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# WALL INSULATION

## Wall Assembly Design Guide



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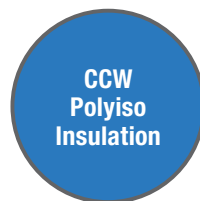
Carlisle Coatings & Waterproofing Incorporated (CCW) is publishing this guide to assist design professionals with selecting CCW membrane air barriers and R2+ insulation in exterior commercial wall construction. CCW products provide walls with energy efficiency and moisture management, while complying with fire safety requirements.

This guide also addresses the use of Carlisle membrane air barriers in combination with popular types of wall insulation by other manufacturers. Throughout this document, the

wall assembly energy efficiency requirements are based on International Energy Conservation Code (IECC) 2012, for opaque wall assemblies in Group R (unless otherwise indicated). The moisture management recommendations are based on common field practices and WUFI software analysis, version 5.3. Compliance with fire safety requirements is based on NFPA 285 testing, engineering judgments derived from NFPA 285 testing and other burn testing.

# R2+

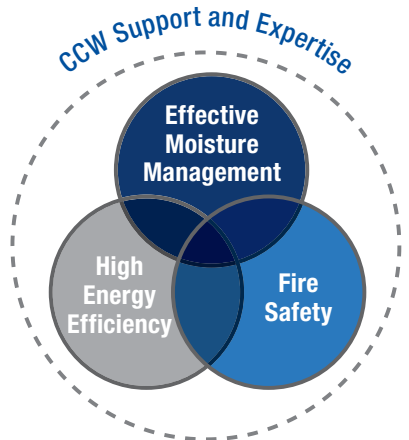
Insulation, Weatherization Plus More



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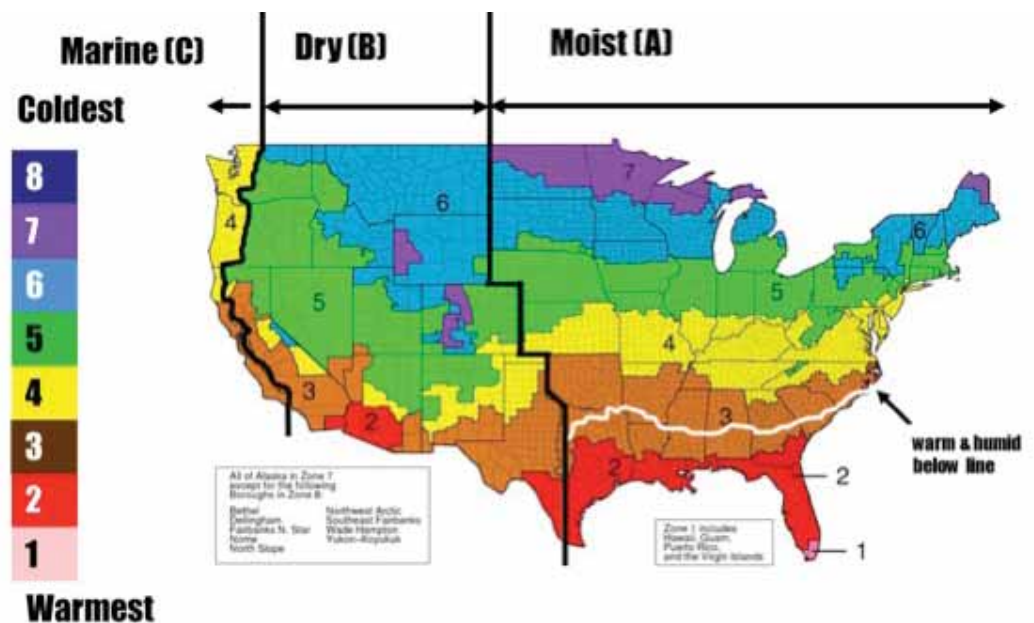


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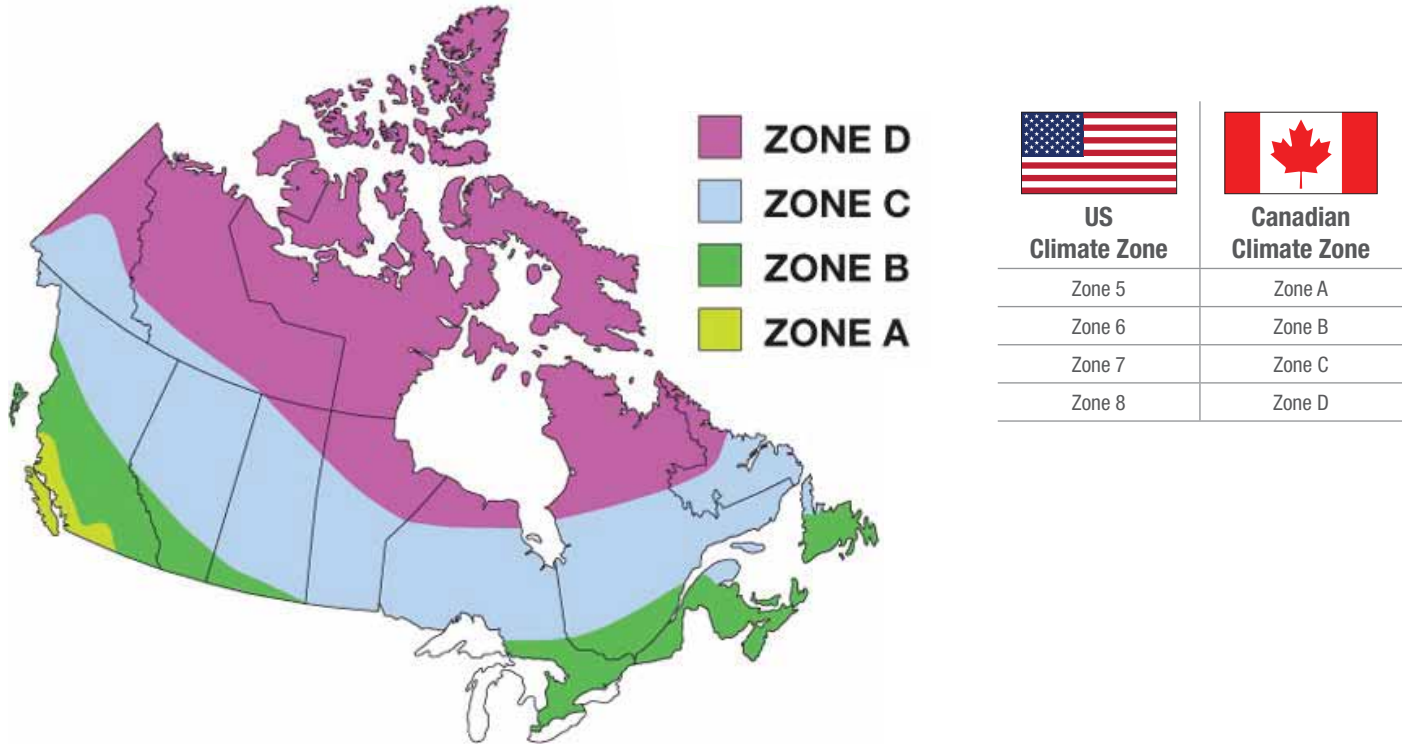


### Climate Zone Map

Wall energy efficiency and moisture management requirements are dependent upon many factors, especially the climate zone where they are constructed and building's use. The ASHRAE 90.1 climate zone map for the United States is shown below. Wall assemblies in this document will bear reference to these climate zones.



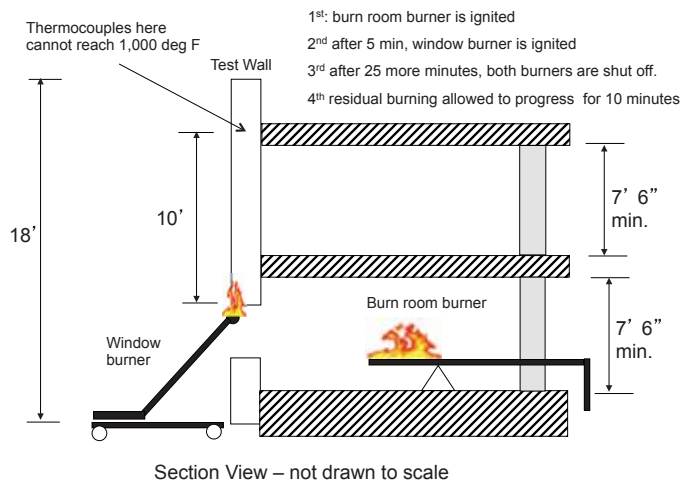
The ASHRAE 90.1 climate zone map for Canada is shown below.



Wall assemblies in this document reference U.S. climate zones. For reference to projects in Canada, U.S./Canadian equivalent Climate Zones are indicated in the table above, next to the Canadian Climate Zone Map.

### Code-Required Fire Safety - The NFPA 285 Test

Exterior wall construction must comply with energy efficiency, moisture management and fire safety requirements. An essential test for evaluating fire safety of exterior wall construction is NFPA 285. NFPA 285 is a 2-storey wall burn assembly test which evaluates vertical and lateral propagation of fire. Wall assemblies of non-combustible construction require this test when the assemblies have combustible insulation, cladding or air/water resistive barrier membranes. A photo of the NFPA 285 test in progress and a section drawing appear to the right and below.



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### CCW Wall Membrane and Insulation – A Versatile, NFPA 285-Tested Package

CCW FIRE-RESIST air barriers and CCW R2+ polyisocyanurate (polyiso) foam board insulation are combined to form complete wall weatherization systems which deliver high energy efficiency and effective moisture management. These high-performance products are also formulated for Fire-Resistance. Though these products are combustible, they burn slowly and stay in place. CCW FIRE-RESIST air barriers and CCW R2+ polyiso insulation pass the NFPA 285 test in many wall assemblies.



CCW Fire-Resist Barritech NP™



Competitor's Synthetic Polymer Membrane



Fire-Resist Barritech VP over R2+ SHEATHE Insulation  
Window head condition over NFPA 285 Test

### CCW Membrane Air Barrier Products – General Characteristics

Product	Type	Description	Wet Thickness	Dry Thickness	Minimum Install Temp	Maximum Service Temp
CCW-705	Self-Adhered Sheet	HDPE film coated with SBS rubber modified asphalt.	N/A	40 mils	40°F	149°F
CCW-705 LT		HDPE film coated with low-temp formula SBS rubber modified asphalt adhesive	N/A	40 mils	25°F	149°F
705FR-A		Foil/HDPE composite coated with SBS rubber modified asphalt	N/A	40 mils	40°F	149°F
705FR-A LT		HDPE composite coated with low-temp formula SBS rubber modified asphalt adhesive	N/A	40 mils	25°F	149°F
Barriseal®-S	Fluid-Applied	Spray-applied rubberized asphalt. Solvent-free, low VOC.	60 mils	40 mils*	20°F	149°F
Barriseal-R		Roller-applied rubberized asphalt. Solvent-free, low VOC.	60 mils	40 mils*	50°F	149°F
Barritech VP		Spray or roller-applied latex polymer. Vapor-permeable membrane.	60 mils	40 mils*	40°F	180°F
Barritech NP		Spray or roller-applied synthetic polymer. Vapor-barrier membrane.	75 mils	40 mils*	40°F	180°F

\*Theoretical dry thickness based on % solids multiplied by wet thickness.

CCW membrane air barriers have been tested for air leakage, water resistance and numerous other physical properties. All products offered are fully-adhered membranes, installed in either sheet or liquid form. Please consult Product Technical Data Sheets, CCW Standard Details and MSDSs for complete information about physical properties and installation. When installed per CCW instructions, these products meet the IBC 2012 requirement for “continuous air barrier.”

## CCW Membrane Air Barrier Products – Vapor Permeability Properties

Product	Water Vapor Permeance [U.S. Perm]		Water Vapor Transmission [g/m <sup>2</sup> *24h]		IBC 2009 & 2012 Vapor Retarder Classification	ICC-ES AC 212 Grade	ICC-ES AC 38 Grade
	ASTM E96 A	ASTM E96 B	ASTM E96 A	ASTM E96 B			
CCW-705	0.083	0.095	0.37	0.53	I	N/A	A
705FR-A	<0.01	<0.01	<0.02	<0.02	I	N/A	A
Barriseal-S/R	0.165	0.85	0.82	4.3	II	B	N/A
Barritech VP	0.719	14.3	4.3	87	II	D	N/A
Barritech NP	0.05	0.76	0.33	5.2	I	B	N/A

These vapor permeability properties are shown to aid design professionals. Product vapor permeability classifications are indicated according to International Building Code (IBC) 2009 & 2012, ICC-ES AC-212 and ICC-ES AC-38. The vapor permeability of the membrane can affect the wetting/drying behavior of the wall assembly. This is accounted for in the wall system recommendations in this document.

## CCW Membrane Air Barrier Products – Air and Water Resistive Barrier Properties

Product	Air Barrier Material ASTM E 2178	Air Barrier Assembly ASTM E 2357	Water Tightness of Material	Water Tightness of Assembly ASTM E 331
CCW-705	Meet IECC and ABAA requirement of <0.004 CFM/ft <sup>2</sup> @ 1.57 PSF [<0.02 L/s*m <sup>2</sup> @ 75 Pa]	Meet IECC and ABAA requirement of <0.04 CFM/ft <sup>2</sup> @ 1.57 PSF [<0.2 L/s*m <sup>2</sup> @ 75 Pa]	Meet requirements of ICCES AC-38 (22" water column for 5 h)	No leaking @ -6,24 PSF for 15 min
705FR-A				
Barriseal-S/R			Meet requirements of ICC-ES AC- 212 (22" water column for 5 h)	
Barritech VP				
Barritech NP				

CCW membrane air barrier products have been tested and verified to provide air and water tightness. As they are 40 mil thickness, fully-adhered systems, they provide a thorough shield to air and water. These products must be installed and detailed properly to perform. Please consult individual CCW product literature and details for complete information.

