



## Structural Fire Resistance ASTM E119

### Types of Construction and Fire Resistance Ratings

The International Building Code<sup>2</sup> (IBC), Section 602, identifies building construction classifications. Some classifications require exterior wall fire resistance ratings of 1, 2 or 3 hours depending on building characteristics, including use and occupancy classification, height and area, fire separation distances, and other details.

### Testing Fire Resistance Ratings

IBC Section 703 specifies that the fire resistance rating of building walls be determined in accordance with one of several alternative methods including ASTM E119 testing or engineering analysis (Section 703.3.4).

### ASTM E119

ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials<sup>1</sup>, evaluates the duration for which building elements such as the Owens Corning® Enclosure Solutions Wall Systems will contain a fire and retain its structural integrity during a fire test exposure. The test exposes a wall

assembly to a controlled time/temperature fire exposure for a specified time period. The timed fire exposure is followed by the application of a fire hose stream to evaluate the ability of the fire weakened assembly to withstand both the thermal shock of a sudden cold water stream, and its retained structural integrity. The test standard measures the transmission of heat and hot gases through the wall assembly. For load bearing walls the standard also measures the load carrying ability of the wall assembly during the test exposure.

### Owens Corning® Enclosure Solutions Fire Resistance Rating

The Owens Corning® Enclosure Steel Stud Wall Assembly is fire resistance rated for interior fire exposure for one and three hours, depending on the components used, on the type of interior gypsum board installed, and if it is load bearing or non-bearing. It is rated for a one hour exterior exposure. See Table 1 for additional details. Some system assemblies and descriptions are also available in the Underwriters Laboratories OnLine Certifications Directory. See the live links provided in Table 1 for complete details.

**Table 1:**

Steel Stud Cavity Wall Fire Resistance Rated Wall System Summary				
Component	Design Options via Third Party Engineering Analysis*	<a href="#">UL Assembly V414</a>	<a href="#">UL Assembly V434</a>	<a href="#">UL Assembly W429</a>
Interior Fire Rating (Structural)	3 hour (Non-Bearing)	3 hour (Non-Bearing)	1 hour (Bearing or Non-Bearing)	3 hour (Non-Bearing)
	1 hour (Bearing)			1 hour (Bearing)
Steel Stud, Bearing	C-shaped, min. 3-1/2 deep, fabricated from No. 20 MSG (0.0329 in., min bare steel thickness) corrosion resistant steel. Studs shall be designed in accordance with the current edition of the Specification for the Design of Cold-Formed Steel Structural Members by the American Iron and Steel Institute. All design details enhancing the structural integrity of the wall assembly, including the axial design load of the studs, shall be as specified by the steel stud designer and/or producer and shall meet the requirements of all applicable local code agencies. The max stud spacing shall not exceed 24 in. OC. Studs attached to the floor and ceiling runners with ½ in. long Type S12 pan head or 5/8 in. long Type S-12 low profile head, self-drilling, self-tapping steel screws on both sides of the studs.	N/A	C-shaped, min. 3-1/2 deep, fabricated from No. 20 MSG (0.0329 in., min bare steel thickness) corrosion resistant steel. Studs shall be designed in accordance with the current edition of the Specification for the Design of Cold-Formed Steel Structural Members by the American Iron and Steel Institute. All design details enhancing the structural integrity of the wall assembly, including the axial design load of the studs, shall be as specified by the steel stud designer and/or producer and shall meet the requirements of all applicable local code agencies. The max stud spacing shall not exceed 24 in. OC. Studs attached to the floor and ceiling runners with ½ in. long Type S12 pan head or 5/8 in. long Type S-12 low profile head, self-drilling, self-tapping steel screws on both sides of the studs.	C-shaped, min. 3-1/2 deep, fabricated from No. 20 MSG (0.0329 in., min bare steel thickness) corrosion resistant steel. Studs shall be designed in accordance with the current edition of the Specification for the Design of Cold-Formed Steel Structural Members by the American Iron and Steel Institute. All design details enhancing the structural integrity of the wall assembly, including the axial design load of the studs, shall be as specified by the steel stud designer and/or producer and shall meet the requirements of all applicable local code agencies. The max stud spacing shall not exceed 24 in. OC. Studs attached to the floor and ceiling runners with ½ in. long Type S12 pan head or 5/8 in. long Type S-12 low profile head, self-drilling, self-tapping steel screws on both sides of the studs.



