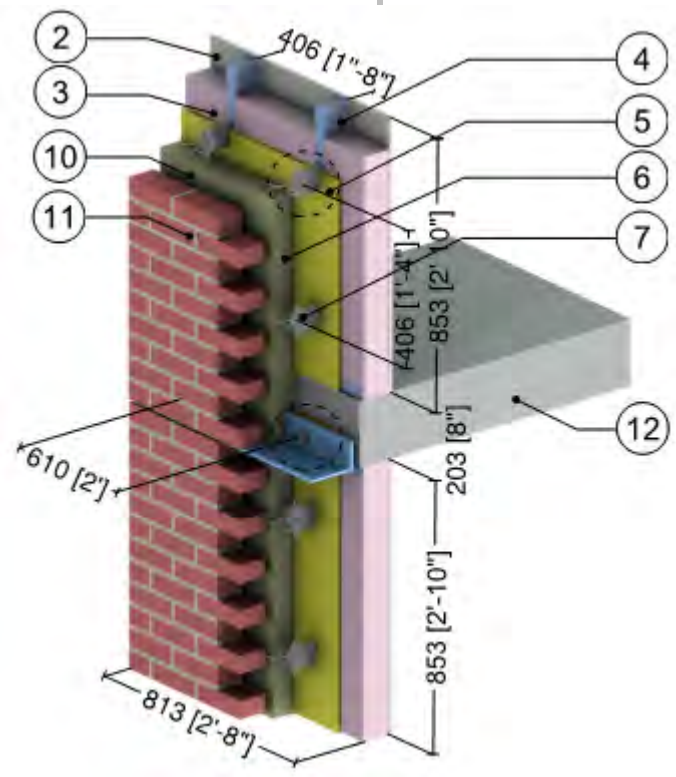
Brick Tie Detail

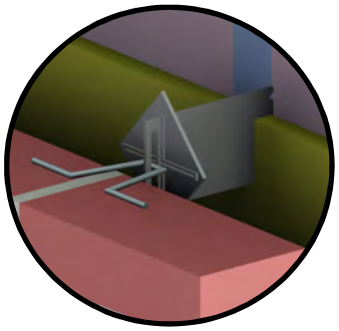
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.30 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Brick Ties	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Stainless Steel Shelf Angle	3/8" (10)	118 (17)	-	500 (8000)	0.12 (500)
9	Flashing	20 Gauge	347 (50)	-	489 (7830)	0.12 (500)
10	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
11	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

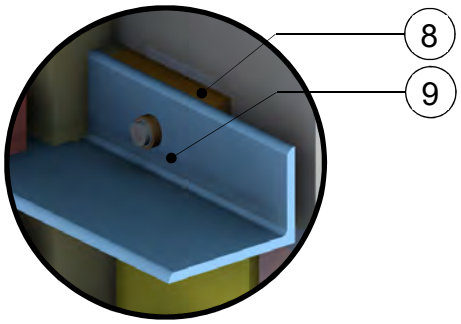
Detail 5.2.29

Exterior and Interior Insulated Wall Assembly with Thermally Broken Steel Shelf Angle & Brick Ties Supporting Brick Veneer – Slab Intersection





Brick Tie Detail



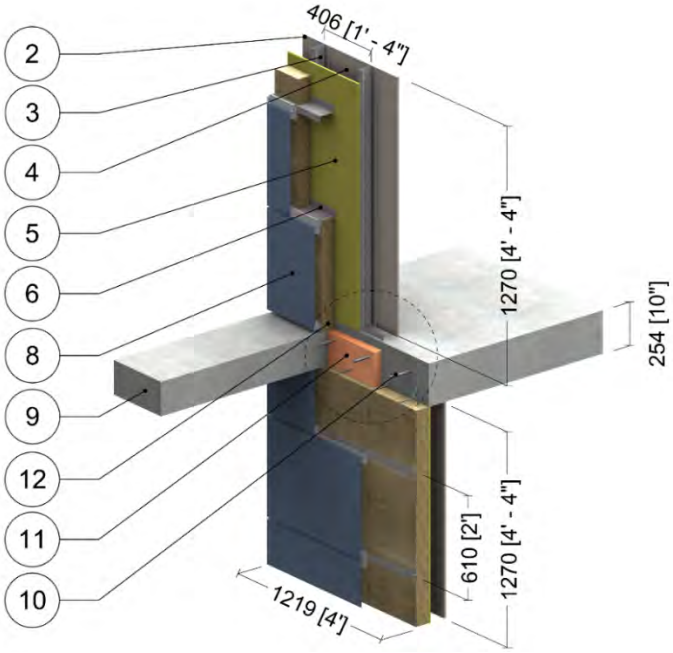
Shelf Angle Detail

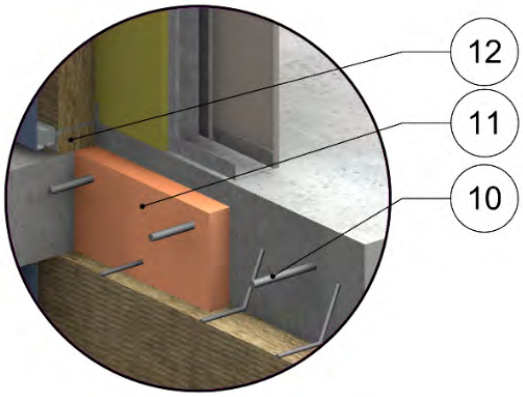
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.30 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	-	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
7	Brick Ties	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Armatherm FRR Thermal Break	1" (25)	1.4 (0.20)	-	85 (5.3)	-
9	Steel Shelf Angle and Bolts	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Air Gap[2]	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
11	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
12	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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 was found using ISO 100077-2

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





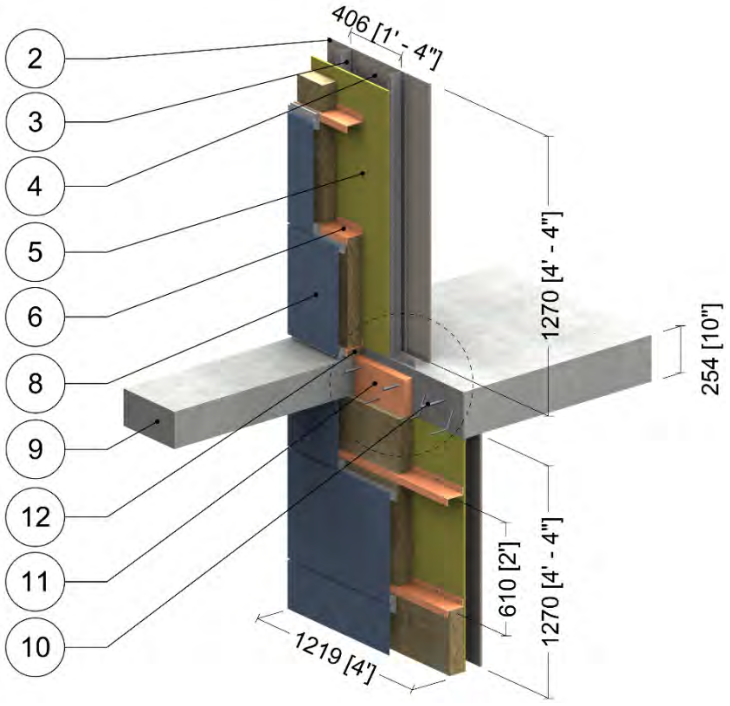
Thermally Broken Slab Detail
(Armatherm 500)

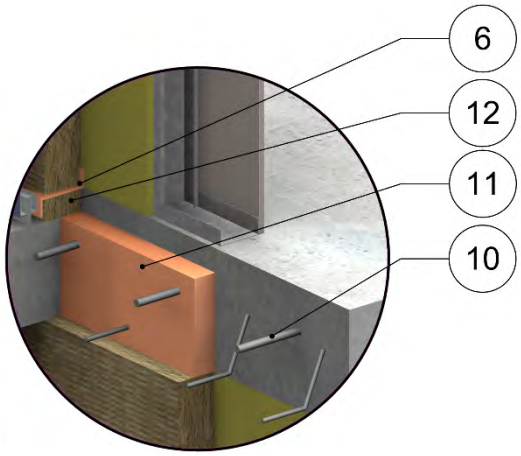
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air Cavity	3 5/8" (92)	-	R-0.9 (2.11 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Mineral Wool Insulation	3 1/2” (89)	-	R-14.7 (2.59 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Carbon Steel Rebar	-	430 (62)	-	489 (7830)	0.12 (500)
	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
11	Armatherm 500-280 Thermal Break	2” (51)	0.53 (0.08)	-	-	-
	Armatherm 500-080 Thermal Break	2” (51)	0.26 (0.04)	-	-	-
12	Curb Insulation	3 1/2” (89)	-	R-14.7 (2.59 RSI)	1.8 (28)	0.29 (1220)
13	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





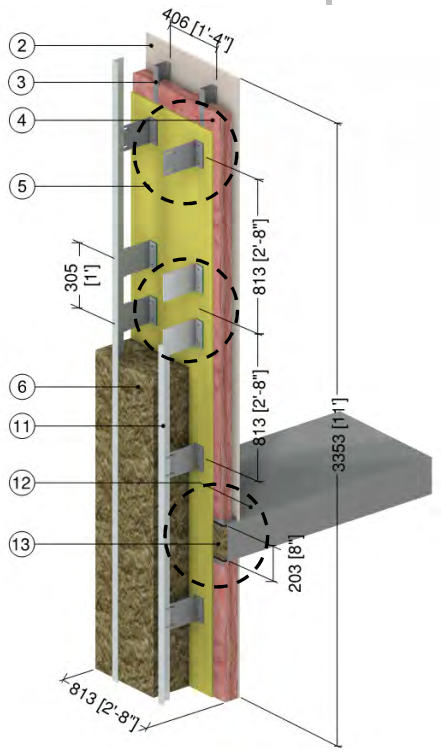
Thermally Broken Slab Detail
(Armatherm 500-080)

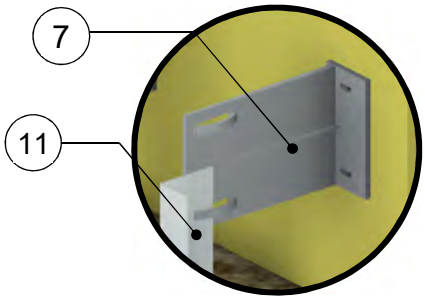
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air Cavity	3 5/8" (92)	-	R-0.9 (2.11 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Armatherm Z-girts (24” o.c.)	0.2 (5)	1.4 (0.2)	-	-	-
7	Exterior Mineral Wool Insulation	3 1/2” (89)	-	R-14.7 (2.59 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
11	Armatherm 500-080 Thermal Break	2” (51)	0.26 (0.04)	-	-	-
12	Curb Insulation	3 1/2” (89)	-	R-14.7 (2.59 RSI)	1.8 (28)	0.29 (1220)
13	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

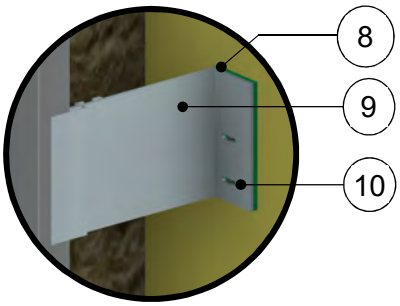
Detail 5.2.32

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Nvelope – Eko Thermobracket and NV1 Clip System Supporting Cladding – Intermediate Floor Intersection

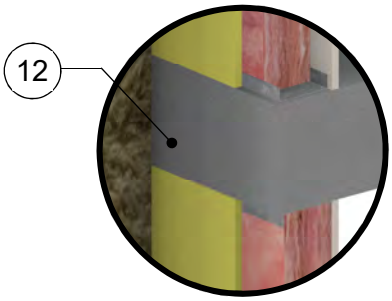




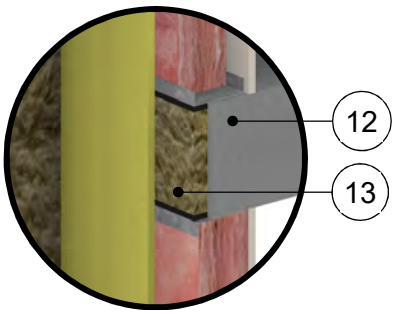
Eko Thermobracket Clip



NV1 Clip



Uninsulated Floor Intersection



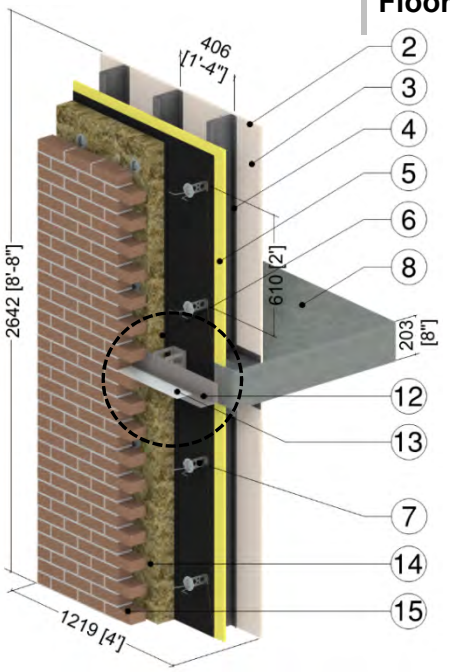
Insulated Floor Intersection

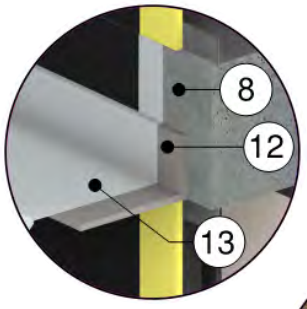
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.28 (0.040)	R-13 (2.29 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	Exterior Mineral Wool Insulation	1.5” to 4” (38 to 102)	0.24 (0.034)	R-6.3 to R-16.8 (1.11 RSI to 2.96 RSI)	4 (64)	0.20 (850)
7	Nvelope Eko Thermobracket (Polymer Composite)	-	4.86 (0.70)	-	-	-
8	Nvelope Clip Isolator	0.2" (5)	0.82 (0.117)	-	-	-
9	Nvelope Clip Extrusion – Aluminum 6005A alloy	Varies	1340 (193)	-	-	-
10	#14 Stainless Steel Fastener	1/4" (6) ∅	118 (17)	-	-	-
11	Vertical Aluminum Sub-girt	0.09” (2.2)	1340 (193)	-	-	-
12	Concrete Floor Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Insulation at Floor Slab	1” (25)	0.24 (0.034)	-	4 (64)	0.20 (850)
14	Generic Cladding with 1” (25mm) vented air space is incorporated into exterior heat transfer coefficient					
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

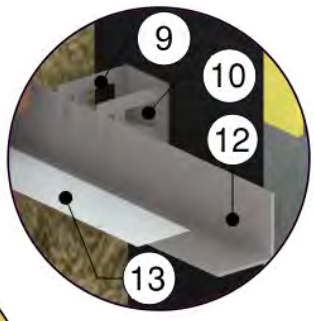
Detail 5.2.33

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 – Intermediate Floor Intersection





Direct Anchor Shelf Angle



FERO FAST Thermal Bracket System



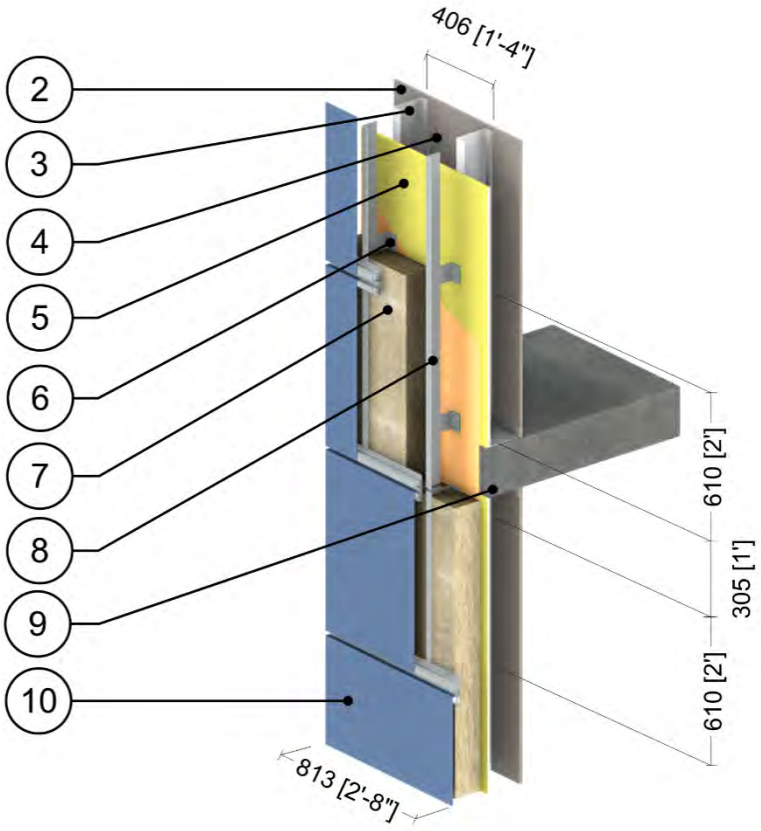
FERO FAST Thermal Bracket System with Aerogel Coating

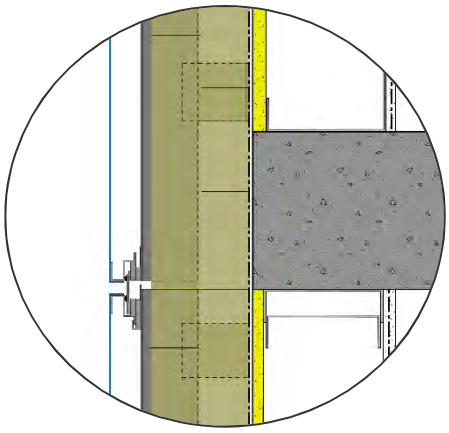
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	4" (102)	varies	R-16.8 (2.96 RSI) to R-24.0 (4.23 RSI)	varies	varies
7	Brick Ties	4" (102)	430 (62)	-	445 (7130)	0.09 (390)
8	Intermediate Concrete Floor	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	FERO FAST Bracket	3/16" (5)	347 (50)	-	489 (7830)	0.12 (500)
10	Anchor Bolt	5/8" (16) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	Aerogel Coating	1/8" (3)	0.24 (0.035)	-	-	-
12	Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
13	Flashing	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
14	Vented Air Cavity	1" (25)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
15	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
16	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

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





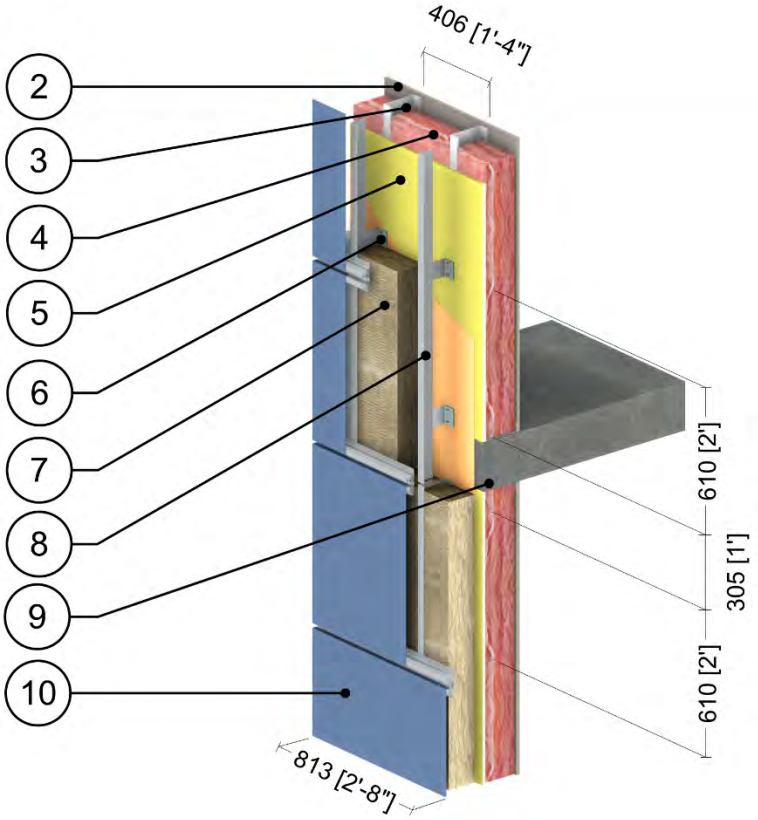
Intermediate Floor Detail

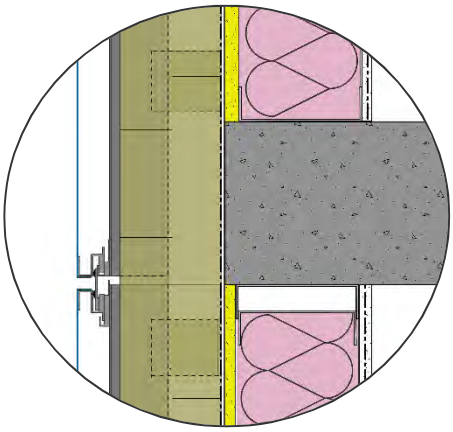
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.16 to (0.11 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6" (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





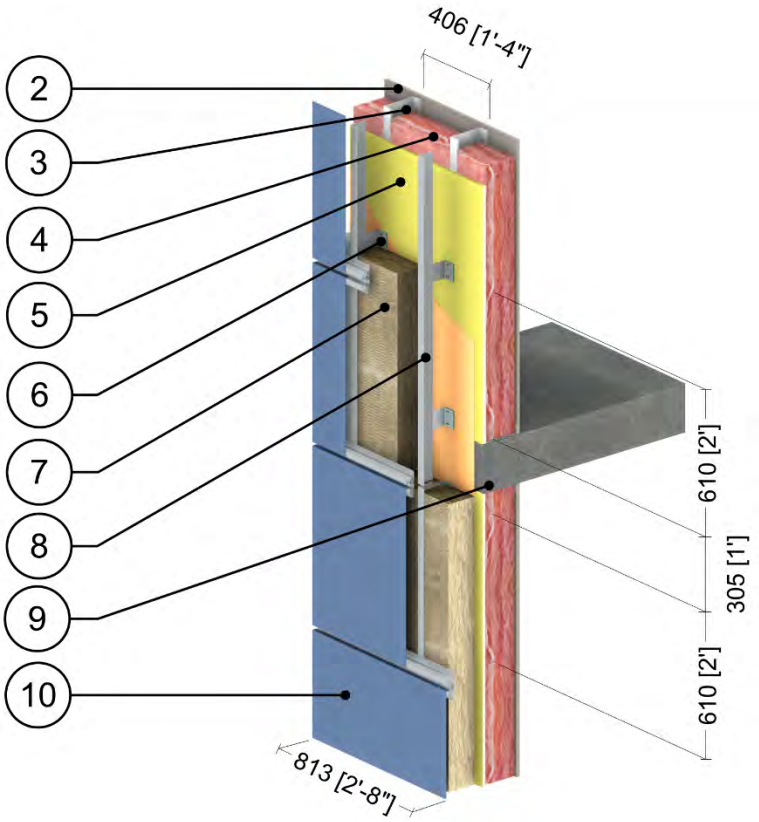
Intermediate Floor Detail

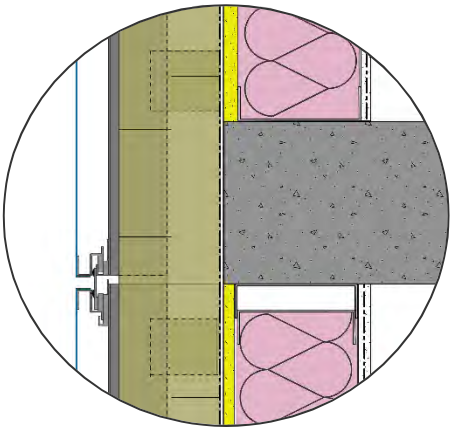
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.16 to (0.11 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6" (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





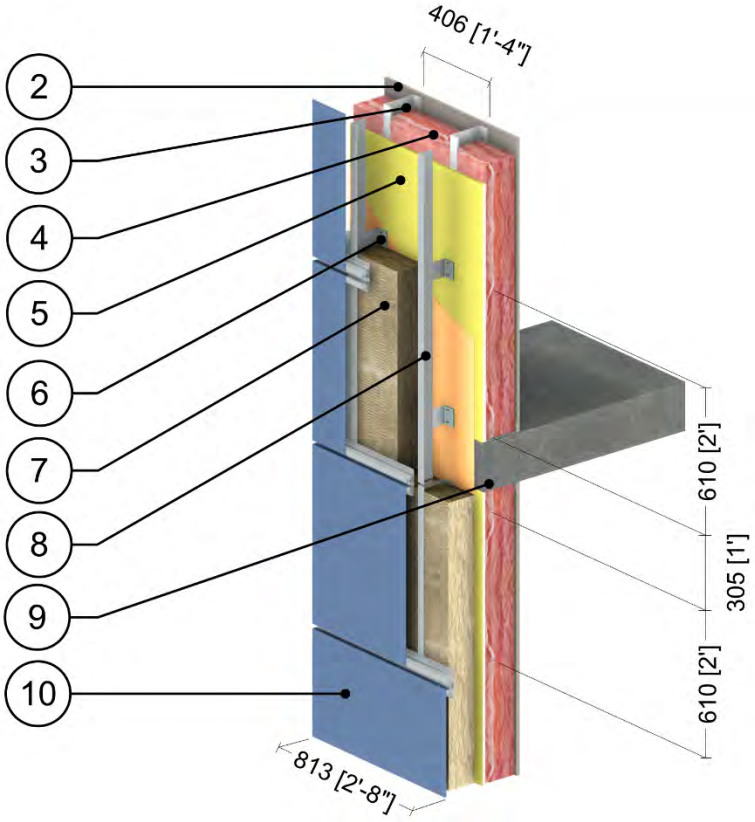
Intermediate Floor Detail

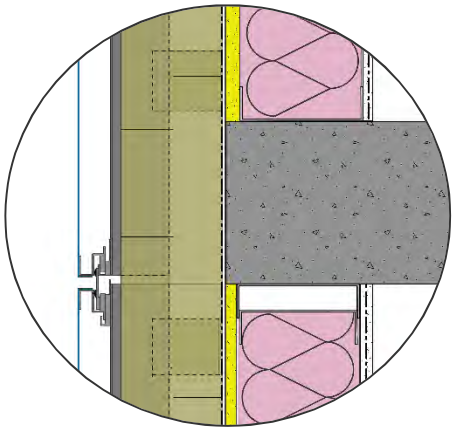
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.16 to (0.11 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6" (152)	0.26 (0.038)	R-22.5 (3.96 RSI)	0.99 (15.9)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





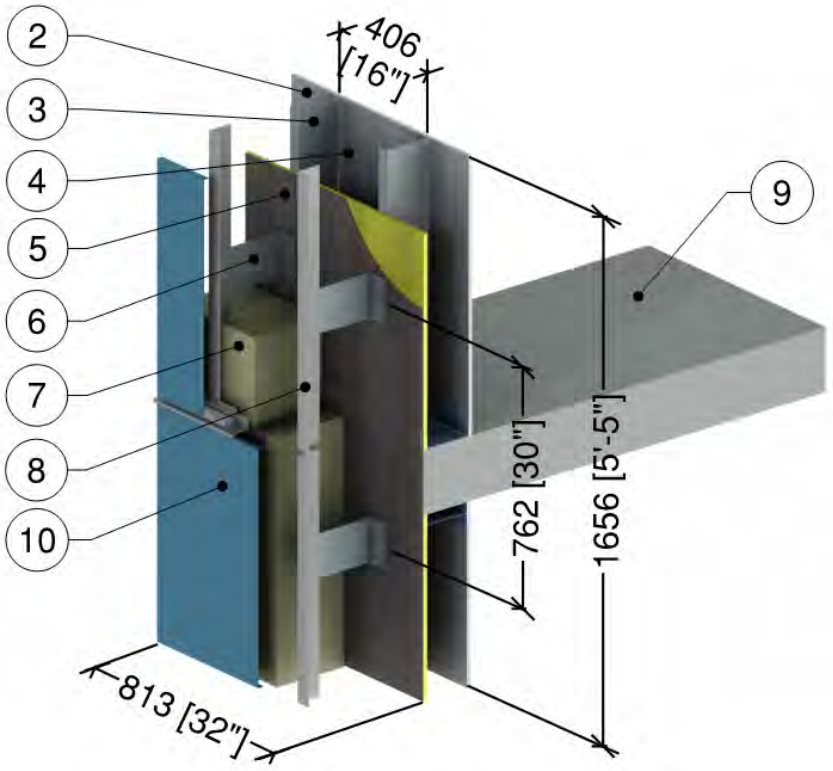
Intermediate Floor Detail

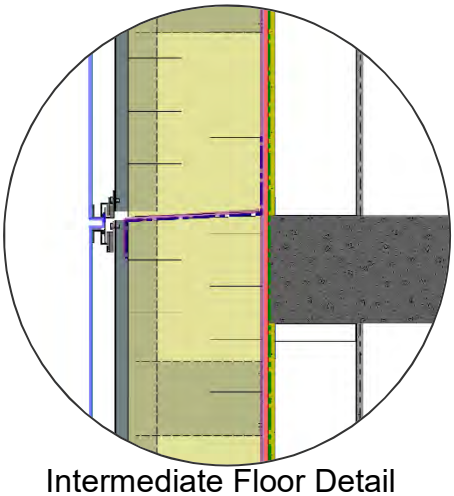
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.16 to (0.11 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6" (152)	0.25 (0.036)	R-24 (4.23 RSI)	1.42 (22.7)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





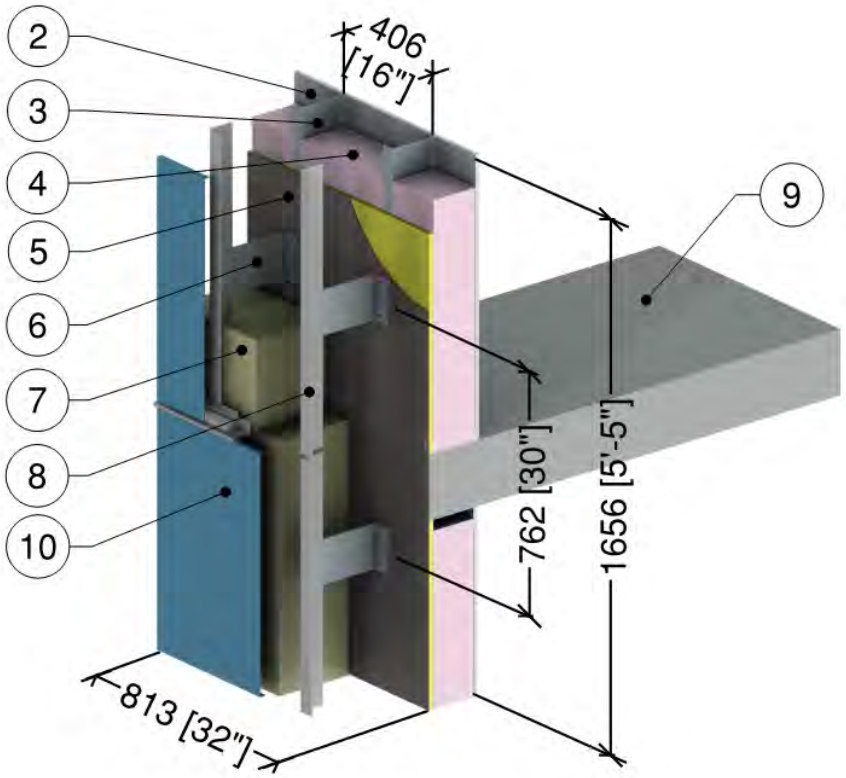
Intermediate Floor Detail

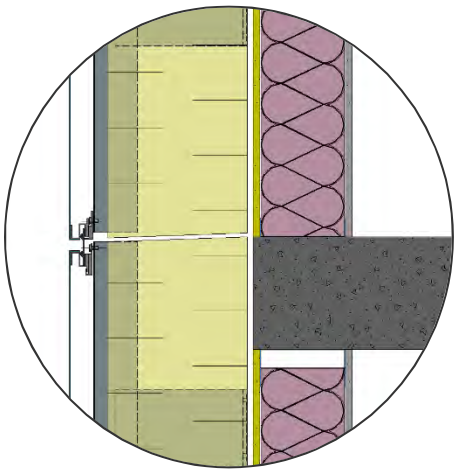
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6" (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	FRP Bracket	-	4.9 (0.70)	-	110 (1760)	-
7	Exterior Mineral Wool Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-Rail	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.2.39

Exterior and Interior Insulated 6'' x 1 /58" 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





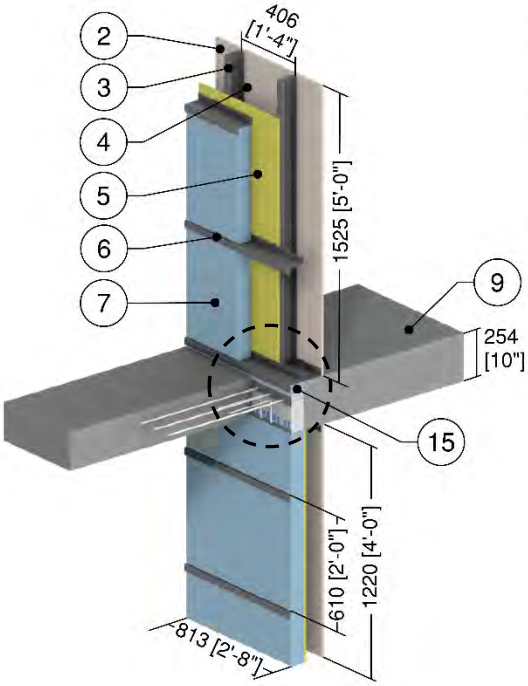
Intermediate Floor Detail

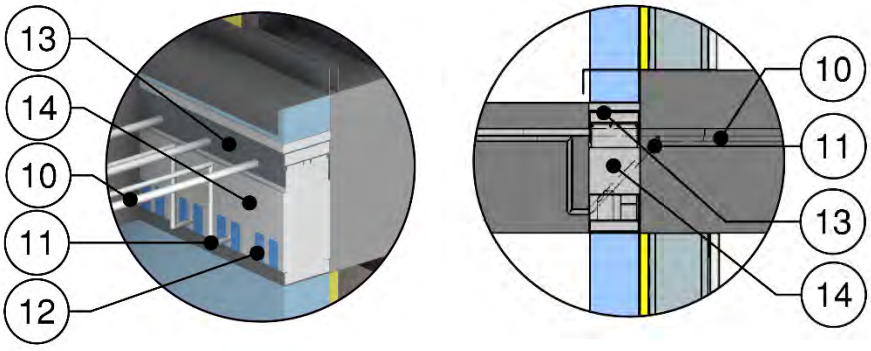
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6" (152)	-	R-19 (3.35 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	FRP Bracket	-	4.9 (0.70)	-	110 (1760)	-
7	Exterior Mineral Wool Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-Rail	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

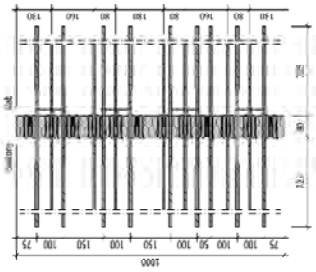
Detail 5.2.40

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





Isokorb K65-V8 Detail



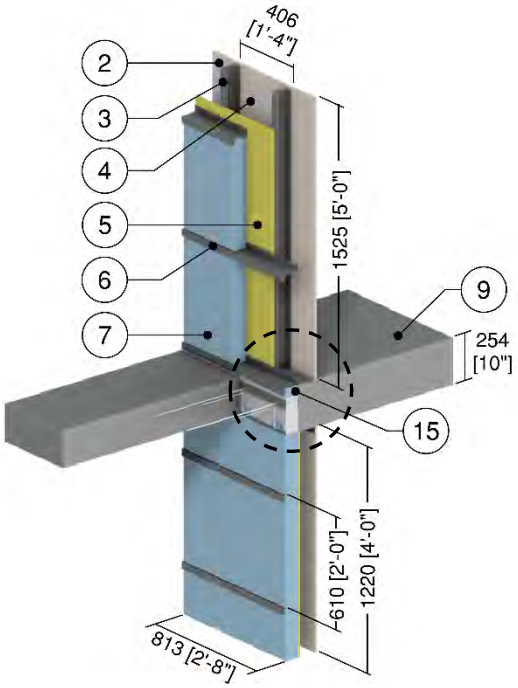
Isokorb K65-V8
Rebar Arrangement

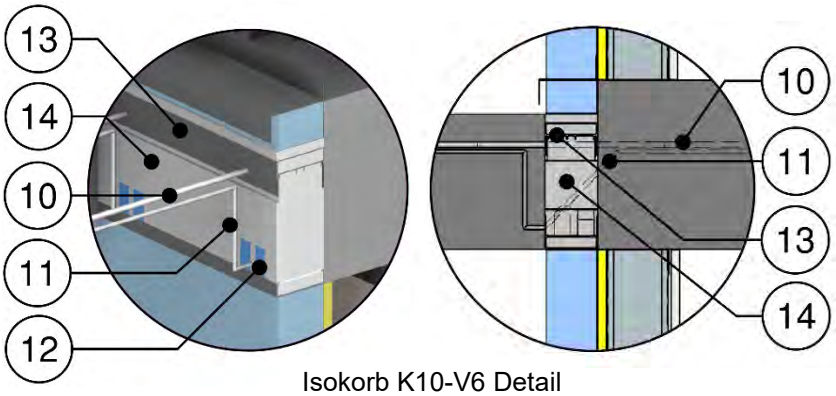
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
13	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Polystyrene Insulation	3.2” (80)	0.22 (0.031)	R-15 (2.58 RSI)	1.3 (20)	0.35 (1500)
15	Curb Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

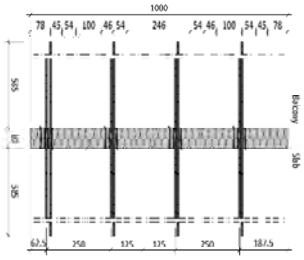
Detail 5.2.41

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





Isokorb K10-V6 Detail



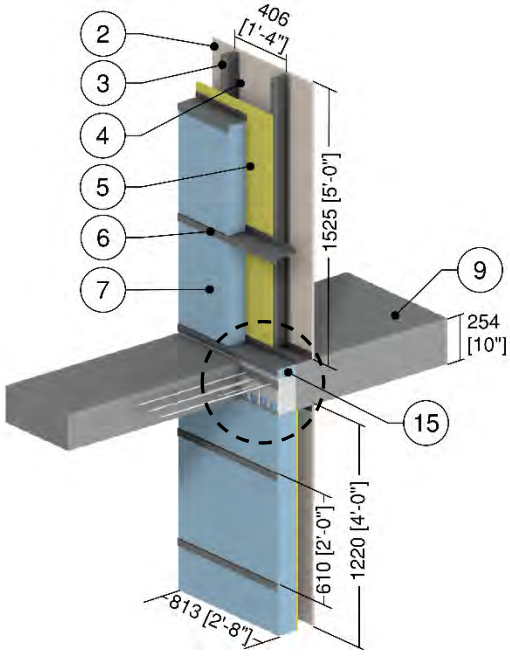
Isokorb K10-V6
Rebar Arrangement

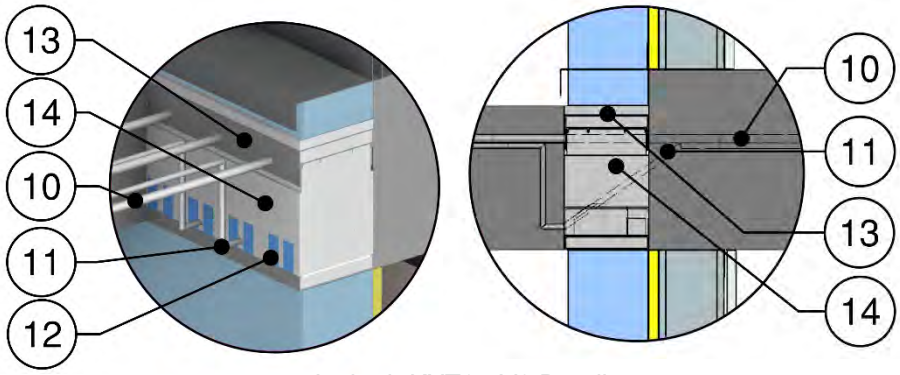
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
13	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Polystyrene Insulation	3.2” (80)	0.22 (0.031)	R-15 (2.58 RSI)	1.3 (20)	0.35 (1500)
15	Curb Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

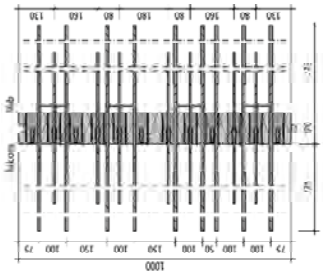
Detail 5.2.42

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





Isokorb KXT65-V8 Detail



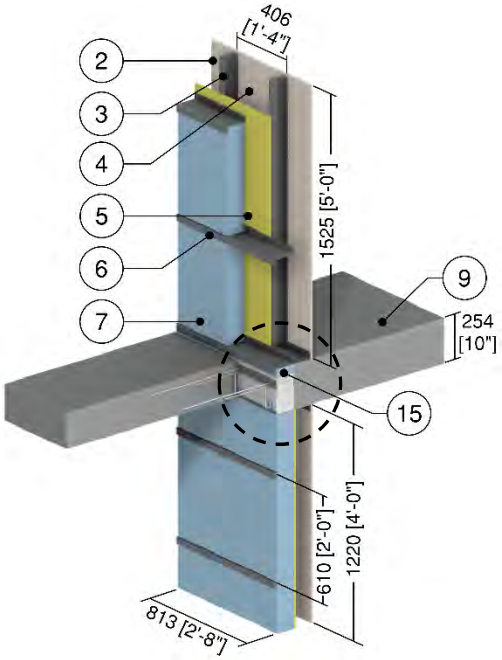
Isokorb KXT65-V8 Rebar Arrangement

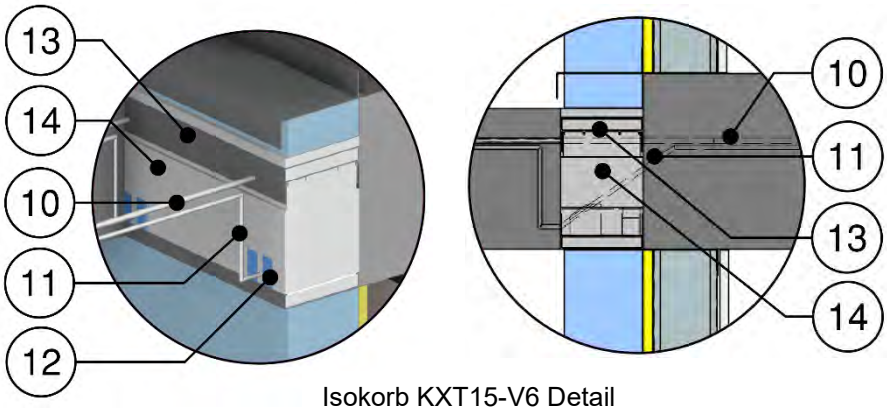
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	4.5” (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
13	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Polystyrene Insulation	4.7” (120)	0.22 (0.031)	R-21.7 (3.83 RSI)	1.3 (20)	0.35 (1500)
15	Curb Insulation	4.5” (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

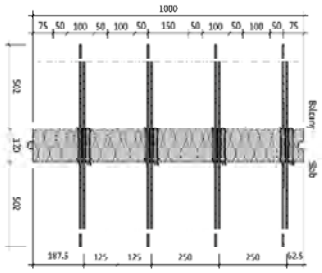
Detail 5.2.43

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





Isokorb KXT15-V6 Detail



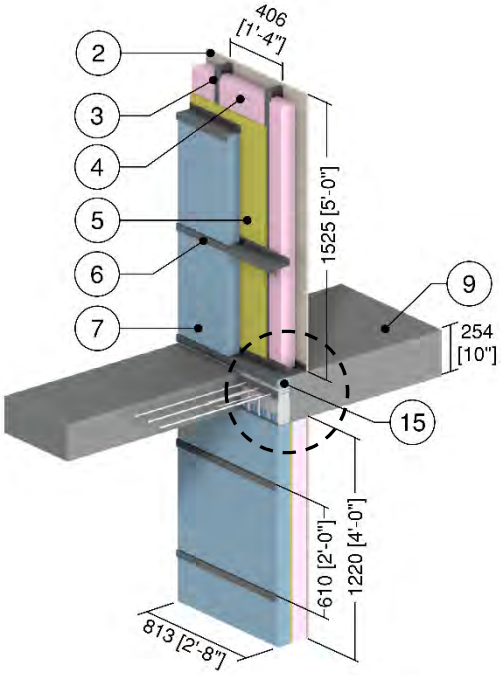
Isokorb KXT15-V6
Rebar Arrangement

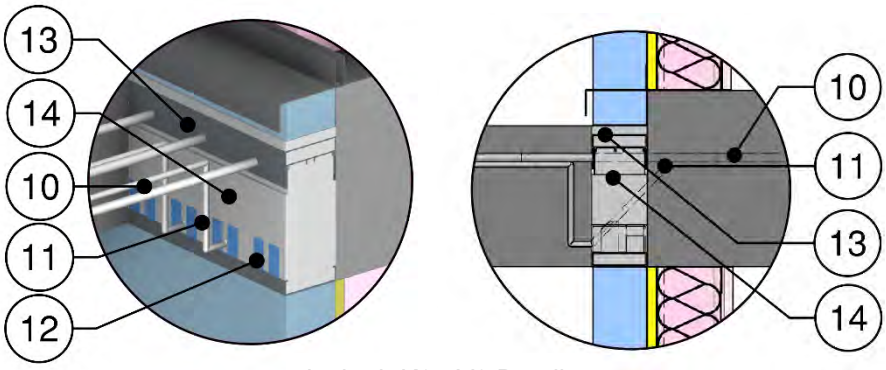
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	4.5” (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
13	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Polystyrene Insulation	4.7” (120)	0.22 (0.031)	R-21.7 (3.83 RSI)	1.3 (20)	0.35 (1500)
15	Curb Insulation	4.5” (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

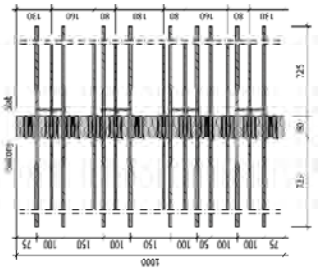
Detail 5.2.44

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 – Isokorb K65-V8 Thermally Broken Slab Projection with Insulated Curb





Isokorb K65-V8 Detail



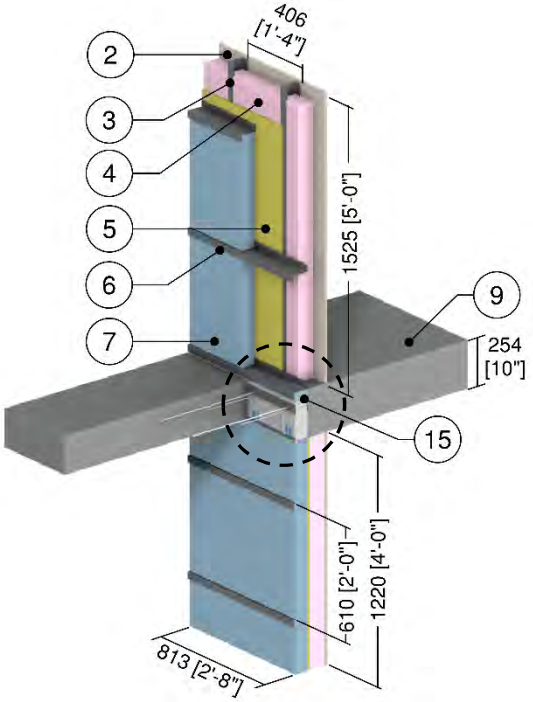
Isokorb K65-V8
Rebar Arrangement

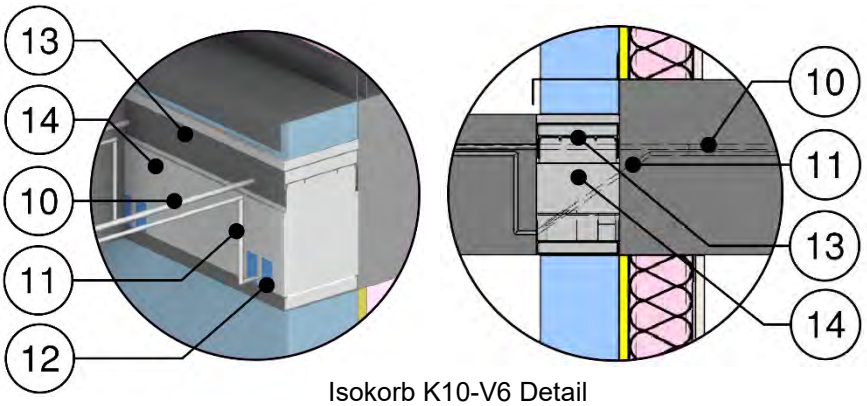
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
13	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Polystyrene Insulation	3.2” (80)	0.22 (0.031)	R-15 (2.58 RSI)	1.3 (20)	0.35 (1500)
15	Curb Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

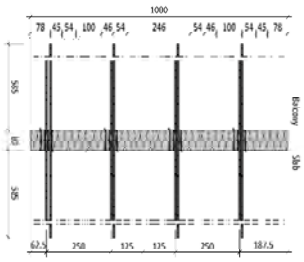
Detail 5.2.45

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 – Isokorb K10-V6 Thermally Broken Slab Projection with Insulated Curb





Isokorb K10-V6 Detail



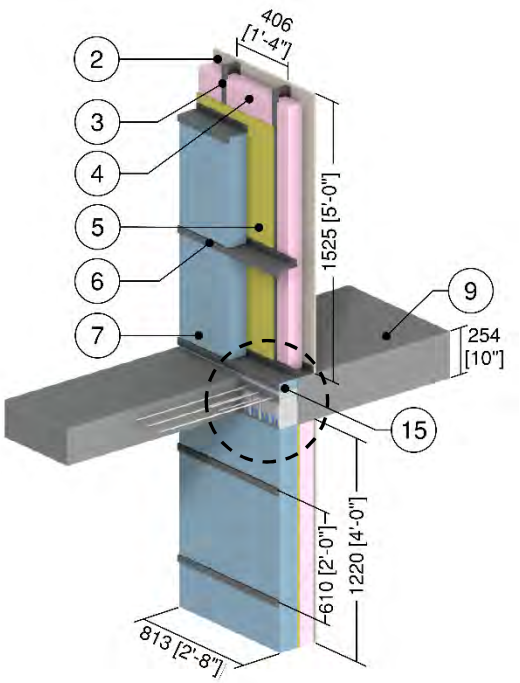
Isokorb K10-V6
Rebar Arrangement

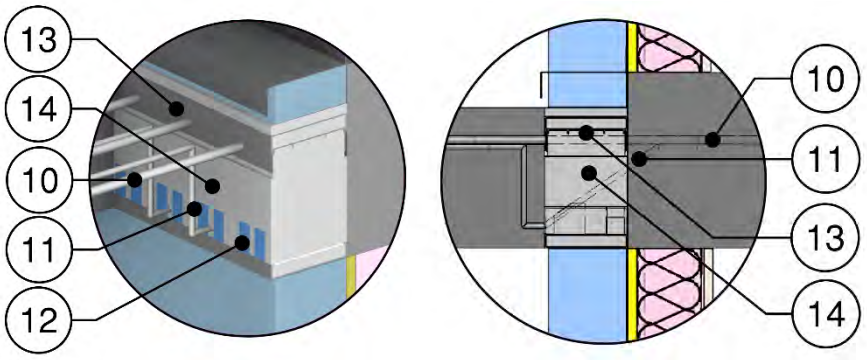
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
13	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Polystyrene Insulation	3.2” (80)	0.22 (0.031)	R-15 (2.58 RSI)	1.3 (20)	0.35 (1500)
15	Curb Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

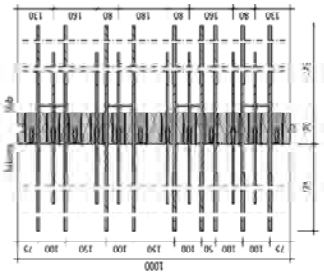
Detail 5.2.46

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 – Isokorb KXT65-V8 Thermally Broken Slab Projection with Insulated Curb





Isokorb KXT65-V8 Detail



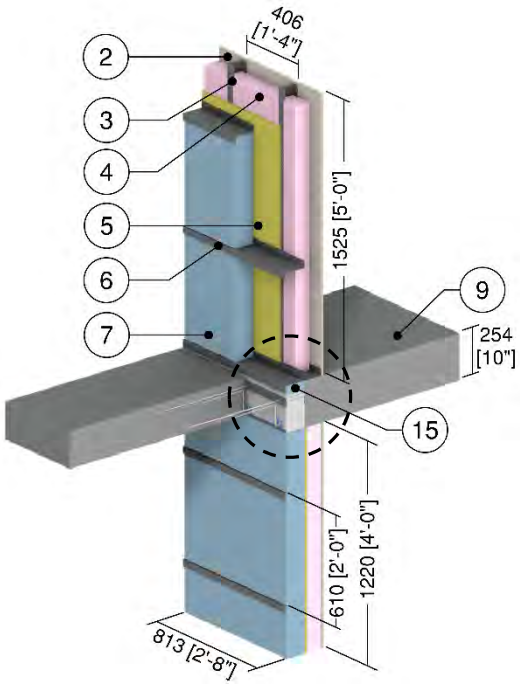
Isokorb KXT65-V8 Rebar Arrangement

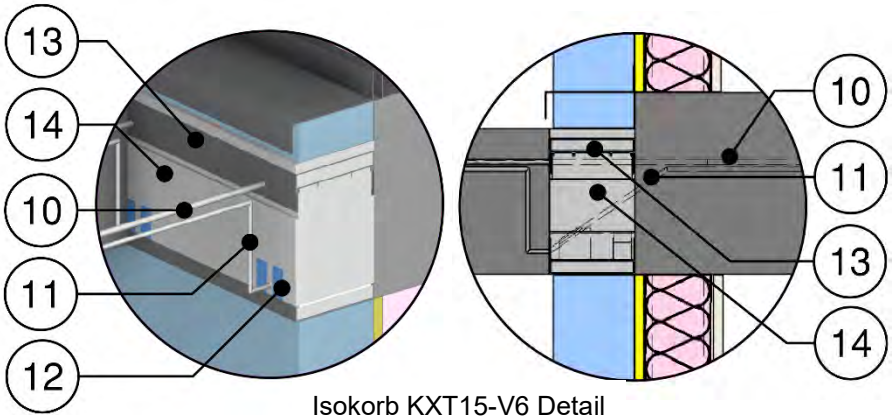
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	4.5” (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
13	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Polystyrene Insulation	4.7” (120)	0.22 (0.031)	R-21.7 (3.83 RSI)	1.3 (20)	0.35 (1500)
15	Curb Insulation	4.5” (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

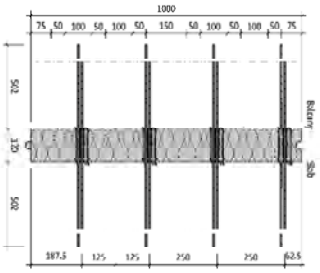
Detail 5.2.47

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 – Isokorb KXT15-V6 Thermally Broken Slab Projection with Insulated Curb





Isokorb KXT15-V6 Detail



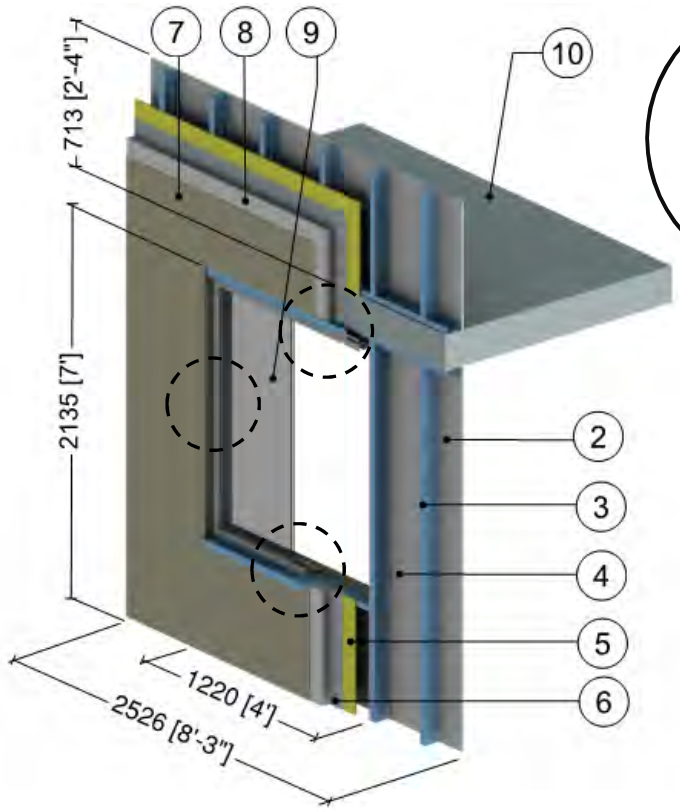
Isokorb KXT15-V6
Rebar Arrangement

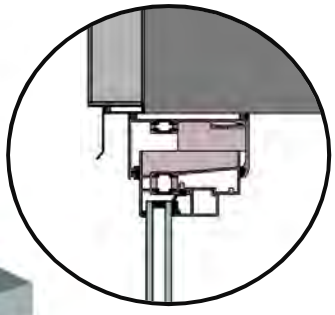
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	4.5” (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	10” (254)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
13	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
14	Polystyrene Insulation	4.7” (120)	0.22 (0.031)	R-21.7 (3.83 RSI)	1.3 (20)	0.35 (1500)
15	Curb Insulation	4.5” (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

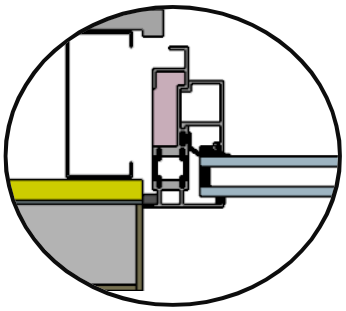
Detail 5.3.1

Exterior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection

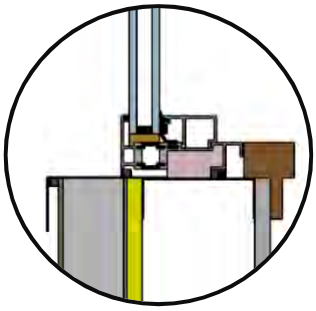




Head Detail



Jamb Detail



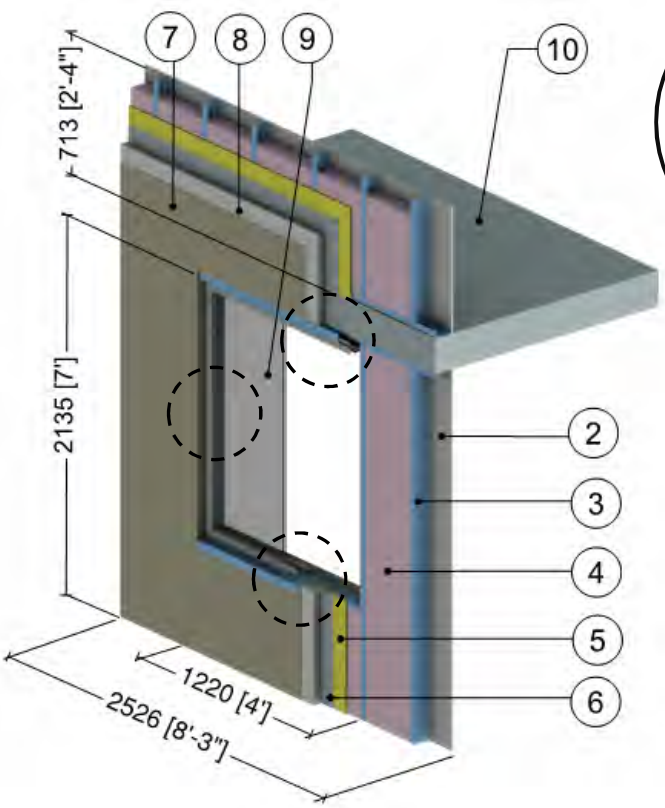
Sill Detail

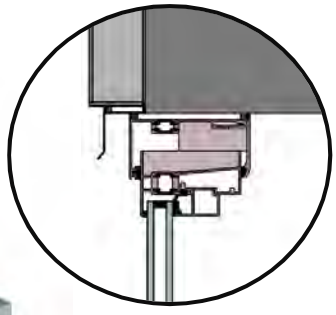
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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	Lamina	1/8" (4)	6 (0.9)	R-0.04 (0.01 RSI)	120 (1922)	0.20 (850)
8	Insulation Board	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 RSI)	1 (16)	0.35 (1470)
9	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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

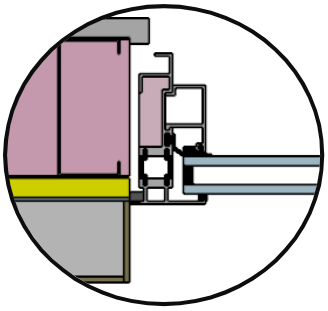
Detail 5.3.2

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

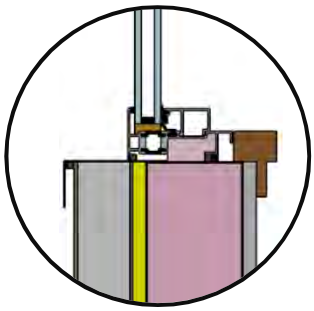




Head Detail



Jamb Detail



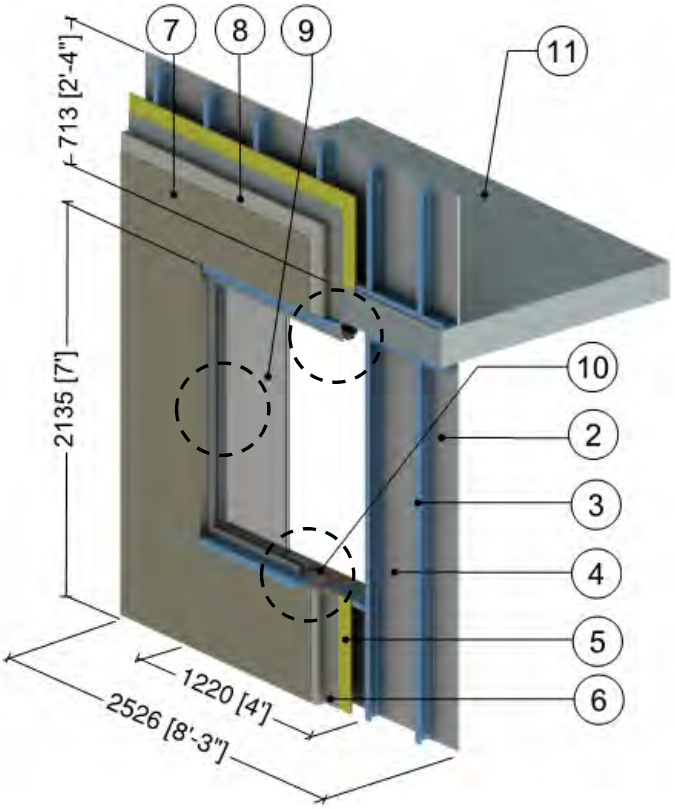
Sill Detail

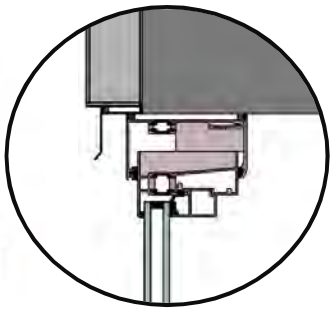
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	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 (1.1)	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	Lamina	1/8" (4)	6 (0.9)	R-0.04 (0.01 RSI)	120 (1922)	0.20 (850)
8	Insulation Board	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 RSI)	1 (16)	0.35 (1470)
9	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Concrete Slab	8" (203)	12 (1.8)	-	140 (2250)	0.20 (850)
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

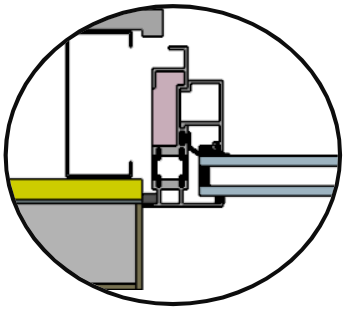
Detail 5.3.3

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

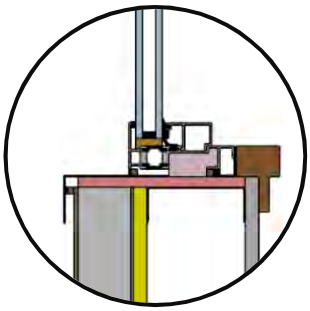




Head Detail



Jamb Detail



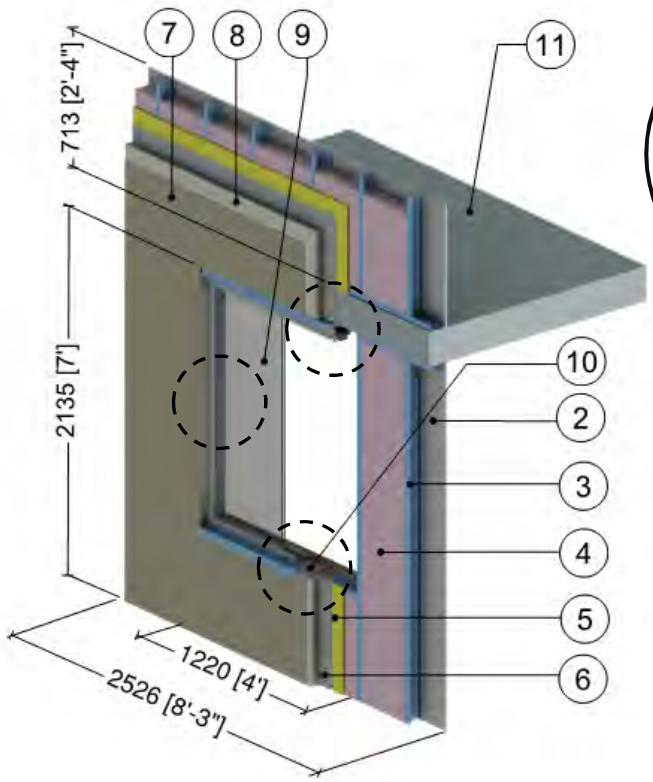
Sill Detail

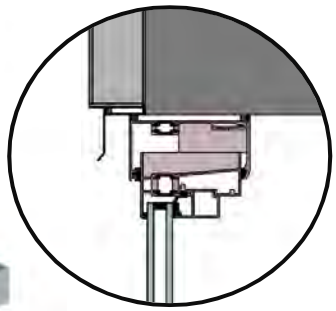
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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	Lamina	1/8” (4)	6 (0.9)	R-0.04 (0.01 RSI)	120 (1922)	0.20 (850)
8	Insulation Board	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 RSI)	1 (16)	0.35 (1470)
9	5’ (1.5m) x 6’ (1.8m) Aluminum window: double glazed & thermally broken2, double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Aerogel Blanket	3/8" (10)	0.086 (0.015)	R-3.8 (0.67 RSI)	-	-
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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

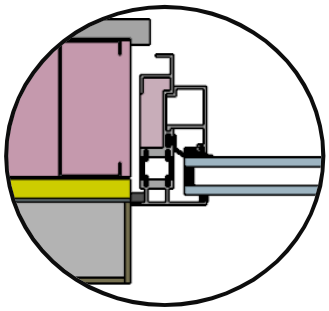
Detail 5.3.4

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Drained EIFS Wall Assembly – Window with Aerogel and Floor Slab Intersection

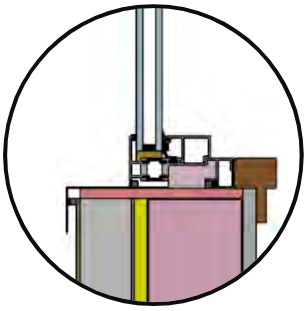




Head Detail



Jamb Detail



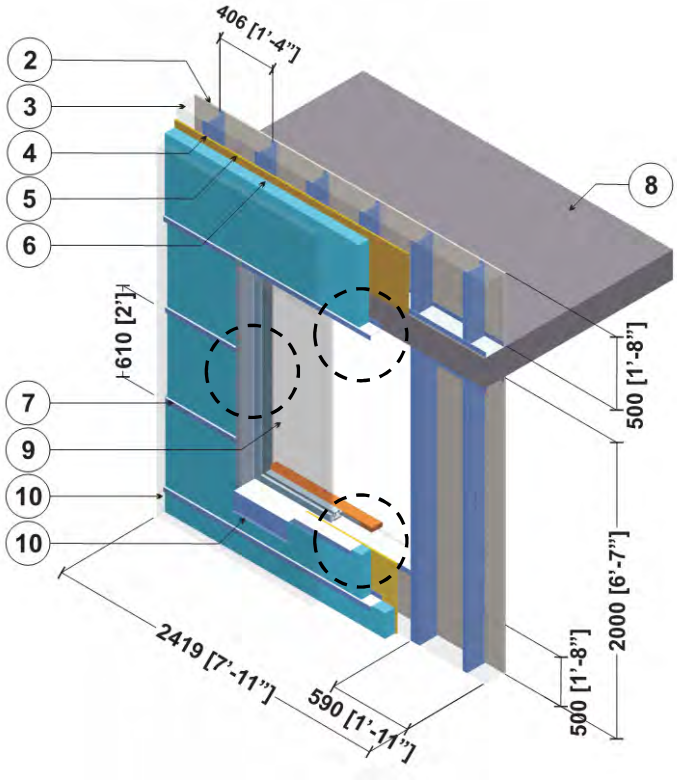
Sill Detail

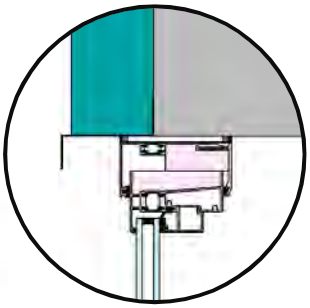
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	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 (1.1)	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	Lamina	1/8" (4)	6 (0.9)	R-0.04 (0.01 RSI)	120 (1922)	0.20 (850)
8	Insulation Board	Varies	0.27 (0.039)	R-7.5 (1.32 RSI) to R-15 (2.64 RSI)	1 (16)	0.35 (1470)
9	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Aerogel Blanket	3/8" (10)	0.086 (0.015)	R-3.8 (0.67 RSI)	-	-
11	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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

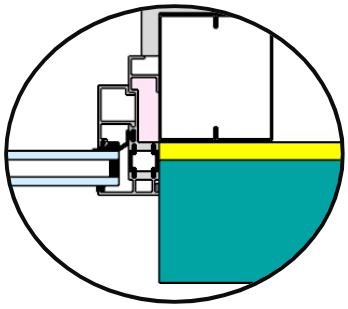
Detail 5.3.5

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 & Intermediate Floor Intersection

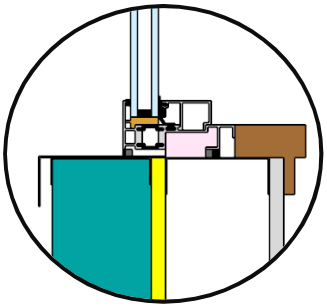




Head Detail



Jamb Detail



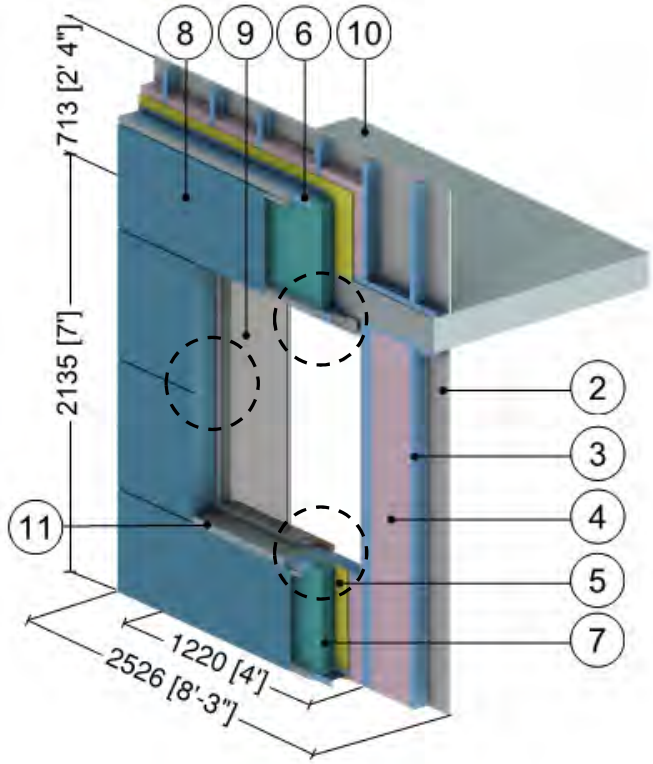
Sill Detail

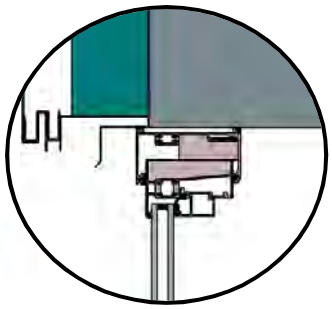
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-Girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient, sill flashing & interior finish materials					
11	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity for air spaces within window framing was found using ISO 10077-2

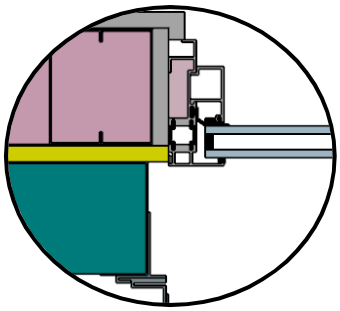
Detail 5.3.6

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 – Window and Intermediate Floor Intersection

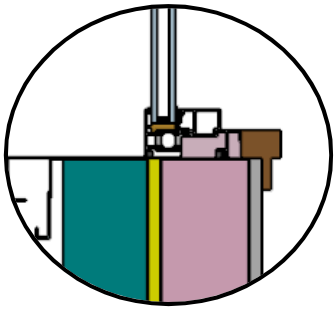




Head Detail



Jamb Detail



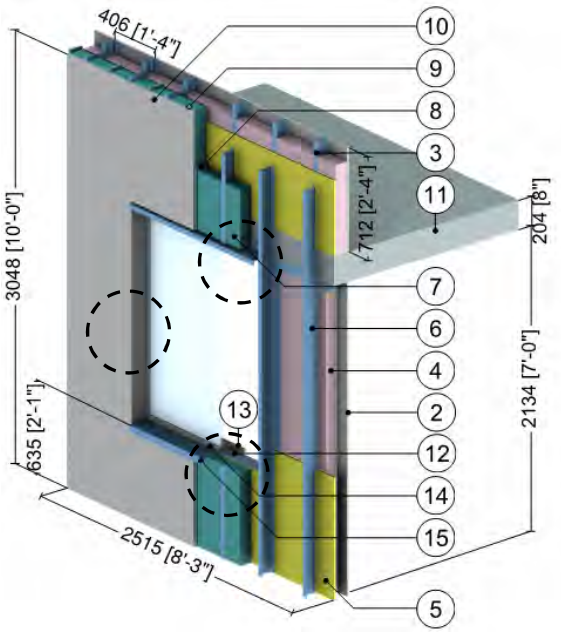
Sill Detail

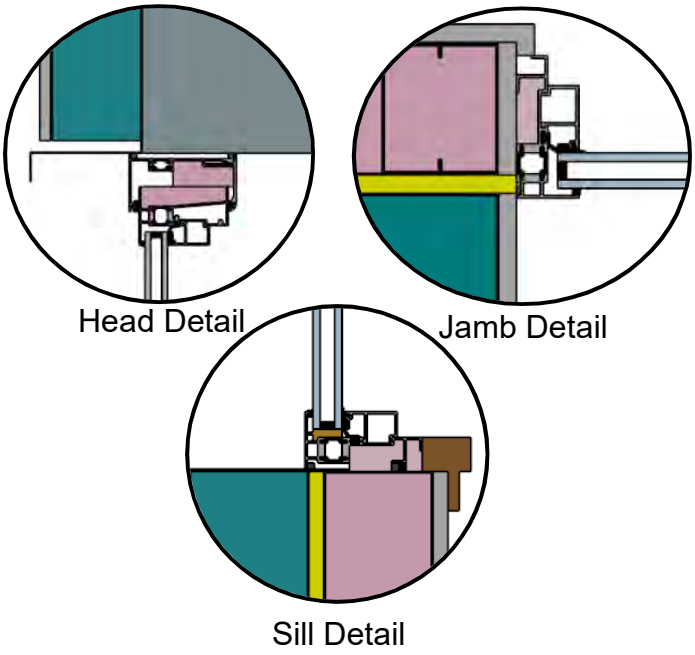
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top Tracks	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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	5’ (1.5m) x 6’ (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Aluminum Flashing	18 Gauge	1110 (160)	-	171(2739)	0.21 (900)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity for air spaces within window framing was found using ISO 10077-2

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 – Window and Intermediate Floor Intersection





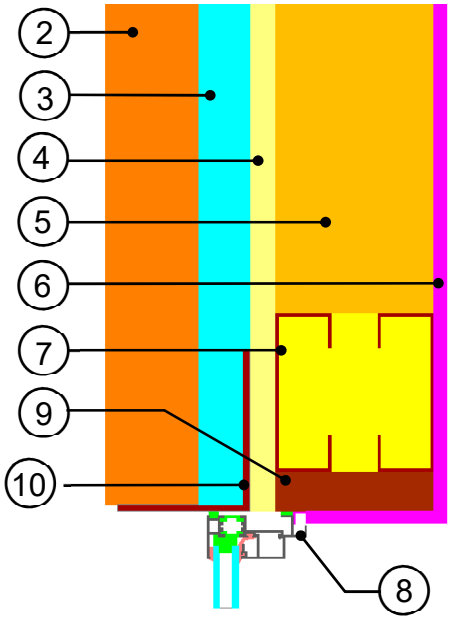
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	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	Vertical Z-Girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
8	Rigid Insulation Bracing	Varies	0.2 (0.29)	-	1.8 (28)	0.29 (1220)
9	Rainscreen Cavity	1/2” (13)	-	R-0.5 (0.09 RSI)	0.075 (1.2)	0.24 (1000)
10	Stucco Cement with Breather Board	1/2” (13)	6 (0.9)	R-0.1 (0.01 RSI)	120 (1922)	0.20 (850)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Metal sheet connected to studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Wood Sill	1.5” (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	5’ (1.5m) x 6’ (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
15	Aluminum Flashing	14 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
16	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

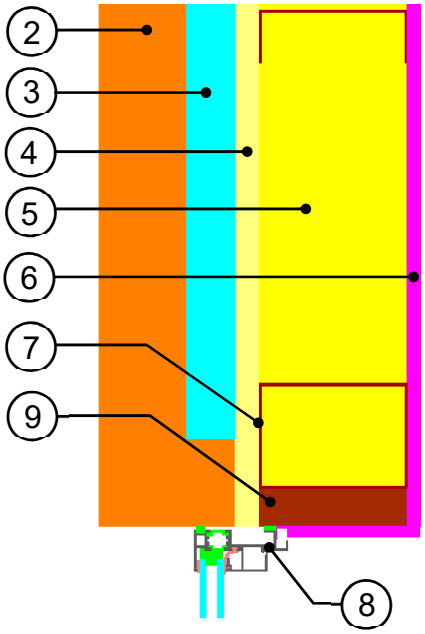
Detail 5.3.8

Interior Insulated Steel Frame Wall Assembly with Brick Cladding – Window Intersection

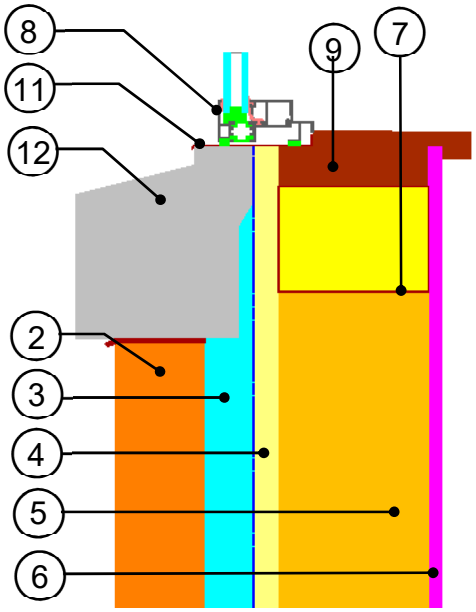
Detail referenced from work done by Passive House Academy



Head



Jamb



Sill

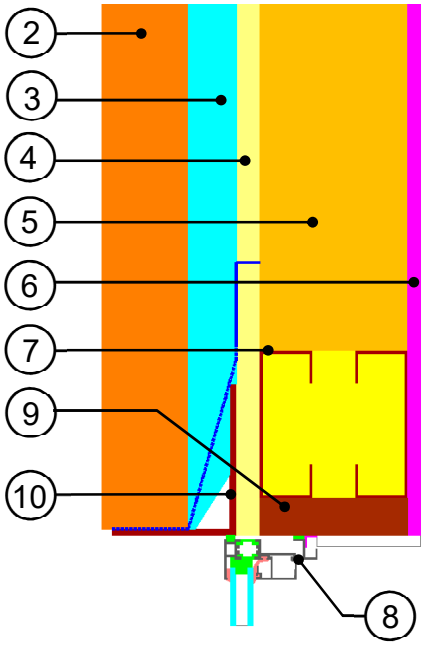
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.74 (0.13 RSI)	-	-
2	Brick	3 5/8" (92)	0.578 (1.0)	R-0.523 (0.092 RSI)	110 (1800)	-
3	Air Cavity	2" (51)	0.132 (0.23)	R-1.261 (0.222 RSI)	-	-
4	Insulation	1" (25)	0.0139 (0.024)	R-6 (1.055 RSI)	-	-
5	Mineral Wool Insulation with Steel Studs	6 3/8" (162)	0.0370 (0.064)	R-14.36 (2.53 RSI)	-	-
6	Gypsum Board	1/2" (13)	0.092 (0.16)	R-0.5 (0.08 RSI)	50 (800)	-
7	Steel Studs	-	27.7 (48)	-	-	-
8	5500 ISOWEB Window	-	-	-	-	-
9	Timber Buck	-	0.006 (0.10)	-	-	-
10	Steel Lintel	-	27.7 (48)	-	-	-
11	Aluminum Sill Pan	-	92.45 (160)	-	-	-
12	Concrete Sill	-	1.4 (2.4)	-	-	-
13	Exterior Film[1]	-	-	R-0.23 (0.04 RSI)	-	-

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

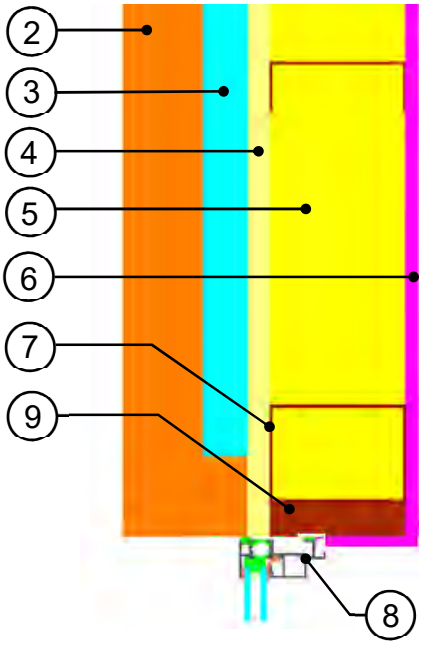
Detail 5.3.9

Interior Insulated Steel Frame Wall Assembly with Brick Cladding – Window Intersection Aligned with Insulation

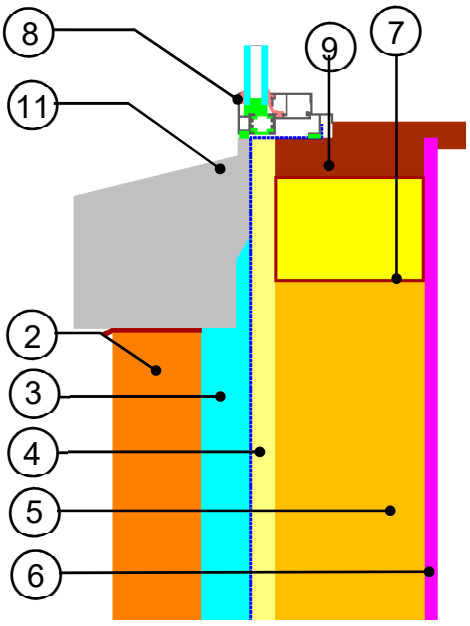
Detail referenced from work done by Passive House Academy



Head



Jamb



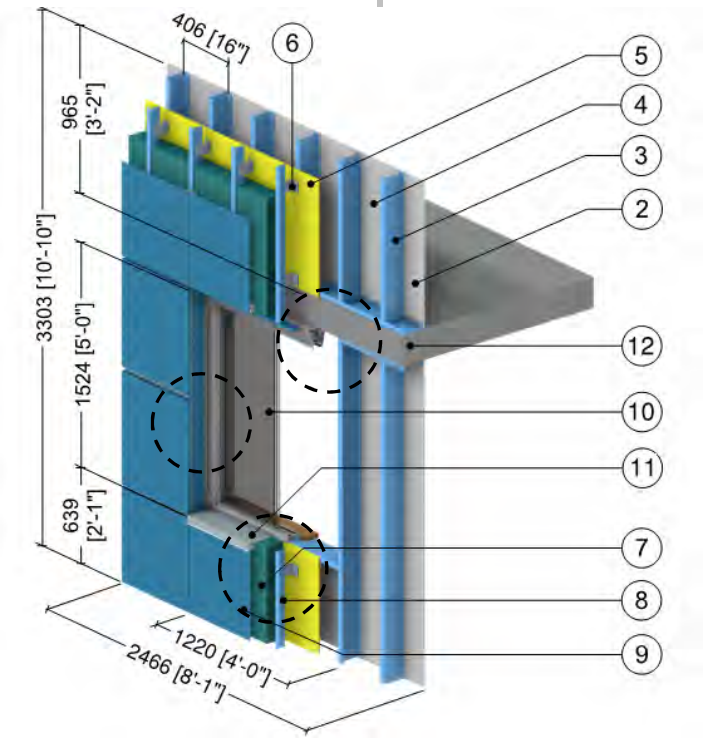
Sill

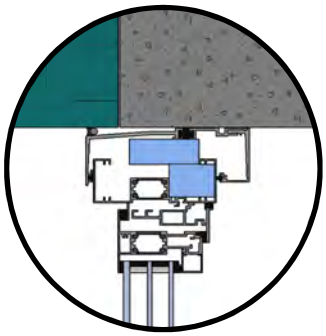
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.74 (0.13 RSI)	-	-
2	Brick	3 5/8" (92)	0.578 (1.0)	R-0.523 (0.092 RSI)	110 (1800)	-
3	Air Cavity	2" (51)	0.132 (0.23)	R-1.261 (0.222 RSI)	-	-
4	Insulation	1" (25)	0.0139 (0.024)	R-6 (1.055 RSI)	-	-
5	Mineral Wool Insulation with Steel Studs	6 3/8" (162)	0.0370 (0.064)	R-14.36 (2.53 RSI)	-	-
6	Gypsum Board	1/2" (13)	0.092 (0.16)	R-0.5 (0.08 RSI)	50 (800)	-
7	Steel Studs	-	27.7 (48)	-	-	-
8	5500 ISOWEB Window	-	-	-	-	-
9	Timber Buck	-	0.006 (0.10)	-	-	-
10	Steel Lintel	-	27.7 (48)	-	-	-
11	Concrete Sill	-	1.4 (2.4)	-	-	-
12	Exterior Film[1]	-	-	R-0.23 (0.04 RSI)	-	-

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

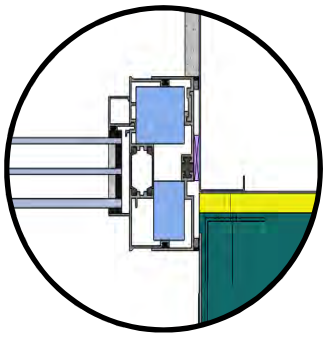
Detail 5.3.10

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

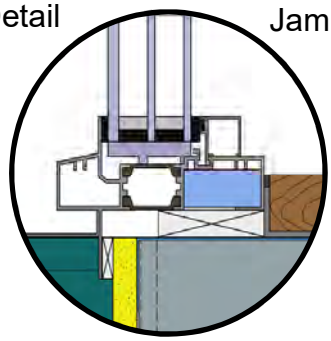




Head Detail



Jamb Detail



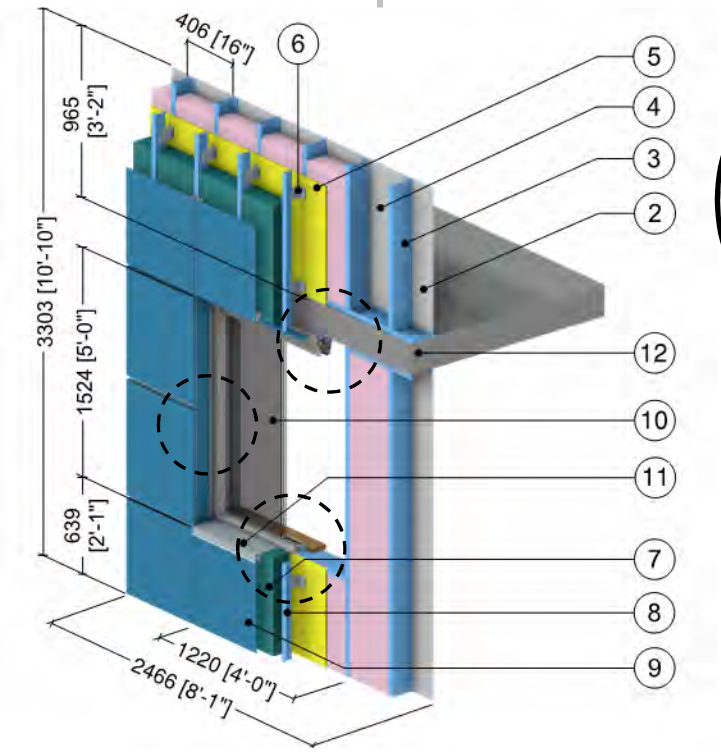
Sill Detail

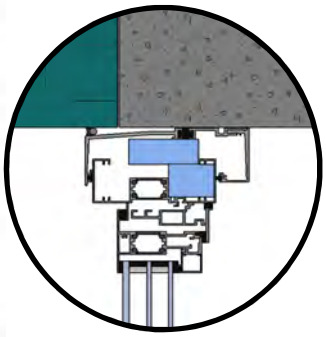
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs (16” o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	0.09” (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
7	Exterior Insulation	Varies	-	R-10 to R-25 (1.76 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum window: triple glazed & thermally broken[2], IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K)					
11	Aluminum Flashing	14 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
12	Concrete Floor Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Exterior Film[1]	-	-	R-0.2 (0.03 RSI) to R-0.7 (0.12 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

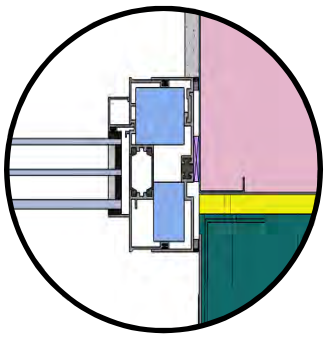
Detail 5.3.11

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 – Triple Glazed Aluminum Window & Intermediate Floor Intersection with Window Thermal Break Positioned in Steel Framing

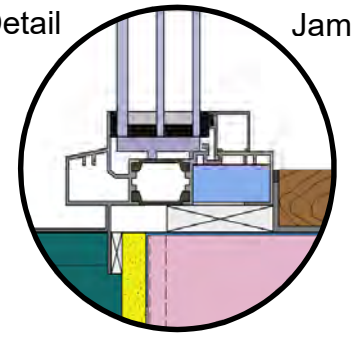




Head Detail



Jamb Detail



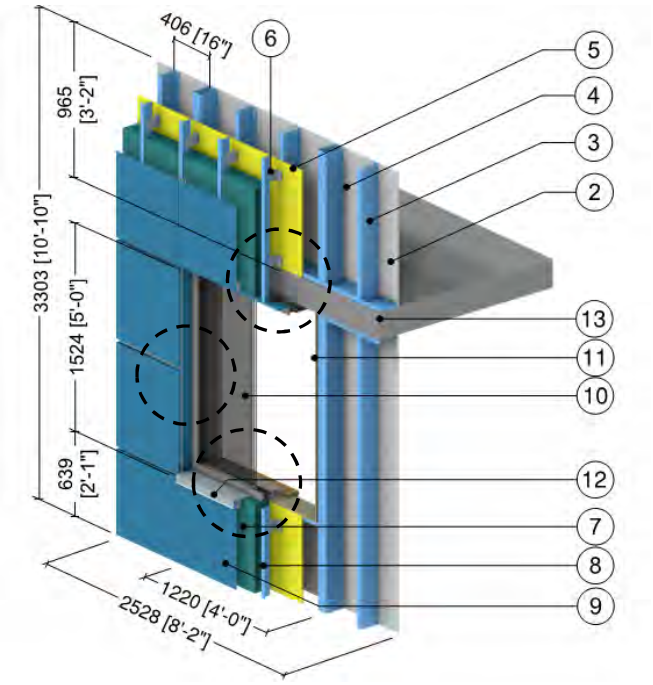
Sill Detail

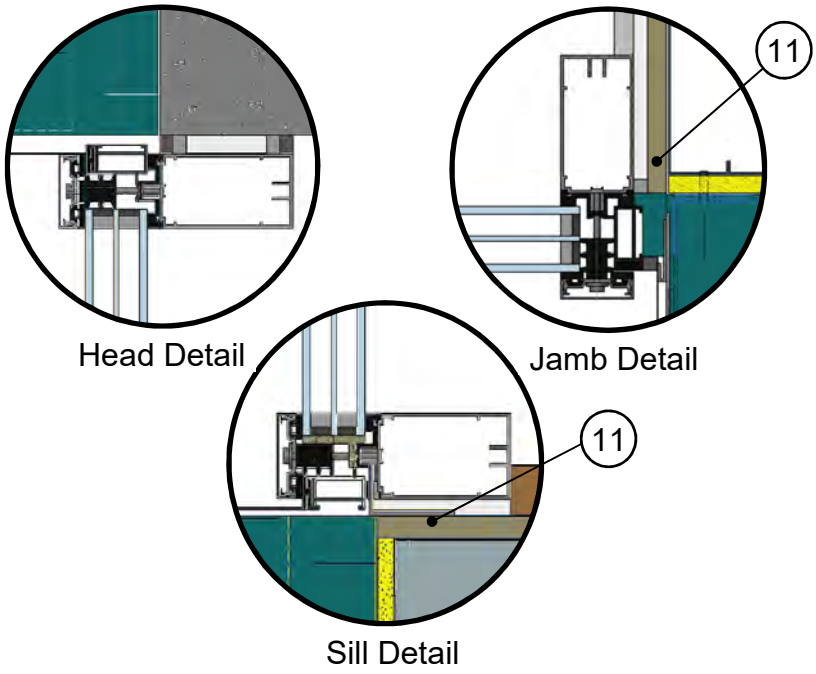
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs (16” o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglas Batt Insulation	6” (152)	0.32 (0.046)	R-19 (3.35 RSI)	0.9 (1.1)	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	Thermally Isolated Aluminum Bracket	0.09” (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
7	Exterior Insulation	Varies	-	R-10 to R-25 (1.76 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum window: triple glazed & thermally broken, IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K) [2]					
11	Aluminum Flashing	14 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
12	Concrete Floor Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Exterior Film[1]	-	-	R-0.2 (0.03 RSI) to R-0.7 (0.12 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 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



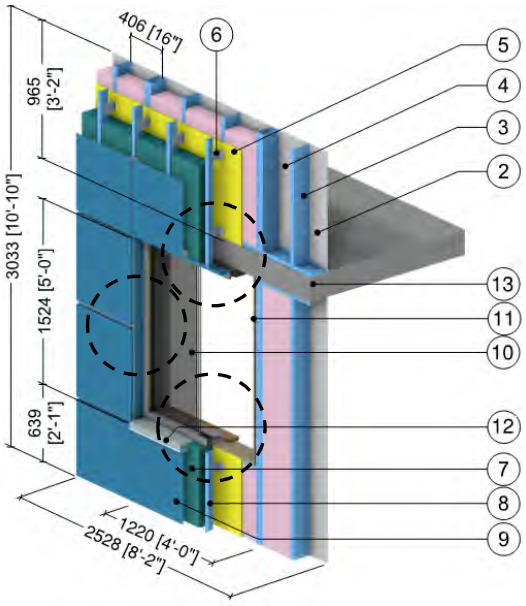


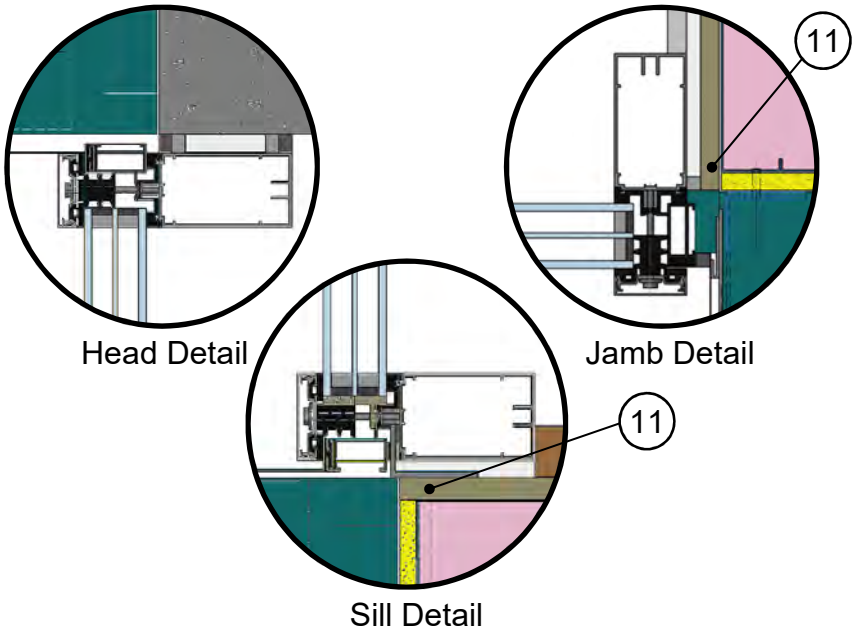
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs (16” o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	0.09” (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
7	Exterior Insulation	Varies	-	R-10 to R-25 (1.76 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum curtain wall (Passive House certified): triple glazed & thermally broken[2], IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K)					
11	Wood Liner	1/2” (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
12	Aluminum Flashing	14 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
13	Concrete Floor Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Exterior Film[1]	-	-	R-0.2 (0.03 RSI) to R-0.7 (0.12 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 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 – Triple Glazed Aluminum Curtain Wall & Intermediate Floor Intersection with Window Thermal Break Positioned in the Exterior Insulation



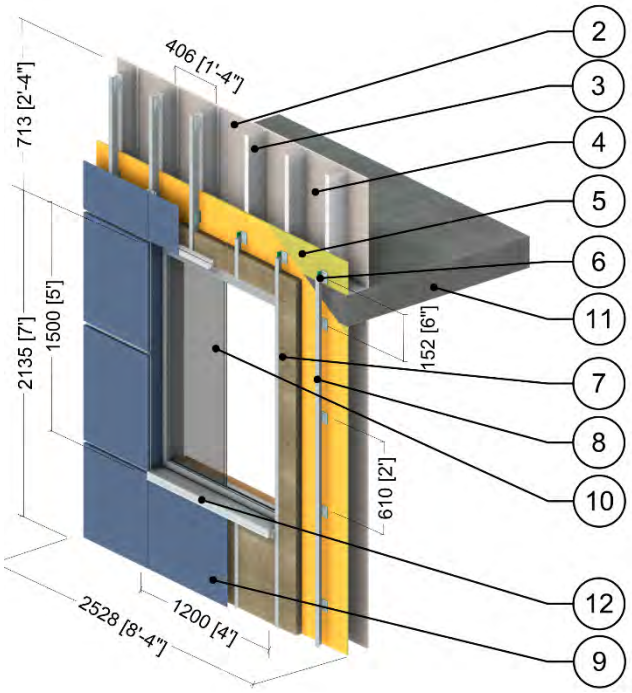


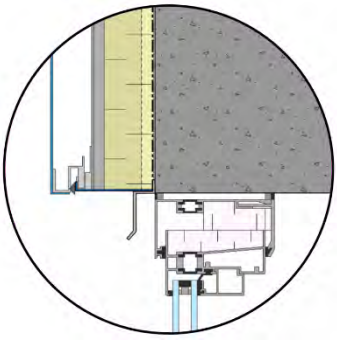
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs (16” o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglas Batt Insulation	6” (152)	0.32 (0.046)	R-19 (3.35 RSI)	0.9 (1.1)	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	Thermally Isolated Aluminum Bracket	0.09” (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
7	Exterior Insulation	Varies	-	R-10 to R-25 (1.76 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum curtain wall (Passive House certified): triple glazed & thermally broken[2], IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K)					
11	Wood Liner	1/2” (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
12	Aluminum Flashing	14 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
13	Concrete Floor Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Exterior Film[1]	-	-	R-0.2 (0.03 RSI) to R-0.7 (0.12 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

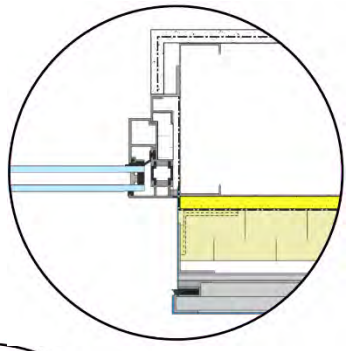
Detail 5.3.14

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

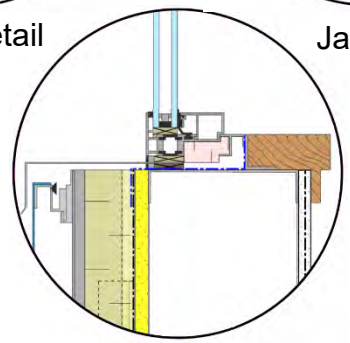




Head Detail



Jamb Detail



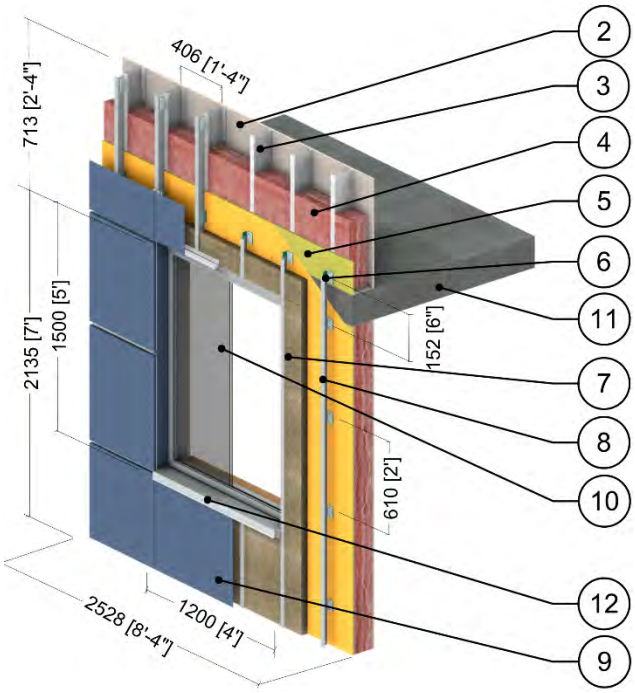
Sill Detail

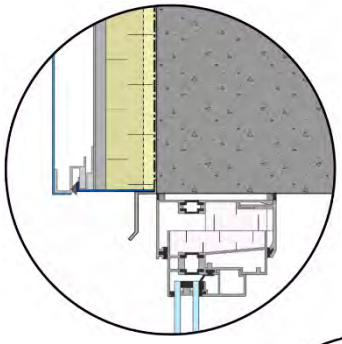
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum window: thermally broken, double glazed IGU[2] U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Aluminum Flashing	18 gauge	1110 (160)	-	171 (2739)	0.22 (900)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

