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Does My Wall Assembly Have to Comply with NFPA 285?

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Air Barrier Systems
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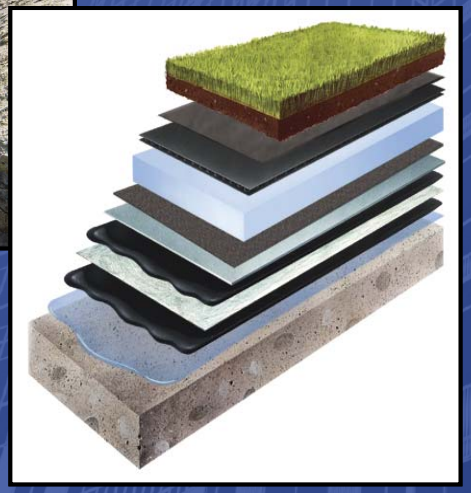
Sheet, Hot Rubber, Coatings
Roofing Systems
Vegetative, Cool Roofs, Maintenance Sys.
PERMAX Spray Polyurethane Foam
Walls, Roofs, Air Barriers



BUILDING ENVELOPE SYSTEMS®

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Agenda

- Definitions
- History
- Conducting NFPA 285
- Increased Demand and Code Adoption
- Designing an NFPA 285 Compliant Wall
- Future of NFPA 285

Definitions

Air Barrier:

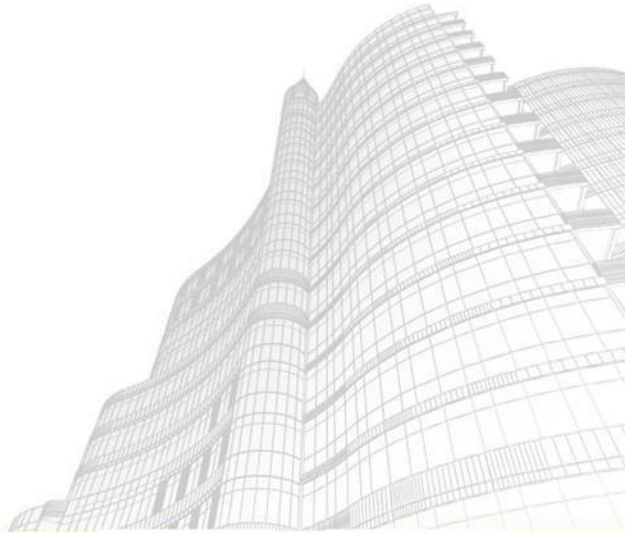
The components of a wall assembly installed to effectively resist air leakage through the building envelope.

- An air barrier should be considered a ***SYSTEM*** not a product.

Definitions

Continuous Insulation (CI):

A thermal resistant product installed continuously over a building envelope to eliminate thermal bridging.

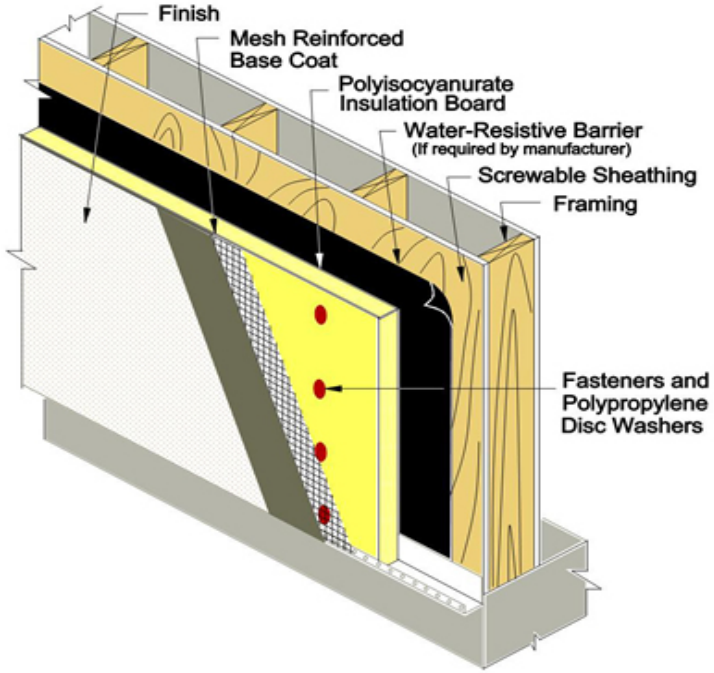


Definitions

EIFS: Exterior Insulation Finishing System

Light weight insulated waterproofing veneer

- Rigid insulation adhered to substrate with synthetic coating applied for weather protection

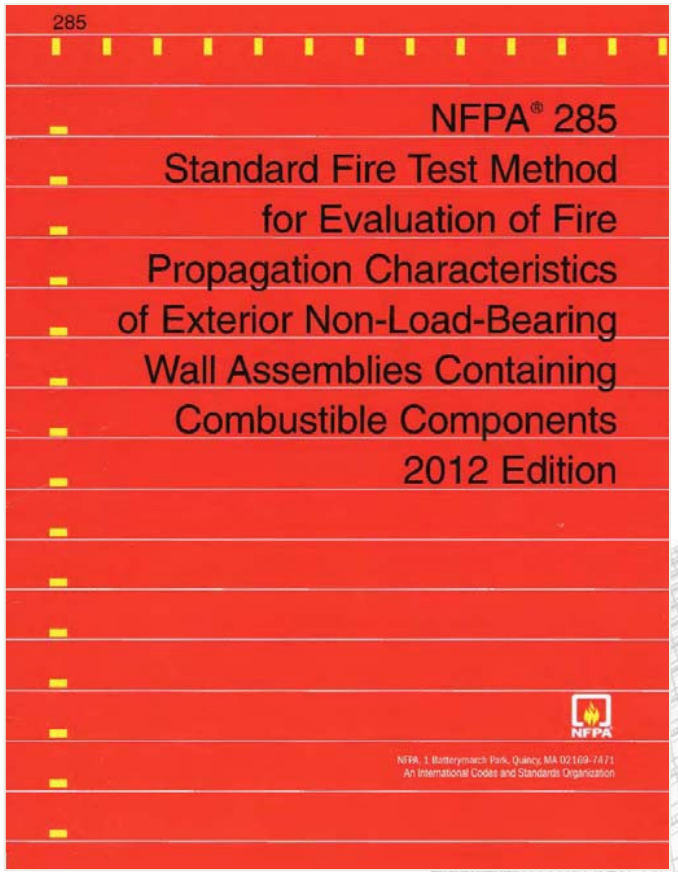


Source: Minnesota Lathe & Plaster Bureau

Definitions

NFPA 285:

Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multi-story Apparatus



NFPA 285 Test Document Cover

NFPA 285 Testing Emphasis

The purpose of requiring NFPA 285 compliance is to regulate combustible components in exterior wall assemblies of multi-story buildings, and limit fire spread to other floors or adjacent areas.

Source: National Institute of Standards and Technology

NFPA 285 Testing Emphasis

- Exterior face of the wall assembly
- Vertically within the combustible components from one story to the next

Source: AP Photo: Stephen Carr

NFPA 285 Testing Emphasis

- Interior surface of the wall assembly from one story to the next
- Laterally from fire origin to adjacent compartments or spaces

Source: AP Photo: Xinhua
Apartment building fire Shanghai, China

A Brief History

Exterior Insulation Finishing Systems (EIFS)

- Synthetic Stucco
- Light weight
- Insulated cladding
- Waterproofing veneer
- Popular in 1970's
- Highly flammable

Peabody Hotel Orland, Florida

Misconceptions: Foam is Dangerous

- 1997 International Building Code required NFPA 285 for foam plastic insulation on exterior walls.

- Internet searches are misleading.
  - Fires originating from the exterior [Monte Carlo exterior welding accident] are not common and therefore not the purpose of NFPA 285.

Source: ENR Construction

Numerous exterior wall plastic foam systems pass NFPA285
EIFS systems • Rigid Insulation • Spray Polyurethane Foam

A Brief History

2012 IBC Table 601: Fire Resistance Rating Requirements

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A[d]	B	A[d]	B	HT	A[d]	B
Primary structural frame[g] (see Section 202)	3[a]	2[a]	1	0	1	0	HT	1	0
Bearing Walls									
Exterior[f,g]	3	2	1	0	2	2	2	1	0
Interior	3[a]	2[a]	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions Exterior	See Table 602								
Nonbearing walls and partitions Interior[e]	0	0	0	0	0	0	Section 602.4.6	0	0
Floor construction and secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and secondary members (see Section 202)	$1^1/_2$[b]	1[b,c]	1[b,c]	0[c]	1[b,c]	0	HT	1[b,c]	0

Type I: Noncombustible Materials & Structure
All exterior and structural components require fire-rated assemblies.

Type II: Noncombustible Exterior & Components
Exterior walls, floors, and roof are composed of noncombustible materials.

Type III: Noncombustible Exterior:
Exterior walls = noncombustible materials & Interior walls = any material permitted by code

Type IV: Heavy Timber Construction: Exterior walls = noncombustible materials & Interior walls = solid or laminated wood without concealed spaces.

Type V: Combustible Construction: Structural elements, exterior walls, and interior walls are made from any materials permitted by code.

A Brief History

NFPA Testing

Source: "NFPA 285: What you Need to Know" by Jesse J. Beitel – JBED Summer 2012 issue

Standard Methods of Tests of Fire Resistance of Building Construction and Materials

- Also known as UBC 17-6 or UBC 26-4 as referenced in various codes prior to IBC adoption
- Full Scale 2 story fire test
- Purpose: analyze how an interior fire may alter flame and smoke propagation of an exterior when plastic insulation associated with EIFS is installed continuously in the wall cavity

A Brief History

NFPA Testing

Source: FDNY training program

Results:

- New understanding of flame and smoke spread on exterior walls when fire originates from interior spaces.
- New emphasis on combustible components in exterior walls
- EIFS assemblies and other foam plastic assemblies able to pass NFPA testing and be safely installed on non combustible construction types I, II, III, and IV
- Added to Uniform Building Code (UBC) 1988

