



International Institute of
Building Enclosure Consultants

Low Slope Roofing

Rooftop Quality Assurance

AIA
Continuing
Education
Provider

8 IIBEC Continuing Educational Hours
8 AIA Learning Units and HSW Credit

Version 09.19.04

Learning Objectives

- Roof categories
- Components of a low slope roofing system
- Decks
- Insulations
- Roof Boards
- Substrate Boards

Learning Objectives

Critical observations associated with:

- BUR
- Modified bitumens
- Single ply elastomeric/thermoset
- Single ply thermoplastic
- Spray in place polyurethane

Roof Categories by Slope

Low slope roofing

- Watertight or membrane roofing

Steep roofing

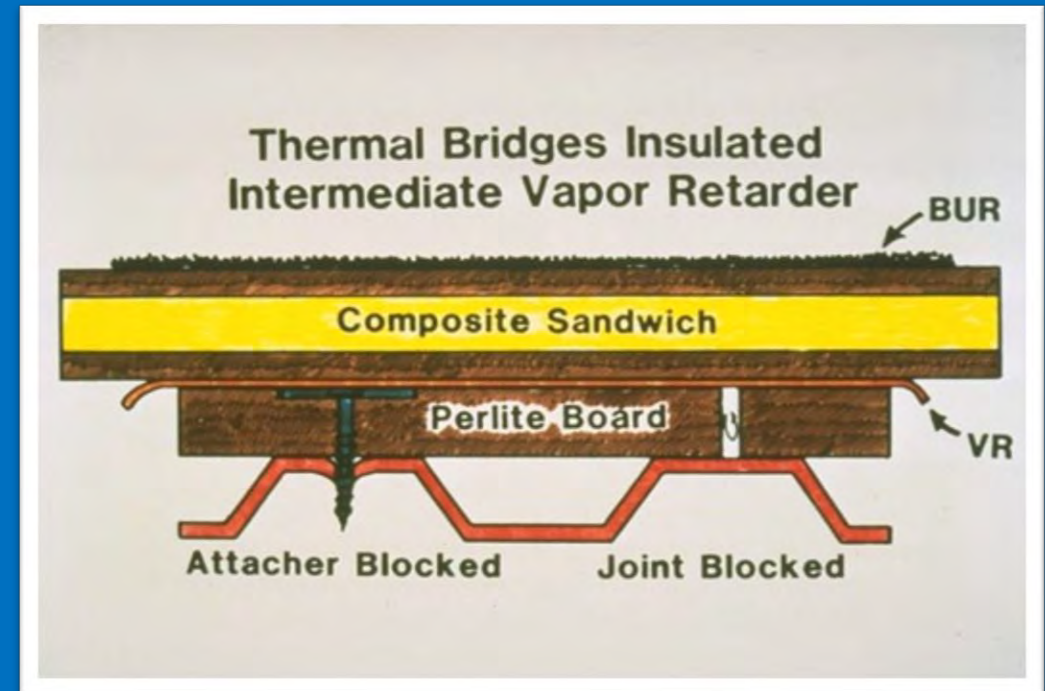
- Water shedding – not watertight

Low Slope Roofing Definition and Use

- Slope criteria - 0 to 1-1/2" per foot
- Some refer to 3" per foot as the line of transition from low slope to steep slope.
- Typical low slope roof systems can be installed on steeper roofs, however steeper slopes may affect their fire rating

Low Slope Roofing Components

- Structural roof deck
- Substrate Board
- Sometimes Vapor retarder/air barrier
- Thermal insulation
- Roof Board
- Membrane (Single or Multiple plies)
- Base Flashings
- Flashings
- Surfacing
- Attachment method (mechanical, adhesive or ballasted)



Is Roof Ready for Roof Work?

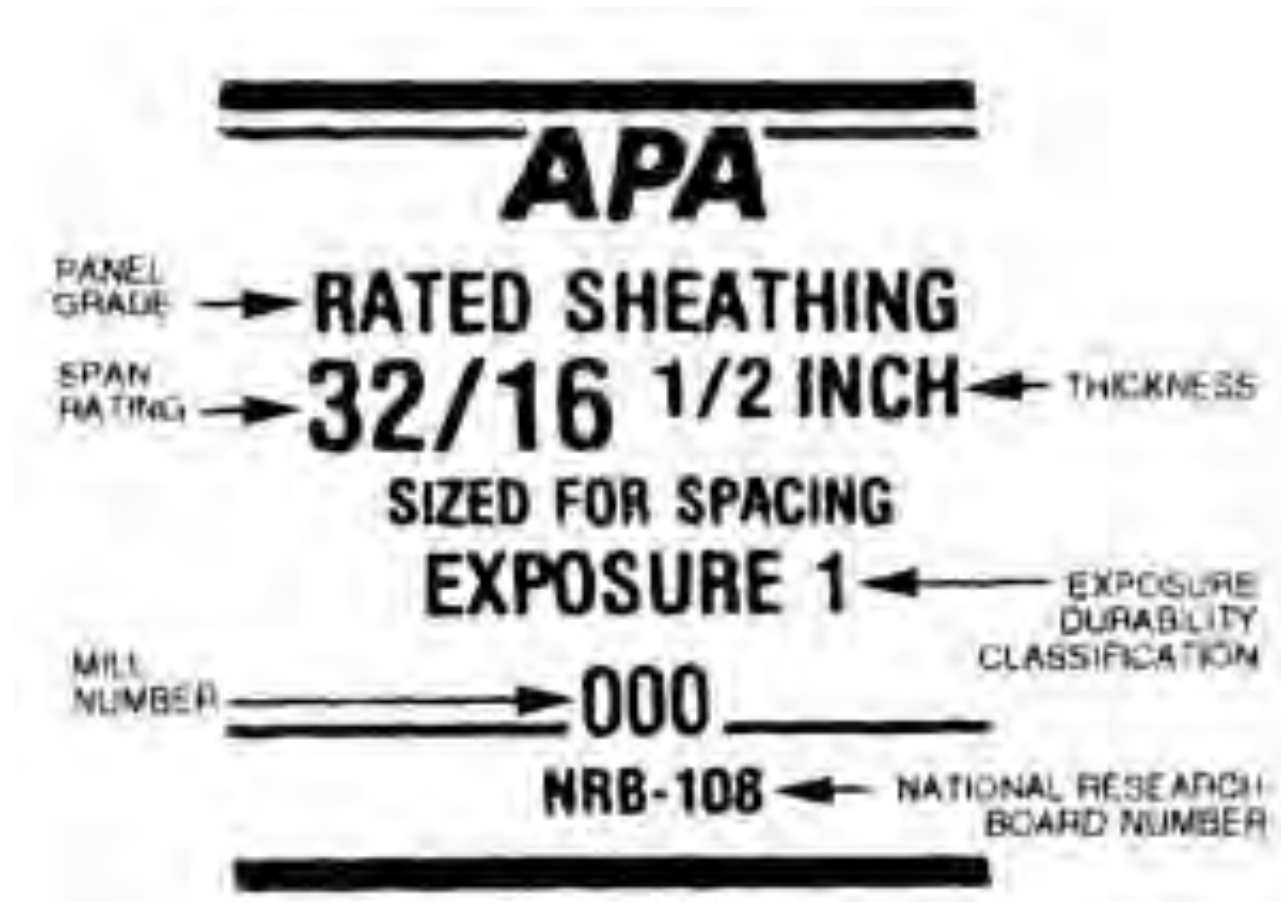
- Plumbing/drains complete
- Nailers attached per FM 1-49
- Equipment base flashing heights correct
- Do details match job conditions?
- Has roofer conducted a thorough deck inspection?
- If needed, has the deck been signed off by the special inspector or jurisdiction

