



# Elastomeric Roof Coatings using Styrene Butadiene as a Waterproofing Primer and Styrene Acrylic as a Reflective Topcoat.



Golden Gate Society for Coatings Technology



FOR PACIFIC NORTHWEST SOCIETY  
COATINGS TECHNOLOGY

11/13-15/17

John Dockery

- Trinseo the company
  - Liquid Applied Membranes
  - Why White Roofs?
  - Roofing Market
  - Styrene Butadiene Basecoat
  - Styrene Acrylic Topcoat
  - Formulating Latitude
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# Trinseo

## Fast Facts

- Trinseo was founded on a unique combination of strong capabilities – strong market positions, production assets, and leading technology
- More than 2,200 employees, based in 27 countries
- 18 manufacturing sites and 11 R&D facilities around the world
- Part of Dow Chemical until 2010
- Leader in our key products: plastics, latex, and rubber



# Trinseo Portfolio Overview

	Performance Materials Division				Basic Plastics and Feedstocks Division	
Businesses and Key Products	<b>Binders</b> Styrene Butadiene (SB) Latex Styrene Acrylic (SA) Latex		<b>Performance Plastics</b> Consumer Essential Markets Automotive Plastics		Polystyrene (PS) Acrylonitrile Butadiene Styrene (ABS) Styrene Acrylonitrile (SAN) Polycarbonate (PC) Feedstocks	
Brands	LOMAX™ FOUNDATIONS™ HPL™  ENVERSA™ SPRINTAN™	MaxCoat™ MaxFoS™ MaxForte™	ProForte™ EVEREST™ ProWeb™	EMERGE™ INSPIRE™ VEL VEX™ CELEX™ PULSE™	CALIBRE™ STYRON™ TYRIL™	MAGNUM™ STYRON™ A-TECH STYRON™ C-TECH
End Uses						



# Liquid Applied Membranes

# Liquid Applied Membranes and Coatings

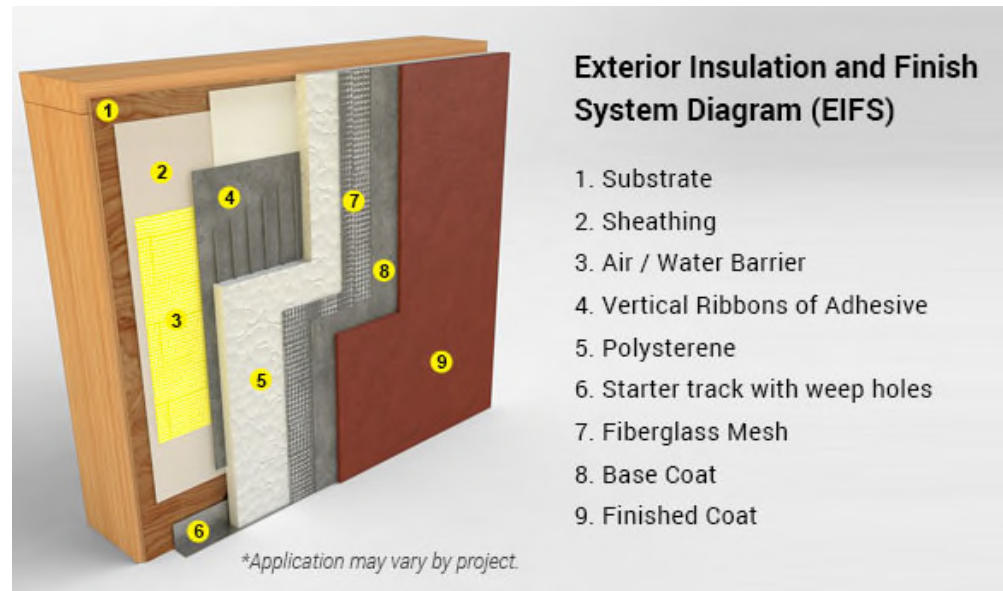
Water is the Enemy!





# Liquid Applied Membranes and Coatings

**EIFS Membranes** - Exterior insulation finish system (EIFS) is a general class of non-load bearing building cladding systems that provides exterior walls with an insulated, water-resistant, finished surface in an integrated composite material system.





# Liquid Applied Membranes and Coatings

**Waterproof Membranes** – Materials used in a system to prevent the ingress of water into foundations, roofs, walls, basements, buildings and structures when properly installed.



# Liquid Applied Membranes and Coatings

**Elastomeric Coatings** – Designed for use on masonry, concrete and other construction materials to prevent water from penetrating into building interiors. The flexible film covers and hides hairline cracks to make a uniform, pinhole-free coating layer.