A Brief History

NFPA 285 Assembly Test

Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multi-story Apparatus

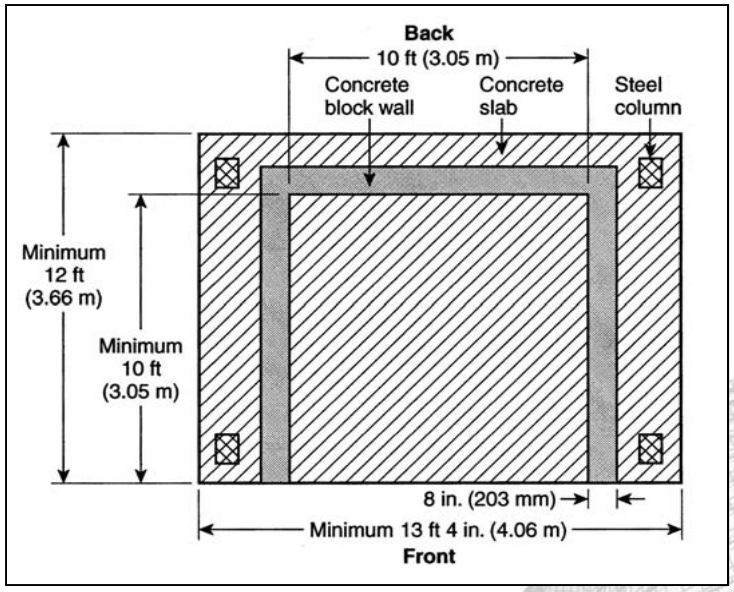
Fire test c/o Henry Company

NFPA 285 Assembly Test

Conducting NFPA 285

NFPA 285 Test Apparatus

- Simulated 2-story
- 13’-0” x 12’-0” x 18’-0”
- Two gas-fired burners



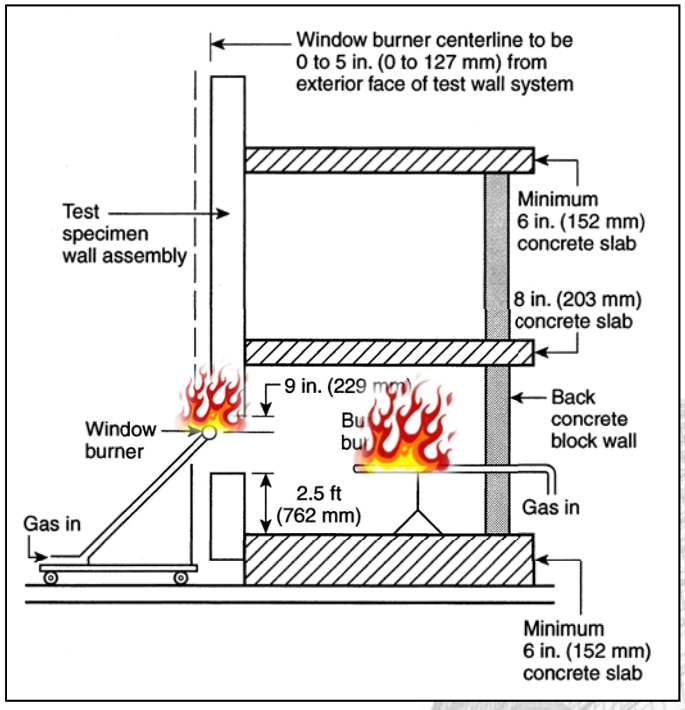
Plan View of Testing Apparatus

NFPA 285 Assembly Test

Conducting NFPA 285

NFPA 285 Test Apparatus

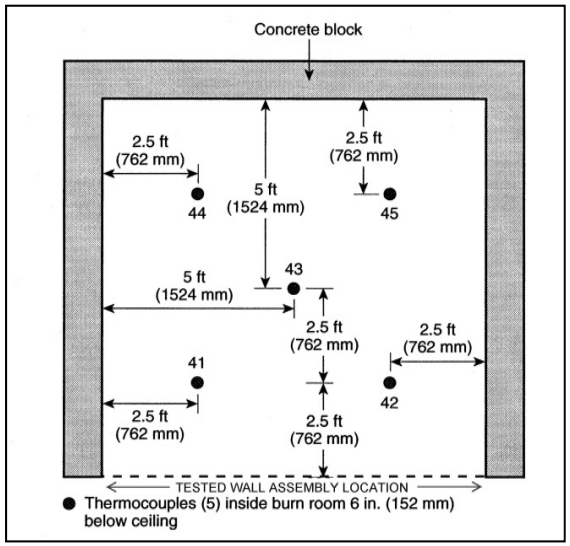
- Gas burner #1
  - Interior of first story
- Gas burner #2
  - Window rough opening



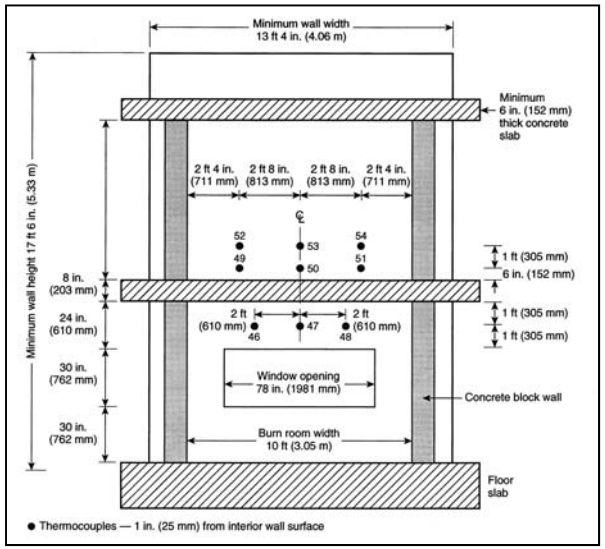
Section View of Testing Apparatus

NFPA 285 Assembly Test

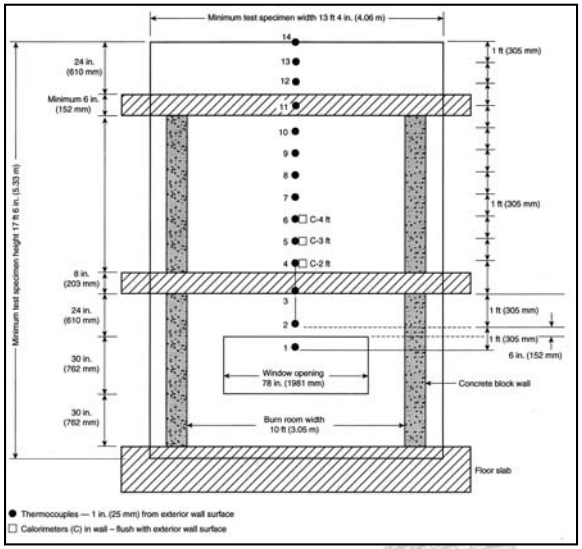
Conducting NFPA 285



Plan View



Interior Elevation

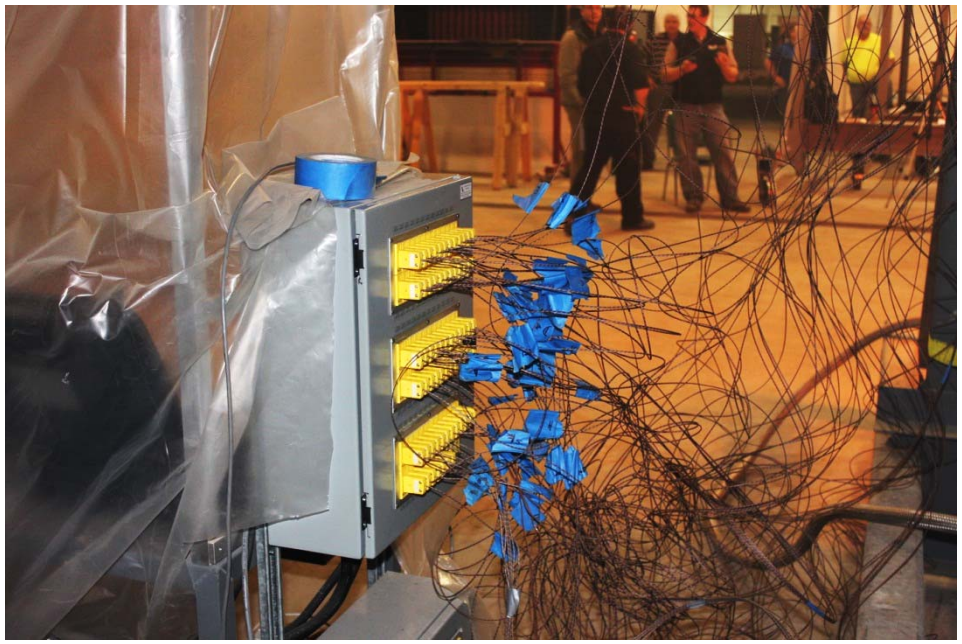


Exterior Elevation

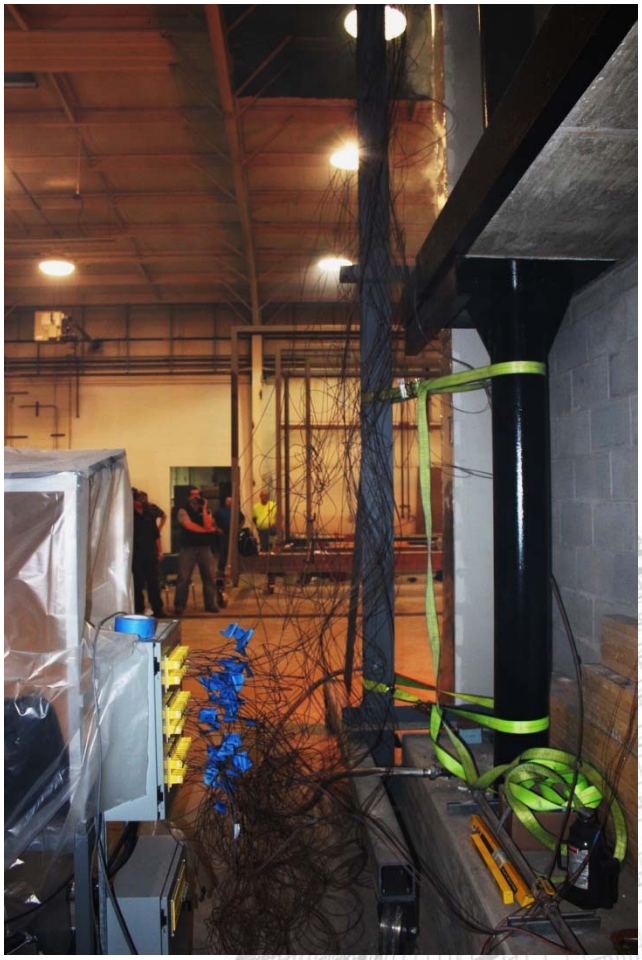
A passing result is based upon visual observations and temperatures taken at various thermocouples during the allotted time.