Roof Decks - Wood

- Plywood sheathing
- OSB sheathing
- Tongue & groove planks
- Stress-skin panels
- Cementitious-wood fiber
- Structural Insulated Panels



Engineered Sheathing Stamp



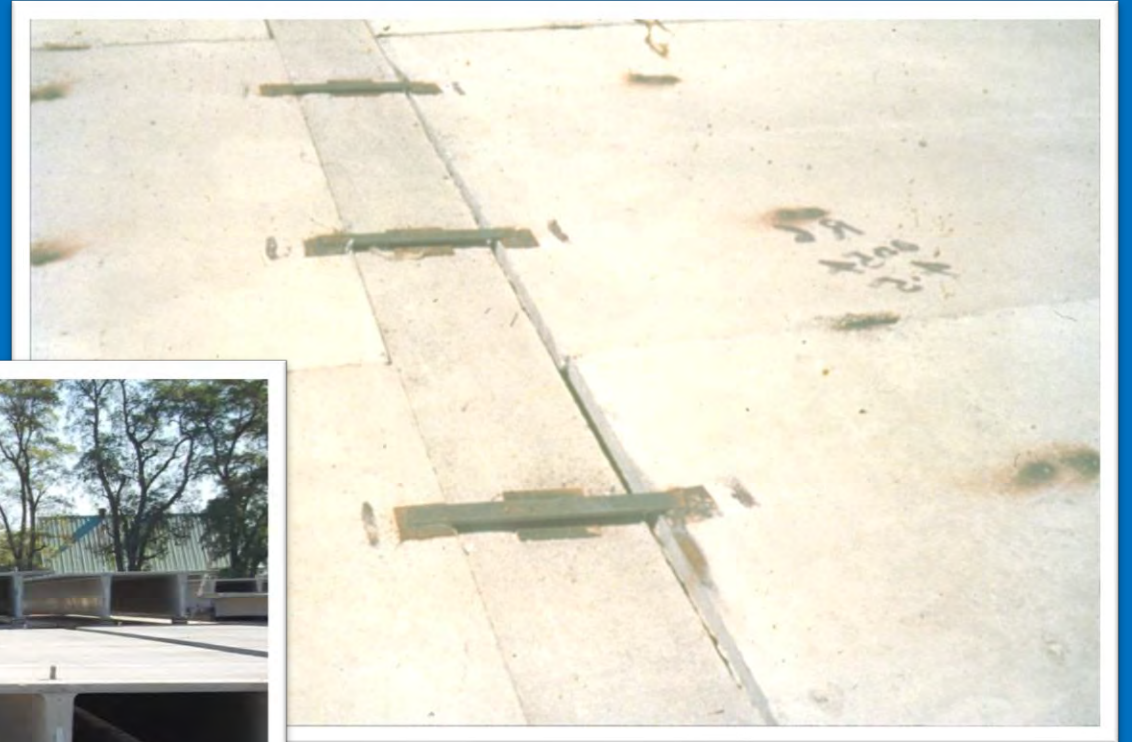
Observer Items – Wood Decks

- Plywood and OSB installed with 1/8" spaces
- Specified thickness
- Fastener type and frequency
- Voids/overlaps repaired
- Red rosin paper separator under base sheets
- Mechanical fastening to cementitious wood fiber, wood, plywood and OSB
- Check grade stamp for type
- If attic, grade stamp should face down

Roof Decks – Concrete

Precast

- Single or double tee
- Hollow core slab
- Solid slab



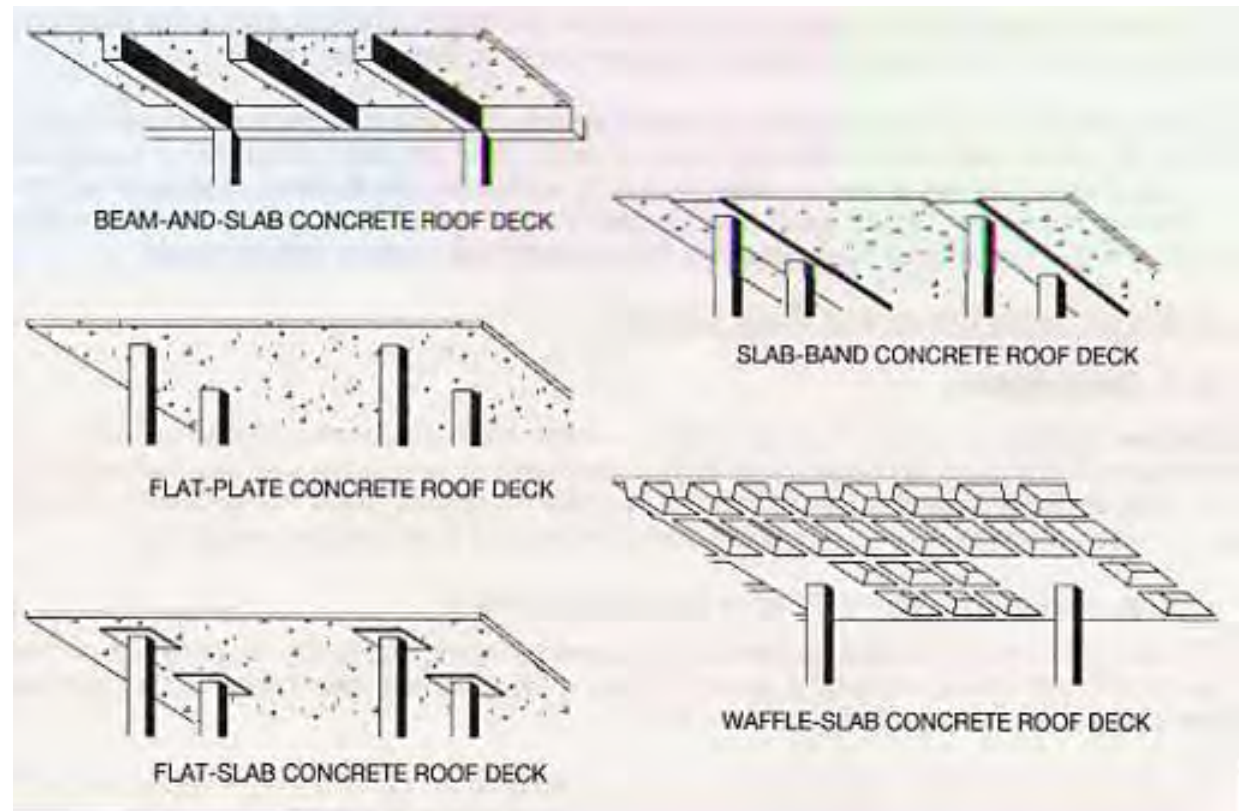
Observer Items - Precast

- Grout in height deviations – $\frac{1}{4}$ "/ft slope
- Grout in voids
- Grind off cables, other projections
- Check to be sure camber does not prevent drainage
- Determine if concrete overlay is specified
- Difficult to mechanically fasten to hollow core slabs