## CCW Membrane Air Barrier Products – Material Burn Properties

Test Method	Property	Results		
		CCW-705FR-A	Barritech NP	Barritech VP
ASTM E84	Flame Spread Index	15	25	15
	Smoke Generation Index	200	200	80
ASTM E1354	Heat Flux	50 kW/m <sup>2</sup>	50 kW/m <sup>2</sup>	50 kW/m <sup>2</sup>
	Effective Heat of Combustion (EHC)	0.57 MJ/kg	8.2 MJ/kg	12.3 MJ/kg
	Peak Heat Release Rate (HRR Peak)	6.67 kW/m <sup>2</sup>	195 kW/m <sup>2</sup>	167 kW/m <sup>2</sup>
	Total Heat Release (THR)	1.1 MJ/m <sup>2</sup>	12.9 MJ/m <sup>2</sup>	14.7 MJ/m <sup>2</sup>

CCW Fire-Resist membranes are formulated to resist ignition and to burn slowly. Burn test results are shown in the table above. ASTM E 84 evaluates the surface burning characteristics and smoke generation. Larger number for flame spread indicates faster burn while larger number for smoke generation indicates more smoke. Fire-Resist 705 FR-A, Barritech VP and Barritech NP have flame spread 25 or less and smoke generation below 450. This corresponds to the IBC "Class A" rating for combustible materials. ASTM E 84 is a common standard used to assess flammability of coatings, finishes and insulation. However, ASTM E 84 is a horizontal test, which has limited applicability to a vertical wall burn test, such as NFPA 285. ASTM E 1354 is a small-scale test used to predict behavior of products in the NFPA 285 test. ASTM E 1354 quantifies the amount and rate of heat liberated by a material during burn. In this test, larger numbers indicate a product that burns hotter. ASTM E 1354 is an important test because results are used to justify material substitutions in NFPA 285 engineering judgments. For example, if a wall assembly has passed NFPA 285 with Fire-Resist Barritech VP, then Fire-Resist Barritech NP and 705 FR-A are acceptable for substitution into that exact same wall assembly.

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### CCW Membrane Air Barrier Products – Photos



Barriseal-S on Concrete Block Wall with Embedded Ties



Barritech VP on Exterior Gypsum Sheathing



Barritech NP on Exterior Gypsum Sheathing



Barritech VP Roller Application



Barritech VP Spray Application



CCW-705 installation over Exterior Gypsum Sheathing



705FR-A



Barriseal-S with CCW-705 Flashing & Polyurethane Caulk Details



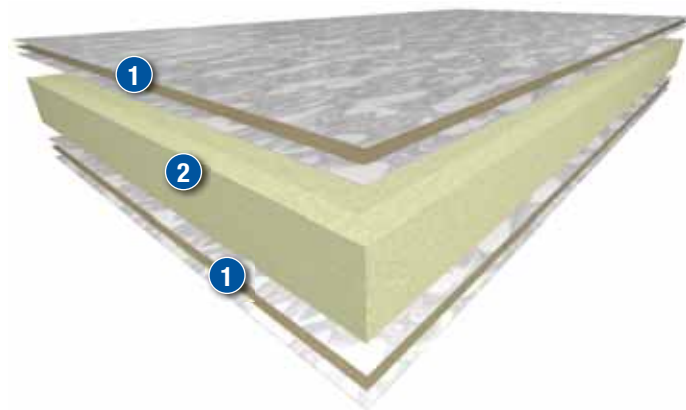
CCW-705

CCW membrane air barrier products have been used on many commercial projects. The photos above show examples of sheet and fluid membrane installation.

## R2+ Polyisocyanurate Insulation

CCW R2+ polyiso insulation board products are specially-made for commercial wall applications. These products are made in seven different Carlisle manufacturing plants, strategically located throughout the United States. CCW offers four insulation products to suit a wide variety of needs in commercial wall assemblies.

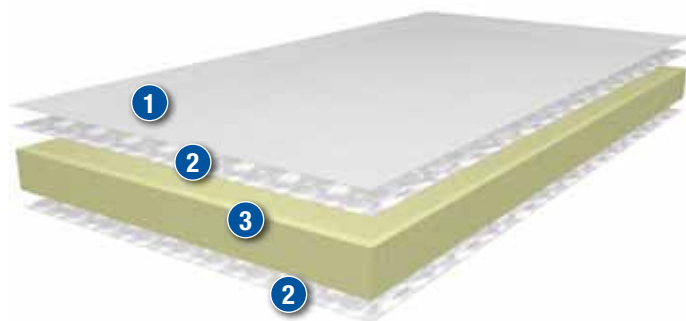
### R2+ Silver



- 1 "Tri-Laminate" Facer – Aluminum Foil/Kraft Paper/Aluminum Foil
- 2 Closed-cell Polyisocyanurate (Polyiso) Foam Core

- Highest R per inch
- Suitable for use behind brick, stone or stucco claddings

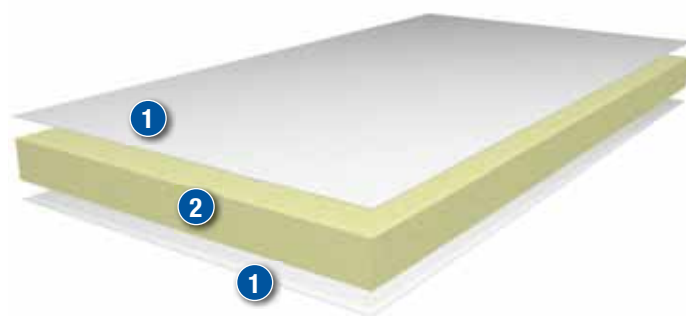
### R2+ Sheathe



- 1 Non-Reflective White Coating
- 2 Embossed Aluminum Foil Facer
- 3 Closed-cell Polyisocyanurate Foam Core

- Class A foam core
- Suitable for use behind many cladding systems
- Can be installed over open steel studs without exterior gypsum sheathing

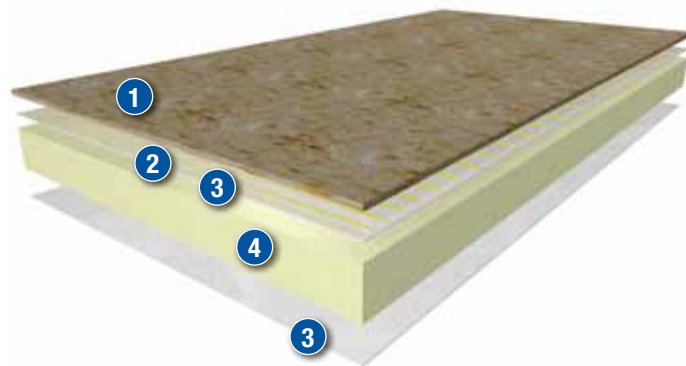
### R2+ Matte



- 1 Coated Glass Facer
- 2 Closed-cell Polyisocyanurate Foam Core

- Tough, Fire-Resistant coated glass facer
- Suitable for use behind many cladding systems, including sheet metal and aluminum composite rain screen systems.

### R2+ Base



- 1 Fire-Treated Plywood
- 2 Laminating Adhesive
- 3 Coated Glass Facer
- 4 Closed-cell Polyisocyanurate Foam Core

- Insulated nail base, allows easy attachment of lightweight cladding systems such as stucco, cultured stone and siding
- Can be installed over open steel studs without exterior gypsum sheathing

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### R2+ Polyisocyanurate Insulation – General Characteristics

	ASTM C1289 Classification	Facer	ASTM E84, Foam Core	
			Flame Spread Index	Smoke Generation Index
R2+ SILVER	Type I, Class 1, Grade 2 (20 psi) or Grade 3 (25 psi)	Tri-laminate foil composite, both sides	<75	<450
R2+ MATTE	Type II, Class 2, Grade 2 (20 psi) or Grade 3 (25 psi)	Coated glass, both sides	<75	<450
R2+ SHEATHE	Type I, Class 1, Grade 3 (25 psi)	Embossed foil w/ white coating one side, silver embossed foil other side	<25	<450
R2+ BASE*	Type V. 20 psi or 25 psi foam core available	Coated-glass-faced foam board laminated to 5/8" or 3/4" fire-treated plywood	<75	<450

\*Fire-treated plywood on R2+ BASE has ASTM E84 flame spread index of 25 or less and smoke generation index of 450 or less

All four of the R2+ brand polyiso insulations are suitable for use in wall assemblies of Type I, II, III, IV and V construction. Justification and conditions are contained in Technical Evaluation Reports (TER 1407-1 and TER 1407-2) by DRJ Engineering <http://www.drjengineering.org/>.

For many years ASTM C1289 has served as a benchmark for specification of polyiso insulation. CCW's R2+ products have been tested to this specification, and their ASTM C1289 classifications are indicated in the table above. ASTM E84 flame spread properties are also shown. As mentioned previously, ASTM E84 is a horizontal burn test, so the results do not adequately characterize burn performance in a vertical wall assembly. NFPA 285 addresses burn performance of vertical walls. All CCW R2+ products have been tested to NFPA 285 and pass this test in many wall assemblies. The passing NFPA 285 wall assemblies are listed in detail later in this document.

Polyiso has been used in construction applications in North America for nearly 40 years. Polyiso has long dominated the roofing insulation market. The same qualities that make this material a great choice for roofing also make it a great choice for walls. These are properties are high R value per inch, excellent burn resistance, easy installation, high service temperature, competitive pricing and regional availability. Some installation photos of Carlisle polyiso roof insulation are shown below.



Polyiso Insulation being Installed on a Roof Deck



Polyiso Insulation Accepting Bonding Adhesive and a Roof Membrane



Polyiso Insulation can handle high temp and humidity, directly beneath a black membrane

CCW R2+ polyiso for walls is not the same as Carlisle's roofing polyiso. R2+ wall polyiso is made with special facers to provide added durability, weatherability, dimensional stability and Fire-Resistance. Additionally, CCW R2+ SHEATHE is made with a special ASTM E84 Class A rated foam core. When installed per CCW instructions, the R2+ products meet the IBC 2012 requirement for "continuous insulation." R2+ SHEATHE and R2+ SILVER can also meet the IBC 2012 requirement for "continuous air barrier" when joints, openings and terminations are detailed, according to CCW instructions. Please consult CCW's R2+ Product Technical Data Sheets and Standard Details for complete information about physical properties and installation.



## R2+ Polyisocyanurate Insulation – Thermal Resistance (R-value) of Standard Thickness Products

Foam Core Thickness	R-Value				
	R2+ SILVER	R2+ MATTE	R2+ SHEATHE	R2+ BASE with 5/8" FT PLY	R2+ BASE with 3/4" FT PLY
1.0	6.7	6.0	6.3	6.6	6.6
1.2	—	—	7.6	—	—
1.5	10.5	9.0	9.5	9.6	9.6
1.6	—	—	10.1	—	—
1.8	—	—	11.4	—	—
2.0	14.4	12.1	12.6	12.7	12.7
2.1	—	—	13.3	—	—
2.5	17.8	15.3	15.8	15.9	15.9
3.0	21.2	18.5	18.9	19.1	19.1
3.1	—	—	19.5	—	—
3.3	—	20.4	—	—	—
3.5	24.6	21.7	—	—	—

Thermal resistance in STD units [ $^{\circ}\text{F}\cdot\text{ft}^2\cdot\text{h} / \text{Btu}$ ]. Initial R-value at 75°F mean temp, ASTM C518.

A key advantage of polyisocyanurate insulation is its high R-value per inch. The CCW R2+ product R-values are shown at all standard product thicknesses. The test method used to measure R-Value is ASTM C518.

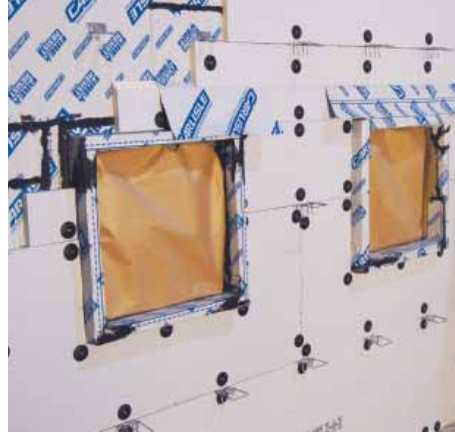
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### R2+ Polyisocyanurate Foam Board Insulation – Photos



R2+ SILVER, 16" X 8' boards installed between rows of embedded brick ties



R2+ MATTE 24" X 8' boards installed between rows of L profile ties



R2+ BASE 4' x 8' boards, installed directly over steel studs



R2+ SHEATHE 4' x 8' boards fastened directly over studs, joints taped with CCW Foil-Grip 1402



R2+ MATTE 4' x 8' boards installed over exterior gypsum sheathing and WRB



R2+ SILVER installation over Barritech VP



R2+ SHEATHE Taped Boards & Brick Veneer



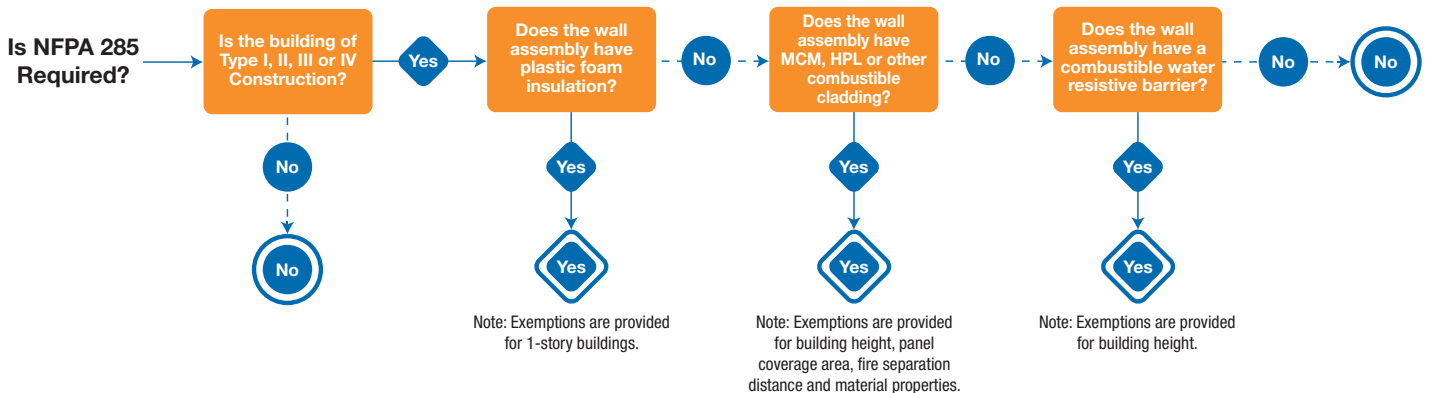
Thin Brick over R2+ BASE

CCW R2+ insulation has been used on many commercial projects. The photos above show examples of product installation. Ideally, CCW R2+ is used with CCW membrane and accessory product to form a complete, warranted package.

## Where is NFPA 285 Required?

Overall, IBC 2012 requires NFPA 285 in walls of non-combustible multi-story construction if the wall assembly has foam plastic insulation, a combustible membrane or combustible cladding. Follow the decision tree below to see if your wall requires NFPA 285.

