Keeping White Roofs White

New Acrylic Latex for Reflective Roof Coatings with Improved Dirt Pickup Resistance

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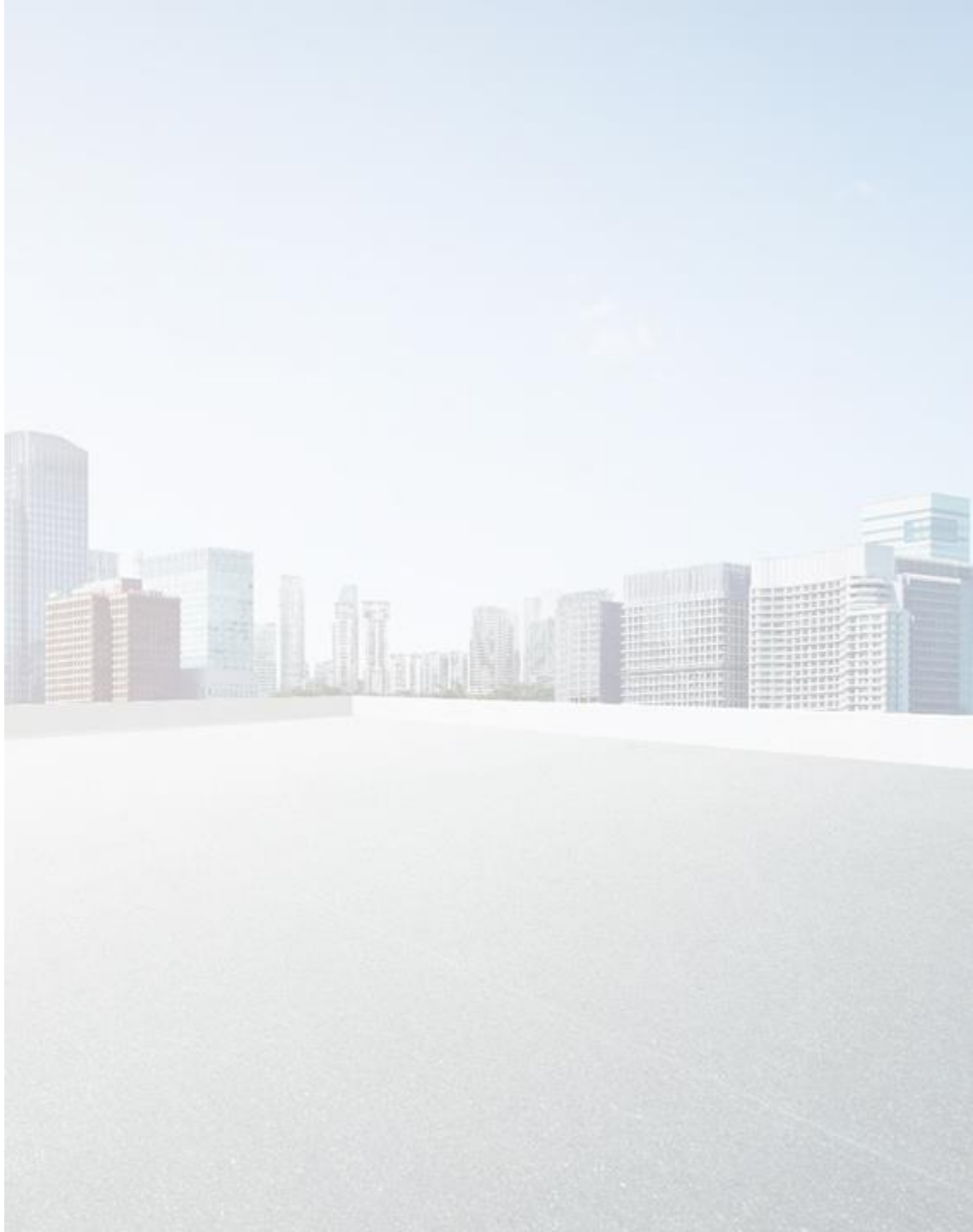
October 2025



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Agenda

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- Cool Roofs
- Total Solar Reflectance
- Asphalt Bleed-Through Resistance
- Dirt Pickup Resistance
- Summary

Cool Roofs

"COOL ROOF IS THE ANSWER TO REDUCE OUR GLOBAL CARBON EMISSIONS"
– European Cool Roofs Council

Cool materials with **high solar reflectance** (ability to reflect sunlight) and **high thermal emittance** (ability to radiate heat) help roofs absorb less heat and **stay up to 28–33°C cooler** than conventional materials during peak summer weather.

Cool roofs can deliver **air-conditioning savings** and **peak demand reductions of 10–30%,** based on daily summertime usage.

Case Study: Trapani, Italy

After the application of a cool roof:

- The percentage of hours with indoor temperatures above 25°C **dropped from 78% to 52%.**
- The percentage of temperatures above 27°C **decreased from 54% to 15%.**
- Before the cool roof application, the daily mean indoor temperature was 1.8°C warmer than outside. After application, **the indoor air is 0.9°C cooler than the outdoor temperature.**
- The surface temperature of the cool roof is **up to 20°C cooler** than the original roof.
- The annual cooling energy demand was **reduced by 54%.**

Sources: Cool Roofs in Europe, Initiatives and Examples https://build-up.ec.europa.eu/sites/default/files/content/Cool%20Roofs_EN_1.pdf; European Cool Roofs Council https://coolroofcouncil.eu/

Typical Benefits of Cool Roof Coatings

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Extend the life of the roof

Protect the roof surface by providing a low-cost, sacrificial layer that absorbs the punishment of the elements