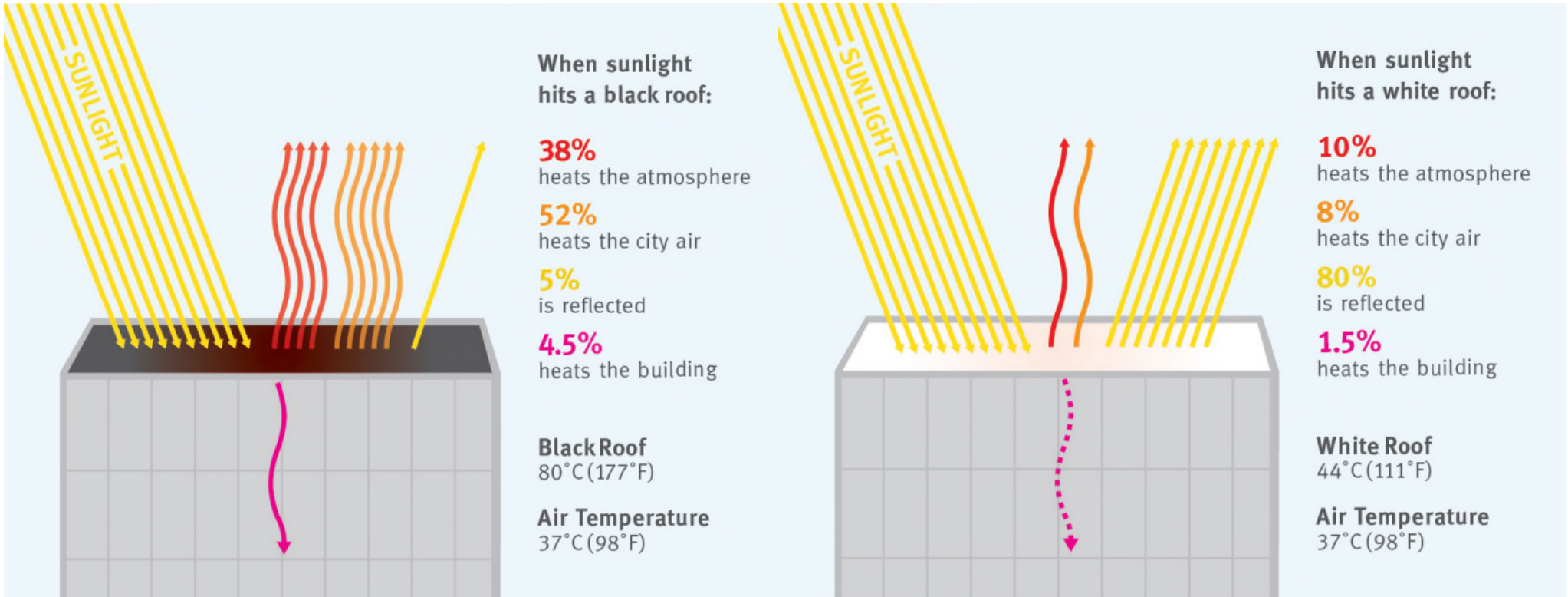




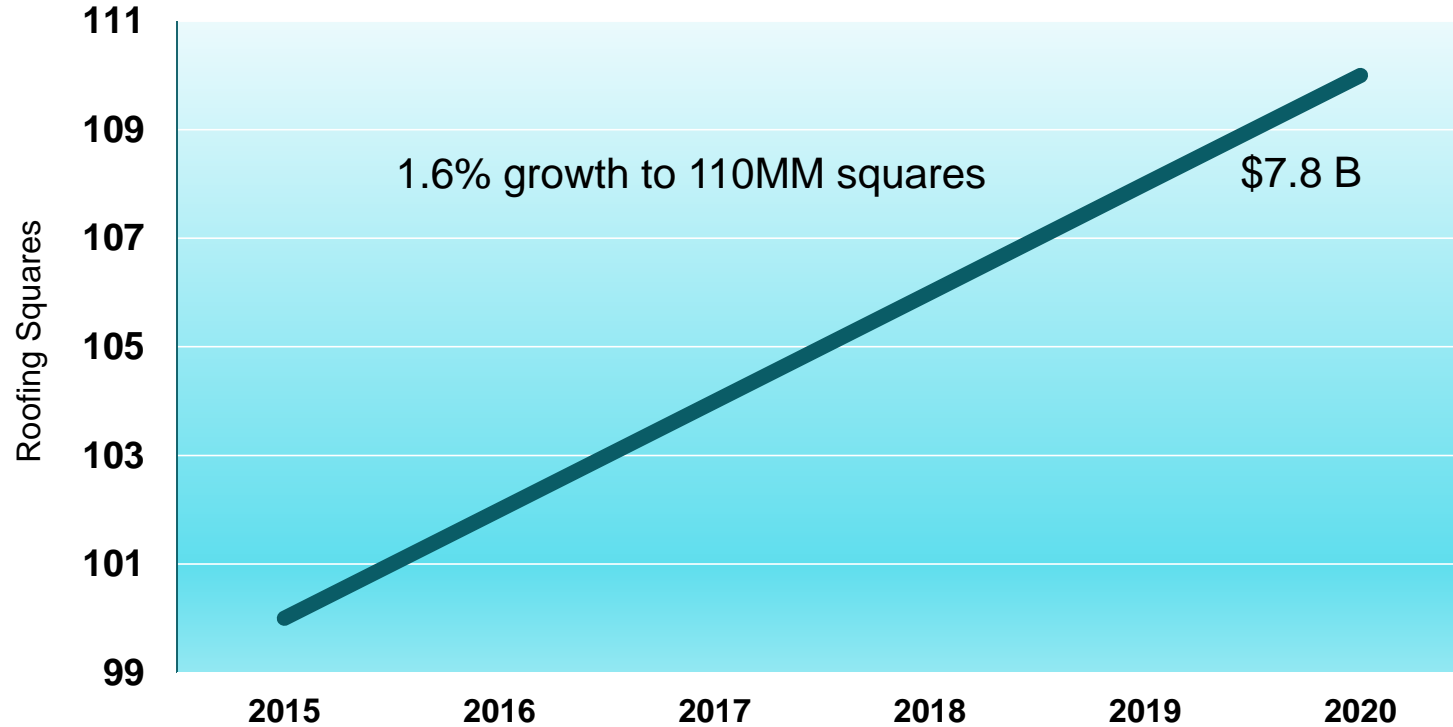
# White roofing

# Why White Roofs?

- 85-90% of roofs in the U.S. are dark colors
- White roofs can combat heat island effect and reduce building cooling cost



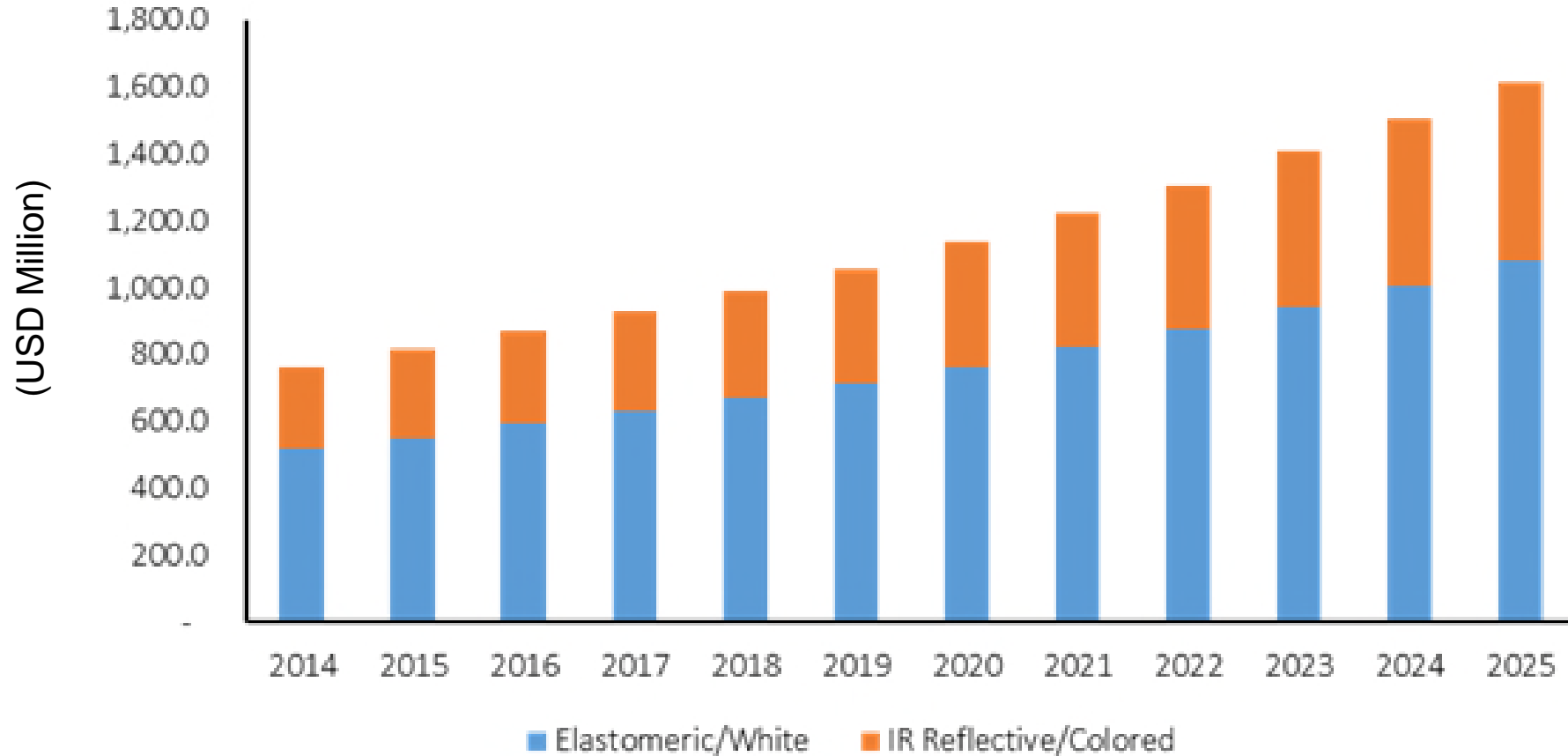
# US Commercial Roofing Demand



Reroofing applications accounted for the larger share of demand supported by the large stock of installed roofs.

