Structural Fire Resistance
ASTM E119

Types of Construction and Fire Resistance Ratings

The International Building Code[2] (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[1], evaluates the duration for which building elements such as the Owens Corning® Enclosure Solutions Concrete Masonry Unit (CMU) with Masonry Veneer 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 Wall System Fire Resistance Rating

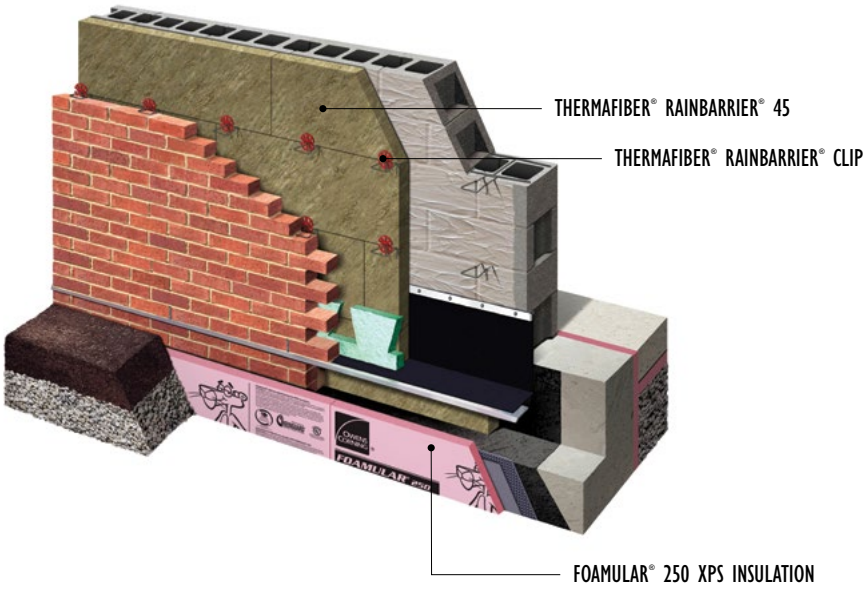
The Owens Corning® Enclosure Solutions CMU Wall System is fire resistance rated for 2, 3 or 4 hours depending on the type of concrete masonry unit. See Table 1 for additional details. Some assemblies and system descriptions are are available in the Underwriters Laboratories OnLine Certifications Directory, Fire Resistance Rated Design No. U938 for complete UL specifications.

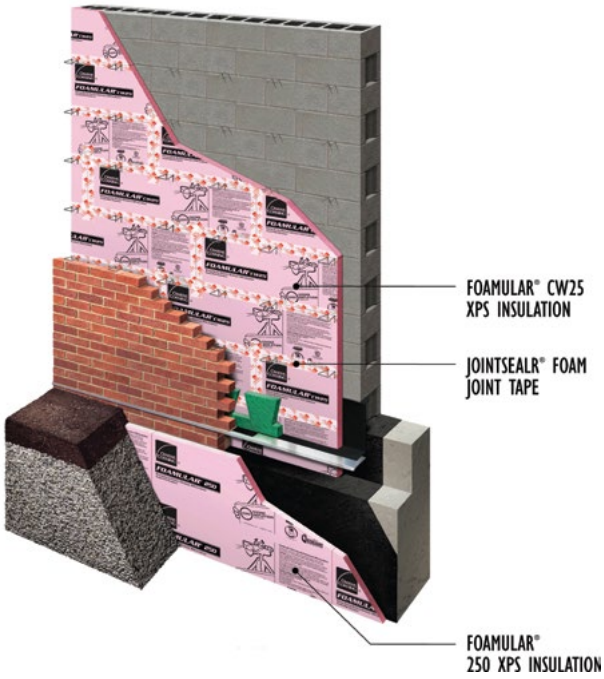
Table 1:

CMU (Multi-Wythe Masonry Cavity Wall, and Single Wythe CMU) Fire Resistance Rated Wall System Summary					
Component	**Design Options via Third Party Engineering Analysis***	**UL Assembly U902**	**UL Assembly U912**	**UL Assembly U938**	**UL Assembly U939**
Interior fire Rating	2, 3 or 4 hour	4 hour	3 hour	2, 3 or 4 hour	2, 3 or 4 hour
Structural	Bearing or Non-Bearing	Bearing	Bearing or Non-Bearing	Bearing	Bearing
Concrete Block (CMU)	Various designs. Classification 2-4 Hr. See UL Concrete Blocks category for list of eligible manufacturers.	Various designs, Classification D-2 (2 h). See Concrete Blocks category for list of eligible manufacturers	Various designs, Classification D-2 (2 h). See Concrete Blocks category for list of eligible manufacturers	Various designs. Classification 2-4 Hr. See UL Concrete Blocks category for list of eligible manufacturers.	Various designs. Classification 2-4 Hr. See UL Concrete Blocks category for list of eligible manufacturers.
Mortar	Blocks laid in full bed of mortar, nom. 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.	Bricks and blocks laid in full bed of mortar nom. 3/8 in. thick of not less than 2-1/4 and not more than 3-1/2 parts clean sharp sand to 1 part Portland cement (proportioned by vol) and not more than 50 percent hydrated lime (by cement vol). Vertical joints staggered.	Bricks and blocks laid in full bed of mortar nom. 3/8 in. thick of not less than 2-1/4 and not more than 3-1/2 parts clean sharp sand to 1 part Portland cement (proportioned by vol) and not more than 50 percent hydrated lime (by cement vol). Vertical joints staggered.	Blocks laid in full bed of mortar, nom. 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.	Blocks laid in full bed of mortar, nom. 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.
Air & Water Resistive Barrier	Any WRB listed in Tables 2a or 2b	N/A	N/A	Tremco ExoAir 230, applied to completely cover the concrete blocks at a min thickness of 35 mil (0.9 mm) dry, 70 mil (1.8 mm) wet thickness.	N/A (See Foamular XPS CI with FoamSealR taped joints)