Reflective roof coatings **reduce surface temperatures**

Greater occupant comfort – in occupied buildings without A/C

Avoids building or occupant disruption and roof replacement

Save money

Repair and /or coat vs tear off and replace

Federal and local tax deductions

Less A/C required for cooling

Peak Energy Use Reduction

Roof Coating Needs

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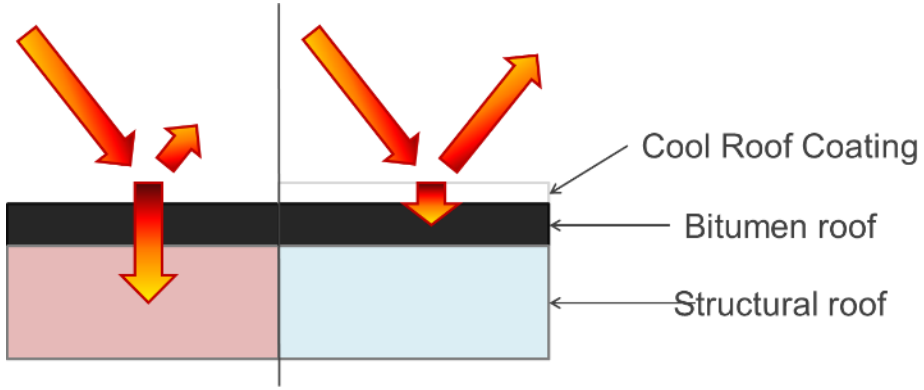
ASTM D6083

Property	Test	ASTM	Spec
Toughness	Initial percent elongation	D 2370	100%
	Initial tensile strength	D 2370	200 psi
	Tear resistance	D 624	60 lbf/in
Water resistance Adhesion	Water vapor permeance	D 1653	< 50 perms
	Water swelling	D 471	< 20%
	Wet adhesion	D 903	> 2 pli
Fungi resistance	Fungi resistance	G 21	Zero rating
Durability	Accelerate weathering	D 4798	No cracking or checking
	Final percent elongation after 1000 h accelerated weathering	D 2370	100%
	Low temperature flexibility after 1000 h accelerated weathering	D 522	0.5” mandrel @ -10C
Reflectivity	High solar reflectance		
	Dirt pickup resistance	In-house method	
	Bleed-through resistance	In-house method	

Total Solar Reflectance (TSR)



TSR – percentage of (irradiate) solar energy reflected by an object

	TSR
Bitumen/Mod.	10 – 20 %
White Cool Roof on bitumen	60 – 75 %

SOLAR REFLECTANCE
The solar energy that is reflected by the roof

THERMAL EMITTANCE
The relative ability of the roof surface to radiate heat. Acrylic roof coatings = ~0.9

Solar Reflectance Index (SRI)

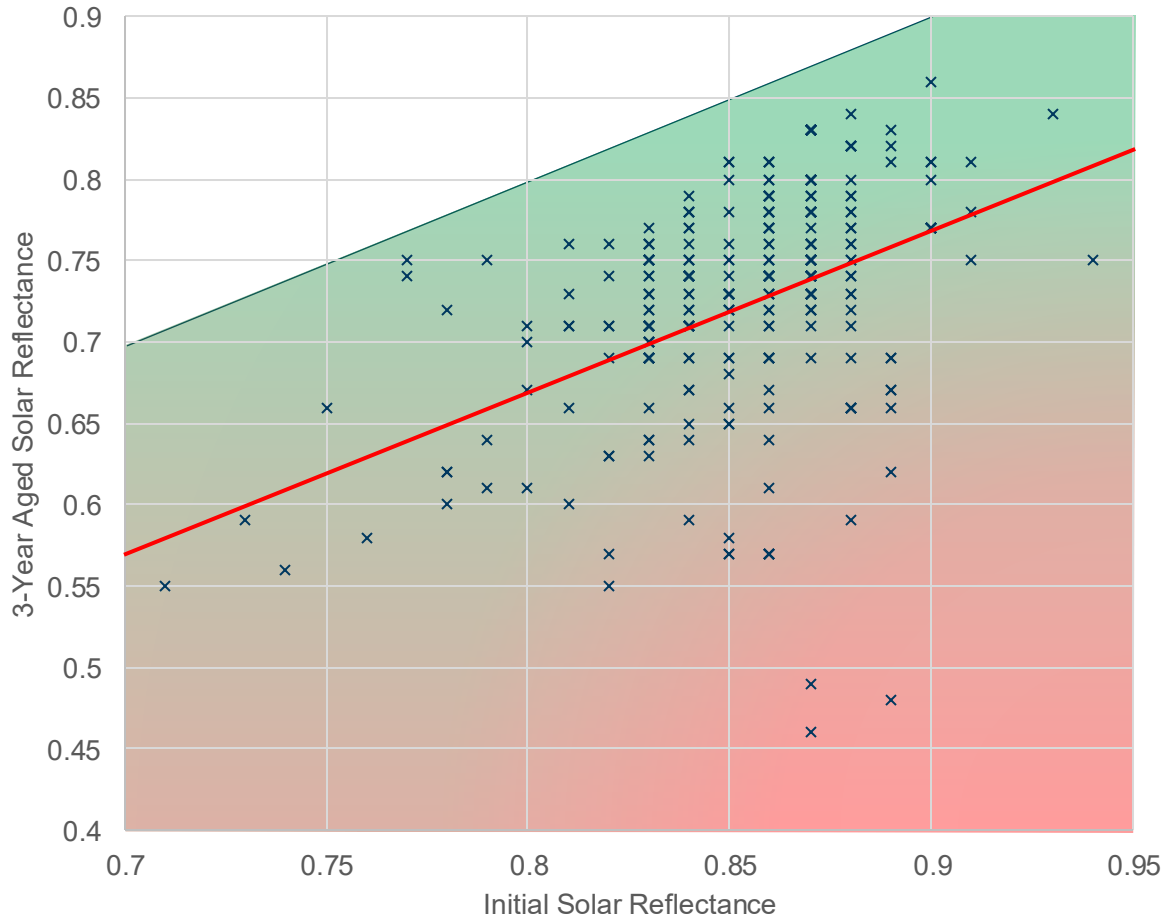
Calculated value indicating the ability of a roof surface to return solar energy to the atmosphere.

