



**1.0 Hour, HSW**

# **Extruded Polystyrene Insulation in Commercial Roof Systems**

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# Learning Objectives

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*For XPS insulation in commercial roof systems:*

- 1. Understand physical property comparison of various rigid foam plastic insulation products.**
- 2. Understand ASTM C578 polystyrene product categories for specification writing.**
- 3. Understand proper use of XPS in a variety of commercial roof insulation applications.**
- 4. Understand building and energy code compliance using foam plastic roof insulation.**

# Closed Cell, Means What?

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Closed Cell = Water Resistant

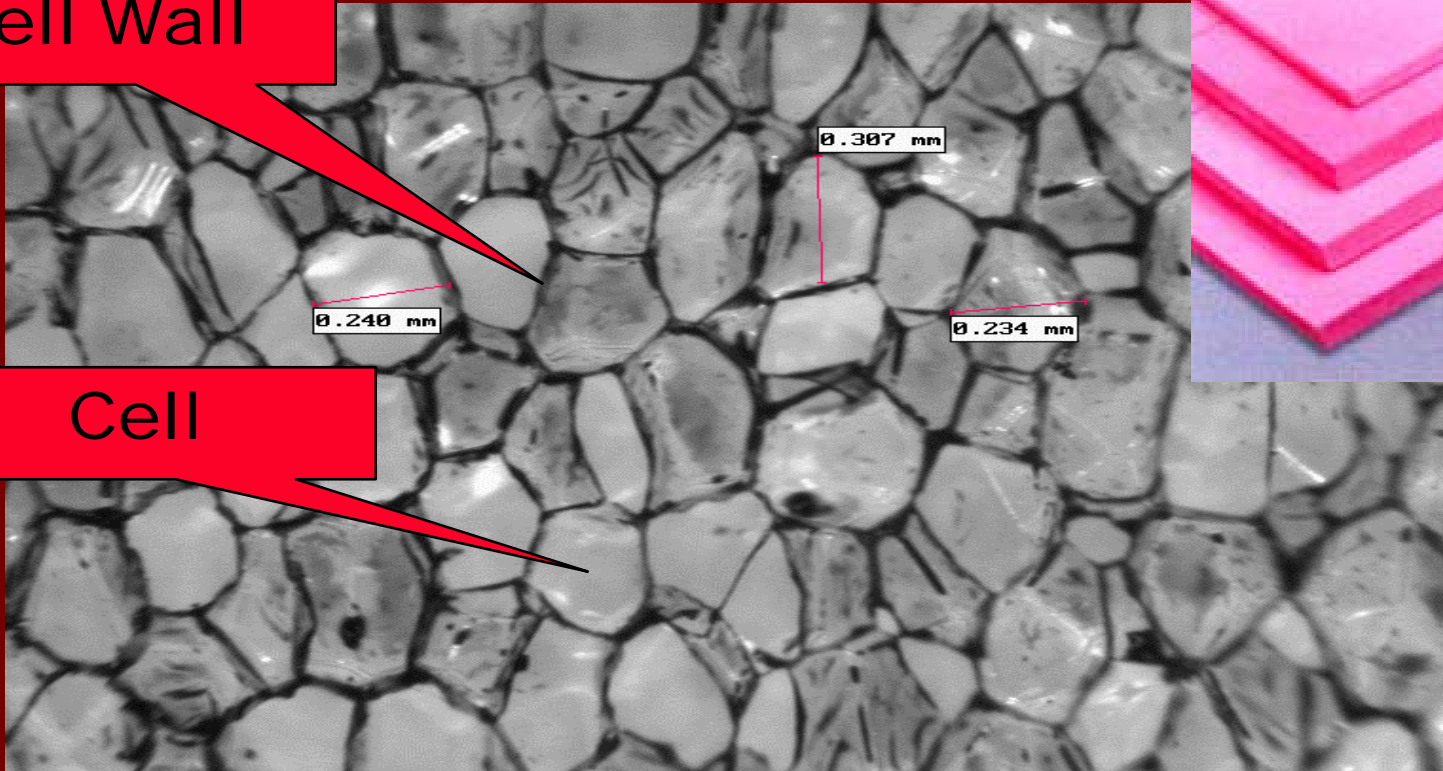
But, it does not mean the same thing for all types of foam plastic insulation.