# Elastomeric Cool Roofing Market

U.S. cool roof coating market revenue, 2014 - 2025 (USD Million)



- ASTM D-6083
    - Tensile Strength
    - Elongation
    - Tear Strength
    - Wet Peel Adhesion
  - ANSI 118.10
    - J-Tube
      - Water Ponding Resistance
  - Trinseo Methods
    - Accelerated Dirt Pickup Resistance
    - Asphalt Bleed Through Resistance
-



# Styrene Butadiene as an Elastomeric Basecoat Primer

- Styrene Butadiene Performance Attributes:
    - Waterproofing
      - Concrete Sealer
      - Below Grade Membrane
      - Underlayment
    - Adhesion
      - Tile Adhesive
      - Glass Mat
      - Metal Ducting
    - High Binding Efficiency
      - Carpet
      - Paper
-

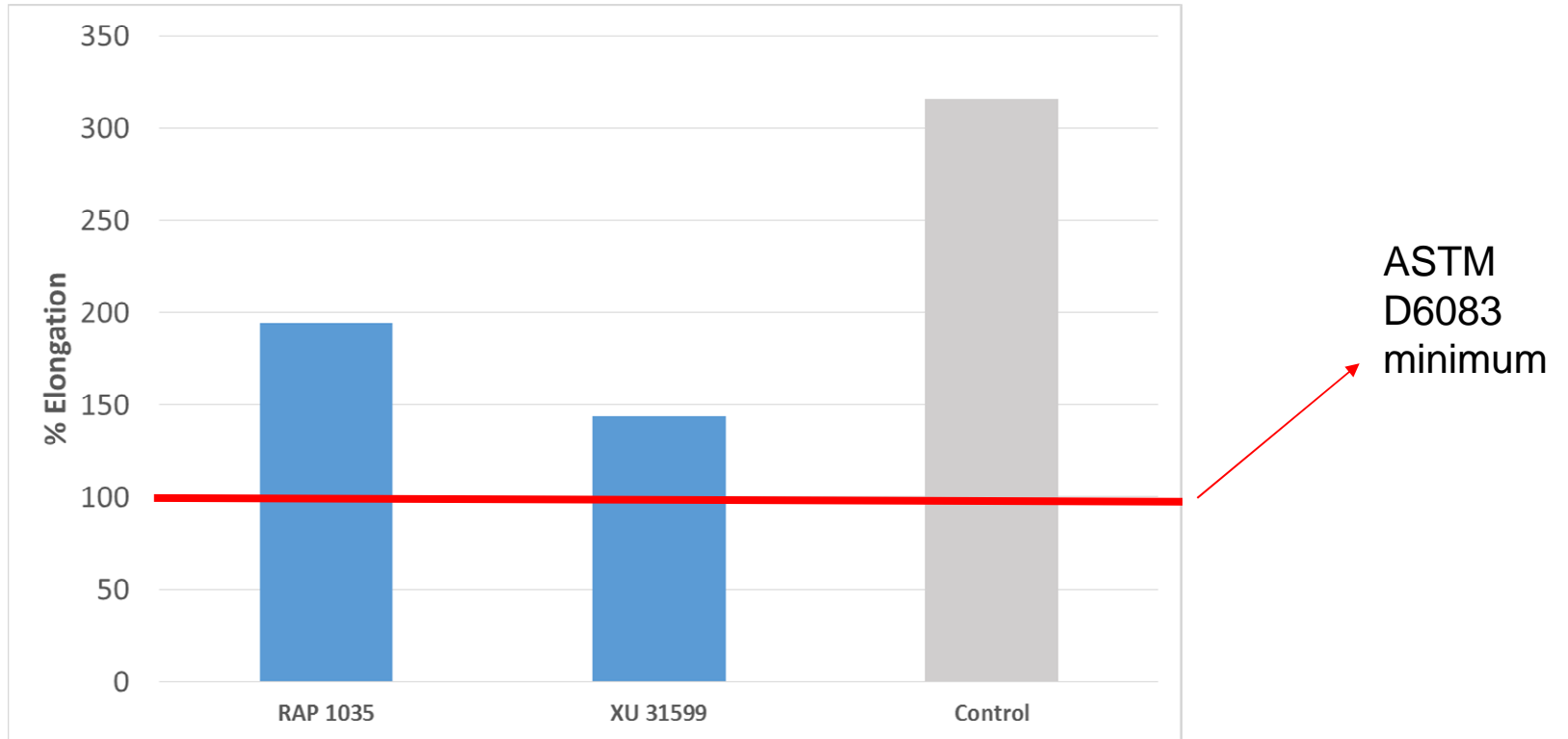
# Styrene Butadiene Basecoat Formulation

Raw Materials	Pounds	Gallons
Water	120.00	14.43
Propylene Glycol	10.00	1.17
Dispersant	16.00	1.74
Defoamer	2.00	0.28
Ammonia	1.50	0.20
HEC Thickener	2.00	0.20
TiO2	75.00	2.25
Calcium Carbonate	390.00	17.28
Zinc Oxide	7.00	0.15
Perservative	2.00	0.21
Mildewcide	15.00	1.56
Let Down		
Styrene Butadiene Latex	491.92	55.77
Defoamer	2.00	0.28
Solvent	6.00	0.76
Ammonia	1.50	0.20
Water	30.00	3.61
HUER Thickener	0.90	0.10
<b>Totals</b>	<b>1172.82</b>	<b>100.20</b>

Wet Paint Properties	
PVC	41.4%
WS	62.6%
VS	49.3%
# / gal	11.7
120F 2wk Stability (ΔKU)	2.0