Combines reflectance and emittance.

Typically reported as a value between 0 and 100.

Influence of Aging on TSR

- Cool Roof Rating Council records initial and 3-year aged reflectance
- Decrease in reflectance ranges from 0.02 to 0.4
- Average decrease is 0.13 ± 0.05
- How does this translate to temperature?



Source: Cool Roof Rating Council

What Impacts TSR

The keys to keeping white roofs white are bleed-through resistance and dirt pickup resistance

Asphalt Bleed-Through Resistance

- Light oils present in asphalt used in bitumen roof, exude from material;
- This oil quick diffuse to the top of an applied coating;
- Causing a strong coloring effect of the coating (cappuccino color).
- RCMA Tech Note 2: Use of Primers Prior to Roof Coating: “Special primers designed to resist the exudate from bleeding through to the fresh coating may be required prior to the application of light-colored elastomeric coatings.”

Dirt Pickup Resistance

- Dirt pickup resistance (DPUR) is a crucial requirement for roof coatings
- Accumulated dirt reduces reflectivity
- DPUR can significantly affect building energy costs in roof coating applications
- Does not significantly affect thermal emittance

EPS® 719
Minimizes Asphalt Bleed Through

EPS® 719 is an all-acrylic emulsion designed to minimize asphalt bleed through in cool roof coatings while maintaining flexibility and toughness.

MARKET SEGMENTS
- Elastomeric Roof Coatings / Wall Coatings
- Construction

PROPERTIES
- Exterior durability
- Asphalt bleed-through resistance
- Dirt pickup resistance
- Water resistance
- Adhesion to asphalt, PVC, metal, and other common roofing substrates
- Hydrophobic
- Low water uptake

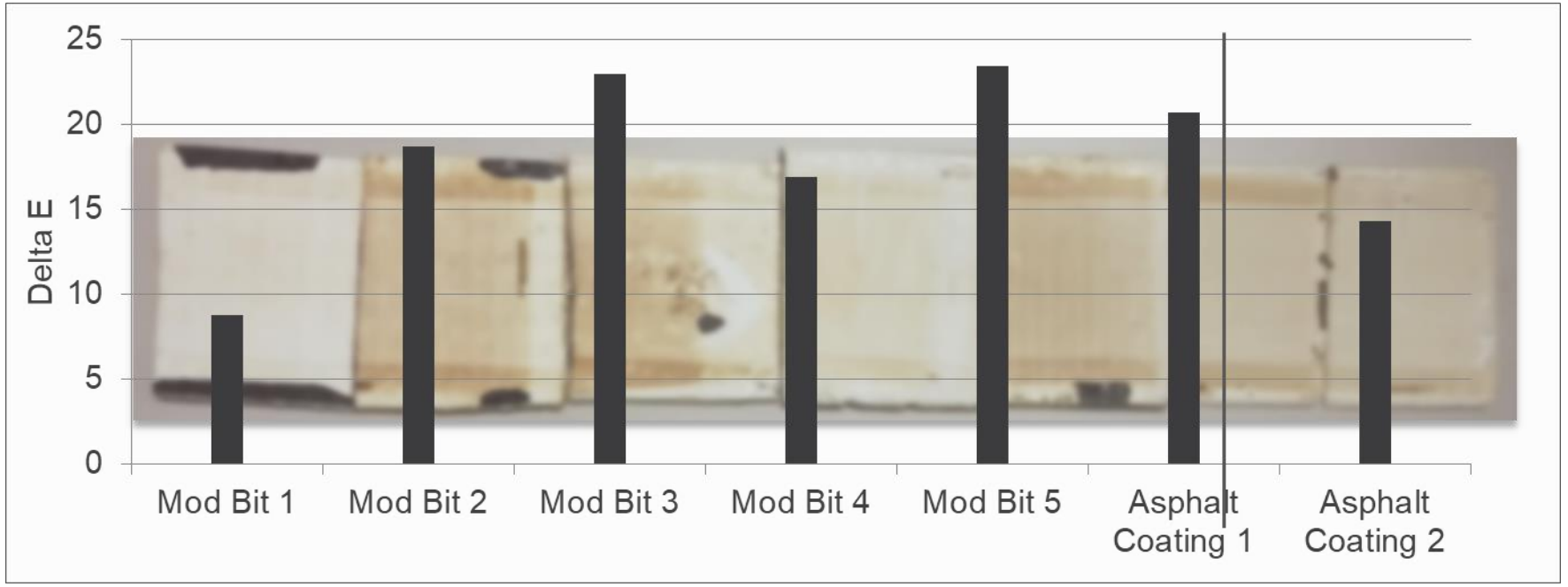
Specifications	
Weight Solids	55.0 ± 1%
Viscosity, 23 °C [mPa·s]	< 1000
pH	8.0 – 8.5

Typical Properties	
MFFT (° C)	~10
Density @ 20 °C [kg/m3]	NA

EPS® 719 Roofing Applications

- Metal and Concrete
- Sprayed Polyurethane Foam (SPF)
- Single Ply Membranes
- Asphalt Roofs
  - I. Modified Bitumen (is toughened, flexibilized and reinforced with fabric)
  - II. Built Up Roof (BUR): Consists of multiple alternating layers of bitumen and fabric. Softens and self-heals during warm temps. Gravel is used as a topcoat.

