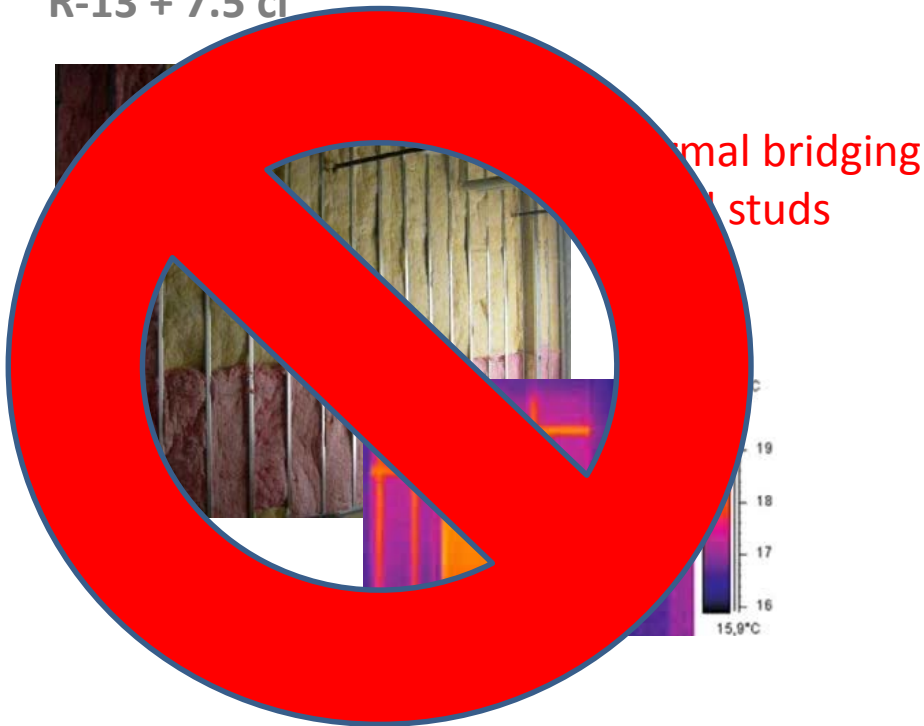




Polyiso versus Mineral Wool for exterior wall insulation

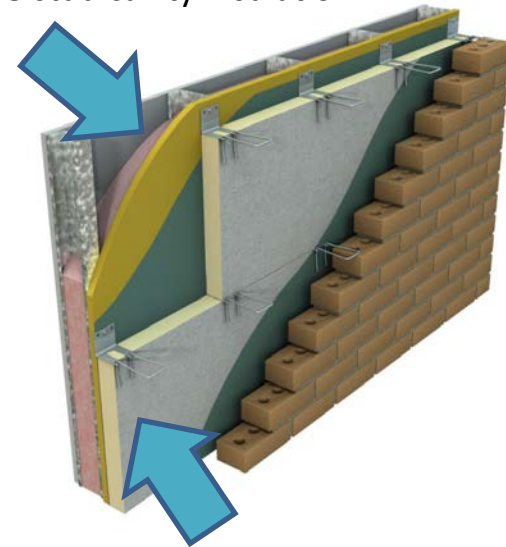
Wall Continuous Insulation “ci”

- Example: IECC 2012 Steel Stud Wall Requirements
- R-13 + 7.5 ci



Continuous Insulation

R-13 stud cavity insulation



R-7.5 “continuous insulation” (ci)

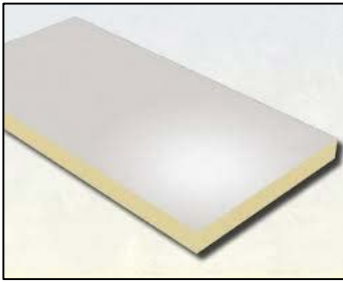
Fire Safety – NFPA 285 Wall Assembly Burn Test

Requirement Triggered by:



- **Plastic Foam Insulation**
 - Polyisocyanurate
 - Extruded Polystyrene (XPS)
 - Expanded Polystyrene (EPS)
 - Spray Polyurethane Foam (SPF)
 - **Combustible Claddings**
 - Metal Composite (MCM)
 - High Pressure Laminate (HPL)
 - Fiber Reinforced Plastic (FRP)
- Type I-IV Construction**
- **Wall Membranes**
 - Self-Adhered Sheet
 - Fluid-Applied
 - Building Paper/ Wrap

