Continuous Insulation for Code-Compliant, High-Performance Walls in Types I-IV Construction

Module 1: Continuous Insulation

Revised 10/31/2016

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Introduction

- **About PIMA**
  - Represents polyiso insulation manufacturers and industry suppliers
- **Mission**
  - Unified voice for rigid polyiso industry
  - Advocate for safe, cost-effective, sustainable and energy-efficient construction
  - Leadership, advocacy and education
- **polyiso.org**

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Introduction

- Why learn about continuous insulation (CI)?
  - Concept in use since the early 1900s
  - Used on low-slope commercial roofs since 1940s
- Scope: CI wall applications in Type I-IV construction

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Introduction

- What are Types I-V construction? (IBC Chapter 6)
  - Type I-II construction:
    - Exterior and interior building elements must be noncombustible materials
  - Type III construction
    - Exterior must be noncombustible, interior may be any permitted by code
  - Type IV construction (Heavy Timber)
    - Exterior must be noncombustible, interior must be solid or laminated wood without concealed spaces
  - Type V construction
    - Exterior and interior building elements may be any permitted by code

Introduction

- Foam Plastic Insulating Sheathing (FPIS)
  - Is widely-used and cost-effective
  - Has a responsible impact on the environment
  - Can be used for a variety of applications

Source: architecture-page.com

Source: beltstl.com

Source: designbuild-network.com

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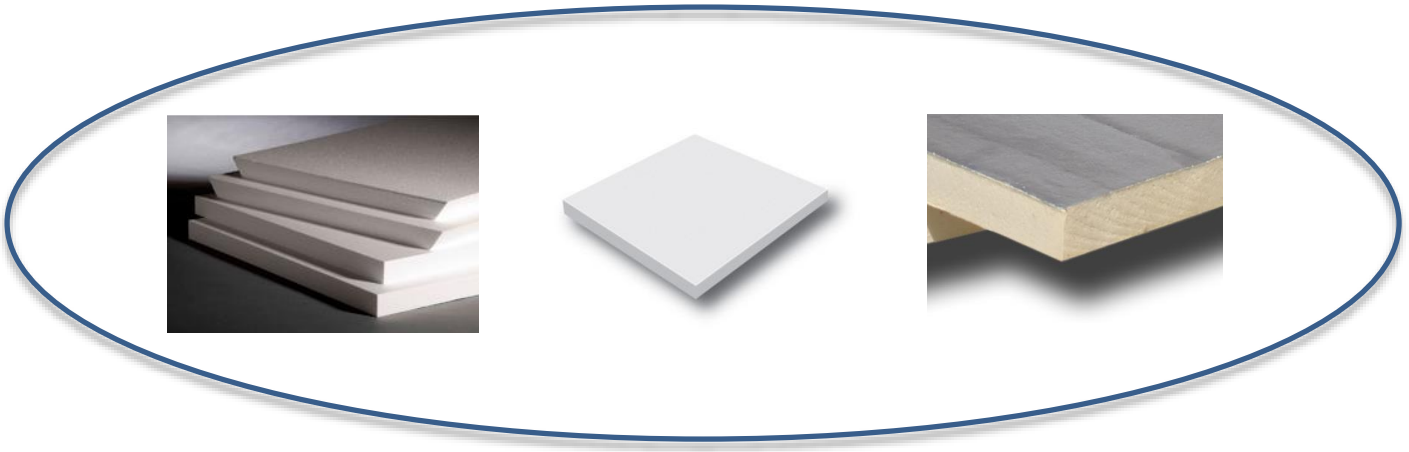
Introduction

- Three types of FPIS:
  - Expanded Polystyrene (EPS), ASTM C578
  - Extruded Polystyrene (XPS), ASTM C578
  - Polyisocyanurate (Polyiso), ASTM C1289