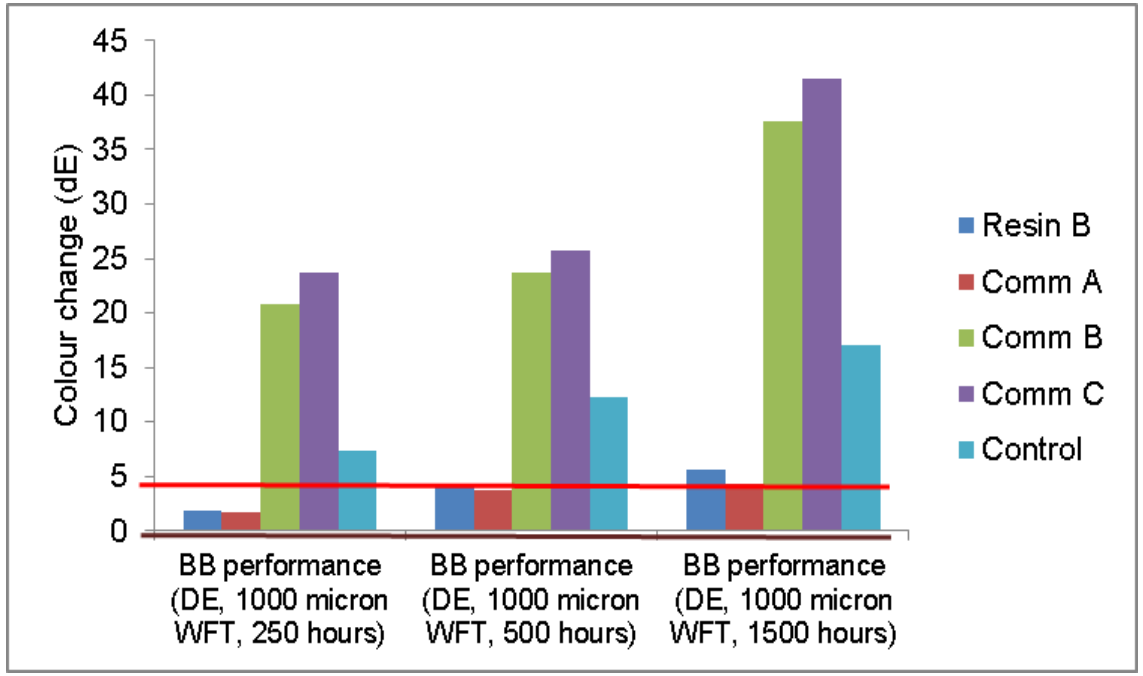
Bleed-Through Substrate Benchmark



A commericial white cool roof coating is applied on 7 different bitumen asphalt substates.
Wet film:
2 X 500 micron
Drying 7 days RT

- Coating discoloration (500h QUV)
- Common problem over different asphalt-based roofing materials
- The level of discoloration depends on the used bitumen / asphalt.

Bleed Block Comparison



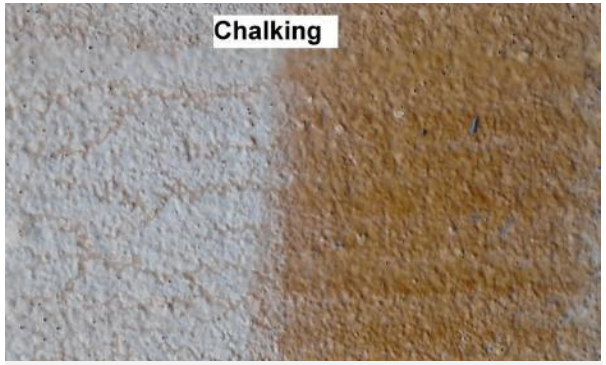
Substrate: Com. Mod. Bit.
Wet film: 1000 micron
Drying: 7 days RT (T: 23°C, RH: 65 %)
dE spectrophotometer after:
250, 500 and 1500 hr QUV Exposure

- Resin B outperform samples Comm B and Comm C (< 10%)
- Comm A has equal performance to Resin B
- Control fails as expected

Accelerated Aging - 1500h

- Competitor B and C show severe chalking after 1500 h accelerated aging
- Resin B / EPS® 719 doesn't show any chalking issue