## Steel Stud Cavity Wall Fire Resistance Rated Wall System Summary (Continued)

Component	Design Options via Third Party Engineering Analysis*	<a href="#">UL Assembly V414</a>	<a href="#">UL Assembly V434</a>	<a href="#">UL Assembly W429</a>
Steel Stud, Non-Bearing	C-shaped, fabricated from min No. 20 MSG galv steel, min 3-5/8 in. wide with min 1-5/8 in. legs and min 5/16 in. stiffening flanges, spaced 16 in. OC. Studs cut 3/4 in. less than assembly height.	C-shaped, fabricated from No. 20 MSG galv steel, min 3-5/8 in. wide with min 1-5/8 in. legs and min 5/16 in. stiffening flanges, spaced 16 in. OC. Studs cut 3/4 in. less than assembly height.	N/A	C-shaped, fabricated from min No. 20 MSG galv steel, min 3-5/8 in. wide with min 1-5/8 in. legs and min 5/16 in. stiffening flanges, spaced 16 in. OC. Studs cut 3/4 in. less than assembly height.
Lateral Support for Steel Studs	Where required for lateral support of studs, support may be provided by means of steel straps, channels or other similar means as specified in the design of a particular steel stud wall system.	C-shaped channel, used for lateral support, fabricated from nom No. 16 MSG galv steel, 1-1/2 in. wide with 1/2 in. legs. Fastened at each stud.	Where required for lateral support of studs, support may be provided by means of steel straps, channels or other similar means as specified in the design of a particular steel stud wall system.	Where required for lateral support of studs, support may be provided by means of steel straps, channels or other similar means as specified in the design of a particular steel stud wall system.
Cavity Batt Insulation	<a href="#">EcoTouch</a> or <a href="#">Flame Spread 25 Batt</a> , foil or unfaced glass fiber batts, min 3-1/2 in. thick, having a min density of 0.8 pcf, , placed to fill the interior of the stud cavities.	Kraft paper, foil or unfaced glass fiber batts, min 3-1/2 in. thick, having a min density of 0.8 pcf, faced or unfaced mineral wool batts and blankets, 3-1/2 in. thick min, placed to fill the interior of the stud cavities.	Kraft paper, foil or unfaced glass fiber batts, min 3-1/2 in. thick, having a min density of 0.5 pcf, or faced or unfaced mineral wool batts and blankets, min 3-1/2 in. thick, placed to fill the interior of the stud cavities.	<a href="#">EcoTouch</a> or <a href="#">Flame Spread 25 Batt</a> , foil or unfaced glass fiber batts, min 3-1/2 in. thick, having a min density of 0.8 pcf, , placed to fill the interior of the stud cavities.
Gypsum Board, Interior, Bearing Wall	Any 5/8 in. thick UL Classified Gypsum Board that is eligible for use in Design Nos. L501, G512 or U305. Nom 5/8 in. thick, 4 ft wide. Gypsum board applied vertically with joints centered over studs. Fastened to the steel studs with a 1 in. long Type S self-drilling, self-tapping steel screws spaced 8 in. OC along the edges and 12 in. OC in the field of the board. See Gypsum Board*Category (CKNX) for list of manufacturers.	N/A	Any 5/8 in. thick UL Classified Gypsum Board that is eligible for use in Design Nos. L501, G512 or U305. Nom 5/8 in. thick, 4 ft wide. Wallboard Gypsum board applied vertically with joints centered over studs. Fastened to the steel studs with a 1 in. long Type S self-drilling, self-tapping steel screws spaced 8 in. OC along the edges and 12 in. OC in the field of the board.	Any 5/8 in. thick UL Classified Gypsum Board that is eligible for use in Design Nos. L501, G512 or U305. Nom 5/8 in. thick, 4 ft wide. Gypsum board applied vertically with joints centered over studs. Fastened to the steel studs with a 1 in. long Type S self-drilling, self-tapping steel screws spaced 8 in. OC along the edges and 12 in. OC in the field of the board. See Gypsum Board*Category (CKNX) for list of manufacturers.
Gypsum Board, Interior, Non-Bearing Wall	Any 5/8 in. thick UL Classified Gypsum Board that is eligible for use in Design No. G512. Nom. 5/8 in. thick, 4 ft wide applied vertically with joints centered over studs. Fastened to the steel studs with 1 in. long Type S self-drilling, self-tapping steel screws spaced 8 in. OC along the edges and 12 in. OC in the field of the board. See Gypsum Board* Category (CKNX) for list of manufacturers.	5/8 in. thick, 4 ft wide. Wallboard applied vertically with joints centered over studs. Fastened to the steel studs with 1 in. long Type S self-drilling, self-tapping steel screws spaced 8 in. OC along the edges and 12 in. OC in the field of the board. See listing for approved manufacturers.	N/A	Any 5/8 in. thick UL Classified Gypsum Board that is eligible for use in Design No. G512. Nom. 5/8 in. thick, 4 ft wide applied vertically with joints centered over studs. Fastened to the steel studs with 1 in. long Type S self-drilling, self-tapping steel screws spaced 8 in. OC along the edges and 12 in. OC in the field of the board. See Gypsum Board* Category (CKNX) for list of manufacturers.