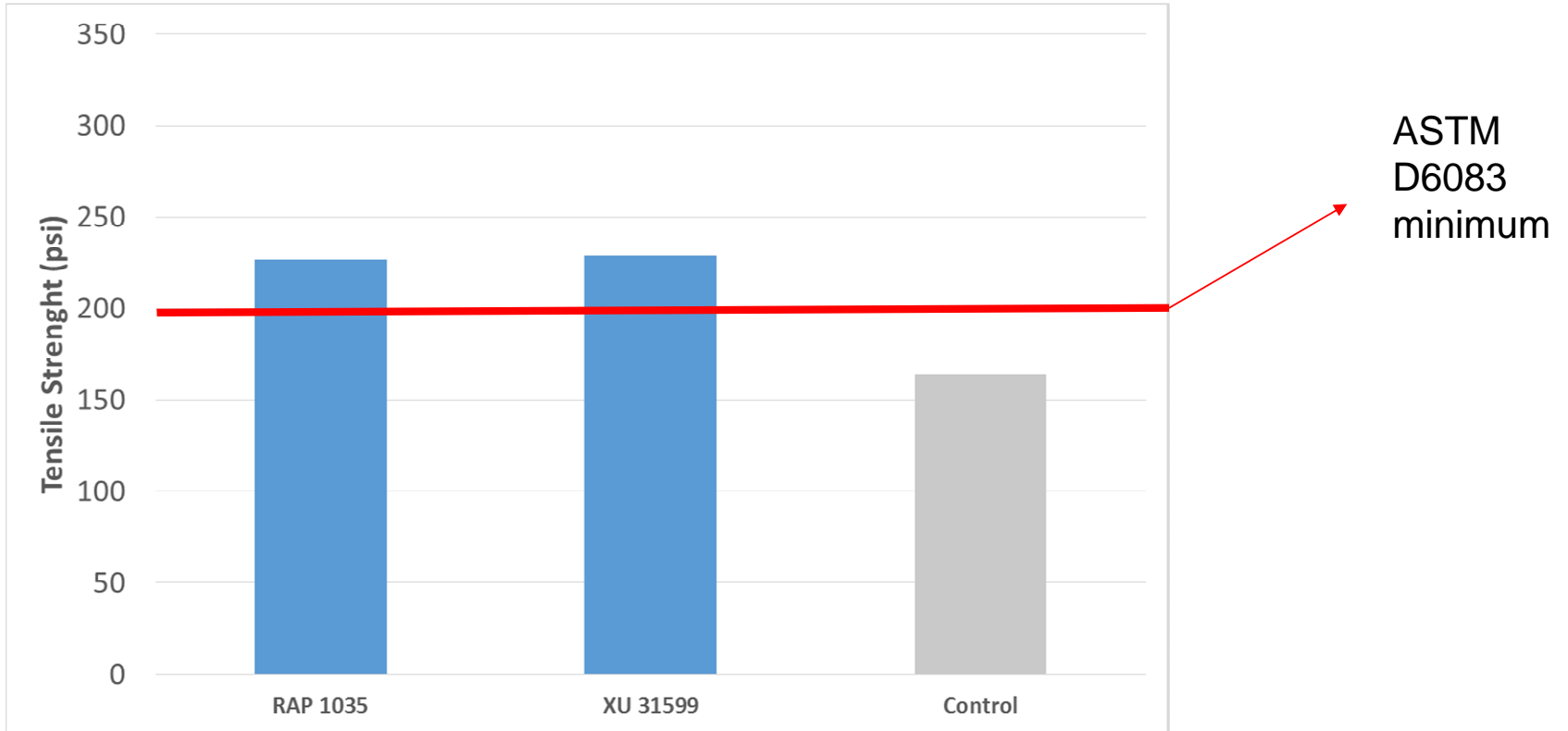
Control: Commercial Elastomeric

# Basecoat Elongation



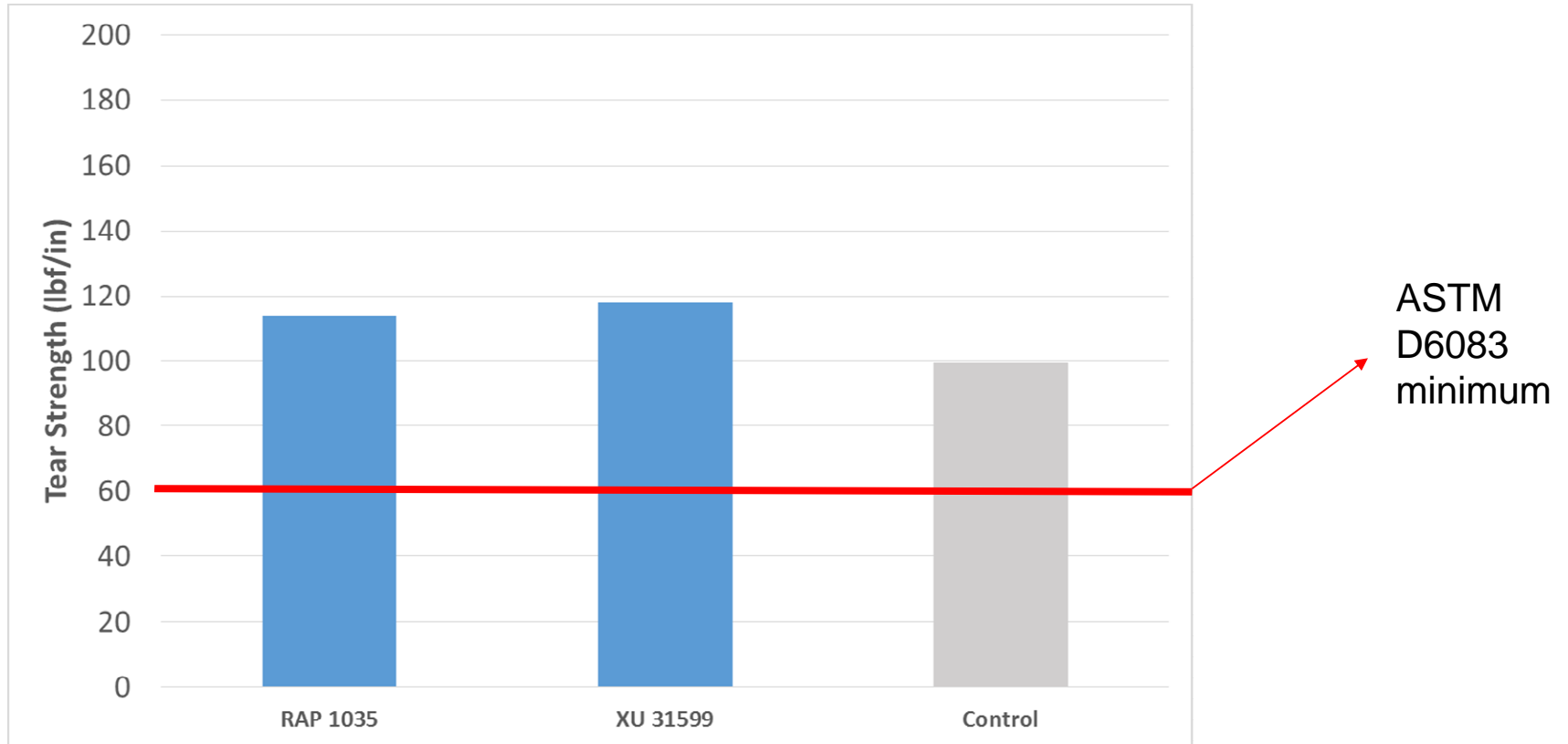
Elongation for Trinseo styrene butadiene latexes was well over the ASTM minimum requirement.

# Basecoat Tensile Strength



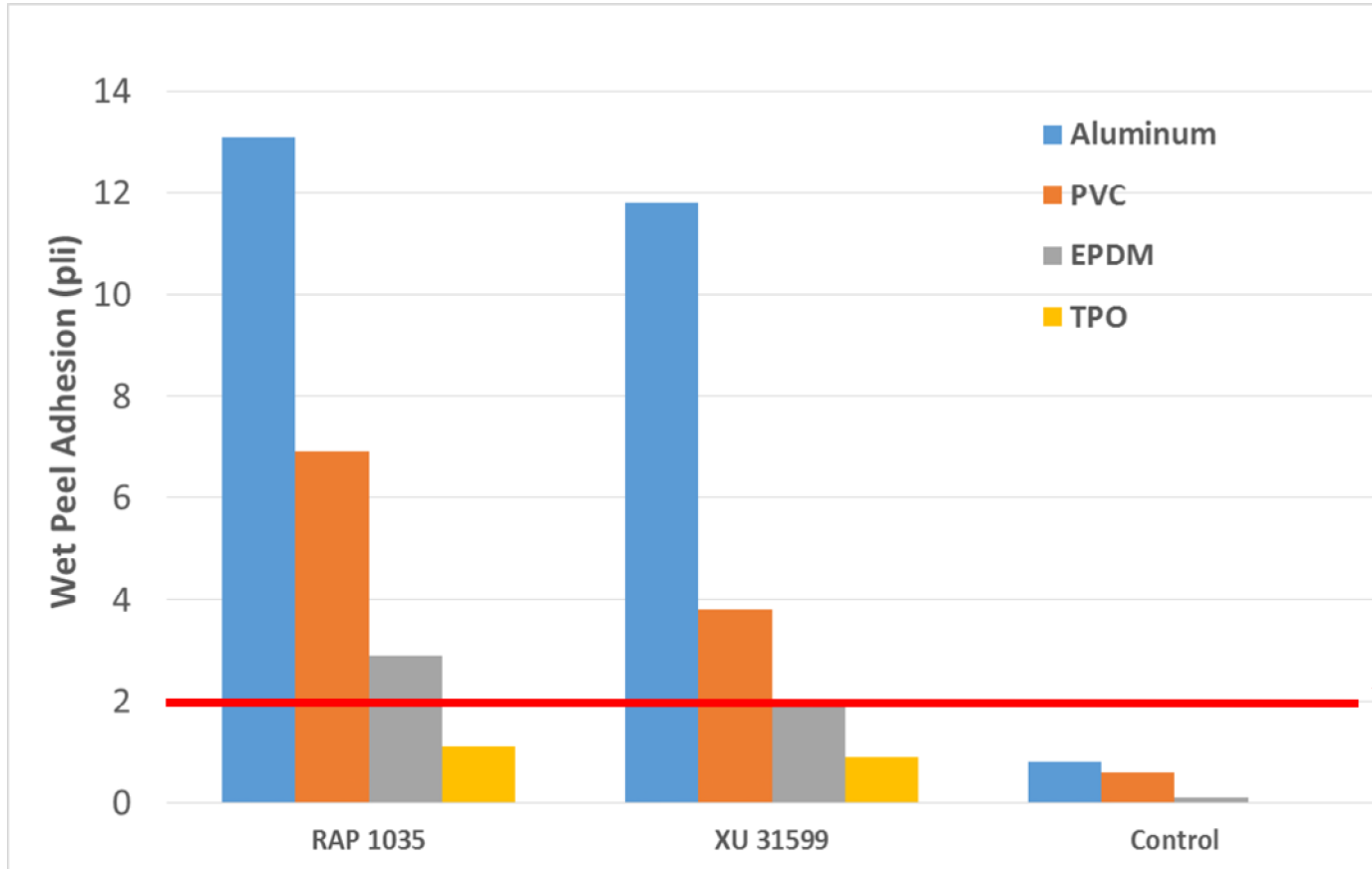
Tensile strength for Trinseo styrene butadiene latexes outperformed the commercial control.

# Basecoat Tear Strength



Trinseo styrene butadiene latexes outperformed the commercial control and almost doubled the ASTM minimum for tear strength.