NFPA 285 Assembly Test

Conducting NFPA 285

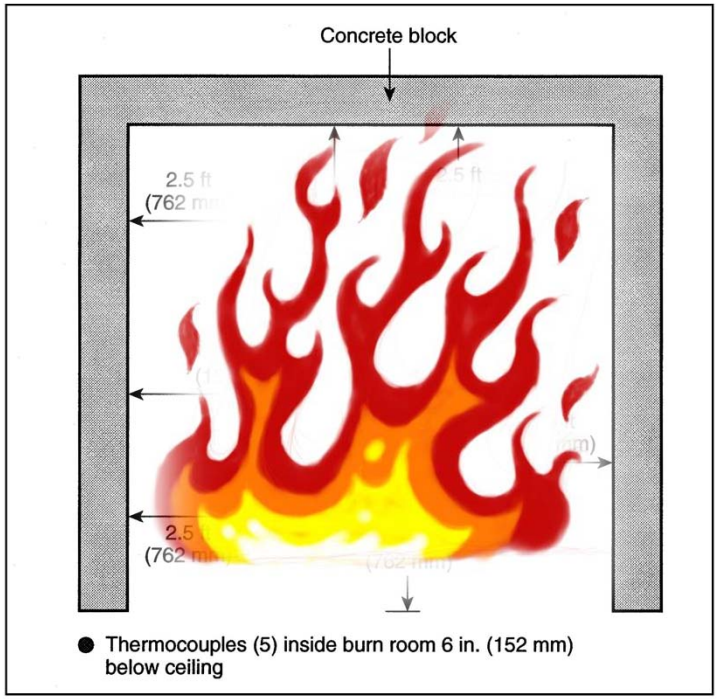


Closer view of thermocouples associated with temperature observation and recordings



NFPA 285 Assembly Test

Conducting NFPA 285

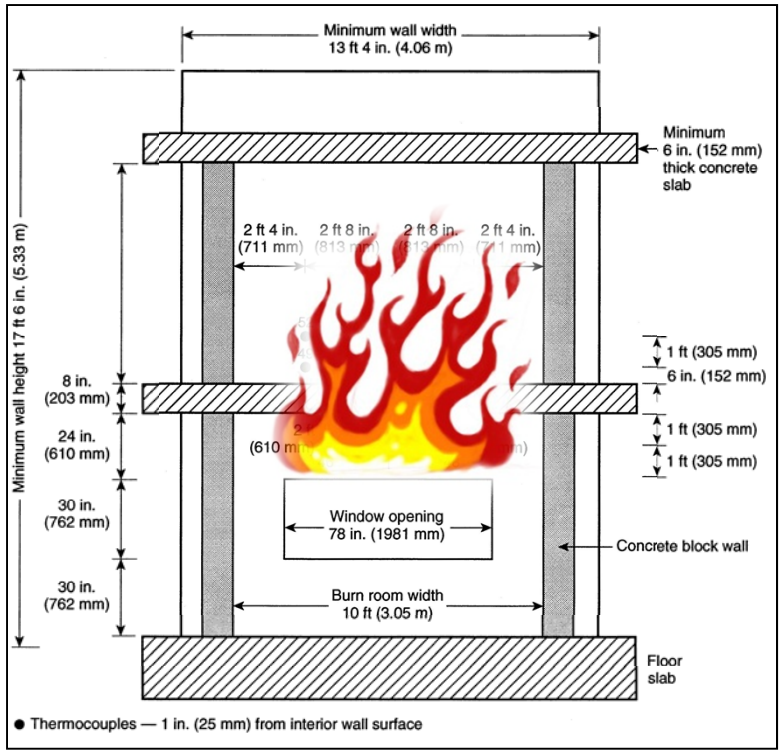


Plan View

- Flames shall not extend vertically or horizontally into the wall cavity.
- Must stay within predetermined temperatures
- Flames cannot occur beyond side walls of testing

NFPA 285 Assembly Test

Conducting NFPA 285

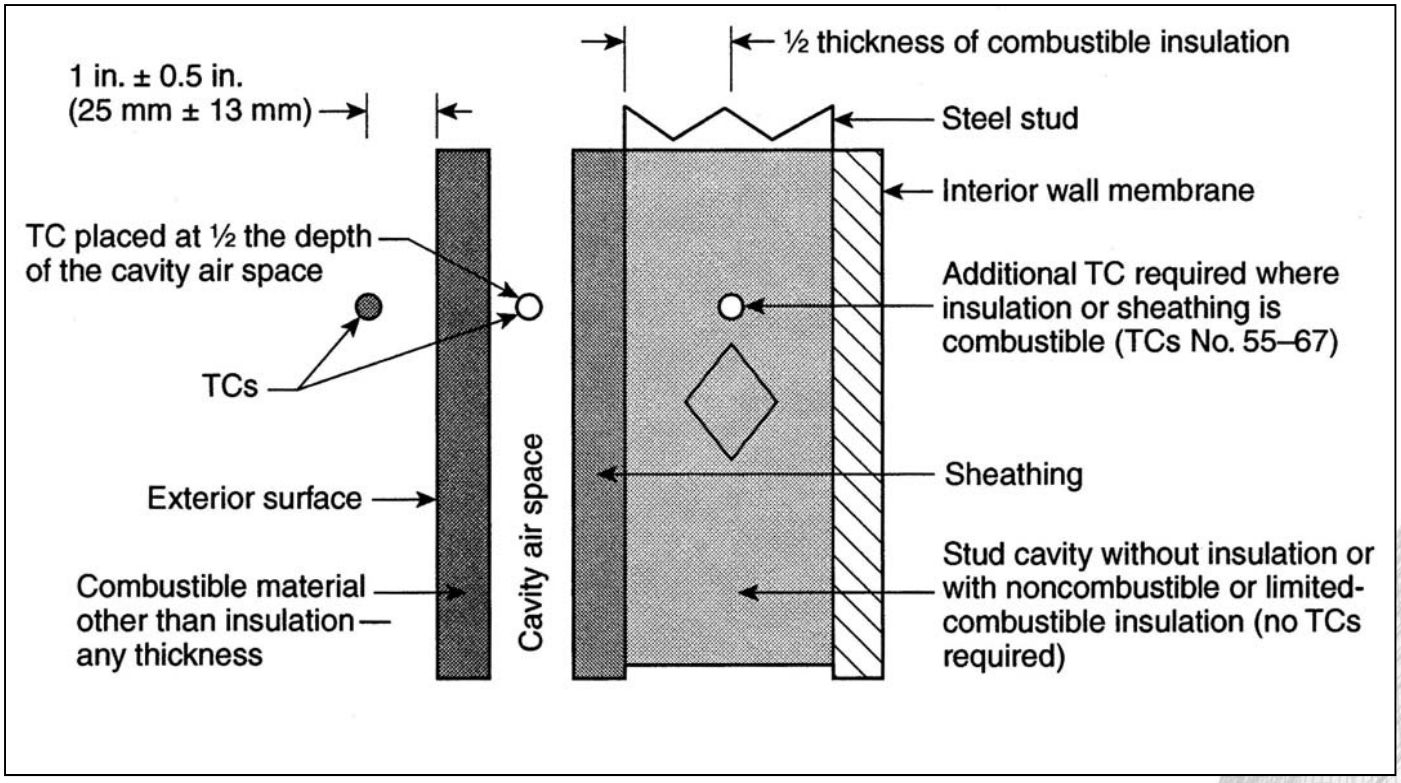


Front Elevation

- Flames must not extend greater than 10’-0” above rough opening
- Flames must not extend greater than 5’-0” horizontally from center of rough opening
- Flames can not occur in interior of second story