### Steel Stud Cavity Wall Fire Resistance Rated Wall System Summary (Continued)

Component	Design Options via Third Party Engineering Analysis*	<a href="#">UL Assembly V414</a>	<a href="#">UL Assembly V434</a>	<a href="#">UL Assembly W429</a>
Gypsum Board, Exterior, Bearing or Non-Bearing Wall	Any 5/8 in. thick UL Classified exterior Gypsum Board that is eligible for use in Design Nos. L501, G512 or U305. Nom 5/8 in. thick, 4 ft wide. Gypsum board applied vertically with joints centered over studs. Fastened to the steel studs with a 1 in. long Type S self-drilling, self-tapping steel screws spaced 8 in. OC along the edges and 12 in. OC in the field of the board. See Gypsum Board* Category (CKNX) for list of manufacturers.	N/A	N/A	Any 5/8 in. thick UL Classified exterior Gypsum Board that is eligible for use in Design Nos. L501, G512 or U305. Nom 5/8 in. thick, 4 ft wide. Gypsum board applied vertically with joints centered over studs. Fastened to the steel studs with a 1 in. long Type S self-drilling, self-tapping steel screws spaced 8 in. OC along the edges and 12 in. OC in the field of the board. See Gypsum Board* Category (CKNX) for list of manufacturers.
Air & Water Resistive Barrier	Any WRB listed in Tables 2a or 2b	N/A	N/A	<a href="#">Tremco ExoAir 230</a> , Combustible Air and Weather Barrier Sealant — Applied to completely cover the gypsum sheathing at a min thickness of 35 mil (0.9 mm) dry, 70 mil (1.8 mm) wet thickness.
Masonry Anchors/Ties	Zinc barrel screw masonry veneer anchors with 1 in. long self-drilling tip attached into steel studs. Includes flanged head/integral zinc/EPDM washer, and themal break clip to receive pintle wire tie. Installed on each stud 16 in. vertically with 2 in. diameter plastic brick tie washers.	Attached to steel studs 16 in. OC max. Underlay bracket with self-sealing gasket material and secure with 2-1/2 in. long Type S-12 steel screws. Bracket legs penetrate XPS and engage steel stud flange.	Wall anchors attached to steel studs with 1/2 in. long Type S-12 self-drilling, self-tapping steel screws, spaced max 24 in. OC.	Zinc barrel screw masonry veneer anchors with 1 in. long self-drilling tip attached into steel studs. Includes flanged head/integral zinc/EPDM washer, and themal break clip to receive pintle wire tie. Installed on each stud 16 in. vertically with 2 in. diameter plastic brick tie washers.
Continuous Insulation (CI) (Alternate 1)	<a href="#">Foamular 250</a> , Unfaced max 4 in. thick applied to studs with Type S-12 ceramic coated self-drilling steel screws of sufficient length spaced 12 in. OC with 2 in. diameter plastic pronged continuous insulation washers.	<a href="#">Foamular 150 or 250</a> , max 2 in. thick, faced or unfaced, applied to studs with 2-1/2 in. long Type S-12 self-drilling, self-tapping steel screws spaced 12 in. OC.	<a href="#">Foamular 150 or 250</a> , max 2 in. thick, faced or unfaced, applied to studs with 2-1/2 in. long Type S-12 self-drilling, self-tapping steel screws spaced 12 in. OC.	<a href="#">Foamular 250</a> , Unfaced max 4 in. thick applied to studs with Type S-12 ceramic coated self-drilling steel screws of sufficient length spaced 12 in. OC with 2 in. diameter plastic pronged continuous insulation washers.
Continuous Insulation (CI) (Alternate 2)	<a href="#">Thermafiber RainBarrier or HD</a> (mineral wool), 16 in. wide, unfaced, max 4" thick, single or multiple layer, installed over WRB and exterior gypsum board	N/A	N/A	N/A
CI Joint Treatment for use with XPS CI	<a href="#">JointSealR Foam Seam Tape</a> (optional)	Min 2 in. wide plastic tape placed over joints of XPS on exterior surface of wall or sealant placed within the joints of the XPS	Min 2 in. wide plastic tape placed over joints of XPS on exterior surface of wall or sealant placed within the joints of the XPS	Not specified