Competitor B & C



Competitor B & C

Resin B / EPS® 719

33 Months South 5° Exterior Exposure
Marengo, IL, USA

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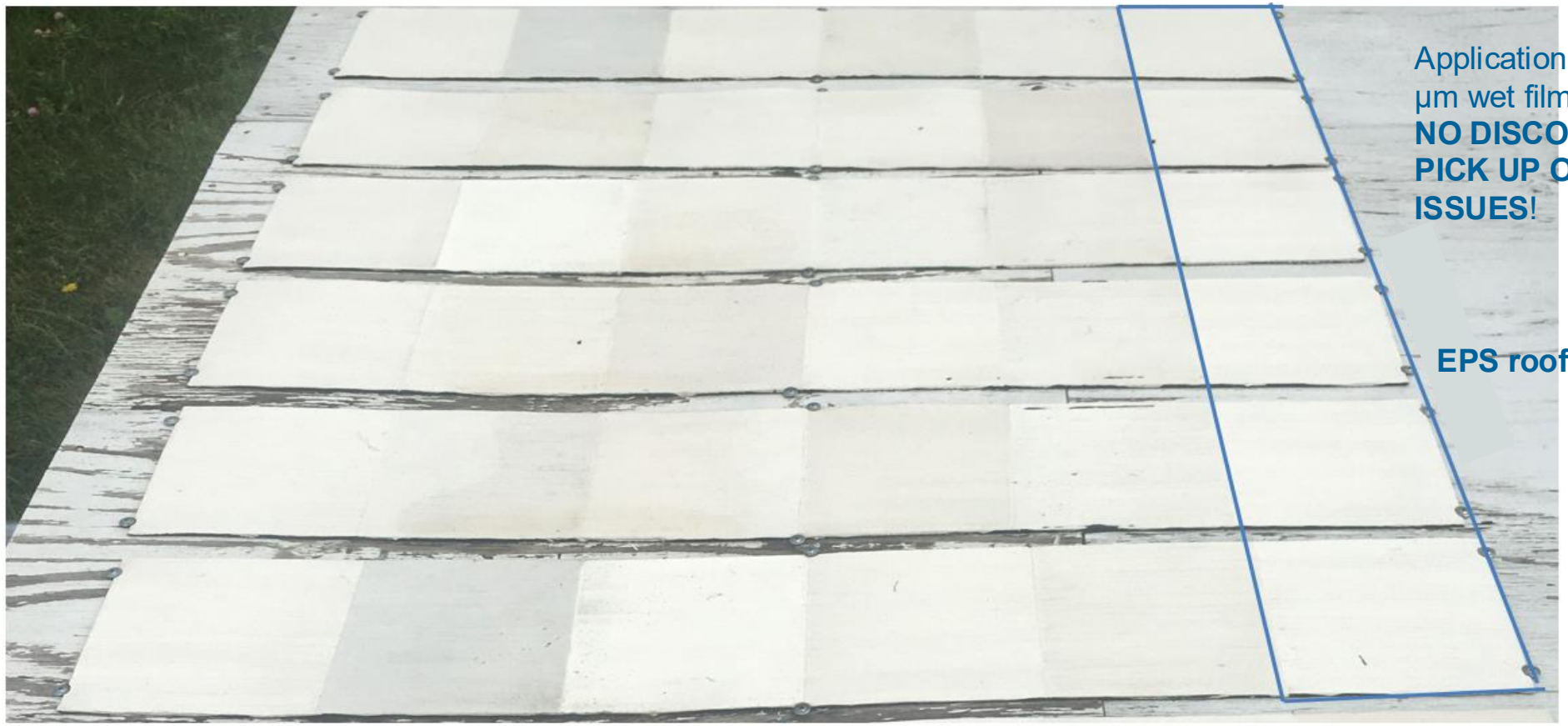
Of different commercial acrylic roof coatings resins and EPS experimental resins cool roof coating were made using the optimized paint formulation. These coatings were applied on strips of smooth bitumen .



Application: 2 X 500 µm wet film, brush applied

NO DISCOLORATION, DIRT PICK UP OR CHALKING ISSUES!

EPS roof coatings polymer

Roofing Membrane Coatings
Exterior Exposure – Marengo, IL, USA

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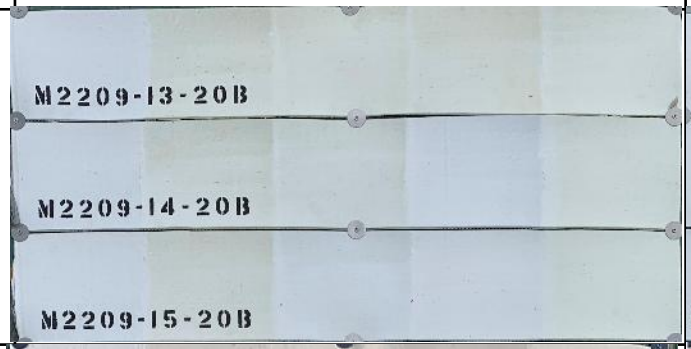
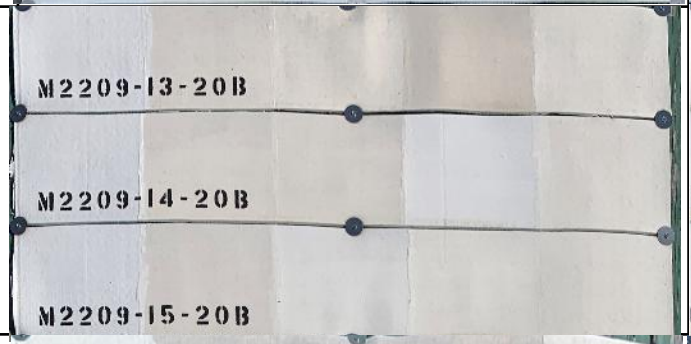
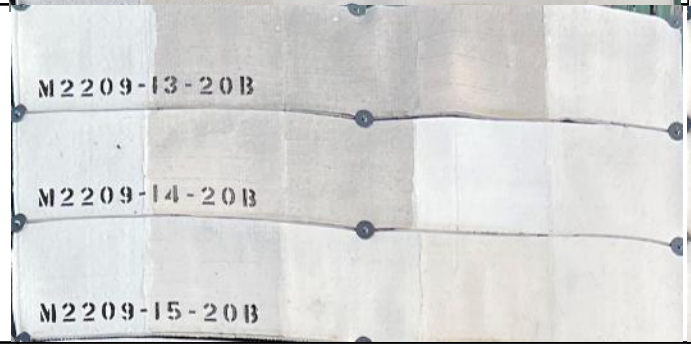
	APP Modified Bitumen	PVC
Initial		
15 Months		
38 Months		

EPS Roof Coatings Polymer

- Polymer selection impacts bleed-through resistance and changes in solar reflectance
- Results differ by substrate
- APP Modified Bitumen
  - Bleed-trough happens quickly
  - Oils change the color of the film
- Plasticizers in PVC soften the film so the membrane soils over time