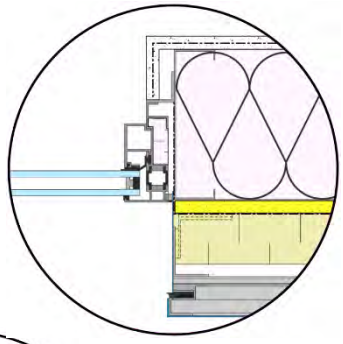
Detail 5.3.15

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

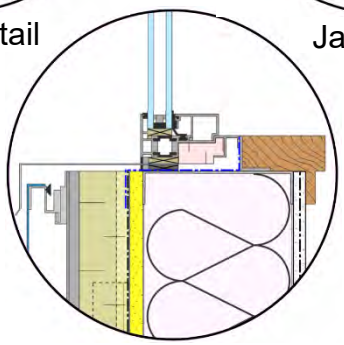




Head Detail



Jamb Detail



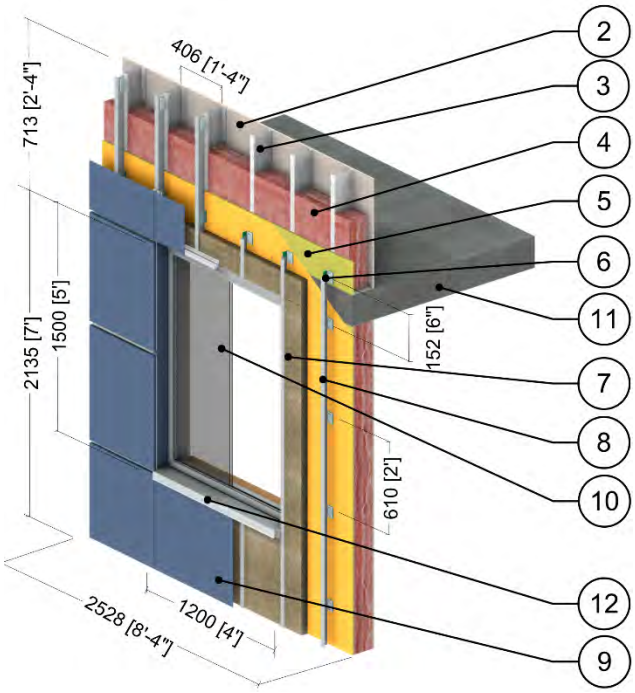
Sill Detail

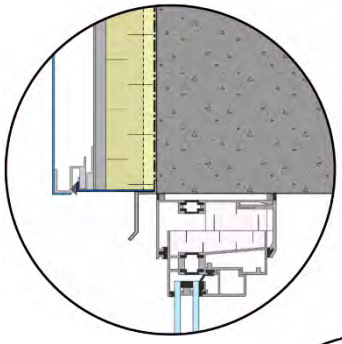
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum window: thermally broken, double glazed IGU[2] U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Aluminum Flashing	18 gauge	1110 (160)	-	171 (2739)	0.22 (900)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

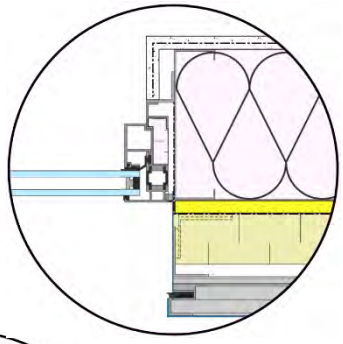
Detail 5.3.16

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

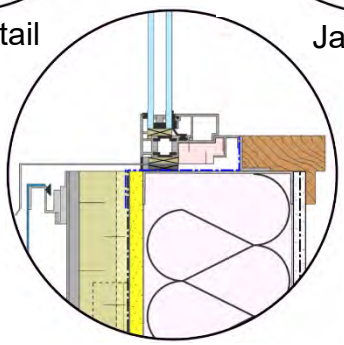




Head Detail



Jamb Detail



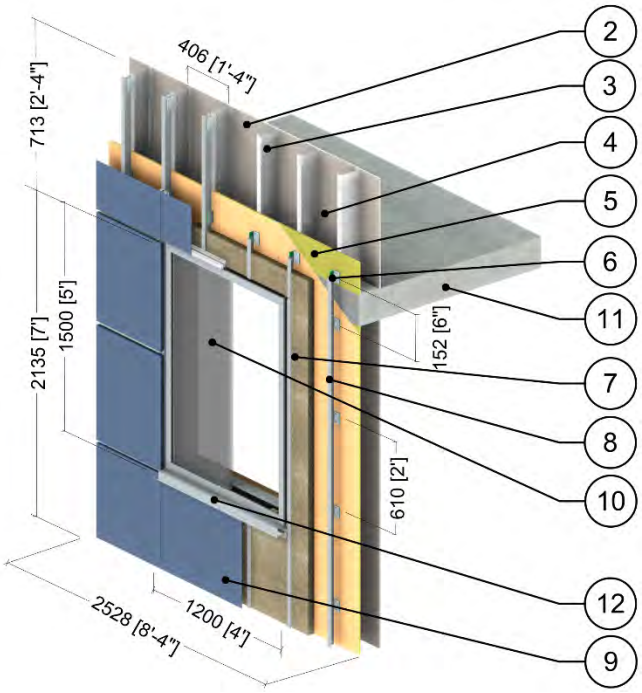
Sill Detail

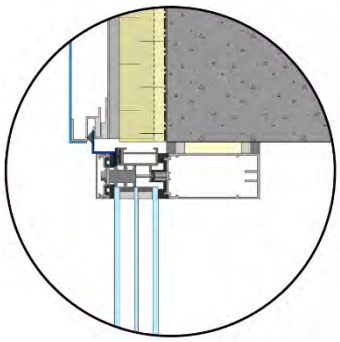
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.26 (0.038)	R-22.5 (3.96 RSI)	0.99 (15.9)	0.17 (710)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum window: thermally broken, double glazed IGU[2] U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Aluminum Flashing	18 gauge	1110 (160)	-	171 (2739)	0.22 (900)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

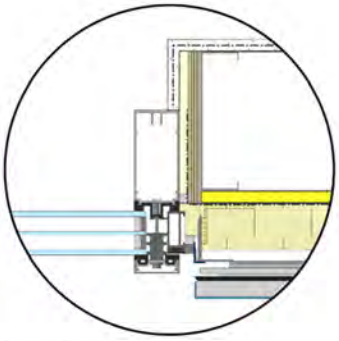
Detail 5.3.17

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

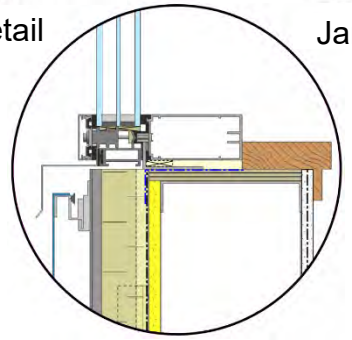




Head Detail



Jamb Detail



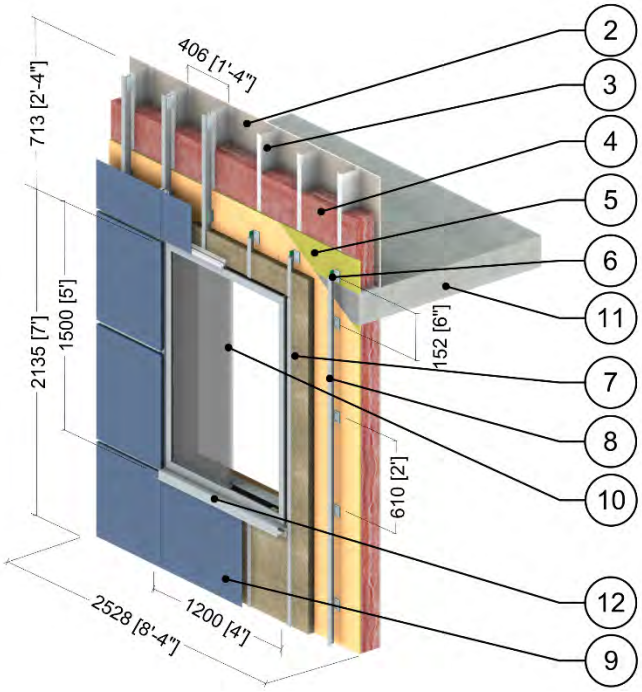
Sill Detail

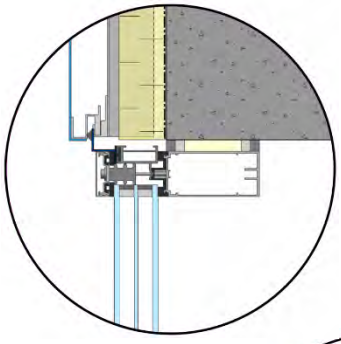
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum window: thermally broken, triple glazed IGU[2] U_{IGU} = 0.220 BTU/hr.ft².°F (1.25 W/m²K)					
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Aluminum Flashing	18 gauge	1110 (160)	-	171 (2739)	0.22 (900)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

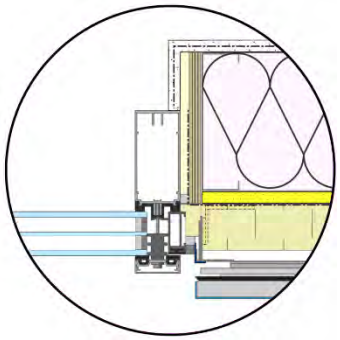
Detail 5.3.18

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

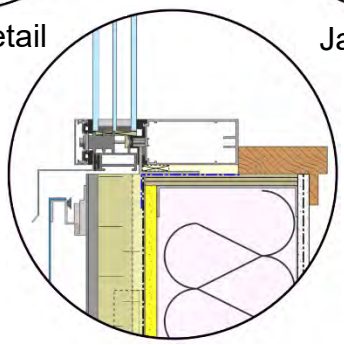




Head Detail



Jamb Detail



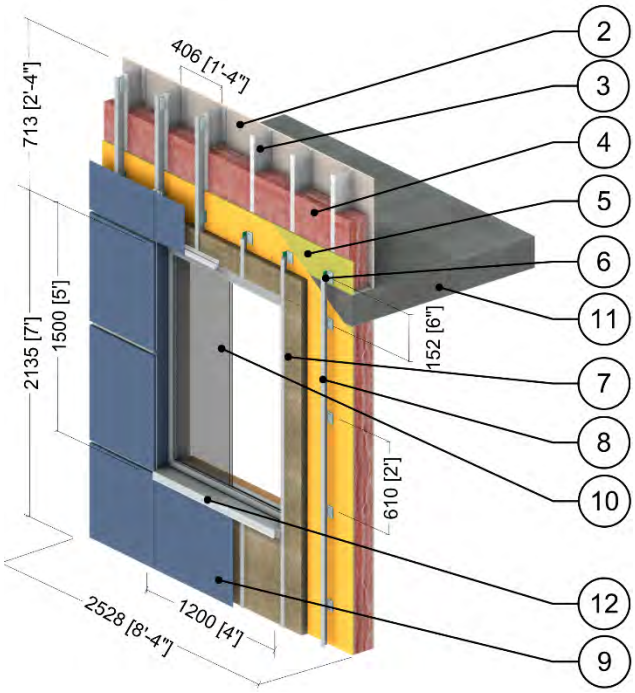
Sill Detail

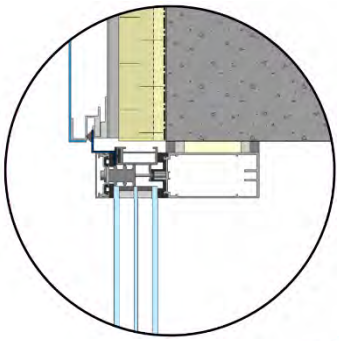
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum window: thermally broken, double glazed IGU[2] U_{IGU} = 0.220 BTU/hr.ft².°F (1.25 W/m²K)					
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Aluminum Flashing	18 gauge	1110 (160)	-	171 (2739)	0.22 (900)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

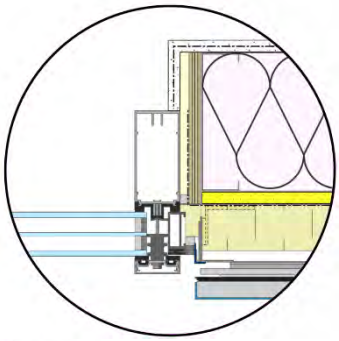
Detail 5.3.19

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

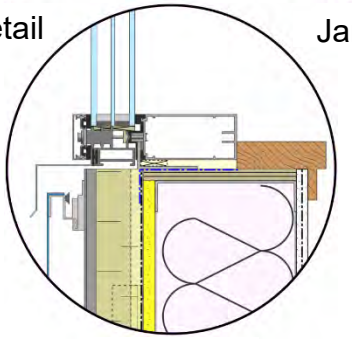




Head Detail



Jamb Detail



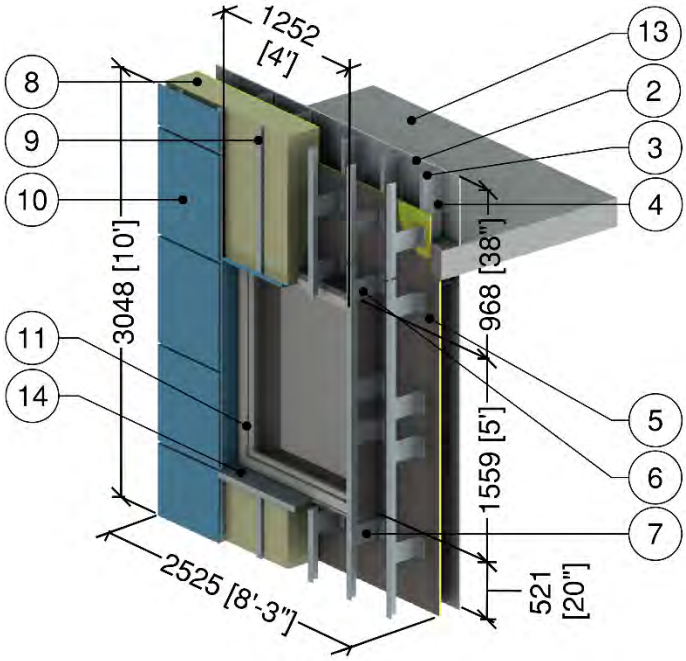
Sill Detail

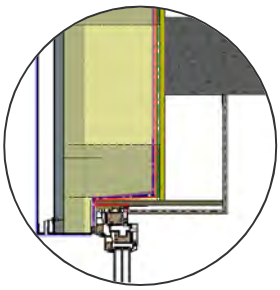
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.26 (0.038)	R-22.5 (3.96 RSI)	0.99 (15.9)	0.17 (710)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Aluminum window: thermally broken, double glazed IGU[2] U_{IGU} = 0.220 BTU/hr.ft².°F (1.25 W/m²K)					
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Aluminum Flashing	18 gauge	1110 (160)	-	171 (2739)	0.22 (900)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

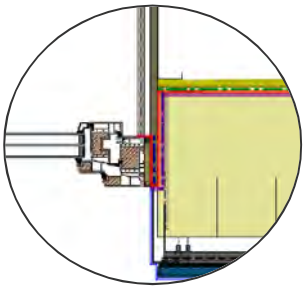
Detail 5.3.20

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

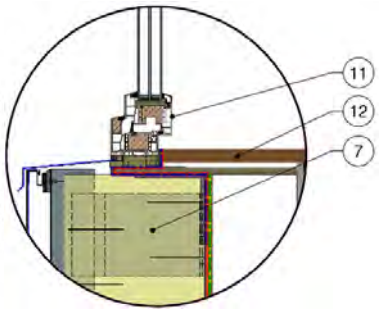




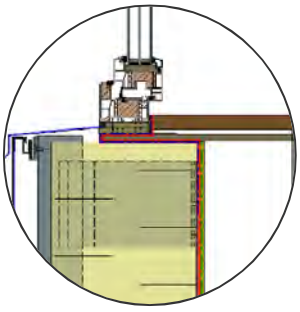
Head Detail



Jamb Detail



Scenario A -
With Support Bracket



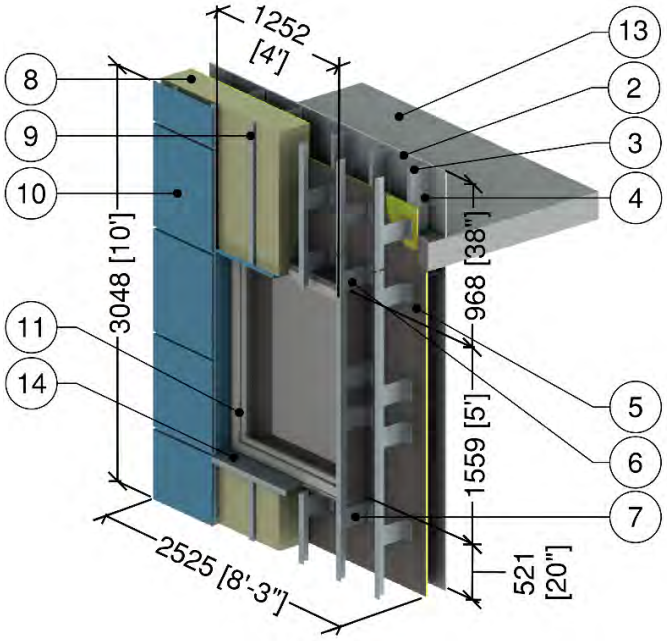
Scenario B -
Without Support Bracket

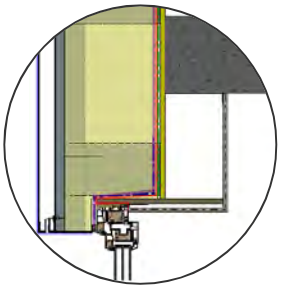
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	FRP Bracket	-	4.85 (0.7)	-	110 (1760)	-
7	Aluminum Bracket	-	1110 (160)	-	171 (2739)	0.22 (900)
8	Exterior Mineral Wool Insulation	10” (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
9	Vertical Aluminum L-Rail	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	5’ (1.5m) x 4’ (1.2m) Vinyl window: thermally broke, triple glazed IGU[2] U_{IGU} = 0.13 BTU/hr·ft²·°F (0.72 W/m²K)					
12	Wood Liner	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

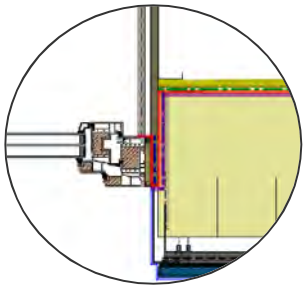
Detail 5.3.21

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

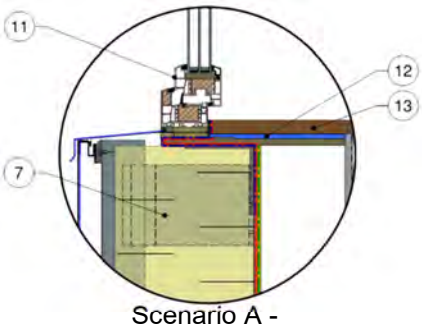




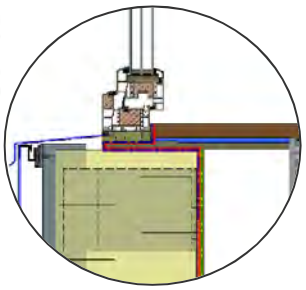
Head Detail



Jamb Detail



Scenario A -
With Support Bracket



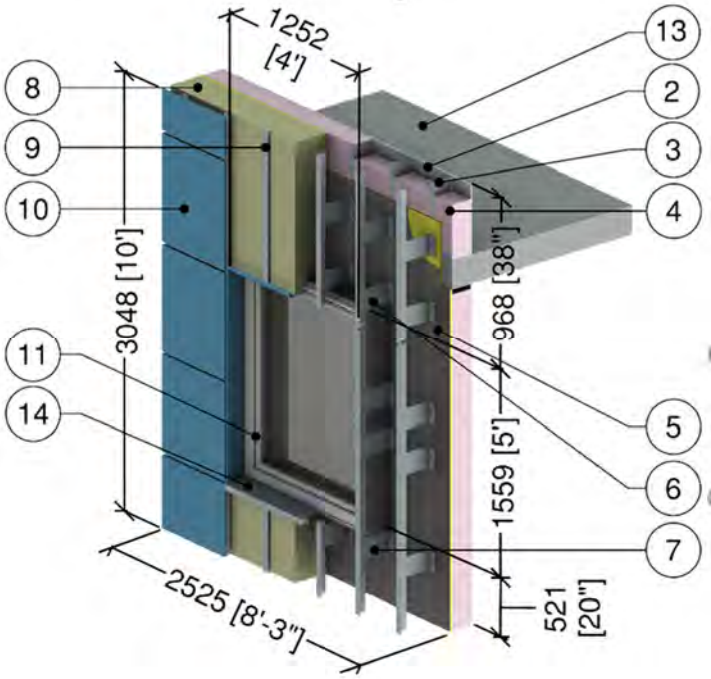
Scenario B -
Without Support Bracket

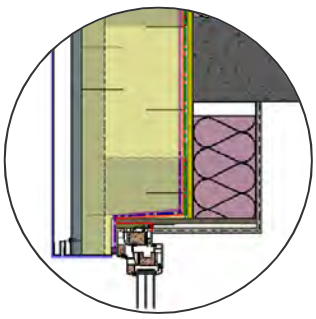
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	FRP Bracket	-	4.85 (0.7)	-	110 (1760)	-
7	Aluminum Bracket	-	1110 (160)	-	171 (2739)	0.22 (900)
8	Exterior Mineral Wool Insulation	10” (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
9	Vertical Aluminum L-Rail	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	5’ (1.5m) x 4’ (1.2m) Vinyl window: thermally broke, triple glazed IGU[2] U_{IGU} = 0.13 BTU/hr·ft²·°F (0.72 W/m²K)					
12	Aerogel Insulation Blanket	3/8” (10)	0.10 (0.014)	R-4.1 (0.71 RSI)	12.5 (200)	-
13	Wood Liner	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
15	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

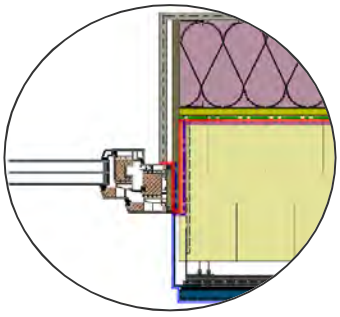
Detail 5.3.22

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

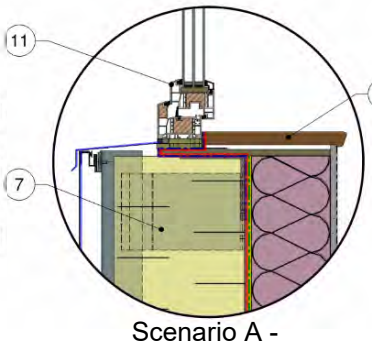




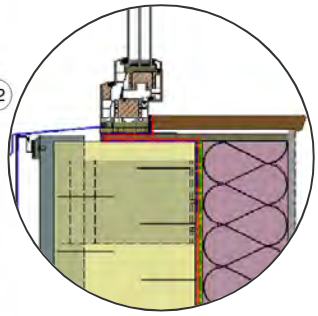
Head Detail



Jamb Detail



Scenario A - With Support Bracket



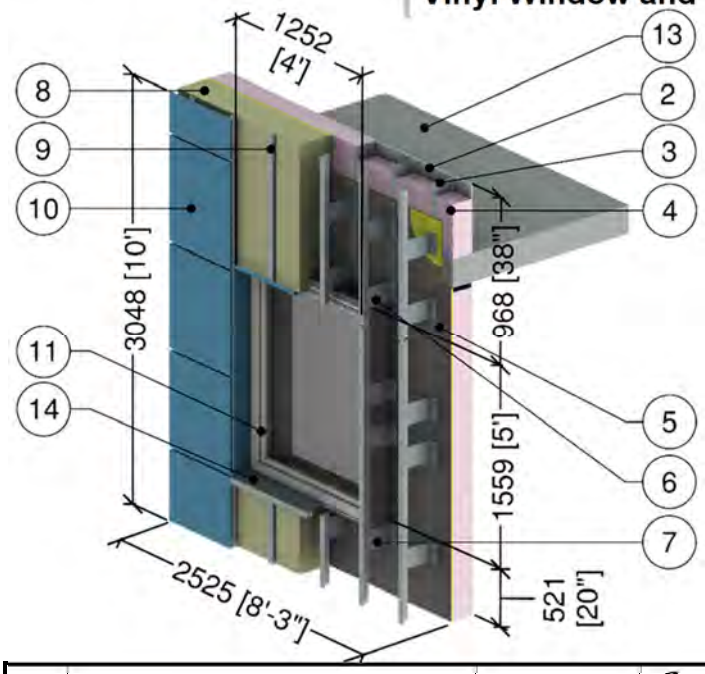
Scenario B - Without Support Bracket

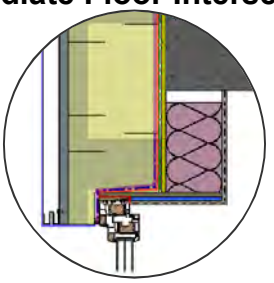
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6” (152)	0.32 (0.046)	R-19 (3.35 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	FRP Bracket	-	4.85 (0.7)	-	110 (1760)	-
7	Aluminum Bracket	-	1110 (160)	-	171 (2739)	0.22 (900)
8	Exterior Mineral Wool Insulation	10” (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
9	Vertical Aluminum L-Rail	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	5’ (1.5m) x 4’ (1.2m) Vinyl window: thermally broke, triple glazed IGU[2] U_{IGU} = 0.13 BTU/hr·ft²·°F (0.72 W/m²K)					
12	Wood Liner	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

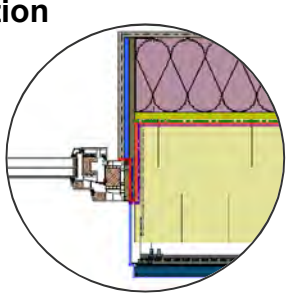
Detail 5.3.23

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

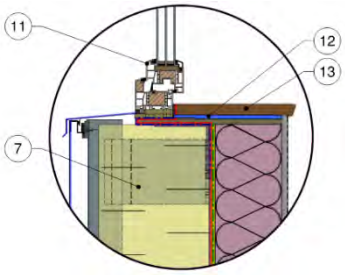




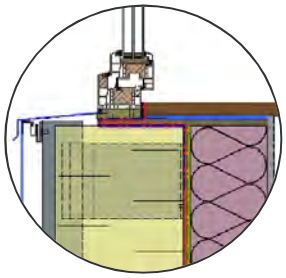
Head Detail



Jamb Detail



Scenario A -
With Support Bracket



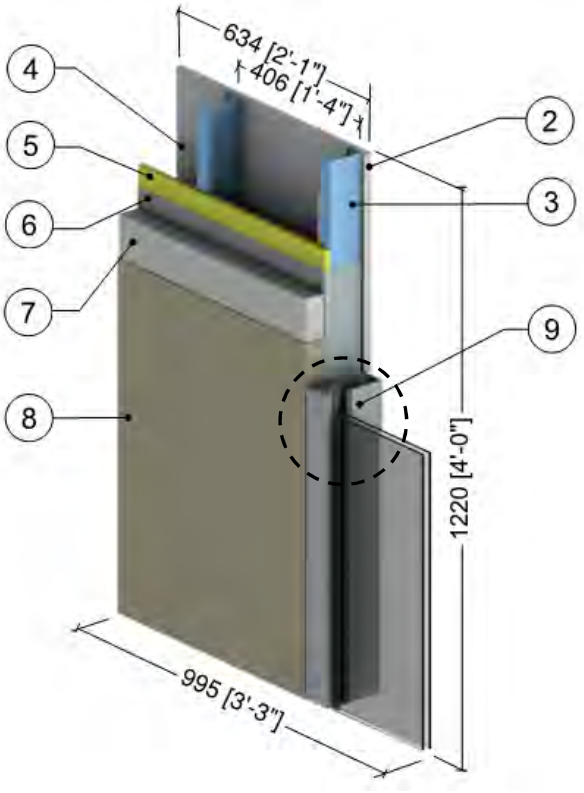
Scenario B -
Without Support Bracket

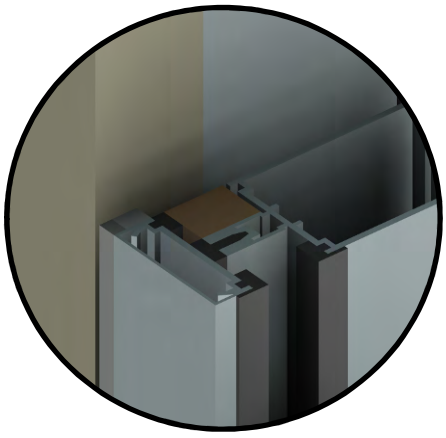
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6” (152)	0.32 (0.046)	R-19 (3.35 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	FRP Bracket	-	4.85 (0.7)	-	110 (1760)	-
7	Aluminum Bracket	-	1110 (160)	-	171 (2739)	0.22 (900)
8	Exterior Mineral Wool Insulation	10” (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
9	Vertical Aluminum L-Rail	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	5’ (1.5m) x 4’ (1.2m) Vinyl window: thermally broke, triple glazed IGU[2] U_{IGU} = 0.13 BTU/hr·ft²·°F (0.72 W/m²K)					
12	Aerogel Insulation Blanket	3/8” (10)	0.10 (0.014)	R-4.1 (0.71 RSI)	12.5 (200)	-
13	Wood Liner	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
15	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.21 (900)
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 was found using ISO 100077-2

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





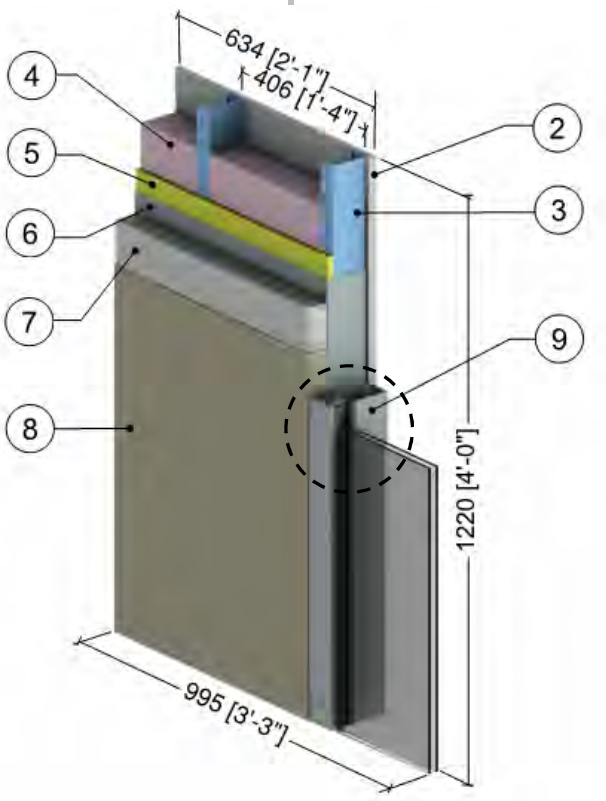
Curtain Wall
Jamb Detail

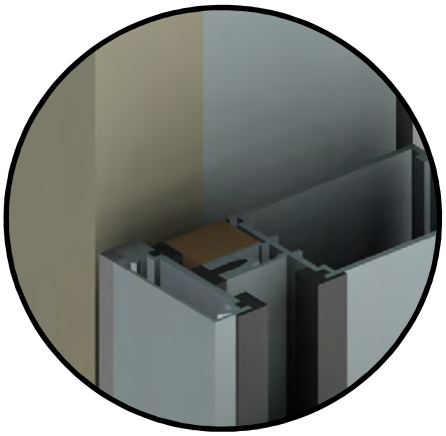
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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	Conventional curtain wall system: double glazed with minimal thermal break[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²°F (1.82 W/m²K)					
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 5.4.2

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





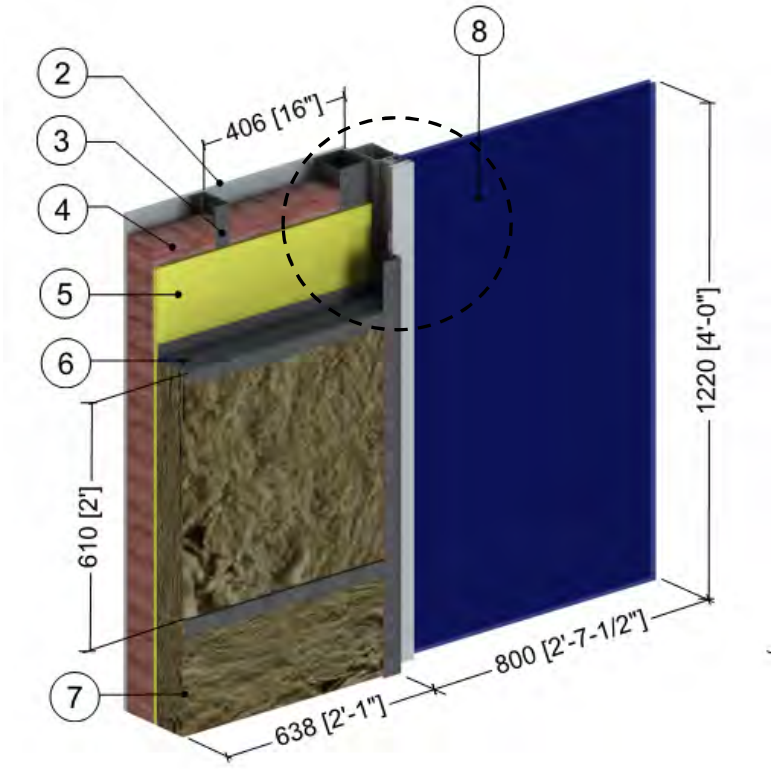
Curtain Wall
Jamb Detail

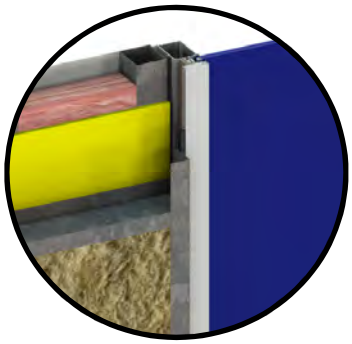
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (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 (1.1)	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	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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	Conventional curtain wall system: double glazed with minimal thermal break[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
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

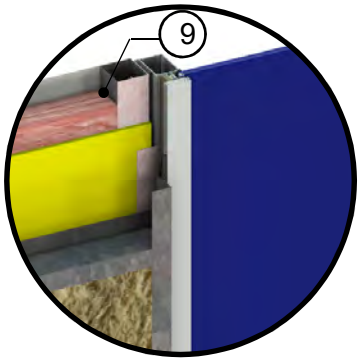
Detail 5.4.3

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





Without Aerogel Detail



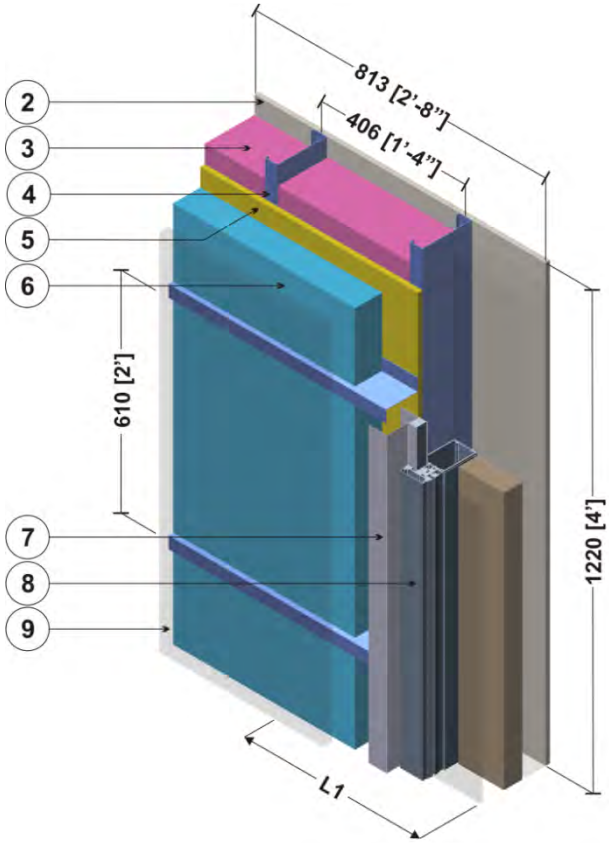
With Aerogel Detail

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 to R-1.1 (0.12 RSI to 0.20 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	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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3 1/2" (89)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Conventional curtain wall system: double glazed with minimal thermal break[2], double glazed IGU U_{IGU} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
9	Aerogel Blanket	0.4" (10)	0.086 (0.015)	R-3.8 (0.67 RSI)	-	-
10	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 5.4.4

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

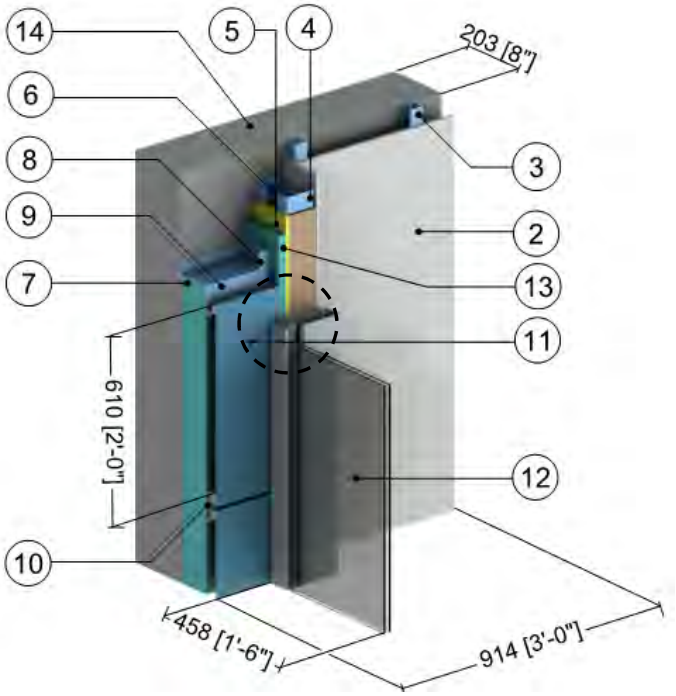


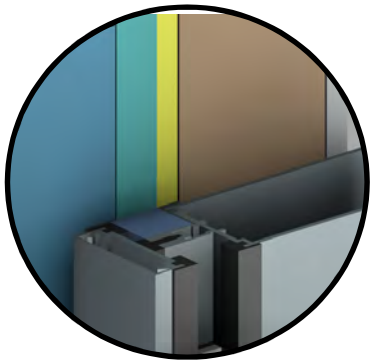
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (90)	0.31 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-girts w/ 1 1/2" Flange with Closure Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Conventional curtain wall system with insulated back pan (Pressure plates with minimal thermal break)[2]					
9	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.2 (0.03 RSI) to R-0.7 (0.12 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 curtain wall framing was found using ISO 10077-2

Detail 5.4.5

Exterior Insulated Concrete Wall and Steel Stud Assembly Supporting Metal Cladding – Curtain Wall Transition Intersection





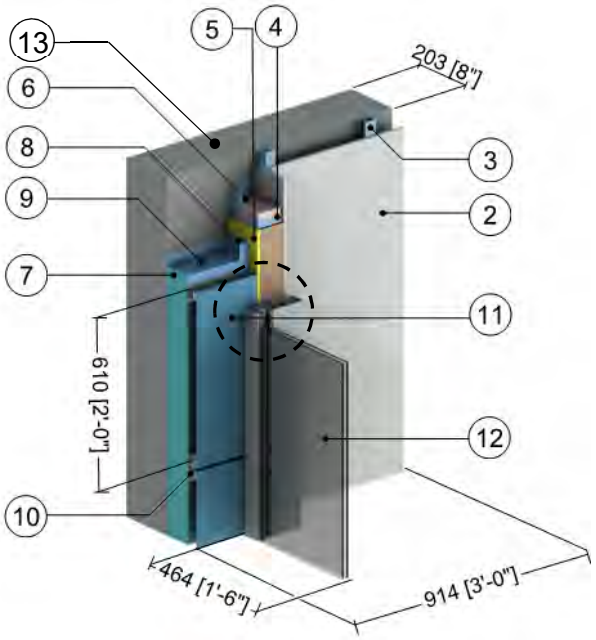
Jamb Detail

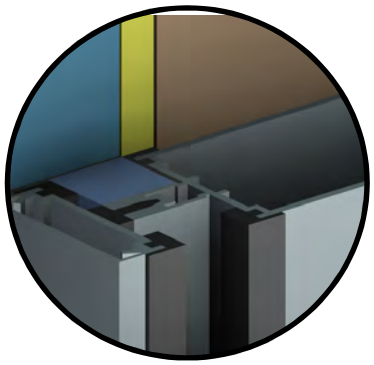
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Air Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
7	Exterior Insulation	Varies	-	R-15 to R-25 (2.64 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Z-Girt	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Horizontal Z-Girt (24" o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Metal Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
12	Conventional curtain wall system: double glazed with minimal thermal break[2], double glazed IGU U_{IGU} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
13	Rigid Insulation	1" (25)	-	R-5.0 (0.88 RSI)	1.8 (28)	0.29 (1220)
14	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
15	Exterior Film[1]	-	-	R-0.7 (0.12 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 5.4.6

Exterior Insulated Concrete Wall and Steel Stud Assembly Supporting Metal Cladding with Cavity Insulation – Curtain Wall Transition Intersection





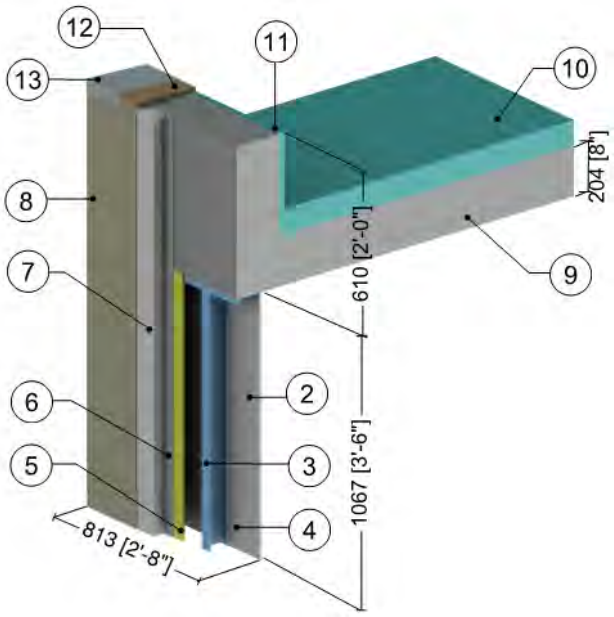
Jamb Detail

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	1 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Fiberglass Batt Insulation	3 5/8" (92)	0.29 (0.042)	R-12.0 (2.1 RSI)	0.9 (14)	0.17 (710)
7	Exterior Insulation	Varies	-	R-15 to R-25 (2.64 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Z-Girt	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Horizontal Z-Girt (24" o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Metal Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
12	Conventional curtain wall system: double glazed with minimal thermal break[2], double glazed IGU U_{IGU} = 0.32 BTU/hr·ft2·oF (1.82 W/m2K)					
13	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Exterior Film[1]	-	-	R-0.7 (0.12 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 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

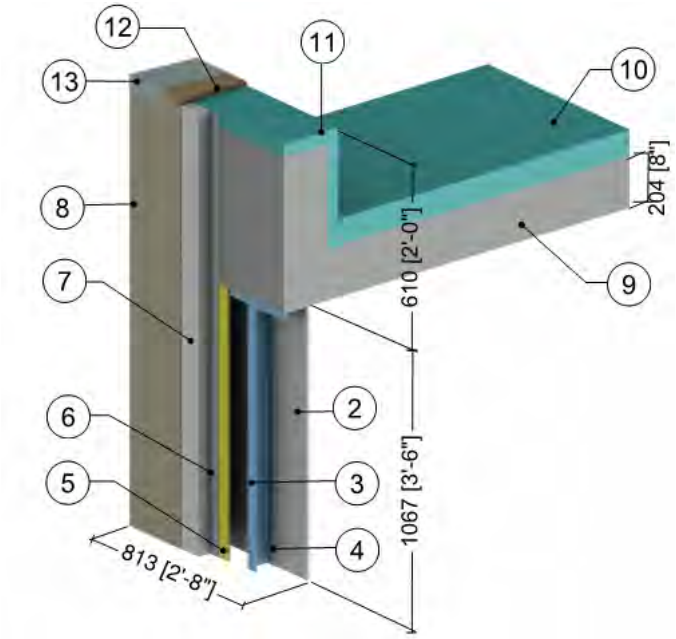


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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	Concrete Slab & Parapet	8” (203)	12 (1.8)	-	140 (2250)	0.20 (850)
10	Roof Insulation	4” (100)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
11	Parapet Insulation	1” (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
12	Wood Blocking	5/8” (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
13	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

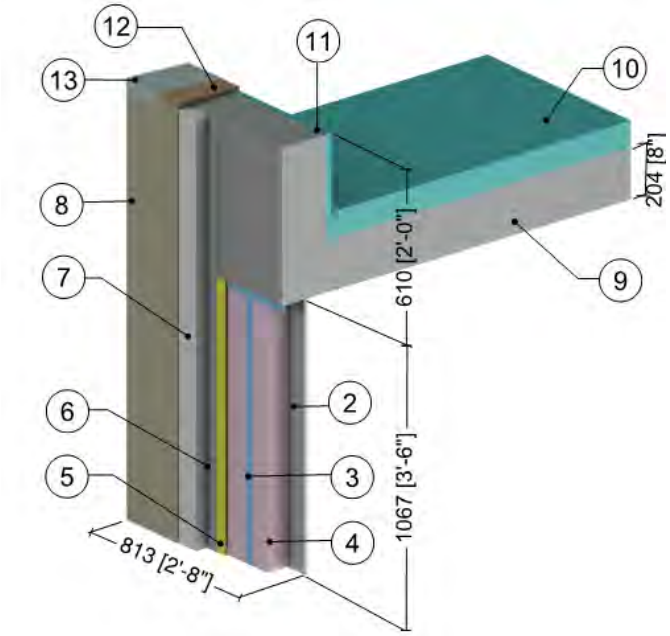


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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	Concrete Slab & Parapet	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Roof Insulation	4” (100)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
11	Parapet Insulation	Varies	-	R-10 to R-20 (1.76 RSI to 3.52 RSI)	1.8 (28)	0.29 (1220)
12	Wood Blocking	5/8” (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
13	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.5.3

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection

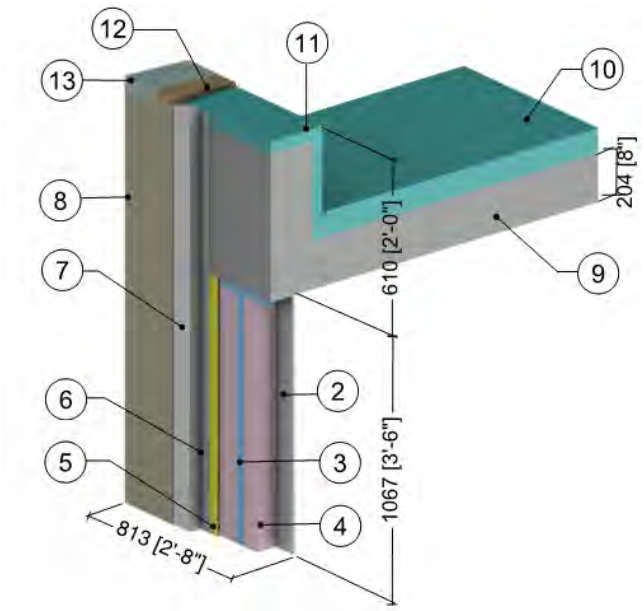


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top Tracks	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 (1.1)	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	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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	Concrete Slab & Parapet	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Roof Insulation	4” (100)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
11	Parapet Insulation	1” (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
12	Wood Blocking	5/8” (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
13	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.5.4

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection

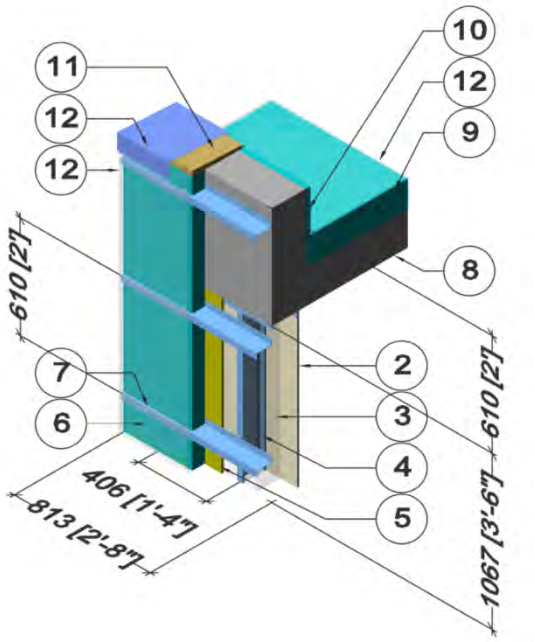


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16”o.c.) with Top Tracks	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 (1.1)	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	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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	Concrete Slab & Parapet	8” (203)	12 (1.8)	-	140 (2250)	0.20 (850)
10	Roof Insulation	4” (100)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
11	Parapet Insulation	Varies	-	R-10 to R-20 (1.76 RSI to 3.52 RSI)	1.8 (28)	0.29 (1220)
12	Wood Blocking	5/8” (16)	0.63 (0.09)	R-1 (0.18 RSI)	27.8 (445)	0.45 (1880)
13	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

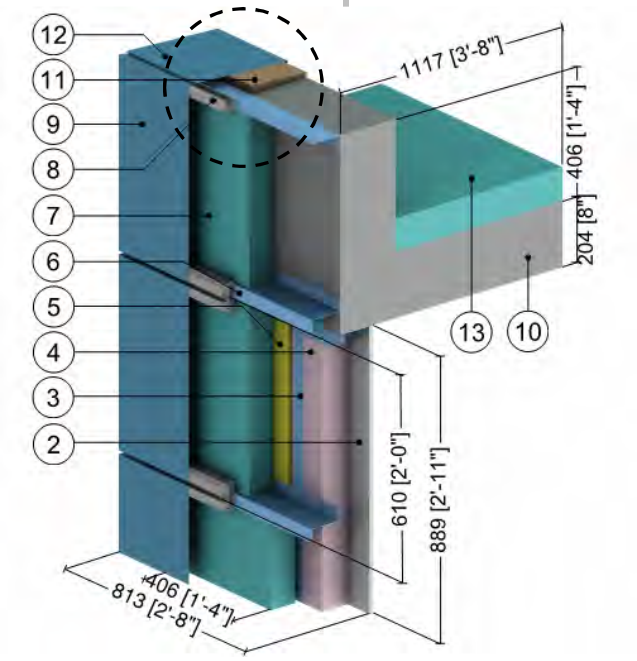


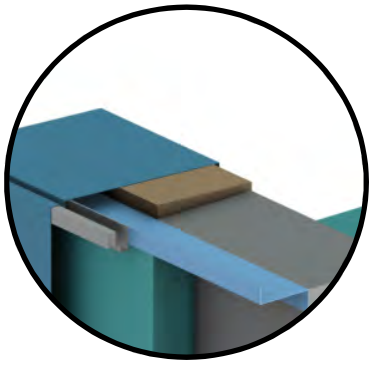
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Track	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R5 to R25 (0.88 to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-Girts w/ 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Concrete Slab & Parapet	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Roof Insulation	4” (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
10	Parapet Insulation	1” (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
11	Wood Blocking	5/8” (16)	0.63 (0.09)	R-1 (0.18 RSI)	27.8 (445)	0.45 (1880)
12	Metal cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient, metal cap flashing & finish roof materials					
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.5.6

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Concrete Parapet and Slab Intersection





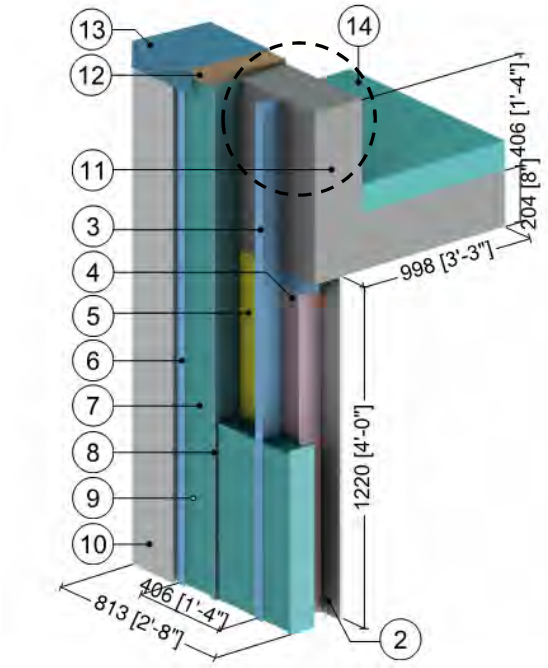
Parapet Cap Detail

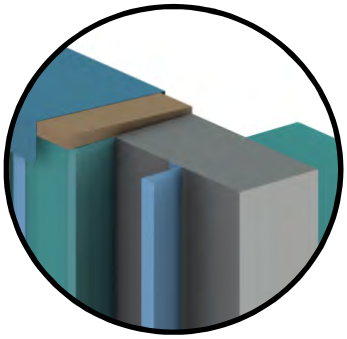
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top Tracks	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	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
8	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab and Parapet	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Wood Blocking	5/8” (16)	0.69 (0.10)	R-1 (RSI-0.18)	31 (500)	0.45 (1880)
12	Steel Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Roof Insulation	4’’ (102)	0.20 (0.029)	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.5.7

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Vertical Z Girts (16” o.c.) Supporting Stucco Cladding – Concrete Parapet & Slab Intersection





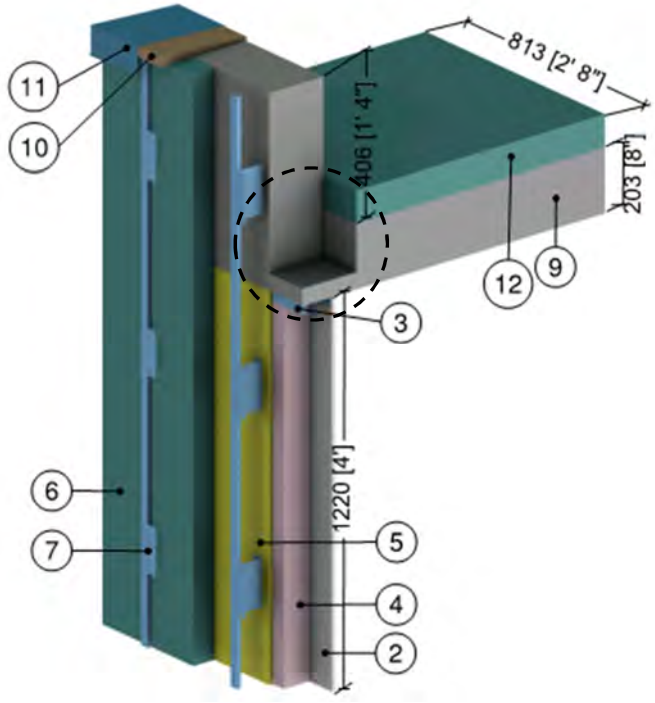
Parapet Cap Detail

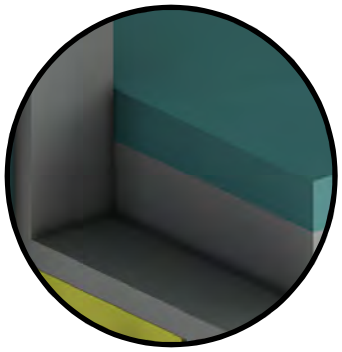
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top Tracks	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	Vertical Z-Girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
8	Rigid Insulation Bracing	Varies	0.2 (0.029)	-	1.8 (28)	0.29 (1220)
9	Rainscreen Cavity	1/2” (13)	-	R-0.5 (0.09 RSI)	0.075 (1.2)	0.24 (1000)
10	Stucco Cement with Breather Board	1/2” (13)	6 (0.9)	R-0.1 (0.01 RSI)	120 (1922)	0.20 (850)
11	Concrete Slab and Parapet	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Wood Blocking	5/8” (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	Steel Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
14	Roof Insulation	4 (102)	0.20 (0.029)	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
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

Detail 5.5.8

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z Girts (16" o.c.) Supporting Metal Cladding – Concrete Roof Deck at Continuous Concrete Parapet





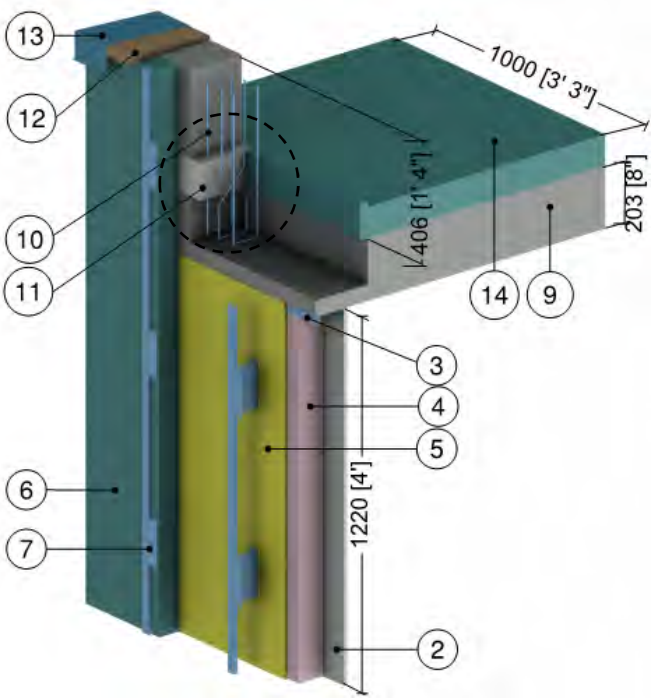
Continuous Concrete Parapet Detail

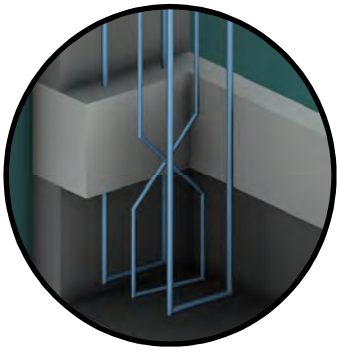
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8" (92)	0.31 (0.044)	R-12.0 (2.11 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	Exterior Insulation	3" (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
7	Intermittent Vertical Z-Girts with 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab and Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
11	Steel Cap Flashing	18 Gauge	347 (50)	-	489 (7830)	0.12 (500)
12	Roof Insulation	4 (102)	0.20 (0.029)	R-20 (3.50 RSI)	1.8 (28)	0.29 (1220)
13	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.5.9

Exterior and Interior Insulated 3 5/8" x 1 5/8" Steel Stud (16" o.c.) Wall Assembly with Intermittent Vertical Z Girts (16" o.c.) Supporting Metal Cladding – Concrete Roof Deck at Isokorb AXT1 Thermally Broken Concrete Parapet





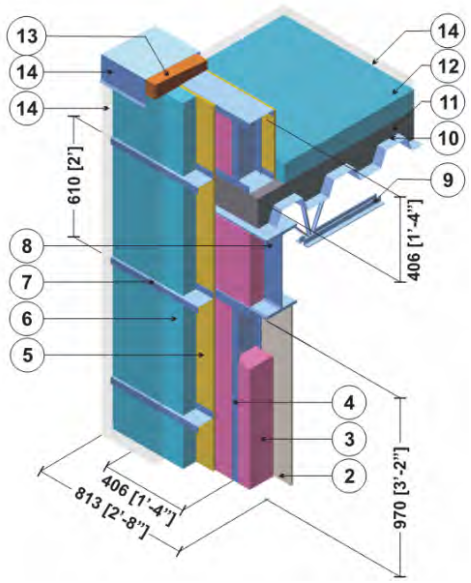
Thermally Broken Parapet Detail (Isokorb AXT1)

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 Film[1]	-	-	R-0.6 (0.11 RSI) to 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 with Top Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8" (92)	0.31 (0.044)	R-12.0 (2.11 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	Exterior Insulation	3" (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
7	Intermittent Vertical Z-Girts with 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab and Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
11	Polystyrene Hard Foam Insulation	4 3/4" (120)	0.217 (0.031)	R-22.0 (3.87 RSI)	66 (1060)	0.35 (1500)
12	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
13	Steel Cap Flashing	18 Gauge	347 (50)	-	489 (7830)	0.12 (500)
14	Roof Insulation	4 (102)	0.20 (0.029)	R-20 (3.50 RSI)	1.8 (28)	0.29 (1220)
15	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
16	Exterior Film[1]	-	-	R-0.2 (0.03 RSI) to R-0.7 (0.12 RSI)	-	-

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

Detail 5.5.10

Exterior and Interior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

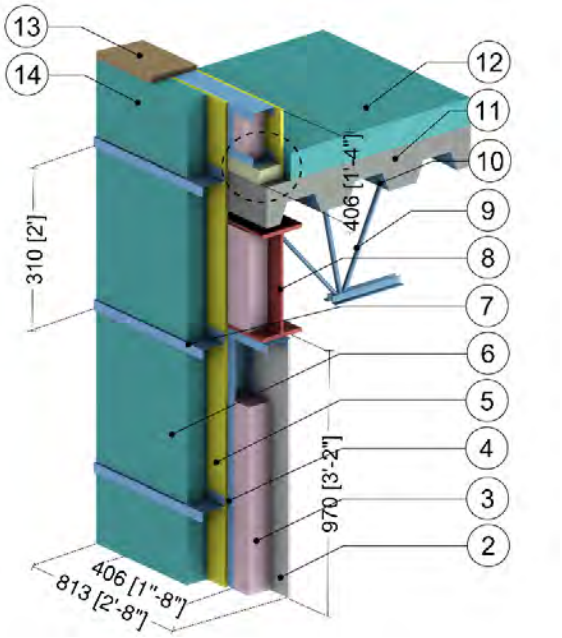


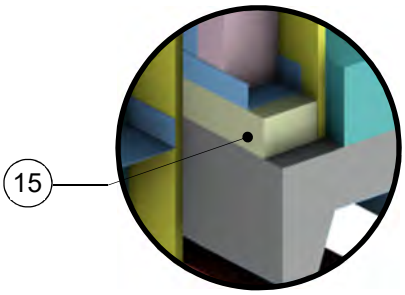
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.29 (0.042)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	varies	-	R5 to R25 (0.88 to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
9	Open Web Steel Joist	-	347 (50)	-	489 (7830)	0.12 (500)
10	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
11	Concrete Topping	6" (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
12	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
13	Wood Blocking	5/8" (16)	0.63 (0.09)	R-1 (0.18 RSI)	27.8 (445)	0.45 (1880)
14	Metal cladding with 1/2" (13mm) vented air space/ metal cap flashing/ finish roof materials is incorporated into exterior heat transfer coefficient					
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.5.11

Exterior and Interior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection with Thermal Break under Parapet Stud Cavity





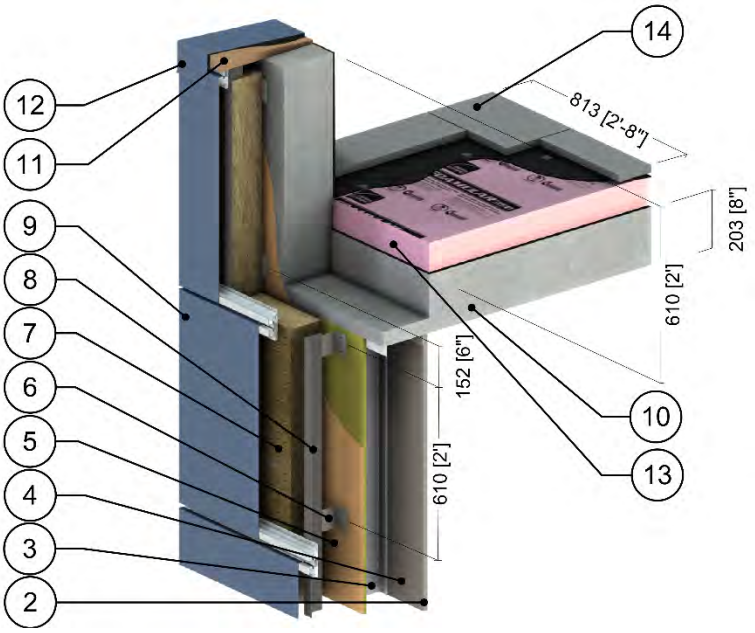
Parapet Thermal Break

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 Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 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	Fiberglass Batt Insulation	3 5/8" (92)	0.31 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	varies	-	R15 (2.64 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
9	Open Web Steel Joist	-	347 (50)	-	489 (7830)	0.12 (500)
10	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
11	Concrete Topping	6" (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
12	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
13	Wood Blocking	5/8" (16)	0.63 (0.09)	R-1 (0.18 RSI)	27.8 (445)	0.45 (1880)
14	Metal cladding with vented air space/ cap flashing/ finish roof materials is incorporated into exterior heat transfer coefficient					
15	Armatherm 500	2" (50)	0.32 (0.05)	R-6.2 (1.09 RSI)	-	-
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

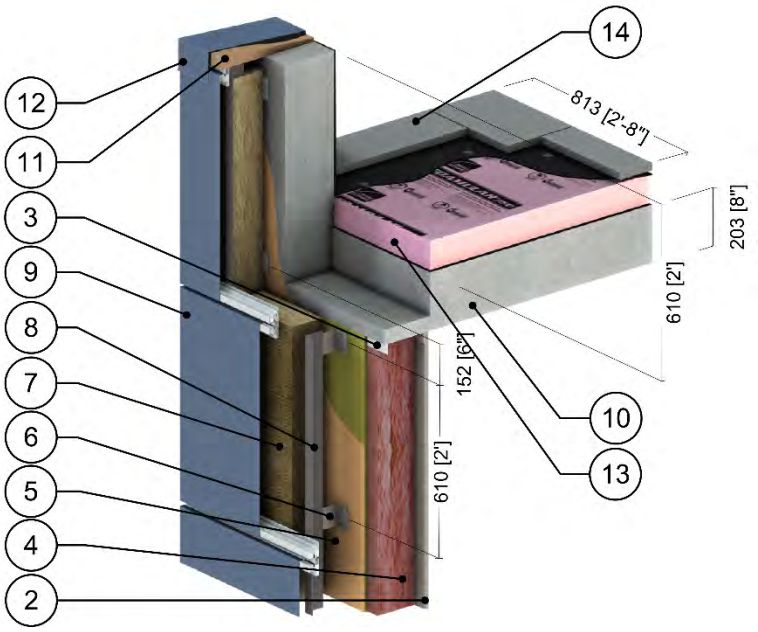


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6" (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
12	Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Foamular XPS Rigid Insulation	4" (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
14	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

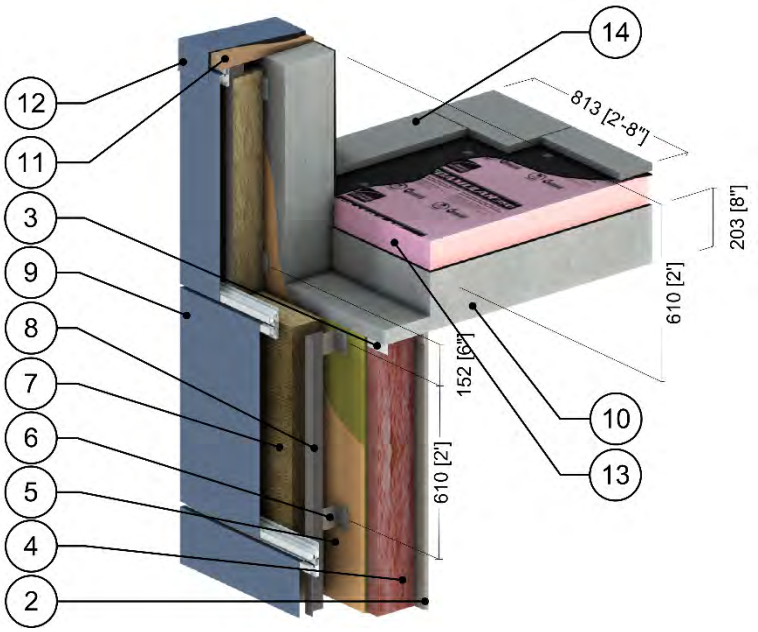


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6" (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
12	Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Foamular XPS Rigid Insulation	4" (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
14	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

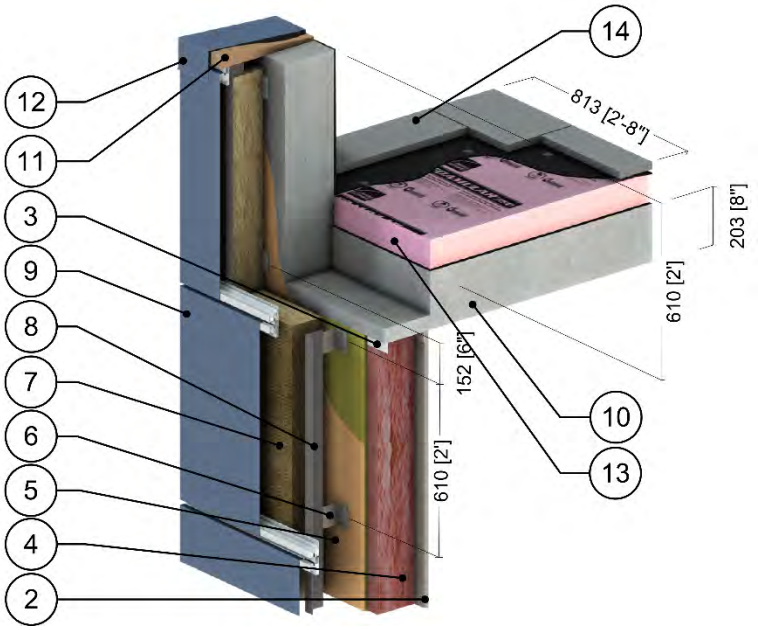


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6" (152)	0.26 (0.038)	R-22.5 (3.96 RSI)	0.99 (15.9)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
12	Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Foamular XPS Rigid Insulation	4" (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
14	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

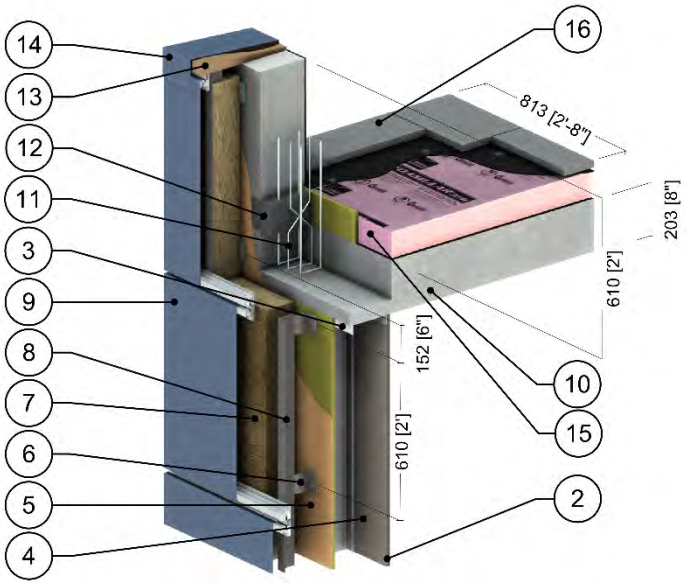


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6" (152)	0.25 (0.036)	R-24 (4.23 RSI)	1.42 (22.7)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
12	Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Foamular XPS Rigid Insulation	4" (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
14	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

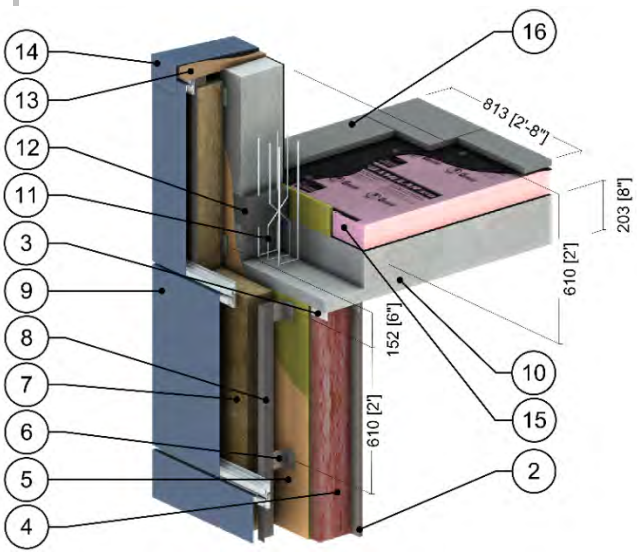


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6" (152)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Polystyrene Rigid Foam Insulation	4 3/4" (120)	0.217 (0.031)	R-22.0 (3.87 RSI)	66 (1060)	0.35 (1500)
13	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
14	Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Foamular XPS Rigid Insulation	4" (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
16	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
17	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

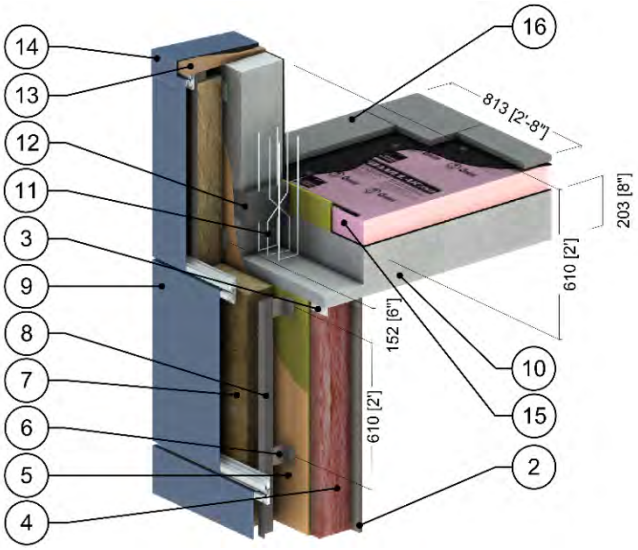


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6" (152)	0.30 (0.043)	R-20 (3.52 RSI)	0.55 (8.8)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Polystyrene Rigid Foam Insulation	4 3/4" (120)	0.217 (0.031)	R-22.0 (3.87 RSI)	66 (1060)	0.35 (1500)
13	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
14	Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Foamular XPS Rigid Insulation	4" (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
16	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
17	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

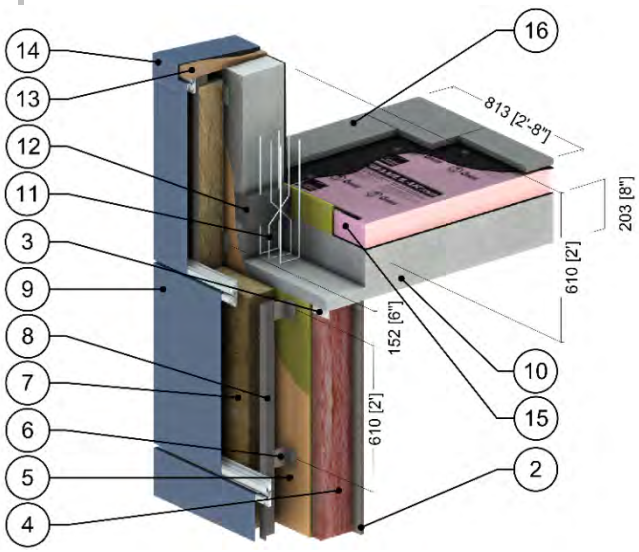


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6” (152)	0.26 (0.038)	R-22.5 (3.96 RSI)	0.99 (15.9)	0.17 (710)
5	Exterior Sheathing	5/8” (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Polystyrene Rigid Foam Insulation	4 3/4” (120)	0.217 (0.031)	R-22.0 (3.87 RSI)	66 (1060)	0.35 (1500)
13	Wood Blocking	5/8” (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
14	Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Foamular XPS Rigid Insulation	4” (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
16	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
17	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

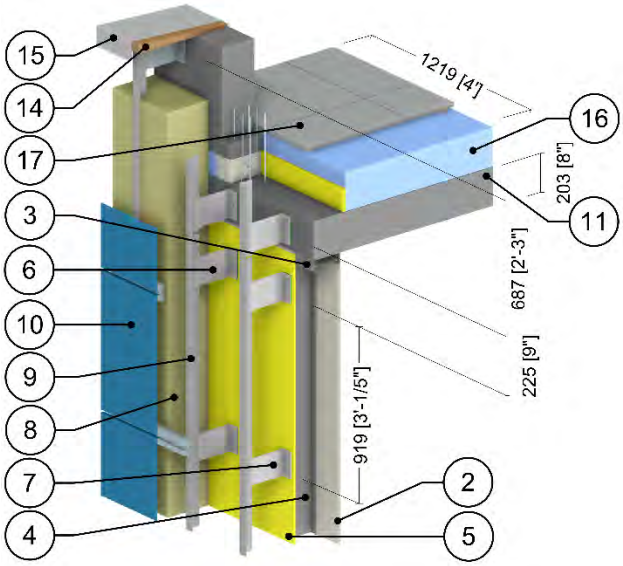


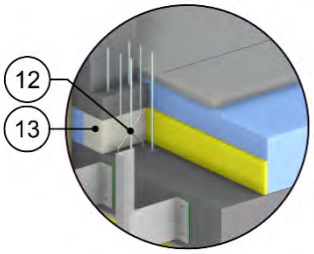
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Ecotouch Pink Fiberglass Batt	6" (152)	0.25 (0.036)	R-24 (4.23 RSI)	1.42 (22.7)	0.17 (710)
5	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	varies	-	-	-	-
7	Thermafiber RainBarrier 45 Mineral Wool Semi Rigid Insulation	varies	0.24 (0.034)	R-8.4 to R-21.0 (1.48 to 3.70 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-girt	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
12	Polystyrene Rigid Foam Insulation	4 3/4" (120)	0.217 (0.031)	R-22.0 (3.87 RSI)	66 (1060)	0.35 (1500)
13	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
14	Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Foamular XPS Rigid Insulation	4" (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
16	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
17	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

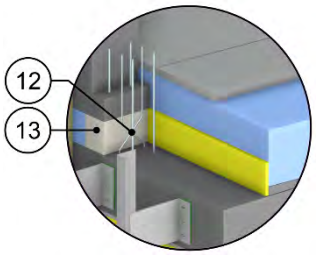
Detail 5.5.20

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 – Concrete Roof Deck at Isokorb AXT Thermally Broken Concrete Parapet

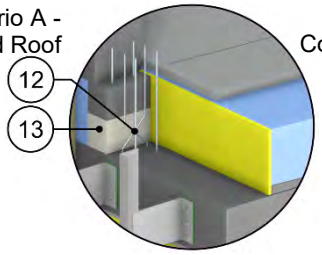




Scenario A - Sloped Roof



Scenario B - Concrete Topping



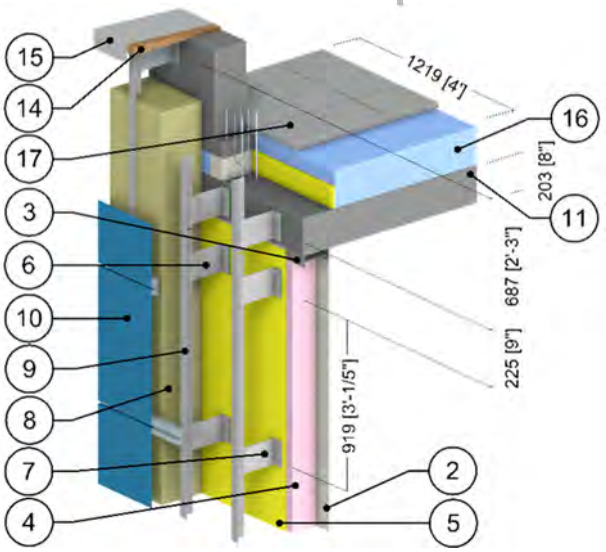
Scenario C - Concrete Topping with Aligned Insulation

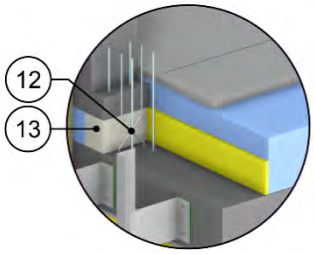
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Top Track	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6" (152)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	FRP Bracket	-	4.9 (0.70)	-	-	-
7	Aluminum Bracket	-	1110 (160)	-	171 (2739)	0.22 (900)
8	Exterior Mineral Wool Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
9	Vertical Aluminum L-Rail	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Concrete Slab and Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Stainless Steel Rebar	-	118 (17)	-	48.1 (7700)	0.12 (500)
13	Polystyrene Foam Insulation	4.7" (120)	0.22 (0.031)	R-22 (3.87 RSI)	66 (1060)	0.35 (1500)
14	Wood Blocking	-	0.69 (0.10)	-	31 (500)	0.45 (1880)
15	Aluminum Cap Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.12 (500)
16	Rigid Roof Insulation	8" (203)	0.20 (0.029)	R-40 (7.01 RSI)	1.8 (28)	0.29 (1220)
17	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
18	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

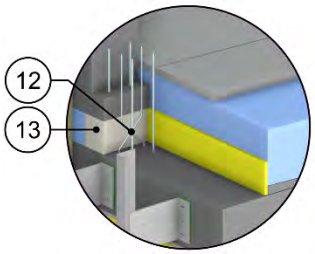
Detail 5.5.21

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 – Concrete Roof Deck at Isokorb AXT Thermally Broken Concrete Parapet

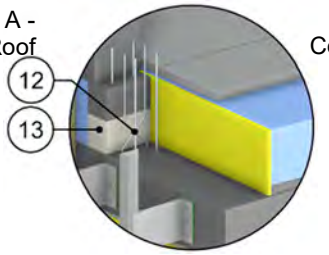




Scenario A - Sloped Roof



Scenario B - Concrete Topping



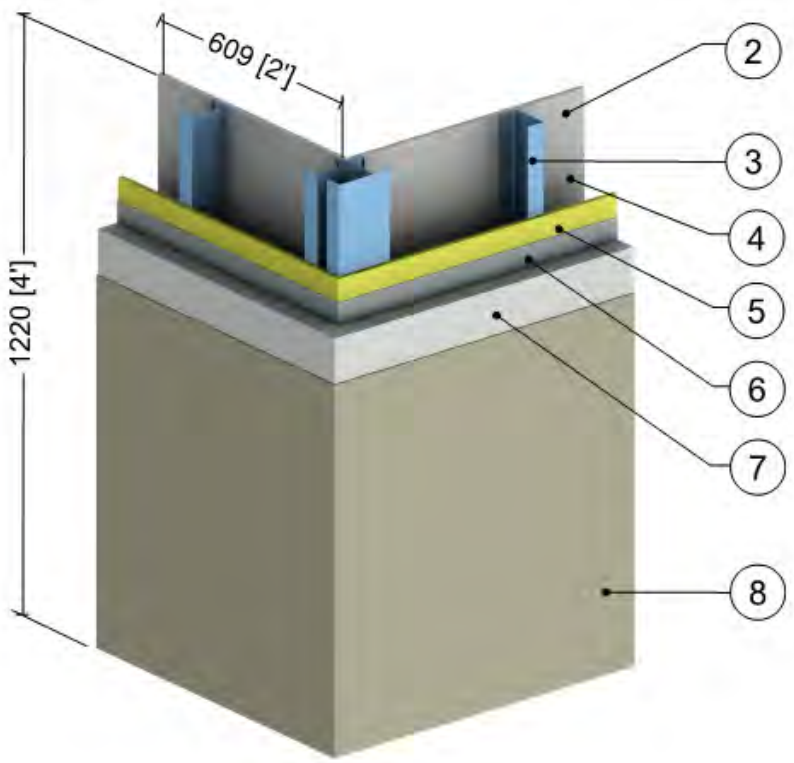
Scenario C - Concrete Topping with Aligned Insulation

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 Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 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	6" x 1 5/8" Steel Studs with Top Track	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6" (152)	0.32 (0.046)	R-19 (3.35 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	FRP Bracket	-	4.9 (0.70)	-	-	-
7	Aluminum Bracket	-	1110 (160)	-	171 (2739)	0.22 (900)
8	Semi Rigid Exterior Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
9	Vertical Aluminum L-Rail	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Concrete Slab and Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Stainless Steel Rebar	-	118 (17)	-	48.1 (7700)	0.12 (500)
13	Polystyrene Foam Insulation	4.7" (120)	0.22 (0.031)	R-22 (3.87 RSI)	66 (1060)	0.35 (1500)
14	Wood Blocking	-	0.69 (0.10)	-	31 (500)	0.45 (1880)
15	Aluminum Cap Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.12 (500)
16	Rigid Roof Insulation	8" (203)	0.20 (0.029)	R-40 (7.01 RSI)	1.8 (28)	0.29 (1220)
17	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
18	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.6.1

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

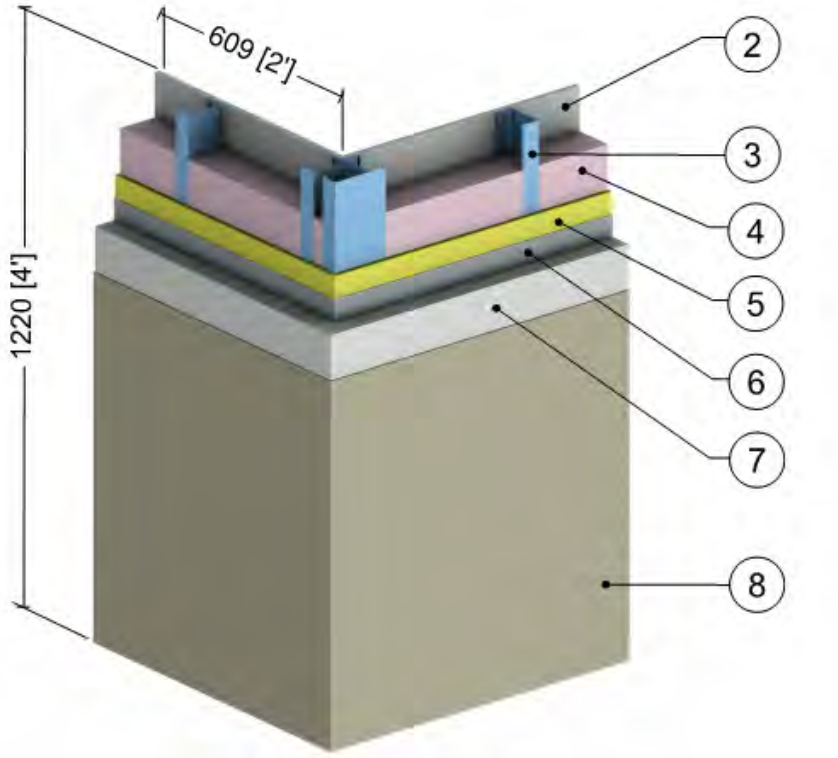


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 (0.11 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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

Detail 5.6.2

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

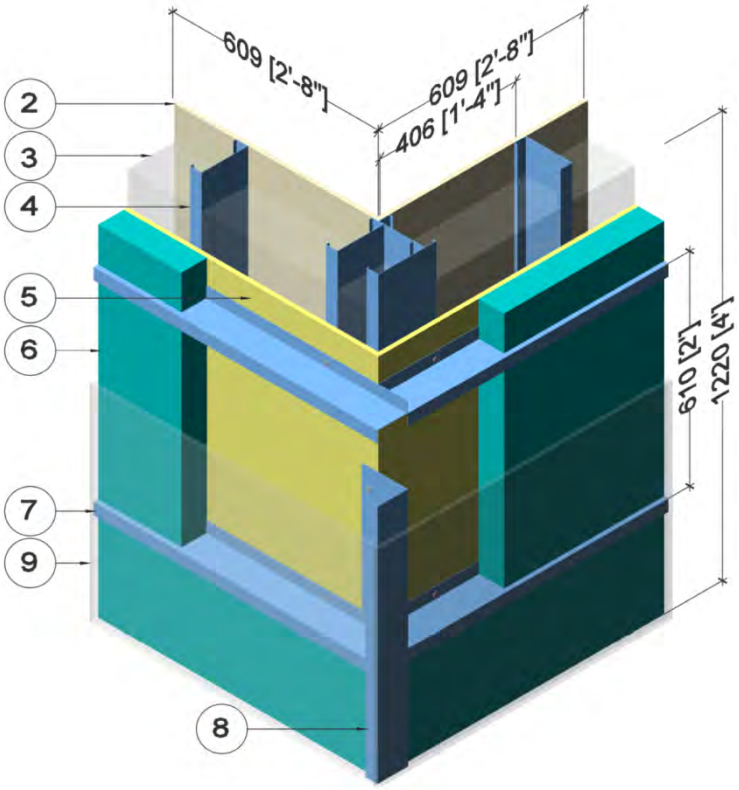


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 (0.11 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 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)	0.30 (0.043)	R-12 (2.1 RSI)	0.9 (1.1)	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	Varies	0.27 (0.039)	R-7.5 to R-15 (1.32 RSI to 2.64 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

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

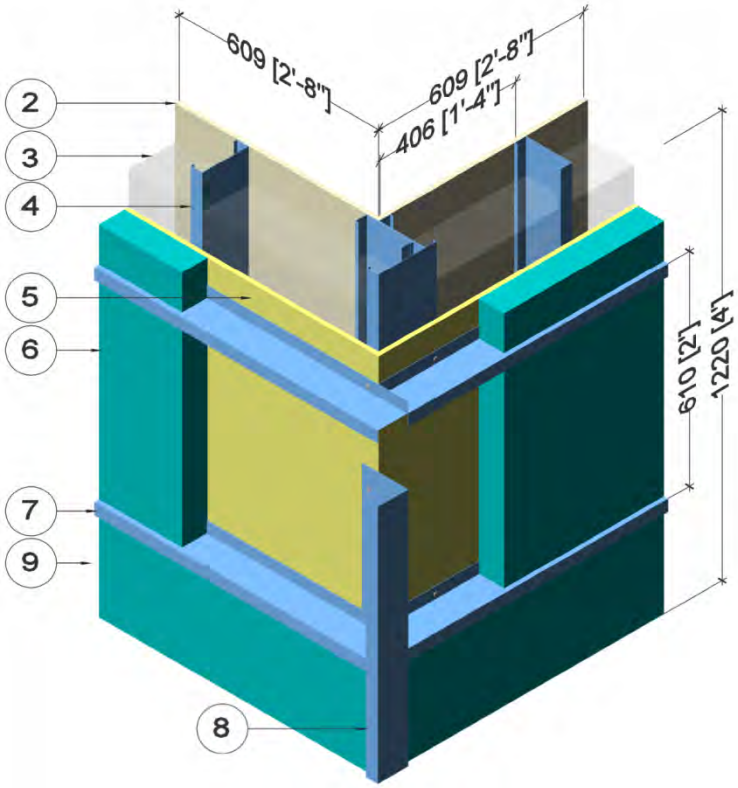


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-Girts w/ 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Corner Break Shape w/ 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal cladding with 1/2” (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

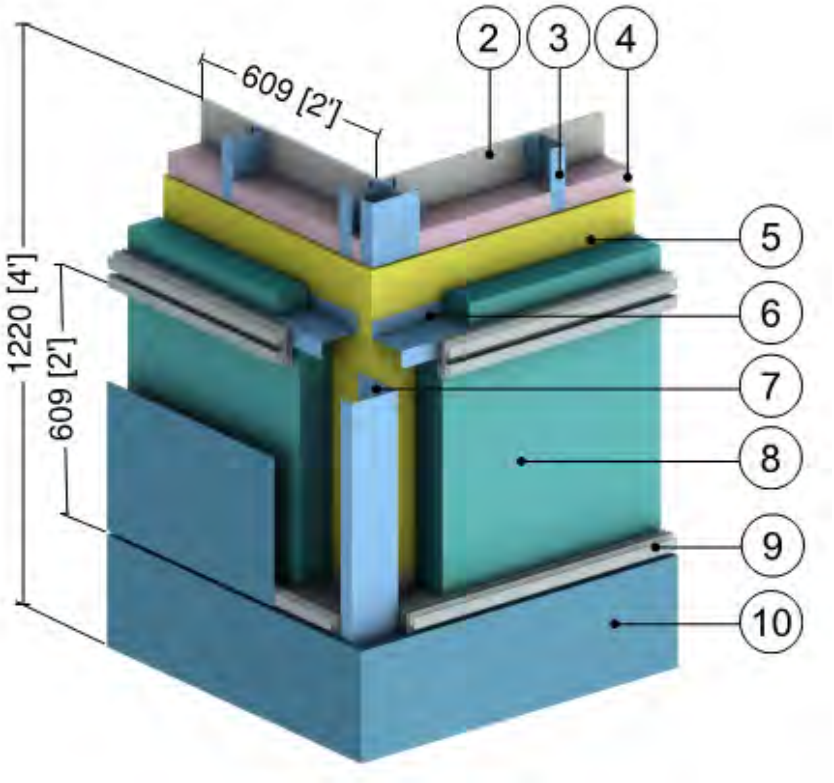


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Corner Break Shape w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.6.5

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

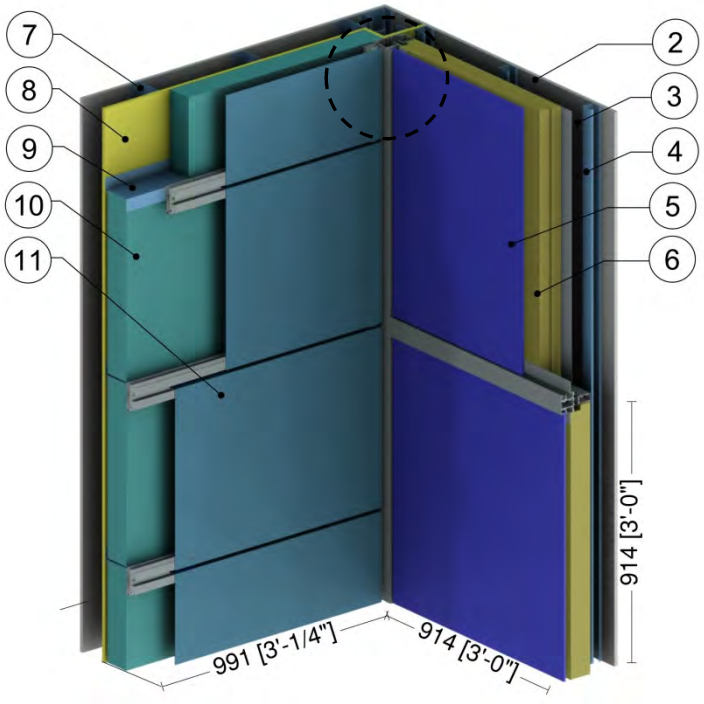


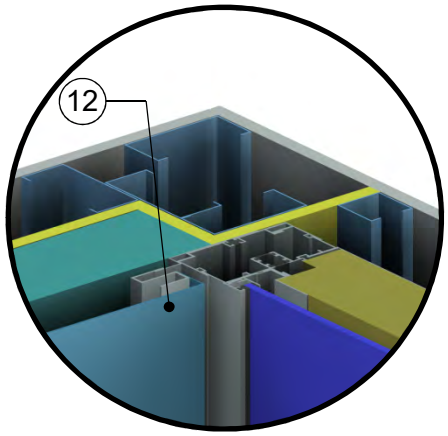
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (0.043)	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	Horizontal Z-Girt with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Corner Break Shape w/ 1 1/2” Flange	18 Gauge	430 (62)		489 (7830)	0.12 (500)
8	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
9	Panel Clip	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Metal Cladding with 1/2” (13mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





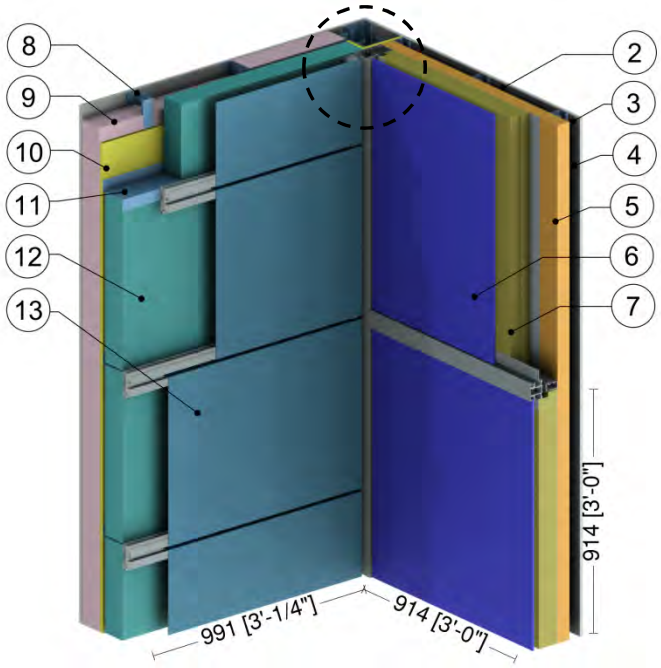
Corner Post Detail

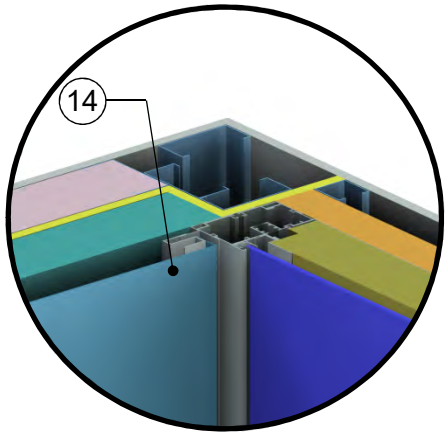
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame[2]					
6	Backpan Insulation	-	-	R-16.8 (2.96 RSI)	4 (64)	0.20 (850)
7	3 5/8” x 1 5/8” Steel Studs (16” o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
9	Horizontal Z-girts (24” o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Exterior Insulation	Varies	-	R-15 to R-25 (2.64 RSI) to 4.40 RSI)	1.8 (28)	0.29 (1220)
11	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
12	Aluminum Flashing	14 Gauge	1109 (16)	-	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 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





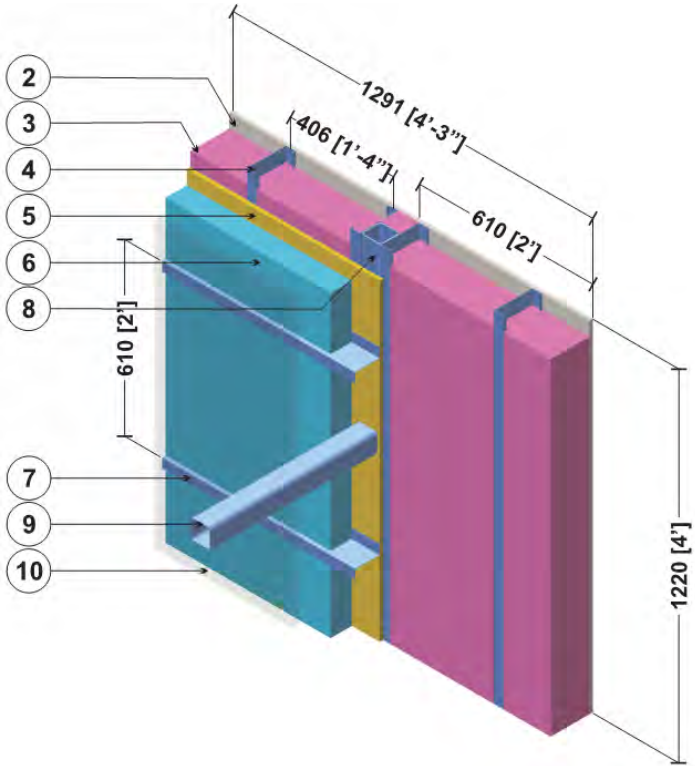
Corner Post Detail

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 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	Air in Stud Cavity	1 5/8” (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8” x 1 5/8” Steel Studs (16”o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Continuous Sprayfoam Insulation	2” (51)	0.17 (0.024)	R-12 (2.11 RSI)	2.8 (39)	0.35 (1470)
6	Aluminum Window Wall Spandrel System with Insulated Backpan: thermally broken frame[2]					
7	Backpan Insulation	Varies	-	R-8.4 to R-16.8 (1.48 RSI to2.96 RSI)	4 (64)	0.20 (850)
8	3 5/8” x 1 5/8” Steel Studs (16” o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Fiberglass Batt Insulation	3 5/8” (92)	0.30 (0.043)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
10	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
11	Horizontal Z-girts (24” o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Exterior Insulation	Varies	-	R-15 to R-25 (2.64 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
13	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
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 5.7.1

Exterior and Interior Insulated 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) Wall Assembly with Horizontal Z-Girts (24″ o.c.) Supporting Metal Cladding – Structural Steel Column & Cantilever Beam Intersection (Canopy Support)

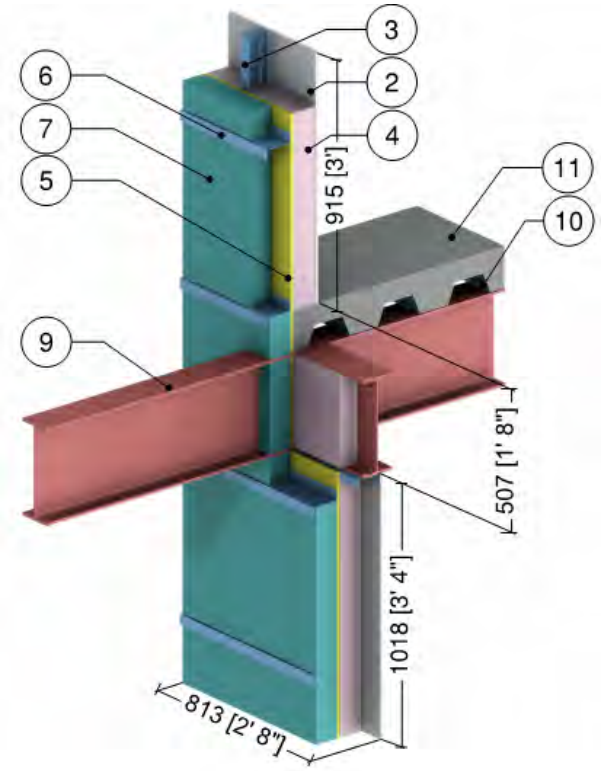


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.30 (0.043)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Steel Post (HSS 76x76x3.2)	1/8" (3)	347 (50)	-	489 (7830)	0.12 (500)
9	Steel Beam (HSS 76x76x3.2)	1/8" (3)	347 (50)	-	489 (7830)	0.12 (500)
10	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.7.2

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Uninterrupted Beam

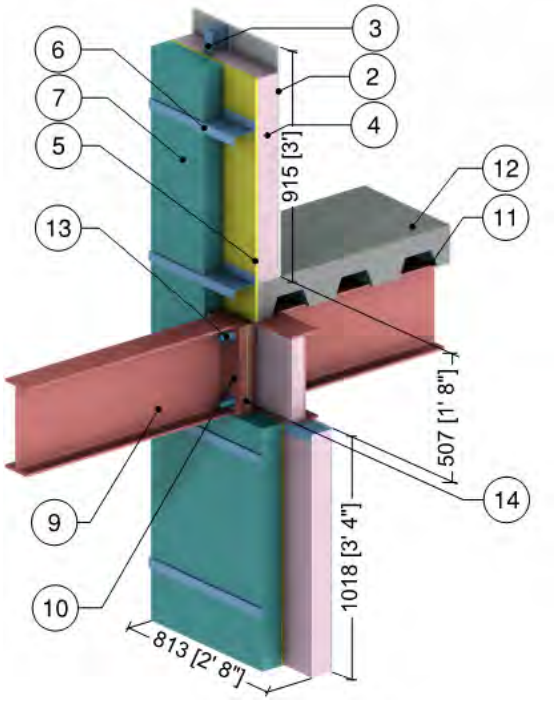


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.043)	R-12.0 (2.11 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	Horizontal Z-girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Steel Through Beam W14x26 (W360x39)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Steel Deck	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Concrete Topping	6” (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.7.3