Roof Decks – Concrete

Cast-in place

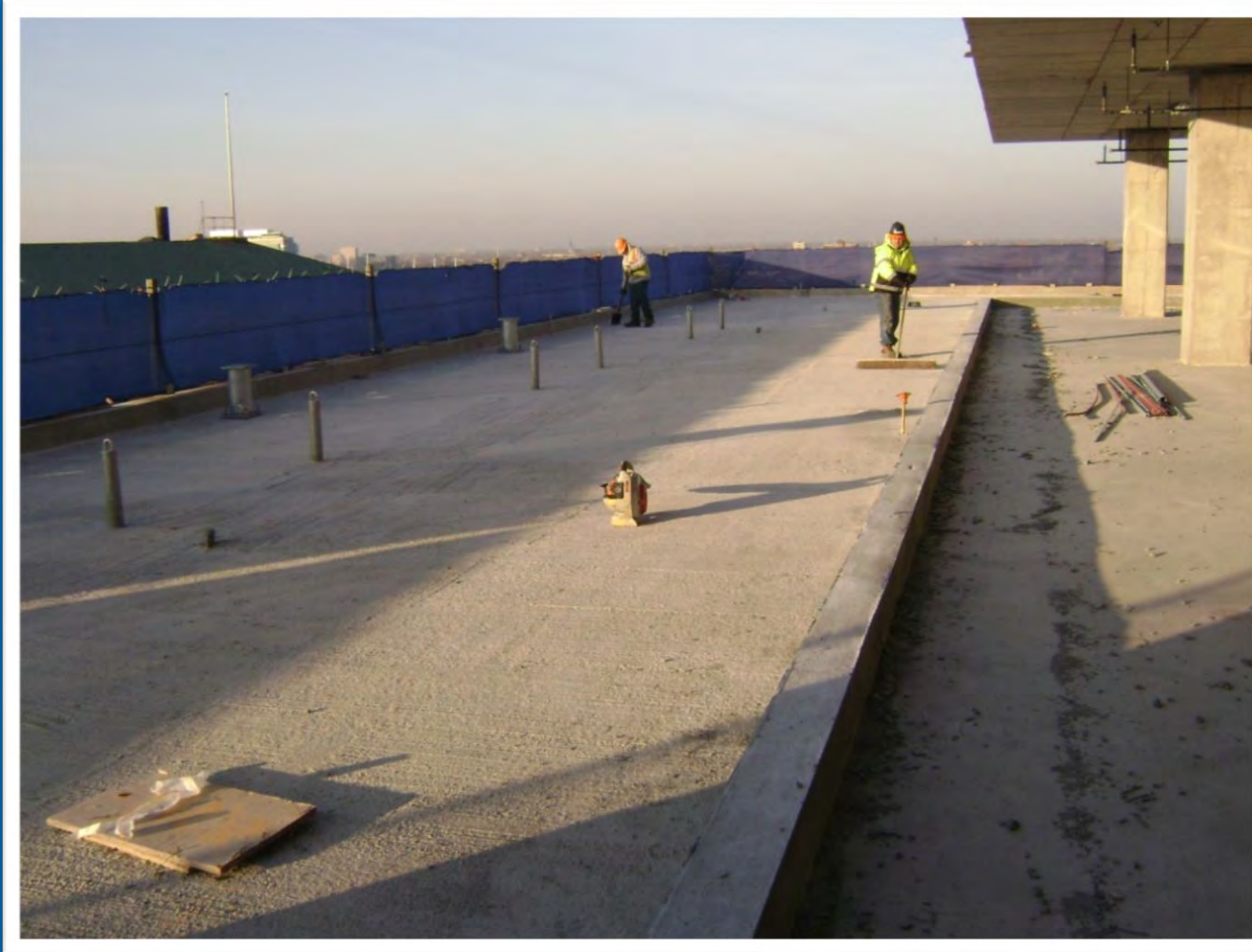
- Slab-beam-girder
- Joist
- Waffle slab
- Flat plate/flat slab
- Post-tensioned
- Pre-tensioned
- Light weight



Observer Items – Cast in Place Concrete

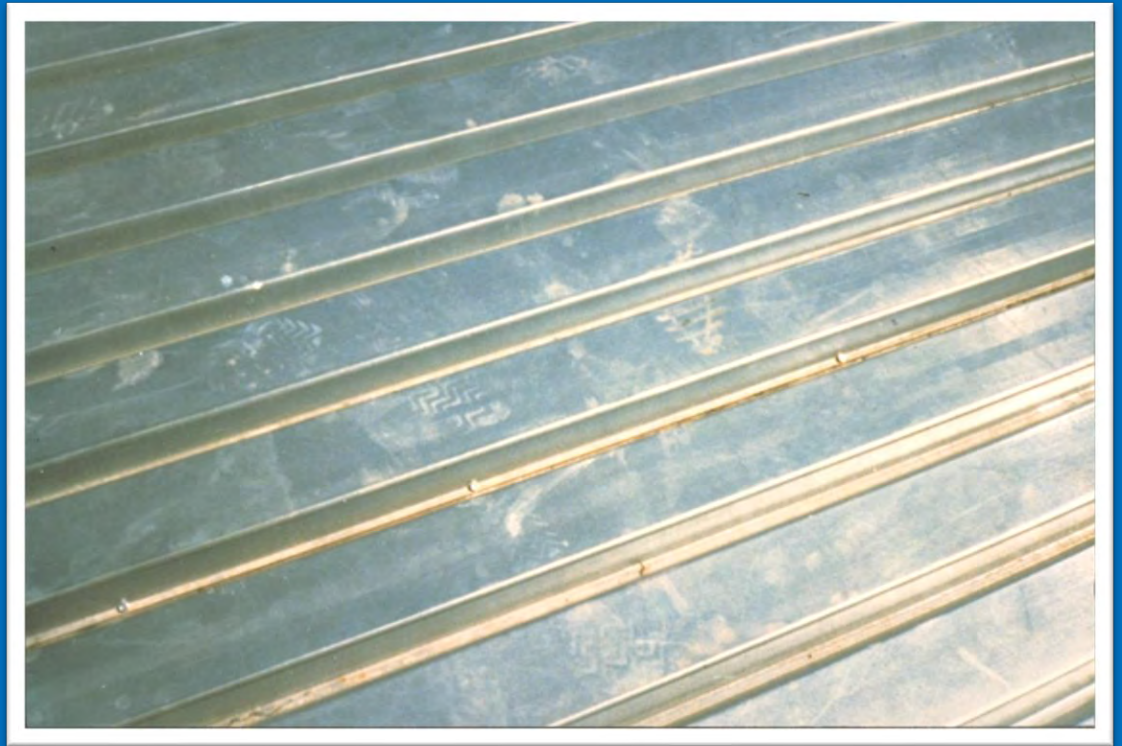
- Be sure deck has cured as required
- Check for dryness prior to direct adhesion
 - Pour on hot asphalt, peel off
 - Place membrane on concrete for hour
 - Moisture Probes
- Grout in or grind off imperfections
- Be careful with mechanically fastening on pre or post tensioned decks
- Make sure deck is primed properly