NFPA 285 Assembly Test

Conducting NFPA 285

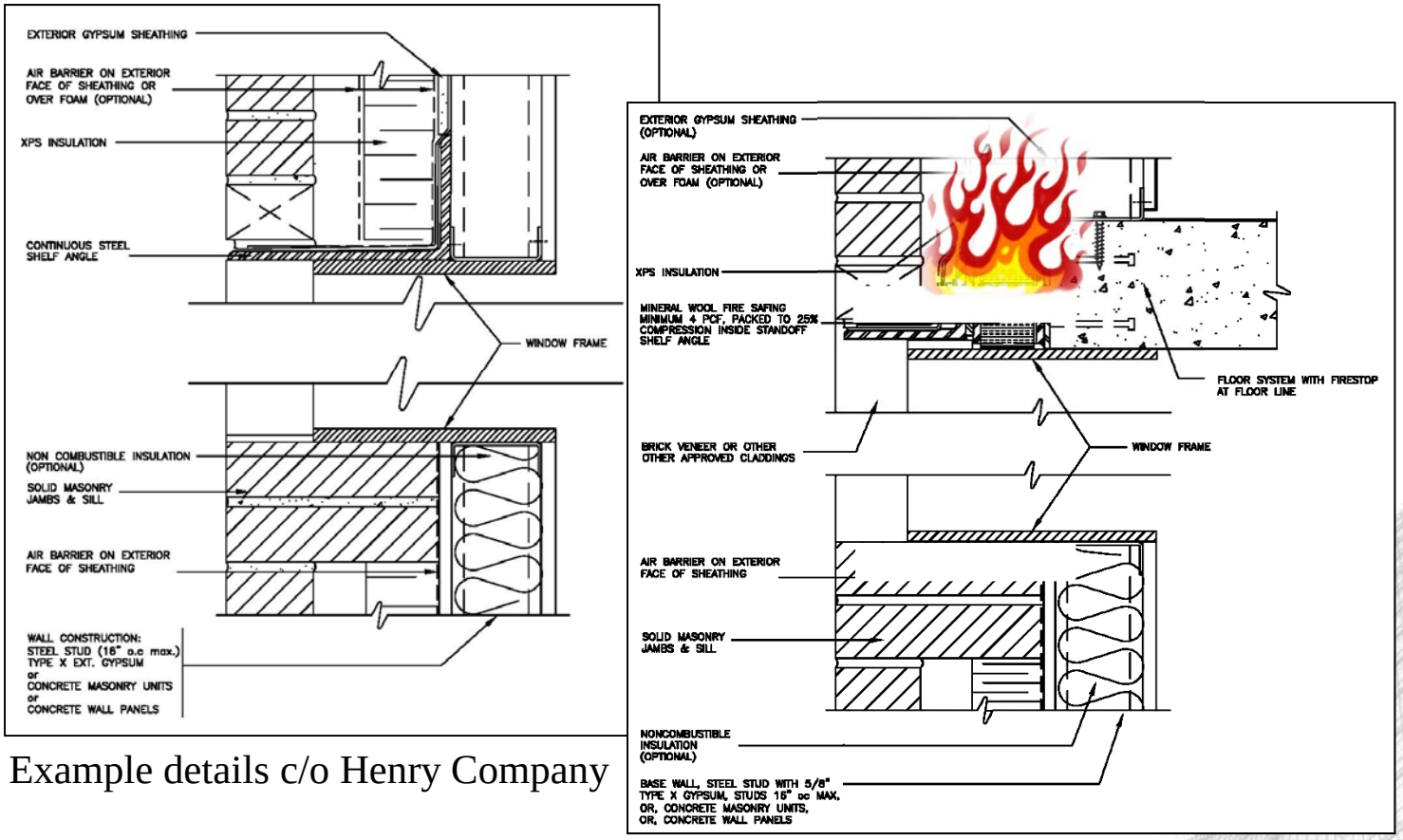


Example Wall Assembly courtesy of NFPA 285 2012 Edition

Assembly Test

NFPA 285 Assembly Test

Conducting NFPA 285



Example details c/o Henry Company

Assembly Test

NFPA 285 Assembly Test

Conducting NFPA 285

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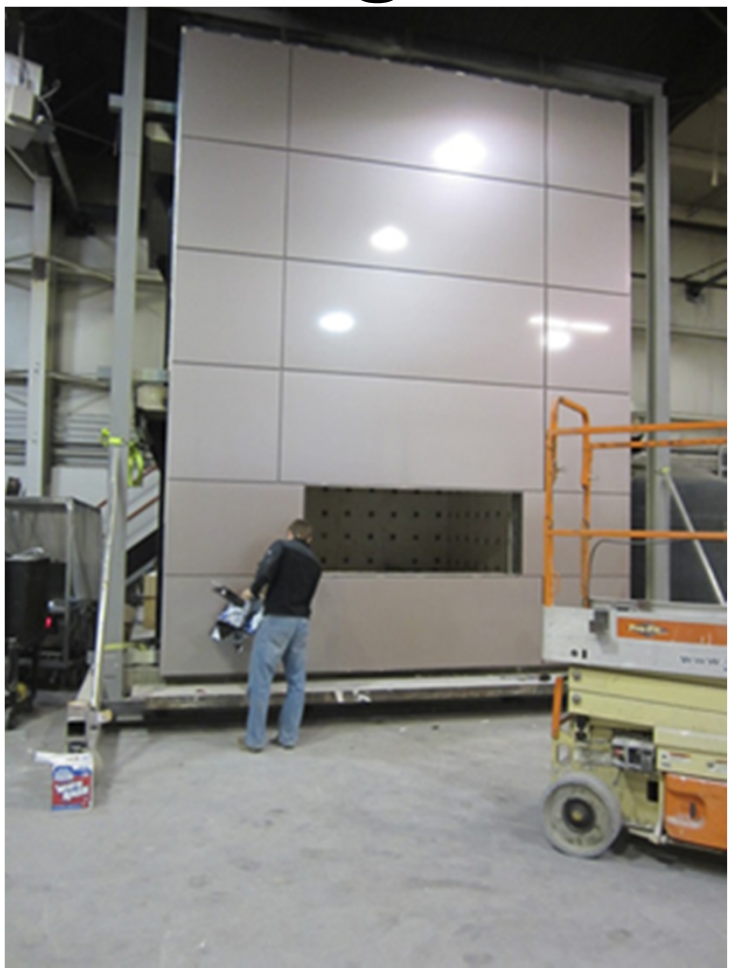
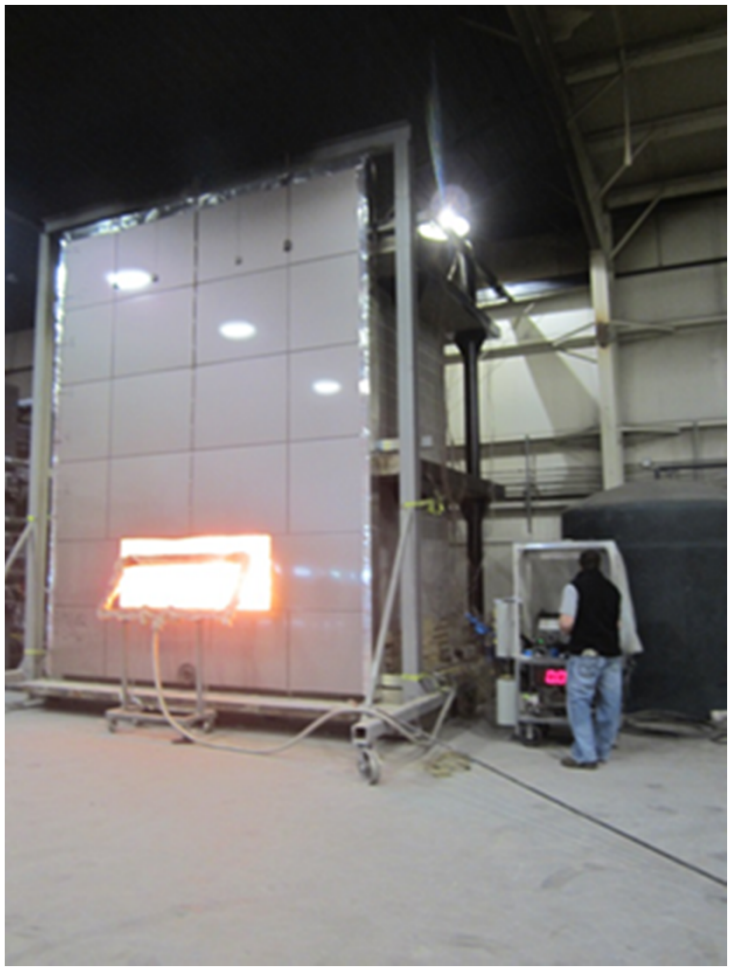


NFPA 285 Assembly Test

Conducting NFPA 285



NFPA 285 Assembly Test

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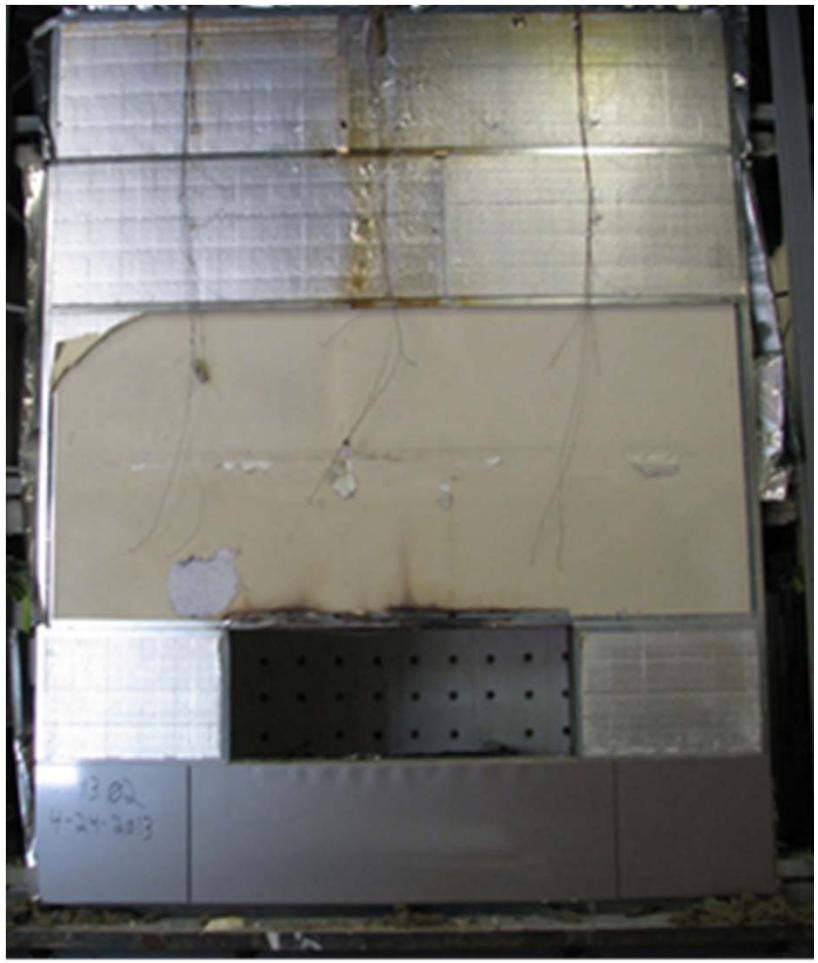


NFPA 285 Assembly Test

Conducting NFPA 285

NFPA 285 Assembly Test

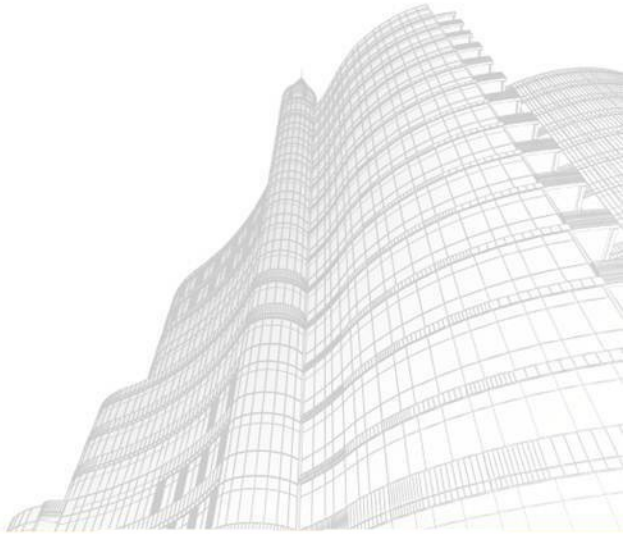
Engineering Judgments

- Also known as Engineering Analysis/Engineering Evaluation
- In depth investigation of a product substitution in a currently passing assembly
  - For example: A licensed consulting engineer specializing in fire code safety may authorize a ‘one off’ from an NFPA 285 passing wall assembly based off of substantial submitted data and evaluation.

ASTM E84–*Surface Burning Characteristics*
ASTM E1354–*Cone Calorimeter Test*
ICC ES Reports
ASTM E119/UL 263/IBC 703.2
NFPA 268–*Radiant Ignitibility of Assemblies*

Increased Demand and Code Adoption

2012 International Building Code (IBC)
2012 International Residential Code (IRC)
2012 International Energy Code Council
ASHRAE 90.1
LEED v4