**Steel Stud Cavity Wall Fire Resistance Rated Wall System Summary (Continued)**

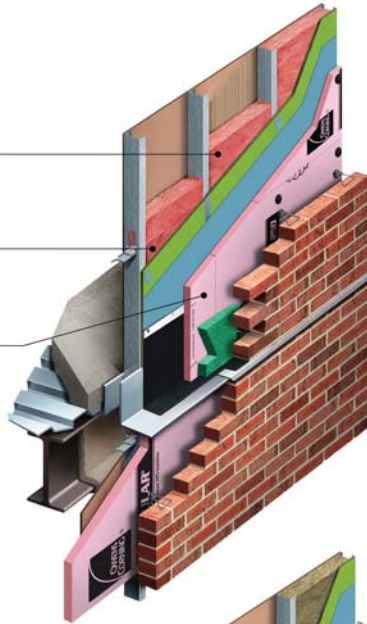
Component	Design Options via Third Party Engineering Analysis*	<a href="#">UL Assembly V414</a>	<a href="#">UL Assembly V434</a>	<a href="#">UL Assembly W429</a>
Air Space	1" minimum Between face brick or CMU and CI	1" minimum	1" minimum	1" minimum
Mortar Drop Protection	10 in. high, at bottom of air space on top of through wall flashing assembly, 90% open weave drainage mesh adjacent to weep vents. Thickness to fill air space cavity between foam insulation and exterior brick.	Optional	Optional	10 in. high, at bottom of air space on top of through wall flashing assembly, 90% open weave drainage mesh adjacent to weep vents. Thickness to fill air space cavity between foam insulation and exterior brick.
Exterior Finish	<p>One of the following exterior facings installed in accordance with the manufacturer's installation instructions and fastened over CI into furring or steel stud framing.</p> <p>Aluminum Siding — 0.019 in. min thick painted aluminum meeting AAMA 1402</p> <p>Steel Siding — Min No. 17 GSG gauge painted steel.</p> <p>Vinyl Siding — 0.035 in. min thick vinyl, exterior plastic siding.</p> <p>Wood Siding — 0.313 in. min thick lumber, plywood or OSB wood based siding.</p> <p>Hard board Siding — 0.250 in. min thick hard board exterior siding.</p> <p>Fiber-Cement Siding — 0.250 in. min thick fiber-cement based siding.</p> <p>Stone — 2.0 in. min (natural stone) or 1.5 in. min (cast artificial) thick stone.</p> <p>Brick Veneer — Any 4 in. wide brick. Min 1 in. airspace provided between veneer and CI. Secured to Steel Studs with masonry ties.</p> <p>Concrete Masonry Veneer — 2.0 in. min thick concrete masonry units. Fastened over CI. Secured to Steel Studs with masonry ties.</p> <p>Stucco — Portland cement type, 0.750 in. min thickness. Metal lath or mesh base fastened over XPS CI to Steel Studs.</p> <p>One-Coat Stucco — 0.375 in. min thickness. Wire fabric lath fastened over XPS CI to Steel Studs.</p> <p>Exterior Insulation and Finish System (EIFS) — Base coat with reinforcing mesh applied over XPS CI followed by finish coat.</p> <p>Metal Panel — 0.039 in. min. thick metal panel or metal-composite-metal (MCM) panel. Wall and Partition Facing and Accessories — Installed in accordance with the manufacturers installation instructions. Min. 0.25 in. (6 mm) thick panel fastened to the exterior surface.</p>	4" Face Brick	4" Face Brick	4" Face Brick