Roof Decks – Concrete

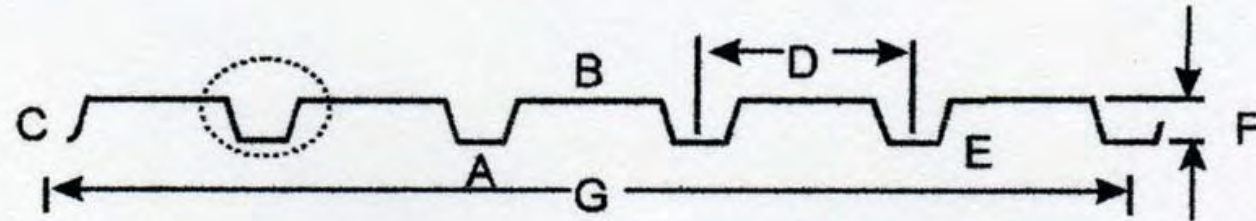


Roof Decks - Metal

- Form deck (centering)
 - used for cementitious fills
- Metal pan
 - used for poured concrete
- Acoustical metal
 - holes in sides of web filled with FG
- Wide (B), medium, or narrow fluted decking



Terminology Refresher



- A Rib
- B Top Flange
- C Side Lap
- D Module
- E Web
- F Depth
- G Coverage Width

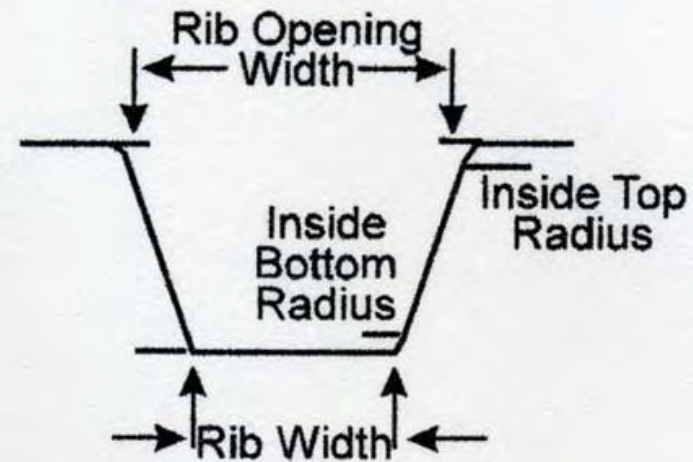


Fig 8

Observer Items – Steel Decks

- Loose welds
- Higher density welds in corners and perimeters
- Minimum lap at end joints.
- All sections min. two spans
- Side stitching with tech screws 30 in. OC maximum

Observer Items – Steel Decks

- Look for localized damage
- Check type of deck and gauge
- Remove debris/snow from rib openings
- Are welds painted?
- Check modularity if questionable

Observer Items – Steel Decks

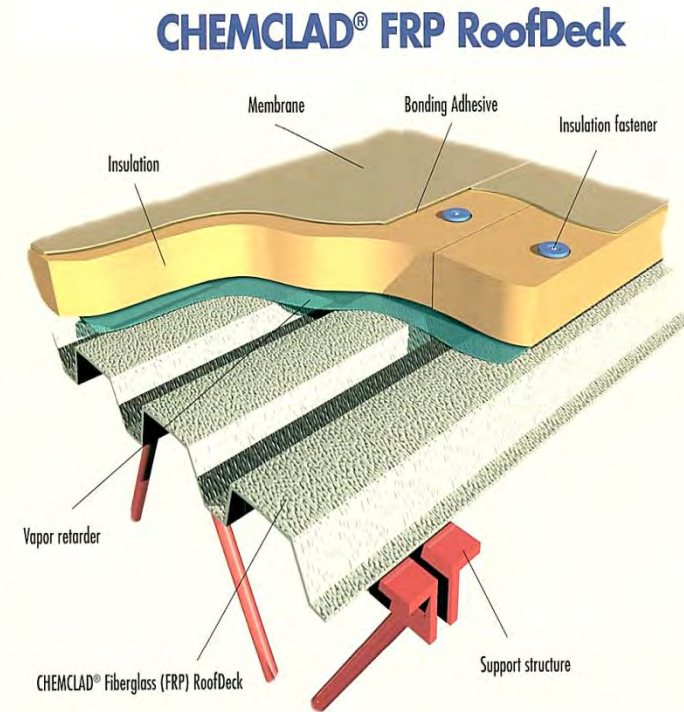


Observer Items – Steel Decks



Roof Decks - Fiberglass

- Fiberglass roof deck
- Chemical & moisture resistant
- The insulation may be iso, stone wool, or other.



The Difference is in the Deck

Roof Decks – Insulating Fill

Lightweight insulating concrete fill

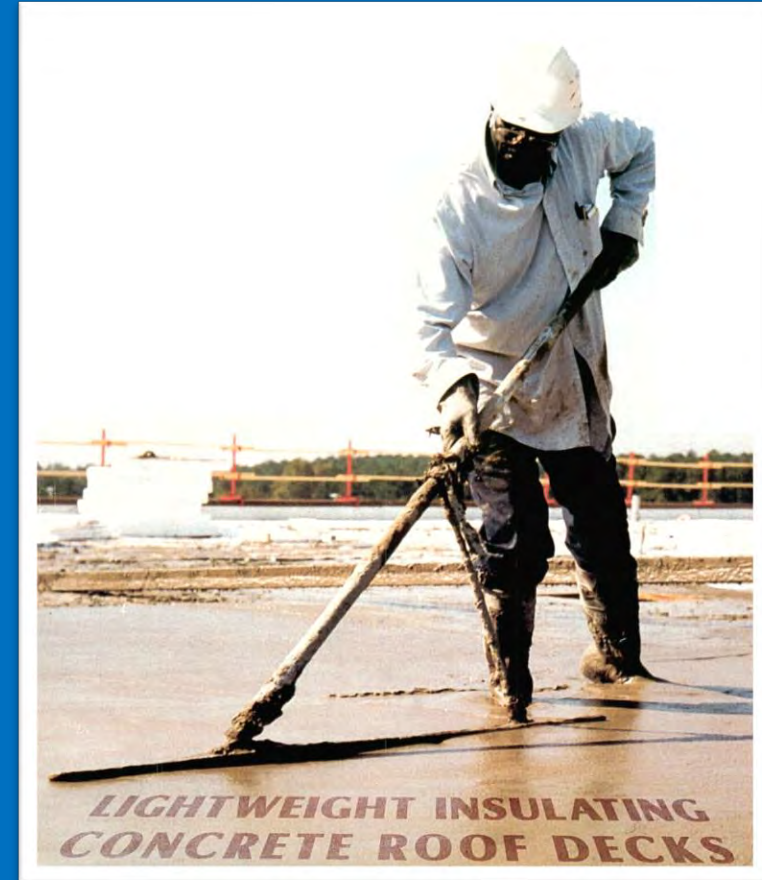
- Light wt. aggregate or cellular

Gypsum concrete fill

- historical

Thermosetting insulating fill

- historical



Observer Items – Insulating Fills

- Correct type?
- Does spec call for sampling and testing?
- Do not leave exposed to weather
- Does first application cover top of deck?
- Minimum thickness at board joints
- Run pull tests (40#) to determine cure
- Grout in/grind off imperfections

Substrate Boards

- Perlite
- Wood fiber – 1 side or six side coated
- Gypsum board
- Glass faced gypsum board
- Asphalt Impregnated boards