# Extruded Polystyrene (XPS)

## Closed Cell

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Cell Wall

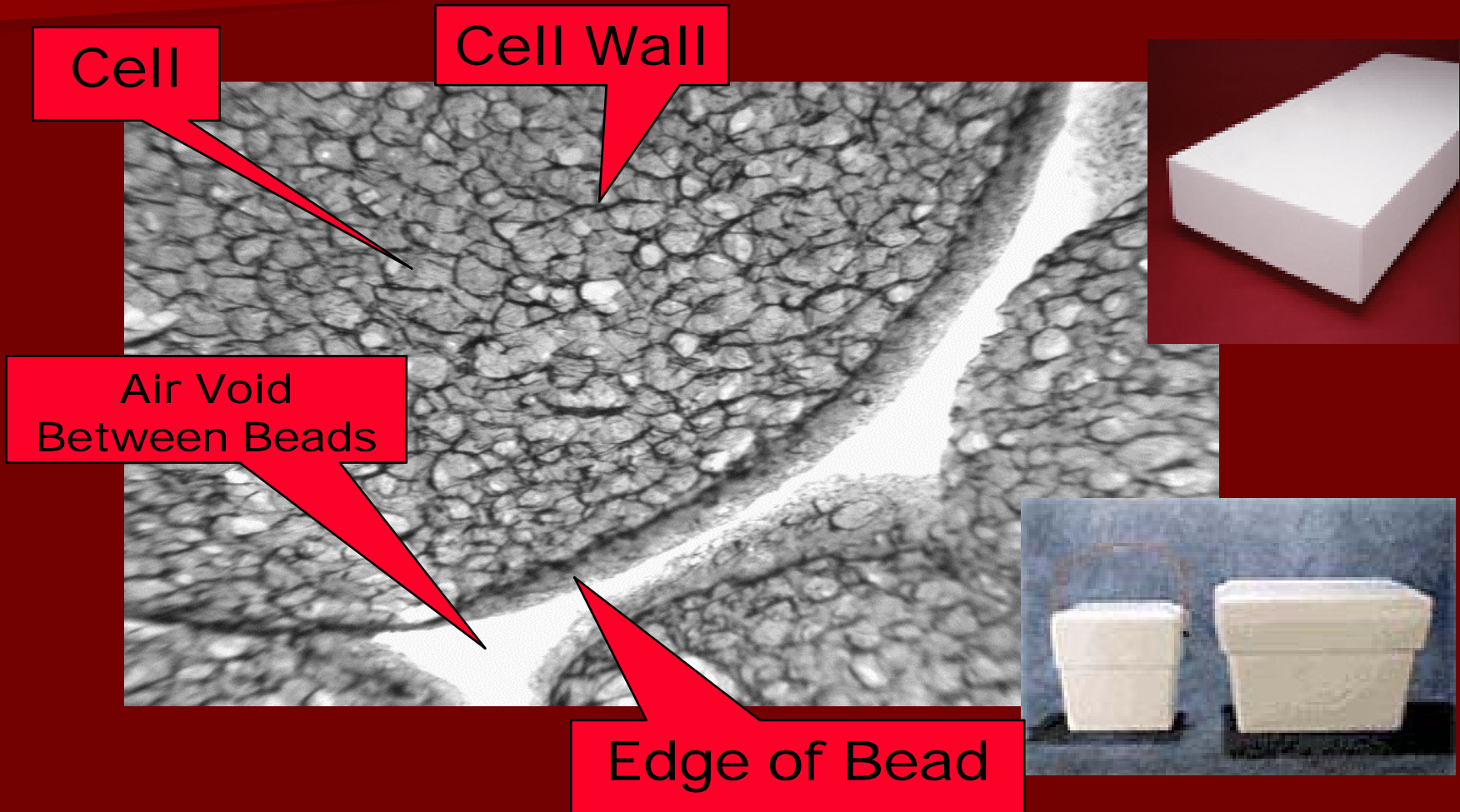


Cell

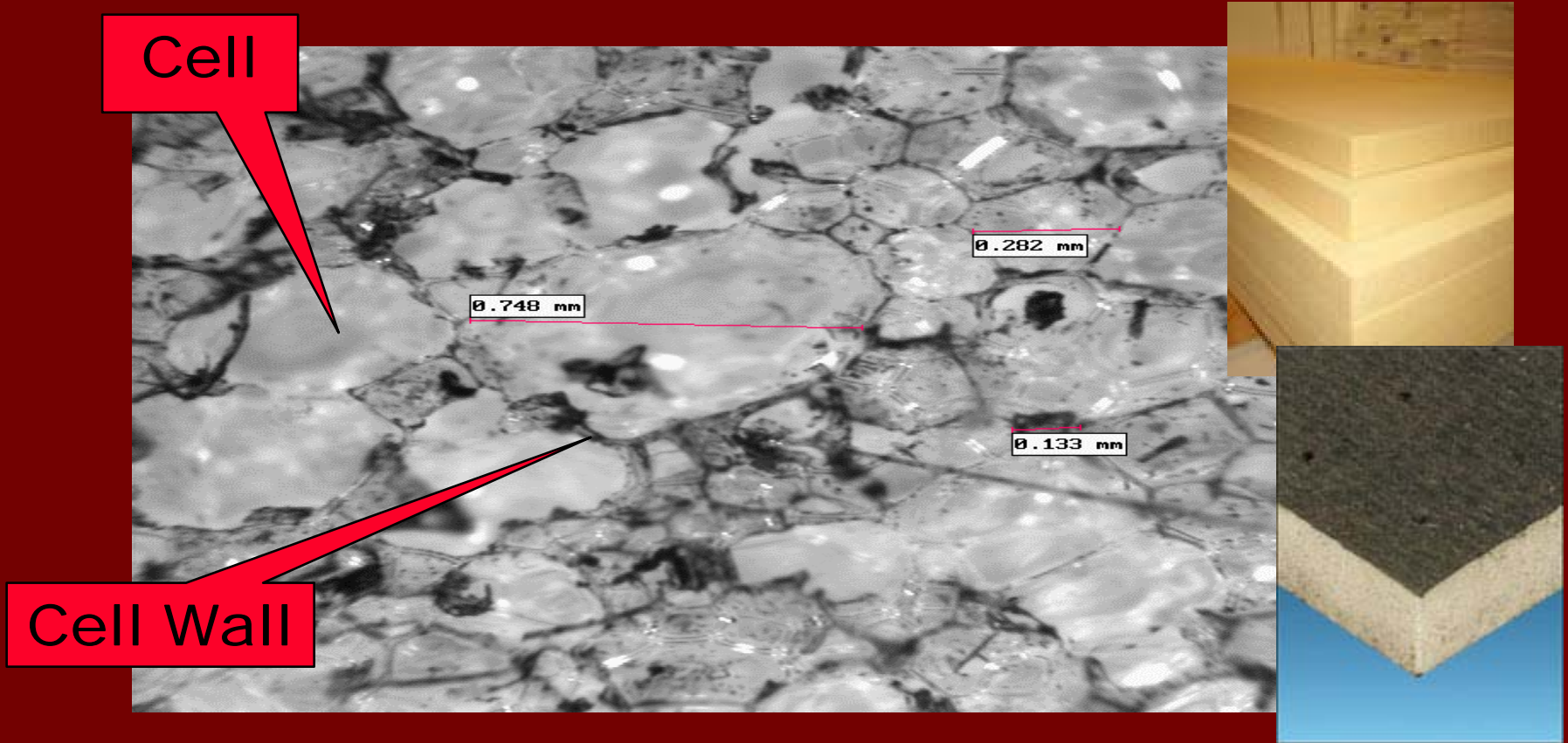


# Expanded Polystyrene (EPS), Closed Cell