# Wet Peel Adhesion



ASTM  
D6083  
minimum

Trinseo styrene butadiene latexes have good adhesion to numerous roofing substrates.



- Method:
    - Coat a cementitious panel (ie. HardiePlank™) with an asphalt emulsion
    - Allow to dry for 1 week
    - Expose panel to QUV-B light for 1 week (no moisture)
    - Cast a 10 mil film using a draw down bar of basecoat and dry over night
    - Brush on common topcoat over  $\frac{3}{4}$  of the panel covering a portion of the basecoat stripe (15-20 mil)
    - Expose in QUV-B for 48 hours (1:1 moisture:light).
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# Asphalt Bleed Through Resistance



Trinseo styrene butadiene latexes offer superior asphalt bleed through resistance to keep white roofs white.

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# Styrene Acrylic Elastomeric Protective Topcoat

# Topcoat Formulation

Raw Materials	Pounds	Gallons
Water	127.00	15.27
Propylene Glycol	10.00	1.17
Dispersant	16.00	1.74
Defoamer	2.00	0.28
Ammonia	1.50	0.20
HEC Thickener	2.50	0.25
TiO2	97.00	2.91
Calcium Carbonate	375.00	16.61
Zinc Oxide	7.00	0.15
Perservative	2.00	0.21
Mildewcide	15.00	1.56
Let Down		
Styrene Acrylic	445.00	50.45
Ammonia	1.50	0.20
Defoamer	2.00	0.28
Solvent	6.00	0.76
Water	65.00	7.82
HUER Thickener	1.00	0.11
<b>Totals</b>	<b>1174.50</b>	<b>99.99</b>

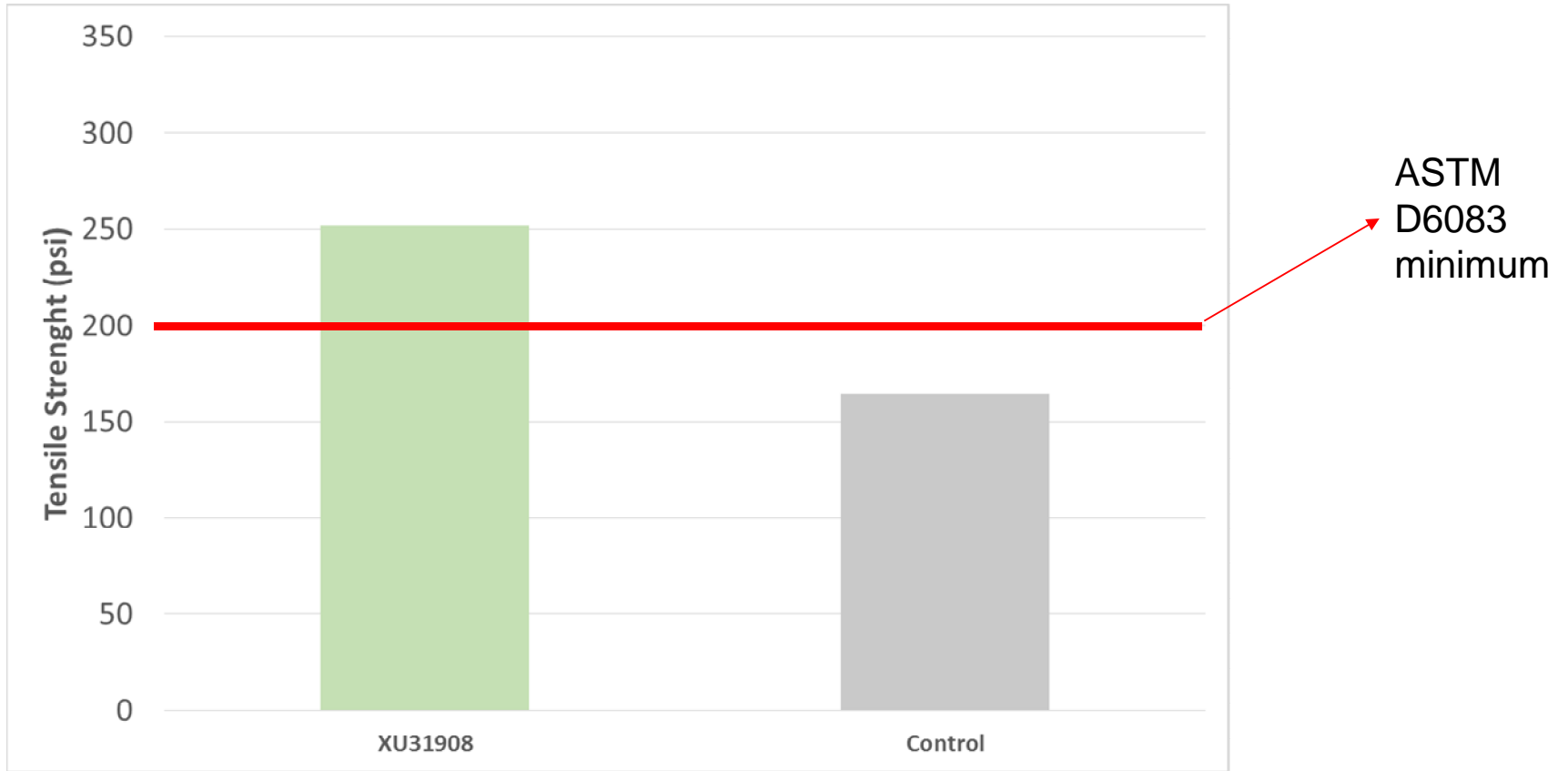
Wet Paint Properties	
PVC	40.6%
WS	63.3%
VS	49.8%
# / gal	11.8
120F 2wk Stability ( $\Delta$ KU)	7.0

# Topcoat Percent Elongation



Trinseo styrene acrylic elastomeric meets ASTM minimum for elongation.