ECOTOUCH® FLAME SPREAD 25 INSULATION

ECOTOUCH® PINK® FIBERGLAS™ INSULATION

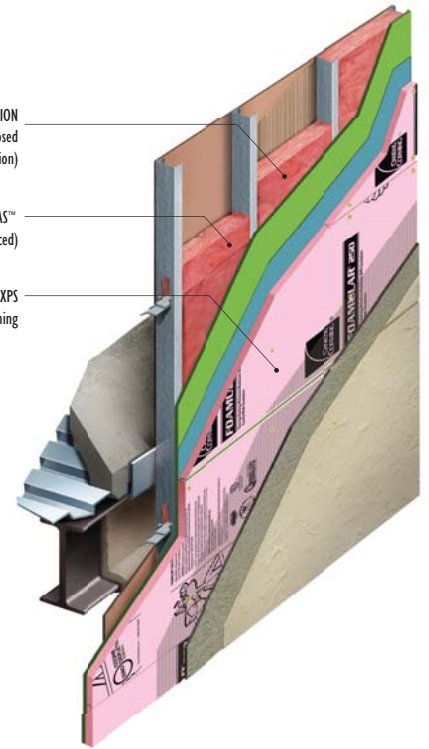
FOAMULAR® 250 XPS INSULATION



ECOTOUCH® FLAME SPREAD 25 INSULATION  
(25 flame spread facer for exposed use or for Types I or II construction)

ECOTOUCH® PINK® FIBERGLAS™ INSULATION (unfaced)

FOAMULAR® 250 XPS continuous insulating sheathing



THERMAFIBER® ULTRABATT™ or SAFB™  
(Sound Attenuation Fire Blanket)

THERMAFIBER® RAINBARRIER® 45 or RAINBARRIER® HD

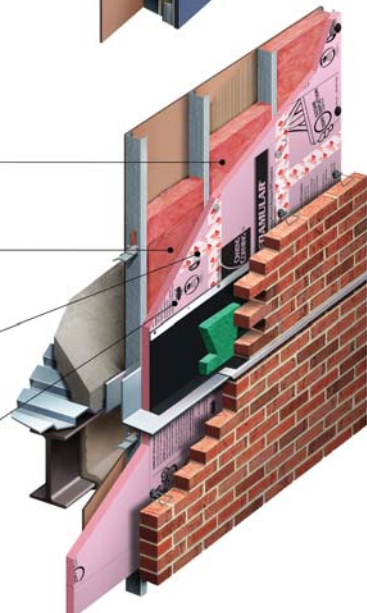


ECOTOUCH® FLAME SPREAD 25 INSULATION

ECOTOUCH® PINK® FIBERGLAS™ INSULATION

JOINTSEALR® FOAM JOINT TAPE

FOAMULAR® 250 XPS INSULATION



ASTM E119 Test Assembly, Exterior Side



Fire Exposure Inside ASTM E119 Furnace



## Use of Tables 2a and 2b

Select the appropriate class air/water barrier system for the project need:

- Table 2a for Class I vapor retarding performance
- Table 2b for Class II or III vapor retarding performance

Definitions: (International Building Code, Section 1405.3.3, Material Vapor Retarder Class)

Vapor Permeable Membranes have a water vapor permeance rating of 5 perms or greater when tested in accordance with ASTM E96, desiccant method, Procedure A. Vapor Retarding Membranes limit the amount of water vapor that passes through a material when tested in accordance with ASTM E96, desiccant method, Procedure A. Permeance Classifications are defined as follows:

Class I:  $\leq 0.1$  perm

Class II:  $> 0.1$  perm  $\leq 1.0$  perm

Class III:  $> 1.0$  perm  $\leq 10$  perm

The tables are also organized by type of system, either fluid applied, mechanically attached sheet, or self adhering sheet. Refer to the membrane manufacturer for specific product specifications, technical data, and installation instructions.\*

For additional air/water barrier code compliance information consult the following references:

- International Building Code, Section 1404.2, Water Resistive Barrier
- ANSI/ASHRAE/IES Standard 90.1, Energy Standard for Buildings Except Low Rise Residential Buildings, Section 5.4.3.1.3, (Air Barrier Design) Acceptable Materials and Assemblies
- International Energy Conservation Code, Section C-402.5.1.2.2, Assemblies (Air Barrier Compliance Options)

## Table 2a, Class I Vapor Retarder\*

Fluid-Applied Membranes	
BASF	Enershield <sup>®</sup> I
Carlisle	Barritech <sup>™</sup> NP
Grace Construction Products	Perm-A-Barrier <sup>®</sup> NPL
Henry	Air-Bloc <sup>®</sup> 32MR
Henry	Air-Bloc <sup>®</sup> 21FR (used as an adhesive for rigid insulation)
Henry	Air-Bloc <sup>®</sup> 33MR
Hohmann & Barnard	Enviro-Barrier <sup>™</sup>
Polyguard Products	Airlok Flex <sup>®</sup>
PROSOCO	R-Guard <sup>®</sup> VB
Tremco	ExoAir <sup>®</sup> 130
W.R. Meadows	Air-Shield <sup>™</sup> LSR
Mechanically Attached Sheet Membranes	
NA	
Self-Adhered Sheet Membranes	
Carlisle	CCW-705FR
3M	Self-Adhered Air and Vapor Barrier 3015
Grace Construction Products	Perm-A-Barrier <sup>®</sup> Aluminum Wall
Henry	Metal Clad <sup>™</sup>
Henry	Foilskin <sup>®</sup>