Exterior Wall Insulation NFPA 285 Status



Polyisocyanurate
(Polyiso)



Mineral Fiber
(Mineral Wool)

**Pass with brick
and rain screen
claddings**

**Pass with brick
claddings**



Extruded
Polystyrene (XPS)



Expanded Polystyrene
(EPS)



Spray Polyurethane
Foam (SPF)

Compliance with Fire Safety Requirements

Two Insulation Choices with Rain Screen Claddings

Polyiso



**Mineral
Fiber**



Polyiso versus Mineral Fiber Insulation



- 2" thick foil-faced polyiso
- Published Value R-13.0
- 4' X 8' board covers 32 SQ FT
- 12.8 lb/ board
- 0.4 lb/ft²



- 3" thick double density mineral fiber
- Published Value R-12.9
- 2' X 4' board covers 8 SQ FT
- 8.8 lb/ board
- 1.1 lb/ft²

Mineral Fiber and Polyiso Insulation – Tested R-Value at 2 mean Temps

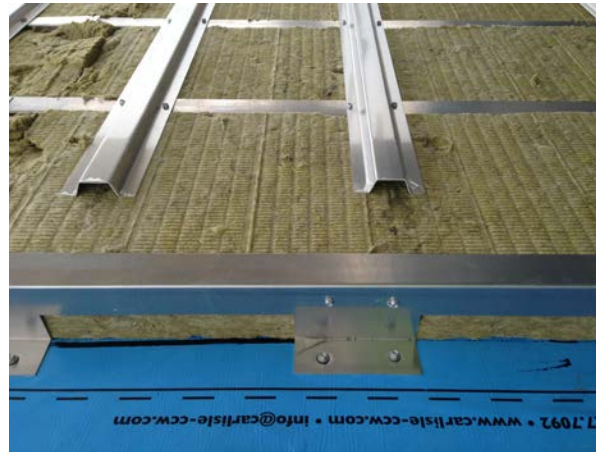
	2" Thick Foil-Faced Polyiso Published R-13.0			3" Thick Double Density Mineral Fiber Published R-12.9		
	Specimen 1	Specimen 2	Average	Specimen 1	Specimen 2	Average
R-Value 75F Mean Temp	12.9	12.8	12.8	12.5	12.6	12.5
R-Value 40F Mean Temp	13.3	13.3	13.3	13.8	13.8	13.8
% change			+4%			+10%

• 75F mean temp: 50F cold side, 100F warm side

• 40F mean temp: 20F cold side, 60 F warm side

Insulation Outside the Weather Barrier

- Covered with cladding
- Occupies a portion of the ventilated space between cladding and weather barrier
- Subjected to
 - Moisture
 - Wind
 - Pollutants



Mineral Fiber and Polyiso Insulation – High Moisture Exposure

	2" Thick Foil-Faced Polyiso Published R-13.0			3" Thick Double Density Mineral Fiber Published R-12.9		
	Dry	Wet	Change	Dry	Wet	Change
R-Value @75F Mean Temp	12.8	12.4	-4%	12.5	2.8	-78%
R-Value @40F Mean Temp	13.3	13.0	-2%	13.8	4.9	-64%
Density [lb/ft ³]	2.38	2.67	+12%	4.43	29.5	+566%

- Test method: ASTM C 518
- Wet samples: 2h immersion in water at room temp, **no drainage** allowed. Samples placed in plastic bag during measurement