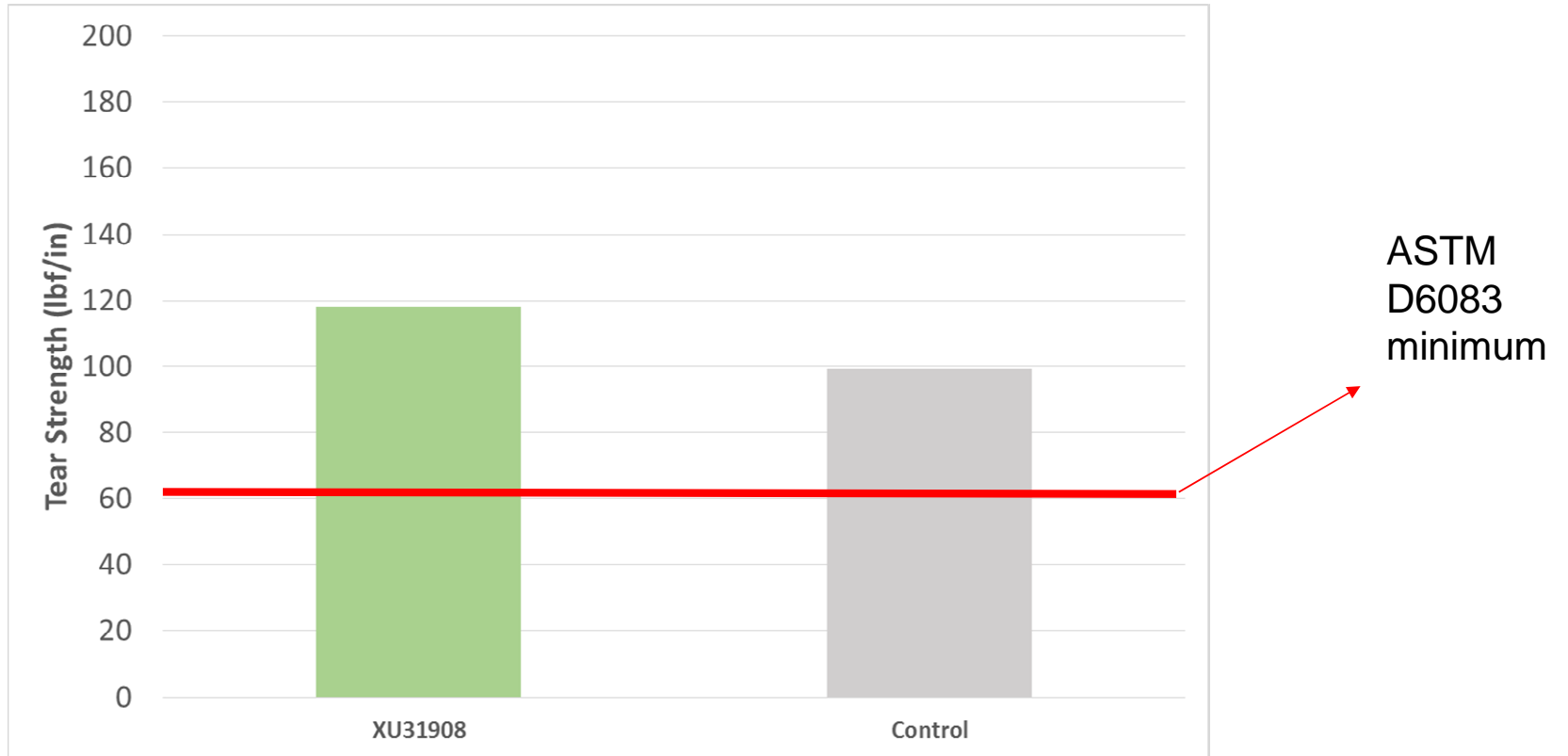
# Topcoat Tensile Strength



Trinseo protective elastomeric exceeds ASTM requirements for tensile strength and outperforms the commercial control.

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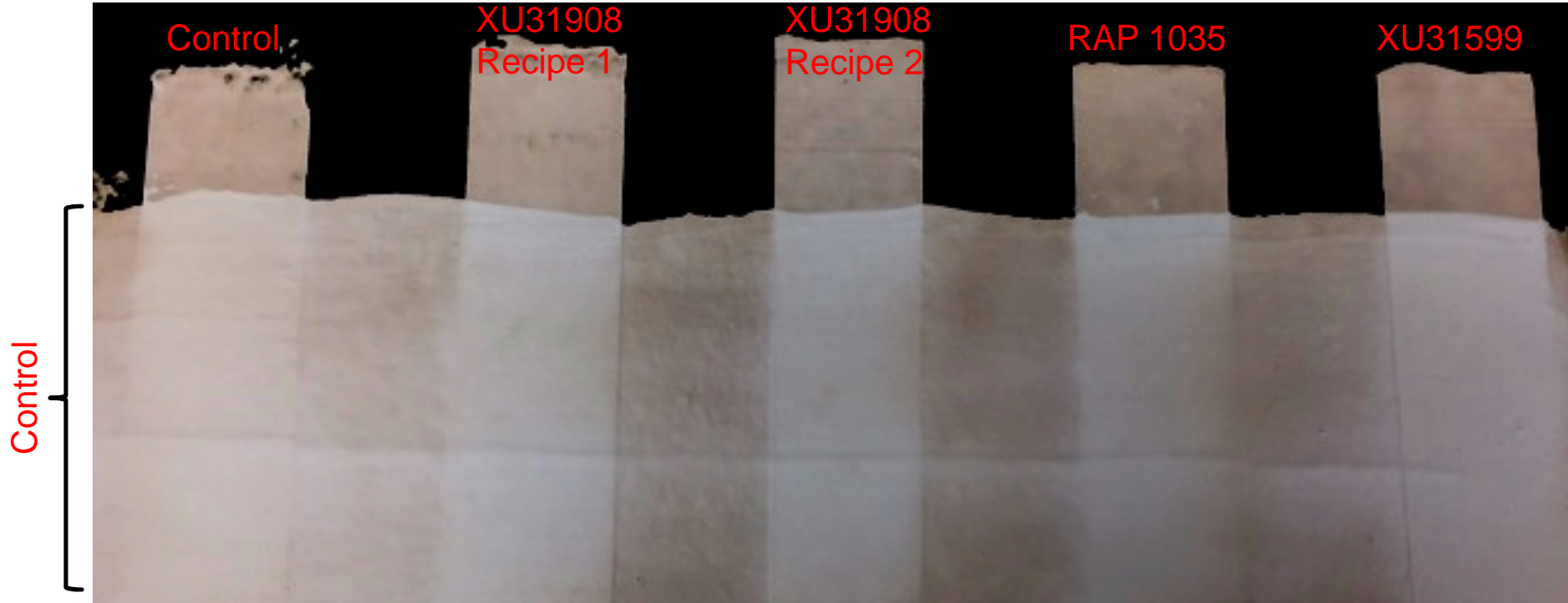
# Topcoat Tear Strength



Trinseo elastomeric styrene acrylic exhibits almost double the tear strength than required by ASTM D-6083.



# Asphalt Bleed Through Resistance

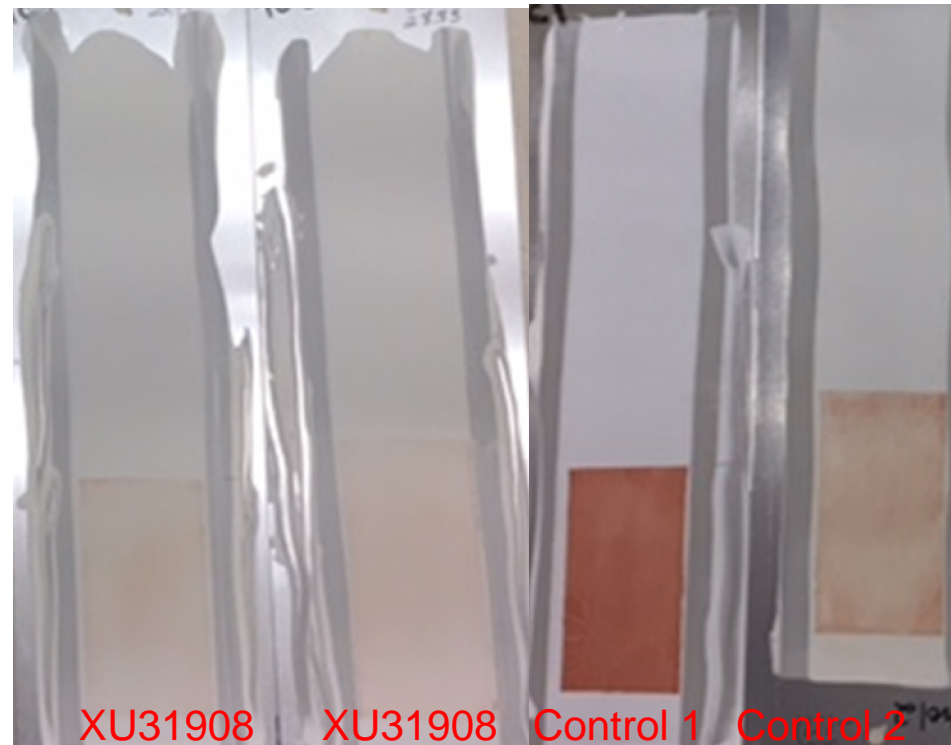


XU 31908 also exhibits superior asphalt bleed through resistance in two formulations compared to a commercial elastomeric.

