Long Term Thermal Resistance Webinar

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Learning Objectives

- Introduction to Polyiso and PIMA
- Understand LTTR and its importance
- Understand the PIMA QualityMark℠ Program
- Understand why the LTTR testing method is changing
- Understand which R-value to use when bidding projects
- Understand why some R-values are different with other manufacturers' product
- Compare Polyiso to other available building materials

Section 1

POLYISO AND PIMA

Polyisocyanurate Insulation

- Closed-cell, rigid foam board insulation
  - Primary Uses:
    - Offices
    - Health Facilities
    - Warehouses
    - Retail and Industrial Manufacturing Facilities
    - Educational Institutions
- Cited by US EPA for its responsible impact on the environment

Polyisocyanurate Insulation

- Polyiso roof insulation offers:
  - The highest R-value per inch
  - Outstanding installed cost advantages
  - Exclusive third-party, thermal performance certification
  - The only high-thermal foam to meet both FM 4450 and UL 1256 fire tests
  - Nationwide availability

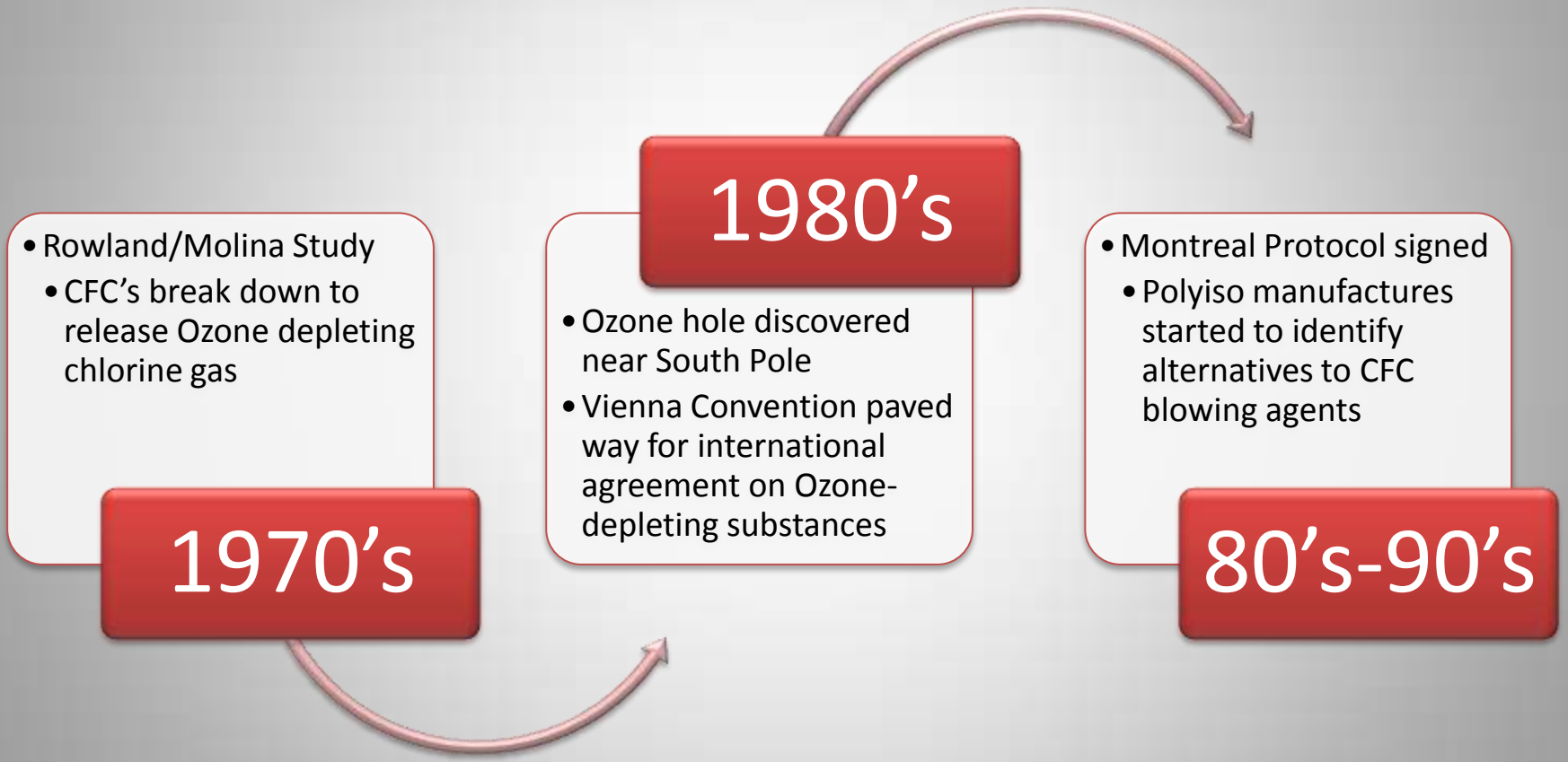
PIMA

- Polyisocyanurate Insulation Manufacturers Association
- National trade association representing Polyiso insulation manufacturers and suppliers
- Leads programs and supports polyiso related legislation