Beads with Open Voids

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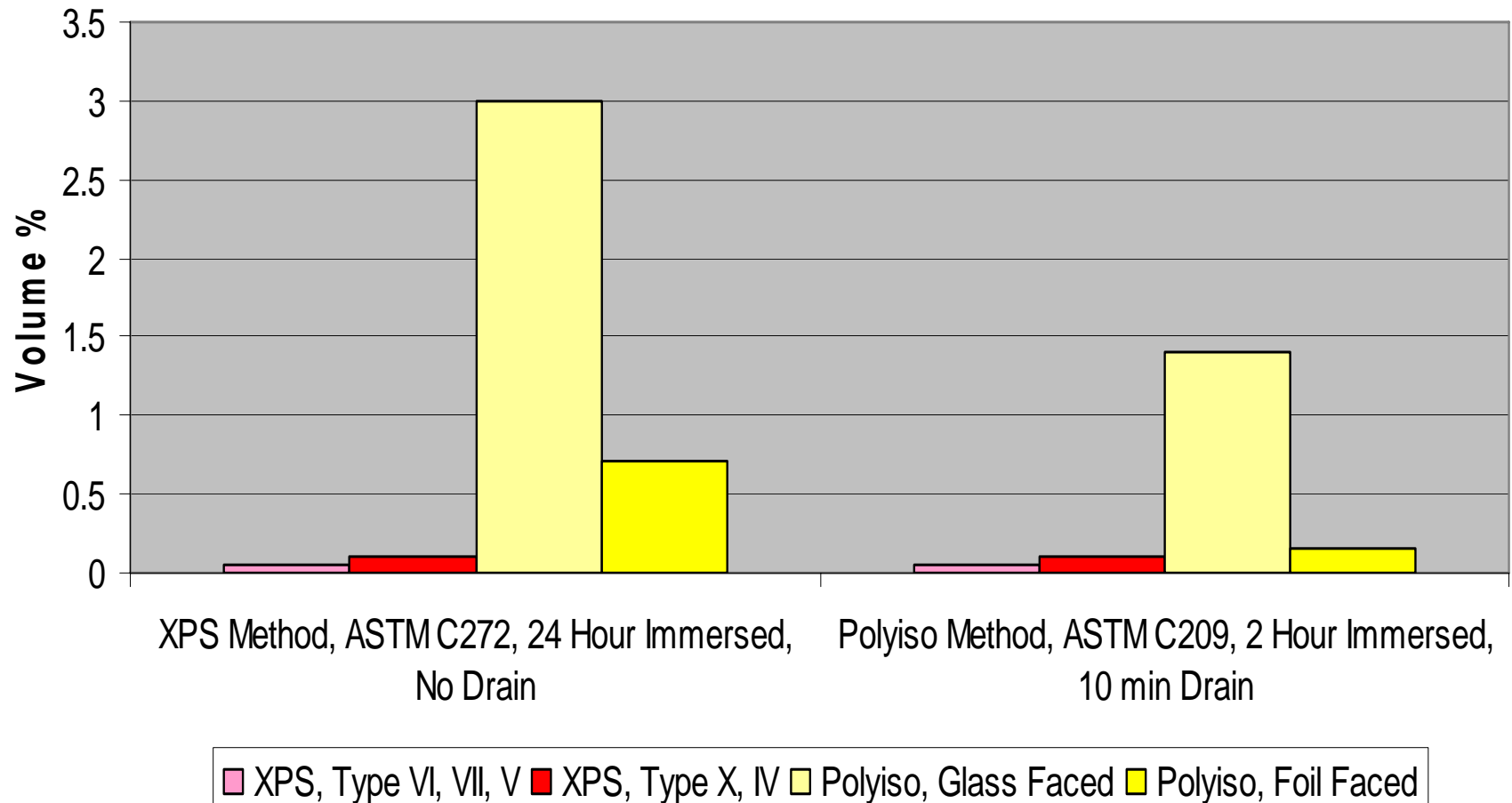