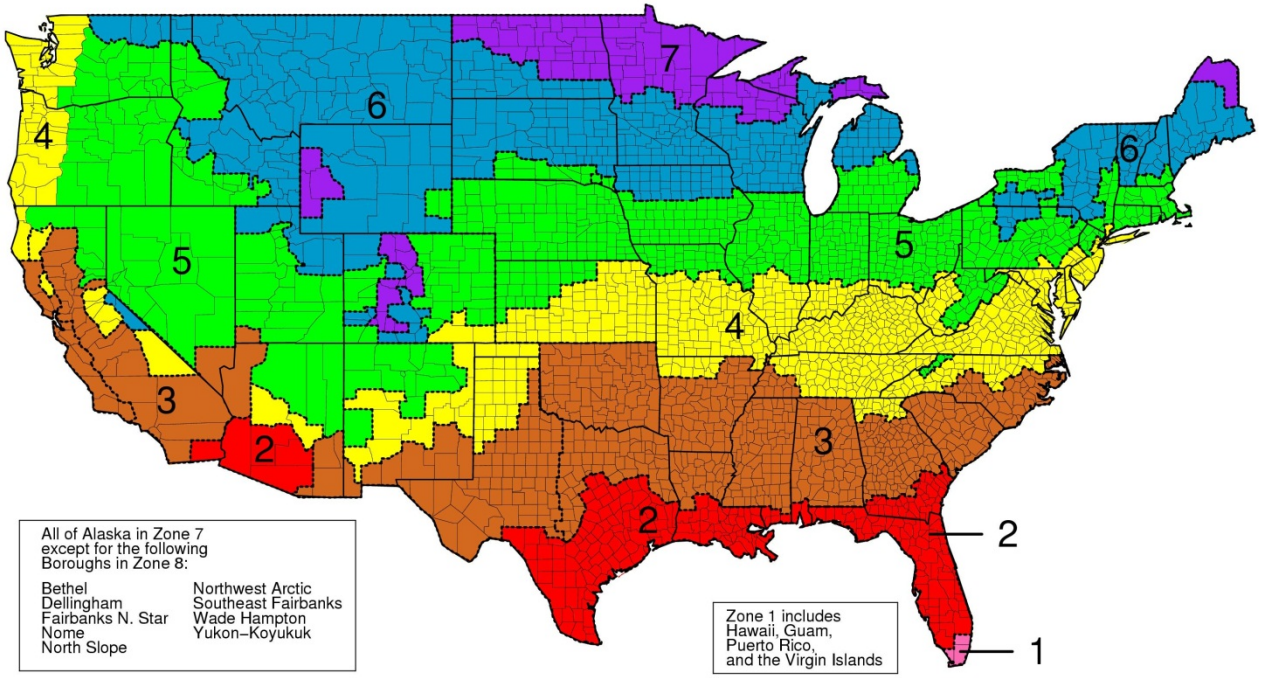


Increased Demand and Code Adoption

International Building Code Section	Adopted
Foam Plastic Insulation 2603.5.5	2000
Metal Composite Materials (MCM) 1407.10.4	2003
Fiber Reinforced Polymer (FRP) section 2612.6	2009
Exterior Wall Coverings (Fire Blocking) 718.2.6	2012
Weather Resistive Barrier (WRB) 1403.5	2012
High Pressure Laminates (HPL) 1409.10.4	2012
Mechanical Equipment Screens (Roof) 1509.6.2	2012

2012 International Building Code References
7 Sections Triggering NFPA 285
Compliant Wall Assemblies.

Increased Demand and Code Adoption



2012 IBC Requires Air Barriers in Climate Zones 4-8
2012 IRC Requires Air Barriers in ALL Climate Zones

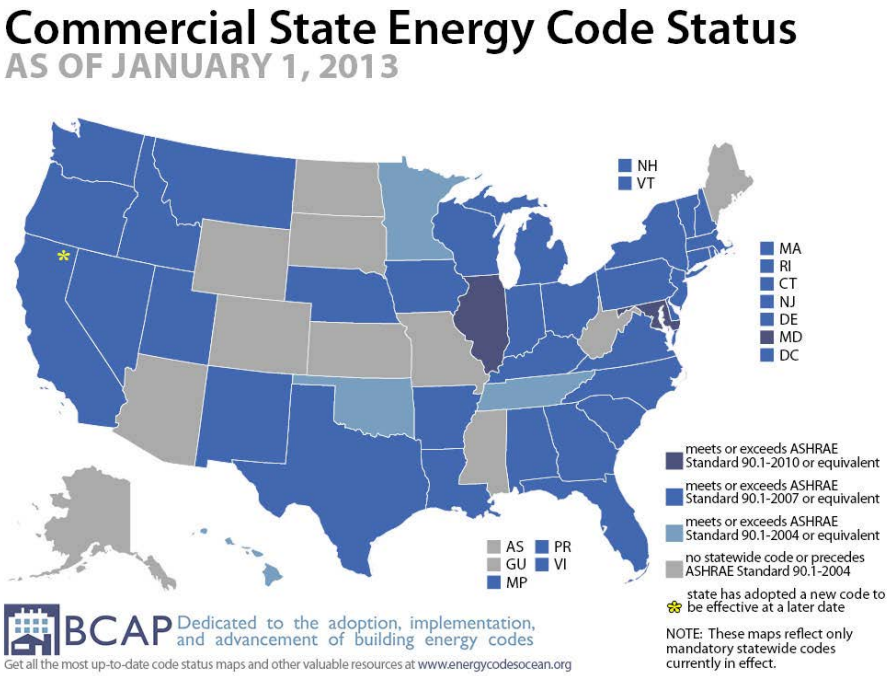
Increased Demand and Code Adoption

Building Codes Require Continuous Air Barriers

ASHRAE 90.1 2010

Many states follow ASHRAE guidelines even where 2012 IBC/IRC and 2012 IECC are not yet adopted

- 90.1-2010 exempts semi-heated spaces in climate Zones 1 through 6 in addition to single wythe concrete buildings in Climate Zone 2B



Source: Air Barrier Association of America (www.airbarrier.org)

Increased Demand and Code Adoption

Building Codes Require Continuous Air Barriers

LEEDv4 Energy & Atmosphere

- Minimum energy performance to comply with ASHRAE 90.1 2010
  - Installation of an air barrier is now a prerequisite
  - No longer able to obtain LEED points from installing an air barrier.

Increased Demand and Code Adoption

Climate Zone	1		2		3		4 Except Marine		5 and Marine 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal buildings (with R-5 thermal blocs)	R-19 + R-11LS	R-19 + R-11LS	R-19 + R-11LS	R-19 + R-11LS	R-19 + R-11LS	R-19 + R-11LS	R-19 + R-11LS	R-19 + R-11LS	R-19 + R-11LS	R-19 + R-11LS	R-25 + R-11LS	R-25 + R-11LS	R-30 + R-11LS	R-30 + R-11LS	R-30 + R-11LS	R-30 + R-11LS
Arric and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Walls, Above Grade																
Mass	R-5.7ci	5.7ci	5.7ci	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Meal buildng	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-19.5ci	R-13 + R-13ci	R-13 + R-19.5ci
Metal framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-15.6ci or R-20 + R-10ci	R-13 + R-15.6ci or R-20 + R-10ci
Walls, Below Grade																
Below-grade wall	NR	NR	NR	NR	NR	NR	R-7ci	R-7ci	R-7ci	R-7ci	R-7ci	R-7ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30
Slab-on-Grade Floors																
Unheated slabs	NR	NR	NR	NR	NR	NR	R-10 for 24" Below	R-10 for 24" Below	R-10 for 24" Below	R-10 for 24" Below	R-10 for 24" Below	R-15 for 24" Below	R-15 for 24" Below	R-15 for 24" Below	R-15 for 24" Below	R-20 for 24" Below
Heated slabs	R-7.5 for 12" Below	R-7.5 for 12" Below	R-7.5 for 12" Below	R-7.5 for 12" Below	R-10 for 24" Below	R-10 for 24" Below	R-15 for 24" Below	R-15 for 24" Below	R-15 for 36" Below	R-15 for 36" Below	R-15 for 36" Below	R-20 for 48" Below	R-20 for 48" Below	R-20 for 48" Below	R-20 for 48" Below	R-20 for 48" Below
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or sliding	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

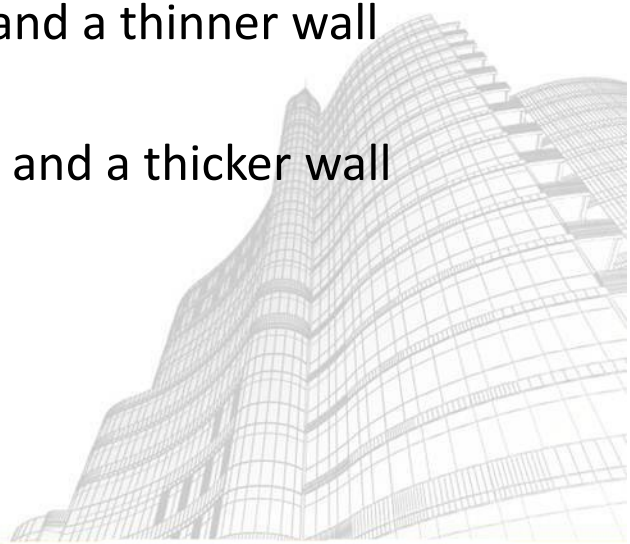
Table C402.2 Opaque Thermal Envelope Requirements

Increased Demand and Code Adoption

Increased Demand and Code Adoption

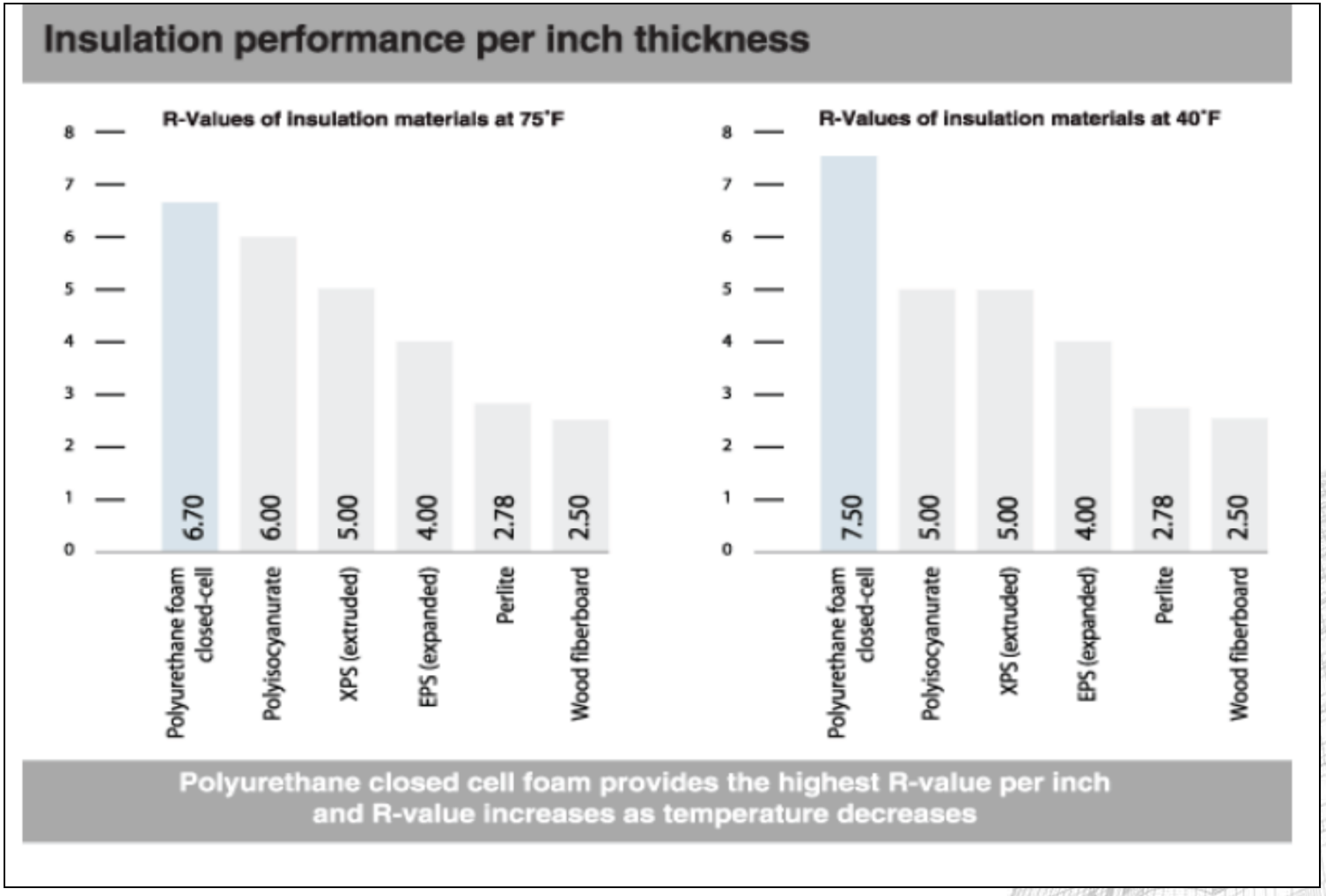
Considerations when choosing continuous insulation (CI)