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Isolator Pad

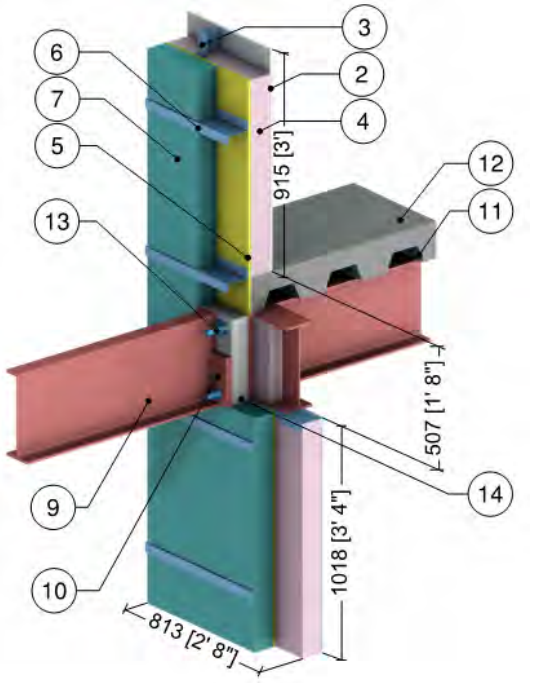


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.043)	R-12.0 (2.10 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	Horizontal Z-girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	0.2 (0.029)	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Steel Beam W14x26 (W360x39)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Steel Bearing Plates	1 3/16” (30)	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Deck	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Concrete Topping	6” (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Steel or Stainless Steel Bolts	-	347 to 118 (50 to 17)	-	500 (8000)	0.12 (500)
14	Polymer Thermal Isolator Pad	3/16” to 3/8” (5 to 10)	1.7 (0.25)	-	137 (2200)	0.31 (1300)
15	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.7.4

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Isokorb S22 Thermally Broken Beam

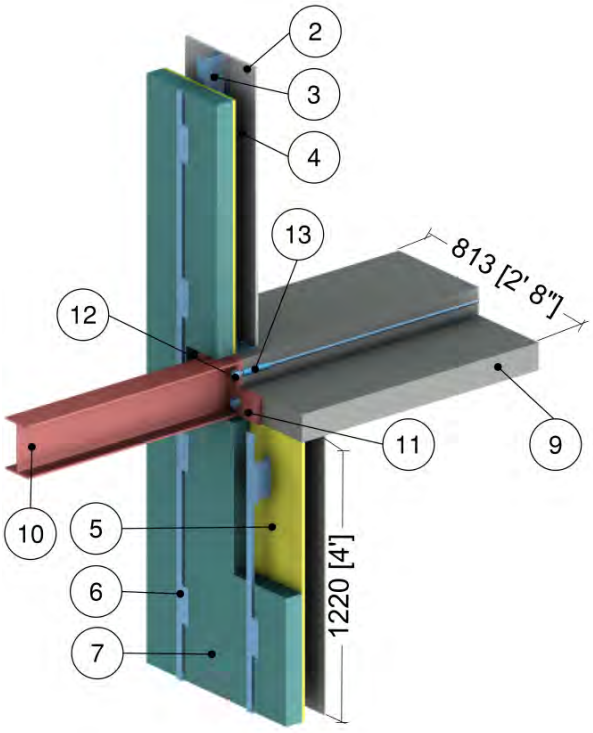


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.043)	R-12.0 (2.11 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	Horizontal Z-girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Steel Beam W14x26 (W360x39)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Steel Bearing Plates	1 3/16” (30)	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Deck	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Concrete Topping	6” (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
Isokorb S22 Thermal Break						
13	Stainless Steel Bolts, Plates and HSS	-	118 (17)	-	500 (8000)	0.12 (500)
14	Polystyrene Hard Foam Insulation	3 1/8” (80)	0.217 (0.031)	R-14.5 (2.6 RSI)	66 (1060)	0.35 (1500)
15	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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

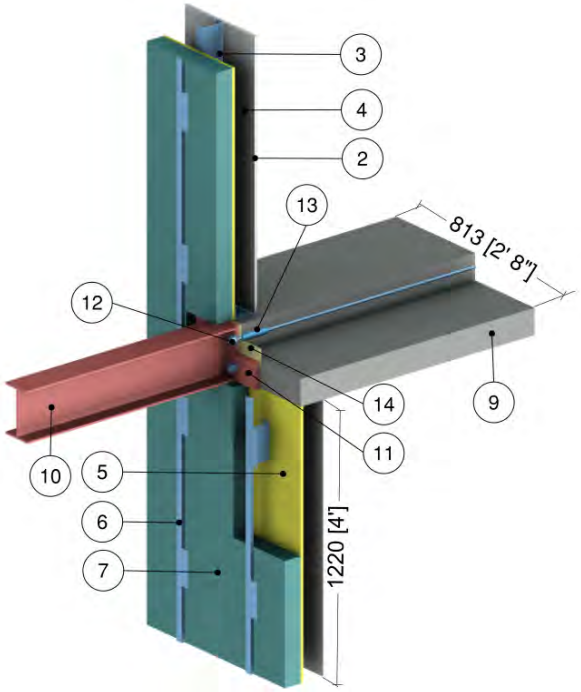


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Intermittent Vertical Z-Girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	8 5/8” (220)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Beam W8x18 (W200x27)	-	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Bearing Plates	3/4” (20)	347 (50)	-	489 (7830)	0.12 (500)
12	Steel Bolts and Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
13	Stainless Steel Anchors	-	118 (17)	-	500 (8000)	0.12 (500)
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

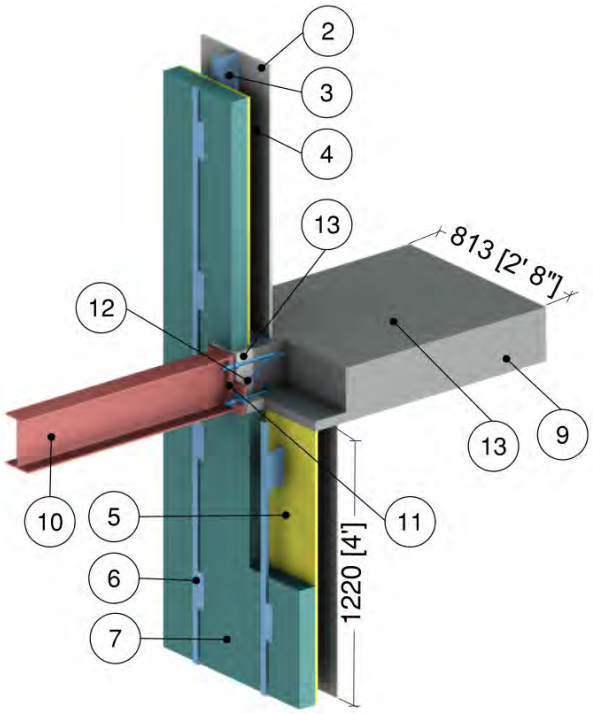


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Intermittent Vertical Z-Girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	8 5/8” (220)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Beam W8x18 (W200x27)	-	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Bearing Plates	3/4” (20)	347 (50)	-	489 (7830)	0.12 (500)
12	Steel Bolts and Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
13	Stainless Steel Anchors	-	118 (17)	-	500 (8000)	0.12 (500)
14	Polymer Thermal Isolator Pad	3/8” (10)	1.7 (0.25)	-	137 (2200)	0.31 (1300)
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

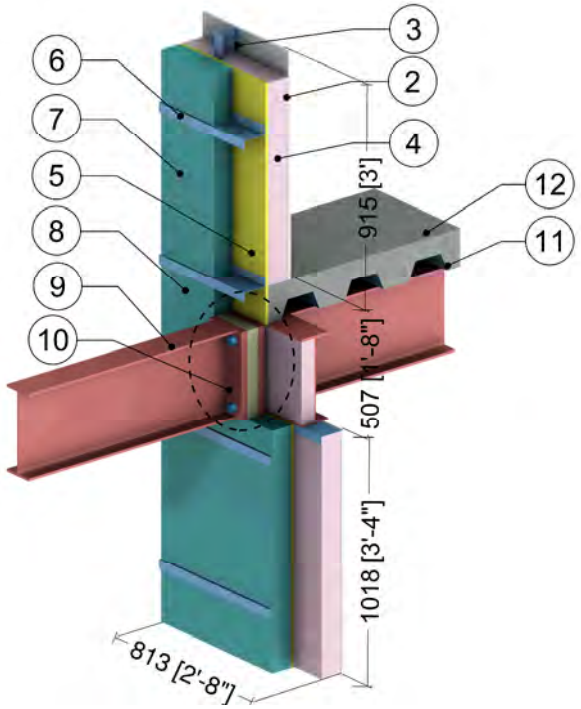


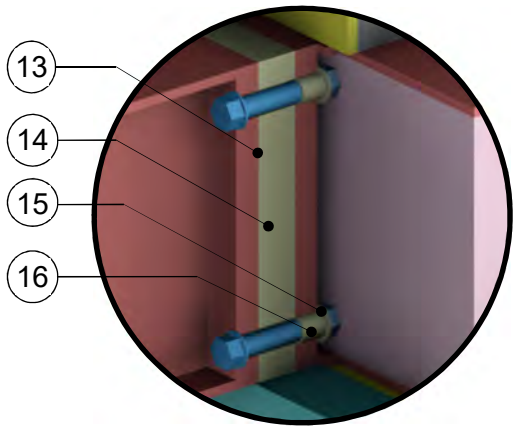
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Intermittent Vertical Z-Girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Concrete Slab	8 5/8” (220)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Steel Beam W8x18 (W200x27)	-	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Bearing Plate with Butt Stop	3/4” (20)	347 (50)	-	489 (7830)	0.12 (500)
	Isokorb KS14 Thermal Break					
12	Stainless Steel Reinforcement	-	118 (17)	-	500 (8000)	0.12 (500)
13	Polystyrene Hard Foam Insulation	3 1/8” (80)	0.217 (0.031)	R-14.5 (2.6 RSI)	66 (1060)	0.35 (1500)
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 5.7.8

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Beam Thermal Break





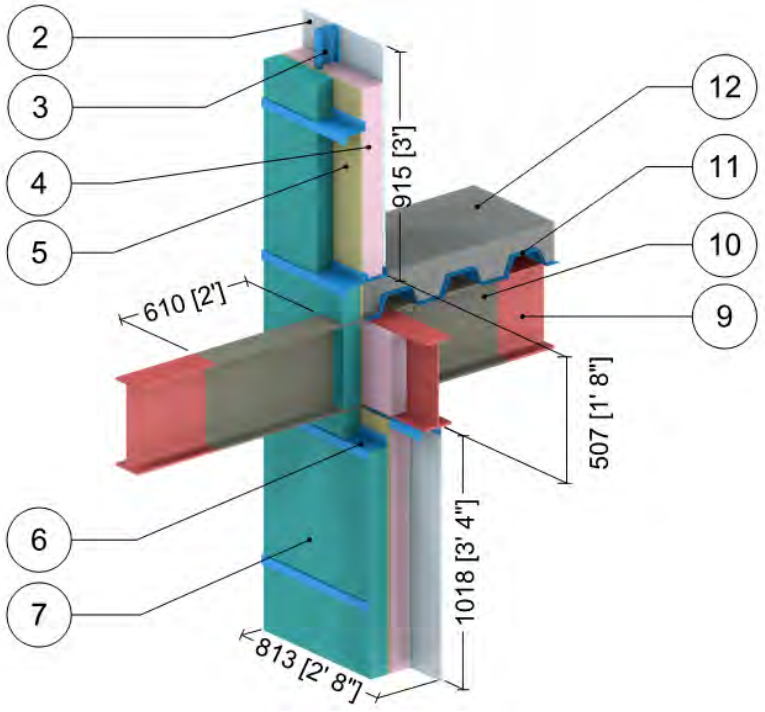
Beam Thermal Break

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 Film[1]	-	-	R-0.6 (0.11 RSI) to R-0.9 (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	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.043)	R-12.0 (2.10 RSI)	0.9 (14)	0.17 (710)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
6	Horizontal Z-girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	0.2 (0.029)	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Steel Beam W14x26 (W360x39)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Steel Bearing Plates	1 3/16” (30)	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
12	Concrete Topping	6” (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
13	Steel or Stainless Steel Bolts	-	347 (50) to 118 (17)	-	500 (8000)	0.12 (500)
14	Armatherm FRR Break	1” to 2” (25 to 50)	1.4 (0.20)	-	85 (5.3)	-
15	Armatherm FRR Washer	3/8” (10)	1.4 (0.20)	-	85 (5.3)	-
16	Armatherm FRR Bushing	1.2” (30)	1.4 (0.20)	-	85 (5.3)	
17	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 5.7.9

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly with Horizontal Z-girts (24” o.c.) Supporting Metal Cladding – Structural Steel Floor Intersection with Aerolon Coating

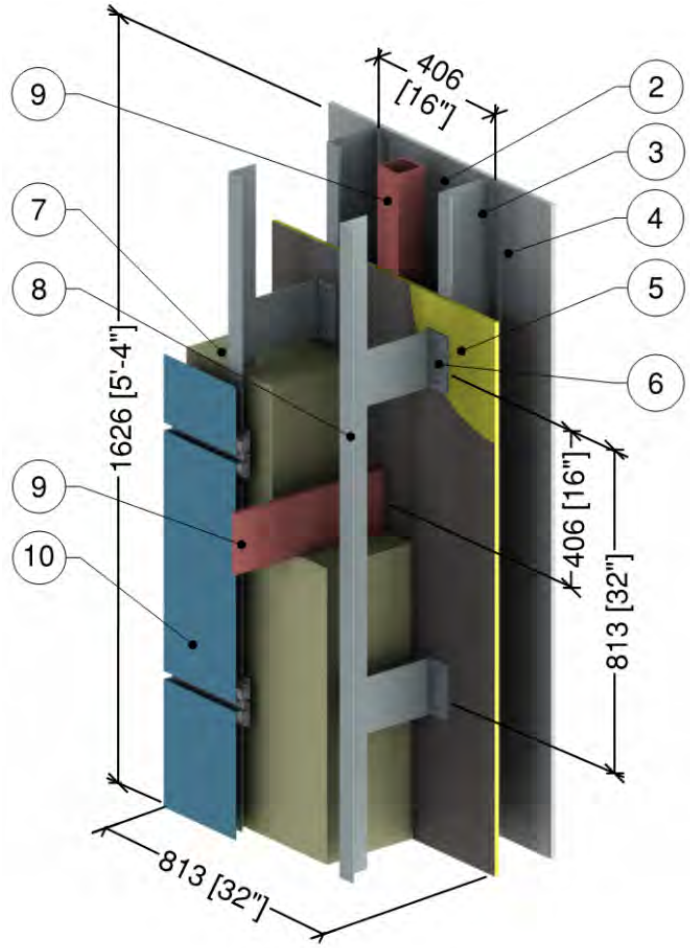


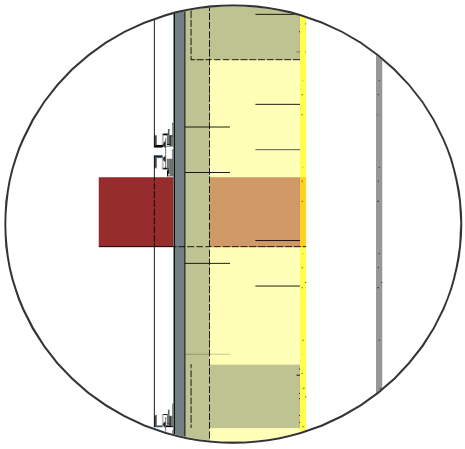
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.043)	R-12.0 (2.10 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	Horizontal Z-girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	0.2 (0.029)	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Steel Beam W14x26 (W360x39)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Aerolon Coating	0.098” (2.5)	-	R-0.4 (0.07 RSI)	-	-
11	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
12	Concrete Topping	6” (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
13	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





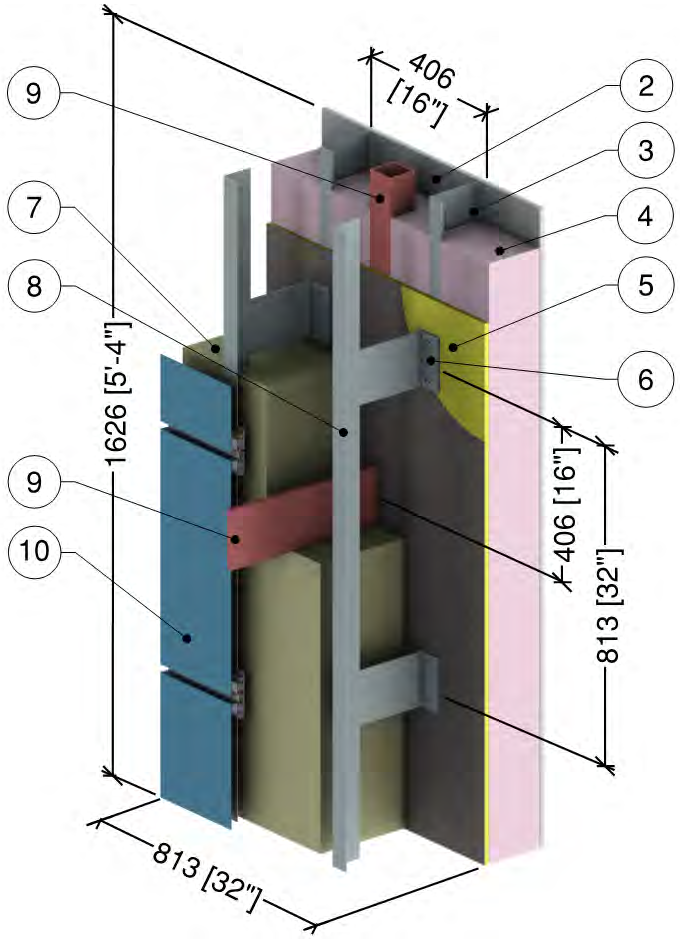
Knife Edge Detail

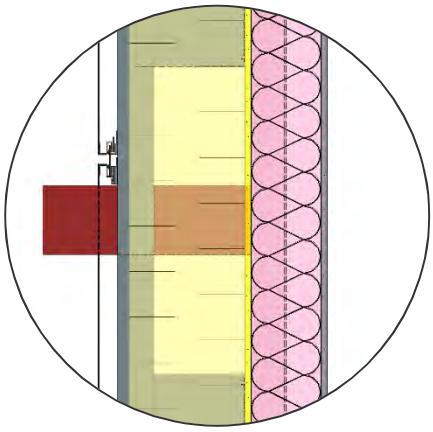
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6" (152)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	FRP Bracket	-	4.85 (0.7)	-	110 (1760)	-
7	Exterior Mineral Wool Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-Rail	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Steel Column and Knife Edge	5/8" (16)	430 (62)	-	489 (7830)	0.12 (500)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





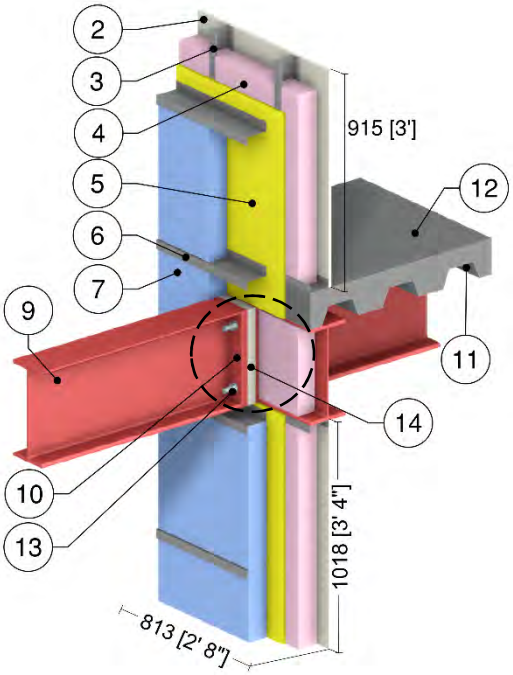
Knife Edge Detail

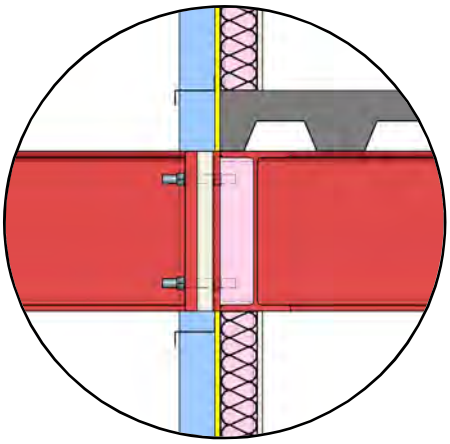
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6" (152)	0.32 (0.046)	R-19 (3.35 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	FRP Bracket	-	4.85 (0.7)	-	110 (1760)	-
7	Exterior Mineral Wool Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-Rail	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Steel Column and Knife Edge	5/8" (16)	430 (62)	-	489 (7830)	0.12 (500)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Structural Steel Floor Intersection with Thermal Isolator Pad





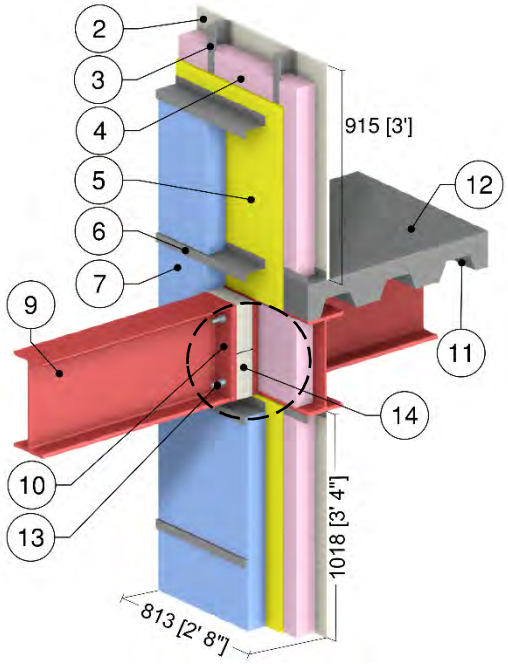
Structural Steel Beam Detail

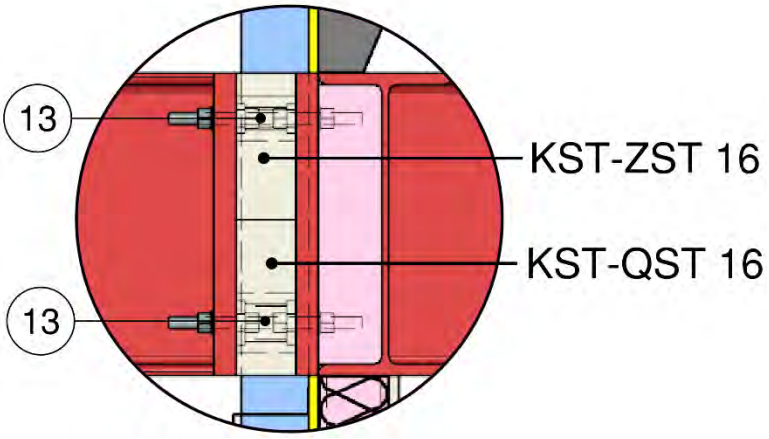
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.044)	R-12.0 (2.10 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	Horizontal Z-girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	0.20 (0.029)	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Steel Beam W14x26 (W360x39)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Steel Bearing Plates	1 3/16” (30)	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Deck	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Concrete Topping	6” (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Stainless Steel or Steel Bolts and Bushings	-	118 to 347 (17 to 50)	-	500 (8000)	0.12 (500)
14	Polymer Thermal Isolator Pad	1” to 2” (25 to 50)	1.7 (0.25)	-	137 (2200)	0.31 (1300)
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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 – Structural Steel Floor Intersection with Isokorb KST System Thermally Broken Beam





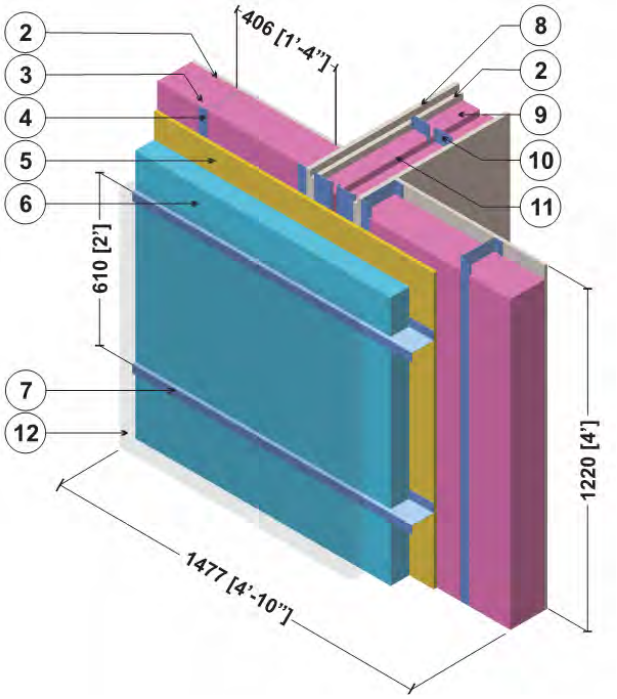
KST System Detail

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 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	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fibreglass Batt Insulation	3 5/8” (92)	0.30 (0.044)	R-12.0 (2.10 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	Horizontal Z-girts with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Insulation	3” (76)	0.20 (0.029)	R-15.0 (2.64 RSI)	1.8 (28)	0.29 (1220)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Steel Beam W14x26 (W360x39)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Steel Bearing Plates	1 3/16” (30)	347 (50)	-	489 (7830)	0.12 (500)
11	Steel Deck	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Concrete Topping	6” (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
Isokorb KST System Thermal Break						
13	Stainless Steel Bolts, Plates and HSS	-	118 (17)	-	500 (8000)	0.12 (500)
14	Polystyrene Insulation	3.2” (80)	0.22 (0.031)	R-15 (2.58 RSI)	1.3 (20)	0.35 (1500)
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 .2 to (0.03RSI to 0.12 RSI)	-	-

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

Detail 5.8.1

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

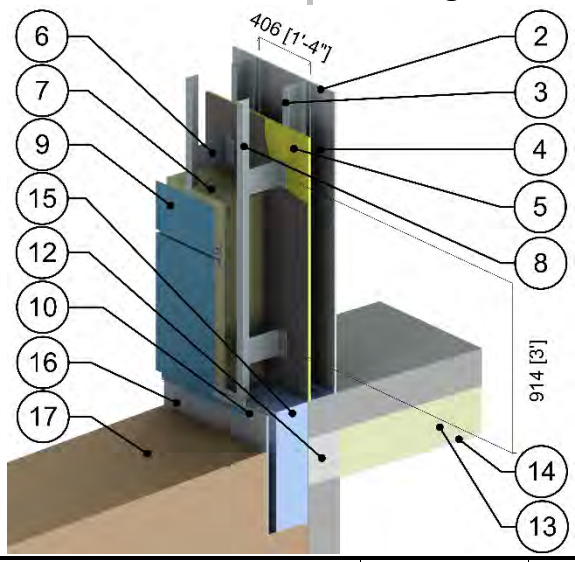


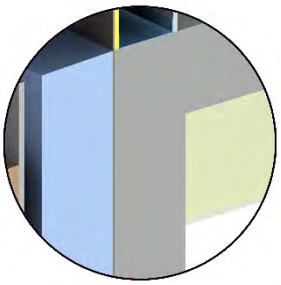
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.31 (0.044)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-girts w/ 1 1/2" Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
9	Acoustic Batt Insulation	2 5/8" (67)	0.29 (0.042)	-	0.9 (14)	0.17 (710)
10	2 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
12	Metal cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
13	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

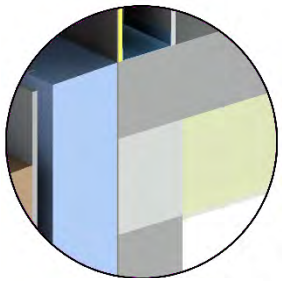
Detail 5.8.2

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





Scenario A - Without Thermal Break



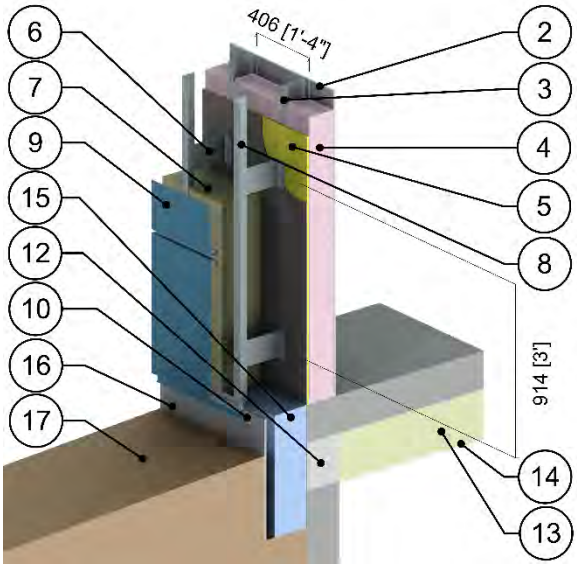
Scenario B - With Thermal Break

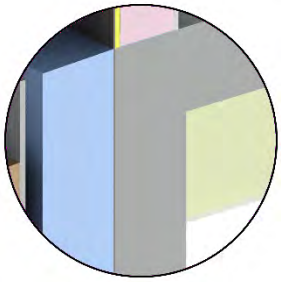
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	6” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	FRP Bracket	-	4.9 (0.70)	-	110 (1760)	-
7	Exterior Mineral Wool Insulation	10” (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-Rail	0.09” (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
10	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.22 (900)
11	Concrete Foundation	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Foundation Thermal Block	8” (203)	0.20 (0.029)	R-40 (7.04 RSI)	1.8 (28)	0.29 (1220)
13	Slab Insulation	10” (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
14	Gypsum Thermal Protection Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
15	Below Grade Rigid Insulation	8” (203)	0.20 (0.029)	R-40 (7.04 RSI)	1.8 (28)	0.29 (1220)
16	Cement Protection Board	1/2" (13)	12.5 (1.8)	-	140 (2250)	0.20 (850)
17	Soil	-	15.6 (2.25)	-	-	-
18	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 RSI)	-	-

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

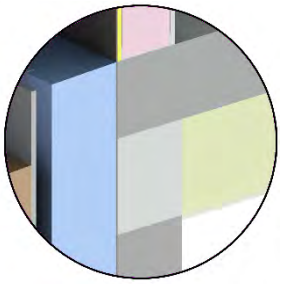
Detail 5.8.3

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





Scenario A - Without Thermal Break



Scenario B - With Thermal Break

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 Film[1]	-	-	R-0.7 to R-0.9 (0.12 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	6" x 1 5/8" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6" (152)	0.32 (0.046)	R-19 (3.35 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	FRP Bracket	-	4.9 (0.70)	-	110 (1760)	-
7	Exterior Mineral Wool Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
8	Vertical Aluminum L-Rail	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
9	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
10	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.22 (900)
11	Concrete Foundation	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Foundation Thermal Block	8" (203)	0.20 (0.029)	R-40 (7.04 RSI)	1.8 (28)	0.29 (1220)
13	Slab Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
14	Gypsum Thermal Protection Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
15	Below Grade Rigid Insulation	8" (203)	0.20 (0.029)	R-40 (7.04 RSI)	1.8 (28)	0.29 (1220)
16	Cement Protection Board	1/2" (13)	12.5 (1.8)	-	140 (2250)	0.20 (850)
17	Soil	-	15.6 (2.25)	-	-	-
18	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 RSI)	-	-

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

6.0 Metal Buildings

Detail 6.1.1 ..... **A.6.1**

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

Detail 6.1.2 ..... **A.6.2**

Vertical Insulated Metal Panel – Metal Stack Joint and Support Girt Back/Hat Track Backup Wall

Detail 6.1.3 ..... **A.6.3**

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

Detail 6.1.4 ..... **A.6.4**

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

Detail 6.1.5 ..... **A.6.5**

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

Detail 6.1.6 ..... **A.6.6**

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

Detail 6.1.7 ..... **A.6.7**

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

Detail 6.1.8 ..... **A.6.8**

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

Detail 6.2.1 ..... **A.6.9**

Vertical Insulated Metal Panel - Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Support Girt/Hat Track Backup Wall

Detail 6.2.2 ..... **A.6.10**

Horizontal Insulated Metal Panel – Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Steel Stud Backup Wall

Detail 6.3.1 ..... **A.6.11**

Vertical Insulated Metal Panel – Window Glazing Transition with Steel Support Framing

Detail 6.3.2 ..... **A.6.12**

Horizontal Insulated Metal Panel – Window Glazing Transition with Steel Support Framing

Detail 6.4.1 ..... **A.6.13**

Vertical Insulated Metal Panel – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

Detail 6.4.2 ..... **A.6.15**

Horizontal Insulated Metal Panel – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

Detail 6.5.1 ..... **A.6.16**

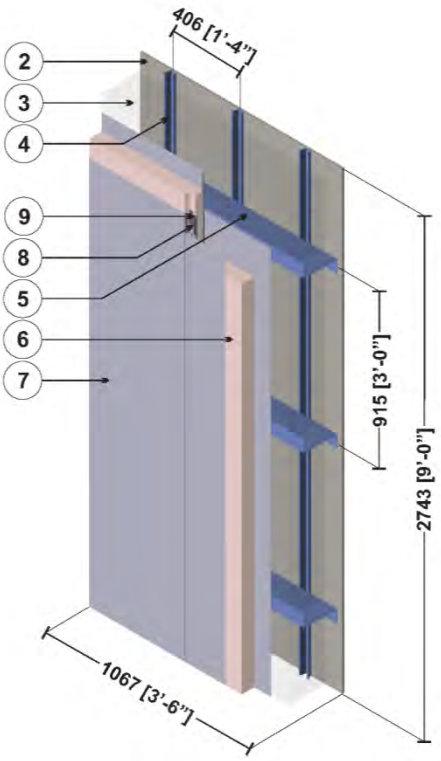
Vertical Insulated Metal Panel – Corner Intersection with Post and Support Girt/Hat Track Backup Wall

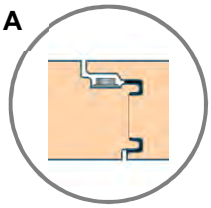
Detail 6.5.2 ..... **A.6.17**

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





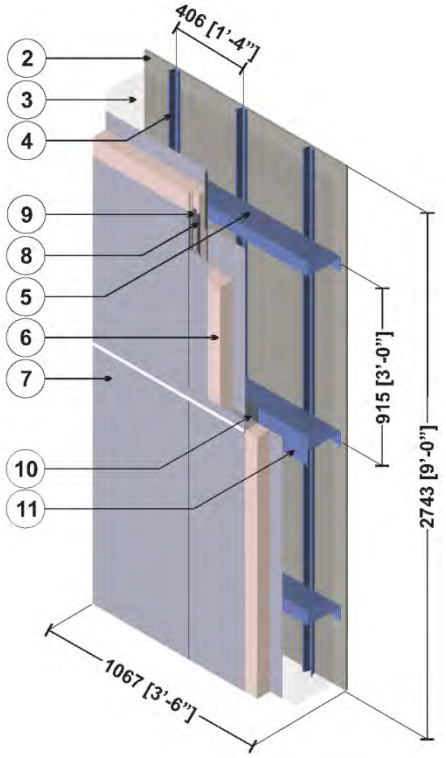
Vertical Joint

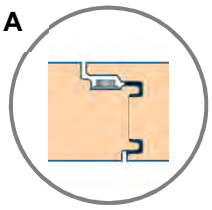
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Hat Tracks @ 16" o.c.	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Z-Girts with 1 1/2" Flange	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Polyisocyanurate Insulation	3" (76)	0.143 (0.02)	R-21 (3.70)	1.8 (28)	0.29 (1220)
7	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Sealant	Varies	2.4 (0.35)	-	-	-
9	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	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

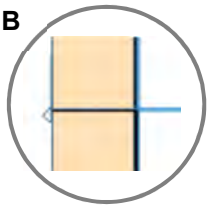
Detail 6.1.2

Vertical Insulated Metal Panel – Metal Stack Joint and Support Girt Back/Hat Track Backup Wall





Vertical Joint



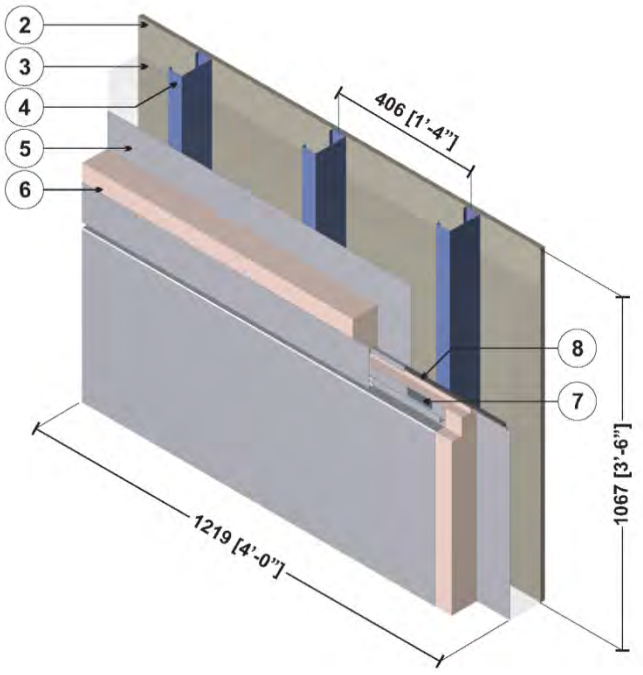
Horizontal Joint

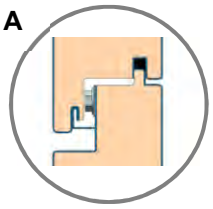
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Hat Tracks @ 16" o.c.	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Z-Girts with 1 1/2" Flange	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Polyisocyanurate Insulation	3" (76)	0.143 (0.020)	R-21 (3.70)	1.8 (28)	0.29 (1220)
7	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Sealant	Varies	2.4 (0.35)	-	-	-
9	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
10	Steel Flashing & Trim	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Steel Angle	16 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

Detail 6.1.3

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





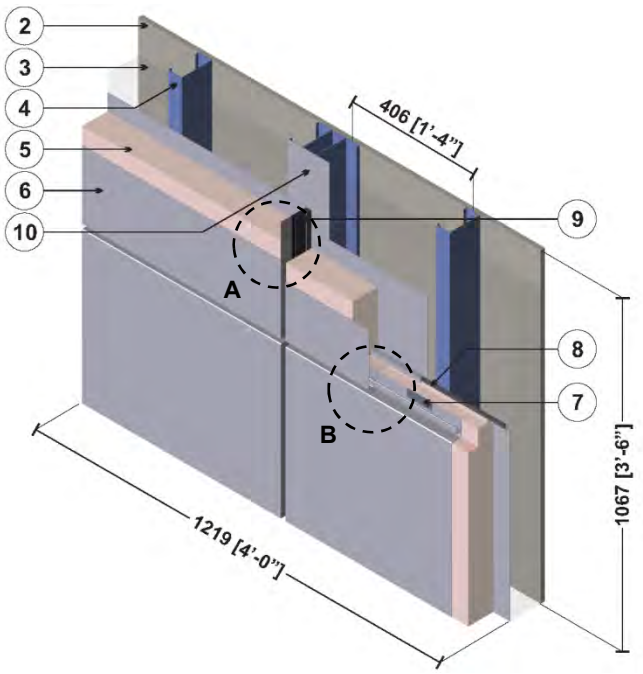
Horizontal Joint

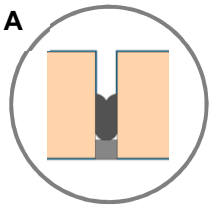
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16" o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Polyisocyanurate Insulation	3" (76)	0.143 (0.02)	R-21.0 (3.70)	1.8 (28)	0.29 (1220)
6	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
8	Sealant	Varies	2.4 (0.35)	-	-	-
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

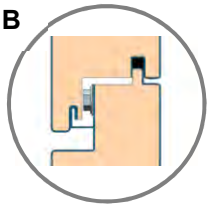
Detail 6.1.4

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





Vertical Joint



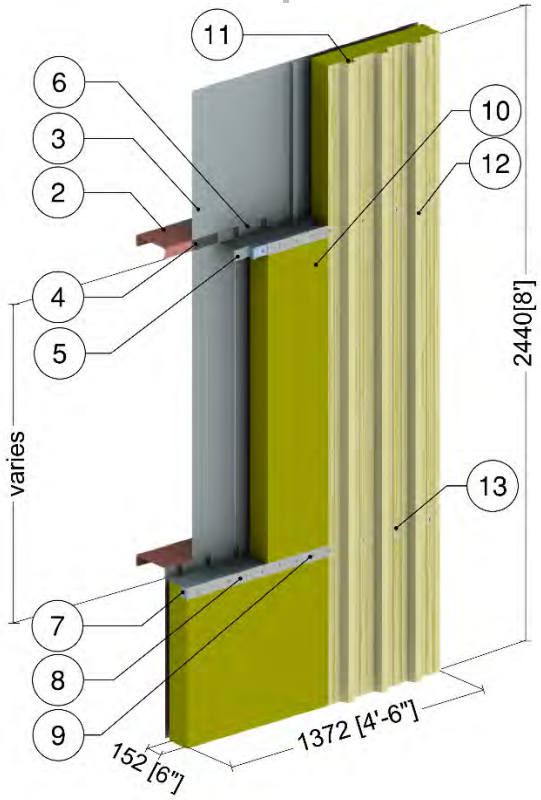
Horizontal Joint

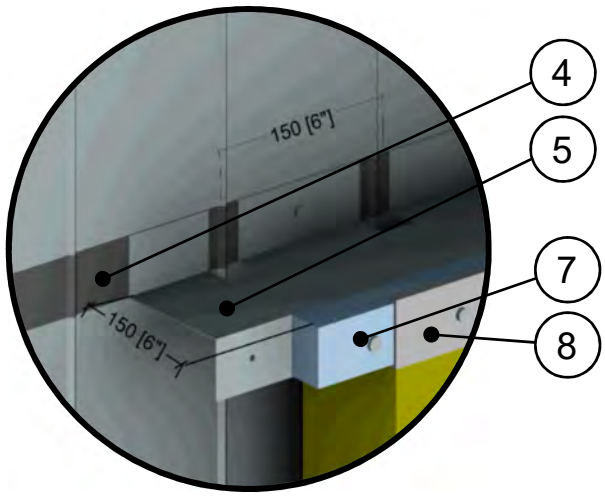
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16" o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Polyisocyanurate Insulation	3" (76)	0.143 (0.02)	R-21.0 (3.70)	1.8 (28)	0.29 (1220)
6	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
8	Sealant	Varies	2.4 (0.35)	-	-	-
9	Gasket	1 1/3" (33)	0.966 (0.14)	-	-	-
10	Steel Plate	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

Detail 6.1.5

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





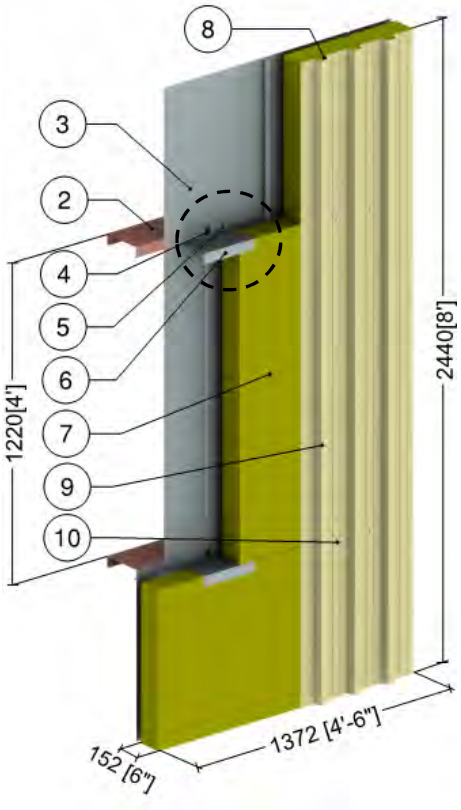
Notched Z-Bar with
Thermal Block and U-Bar

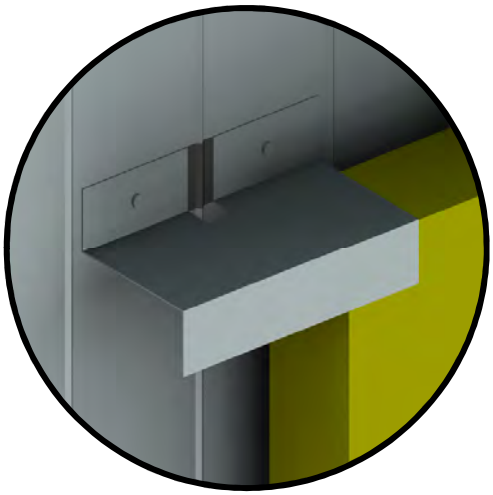
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films (left side)[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	8 x 2 Steel Girts @ 48" o.c.	0.10" (2.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Galvanized Steel Liner Panel	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Thermal Tape	1/8" (3.2)	0.097 (0.014)	-	-	-
5	Galvanized Steel Notched Z-Bar	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	#12 Galvanized Steel Fasteners	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
7	Thermal Block Insulation	2" (50)	0.200 (0.029)	R-10 (1.76 RSI)	9.4 (150)	0.23 (1000)
8	Galvanized Steel U-Bar	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	#12 Galvanized Steel Fasteners (7.5" o.c.)	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
10	Exterior Mineral Wool Insulation	6" (152)	0.238 (0.034)	R-25 (4.4 RSI)	1.8 (28)	0.29 (1090)
11	Air Gap[2]	-	Varies	-	0.075 (1.2)	0.24 (1000)
12	Galvanized Steel Cladding	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	#12 Galvanized Steel Fasteners	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
14	Exterior Film (right side)[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 was found using ISO 100077-2

Detail 6.1.6

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





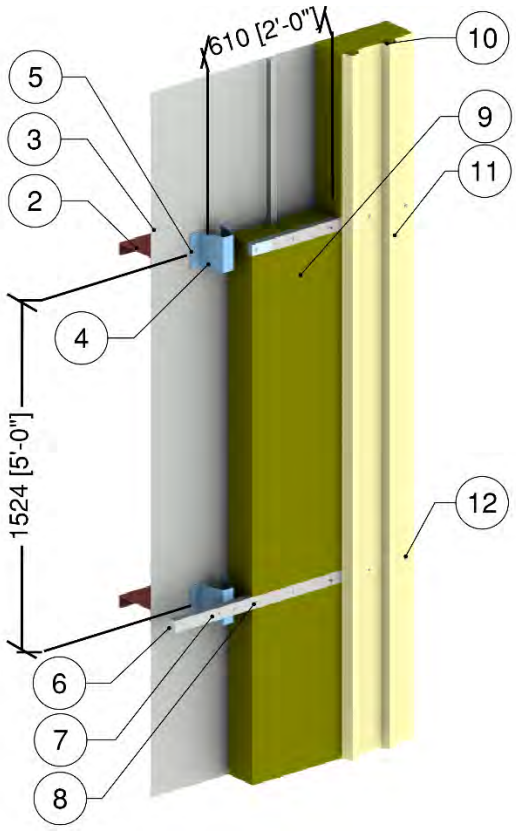
Intermittent
Notched Z-Bar

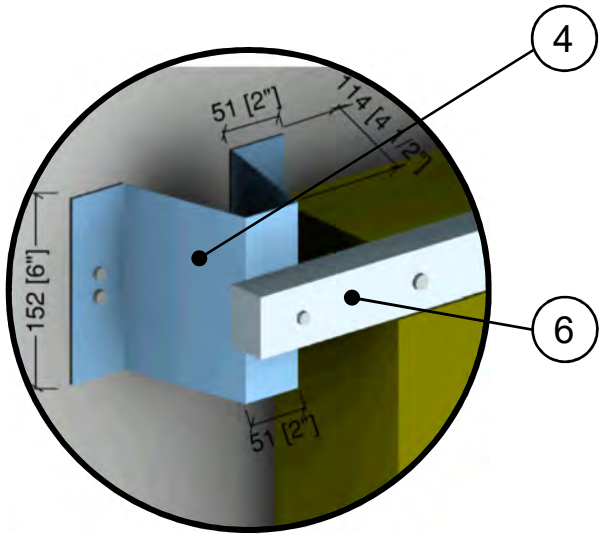
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films (left side)[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	8 x 2 Steel Girts @ 48" o.c.	0.10" (2.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Galvanized Steel Liner Panel	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Thermal Tape	1/8" (3.2)	0.097 (0.014)	-	-	-
5	#12 Galvanized Steel Fasteners	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
6	Galvanized Steel Notched Z-Bar	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Exterior Mineral Wool Insulation	6" (152)	0.238 (0.034)	R-25 (4.4 RSI)	1.8 (28)	0.29 (1090)
8	Air Gap[2]	-	Varies	-	0.075 (1.2)	0.24 (1000)
9	Galvanized Steel Cladding	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	#12 Galvanized Steel Fasteners (7.5" o.c.)	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
11	Exterior Film (right side)[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 was found using ISO 100077-2

Detail 6.1.7

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





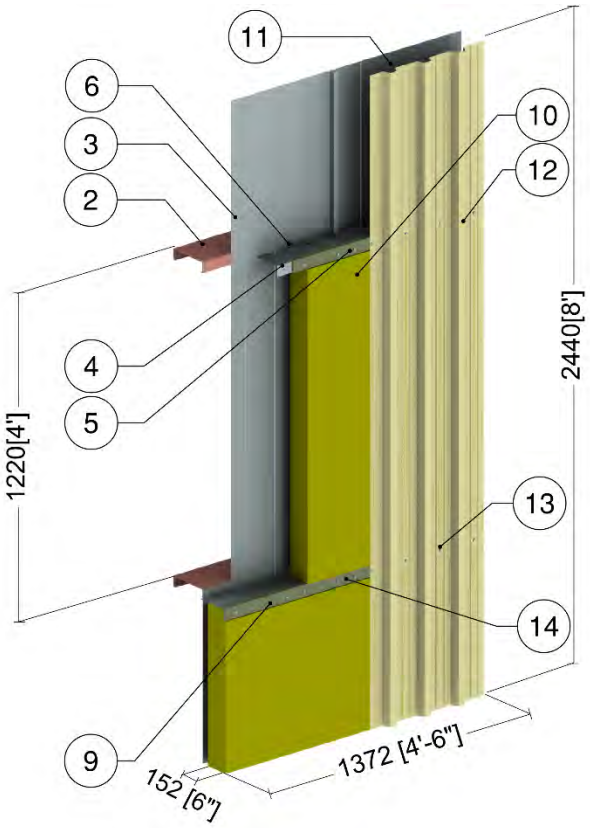
Thermal Chair with
Thermal Block and U-Bar

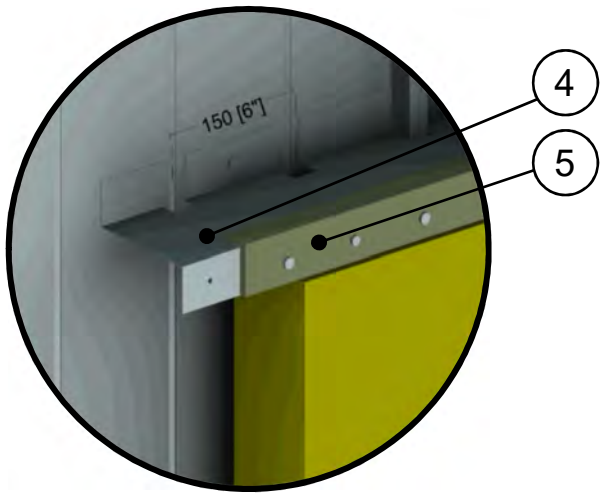
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films (left side)[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	8 x 2 Steel Girts @ 48" o.c.	0.10" (2.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Galvanized Steel Liner Panel	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Thermal chairs	18 Gauge	430 (62)	-	-	-
5	#12 Galvanized Steel Fasteners	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
6	Thermal Block Insulation	2" (50)	0.200 (0.029)	R-10 (1.76 RSI)	9.4 (150)	0.23 (1000)
7	Galvanized Steel U-Bar	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	#12 Galvanized Steel Fasteners (7.5" o.c.)	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
9	Exterior Mineral Wool Insulation	6" (152)	0.238 (0.034)	R-25 (4.4 RSI)	1.8 (28)	0.29 (1090)
10	Air Gap[2]	-	Varies	-	0.075 (1.2)	0.24 (1000)
11	Galvanized Steel Cladding	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	#12 Galvanized Steel Fasteners (7.5" o.c.)	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
13	Exterior Film (right side)[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 was found using ISO 100077-2

Detail 6.1.8

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





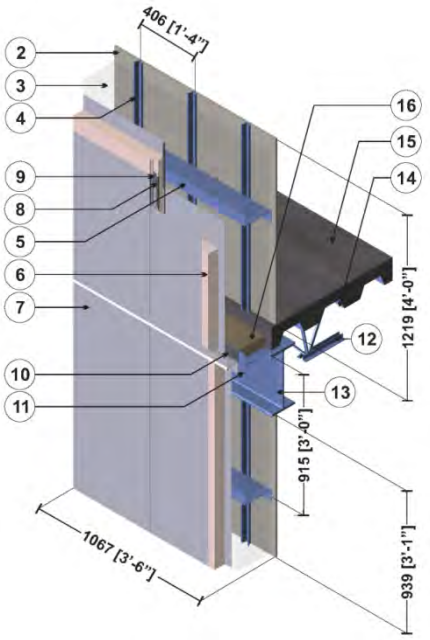
Notched Z-Bar with Ceramic Blanket

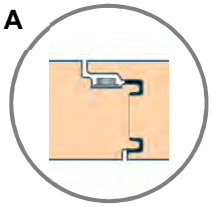
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films (left side)[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	8 x 2 Steel Girts @ 48" o.c.	0.10" (2.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Galvanized Steel Liner Panel	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Galvanized Steel Notched Z-Bar	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Ceramic Fibre strip	-	-	-	-	-
6	#12 Galvanized Steel Fasteners	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
7	#12 Galvanized Steel Fasteners	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
8	Exterior Mineral Wool Insulation	6" (152)	0.238 (0.034)	R-25 (4.4 RSI)	1.8 (28)	0.29 (1090)
9	Air Gap[2]	-	Varies	-	0.075 (1.2)	0.24 (1000)
10	Galvanized Steel Cladding	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	#12 Galvanized Steel Fasteners (7.5" o.c.)	0.21" (5) Ø	430 (62)	-	489 (7830)	0.12 (500)
12	Ceramic Blanket	1/2" (13)	0.62 (0.09)	R-0.8 (0.14)	-	-
13	Exterior Film (right side)[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 was found using ISO 100077-2

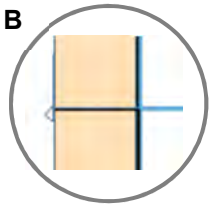
Detail 6.2.1

Vertical Insulated Metal Panel - Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Support Girt/Hat Track Backup Wall





Vertical Joint



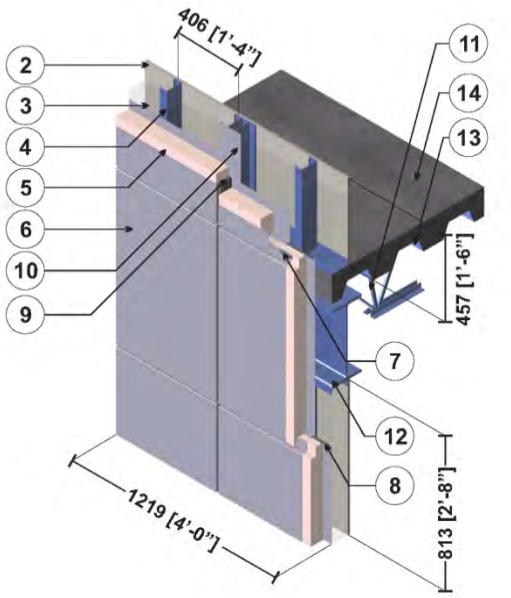
Horizontal Joint

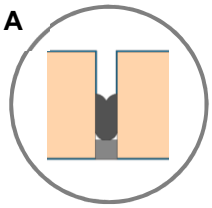
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Hat Tracks @ 16" o.c.	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Z-Girts with 1 1/2" Flange	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Polyisocyanurate Insulation	3" (76)	0.143 (0.02)	R-21 (3.70)	1.8 (28)	0.29 (1220)
7	Steel Facer Skin	24 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Sealant	-	2.4 (0.35)	-	-	-
9	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
10	Steel Flashing & Trim	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Steel Angle	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Open Web Steel Joist	-	314 (45)	-	489 (7830)	0.12 (500)
13	Steel Beam (W410)	-	314 (45)	-	489 (7830)	0.12 (500)
14	Steel Deck	1/16" (1.6)	314 (45)	-	489 (7830)	0.12 (500)
15	Concrete Topping	6" (152)	6 (0.9)	-	120 (1920)	0.20 (850)
16	Semi-Rigid Insulation	-	0.28 (0.04)	-	4.5 (72)	0.17 (710)
17	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

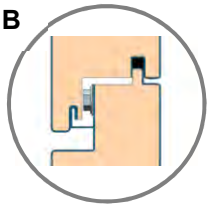
Detail 6.2.2

Horizontal Insulated Metal Panel – Corrugated Slab Intersection with I-beam – Open Web Steel Joist and Steel Stud Backup Wall





Vertical Joint



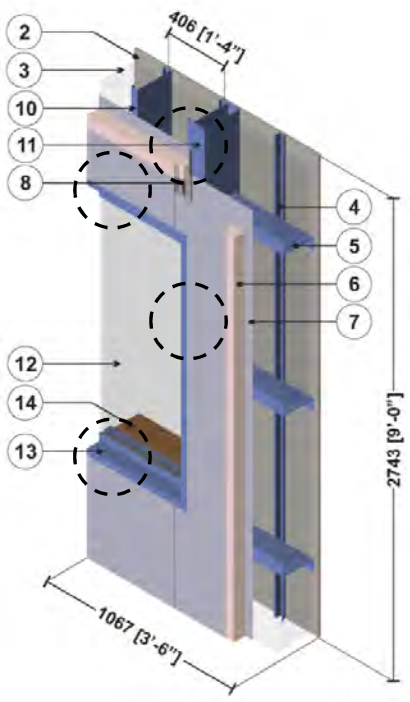
Horizontal Joint

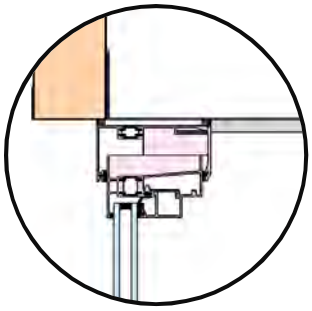
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16" o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Polyisocyanurate Insulation	3" (76.2)	0.143 (0.02)	R-21.0 (3.70)	1.8 (28)	0.29 (1220)
6	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
8	Sealant	-	2.4 (0.35)	-	-	-
9	Gasket	1 1/3" (33)	0.966 (0.14)	-	-	-
10	Steel Plate	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Open Web Steel Joist	-	314 (45)	-	489 (7830)	0.12 (500)
12	Steel Beam (W410)	-	314 (45)	-	489 (7830)	0.12 (500)
13	Steel Deck	1/16" (1.6)	314 (45)	-	489 (7830)	0.12 (500)
14	Concrete Topping	6" (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
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

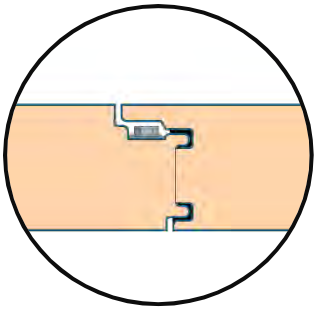
Detail 6.3.1

Vertical Insulated Metal Panel – Window Glazing Transition with Steel Support Framing

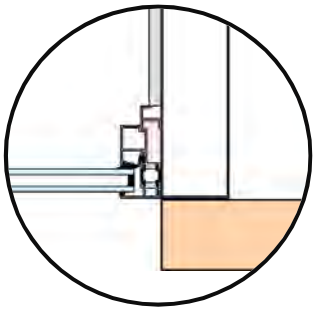




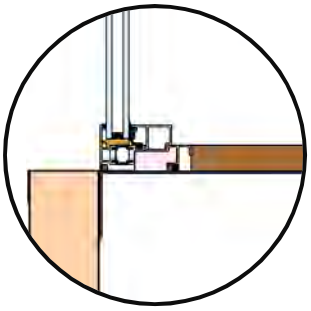
Head Detail



Vertical Joint



Jamb Detail



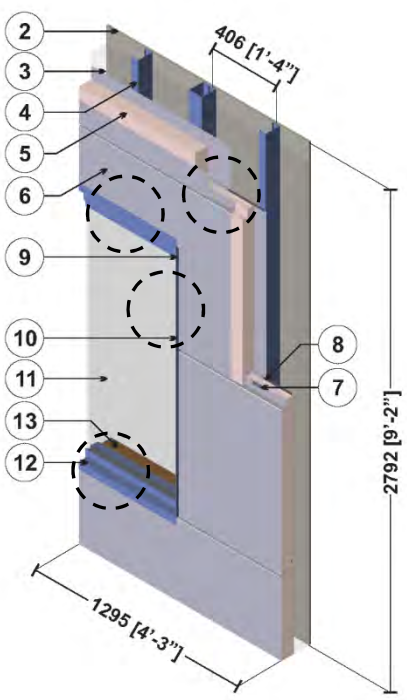
Sill Detail

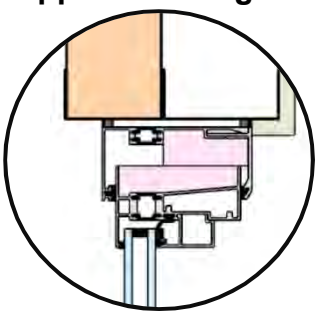
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Hat Tracks @ 16" o.c.	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Z-Girts with 1 1/2" Flange	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Polyisocyanurate Insulation	3" (76.2)	0.143 (0.02)	R-21.0 (3.70)	1.8 (28)	0.29 (1220)
7	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Sealant	-	2.4 (0.35)	-	-	-
9	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
10	Steel Studs @ 16" o.c. with Track	18 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Steel Support Post	1/8" (3.2)	314 (45)	-	489 (7830)	0.12 (500)
12	5' (1.5m) High aluminum window: double glazed & thermally broken[2]					
13	Window Trim and Sill Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
14	Wood Sill	5/8" (16)	0.6 (0.09)	-	27.8 (445)	0.45 (1880)
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 & surface emissivity. Window values supplemented by ISO 1007-2, Annex B.
[2] The thermal conductivity of air spaces within window framing was found using ISO 10077-2

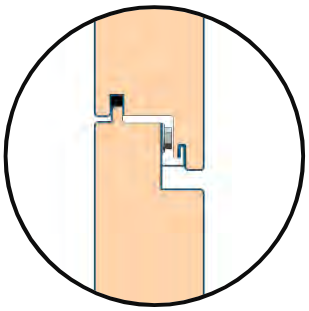
Detail 6.3.2

Horizontal Insulated Metal Panel – Window Glazing Transition with Steel Support Framing

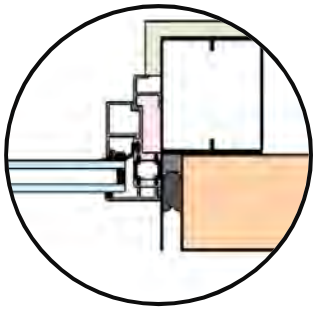




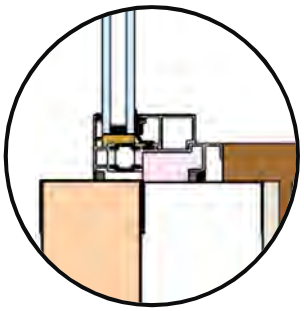
Head Detail



Horizontal Joint



Jamb Detail



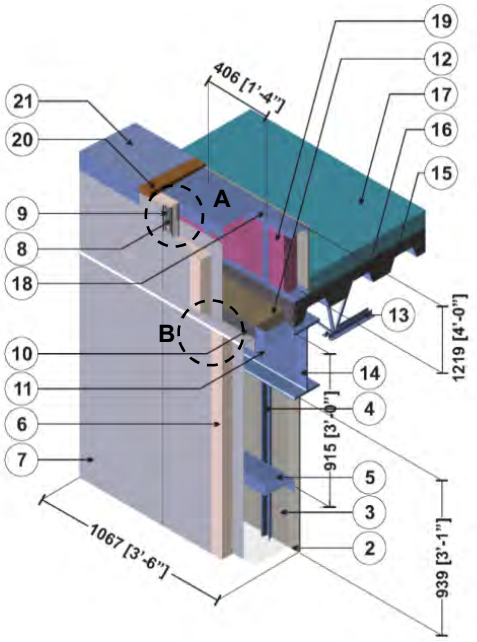
Sill Detail

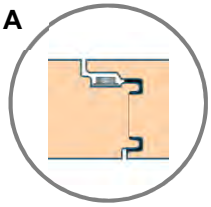
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16" o.c.) with Track	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Polyisocyanurate Insulation	3" (76)	0.143 (0.02)	R-21.0 (3.70)	1.8 (28)	0.29 (1220)
6	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
8	Sealant	-	2.4 (0.35)	-	-	-
9	Gasket	-	0.966 (0.14)	-	-	-
10	Steel Plate	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	5' (1.5m) High aluminum window: double glazed & thermally broken[2]					
12	Steel Window Trim and Sill Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Wood Sill	5/8" (16)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
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 & surface emissivity. Window values supplemented by ISO 1007-2, Annex B.
[2] The thermal conductivity of air spaces within curtain wall framing was found using ISO 10077-2

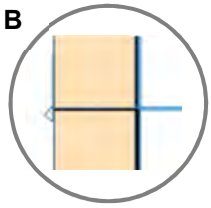
Detail 6.4.1

Vertical Insulated Metal Panel – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection





Vertical Joint



Horizontal Joint

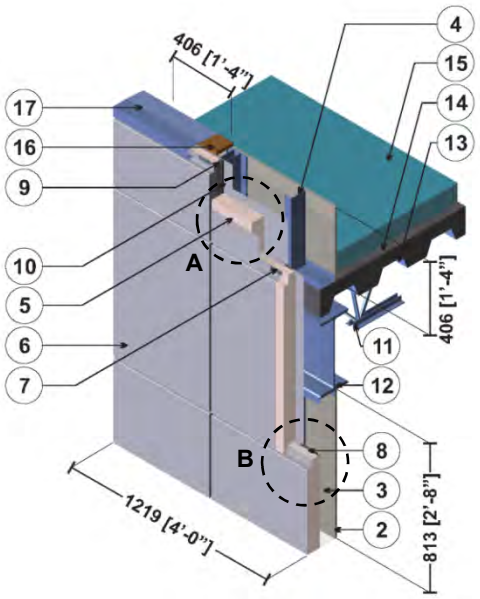
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Hat Tracks @ 16" o.c.	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Z-Girts with 1 1/2" Flange	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Polyisocyanurate Insulation	3" (76)	0.143 (0.02)	R-21.0 (3.70)	1.8 (28)	0.29 (1220)
7	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Sealant	-	2.4 (0.35)	-	-	-
9	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
10	Steel Flashing & Trim	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Steel Angle	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Semi-Rigid Insulation	-	0.28 (0.04)	-	4.5 (72)	0.17 (710)
13	Open Web Steel Joist	-	314 (45)	-	489 (7830)	0.12 (500)
14	Steel Beam (W410)	-	314 (45)	-	489 (7830)	0.12 (500)
15	Steel Deck	1/16" (2)	314 (45)	-	489 (7830)	0.12 (500)
16	Concrete Topping	6" (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
17	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
18	3 5/8" x 1 5/8" Steel Studs with Track	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
19	Parapet Insulation	-	0.29 (0.042)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)

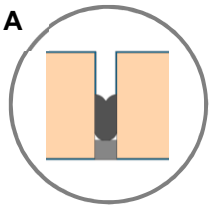
20	Wood Block	5/8" (16)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
21	Flashing & roof finish materials are incorporated into exterior heat transfer coefficient.					
22	Exterior Film[1]	-	-	R-0.2 (0.03 RSI)	-	-

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

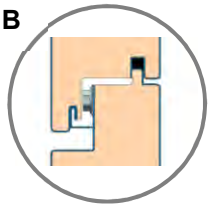
Detail 6.4.2

Horizontal Insulated Metal Panel – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection





Vertical Joint



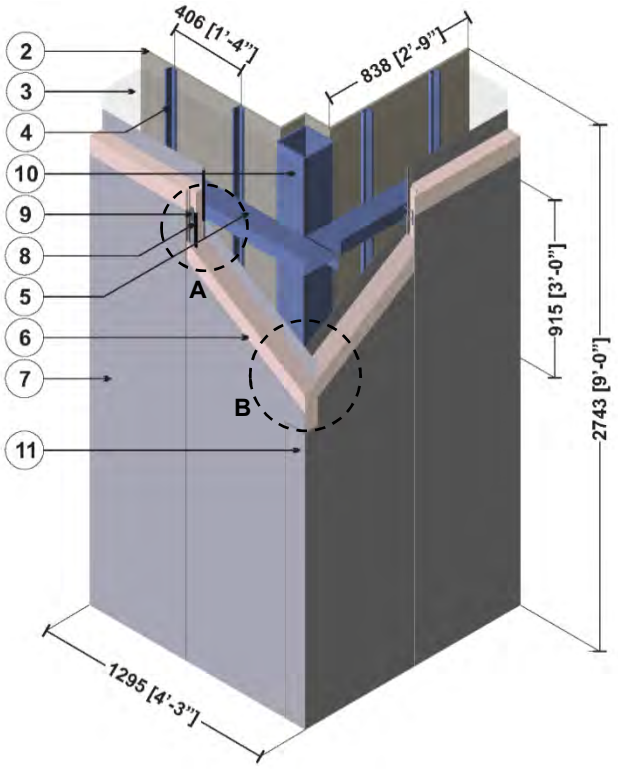
Horizontal Joint

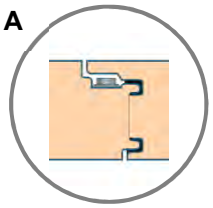
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16" o.c.) with Track	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Polyisocyanurate Insulation	3" (76)	0.143 (0.02)	R-21.0 (3.70)	1.8 (28)	0.29 (1220)
6	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
8	Sealant	-	2.4 (0.35)	-	-	-
9	Gasket	-	0.966 (0.14)	-	-	-
10	Steel Plate	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Open Web Steel Joist	-	314 (45)	-	489 (7830)	0.12 (500)
12	Steel Beam (W410)	-	314 (45)	-	489 (7830)	0.12 (500)
13	Steel Deck	1/16" (1.6)	314 (45)	-	489 (7830)	0.12 (500)
14	Concrete Topping	6" (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
15	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
16	Wood Block	5/8" (16)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
17	Flashing & roof finish materials are incorporated into exterior heat transfer coefficient.					
18	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

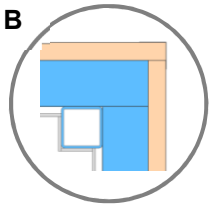
Detail 6.5.1

Vertical Insulated Metal Panel – Corner Intersection with Post and Support Girt/Hat Track Backup Wall





Vertical Joint



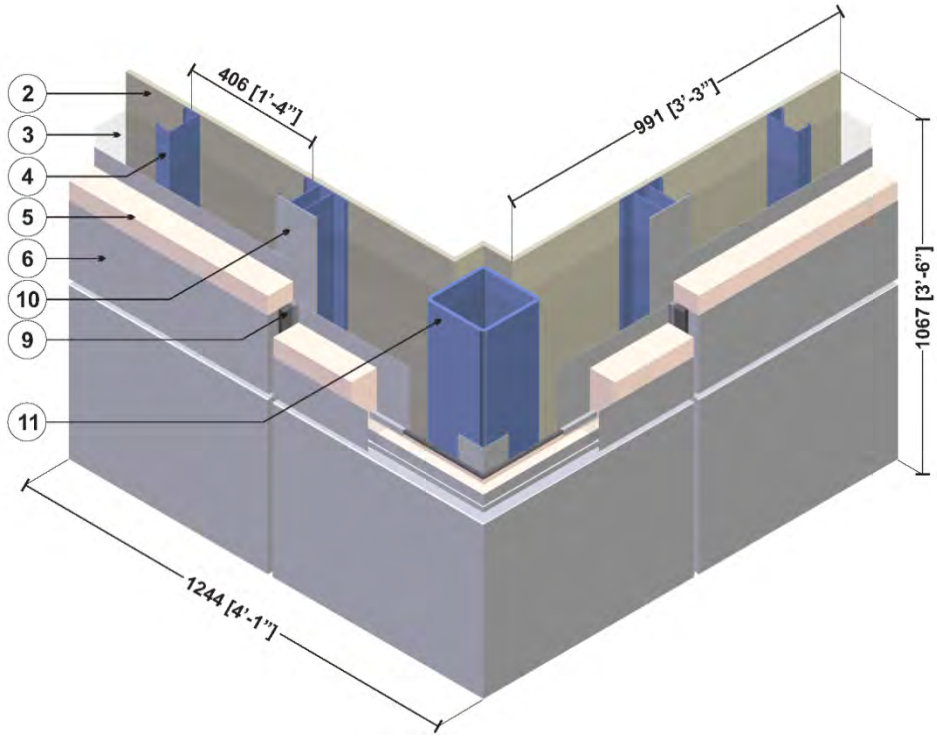
Corner Plan Detail

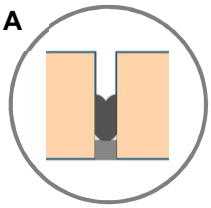
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	Hat Tracks @ 16" o.c.	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Z-Girts with 1 1/2" Flange	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Polyisocyanurate Insulation	3" (76)	0.143 (0.02)	R-21.0 (3.70)	1.8 (28)	0.29 (1220)
7	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Sealant	-	2.4 (0.35)	-	-	-
9	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
10	HSS Steel Post	1/8" (3)	314 (45)	-	489 (7830)	0.12 (500)
11	Steel Corner Trim	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

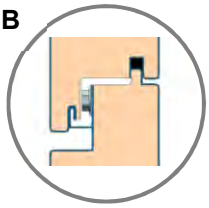
Detail 6.5.2

Horizontal Insulated Metal Panel – Corner Intersection with Post and Steel Stud Backup Wall

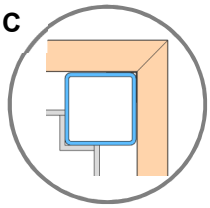




Vertical Joint



Horizontal Joint



Corner Plan 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 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	Air in Cavity	-	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" x 1 5/8" Steel Studs (16" o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Polyisocyanurate Insulation	3" (76)	0.143 (0.02)	R-21.0 (3.70)	1.8 (28)	0.29 (1220)
6	Steel Facer Skin	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	#14 Steel Fasteners	1/4" (6) Ø	314 (45)	-	489 (7830)	0.12 (500)
8	Sealant	-	2.4 (0.35)	-	-	-
9	Gasket	-	0.966 (0.14)	-	-	-
10	Steel Plate	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	HSS Steel Post	1/8" (3)	314 (45)	-	489 (7830)	0.12 (500)
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

7.0 Concrete Construction

Detail 7.1.1 ..... **A.7.1**

Exterior Insulated Concrete Drained EIFS Wall Assembly – Clear Wall

Detail 7.1.3 ..... **A.7.2**

Exterior Insulated Concrete Block Wall with Thermally Broken ISO Clip System with Horizontal Sub-Girt Supporting Cladding – Clear Wall

Detail 7.1.4 ..... **A.7.3**

Exterior Insulated Concrete Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall

Detail 7.1.5 ..... **A.7.4**

Exterior Insulated Concrete Block Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall

Detail 7.1.6 ..... **A.7.5**

Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Zinc 2-Seal Anchor Supporting Brick Veneer – Clear Wall

Detail 7.1.7 ..... **A.7.6**

Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Stainless Steel 2-Seal Thermal Wing Nut Anchor Supporting Brick Veneer – Clear Wall

Detail 7.1.8 ..... **A.7.7**

Precast Sandwich Panel Wall Assembly with Concrete Panel Joints – Clear Wall

Detail 7.1.9 ..... **A.7.8**

Precast Sandwich Panel Wall Assembly with Tigerloc Thermally Broken Panel Joints – Clear Wall

Detail 7.1.10 ..... **A.7.9**

Precast Concrete Sandwich Panel Wall Assembly with FRP Connectors – Clear Wall

Detail 7.1.11 ..... **A.7.10**

Exterior Insulated Concrete Block Wall with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall

Detail 7.1.12 ..... **A.7.11**

Exterior Insulated Concrete Block Wall with Vertical Clips Supporting Cladding – Clear Wall

Detail 7.1.13 ..... **A.7.12**

Exterior Insulated Concrete Block Wall Assembly with Brick Ties Supporting Brick Veneer – Clear Wall

Detail 7.1.14 ..... **A.7.13**

Interior Insulated Concrete Mass Wall with 1 5/8” Steel Stud (16” o.c.) Supporting Interior Finish Wall Assembly – Clear Wall

Detail 7.1.15 ..... **A.7.14**

Precast Sandwich Panel Wall Assembly with Steel Connectors and 3 5/8" x 1 5/8" Steel Stud (16" o.c.) – Clear Wall

Detail 7.2.1 ..... **A.7.15**

Exterior Insulated Concrete Drained EIFS Wall Assembly – Intermediate Floor Intersection

Detail 7.2.2 ..... **A.7.16**

Interior Insulated Concrete Mass Wall with 1 5/8″ Steel Stud (16″o.c.) Supporting Interior Finish – Non-Insulated Interior Wall and Non-insulated Intermediate Floor Intersection

Detail 7.2.3 ..... **A.7.17**

Interior Insulated Concrete Mass Wall with 1 5/8″ Steel Stud (16″ o.c.) Supporting Interior Finish – Insulated Interior Wall and Non-insulated Intermediate Floor Intersection

Detail 7.2.4 ..... **A.7.18**

Interior Insulated Concrete Mass Wall with 3 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Interior Insulated Wall and Non-Insulated Partition Wall Intersection

Detail 7.2.5 ..... **A.7.19**

Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Continuous Concrete Intermediate Floor Intersection

Detail 7.2.6 ..... **A.7.20**

Precast Wall Assembly with 3 5/8" x 1 5/8" Steel Stud (16" o.c.) and Insulation in Stud Cavity – Intermediate Floor Intersection

Detail 7.2.7 ..... **A.7.21**

Precast Wall Assembly with 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) and Rigid Insulation Outboard of Studs – Intermediate Floor Intersection

Detail 7.2.8 ..... **A.7.22**

Precast Sandwich Panel Wall Assembly with 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) – Intermediate Floor Intersection

Detail 7.2.9 ..... **A.7.23**

Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors at 24" o.c. – Intermediate Floor Intersection

Detail 7.2.10 ..... **A.7.24**

Precast Sandwich Panel Wall Assembly with Steel Connectors at 16" o.c. – Intermediate Floor Intersection

Detail 7.2.11 ..... **A.7.25**

Precast Sandwich Panel Wall Assembly with Steel Connectors at 36" o.c. – Intermediate Floor Intersection

Detail 7.2.12 ..... **A.7.26**

Precast Sandwich Panel Wall Assembly with Steel Connectors at 48” o.c. – Intermediate Floor Intersection

Detail 7.2.13 ..... **A.7.27**

Precast Sandwich Panel Wall Assembly with Fiber-Reinforced Composite Connections at 16” o.c. – Intermediate Floor Intersection

Detail 7.2.14 ..... **A.7.28**

Exterior Insulated Concrete Block Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection

Detail 7.2.15 ..... **A.7.29**

Exterior Insulated Concrete Block Wall Assembly with Stand-Off Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection

Detail 7.2.16 ..... **A.7.30**

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony

Detail 7.2.17 ..... **A.7.31**

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Angle Supported Slab & Intermediate Floor Intersection

Detail 7.2.18 ..... **A.7.32**

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony

Detail 7.2.19 ..... **A.7.33**

Exterior Insulated Concrete Block Wall Assembly with Thermally Broken Shelf Angle & Brick Ties Supporting Brick Veneer – Slab Intersection

Detail 7.2.20 ..... **A.7.34**

Interior Insulated Concrete Mass Wall with 1 5/8” x 1 5/8” Steel Studs (16” o.c.) Supporting Interior Finish – Isokorb Rutherma DF Thermally Broken Concrete Intermediate Floor Intersection

Detail 7.2.21 ..... **A.7.35**

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Intermediate Floor Intersection with Inner Wythe Supported by Concrete Floor

Detail 7.2.22 ..... **A.7.36**

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

Detail 7.2.23 ..... **A.7.37**

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

Detail 7.3.1 ..... **A.7.38**

Exterior Insulated Concrete Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection

Detail 7.3.2 ..... **A.7.39**

Interior Insulated Concrete Mass Wall with 1 5/8” x 1 5/8” Steel Studs (16” o.c.) Supporting Interior Finish – Window & Intermediate Floor Intersection

Detail 7.3.3 ..... **A.7.40**

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 with Project Slab

Detail 7.3.4 ..... **A.7.41**

Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors at 24” (o.c.) – Window Intersection

Detail 7.3.5 ..... **A.7.42**

Precast Sandwich Panel Wall Assembly with 3 5/8″ Steel Stud (16″ o.c.) – Window Intersection

Detail 7.3.6 ..... **A.7.43**

Exterior Insulated Concrete Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection

Detail 7.3.7 ..... **A.7.44**

Interior Insulated Concrete Block or Concrete Wall Assembly with Brick Cladding – Window Intersection

Detail referenced from work done by Passive House Academy

Detail 7.3.8 ..... **A.7.45**

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

Detail 7.3.9 ..... **A.7.46**

Interior Insulated Concrete Mass Wall with 1 5/8” x 1 5/8” Steel Studs (16” o.c.) Supporting Interior Finish – Window & Projected Slab Intersection with Plywood and Insulation Liner

Detail 7.3.10 ..... **A.7.47**

Interior Insulated Concrete Mass Wall with 1 5/8” x 1 5/8” Steel Studs (16” o.c.) Supporting Interior Finish – Window & Projected Slab Intersection with Wall Insulation Wrapped into Opening

Detail 7.3.11 ..... **A.7.48**

Interior Insulated Concrete Mass Wall with 1 5/8” x 1 5/8” Steel Studs (16” o.c.) Supporting Interior Finish – Window & Projected Slab Intersection – Plywood Liner and Glazing Aligned with Wall Insulation

Detail 7.3.12 ..... **A.7.49**

Exterior Insulated Concrete Mass Wall with 1 5/8” x 1 5/8” Steel Stud (16” o.c.) and Thermally Isolated Vertical Brackets and Rail System (24” o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Window & Intermediate Floor Intersection with Window Thermal Break Positioned in Concrete Opening

Detail 7.3.13 ..... **A.7.50**

Exterior Insulated Concrete Mass Wall with 1 5/8” x 1 5/8” Steel Stud (16” o.c.) and Thermally Isolated Vertical Brackets and Rail System (24” o.c.) Supporting Metal Cladding – Triple Glazed Aluminum Curtain Wall & Intermediate Floor Intersection with Window Thermal Break Positioned in the Exterior Insulation

Detail 7.3.14 ..... **A.7.51**

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

Detail 7.3.15 ..... **A.7.52**

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

Detail 7.4.1 ..... **A.7.53**

Exterior Insulated Concrete Drained EIFS Wall Assembly – Conventional Curtain Wall Transition

Detail 7.4.2 ..... **A.7.54**

Precast Sandwich Panel Wall Assembly with 3 5/8″ Steel Stud (16″ o.c.) – Curtain Wall Spandrel Transition

Detail 7.4.3 ..... **A.7.55**

Interior Insulated Concrete Mass Wall – Conventional Curtain Wall Transition

Detail 7.4.4 ..... **A.7.56**

Interior Insulated Concrete Mass Wall – Thermally Broken Curtain Wall Transition

Detail 7.4.5 ..... **A.7.57**

Precast Sandwich Panel Wall Assembly – Tigerloc Thermally Broken Curtain Wall Transition

Detail 7.4.6 ..... **A.7.58**

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – High Performance Aluminum Window Sill Detail

Detail 7.4.7 ..... **A.7.59**

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – High Performance Aluminum Window Head Detail

Detail 7.5.1 ..... **A.7.60**

Exterior Insulated Concrete Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection

Detail 7.5.2 ..... **A.7.61**

Exterior Insulated Concrete Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection

Detail 7.5.3 ..... **A.7.62**

Interior Insulated Concrete Mass Wall with 1 5/8″ Steel Stud (16″ o.c.) Supporting Interior Finish – Concrete Parapet & Roof Intersection

Detail 7.5.4 ..... **A.7.63**

Precast Sandwich Panel Wall Assembly with 3 5/8″ Steel Stud (16″ o.c.) – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

Detail 7.5.5 ..... **A.7.64**

Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection

Detail 7.5.6 ..... **A.7.65**

Precast Wall Assembly with 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) and Rigid Insulation Outboard of Studs – Parapet & Roof Intersection

Detail 7.5.7 ..... **A.7.66**

Precast Wall Assembly with 3 5/8″ x 1 5/8″ Steel Stud (16″ o.c.) and Rigid Insulation Outboard of Studs – Parapet & Roof Intersection with Thermal Break under Parapet Stud Cavity and At Anchors

Detail 7.5.8 ..... **A.7.67**

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Parapet & Roof Intersection

Detail 7.5.9 ..... **A.7.68**

Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Paraloc Thermally Broken Parapet Intersection

Detail 7.5.10 ..... **A.7.69**

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Roof to Wall Intersection with Wood-Framed Parapet

Detail 7.5.11 ..... **A.7.70**

Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer – Parapet & Roof Intersection with Uninsulated Parapet

Detail 7.5.12 ..... **A.7.71**

Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer – Parapet & Roof Intersection with Insulation Wrapped Around Parapet

Detail 7.6.1 ..... **A.7.72**

Exterior Insulated Concrete Drained EIFS Wall Assembly – Corner Intersection

Detail 7.6.2 ..... **A.7.73**

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Outside Corner

Detail 7.7.1 ..... **A.7.74**

Interior Insulated Concrete Mass Wall with 3 5/8” x 1 5/8” Steel Studs (16” o.c.) Supporting Interior Finish – Intermediate Floor Intersection above Parking Garage

Detail 7.7.2 ..... **A.7.75**

Insulated Concrete Floor Slab – Concrete Column Intersection

Detail 7.7.3 ..... **A.7.76**

Precast Sandwich Wall Assembly Slab and Foundation Intersection

Detail 7.7.4 ..... **A.7.77**

Precast Sandwich Panel with 3 5/8” Steel Stud (16” o.c.) – Concrete Slab and Foundation Wall

Detail 7.7.5 ..... **A.7.78**

Precast Sandwich Panel with 3 5/8” Steel Stud (16” o.c.) – Thermally Broken Concrete Slab and Foundation Intersection

Detail 7.7.6 ..... **A.7.79**

Insulated Slab on Grade – Steel Column

Detail 7.7.7 ..... **A.7.80**

Insulated Slab on Grade – Armatherm 500 Thermal Break under Column

Detail 7.7.8 ..... **A.7.81**

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Base of Wall at Foundation with Insulation Skirt

Detail 7.7.9 ..... **A.7.82**

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 ..... **A.7.83**

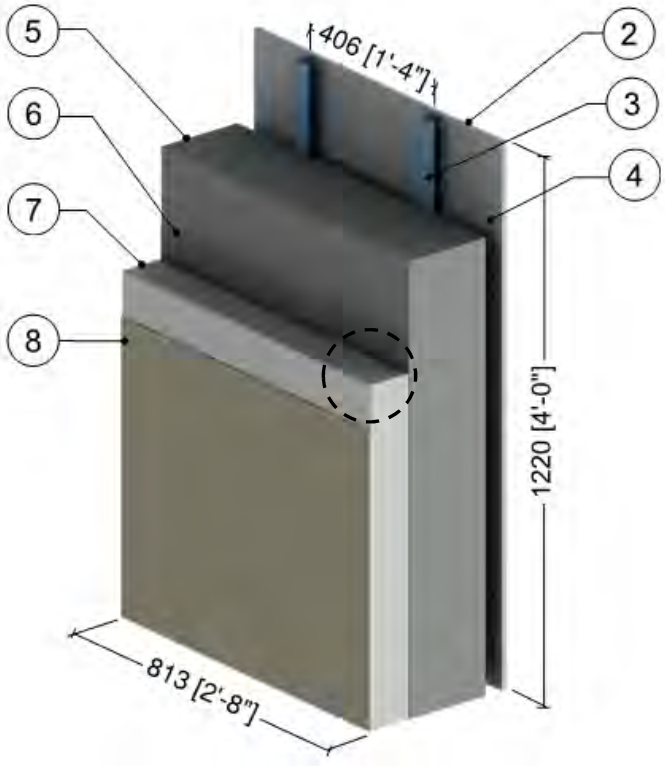
Owens Corning Exterior Insulated Concrete Block Wall Assembly with Stainless Steel Stand-off Shelf Angle and Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer and Insulation Below Floor – Slab on Grade and Foundation Intersection

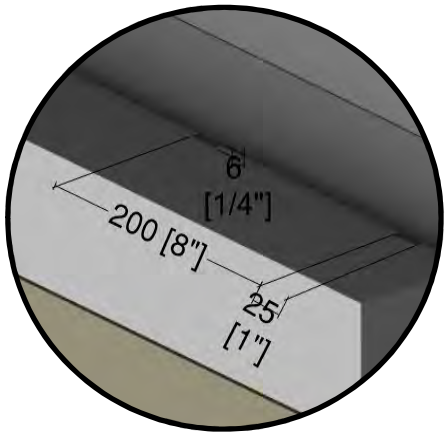
Detail 7.8.1 ..... **A.7.84**

Precast Sandwich Panel Wall Assembly – Emloc Thermally Broken Embedment Detail

Detail 7.1.1

Exterior Insulated Concrete Drained EIFS Wall Assembly – Clear Wall





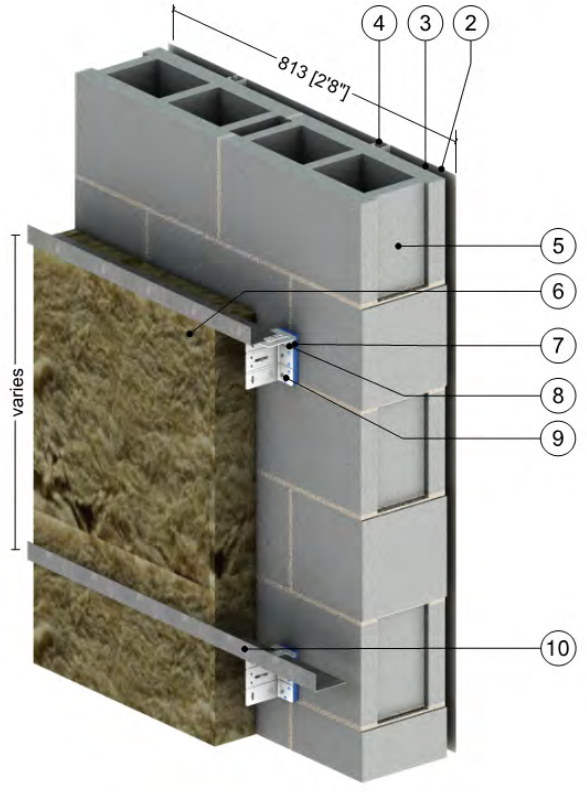
1" (25 mm)
Drained EIFS
Detail

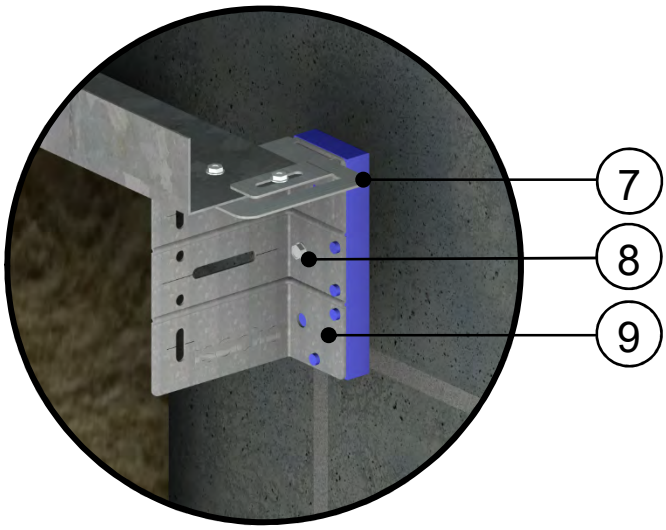
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 (0.11 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16" o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Weather Resistive Barrier with Adhesive	-	-	-	-	-
7	Insulation Board	4" (100)	0.27 (0.039)	R-15 (2.64 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

Detail 7.1.3

Exterior Insulated Concrete Block Wall with Thermally Broken ISO Clip System with Horizontal Sub-Girt Supporting Cladding – Clear Wall





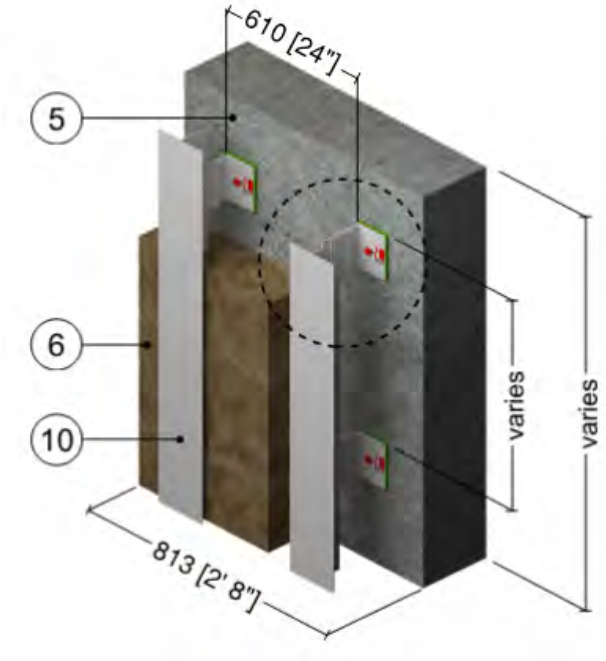
ISO Clip Detail

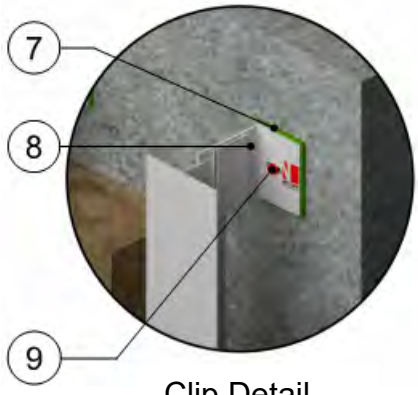
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Standard Concrete Blocks	8" (203)	10.3 (1.5)	-	119 (1900)	0.19 (800)
6	Exterior Mineral Wool Insulation	4" to 6" (102 to 152)	0.24 (0.034)	R-16.8 to R-25.2 (2.96 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	ISO Clip - HDPE Isolator	1/2" (12.7)	3.1 (0.45)	-	-	-
8	#14 Steel Fasteners	1/4" (6) ø	347 (50)	-	489 (7830)	0.12 (500)
9	ISO Clip - Galvanized Metal	14 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Horizontal Sub-girt	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 7.1.4

Exterior Insulated Concrete Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall





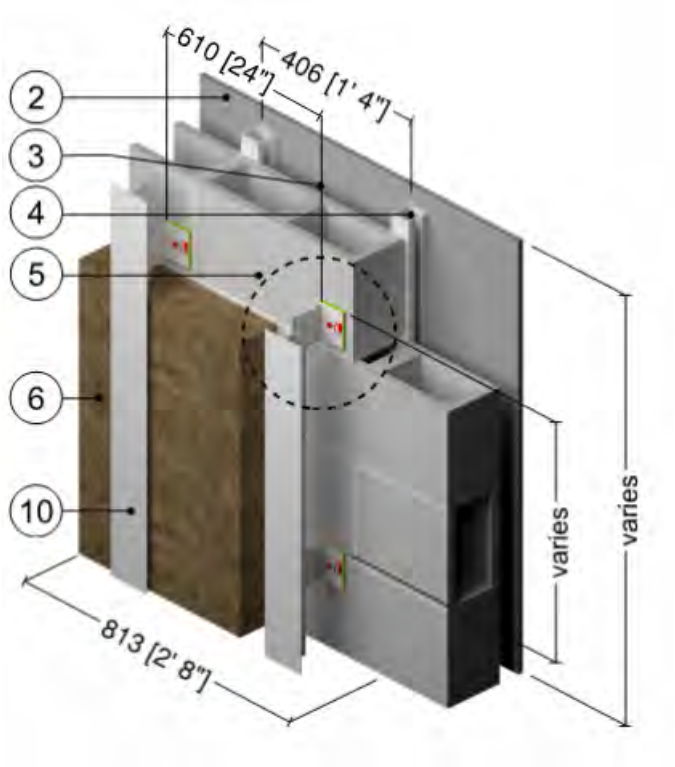
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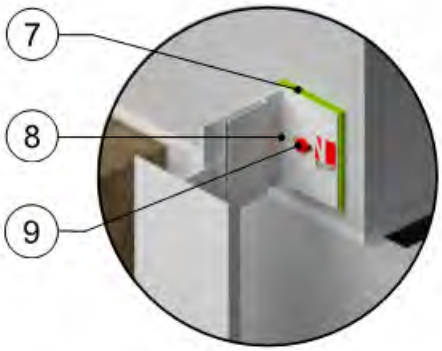
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Exterior Mineral Wool Insulation	2" to 6" (50 to 152)	0.24 (0.034)	R-8.4 to R-25.2 (1.48 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	NV1 Clip Isolator	0.2" (5)	0.82 (0.117)	-	87 (1400)	0.20 (840)
8	NV1 Clip Extrusion – Aluminum 6005A alloy	Varies	1340 (193)	-	171 (2739)	0.21 (900)
9	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	503 (8060)	0.12 (500)
10	Vertical Sub-girt	0.09" (2.2)	1340 (193)	-	171 (2739)	0.21 (900)
11	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 7.1.5

Exterior Insulated Concrete Block Wall Assembly with Nvelope – NV1 Clip System Supporting Cladding – Clear Wall





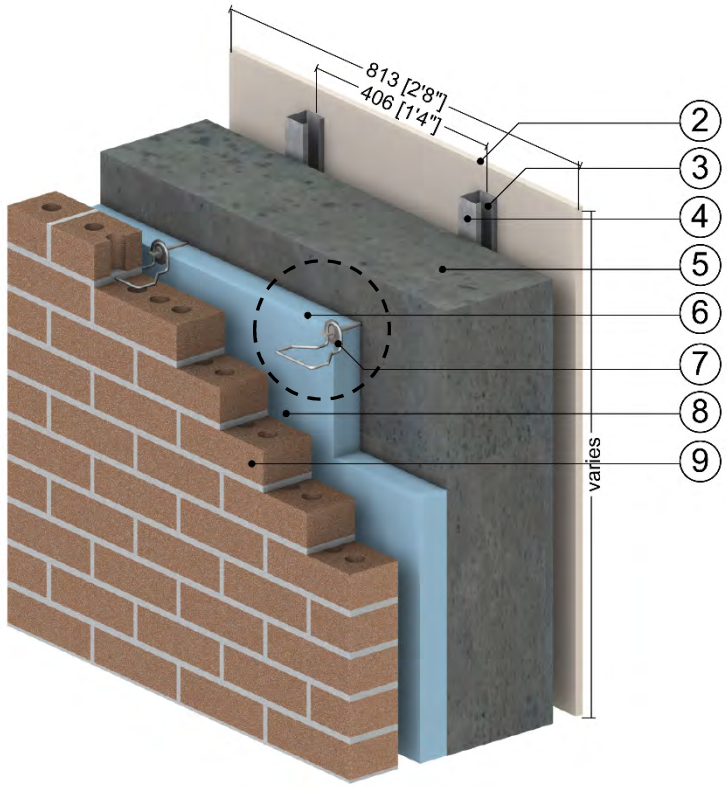
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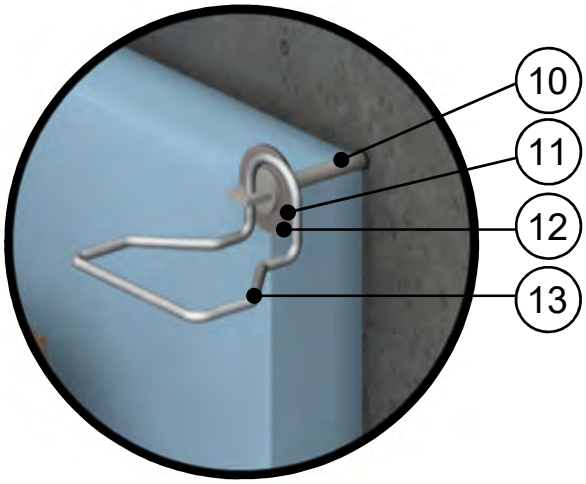
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Standard Concrete Block	7-5/8" (190)	10.3 (1.5)	-	119 (1900)	0.19 (800)
6	Exterior Mineral Wool Insulation	2" to 6" (50 to 152)	0.24 (0.034)	R-8.4 to R-25.2 (1.48 RSI to 4.44 RSI)	4 (64)	0.20 (850)
7	NV1 Clip Isolator	0.2" (5)	0.82 (0.117)	-	87 (1400)	0.20 (840)
8	NV1 Clip Extrusion – Aluminum 6005A alloy	Varies	1340 (193)	-	171 (2739)	0.21 (900)
9	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	503 (8060)	0.12 (500)
10	Vertical Sub-girt	0.09" (2.2)	1340 (193)	-	171 (2739)	0.21 (900)
11	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 7.1.6

Exterior Insulated Concrete Mass Wall Assembly with Hohmann & Barnard Masonry Zinc 2-Seal Anchor Supporting Brick Veneer – Clear Wall





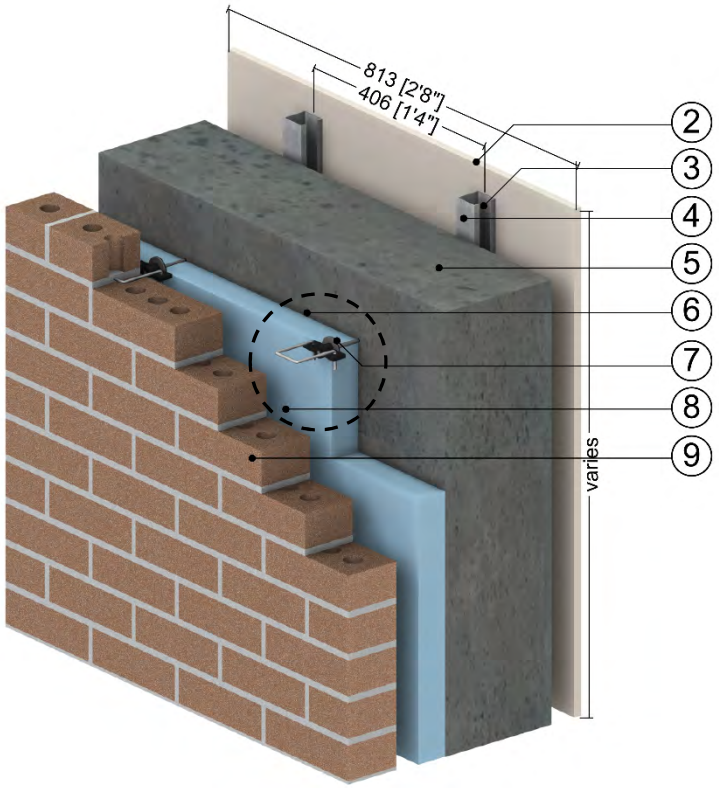
Anchor Detail

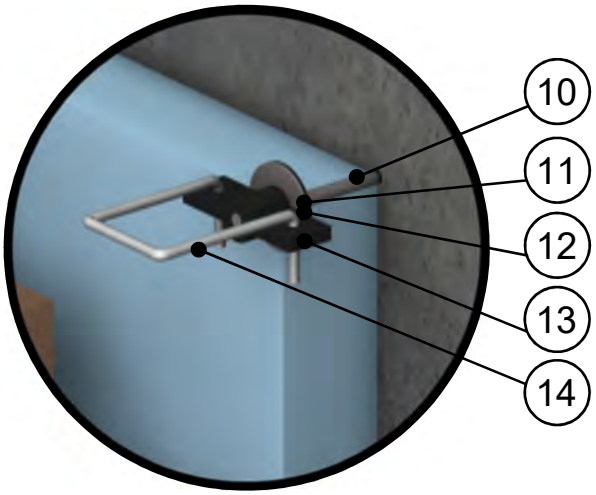
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Mass Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Exterior Mineral Wool Insulation	1" to 4" (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 RSI to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1" to 4" (25 to 102)	784 (113)	-	445 (7130)	0.09 (390)
8	Vented Air Cavity	1.5" (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Zinc Barrel	-	784 (113)	-	-	-
11	Steel Washer	1.5" (38) ∅	347 (50)	-	489 (7830)	0.12 (500)
12	Rubber Washer (EPDM)	-	1.7 (0.25)	-	-	-
13	Galvanized Steel Wire Pintle	3/16" (5) ∅	430 (62)	-	489 (7830)	0.12 (500)
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