### IBC 2012 NFPA 285 Requirements



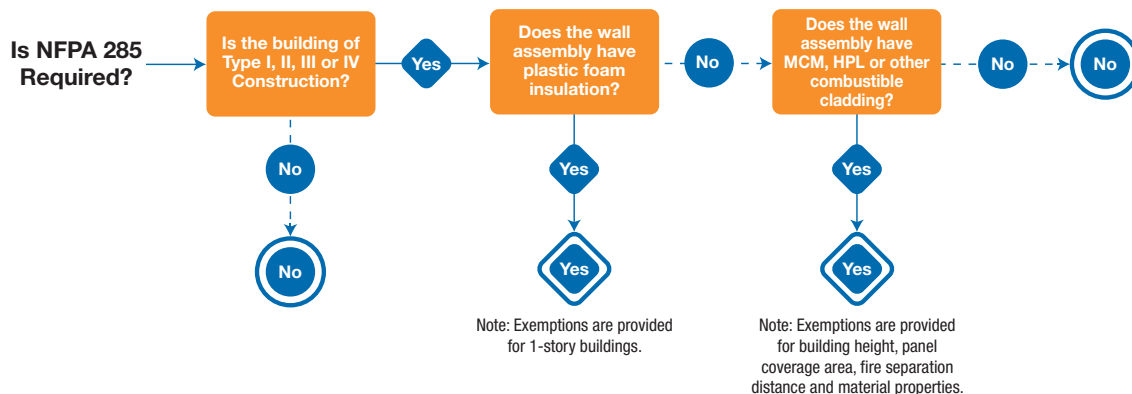
IBC 2015 has similar requirements for NFPA 285 as IBC 2012, except more exemptions from the NFPA 285 test have been added to IBC 2015. A summary of these IBC 2015 NFPA 285 exemptions appears below:

### IBC 2015 NFPA 285 Exemptions

Wall containing combustible water resistive barrier (WRB) is exempt from NFPA 285 if...	Wall containing foam plastic insulation is exempt from NFPA 285 if...
<p>WRB is the only combustible material in the wall assembly and cladding is brick, concrete, stone, stucco, terra cotta or steel with minimum thickness prescribed in IBC Table 1405.2</p> <p>OR</p> <p>WRB is the only combustible material in the wall assembly, and it meets the following properties:</p> <ul style="list-style-type: none"> <li>• FS ≤ 25, SM ≤ 450, ASTM E 84</li> <li>• ASTM E 1354, 50 kW/m<sup>2</sup> heat flux                             <ul style="list-style-type: none"> <li>– HRR &lt; 150 kW/m<sup>2</sup></li> <li>– THR &lt; 20 MJ/ m<sup>2</sup></li> </ul> </li> </ul>	<p>Foam insulation is covered on each face with 1" minimum thickness concrete or masonry</p> <p>AND One of these two...</p> <p>There is no air space between the concrete or masonry and the insulation.</p> <p>OR</p> <p>The insulation has a flame spread index of 25 or less per ASTM E 84 and the air space between the concrete or masonry and the insulation is 1" or less.</p>

Overall, IBC 2009 and earlier versions require NFPA 285 in walls of non-combustible construction if the wall assembly has foam plastic insulation or combustible cladding. Follow the decision tree below to see if your wall requires NFPA 285.

### IBC 2009, 2006 NFPA 285 Requirements

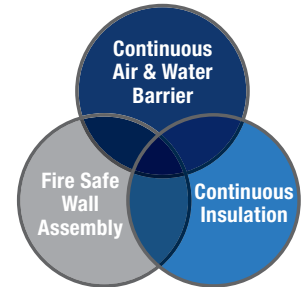


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### Index of Wall Assemblies

Using NFPA 285 testing and engineering judgments, CCW has compiled a comprehensive list of wall assemblies that pass this test. In addition, CCW has used WUFI software and field experience to recommend wall weatherization packages that provide effective wetting/drying behavior. These wall assemblies incorporate a continuous air barrier and continuous insulation.



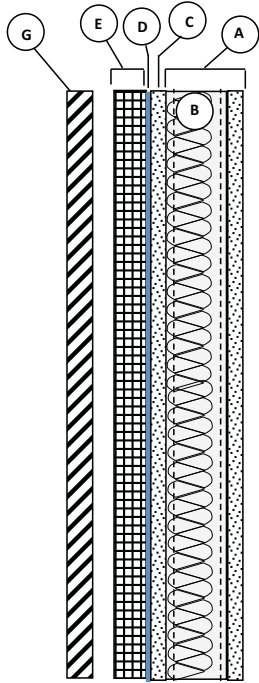
No.	Pages	Description
I.	13-15, 18-20	Steel Stud Wall with Exterior Gypsum Sheathing and Exterior Insulation
II.	16-20	Mass Wall with Exterior Insulation
III.	21, 23	Steel Stud Wall no Exterior Insulation
IV.	22-23	Mass Wall no Insulation
V.	24, 26	R2+ SHEATHE over Open Steel Studs
VI.	25-26	R2+ BASE over Open Steel Studs
VII.	27, 29	R2+ BASE with Gypsum Sheathing & Steel Studs – CCW Membrane on Gypsum Sheathing
VIII.	28-29	R2+ BASE with Mass Wall – CCW Membrane on CMU or Concrete
IX.	30, 32	Gypsum Sheathing & Steel Studs – CCW Membrane over R2+ BASE
X.	31-32	Mass Wall – CCW Membrane over R2+ BASE
XI.	33-34, 37	Mass Wall with Interior Insulation, CCW Membrane on Insulation
XII.	35-37	Mass Wall with Interior Insulation, CCW Membrane on Wall

### Wall Assembly Abbreviations:

FG	Un-faced fiber glass batt insulation.
KP	Kraft paper facer on fiber glass batt insulation (paper facing the interior)
SPF	Spray polyurethane foam
3A WH	Within Climate Zone 3A, south of “Warm and Humid” line

NOTE: The wall weatherization package recommendations from CCW are based on WUFI simulations and field “best practices”. These recommendations represent a good starting point for design professionals in consideration of their Project’s wall assemblies. These recommendations do not replace Project-specific design, which is the responsibility of the design professional. Nor do these recommendations offer any additional warranty beyond the standard warranties offered by CCW.

## Wall Assembly I



### Steel Stud Wall with Exterior Gypsum Sheathing and Exterior Insulation

- A. STEEL STUDS WITH AND INTERIOR GYPSUM SHEATHING
- B. STUD CAVITY INSULATION
- C. EXTERIOR GYPSUM SHEATHING
- D. CCW MEMBRANE AIR BARRIER
- E. EXTERIOR INSULATION
- F. WRB OVER INSULATION (NOT USED)
- G. EXTERIOR CLADDING

Wall assembly I is a versatile system that can be used in every North American Climate. The recommended R2+ insulation thickness and accompanying CCW membrane choices are shown in the table below. This wall assembly can be used in jurisdictions whose energy code is based on IECC 2012 and earlier versions. CCW Fire-Resist Barritech NP, Barritech VP and 705 FR-A pass NFPA 285 in this wall assembly with many cladding and insulation options as indicated on pages 18-20. CCW-705 passes NFPA 285 in this wall assembly with heavy, non-combustible claddings and R2+ SHEATHE insulation. Please consult NFPA 285 wall component choices indicated on pages 18-20.

### Wall Assembly I Insulation and WRB Options - IECC 2012 Compliance And Hygro-Thermal Performance

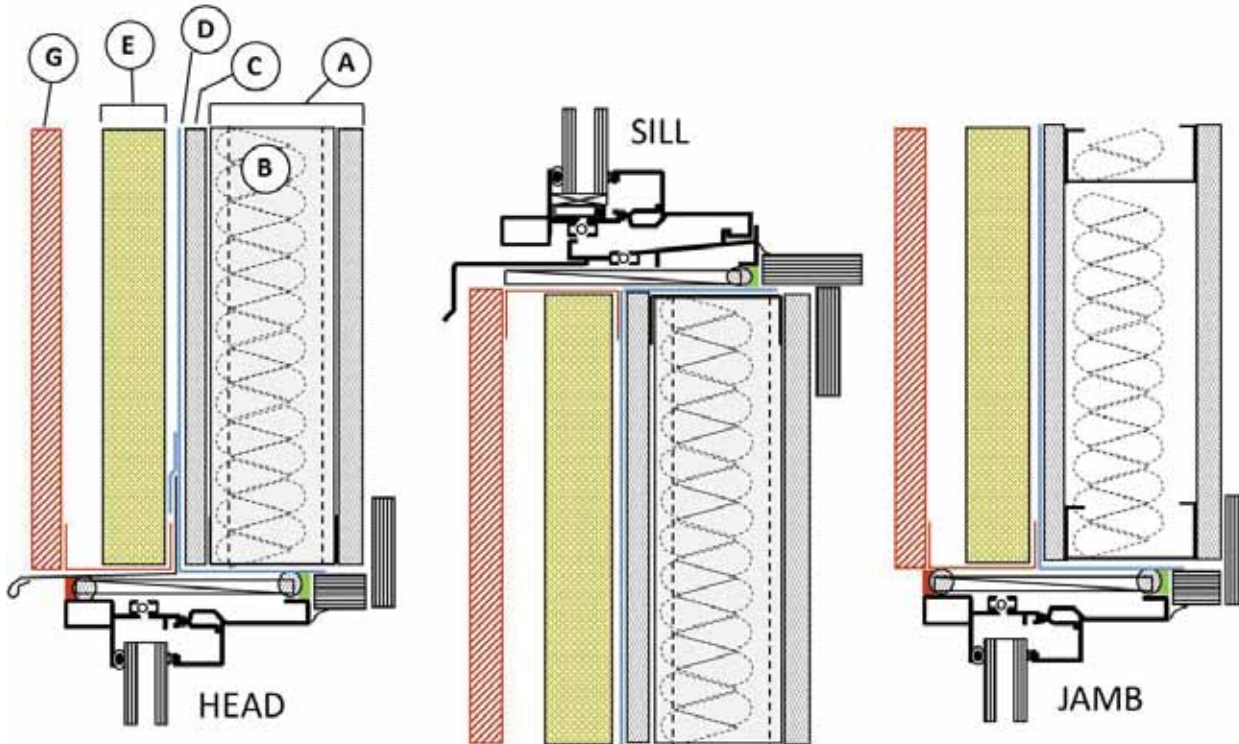
Layer	Zone 1	Zones 2, 3 & 4	Zone 5	Zone 6	Zone 7	Zone 8
B	MAX R-13 FG MIN 1-½" SPF	MAX R-13 FG MIN 1-½" SPF	MAX R-13 FG W/ KP MIN 1-½" SPF	MAX R-13 FG W/ KP MIN 1-½" SPF	MAX R-13 FG W/ KP MIN 1-½" SPF	MAX R-13 FG W/ KP MIN 1-½" SPF
D	Fire-Resist 705FR-A Fire-Resist Barritech VP Fire-Resist Barritech NP CCW-705*					
E	MINIMUM 1" R2+ SILVER R2+ MATTE R2+ SHEATHE	MINIMUM 1-½" R2+ SILVER R2+ MATTE R2+ SHEATHE	MINIMUM 2" R2+ SILVER R2+ MATTE R2+ SHEATHE	MINIMUM 2-½" R2+ SILVER R2+ MATTE R2+ SHEATHE	3-½" R2+ SILVER or R2+ MATTE 3.1" R2+ SHEATHE	

\*CCW-705 Passes NFPA 285 with R2+ SHEATHE and certain claddings. See pages 18-20.

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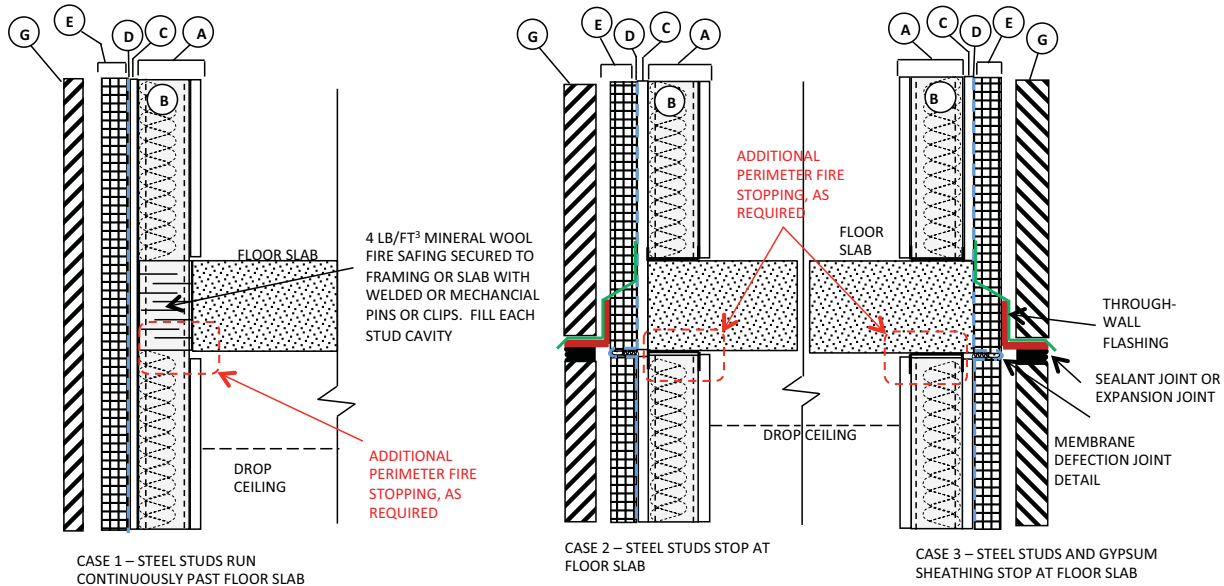
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### NFPA 285 Window Opening Details – Wall Assembly I with R2+ Polyiso Insulation



Wall Assembly I built with R2+ polyisocyanurate exterior insulation can use window details as shown above. Details will vary with cladding and window type, but the same basic configuration shown can be used in virtually all conditions. This detail does not show a wood buck in the window opening, but this element can be included as it is often used to facilitate window installation. The wood buck is optional, however when used in an NFPA 285 wall assembly, the wood must be fire-treated. In this construction, the CCW membrane air barrier is installed over the exterior gypsum sheathing and wrapped into the window rough opening on all four sides. The R2+ insulation is placed over the CCW membrane, and secured in place with the cladding attachment hardware. The R2+ insulation runs all the way to the rough opening – no additional fire blocking materials are needed. The rough opening is closed with sheet metal trim or cladding closure hardware. For effective moisture management, a flashing should be installed at the window head, going from the CCW membrane to daylight. Air barrier continuity is maintained by sealing the window frame to the CCW membrane on all four sides with a compatible sealant (shown in green in the detail).