- Types of insulation
- Location of insulation
  - Permeability
  - Moisture resistance for exterior applications
- Minimum R-Value CI requirements
  - Thickness of wall:
    High R-value/inch = less insulation required and a thinner wall assembly.
  - Low R-value/inch = more insulation required and a thicker wall assembly.
- Dew point location
- Flammability



Increased Demand and Code Adoption

Considerations when choosing continuous insulation (CI)

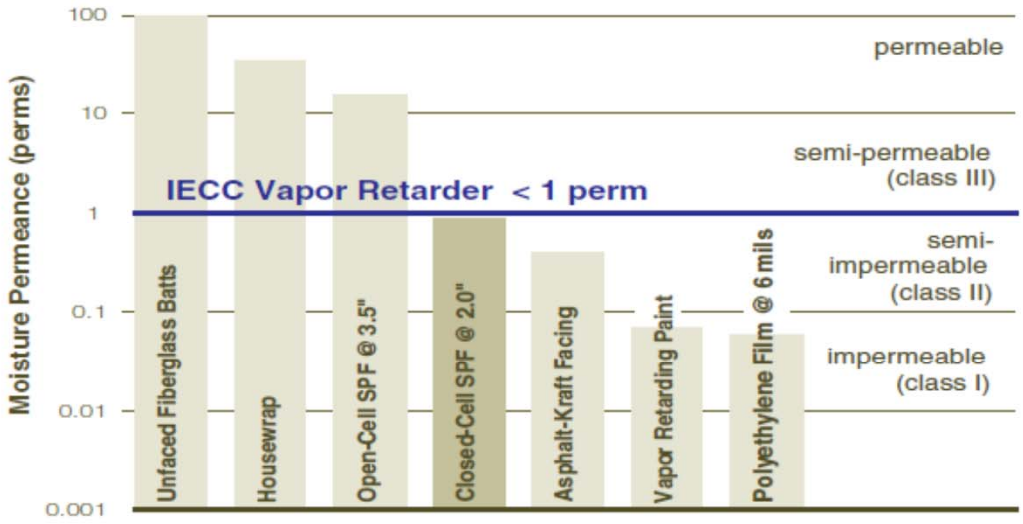


Honeywell Closed Cell Spray Polyurethane Foam Installation Facts, June 2007

Increased Demand and Code Adoption

Considerations when choosing continuous insulation (CI)

Integral Vapor Retarder



Fibrous insulations allow free movement of water vapor, and alone, do not serve as a vapor retarder. Closed-cell foam, when sprayed to a thickness of about 2 inches, will provide a vapor retarder of 1 perm or less, meeting IBC and IRC building code requirements for vapor retarders.

"At 1 perm, closed-cell SPF is semi-impermeable, enabling it to allow for controlled breathing and drying. SPF uniformity and consistency enables it to resist passage of vapor equally well in all directions." David Frame, Journal of Light Construction

Honeywell Closed Cell Spray Polyurethane Foam Installation Facts, June 2007

Designing an NFPA 285 Compliant Wall

NFPA 285: *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multi-story Apparatus.*

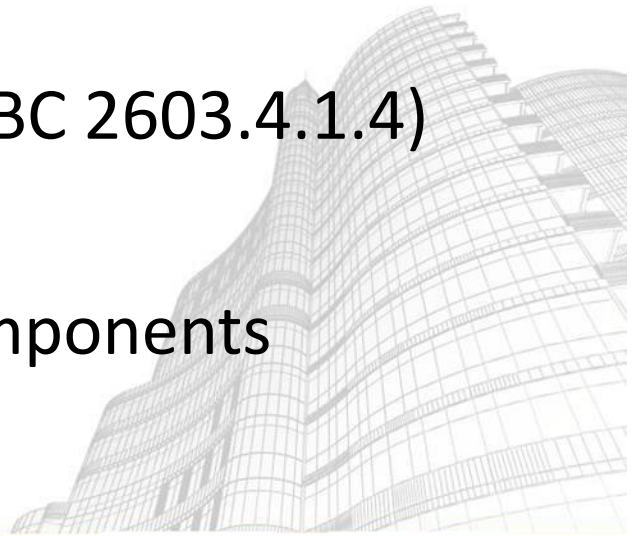
Designing an NFPA 285 Compliant Wall

EXCEPTIONS:

- Load bearing walls
- One story structures less than 40’-0”

  (2012 IBC Section 1403.5)
- One story structures equipped with an automatic sprinkler

  (2012 IBC Section 2603.5.5/ 2012 IBC 2603.4.1.4)
- Type V construction
- Types I-IV and No Combustible Components



Designing an NFPA 285 Compliant Wall

Available Selection Charts

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1 layer – ⅝-inch thick, Type X, Gypsum wallboard on interior, installed over steel studs: minimum 3⅝-inch depth, minimum 20-gauge at a maximum of 24-inch OC with lateral bracing every 4 ft. vertically
Floor-line Fire-stopping	4 lb/cu ft. mineral wool (e.g. Thermafiber or Roxul) in each stud cavity at each floor-line – attached with Z-clips or equivalent
Cavity Insulation – Use either 1 or 2	1 – None 2 – Any noncombustible insulation (faced or unfaced)
Interior vapor membrane (optional) – Use either 1 or 2	1 – None 2 – One layer of maximum 6-mil thick polyethylene film
Exterior sheathing – Use either 1 or 2	1 – ½-inch thick, exterior type gypsum sheathing 2 – ⅝-inch thick, Type X, exterior type gypsum sheathing
Air barrier membrane applied to gypsum sheathing – Select from list	1 - None 2 - Air-Bloc® 21FR 3 - Air-Bloc® 31MR 4 - Air-Bloc® 32MR 5 – Air-Bloc® 33MR 6 - BlueskinVP™ 160 7 - Metal Clad™
Exterior insulation	Extruded Polystyrene Foam Insulation (XPS) - Type IV per ASTM C578 – Maximum of 3-inch thickness On insulation joints, asphalt flashing tape such as Henry® Blueskin® SA or Butyl-based flashing tape – max. 4-inch width can be used.
Exterior Veneer – Use either 1, 2, 3, 4, 5 or 6	1 – Brick - Standard nominal 4-inch thick, clay brick. Brick installed with standard type veneer anchors at maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 2 – Concrete – 2 inches thick or greater. Maximum 2-inch air gap between exterior insulation and concrete. 3 – Concrete masonry units – 4 inches thick or greater. Maximum 2-inch air gap between exterior insulation and CMU. 4 – Stone veneer – Minimum 2-inch thick, Limestone or natural stone veneer or minimum 1-1/2 inch thick cast artificial stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

Product manufacturers offer publicly published literature containing a list of products to choose from including the substrate, air barrier, insulation, cladding, etc. that can be used interchangeably and still comply with NFPA 285.

Designing an NFPA 285 Compliant Wall

Available Selection Charts

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1 layer – ⅝-inch thick, Type X, Gypsum wallboard on interior, installed over steel studs: minimum 3⅝-inch depth, minimum 20-gauge at a maximum of 24-inch OC with lateral bracing every 4 ft. vertically
Floor-line Fire-stop	
Cavity Insulation – or 2	
Interior vapor mem (optional) – Use eit	
Exterior sheathing - 1 or 2	
Air barrier membra to gypsum sheathir from list	4 - Air-Bloc® 32MR 5 – Air-Bloc® 33MR 6 - BlueskinVP™ 160 7 - Metal Clad™
Exterior insulation	Extruded Polystyrene Foam Insulation (XPS) - Type IV per ASTM C578 – Maximum of 3-inch thickness On insulation joints, asphalt flashing tape such as Henry® Blueskin® SA or Butyl-based flashing tape – max. 4-inch width can be used.
Exterior Veneer – Use either 1, 2, 3, 4, 5 or 6	1 – Brick - Standard nominal 4-inch thick, clay brick. Brick installed with standard type veneer anchors at maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 2 – Concrete – 2 inches thick or greater. Maximum 2-inch air gap between exterior insulation and concrete. 3 – Concrete masonry units – 4 inches thick or greater. Maximum 2-inch air gap between exterior insulation and CMU. 4 – Stone veneer – Minimum 2-inch thick, Limestone or natural stone veneer or minimum 1-1/2 inch thick cast artificial stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

<u>Step 1:</u>
Select Base Wall System

Designing an NFPA 285 Compliant Wall

Available Selection Charts

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1 layer – ⅝-inch thick, Type X, Gypsum wallboard on interior, installed over steel studs: minimum 3⅝-inch depth, minimum 20-gauge at a maximum of 24-inch OC with lateral bracing every 4 ft. vertically
Floor-line Fire-stopping	4 lb/cu ft. mineral wool (e.g. Thermafiber or Roxul) in each stud cavity at each floor-line – attached with Z-clips or equivalent
Cavity Insulation – [illegible] or 2	
Interior vapor mem[illegible] (optional) – Use either 1 or 2	2 – One layer of maximum 6-mil thick polyethylene film
Exterior sheathing – Use either 1 or 2	1 – ½-inch thick, exterior type gypsum sheathing 2 – ⅝-inch thick, Type X, exterior type gypsum sheathing
Air barrier membrane applied to gypsum sheathing – Select from list	1 - None 2 - Air-Bloc® 21FR 3 - Air-Bloc® 31MR 4 - Air-Bloc® 32MR 5 – Air-Bloc® 33MR 6 - BlueskinVP™ 160 7 - Metal Clad™
Exterior insulation	Extruded Polystyrene Foam Insulation (XPS) - Type IV per ASTM C578 – Maximum of 3-inch thickness On insulation joints, asphalt flashing tape such as Henry® Blueskin® SA or Butyl-based flashing tape – max. 4-inch width can be used.
Exterior Veneer – Use either 1, 2, 3, 4, 5 or 6	1 – Brick - Standard nominal 4-inch thick, clay brick. Brick installed with standard type veneer anchors at maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 2 – Concrete – 2 inches thick or greater. Maximum 2-inch air gap between exterior insulation and concrete. 3 – Concrete masonry units – 4 inches thick or greater. Maximum 2-inch air gap between exterior insulation and CMU. 4 – Stone veneer – Minimum 2-inch thick, Limestone or natural stone veneer or minimum 1-1/2 inch thick cast artificial stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

| Floor-line Fire-stopping | 4 lb/cu ft. mineral wool (e.g. Thermafiber or Roxul) in each stud cavity at each floor-line – attached with Z-clips or equivalent |