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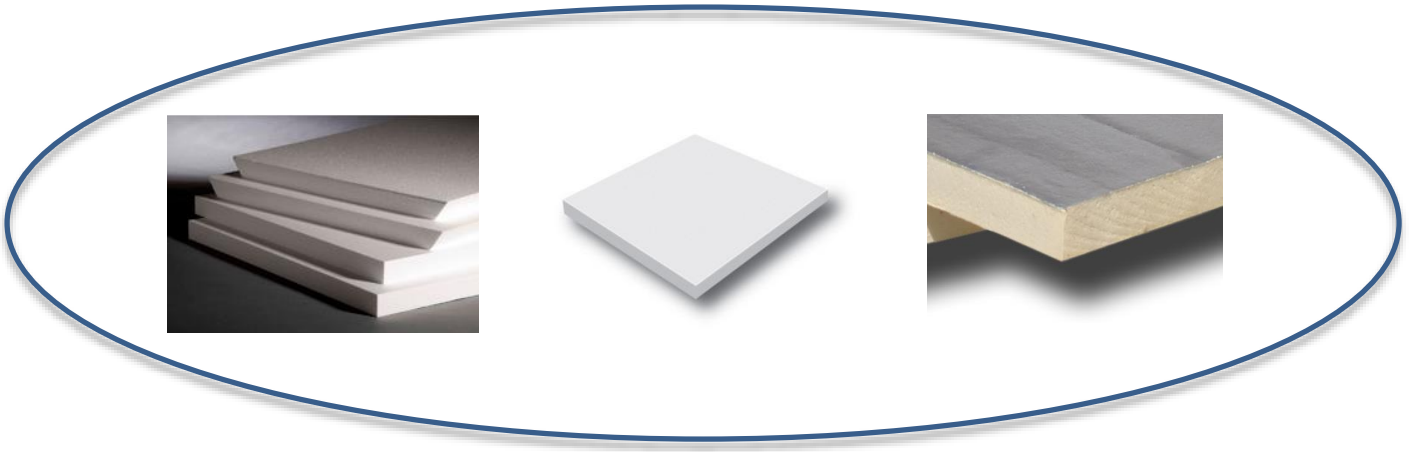
Introduction

- What do ASTM standards govern?
  - Wide variety of physical, structural, thermal, and moisture property tests
  - Ensures that a product's performance is up to a minimum level (and may exceed this level)



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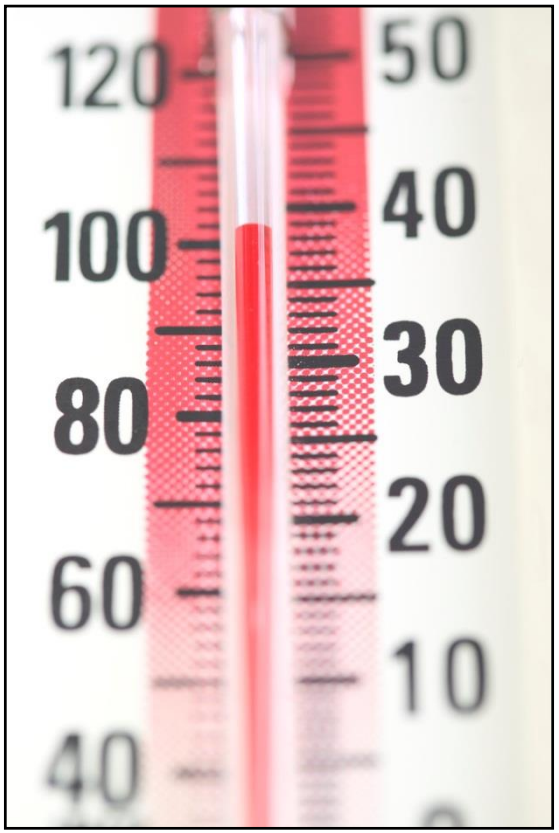
Introduction – Polyiso

- Polyiso key attributes:
  - Highest R-value per inch of thickness
    - ASTM requires R-6 per inch, some brands may be higher
  - Moisture-resistant, not a food source for mold
  - Compatible with common adhesives and sealants
  - Excellent dimensional stability
  - Superior fire performance

Introduction – Polyiso

- More key attributes:
  - Service temperature: -75°F (-60°C) to 225°F (107°C)
  - Long-term R-value
  - Recycled content
  - Zero ozone depletion potential
  - Virtually no global warming potential



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Continuous Insulation

- Definition (ASHRAE 90.1-2013)

continuous insulation (c.i.): insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.