Biofouling – 6 years Exposure – FL, USA

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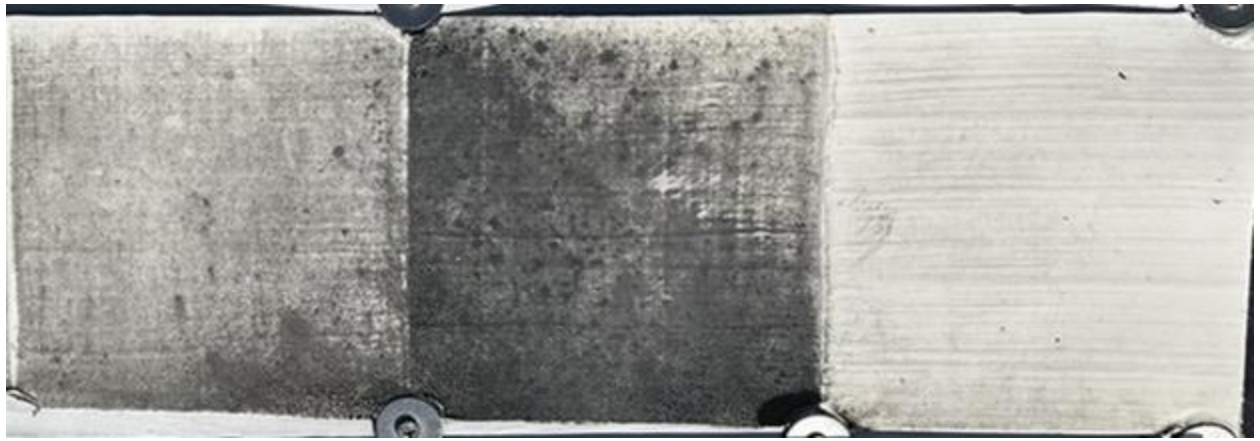
- The figure below shows the results of a long-term outdoor exposure test in Florida.
- Three coatings with identical formulations and preservative packages—but different latexes—showed dramatically different results after 6 years.
- The coating in the center, made with a comparative resin, was almost completely overgrown. The left-hand experimental coating showed moderate growth, while the coating on the right, containing an EPS® roofing polymer remained substantially free of biological growth.



EPS® Polymer

New Low-Temperature Flexibility Resin

EPS® 719 is an excellent resin for cool roof coatings in regions where low-temperature flexibility is not required. However, to meet the performance criteria of ASTM D6083 Type II, low-temperature flexibility becomes essential.

EPS® 210* was specifically developed to meet the requirements of ASTM D6083 Type II.

This new resin targets applications in climates where coatings must offer:

- Excellent DPUR performance
- Asphalt bleed-through resistance
- Flexibility at low temperatures (down to -10 °C)
- High permeance
- Low water uptake

* Tech transfer in progress

EPS® 210
Exceptional DPUR – Keeps White Roofs White

EPS® 210* is an all-acrylic emulsion designed for use in elastomeric roof coatings. Coatings formulated with this polymer are capable of conforming to **ASTM D6083 Type II** standards while still providing exceptional **dirt pickup resistance** and **resistance to asphalt bleed-through**.

Specifications	
Weight Solids	55.0 ± 1.0 %
Viscosity, 23 °C [mPa·s]	< 500
pH	7.5 – 8.5

Typical Properties	
Tg (°C)	~12
Density @ 20 °C [kg/m3]	1042

MARKET SEGMENTS
- Elastomeric Roof Coatings
- Elastomeric Wall Coatings

PROPERTIES
- Dirt pickup resistance
- Weatherability
- Asphalt bleed-through resistance
- Adhesion to typical roofing substrates
- Excellent balance of tensile and elongation properties

*Tech transfer in progress

Red Iron Oxide Slurry Testing

- Standard accelerated testing for **Dirt Pickup Resistance**
- Cure samples
    - Room temperature curing (3 days)
    - QUV for 7 days
- Apply a red iron oxide slurry
- Allow to dry
- Lightly rinse with water and wipe with cheesecloth

Dirt Pickup Resistance
Benzophenone vs. EPS DPUR Technology

Conventional Approach: Benzophenone

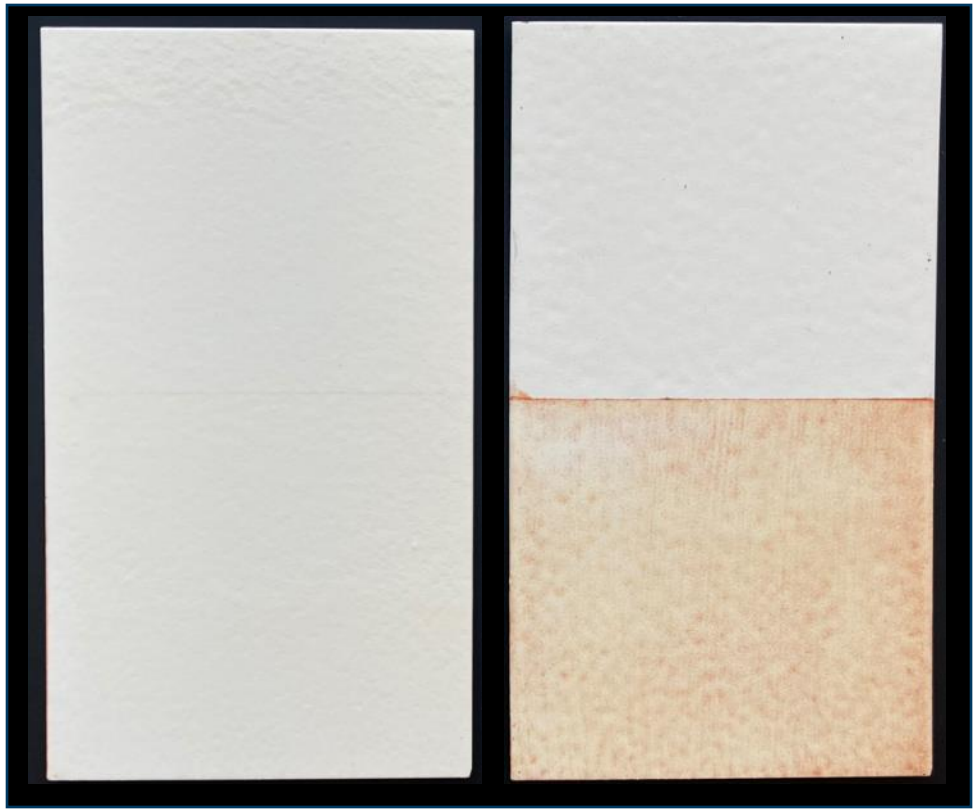
- Commonly used in resin and coating formulations to enhance dirt pickup resistance (DPUR).
- UV-activated benzophenone abstracts hydrogen from acrylic resins, initiating surface-level radical crosslinking.
- Limitations:
    - Classified as a VOC per ASTM D-6886 (methyl palmitate GC method).
    - Often disclosed on Safety Data Sheets (SDS).
    - Solid at room temperature.