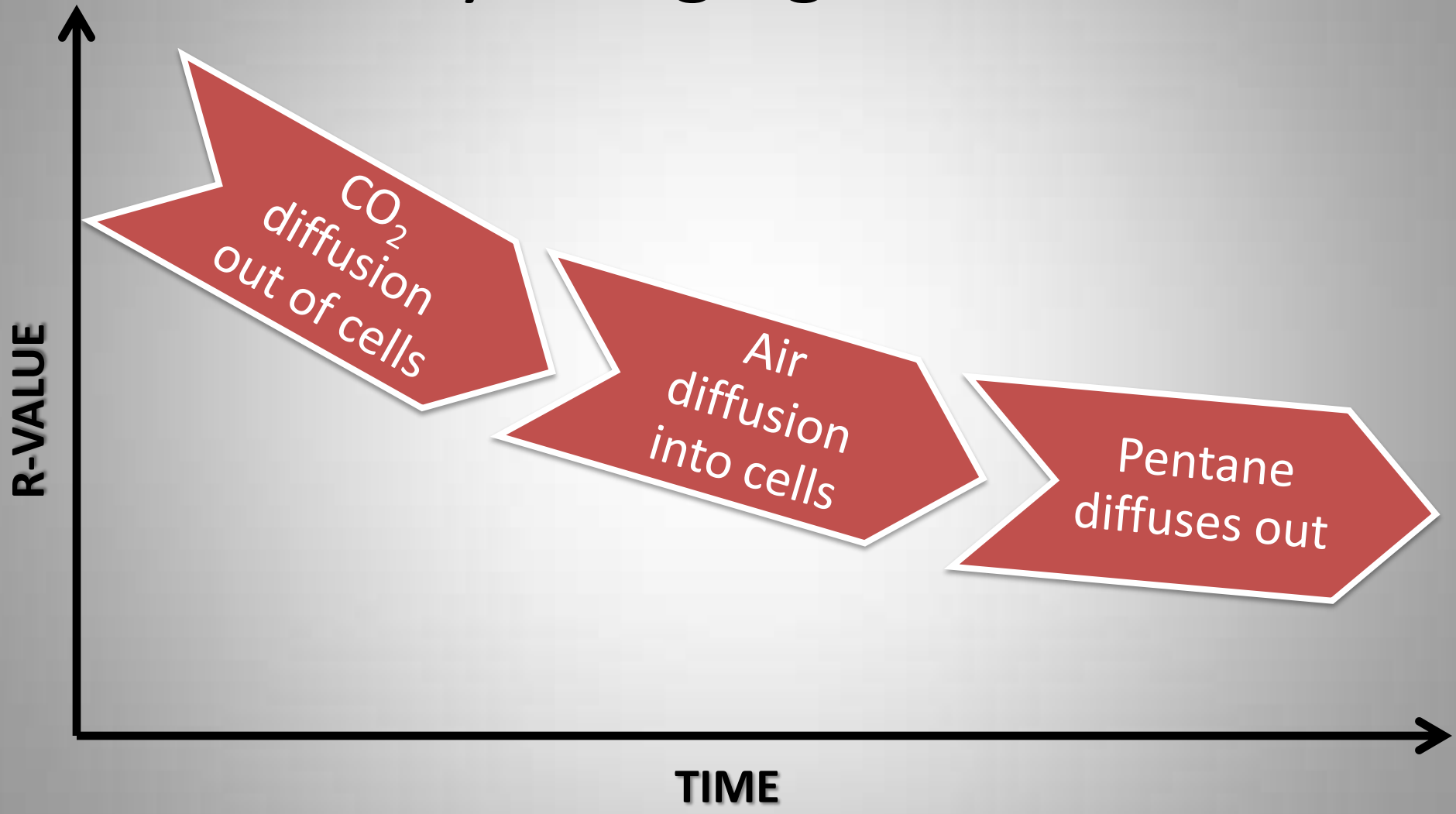
Section 2

TESTING STANDARDS

Blowing Agent Transition



Polyiso Aging Process



Testing Standards Progression

1970's – Early 1980's

- R-value at time of manufacture

Early 1980's – Early 1990's

- RIC/TIMA 281-1 (Uniform conditioning for 6 months)
- ASTM C1289 (PIMA 101/90 day conditioning @ 140 degrees F) (1987)