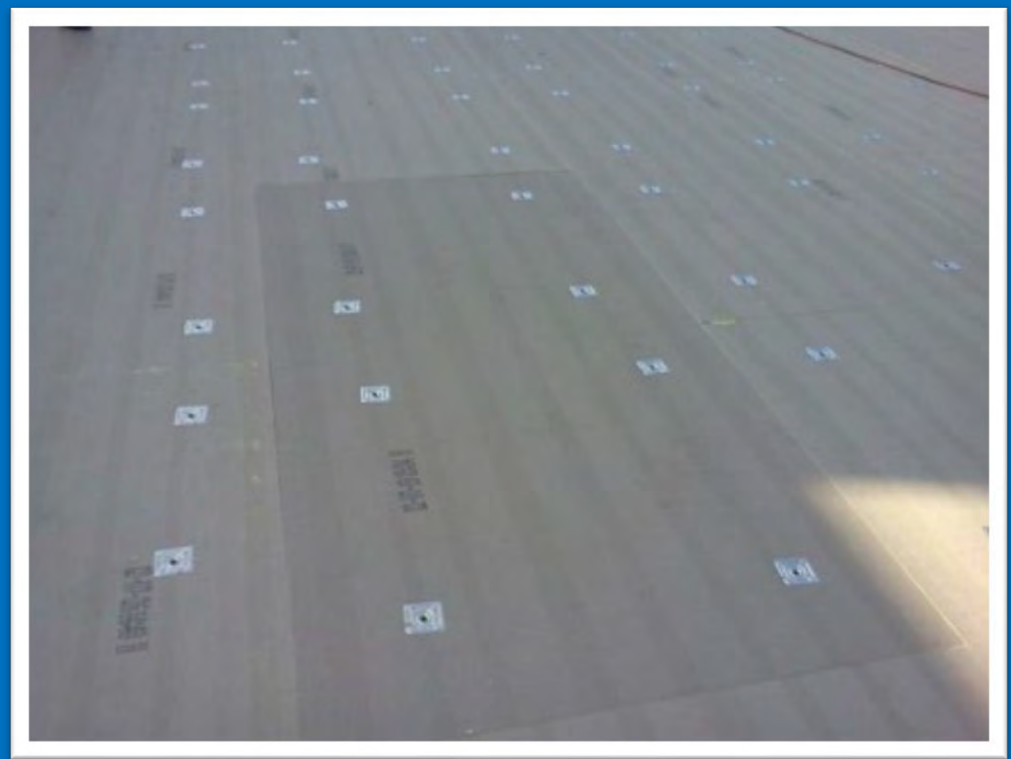


Substrate Boards

- High density isoboard
- High density stone wool
- Specialized cement board



Substrate Boards



Vapor Retarders

- Foil laminates
- Polyethylene
- High Density Polyethylene
- Polyvinyl Chloride
- Self-adhered Modified Asphalt Based
- Asphalt & Felt



Observer Items – Vapor Retarders

- Do you really want to mechanically fasten through the vapor retarder?
- Is intention to function as a temporary membrane?
- Sealed laps
- Sealed penetrations
- Enveloped at perimeters
- Is one obviously needed?
- A two-ply vapor retarder without a glaze coat is not waterproof

Types of Insulation

- Fibrous
- Thermoplastic
- Thermoset
- Other

Insulation Facing

- Organic/fiberglass felt (also called universal facer)
- Uncoated fiberglass mat
- Bitumen coated fiberglass mat
- Cementitious coated fiberglass mat
- Aluminum foil laminates (not common)

Observer Items – Insulation Facing

- Is contractor using correct facing as specified
- Is facing compatible with adhesive
- Is insulation stored properly and dry

Fibrous Boards

Wood Fiberboard

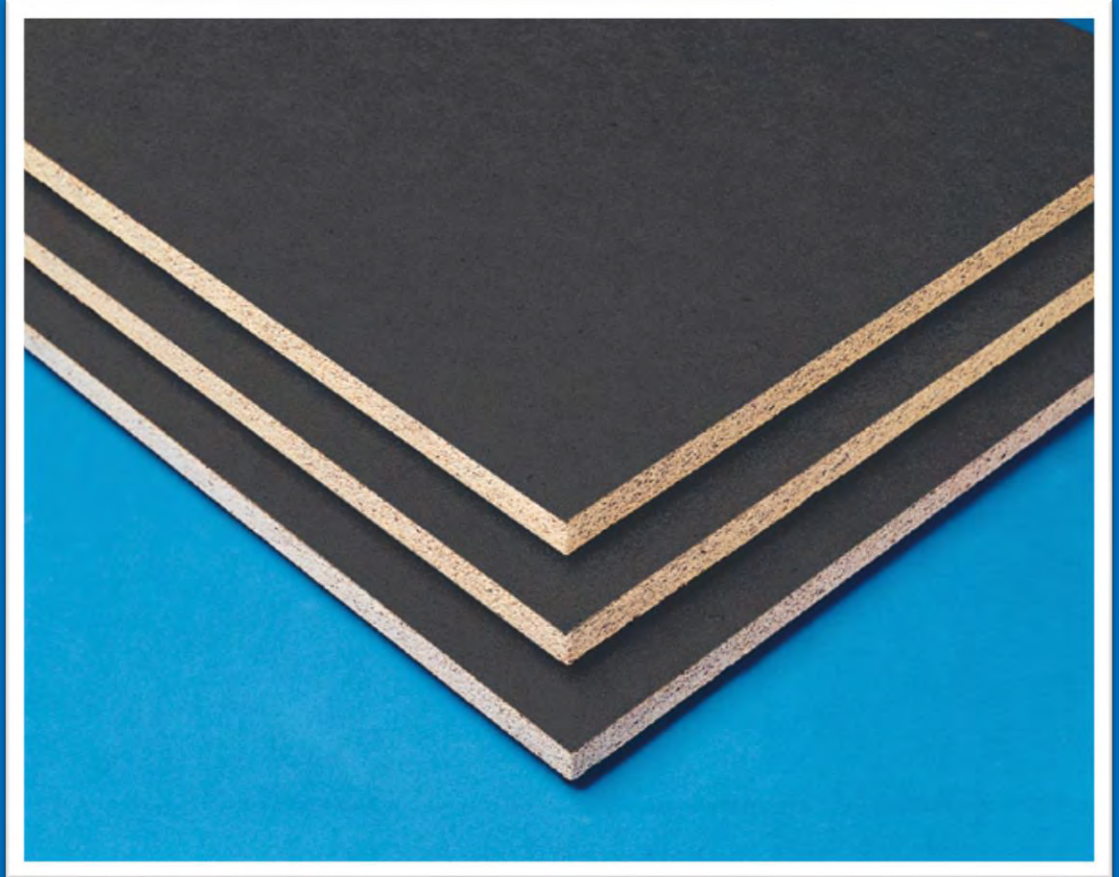


Observer Items – Wood Fiber Insulation

- Right type/density
- Coated six sides?
- Compatibility with adhesives
- Storage is very important – wicks water