# Polyisocyanurate (Iso), Open, Irregular Cells



# Water Absorption Comparison

Always Compare Properties AND Methods



# XPS Roof Insulation Systems

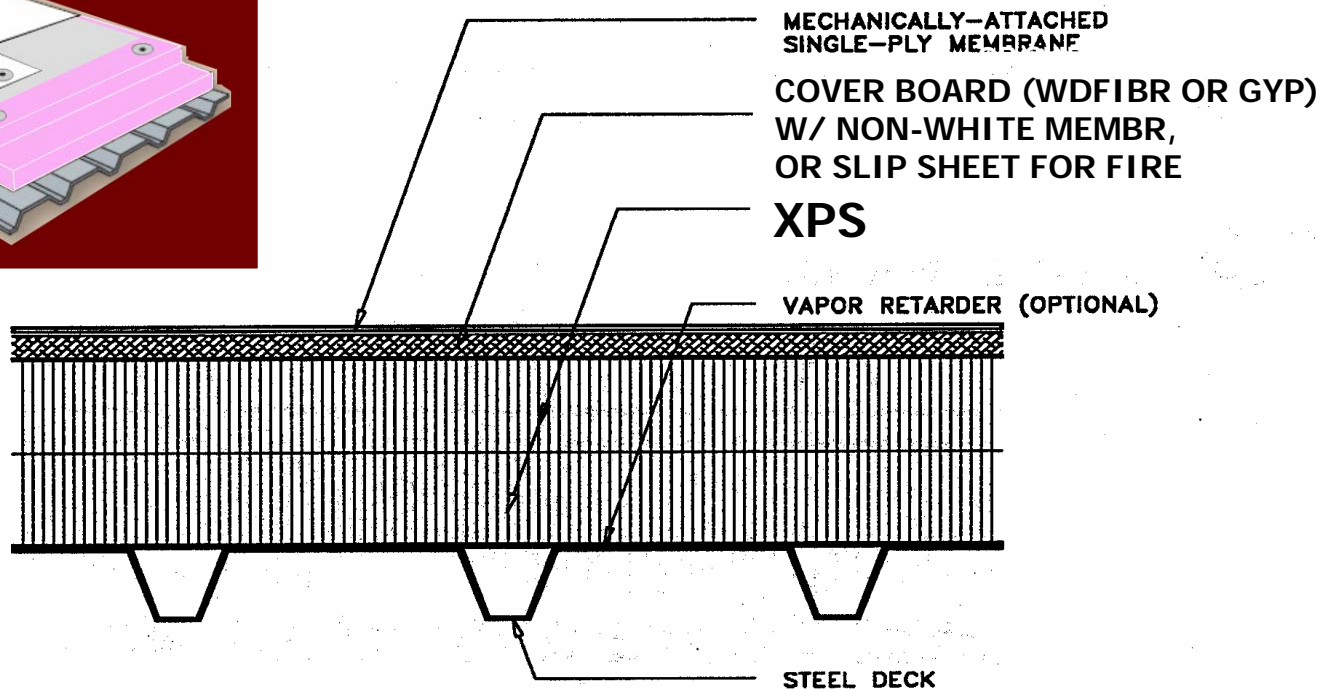
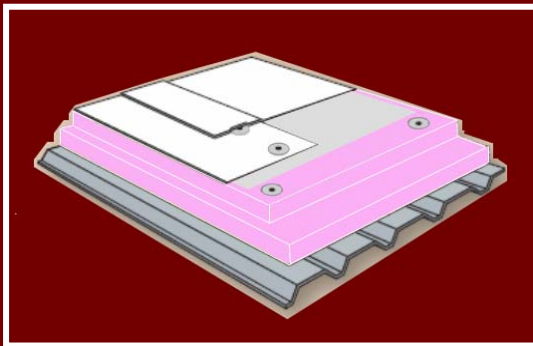
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**5 system types:**

- **Single-ply (insulation below membrane)**
- **Protected Membrane (PRMA, insulation above the membrane)**
- **Metal, Architectural Roofing**
- **Waterproofing/Plaza Deck**
- **Recover**

# XPS, Mechanically Attached

Mechanical fasteners and stress plates hold the insulation and membrane in place.