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# Topcoat Dirt Pick Up Resistance

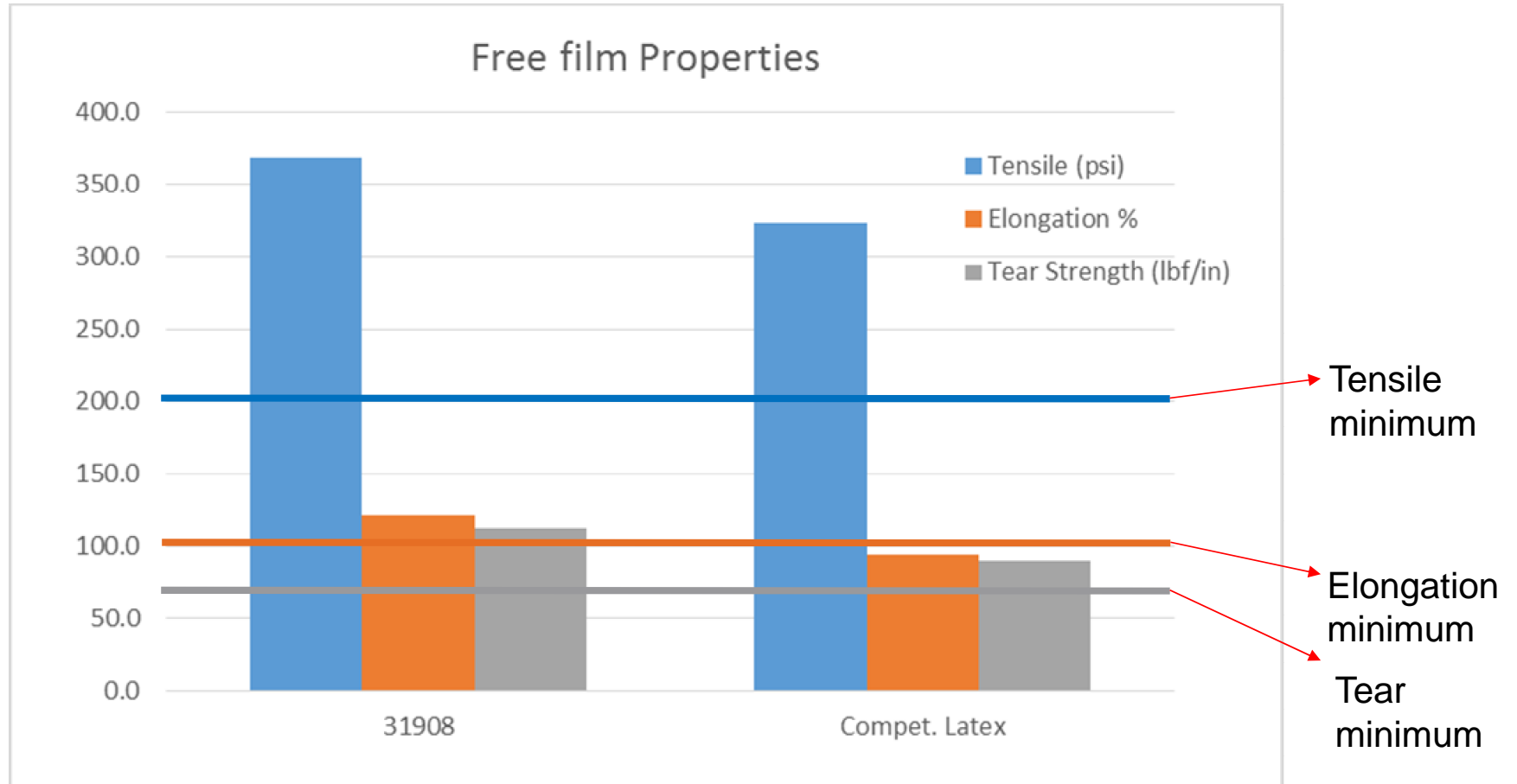
- Method:
  - Draw down 10 mil of coatings over aluminum panel.
  - Dry for 14 days.
  - Expose to light only in QUV for 3 days.
  - Remove and apply red iron oxide solution.
  - Dry over night.
  - Rinse off surface under tap water.
  - Place in scrub machine with wet sponge rather than bristle brush for 30 cycles.
  - Remove and record.



Trinseo XU31908 displays inherent dirt pick up resistance compared to commercial controls.