## NFPA 285 Floor Line Fire Stopping – Wall Assembly I

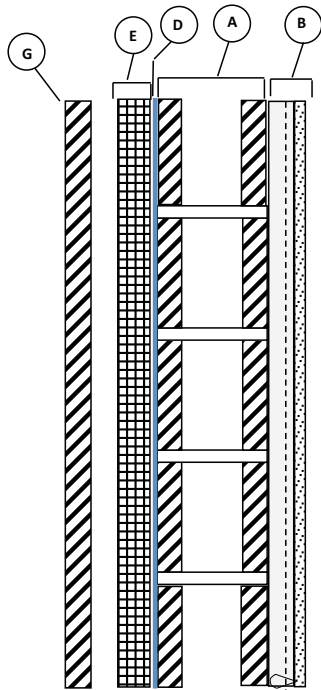


The NFPA 285 test requires floor line fire stopping where steel studs run continuously past floor line. This is shown in the section drawing for “Case 1”. Mineral wool fire stopping must fill each stud cavity and must be secure in place with welded pins or clips. This fire stopping acts to prevent the fire originating the 1st story from reaching the 2nd story. The thermal barrier on the interior side of the wall must be continuous. Where there is a drop ceiling, it is important to run the interior drywall above the drop ceiling all the way to the floor slab. Additional perimeter fire stopping may be required, above and beyond the requirements of the NFPA 285 test, depending on building type and usage and building code requirements.

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### Wall Assembly II



### Mass Wall with Exterior Insulation

- A. CMU OR CONCRETE
- B. OPTIONAL - INTERIOR GYPSUM SHEATHING OVER FURRING
- C. EXTERIOR GYPSUM SHEATHING (NOT USED)
- D. CCW MEMBRANE AIR BARRIER
- E. EXTERIOR INSULATION
- F. WRB OVER EXTERIOR INSULATION (NOT USED)
- G. EXTERIOR CLADDING

Wall assembly II is an excellent wall system which can be used in every North American climate. The heart of this wall assembly is a massive layer of concrete or concrete masonry unit (CMU). This wall system is durable and inherently moisture and Fire-Resistant but it is a more costly wall to build, so it is often used in institutional construction where it is expected to have a very long service life. This wall assembly can be used in jurisdictions whose energy code is based on IECC 2012 and earlier versions. CCW Fire-Resist Barritech NP, Barritech VP AND CCW-705 VP pass NFPA 285 in this wall assembly with many cladding and insulation options as indicated on pages 18-20. CCW-705 passes NFPA 285 in this wall assembly with certain claddings and R2+ SHEATHE or mineral wool insulation. Please consult wall component choices indicated in the NFPA 285 Table of Substitutions on pages 18-20. Barriseal-S/R can be used only if the wall assembly is exempt from NFPA 285.

### Wall Assembly II Insulation And WRB Options - IECC 2012 Compliance And Hygro-Thermal Performance

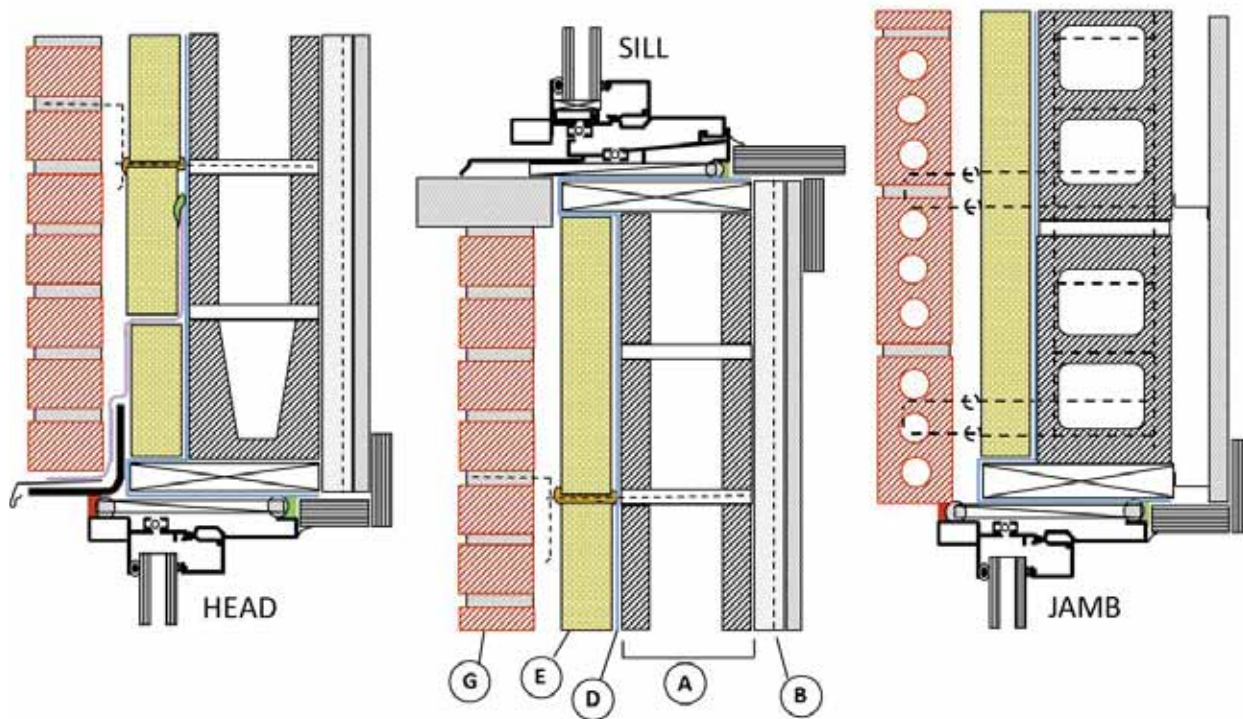
Layer	Zone 1	Zones 2	Zone 3 & 4	Zone 5, 6 & 7	Zone 8**
D			Fire-Resist 705FR-A Fire-Resist Barritech VP Fire-Resist Barritech NP CCW-705*		
E	MINIMUM 1" R2+ SILVER R2+ MATTE R2+ SHEATHE	MINIMUM 1-½" R2+ SILVER R2+ MATTE R2+ SHEATHE	MINIMUM 2" R2+ SILVER R2+ MATTE R2+ SHEATHE	MINIMUM 2-½" R2+ SILVER R2+ MATTE R2+ SHEATHE	MINIMUM 4" R2+ SILVER R2+ MATTE

\*CCW-705 Passes NFPA 285 with R2+ SHEATHE and certain claddings. See pages 18-20.

\*\*R2+ polyiso exceeding 3-1/2" thickness permitted in Wall Assembly II only where wall assembly is exempt from NFPA 285 requirements



## NFPA 285 Window Opening Details – Wall Assembly II with R2+ Polyiso Insulation



Wall Assembly II built with R2+ polyisocyanurate exterior insulation can use window details as shown above. Details will vary with cladding and window type, but the same basic configuration shown can be used in virtually all conditions. In this construction, the CCW membrane air barrier is installed over the CMU wall and wrapped into the window rough opening on all four sides. This detail shows a wood buck in the window opening, which is often used to facilitate window installation. The wood buck is optional, however when used in an NFPA 285 wall assembly, the wood must be fire-treated. This assembly shows brick cladding and imbedded ties in the CMU. 16" width R2+ insulation is placed over the CCW membrane, wedged between rows of brick ties. The R2+ insulation is secured in place with insulation adhesive such as LM 800 XL, and the brick ties. A low-rise foam sealant, as listed on pages 18-20 can also be applied between neighboring R2+ boards to enhance insulation continuity. The R2+ insulation runs all the way to the rough opening – no additional fire blocking materials are needed. At the window head, a floating steel lintel is shown. Also shown is 705 TWF self-adhered through-wall flashing with LM 800 XL mastic termination. Note that the through-wall flashing must be terminated on the backup wall, NOT on the face of the R2+ insulation. Finally, air barrier continuity is maintained by sealing the window frame to the CCW membrane on all four sides with a compatible sealant (shown in green in the detail).

# WALL INSULATION

## Wall Assembly Design Guide

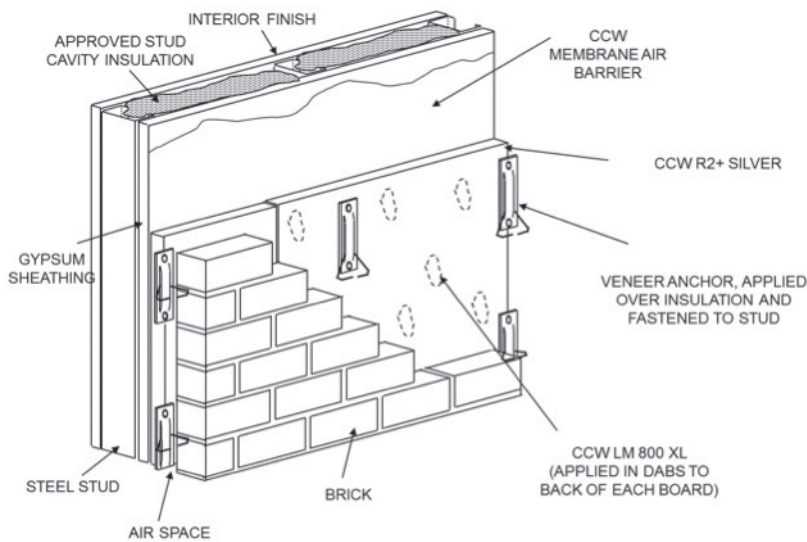
### NFPA 285 Table Of Substitutions: Wall Assemblies I and II with Closed-Joint Non-Combustible Cladding

Wall Component	Material Options
<b>A. Base Wall</b> – Use 1, 2 or 3	<ol style="list-style-type: none"> <li>Concrete – cast in place or tilt-up</li> <li>Concrete Masonry Unit (CMU)</li> <li>Steel Studs - 25 gauge or thicker, 3-5/8" depth minimum, 24" o.c maximum spacing. Lateral bracing required every 4' 5/8" type X gypsum wallboard, or equivalent thermal barrier, required on the interior side.</li> </ol>
<b>B. Stud Cavity Insulation</b> – Use 1, 2, 3, 4 or 5  Options 2 and 3 permitted only with these exterior insulations: CCW R2+, Hunter XCI or mineral wool insulation.	<ol style="list-style-type: none"> <li>None</li> <li>Spray polyurethane foam 1-1/2" minimum up to full cavity thickness: Bayer EcoBay CC or BASF Walltite</li> <li>Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m<sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T<sub>ign</sub>, Pk. HRR) than Bayer EcoBay CC or BASF Walltite.</li> <li>Any noncombustible insulation per ASTM E136</li> <li>Any mineral fiber or fiberglass board/batt, Class A ASTM E84, faced or unfaced</li> </ol>
<b>C. Exterior Sheathing over Steel Stud Base Wall</b>	<ol style="list-style-type: none"> <li>1/2" or thicker exterior gypsum sheathing</li> </ol>
<b>D. WRB Over Base Wall Surface</b> – Use 1, 2, 3, or 4  Option 4 (CCW-705) can only be used with insulation options 1c (R2+ SHEATHE), 2c (XCI Class A), 5a and 5b (mineral wool)	<ol style="list-style-type: none"> <li>CCW-705FR-A with 702LV, 702WB, CAV-GRIP™ or Travel-Tack surface prep.</li> <li>Fire-Resist Barritech NP</li> <li>Fire-Resist Barritech VP.</li> <li>CCW-705 with 702, 702 LV, 702 WB, CAV-GRIP, or Travel-Tack surface prep.</li> </ol>
<b>E. Exterior Insulation</b> – Use 1a, 1b, 1c, 2a, 2b, 2c, 3a, 3b, 4a, 4b, 5a or 5b	<ol style="list-style-type: none"> <li>Polysocyanurate insulation by Carlisle Coatings &amp; Waterproofing. 20 psi or 25 psi grade. 3-1/2" thick maximum             <ol style="list-style-type: none"> <li>R2+ SILVER</li> <li>R2+ MATTE</li> <li>R2+ SHEATHE</li> </ol> </li> <li>Polysocyanurate insulation by Hunter Panels. 20 psi or 25 psi grade. 3-1/2" thick maximum             <ol style="list-style-type: none"> <li>XCI Foil</li> <li>XCI CG</li> <li>XCI Class A</li> </ol> </li> <li>Polysocyanurate insulation by Dow Chemical Company, 4-1/4" thick maximum             <ol style="list-style-type: none"> <li>THERMAX™ CI</li> <li>THERMAX™ Sheathing</li> </ol> </li> <li>Extruded Polystyrene (XPS) Insulation. Approved for exterior wall cavity. 15 psi or 25 psi grade. 3" thick maximum             <ol style="list-style-type: none"> <li>STYROFOAM™ brand XPS by Dow Chemical Company</li> <li>FOAMULAR™ brand by Owens Corning</li> </ol> </li> <li>Mineral Wool Insulation for Exterior Wall Cavity. 1" minimum, no maximum thickness.             <ol style="list-style-type: none"> <li>CAVITYROCK™ MD or CAVITYROCK DD by Roxul</li> <li>RainBarrier™ HD and RainBarrier 45 by Owens Corning-ThermaFiber</li> </ol> </li> </ol>
Insulation joint prep and attachment permitted with CCW R2+ and Hunter XCI insulation	<ol style="list-style-type: none"> <li>CCW LM 800 XL adhesive applied in 3/8" x 3" dabs, 16" o.c. may be used to adhere R2+ or XCI to WRB or to base wall surface.</li> <li>FOMO HandiFoam FireBlock or TVM FireBlock may be used as gap filler between R2+ or XCI insulation panels.</li> <li>CAV-GRIP or Travel-Tack may be used as an adhesive (application rate per Product Data Sheet) to attach R2+ or XCI to base wall surface.</li> <li>4" Foil-Grip™ 1402 or Aluma-Grip™ 701 over sheathing joints and AlumaGRIP-701 wrapping openings and corners and AlumaGRIP-701 covering transitions and terminations.</li> </ol>
<b>F. WRB Over Exterior Insulation</b>	None required. For these wall assemblies, CCW membrane air barriers are recommended for installation over the base wall rather than over the insulation.
With exterior cladding options 2 and 7: Slip sheet permitted between exterior insulation and exterior cladding in addition to WRB on base wall surface.	Mechanically-attached, Grade D building wrap which has been tested per ASTM E1354 (at a minimum of 20 kW/m <sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T <sub>ign</sub> , Pk. HRR) than those products listed in layer D, "WRB Over Base Wall Surface".