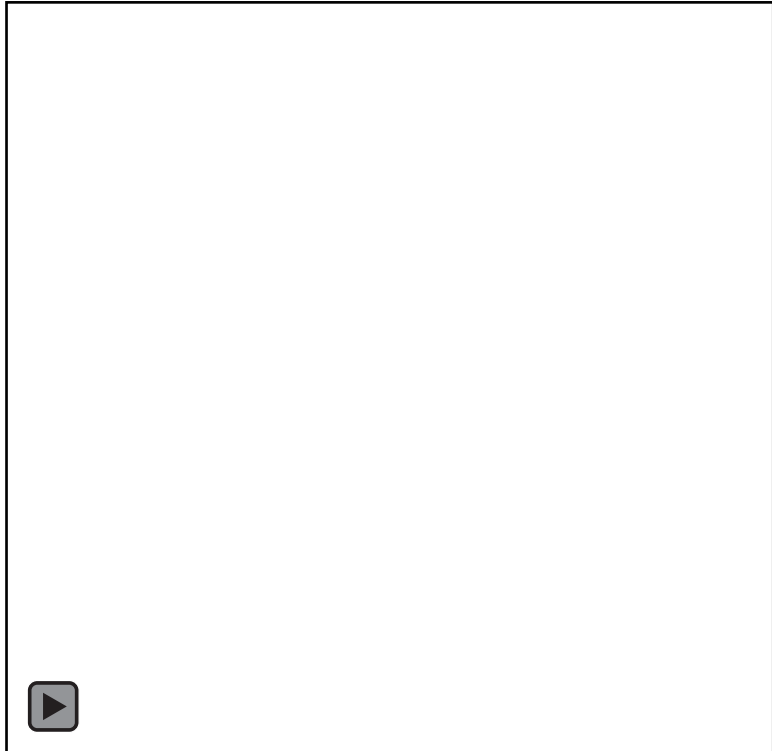
Mineral Fiber and Polyiso Insulation – High Moisture Exposure

	2" Thick Foil-Faced Polyiso Published R-13.0			3" Thick Double Density Mineral Fiber Published R-12.9		
	Dry	Wet	Change	Dry	Wet	Change
R-Value @75F Mean Temp	12.3	12.3	0%	12.5	3.4	-73%
R-Value @40F Mean Temp	13.1	13.1	0%	13.8	6.5	-53%
Density [lb/ft ³]	2.38	2.47	+3.7%	4.52	15.4	+242%

- Test method: ASTM C 518
- Wet samples: ASTM C 209 2h immersion in water at room temp, **10 min drain**. Samples placed in plastic bag during measurement

Does this Happen in Real Life?

- Yes – at horizontal projections
 - Metal Z's
 - Footing
 - Window Head



Polyiso Foam Board - Facers

- Need facers to confine foam and form a board
- Foam itself is closed-cell, impermeable and water resistant (similar to closed-cell spray polyurethane foam)
- Foam is thermoset (burns, does not melt)



Beads of mixed 2-part resin extruded onto facer

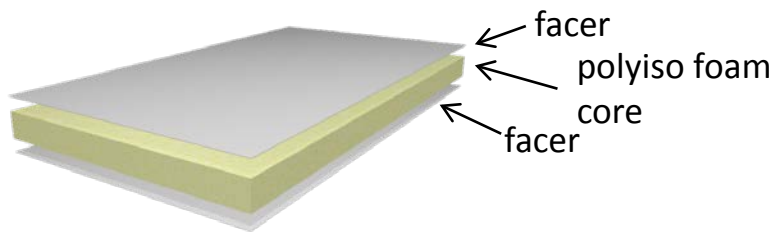


Resin expands and cures, filling space between facers



Boards are cut to size, packaged, cured and shipped

Polyiso Insulation Facers



Felt-faced polyiso on roof



Foil-faced polyiso on wall

- **Felt (Paper) Facers**
 - Used in most roofing applications
 - Accept roof covering in same-day installation
- **Coated Glass Facers**
 - Used in wall and specialty roofing applications
 - Add moisture resistance, toughness and fire resistance
- **Foil Facers**
 - Used primarily in wall applications
 - Add moisture resistance, UV resistance and R-Value
 - Can provide WRB functions

Wall Polyiso: Coated Glass vs. Foil Facers

Aluminum Foil Facer

- Low vapor permeability
 - 0.1 Perm or less
- Air and vapor barrier
- Non-porous and non-absorbent
- Heat reflective
- Makes R-6.5/ inch polyiso
- ASTM C 1289 Type I, Class 1 or Class 2

Coated Glass Facer

- High vapor permeability
 - 25 Perms or higher
- Air barrier
- High tear and puncture resistance
- Alkaline resistant
- Burn resistant
- Makes R-6.0 per inch polyiso
- ASTM C 1289 Type II Class 2

Polyiso Options for Wall Assemblies

Polyiso insulating
nail base



Foil or coated glass faced polyiso
installed over opaque wall



Polyiso foam sheathing
installed over open studs