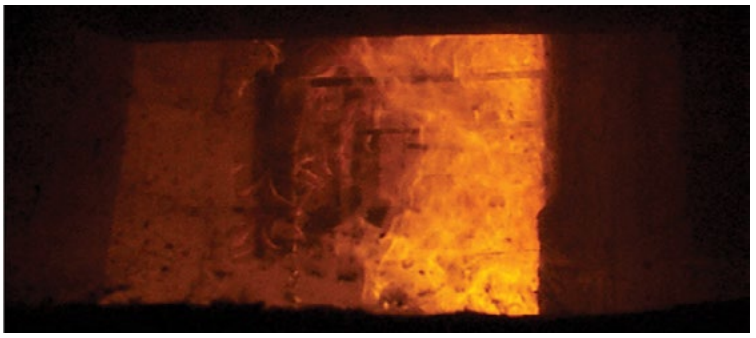
CMU (Multi-Wythe Masonry Cavity Wall, and Single Wythe CMU) Fire Resistance Rated Wall System Summary (continued)					
Component	**Design Options via Third Party Engineering Analysis***	**UL Assembly U902**	**UL Assembly U912**	**UL Assembly U938**	**UL Assembly U939**
Horizontal Joint Reinforcement	Any truss style adjustable joint reinforcement with eyes to receive wire ties for insulated cavity walls.	Prefabricated steel reinforcement, truss or ladder type, used for embedment in every second horizontal mortar joint. Placed the full width of wall assembly. Side and cross rods No. 9 (0.150 in.) min diam with welded joints a max 16 in. OC.	Not Specified	Any truss style adjustable joint reinforcement with eyes to receive wire ties for insulated cavity walls.	Any truss style joint reinforcement
Masonry Ties	Pintle wire ties used to fasten brick veneer through foamed plastic or mineral wool into concrete block horizontal joint reinforcement. Wire ties spaced 16 in. O.C. vertically and horizontally. Use Thermafiber RainBarrier Clip optional to secure mineral wool insulation.	3/4 in. wide, 7 in. long corrugated 26 MSG galv steel. Spaced one to each brick in every second course of blocks.	None/Not Specified	Pintle wire ties used to fasten brick veneer through foamed plastic into concrete block horizontal joint reinforcement (Item 6). Wire ties spaced 16 in. O.C. vertically and horizontally.	Zinc barrel masonry veneer anchor with 1-3/4 in. long concrete block screw attached into concrete block (Item 1). Includes flanged head/ integral zinc/EPDM washer, and thermal break clip to receive pintle wire tie. Barrel length to be determined by the thickness of XPS CI. Install with 2 in. diameter plastic brick tie washer, minimum one anchor per 2.67 square feet, or spaced closer if required by building code.
Continuous Insulation (CI) (Alternate 1)	Foamular CW25 (XPS), 16 in. wide, unfaced, max 4 in. thick, single or multiple layer, installed over WRB and concrete block wall between eye wires and secured with wire tie pintle legs	Foamular 150, 250, CW15, CW25	Foamular 150 or 250, installed on the interior face of the CMU using flat steel furring, min 0.020 in. thick (26 gauge) galv steel, 1-5/8 in. wide, 0.1 in. deep spaced 24 in. OC. Fastened to CMU through XPS CI.	Foamular CW25, 16 in. wide. Unfaced, max 4 in. thick, single or multiple layer, applied to concrete block wall with wire ties.	Foamular 250
Continuous Insulation (CI) (Alternate 2)	Thermafiber RainBarrier or HD (mineral wool), 16 in. wide, unfaced, max 4" thick, single or multiple layer, , installed over WRB and concrete block wall between eye wires and secured with RainBarrier Clips	N/A	N/A	N/A	N/A
CI Joint Treatment for use with XPS CI	JointSealR Foam Seam Tape (optional)	N/A	N/A	None	JointSealR or FlashSealR. On the surface of the XPS CI over joints. Polymer backing with acrylic adhesive. Joint tape 3-1/2" wide to seal joints between XPS boards, or, flashing tape 4", 6" or 9" wide to seal penetrations. Hand pressed in place and roller finished.
Air Space	Varies 1" to 2"	Varies 1" to 2"	N/A	Varies 1" to 2"	Varies 1" to 2"

CMU (Multi-Wythe Masonry Cavity Wall, and Single Wythe CMU) Fire Resistance Rated Wall System Summary (continued)					
Component	**Design Options via Third Party Engineering Analysis***	**UL Assembly U902**	**UL Assembly U912**	**UL Assembly U938**	**UL Assembly U939**
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.	Not specified	N/A	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.	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.





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, dessicant method, Procedure A. Vapor Retarding Membranes limit the amount of water vapor that passes through a material when tested in accordance with ASTM E96, dessicant method, Procedure A. Permeance Classifications are defined as follows:

Class I: ≤ 0.1 perm Class II: > 0.1 perm ≤ 1.0 perm Class III: > 1.0 perm ≤ 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*

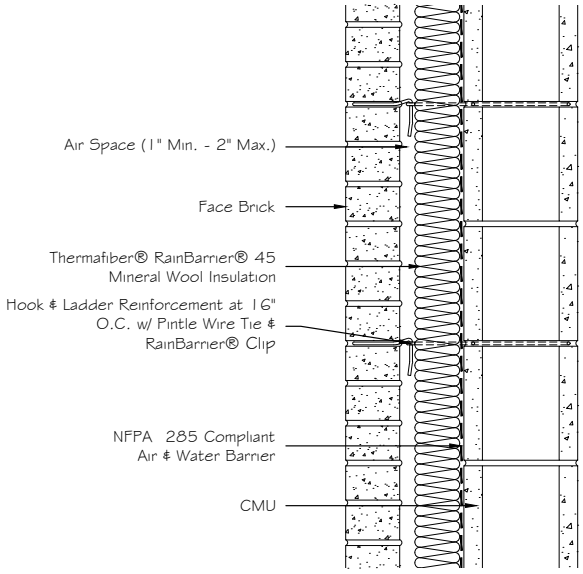
Fluid-Applied Membranes	
BASF	Enershield® I
Carlisle	Barritech™ NP
Grace Construction Products	Perm-A-Barrier® NPL
Henry	Air-Bloc® 32MR
Henry	Air-Bloc® 21FR (used as an adhesive for rigid insulation)
Henry	Air-Bloc® 33MR
Hohmann & Barnard	Enviro-Barrier™
Polyguard Products	Airlok Flex®
PROSOCO	R-Guard® VB
Tremco	ExoAir® 130
W.R. Meadows	Air-Shield™ 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® Aluminum Wall
Henry	Metal Clad™
Henry	Foilskin®