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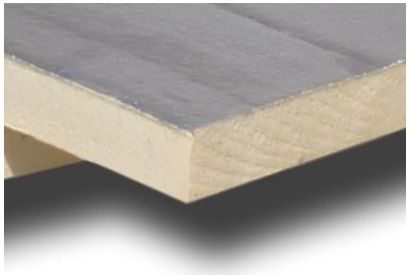
Kinds of Continuous Insulation

- Foam Plastic Insulating Sheathing
  - EPS, XPS, Polyiso
- Spray Polyurethane Foam
  - SPF (closed cell polyurethane)
- Others
  - Rock wool
  - Fiberglass boards
  - Fiberboard



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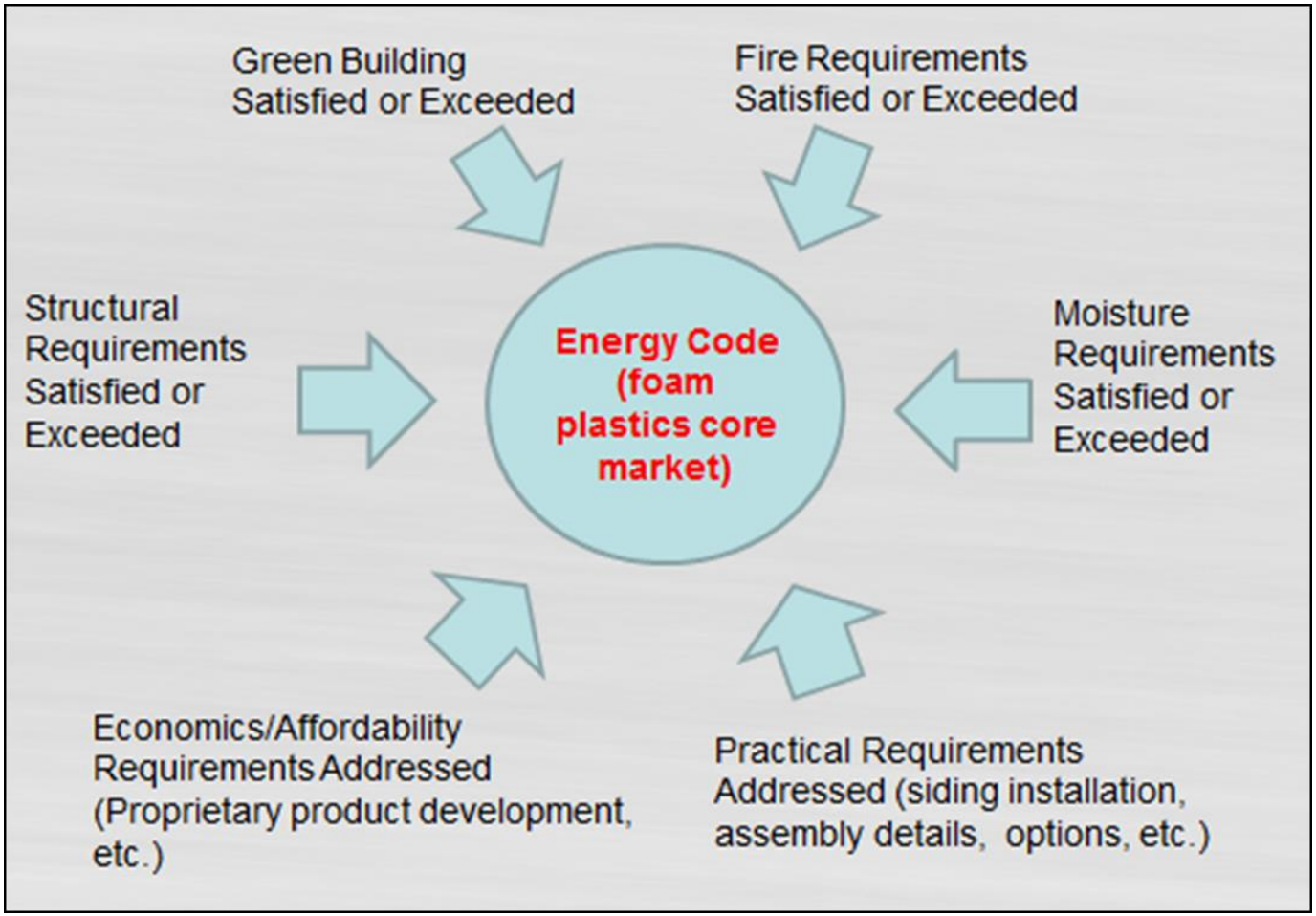
Role of CI



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Thermal Properties

TABLE 1. Examples of Minimum R-Value Per Inch for Common Types of Continuous Insulation (Foam Sheathing)

Continuous Insulation Material Type	R-value per Inch of Thickness
EPS (ASTM C578, Type II)	**4.0**
XPS (ASTM C578, Type X)	**5.0**
Polyiso (ASTM C1289, Type I)	**6.0***

* 6.0 is ASTM minimum R-value per inch. Some brands of Polyiso exceed this minimum. Consult manufacturer.