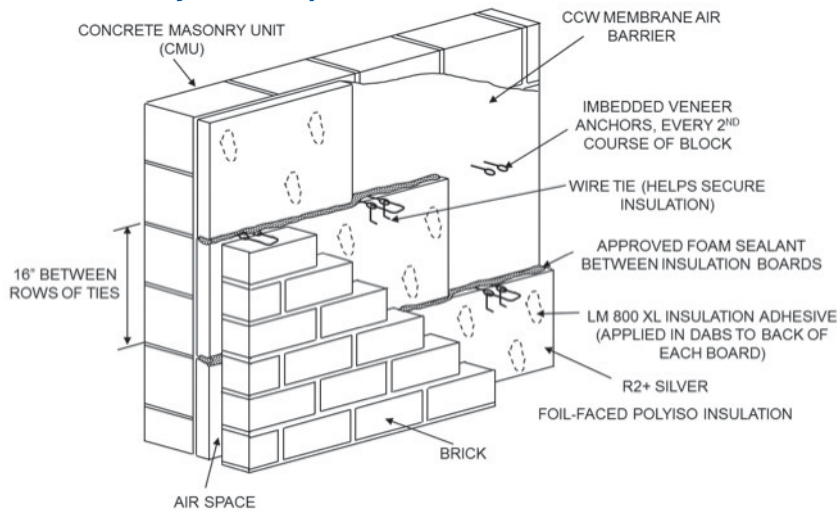
## NFPA 285 Table Of Substitutions: Wall Assemblies I and II with Closed-Joint Non-Combustible Cladding (continued)

<p><b>G. Exterior Cladding</b> - Use 1, 2, 3, 4, 5, 6, 7 or 8.</p> <p>Cladding option 8 permitted with CCW R2+ or Hunter XCI insulation only.</p>	<ol style="list-style-type: none"> <li>1. Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/ Anchors 24" o.c. (max).</li> <li>2. Stucco – minimum ¾" thick exterior cement plaster and lath.</li> <li>3. Limestone – minimum 2" thick, using any standard non-open joint installation technique such as shiplap.</li> <li>4. Natural Stone Veneer – minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone.</li> <li>5. Cast Artificial Stone – minimum 1-½" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap.</li> <li>6. Terra Cotta Cladding – minimum 1-¼" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap.</li> <li>7. Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Veneer, thin-set adhesive and lath shall have a combined thickness of at least ¾".</li> <li>8. TABS II Panel System with ½" thick bricks using TABS Wall Adhesive.</li> </ol>
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### Wall Assembly I - Example



### Wall Assembly II - Example



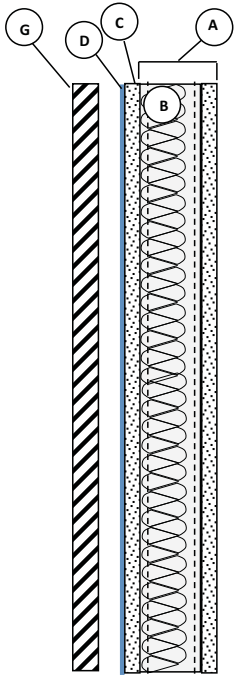
# WALL INSULATION

## Wall Assembly Design Guide

### NFPA 285 Table Of Substitutions: Wall Assemblies I and II with Lightweight, Ventilated Cladding Systems

Wall Component	Material Options
<b>A. Base Wall</b> – Use 1, 2 or 3	<ol style="list-style-type: none"> <li>Concrete – cast in place or tilt-up</li> <li>Concrete Masonry Unit (CMU)</li> <li>Steel Studs - 25 gauge or thicker, 3-5/8" depth minimum, 24" o.c maximum spacing. Lateral bracing required every 4' 5/8" type X gypsum wallboard, or equivalent thermal barrier, required on the interior side.</li> </ol>
<b>B. Stud Cavity Insulation</b> – Use 1, 2, 3, 4 or 5  Options 2 and 3 permitted only with these exterior insulations: CCW R2+, Hunter XCI or mineral wool insulation.	<ol style="list-style-type: none"> <li>None</li> <li>Spray polyurethane foam 1-1/2" minimum up to full cavity thickness: Bayer EcoBay CC or BASF Walltite</li> <li>Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m<sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T<sub>ign</sub>, Pk. HRR) than Bayer EcoBay CC or BASF Walltite.</li> <li>Any noncombustible insulation per ASTM E136</li> <li>Any mineral fiber or fiberglass board/batt, Class A ASTM E84, faced or unfaced</li> </ol>
<b>C. Exterior Sheathing over Steel Stud Base Wall</b>	<ol style="list-style-type: none"> <li>1/2" or thicker exterior gypsum sheathing</li> </ol>
<b>D. WRB Over Base Wall Surface</b> – Use 1, 2, or 3	<ol style="list-style-type: none"> <li>Fire-Resist CCW-705FR-A with 702, 702LV, 702WB, CAV-GRIP, or Travel-Tack</li> <li>Fire-Resist Barritech NP</li> <li>Fire-Resist Barritech VP</li> </ol>
<b>E. Exterior Insulation</b> – Use 1a, 1b, 2a, 2b, 3a, 3b, 4a or 4b	<ol style="list-style-type: none"> <li>Polyisocyanurate insulation by Carlisle Coatings &amp; Waterproofing. 20 psi or 25 psi grade. 3-1/2" thick maximum               <ol style="list-style-type: none"> <li>R2+ MATTE</li> <li>R2+ SHEATHE</li> </ol> </li> <li>Polyisocyanurate insulation by Hunter Panels. 20 psi or 25 psi grade. 3-1/2" thick maximum               <ol style="list-style-type: none"> <li>XCI CG</li> <li>XCI Class A</li> </ol> </li> <li>Polyisocyanurate insulation by Dow Chemical Company, 3" thick maximum               <ol style="list-style-type: none"> <li>THERMAX™ CI</li> <li>THERMAX™ Sheathing</li> </ol> </li> <li>Mineral Wool Insulation for Exterior Wall Cavity. 1" minimum, no maximum thickness.               <ol style="list-style-type: none"> <li>CAVITYROCK™ MD or CAVITYROCK DD by Roxul</li> <li>RainBarrier™ HD and RainBarrier™ 45 by Owens Corning-ThermaFiber™</li> </ol> </li> </ol>
Insulation joint prep and attachment permitted with CCW R2+ and Hunter XCI insulation	<ol style="list-style-type: none"> <li>CCW LM 800 XL adhesive applied in 3/8" x 3" dabs, 16" o.c. may be used to adhere R2+ or XCI to WRB or to base wall surface.</li> <li>FOMO HandiFoam FireBlock or TVM FireBlock may be used as gap filler between R2+ or XCI insulation panels.</li> <li>CAV-GRIP or Travel-Tack may be used as an adhesive (application rate per Product Data Sheet) to attach R2+ or XCI to base wall surface.</li> <li>4" Foil-Grip 1402 or Aluma-Grip 701 over sheathing joints and Aluma-Grip 701 wrapping openings and corners and Aluma-Grip 701 covering transitions and terminations.</li> </ol>
<b>F. WRB Over Exterior Insulation</b>	None required. For these wall assemblies, CCW membrane air barriers are recommended for installation over the base wall rather than over the insulation.
<b>G. Exterior Cladding</b> – Use 1, 2, 3, 4, 5 or 6	<ol style="list-style-type: none"> <li>Any metal composite material (MCM) that has successfully passed NFPA 285.</li> <li>Uninsulated sheet metal building panels including steel, copper, aluminum.</li> <li>Uninsulated Fiber-cement siding</li> <li>Stone/Aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria.</li> <li>Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria.</li> <li>Terra cotta rain screen cladding –Minimum 1-1/4" thick with ventilated shiplap.</li> </ol>

### Wall Assembly III



### Steel Stud Wall – No Exterior Insulation

- A. STEEL STUDS WITH INTERIOR GYPSUM SHEATHING
- B. STUD CAVITY INSULATION
- C. EXTERIOR GYPSUM SHEATHING
- D. CCW MEMBRANE AIR BARRIER
- E. EXTERIOR INSULATION (NOT USED)
- F. WRB OVER EXTERIOR INSULATION (NOT USED)
- G. EXTERIOR CLADDING

Steel stud wall assemblies are often constructed without any exterior insulation. This can be done in Climate Zones 1- 4 within jurisdictions whose energy code is based on IECC 2006 or earlier versions. IECC 2006, 2009 and 2012 allow compliance with maximum allowable U-Value as an alternative to compliance with prescribed minimum R- Values. Where steel stud walls are built without any exterior insulation, the CCW membrane air barriers can be used as shown. CCW does not recommend this type of wall assembly in cold climates due to the high potential for stud cavity condensation. CCW Fire-Resist Barritech NP, Barritech VP and 705 FR-A pass NFPA 285 in this type of wall assembly. CCW-705 and Barriseal can be used only if the wall assembly is exempt from NFPA 285. NFPA 285 window details for Wall Assembly III are similar to those shown for Wall Assembly I, page 14. NFPA 285 floor line fire stopping details for Wall Assembly III are similar to those shown for Wall Assembly I, page 15. Just remove the exterior insulation.

### Wall Assembly III Insulation And WRB Options - IECC 2006 Compliance And Hygro-Thermal Performance

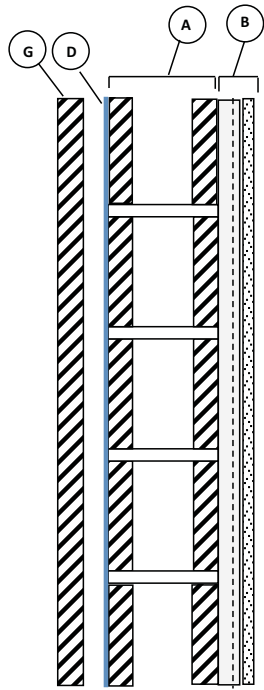
Layer	Zone 1	Zones 2, 3 WH	Zone 3	Zone 4A, 4B	Zones 4C, 5, 6, 7 and 8
B	MIN R-13 FG MIN 2-½" SPF	MIN R-13 FG MIN 2-½" SPF	MIN R-13 FG MIN 2-½" SPF	MIN R-13 FG w/KP MIN 2-½" SPF	See Wall Assembly I. "ci" prescribed by IECC 2006 and later versions.
D	Fire-Resist 705 FR-A Fire-Resist Barritech NP Fire-Resist Barritech VP CCW-705* Barriseal-S/R*		Fire-Resist Barritech VP		

\*Barriseal-S/R and CW-705 permitted in Wall Assembly III only if wall assembly is exempt from the NFPA 285 requirement.

# WALL INSULATION

## Wall Assembly Design Guide

### Wall Assembly IV



### Mass Wall – No Insulation

- A. CMU OR CONCRETE
- B. INTERIOR GYPSUM SHEATHING OVER FURRING (OPTIONAL)
- C. EXTERIOR GYPSUM SHEATHING (NOT USED)
- D. CCW MEMBRANE AIR BARRIER
- E. EXTERIOR INSULATION (NOT USED)
- F. WRB OVER EXTERIOR INSULATION (NOT USED)
- G. EXTERIOR CLADDING

Mass wall assemblies constructed without exterior insulation can be used in warmer USA climate zones whose energy code is based on IECC 2006 or earlier versions. CCW Fire-Resist Barritech NP, Barritech VP and 705 FR-A pass NFPA 285 in this wall assembly. CCW-705 and Barriseal can be used only if the wall assembly is exempt from NFPA 285. NFPA 285 window details for Wall Assembly IV are similar to those shown for Wall Assembly II, page 17. Just remove the exterior insulation.

### Wall Assembly IV Insulation And WRB Options - IECC 2006 Compliance And Hygro-Thermal Performance

Layer	Zone 1	Zone 2	Zones 3, 4, 5, 6, 7 & 8
D	Fire-Resist 705 FR-A Fire-Resist Barritech NP Fire-Resist Barritech VP CCW-705* Barriseal-S/R*		See Wall Assembly II. "ci" prescribed by IECC 2006 and later versions.

\*Barriseal-S/R and CW-705 permitted in Wall Assembly IV only if wall assembly is exempt from the NFPA 285 requirement.

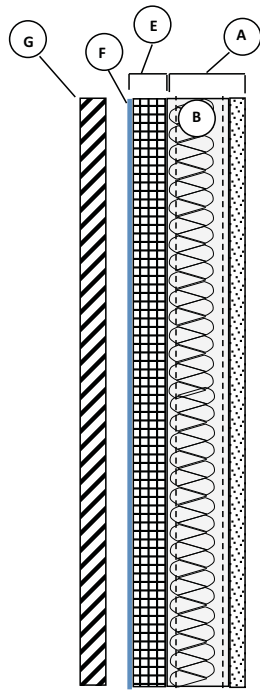
## NFPA 285 Table Of Substitutions: Wall Assemblies III and IV

Wall Component	Material Options
<b>A. Base Wall</b> – Use 1, 2 or 3	<ol style="list-style-type: none"> <li>1. Concrete – cast in place or tilt-up</li> <li>2. Concrete Masonry Unit (CMU)</li> <li>3. Steel Studs - 25 gauge or thicker, 3-5/8" depth minimum, 24" o.c maximum spacing. Lateral bracing required every 4' 5/8" type X gypsum wallboard, or equivalent thermal barrier, required on the interior side.</li> </ol>
<b>B. Stud Cavity Insulation</b> – Use 1, 2, 3, 4 or 5	<ol style="list-style-type: none"> <li>1. Spray polyurethane foam 1½" minimum up to full cavity thickness: Bayer EcoBay CC or BASF Walltite</li> <li>2. Any noncombustible insulation per ASTM E136</li> <li>3. Any Mineral Fiber or Fiberglass board/batt, Class A ASTM E84, faced or unfaced</li> <li>4. Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m<sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T<sub>ign</sub>, Pk. HRR) than Bayer EcoBay CC or BASF Walltite.</li> </ol>
<b>C. Exterior Sheathing over Steel Stud Base Wall</b>	<ol style="list-style-type: none"> <li>1. ½" or thicker exterior gypsum sheathing</li> </ol>
<b>D. WRB Over Base Wall Surface</b> – Use 1, 2, 3 or 4	<ol style="list-style-type: none"> <li>1. Fire-Resist CCW-705FR-A with 702, 702 LV, 702 WB, CAV-GRIP, or Travel-Tack surface prep</li> <li>2. Fire-Resist Barritech NP*</li> <li>3. Fire-Resist Barritech VP*</li> </ol>
Slip sheet over WRB permitted with exterior cladding options 2 and 7	Mechanically-attached, Grade D building wrap which has been tested per ASTM E1354 (at a minimum of 20 kW/m <sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T <sub>ign</sub> , Pk. HRR) than those products listed in layer D, "WRB Over Base Wall Surface".
<b>E. Exterior Insulation</b>	Not used in these wall assemblies.
<b>F. WRB Over Exterior Insulation</b>	Not used in these wall assemblies.
<b>G. Exterior Cladding</b> – Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14	<ol style="list-style-type: none"> <li>1. Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/ Anchors 24" o.c. (max).</li> <li>2. Stucco – minimum ¾" thick exterior cement plaster and lath.</li> <li>3. Limestone – minimum 2" thick using any standard non-open joint installation technique such as shiplap.</li> <li>4. Natural Stone Veneer – minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone.</li> <li>5. Cast Artificial Stone – minimum 1½" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap.</li> <li>6. Terra Cotta Cladding – minimum 1¼" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap.</li> <li>7. Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Veneer, thin-set adhesive and lath shall have a combined thickness of at least ¾ inch.</li> <li>8. TABS II Panel System with ½" thick bricks using TABS Wall Adhesive.</li> <li>9. Any MCM that has successfully passed NFPA 285.</li> <li>10. Uninsulated sheet metal building panels including steel, copper, aluminum.</li> <li>11. Uninsulated Fiber-cement siding.</li> <li>12. Stone/Aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria.</li> <li>13. Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria.</li> <li>14. Terra Cotta Cladding – Any rain-screen terra cotta (min 1¼" thick) with ventilated shiplap.</li> </ol>