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

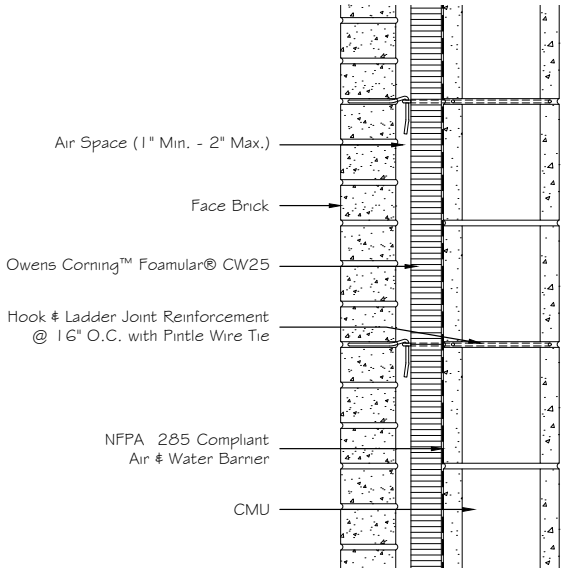
Fluid-Applied Membranes	
BASF	Enershield® HP
Carlisle	Barritech™ VP
Dryvit	Backstop® NT
Dupont™	DuPont™ Tyvek® Fluid Applied Weather Barrier
Grace Construction Products	Perm-A-Barrier® VPL
Grace Construction Products	Perm-A-Barrier® VPL LT
Henry	Air-Bloc® 17MR
Henry	Air-Bloc® 31MR
Henry	Air-Bloc® 33MR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

ENCLOSURE SOLUTIONS

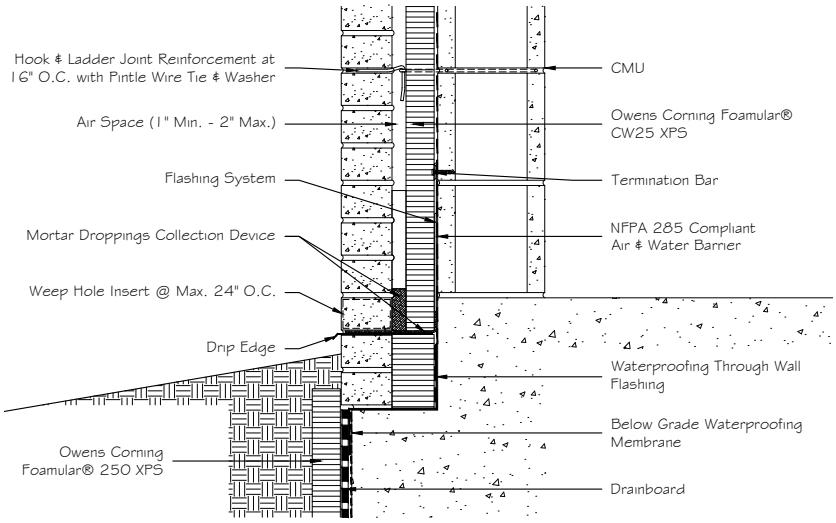
Technical Bulletin CMU-03



Owens Corning® Enclosure Solutions CMU, Wall Secion with Thermafiber RainBarrier 45 Mineral Wool Insulation



Owens Corning® Enclosure Solutions CMU, Wall Section with FOAMULAR XPS Insulation



Owens Corning® Enclosure Solutions CMU, Base of Wall Section

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