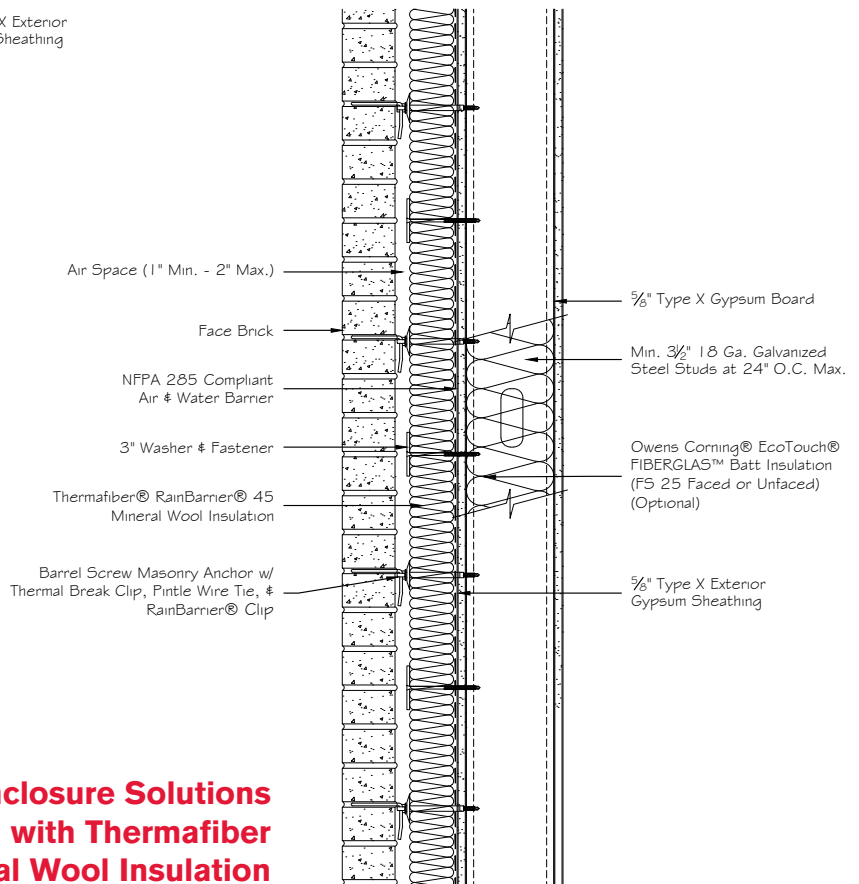
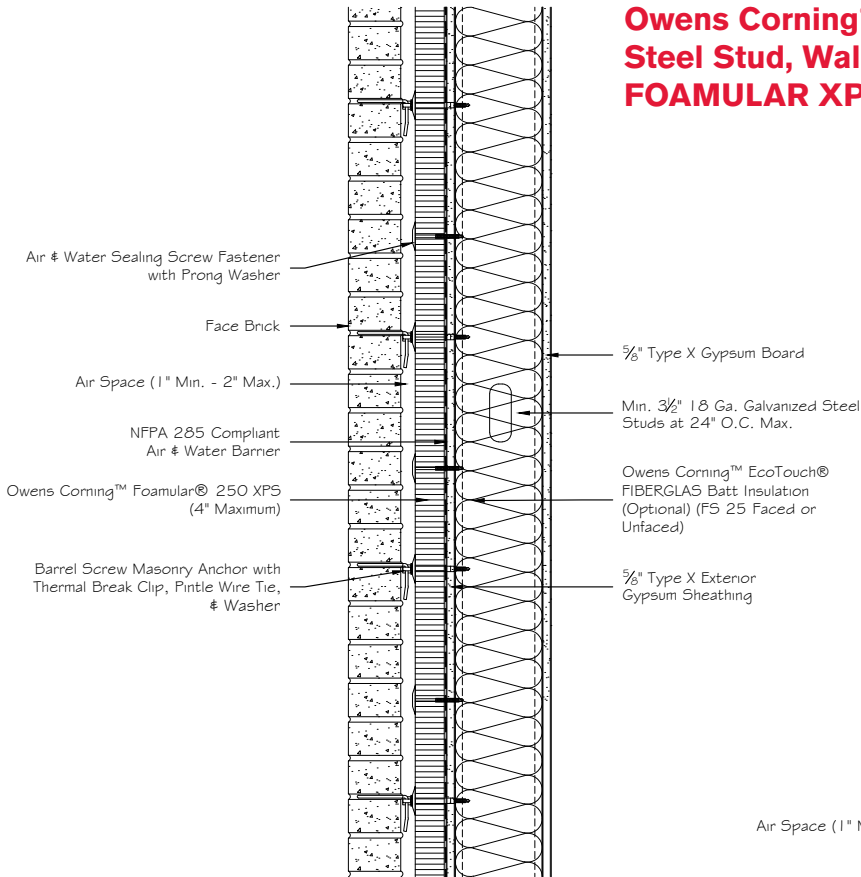