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





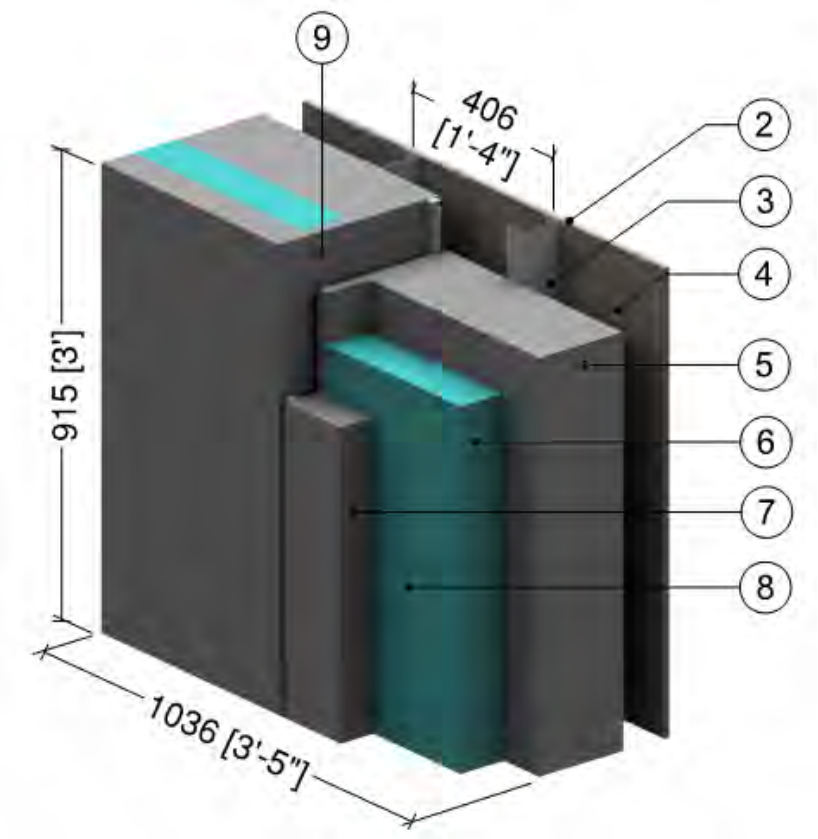
Anchor Detail

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 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	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Mass Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Exterior Mineral Wool Insulation	1" to 4" (25 to 102)	0.24 (0.034)	R-4.2 to R-16.8 (0.74 RSI to 2.96 RSI)	4 (64)	0.20 (850)
7	Brick Tie	1" to 4" (25 to 102)	784 (113)	-	445 (7130)	0.09 (390)
8	Vented Air Cavity	1.5" (38)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
9	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Stainless Steel Barrel	-	118 (17)	-	503 (8060)	0.12 (500)
11	Steel Washer	1.5" (38) ∅	347 (50)	-	489 (7830)	0.12 (500)
12	Rubber Washer (EPDM)	-	1.7 (0.25)	-	-	-
13	Steel Wing Nut with Plastic Coating	Varies	347 (50)	-	489 (7830)	0.12 (500)
14	Galvanized Steel Wire Pintle	3/16" (5) ∅	430 (62)	-	489 (7830)	0.12 (500)
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

Detail 7.1.8

Precast Sandwich Panel Wall Assembly with Concrete Panel Joints – Clear Wall

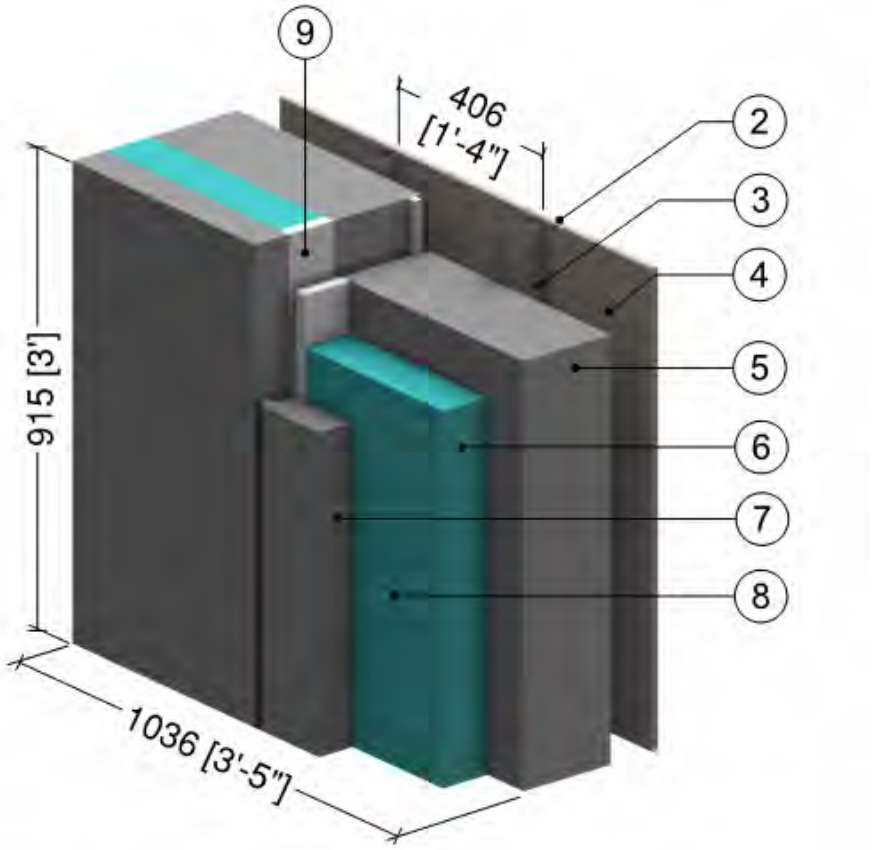


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 1/8" (130)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	7 3/4" (197)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	2" to 4" (51 to 102)	-	R-10 to R-20 (1.8 to 3.5 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Precast Sandwich Panel, Structural Ties @ 24" (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Concrete Panel Joint	1" (25)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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

Detail 7.1.9

Precast Sandwich Panel Wall Assembly with Tigerloc Thermally Broken Panel Joints – Clear Wall

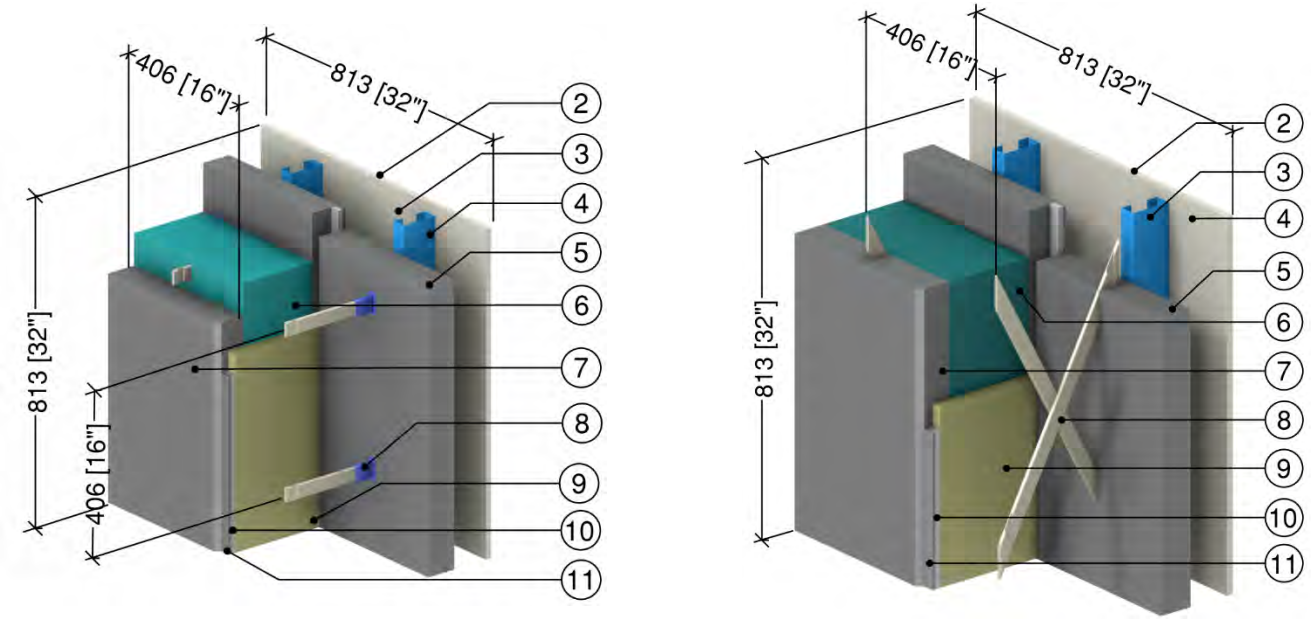


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 1/8" (130)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	7 3/4" (197)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	2" to 4" (51 to 102)	-	R-10 to R-20 (1.8 to 3.5 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Precast Sandwich Panel, Structural Ties @ 24" (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Tigerloc, PVC Foam	1" (25)	0.42 (0.06)	-	-	-
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

Detail 7.1.10

Precast Concrete Sandwich Panel Wall Assembly with FRP Connectors – Clear Wall

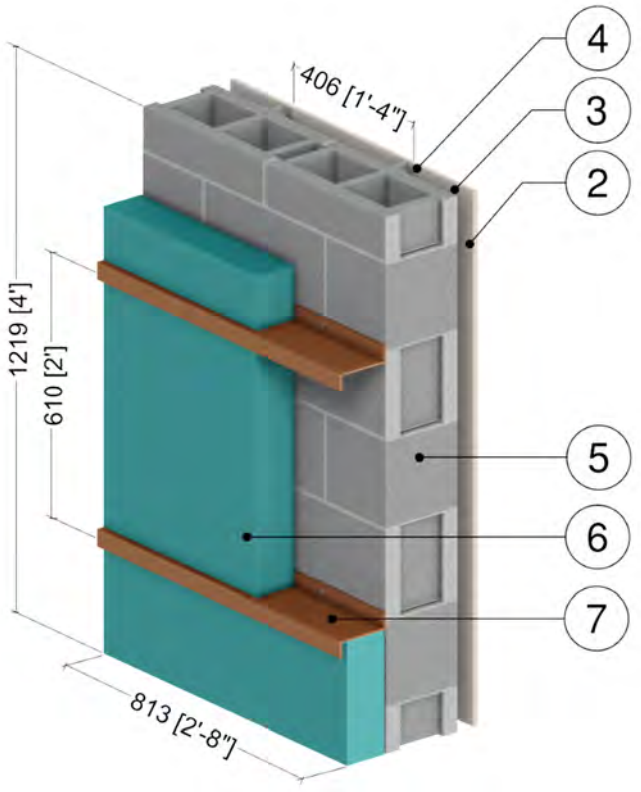


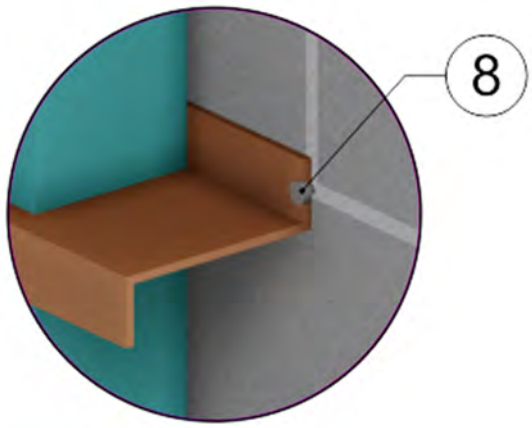
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (15)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	8" (203)	-	R-40 (7.04 RSI) to R-56 (9.86 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Precast Sandwich Panel, FRP Connectors	-	6.93 (1)	-	-	-
9	Mineral Wool Insulation	-	0.238 (0.034)	-	4 (64)	0.20 (850)
10	Backer Rod	-	0.25 (0.036)	-	-	-
11	Sealant	-	1.73 (0.25)	-	-	-
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

Detail 7.1.11

Exterior Insulated Concrete Block Wall with Armadillo FRR Horizontal Z-Girts Supporting Cladding – Clear Wall





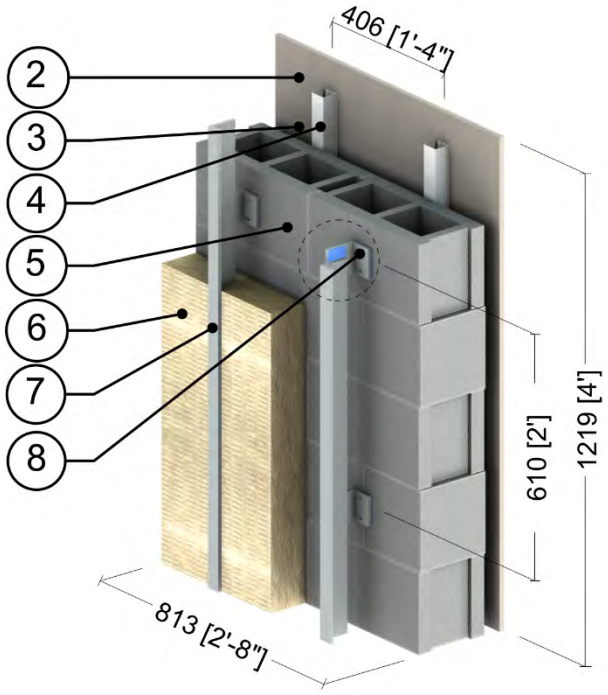
FRR Girt Detail

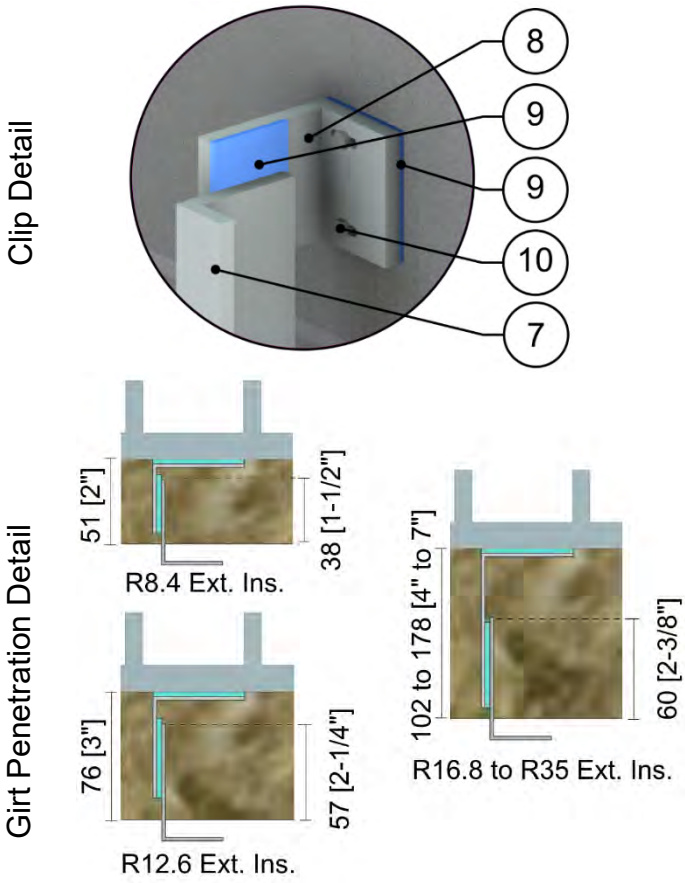
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Standard Concrete Blocks	8" (203)	10.3 (1.5)	-	119 (1900)	0.19 (800)
6	Exterior Insulation	Varies	-	R-10.0 to R-25.0 (1.76 RSI to 4.40 RSI)	4 (64)	0.20 (850)
7	Armadillo FRR Girt	-	1.4 (0.2)	-	85 (5.3)	-
8	#12 Steel Fasteners (16" o.c.)	7/32" (5.5) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 7.1.12

Exterior Insulated Concrete Block Wall with Vertical Clips Supporting Cladding – Clear Wall



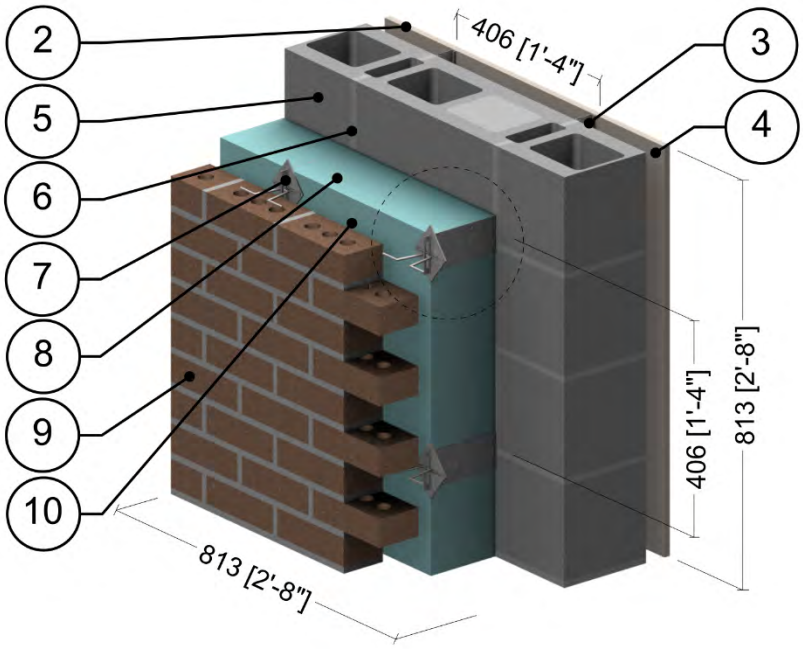


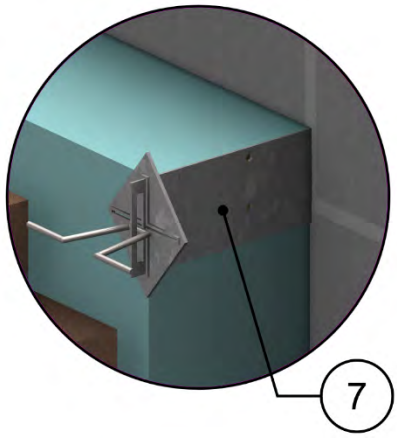
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Standard Concrete Blocks	8" (203)	10.3 (1.5)	-	119 (1900)	0.19 (800)
6	Exterior Mineral Wool Insulation	varies	0.24 (0.034)	R-4.2 to R-29.4 (0.74 to 5.18 RSI)	4 (64)	0.20 (850)
7	Vertical Aluminum L-girt	0.09" (2.2)	1339 (193)	-	169 (2700)	0.22 (900)
8	Aluminum Clip	0.09" (2.2)	1110 (160)	-	171 (2739)	0.21 (900)
9	HDPE Isolator	1/8" (3)	3.5 (0.5)	-	59 (950)	0.48 (2000)
10	#14 Stainless Steel Fasteners	1/4" (6) Ø	118 (17)	-	500 (8000)	0.12 (500)
11	Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 7.1.13

Exterior Insulated Concrete Block Wall Assembly with Brick Ties Supporting Brick Veneer – Clear Wall





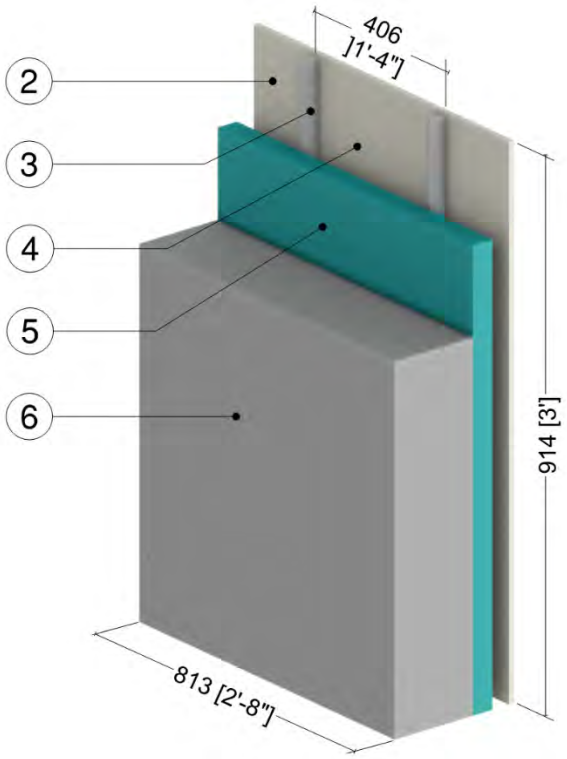
Clip Detail

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 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" Steel Studs with Metal Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Masonry Ties @ 16" (406) o.c.	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Exterior Insulation	Varies	-	R-5 to R-35 (0.88 RSI to 6.2 RSI)	1.8 (28)	0.29 (1220)
9	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

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

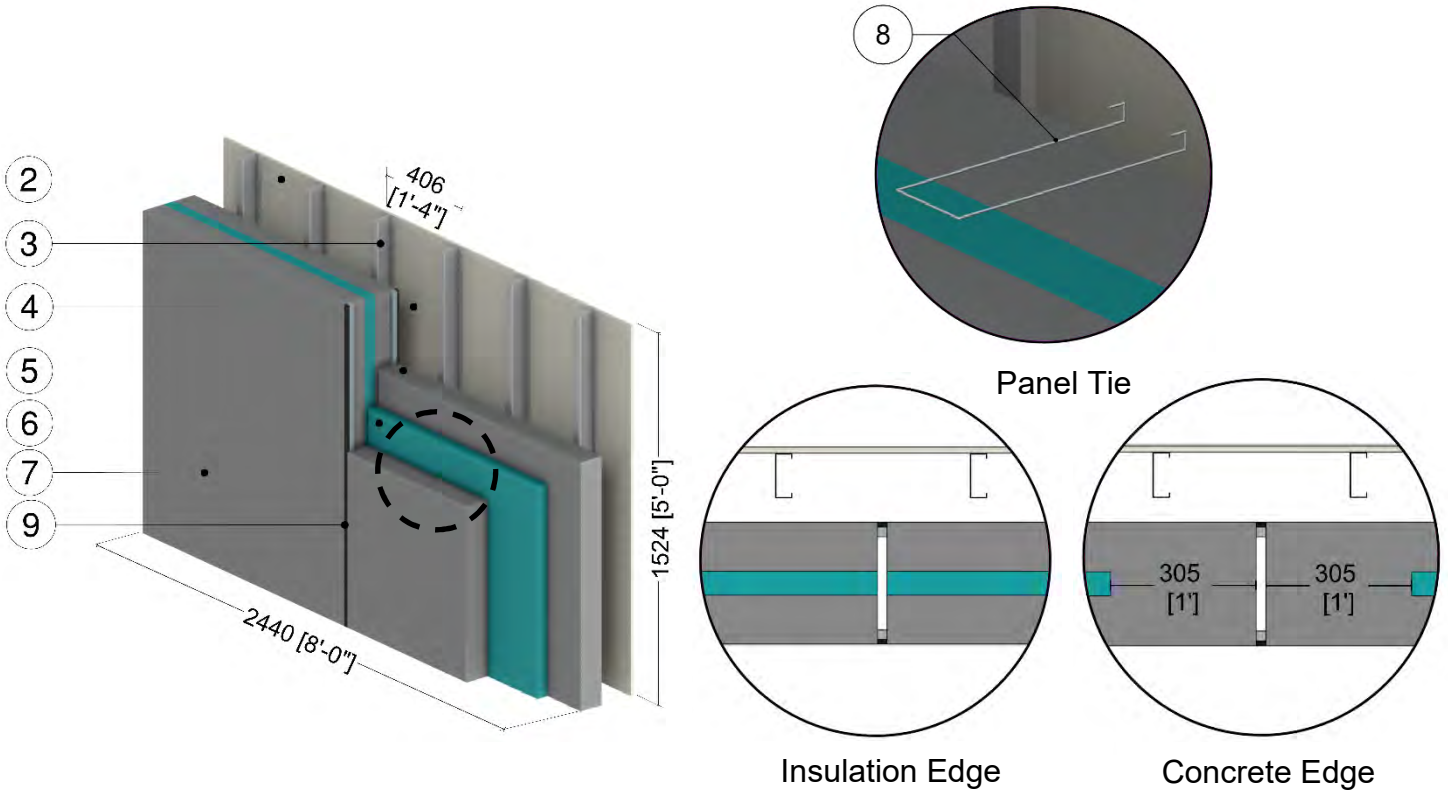


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8” (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Interior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
6	Exterior Concrete Mass Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	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

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

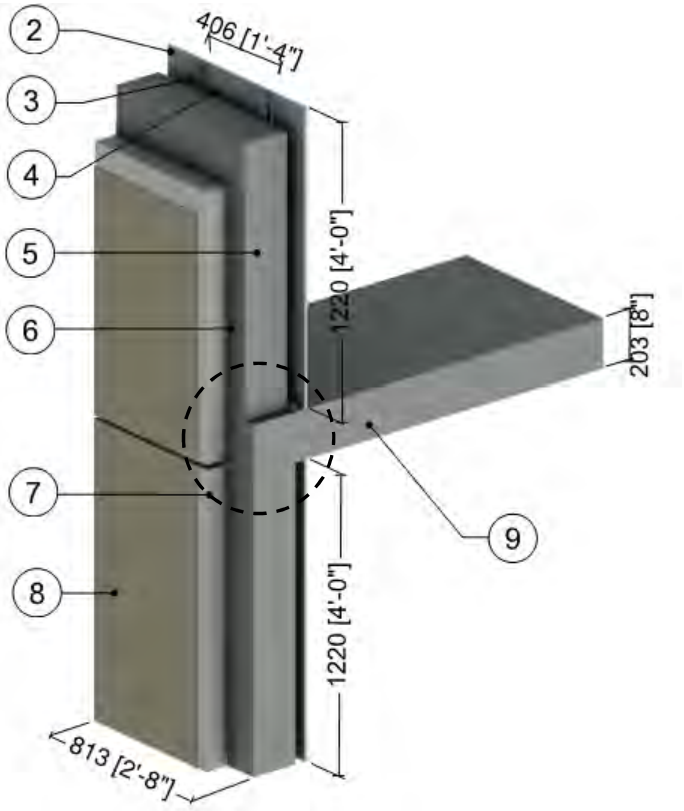


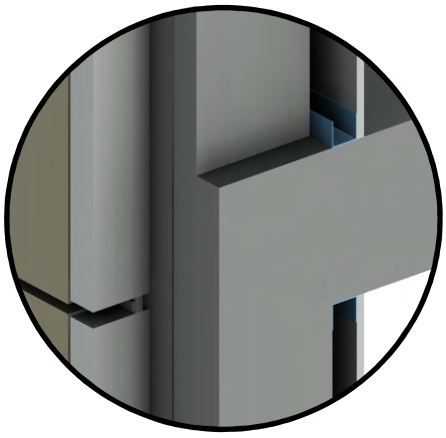
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	5 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete	4" (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Precast Sandwich Panel, Steel Connectors at various spacing	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Sealant	-	2.4 (3.5)	-	174 (2800)	0.17 (700)
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

Detail 7.2.1

Exterior Insulated Concrete Drained EIFS Wall Assembly – Intermediate Floor Intersection





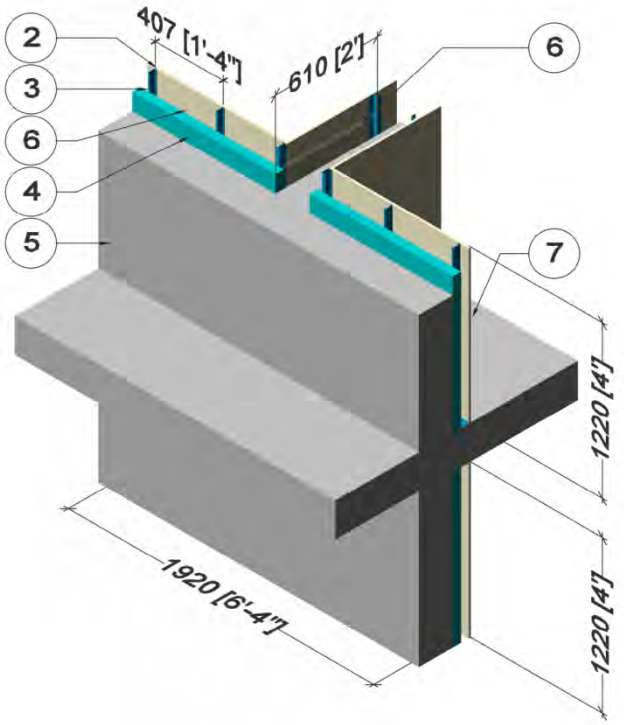
1" (25 mm)
Drained EIFS
at Slab Detail

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-0.6 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 Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete Wall	8" (203)	12 (1.8)	-	140 (2250)	0.20 (850)
6	Weather Resistive Barrier with Adhesive	-	-	-	-	-
7	Insulation Board	4" (100)	0.27 (0.039)	R-15 (2.64 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	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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

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

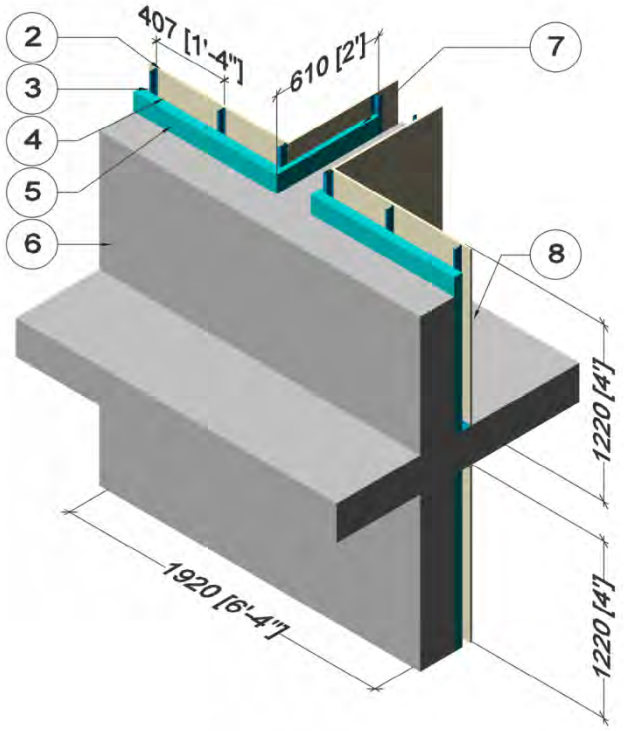


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8” Steel Studs with Metal Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Interior Insulation	2” (51)	0.2 (0.03)	R-11 (1.9 RSI)	1.8 (28)	0.29 (1220)
5	Exterior Concrete Mass Wall	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Air in Stud Cavity and Interior Partition	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
7	Concrete Slab, Floor & Balcony	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	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

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

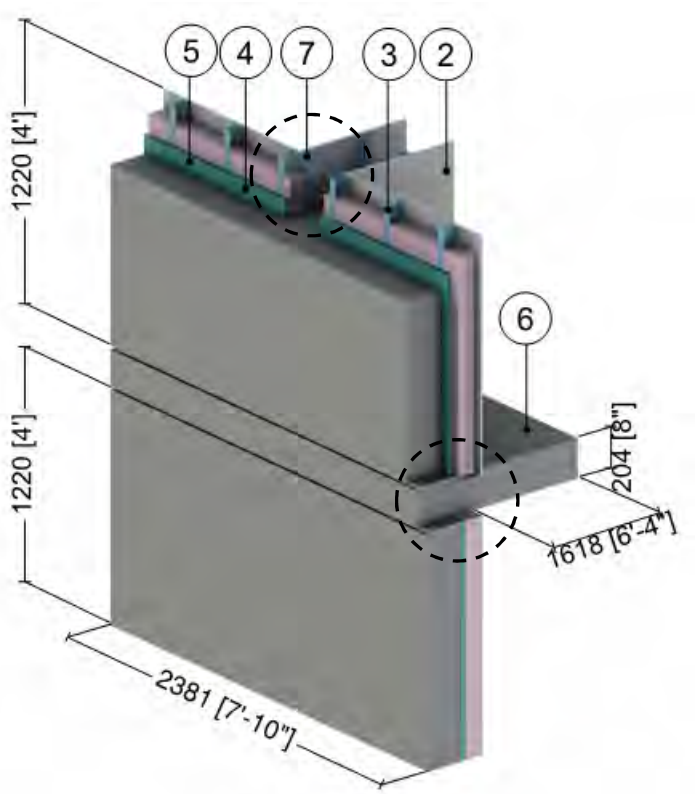


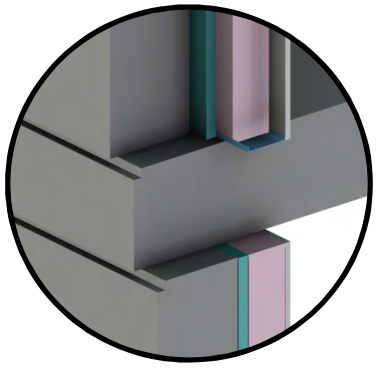
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8” Steel Studs with Top and Bottom Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8” (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Interior Insulation	2” (51)	0.2 (0.03)	R-11 (1.9 RSI)	1.8 (28)	0.29 (1220)
6	Exterior Concrete Mass Wall	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Interior Partition Insulation	1” (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
8	Concrete Slab, Floor & Balcony	8” (203)	12.5 (1.8)	-	140 (2250)	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

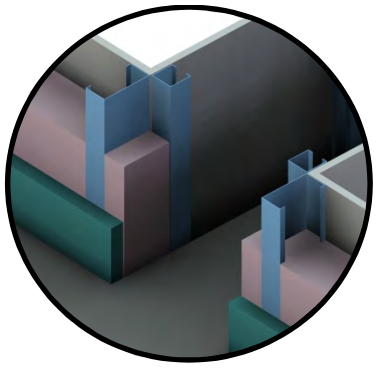
Detail 7.2.4

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





Slab Edge Detail



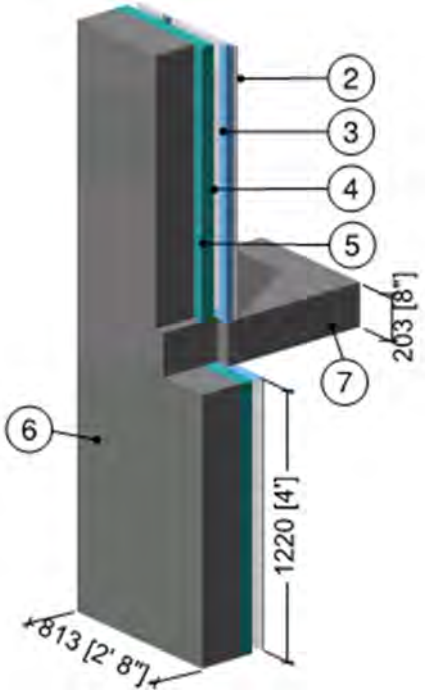
Partition Detail

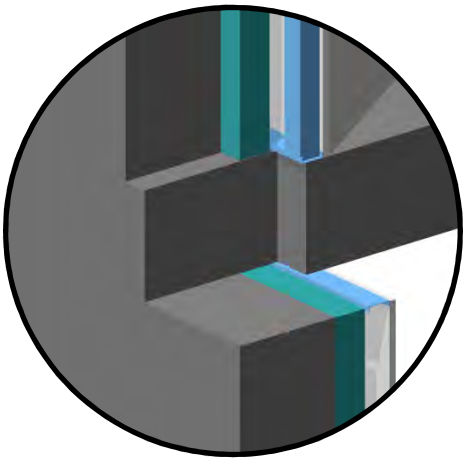
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.29 (0.042)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
5	Continuous Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall/Floor Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	1 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	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

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





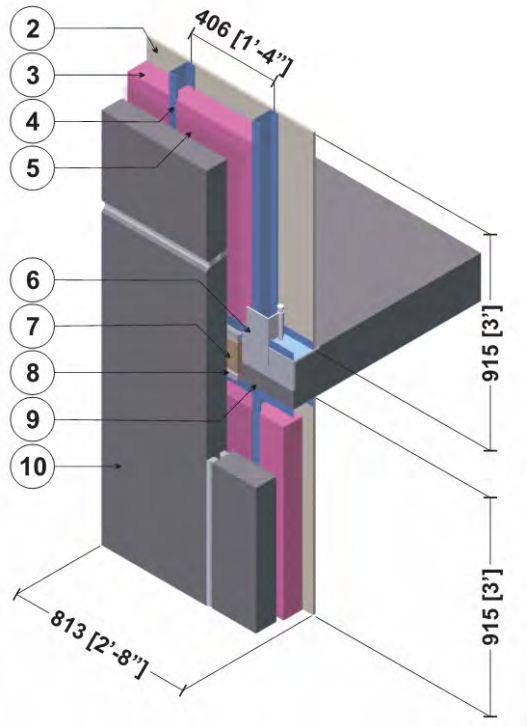
Continuous Concrete Slab Detail

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 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 with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8” (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Continuous Insulation	2 1/2” (64)	0.2 (0.029)	R-12.5 (2.20 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	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

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

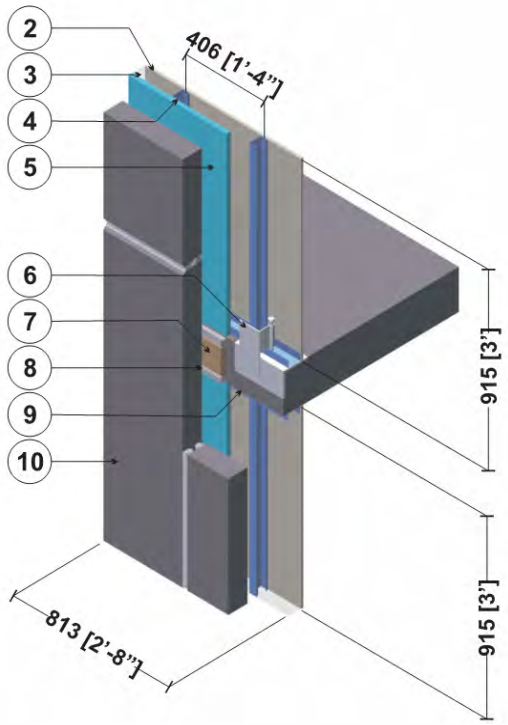


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8” (92)	0.29 (0.042)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Air in Stud Cavity	2” (51)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
7	Semi Rigid Insulation	1” (25)	0.28 (0.04)	R-3.6 (0.64 RSI)	4.5 (72)	0.17 (710)
8	Silicone Sealant	-	2.4 (0.35)	-	-	-
9	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Precast Wall Panel	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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

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

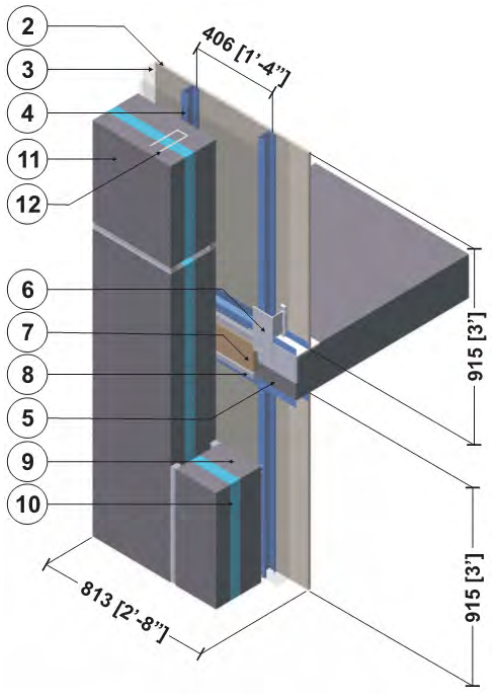


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Rigid Insulation	2” (51)	-	R-10 (1.8 RSI)	1.8 (28)	0.29 (1220)
6	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
7	Semi Rigid Insulation	1” (25)	0.28 (0.04)	R-3.6 (0.64 RSI)	4.5 (72)	0.17 (710)
8	Silicone Sealant	-	2.4 (0.35)	-	-	-
9	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Precast Wall Panel	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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

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

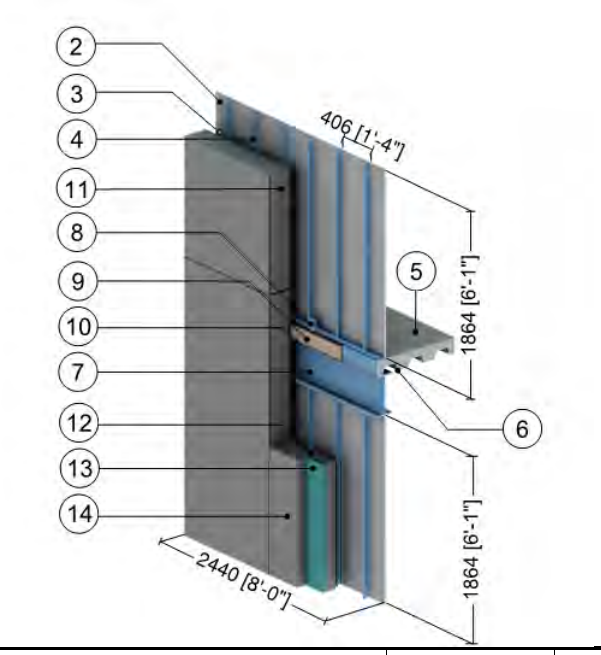


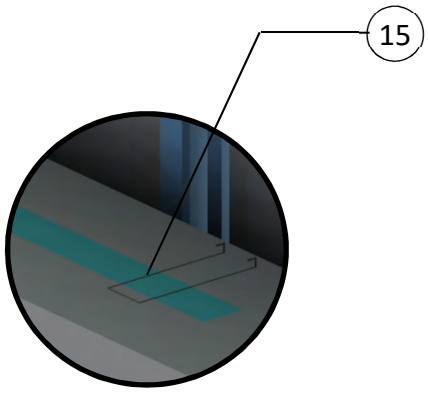
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
7	Semi Rigid Insulation	1” (25)	0.28 (0.04)	R-3.6 (0.64 RSI)	4.5 (72)	0.17 (710)
8	Silicone Sealant	-	2.4 (0.35)	-	-	-
9	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.8 RSI)	1.8 (28)	0.29 (1220)
11	Precast Sandwich Panel, Exterior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Precast Sandwich Panel, Structural Ties @ 24” (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
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

Detail 7.2.9

Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors at 24” o.c. – Intermediate Floor Intersection





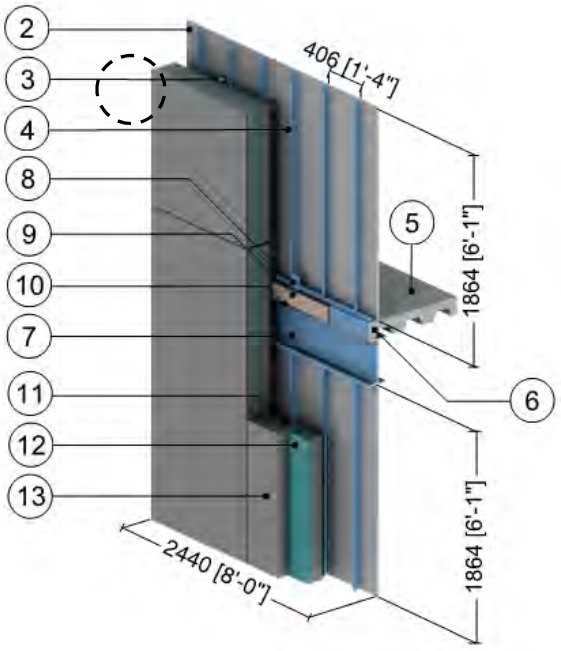
Connector Detail

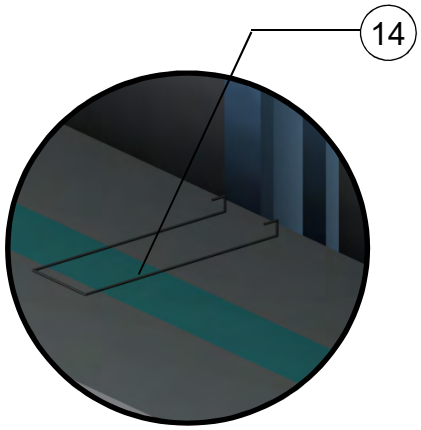
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film (bottom)[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Topping	6” (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
6	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
7	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
8	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
9	Semi Rigid Insulation	1” (25)	0.24 (0.034)	R-4.2 (0.75 RSI)	4 (64)	0.20 (850)
10	Silicone Sealant	-	2.4 (0.35)	-	174 (2800)	0.17 (700)
11	Concrete at Panel Edges	12” (305)	12.5 (1.8)	-	140 (2250)	.20 (850)
12	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
14	Precast Sandwich Panel, Exterior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
15	Precast Sandwich Panel, Steel Connectors @ 24” (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
16	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

Detail 7.2.10

Precast Sandwich Panel Wall Assembly with Steel Connectors at 16” o.c. – Intermediate Floor Intersection





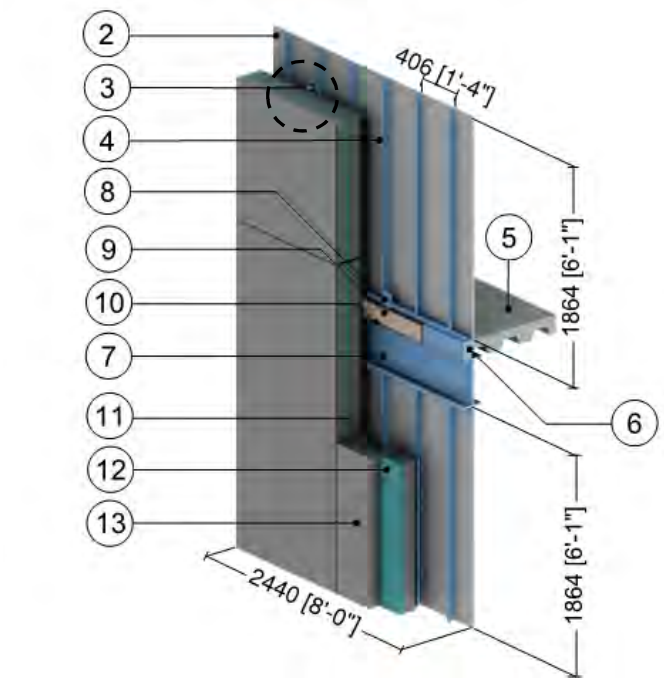
Connector Detail

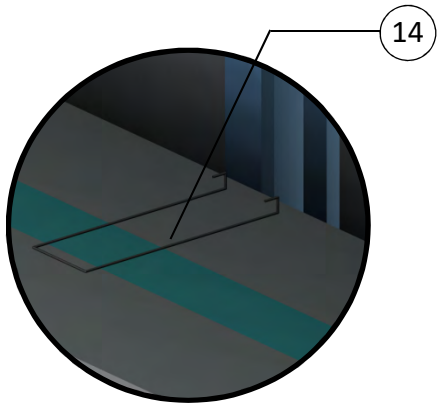
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film (bottom)[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Topping	6” (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
6	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
7	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
8	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
9	Semi Rigid Insulation	1” (25)	0.24 (0.034)	R-4.2 (0.75 RSI)	4 (64)	0.20 (850)
10	Silicone Sealant	-	2.4 (0.35)	-	174 (2800)	0.17 (700)
11	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
13	Precast Sandwich Panel, Exterior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Precast Sandwich Panel, Steel Connectors @ 16” (406) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
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

Detail 7.2.11

Precast Sandwich Panel Wall Assembly with Steel Connectors at 36” o.c. – Intermediate Floor Intersection





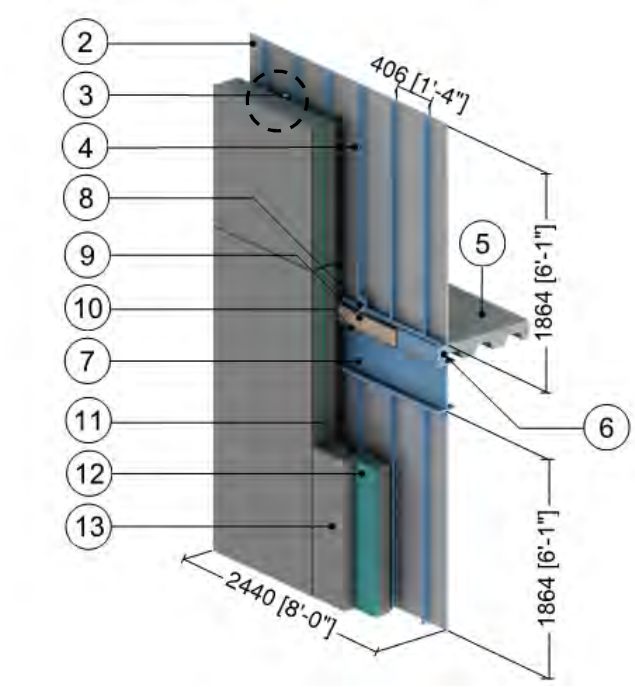
Connector Detail

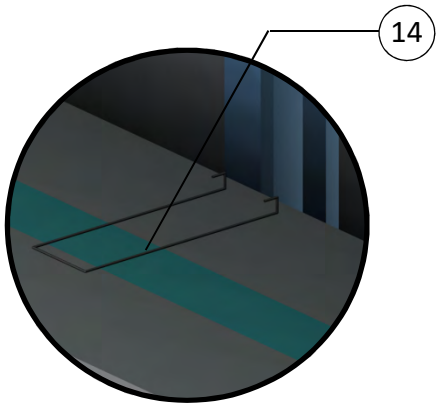
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film (bottom)[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Topping	6” (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
6	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
7	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
8	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
9	Semi Rigid Insulation	1” (25)	0.24 (0.034)	R-4.2 (0.75 RSI)	4 (64)	0.20 (850)
10	Silicone Sealant	-	2.4 (0.35)	-	-	-
11	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
13	Precast Sandwich Panel, Exterior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Precast Sandwich Panel, Steel Connectors @ 36” (914) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
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

Detail 7.2.12

Precast Sandwich Panel Wall Assembly with Steel Connectors at 48” o.c. – Intermediate Floor Intersection





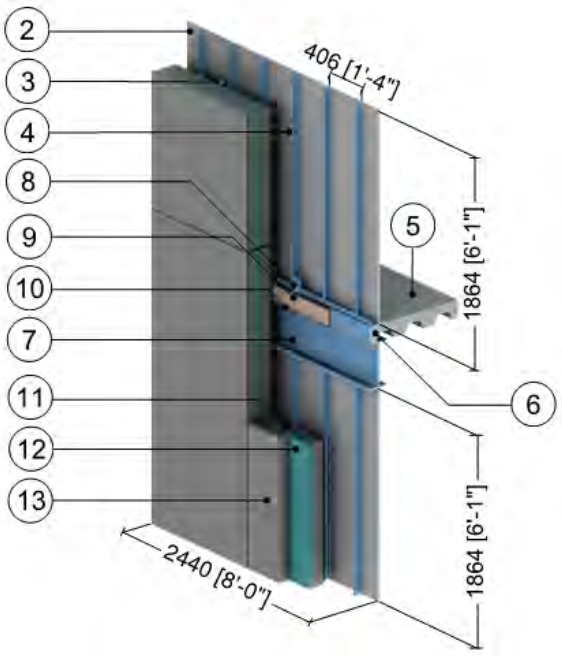
Connector Detail

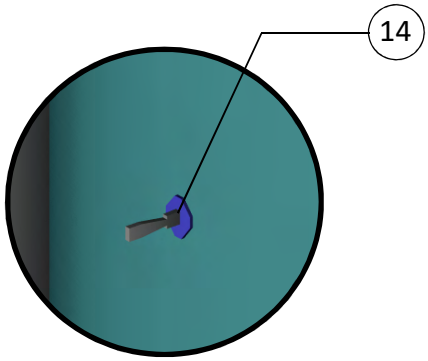
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film (bottom)[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Topping	6” (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
6	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
7	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
8	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
9	Semi Rigid Insulation	1” (25)	0.24 (0.034)	R-4.2 (0.75 RSI)	4 (64)	0.20 (850)
10	Silicone Sealant	-	2.4 (0.35)	-	-	-
11	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
13	Precast Sandwich Panel, Exterior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Precast Sandwich Panel, Steel Connectors @ 48” (1220) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
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

Detail 7.2.13

Precast Sandwich Panel Wall Assembly with Fiber-Reinforced Composite Connections at 16” o.c. – Intermediate Floor Intersection





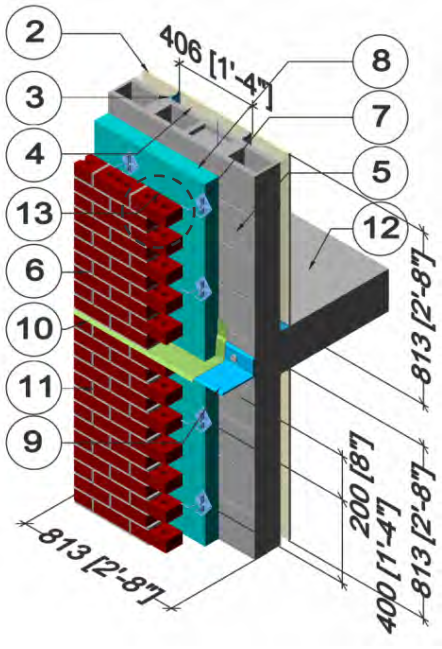
Connector Detail

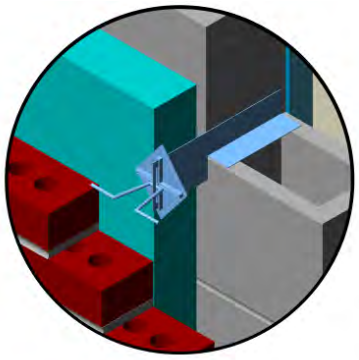
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film (bottom)[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Topping	6” (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
6	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
7	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
8	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
9	Semi Rigid Insulation	1” (25)	0.24 (0.034)	R-4.2 (0.75 RSI)	4 (64)	0.20 (850)
10	Silicone Sealant	-	2.4 (0.35)	-	-	-
11	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
13	Precast Sandwich Panel, Exterior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Precast Sandwich Panel, Fiber-Reinforced Composite Connectors @ 16” (406) o.c.	-	6.9 (1.0)	-	-	-
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

Detail 7.2.14

Exterior Insulated Concrete Block Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection





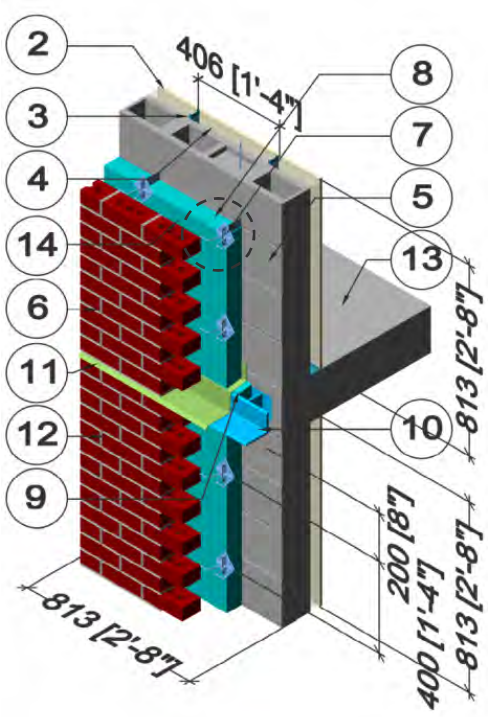
Brick Tie Detail

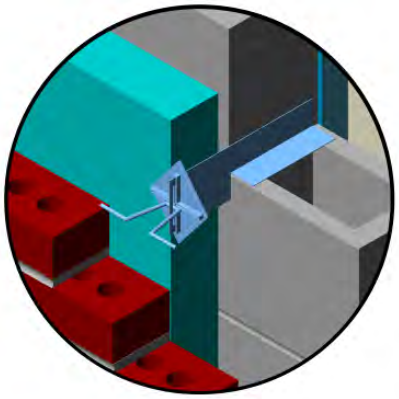
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Metal Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Masonry Ties @ 16" (406) o.c.	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
9	Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Flashing	20 Gauge	347 (50)	-	489 (7830)	0.12 (500)
11	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
12	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

Detail 7.2.15

Exterior Insulated Concrete Block Wall Assembly with Stand-Off Shelf Angle & Brick Ties Supporting Brick Veneer – Intermediate Floor Intersection





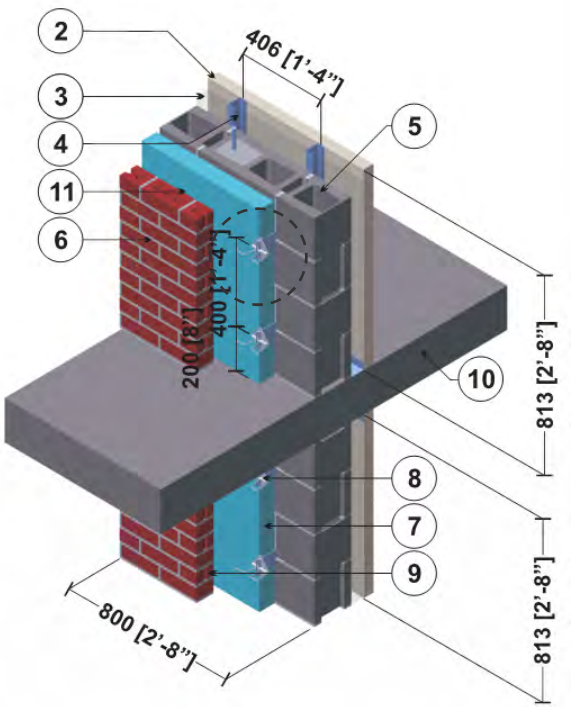
Brick Tie Detail

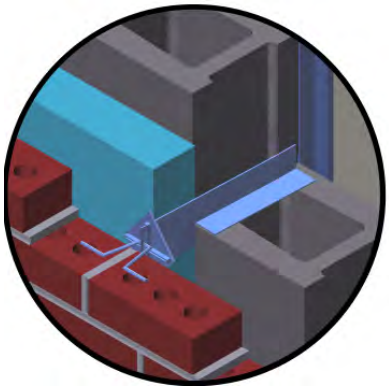
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Metal Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Masonry Ties @ 16" (406) o.c.	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RS) to 4.4 RSI)	1.8 (28)	0.29 (1220)
9	Insulation Behind Shelf Angle	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
10	Stand-Off Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
11	Flashing	20 Gauge	347 (50)	-	489 (7830)	0.12 (500)
12	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
13	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

Detail 7.2.16

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony





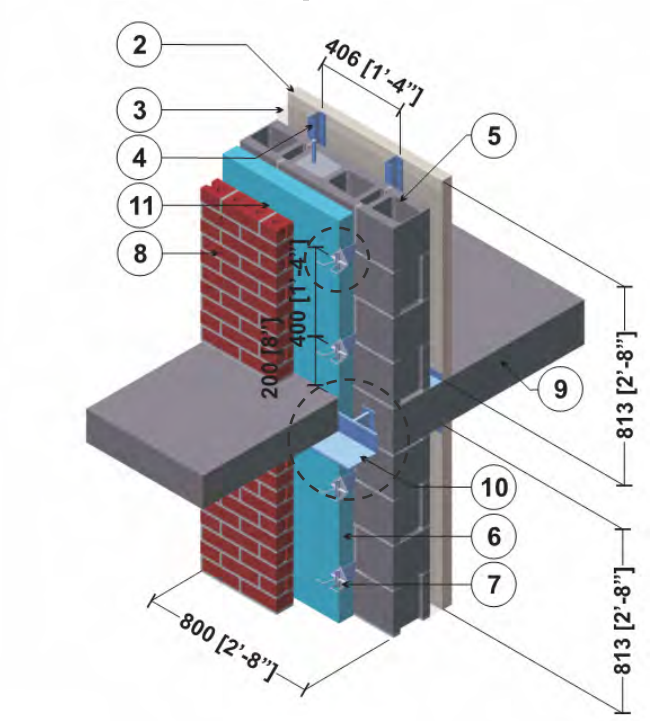
Brick Tie Detail

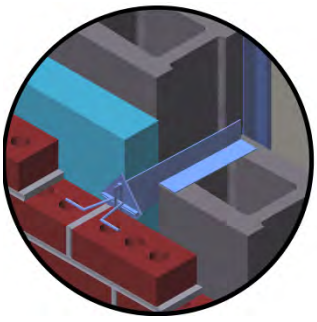
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" Steel Studs with Metal Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
8	Masonry Ties @ 16" (406) o.c.	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
9	Brick Veneer	3 5/8" (90)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

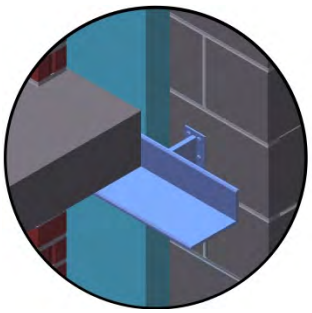
Detail 7.2.17

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Angle Supported Slab & Intermediate Floor Intersection





Brick Tie Detail



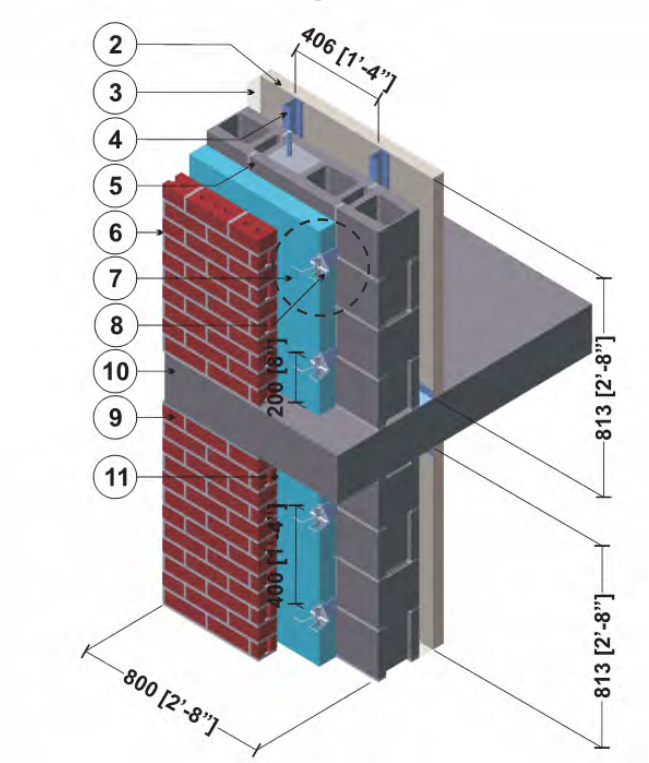
Shelf Angle Detail

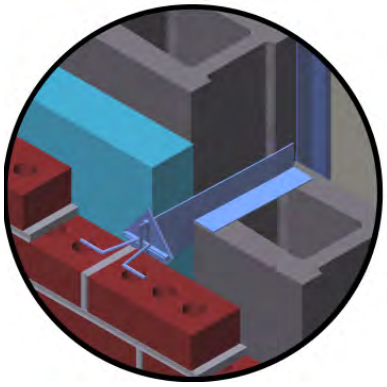
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" Steel Studs with Metal Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
7	Masonry Ties @ 16" (406) o.c.	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
9	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Slab & Brick (Anchored to Slab at 16" o.c.) Support Angle	-	347 (50)	-	489 (7830)	0.12 (500)
11	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

Detail 7.2.18

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Intermediate Floor Intersection at Balcony





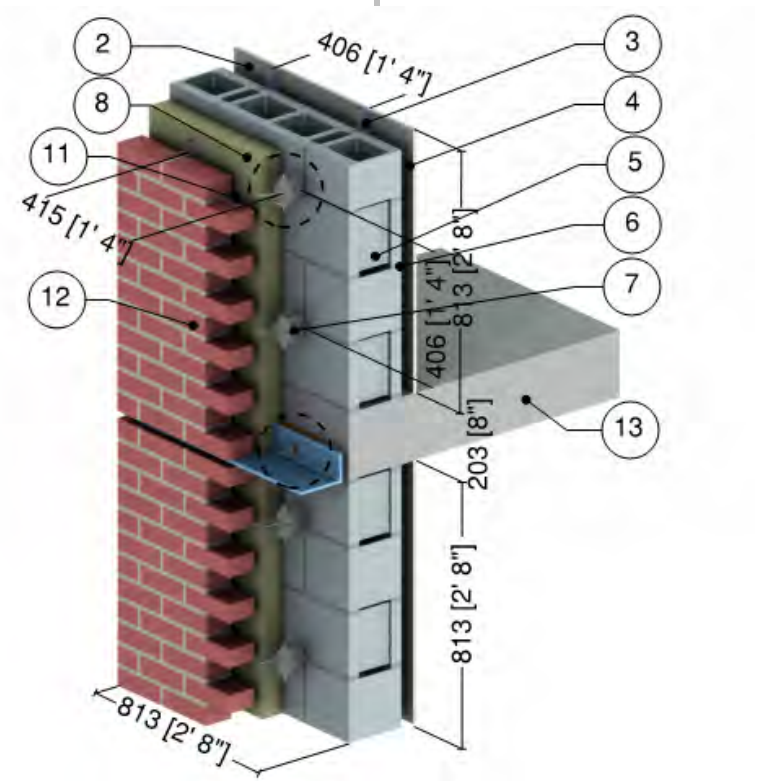
Brick Tie Detail

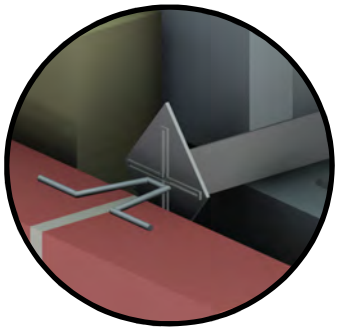
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" Steel Studs with Metal Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
8	Masonry Ties @ 16" (406) o.c.	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
9	Brick Veneer	3 5/8" (90)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

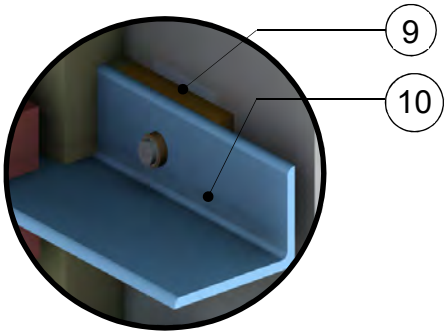
Detail 7.2.19

Exterior Insulated Concrete Block Wall Assembly with Thermally Broken Shelf Angle & Brick Ties Supporting Brick Veneer – Slab Intersection





Brick Tie Detail



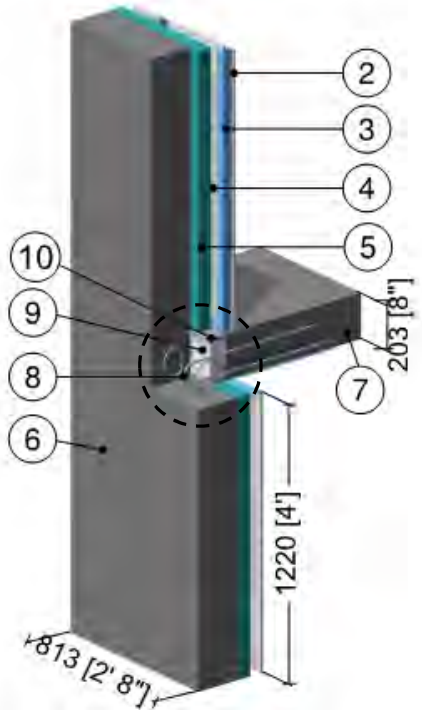
Shelf Angle Detail

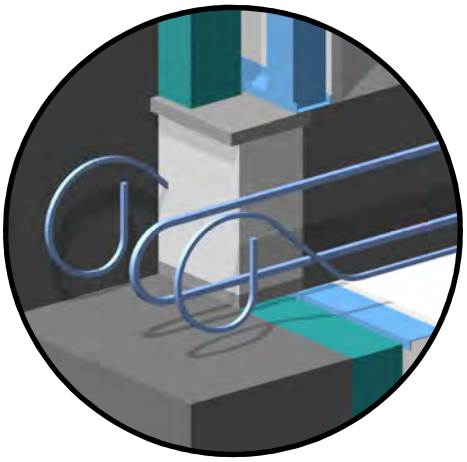
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Metal Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Masonry Ties @ 16" (406) o.c.	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Exterior Insulation	-	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
9	Armatherm FRR Thermal Break	1" (25)	1.4 (0.20)	-	85 (5.3)	-
10	Steel Shelf Angle and Bolts	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Stainless Steel Shelf Angle and Bolts	3/8" (10)	118 (17)	-	503 (8060)	0.12 (500)
11	Air Gap[2]	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
12	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
13	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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 was found using ISO 100077-2

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 Rutherma DF Thermally Broken Concrete Intermediate Floor Intersection





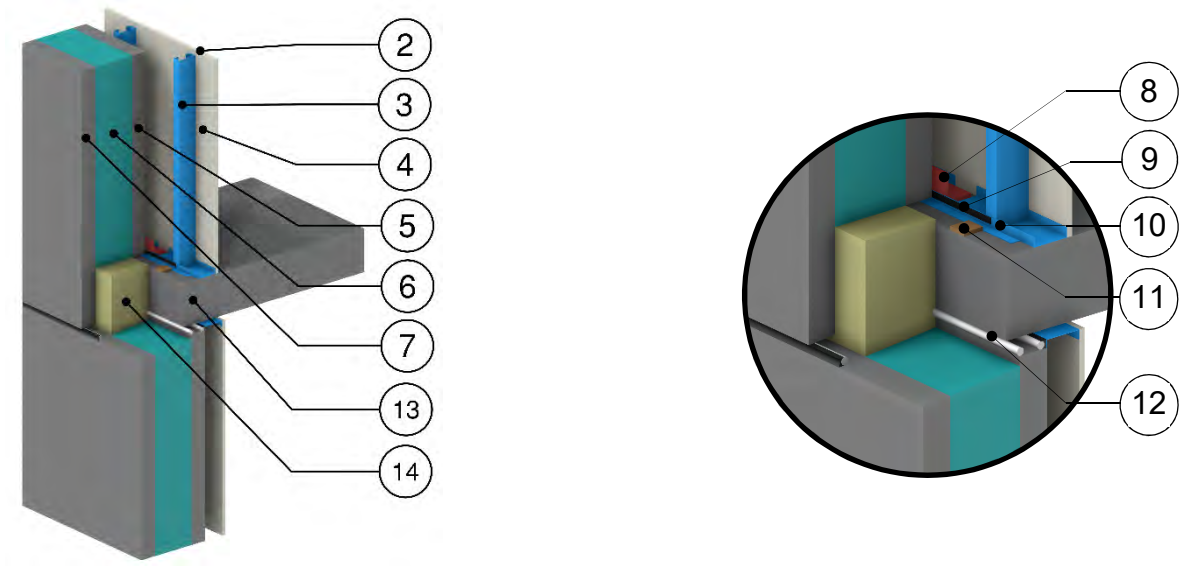
Thermally Broken Slab Detail
(Rutherma Type DF)

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 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 with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Continuous Insulation	2 1/2" (64)	0.2 (0.029)	R-12.5 (2.20 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall	8" (203)	12.5 (1.8)	R-0.64 (0.11 RSI)	140 (2250)	0.20 (850)
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Stainless Steel Reinforcement	-	118 (17)	-	503 (8060)	0.12 (500)
9	Polystyrene Hard Foam Insulation	2 3/8" (60)	0.217 (0.031)	R-10.9 (1.93 RSI)	66 (1060)	0.35 (1500)
10	Cement Board	1/2" (13)	1.7 (0.25)	-	72 (1150)	0.20 (850)
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

Detail 7.2.21

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Intermediate Floor Intersection with Inner Wythe Supported by Concrete Floor

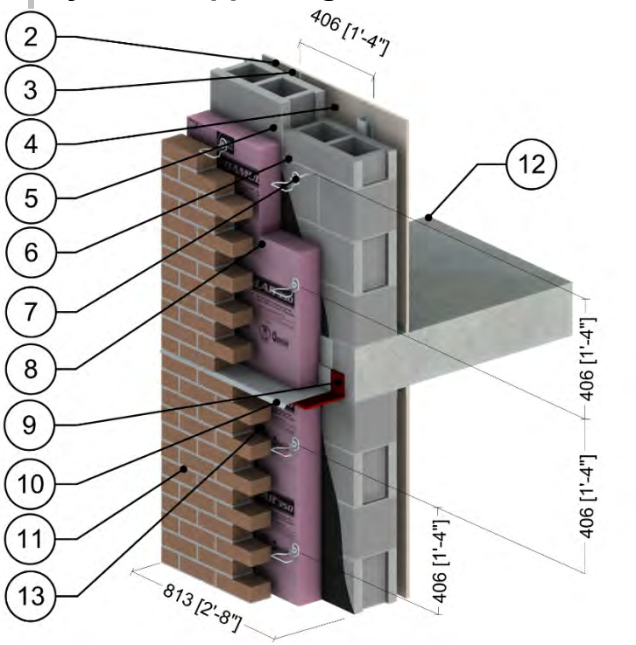


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (15)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	8" (203)	-	R-40 (7.04 RSI) to R-56 (9.86 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Anchor	-	347 (50)	-	489 (7830)	0.12 (500)
9	Sealant	-	1.73 (0.25)	-	-	-
10	Angle	-	430 (62)	-	489 (7830)	0.12 (500)
11	Shims	-	0.69 (0.1)	-	-	-
12	Backer Rod	-	0.25 (0.036)	-	-	-
13	Concrete Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Mineral Wool Slab Insulation	8" (203)	0.238 (0.034)	R-33.6 (5.92 RSI)	4 (64)	0.20 (850)
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

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

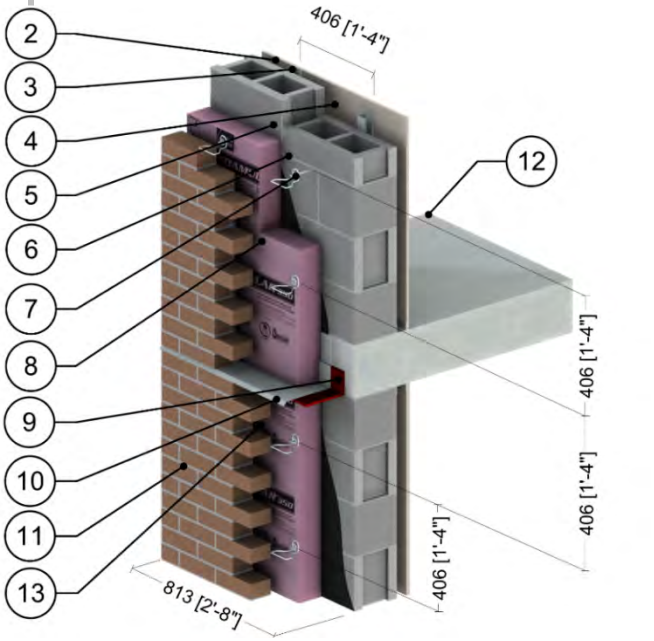


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Metal Tracks	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Heckmann Pos-I-Tie Masonry Tie @ 16" (406) o.c.	varies	-	-	-	-
8	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
9	Steel Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Metal Flashing	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
12	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Vented Air Gap[2]	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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 was found using ISO 100077-2

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

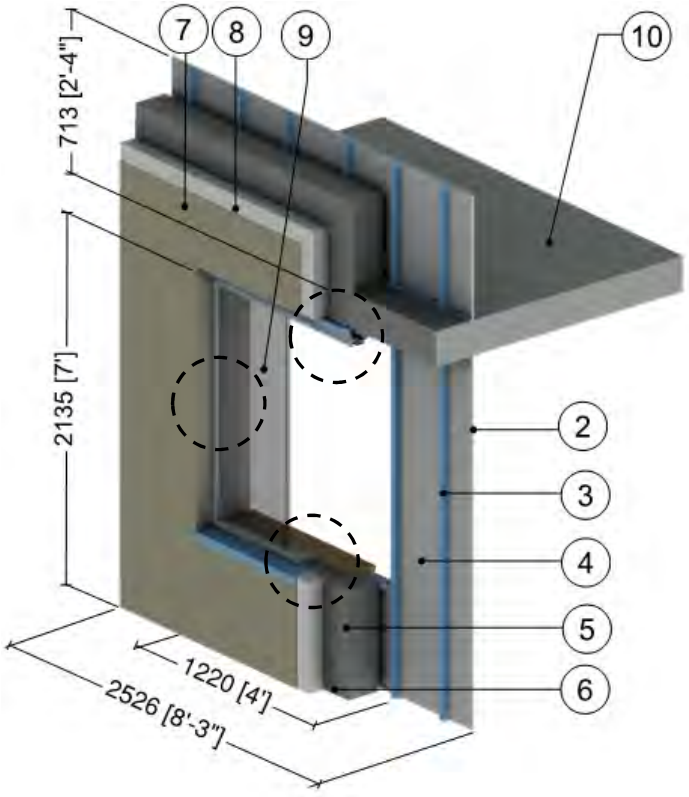


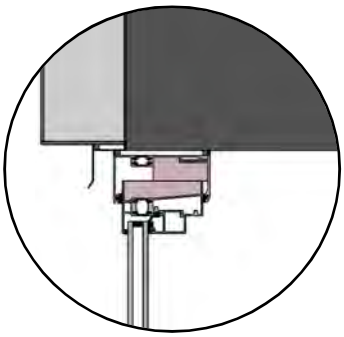
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Metal Tracks	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Heckmann Pos-I-Tie Masonry Tie @ 16" (406) o.c.	varies	-	-	-	-
8	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
9	Stainless Steel Stand-off Shelf Angle	3/8" (10)	118 (17)	-	503 (8060)	0.12 (500)
10	Flashing	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
12	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Vented Air Gap[2]	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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 was found using ISO 100077-2

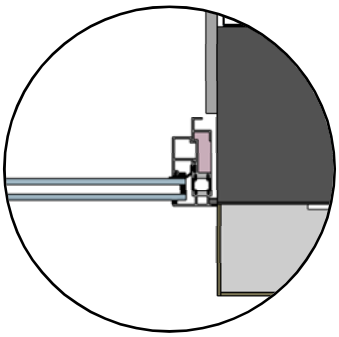
Detail 7.3.1

Exterior Insulated Concrete Drained EIFS Wall Assembly – Window and Intermediate Floor Intersection

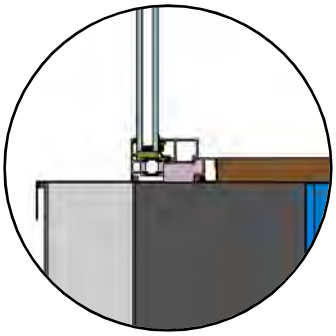




Head Detail



Jamb Detail



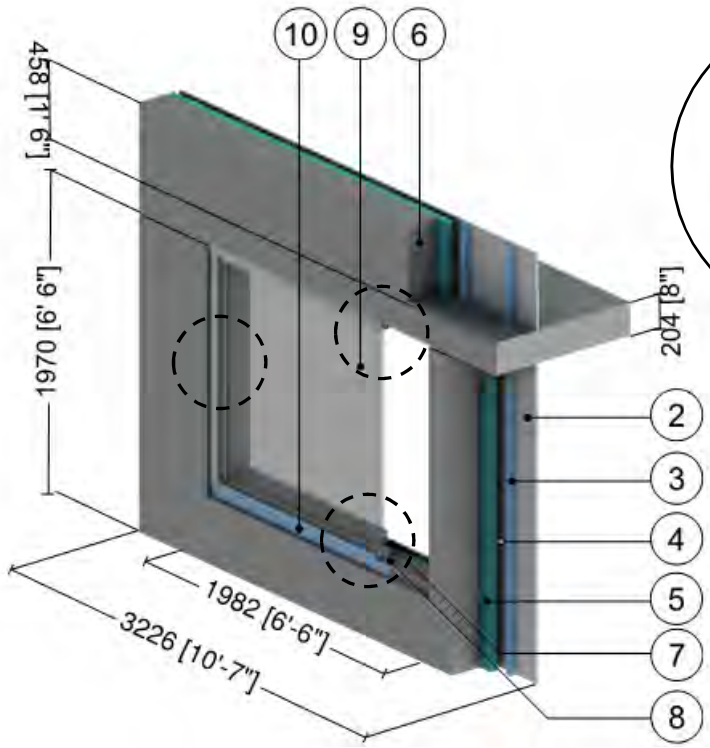
Sill Detail

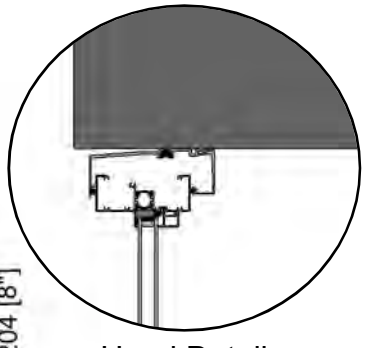
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Weather Resistive Barrier with Adhesive	-	-	-	-	-
7	Lamina	1/8" (4)	6 (0.9)	R-0.04 (0.01 RSI)	120 (1922)	0.20 (850)
8	Insulation Board	4" (100)	0.27 (0.039)	R-15 (2.64 RSI)	1.2 (20)	0.35 (1470)
9	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Concrete Slab	8" (203)	12 (1.8)	-	140 (2250)	0.20 (850)
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

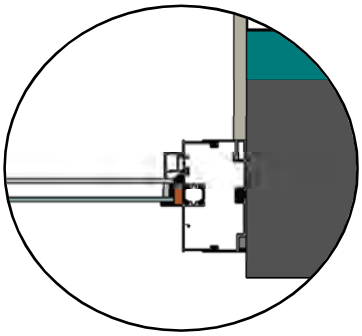
Detail 7.3.2

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

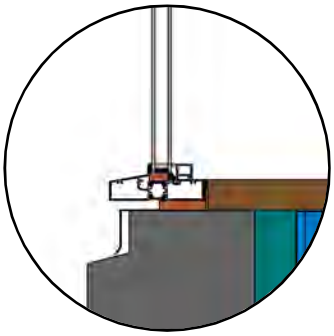




Head Detail



Jamb Detail



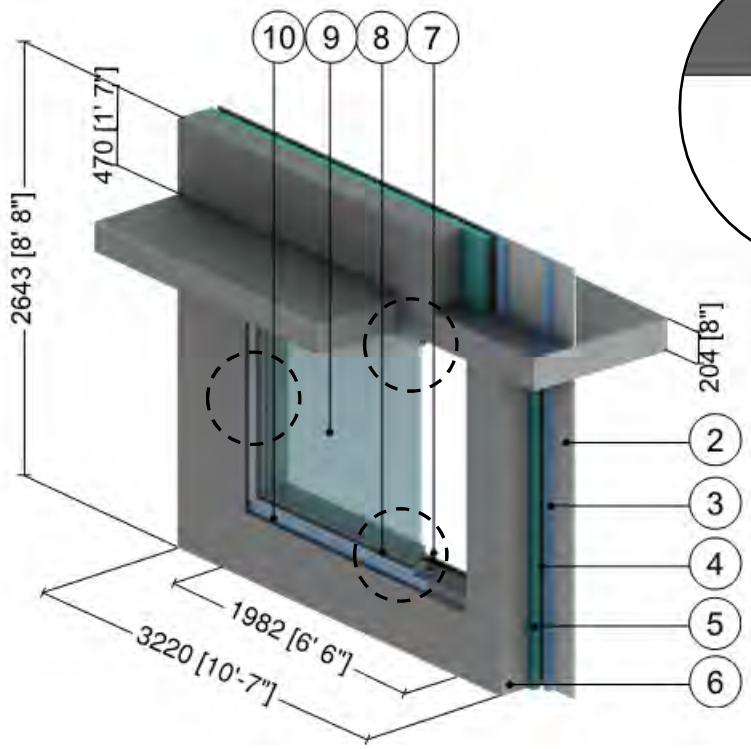
Sill Detail

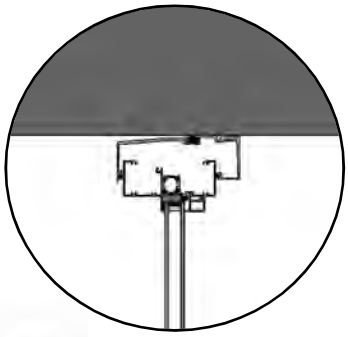
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (92)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Continuous Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall/Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Wood Sill	1 1/4" (30)	0.69 (0.10)	-	27.8 (445)	0.45 (1880)
9	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Aluminum Flashing	16 Gauge	1109 (160)	-	171(2739)	0.21 (900)
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.

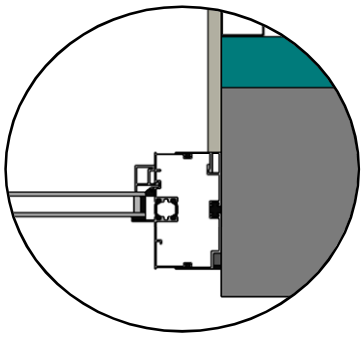
Detail 7.3.3

Interior Insulated Concrete Mass Wall with 1 5/8" x 1 5/8" Steel Studs (16" o.c.) Supporting Interior Finish – Window & Intermediate Floor Intersection with Project Slab

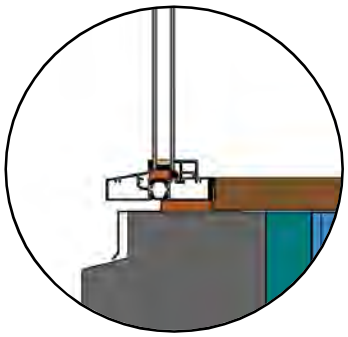




Head Detail



Jamb Detail



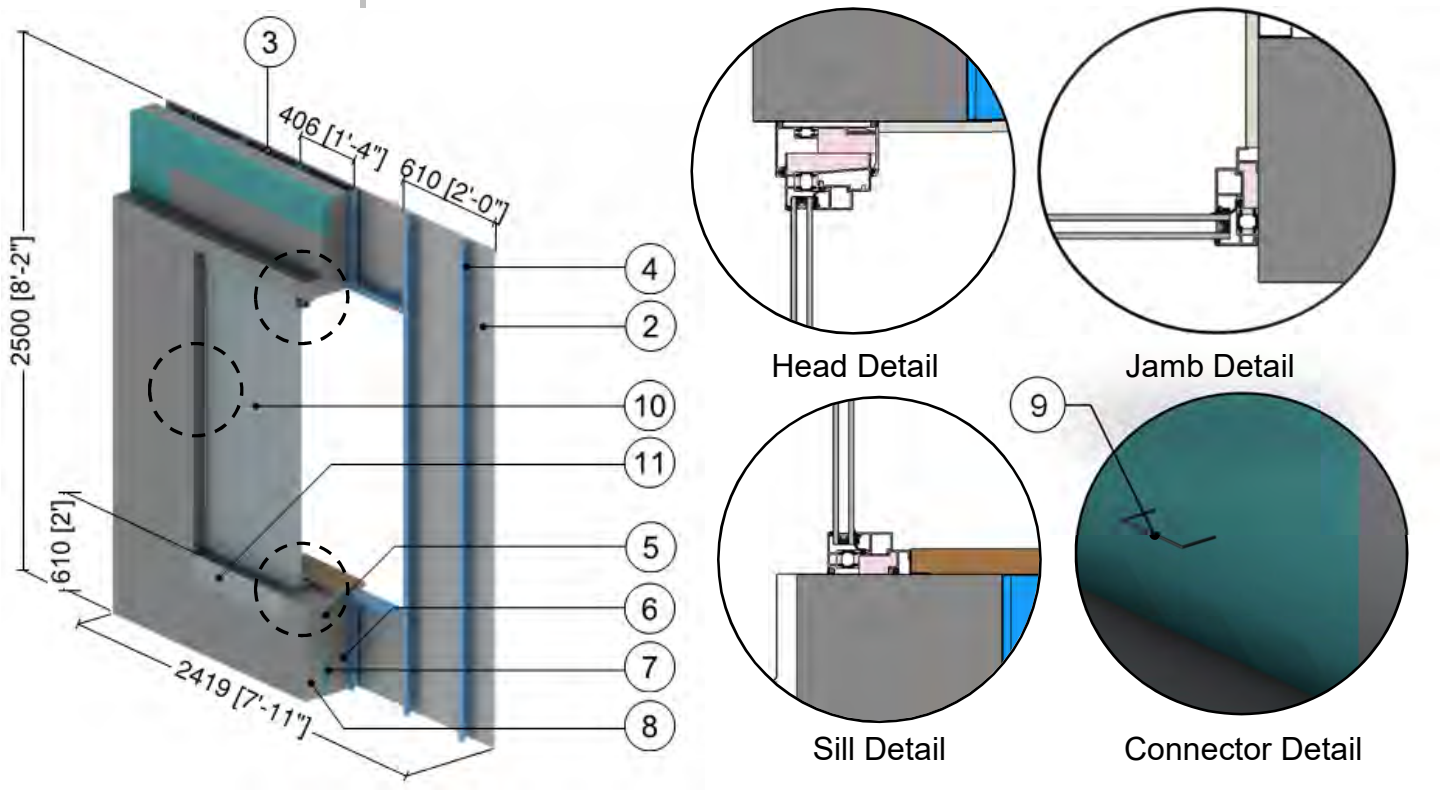
Sill Detail

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 Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 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 with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (92)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Continuous Rigid Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall/ Projected Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Steel Sheet Connected to Studs[3]	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Wood Sill	1 1/4" (30)	0.69 (0.1)	-	27.8 (445)	0.45 (1880)
9	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
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
[3] Scenarios C and D include sheet steel, Scenarios A and B do not.

Detail 7.3.4

Precast Sandwich Panel Wall Assembly with Concrete at Panel Perimeter and Steel Connectors at 24” (o.c.) – Window Intersection

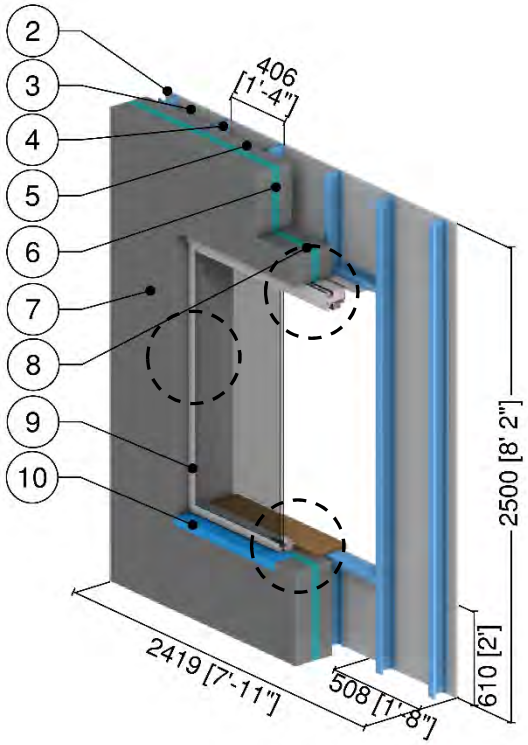


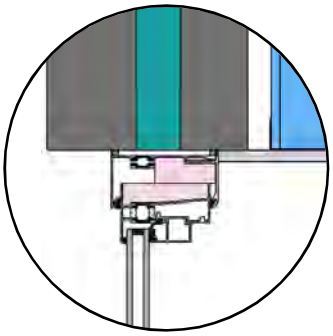
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film	-	-	R-0.7 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete at Window Perimeter	12” (304)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	Precast Sandwich Panel, Exterior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Precast Sandwich Panel, Steel Structural Ties @ 24” (914) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	5’ (1.5m) x 6’ (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
11	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Exterior Film	-	-	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

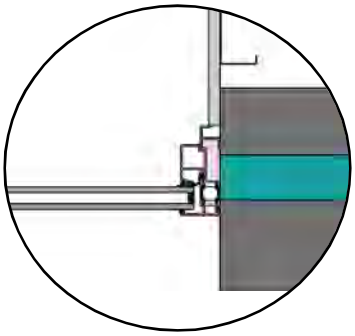
Detail 7.3.5

Precast Sandwich Panel Wall Assembly with 3 5/8″ Steel Stud (16″ o.c.) – Window Intersection

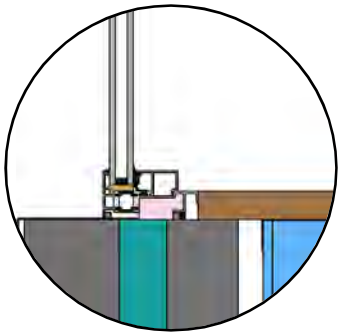




Head Detail



Jamb Detail



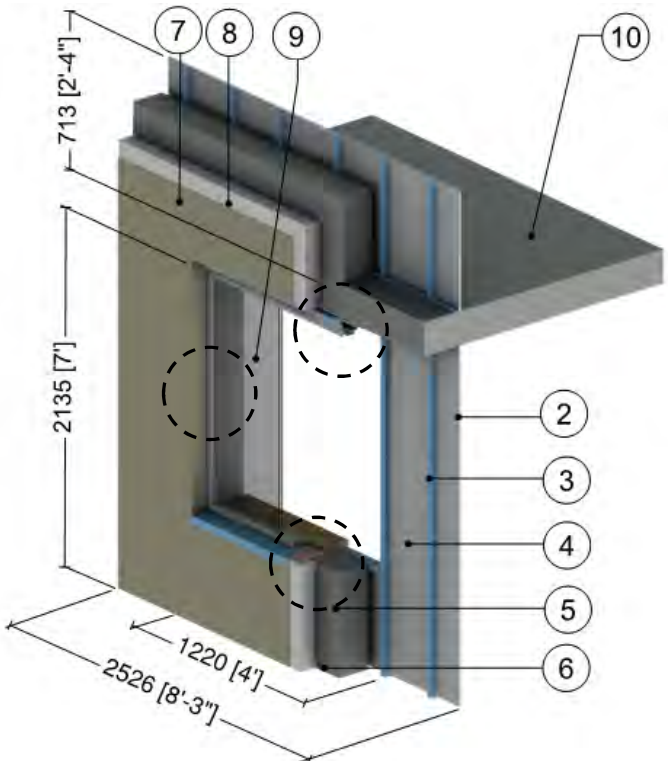
Sill Detail

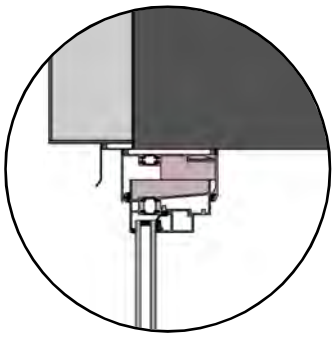
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	6 5/8” (168)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” Steel Studs with Metal Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel, Insulation	2” (50)	-	R-10 (1.8 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Precast Sandwich Panel, Steel Connectors @ 24” (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	1.5m (H) x 1.2m (W) Aluminum window: double glazed & thermally broken[2]					
10	Flashing/ finish material is incorporated into exterior heat transfer coefficient					
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 for air spaces within window framing was found using ISO 10077-2.