EPS DPUR Technology

- No benzophenone required to achieve superior DPUR performance.
- No added volatile organic compounds.
- DPUR functionality is chemically built into the resin.
- No need for special additives or processing steps.

EPS® 2210
EPS DPUR

Comp Resin
Benzophenone



Dirt Pickup Resistance
Exterior Exposure – Los Angeles, CA, USA

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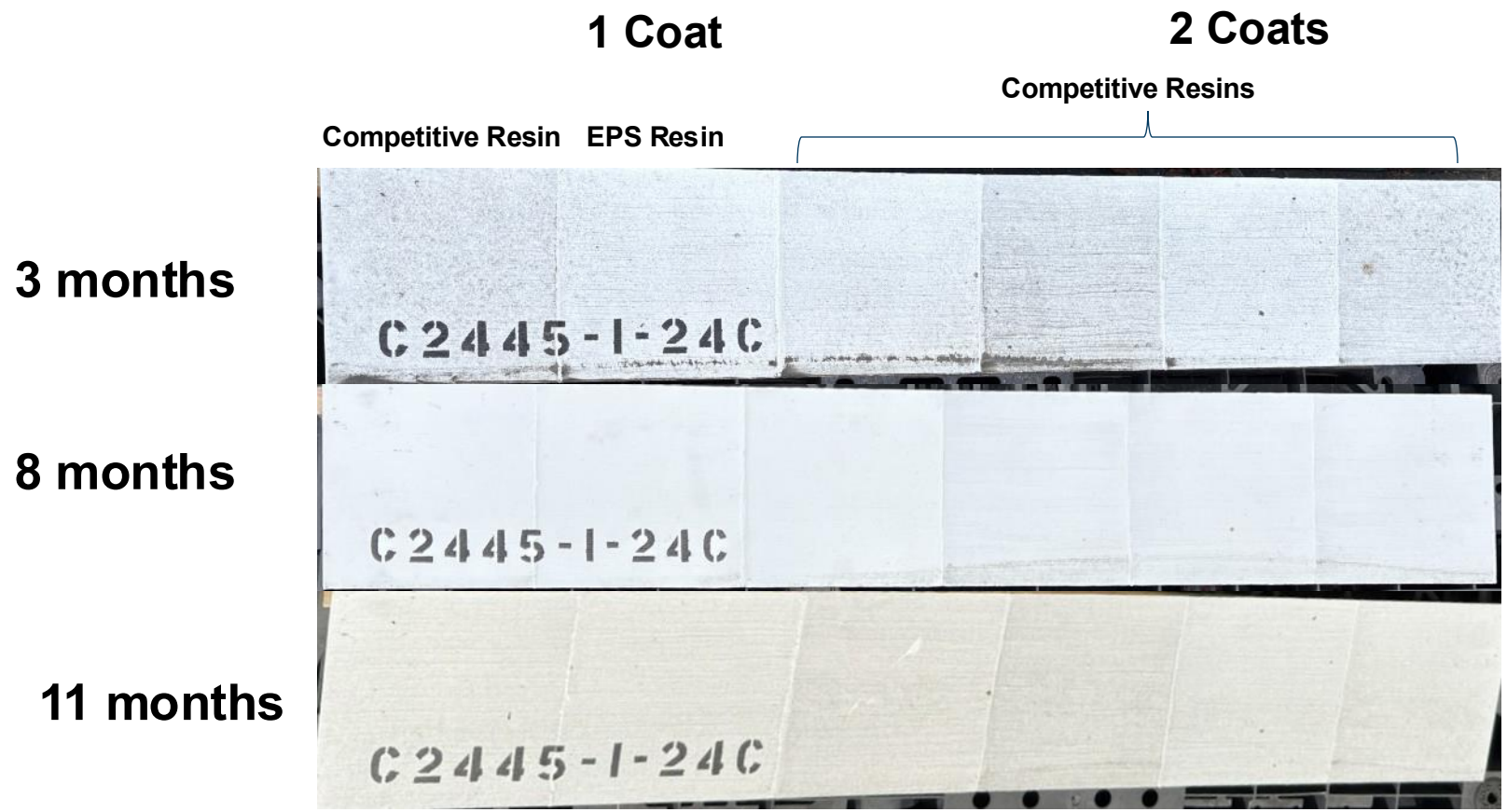