# WALL INSULATION

## Wall Assembly Design Guide

### Wall Assembly V R2+ SHEATHE Over Open Steel Studs



### Steel Stud Wall with Insulating Sheathing

- A. STEEL STUDS WITH INTERIOR GYPSUM SHEATHING
- B. STUD CAVITY INSULATION
- C. WRB OVER BASE WALL ASSEMBLY (NOT USED)
- D. EXTERIOR GYPSUM SHEATHING (NOT USED)
- E. CCW R2+ SHEATHE
- F. CCW MEMBRANE AIR BARRIER
- G. EXTERIOR CLADDING

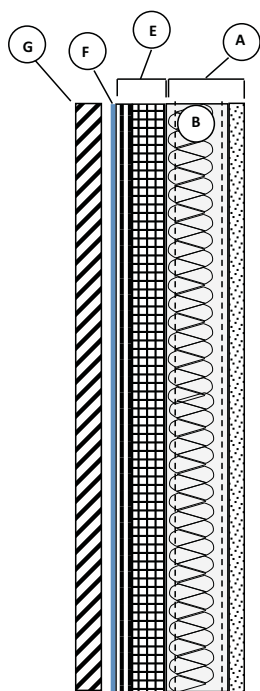
R2+ SHEATHE can be installed directly over steel studs to make a wall assembly that can be used in all North American climate zones. This wall assembly can be used in jurisdictions whose energy code is based on IECC 2012 and earlier versions. CCW Fire-Resist Barritech NP and Barritech VP can be applied over R2+ SHEATHE, and pass NFPA 285 in this wall assembly. Alternatively, R2+ SHEATHE joints can be taped with CCW FOIL-GRIP-1402 Tape and no additional WRB is necessary. In this assembly, R2+ SHEATHE insulation must be fastened securely to 18-gauge steel studs, or thicker, with approved fastening 16" OC in the field and 12" OC at perimeter and terminations. CCW recommends this wall assembly as a value-engineered system for low-rise commercial construction. It is CCW's opinion that Wall Assembly I provides a superior weatherization package compared to Wall Assembly V. NFPA 285 window details for Wall Assembly V are similar to those shown for Wall Assembly I, page 14. NFPA 285 floor line fire stopping details for Wall Assembly V are similar to those shown for Wall Assembly I, page 15. Just remove the exterior gypsum sheathing. This wall assembly can be used in all climate zones as shown. If stud cavity insulation is used, un-faced fiber glass batt, maximum R-13, is recommended.

### Wall Assembly V Insulation And WRB Options - IECC 2012 Compliance And Hygro-Thermal Performance

Layer	Zone 1	Zones 2, 3 & 4	Zone 5	Zone 6	Zone 7 & 8
B	MIN R-13 FG	MAX R-13 FG	MAX R-13 FG	MAX R-13 FG	MAX R-13 FG
E	MINIMUM 1" R2+ SHEATHE	MINIMUM 1-½" R2+ SHEATHE	MINIMUM 2" R2+ SHEATHE	MINIMUM 2-½" R2+ SHEATHE	MINIMUM 3.1" R2+ SHEATHE
F	Fire-Resist Barritech NP Fire-Resist Barritech VP Foil-GRIP 1402 joints and Aluma-GRIP 701 flashings				



## Wall Assembly VI R2+ BASE over open Steel Studs



### Steel Stud Wall with R2+ Base

- A. STEEL STUDS WITH INTERIOR GYPSUM SHEATHING
- B. STUD CAVITY INSULATION
- C. EXTERIOR GYPSUM SHEATHING (NOT USED)
- D. WRB OVER BASE WALL ASSEMBLY (NOT USED)
- E. CCW R2+ BASE
- F. CCW MEMBRANE AIR BARRIER
- G. EXTERIOR CLADDING

R2+ BASE provides a convenient solution for attaching lightweight, thin cladding systems such as stucco, cultured stone, fiber cement siding and metal panels. The fire-treated plywood facer provides a hard surface for easy attachment of these claddings. In Wall Assembly VI, R2+ BASE is installed directly over open steel studs. CCW Fire-Resist Barritech NP, Barritech VP and 705 FR-A can then be applied over R2+ BASE, and pass NFPA 285 with a variety of cladding options. In very cold climates, an interior vapor retarder in the form of kraft-paper-faced insulation or closed cell spray polyurethane foam is recommended to keep interior moisture from migrating into the colder exterior layers of the assembly. This wall assembly is recommended for use in all climate zones, as shown. In cold, damp climate Zone 6A, an impermeable CCW membrane is recommended over R2+ BASE where stucco or other absorbent, non-ventilated cladding is used. NFPA 285 window details for Wall Assembly VI are similar to those shown for Wall Assembly I, page 14. NFPA 285 floor line fire stopping details for Wall Assembly VI are similar to those shown for Wall Assembly I, page 15.

### Wall Assembly VI Insulation And WRB Options - IECC 2012 Compliance And Hygro-Thermal Performance

Layer	Zone 1	Zones 2, 3 & 4	Zone 5	Zone 6*	Zones 7 & 8
B	MAX R-13 FG MIN 1-1/2" SPF	MAX R-13 FG MIN 1-1/2" SPF	MAX R-13 FG MIN 1-1/2" SPF	MAX R-13 FG MIN 1-1/2" SPF	MAX R-13 FG w/ KP MIN 1-1/2" SPF
E	MIN 1-5/8" R2+ BASE	MIN 2-1/8" R2+ BASE	MIN. 2-5/8" R2+ BASE	MIN 3-1/8" R2+ BASE	3-5/8" or 3-3/4" R2+ BASE
F	Fire-Resist 705 FR-A Fire-Resist Barritech NP Fire-Resist Barritech VP				Fire-Resist Barritech NP

\*NOTE: Vapor impermeable WRB is recommended for use over R2+BASE in Zone 6A when non-ventilated, absorbent cladding such as stucco is used.

# WALL INSULATION

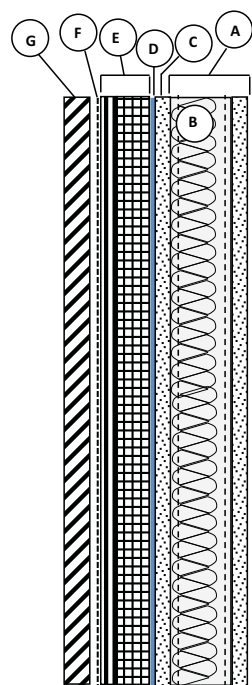
## Wall Assembly Design Guide

### NFPA 285 Table Of Substitutions: Wall Assemblies V and VI

Wall Component	Material Options
<b>A. Base Wall</b>	Steel Studs - 25 gauge or thicker, 3 5/8" depth minimum, 24" o.c maximum spacing. Lateral bracing required every 4' 9/8" type X gypsum wallboard, or equivalent thermal barrier, required on the interior side.
<b>B. Stud Cavity Insulation</b> – Use 1, 2, 3, 4 or 5  Note: Options 1 and 2 are not permitted with R2+ SHEATHE.	<ol style="list-style-type: none"> <li>1. Spray polyurethane foam 1-1/2" minimum up to full cavity thickness: Bayer EcoBay CC or BASF Walltite</li> <li>2. Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m<sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T<sub>ign</sub>, Pk. HRR) than Bayer EcoBay CC or BASF Walltite.</li> <li>3. Any noncombustible insulation per ASTM E136</li> <li>4. Any mineral fiber or fiberglass board/batt, Class A ASTM E84, faced or unfaced</li> <li>5. None</li> </ol>
<b>C. Exterior Sheathing over Steel Stud Base Wall</b>	None. Not used in these wall assemblies.
<b>D. WRB Over Base Wall Surface</b>	None. CCW membranes cannot be installed over open steel studs.
<b>E. Exterior Insulation</b> – Use 1 or 2  Insulation joint prep permitted	<ol style="list-style-type: none"> <li>1. CCW R2+ SHEATHE, maximum 3-1/2" thick</li> <li>2. CCW R2+ BASE, maximum 3-9/8" thick</li> </ol> <ol style="list-style-type: none"> <li>1. FOMO HandiFoam FireBlock or TVM FireBlock may be used as gap filler between R2+ SHEATHE and R2+ BASE insulation panels.</li> <li>2. Over R2+ SHEATHE: 4" Foil-GRIP-1402 or AlumaGRIP-701 over sheathing joints and AlumaGRIP-701 wrapping openings and corners and AlumaGRIP-701 covering transitions and terminations.</li> </ol>
<b>F. WRB Over Exterior Insulation</b> – Use 1, 2 or 3  Slip sheet over WRB permitted with exterior cladding options 2 and 7	<ol style="list-style-type: none"> <li>1. Fire-Resist CCW-705FR-A with 702, 702 LV, 702 WB, CAV-GRIP, or Travel-Tack surface prep</li> <li>2. Fire-Resist Barritech NP</li> <li>3. Fire-Resist Barritech VP</li> </ol> <p>Mechanically-attached, Grade D building wrap which has been tested per ASTM E1354 (at a minimum of 20 kW/m<sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T<sub>ign</sub>, Pk. HRR) than those products listed in layer D, "WRB Over Base Wall Surface".</p>
<b>G. Exterior Cladding</b> – Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14	<ol style="list-style-type: none"> <li>1. Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/ Anchors 24" o.c. (max).</li> <li>2. Stucco – minimum 3/4" thick exterior cement plaster and lath. For these systems which require a more durable WRB system, any building wrap or 15# felt that meets requirement #4 in "WRB over Exterior Insulation" can be used as a slip sheet between the WRB and the lath.</li> <li>3. Limestone – minimum 2" thick, using any standard non-open joint installation technique such as shiplap.</li> <li>4. Natural Stone Veneer – minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone.</li> <li>5. Cast Artificial Stone – minimum 1 1/2" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap.</li> <li>6. Terra Cotta Cladding – minimum 1 1/4" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap.</li> <li>7. Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Veneer, thin-set adhesive and lath shall have a combined thickness of at least 3/4"</li> <li>8. TABS II Panel System with 1/2" thick bricks using TABS Wall Adhesive.</li> <li>9. Any MCM that has successfully passed NFPA 285.</li> <li>10. Uninsulated sheet metal building panels including steel, copper, aluminum.</li> <li>11. Uninsulated Fiber-cement siding.</li> <li>12. Stone/Aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria.</li> <li>13. Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria.</li> <li>14. Terra Cotta Cladding – Any rain-screen terra cotta (min 1 1/4" thick) with ventilated shiplap.</li> </ol>

## Wall Assembly VII

### R2+ BASE with Gypsum Sheathing & Steel Studs – CCW Membrane on Gypsum Sheathing



### Steel Stud Wall with Exterior Gypsum Sheathing and R2+ Base – CCW Membrane Inboard

- A. STEEL STUDS WITH INTERIOR GYPSUM SHEATHING
- B. STUD CAVITY INSULATION
- C. EXTERIOR GYPSUM SHEATHING
- D. CCW MEMBRANE AIR BARRIER
- E. CCW R2+ BASE
- F. BUILDING WRAP OR 15# FELT
- G. EXTERIOR CLADDING

Wall assembly VII consists of R2+ BASE installed over exterior gypsum sheathing. A CCW membrane is applied over the exterior gypsum sheathing. The plywood face of R2+ BASE must be covered with a Grade D (permeable) water resistive barrier, such as 15# felt or equivalent. A light-weight cladding can then be applied, fastening through the WRB into the plywood face of R2+ BASE. This wall assembly is ideal for providing continuous insulation with an easy cladding attachment option. The location of the CCW membrane facilitates tie-in to neighboring wall assemblies which also have the air barrier on the exterior face of the base wall assembly. This wall assembly can be used in Zones 1-8. In colder climates, an interior vapor retarder in the form of kraft-paper-faced insulation or closed cell spray polyurethane foam is recommended to keep interior moisture from migrating into the colder exterior layers of the assembly.

### Wall Assembly VII Insulation And WRB Options - IECC 2012 Compliance And Hygro-Thermal Performance

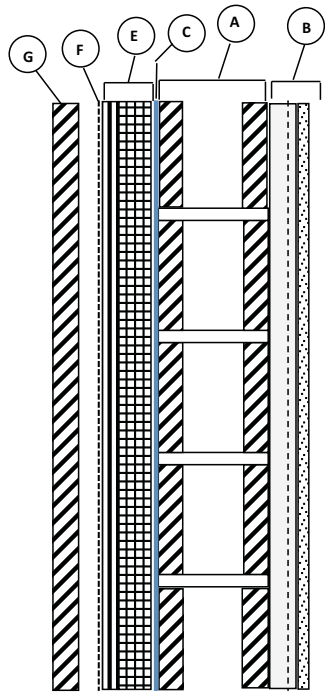
Layer	Zone 1	Zones 2, 3 & 4	Zone 5	Zone 6*	Zones 7 & 8
B	MAX R-13 FG MIN 1-½" SPF	MAX R-13 FG MIN 1-½" SPF	MAX R-13 FG w/KP MIN 1-½" SPF	MAX R-13 FG w/KP MIN 1-½" SPF	MAX R-13 FG w/KP MIN 1-½" SPF
E	MIN. 1-5/8" R2+ BASE	MIN. 2-1/8" R2+ BASE	MIN. 2-5/8" R2+ BASE	MIN. 3-1/8" R2+ BASE	3-5/8" or 3-3/4" R2+ BASE
D	Fire-Resist 705FR-A Fire-Resist Barritech NP Fire-Resist Barritech VP				

\*NOTE: Not recommended Zone 6A when non-ventilated, absorbent cladding such as stucco is used. Use Wall Assembly VI or IX for this application.

# WALL INSULATION

## Wall Assembly Design Guide

### Wall Assembly VIII R2+ BASE with Mass Wall – CCW Membrane on CMU or Concrete



### Mass Wall with R2+ Base – CCW Membrane Inboard

- A. CMU OR CONCRETE
- B. OPTIONAL - INTERIOR GYPSUM SHEATHING OVER FURRING
- C. EXTERIOR GYPSUM SHEATHING (NOT USED)
- D. CCW MEMBRANE AIR BARRIER
- E. R2+ BASE
- F. BUILDING WRAP OR 15# FELT
- G. EXTERIOR CLADDING

Wall assembly VIII consists of R2+ BASE installed over a concrete or CMU wall. A CCW membrane is applied over the exterior face of the concrete or CMU wall. The plywood face of R2+ BASE must be covered with a Grade D (permeable) water resistive barrier, such as 15# felt or equivalent. A light-weight cladding can then be applied, fastening through the WRB into the plywood face of R2+ BASE. This wall assembly is ideal for providing continuous insulation with an easy cladding attachment option over a mass wall. The location of the CCW membrane facilitates tie-in to neighboring wall assemblies which also have the air barrier on the exterior face of the base wall assembly. This wall assembly can be used in Zones 1-7. This wall assembly is not recommended in cold, damp climate Zone 6A when absorbent, non-ventilated cladding such as stucco is used.