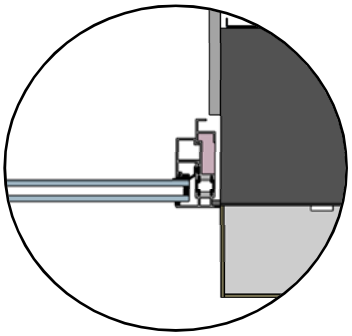
Detail 7.3.6

Exterior Insulated Concrete Drained EIFS Wall Assembly – Window with Aerogel and Intermediate Floor Intersection

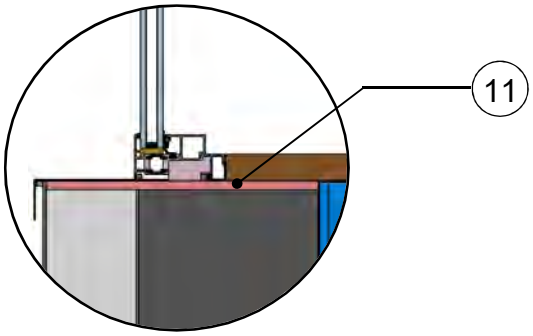




Head Detail



Jamb Detail



Sill Detail

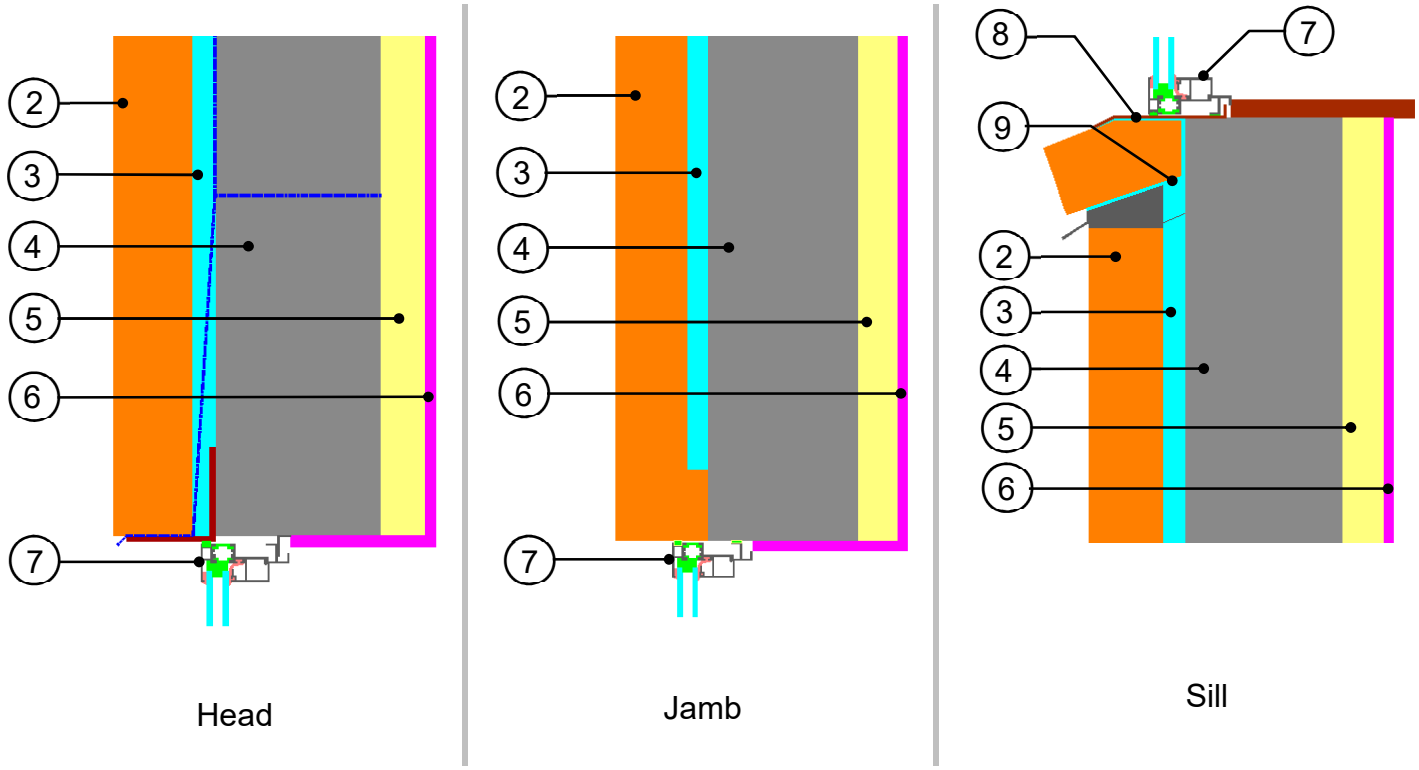
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Weather Resistive Barrier with Adhesive	-	-	-	-	-
7	Lamina	1/8" (4)	6 (0.9)	R-0.04 (0.01 RSI)	120 (1922)	0.20 (850)
8	Insulation Board	4" (100)	0.27 (0.039)	R-15 (2.64 RSI)	1.2 (20)	0.35 (1470)
9	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
10	Concrete Slab	8" (203)	12 (1.8)	-	140 (2250)	0.20 (850)
11	Aerogel Blanket	3/8" (10)	0.1 (0.015)	R-3.8 (0.67 RSI)	-	-
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 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



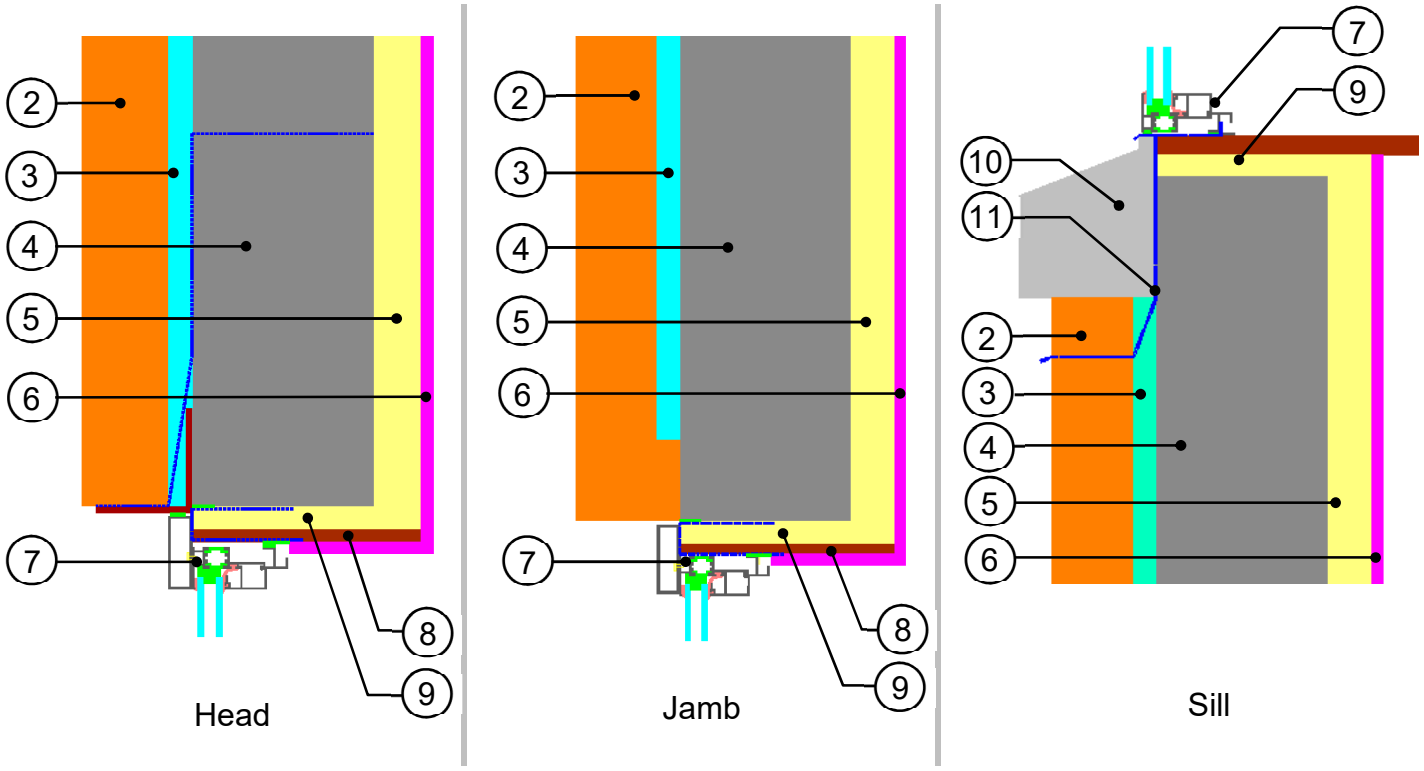
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.74 (0.13 RSI)	-	-
2	Brick	3 5/8" (92)	0.578 (1.0)	R-0.523 (0.092 RSI)	110 (1800)	-
3	Air Cavity	1" (25)	0.070 (0.122)	R-1.185 (0.209 RSI)	-	-
4	Concrete Block (CMU)	7 5/8" (194)	0.069 (1.2)	R-0.916 (0.161 RSI)	130 (2100)	-
5	Interior Insulation	2" (51)	0.0139 (0.024)	R12 (2.11 RSI)	-	-
6	Gypsum Board	1/2" (13)	0.092 (0.16)	R-0.5 (0.08 RSI)	50 (800)	-
7	5500 ISOWEB Window	-	-	-	-	-
8	Aluminum Sill Flashing	12 Gauge	92.45 (160)	-	-	-
9	Brick Sill	3 5/8" (92)	0.578 (1.0)	-	110 (1800)	
10	Exterior Film[1]	-	-	R-0.23 (0.04 RSI)	-	-

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

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

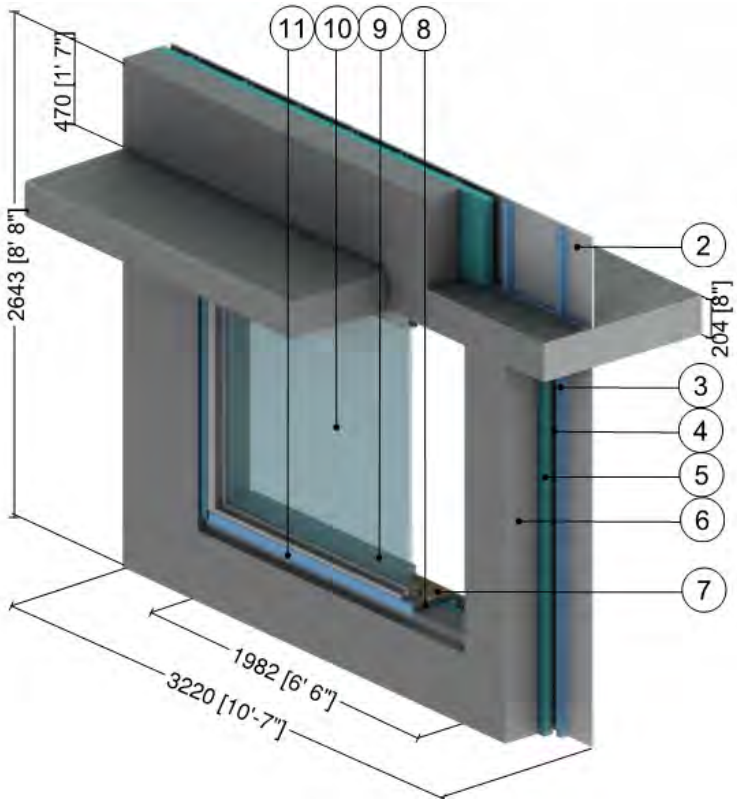


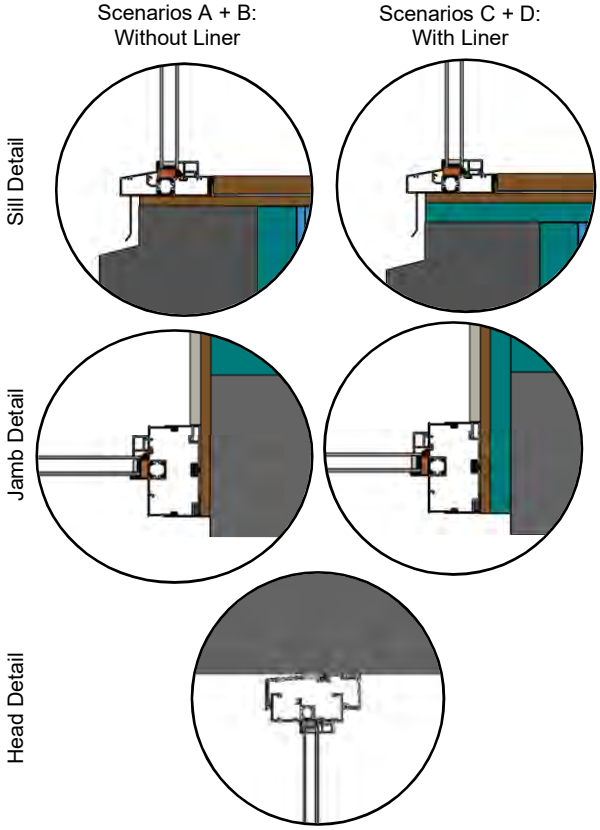
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.74 (0.13 RSI)	-	-
2	Brick	3 5/8” (92)	0.578 (1.0)	R-0.523 (0.092 RSI)	110 (1800)	-
3	Air Cavity	1” (25)	0.070 (0.122)	R-1.185 (0.209 RSI)	-	-
4	Concrete Block (CMU)	7 5/8” (194)	0.069 (1.2)	R-0.916 (0.161 RSI)	130 (2100)	-
5	Interior Insulation	2” (51)	0.0139 (0.024)	R12 (2.11 RSI)	-	-
6	Gypsum Board	1/2" (13)	0.092 (0.16)	R-0.5 (0.08 RSI)	50 (800)	-
7	5500 ISOWEB Window	-	-	-	-	-
8	Plywood Liner	3/4" (19)	0.058 (0.1)	-	-	-
9	Rigid Insulation	1” (25)	0.0139 (0.024)	-	-	-
10	Concrete Sill	-	1.4 (2.4)	-	110 (1800)	-
11	Aluminum Sill Flashing	12 Gauge	92.45 (160)	-	-	-
12	Exterior Film[1]	-	-	R-0.23 (0.04 RSI)	-	-

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

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



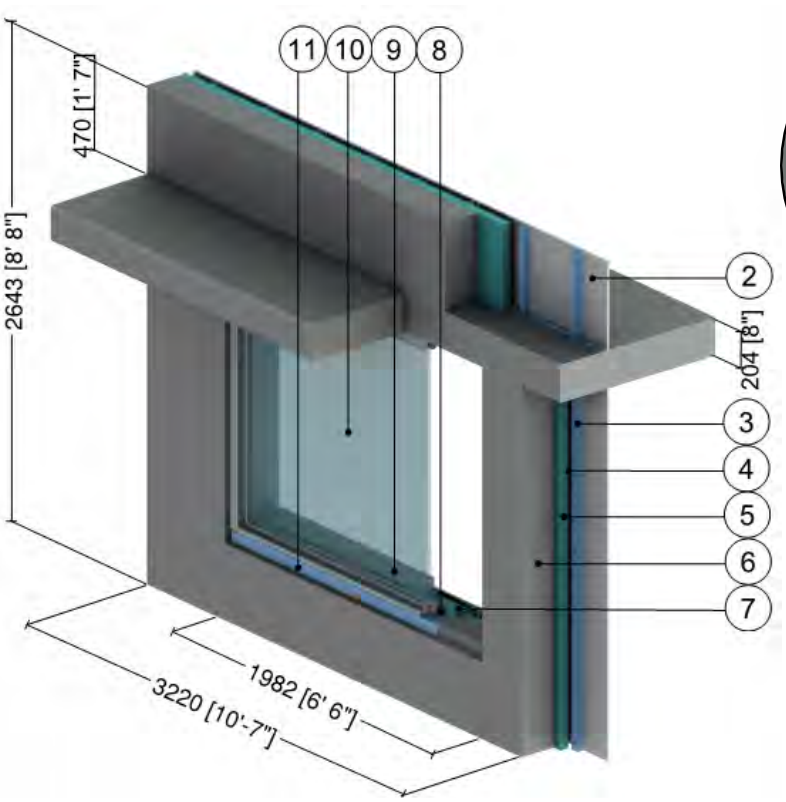


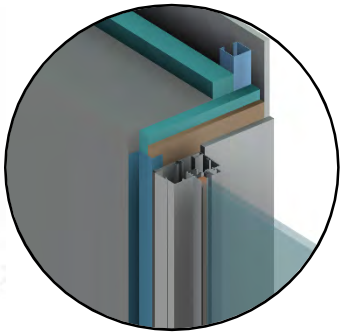
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (92)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Continuous Rigid Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall/ Projected Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Plywood Liner	1/2" (13)	0.69 (0.1)	-	27.8 (445)	0.45 (1880)
8	Liner Insulation	Optional	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
9	Wood Sill	1 1/4" (30)	0.69 (0.1)	-	27.8 (445)	0.45 (1880)
10	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
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

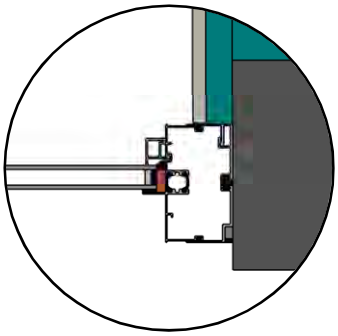
Detail 7.3.10

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

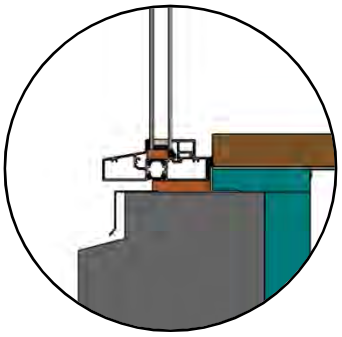




Head Detail



Jamb Detail



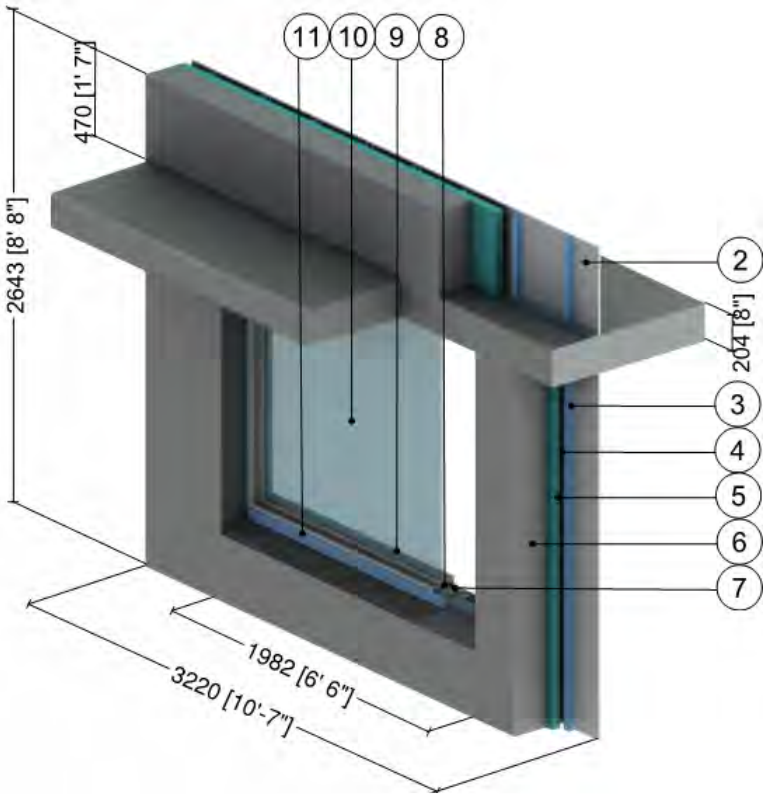
Sill Detail

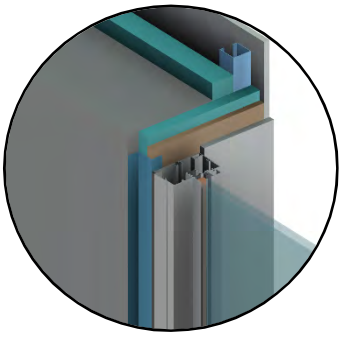
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (92)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Continuous Rigid Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall/ Projected Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Opening Insulation	Varies	-	R-5 to R-10 (0.88 RSI to 1.76 RSI)	27.8 (445)	0.45 (1880)
8	Shim Insulation	Optional	0.24 (0.034)	-	1.8 (28)	0.29 (1220)
9	Wood Sill	1 1/4" (30)	0.69 (0.1)	-	27.8 (445)	0.45 (1880)
10	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
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

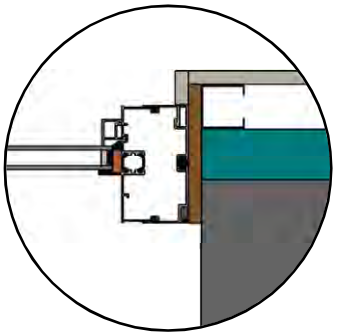
Detail 7.3.11

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

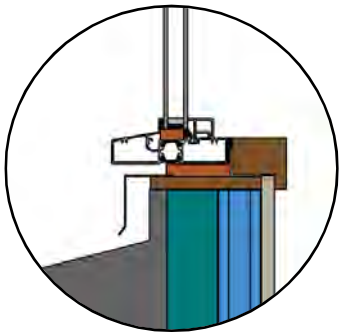




Head Detail



Jamb Detail



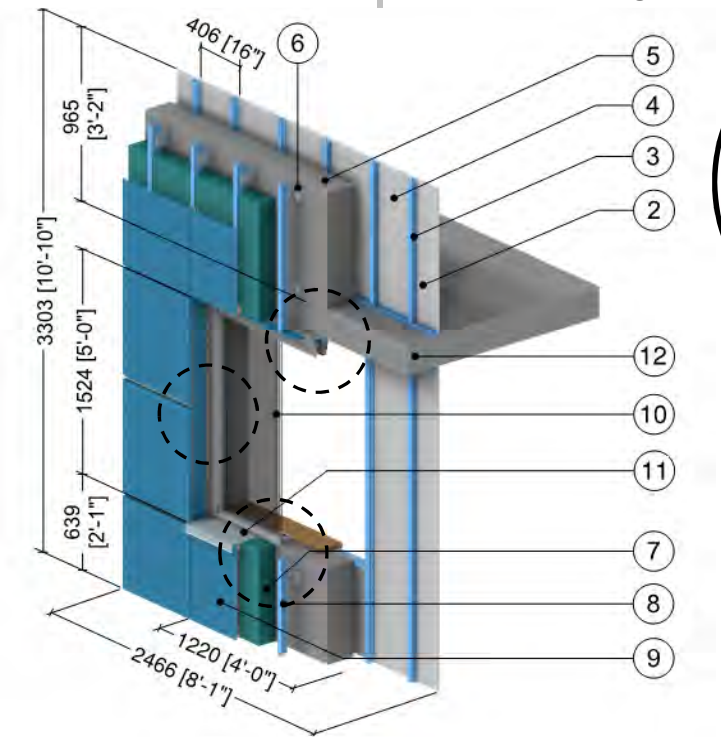
Sill Detail

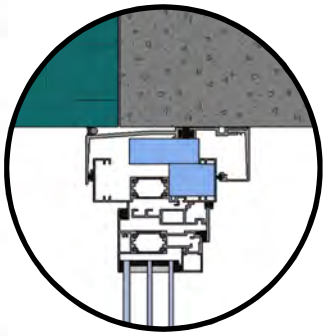
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (92)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Continuous Rigid Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall/ Projected Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Plywood Liner	1/2" (13)	0.69 (0.1)	-	27.8 (445)	0.45 (1880)
8	Shim Insulation	Optional	0.24 (0.034)	-	1.8 (28)	0.29 (1220)
9	Wood Sill	1 1/4" (30)	0.69 (0.1)	-	27.8 (445)	0.45 (1880)
10	5' (1.5m) x 6' (1.8m) Aluminum window: double glazed & thermally broken[2], IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
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

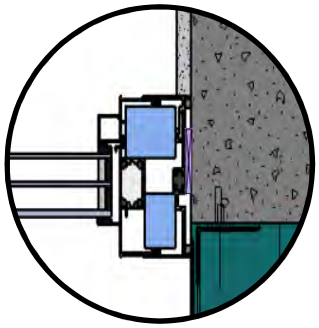
Detail 7.3.12

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

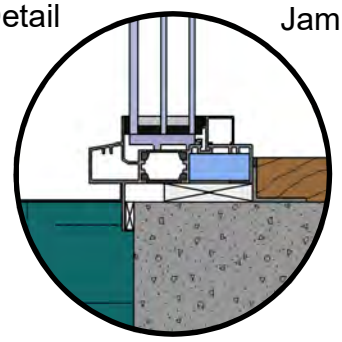




Head Detail



Jamb Detail



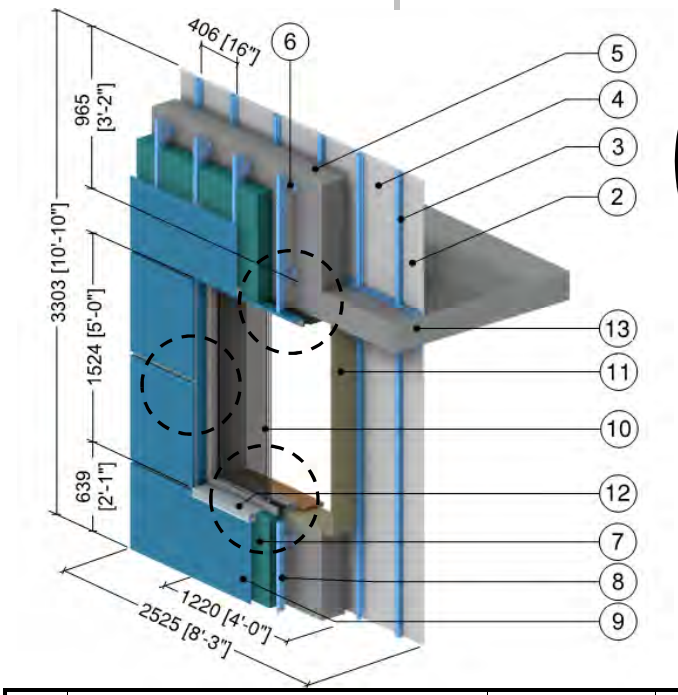
Sill Detail

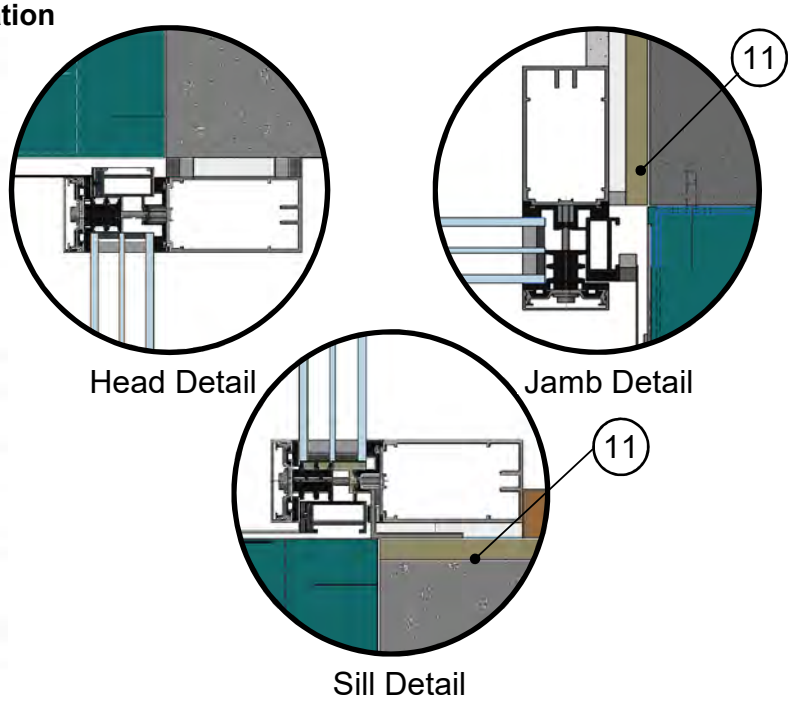
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Thermally Isolated Aluminum Bracket	0.09" (2.2)	1109 (160)	-	171 (2739)	0.21 (900)
7	Exterior Insulation	Varies	-	R-10 to R-25 (1.76 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Aluminum L-girt	0.09" (2.2)	1109 (160)	-	171 (2739)	0.21 (900)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5' (1.5m) x 4' (1.2m) Aluminum window: triple glazed & thermally broken[2], IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K)					
11	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
12	Concrete Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
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 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



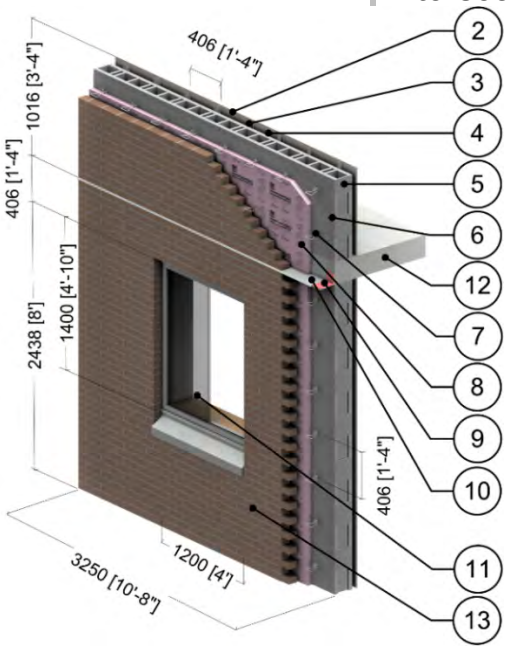


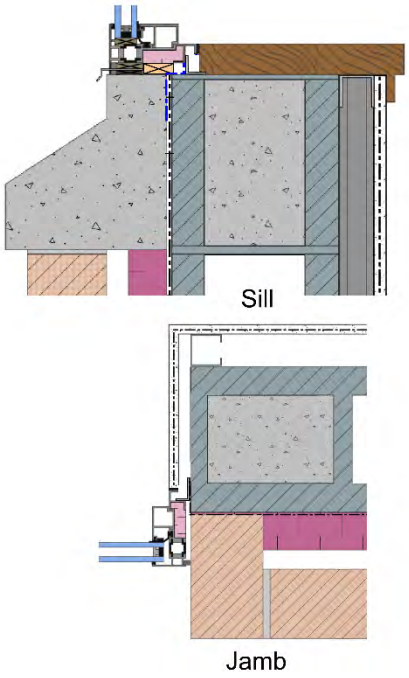
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Thermally Isolated Aluminum Bracket	0.09" (2.2)	1109 (160)	-	171 (2739)	0.21 (900)
7	Exterior Insulation	Varies	-	R-10 to R-25 (1.76 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Aluminum L-girt	0.09" (2.2)	1109 (160)	-	171 (2739)	0.21 (900)
9	Generic Cladding with 1/2" (13mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5' (1.5m) x 4' (1.2m) Aluminum curtain wall (Passive House certified): triple glazed & thermally broken[2], IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K)					
11	Wood Liner	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
12	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
13	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Exterior Film[1]	-	-	R-0.2 (0.03 RSI)	-	-

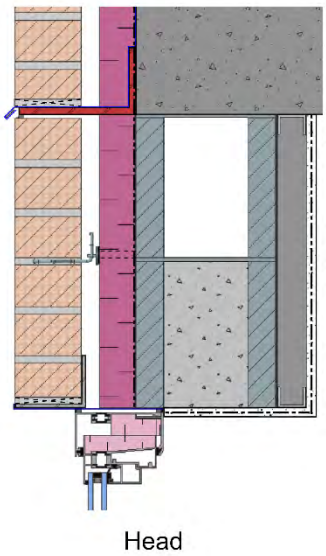
[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 7.3.14

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





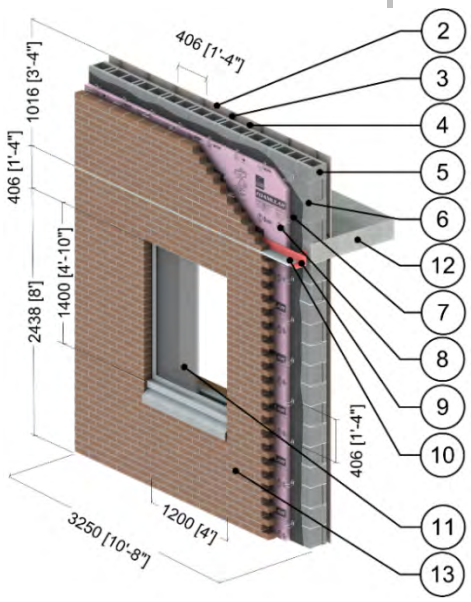


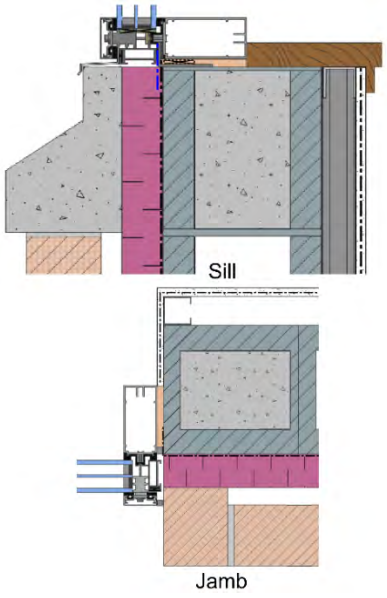
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	119 (1900)	0.12 (500)
7	Heckmann Pos-I-Tie Masonry Tie @ 16" (406) o.c.	varies	-	-	-	-
8	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
9	Steel Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Steel Lintel	1/4" (6)	347 (50)	-	489 (7830)	0.12 (500)
11	4'8 (1.4m) x 4' (1.2m) Aluminum window: thermally broken, double glazed IGU[2] U_{IGU} = 0.321 BTU/hr.ft².°F (1.82 W/m²K)					
12	Concrete Slab	8" (203)	12 (1.8)	-	140 (2250)	0.20 (850)
13	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
14	Exterior Film[1]	-	-	R-0.2 (0.03 RSI)	-	-

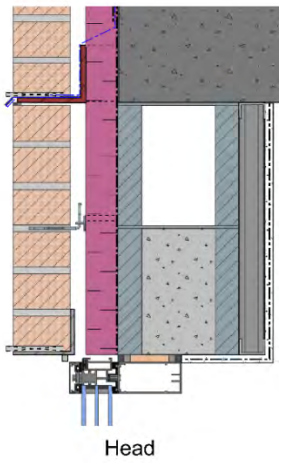
[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity of air spaces was found using ISO 100077-2

Detail 7.3.15

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





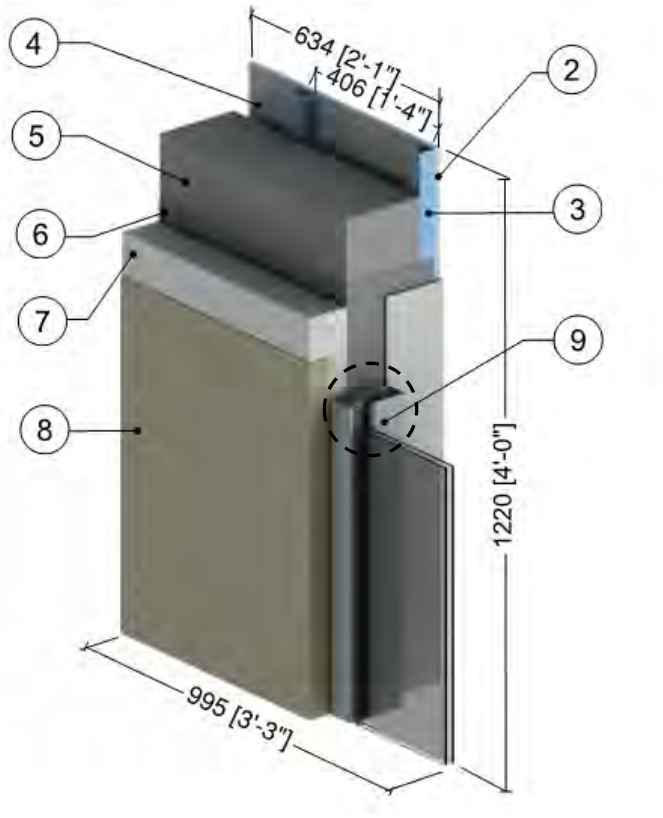


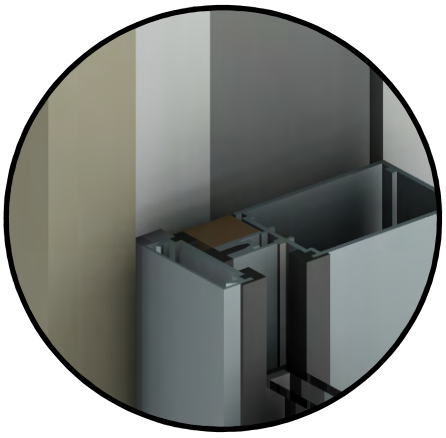
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	119 (1900)	0.12 (500)
7	Heckmann Pos-I-Tie Masonry Tie @ 16" (406) o.c.	varies	-	-	-	-
8	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
9	Stainless Steel Shelf Angle	3/8" (10)	118 (17)	-	503 (8060)	0.12 (500)
10	Steel Lintel	1/4" (6)	347 (50)	-	489 (7830)	0.12 (500)
11	4'8 (1.5m) x 4' (1.2m) Aluminum window: thermally broken, triple glazed IGU[2] U_{IGU} = 0.22 BTU/hr.ft².°F (1.25 W/m²K)					
12	Concrete Slab	8" (203)	12 (1.8)	-	140 (2250)	0.20 (850)
13	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
14	Spray Foam Insulation	3/8" (10)	0.17 (0.024)	-	2.8 (39)	0.35 (1470)
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 was found using ISO 100077-2

Detail 7.4.1

Exterior Insulated Concrete Drained EIFS Wall Assembly – Conventional Curtain Wall Transition





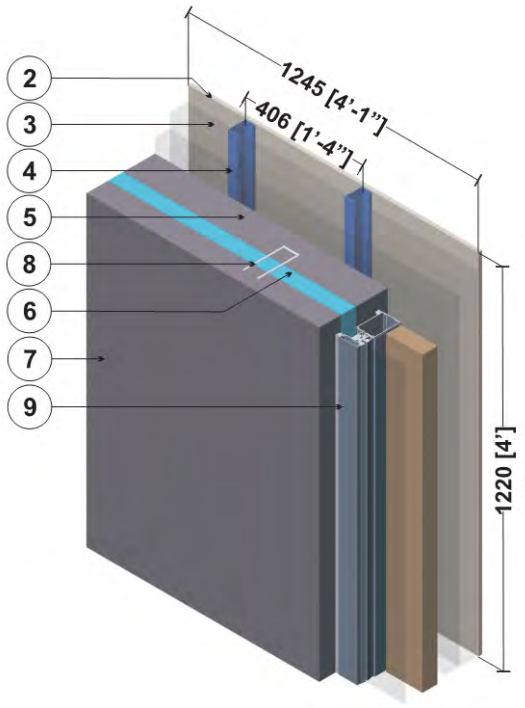
Curtain Wall
Jamb Detail

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-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (30)	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 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Weather Resistive Barrier with Adhesive	-	-	-	-	-
7	Insulation Board	4" (100)	0.27 (0.039)	R-15 (2.64 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	Conventional curtain wall system: double glazed with minimal thermal break[2], double glazed IGU U_{IGU} = 0.32 BTU/hrft²F (1.82 W/m²K)					
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 7.4.2

Precast Sandwich Panel Wall Assembly with 3 5/8″ Steel Stud (16″ o.c.) – Curtain Wall Spandrel Transition

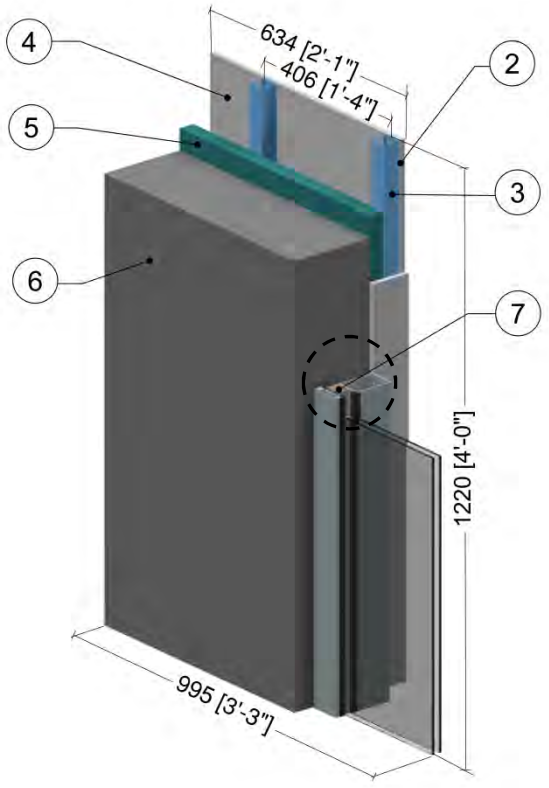


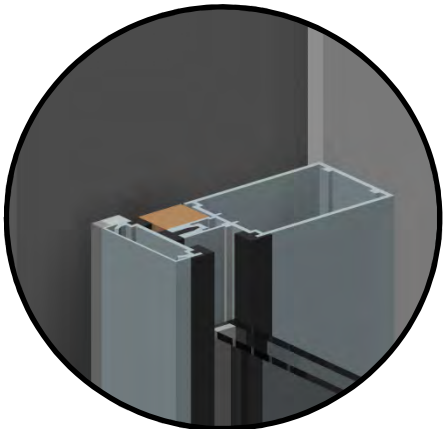
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” Steel Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Precast Sandwich Panel, Interior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel, Insulation	2” (50)	-	R-10 (1.8 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Precast Sandwich Panel, Structural Ties @ 24” (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Conventional curtain wall system with insulated back pan (Pressure plates with minimal thermal break)[2]					
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 curtain wall framing was found using ISO 10077-2.

Detail 7.4.3

Interior Insulated Concrete Mass Wall – Conventional Curtain Wall Transition





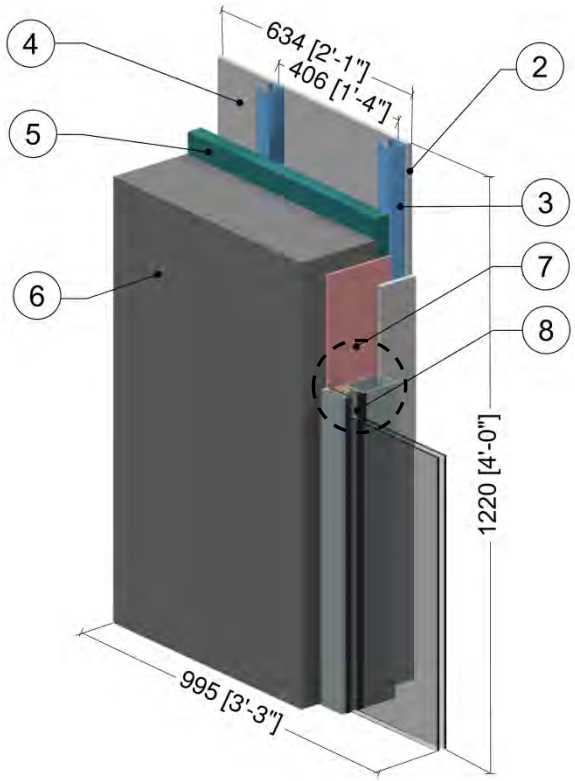
Curtain Wall
Jamb Detail

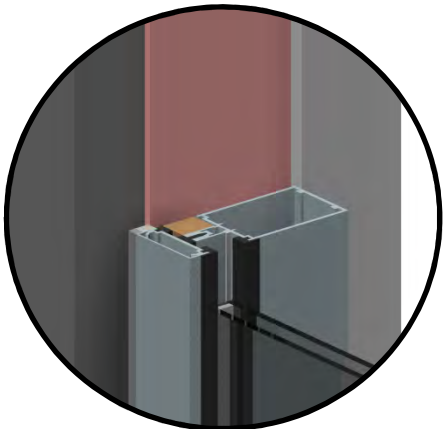
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.7 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (30)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (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	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Interior Insulation	2" (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Conventional curtain wall system: double glazed with minimal thermal break[2], double glazed IGU U_{IGU} = 0.32 BTU/hrft²F (1.82 W/m²K)					
8	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 7.4.4

Interior Insulated Concrete Mass Wall – Thermally Broken Curtain Wall Transition





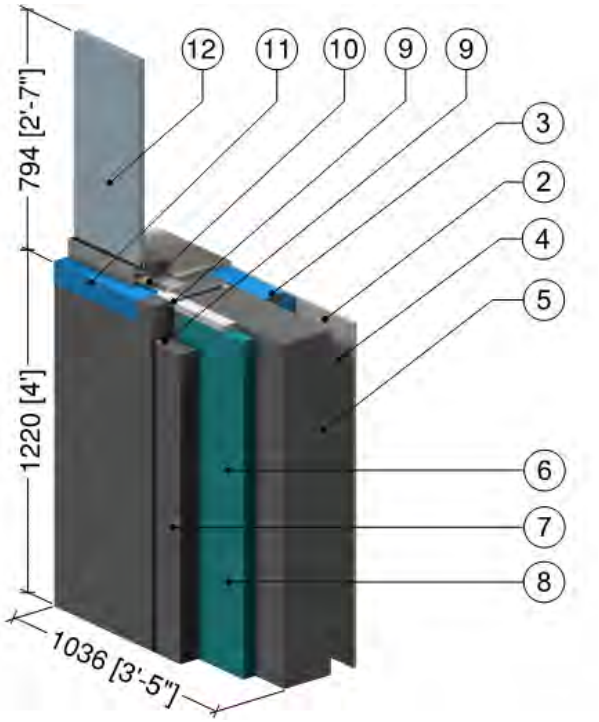
Curtain Wall
Jamb Detail

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 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (30)	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	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Interior Insulation	2" (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Aerogel Blanket	0.4" (10)	0.1 (0.015)	R-3.8 (0.67 RSI)	-	-
8	Conventional curtain wall system: double glazed with minimal thermal break[2], double glazed IGU U_{IGU} = 0.32 BTU/hrft²F (1.82 W/m²K)					
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 7.4.5

Precast Sandwich Panel Wall Assembly – Tigerloc Thermally Broken Curtain Wall Transition

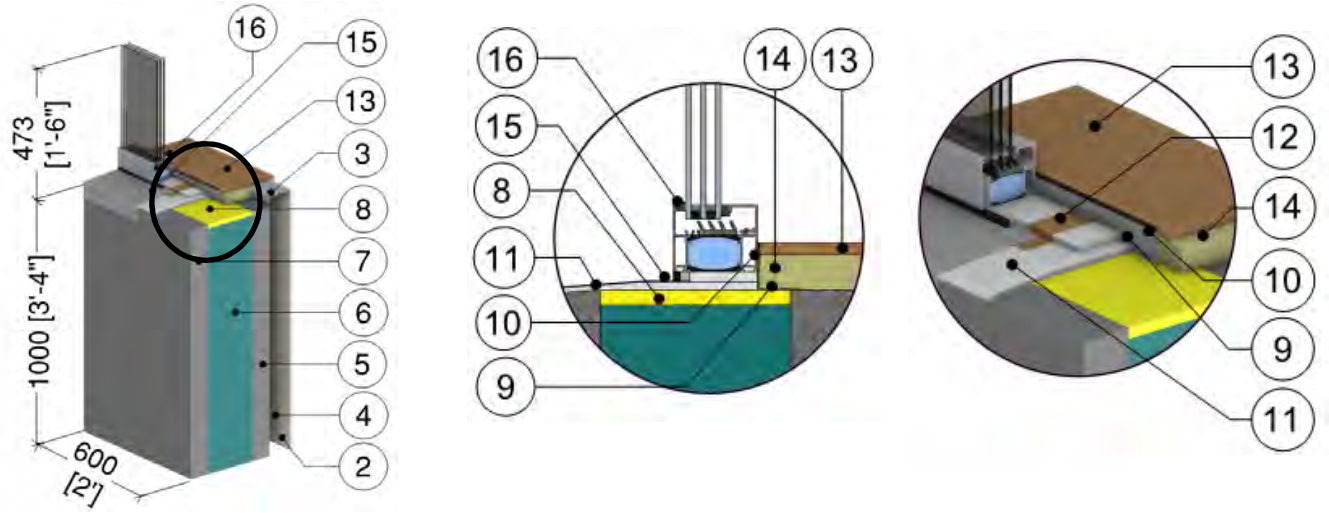


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 1/8" (130)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	7 3/4" (197)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	2" to 4" (51 to 102)	-	R-10 to R-20 (1.8 RSI to 3.5 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Precast Sandwich Panel, Structural Ties @ 24" (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Tigerloc, PVC Foam	1" (25)	0.42 (0.06)	-	-	-
10	Mineral Wool Sill Insulation	-	0.24 (0.034)	-	4 (64)	0.20 (850)
11	Sill Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Conventional curtain wall system with insulated back pan (Pressure plates with minimal thermal break)[2]					
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 7.4.6

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – High Performance Aluminum Window Sill Detail

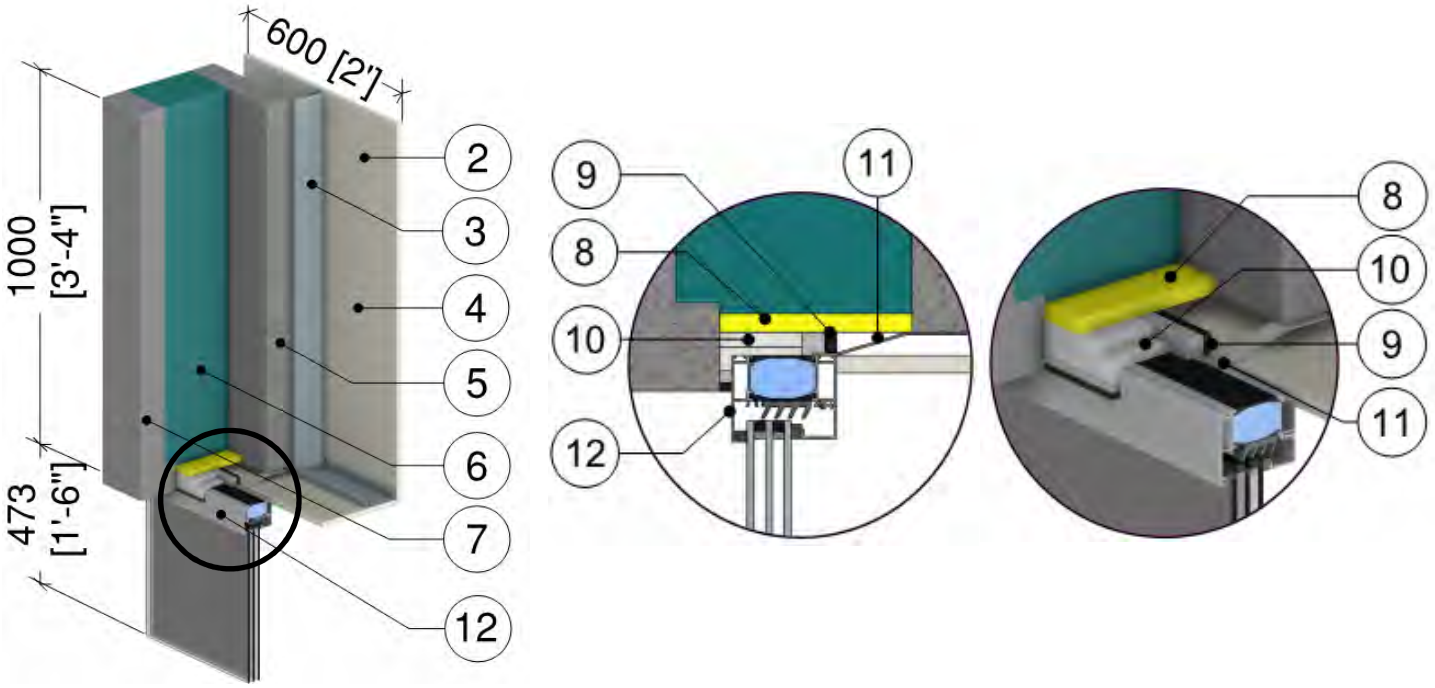


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI) to R-1.1 (0.2 RSI)	-	-
2	Gypsum Board	5/8" (15)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	8" (203)	-	R-40 (7.04 RSI) to R-56 (9.86 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Exterior Gypsum Closure	5/8" (15)	1.1 (0.16)	-	50 (800)	0.26 (1090)
9	Angle	-	430 (62)	-	489 (7830)	0.12 (500)
10	Sealant	-	1.73 (0.25)	-	-	-
11	Sill Insulation Below Frame, Spray Foam or Aerogel	-	0.167 (0.024) to 0.1 (0.014)	-	2.4 (39)	0.35 (1470)
12	Shims	-	0.69 (0.1)	-	-	-
13	Wood Sill	1/2" (13)	0.69 (0.1)	-	31 (500)	0.45 (1880)
14	Sill Insulation Behind Frame, Mineral Wool	-	0.238 (0.034)	-	4 (64)	0.20 (850)
15	Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
16	Raico Frame+ Aluminum Frame, triple glazed thermally broken window triple glazed IGU U_{IGU} = 0.12 Btu/hr·ft²·°F (0.7 W/m²K)[2]					
17	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 airspaces within framing was found using ISO 100077-2

Detail 7.4.7

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – High Performance Aluminum Window Head Detail

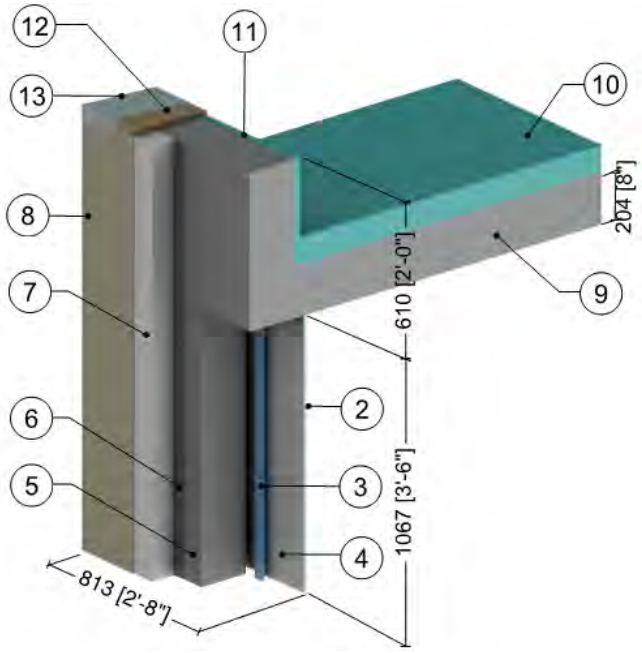


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI) to R-1.1 (0.2 RSI)	-	-
2	Gypsum Board	5/8" (15)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	8" (203)	-	R-40 (7.04 RSI) to R-56 (9.86 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Exterior Gypsum Closure	5/8" (15)	1.1 (0.16)	-	50 (800)	0.26 (1090)
9	Sealant	-	1.73 (0.25)	-	-	-
10	Opening Insulation, Spray Foam or Aerogel	-	0.167 (0.024) to 0.1 (0.014)	-	2.4 (39)	0.35 (1470)
11	Window Straps	-	430 (62)	-	489 (7830)	0.12 (500)
12	Raico Frame+ Aluminum Frame, triple glazed thermally broken window triple glazed IGU U_{IGU} = 0.12 Btu/hr·ft²·°F (0.7 W/m²K)[2]					
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 airspaces within framing was found using ISO 100077-2

Detail 7.5.1

Exterior Insulated Concrete Drained EIFS Wall Assembly – Concrete Parapet & Slab Intersection

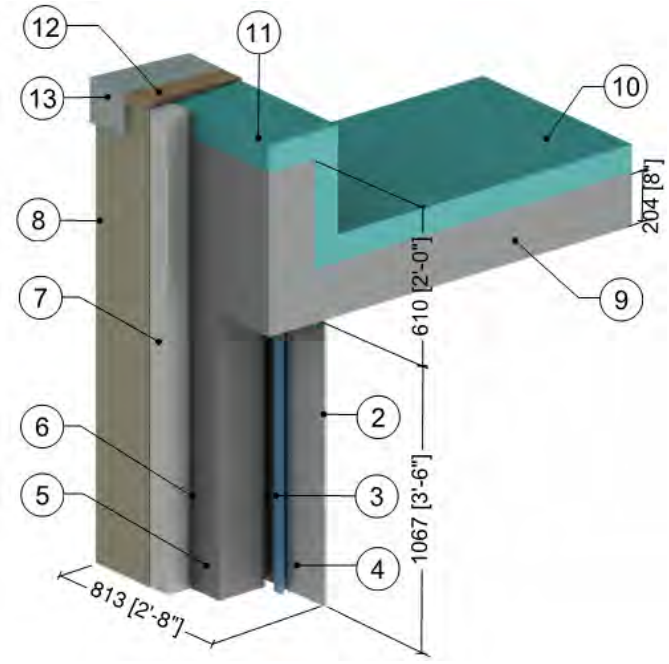


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Weather Resistive Barrier with Adhesive	-	-	-	-	-
7	Insulation Board	4" (100)	0.27 (0.039)	R-15 (2.64 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	Concrete Slab & Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Roof Insulation	4" (100)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
11	Parapet Insulation	1" (25)	-	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
12	Wood Blocking	5/8" (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
13	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 7.5.2

Exterior Insulated Concrete Drained EIFS Wall Assembly – Insulated Concrete Parapet & Slab Intersection

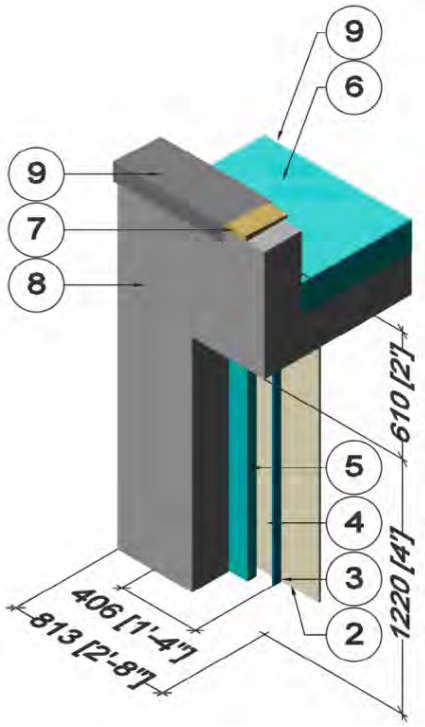


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16"o.c.) with Top Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Weather Resistive Barrier with Adhesive	-	-	-	-	-
7	Insulation Board	4" (100)	0.27 (0.039)	R-15 (2.64 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	Concrete Slab & Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Roof Insulation	4" (100)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
11	Parapet Insulation	Varies	-	R-10 to R-20 (1.76 RSI to 3.52 RSI)	1.8 (28)	0.29 (1220)
12	Wood Blocking	5/8" (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
13	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
14	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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

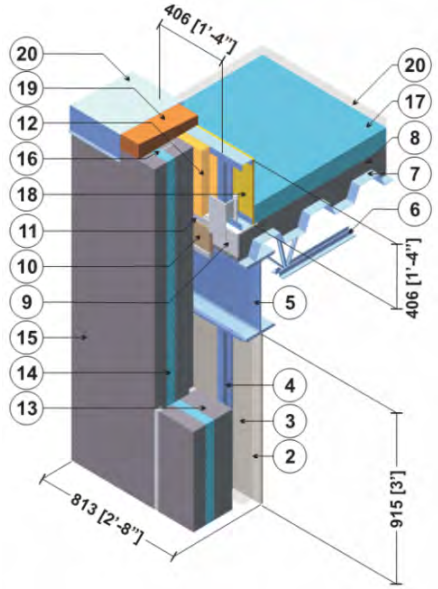


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Top Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (42)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Interior Insulation	2" (51)	0.2 (0.03)	R-11 (1.9 RSI)	1.8 (28)	0.29 (1220)
6	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
7	Wood Blocking	5/8" (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
8	Concrete Slab & Parapet	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Metal cap flashing/ finish roof material is incorporated into exterior heat transfer coefficient					
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

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

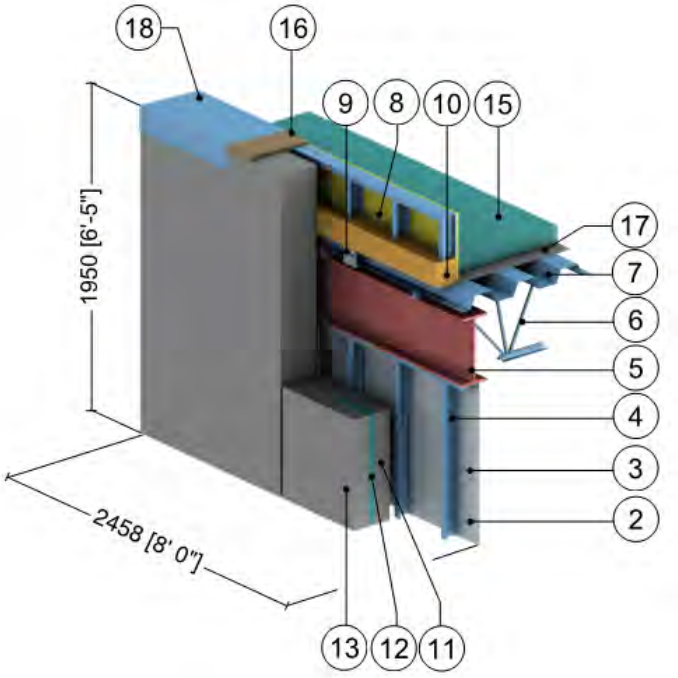


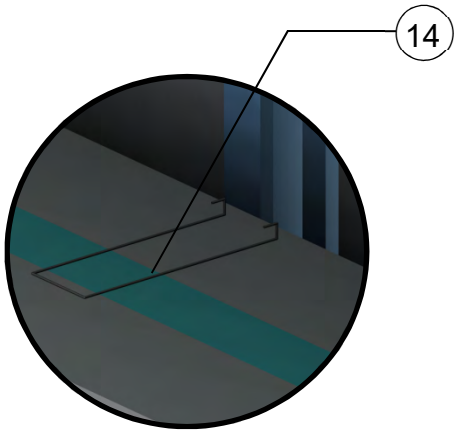
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5 5/8” (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
6	Open Web Steel Joist (550C)	-	347 (50)	-	489 (7830)	0.12 (500)
7	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
8	Concrete Topping	6” (152)	6.3 (0.9)	-	120 (1920)	0.20 (850)
9	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
10	Semi Rigid Insulation	1” (25)	0.28 (0.04)	R-3.6 (0.64 RSI)	4.5 (72)	0.17 (710)
11	Silicone Sealant	-	2.4 (0.35)	-	-	-
12	Spray Foam Insulation	2” (51)	0.17 (0.025)	R-11.5 (2.0 RSI)	2.8 (39)	0.35 (1470)
13	Precast Sandwich Panel, Interior Concrete Panel	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.8 RSI)	1.8 (28)	0.29 (1220)
15	Precast Sandwich Panel, Exterior Concrete Panel	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
16	Precast Sandwich Panel, Structural Ties @ 24” (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
17	Roof Insulation	4” (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
18	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
19	Wood Blocking	5/8” (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
20	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
21	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

Detail 7.5.5

Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Parapet Intersection





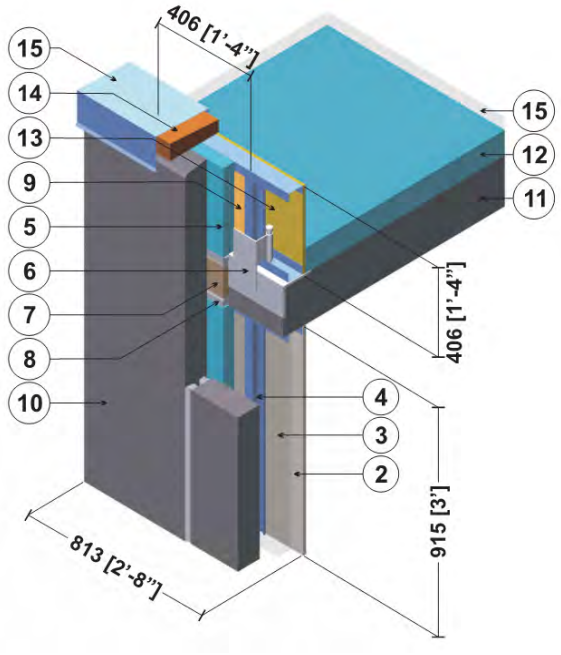
Connector Detail

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 Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 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	Air in Stud Cavity	5 5/8" (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
6	Open Web Steel Joist (550C)	-	347 (50)	-	489 (7830)	0.12 (500)
7	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
8	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
9	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
10	Polyurethane Foam Insulation	5 2/3" (144)	0.17 (0.024)	R-34 (6.0 RSI)	2.8 (30)	0.35 (1470)
11	Precast Sandwich Panel, Interior Concrete	4" (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Precast Sandwich Panel, Insulation	2" (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
13	Precast Sandwich Panel, Exterior Concrete	4" (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Precast Sandwich Panel, Steel Structural Ties @ 24" (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
16	Wood Blocking	5/8" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
17	Roof Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
18	Flashing & roof finish material are incorporated into exterior heat transfer coefficient					
19	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

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

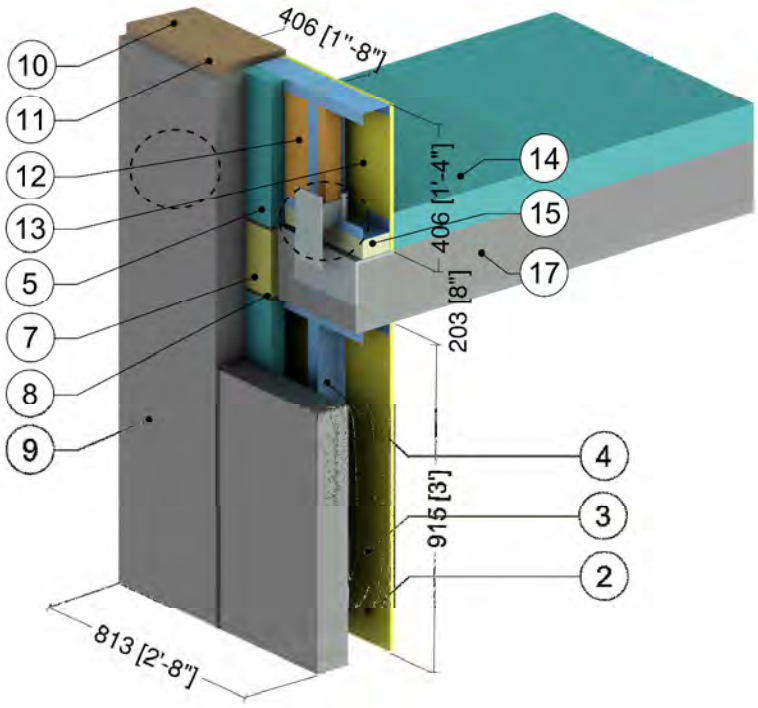


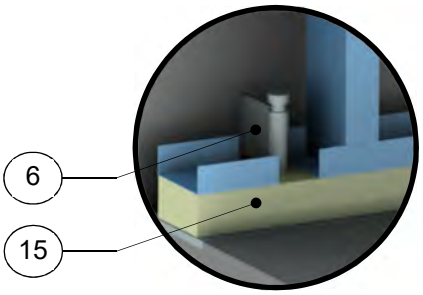
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Rigid Insulation	2” (51)	-	R-10 (1.8 RSI)	1.8 (28)	0.29 (1220)
6	Gravity and Slot Anchors at Roof	-	347 (50)	-	489 (7830)	0.12 (500)
7	Semi Rigid Insulation	1” (25)	0.28 (0.04)	R-3.6 (0.64 RSI)	4.5 (72)	0.17 (710)
8	Silicone Sealant	-	2.4 (0.35)	-	-	-
9	Spray Foam Insulation	1” (25)	0.17 (0.025)	R-5.8 (1.02 RSI)	2.8 (39)	0.35 (1470)
10	Precast Wall Panel	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Roof Insulation	4” (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
13	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
14	Wood Blocking	5/8” (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
15	Flashing & roof finish materials are incorporated into exterior heat transfer coefficient					
16	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

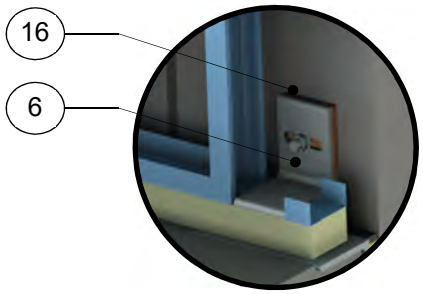
Detail 7.5.7

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





Gravity Anchor Detail



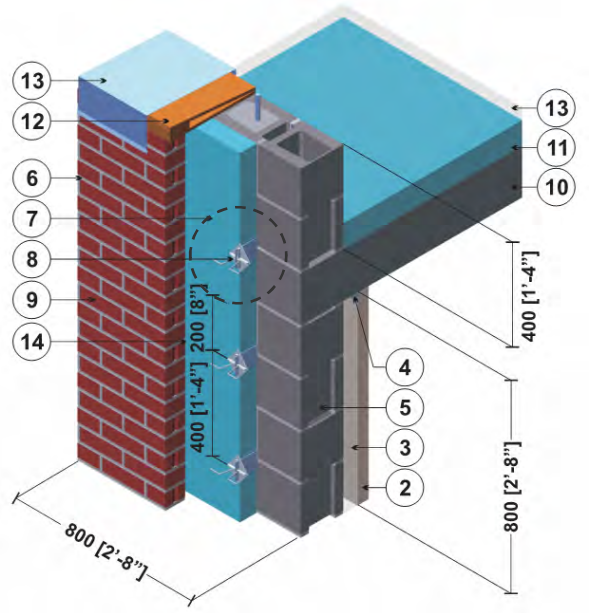
Slot Anchor Detail

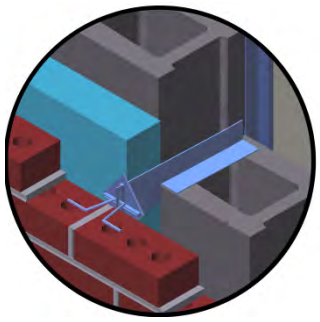
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Rigid Insulation	2” (51)	-	R-10 (1.8 RSI)	1.8 (28)	0.29 (1220)
6	Gravity and Slot Anchors at Roof	-	347 (50)	-	489 (7830)	0.12 (500)
7	Semi Rigid Insulation	1” (25)	0.28 (0.04)	R-3.6 (0.64 RSI)	4.5 (72)	0.17 (710)
8	Silicone Sealant	-	2.4 (0.35)	-	-	-
9	Precast Wall Panel	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Flashing & roof finish materials are incorporated into exterior heat transfer coefficient					
11	Wood Blocking	5/8” (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
12	Spray Foam Insulation	1” (25)	0.17 (0.025)	R-5.8 (1.02 RSI)	2.8 (39)	0.35 (1470)
13	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
14	Roof Insulation	4” (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
15	Armatherm 500	2” (50)	0.32 (0.05)	R-6.2 (1.09 RSI)	-	-
16	Armatherm FRR	3/8” (10)	1.4 (0.20)	-	85 (5.3)	-
17	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
18	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

Detail 7.5.8

Exterior Insulated Concrete Block Wall Assembly with Masonry Ties Supporting Brick Veneer – Parapet & Roof Intersection





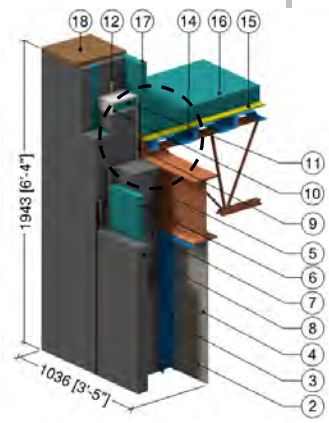
Brick Tie Detail

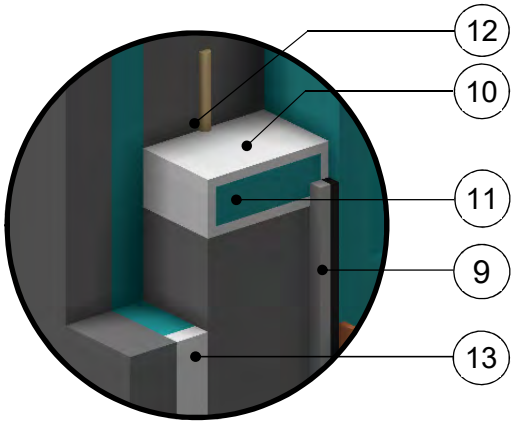
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" Steel Studs with Metal Tracks	20 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
8	Masonry Ties @ 16" (406) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
12	Wood Blocking	5/8" (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
13	Flashing & roof finish materials are incorporated into exterior heat transfer coefficient					
14	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
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

Detail 7.5.9

Precast Sandwich Panel – Steel Roof Deck with Open Web Steel Joist & Paraloc Thermally Broken Parapet Intersection



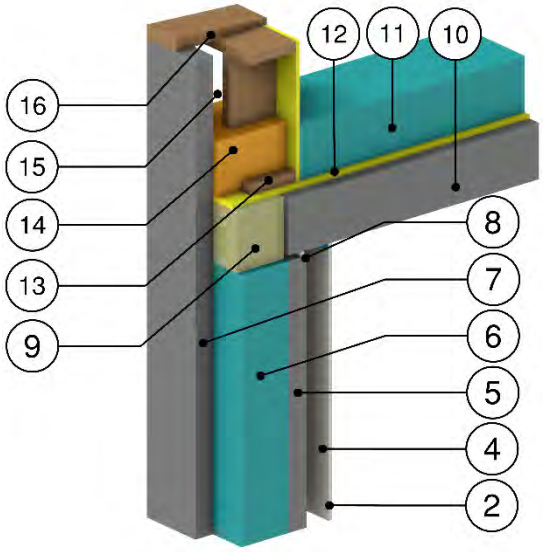


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	4 1/8" (130)	-	R-0.9 (RSI-0.16)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	7 3/4" (197)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	2" to 4" (51 to 102)	-	R-10 (1.8 RSI) to R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Precast Sandwich Panel, Structural Ties @ 24" (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Silicone Sealant	-	1.7 (0.25)	-	-	-
10	Paraloc, PVC Foam	1/2" (13)	0.42 (0.06)	-	-	-
11	Paraloc, Insulation	2" to 4" (51 to 102)	-	R-10 to R-20 (1.8 RSI to 3.5 RSI)	1.8 (28)	0.29 (1220)
12	FRP rebar @ 10" (254) o.c.	#5 (16M)	2.4 (0.35)	-	-	-
13	Tigerloc, PVC Foam	1" (25)	0.42 (0.06)	-	-	-
14	Open Web Steel Joist, Beam, Angle, and Deck	-	347 (50)	-	489 (7830)	0.12 (500)
15	Exterior Sheathing	5/8" (16)	1.1 (0.16)	R-0.6 (0.1 RSI)	50 (800)	0.26 (1090)
16	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
17	Parapet Insulation	2" to 4" (51 to 102)	-	R-10 to R-20 (1.8 RSI to 3.5 RSI)	1.8 (28)	0.29 (1220)
18	Wood Blocking	5/8" (16)	0.63 (0.09)	-	27.8 (445)	0.45 (1880)
19	Flashing and roof finish material are incorporated into exterior heat transfer coefficient					
20	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

Detail 7.5.10

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Roof to Wall Intersection with Wood-Framed Parapet

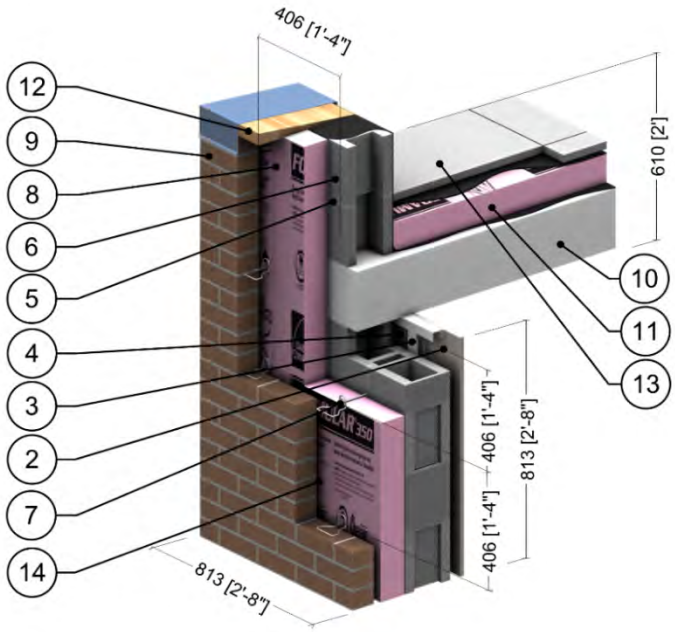


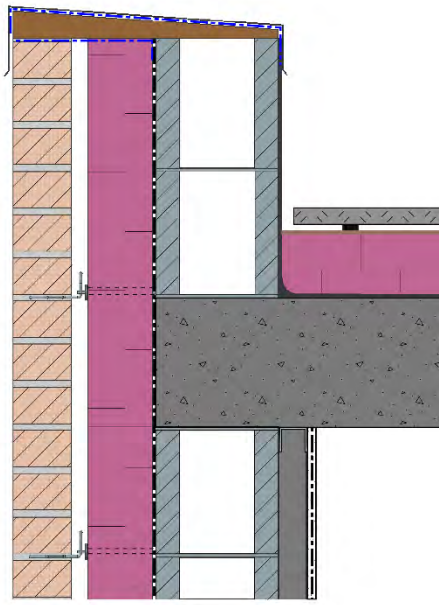
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 (0.11 RSI) to R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8” (15)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	3” (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	8” (203)	-	R-40 (7.04 RSI) to R-56 (9.86 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3” (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Sealant	-	1.73 (0.25)	-	-	-
9	Mineral Wool Slab Insulation	8” (203)	0.238 (0.034)	R-33.6 (5.92 RSI)	4 (64)	0.20 (850)
10	Concrete Roof Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Roof Insulation	8” (203)	0.167 (0.024)	R-48 (8.45 RSI)	1.8 (28)	0.29 (1220)
12	Exterior Gypsum	5/8” (15)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	2x8 Wood Stud (16” o.c.)	7 1/4” (184)	0.69 (0.1)	-	31 (500)	0.45 (1880)
14	Spray Foam Insulation in Parapet Cavity	8” (203)	0.167 (0.024)	-	2.4 (39)	0.35 (1470)
15	Air in Parapet Cavity	12” (305)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
16	Wood Cap	1” (25)	0.69 (0.1)	-	31 (500)	0.45 (1880)
17	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

Detail 7.5.11

Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer – Parapet & Roof Intersection with Uninsulated Parapet



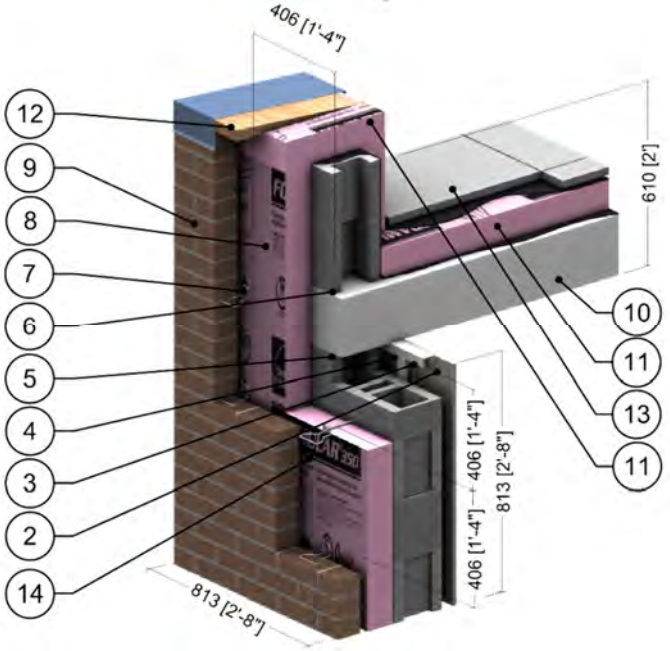


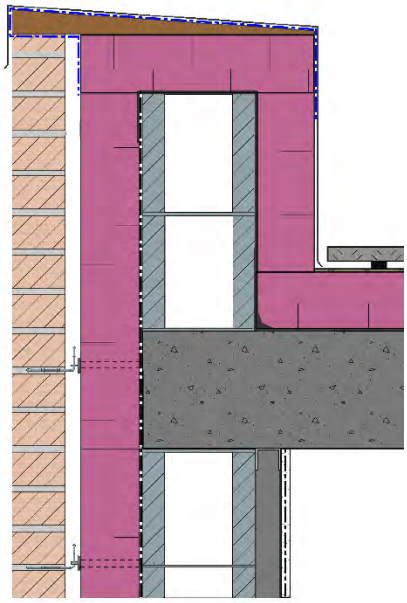
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Metal Tracks	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Heckmann Pos-I-Tie Masonry Tie @ 16" (406) o.c.	varies	-	-	-	-
8	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
9	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Foamular XPS Rigid Insulation	4" (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
12	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
13	Flashing & roof finish materials are incorporated into exterior heat transfer coefficient					
14	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 7.5.12

Owens Corning Exterior Insulated Concrete Block Wall Assembly with Heckmann Pos-I-Tie Veneer Anchoring System Supporting Brick Veneer – Parapet & Roof Intersection with Insulation Wrapped Around Parapet



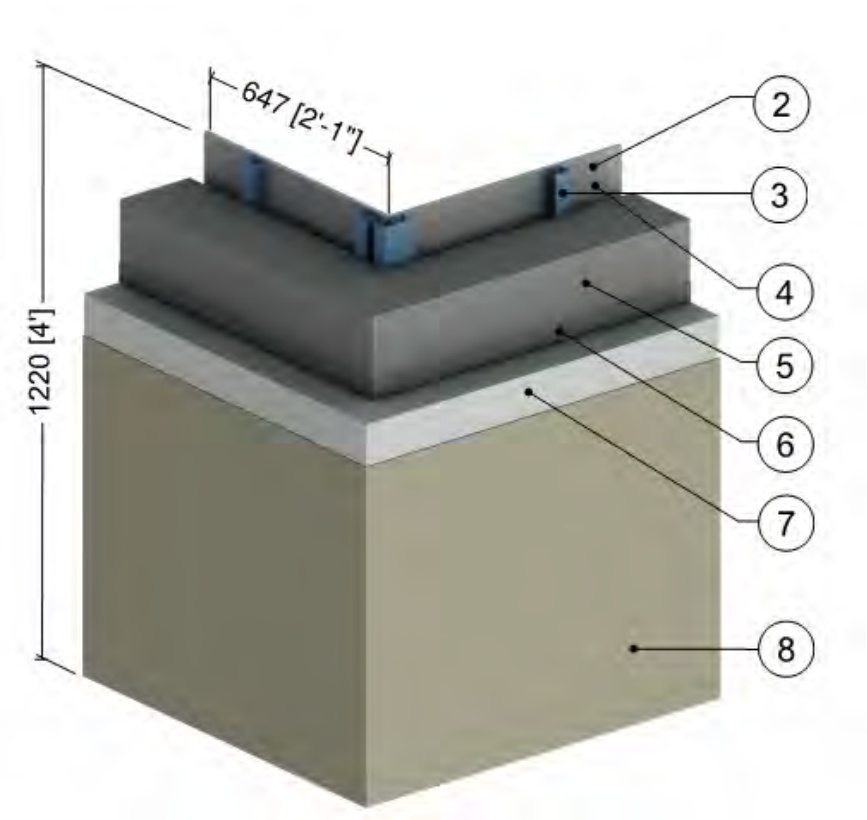


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Metal Tracks	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Heckmann Pos-I-Tie Masonry Tie @ 16" (406) o.c.	varies	-	-	-	-
8	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
9	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
10	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
11	Foamular XPS Rigid Insulation	4" (102)	0.20 (0.029)	R-20 (3.52 RSI)	1.8 (28)	0.29 (1220)
12	Wood Blocking	5/8" (16)	0.69 (0.10)	R-1.0 (0.18 RSI)	31 (500)	0.45 (1880)
13	Flashing & roof finish materials are incorporated into exterior heat transfer coefficient					
14	Air Gap	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 7.6.1

Exterior Insulated Concrete Drained EIFS Wall Assembly – Corner Intersection

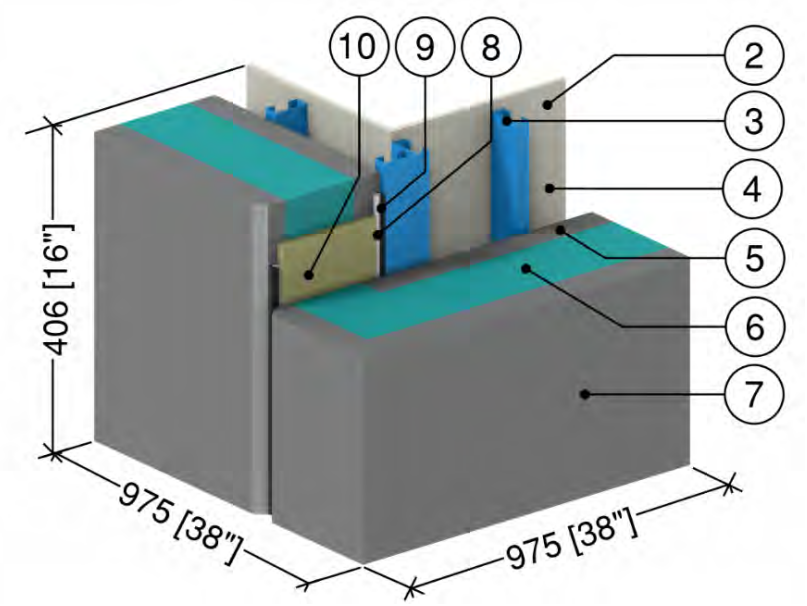


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 (0.11 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" x 1 5/8" Steel Studs (16"o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Concrete Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Weather Resistive Barrier with Adhesive	-	-	-	-	-
7	Insulation Board	4" (100)	0.27 (0.039)	R-15 (2.64 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

Detail 7.6.2

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Outside Corner

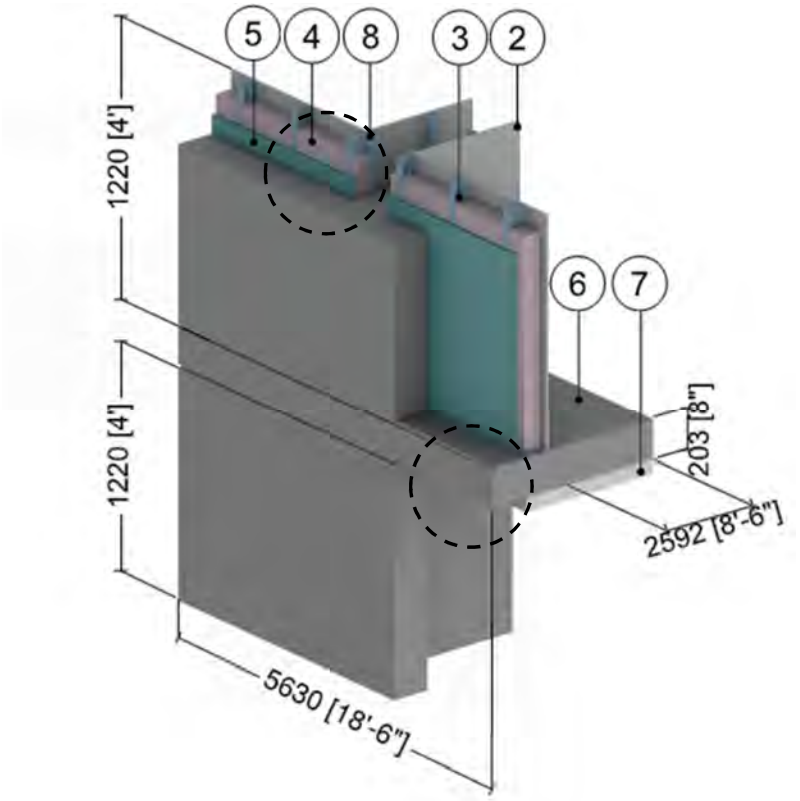


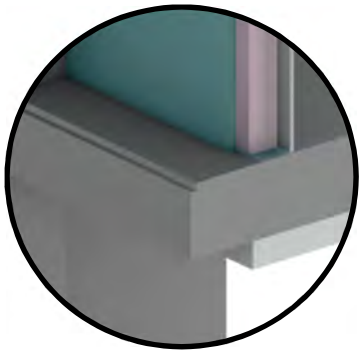
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	5/8" (15)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	8" (203)	-	R-40 (7.04 RSI) to R-56 (9.86 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Sealant	-	1.73 (0.25)	-	-	-
9	Backer Rod	-	0.25 (0.036)	-	-	-
10	Mineral Wool Insulation	-	0.238 (0.034)	-	4 (64)	0.20 (850)
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

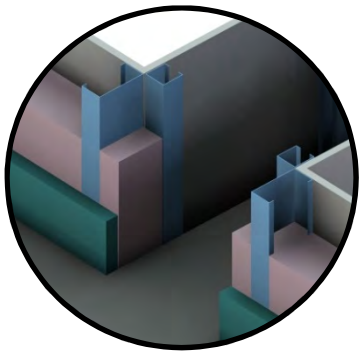
Detail 7.7.1

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





Slab Edge Detail



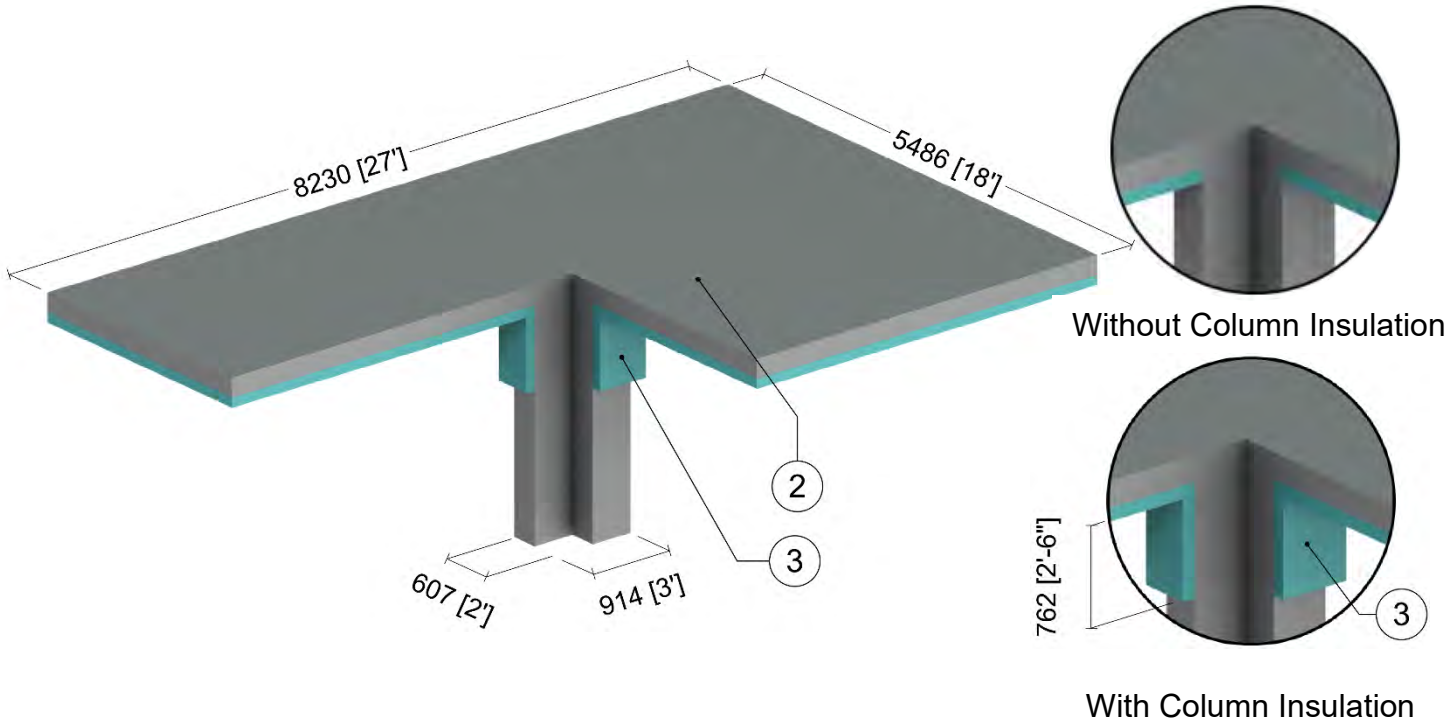
Partition Detail

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 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	3 5/8" x 1 5/8" Steel Studs with Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8" (92)	0.29 (0.042)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
5	Continuous Insulation	Varies	-	R-10 to R-15 (1.76 RS to 2.64 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Wall & Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Spray Applied Fiberglass Insulation	4" (102)	0.20 (0.029)	R-20 (3.5 RSI)	0.9 (14)	0.12 (500)
8	1 5/8" x 1 5/8" Steel Studs with Bottom Tracks	18 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

Detail 7.7.2

Insulated Concrete Floor Slab – Concrete Column Intersection

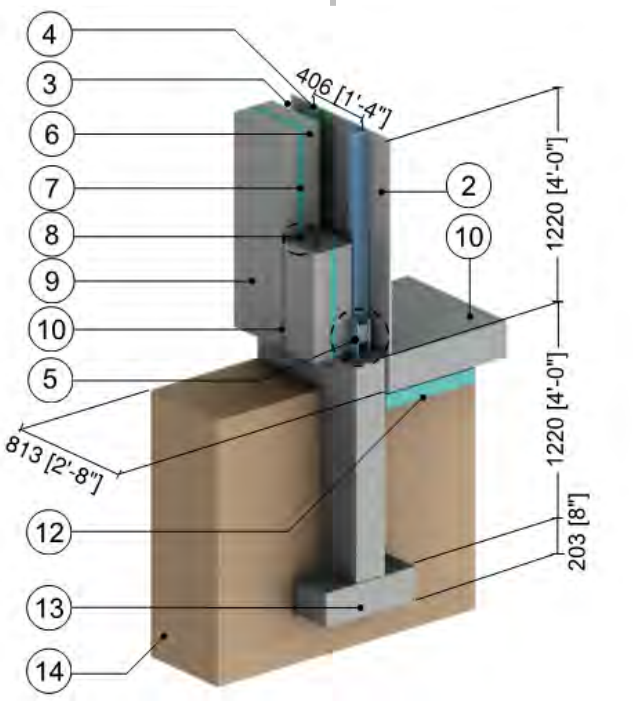


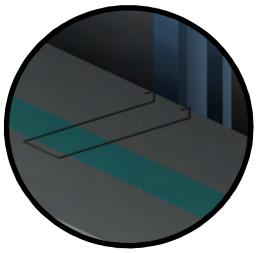
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.9 (0.16 RSI)	-	-
2	Concrete Floor	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Spray Applied Fiberglass Insulation	4" (101)	0.2 (0.029)	R-20 (3.5 RSI)	0.9 (14)	0.12 (500)
4	Exterior Film[1]	-	-	R-0.6 (0.11 RSI)	-	-

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

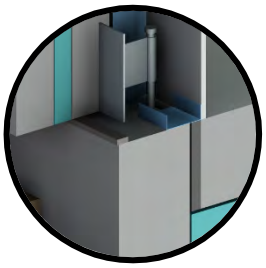
Detail 7.7.3

Precast Sandwich Wall Assembly Slab and Foundation Intersection





Connector Detail



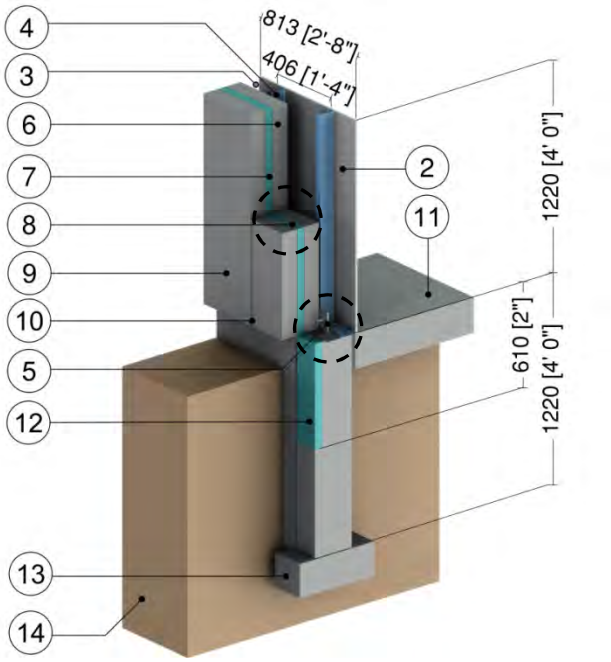
Gravity and Slot Anchor Detail

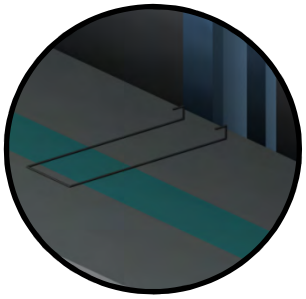
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5" (127)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" Steel Studs with Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
6	Precast Sandwich Panel, Interior Concrete	4" (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Precast Sandwich Panel, Insulation	2" (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	Precast Sandwich Panel, Structural Ties @ 24" (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Precast Sandwich Panel, Exterior Concrete	4" (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Silicone Sealant	-	2.4 (3.5)	-	174 (2800)	0.17 (700)
11	Concrete Slab on Grade	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Foundation Insulation	3 1/2" (89)	0.24 (0.0343)	R-15 (2.6 RSI)	1.8 (28)	0.29 (1220)
13	Concrete Footing	12" (305)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Soil	-	15.6 (2.25)	-	-	-
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

Detail 7.7.4

Precast Sandwich Panel with 3 5/8" Steel Stud (16" o.c.) – Concrete Slab and Foundation Wall





Connector Detail



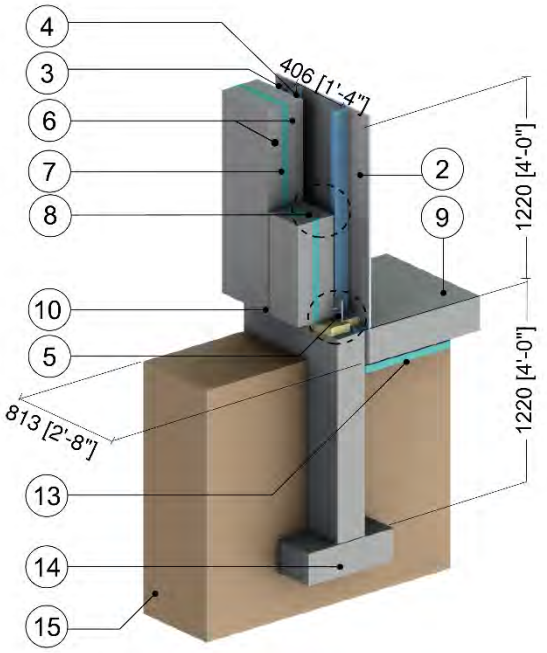
Gravity and Slot Anchor Detail

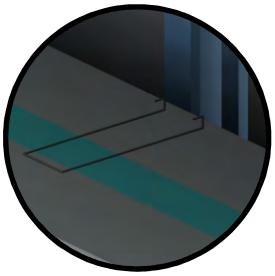
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5 5/8" (143)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
6	Precast Sandwich Panel, Interior Concrete	4" (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Precast Sandwich Panel, Insulation	2" (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	Precast Sandwich Panel, Structural Ties @ 24" o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Precast Sandwich Panel, Exterior Concrete	4" (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Silicone Sealant	-	2.4 (3.5)	-	174 (2800)	0.17 (700)
11	Concrete Slab on Grade	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Foundation Insulation	2" (50)	0.2 (0.028)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
13	Concrete Footing	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Soil	-	15.6 (2.25)	-	-	-
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

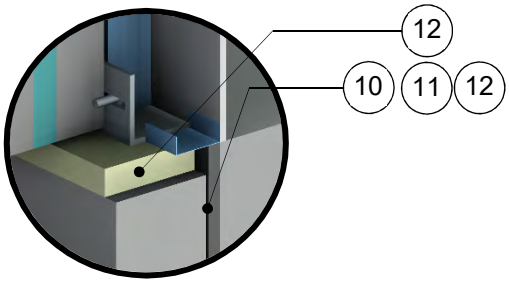
Detail 7.7.5

Precast Sandwich Panel with 3 5/8” Steel Stud (16” o.c.) – Thermally Broken Concrete Slab and Foundation Intersection





Connector Detail



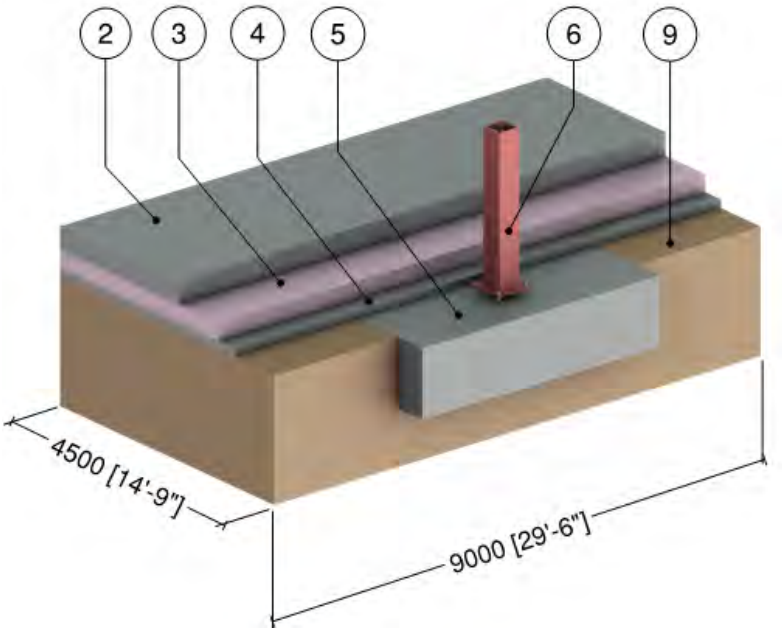
Gravity and Slot Anchor Detail

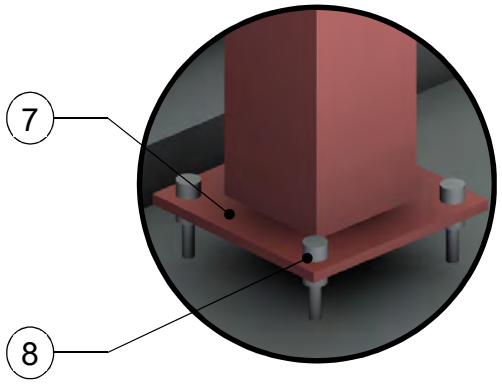
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	5” (127)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	3 5/8” Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Gravity and Slot Anchors at Slab	-	347 (50)	-	489 (7830)	0.12 (500)
6	Precast Sandwich Panels	4” (102)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Precast Sandwich Panel, Insulation	2” (51)	-	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	Precast Sandwich Panel, Structural Ties @ 24” (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Concrete Slab on Grade	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Sealant	-	2.4 (3.5)	-	174 (2800)	0.17 (700)
11	Fibreboard	1” (25)	0.38 (0.055)	R-2.6 (0.47 RSI)	16 (254)	0.50 (2100)
12	Armatherm 500	2” (50)	0.32 (0.05)	R-6.2 (1.09 RSI)	-	-
13	Foundation Insulation	3 1/2” (89)	0.24 (0.0343)	R-15 (2.6 RSI)	1.8 (28)	0.29 (1220)
14	Concrete Footing	12" (305)	12.5 (1.8)	-	140 (2250)	0.20 (850)
15	Soil	-	15.6 (2.25)	-	-	-
16	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

Detail 7.7.6

Insulated Slab on Grade – Steel Column





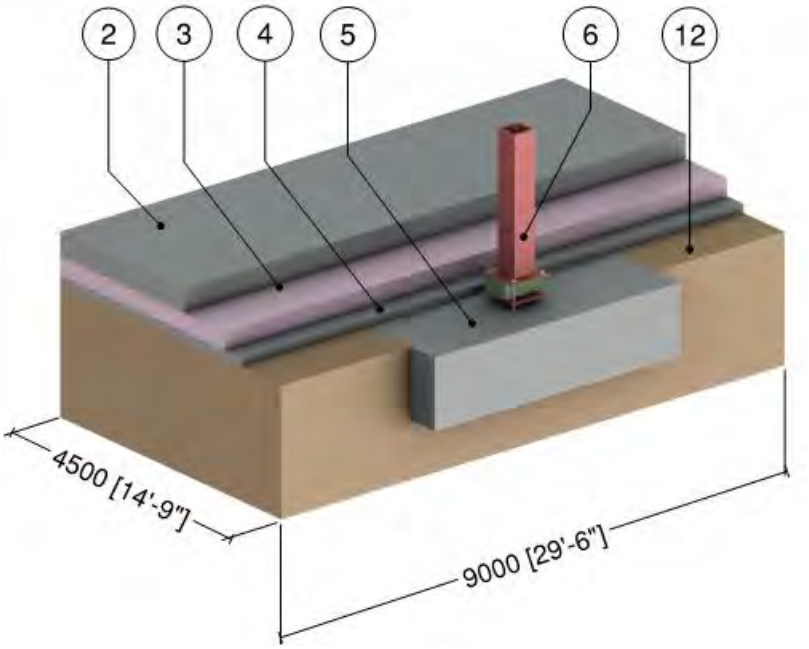
Column Connection

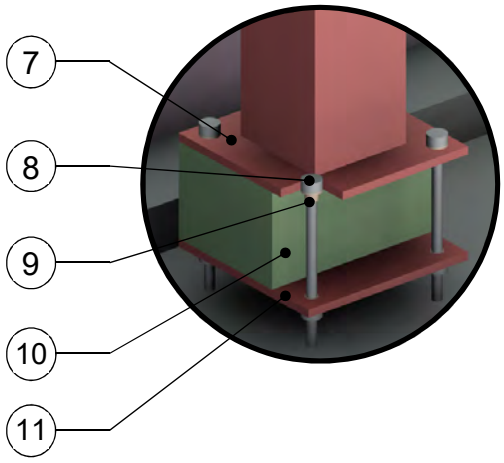
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Concrete Slab on Grade	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Extruded Polystyrene Insulation (XPS)	6" (152)	0.20 (0.029)	R-30 (5.28 RSI)	1.8 (28)	0.29 (1220)
4	Concrete Sub Slab	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
5	Concrete Footing	24" (610)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	8" x 8" HSS Column	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
7	14" x 14" x 1/2" Base Plate	1/2" (13)	430 (62)	-	489 (7830)	0.12 (500)
8	Stainless Steel Bolts	3/4" (6) ∅	117 (17)	-	489 (7830)	0.12 (500)
9	Soil	-	10.4 (1.5)	-	-	-

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

Detail 7.7.7

Insulated Slab on Grade – Armatherm 500 Thermal Break under Column





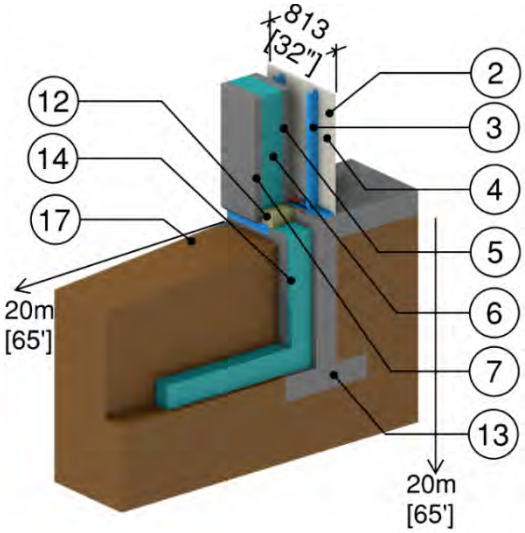
Armatherm 500 Column Thermal Break

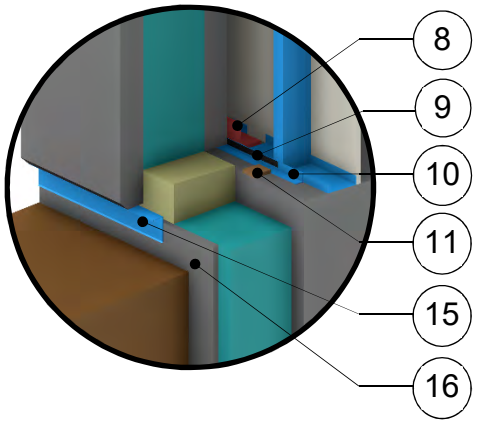
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Concrete Slab on Grade	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Extruded Polystyrene Insulation (XPS)	6" (152)	0.20 (0.029)	R-30 (5.28 RSI)	1.8 (28)	0.29 (1220)
4	Concrete Sub Slab	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
5	Concrete Footing	24" (610)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	8" x 8" HSS Column	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
7	14" x 14" x 1/2" Base Plate	1/2" (13)	430 (62)	-	489 (7830)	0.12 (500)
8	Stainless Steel Bolts	3/4" (6) ∅	117 (17)	-	489 (7830)	0.12 (500)
9	Armatherm FRR Washers and Bushing	-	1.4 (0.2)	-	85 (1362)	-
10	Armatherm 500 Thermal Break	6" (152)	0.32 (0.05)	-	-	-
11	14" x 14" x 1/2" Base Plate	1/2" (13)	430 (62)	-	489 (7830)	0.12 (500)
12	Soil	-	10.4 (1.5)	-	-	-

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

Detail 7.7.8

Highly Insulated Precast Concrete Sandwich Panel Wall Assembly – Base of Wall at Foundation with Insulation Skirt



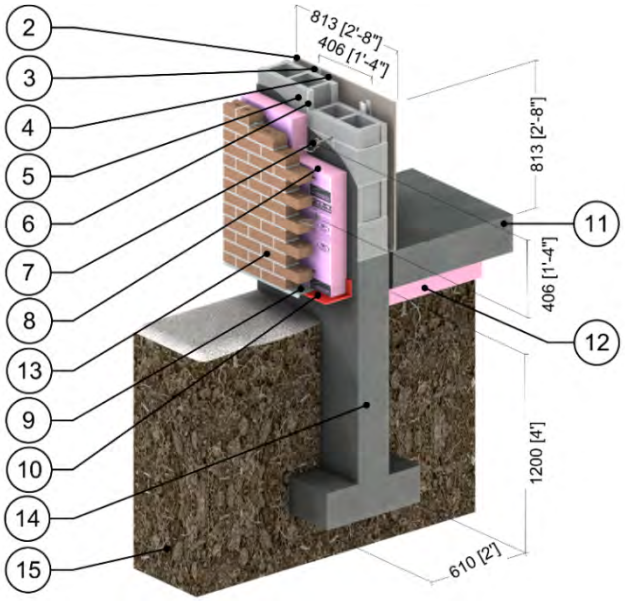


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI) to R-0.9 (0.16 RSI)	-	-
2	Gypsum Board	5/8" (15)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Precast Sandwich Panel, Interior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Precast Sandwich Panel Insulation	8" (203)	-	R-40 (7.04 RSI) to R-56 (9.86 RSI)	1.8 (28)	0.29 (1220)
7	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Anchor	-	347 (50)	-	489 (7830)	0.12 (500)
9	Sealant	-	1.73 (0.25)	-	-	-
10	Angle	-	430 (62)	-	489 (7830)	0.12 (500)
11	Shims	-	0.69 (0.1)	-	-	-
12	Mineral Wool Slab Insulation	8" (203)	0.238 (0.034)	R-33.6 (5.92 RSI)	4 (64)	0.20 (850)
13	Concrete Footing and Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
14	Foundation Insulation	8" (203)	0.167 (0.024)	R-48 (8.45 RSI)	1.8 (28)	0.29 (1220)
15	Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
16	Cover Board	5/8" (15)	12.5 (1.8)	-	140 (2250)	0.20 (850)
17	Soil	-	13.9 (2)	-	-	-
18	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