Step 2:

Select Interior Components

- Fire Stopping

Designing an NFPA 285 Compliant Wall

Available Selection Charts

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1 layer – ⅝-inch thick, Type X, Gypsum wallboard on interior, installed over steel studs: minimum 3⅝-inch depth, minimum 20-gauge at a maximum of 24-inch OC with lateral bracing every 4 ft. vertically
Floor-line Fire-stopping	4 lb/cu ft. mineral wool (e.g. Thermafiber or Roxul) in each stud cavity at each floor-
Cavity Insulation – Use either 1 or 2	1 – None 2 – Any noncombustible insulation (faced or unfaced)
Interior vapor membrane (optional) – Use either 1 or 2	2 – One layer of maximum 6-mil thick polyethylene film
Exterior sheathing – Use either 1 or 2	1 – ½-inch thick, exterior type gypsum sheathing 2 – ⅝-inch thick, Type X, exterior type gypsum sheathing
Air barrier membrane applied to gypsum sheathing – Select from list	1 - None 2 - Air-Bloc® 21FR 3 - Air-Bloc® 31MR 4 - Air-Bloc® 32MR 5 – Air-Bloc® 33MR 6 - BlueskinVP™ 160 7 - Metal Clad™
Exterior insulation	Extruded Polystyrene Foam Insulation (XPS) - Type IV per ASTM C578 – Maximum of 3-inch thickness On insulation joints, asphalt flashing tape such as Henry® Blueskin® SA or Butyl-based flashing tape – max. 4-inch width can be used.
Exterior Veneer – Use either 1, 2, 3, 4, 5 or 6	1 – Brick - Standard nominal 4-inch thick, clay brick. Brick installed with standard type veneer anchors at maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 2 – Concrete – 2 inches thick or greater. Maximum 2-inch air gap between exterior insulation and concrete. 3 – Concrete masonry units – 4 inches thick or greater. Maximum 2-inch air gap between exterior insulation and CMU. 4 – Stone veneer – Minimum 2-inch thick, Limestone or natural stone veneer or minimum 1-1/2 inch thick cast artificial stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

Cavity Insulation – Use either 1 or 2 | 1 – None
2 – Any noncombustible insulation (faced or unfaced)

Step 3:

Select Interior Components

- Cavity Insulation

Designing an NFPA 285 Compliant Wall

Available Selection Charts

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1 layer – ⅝-inch thick, Type X, Gypsum wallboard on interior, installed over steel studs: minimum 3⅝-inch depth, minimum 20-gauge at a maximum of 24-inch OC with lateral bracing every 4 ft. vertically
Floor-line Fire-stopping	4 lb/cu ft. mineral wool (e.g. Thermafiber or Roxul) in each stud cavity at each floor-
Cavity Insulation – I or 2	
Interior vapor mem (optional) – Use eit	
Exterior sheathing – Use either 1 or 2	1 – ½-inch thick, exterior type gypsum sheathing 2 – ⅝-inch thick, Type X, exterior type gypsum sheathing
Air barrier membrane applied to gypsum sheathing – Select from list	1 - None 2 - Air-Bloc® 21FR 3 - Air-Bloc® 31MR 4 - Air-Bloc® 32MR 5 – Air-Bloc® 33MR 6 - BlueskinVP™ 160 7 - Metal Clad™
Exterior insulation	Extruded Polystyrene Foam Insulation (XPS) - Type IV per ASTM C578 – Maximum of 3-inch thickness On insulation joints, asphalt flashing tape such as Henry® Blueskin® SA or Butyl-based flashing tape – max. 4-inch width can be used.
Exterior Veneer – Use either 1, 2, 3, 4, 5 or 6	1 – Brick - Standard nominal 4-inch thick, clay brick. Brick installed with standard type veneer anchors at maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 2 – Concrete – 2 inches thick or greater. Maximum 2-inch air gap between exterior insulation and concrete. 3 – Concrete masonry units – 4 inches thick or greater. Maximum 2-inch air gap between exterior insulation and CMU. 4 – Stone veneer – Minimum 2-inch thick, Limestone or natural stone veneer or minimum 1-1/2 inch thick cast artificial stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

Interior vapor membrane (optional) – Use either 1 or 2	1 – None 2 – One layer of maximum 6-mil thick polyethylene film

Step 4:

Select Interior Components

- Optional Vapor Barrier

Designing an NFPA 285 Compliant Wall

Available Selection Charts

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1 layer – ⅝-inch thick, Type X, Gypsum wallboard on interior, installed over steel studs: minimum 3⅝-inch depth, minimum 20-gauge at a maximum of 24-inch OC with lateral bracing every 4 ft. vertically
Floor-line Fire-stopping	4 lb/cu ft. mineral wool (e.g. Thermafiber or Roxul) in each stud cavity at each floor-line – attached with Z-clips or equivalent
Cavity Insulation – (or 2	
Interior vapor mem (optional) – Use eit	
Exterior sheathing – Use either 1 or 2	1 – ½-inch thick, exterior type gypsum sheathing 2 – ⅝-inch thick, Type X, exterior type gypsum sheathing
Air barrier membrane applied to gypsum sheathing – Select from list	1 - None 2 - Air-Bloc® 21FR 3 - Air-Bloc® 31MR 4 - Air-Bloc® 32MR 5 – Air-Bloc® 33MR 6 - BlueskinVP™ 160 7 - Metal Clad™
Exterior insulation	Extruded Polystyrene Foam Insulation (XPS) - Type IV per ASTM C578 – Maximum of 3-inch thickness On insulation joints, asphalt flashing tape such as Henry® Blueskin® SA or Butyl-based flashing tape – max. 4-inch width can be used.
Exterior Veneer – Use either 1, 2, 3, 4, 5 or 6	1 – Brick - Standard nominal 4-inch thick, clay brick. Brick installed with standard type veneer anchors at maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 2 – Concrete – 2 inches thick or greater. Maximum 2-inch air gap between exterior insulation and concrete. 3 – Concrete masonry units – 4 inches thick or greater. Maximum 2-inch air gap between exterior insulation and CMU. 4 – Stone veneer – Minimum 2-inch thick, Limestone or natural stone veneer or minimum 1-1/2 inch thick cast artificial stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

Exterior sheathing – Use either 1 or 2	1 – ½-inch thick, exterior type gypsum sheathing 2 – ⅝-inch thick, Type X, exterior type gypsum sheathing

<u>Step 5:</u>

Select Interior Components

- Exterior Sheathing

Designing an NFPA 285 Compliant Wall

Available Selection Charts

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1 layer – ⅝-inch thick, Type X, Gypsum wallboard on interior, installed over steel
Floor-line Fire-stop	
Cavity Insulation – or 2	
Interior vapor mem (optional) – Use eit	
Exterior sheathing - 1 or 2	
Air barrier membra to gypsum sheathir from list	
	5 – Air-Bloc® 33MR 6 - BlueskinVP™ 160 7 - Metal Clad™
Exterior insulation	Extruded Polystyrene Foam Insulation (XPS) - Type IV per ASTM C578 – Maximum of 3-inch thickness On insulation joints, asphalt flashing tape such as Henry® Blueskin® SA or Butyl-based flashing tape – max. 4-inch width can be used.
Exterior Veneer – Use either 1, 2, 3, 4, 5 or 6	1 – Brick - Standard nominal 4-inch thick, clay brick. Brick installed with standard type veneer anchors at maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 2 – Concrete – 2 inches thick or greater. Maximum 2-inch air gap between exterior insulation and concrete. 3 – Concrete masonry units – 4 inches thick or greater. Maximum 2-inch air gap between exterior insulation and CMU. 4 – Stone veneer – Minimum 2-inch thick, Limestone or natural stone veneer or minimum 1-1/2 inch thick cast artificial stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

Air barrier membrane applied to gypsum sheathing – Select from list	1 - None 2 - Air-Bloc® 21FR 3 - Air-Bloc® 31MR 4 - Air-Bloc® 32MR 5 – Air-Bloc® 33MR 6 - BlueskinVP™ 160 7 - Metal Clad™

<u>Step 6:</u>
Select Air Barrier

Designing an NFPA 285 Compliant Wall

Available Selection Charts

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 – Concrete wall 2 – Concrete Masonry wall 3 – 1 layer – ⅝-inch thick, Type X, Gypsum wallboard on interior, installed over steel studs: minimum 3⅝-inch depth, minimum 20-gauge at a maximum of 24-inch OC with lateral bracing every 4 ft. vertically
Floor-line Fire-stopping	4 lb/cu ft. mineral wool (e.g. Thermafiber or Roxul) in each stud cavity at each floor-line – attached with Z-clips or equivalent
Cavity Insulation – Use either 1 or 2	1 – None
Interior vapor mem (optional) – Use eit	
Exterior sheathing - 1 or 2	
Air barrier membra to gypsum sheathing – Select from list	2 - Air-Bloc® 21PR 3 - Air-Bloc® 31MR 4 - Air-Bloc® 32MR 5 – Air-Bloc® 33MR 6 - BlueskinVP™ 160 7 - Metal Clad™
Exterior insulation	Extruded Polystyrene Foam Insulation (XPS) - Type IV per ASTM C578 – Maximum of 3-inch thickness On insulation joints, asphalt flashing tape such as Henry® Blueskin® SA or Butyl-based flashing tape – max. 4-inch width can be used.
Exterior Veneer – Use either 1, 2, 3, 4, 5 or 6	1 – Brick - Standard nominal 4-inch thick, clay brick. Brick installed with standard type veneer anchors at maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 2 – Concrete – 2 inches thick or greater. Maximum 2-inch air gap between exterior insulation and concrete. 3 – Concrete masonry units – 4 inches thick or greater. Maximum 2-inch air gap between exterior insulation and CMU. 4 – Stone veneer – Minimum 2-inch thick, Limestone or natural stone veneer or minimum 1-1/2 inch thick cast artificial stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

Exterior insulation	Extruded Polystyrene Foam Insulation (XPS) - Type IV per ASTM C578 – Maximum of 3-inch thickness On insulation joints, asphalt flashing tape such as Henry® Blueskin® SA or Butyl-based flashing tape – max. 4-inch width can be used.