### Wall Assembly VIII Insulation And WRB Options - IECC 2012 Compliance And Hygro-Thermal Performance

Layer	Zone 1	Zone 2	Zones 3 & 4	Zones 5, 6* & 7	Zone 8
C	MIN. 1-5/8" R2+ BASE	MIN. 2-1/8" R2+ BASE	MIN. 2-5/8" R2+ BASE	MIN. 3-1/8" R2+ BASE	Not Recommended
C	Fire-Resist 705FR-A Fire-Resist Barritech NP Fire-Resist Barritech VP				

\*NOTE: Not recommended in Zone 6A when non-ventilated, absorbent cladding such as stucco is used.

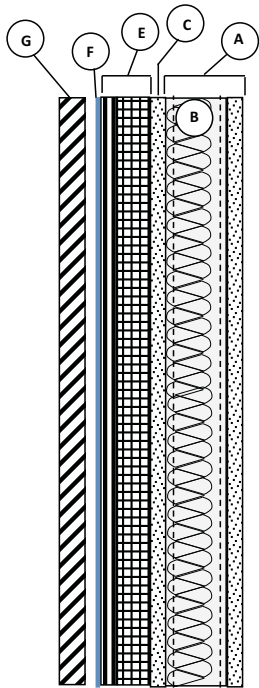
## NFPA 285 Table Of Substitutions: Wall Assemblies VII and VIII

Wall Component	Material Options
<b>A. Base Wall</b> – Use 1, 2 or 3	<ol style="list-style-type: none"> <li>1. Concrete – cast in place or tilt-up</li> <li>2. Concrete Masonry Unit (CMU)</li> <li>3. Steel Studs - 25 gauge or thicker, 3-5/8" depth minimum, 24" o.c maximum spacing. Lateral bracing required every 4' 5/8" type X gypsum wallboard, or equivalent thermal barrier, required on the interior side.</li> </ol>
<b>B. Stud Cavity Insulation</b> – Use 1, 2, 3, 4 or 5	<ol style="list-style-type: none"> <li>1. None</li> <li>2. Spray polyurethane foam 1-1/2" minimum up to full cavity thickness: Bayer EcoBay CC or BASF Walltite</li> <li>3. Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m<sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T<sub>ign</sub>, Pk. HRR) than Bayer EcoBay CC or BASF Walltite.</li> <li>4. Any noncombustible insulation per ASTM E136</li> <li>5. Any mineral fiber or fiberglass board/batt, Class A ASTM E84, faced or unfaced</li> </ol>
<b>C. Exterior Sheathing over Steel Stud Base Wall</b>	1/2" or thicker exterior gypsum sheathing
<b>D. WRB Over Base Wall Surface</b> – Use 1, 2,3, or 4	<ol style="list-style-type: none"> <li>1. Fire-Resist CCW-705FR-A with 702, 702 LV, 702 WB, CAV-GRIP, or Travel-Tack surface prep.</li> <li>2. Fire-Resist Barritech NP</li> <li>3. Fire-Resist Barritech VP</li> </ol>
<b>E. Exterior Insulation</b>	3-5/8" thick maximum R2+ BASE
Insulation joint prep permitted	FOMO HandiFoam FireBlock or TVM FireBlock may be used as gap filler between R2+ BASE insulation panels.
<b>F. WRB Over Exterior Insulation</b>	Mechanically-attached, Grade D building wrap which has been tested per ASTM E1354 (at a minimum of 20 kW/m <sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T <sub>ign</sub> , Pk. HRR) than those products listed in layer D, "WRB Over Base Wall Surface".
<b>G. Exterior Cladding</b> – Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14	<ol style="list-style-type: none"> <li>1. Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/ Anchors 24" o.c. (max).</li> <li>2. Stucco – minimum 3/4" thick exterior cement plaster and lath. For these systems which require a more durable WRB system, any building wrap or 15# felt that meets requirement #4 in "WRB over Exterior Insulation" can be used as a slip sheet between the WRB/R2+ SILVER and the lath.</li> <li>3. Limestone – minimum 2" thick, using any standard non-open joint installation technique such as shiplap.</li> <li>4. Natural Stone Veneer – minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone.</li> <li>5. Cast Artificial Stone – minimum 1-1/2" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap.</li> <li>6. Terra Cotta Cladding – minimum 1-1/4" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap.</li> <li>7. Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Veneer, thin-set adhesive and lath shall have a combined thickness of at least 3/4".</li> <li>8. TABS II Panel System with 1/2" thick bricks using TABS Wall Adhesive.</li> <li>9. Any metal composite material (MCM) that has successfully passed NFPA 285.</li> <li>10. Uninsulated sheet metal building panels including steel, copper, aluminum.</li> <li>11. Uninsulated Fiber-cement siding</li> <li>12. Stone/Aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria.</li> <li>13. Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria.</li> <li>14. Terra Cotta Rain Screen Cladding – Minimum 1-1/4" thick with ventilated shiplap.</li> </ol>

# WALL INSULATION

## Wall Assembly Design Guide

### Wall Assembly IX Gypsum Sheathing & Steel Studs – CCW Membrane over R2+ BASE



### Steel Stud Wall with Exterior Gypsum Sheathing and R2+ Base – CCW Membrane Outboard

- A. STEEL STUDS WITH EXTERIOR AND INTERIOR GYPSUM SHEATHING
- B. STUD CAVITY INSULATION
- C. EXTERIOR GYPSUM SHEATHING
- D. WRB OVER BASE WALL ASSEMBLY (NOT USED)
- E. CCW R2+ BASE
- F. CCW MEMBRANE AIR BARRIER
- G. EXTERIOR CLADDING

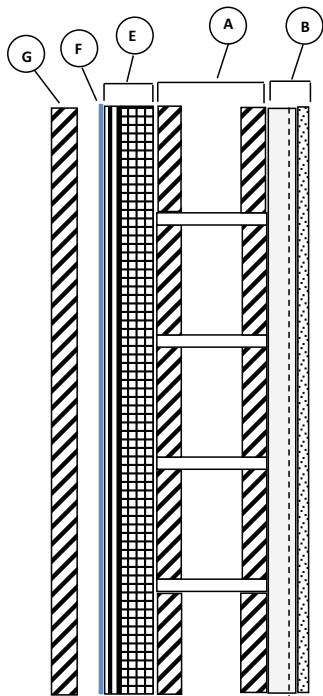
Wall assembly IX is similar to wall assembly VII, except the former has the CCW membrane applied over R2+ BASE while the latter has the CCW membrane applied over exterior gypsum. The CCW membrane air barrier can be applied to the R2+ BASE and serve as the sole membrane air and water resistive barrier in the wall assembly. CCW Fire-Resist Barritech NP, Barritech VP and 705 VP can be applied in the wall assembly as shown, and pass NFPA 285. This wall assembly can be used in jurisdictions whose energy code is based on IECC 2012 or earlier versions. It is recommended in all climate zones, as shown. To prevent moisture build up in the gypsum sheathing, an interior vapor retarder in the form of kraft paper facing of spray polyurethane foam is recommended in Zones 5 and colder. In very cold Zones 7 and 8, Fire-Resist Barritech VP is required to allow winter-season internal condensation to dry through. NFPA 285 window details for Wall Assembly IX are similar to those shown for Wall Assembly I, page 14. NFPA 285 floor line fire stopping details for Wall Assembly IX are similar to those shown for Wall Assembly I, page 15.

### Wall Assembly IX Insulation And WRB Options - IECC 2012 Compliance And Hygro-Thermal Performance

Layer	Zone 1	Zones 2, 3 & 4	Zone 5	Zone 6*	Zones 7 & 8
B	MIN R-13 FG MIN 1-½" SPF	MIN R-13 FG MIN 1-½" SPF	MAX R-13 FG w/ KP MIN 1-½" SPF	MAX R-13 FG w/ KP MIN 1-½" SPF	MAX R-13 FG w/KP MIN 1-½" SPF
E	MIN. 1-5/8" R2+ BASE	MIN. 2-1/8" R2+ BASE	MIN. 2-5/8" R2+ BASE	MIN. 3-1/8" R2+ BASE	3-5/8" or 3-3/4" R2+ BASE
F	Fire-Resist 705 FR-A Fire-Resist Barritech NP Fire-Resist Barritech VP				Fire-Resist Barritech VP

\*NOTE: Vapor-impermeable WRB is recommended for use over R2+ Base in Zone 6A when non-ventilated, absorbent cladding such as stucco is used.

**Wall Assembly X**  
**Mass Wall – CCW Membrane over R2+ BASE**



**Mass Wall with R2+ Base –  
 CCW Membrane Outboard**

- A. CMU OR CONCRETE
- B. OPTIONAL - INTERIOR GYPSUM SHEATHING OVER FURRING
- C. EXTERIOR GYPSUM SHEATHING (NOT USED)
- D. WRB OVER BASE WALL ASSEMBLY (NOT USED)
- E. CCW R2+ BASE
- F. CCW MEMBRANE AIR BARRIER
- G. EXTERIOR CLADDING

Wall assembly X consists of R2+ BASE installed over a concrete or CMU wall, with CCW membrane applied over the plywood face of R2+ BASE. A light-weight cladding can then be applied, fastening through the CCW membrane into the plywood face of R2+ BASE. This wall assembly is ideal for providing continuous insulation with an easy cladding attachment option over a mass wall. This wall assembly can be used in Zones 1-7. In colder climate zones, any Fire-Resist CCW membrane can be installed over R2+ Base. In colder zones, Fire-Resist Barritech VP is required to allow interior-generated moisture to dry through. The use of permeable membrane is more broadly required in this wall assembly compared to Wall Assembly IX. This wall assembly does not accommodate spray foam or kraft paper in the interior, so migration of interior-generated moisture in colder climates has more significant effect. In this wall assembly, absorbent, non-ventilated claddings such as stucco cannot be used in Zone 6A.

**Wall Assembly X Insulation And WRB Options - IECC 2012 Compliance And Hygro-Thermal Performance**

Layer	Zone 1	Zone 2	Zone 3	Zone 4	Zones 5, 6* & 7	Zone 8
E	MIN. 1-5/8" R2+ BASE	MIN. 2-1/8" R2+ BASE	MIN. 2-5/8" R2+ BASE	MIN. 2-5/8" R2+ BASE	MIN. 3-1/8" R2+ BASE	Not Recommended
F	Fire-Resist 705 FR-A Fire-Resist Barritech NP Fire-Resist Barritech VP			Fire-Resist Barritech VP		

\*NOTE: Not recommended in Zone 6A with non-ventilated absorbent cladding such as stucco.

# WALL INSULATION

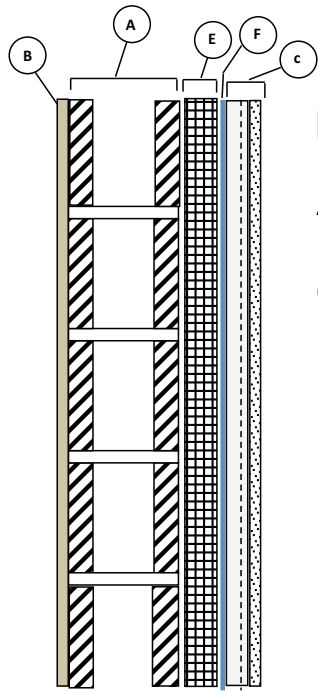
## Wall Assembly Design Guide

### NFPA 285 Table Of Substitutions: Wall Assemblies IX and X

Wall Component	Material Options
<b>A. Base Wall</b> – Use 1, 2 or 3	<ol style="list-style-type: none"> <li>1. Concrete – cast in place or tilt-up</li> <li>2. Concrete Masonry Unit (CMU)</li> <li>3. Steel Studs - 25 gauge or thicker, 3-5/8" depth minimum, 24" o.c maximum spacing. Lateral bracing required every 4' 9/8" type X gypsum wallboard, or equivalent thermal barrier, required on the interior side.</li> </ol>
<b>B. Stud Cavity Insulation</b> – Use 1, 2, 3, 4 or 5	<ol style="list-style-type: none"> <li>1. None</li> <li>2. Spray polyurethane foam 1-1/2" minimum up to full cavity thickness: Bayer EcoBay CC or BASF Walltite</li> <li>3. Any foam plastic insulation (SPF or board type) which has been tested per ASTM E1354 (at a minimum of 20 kW/m<sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T<sub>ign</sub>, Pk. HRR) than Bayer EcoBay CC or BASF Walltite.</li> <li>4. Any noncombustible insulation per ASTM E136</li> <li>5. Any mineral fiber or fiberglass board/batt, Class A ASTM E84, faced or unfaced</li> </ol>
<b>C. Exterior Sheathing over Steel Stud Base Wall</b>	1/2" or thicker exterior gypsum sheathing
<b>D. WRB Over Base Wall Surface</b> – Use 1, 2, 3, or 4	None. Not used in these wall assemblies.
<b>E. Exterior Insulation</b>	3-5/8" thick maximum R2+ BASE
Insulation joint fill permitted	FOMO HandiFoam FireBlock or TVM FireBlock may be used as gap filler between R2+ BASE insulation panels.
<b>F. WRB Over Exterior Insulation</b> – Use 1, 2 or 3	<ol style="list-style-type: none"> <li>1. Fire-Resist CCW-705FR-A with 702, 702 LV, 702 WB, CAV-GRIP, or Travel-Tack surface prep.</li> <li>2. Fire-Resist Barritech NP</li> <li>3. Fire-Resist Barritech VP</li> </ol>
Slip sheet over WRB permitted with exterior cladding options 2 and 7	Mechanically-attached, Grade D building wrap which has been tested per ASTM E1354 (at a minimum of 20 kW/m <sup>2</sup> heat flux) and shown by analysis to be less flammable (improved T <sub>ign</sub> , Pk. HRR) than those products listed in layer F, "WRB Over Exterior Insulation".
<b>G. Exterior Cladding</b> – Use 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14	<ol style="list-style-type: none"> <li>1. Brick – Nominal 4" clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/ Anchors 24" o.c. (max).</li> <li>2. Stucco – minimum 3/4" thick exterior cement plaster and lath. For these systems which require a more durable WRB system, any building wrap or 15# felt that meets requirement #4 in "WRB over Exterior Insulation" can be used as a slip sheet between the WRB/R2+ SILVER and the lath.</li> <li>3. Limestone – minimum 2" thick, using any standard non-open joint installation technique such as shiplap.</li> <li>4. Natural Stone Veneer – minimum 2" thick using any standard non-open joint installation technique such as grouted/mortared stone.</li> <li>5. Cast Artificial Stone – minimum 1-1/2" thick complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap.</li> <li>6. Terra Cotta Cladding – minimum 1-1/4" thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap.</li> <li>7. Thin brick/cultured stone set in thin set adhesive and metal lath that has been tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes, or has passed an NFPA 285 test. Veneer, thin-set adhesive and lath shall have a combined thickness of at least 3/4".</li> <li>8. TABS II Panel System with 1/2" thick bricks using TABS Wall Adhesive.</li> <li>9. Any metal composite material (MCM) that has successfully passed NFPA 285.</li> <li>10. Uninsulated sheet metal building panels including steel, copper, aluminum.</li> <li>11. Uninsulated fiber-cement siding</li> <li>12. Stone/Aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria.</li> <li>13. Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 criteria.</li> <li>14. Terra Cotta Rain Screen Cladding – Minimum 1-1/4" thick with ventilated shiplap.</li> </ol>