Detail 7.7.9

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

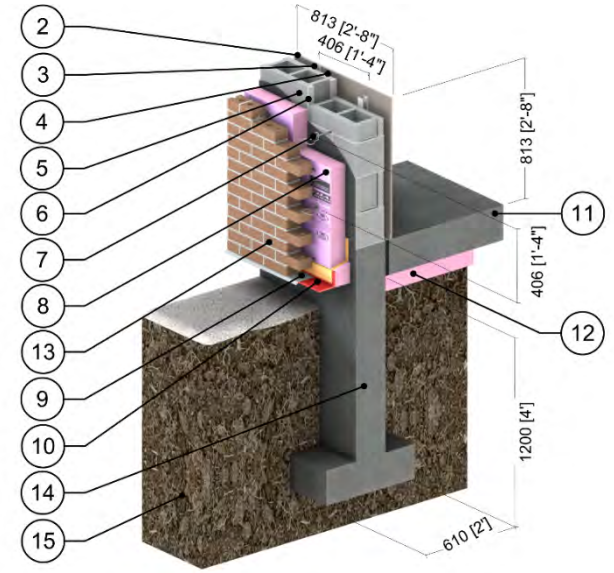


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Bottom Track	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Heckmann Pos-I-Tie Masonry Tie @ 16" (406) o.c.	varies	-	-	-	-
8	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
9	Steel Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Metal Flashing	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Concrete Slab on Grade	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Foamular XPS Insulation	3 1/2" (89)	0.20 (0.029)	R-17.5 (3.08 RSI)	1.8 (28)	0.29 (1220)
13	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
14	Concrete Footing	24" (610)	12.5 (1.8)	-	140 (2250)	0.20 (850)
15	Soil	-	15.6 (2.25)	-	-	-
16	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

Detail 7.7.10

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 and Insulation Below Floor – Slab on Grade and Foundation Intersection

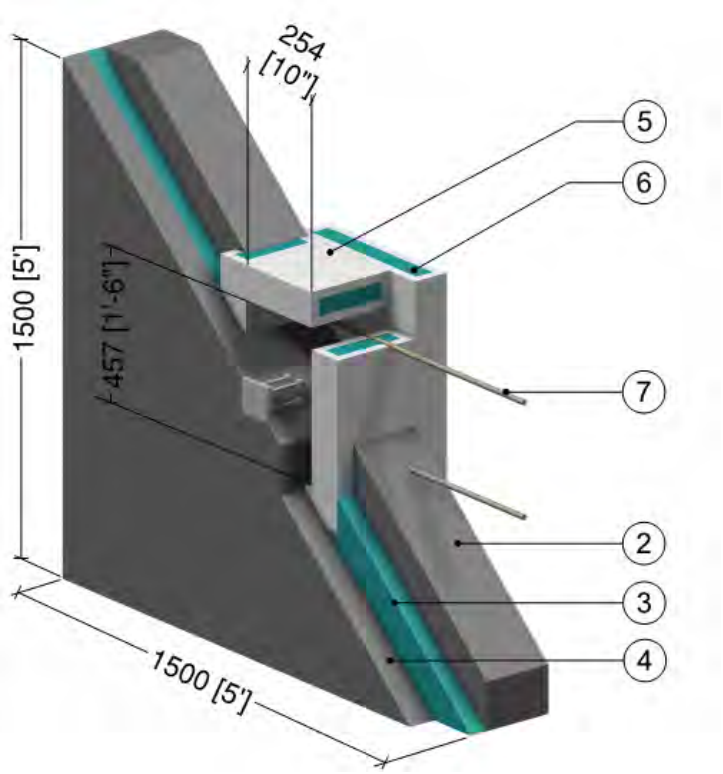


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	1 5/8" Steel Studs with Bottom Track	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	7 5/8" (190)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	Cement Mortar	-	3.5 (0.5)	-	113 (1800)	0.12 (500)
7	Heckmann Pos-I-Tie Masonry Tie @ 16" (406) o.c.	varies	-	-	-	-
8	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
9	Stainless Steel Stand-off Shelf Angle	3/8" (10)	118 (17)	-	503 (8060)	0.12 (500)
10	Metal Flashing	20 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Concrete Slab on Grade	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Foamular XPS Insulation	3 1/2" (89)	0.20 (0.029)	R-17.5 (3.08 RSI)	1.8 (28)	0.29 (1220)
13	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
14	Concrete Footing	24" (610)	12.5 (1.8)	-	140 (2250)	0.20 (850)
15	Soil	-	15.6 (2.25)	-	-	-
16	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

Detail 7.8.1

Precast Sandwich Panel Wall Assembly – Emloc Thermally Broken Embedment 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 Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Precast Sandwich Panel, Interior Concrete Panel	7 3/4" (197)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Precast Sandwich Panel Insulation	2" to 4" (51 to 102)	-	R-10 to R-20 (1.8 RSI to 3.5 RSI)	1.8 (28)	0.29 (1220)
4	Precast Sandwich Panel, Exterior Concrete Panel	3" (76)	12.5 (1.8)	-	140 (2250)	0.20 (850)
5	Emloc, PVC Foam	1" (25)	0.42 (0.06)	-	-	-
6	Emloc, Insulation	2" to 4" (51 to 102)	-	R-10 to R-20 (1.8 RSI to 3.5 RSI)	1.8 (28)	0.29 (1220)
7	FRP rebar	#5 (16M)	2.4 (0.35)	-	-	-
8	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

8.0 Wood-Frame and Timber Construction

Detail 8.1.1 ..... **A.8.1**

Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Clear Wall

Detail 8.1.2 ..... **A.8.2**

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Clear Wall

Detail 8.1.3 ..... **A.8.3**

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Clear Wall

Detail 8.1.4 ..... **A.8.4**

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Horizontal Metal Z-Girts (24” o.c.) Supporting Fiber Cement Board – Clear Wall

Detail 8.1.5 ..... **A.8.5**

Exterior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Knight MFI-System (24” o.c.) Supporting Cladding – Clear Wall

Detail 8.1.6 ..... **A.8.6**

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Knight MFI-System (24” o.c.) Supporting Cladding – Clear Wall

Detail 8.1.7 ..... **A.8.7**

Exterior Insulated 2x6 Wood Stud (16”o.c.) Wall Assembly with Thermally Broken Aluminum Clip Rail System (24” o.c.) Supporting Cladding – Clear Wall

Detail 8.1.8 ..... **A.8.8**

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16” o.c.) Wall Assembly with 2” Gap – Clear Wall

Detail 8.1.9 ..... **A.8.9**

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16” o.c.) Wall Assembly with 3” Gap – Clear Wall

Detail 8.1.10 ..... **A.8.10**

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16” o.c.) Wall Assembly with 4” Gap – Clear Wall

Detail 8.1.11 ..... **A.8.11**

Interior Insulated Cross Laminated Timber (CLT) Spandrel with ISO-CONNECT Anchor – Anchor Point Transmittance

Detail 8.1.12 ..... **A.8.12**

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

Detail 8.1.13 ..... **A.8.13**

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

Detail 8.1.14 ..... A.8.14

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-24 Batt Insulation in Stud Cavity – Clear Wall

Detail 8.1.15 ..... A.8.15

Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Clear Wall

Detail 8.1.16 ..... A.8.16

Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Wood Strapping and Continuous Rigid Insulation Supporting Fiber Cement Board

Detail 8.2.1 ..... A.8.17

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Rim Joist and Floor Intersection without Metal Flashing Bypassing Exterior Insulation

Detail 8.2.2 ..... A.8.18

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Rim Joist and Floor Intersection with Metal Flashing Bypassing Exterior Insulation

Detail 8.2.3 ..... A.8.19

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Cantilevered Wood Joist Balcony Intersection

Detail 8.2.4 ..... A.8.20

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Independently Supported Balcony Intersection

Detail 8.2.5 ..... A.8.21

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Cantilevered Floor Intersection

Detail 8.2.6 ..... A.8.22

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16” o.c.) Wall Assembly with 2” Gap – Rim Joist and Floor Intersection

Detail 8.2.7 ..... A.8.23

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16” o.c.) Wall Assembly with 3” Gap – Rim Joist and Floor Intersection

Detail 8.2.8 ..... A.8.24

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16” o.c.) Wall Assembly with 4” Gap – Rim Joist and Floor Intersection

Detail 8.2.9 ..... A.8.25

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16” o.c.) Wall Assembly with 2” Gap – Insulated Rim Joist and Floor Intersection

Detail 8.2.10 ..... A.8.26

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16” o.c.) Wall Assembly with 3” Gap – Insulated Rim Joist and Floor Intersection

Detail 8.2.11 ..... A.8.27

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16” o.c.) Wall Assembly with 4” Gap – Insulated Rim Joist and Floor Intersection

Detail 8.3.1 ..... A.8.28

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Vinyl Window Intersection

Detail 8.3.2 ..... A.8.29

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Aluminum Window Intersection

Detail 8.3.3 ..... A.8.30

Exterior and Interior Insulated 2x6 Wood Stud (8” o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Vinyl Window Intersection

Detail 8.3.4 ..... A.8.31

Exterior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed Flange Mounted Vinyl Window Intersection with Window Positioned in Wood Framing

Detail 8.3.5 ..... A.8.32

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed Flange Mounted Vinyl Window Intersection with Window Positioned in Wood Framing

Detail 8.3.6 ..... A.8.33

Exterior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping (16” o.c.) and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed High Performance Vinyl Window Intersection (Insulated Frames)

Detail 8.3.7 ..... A.8.34

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping (16” o.c.) and Continuous Insulation Supporting Rainscreen

Fiber Cement Board – Triple Glazed High Performance Vinyl Window Intersection (Insulated Frames)

Detail 8.3.8 ..... **A.8.35**

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

Detail 8.3.9 ..... **A.8.36**

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

Detail 8.3.10 ..... **A.8.37**

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

Detail 8.3.11 ..... **A.8.38**

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

Detail 8.3.12 ..... **A.8.39**

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

Detail 8.3.13 ..... **A.8.40**

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

Detail 8.3.14 ..... **A.8.41**

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

Detail 8.3.15 ..... **A.8.42**

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

Detail 8.3.16 ..... **A.8.43**

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

Detail 8.4.1 ..... **A.8.44**

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Vented Low-slope Roof & Parapet Intersection

Detail 8.4.2 ..... A.8.45

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Sloped Wood Framed Roof & Wall Intersection with Insulation at Ceiling

Detail 8.4.3 ..... A.8.46

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Sloped Wood Framed Roof & Wall Intersection with Insulation at Roof Sheathing

Detail 8.4.4 ..... A.8.47

Ventilated Wood Frame Low Slope Roof - Masonry Firewall Intersection

Detail 8.4.5 ..... A.8.48

Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board –Low-Slope Roof & Parapet Intersection

Detail 8.5.1 ..... A.8.49

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting and Continuous Insulation Fiber Cement Board – Corner Intersection

Detail 8.6.1 ..... A.8.50

Wood-frame Sliding Door – Concrete Floor Intersection for Unheated Spaces (Parking Garages)

Detail 8.6.2 ..... A.8.51

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Continuous Insulation and Wood Strapping Supporting Fiber Cement Board – Rim Joist and Interior Insulated At-Grade Foundation Wall Intersection

Detail 8.6.3 ..... A.8.52

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Continuous Insulation and Wood Strapping Supporting Fiber Cement Board – Rim Joist and Exterior Insulated At-Grade Foundation Wall Intersection

Detail 8.6.4 ..... A.8.53

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Exterior Insulated At-Grade Foundation Wall Intersection

Detail 8.6.5 ..... A.8.54

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Rim Joist and Floor Intersection

Detail 8.6.6 ..... A.8.55

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer – Rim Joist and Floor Intersection

Detail 8.7.1 ..... A.8.56

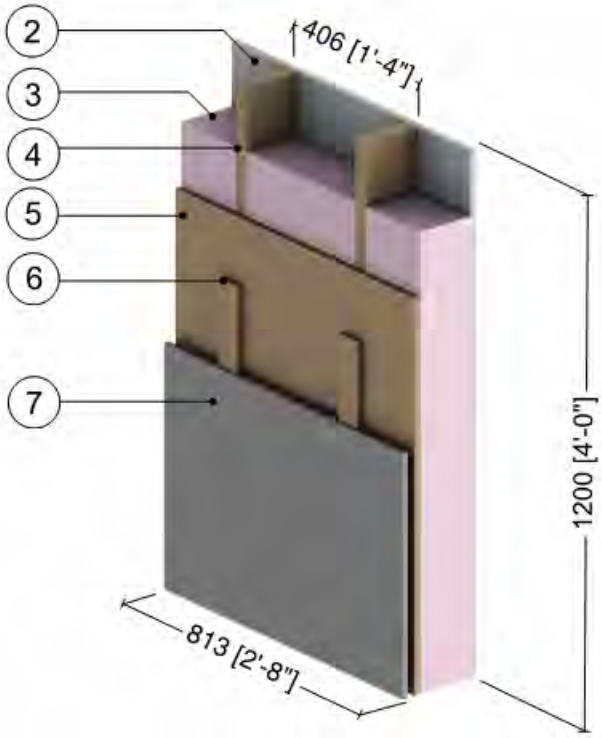
Exterior Insulated Wood Infill Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Concrete Wall and Intermediate Floor Intersection with Flashing Bypassing Exterior Insulation

Detail 8.7.2 ..... A.8.57

Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Wood Strapping and Continuous Rigid Insulation Supporting Fiber Cement Board – Cross Laminated Timber Floor Intersection with Flashing Bypassing Exterior Insulation

Detail 8.1.1

Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Clear Wall

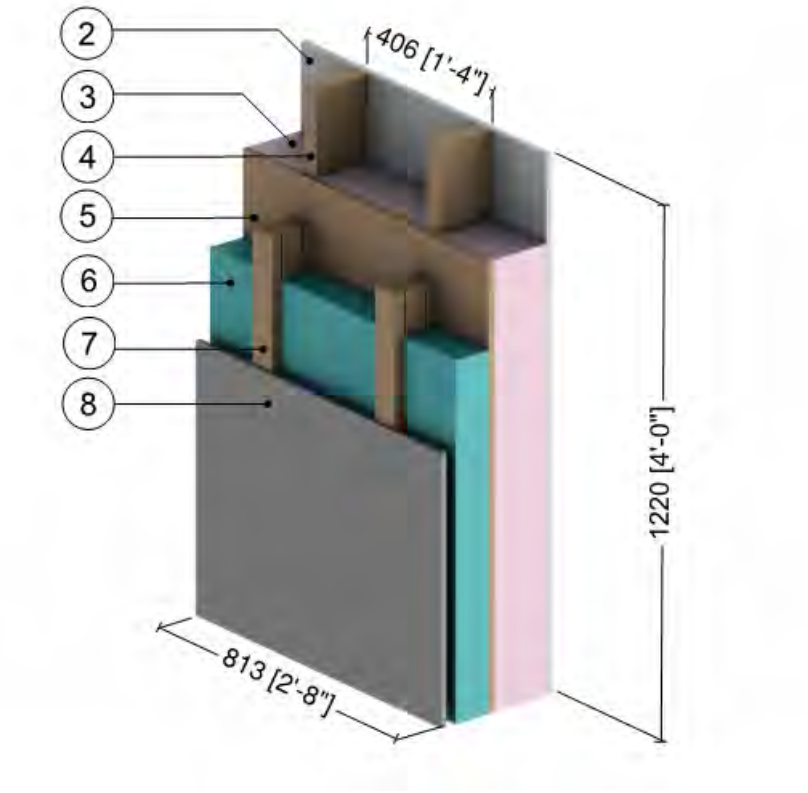


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
7	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
8	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.1.2

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Clear Wall

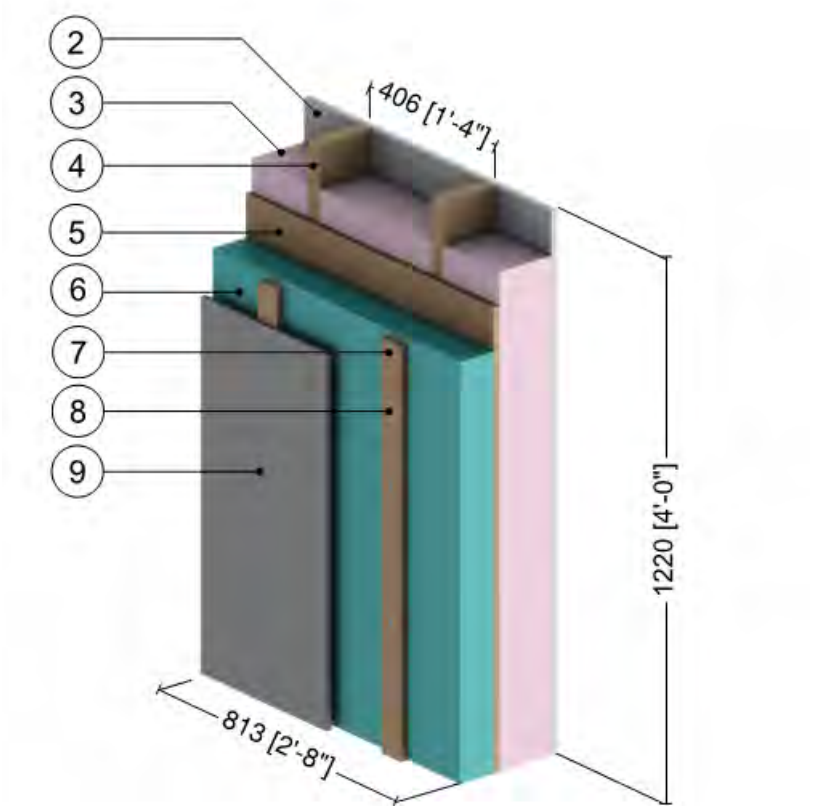


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping (16” o.c.)	Varies	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.1.3

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Clear Wall

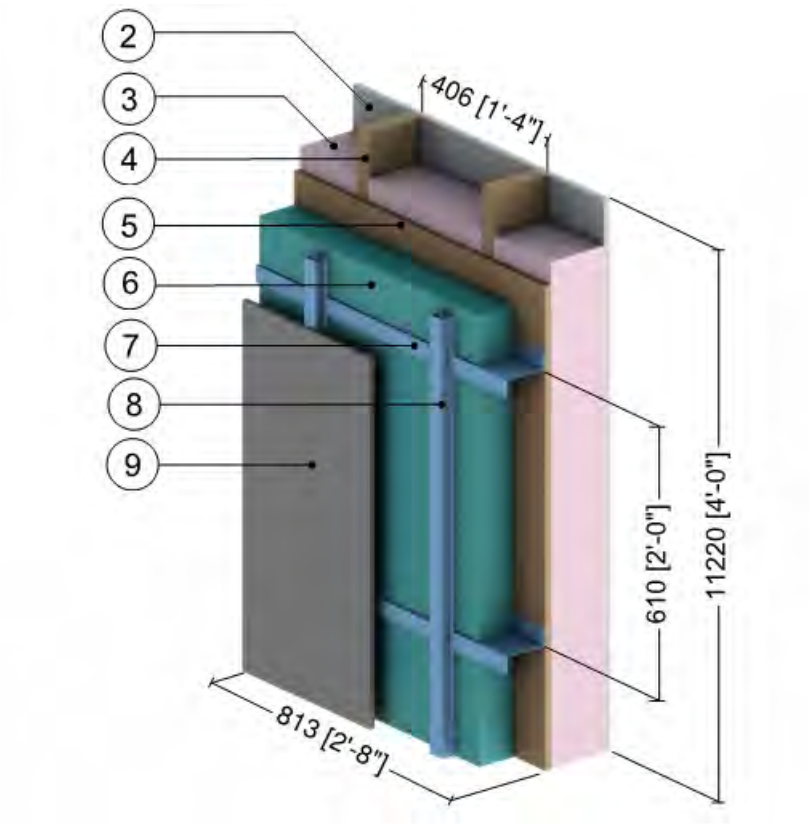


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
7	Wood Strapping (1” x 3”)	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.1.4

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Horizontal Metal Z-Girts (24” o.c.) Supporting Fiber Cement Board – Clear Wall

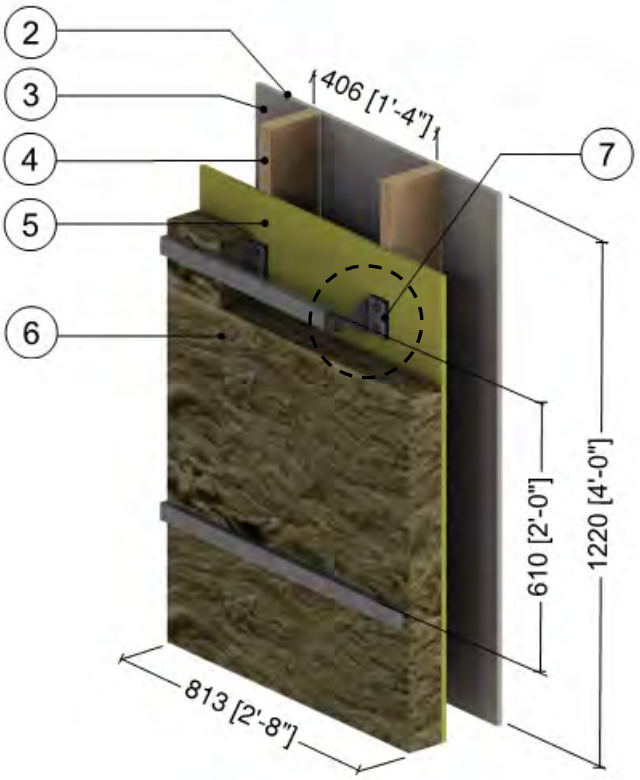


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film (right side)[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-25 (0.88 RSI to 4.40 RSI)	1.8 (28)	0.29 (1220)
7	Horizontal Z-Girt with 1 1/2” Flange	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Steel Furring Hat Track (16” o.c.)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film (left side)[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.1.5

Exterior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Knight MFI-System (24” o.c.) Supporting Cladding – Clear Wall





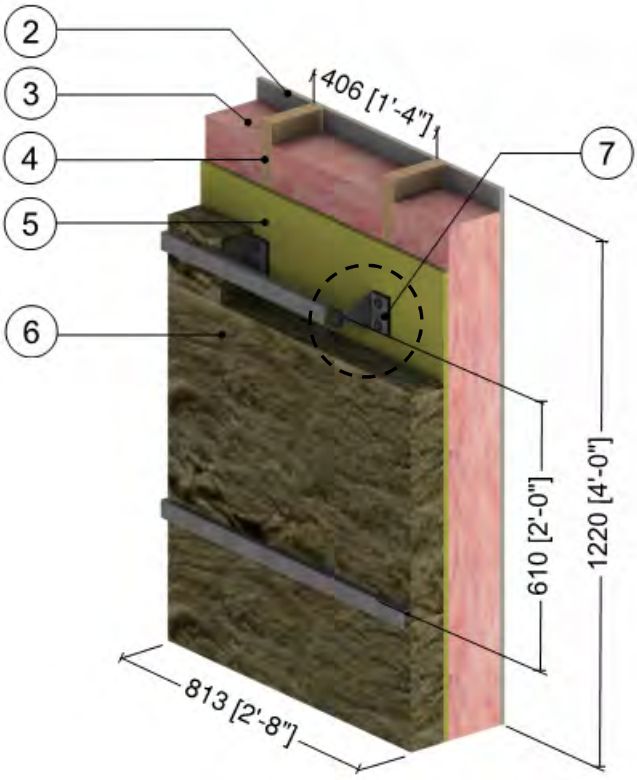
ThermaBracket Detail

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 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	Air in Stud Cavity	5 1/2” (140)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	2x6 Wood Stud (16”o.c.)	5 1/2” (140)	0.83 (0.12)	-	31 (500)	0.45 (1880)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	0.24 (0.03)	R-8.4 to R-25.2 (1.48 RSI to 4.44 RSI)	1.8 (28)	0.29 (1220)
7	ThermaBrackets (24” o.c. vertically)	18 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.1.6

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Knight MFI-System (24” o.c.) Supporting Cladding – Clear Wall





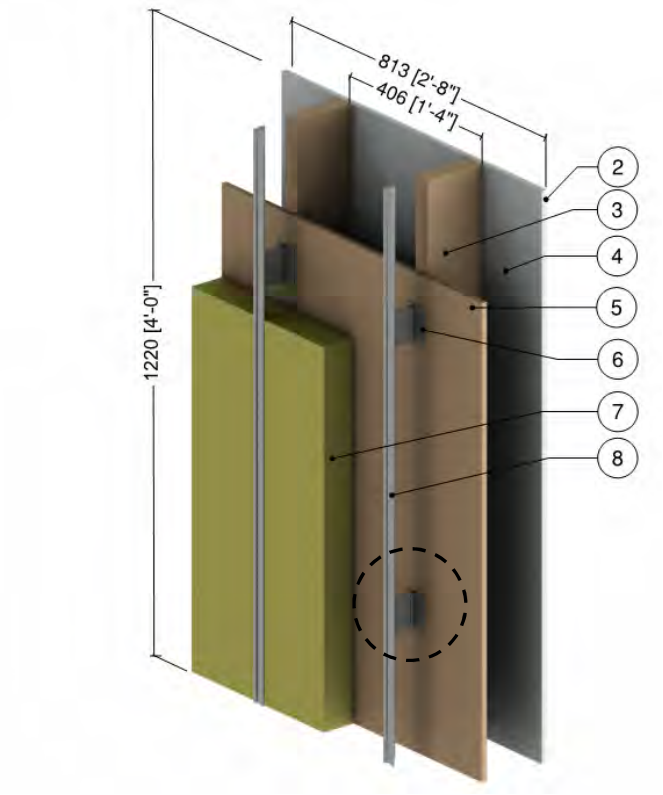
ThermaBracket Detail

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 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	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.35 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16”o.c.)	5 1/2” (140)	0.83 (0.12)	-	31 (500)	0.45 (1880)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	0.24 (0.03)	R-8.4 to R-25.2 (1.48 RSI to 4.44 RSI)	1.8 (28)	0.29 (1220)
7	ThermaBrackets (24” o.c. vertically)	18 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Metal Cladding with 1/2” vented airspace incorporated into exterior heat transfer coefficient					
9	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.1.7

Exterior Insulated 2x6 Wood Stud (16"o.c.) Wall Assembly with Thermally Broken Aluminum Clip Rail System (24" o.c.) Supporting Cladding – Clear Wall





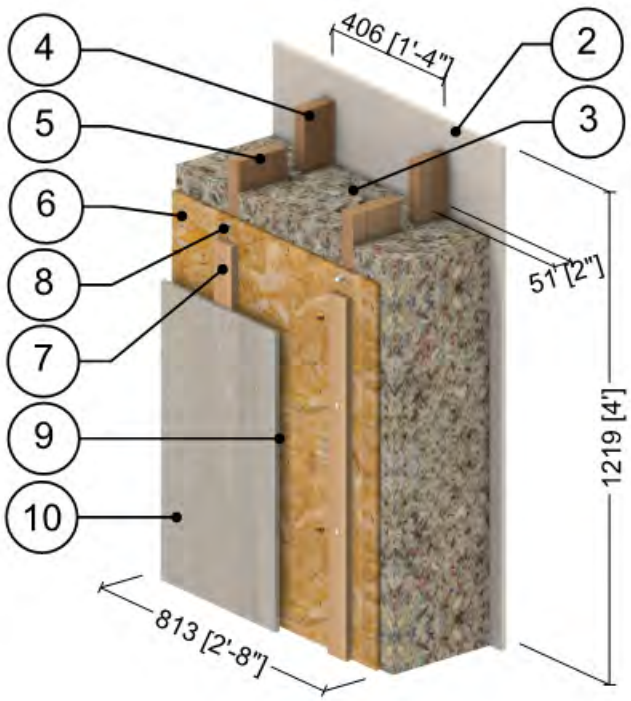
Clip Detail

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 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	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.7 (0.10)	-	31 (500)	0.45 (1880)
4	Air in Stud Cavity	5 1/2" (140)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Wood Sheathing	1/2" (13)	0.7 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	Longboard Aluminum Panel Clip	1/5" to 3/8" (5 to 10)	1109 (160)	-	-	-
7	Exterior Insulation	3" (76)	0.24 (0.03)	R-12.6 (2.22 RSI)	1.8 (28)	0.29 (1220)
8	Vertical Steel Girts	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Cladding with 1/2" (13mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.1.8

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 2" Gap – Clear Wall

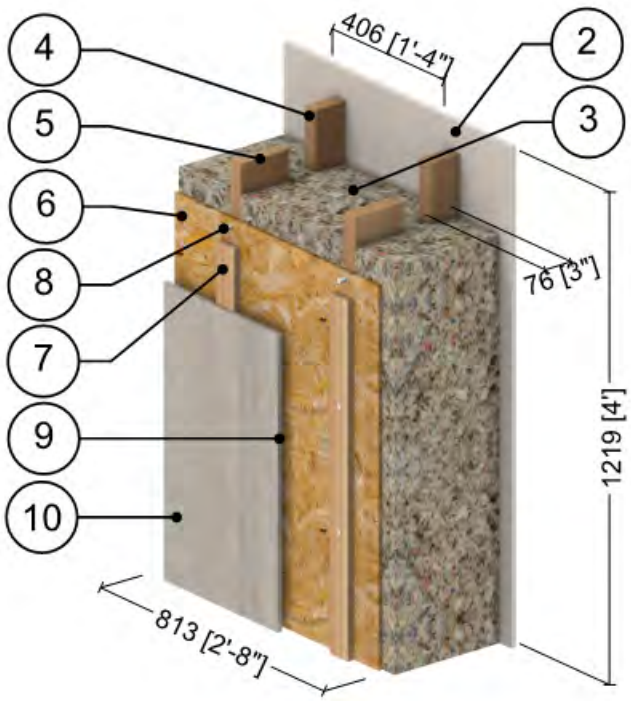


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	11" (279)	0.17 (0.024) to 0.29 (0.041)	R-38.5 to R-66.0 (6.78 RSI to 11.62 RSI)	-	-
4	2x4 Wood Stud (16" o.c.)	3 1/2" (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	Wood Strapping (1" x 3")	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16" o.c.)	0.35" (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	Rainscreen Cavity	3/4" (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
10	Fiber Cement Board	1/2" (13)	4.86 (0.7)	R-0.1 (0.02 RSI)	-	-
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

Detail 8.1.9

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 3" Gap – Clear Wall

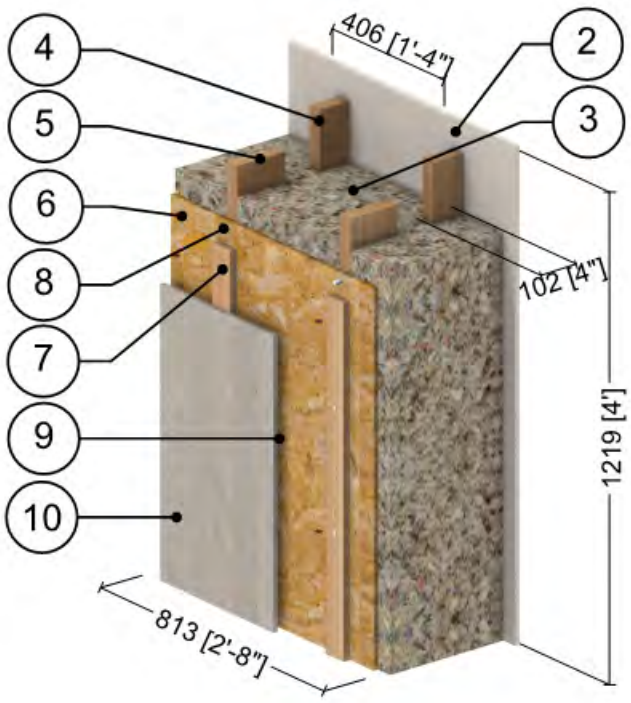


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	12" (305)	0.17 (0.024) to 0.29 (0.041)	R-42.0 to R-72.0 (7.40 RSI to 12.68 RSI)	-	-
4	2x4 Wood Stud (16" o.c.)	3 1/2" (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	Wood Strapping (1" x 3")	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16" o.c.)	0.35" (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	Rainscreen Cavity	3/4" (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
10	Fiber Cement Board	1/2" (13)	4.86 (0.7)	R-0.1 (0.02 RSI)	-	-
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

Detail 8.1.10

Interior Insulated Double Framed Wall 2x6 and 2x4 Wood Stud (16" o.c.) Wall Assembly with 4" Gap – Clear Wall

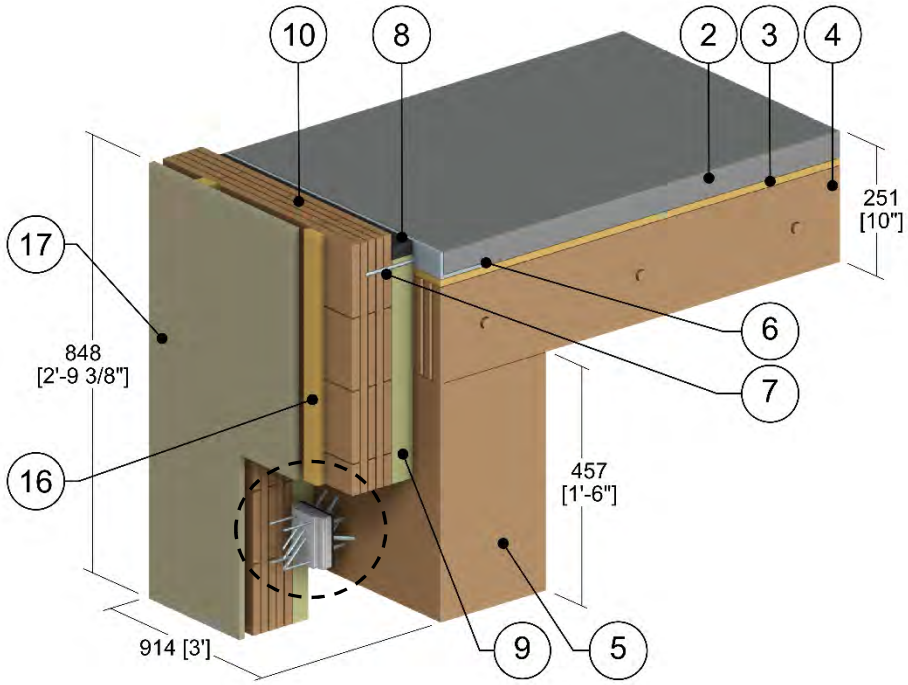


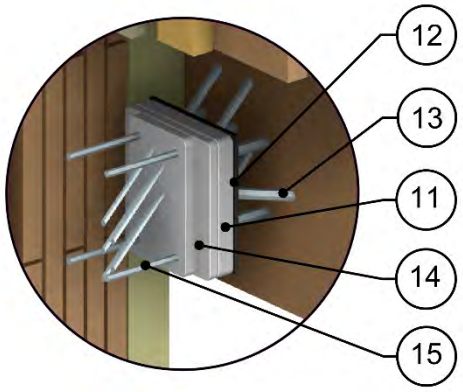
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	13" (330)	0.17 (0.024) to 0.29 (0.041)	R-45.5 to R-78.0 (8.01 RSI to 13.74 RSI)	-	-
4	2x4 Wood Stud (16" o.c.)	3 1/2" (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	Wood Strapping (1" x 3")	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16" o.c.)	0.35" (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	Rainscreen Cavity	3/4" (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
10	Fiber Cement Board	1/2" (13)	4.86 (0.7)	R-0.1 (0.02 RSI)	-	-
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

Detail 8.1.11

Interior Insulated Cross Laminated Timber (CLT) Spandrel with ISO-CONNECT Anchor – Anchor Point Transmittance





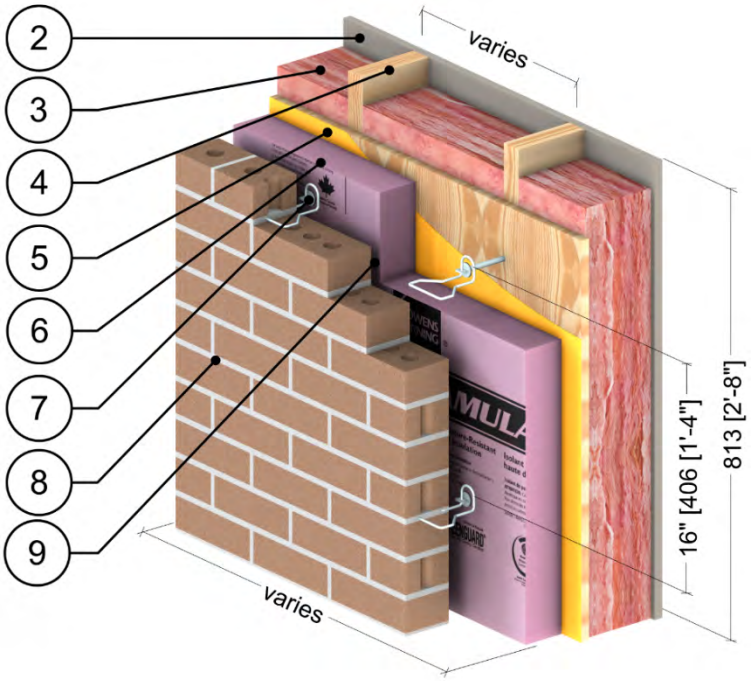
Connector Detail

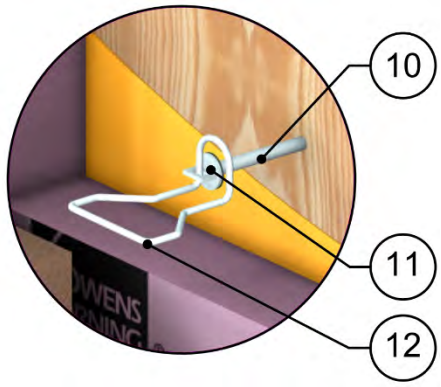
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Concrete Topping	2” (51)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Plywood	5/8” (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
4	DLT Floor	7 1/4” (184)	0.83 (0.12)	-	31 (500)	0.45 (1880)
5	Glulam Beam	9.5” (241)	0.97 (0.14)	R-9.8 (1.73 RSI)	31 (500)	0.45 (1880)
6	L-Angle	1/4” (6)	347 (50)	-	489 (7830)	0.12 (500)
7	Structural Screws 18” o.c.	ø 5/16” (8)	347 (50)	-	489 (7830)	0.12 (500)
8	Firestop Sealant	1” (25)	2.4 (0.35)	-	174 (2800)	0.17 (700)
9	Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-33.6 (1.48 RSI to 5.92 RSI)	4 (64)	0.20 (850)
10	CLT Panel	3.5” (89)	0.83 (0.12)	R-4.2 (0.79 RSI)	31 (500)	0.45 (1880)
11	ISO-CONNECT Plate	19/32” (15)	1110 (160)	-	171 (2740)	0.21 (900)
12	ISO-CONNECT Rubber Pad	1/8” (3)	1.7 (0.25)	-	-	-
13	ISO-CONNECT Fasteners x12	ø 5/16” (8)	347 (50)	-	489 (7830)	0.12 (500)
14	HVP Coupling Plates	19/32” (15)	1110 (160)	-	171 (2740)	0.21 (900)
15	HVP Fasteners x9	ø 3/16” (5)	347 (50)	-	489 (7830)	0.12 (500)
16	1” x 3” Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
17	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
18	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.1.12

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





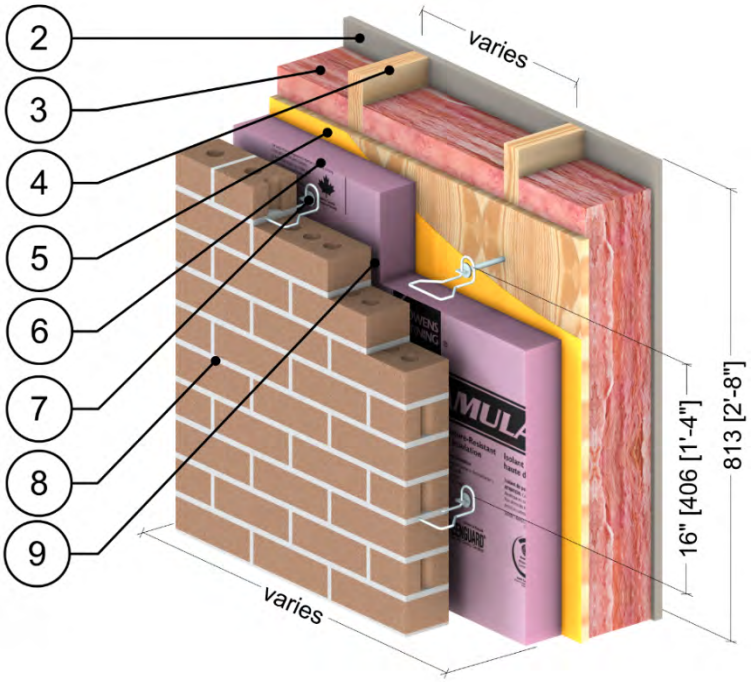
Anchor Detail

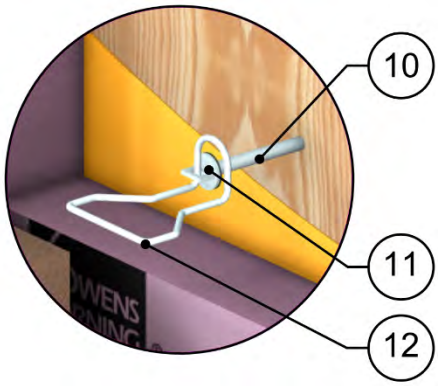
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	5 1/2” (140)	-	R-19 (3.35 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c. and 24” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (16)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
7	Heckmann Pos-I-Tie Masonry Tie @ 16” (406) o.c.	varies	-	-	-	-
8	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
9	Vented Air Cavity[2]	1” (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
10	Zinc Barrel	-	726 (105)	-	412 (6600)	-
11	Rubber Washer (EPDM)	1/16” (1.59)	1.7 (0.25)	-	62 (997)	-
12	Galvanized Steel Wire Pintle	3/16” (5) Ø	645 (93)	-	489 (7830)	0.12 (500)
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 was found using ISO 100077-2

Detail 8.1.13

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





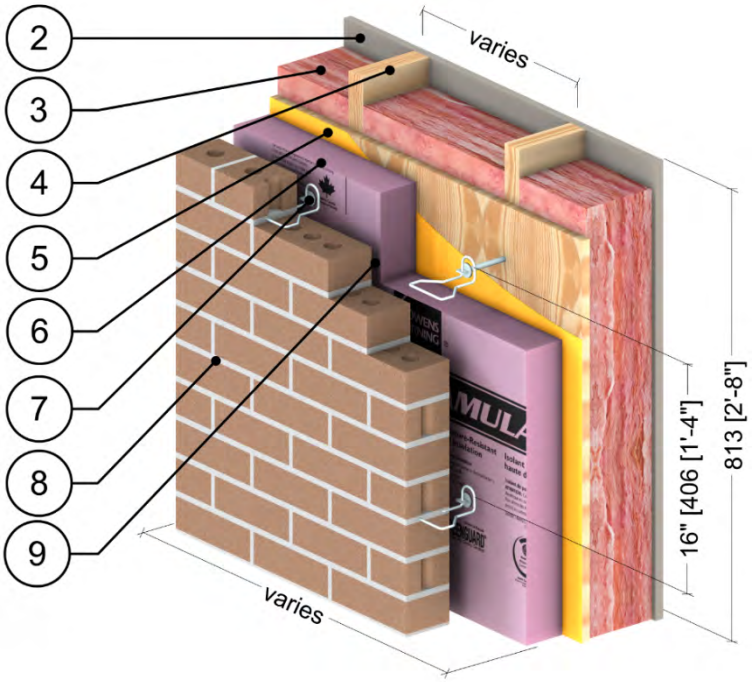
Anchor Detail

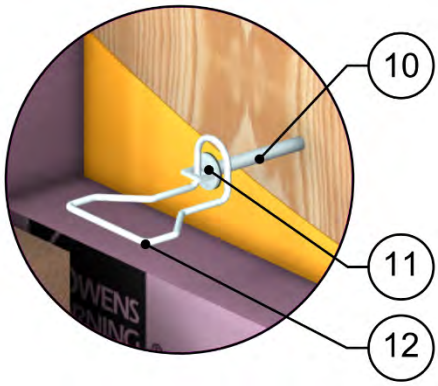
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Ecotouch Pink Fiberglass Batt	5 1/2” (140)	-	R-22 (3.87 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c. and 24” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (16)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
7	Heckmann Pos-I-Tie Masonry Tie @ 16” (406) o.c.	varies	-	-	-	-
8	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
9	Vented Air Cavity[2]	1” (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
10	Zinc Barrel	-	726 (105)	-	412 (6600)	-
11	Rubber Washer (EPDM)	1/16” (1.59)	1.7 (0.25)	-	62 (997)	-
12	Galvanized Steel Wire Pintle	3/16” (5) Ø	645 (93)	-	489 (7830)	0.12 (500)
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 was found using ISO 100077-2

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-24 Batt Insulation in Stud Cavity – Clear Wall





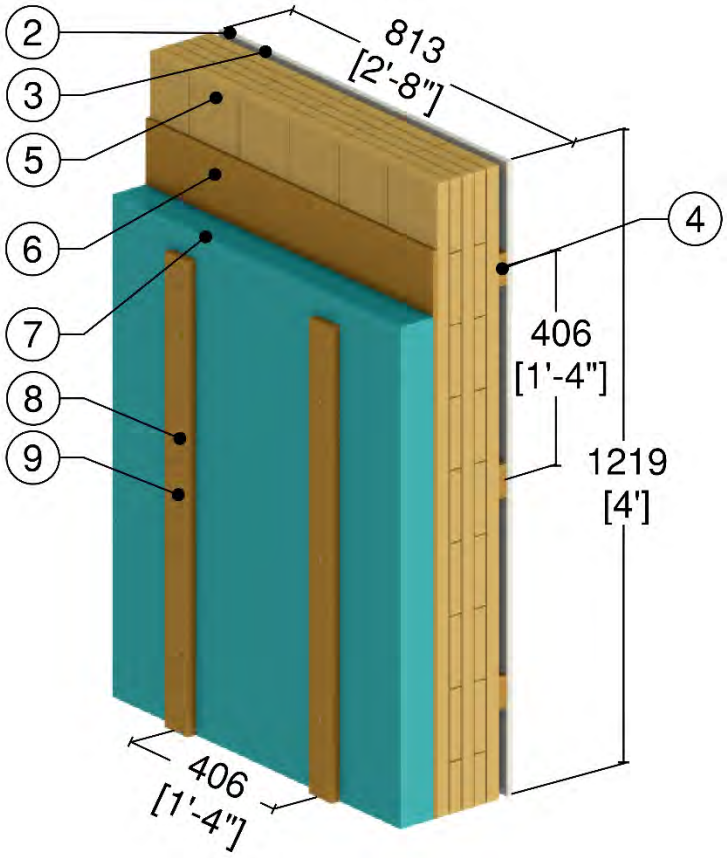
Anchor Detail

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 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	Ecotouch Pink Fiberglass Batt	5 1/2” (140)	-	R-24 (4.23 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c. and 24” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (16)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Foamular CodeBord/C-200 Extruded Polystyrene (XPS) Rigid Insulation Type 3	varies	0.20 (0.029)	R-10 to R-20 (1.76 to 3.52 RSI)	1.8 (28)	0.29 (1220)
7	Heckmann Pos-I-Tie Masonry Tie @ 16” (406) o.c.	varies	-	-	-	-
8	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
9	Vented Air Cavity[2]	1” (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
10	Zinc Barrel	-	726 (105)	-	412 (6600)	-
11	Rubber Washer (EPDM)	1/16” (1.59)	1.7 (0.25)	-	62 (997)	-
12	Galvanized Steel Wire Pintle	3/16” (5) Ø	645 (93)	-	489 (7830)	0.12 (500)
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 was found using ISO 100077-2

Detail 8.1.15

Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Clear Wall

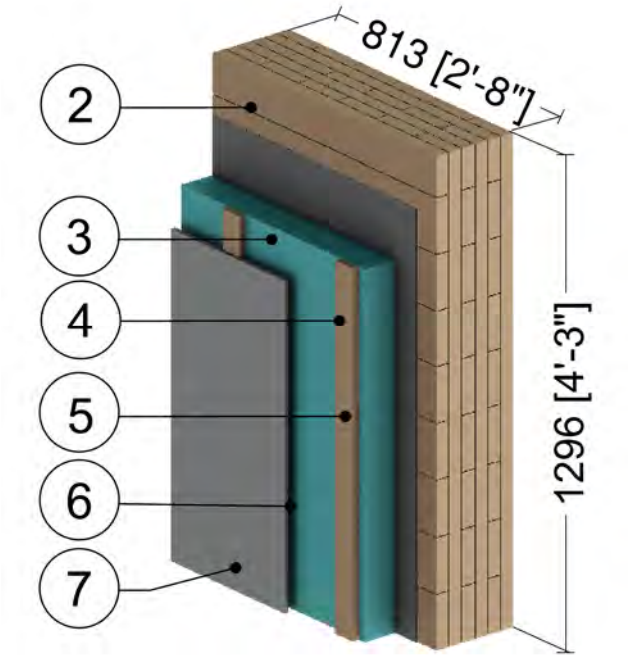


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Cavity	3/4" (19)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1x3 Wood Strapping (16" o.c.)	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Cross Laminated Timber Wall	5 1/2" (140)	0.83 (0.12)	R-6.6 (1.16 RSI)	31 (500)	0.45 (1880)
6	Plywood Sheathing	3/8" (9.5)	0.69 (0.10)	R-0.5 (0.10 RSI)	31 (500)	0.45 (1880)
7	Exterior Insulation	Varies	-	R-15 to R-25 (2.64 to 4.40 RSI)	1.8 (28)	0.29 (1220)
8	1x3 Wood Strapping (16" o.c.)	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	#14 Steel Fasteners (12" o.c.)	0.24" (6.2) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	Fiber Cement Board Cladding with 3/4" (19mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.1.16

Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Wood Strapping and Continuous Rigid Insulation Supporting Fiber Cement Board

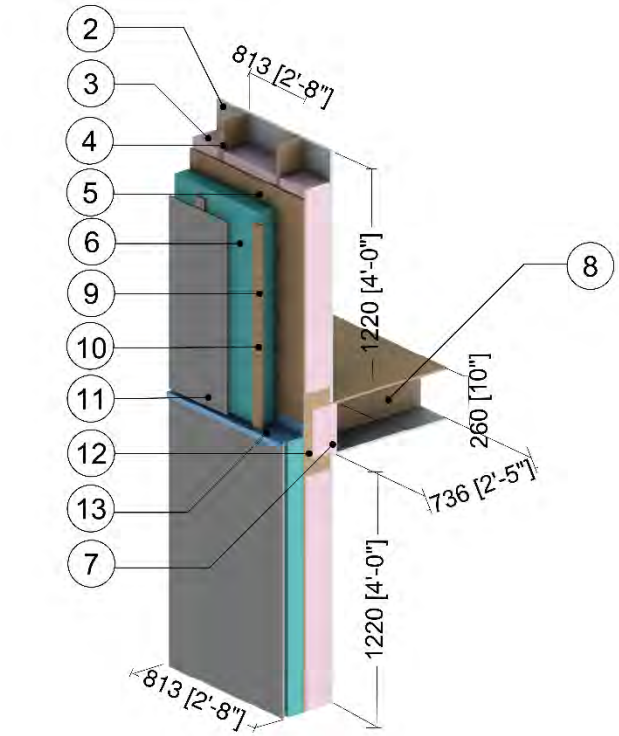


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Cross Laminated Timber Wall	7 1/2" (191)	0.83 (0.12)	R-9 (1.59 RSI)	31 (500)	0.45 (1880)
3	Exterior Insulation	Varies	-	R-15 to R-25 (2.64 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
4	1x3 Wood Strapping (16" o.c.)	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Steel Fasteners (12" o.c.)	0.44" (11) Ø	347 (50)	-	489 (7830)	0.12 (500)
6	Rainscreen Cavity	3/4" (19)	-	R-0.5 (0.09 RSI)	0.075 (1.2)	0.24 (1000)
7	Fiber Cement Board Cladding	1/2" (13)	4.9 (0.7)	R-0.1 (0.02 RSI)	112 (1800)	0.20 (840)
8	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

Detail 8.2.1

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Rim Joist and Floor Intersection without Metal Flashing Bypassing Exterior Insulation

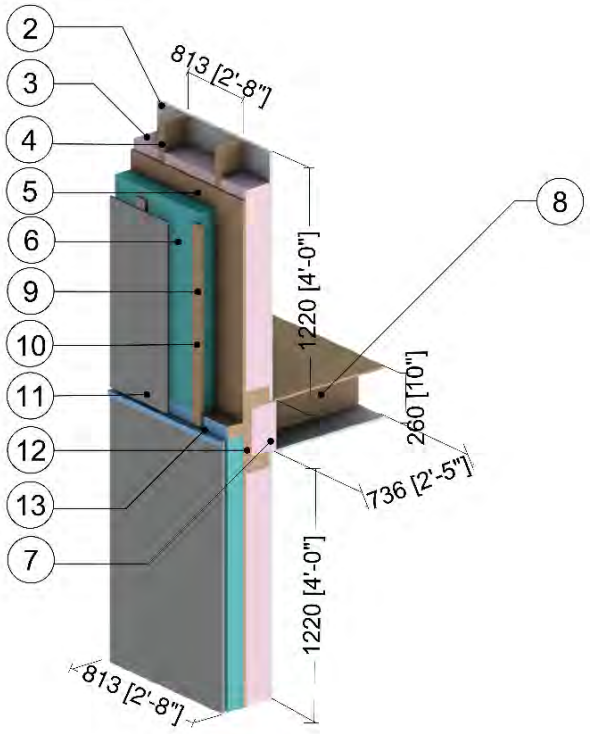


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	Fiberglass Batt Insulation at Joist	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
8	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Wood Strapping (1” x 3”)	1 1/2” (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
12	2x10 Rim Board	1 1/2” (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
13	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
14	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.2.2

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Rim Joist and Floor Intersection with Metal Flashing Bypassing Exterior Insulation

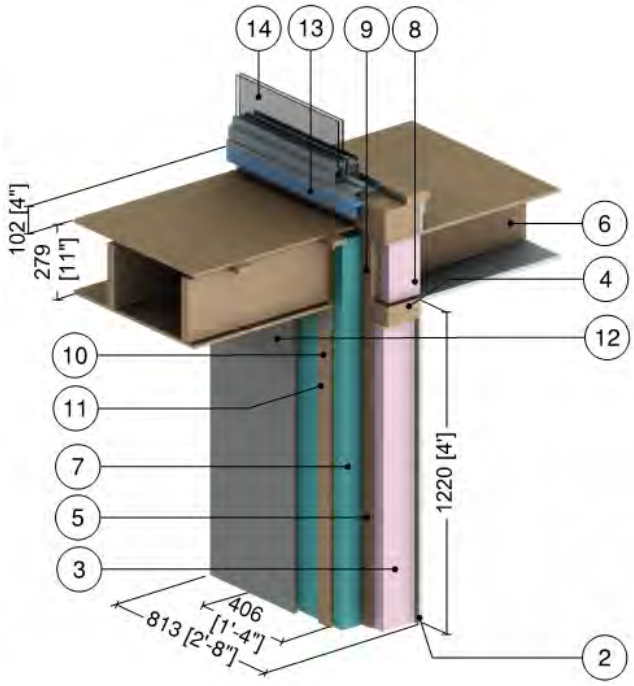


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	Fiberglass Batt Insulation at Joist	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
8	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
12	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
13	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
14	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.2.3

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board - Cantilevered Wood Joist Balcony Intersection

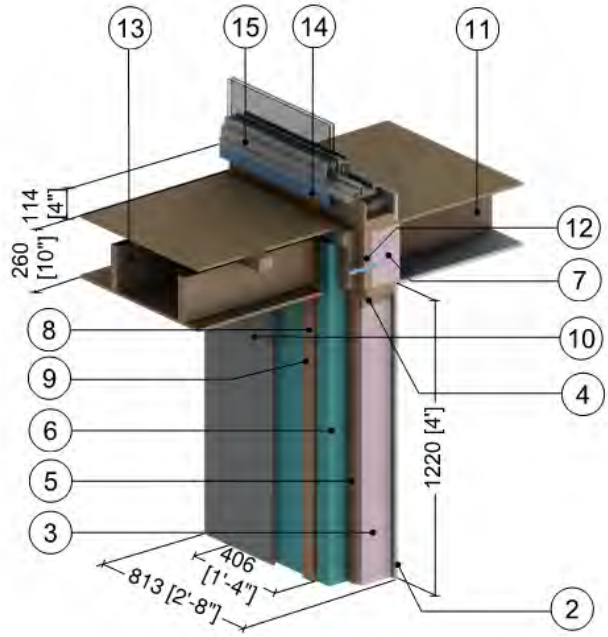


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” OC)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.26 (1090)
6	2x10 Wood Joist (16” OC)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
7	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
8	Fiberglass Batt Insulation at Joist	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
9	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
12	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
13	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
14	Aluminum Sliding Door: double glazed & thermally broken[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
15	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 8.2.4

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Wood Strapping Supporting Fiber Cement Board – Independently Supported Balcony Intersection

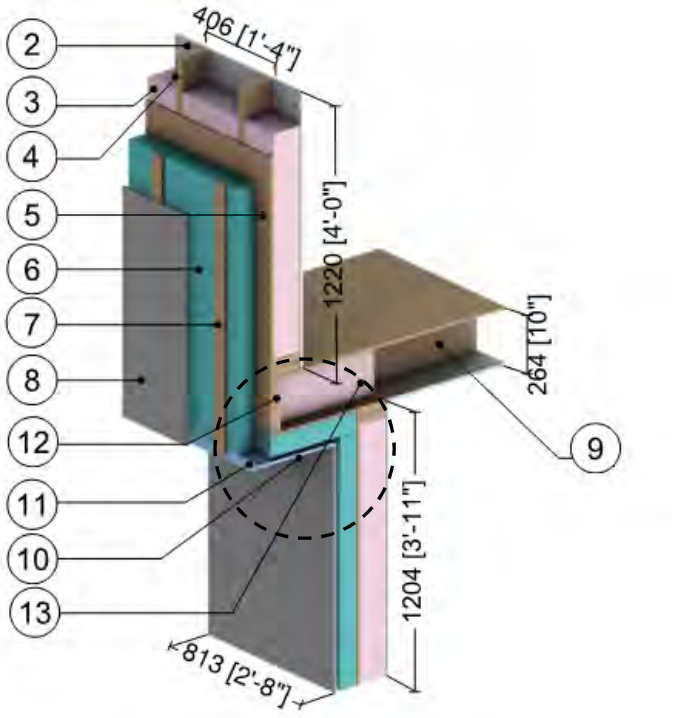


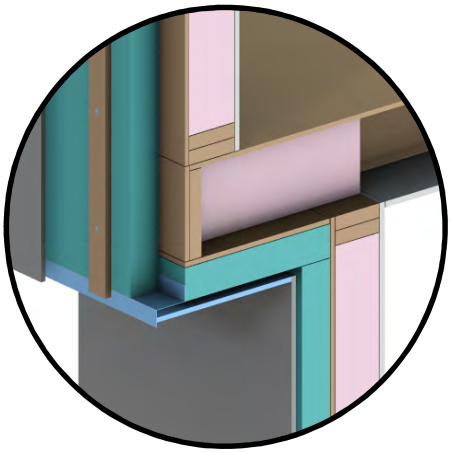
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)		31 (500)	0.45 (1880)
5	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	Fiberglass Batt Insulation at Joist	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
8	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
11	2x10 Wood Joist (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	32 (510)	0.45 (1880)
12	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	2x8 Wood Balcony Joists (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Aluminum Sliding Door: double glazed & thermally broken[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
16	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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

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 – Cantilevered Floor Intersection





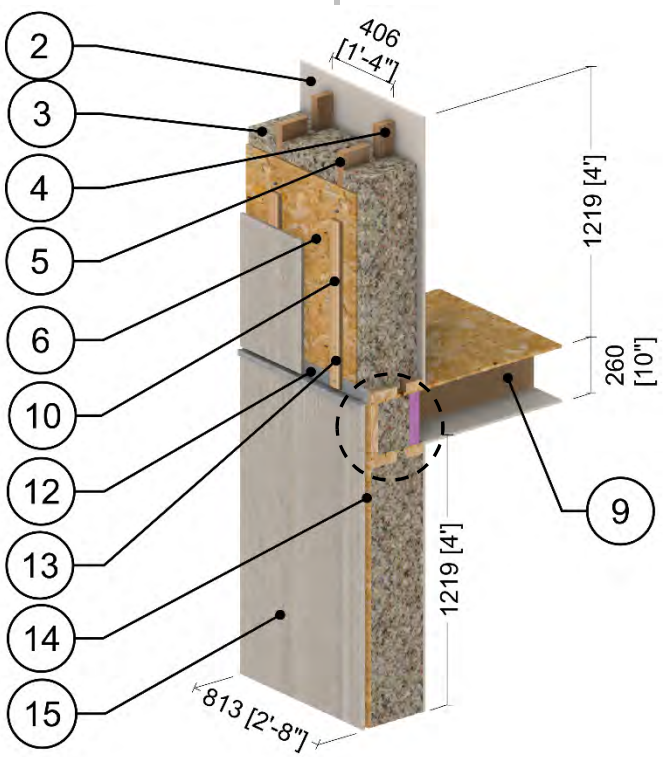
Soffit/Intersection Detail

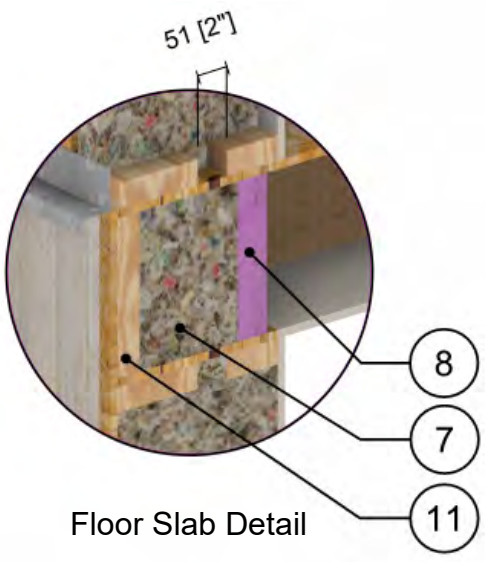
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	5/8” (16)	1.1 (0.16)	R-0.6 (0.20 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	5/8” (16)	0.69 (0.10)	R-0.6 (0.10 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	0.24 (0.0343)	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
9	2x10 Wood Joist (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Vented Aluminum Soffit Panel is incorporated into the exterior heat transfer coefficient					
11	Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	2x10 Rim Joist	1 1/2”	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	Fiberglass Batt Insulation in Floor	9 1/4” (235)	0.33 (0.048)	R-28 (4.9 RSI)	0.9 (14)	0.17 (710)
14	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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





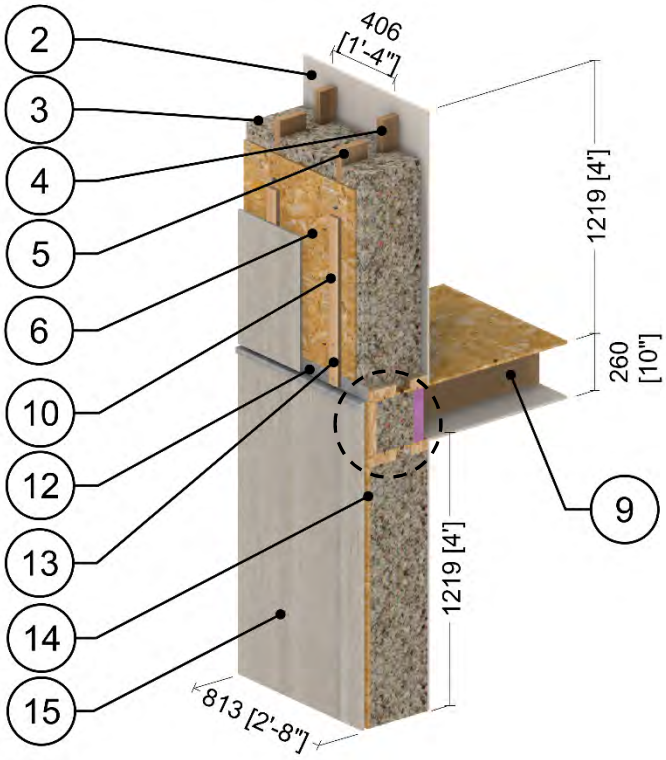
Floor Slab Detail

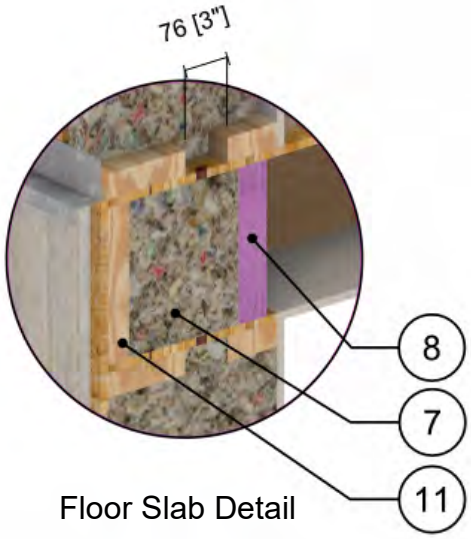
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	11" (279)	Varies	-	-	-
4	2x4 Wood Stud (16" o.c.)	3 1/2" (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	Fill Insulation at Joist	6 3/4" (171)	Varies	-	-	-
8	XPS Insulation	2" (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
9	2x10 Wood Joists (16" o.c.)	9 1/4" (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Steel Fasteners (16" o.c.)	0.35" (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	2x10 Rim Joist	1 1/2" (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
12	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Wood Strapping (1" x 3")	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Rainscreen Cavity	3/4" (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
15	Fiber Cement Board	1/2" (13)	4.86 (0.7)	-	-	-
16	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

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





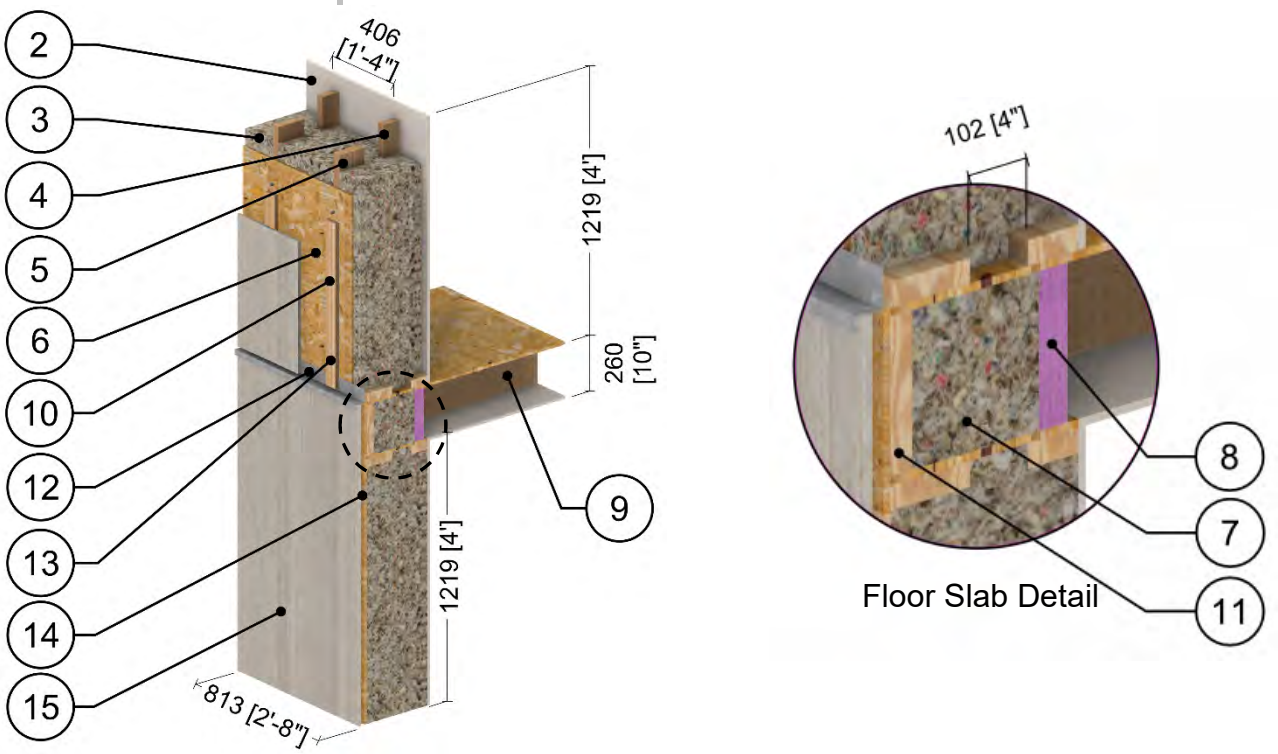
Floor Slab Detail

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 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	Fill Insulation	12" (305)	Varies	-	-	-
4	2x4 Wood Stud (16" o.c.)	3 1/2" (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	Fill Insulation at Joist	6 3/4" (171)	Varies	-	-	-
8	XPS Insulation	2" (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
9	2x10 Wood Joists (16" o.c.)	9 1/4" (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Steel Fasteners (16" o.c.)	0.35" (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	2x10 Rim Joist	1 1/2" (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
12	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Wood Strapping (1" x 3")	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Rainscreen Cavity	3/4" (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
15	Fiber Cement Board	1/2" (13)	4.86 (0.7)	-	-	-
16	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

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

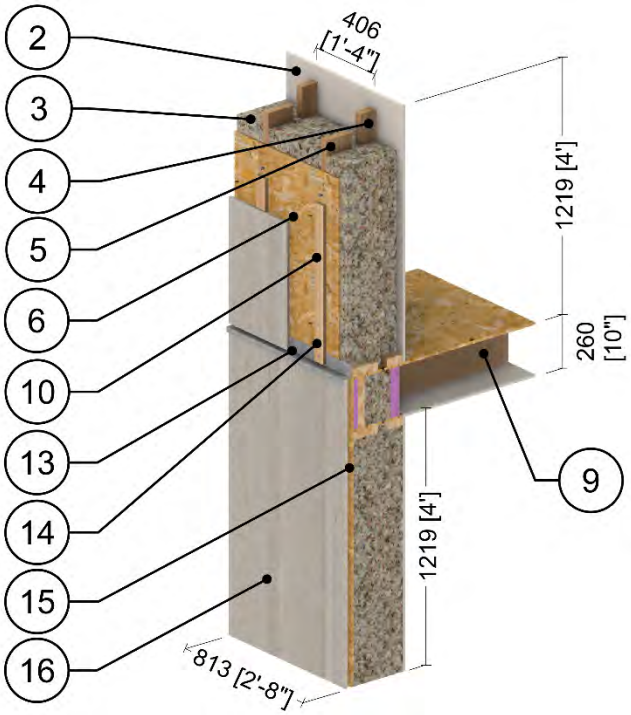


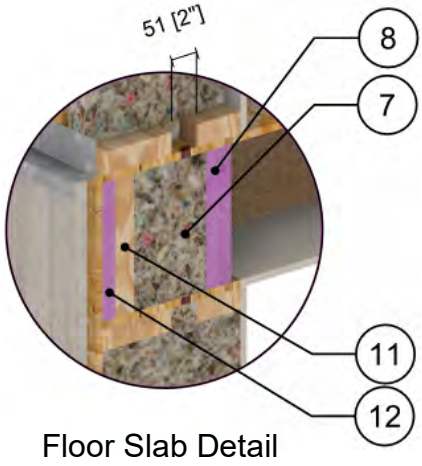
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	13" (330)	Varies	-	-	-
4	2x4 Wood Stud (16" o.c.)	3 1/2" (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	Fill Insulation at Joist	6 3/4" (171)	Varies	-	-	-
8	XPS Insulation	2" (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
9	2x10 Wood Joists (16" o.c.)	9 1/4" (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Steel Fasteners (16" o.c.)	0.35" (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	2x10 Rim Joist	1 1/2" (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
12	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Wood Strapping (1" x 3")	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Rainscreen Cavity	3/4" (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
15	Fiber Cement Board	1/2" (13)	4.86 (0.7)	-	-	-
16	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

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





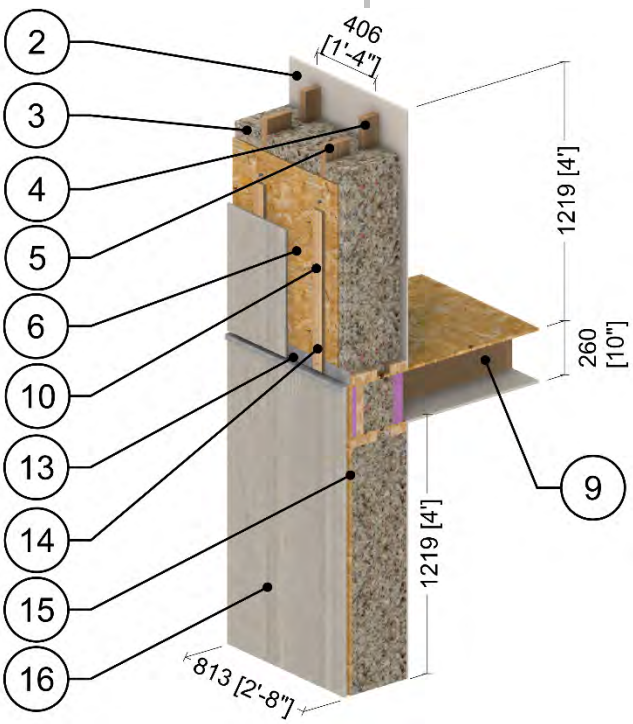
Floor Slab Detail

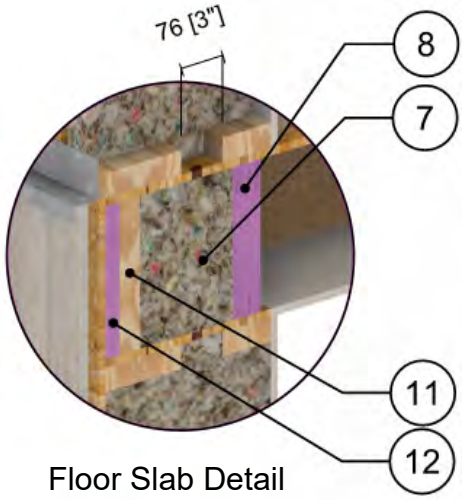
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	11” (279)	Varies	-	-	-
4	2x4 Wood Stud (16” o.c.)	3 1/2” (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	Fill Insulation at Joist	6 3/4” (171)	Varies	-	-	-
8	XPS Insulation	2” (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
9	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
12	Rim Joist Insulation	1” (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
13	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
14	Wood Strapping (1” x 3”)	3/4“ (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
15	Rainscreen Cavity	3/4“ (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
16	Fiber Cement Board	1/2” (13)	4.86 (0.7)	-	-	-
17	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

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





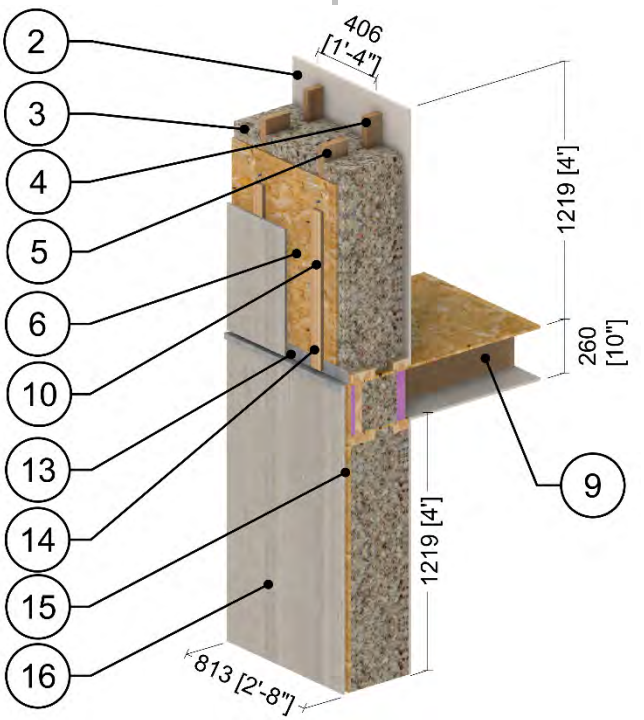
Floor Slab Detail

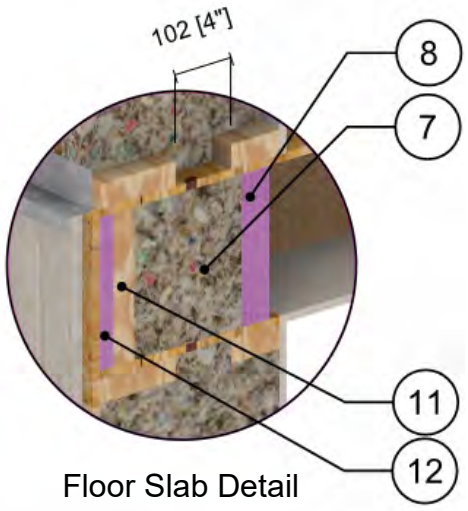
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	12" (305)	Varies	-	-	-
4	2x4 Wood Stud (16" o.c.)	3 1/2" (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	Fill Insulation at Joist	6 3/4" (171)	Varies	-	-	-
8	XPS Insulation	2" (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
9	2x10 Wood Joists (16" o.c.)	9 1/4" (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Steel Fasteners (16" o.c.)	0.35" (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	2x10 Rim Joist	1 1/2" (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
12	Rim Joist Insulation	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
13	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
14	Wood Strapping (1" x 3")	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
15	Rainscreen Cavity	3/4" (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
16	Fiber Cement Board	1/2" (13)	4.86 (0.7)	-	-	-
17	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

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





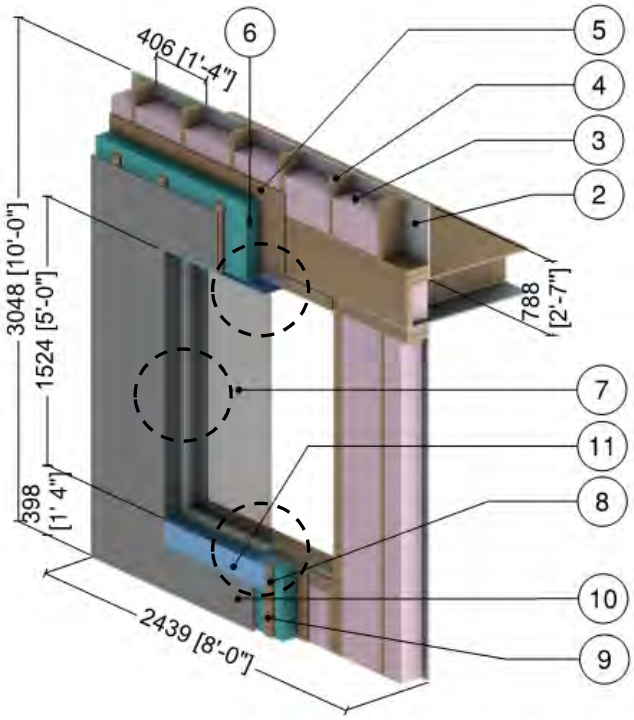
Floor Slab Detail

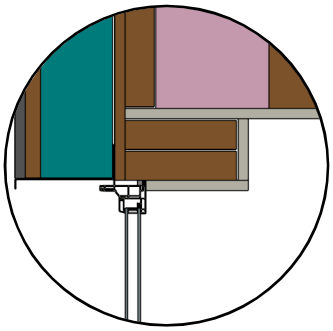
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	13" (330)	Varies	-	-	-
4	2x4 Wood Stud (16" o.c.)	3 1/2" (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	Fill Insulation at Joist	6 3/4" (171)	Varies	-	-	-
8	XPS Insulation	2" (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
9	2x10 Wood Joists (16" o.c.)	9 1/4" (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Steel Fasteners (16" o.c.)	0.35" (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
11	2x10 Rim Joist	1 1/2" (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
12	Rim Joist Insulation	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	1.8 (28)	0.29 (1220)
13	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
14	Wood Strapping (1" x 3")	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
15	Rainscreen Cavity	3/4" (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
16	Fiber Cement Board	1/2" (13)	4.86 (0.7)	-	-	-
17	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

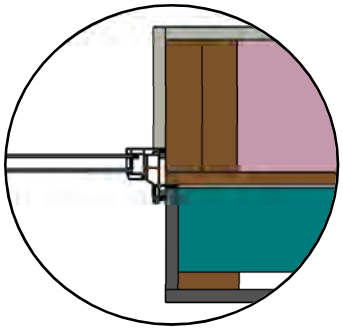
Detail 8.3.1

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

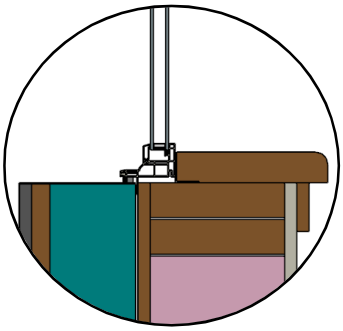




Head Detail



Jamb Detail



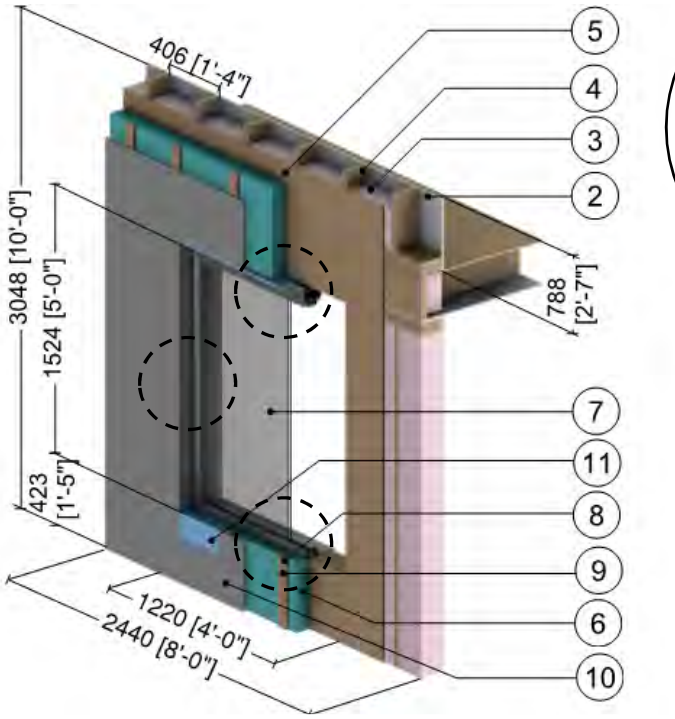
Sill Detail

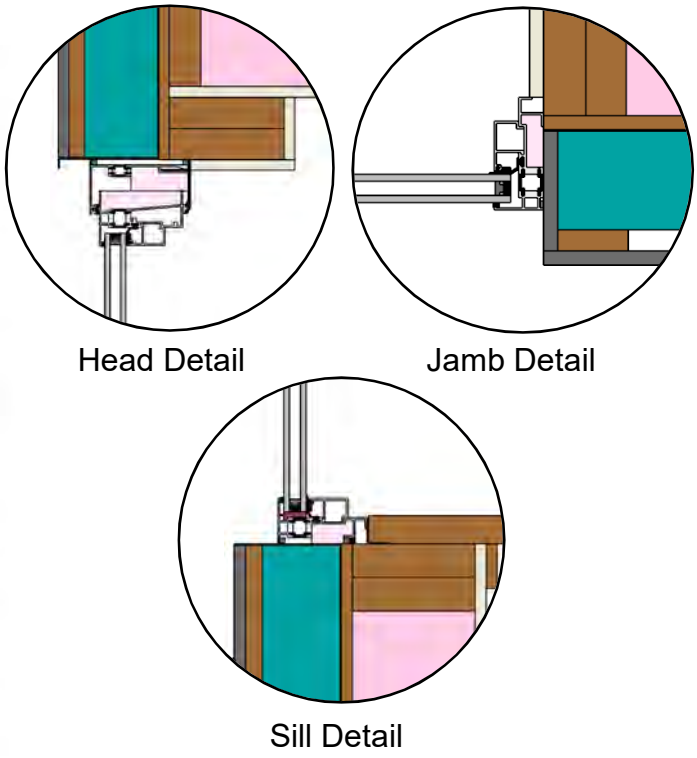
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (16)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	5’ (1.5m) x 6’ (1.8m) Vinyl window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
8	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Steel Fasteners (16” o.c.)	0.35” (9) Ø	430 (50)	-	489 (7830)	0.12 (500)
10	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Aluminum Flashing	18 Gauge	1109 (160)	-	171(2739)	0.21 (900)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity for air spaces within window framing was found using ISO 10077-2

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 – Aluminum Window Intersection



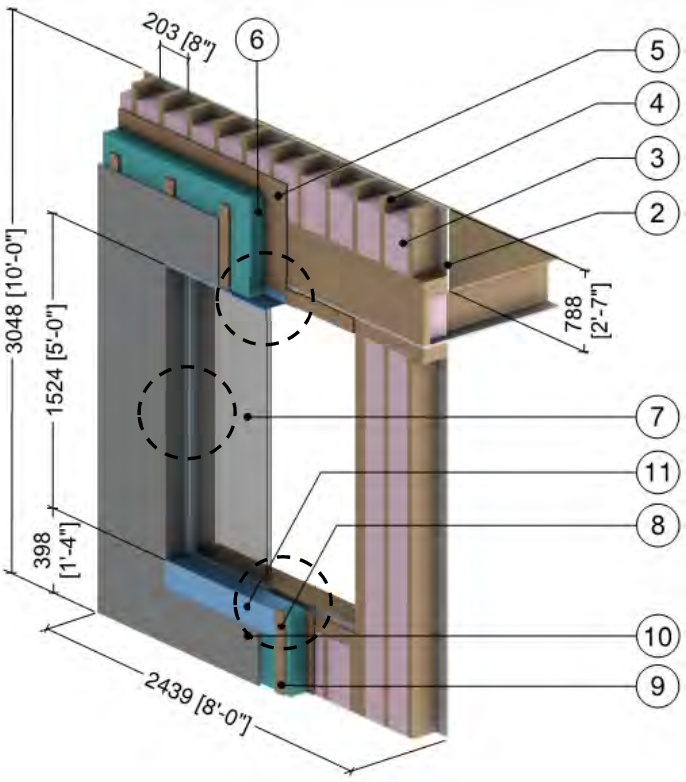


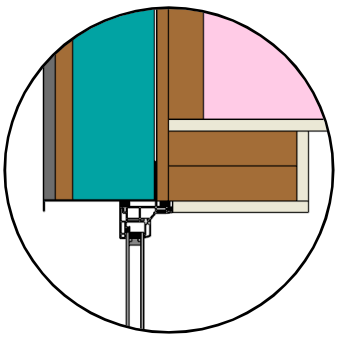
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	-	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	5’ (1.5m) x 6’ (1.8m) Aluminum window: double glazed & thermally broken[2], double glazed IGU UIGU = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
8	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Aluminum Flashing	18 Gauge	1109 (160)	-	171(2739)	0.21 (900)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity for air spaces within window framing was found using ISO 10077-2

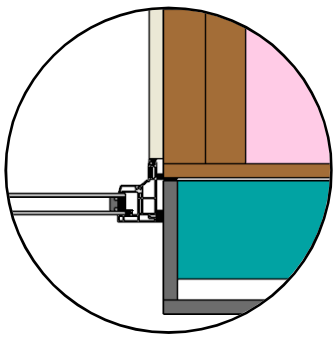
Detail 8.3.3

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

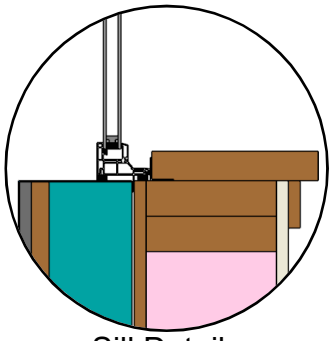




Head Detail



Jamb Detail



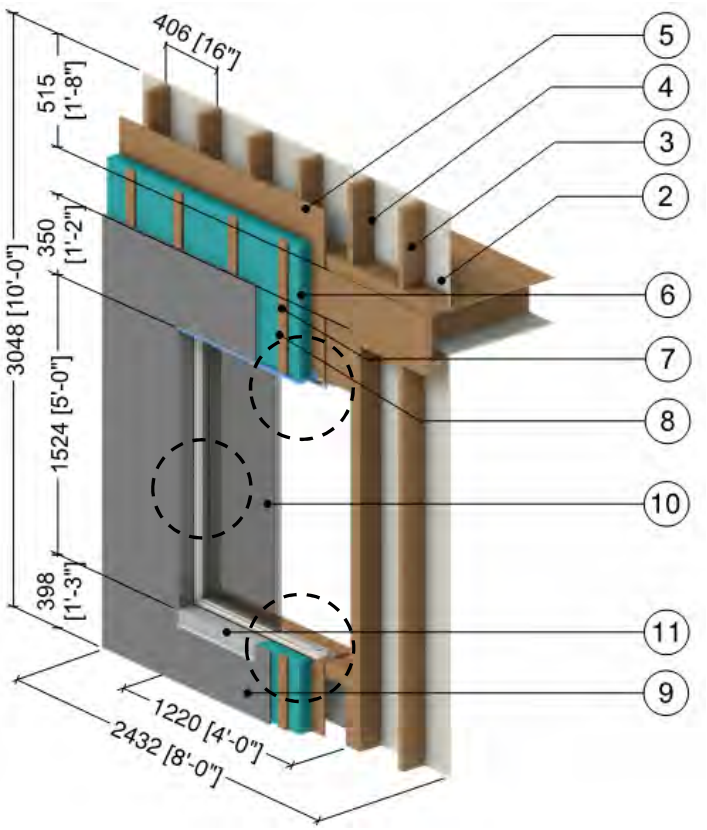
Sill Detail

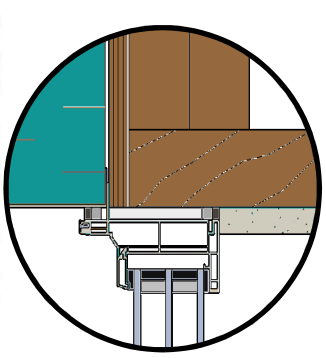
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.9 to R-1.1 (0.16 RSI to 0.2 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2" (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (8" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2" (16)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	5' (1.5m) x 6' (1.8m) Vinyl window: double glazed & thermally broken[2], double glazed IGU U_{IGU} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	1x3 Wood Strapping	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Steel Fasteners (16" o.c.)	0.35" (9) ∅	347 (50)	-	489 (7830)	0.12 (500)
10	Fiber Cement Board Cladding with 3/4" (19mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Aluminum Flashing	18 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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

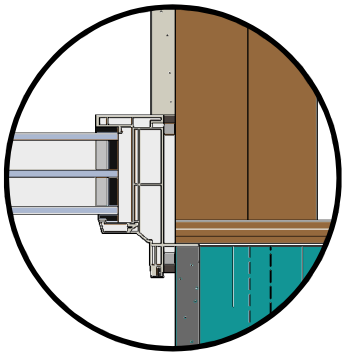
Detail 8.3.4

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

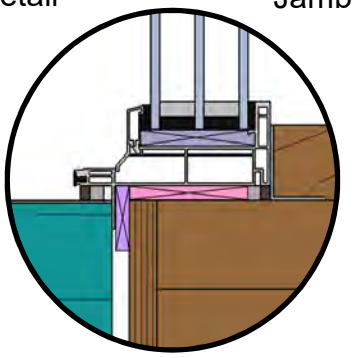




Head Detail



Jamb Detail



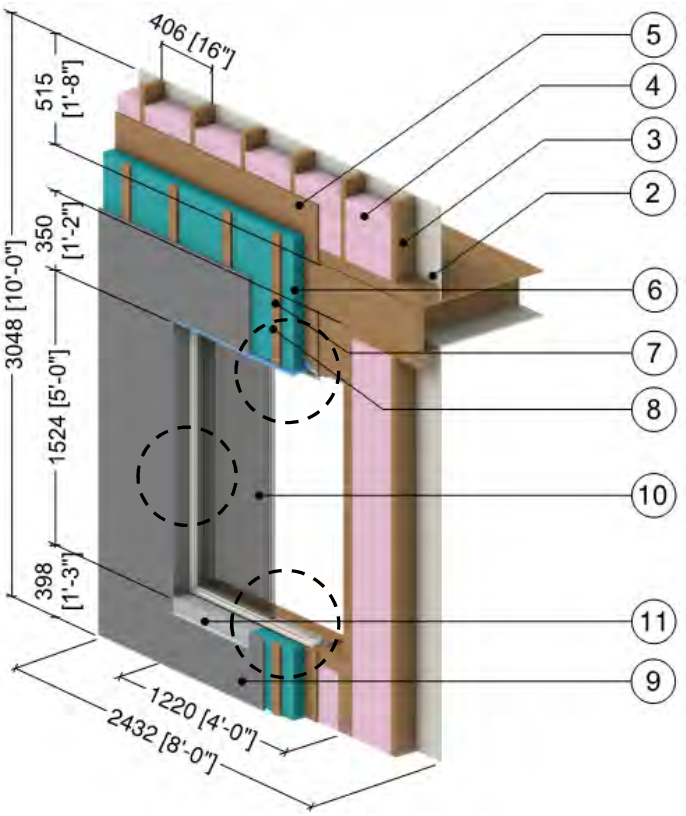
Sill Detail

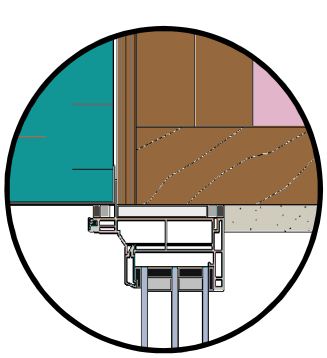
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
4	Air in Stud Cavity	5 1/2" (140)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Wood Sheathing	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16" o.c.)	0.35" (9) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4" (19mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5' (1.5m) x 4' (1.2m) Vinyl window: triple glazed[2], IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K)					
11	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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

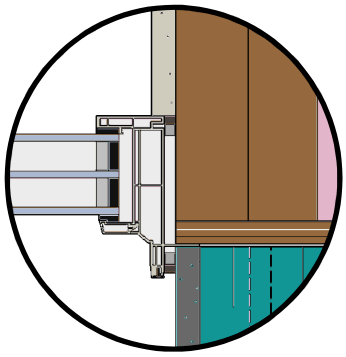
Detail 8.3.5

Exterior and Interior Insulated 2x6 Wood Stud (16" o.c.) Wall Assembly with Wood Strapping and Continuous Insulation Supporting Rainscreen Fiber Cement Board – Triple Glazed Flange Mounted Vinyl Window Intersection with Window Positioned in Wood Framing

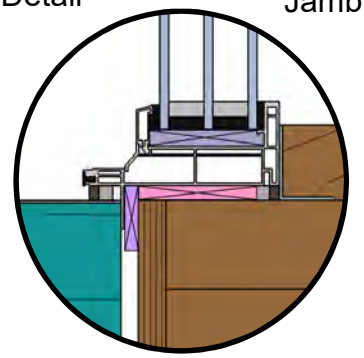




Head Detail



Jamb Detail



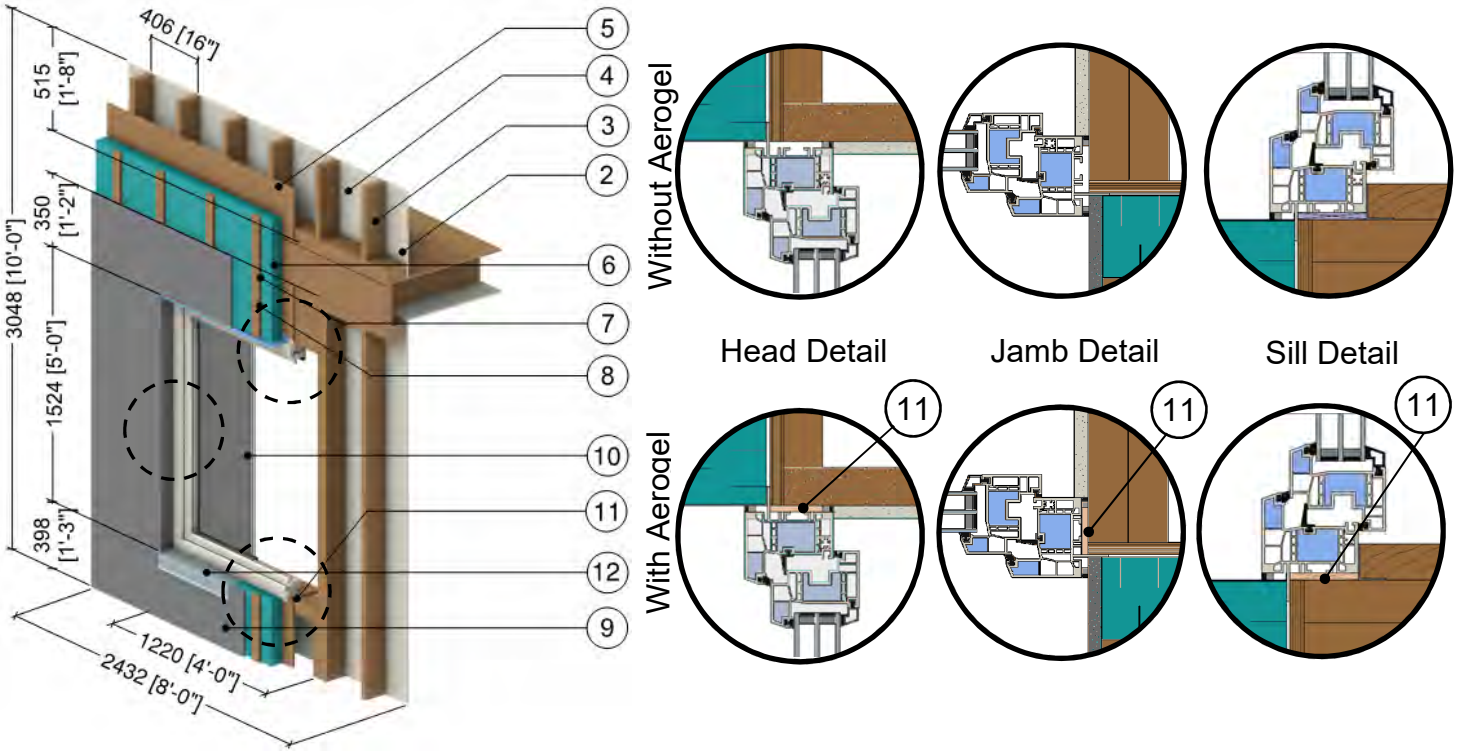
Sill Detail

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 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	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
4	Fiberglass Batt Insulation	5 1/2" (140)	-	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
5	Exterior Wood Sheathing	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16" o.c.)	0.35" (9) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4" (19mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5' (1.5m) x 4' (1.2m) Vinyl window: triple glazed[2], IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K)					
11	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 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)

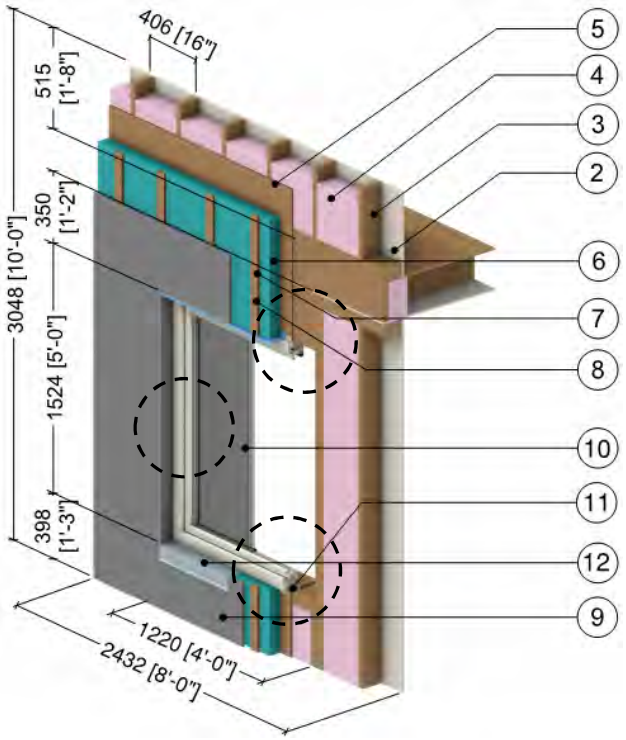


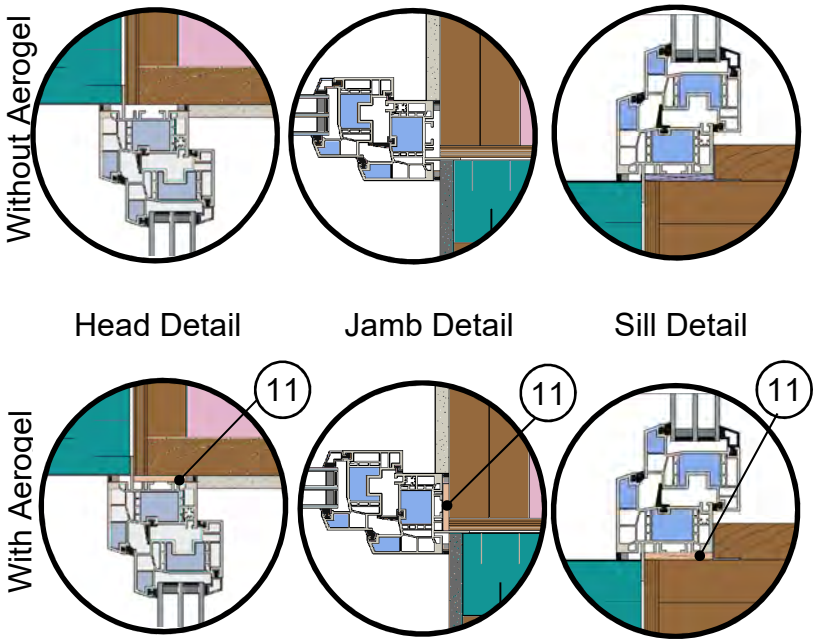
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
4	Air in Stud Cavity	5 1/2" (140)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Exterior Wood Sheathing	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16" o.c.)	0.35" (9) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4" (19mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5' (1.5m) x 4' (1.2m) Vinyl window (Passive House certified)[2]: triple glazed, IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K)					
11	Aerogel Blanket	0.4" (10)	0.086 (0.015)	R-3.8 (0.67 RSI)	-	-
12	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 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 – Triple Glazed High Performance Vinyl Window Intersection (Insulated Frames)



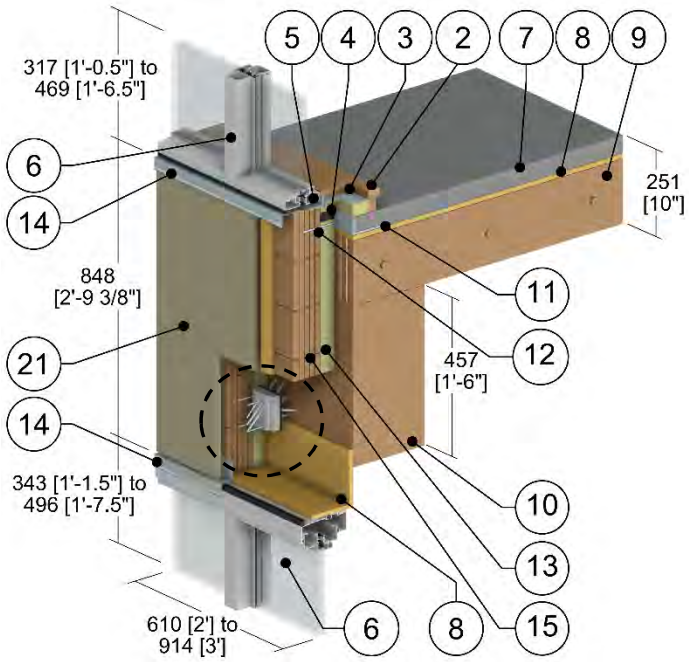


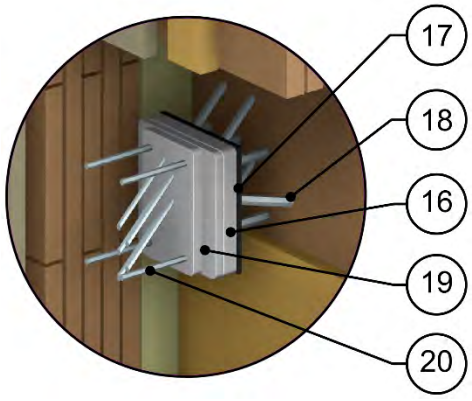
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2x6 Wood Stud (16” o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
4	Fiberglass Batt Insulation	5 1/2" (140)	-	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
5	Exterior Wood Sheathing	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16” o.c.)	0.35” (9) ∅	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4" (19mm) vented air space is incorporated into exterior heat transfer coefficient					
10	5’ (1.5m) x 4’ (1.2m) Vinyl window (Passive House certified)[2]: triple glazed, IGU U_{IGU} = 0.14 BTU/hr.ft².°F (0.81 W/m²K)					
11	Aerogel Blanket	0.4” (10)	0.086 (0.015)	R-3.8 (0.67 RSI)	-	-
12	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 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