Physical Properties in Coating

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Physical Property	Units	ASTM Method	EPS® 719	EPS® 210	ASTM Spec
Table 1 Liquid Physical Properties					
Viscosity	Pa·s	D2196	15	15	0.2 to 100
Volume Solids	%	Calculated	50.7	52.0	>45
Weight Solids	%	Calculated	64.5	65.7	>50
Table 2 Cured Film Physical Properties					
Initial elongation	%	D2370	**505**	267	>100
Initial tensile strength	PSI	D2370	216	306	>200
Aged elongation	%	G155, D2370	204	139	>100
Permeance	Perms	D1653 Method B inverted	3.9	27	<50
Water Swelling	%	D471	20	6.8	<20
Accelerated weathering	P/F	G155	Pass	Pass	No cracking, checking
Adhesion to Galvanized Steel	PLI	C794/D903	4	2.4	>2
Tear Resistance	LB_f/IN	D624	141	101	>60
LT Flex (-10°C)	P/F	D522	Fail	Pass	No cracking
DPUR	dE	EPS Method – ROX Slurry	4.0	2.0	N/A
Bleed through resistance	dE	EPS Method	7	14	N/A

Summary

Cool roof coatings help protect roofs, improve indoor comfort, and reduce energy costs by reflecting sunlight and minimizing heat absorption.

ASTM D6083 sets the performance standards for liquid-applied acrylic roof coatings, ensuring durability, flexibility, and weather resistance.

Proprietary DPUR technology in EPS® 719 and EPS® 210 enables cool roofs to stay cool

EPS® 719-based coatings resist asphalt bleed-through, preserving the appearance and reflectivity on bituminous roofs.

EPS® 210-based coatings resist dirt pickup and are formulated to meet ASTM D6083 Type II requirements, delivering high performance in demanding conditions.

QUESTIONS

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EPS® 719 samples available at
https://www.epscca.com/en_GB/index.html

https://www.linkedin.com/company/eps-materials

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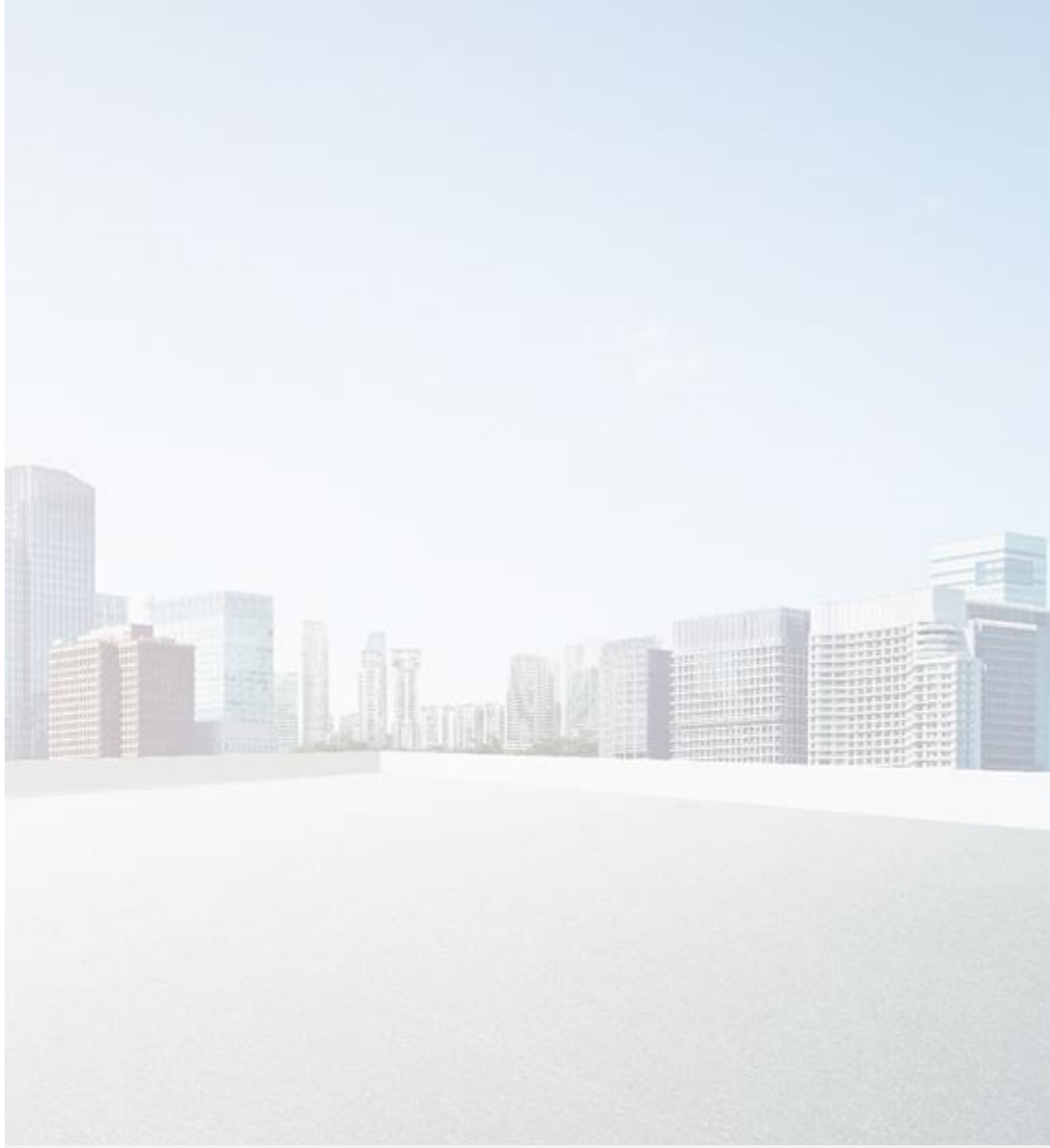

The data in this presentation represents typical values. Since application variables are a major factor in product performance, this information should serve only as a general guide. EPS assumes no obligation or liability for use of this information.