# XPS, Mechanically Attached

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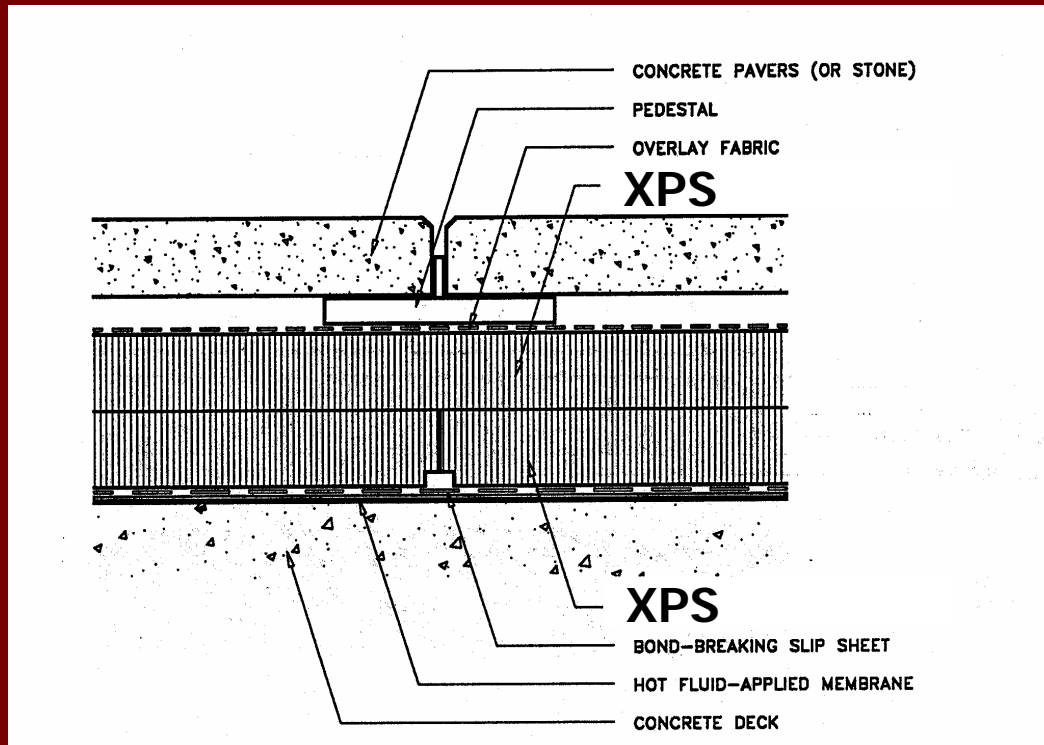
## Design considerations:

- **Cover board, or slip sheet overlayment usually required.**
- **Cover board provides temperature protection from solar heat of dark membranes, and improves ASTM E 108 top surface flame spread (Class, A,B, C).**
- **Slip sheet separates chemically incompatible membranes from XPS, and improves ASTM E 108 flame spread.**
- **Fastener placement dictated by FM 60, 90 or 120 psf uplift test results.**

# XPS, Waterproofing/Plaza Deck Insulation

Waterproofing layer protected from environmental extremes and physical abuse. Creates traffic surface.

Pedestal System to Support Pavers



# XPS, Waterproofing/Plaza Deck Insulation

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## Design considerations:

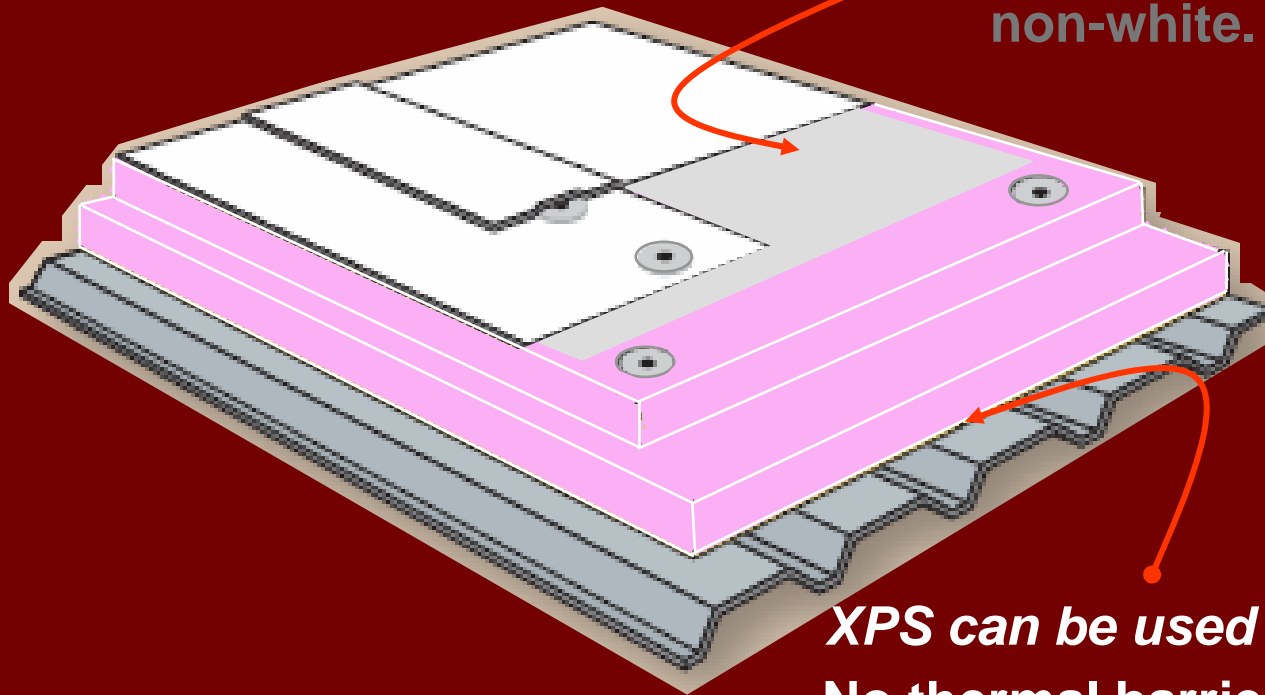
- Design paver ballast in accordance with ANSI/SPRI RP- 4-2002.
- Specify only low water absorbing XPS, ASTM C 578 Types, VI (40 psi), VII (60 psi), or V (100 psi).
- Specify water drainage channels on bottom of insulation layer to encourage water drainage off of membrane.
- Use paver pedestals or XPS “ribbed board” with water drainage channels under pavers.
- Use bond-breaking slipsheet over membrane where required.

# XPS Roof Insulation Direct to Deck

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Slip sheet or cover board may be required to achieve Class A rating.

Mechanically attached single-ply. Must use cover board if membrane fully adhered, or non-white.