Fibrous Boards

Perlite

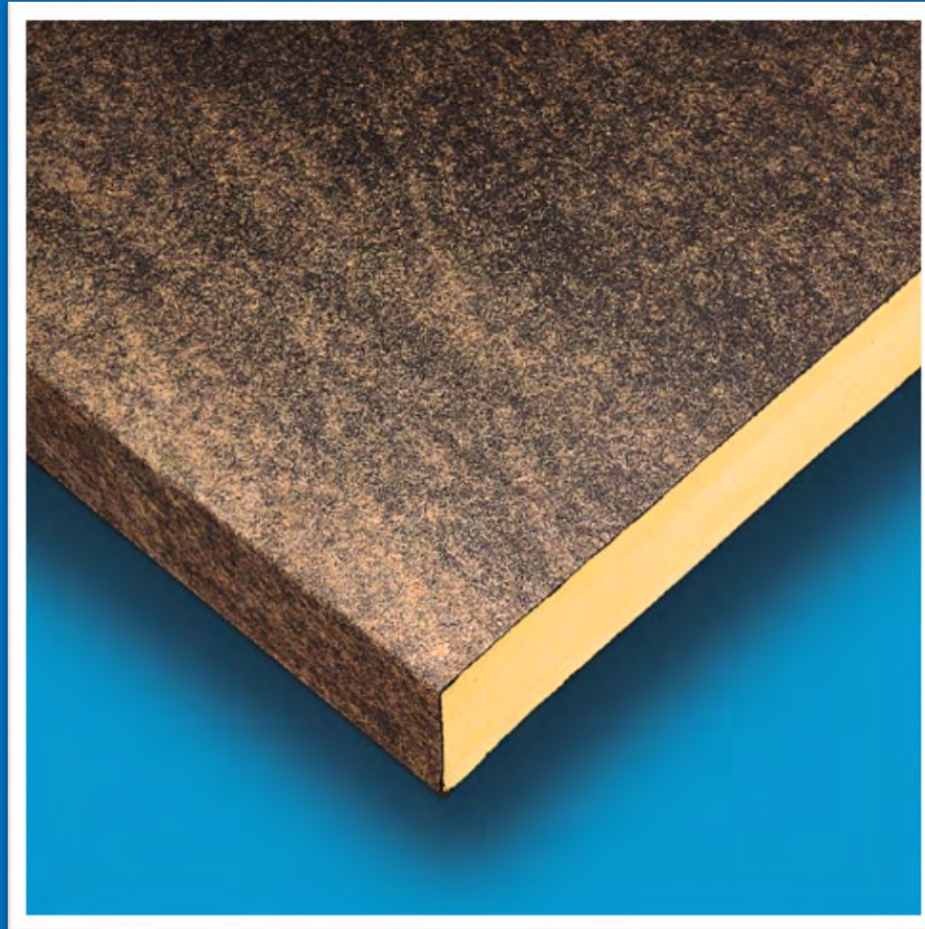


Observer Items - Perlite

- Undamaged boards
- Correct type/density
- Correct thickness
- Proper storage
- Moisture (Wet)

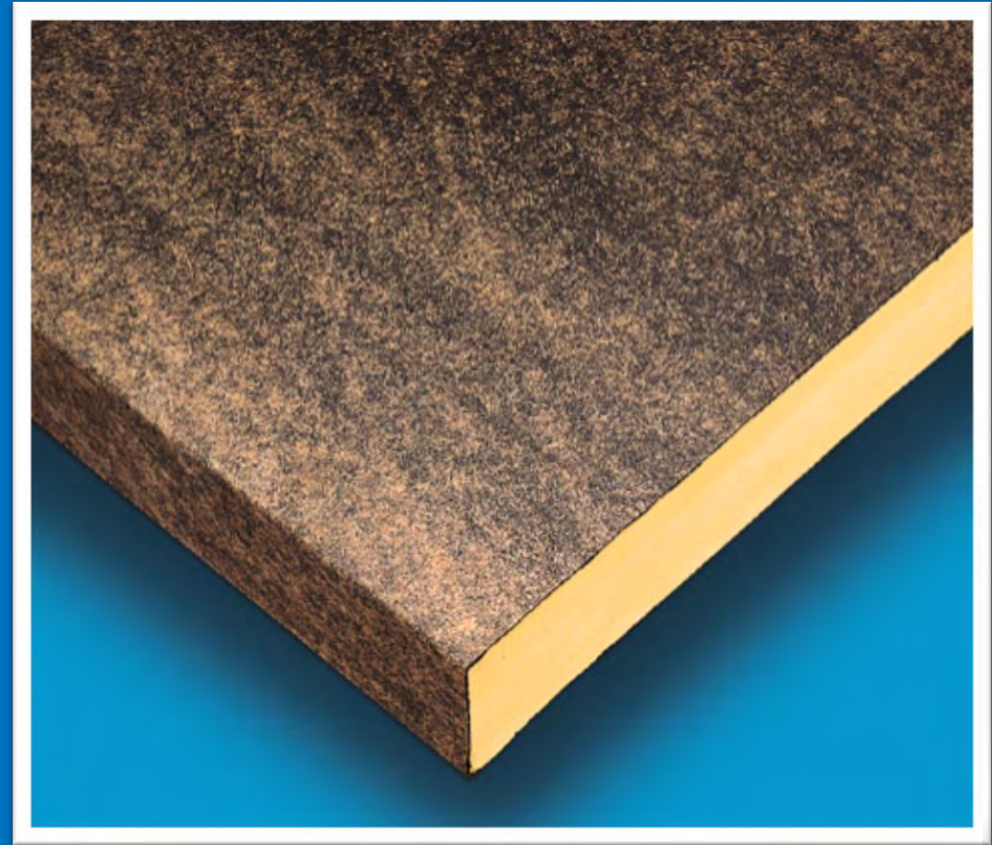
Fibrous Boards

Fiber Glass



Fibrous Boards

- Fiberglass
- Stone wool



Fibrous Boards

Stone wool/Rock Wool as
insulation and as a cover board

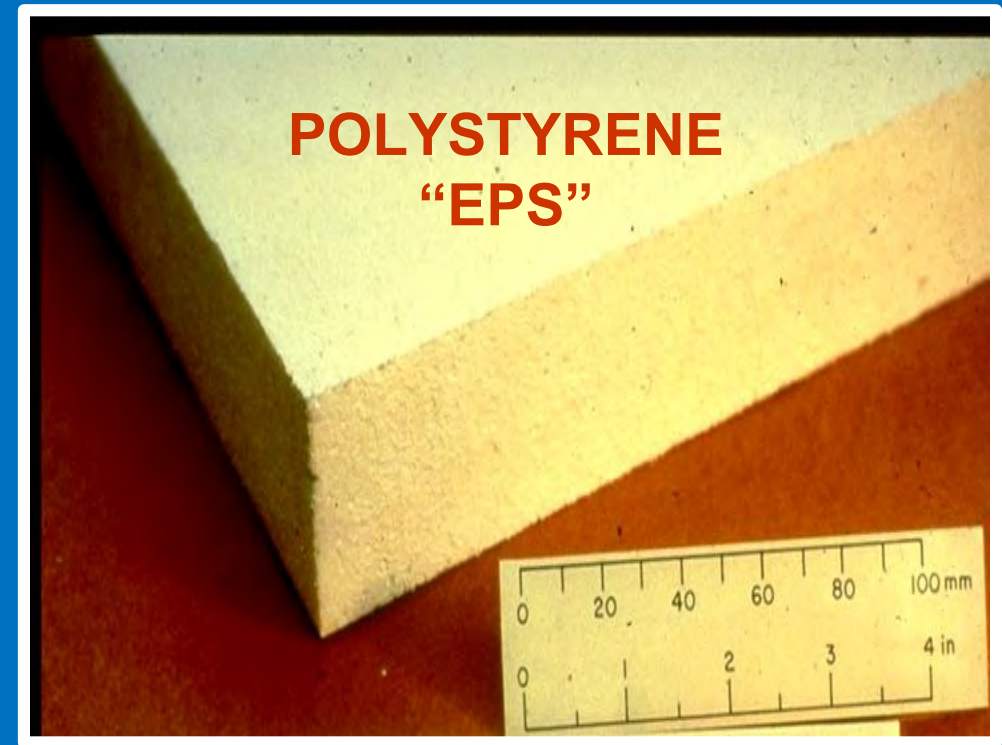


Observer Items – Stone Wool

- Right side up
- Are taped joints specified?
- Proper storage
- Take pictures
- Verify adhesive is appropriate
- Verify adhesive is applied in sufficient quantity