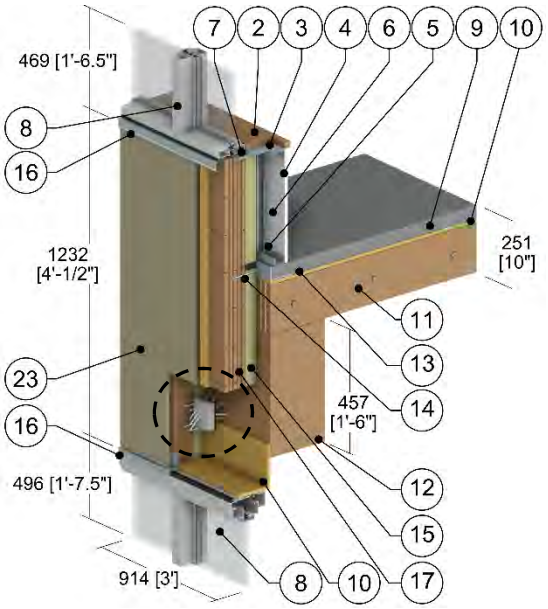
Connector Detail

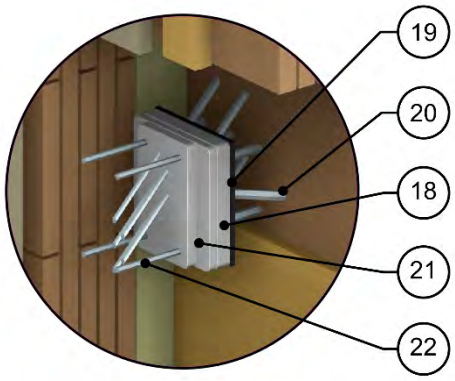
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Wood Sill	1" (25)	0.69 (0.10)	-	31 (500)	0.45 (1880)
3	Support Angle	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Firestop Sealant	1" (25)	2.4 (0.35)	-	174 (2800)	0.17 (700)
5	Window Mounting Angle	1/8" (3)	1110 (160)	-	171 (2740)	0.21 (900)
6	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
7	Concrete Topping	2" (51)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Plywood	5/8" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	DLT Floor	7 1/4" (184)	0.83 (0.12)	-	31 (500)	0.45 (1880)
10	Glulam Beam	9.5" (241)	0.97 (0.14)	R-9.8 (1.73 RSI)	31 (500)	0.45 (1880)
11	L-angle	1/4" (6)	347 (50)	-	489 (7830)	0.12 (500)
12	Structural Screws 18" o.c.	ø 5/16" (8)	347 (50)	-	489 (7830)	0.12 (500)
13	Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-33.6 (1.48 RSI to 5.92 RSI)	4 (64)	0.20 (850)
14	Aluminum Flashing	14 Gauge	1110 (160)	-	171 (2740)	0.21 (900)
15	CLT Panel	3.5" (89)	0.83 (0.12)	R-4.2 (0.79 RSI)	31 (500)	0.45 (1880)
16	ISO-CONNECT Plate	19/32" (15)	1110 (160)	-	171 (2740)	0.21 (900)
17	ISO-CONNECT Rubber Pad	1/8" (3)	1.7 (0.25)	-	-	-
18	ISO-CONNECT Fasteners x12	ø 5/16" (8)	347 (50)	-	489 (7830)	0.12 (500)
19	HVP Coupling Plates	19/32" (15)	1110 (160)	-	171 (2740)	0.21 (900)
20	HVP Fasteners x9	ø 3/16" (5)	347 (50)	-	489 (7830)	0.12 (500)
21	Fiber Cement Board Cladding with 3/4" (19mm) vented airspace incorporated into exterior heat transfer coefficient					
22	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 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





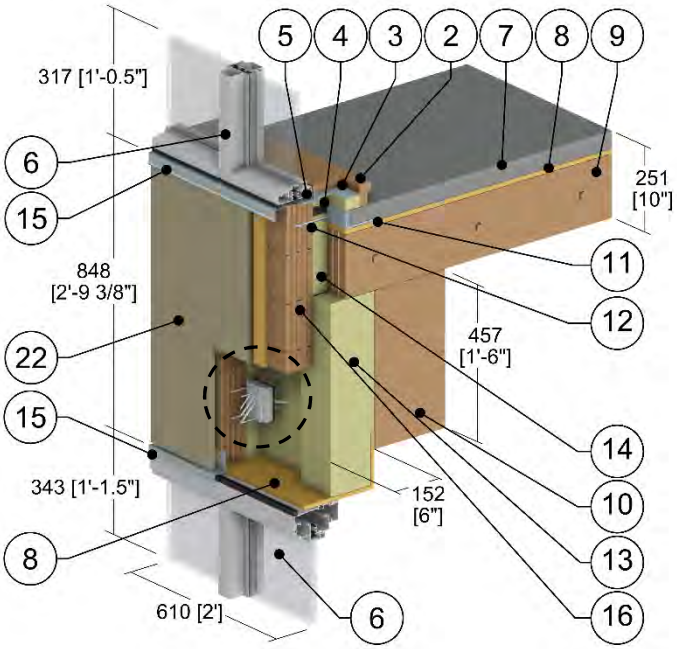
Connector Detail

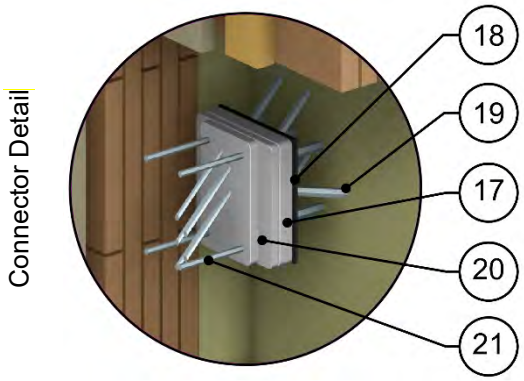
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Wood Sill	1" (25)	0.69 (0.10)	-	31 (500)	0.45 (1880)
3	Support Angle	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Steel Studs (16" o.c.) and Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Air Cavity	2.5" (64)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
7	Window Mounting Angle	1/8" (3)	1110 (160)	-	171 (2740)	0.21 (900)
8	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
9	Concrete Topping	2" (51)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Plywood	5/8" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	DLT Floor	7 1/4" (184)	0.83 (0.12)	-	31 (500)	0.45 (1880)
12	Glulam Beam	9.5" (241)	0.97 (0.14)	R-9.8 (1.73 RSI)	31 (500)	0.45 (1880)
13	L-Angle	1/4" (6)	347 (50)	-	489 (7830)	0.12 (500)
14	Structural Screws 18" o.c.	ø 5/16" (8)	347 (50)	-	489 (7830)	0.12 (500)
15	Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-33.6 (1.48 RSI to 5.92 RSI)	4 (64)	0.20 (850)
16	Aluminum Flashing	14 Gauge	1110 (160)	-	171 (2740)	0.21 (900)
17	CLT Panel	3.5" (89)	0.83 (0.12)	R-4.2 (0.79 RSI)	31 (500)	0.45 (1880)
18	ISO-CONNECT Plate	19/32" (15)	1110 (160)	-	171 (2740)	0.21 (900)
19	ISO-CONNECT Rubber Pad	1/8" (3)	1.7 (0.25)	-	-	-
20	ISO-CONNECT Fasteners x12	ø 5/16" (8)	347 (50)	-	489 (7830)	0.12 (500)
21	HVP Coupling Plates	19/32" (15)	1110 (160)	-	171 (2740)	0.21 (900)
22	HVP Fasteners x9	ø 3/16" (5)	347 (50)	-	489 (7830)	0.12 (500)
23	Fiber Cement Board Cladding with 3/4" (19mm) vented airspace incorporated into exterior heat transfer coefficient					
24	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

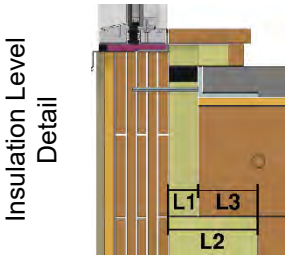
[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 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







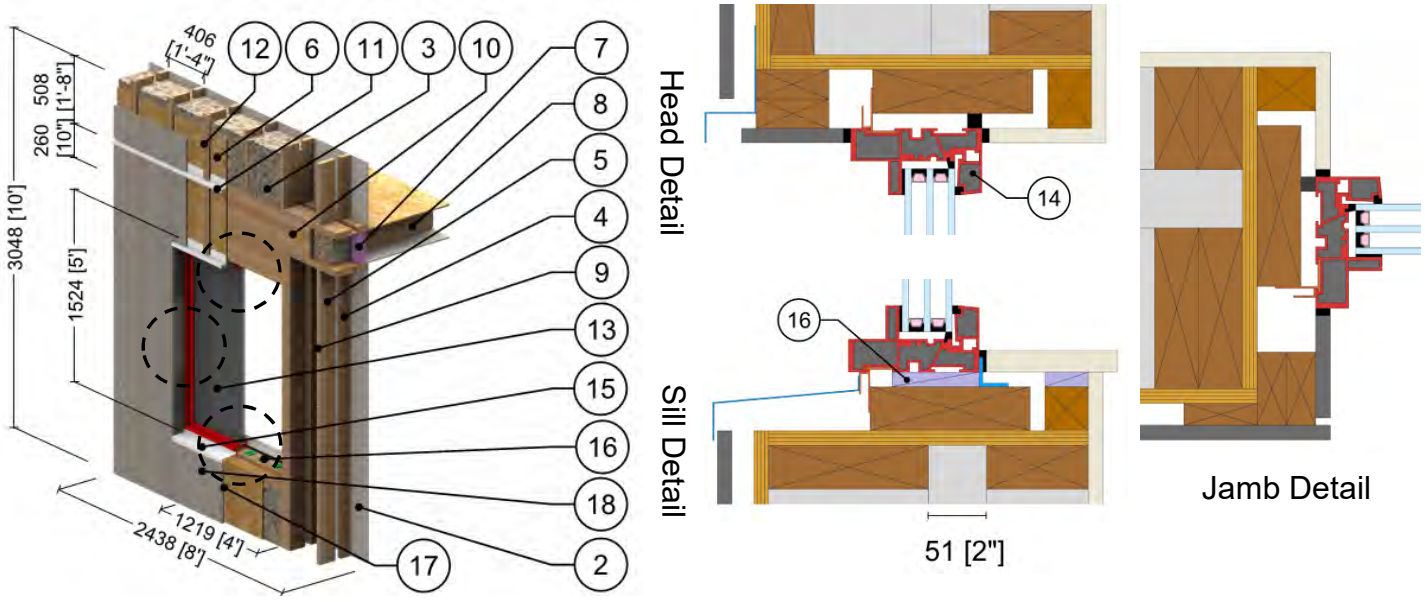
L1 in (mm)	L2 in (mm)	L3 in (mm)
2" (51)	6" (152)	4" (102)
3" (76)	6" (152)	3" (76)
4" (102)	6" (152)	2" (51)

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 Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Wood Sill	1" (25)	0.69 (0.10)	-	31 (500)	0.45 (1880)
3	Support Angle	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Firestop Sealant	1" (25)	2.4 (0.35)	-	174 (2800)	0.17 (700)
5	Window Mounting Angle	1/8" (3)	1110 (160)	-	171 (2740)	0.21 (900)
6	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
7	Concrete Topping	2" (51)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Plywood	5/8" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	DLT Floor	7 1/4" (184)	0.83 (0.12)	-	31 (500)	0.45 (1880)
10	Glulam Beam	9.5" (241)	0.97 (0.14)	R-9.8 (1.73 RSI)	31 (500)	0.45 (1880)
11	L-angle	1/4" (6)	347 (50)	-	489 (7830)	0.12 (500)
12	Structural Screws 18" o.c.	ø 5/16" (8)	347 (50)	-	489 (7830)	0.12 (500)
13	Mineral Wool Insulation	6" (152)	0.24 (0.034)	R-25.2 (4.44 RSI)	4 (64)	0.20 (850)
14	Floor Mineral Wool Insulation	Varies	0.24 (0.034)	R-8.4 to R-16.8 (1.48 RSI to 2.96 RSI)	4 (64)	0.20 (850)
15	Aluminum Flashing	14 Gauge	1110 (160)	-	171 (2740)	0.21 (900)
16	CLT Panel	3.5" (89)	0.83 (0.12)	R-4.2 (0.79 RSI)	31 (500)	0.45 (1880)
17	ISO-CONNECT Plate	19/32" (15)	1110 (160)	-	171 (2740)	0.21 (900)
18	ISO-CONNECT Rubber Pad	1/8" (3)	1.7 (0.25)	-	-	-
19	ISO-CONNECT Fasteners x12	ø 5/16" (8)	347 (50)	-	489 (7830)	0.12 (500)
20	HVP Coupling Plates	19/32" (15)	1110 (160)	-	171 (2740)	0.21 (900)
21	HVP Fasteners x9	ø 3/16" (5)	347 (50)	-	489 (7830)	0.12 (500)
22	Fiber Cement Board Cladding with 3/4" (19mm) vented airspace incorporated into exterior heat transfer coefficient					
23	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 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

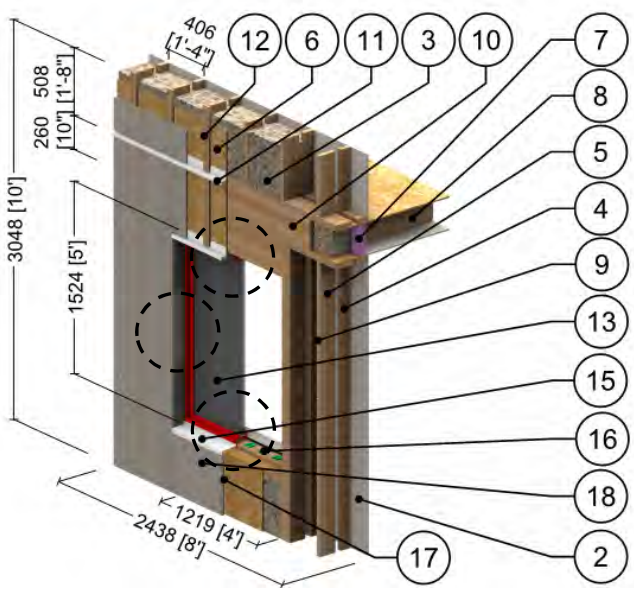


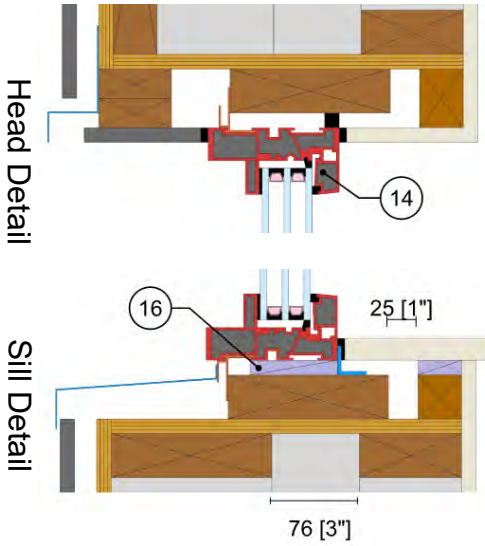
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	11” (279)	Varies	R-38.5 to R-66.0 (6.78 RSI to 11.62 RSI)	-	-
4	2x4 Wood Stud (16” o.c.)	3 1/2” (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	XPS Insulation	2” (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Fasteners (16” o.c.)	0.43” (11) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
11	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Wood Strapping (1” x 3”)	3/4“ (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	5’ (1.5m) x 4’ (1.2m) Fiberglass window: triple glazed[2], IGU U_{IGU} = 0.156 BTU/hr.ft².°F (0.888 W/m²K)					
14	Frame Insulation	-	0.16 (0.023)	-	-	-
15	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
16	Shims	-	1.7 (0.25)	-	-	-
17	Rainscreen Cavity	3/4“ (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
18	Fiber Cement Board	1/2” (13)	4.86 (0.7)	-	-	-
19	Exterior Film[1]	-	-	R-0.2 (0.03 RSI)	-	-

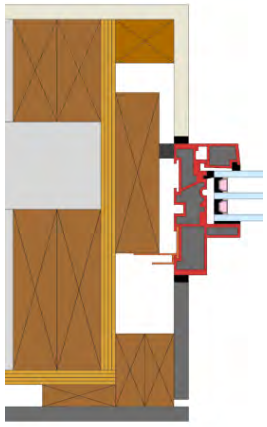
[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 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







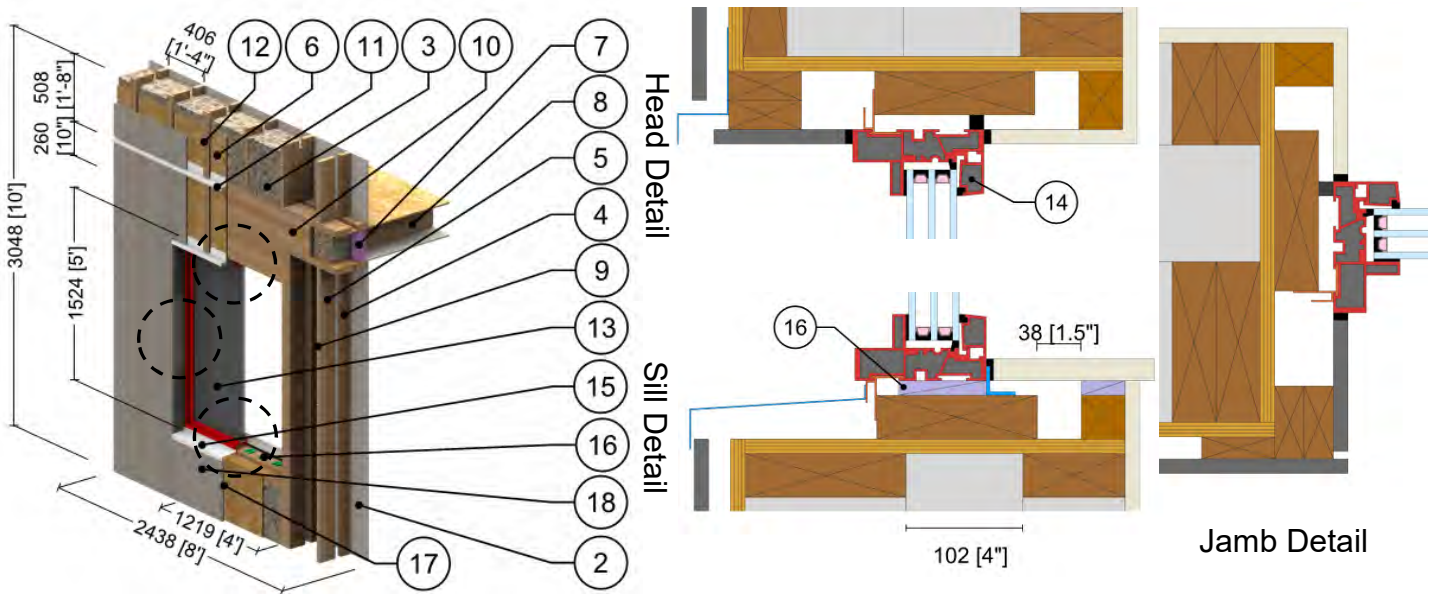
Jamb Detail

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 Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	12” (305)	Varies	R-42.0 to R-72.0 (7.40 RSI to 12.68 RSI)	-	-
4	2x4 Wood Stud (16” o.c.)	3 1/2” (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	XPS Insulation	2” (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Fasteners (16” o.c.)	0.43” (11) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
11	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Wood Strapping (1” x 3”)	3/4“ (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	5’ (1.5m) x 4’ (1.2m) Fiberglass window: triple glazed[2], IGU U_{IGU} = 0.156 BTU/hr.ft².°F (0.888 W/m²K)					
14	Frame Insulation	-	0.16 (0.023)	-	-	-
15	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
16	Shims	-	1.7 (0.25)	-	-	-
17	Rainscreen Cavity	3/4“ (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
18	Fiber Cement Board	1/2” (13)	4.86 (0.7)	-	-	-
19	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 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

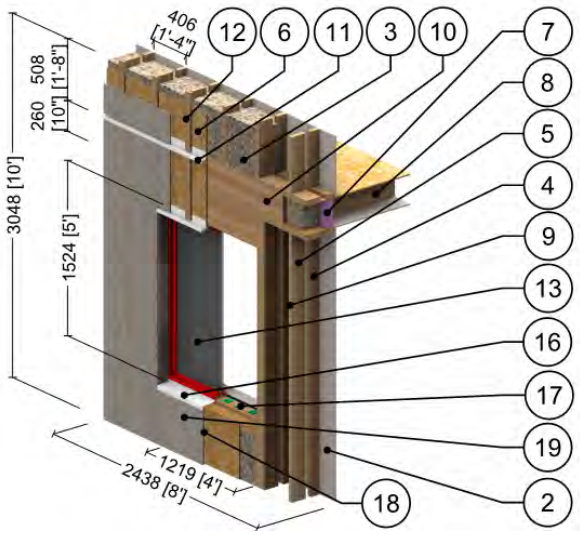


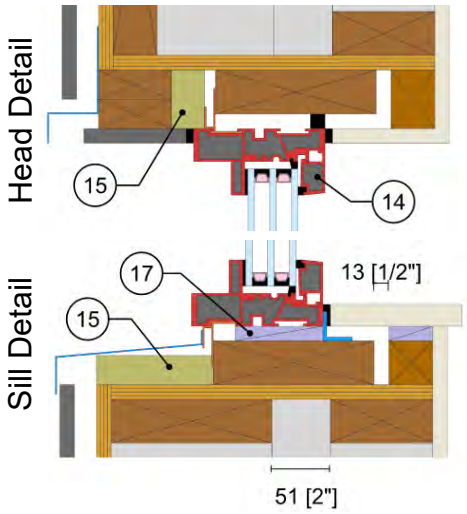
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	13” (330)	Varies	R-45.5 to R-78.0 (8.01 RSI to 13.74 RSI)	-	-
4	2x4 Wood Stud (16” o.c.)	3 1/2” (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	XPS Insulation	2” (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Fasteners (16” o.c.)	0.43” (11) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
11	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Wood Strapping (1” x 3”)	3/4“ (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	5’ (1.5m) x 4’ (1.2m) Fiberglass window: triple glazed[2], IGU U_{IGU} = 0.156 BTU/hr.ft².°F (0.888 W/m²K)					
14	Frame Insulation	-	0.16 (0.023)	-	-	-
15	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
16	Shims	-	1.7 (0.25)	-	-	-
17	Rainscreen Cavity	3/4“ (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
18	Fiber Cement Board	1/2” (13)	4.86 (0.7)	-	-	-
19	Exterior Film[1]	-	-	R-0.2 (0.03 RSI)	-	-

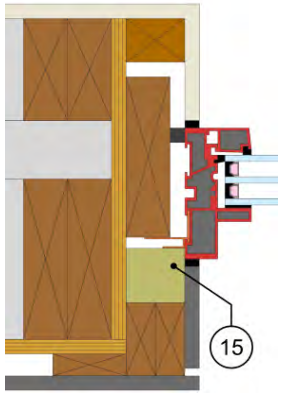
[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 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







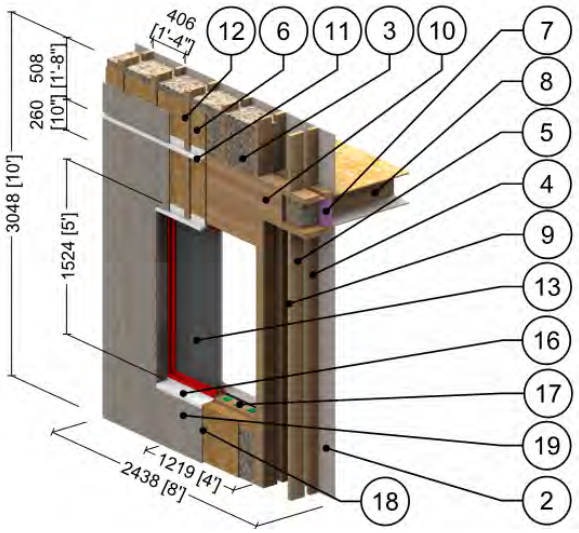
Jamb Detail

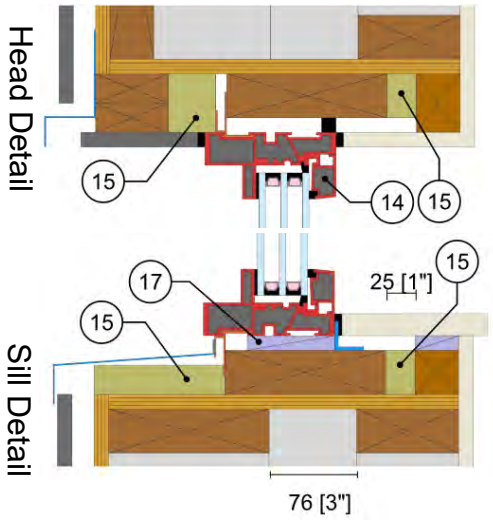
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	11” (279)	Varies	R-38.5 to R-66.0 (6.78 RSI to 11.62 RSI)	-	-
4	2x4 Wood Stud (16” o.c.)	3 1/2” (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	XPS Insulation	2” (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Fasteners (16” o.c.)	0.43” (11) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
11	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Wood Strapping (1” x 3”)	3/4“ (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	5’ (1.5m) x 4’ (1.2m) Fiberglass window: triple glazed[2], IGU U_{IGU} = 0.156 BTU/hr.ft².°F (0.888 W/m²K)					
14	Frame Insulation	-	0.16 (0.023)	-	-	-
15	Mineral Wool	-	0.24 (0.034)	-	4 (64)	0.20 (850)
16	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
17	Shims	-	1.7 (0.25)	-	-	-
18	Rainscreen Cavity	3/4“ (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
19	Fiber Cement Board	1/2” (13)	4.86 (0.7)	-	-	-
20	Exterior Film[1]	-	-	R-0.2 (0.03 RSI)	-	-

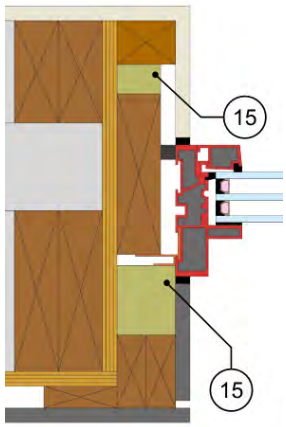
[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 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







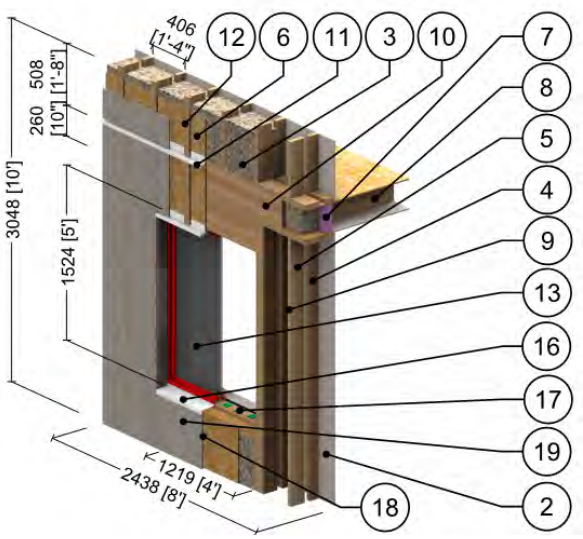
Jamb Detail

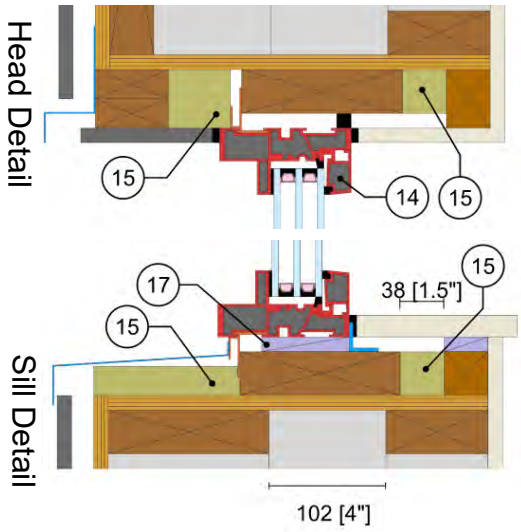
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	12” (305)	Varies	R-42.0 to R-72.0 (7.40 RSI to 12.68 RSI)	-	-
4	2x4 Wood Stud (16” o.c.)	3 1/2” (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	XPS Insulation	2” (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Fasteners (16” o.c.)	0.43” (11) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
11	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Wood Strapping (1” x 3”)	3/4“ (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	5’ (1.5m) x 4’ (1.2m) Fiberglass window: triple glazed[2], IGU U_{IGU} = 0.156 BTU/hr.ft².°F (0.888 W/m²K)					
14	Frame Insulation	-	0.16 (0.023)	-	-	-
15	Mineral Wool	-	0.24 (0.034)	-	4 (64)	0.20 (850)
16	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
17	Shims	-	1.7 (0.25)	-	-	-
18	Rainscreen Cavity	3/4“ (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
19	Fiber Cement Board	1/2” (13)	4.86 (0.7)	-	-	-
20	Exterior Film[1]	-	-	R-0.2 (0.03 RSI)	-	-

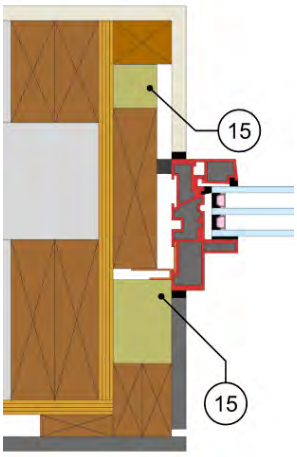
[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity of air spaces within framing was found using ISO 100077-2

Detail 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







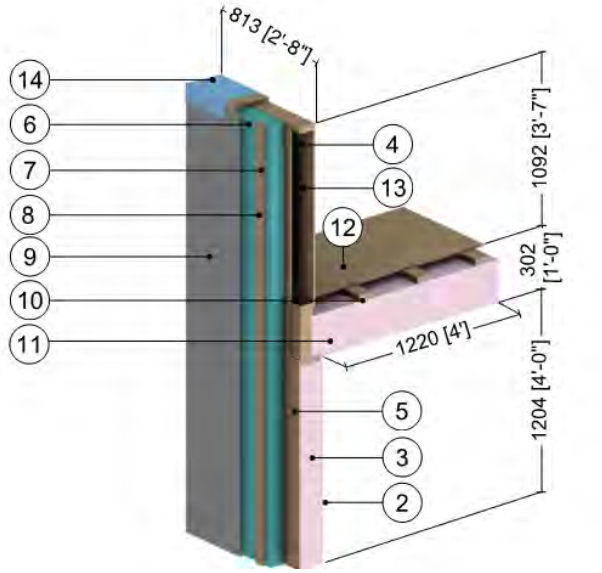
Jamb Detail

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 Film[1]	-	-	R-0.6 to R-1.1 (0.11 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fill Insulation	13” (330)	Varies	R-45.5 to R-78.0 (8.01 RSI to 13.74 RSI)	-	-
4	2x4 Wood Stud (16” o.c.)	3 1/2” (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
7	XPS Insulation	2” (51)	0.20 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
8	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Fasteners (16” o.c.)	0.43” (11) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	2x10 Rim Joist	1 1/2” (38)	0.69 (0.10)	-	31 (510)	0.45 (1880)
11	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Wood Strapping (1” x 3”)	3/4“ (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	5’ (1.5m) x 4’ (1.2m) Fiberglass window: triple glazed[2], IGU U_{IGU} = 0.156 BTU/hr.ft².°F (0.888 W/m²K)					
14	Frame Insulation	-	0.16 (0.023)	-	-	-
15	Mineral Wool	-	0.24 (0.034)	-	4 (64)	0.20 (850)
16	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
17	Shims	-	1.7 (0.25)	-	-	-
18	Rainscreen Cavity	3/4“ (19)	-	R-0.4 (0.07 RSI)	0.075 (1.2)	0.24 (1000)
19	Fiber Cement Board	1/2” (13)	4.86 (0.7)	-	-	-
20	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 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 – Vented Low-slope Roof & Parapet Intersection

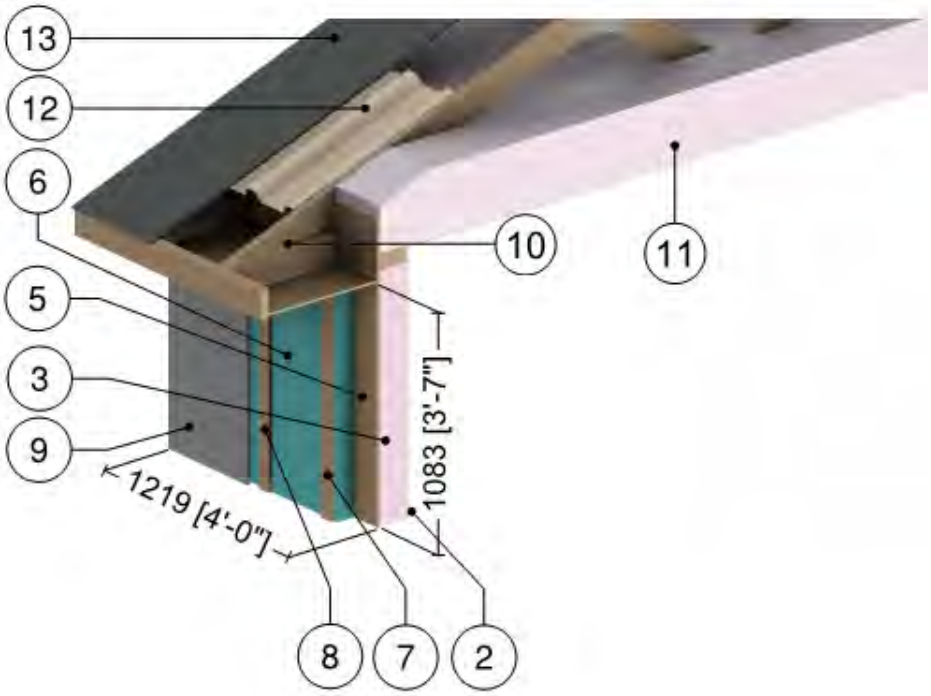


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	3 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-0 to R-15 (0.00 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Roof Wood Framing	-	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Fiberglass Roof Insulation	9 1/4” (235)	0.3 (0.04)	R-30 (5.28 RSI)	0.9 (14)	0.17 (710)
12	Roof Wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
13	Air Cavity	3 1/2” (89)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
14	Steel Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
Flashing & roof material are incorporated into exterior heat transfer coefficient						
15	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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 – Sloped Wood Framed Roof & Wall Intersection with Insulation at Ceiling

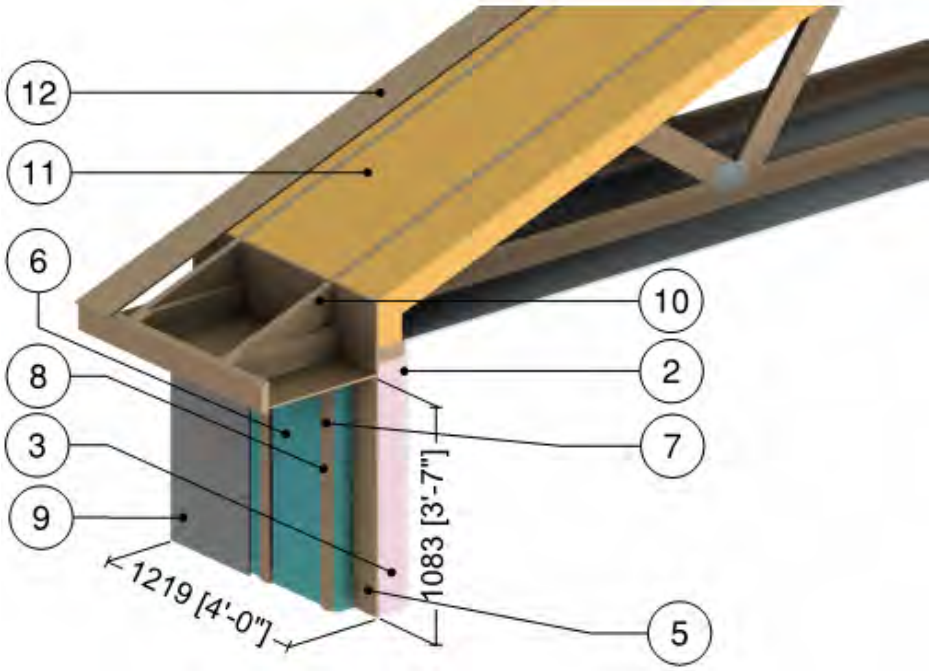


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.12 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-0 to R-15 (0.00 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Roof Truss (24” o.c.)	-	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Attic Insulation	9” (228)	0.29 (0.042)	R-30 (5.3 RSI)	0.9 (14)	0.17 (710)
12	Roof Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
13	Asphalt Shingles	-	-	R-0.45 (0.08 RSI)	57 (920)	0.3 (1260)
14	Exterior Film (left side)[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

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 – Sloped Wood Framed Roof & Wall Intersection with Insulation at Roof Sheathing

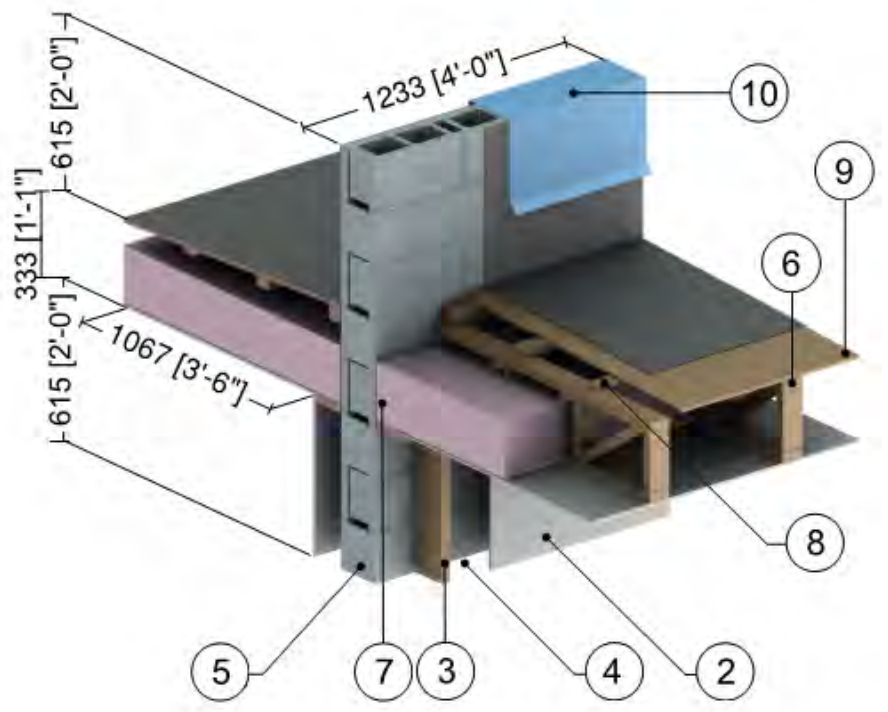


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.12 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	R-7.9 (1.4 RSI)	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-0 to R-15 (0.00 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Roof Truss (24” o.c.)	-	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Polyurethane Foam Insulation	5” (127)	0.17 (0.024)	R-30 (5.3 RSI)	1.8 (28)	0.29 (1220)
12	Roof Wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

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

Detail 8.4.4

Ventilated Wood Frame Low Slope Roof - Masonry Firewall Intersection

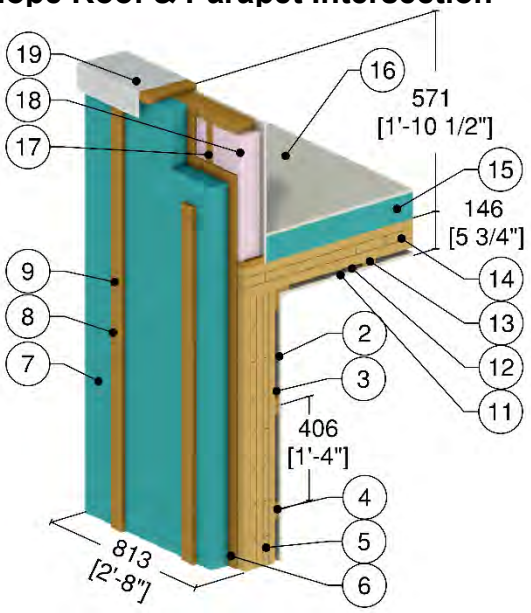


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2x6 Wood Studs (16" o.c.) and Top Plate	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
4	Air Cavity	5 1/2" (140)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	Standard Concrete Block	8" (203)	3.5 (0.5)	-	119 (1900)	0.19 (800)
6	2x4 Parallel Wood Truss	-	0.69 (0.10)	-	31 (500)	0.45 (1880)
7	Roof Insulation	8 3/4" (222)	0.29 (0.04)	R-30 (5.3 RSI)	0.9 (14)	0.17 (710)
8	Wood Purlins (16" o.c.)	-	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Roof Wood Sheathing	1/2" (13)	0.69 (0.10)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
10	Steel Cap Flashing	18 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 8.4.5

Exterior Insulated Cross Laminated Timber (CLT) Wall Assembly with Continuous Rigid Insulation Supporting Fiber Cement Board – Low-Slope Roof & Parapet Intersection

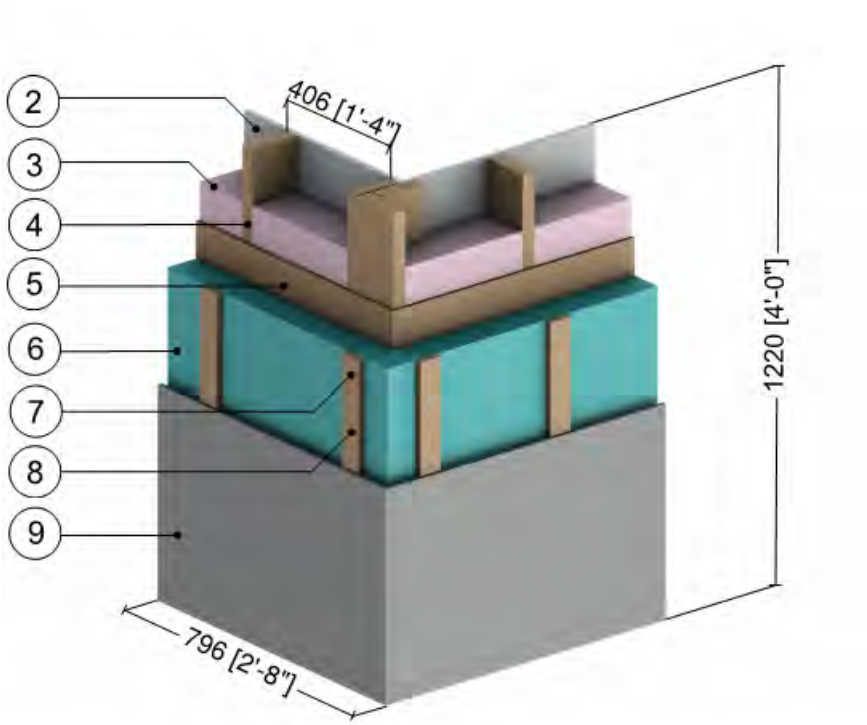


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Cavity	3/4" (19)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1x3 Wood Strapping (16" o.c.)	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Cross Laminated Timber Wall	5 1/2" (140)	0.83 (0.12)	R-6.6 (1.16 RSI)	31 (500)	0.45 (1880)
6	Plywood Sheathing	3/8" (9.5)	0.69 (0.10)	R-0.5 (0.10 RSI)	31 (500)	0.45 (1880)
7	Exterior Insulation	Varies	-	R-15 to R-25 (2.64 to 4.40 RSI)	1.8 (28)	0.29 (1220)
8	1x3 Wood Strapping (16" o.c.)	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	#14 Steel Fasteners (12" o.c.)	0.24" (6.2) Ø	347 (50)	-	489 (7830)	0.12 (500)
10	Fiber Cement Board Cladding with 3/4" (19mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Roof Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
12	Air in Roof Cavity	3/4" (19)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
13	1x3 Wood Strapping (16" o.c.)	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Cross Laminated Timber Roof	4 1/2" (114)	0.83 (0.12)	R-5.4 (0.95 RSI)	31 (500)	0.45 (1880)
15	Roof Insulation	Varies	-	R-20 to R-50 (3.52 to 8.81 RSI)	1.8 (28)	0.29 (1220)
16	Gypsum Top Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
17	2x4 Roof Wood Framing	3 1/2" (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
18	Fiberglass Batt Insulation	3 1/2" (89)	0.042 (0.29)	R-12 (2.11 RSI)	0.9 (14)	0.17 (710)
19	Steel Cap Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
20	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 RSI)	-	-

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

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 – Corner Intersection

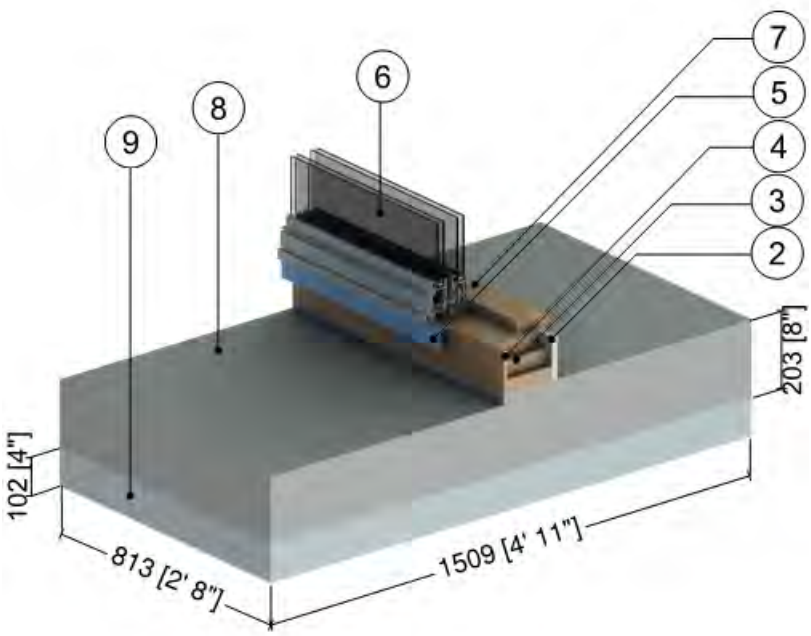


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2” (16)	1.1 (0.16)	R-0.5 (0. 08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (16)	0.69 (0.10)	R-0.6 (0.10 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-0 to R-15 (0.00 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16” o.c.)	-	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

Detail 8.6.1

Wood-frame Sliding Door – Concrete Floor Intersection for Unheated Spaces (Parking Garages)

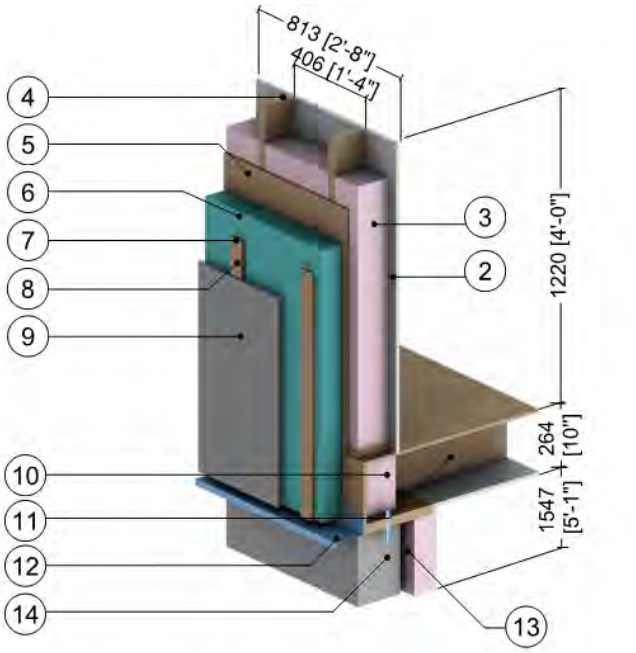


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2x6 Wood Plates	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
4	Exterior Wood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.26 (1090)
5	Steel Flashing	28 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Aluminum Sliding Door: double glazed and thermally broken[2], double glazed IGU UIGU = 0.32 BTU/hr.ft².°F (1.82 W/m²K)					
7	Wood Sill	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	141 (2250)	0.20 (850)
9	Spray Applied Fiberglass insulation	4" (102)	0.20 (0.029)	R-20 (3.5 RSI)	0.9 (14)	0.12 (500)
10	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] The thermal conductivity for air spaces within window framing was found using ISO 10077-2

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 – Rim Joist and Interior Insulated At-Grade Foundation Wall Intersection

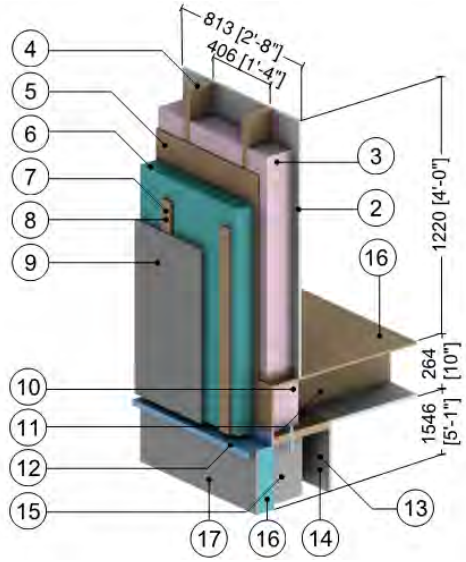


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Plywood Sheathing	1/2” (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	1 1/2” (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Fiberglass Batt Insulation at Joist	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
11	2x10 Wood Joist (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
12	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	2x4 Wood Stud (16” o.c.)	3 1/2” (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Concrete Foundation Wall	8” (203)	12.5 (1.8)	R-0.6 (0.11 RSI)	140 (2250)	0.20 (850)
15	Exterior Film[1,2]	-	-	R-0.7 (0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] Except at foundation wall adjacent soil

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 – Rim Joist and Exterior Insulated At-Grade Foundation Wall Intersection

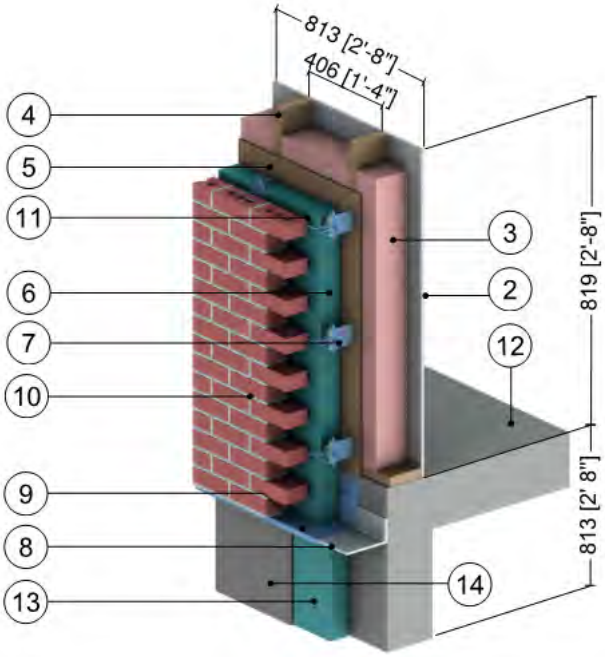


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.)	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (13)	0.69 (0.10)	R-0.5 (0.08 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	1x3 Wood Strapping	3/4” (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
8	Steel Fasteners (16” o.c.)	0.35” (9) Ø	347 (50)	-	489 (7830)	0.12 (500)
9	Fiber Cement Board Cladding with 3/4” (19mm) vented airspace incorporated into exterior heat transfer coefficient					
10	Fiberglass Batt Insulation at Joists	5 1/2” (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
11	2x10 Wood Joists (16” o.c.)	9 1/4” (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
12	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
13	2x4 Wood Stud (16” OC)	3 1/2” (89)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Air Cavity	3 1/2” (89)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
15	Concrete Foundation Wall	8” (203)	12.5 (1.8)	R-0.6 (0.11 RSI)	140 (2250)	0.20 (850)
16	Rigid Exterior Insulation	2 1/2” (64)	-	R-12.5 (2.2 RSI)	1.8 (28)	0.29 (1220)
17	Protective Coating or Flashing	-	-	-	-	-
18	Exterior Film[1,2]	-	-	R-0.7 (0.12 RSI)	-	-

[1] Value selected from table 1, p. 26.1 of 2009 ASHRAE Handbook – Fundamentals depending on surface orientation
[2] Except at foundation wall adjacent soil

Detail 8.6.4

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Exterior Insulated At-Grade Foundation Wall Intersection

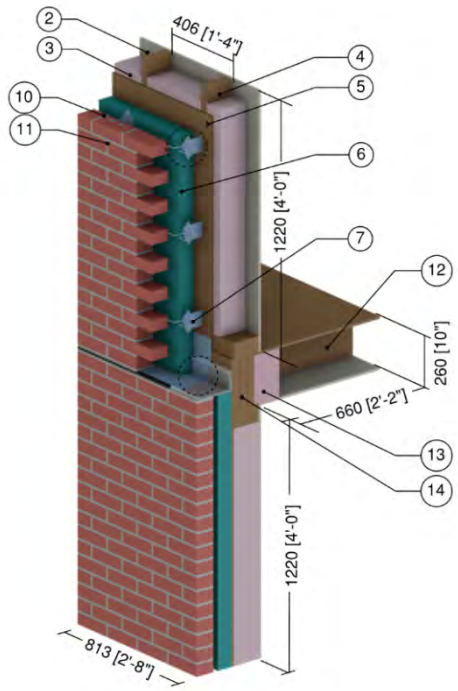


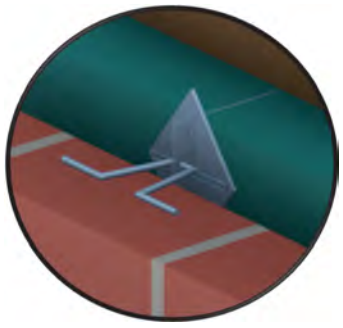
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.7 to R-0.9 (0.12 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2” (140)	0.29 (0.04)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16” o.c.) with Bottom Plate	5 1/2” (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2” (16)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	Masonry Ties @ 16” (406) o.c.	14 Gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Steel Shelf Angle	3/8” (10)	347 (50)	-	489 (7830)	0.12 (500)
9	Steel Flashing	20 Gauge	347 (50)	-	489 (7830)	0.12 (500)
10	Brick Veneer	3 5/8” (92)	5.4 (0.78)	-	120 (1920)	0.19 (720)
11	Air Cavity	1” (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
12	Concrete Slab & Foundation Wall	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Rigid Exterior Insulation	2 1/2” (64)	0.2 (0.03)	R-12.5 (2.2 RSI)	1.8 (28)	0.29 (1220)
14	Protective Coating or Flashing	-	-	-	-	-
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] Except at foundation wall adjacent soil

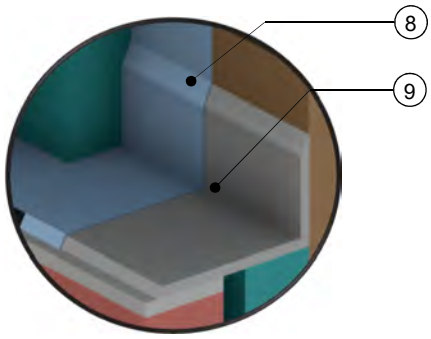
Detail 8.6.5

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Shelf Angle & Brick Ties Supporting Brick Veneer – Rim Joist and Floor Intersection





Brick Tie Detail



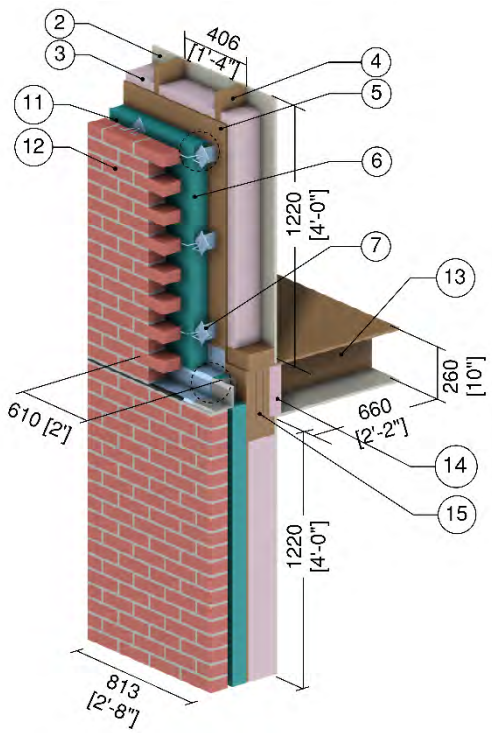
Shelf Angle Detail

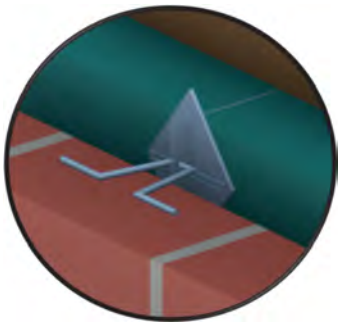
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation in Stud Cavity	5 1/2" (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.13 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-0 to R-10 (0.00 RSI to 1.76 RSI)	1.8 (28)	0.29 (1220)
7	Brick Ties	14 gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Flashing	20 gauge	347 (50)	-	489 (7830)	0.12 (500)
9	Steel Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Air Cavity[2]	1" (25)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
11	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	140 (2250)	0.20 (850)
12	2x10 Wood Joists (16"o.c.)	9 1/4" (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	Fiberglass Batt Insulation at Joists	5 1/2" (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
14	2x10 Rim Joist	1 1/2" (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
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 was found using ISO 100077-2

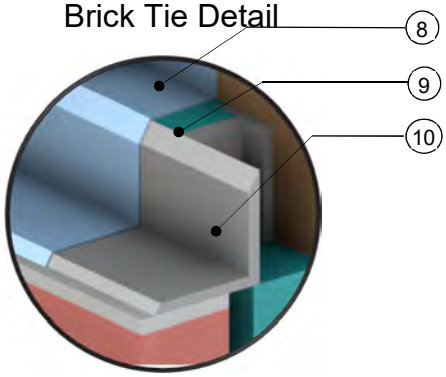
Detail 8.6.6

Exterior and Interior Insulated 2x6 Wood Stud (16” o.c.) Wall Assembly with Stand-off (Knife Plate) Shelf Angle & Brick Ties Supporting Brick Veneer – Rim Joist and Floor Intersection





Brick Tie Detail



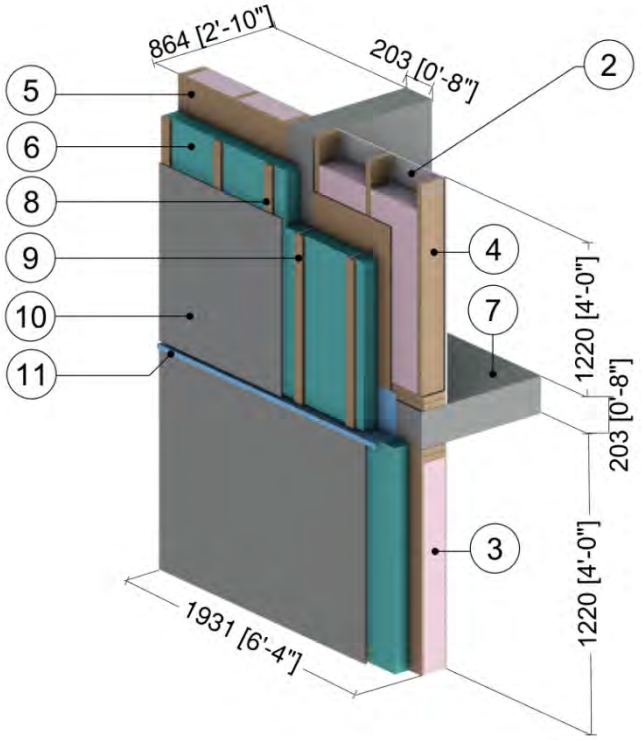
Shelf Angle Detail

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 Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation in Stud Cavity	5 1/2" (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Plywood Sheathing	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-0 to R-10 (0.00 RSI to1.76 RSI)	1.8 (28)	0.29 (1220)
7	Brick Ties	14 gauge	347 (50)	-	489 (7830)	0.12 (500)
8	Exterior Insulation Behind Shelf Angle	Varies	-	R-0 to R-10 (0.00 RSI to1.76 RSI)	1.8 (28)	0.29 (1220)
9	Flashing	20 gauge	347 (50)	-	489 (7830)	0.12 (500)
10	Spteel Shelf Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
11	Air Cavity[2]	1" (25)	-	R-0.9 (0.16RSI)	0.075 (1.2)	0.24 (1000)
12	Brick Veneer	3 5/8" (92)	5.4 (0.78)	-	140 (2250)	0.20 (850)
13	2x10 Wood Joists (16"o.c.)	9 1/4" (235)	0.69 (0.10)	-	31 (500)	0.45 (1880)
14	Fiberglass Batt Insulation at Joists	5 1/2" (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
15	2x10 Rim Joist	1 1/2" (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
16	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 was found using ISO 100077-2

Detail 8.7.1

Exterior Insulated Wood Infill Wall Assembly with Wood Strapping and Continuous Insulation Supporting Fiber Cement Board – Concrete Wall and Intermediate Floor Intersection with Flashing Bypassing Exterior Insulation

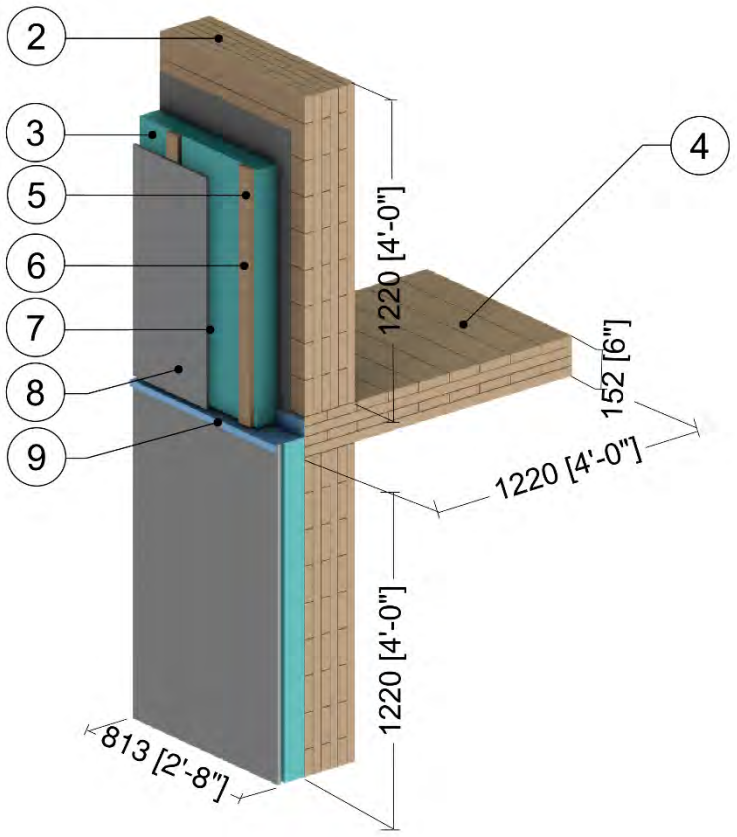


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	5 1/2" (140)	0.29 (0.042)	R-19 (3.3 RSI)	0.9 (14)	0.17 (710)
4	2x6 Wood Stud (16" o.c.)	5 1/2" (140)	0.69 (0.10)	-	31 (500)	0.45 (1880)
5	Exterior Wood Sheathing	1/2" (13)	0.69 (0.10)	R-0.7 (0.12 RSI)	31 (500)	0.45 (1880)
6	Exterior Insulation	Varies	-	R-5 to R-15 (0.88 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	Concrete Wall & Floor Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	1x3 Wood Strapping	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Steel Fasteners (16" o.c.)	0.35" (9) Ø	347(50)	-	489 (7830)	0.12 (500)
10	Fiber Cement Board Cladding with 3/4" (19mm) vented airspace incorporated into exterior heat transfer coefficient					
11	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Exterior Film[1]	-	-	R-0.7 (0.12 RSI)	-	-

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

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



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 Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Cross Laminated Timber Wall	7 1/2" (191)	0.83 (0.12)	R-9 (1.59 RSI)	31 (500)	0.45 (1880)
3	Exterior Insulation	Varies	-	R-15 to R-25 (2.64 RSI to 4.4 RSI)	1.8 (28)	0.29 (1220)
4	Cross Laminated Timber Floor	4 1/2" (114)	0.83 (0.12)	R-5.4 (0.95 RSI)	31 (500)	0.45 (1880)
5	1x3 Wood Strapping (16" o.c.)	3/4" (19)	0.69 (0.10)	-	31 (500)	0.45 (1880)
6	Steel Fasteners (12" o.c.)	0.44" (11) Ø	347 (50)	-	489 (7830)	0.12 (500)
7	Rainscreen Cavity	3/4" (19)	-	R-0.5 (0.09 RSI)	0.075 (1.2)	0.24 (1000)
8	Fiber Cement Board Cladding	1/2" (13)	4.9 (0.7)	R-0.1 (0.02 RSI)	112 (1800)	0.20 (840)
9	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Galvanized Steel L-clips	3/8" (9.5)	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

9.0 Doors and Balconies

Detail 9.1.1 ..... **A.9.1**

Interior Insulated Concrete Curb at Sliding Door Sill and Window Head – Intermediate Floor Intersection

Detail 9.1.2 ..... **A.9.2**

Exterior Insulated Concrete Curb at Sliding Door Sill and Window Head – Intermediate Floor Intersection

Detail 9.1.3 ..... **A.9.3**

Interior Insulated Concrete Curb – Window-Wall and Intermediate Floor Intersection

Detail 9.1.4 ..... **A.9.4**

Exterior Insulated Concrete Curb at Sliding Door Sill and Head- Intermediate Floor Intersection

Detail 9.1.5 ..... **A.9.5**

Exterior Insulated Concrete Curb – Window-Wall and Recessed Intermediate Floor Intersection

Detail 9.1.6 ..... **A.9.6**

Window Wall System with Spandrel Panels and Sliding Door - Concrete Balcony and Curb Intersection

Detail 9.1.7 ..... **A.9.7**

Window-wall with Sliding Door and Insulated Spandrel Section – Concrete Intermediate Floor Intersection without Concrete Curb for Alternative Balcony Slab Connections

Detail 9.1.8 ..... **A.9.8**

Window Wall System with Spandrel Panels and Sliding Door - Thermally Broken Concrete Balcony and Curb Intersection

Detail 9.1.9 ..... **A.9.9**

Window Wall System with Spandrel Panels - Concrete Balcony and Bypass Intersection

Detail 9.1.10 ..... **A.9.10**

Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly - Door Sill with Exterior Slab Insulation

Detail 9.1.11 ..... **A.9.11**

Exterior and Interior Insulated 3 5/8” x 1 5/8” Steel Stud (16” o.c.) Wall Assembly - Door Sill with Exterior Slab Insulation

Detail 9.1.12 ..... **A.9.12**

Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb K65-V8 Thermal Break at Concrete Balcony and Curb Intersection

Detail 9.1.13 ..... **A.9.13**

Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb K10-V6 Thermal Break at Concrete Balcony and Curb Intersection

Detail 9.1.14 ..... A.9.14

Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb KXT65-V8 Thermal Break at Concrete Balcony and Curb Intersection

Detail 9.1.15 ..... A.9.15

Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb KXT15-V6 Thermal Break at Concrete Balcony and Curb Intersection

Detail 9.1.16 ..... A.9.16

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

Detail 9.1.17 ..... A.9.17

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

Detail 9.1.18 ..... A.9.18

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

Detail 9.1.19 ..... A.9.19

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

Detail 9.1.20 ..... A.9.20

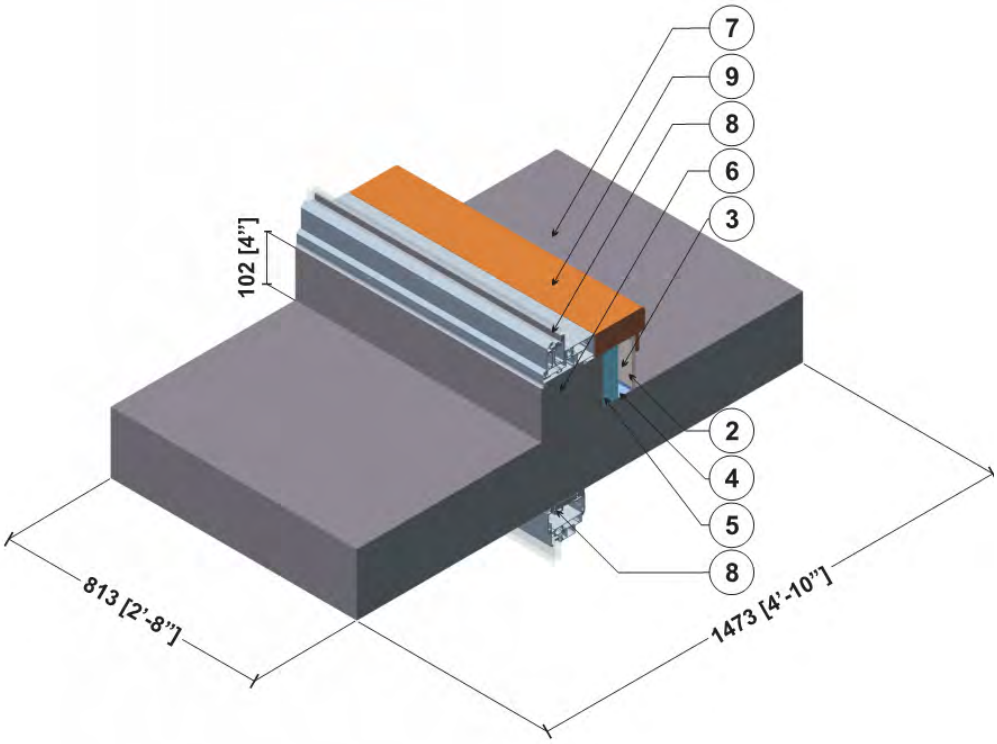
Exterior Insulated 2” x 6” Steel Stud (16” o.c.) Wall Assembly with Vertical Clips (24” o.c.) Supporting Cladding and Sliding Door – Structural Thermal Break at Concrete Balcony and Curb Intersection

Detail 9.1.21 ..... A.9.21

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

Detail 9.1.1

Interior Insulated Concrete Curb at Sliding Door Sill and Window Head – Intermediate Floor Intersection

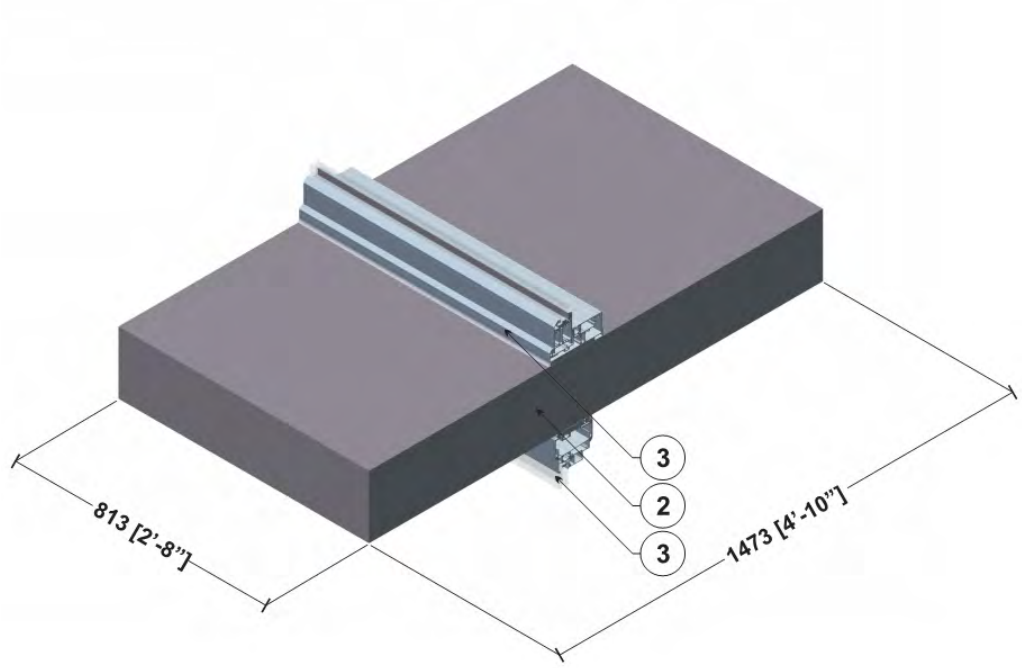


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air in Stud Cavity	2 5/8" (67)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	2 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Interior Insulation	2" (50)	-	R-10 (1.8 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Curb	6" (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Thermally Broken Aluminum Window & Sliding Door[2]					
9	Wood Sill	2" (50)	0.63 (0.09)	-	1.8 (28)	0.29 (1220)
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 sliding door and window framing was found using ISO 10077-2.

Detail 9.1.2

Exterior Insulated Concrete Curb at Sliding Door Sill and Window Head – Intermediate Floor Intersection

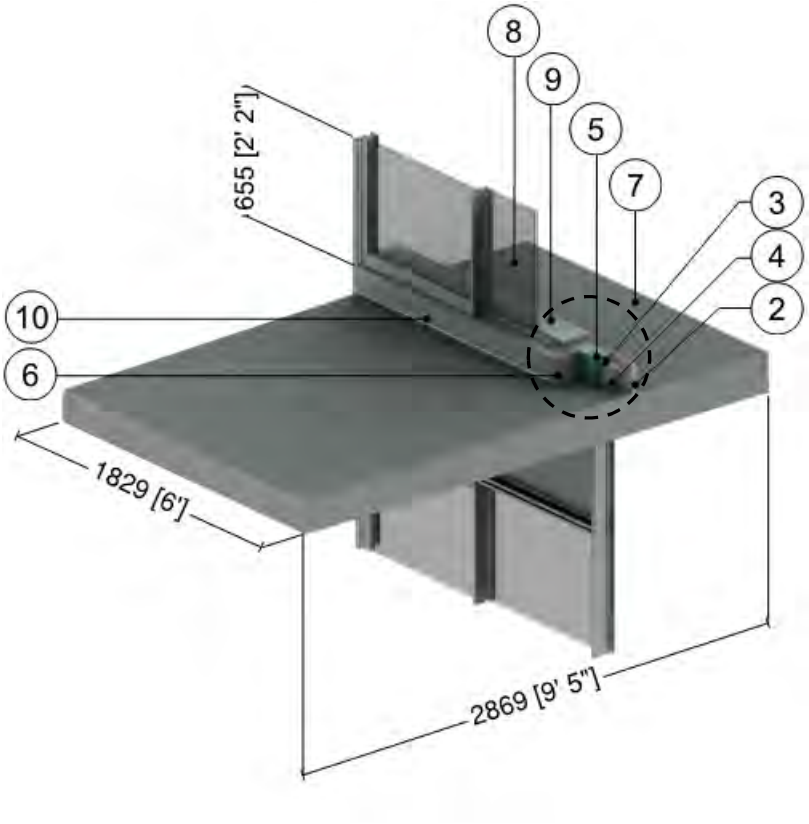


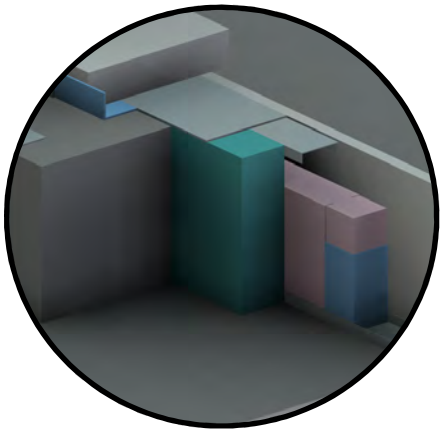
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Thermally Broken Aluminum Window & Sliding Door[2]					
4	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 sliding door and window framing was found using ISO 10077-2.

Detail 9.1.3

Interior Insulated Concrete Curb – Window-Wall and Intermediate Floor Intersection





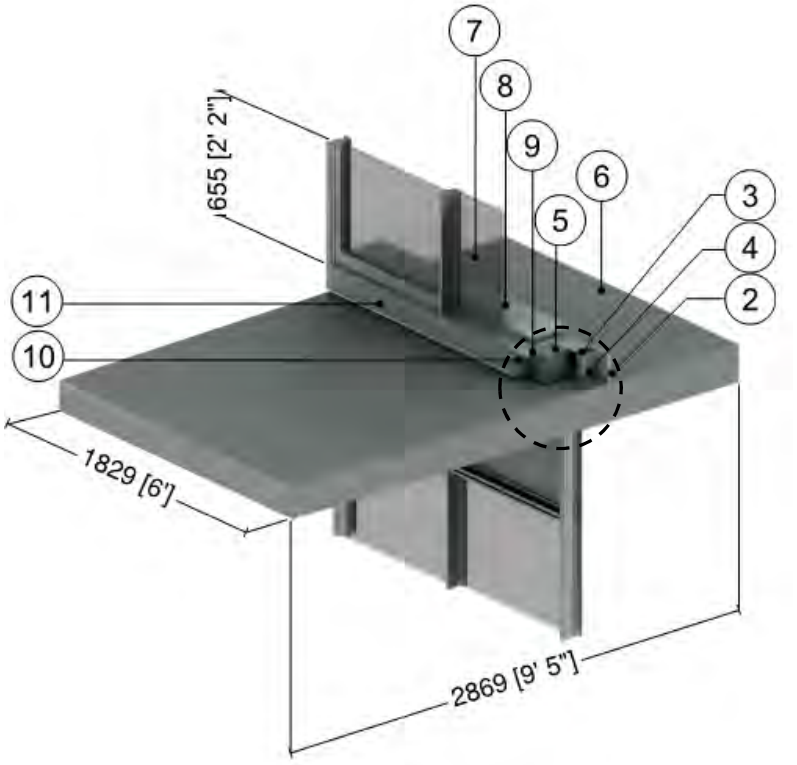
Curb Detail

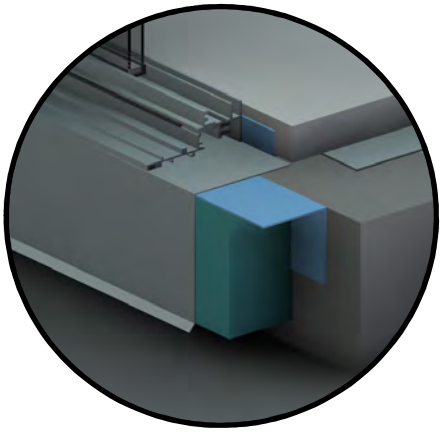
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	1 5/8" (41)	0.29 (0.042)	R-5.5 (0.98 RSI)	0.9 (14)	0.17 (710)
4	1 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Continuous Rigid Insulation	2" (51)	0.24 (0.034)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
6	Concrete Curb	6" (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
8	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
9	Wood Sill	2" (50)	0.69 (0.10)	-	31 (500)	0.45 (1880)
10	Steel Flashing	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 sliding door framing was found using ISO 10077-2

Detail 9.1.4

Exterior Insulated Concrete Curb at Sliding Door Sill and Head-Intermediate Floor Intersection





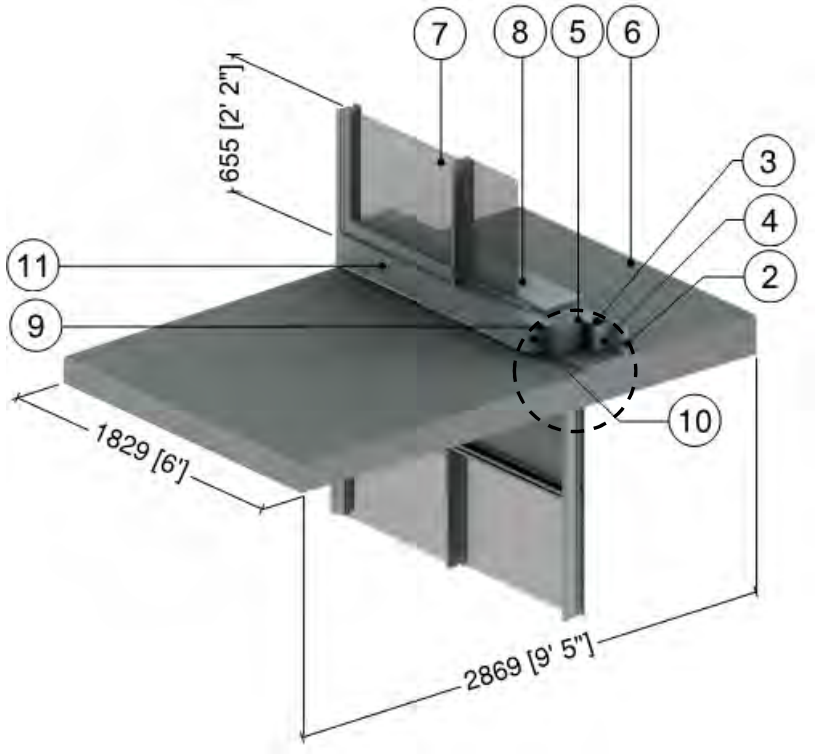
Curb Detail

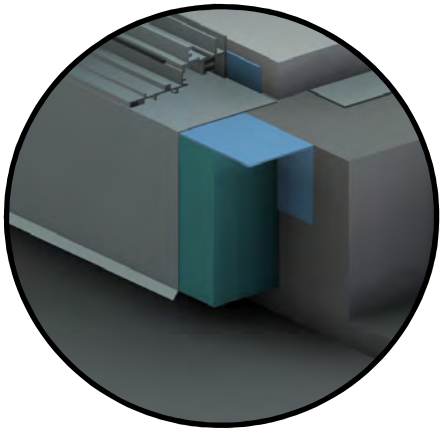
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air In Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Curb	6" (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	Wood Sill	2" (50)	0.69 (0.1)	-	31 (500)	0.45 (1880)
9	Support Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
11	Steel Flashing	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 sliding door framing was found using ISO 10077-2

Detail 9.1.5

Exterior Insulated Concrete Curb – Window-Wall and Recessed Intermediate Floor Intersection





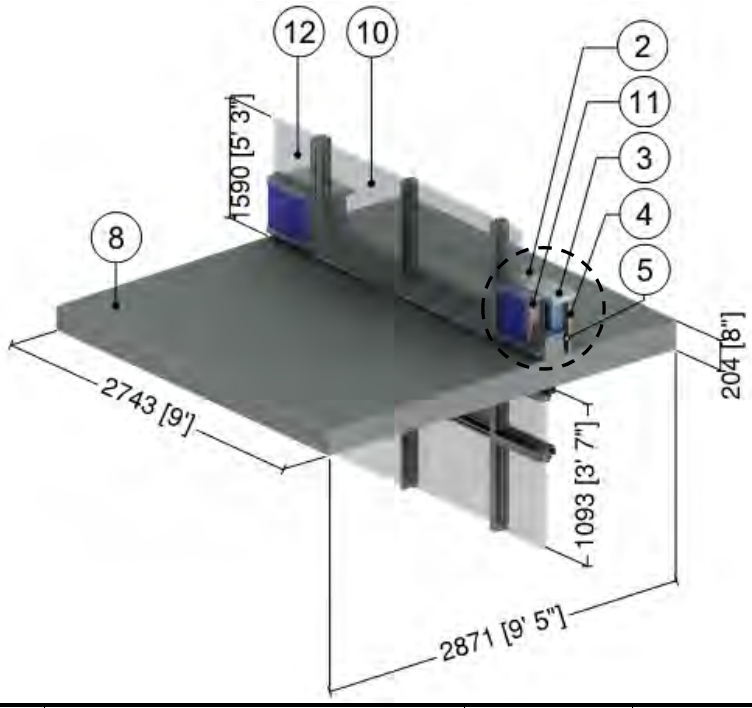
Curb Detail

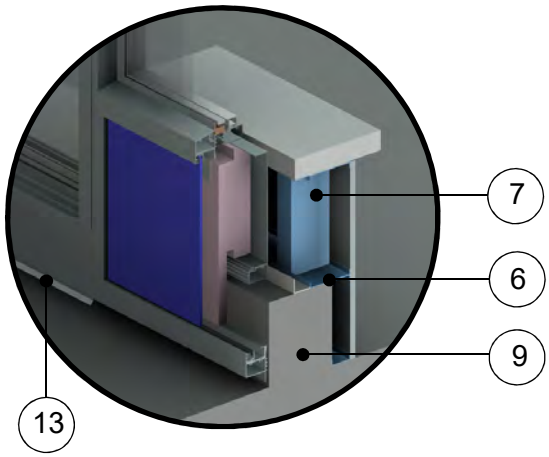
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.9 (0.11 RSI to 0.16 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Air In Stud Cavity	3 5/8" (92)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
4	1 5/8" x 1 5/8" Steel Studs with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Concrete Curb	6" (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
6	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	Wood Sill	2" (50)	0.69 (0.10)	-	31 (500)	0.45 (1880)
9	Support Angle	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
10	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
11	Steel Flashing	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 sliding door framing was found using ISO 10077-2

Detail 9.1.6

Window Wall System with Spandrel Panels and Sliding Door - Concrete Balcony and Curb Intersection





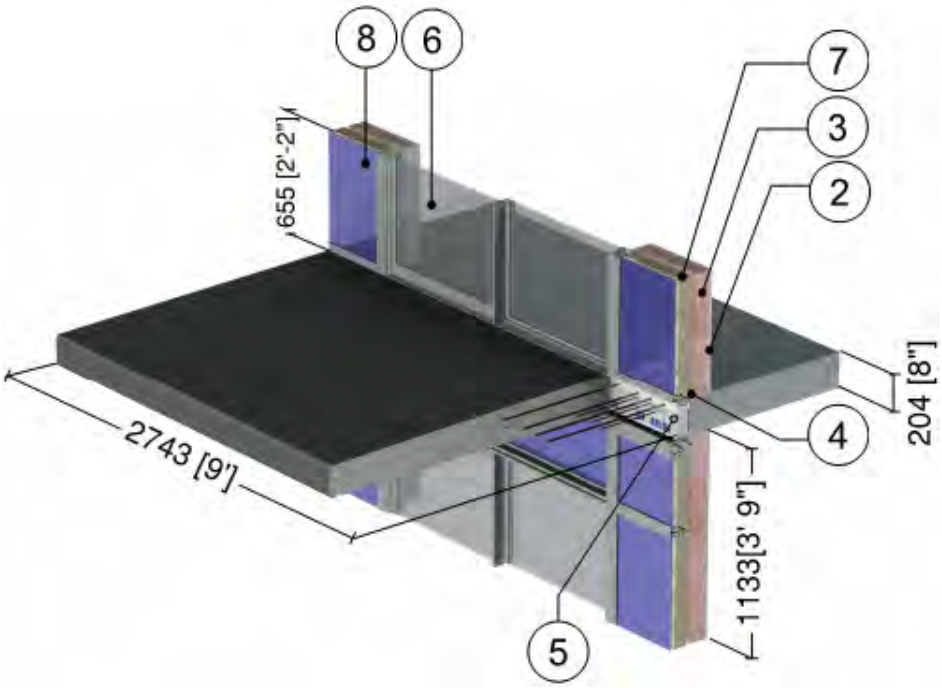
Curb Detail

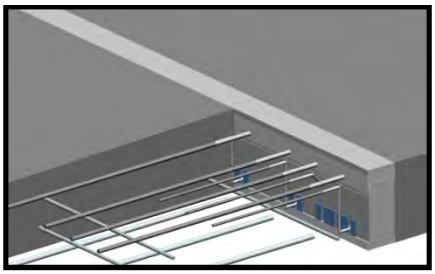
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	2" (50)	0.69 (0.1)	-	31 (500)	0.45 (1880)
3	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	1 5/8" (41)	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	3 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Concrete Curb	6" (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
11	Back Pan Insulation	Varies	0.24 (0.034)	R-6.3 to R-12.6 (1.11 RSI to 2.22 RSI)	4 (64)	0.20 (850)
12	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
13	Aluminum Flashing	16 Gauge	1109 (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 100077-2

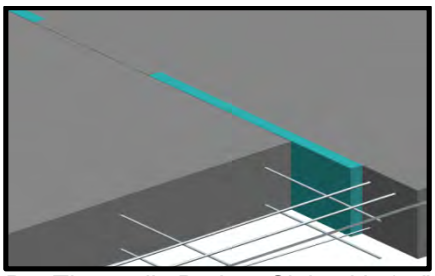
Detail 9.1.7

Window-wall with Sliding Door and Insulated Spandrel Section – Concrete Intermediate Floor Intersection without Concrete Curb for Alternative Balcony Slab Connections

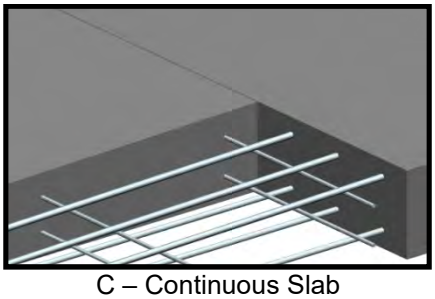




A – Thermally Broken Slab with 3" (80 mm) thick Isokorb CM20



B – Thermally Broken Slab with 1.5" (40 mm) Intermittent Slab Insulation



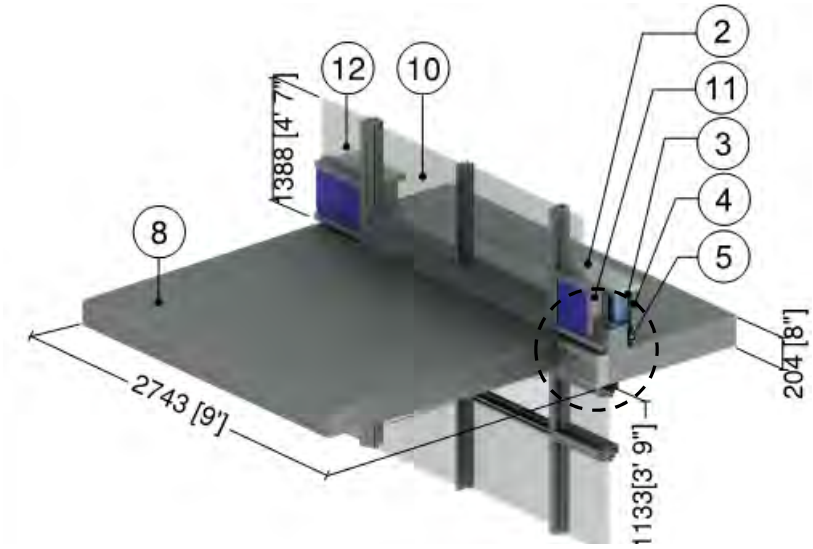
C – Continuous Slab

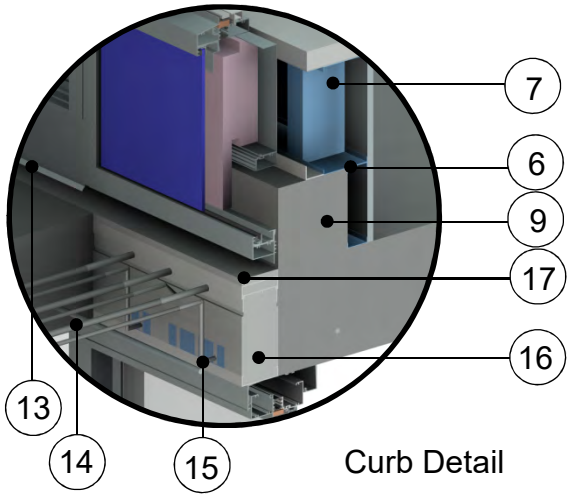
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	Fiberglass Batt Insulation	3 5/8" (92)	0.29 (0.042)	R-12.4 (2.2 RSI)	0.9 (14)	0.17 (710)
4	3 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	8" (203 mm) Concrete Slab with various slab balcony connections shown in A, B, or C above					
6	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
7	Back Pan Insulation	3" (75)	0.24 (0.034)	R-12.6 (2.2 RSI)	1.8 (28)	0.29 (1220)
8	Aluminum Window Wall Vision System: thermally broken frame, double glazed IGU, U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K) [2]					
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 9.1.8

Window Wall System with Spandrel Panels and Sliding Door - Thermally Broken Concrete Balcony and Curb Intersection





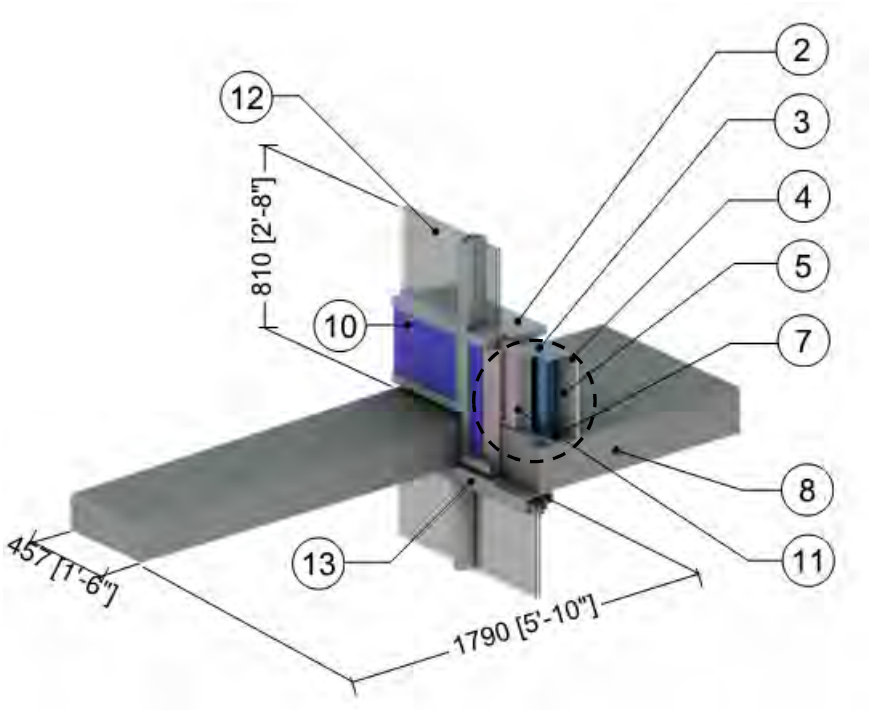
Curb Detail

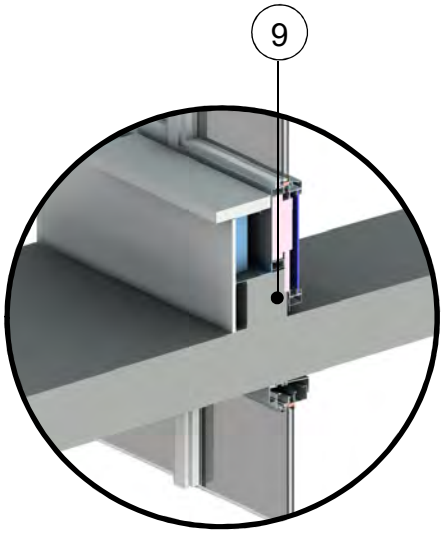
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	2" (50)	0.69 (0.10)	-	31 (500)	0.45 (1880)
3	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	3 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Concrete Curb	6" (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
11	Back Pan Insulation	Varies	0.24 (0.034)	R-6.3 to R-12.6 (1.11 RSI to 2.22 RSI)	4 (64)	0.20 (850)
12	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
13	Aluminum Flashing	14 Gauge	1109 (160)	-	171 (2739)	0.21 (900)
14	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
15	HDPE Plastic Sleeve	-	3.5 (0.5)	-	59 (950)	0.48 (2000)
16	Polystyrene Hard Foam Insulation	3" (76)	0.24 (0.035)	R-12 (2.1 RSI)	66 (1060)	0.35 (1500)
17	Cement Board	1" (25)	1.7 (0.25)	-	72 (1150)	0.20 (850)
18	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 9.1.9

Window Wall System with Spandrel Panels - Concrete Balcony and Bypass Intersection





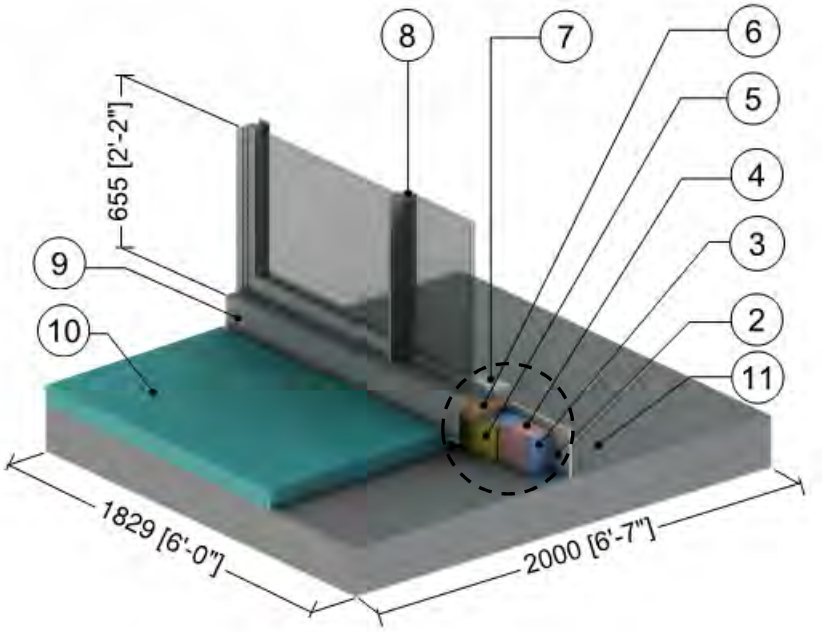
Curb Detail
(view from interior)

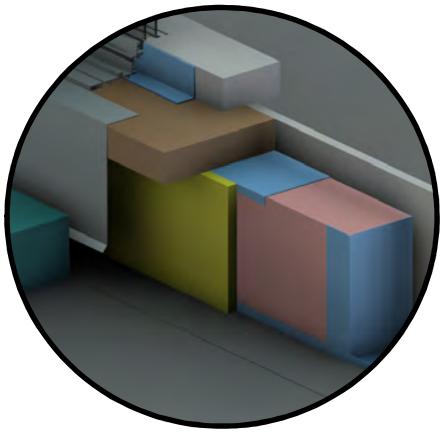
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	2" (50)	0.69 (0.10)	-	31 (500)	0.45 (1880)
3	Steel Sheet Connected to Studs	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Air in Stud Cavity	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
6	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	3 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
9	Concrete Curb	6" (152)	12.5 (1.8)	-	140 (2250)	0.20 (850)
10	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
11	Back Pan Insulation	Varies	0.24 (0.034)	R-6.4 to R-12.8 (1.13 RSI to 2.25 RSI)	4 (64)	0.20 (850)
12	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
13	Aluminum Flashing	14 Gauge	1109 (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 100077-2

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





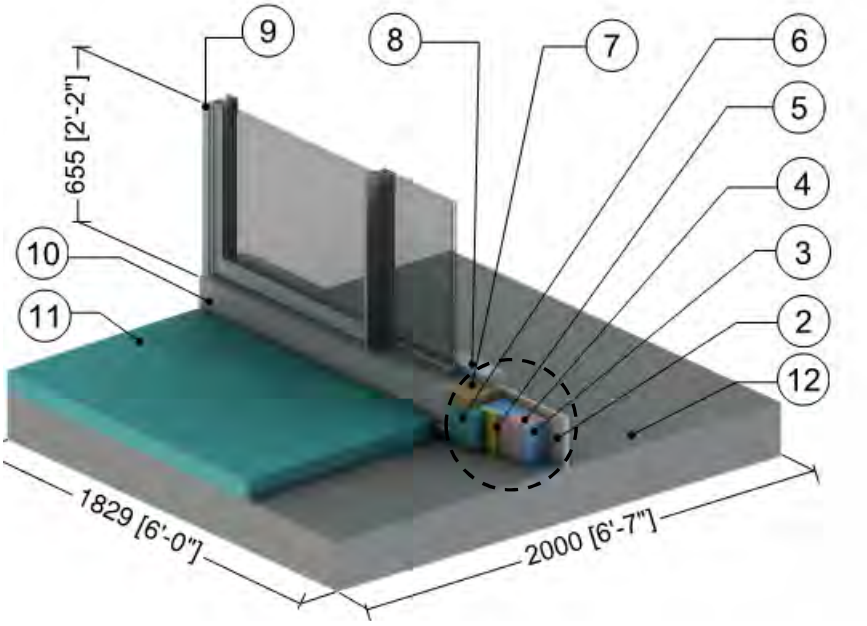
Curb Detail

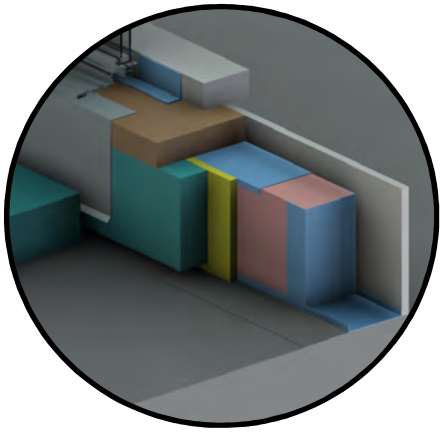
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8” x 1 5/8” Steel Studs (16” o.c.) with Top Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8” (92)	0.29 (0.042)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
5	Exterior Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
6	Wood Blocking	1 5/8” (161)	0.69 (0.1)	-	31 (500)	0.45 (1880)
7	Wood Sill	3 1/4” (82)	0.69 (0.1)	-	31 (500)	0.45 (1880)
8	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
9	Aluminum Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Deck Insulation	3” (75)	0.20 (0.029)	R-15 (2.6 RSI)	1.8 (28)	0.29 (1220)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 sliding door framing was found using ISO 10077-2

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





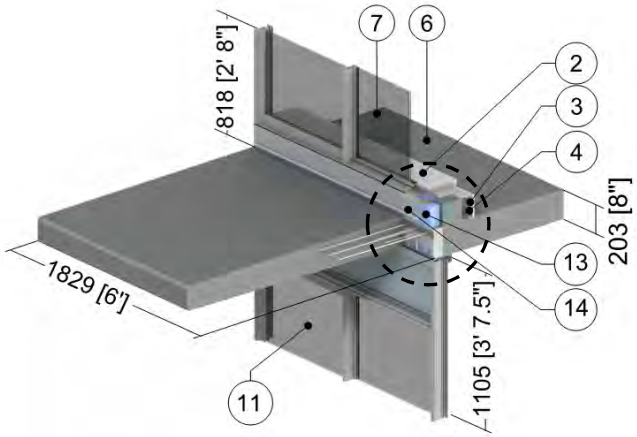
Curb Detail

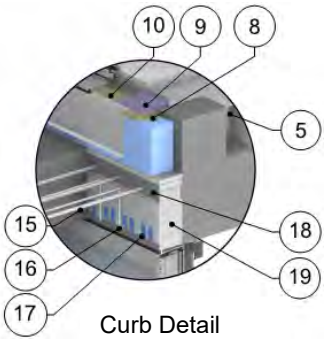
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-0.7 (0.11 RSI to 0.12 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	3 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top Track	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	3 5/8" (92)	0.29 (0.042)	R-12 (2.1 RSI)	0.9 (14)	0.17 (710)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.09 RSI)	50 (800)	0.26 (1090)
6	Exterior Insulation	Varies	-	R-10 to R-15 (1.76 RSI to 2.64 RSI)	1.8 (28)	0.29 (1220)
7	Wood Blocking	1 5/8" (161)	0.69 (0.1)	-	27.8 (445)	0.45 (1880)
8	Wood Sill	3 1/4" (82)	0.69 (0.1)	-	27.8 (445)	0.45 (1880)
9	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
10	Steel Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Deck Insulation	3" (75)	0.20 (0.029)	R-15 (2.6 RSI)	1.8 (28)	0.29 (1220)
12	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
13	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 RSI to 0.12 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 sliding door framing was found using ISO 10077-2

