



Polyiso versus Mineral Wool for exterior wall insulation

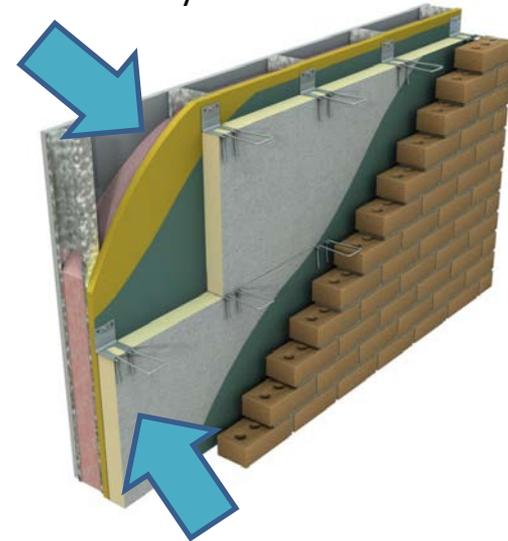
Wall Continuous Insulation "ci"

- 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

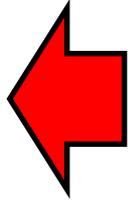


Polyisocyanurate (Polyiso)

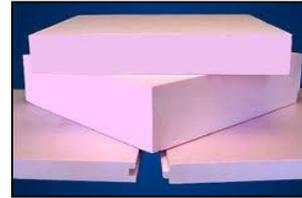
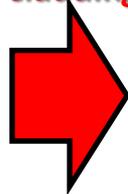


Mineral Fiber (Mineral Wool)

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

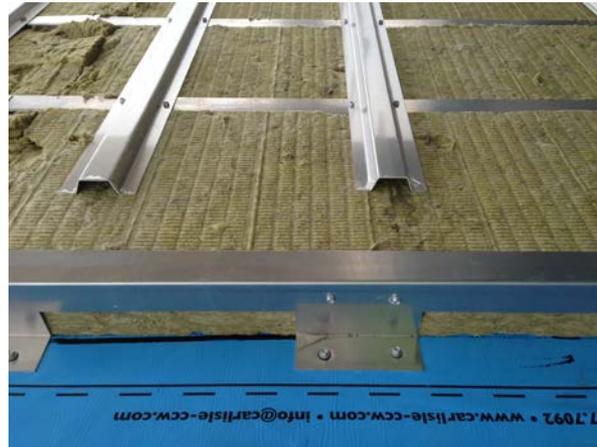
	2" Thick Foil-Faced Polyiso Published R-13.0			3" Thick Double Density Mineral Fiber Published R-12.9		
	Specimen 1	Specimen 2	Average	Specimen 1	Specimen 2	Average
R-Value 75F Mean Temp	12.9	12.8	12.8	12.5	12.6	12.5
R-Value 40F Mean Temp	13.3	13.3	13.3	13.8	13.8	13.8
% change			+4%			+10%

• 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

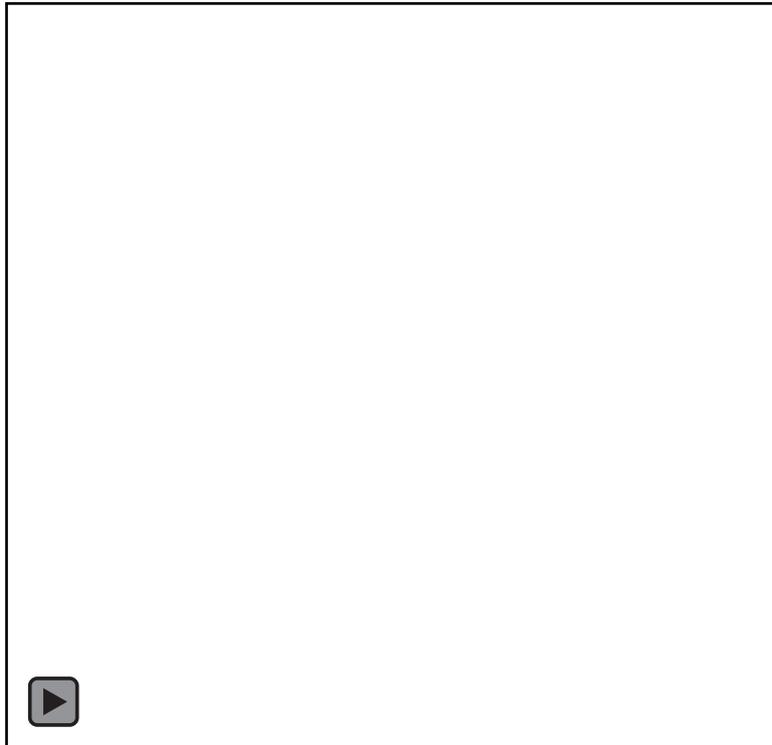
Mineral Fiber and Polyiso Insulation – High Moisture Exposure

	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

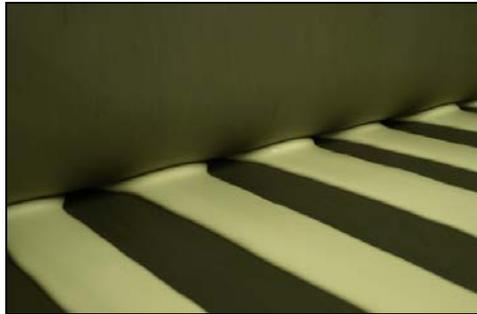
Does this Happen in Real Life?

- 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

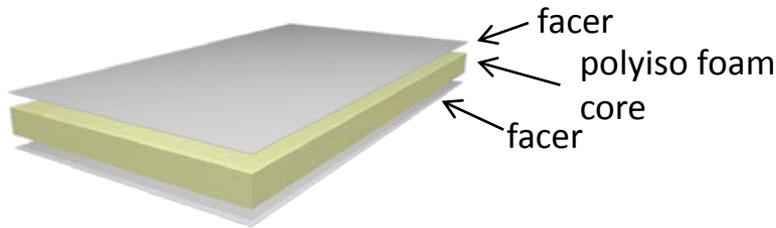


Resin expands and cures, filling space between facers



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



Polyiso foam sheathing installed over open studs



Foil or coated glass faced polyiso installed over opaque wall