### Table 2b, Class II, III, or Higher Perm Vapor Retarder\*

Fluid-Applied Membranes	
BASF	Enershield <sup>®</sup> HP
Carlisle	Barritech <sup>™</sup> VP
Dryvit	Backstop <sup>®</sup> NT
Dupont <sup>™</sup>	DuPont <sup>™</sup> Tyvek <sup>®</sup> Fluid Applied Weather Barrier
Grace Construction Products	Perm-A-Barrier <sup>®</sup> VPL
Grace Construction Products	Perm-A-Barrier <sup>®</sup> VPL LT
Henry	Air-Bloc <sup>®</sup> 17MR
Henry	Air-Bloc <sup>®</sup> 31MR
Henry	Air-Bloc <sup>®</sup> 33MR
Hohmann & Barnard	Enviro-Barrier <sup>™</sup> VP
Momentive Performance Materials	GE SEC2500 SilShield AWB
Momentive Performance Materials	GE SEC2600 SilShield AWB
Momentive Performance Materials	Elemax 2600
Pecora Corporation	XL-Perm Ultra VP
Polyguard Products	Airlok Flex <sup>®</sup> WG
Polyguard Products	Airlok Flex <sup>®</sup> VP
PROSOCO	R-Guard <sup>®</sup> CAT 5
PROSOCO	R-Guard <sup>®</sup> CAT 5 Rain Screen
PROSOCO	R-Guard <sup>®</sup> Spray Wrap MVP
Sto Corp	Sto Gold Coat <sup>®</sup> with StoGuard Fabric
Sto Corp	Sto Emerald Coat <sup>®</sup> with StoGuard Fabric
Sto Corp	Sto ExtraSeal <sup>™</sup> with StoGuard Mesh (Used as adhesive for rigid insulation)
STS Coatings	Wall Guardian <sup>™</sup> FW-100A
Tremco	ExoAir <sup>®</sup> 230
Tremco	Securock <sup>®</sup> ExoAir <sup>®</sup> 430 (Liquid membrane factory applied to USG Securock <sup>®</sup> Sheathing)
W.R. Meadows	Air-Shield <sup>™</sup> LMP (Gray)
W.R. Meadows	Air-Shield <sup>™</sup> LMP (Black)
W.R. Meadows	Air-Shield <sup>™</sup> TMP
Mechanically Attached Sheet Membranes	
Cosella-Dörken	Delta <sup>®</sup> -Fassade S
Cosella-Dörken	Delta <sup>®</sup> -Foxy
Cosella-Dörken	Delta <sup>®</sup> -Foxy Plus
Cosella-Dörken	Delta <sup>®</sup> -Maxx Plus
Cosella-Dörken	Delta <sup>®</sup> -Vent S/Plus
Dow Chemical	WeatherMate <sup>™</sup>
Dow Chemical	WeatherMate <sup>™</sup> Plus
Dupont <sup>™</sup>	DuPont <sup>™</sup> Tyvek <sup>®</sup> CommercialWrap <sup>®</sup>
Dupont <sup>™</sup>	DuPont <sup>™</sup> Tyvek <sup>®</sup> CommercialWrap <sup>®</sup> D
Dupont <sup>™</sup>	DuPont <sup>™</sup> Tyvek <sup>®</sup> ThermaWrap <sup>™</sup>
Kingspan Pactiv	C500
Kingspan Pactiv	C2000
Kingspan Pactiv	Raindrop <sup>®</sup> 3D
Kingspan Pactiv	GreenGuard Max <sup>™</sup>
Kingspan Pactiv	GreenGuard VW
VaproShield	RevealShield <sup>™</sup>
VaproShield	WallShield <sup>®</sup>
VaproShield	WrapShield <sup>®</sup>
Self-Adhered Sheet Membranes	
Grace Construction Products	Perm-A-Barrier <sup>®</sup> VPS
Henry	BlueskinVP <sup>™</sup> 160
VaproShield	RevealShield SA <sup>™</sup>
VaproShield	WrapShield <sup>®</sup> SA RS Rain Screen
VaproShield	WrapShield <sup>®</sup> SA



## Owens Corning® Enclosure Solutions Steel Stud, Wall Section with FOAMULAR XPS Insulation



## Owens Corning® Enclosure Solutions Steel Stud, Wall Section with Thermafiber Rainbarrier Mineral Wool Insulation



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 TOLEDO, OHIO, USA 43659  
 1-800-438-7465 | 1-800-GET-PINK®  
[owenscorning.com/enclosure](http://owenscorning.com/enclosure)