<u>Step 7:</u>
Select Continuous Insulation (CI)

Designing an NFPA 285 Compliant Wall

Available Selection Charts

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 – Concrete wall
Floor-line Fire-stoppir	
Cavity Insulation – Us or 2	
Interior vapor membr (optional) – Use eithe	
Exterior sheathing – U 1 or 2	
Air barrier membrane to gypsum sheathing from list	
Exterior insulation	
Exterior Veneer – Use 2, 3, 4, 5 or 6	stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

Exterior Veneer – Use either 1, 2, 3, 4, 5 or 6	1 – Brick - Standard nominal 4-inch thick, clay brick. Brick installed with standard type veneer anchors at maximum 24 inches OC vertically on each stud. Maximum 2-inch air gap between exterior insulation and brick 2 – Concrete – 2 inches thick or greater. Maximum 2-inch air gap between exterior insulation and concrete. 3 – Concrete masonry units – 4 inches thick or greater. Maximum 2-inch air gap between exterior insulation and CMU. 4 – Stone veneer – Minimum 2-inch thick, Limestone or natural stone veneer or minimum 1-1/2 inch thick cast artificial stone veneer. Any standard non-open-joint installation technique such as ship-lap, etc. can be used. 5 – Terracotta cladding – Use any terracotta cladding system in which terracotta is minimum 1-1/4 inch thick. Any non-open-joint installation technique such as ship-lap, etc. can be used. 6 – Stucco – Minimum ¾-inch thick, exterior cement plaster and lath. This exterior veneer cannot be used with the exterior insulation described above.

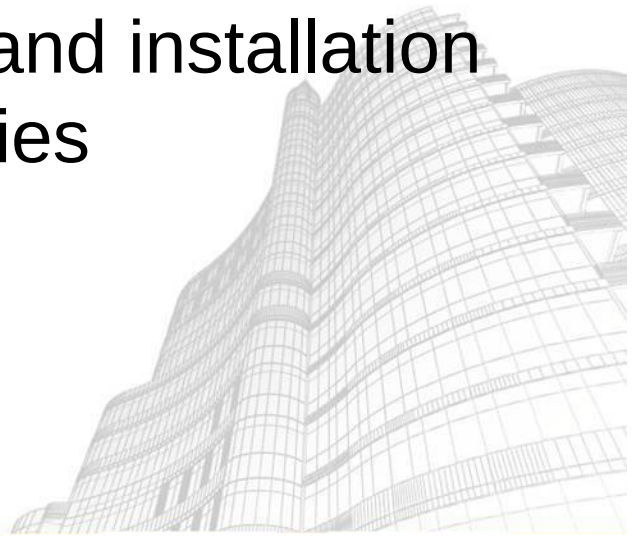
<u>Step 8:</u>

Select Exterior Cladding

Designing an NFPA 285 Compliant Wall

Considerations

- Coordination of multiple manufacturers in specification
- Cross reference various specification sections for each exterior wall component
- Substitution requests become more laborious
- Coordination of detail drawings and installation to avoid voiding product warranties



Future of NFPA 285

2015 IBC Exclusions

- **Section 1403.5 Vertical and lateral flame propagation.**
  - "For the purposes of this section, fenestration products and flashing of fenestration products shall not be considered part of the water-resistive barrier."
- ***NFPA 285 not required*** where the weather barrier is the only combustible component as defined by Section 1403.5 Vertical and lateral flame propagation.
  - Walls in which the water-resistive barrier is the only combustible component and one of the following:
    - Exception 1: The exterior wall has as a wall covering in accordance with Table 1405.2.
    - Exception 2: Complies with testing as stated in 2015 IBC Section

Summary

Advances In Technology Offer

Innovative Design
Increasing Demand On Building Envelopes
Obtaining Minimum Energy Standards
Healthier Indoor Air Quality
Higher Quality Buildings

Potentially Flammable!

Increasingly Difficult To Construct Without Combustible Materials

Summary

Updated Code Requirements Trigger More NFPA 285 Compliant Wall Assemblies

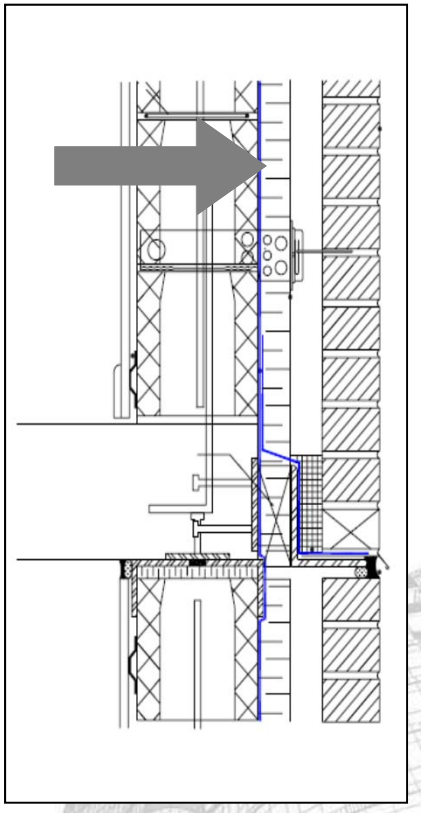
2012 IBC • 2012 IRC • 2012 IECC • ASHRAE • LEED V4

International Building Code Section
Foam Plastic Insulation 2603.5.5
Metal Composite Materials (MCM) 1407.10.4
Fiber Reinforced Polymer (FRP) section 2612.5
Exterior Wall Coverings (Fire Blocking) 718.2.6
Weather Resistive Barrier (WRB) 1403.5
High Pressure Laminates (HPL) 1409.10.4
Mechanical Equipment Screens (Roof) 1509.6.2

EIFS Systems No Longer Only Exterior Wall System Required to Comply with NFPA285!

Summary

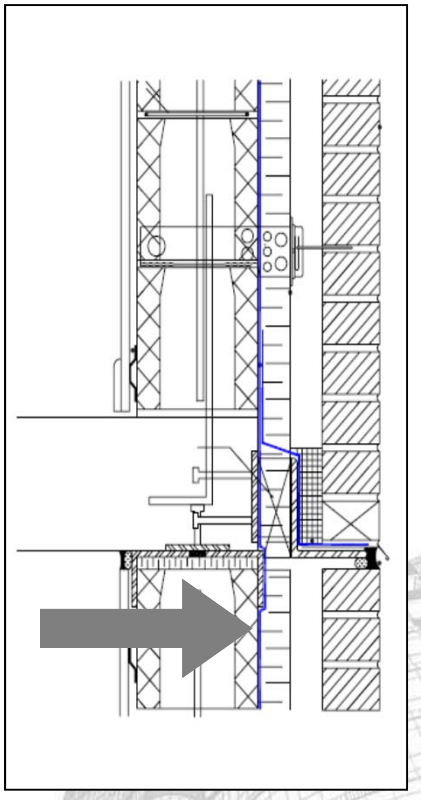
Most prominent changes requiring NFPA 285 Compliance

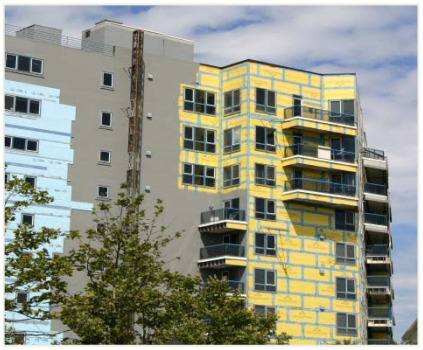


Continuous Insulation

Summary

Most prominent changes requiring NFPA 285 Compliance

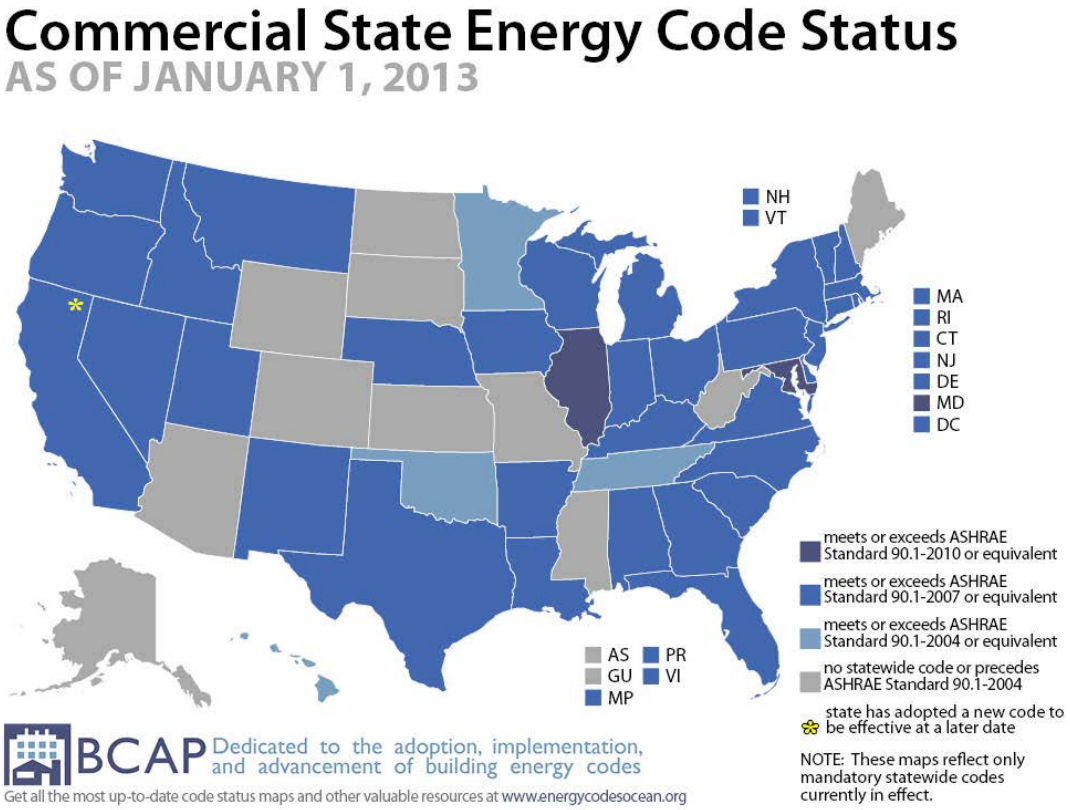




Continuous Air Barrier

Summary

Most prominent changes requiring NFPA 285 Compliance



Source: Air Barrier Association of America (www.airbarrier.org)

2012 IECC Code Adoption by State

Conclusion

Nearly all new construction in the US expected to require passing NFPA 285 wall assemblies where required to comply with ASHRAE, 2012 IBC/IRC, IECC, or LEED v4

- Minimum provisions
- City recognition
- State wide adoption

Understand the code. Be prepared.

Not a question of *IF*, but *WHEN*!

Thank You!

This concludes the AIA portion of the presentation

Questions ???