Thermoplastic Boards

Expanded polystyrene

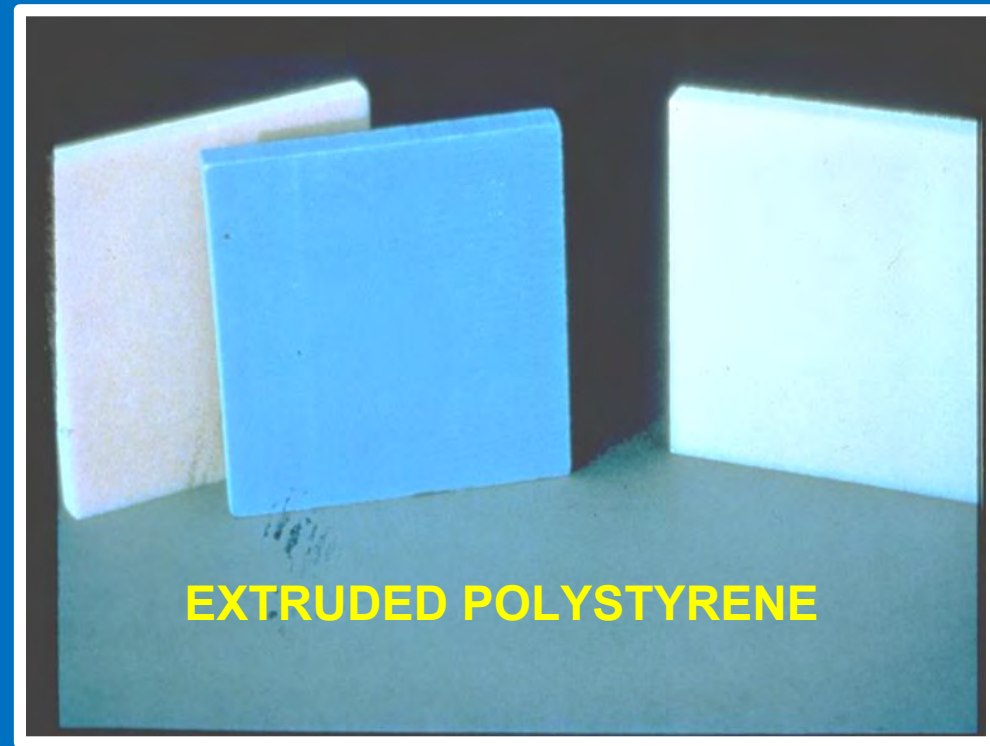


Observer Items - EPS

- Density! Has certification been received?
- Storage to protect from water, temperature, and sunlight
- Compatible with system?
- Susceptible to disintegration from solvents and fumes
- Separator under PVC?

Thermoplastic Boards

Extruded Polystyrene

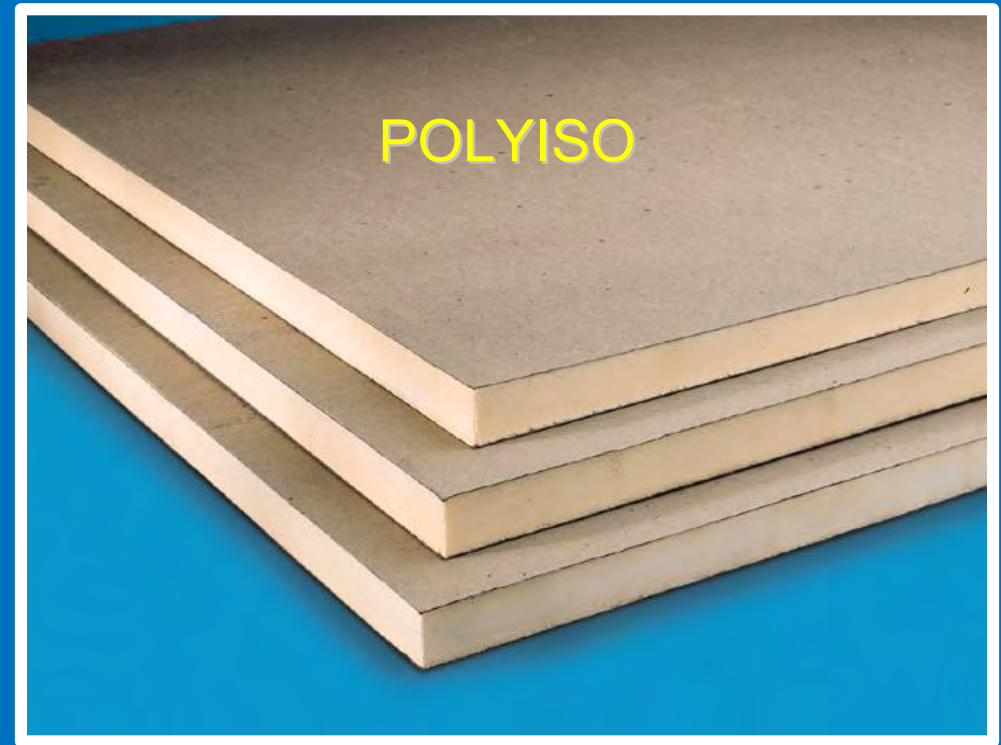


Observer Items – Extruded Polystyrene Foam

- Correct storage to protect from high temperatures and sunlight
- Compatible with system?
- Susceptible to disintegration from solvents and fumes
- Correct type/density

Thermoset Boards

Polyisocyanurate



Observer Items – ISO Board

- Correct product
- Watch thickness vs. specified R value (LTTR?)
- Correct type?
- Check for manufacturing defects – ridges or valleys in board surface, bull nosed or sunken ends
- Storage – remove plastic shipping film – properly cover off ground.
- Moisture (Wet facers)