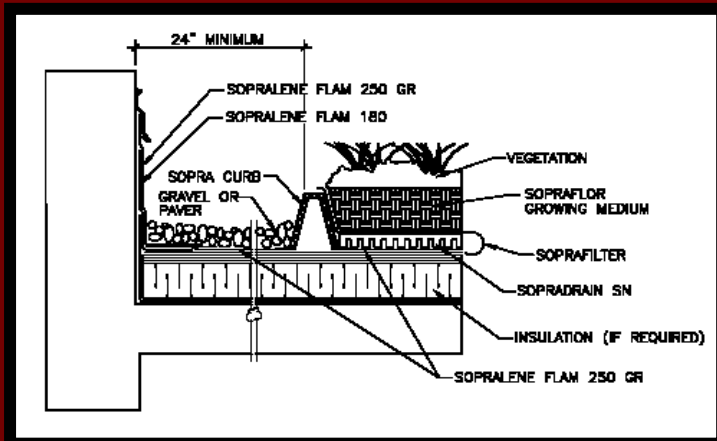


***XPS can be used direct to deck.  
No thermal barrier needed up to 10”  
thick w/o cover, 8” w/ cover board.***

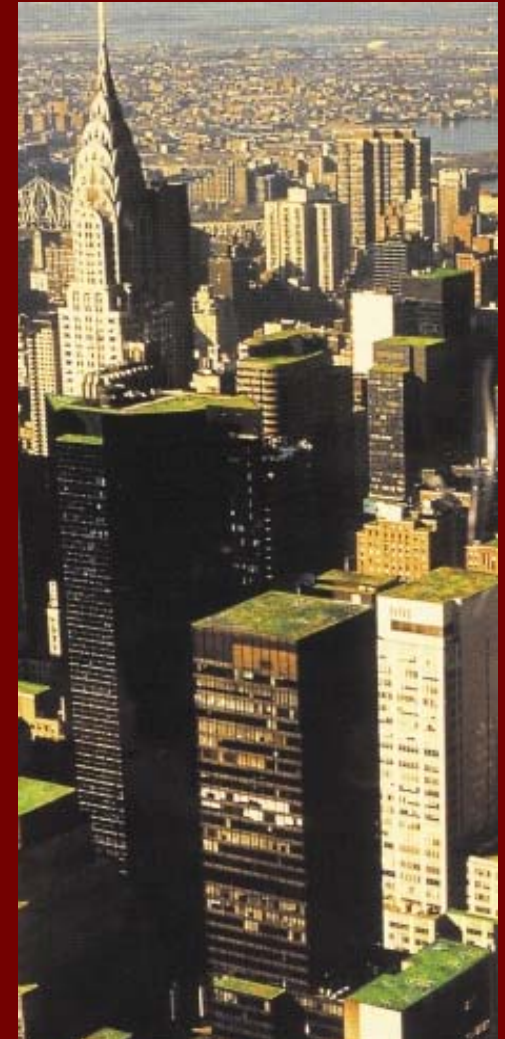
# XPS Enables GREEN Roof Insulation Systems

## *NRCA Green Roof Systems Manual, Section 6.4 Moisture Resistant Insulation:*

"NRCA recommends XPS insulation be used as insulating material for green roof systems... minimum of 40 psi compressive strength for insulation used above or below green roof waterproofing membranes... NRCA recommends that a moisture resistant insulation always be installed above the membrane. This provides thermal protection for the membrane, reducing the overall temperature gradient that a membrane experiences."



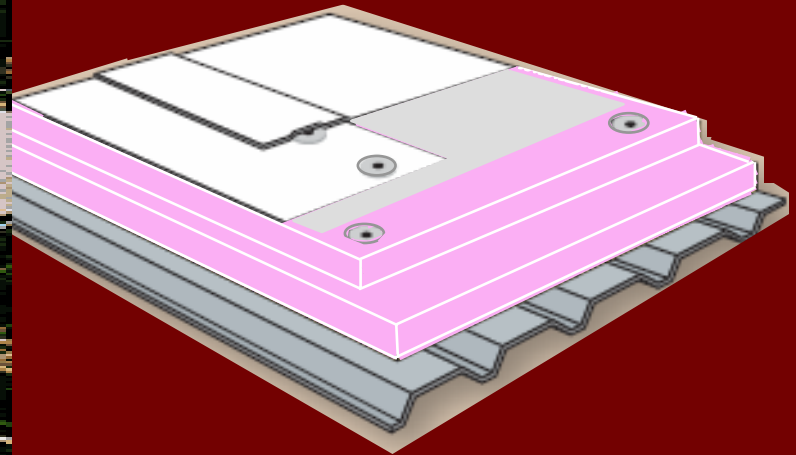
Insulated GREEN  
roofs are not possible  
without XPS.



# “Cool Roofs” w/ XPS Reduce Urban Heat Island Effect

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- XPS, direct to deck, slip sheet (no cover board), TPO membrane very cost effective “cool roof”.
- TPO’s reduce the amount of heat transferred into building.
- Reflective roofs can reduce peak cooling demand by 15%.
- Reflective roofs reduce thermal shock on the roof and increase system life cycle.



# XPS, An Environmentally Responsible Choice

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- Energy saving roof insulation.
- 15% Recycle content. Zero in-plant waste.
- Used with “cool roofs”, reducing urban heat island effect.
- HCFC blowing agent. 95% less ozone layer reduction over last generation CFC.
- HCFC completely gone with next generation blowing agent in 2010.
- Reusable. Saves costly tear-off and disposal over the building life cycle.
- Third party verification, SCS, GreenGuard, Energy Star