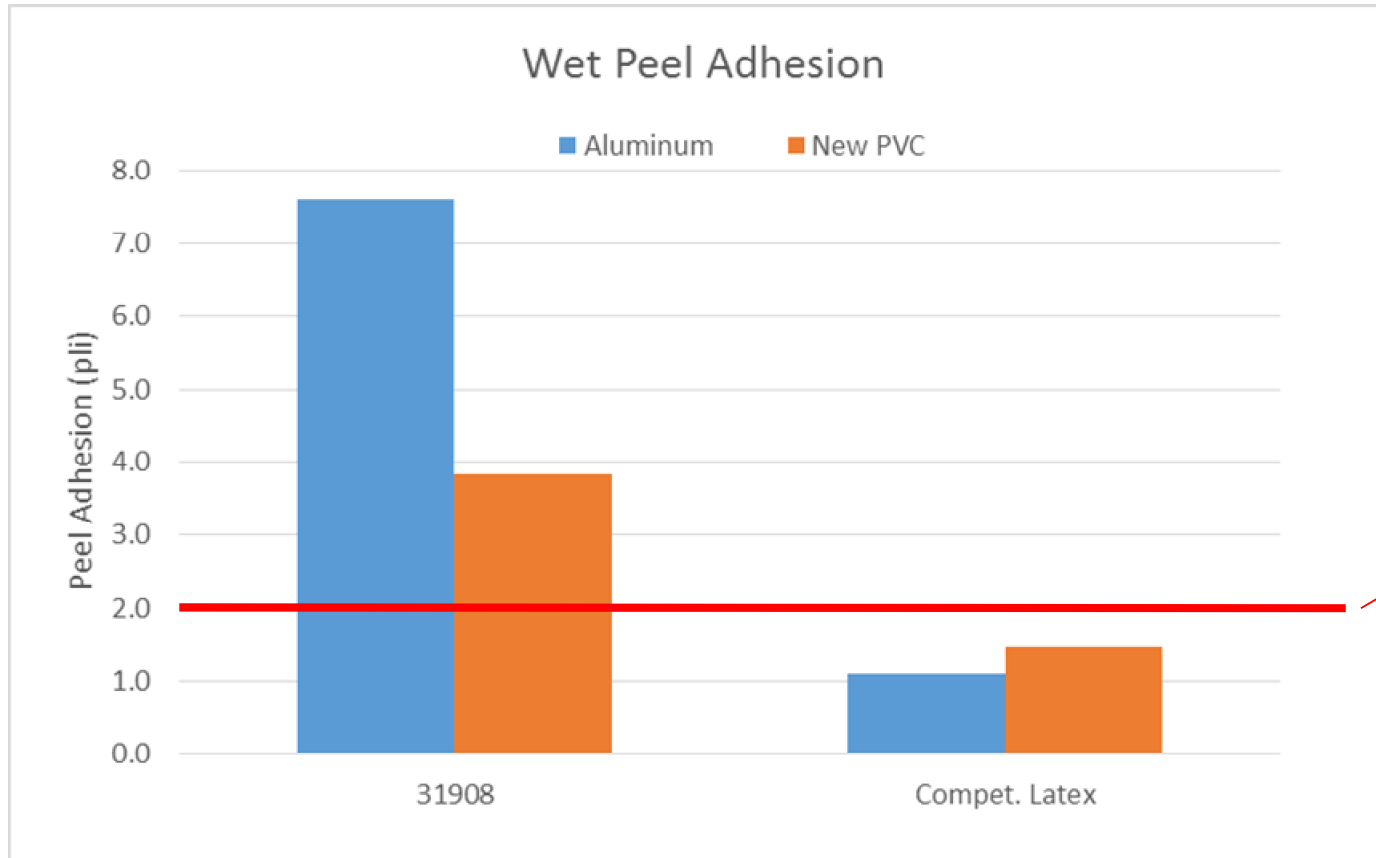
# Topcoat Formulating Latitude

# Drop-in Performance vs Competitive latex



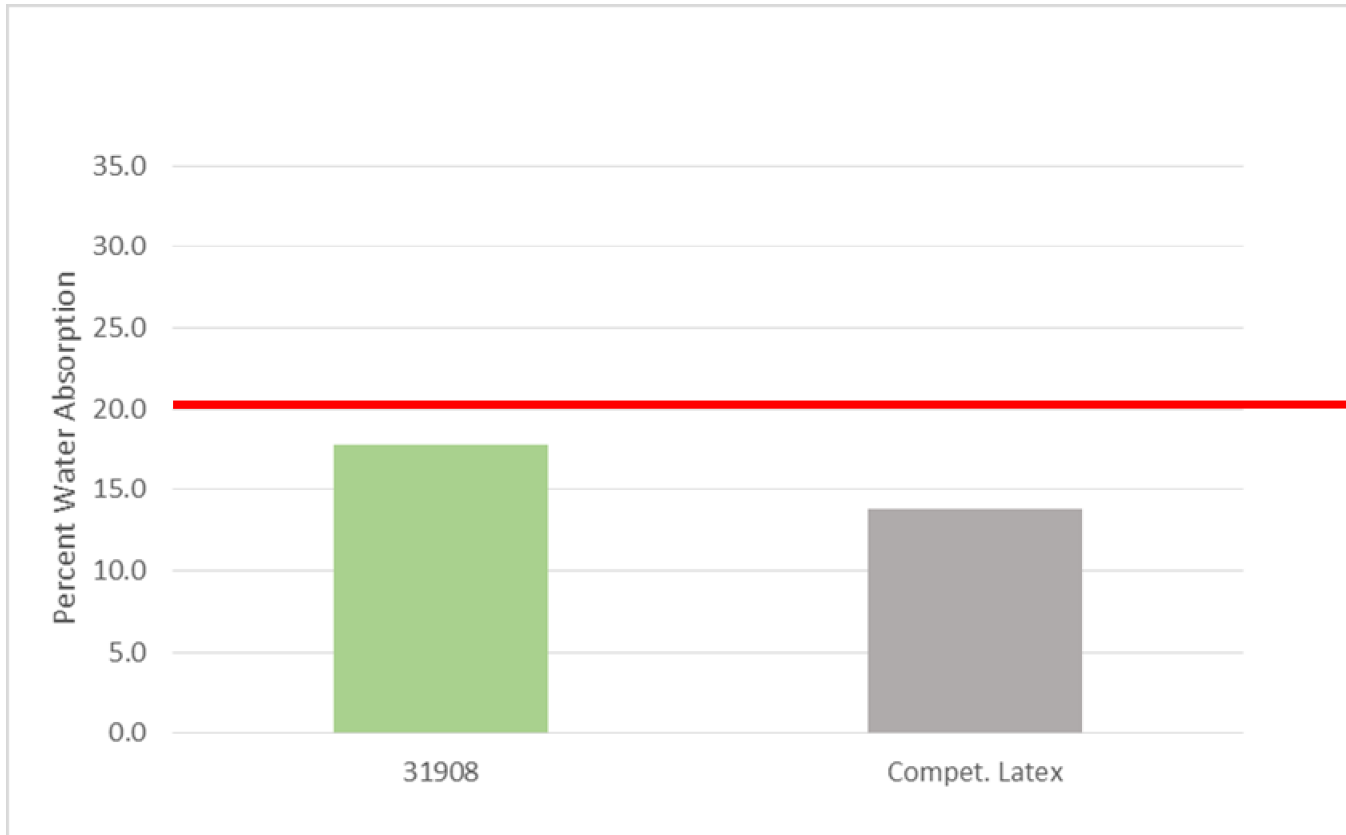
XU 31908 retains performance when “dropped into” a completely different formulation. Formulation latitude is an important attribute when multiple recipes are needed within a single company.

# Drop-In Performance vs Competitive Latex



XU 31908 retains performance when “dropped into” a completely different formulation. Formulation latitude is an important attribute when multiple recipes are needed within a single company.

# Topcoat Water absorption



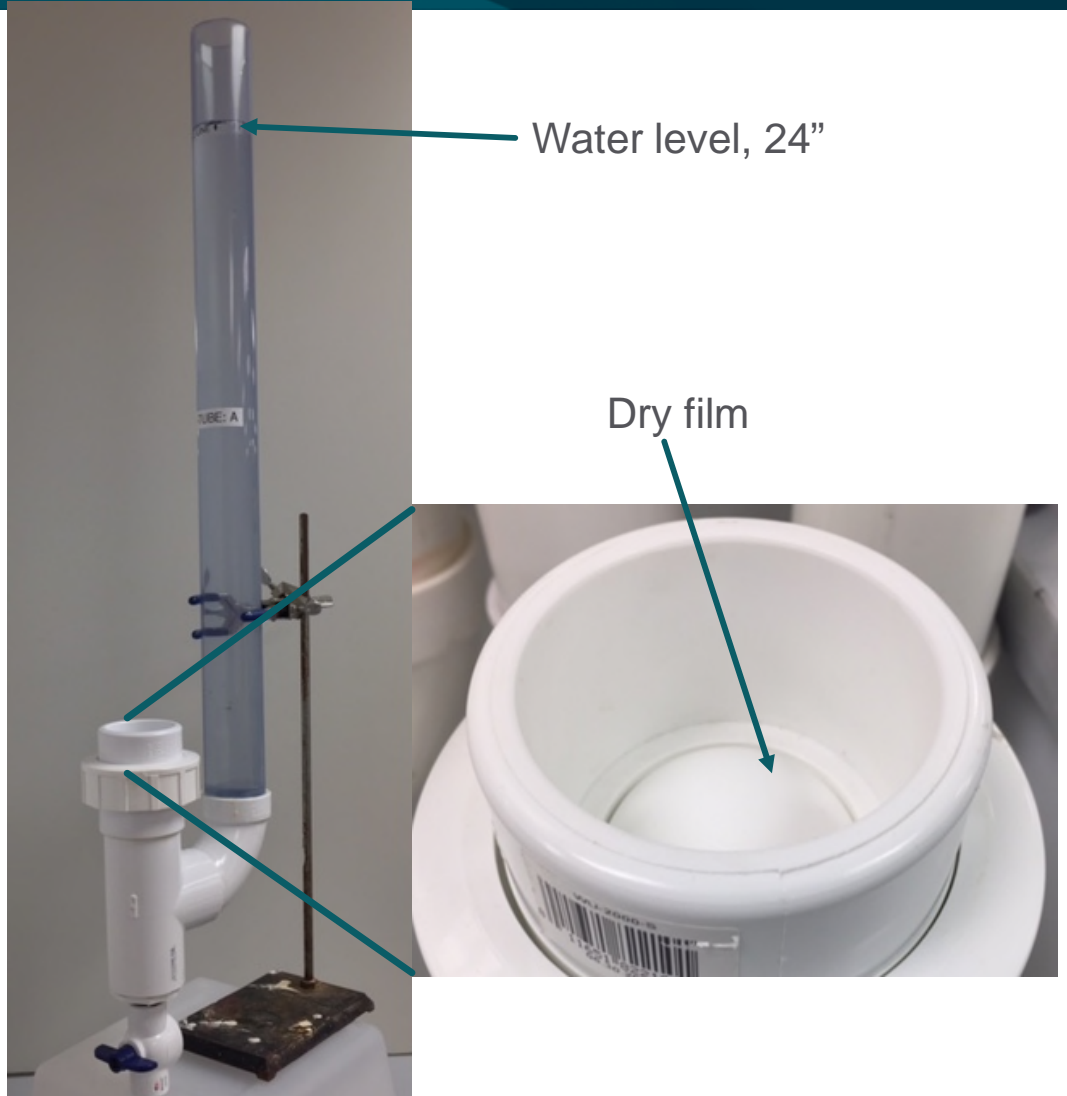
ASTM  
D6083  
maximum

Low water absorption is essential in elastomeric roofing.

# Hydrostatic Pressure Resistance, J-Tube

- Method

- Cast basecoat film of 15-20 mil dry
- Dry over night
- Cast 15-20 mil topcoat over basecoat
- Dry 14 days
- Cut film and place in pipefitting with topcoat in contact with water
- Fill J-tube with water
- Evaluate until failure or water penetration
- No failure at the end of testing (4 months)





- Trinseo offers elastomeric styrene butadiene latexes for use in low slope roofing applications. Some performance attributes are:
    - Excellent adhesion to various substrates
    - Water ponding resistance
    - Superior asphalt bleed through resistance
  - Also available are styrene acrylics with cool white roofing capability
    - Inherent dirt pick up resistance
    - Asphalt bleed through resistance
    - Good formulation latitude
  - Using this Trinseo system (basecoat and topcoat) can ensure the end user to have resistance to ponding water and lasting adhesion on commercial roofing.
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# Acknowledgements

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**Trinseo. Materials. Powering Ideas.**

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