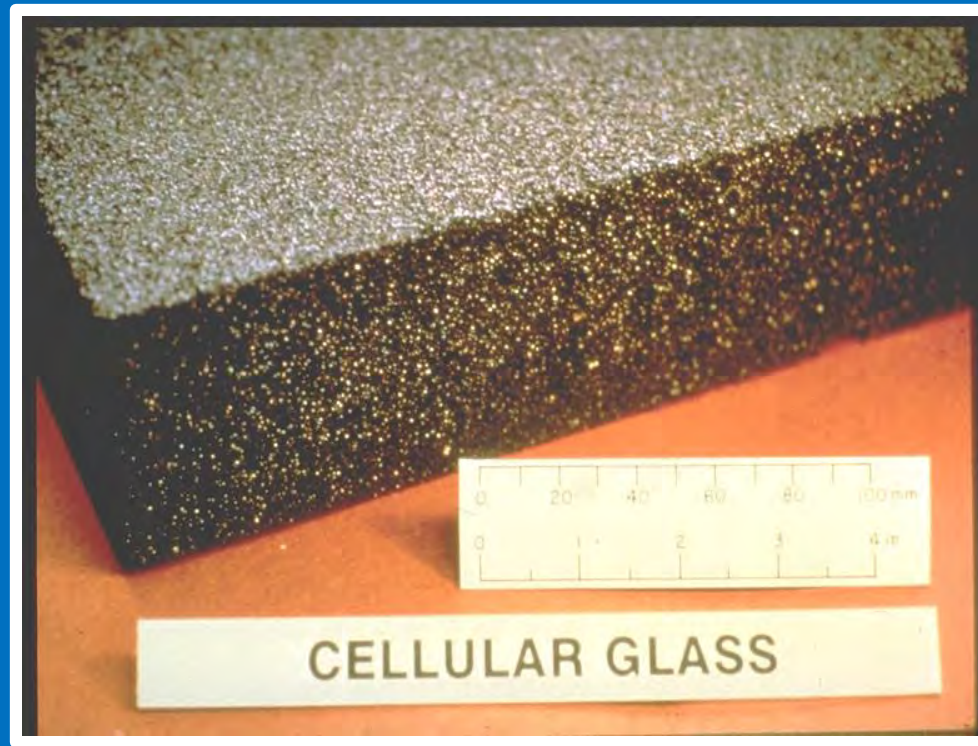
Atlas Energy Corp

STORAGE/PRECAUTIONS

Factory-applied packaging is intended only for protection during transit. When stored outdoors or on the job site, the insulation should be stacked on pallets at least four inches above ground level and completely covered with a weatherproof covering such as a tarpaulin. The temporary factory-applied packaging should be slit or removed to prevent accumulation of condensation. Roof insulation which has become wet or damaged should be removed and replaced with solid, dry insulation.

Other Boards

Cellular Glass

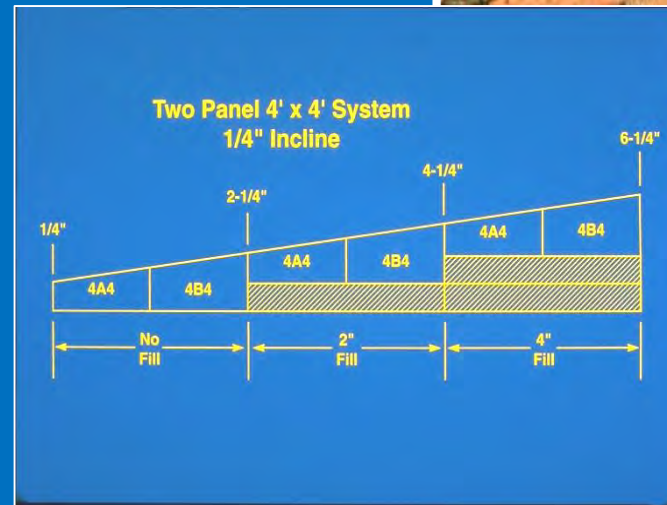
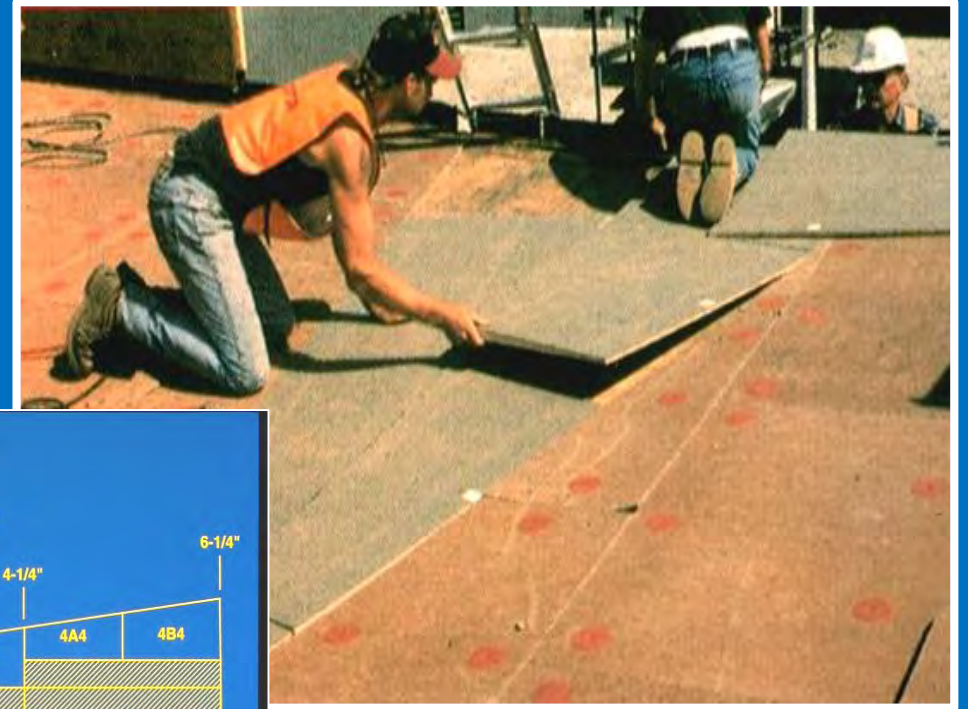


Observer Items – Cellular Glass

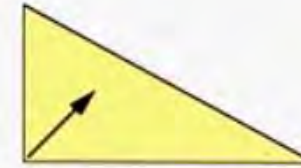
- Board vs. block
- Storage to physically protect and to protect from freeze/thaw while wet

Tapered Insulation

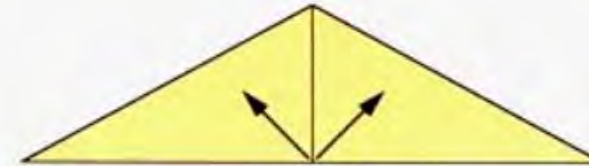
- Fiberboard
- Perlite
- Fiberglass
- Polyisocyanurate
- Polystyrene foam



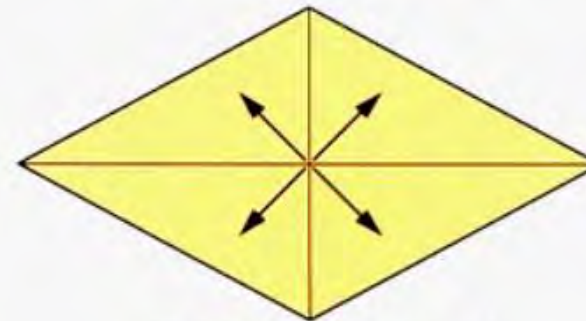
Tapered Insulation



Quarter Cricket



Half Diamond Cricket



Full Diamond Cricket

Observer Items – Tapered Insulation

- Is approved shop drawing on roof?
- Is contractor following plan?
- Do drain locations match drawing?
- Minimum thickness correct?
- Does thickness create interference?
- Do unplanned units block slope?
- Are crickets and saddles sufficiently wide?

“Sloped To Drain”



Summary – Decks and Insulations

The foundation of the roof is very important!



Questions and Discussion