**Wall Assembly XI**  
**Mass Wall with Interior Insulation, CCW Membrane on Insulation**



**Mass Wall with Interior Insulation**

- A. CMU OR CONCRETE WALL
- B. EXTERIOR FINISH
- C. INTERIOR FINISH
- D. CCW MEMBRANE AIR BARRIER CMU OR CONCRETE (NOT USED)
- E. R2+ SHEATHE
- F. CCW MEMBRANE AIR BARRIER OVER INTERIOR INSULATION

A mass wall assembly with interior insulation is a practical choice where the exterior side of the concrete or CMU will have direct-applied stucco, a coating or no finish. In this configuration, the R2+ SHEATHE is performing both as continuous insulation and as a vapor barrier. CCW Fire-Resist CCW-705 VP, Barritech NP or Barritech VP can be installed over the interior face of the R2+ SHEATHE to create a continuous air barrier. Alternatively, the R2+ SHEATHE insulation can be made an air barrier by taping the joints with CCW Foil-GRIP 1402. In this wall assembly, since the CCW membrane and insulation are placed on the negative side of the wall assembly, neither can function as a water resistive barrier. The water resistive barrier in this type of wall assembly is the outer surface of the wall. Due to potential for moisture accumulation indicated by WUFI simulation, CCW does not recommend this wall assembly for Zones 6A, 7 and 8.

**Wall Assembly XI Insulation and CCW Membrane Options – IECC 2012 Compliance and Hygro-Thermal Performance**

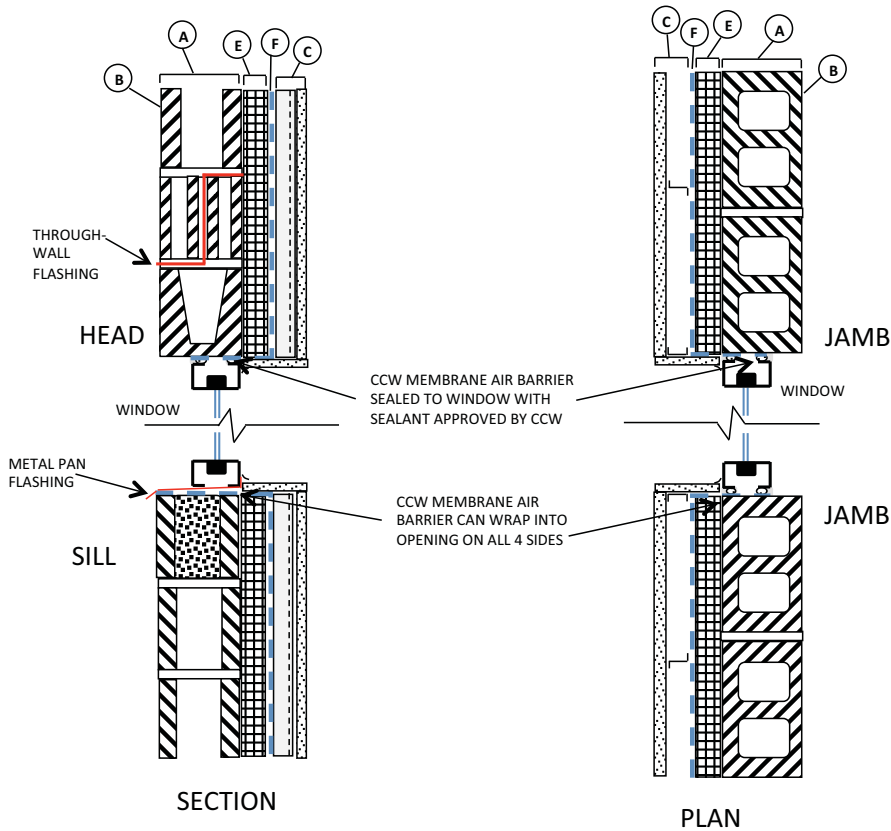
Layer	Zone 1	Zones 2, 3 & 4	Zone 5	Zone 6B	Zones 6A, 7 and 8
E	MIN 1" R2+ SHEATHE	MIN 1-½" R2+ SHEATHE	MIN 2" R2+ SHEATHE	MIN 2-½" R2+ SHEATHE	Not recommended
F	Fire-Resist 705 FR-A Fire-Resist Barritech NP Fire-Resist Barritech VP Foil-Grip 1402 Joints Aluma-Grip 701 flashings				

\*NOTE: Not recommended in Zone 6A when non-ventilated, absorbent cladding such as stucco is used. Use wall assembly X for this application.

# WALL INSULATION

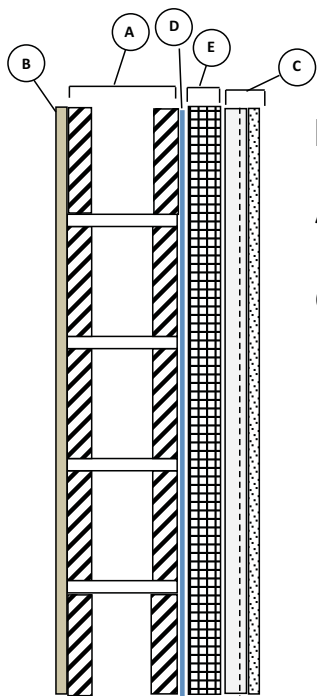
## Wall Assembly Design Guide

### NFPA 285 Window Opening Details – Wall Assembly XI



The window details for Wall Assembly XI require that the CCW membrane or flashing tape accessory wrap out into the opening, so it can be sealed to the window. This is shown in the drawings. Flashing and caulk details on the window are critical, since the primary water resistive barrier is the exterior surface of the wall.

**Wall Assembly XII**  
**Mass Wall with Interior Insulation, CCW Membrane on Wall**



**Mass Wall with Interior Insulation**

- A. CMU OR CONCRETE WALL
- B. EXTERIOR FINISH
- C. INTERIOR FINISH
- D. CCW MEMBRANE AIR BARRIER ON CMU OR CONCRETE
- E. R2+ SHEATHE
- F. CCW MEMBRANE AIR BARRIER OVER INTERIOR INSULATION (NOT USED)

This wall assembly is similar to Assembly XI, except Assembly XII has the CCW membrane installed on the interior surface of the concrete or CMU wall. CCW recommends the non-permeable products, Barritech NP or CCW-705 in warm, moist climates to provide added protection to the interior space from the prevailing damp exterior conditions. In this case, the membrane performs as both an air and vapor barrier. CCW recommends vapor-permeable Barritech VP in colder climates to allow drying potential to the exterior for possible interior condensation during winter conditions. In this case, the membrane performs as just an air barrier. In this wall assembly, since the CCW membrane is placed on the negative side of the wall assembly, the membrane cannot function as a water resistive barrier. The water resistive barrier in this type of wall assembly is the exterior surface of the wall. Due to potential for moisture accumulation indicated by WUFI simulation, CCW does not recommend this wall assembly for Zones 6A, 7 and 8.

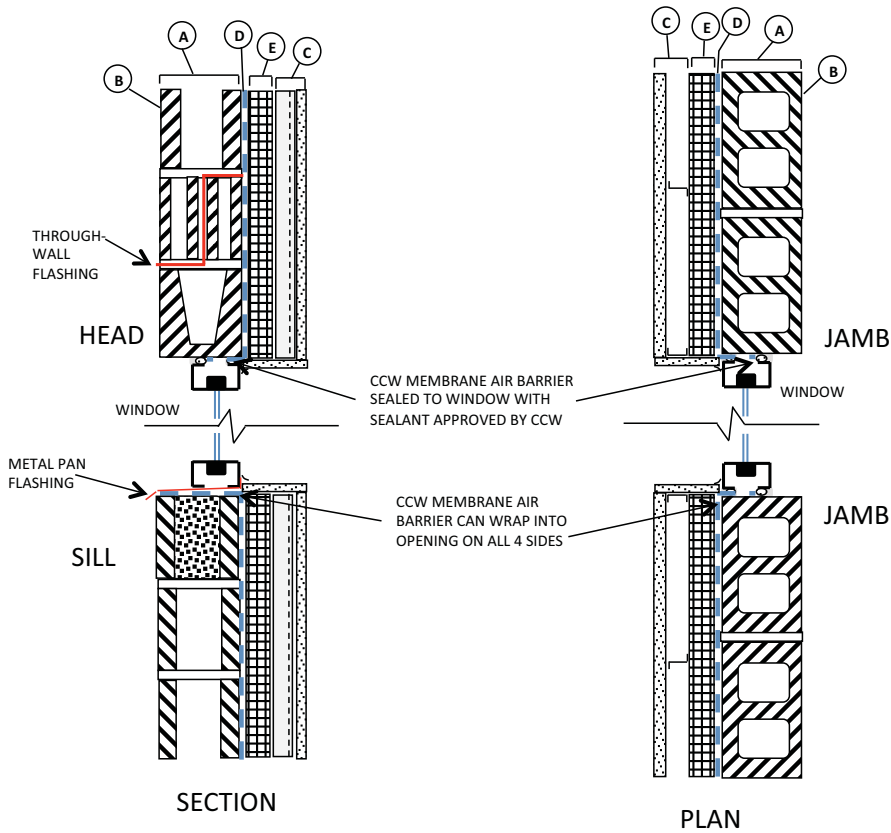
**Wall Assembly XII Insulation and CCW Membrane Options - IECC 2012 Compliance and Hygro-Thermal Performance**

Layer	Zone 1	Zone 2A and Zone 3A WH	Zones 2B, 2C, 3 (except WH) and Zone 4	Zone 5	Zone 6B	Zones 6A, 7 and 8
D	CCW-705 Fire-Resist 705 FR-A Fire-Resist Barritech NP Fire-Resist Barritech VP		Fire-Resist Barritech VP			Not Recommended
E	MIN 1" R2+ SHEATHE	MIN 1-½" R2+SHEATHE	MIN 1-½" R2+SHEATHE	MIN 2" R2+ SHEATHE	MIN 2-½" R2+ SHEATHE	

# WALL INSULATION

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### NFPA 285 Window Opening Details – Wall Assembly XII



Similar to Wall assembly XI, the window details for Wall Assembly XII require that the CCW membrane or flashing tape accessory wrap out into the opening, so that it can be sealed to the window. This is shown in the drawings. Flashing and caulk details on the window are critical, since the primary water resistive barrier is the exterior surface of the wall.

## NFPA 285 Table Of Substitutions: Wall Assemblies XI and XII

Wall Component	Material Options
<b>A. Base Wall</b> – Use 1 or 2	<ol style="list-style-type: none"> <li>1. Cast Concrete – minimum 8" thick</li> <li>2. Concrete Masonry Unit (CMU) – minimum 8" thick</li> </ol>
<b>B. Exterior Finish</b>	<ol style="list-style-type: none"> <li>1. Nothing</li> <li>2. Portland or Lime Stucco</li> <li>3. Any ASTM E84 Class A clear sealer</li> <li>4. Any ASTM E 84 Class A paint or exterior coating</li> </ol>
<b>C. Interior Finish</b>	Gypsum Sheathing, 5/8" Type X, interior grade. Installed directly over R2+ SHEATHE insulation or installed over metal hat or Z furring, maximum 2" deep air gap.
<b>D. CCW Membrane on interior side of base wall</b>	<ol style="list-style-type: none"> <li>1. CCW-705 with 702, 702 LV, 702 WB, CAV-GRIP, or Travel-Tack surface prep</li> <li>2. Fire-Resist CCW-705FR-A with 702, 702 LV, 702 WB, CAV-GRIP, or Travel-Tack surface prep</li> <li>3. Fire-Resist Barritech NP</li> <li>4. Fire-Resist Barritech VP</li> <li>5. None</li> </ol>
<b>E. Interior Insulation</b>	CCW R2+ SHEATHE, maximum 3-1/2" thickness
Insulation joint prep and attachment permitted with interior insulation	<ol style="list-style-type: none"> <li>1. CAV-GRIP or Travel-Tack may be used as an adhesive (application rate per Product Data Sheet) to attach R2+ SHEATHE to CCW membrane or to base wall surface.</li> <li>2. R2+ SHEATHE joints penetrations: use 4" Foil-Grip 1402 or Aluma-Grip 701 over board joints, minimum 9" width Aluma-Grip 701 wrapping openings and corners and minimum 9" width Aluma-Grip 701 covering transitions and terminations.</li> </ol>
<b>F. CCW Membrane over interior insulation</b>	<ol style="list-style-type: none"> <li>1. Fire-Resist CCW-705FR-A with 702, 702 LV, 702 WB, CAV-GRIP, or Travel-Tack surface prep</li> <li>2. Fire-Resist Barritech VP</li> <li>3. Fire-Resist Barritech NP</li> <li>4. None</li> </ol>

\* Note: CCW membrane is used either on the wall or over the insulation, not in both positions.

# WALL INSULATION

## Wall Assembly Design Guide

### References

ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

ASTM C1289 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials

ASTM E1354 Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

Owens Corning Commercial Complete™ Wall System; NFPA 285 Tested Wall Assemblies, Table 3, Printed February 2012

The Dow Chemical Company ICC-ES evaluation Report ESR-2142, Issued October 1, 2012

The Dow Chemical Company ICC-ES evaluation Report ESR-1659, Issued April 1, 2013

Priest & Associates Consulting LLC Engineering Report  
Engineering Extensions based on 12 NFPA 285 Tests  
Project Number 10123, Rev 8  
Prepared for Carlisle Coatings & Waterproofing, Inc.

International Code Council Evaluation Services  
AC-38 Acceptance Criteria for Water Resistive Barriers

International Code Council Evaluation Services  
AC-212 Acceptance Criteria for Water Resistive Coatings used as Water Resistive Barriers over Exterior Sheathing

International Building Code (IBC) 2006, 2009, 2012 and 2015

International Energy Conservation Code (IECC) 2006, 2009 and 2012

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2010 Energy Standard for Buildings Except Low-Rise Residential Buildings



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