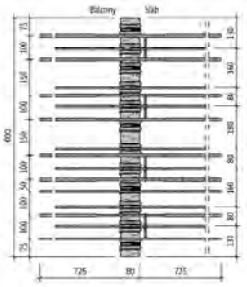
Detail 9.1.12

Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb K65-V8 Thermal Break at Concrete Balcony and Curb Intersection





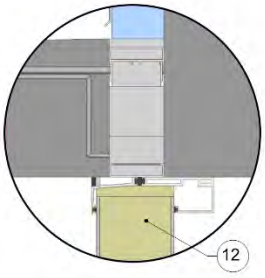
Curb Detail



Isokorb K65-V8 Rebar Arrangement



Scenario A - Window wall thermal break located at concrete slab, un-insulated glazing frame



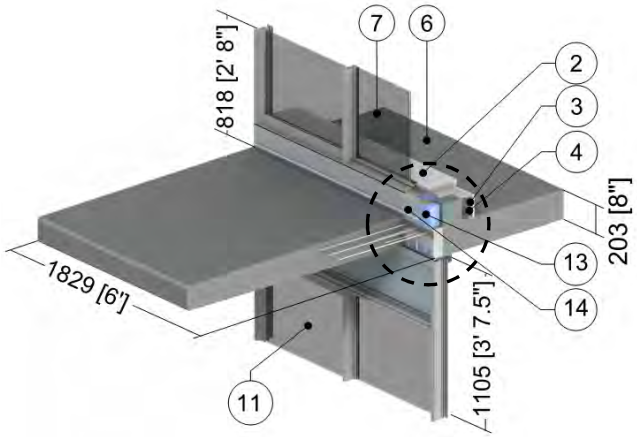
Scenario B - Window wall thermal break located at Isokorb module, insulated glazing frame

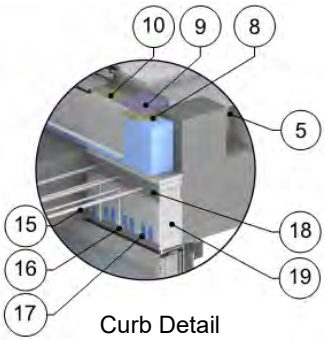
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	1.4" (36)	0.69 (0.10)	-	31 (500)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air in Stud Cavity	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Concrete Curb and Slab	-	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	Support Angle	1/2" (13)	347 (50)	-	489 (7830)	0.12 (500)
9	Support Shims	3/8" (10)	1.7 (0.25)	-	72 (1150)	0.20 (850)
10	Wood Liner	5/8" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
12	Deflection Header Frame Insulation	Varies	0.24 (0.034)	-	4 (64)	0.20 (850)
13	Exterior Insulation	3" (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
14	Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
16	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
17	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
18	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
19	Polystyrene Insulation	3.2" (80)	0.22 (0.031)	R-15 (2.58 RSI)	1.3 (20)	0.35 (1500)
20	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 9.1.13

Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb K10-V6 Thermal Break at Concrete Balcony and Curb Intersection

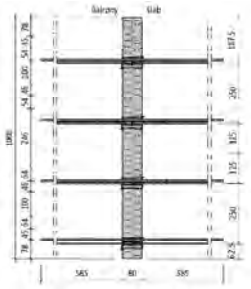




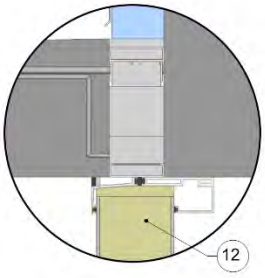
Curb Detail



Scenario A - Window wall thermal break located at concrete slab, un-insulated glazing frame



Isokorb K10-V6 Rebar Arrangement



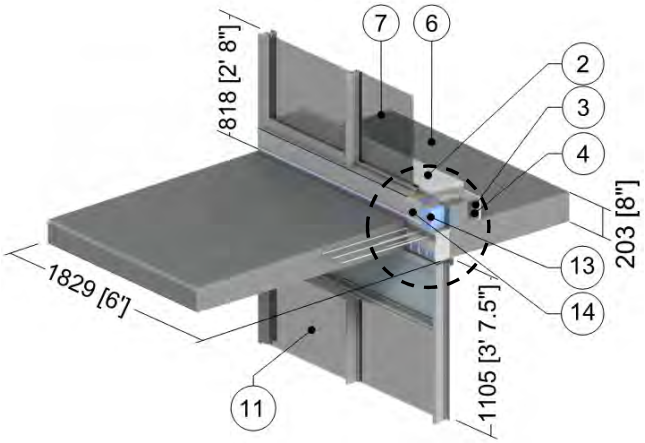
Scenario B - Window wall thermal break located at Isokorb module, insulated glazing frame

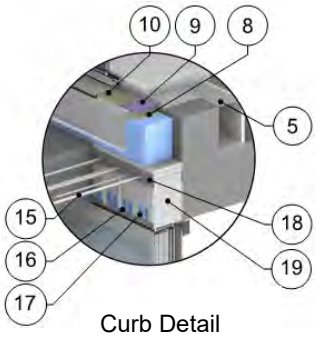
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	1.4" (36)	0.69 (0.10)	-	31 (500)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air in Stud Cavity	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Concrete Curb and Slab	-	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	Support Angle	1/2" (13)	347 (50)	-	489 (7830)	0.12 (500)
9	Support Shims	3/8" (10)	1.7 (0.25)	-	72 (1150)	0.20 (850)
10	Wood Liner	5/8" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
12	Deflection Header Frame Insulation	Varies	0.24 (0.034)	-	4 (64)	0.20 (850)
13	Exterior Insulation	3" (76)	-	R-15 (2.64 RSI)	1.8 (28)	0.29 (1220)
14	Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
16	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
17	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
18	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
19	Polystyrene Insulation	3.2" (80)	0.22 (0.031)	R-15 (2.58 RSI)	1.3 (20)	0.35 (1500)
20	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

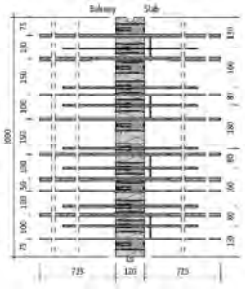
Detail 9.1.14

Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb KXT65-V8 Thermal Break at Concrete Balcony and Curb Intersection





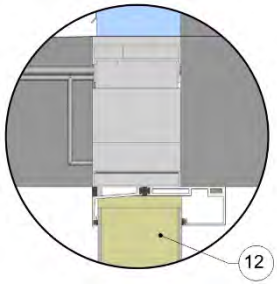
Curb Detail



Isokorb KXT65-V8
Rebar Arrangement



Scenario A - Window wall thermal break located at concrete slab, un-insulated glazing frame



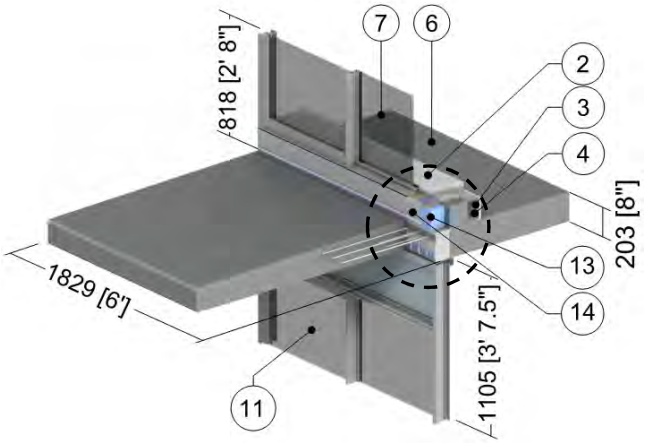
Scenario B - Window wall thermal break located at Isokorb module, insulated glazing frame

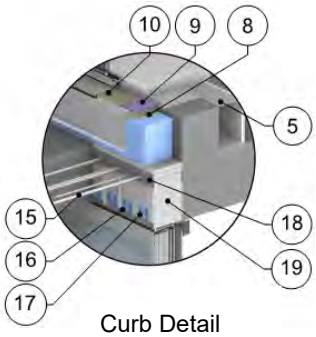
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	1.4" (36)	0.69 (0.10)	-	31 (500)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air in Stud Cavity	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Concrete Curb and Slab	-	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	Support Angle	1/2" (13)	347 (50)	-	489 (7830)	0.12 (500)
9	Support Shims	3/8" (10)	1.7 (0.25)	-	72 (1150)	0.20 (850)
10	Wood Liner	5/8" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
12	Deflection Header Frame Insulation	Varies	0.24 (0.034)	-	4 (64)	0.20 (850)
13	Exterior Insulation	4.5" (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
14	Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
16	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
17	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
18	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
19	Polystyrene Insulation	4.7" (120)	0.22 (0.031)	R-21.7 (3.83 RSI)	1.3 (20)	0.35 (1500)
20	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

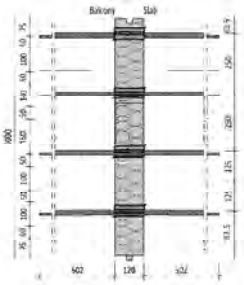
Detail 9.1.15

Window Wall System with Spandrel Panels and Sliding Door - Schöck Isokorb KXT15-V6 Thermal Break at Concrete Balcony and Curb Intersection





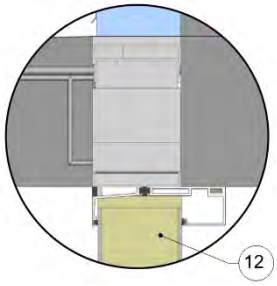
Curb Detail



Isokorb KXT15-V6
Rebar Arrangement



Scenario A - Window wall thermal break located at concrete slab, un-insulated glazing frame



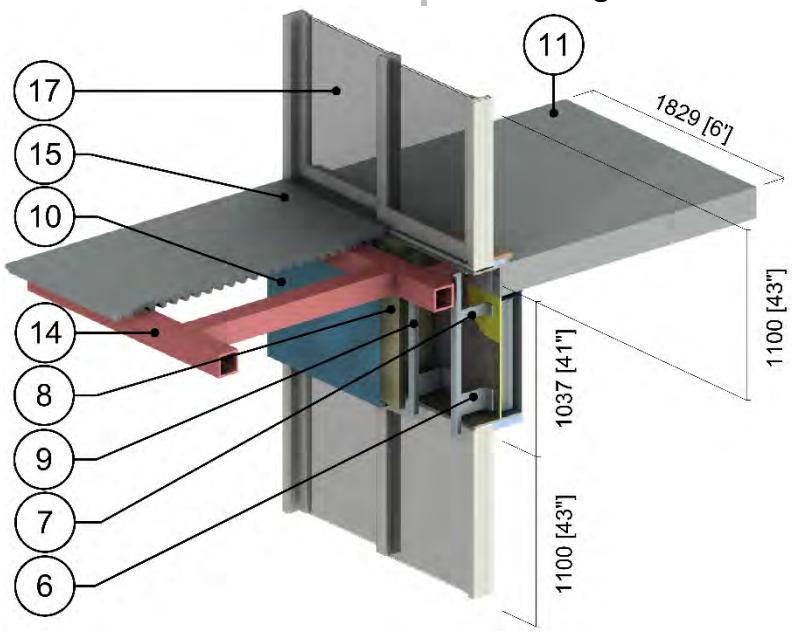
Scenario B - Window wall thermal break located at Isokorb module, insulated glazing frame

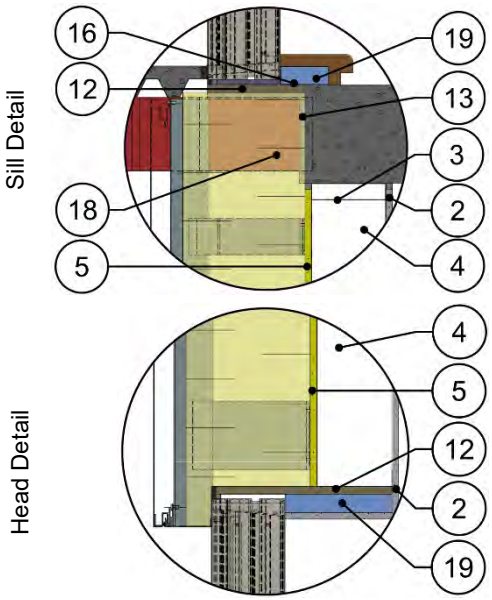
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Wood Sill	1.4" (36)	0.69 (0.10)	-	31 (500)	0.45 (1880)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Air in Stud Cavity	Varies	-	R-0.9 (0.16 RSI)	0.075 (1.2)	0.24 (1000)
5	1 5/8" x 1 5/8" Steel Studs (16" o.c.) with Top and Bottom Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Concrete Curb and Slab	-	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Thermally Broken Aluminum Sliding Door[2], double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
8	Support Angle	1/2" (13)	347 (50)	-	489 (7830)	0.12 (500)
9	Support Shims	3/8" (10)	1.7 (0.25)	-	72 (1150)	0.20 (850)
10	Wood Liner	5/8" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Aluminum Window Wall Vision System[2]: thermally broken frame, double glazed IGU U_{IGU}= 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
12	Deflection Header Frame Insulation	Varies	0.24 (0.034)	-	4 (64)	0.20 (850)
13	Exterior Insulation	4.5" (114)	-	R-22.5 (3.96 RSI)	1.8 (28)	0.29 (1220)
14	Flashing	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Steel Rebar	-	347 (50)	-	489 (7830)	0.12 (500)
16	Stainless Steel Rebar	-	118 (17)	-	500 (8000)	0.12 (500)
17	Plastic Sleeve	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
18	Isokorb Frame	-	1.7 (0.25)	-	72 (1150)	0.20 (850)
19	Polystyrene Insulation	4.7" (120)	0.22 (0.031)	R-21.7 (3.83 RSI)	1.3 (20)	0.35 (1500)
20	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 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



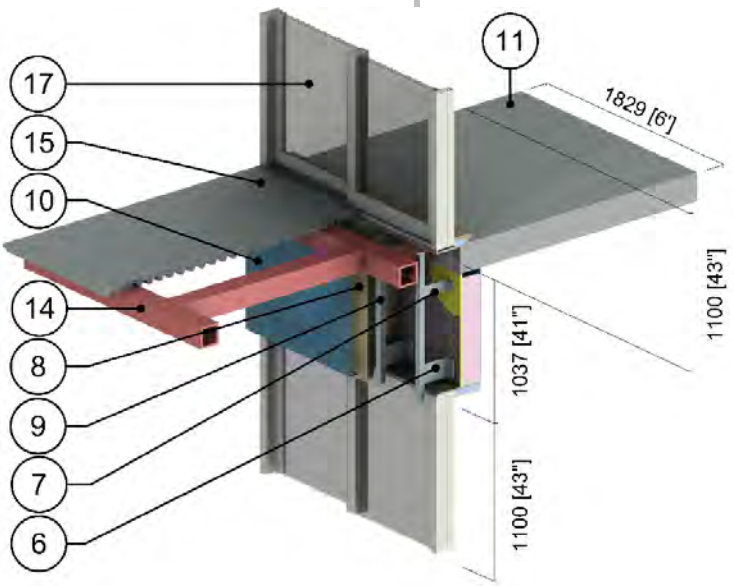


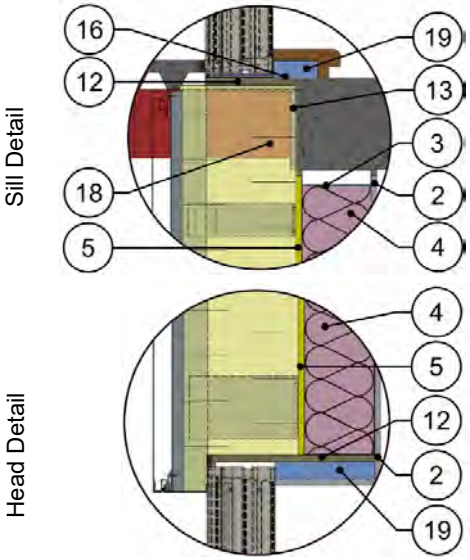
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2" x 6" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6" (152)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	FRP Bracket	-	4.85 (0.7)	-	110 (1760)	-
7	Aluminum Bracket	-	1110 (160)	-	171 (2739)	0.22 (900)
8	Exterior Mineral Wool Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
9	Vertical Aluminum L-Rail	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Wood Liner	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	Steel Support Angle	1/2" (13)	430 (62)	-	489 (7830)	0.12 (500)
14	Steel Balcony Framing	5/8" (16)	430 (62)	-	489 (7830)	0.12 (500)
15	Concrete Balcony Topping	2.5" (64)	12.5 (1.8)	-	140 (2250)	0.20 (850)
16	Aluminum Back Angle	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
17	Thermally broken vinyl sliding door[2], triple glazed IGU U_{IGU} = 0.13 BTU/hr·ft²·°F (0.72 W/m²K)					
18	Steel Column and Knife Edge	5/8" (16)	430 (62)	-	489 (7830)	0.12 (500)
19	Rigid Insulation	-	0.20 (0.029)	-	1.8 (28)	0.29 (1220)
20	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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 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



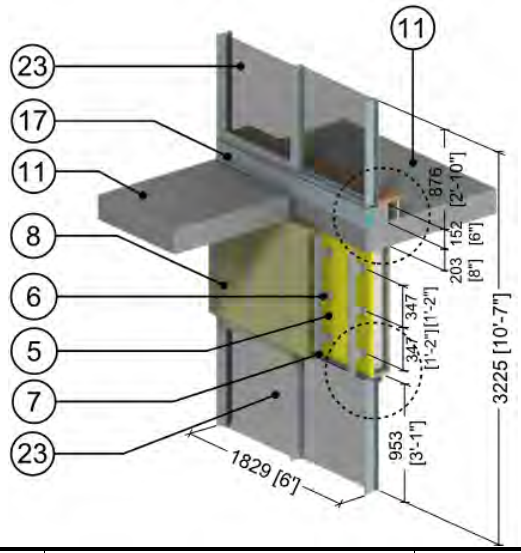


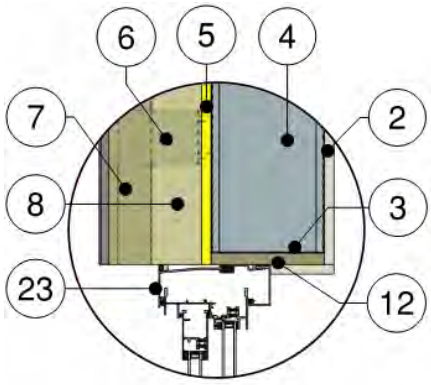
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2" x 6" Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6" (152)	-	R-19 (3.35 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	FRP Bracket	-	4.85 (0.7)	-	110 (1760)	-
7	Aluminum Bracket	-	1110 (160)	-	171 (2739)	0.22 (900)
8	Exterior Mineral Wool Insulation	10" (254)	0.24 (0.034)	R-42 (7.40 RSI)	4.5 (72)	0.20 (850)
9	Vertical Aluminum L-Rail	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
10	Metal Cladding with 1/2" vented airspace incorporated into exterior heat transfer coefficient					
11	Concrete Slab	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Wood Liner	1/2" (13)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	Steel Support Angle	1/2" (13)	430 (62)	-	489 (7830)	0.12 (500)
14	Steel Balcony Framing	5/8" (16)	430 (62)	-	489 (7830)	0.12 (500)
15	Concrete Balcony Topping	2.5" (64)	12.5 (1.8)	-	140 (2250)	0.20 (850)
16	Aluminum Back Angle	0.09" (2.2)	1110 (160)	-	171 (2739)	0.22 (900)
17	Thermally broken vinyl sliding door[2], triple glazed IGU U_{IGU} = 0.13 BTU/hr·ft²·°F (0.72 W/m²K)					
18	Steel Column and Knife Edge	5/8" (16)	430 (62)	-	489 (7830)	0.12 (500)
19	Rigid Insulation	-	0.20 (0.029)	-	1.8 (28)	0.29 (1220)
20	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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

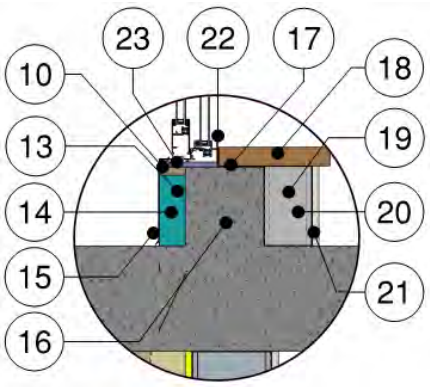
Detail 9.1.18

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





Head Detail



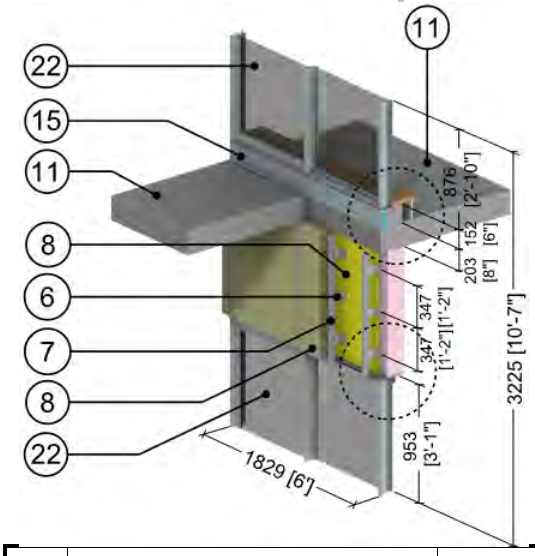
Sill Detail

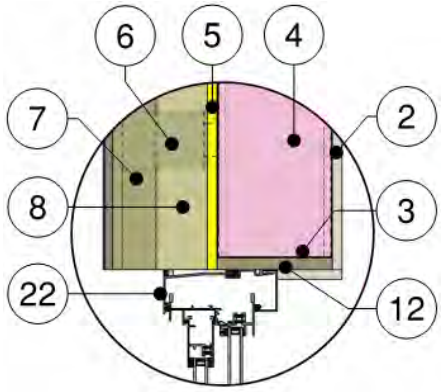
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2” x 6” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	0.09” (2.2)	-	-	-	-
7	Vertical Aluminum L-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
8	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-4.2 to R-21 (0.74 to 3.70 RSI)	-	-
9	Generic Cladding with 1/2" (13 mm) vented air space incorporated into exterior heat transfer coefficient					
10	Wood Buck	5/8” (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Wood Liner	1/2" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	Steel Support Angle	1/4" (6)	430 (62)	-	489 (7830)	0.12 (500)
14	XPS Curb Insulation	2” (51)	0.02 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
15	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.22 (900)
16	Concrete Curb	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
17	Steel Back Angle	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
18	Wood Sill	1 1/2" (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
19	3 5/8” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
20	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
21	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
22	Thermally broken aluminum sliding door[2], double glazed IGU U_{IGU} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
23	Polyamide Shim	1/2" (10)	1.73 (0.25)	-	-	-
24	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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

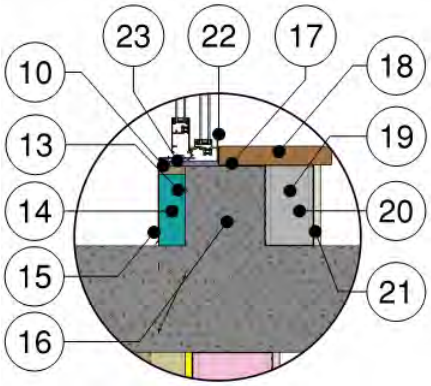
Detail 9.1.19

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





Head Detail



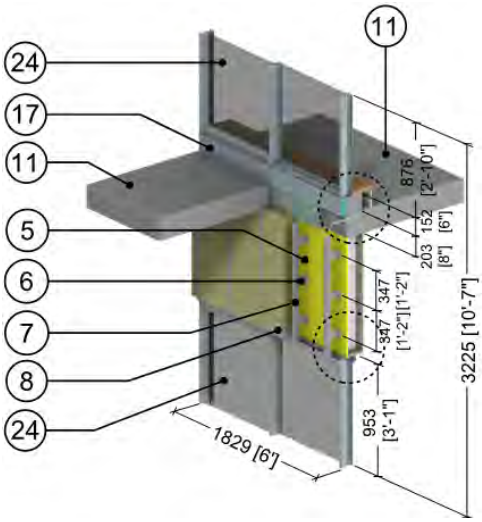
Sill Detail

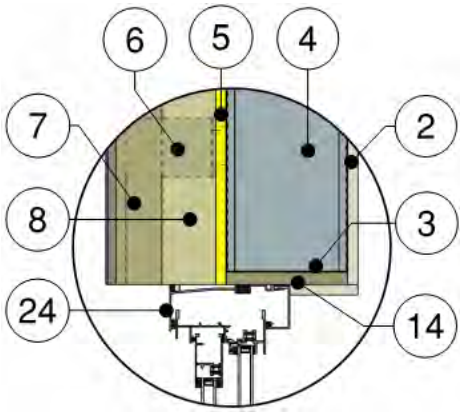
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2” x 6” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6” (152)	0.32 (0.046)	R-19 (0.16 RSI)	0.9 (1.4)	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	Thermally Isolated Aluminum Bracket	0.09” (2.2)	-	-	-	-
7	Vertical Aluminum L-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
8	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-4.2 to R-21 (0.74 to 3.70 RSI)	-	-
9	Generic Cladding with 1/2" (13 mm) vented air space incorporated into exterior heat transfer coefficient					
10	Wood Buck	5/8” (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Wood Liner	1/2" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
13	Steel Support Angle	1/4" (6)	430 (62)	-	489 (7830)	0.12 (500)
14	XPS Curb Insulation	2” (51)	0.02 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
15	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.22 (900)
16	Concrete Curb	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
17	Steel Back Angle	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
18	Wood Sill	1 1/2" (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
19	3 5/8” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
20	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
21	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
22	Thermally broken aluminum sliding door[2], double glazed IGU U_{IGU} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
23	Polyamide Shim	1/2" (10)	1.73 (0.25)	-	-	-
24	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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

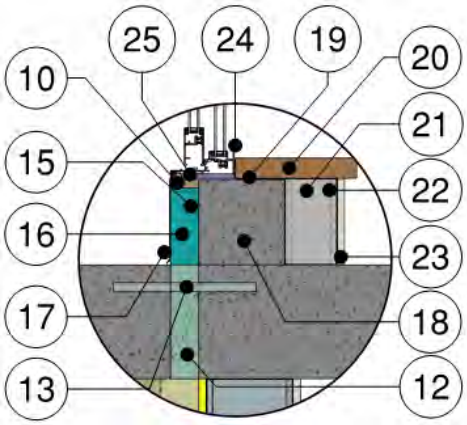
Detail 9.1.20

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





Head Detail



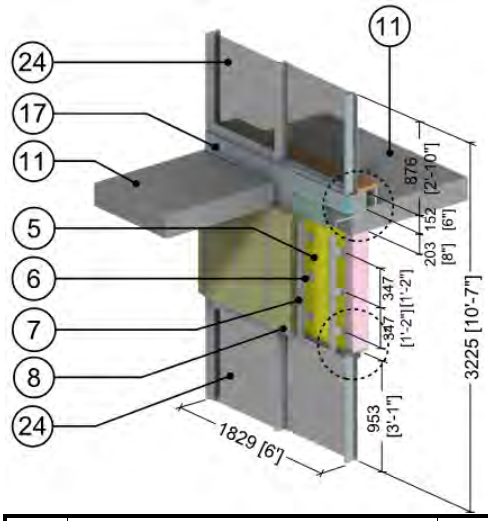
Sill Detail

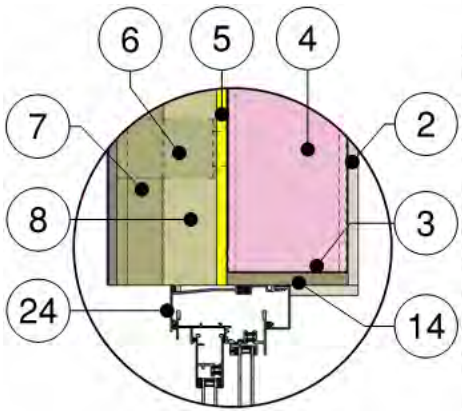
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2” x 6” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Air in Stud Cavity	6” (152)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
5	Exterior Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Thermally Isolated Aluminum Bracket	0.09” (2.2)	-	-	-	-
7	Vertical Aluminum L-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
8	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-4.2 to R-21 (0.74 to 3.70 RSI)	-	-
9	Generic Cladding with 1/2" (13 mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Wood Buck	5/8” (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Structural Thermal Break	2” (51)	0.53 (0.076)		-	-
13	#5 Steel Rebar	5/8” (16) Ø	347 (50)	-	489 (7830)	0.12 (500)
14	Wood Liner	1/2" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
15	Steel Support Angle	1/4" (6)	430 (62)	-	489 (7830)	0.12 (500)
16	XPS Curb Insulation	2” (51)	0.02 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
17	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.22 (900)
18	Concrete Curb	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
19	Steel Back Angle	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
20	Wood Sill	1 1/2" (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
21	3 5/8” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
22	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
23	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
24	Thermally broken aluminum sliding door[2], double glazed IGU U_{IGU} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
25	Polyamide Shim	1/2" (10)	1.73 (0.25)	-	-	-
26	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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

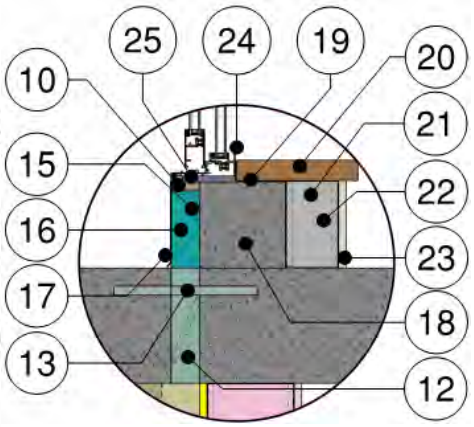
Detail 9.1.21

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





Head Detail



Sill 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 Film[1]	-	-	R-0.6 to R-1.1 (0.11 to 0.20 RSI)	-	-
2	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
3	2” x 6” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Fiberglass Batt Insulation	6” (152)	0.32 (0.046)	R-19 (0.16 RSI)	0.9 (1.4)	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	Thermally Isolated Aluminum Bracket	0.09” (2.2)	-	-	-	-
7	Vertical Aluminum L-girt	0.09” (2.2)	1340 (193)	-	169 (2700)	0.22 (900)
8	Exterior Mineral Wool Insulation	Varies	0.24 (0.034)	R-4.2 to R-21 (0.74 to 3.70 RSI)	-	-
9	Generic Cladding with 1/2" (13 mm) vented air space is incorporated into exterior heat transfer coefficient					
10	Wood Buck	5/8” (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
11	Concrete Slab	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
12	Structural Thermal Break	2” (51)	0.53 (0.076)		-	-
13	#5 Steel Rebar	5/8” (16) Ø	347 (50)	-	489 (7830)	0.12 (500)
14	Wood Liner	1/2" (16)	0.69 (0.10)	-	31 (500)	0.45 (1880)
15	Steel Support Angle	1/4" (6)	430 (62)	-	489 (7830)	0.12 (500)
16	XPS Curb Insulation	2” (51)	0.02 (0.029)	R-10 (1.76 RSI)	1.8 (28)	0.29 (1220)
17	Aluminum Flashing	18 Gauge	1110 (160)	-	171 (2739)	0.22 (900)
18	Concrete Curb	8” (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
19	Steel Back Angle	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
20	Wood Sill	1 1/2" (38)	0.69 (0.10)	-	31 (500)	0.45 (1880)
21	3 5/8” x 1 5/8” Steel Studs with Tracks	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
22	Air in Stud Cavity	3 5/8” (92)	-	R-0.9 (0.16 RSI)	-	0.24 (1000)
23	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
24	Thermally broken aluminum sliding door[2], double glazed IGU U_{IGU} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K)					
25	Polyamide Shim	1/2" (10)	1.73 (0.25)	-	-	-
26	Exterior Film[1]	-	-	R-0.2 to R-0.7 (0.03 to 0.12 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

10.0 Roofs

Detail 10.1.1 ..... **A.10.1**

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (12” o.c.) Supporting Standing Seam Metal Roof – Clear Roof

Detail 10.1.2 ..... **A.10.2**

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24” o.c.) Supporting Standing Seam Metal Roof – Clear Roof

Detail 10.1.3 ..... **A.10.3**

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (36” o.c.) Supporting Standing Seam Metal Roof – Clear Roof

Detail 10.1.4 ..... **A.10.4**

Insulated Sheet Steel Roof Supported by Thermal Chairs – Baseline System – Clear Roof

Detail 10.1.5 ..... **A.10.5**

Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Scenarios – Clear Roof

Detail 10.1.6 ..... **A.10.6**

Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Insulation Type Scenarios – Clear Roof

Detail 10.1.7 ..... **A.10.7**

Insulated Standing Seam Roof Supported by Thermal Chairs – Clear Wall

Detail 10.1.8 ..... **A.10.8**

Standing Seam Roof with Draped Insulation – Clear Wall

Detail 10.1.9 ..... **A.10.9**

Exterior Insulated Low Sloped Roof – Clear Roof Assembly

Detail 10.1.10 ..... **A.10.10**

Exterior Insulated Sloped Metal Roof with Polyisocyanurate Insulation and Bearing Plates 18” x 48” spacing – Clear Roof Assembly

Detail 10.1.11 ..... **A.10.11**

Exterior Insulated Sloped Metal Roof with High Compressive Strength Mineral Wool Insulation and Bearing Plates 18” x 48” spacing – Clear Roof Assembly

Detail 10.2.1 ..... **A.10.12**

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24” o.c.) Supporting Metal Roof – Ridge Intersection

Detail 10.2.2 ..... **A.10.13**

Insulated Concrete Slab – Concrete Curb or Wall Intersection

Detail 10.2.3 ..... **A.10.14**

Owens Corning Insulated Projected Membrane Roof – Floating Concrete Wall Intersection

Detail 10.2.4 ..... A.10.15

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24” o.c.) Supporting Standing Seam Metal Roof and Curtain Wall – Roof to Wall Intersection with Through Wall Structural Beam and Continuous Through Wall Structural Metal Deck

Detail 10.2.5 ..... A.10.16

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24” o.c.) Supporting Standing Seam Metal Roof and Curtain Wall – Roof to Wall Intersection with Through Wall Structural Beam and Thermally Broken Structural Metal Deck

Detail 10.2.6 ..... A.10.17

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24” o.c.) Supporting Standing Seam Metal Roof and Curtain Wall – Roof to Wall Intersection with Through Wall Structural Beam and Fully Insulated Soffit

Detail 10.3.1 ..... A.10.18

Exterior Insulated Conventional Flat Roof – Roof Anchor

Detail 10.3.2 ..... A.10.19

Exterior Insulated Conventional Flat Roof – Armatherm Thermal Break under Roof Anchor

Detail 10.3.3 ..... A.10.20

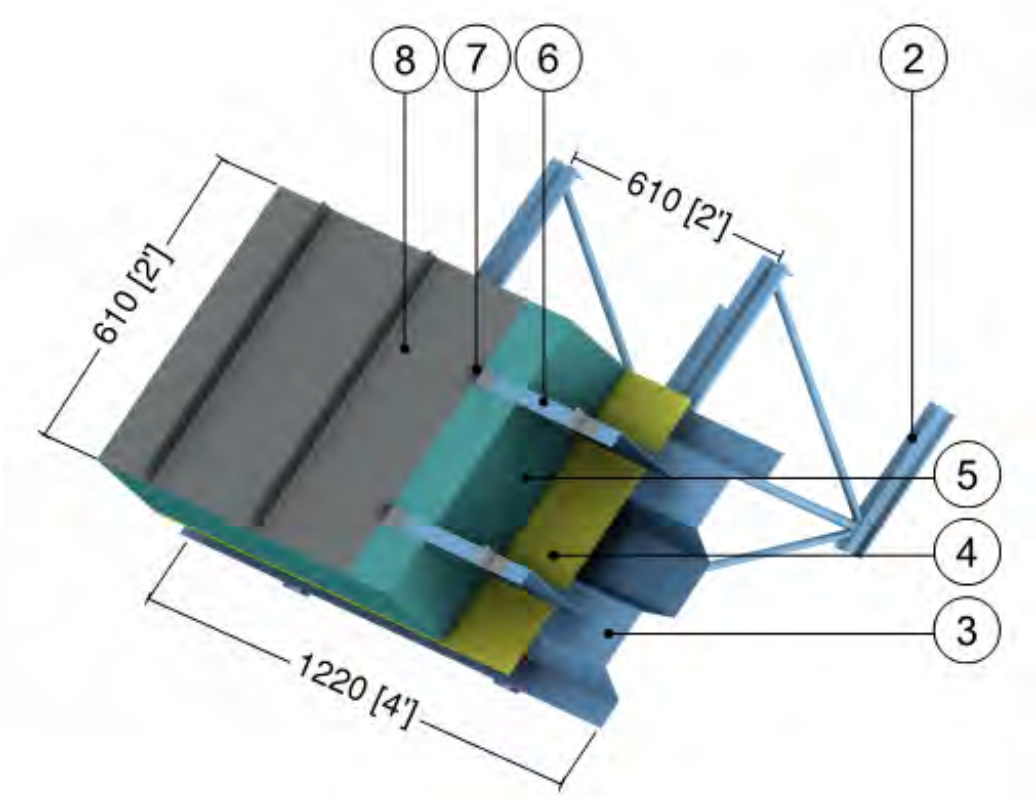
Exterior Insulated Conventional Low-Sloped Roof – Roof Anchor

Detail 10.3.4 ..... A.10.21

Exterior Insulated Conventional Low-Sloped Roof – Thermal Break in Roof Anchor

Detail 10.1.1

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (12” o.c.) Supporting Standing Seam Metal Roof – Clear Roof

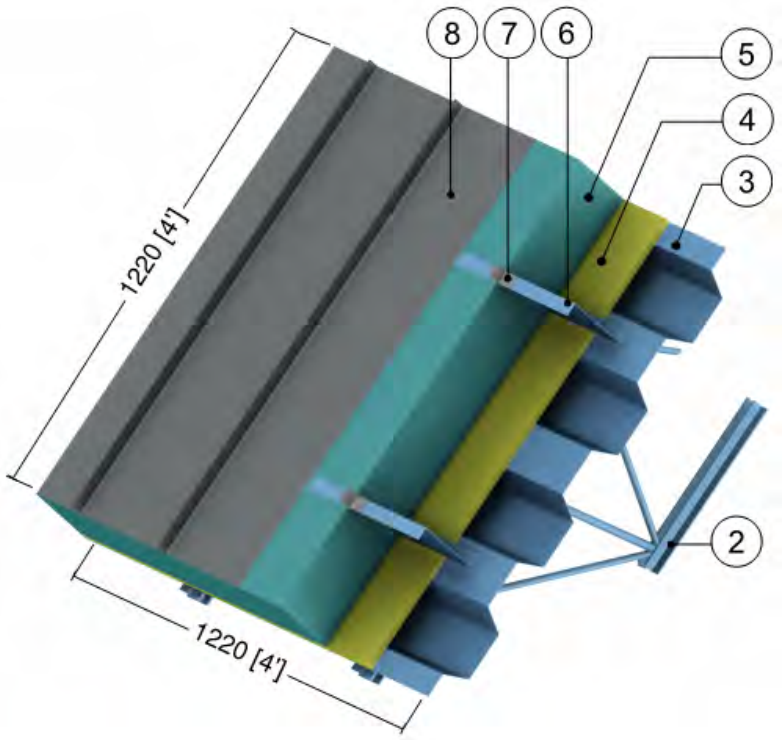


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-1.1 (0.20 RSI)	-	-
2	Open Web Steel Joist (550C) @ 24” (610) o.c.	-	347 (50)	-	489 (7830)	0.12 (500)
3	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
4	Roof Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Rigid Roof Insulation	Varies	-	R-20 to R-40 (3.52 RSI to 7.04 RSI)	1.8 (28)	0.29 (1220)
6	Sub-Girt with 1 1/2” Flange @ 12” (305) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Roof Clip (1 1/2” x 1 1/2”)	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal Roof	24 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

Detail 10.1.2

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24” o.c.) Supporting Standing Seam Metal Roof – Clear Roof

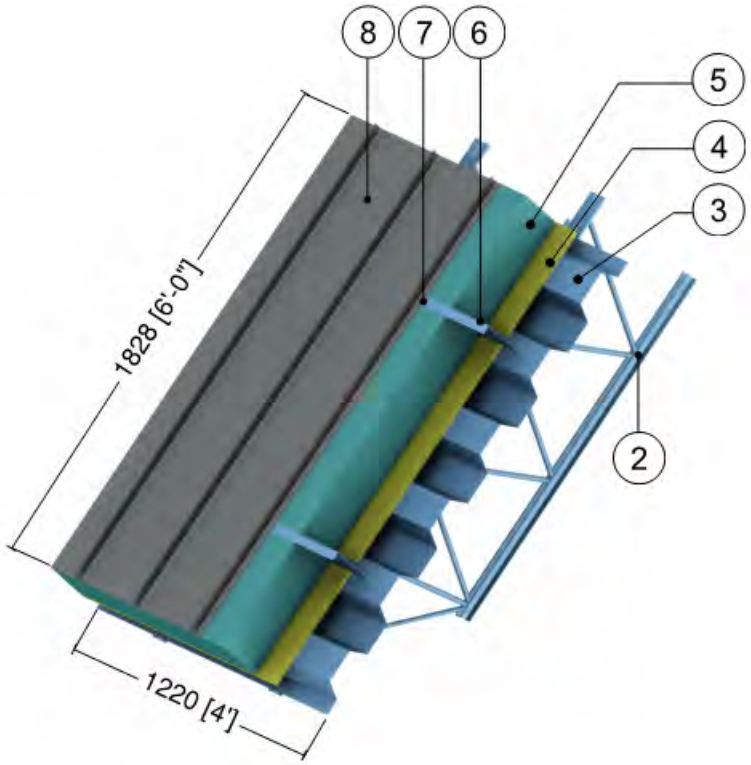


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-1.1 (0.20 RSI)	-	-
2	Open Web Steel Joist (550C) @ 24” (610) o.c.	-	347 (50)	-	489 (7830)	0.12 (500)
3	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
4	Roof Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Rigid Roof Insulation	Varies	-	R-20 to R-40 (3.52 RSI to 7.04 RSI)	1.8 (28)	0.29 (1220)
6	Sub-Girt with 1 1/2” Flange @ 24” (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Roof Clip (1 1/2” x 1 1/2”)	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal Roof	24 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

Detail 10.1.3

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (36” o.c.) Supporting Standing Seam Metal Roof – Clear Roof

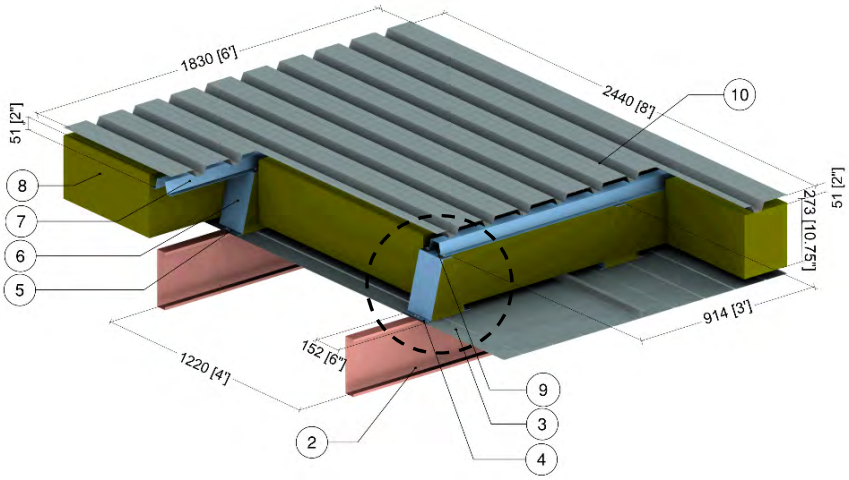


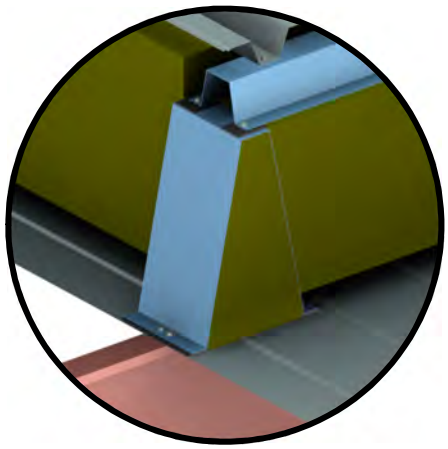
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-1.1 (0.20 RSI)	-	-
2	Open Web Steel Joist (550C)@ 24” (610) o.c.	-	347 (50)	-	489 (7830)	0.12 (500)
3	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
4	Roof Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Rigid Roof Insulation	Varies	-	R-20 to R-40 (3.52 RSI to 7.04 RSI)	1.8 (28)	0.29 (1220)
6	Sub-Girt with 1 1/2” Flange @ 36” (914) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Roof Clips (1 1/2” x 1 1/2")	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal Roof	24 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

Detail 10.1.4

Insulated Sheet Steel Roof Supported by Thermal Chairs – Baseline System – Clear Roof



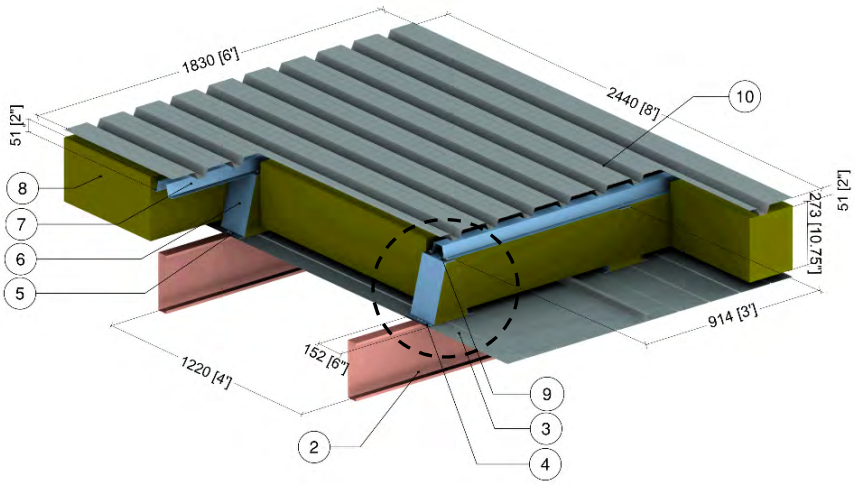


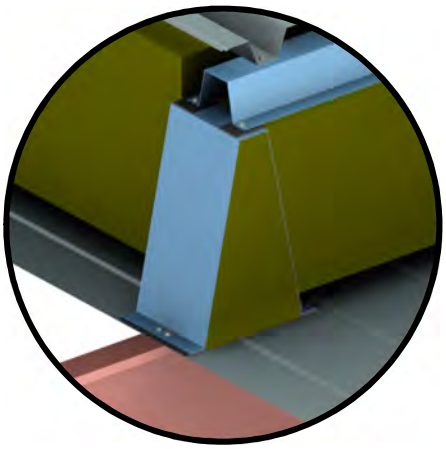
Bracket Detail

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-1.1 (0.20 RSI)	-	-
2	10 x 2 Galvanized Steel Purlin @ 48" o.c.	1/10" (2.6)	430 (62)	-	489 (7830)	0.12 (500)
3	Galvanized Steel Liner	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Thermal Tape	1/8" (3.18)	0.097 (0.014)	-	-	-
5	#12 Steel Fasteners	0.22" (5.50) Ø	430 (62)	-	489 (7830)	0.12 (500)
6	10-in Galvanized Steel Hat Section (Thermal Chair)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	2-in Galvanized Steel Hat Section (Outer Rail)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Mineral Wool Insulation	10 3/4" (273)	0.240 (0.034)	R-45 (7.93 RSI)	1.8 (28)	0.29 (1090)
9	Air Gap[2]	-	Varies	-	0.075 (1.2)	0.24 (1000)
10	Galvanized Steel Cladding	22 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 was found using ISO 100077-2

Detail 10.1.5 Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Scenarios – Clear Roof





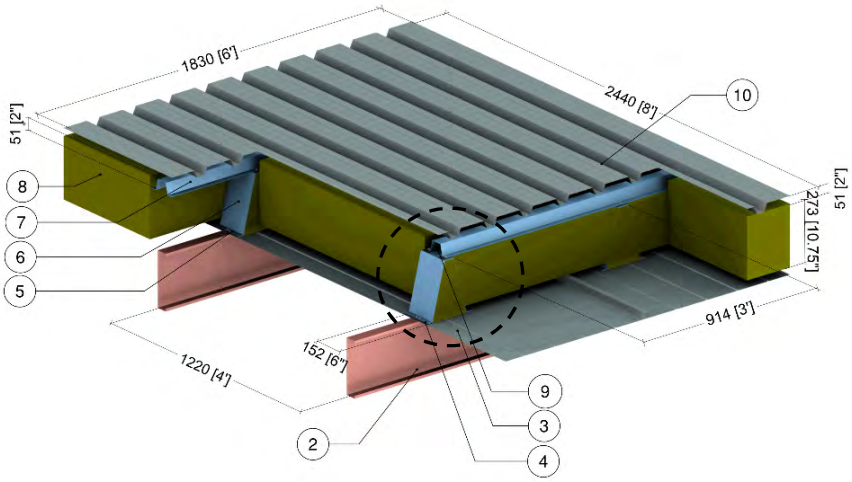
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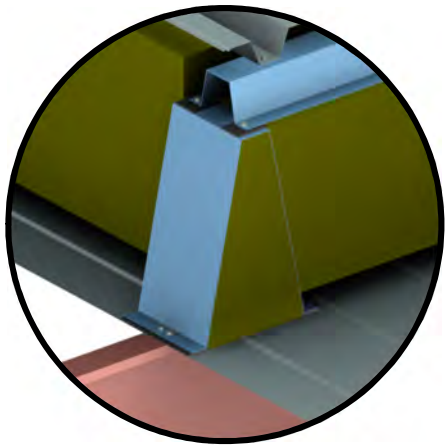
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films (left side)[1]	-	-	R-1.1 (0.20 RSI)	-	-
2	10 x 2 Galvanized Steel Purlin @ 48" o.c.	1/10" (2.6)	430 (62)	-	489 (7830)	0.12 (500)
3	Galvanized Steel Liner	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Thermal Tape	1/8" (3.18)	0.097 (0.014)	-	-	-
5	#12 Steel Fasteners	0.22" (5.50) Ø	430 (62)	-	489 (7830)	0.12 (500)
6	10-in Galvanized Steel Hat Section (Thermal Chair)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	2-in Galvanized Steel Hat Section (Outer Rail)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Mineral Wool Insulation	10 3/4" (273)	0.240 (0.034)	R-45 (7.93 RSI)	1.8 (28)	0.29 (1090)
9	Air Gap[2]	-	Varies	-	0.075 (1.2)	0.24 (1000)
10	Galvanized Steel Cladding	22 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Exterior Film (right side)[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 was found using ISO 100077-2

Detail 10.1.6

Insulated Sheet Steel Roof Supported by Thermal Chairs – Additional Insulation Type Scenarios – Clear Roof





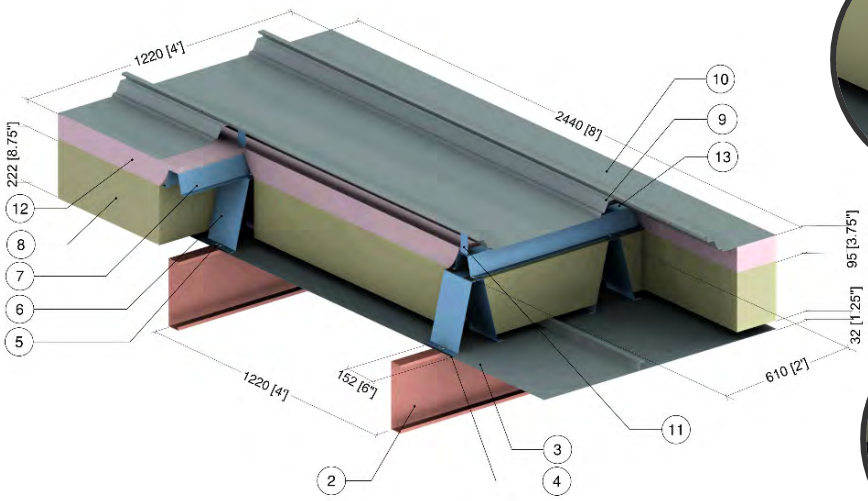
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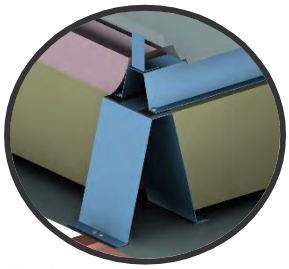
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films (left side)[1]	-	-	R-1.1 (0.20 RSI)	-	-
2	10 x 2 Galvanized Steel Purlin @ 48" o.c.	1/10" (2.6)	430 (62)	-	489 (7830)	0.12 (500)
3	Galvanized Steel Liner	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Thermal Tape	1/8" (3.18)	0.097 (0.014)	-	-	-
5	#12 Steel Fasteners	0.22" (5.50) Ø	430 (62)	-	489 (7830)	0.12 (500)
6	10-in Galvanized Steel Hat Section (Thermal Chair)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	2-in Galvanized Steel Hat Section (Outer Rail)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Mineral Wool Insulation	10 3/4" (273)	0.240 (0.034)	R-45 (7.93 RSI)	1.8 (28)	0.29 (1090)
9	Air Gap[2]	-	Varies	-	0.075 (1.2)	0.24 (1000)
10	Galvanized Steel Cladding	22 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Exterior Film (right side)[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 was found using ISO 100077-2

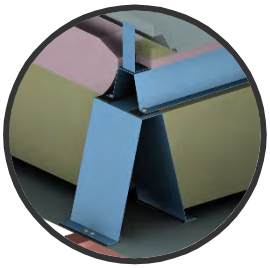
Detail 10.1.7

Insulated Standing Seam Roof Supported by Thermal Chairs – Clear Wall

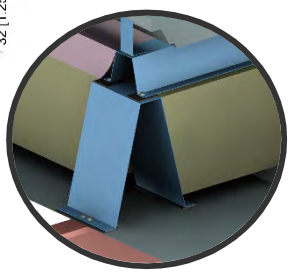




A- Compressed Batt Between and Over Hat Tracks



B- Compressed Batt Between and Over Hat Tracks with Thermal



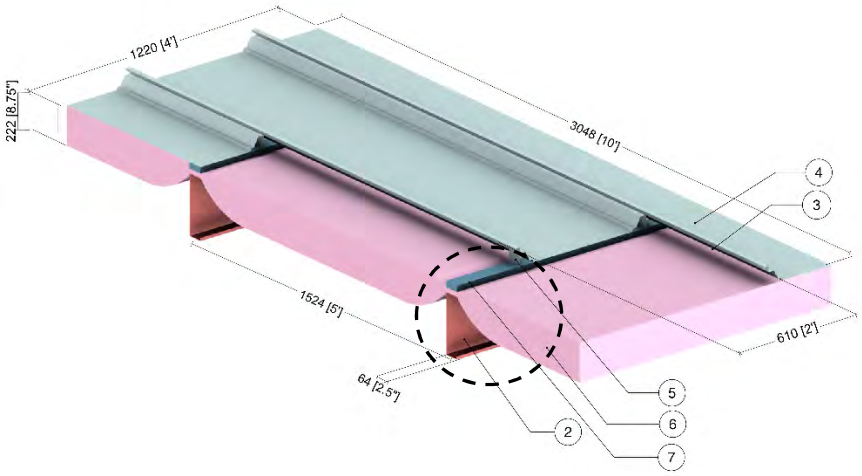
C,D- Insulation Between Hat Tracks

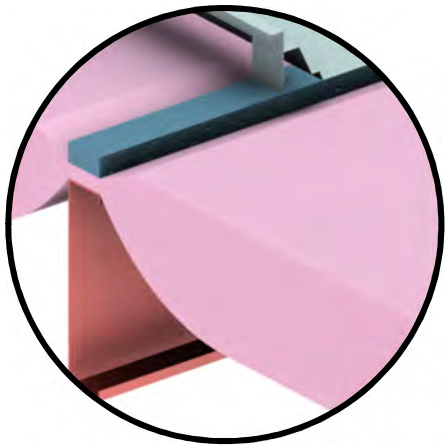
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films (left side)[1]	-	-	R-1.1 (0.20 RSI)	-	-
2	10 x 2 Galvanized Steel Purlin @ 48” o.c.	1/10” (2.6)	430 (62)	-	489 (7830)	0.12 (500)
3	Galvanized Steel Liner	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
4	Thermal Tape	1/8” (3.18)	0.097 (0.014)	-	-	-
5	#12 Steel Fasteners	0.22” (5.50) ø	430 (62)	-	489 (7830)	0.12 (500)
6	10-in Galvanized Steel Hat Section (Thermal Chair)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	2-in Galvanized Steel Hat Section (Outer Rail)	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Mineral Wool Insulation	10 3/4” (273)	0.240 (0.034)	R-45 (7.93 RSI)	1.8 (28)	0.29 (1090)
9	Air Gap[2]	-	Varies	-	0.075 (1.2)	0.24 (1000)
10	Galvanized Steel Cladding	22 Gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Steel Clips	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Fiberglass Batt Insulation	6” (152)	0.30 (0.043)	R-19 (3.35 RSI)	0.9 (14)	0.17 (710)
13	Thermal Block	1” (25)	0.20 (0.029)	R-5 (0.88 RSI)	9.4 (150)	0.23 (1000)
14	Exterior Film (right side)[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 was found using ISO 100077-2

Detail 10.1.8

Standing Seam Roof with Draped Insulation – Clear Wall





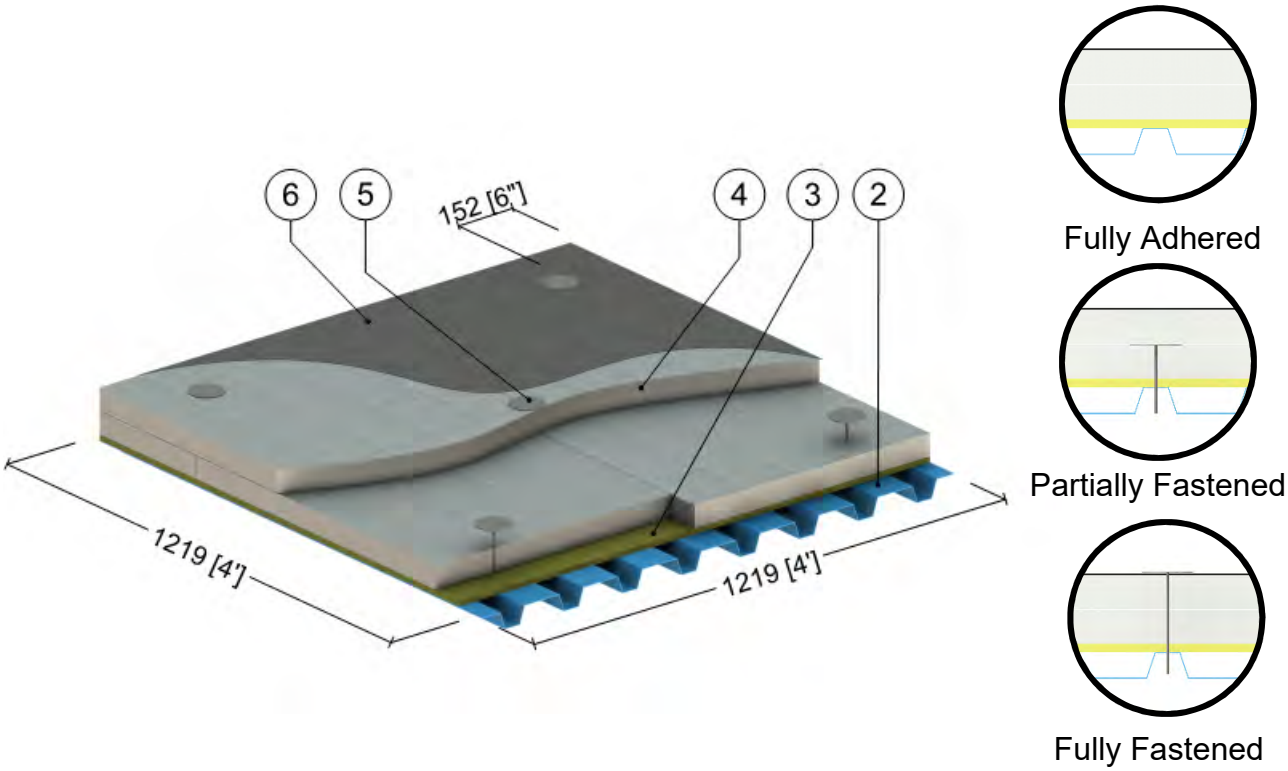
Bracket Detail

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 (left side)[1]	-	-	R-0.6 (0.11 RSI)	-	-
2	10 x 2 Galvanized Steel Purlin @ 48" o.c.	1/10" (2.6)	430 (62)	-	489 (7830)	0.12 (500)
3	Air Gap[2]	-	Varies	-	0.075 (1.2)	0.24 (1000)
4	Galvanized Steel Cladding	22 Gauge	430 (62)	-	489 (7830)	0.12 (500)
5	Steel Clips	18 Gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Fiberglass Batt Insulation	6" (152)	0.30 (0.043)	R-19 (3.35 RSI)	0.9 (14)	0.17 (710)
7	Thermal Block	1" (25)	0.20 (0.029)	R-5 (0.88 RSI)	9.4 (150)	0.23 (1000)
8	Exterior Film (right side)[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 was found using ISO 100077-2

Detail 10.1.9

Exterior Insulated Low Sloped Roof – Clear Roof Assembly

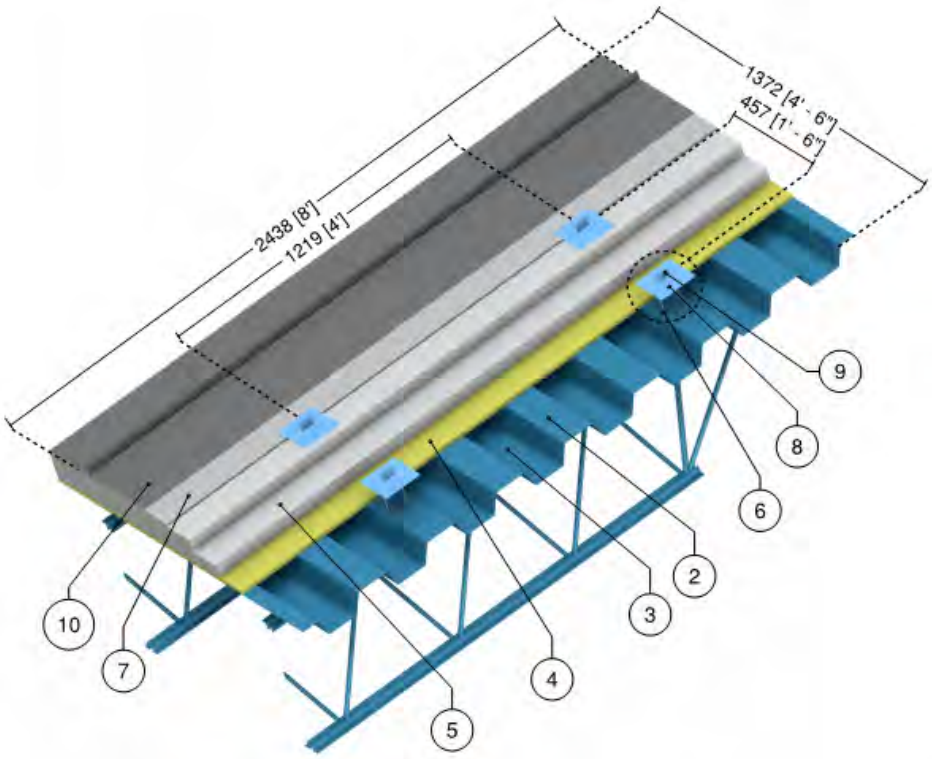


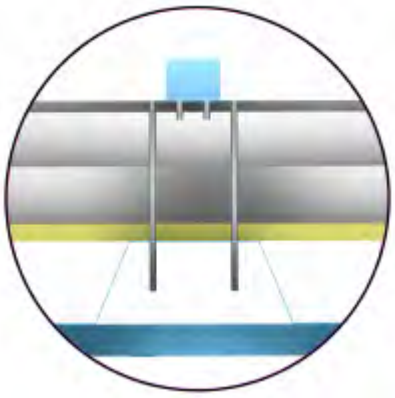
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-1.1 (0.19 RSI)	-	-
2	Steel Deck	1/16" (1.6)	430 (62)	-	489 (7830)	0.12 (500)
3	Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	2 Layer Polyisocyanurate Insulation	4" (101)	0.2 (0.025)	R-22.8 (4.02 RSI)	1.8 (28)	0.29 (1220)
5	#10 or #14 Steel Fasteners	3/16" (4.8) Ø, 1/4" (6.1) Ø	430 (62)	-	489 (7830)	0.12 (500)
6	Asphalt Cover Board and Roof Membrane	1/2" (12)	3 (0.43)	R-0.2 (0.03 RSI)	100 (1600)	100 (1500)
7	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

Detail 10.1.10

Exterior Insulated Sloped Metal Roof with Polyisocyanurate Insulation and Bearing Plates 18” x 48” spacing – Clear Roof Assembly





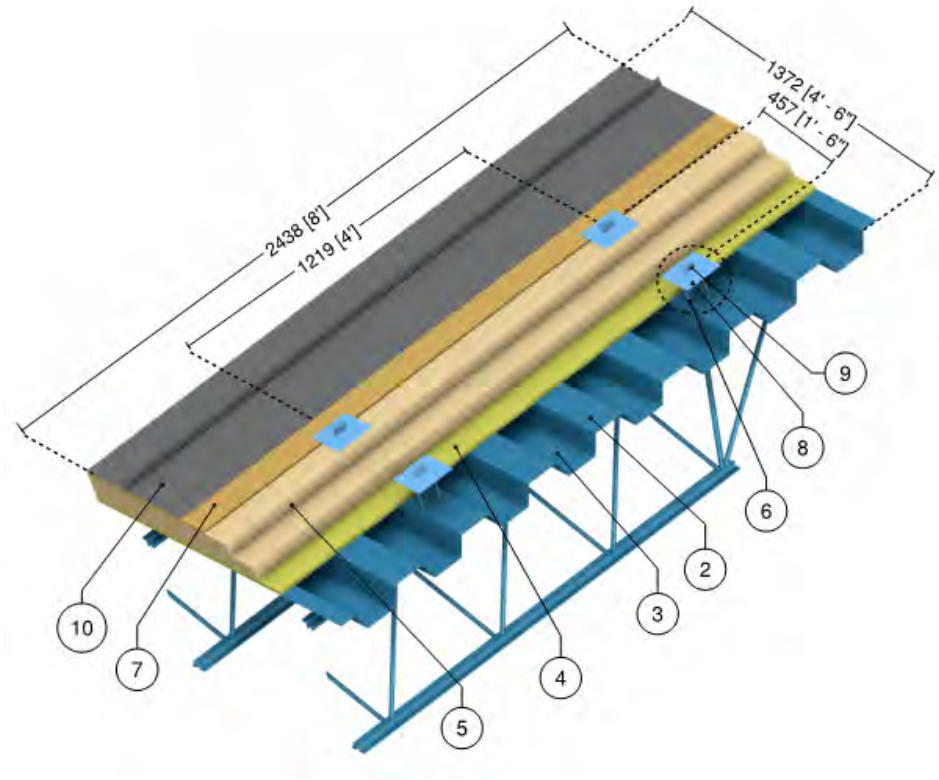
Bearing Plate and Clip Detail

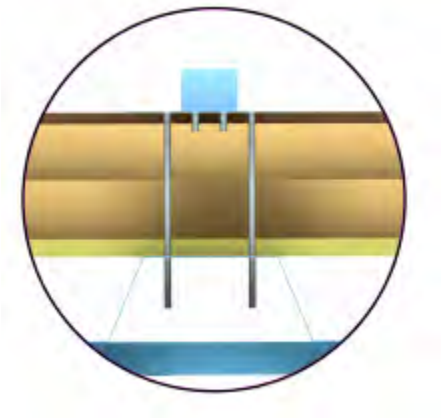
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-1.1 (0.2 RSI)	-	-
2	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Air in Steel Deck Flute[2]	3” (76)	0.87 (0.13)	R-3.5 (0.6 RSI)	0.075 (1.2)	0.24 (1000)
4	Gypsum Board	5/8" (16)	1.11 (0.16)	R-0.6 (0.1 RSI)	50 (800)	0.26 (1090)
5	2 Layer Polyisocyanurate Insulation	Varies	0.18 (0.025)	R-22.8 to R-45.6 (4.02 RSI to 8.03 RSI)	1.8 (28)	0.29 (1220)
6	#14 Steel Fasteners	1/4” (6.1) Ø	347 (50)	-	489 (7830)	0.12 (500)
7	Polyisocyanurate Cover Board	1/2” (12)	0.18 (0.025)	R-2.9 (0.5 RSI)	1.8 (28)	100 (1500)
8	Galvanized Steel Bearing Plates	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Roof Panel Clip (1 ½” x ¾”)	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Standing Seam Roof Panel	24 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 the assembly was found using ISO 100077-2

Detail 10.1.11

Exterior Insulated Sloped Metal Roof with High Compressive Strength Mineral Wool Insulation and Bearing Plates 18" x 48" spacing – Clear Roof Assembly





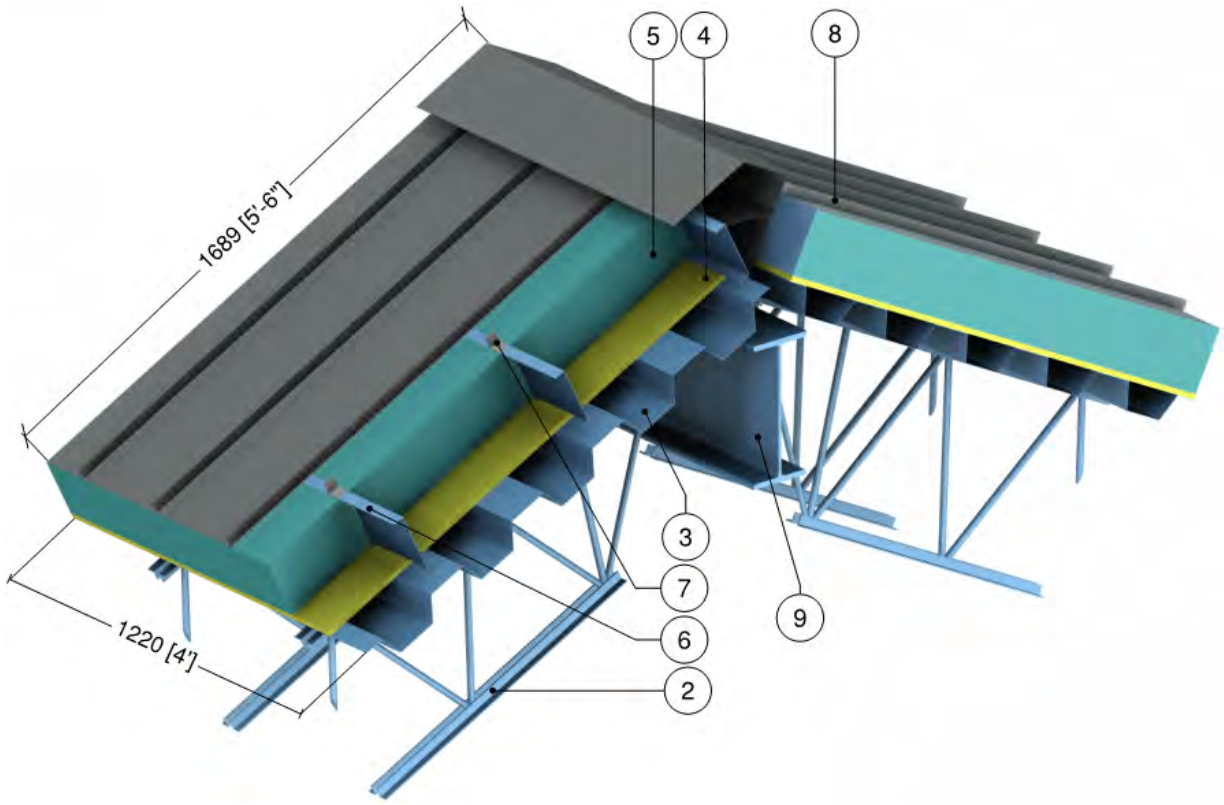
Bearing Plate and Clip Detail

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-1.1 (0.2 RSI)	-	-
2	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Air in Steel Deck Flute[2]	3" (76)	0.87 (0.13)	R-3.5 (0.6 RSI)	0.075 (1.2)	0.24 (1000)
4	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.1 RSI)	50 (800)	0.26 (1090)
5	High Compressive Strength Mineral Wool Insulation	Varies	0.26 (0.038)	R-15.2 to R-30.4 (2.68 RSI to 5.35 RSI)	9 (150)	0.29 (1220)
6	#14 Steel Fasteners	1/4" (6.1) Ø	347 (50)	-	489 (7830)	0.12 (500)
7	Insulating cover board	1/2" (12)	0.26 (0.038)	R-1.9 (0.33 RSI)	14 (220)	0.29 (1220)
8	Galvanized Steel Bearing Plates	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Roof Panel Clip (1 ½" x ¾")	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
10	Standing Seam Roof Panel	24 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 the assembly was found using ISO 100077-2

Detail 10.2.1

Exterior Insulated Sloped Metal Roof with Metal Sub-Girts (24” o.c.) Supporting Metal Roof – Ridge Intersection

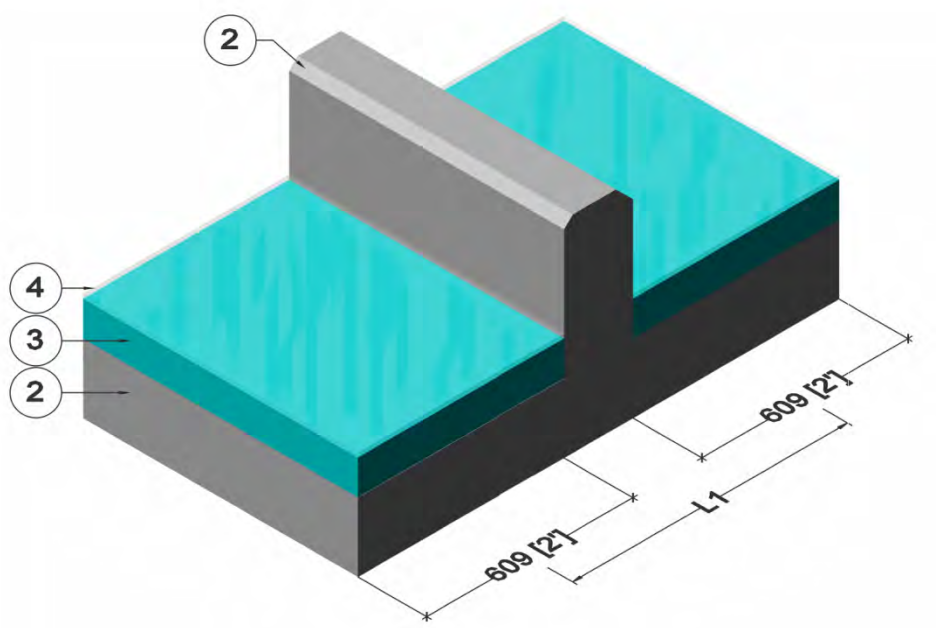


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-1.1 (0.2 RSI)	-	-
2	Open Web Steel Joist (550C) @ 24” (610) o.c.	-	347 (50)	-	489 (7830)	0.12 (500)
3	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
4	Roof Sheathing	1/2” (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
5	Rigid Roof Insulation	Varies	-	R-20 to R-30 (3.52 RSI to 5.28 RSI)	1.8 (28)	0.29 (1220)
6	Sub-Girt with 1 1/2” Flange @ 24” (610) o.c.	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Roof Clips (1 1/2” x 1 1/2")	16 Gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Metal Roof with Ridge Flashing	24 Gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Steel Beam (W410)	-	347 (50)	-	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

Detail 10.2.2

Insulated Concrete Slab – Concrete Curb or Wall Intersection

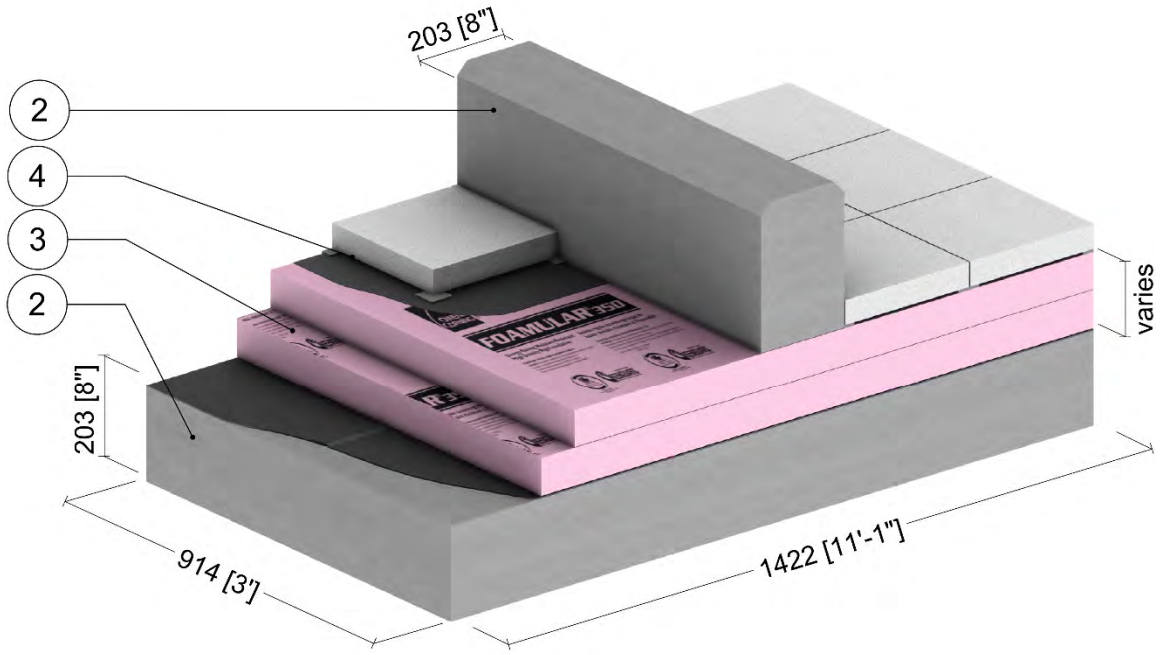


ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-0.6 (0.11 RSI)	-	-
2	Concrete Slab, Curb or Wall	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Roof Insulation	4" (102)	-	R-20 (3.5 RSI)	1.8 (28)	0.29 (1220)
4	Finish roof material is incorporated into exterior heat transfer coefficient					
5	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

Detail 10.2.3

Owens Corning Insulated Projected Membrane Roof – Floating Concrete Wall Intersection

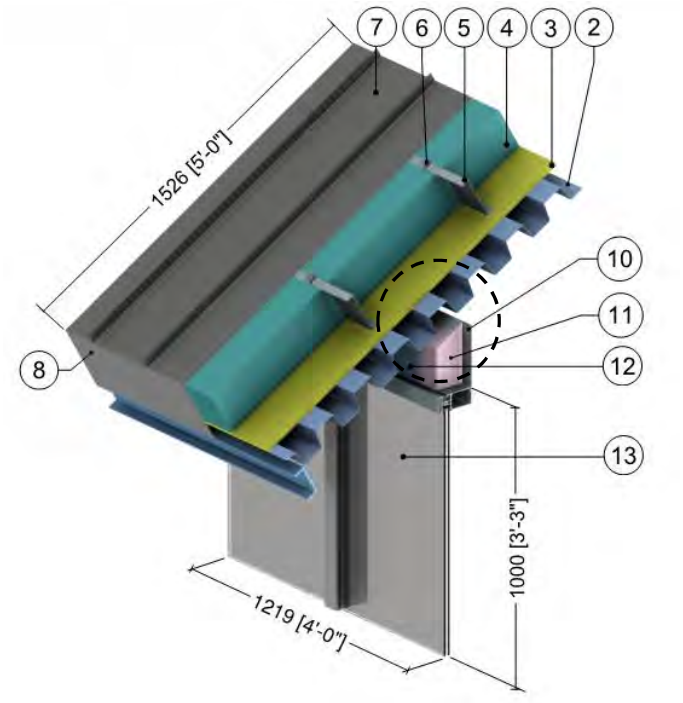


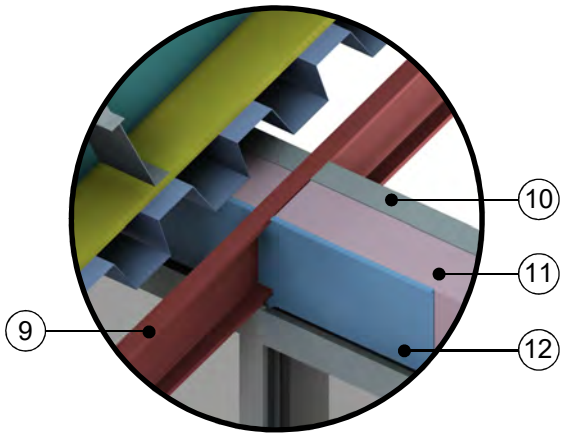
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 (0.11 RSI)	-	-
2	Concrete	8" (203)	12.5 (1.8)	-	140 (2250)	0.20 (850)
3	Fomular 350 Extruded Polystyrene Rigid Insulation Type 4	Varies	-	R-20 to R-40 (3.52 RSI to 7.04 RSI)	varies	-
4	Finish roof material is incorporated into exterior heat transfer coefficient					
5	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

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





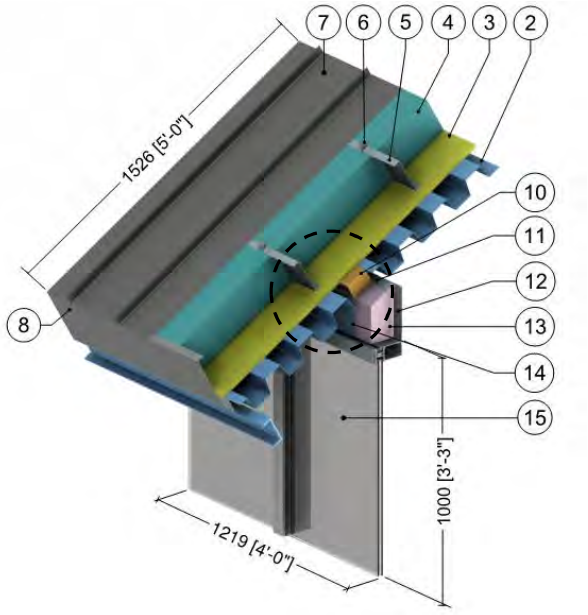
Through Beam and Metal Deck at Curtain Wall

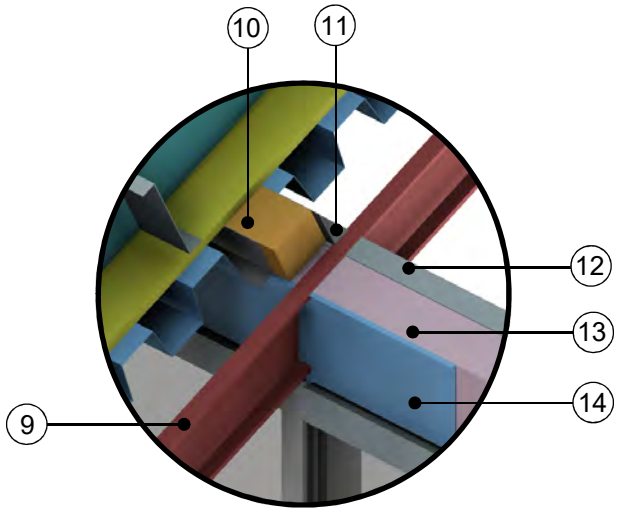
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Steel Deck	1/16” (1.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Roof Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Rigid Roof Insulation	7” (183)	0.2 (0.03)	R-35 (6.16 RSI)	1.8 (28)	0.29 (1220)
5	Sub-Girt with 1 ½” Flange @ 24” (610) o.c.	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Roof Clips (1 1/2" x 1 1/2")	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Metal Roof	24 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Roof Closure Panel	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Interior Closure Panel	12 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Fiberglass Insulation	4 1/2" (118)	0.24 (0.034)	R-19 (3.35 RSI)	4 (64)	0.20 (850)
12	Exterior Closure Panel	12 gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Aluminum Curtain Wall Vision System: thermally broken frame, double glazed IGU U_{COG} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K) [2]					
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 100077-2

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





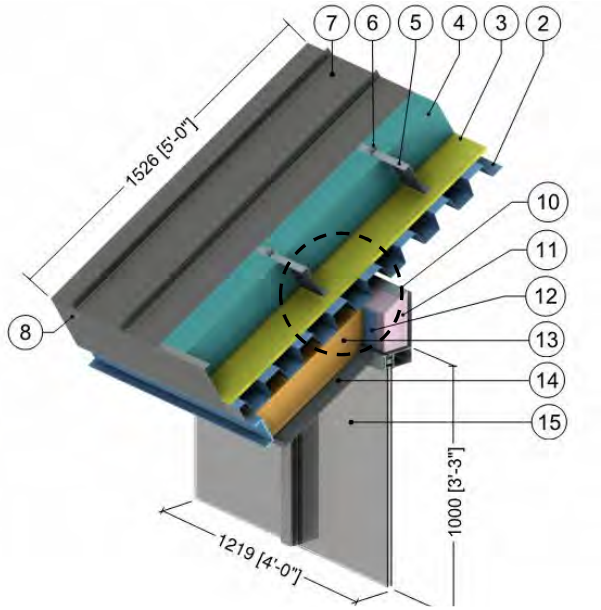
Through Beam and Thermally Broken Metal Deck

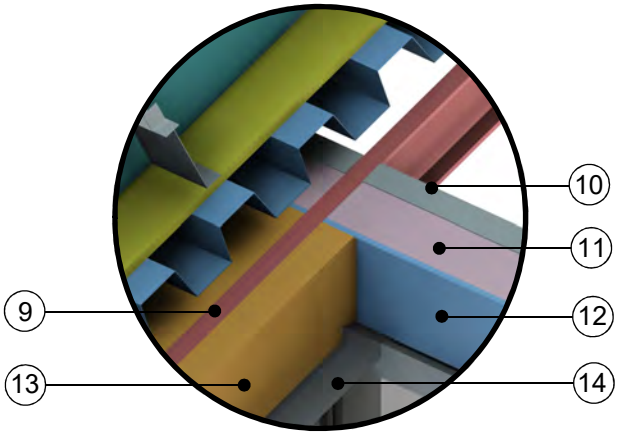
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Roof Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Rigid Roof Insulation	7" (183)	0.2 (0.03)	R-35 (6.16 RSI)	1.8 (28)	0.29 (1220)
5	Sub-Girt with 1 ½" Flange @ 24" (610) o.c.	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Roof Clips (1 1/2" x 1 1/2")	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Metal Roof	24 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Roof Closure Panel	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Steel Beam (W410)	-	347 (50)	-	489 (7830)	0.12 (500)
10	Continuous Spray Foam Insulation	4" (100)	0.17 (0.024)	R-24 (4.23 RSI)	2.8 (39)	0.35 (1470)
11	Stiffening Brackets	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
12	Interior Closure Panel	12 gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Fiberglass Insulation	4 1/2" (118)	0.24 (0.034)	R-19 (3.35 RSI)	4 (64)	0.20 (850)
14	Exterior Closure Panel	12 gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Aluminum Curtain Wall Vision System: thermally broken frame, double glazed IGU U_{COG} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K) [2]					
16	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 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





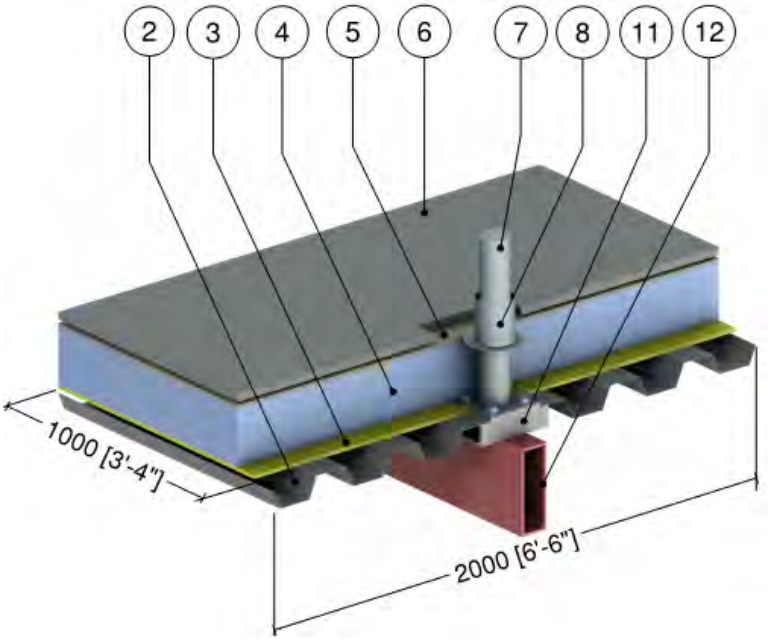
Through Beam and Metal Deck at Soffit

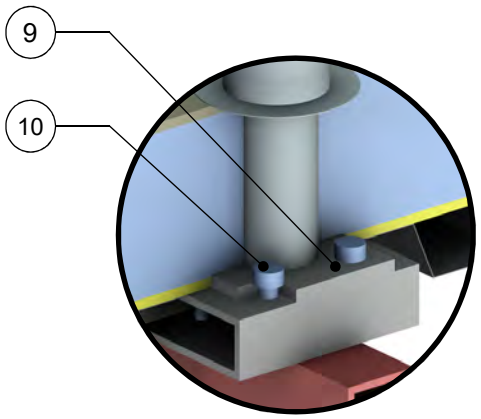
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Films[1]	-	-	R-0.6 to R-1.1 (0.12 RSI to 0.20 RSI)	-	-
2	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Roof Sheathing	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Rigid Roof Insulation	7" (183)	0.2 (0.03)	R-35 (6.16 RSI)	1.8 (28)	0.29 (1220)
5	Sub-Girt with 1 ½" Flange @ 24" (610) o.c.	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
6	Roof Clips (1 1/2" x 1 1/2")	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
7	Metal Roof	24 gauge	430 (62)	-	489 (7830)	0.12 (500)
8	Roof Closure Panel	16 gauge	430 (62)	-	489 (7830)	0.12 (500)
9	Steel Beam	-	347 (50)	-	489 (7830)	0.12 (500)
10	Curtain Wall Bracket and Closure Panel	12 gauge	430 (62)	-	489 (7830)	0.12 (500)
11	Curtain Wall Fill Insulation	4 1/2" (118)	0.24 (0.034)	R-19 (3.35 RSI)	4 (64)	0.20 (850)
12	Curtain Wall Closure Panel	12 gauge	430 (62)	-	489 (7830)	0.12 (500)
13	Rigid Soffit Insulation	6" (150)	0.17 (0.024)	R-36 (6.34 RSI)	2.8 (39)	0.35 (1470)
14	Metal Soffit Panel	24 gauge	430 (62)	-	489 (7830)	0.12 (500)
15	Aluminum Curtain Wall Vision System: thermally broken frame, double glazed IGU U_{COG} = 0.32 BTU/hr·ft²·°F (1.82 W/m²K) [2]					
16	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 10.3.1

Exterior Insulated Conventional Flat Roof – Roof Anchor





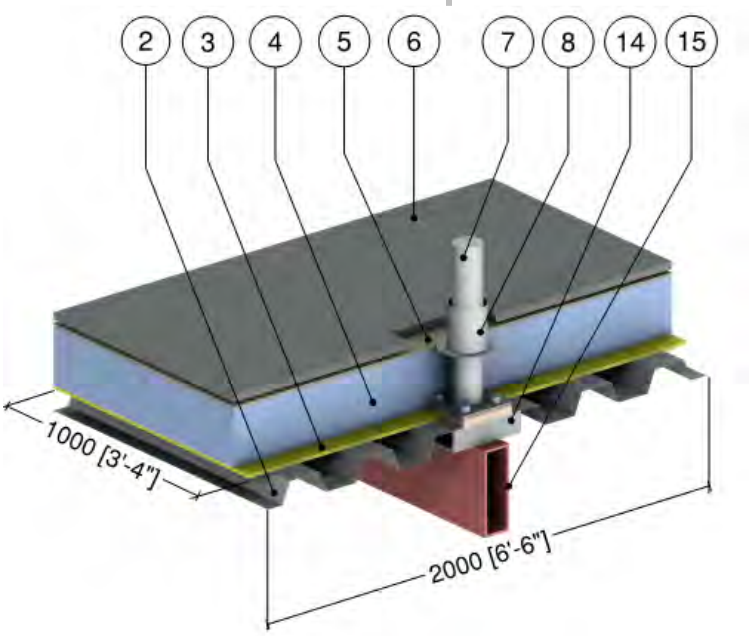
Roof Anchor

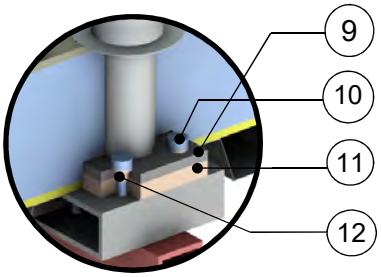
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-1.1 (0.19 RSI)	-	-
2	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Extruded Polystyrene Insulation (XPS)	8" (203)	0.20 (0.029)	R-40 (7.04 RSI)	1.8 (28)	0.29 (1220)
5	Asphalt Cover Board and Roof Membrane	1/2" (13)	3 (0.43)	R-0.2 (0.03 RSI)	100 (1600)	100 (1500)
6	Concrete Pavers	1" (25)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Roof Anchor	1/4" (6)	430 (62)	-	489 (7830)	0.12 (500)
8	Roof Anchor Flashing	18 Gauge	1100 (160)	-	171 (2739)	0.21 (900)
9	8" x 8" x 5/8" Base Plate	5/8" (16)	430 (62)	-	489 (7830)	0.12 (500)
10	Stainless Steel Bolts	3/4" (6) ∅	117 (17)	-	489 (7830)	0.12 (500)
11	3" x 8" x 11" HSS	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
12	Structural Steel	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
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

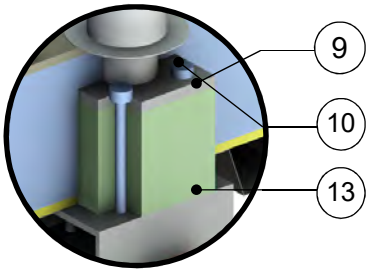
Detail 10.3.2

Exterior Insulated Conventional Flat Roof – Armatherm Thermal Break under Roof Anchor





Armatherm FRR Roof Anchor Thermal Break



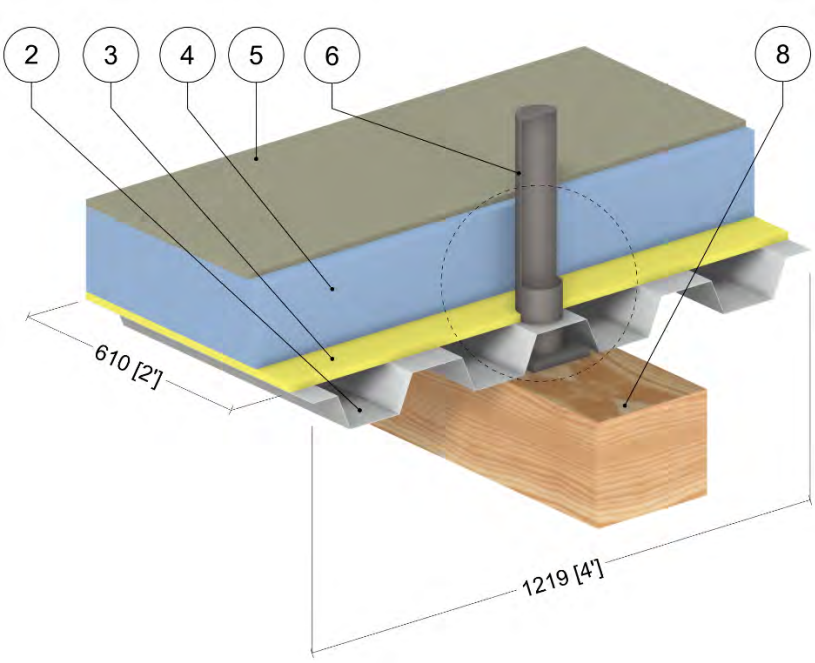
Armatherm 500 Roof Anchor Thermal Break

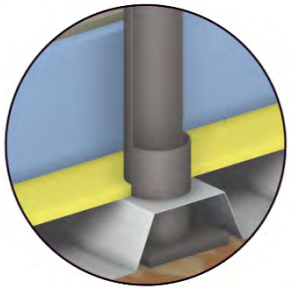
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-1.1 (0.19 RSI)	-	-
2	Steel Deck	1/16" (1.6)	347 (50)	-	489 (7830)	0.12 (500)
3	Gypsum Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
4	Extruded Polystyrene Insulation (XPS)	8" (203)	0.20 (0.029)	R-40 (7.04 RSI)	1.8 (28)	0.29 (1220)
5	Asphalt Cover Board and Roof Membrane	1/2" (13)	3 (0.43)	R-0.2 (0.03 RSI)	100 (1600)	100 (1500)
6	Concrete Pavers	1" (25)	12.5 (1.8)	-	140 (2250)	0.20 (850)
7	Roof Anchor	1/4" (6)	430 (62)	-	489 (7830)	0.12 (500)
8	Roof Anchor Flashing	18 Gauge	1100 (160)	-	171 (2739)	0.21 (900)
9	8" x 8" x 5/8" Base Plate	5/8" (16)	430 (62)	-	489 (7830)	0.12 (500)
10	Stainless Steel Bolts	3/4" (6) ∅	117 (17)	-	489 (7830)	0.12 (500)
11	Armatherm FRR Thermal Break	1/2" (13)	1.4 (0.2)	-	85 (1362)	-
12	Armatherm FRR Washers and Bushing	-	1.4 (0.2)	-	85 (1362)	-
13	Armatherm 500 Thermal Break	6" (152)	0.32 (0.05)	-	-	-
14	3" x 8" x 11" HSS	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
15	Structural Steel	3/8" (10)	347 (50)	-	489 (7830)	0.12 (500)
16	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

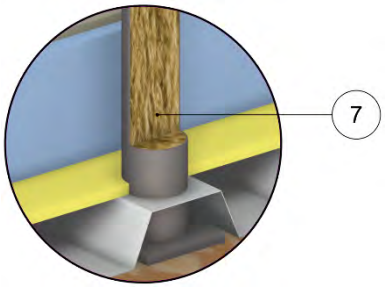
Detail 10.3.3

Exterior Insulated Conventional Low-Sloped Roof – Roof Anchor





Without Fill Insulation



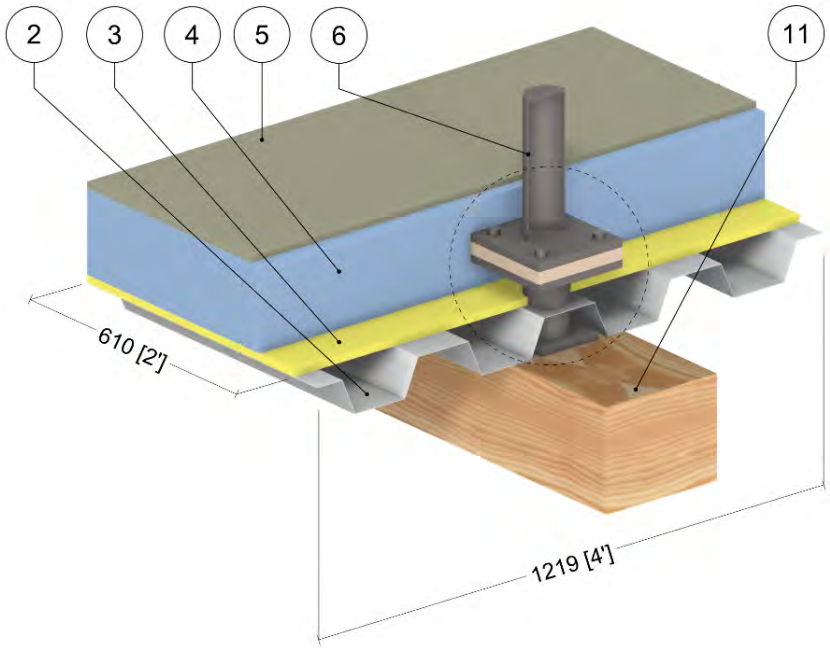
With Fill Insulation

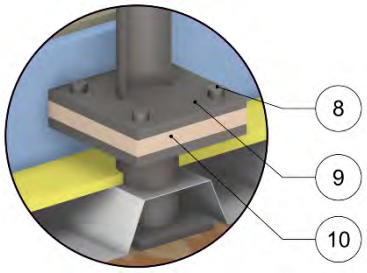
ID	Component	Thickness Inches (mm)	Conductivity Btu·in / ft²·hr·°F (W/m K)	Nominal Resistance hr·ft²·°F/Btu (m²K/W)	Density lb/ft³ (kg/m³)	Specific Heat Btu/lb·°F (J/kg K)
1	Interior Film[1]	-	-	R-1.1 (0.19 RSI)	-	-
2	Steel Deck	1/32" (1.1)	430 (62)	-	489 (7830)	0.12 (500)
3	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
4	Extruded Polystyrene Insulation (XPS)	6-7/8' (175)	0.20 (0.029)	R-34.3 (6.03 RSI)	1.8 (28)	0.29 (1220)
5	Sheathing Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Roof Anchor	3/16" (4.8)	347 (50)	-	489 (7830)	0.12 (500)
7	Mineral Wool Insulation	-	0.24 (0.034)	-	4 (64)	0.20 (850)
8	Glulam Beam	8-1/2" (216)	0.97 (0.14)	-	31 (500)	0.45 (1880)
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

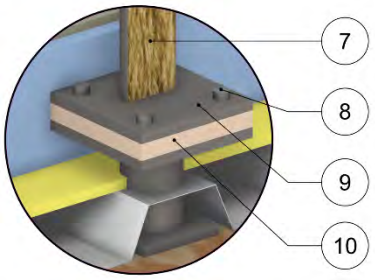
Detail 10.3.4

Exterior Insulated Conventional Low-Sloped Roof – Thermal Break in Roof Anchor





Without Fill Insulation



With Fill Insulation

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 Film[1]	-	-	R-1.1 (0.19 RSI)	-	-
2	Steel Deck	1/32" (1.1)	430 (62)	-	489 (7830)	0.12 (500)
3	Gypsum Board	5/8" (16)	1.1 (0.16)	R-0.6 (0.10 RSI)	50 (800)	0.26 (1090)
4	Extruded Polystyrene Insulation (XPS)	6-7/8' (175)	0.20 (0.029)	R-34.3 (6.03 RSI)	1.8 (28)	0.29 (1220)
5	Sheathing Board	1/2" (13)	1.1 (0.16)	R-0.5 (0.08 RSI)	50 (800)	0.26 (1090)
6	Roof Anchor	3/16" (4.8)	347 (50)	-	489 (7830)	0.12 (500)
7	Mineral Wool Insulation	-	0.24 (0.034)	-	4 (64)	0.20 (850)
8	Fasteners	1/2" (13) ∅	430 (62)	-	489 (7830)	0.12 (500)
9	8" x 8" x 5/8" Base Plate	5/8" (16)	347 (50)	-	489 (7830)	0.12 (500)
10	Thermal Break	1" (25)	1.8 (0.26)	-	108 (1730)	-
11	Glulam Beam	8-1/2" (216)	0.97 (0.14)	-	31 (500)	0.45 (1880)
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