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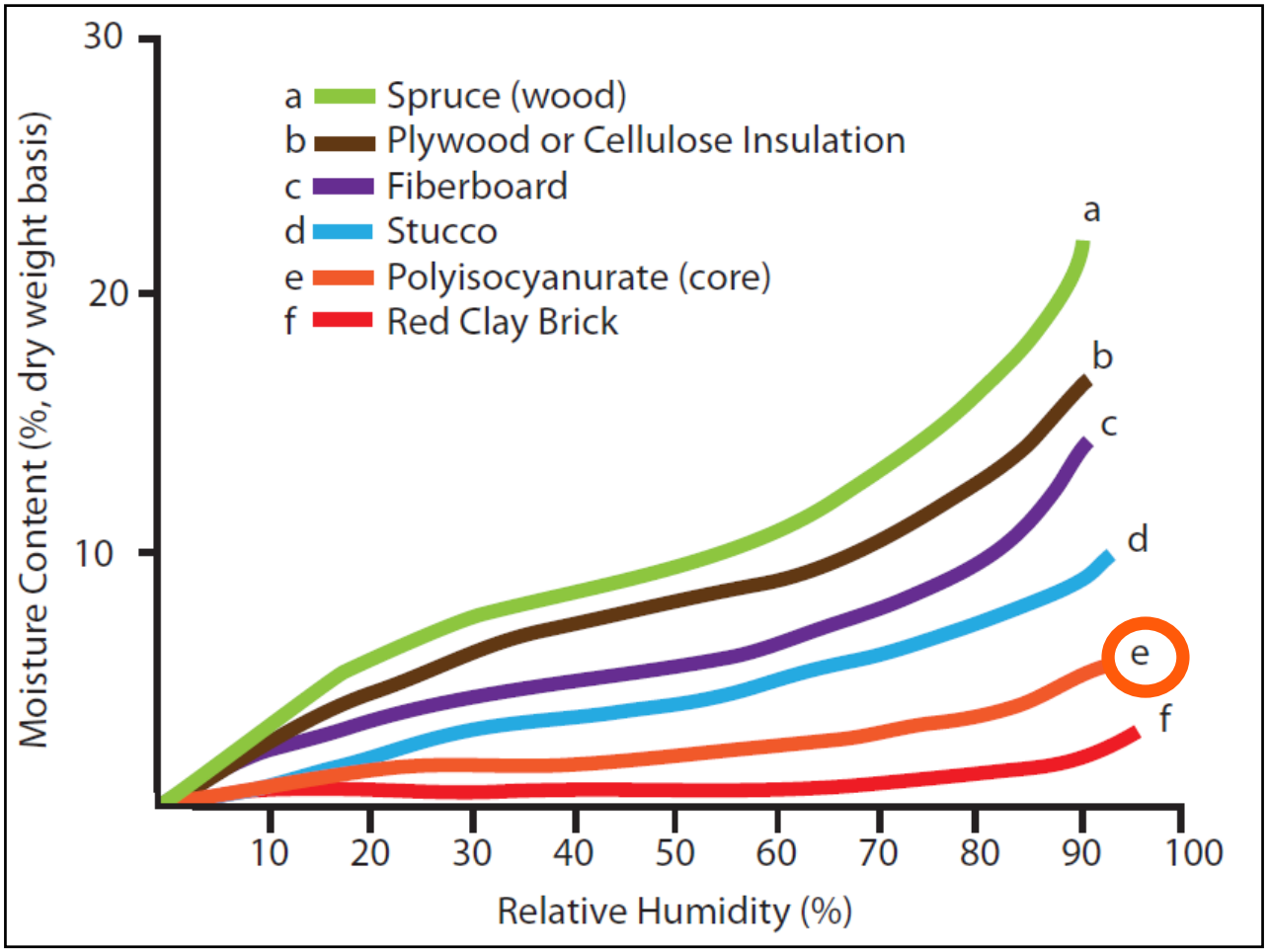
Moisture Sorption Comparison



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Durability

- Foam Plastic Insulating Sheathing
  - Does not rot, decay, or corrode
- Other wall sheathing
  - May be prone to moisture damage

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