Early 1990's – Mid 1990's

- ASTM 1303: ORNL Joint Project (PIMA, NRCA, DOE, EPA): Use of accelerated aging by slicing and scaling (1992)

Mid 1990's – Early 2000's

- Long Term Thermal Resistance (1995: ASTM C1303)

Long Term Thermal Resistance

- January 1, 2003
  - ASTM C1289-03
    - Based on CAN/ULC-S770
    - LTTR Value of 6.0/Inch
    - 15-year time-weighted average of thermal resistance
    - Equivalent to a 5-year aged R-value in controlled lab conditions
    - Predicted R-value based on the 5-year aging process
    - Create 8 thin layers (4 from the surface of the product and 4 from the core) for testing, which could range from 6mm-12mm thick. Sample with the highest LTTR value used
    - Evaluation of real-world evidence found the tests' predictions to have higher LTTR values than were supported by the data

Long Term Thermal Resistance

- January 1, 2014
  - ASTM C1289-13e1
    - Revised slice thickness from 6-12mm range up to 10mm minimum
    - Revised sample age timetable from products tested within 3-14 days of manufacture date to 10-14 days
    - Revised usage of test samples from only the one with the highest R-value to a combination of core and surface samples

LTTR Testing

What Took So Long?

- 2003-2008
  - Collect real-world data for evaluation
- 2008-2013
  - Conduct re-evaluation of test methods
  - Develop new test methods, gain consensus throughout the industry and ASTM
  - Re-certify all products using revised ASTM standards
  - Verify all certifications through QualityMark third party testing

Section 3

QUALITYMARK CERTIFICATION

PIMA QualityMark[CM] Certification

- Begins reporting LTTR values in accordance with ASTM C1289-13e1 on January 1, 2014
- Voluntary program that allows participating Polyiso manufacturers to certify the Long Term Thermal Resistance (LTTR) values of their Polyiso roof insulation products through an independent third-party
- Designed to be a benchmark for all roof insulations and gives consumers an easy way to identify quality products that meet or exceed listed LTTR values.

PIMA QualityMark^{CM} Certification

- Polyiso is the only insulation to be certified by this unique program for its LTTR value
- The PIMA QualityMark^{cm} certification program was developed by PIMA and is administered by FM Global
- Manufacturers are periodically audited by FM Global through this program

Section 4

CHANGE IMPACTS

New Firestone LTTR Values

	Old LTTR (ASTM C1289-03)		New LTTR (ASTM C1289-13e1)	
Board Thickness	LTTR Value	R/Inch	LTTR Value	R/Inch
1”	6.0	6.0	5.6	5.6
2”	12.1	6.0	11.4	5.7
3”	18.5	6.2	17.4	5.8
4”	25.0	6.2	23.6	5.9

- PIMA Minimum LTTR Design Guideline = 5.7/Inch
  - Most manufacturers have adopted and certified at 5.6/Inch
- While R-value per inch increases with thicker board product, we still recommend two layers with a cover board for improved protection and overall roofing system strength, as well as minimization of thermal shorts

Roof Design

ASHRAE Climate Zone	ASHRAE 90.1-2013 R-Value Requirements	Polyiso Thickness to Meet IECC	
		OLD LTTR Method	New LTTR Method
1,2,3	R-25	2 layers 2.1”	2 layers 2.2”
4,5,6	R-30	2 layers 2.5”	2 layers 2.6”
7,8	R-35	2 layers 2.9”	2 layers 3.1”

- A 4-6% increase in thickness can be expected
- Fastener lengths and blocking dimensions may change
- As best practices, designers and specifyers should clearly state the correct ASTM designation (ASTM C1289-13e1) and insulation thickness, which will help to eliminate confusion

Section 5

POLYISO ADVANTAGES

Product Comparison

Polyiso Products

- Low environmental impact
- Virtually no global warming potential
- Zero ozone depletion potential
- Cost effective, optimized energy performance
- Long service life
- Regional materials (nationwide production network)
- R-value of 5.7 per inch of thickness
- Excellent fire test performance
- Preferred insurance ratings
- Moisture resistance
- Dimensional stability
- Compressive strength

Polystyrene Products

- Extruded polystyrene softens at 165^{o}F
- Melts between 200^{o}F-210^{o}F
- Can be attacked by many petroleum-based solvents in adhesives, paints, stains, water repellent and preservative coatings, and in bituminous waterproofing (Can dissolve altogether)
- Exposure to UV light causes degradation
- R-value of 5.0 per inch of thickness

Thank You!