



Next Generation Liquid Applied Roofing Membrane

NEW COOL BARRIER Roofing Membrane based on Polyurethane Dispersion tailored for **durable waterproofing**



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Construction Chemicals

OCTUBRE '17, Expoquimia, Barcelona

Building the future starts here.

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Liquid Applied Membranes Waterproofing: Overview

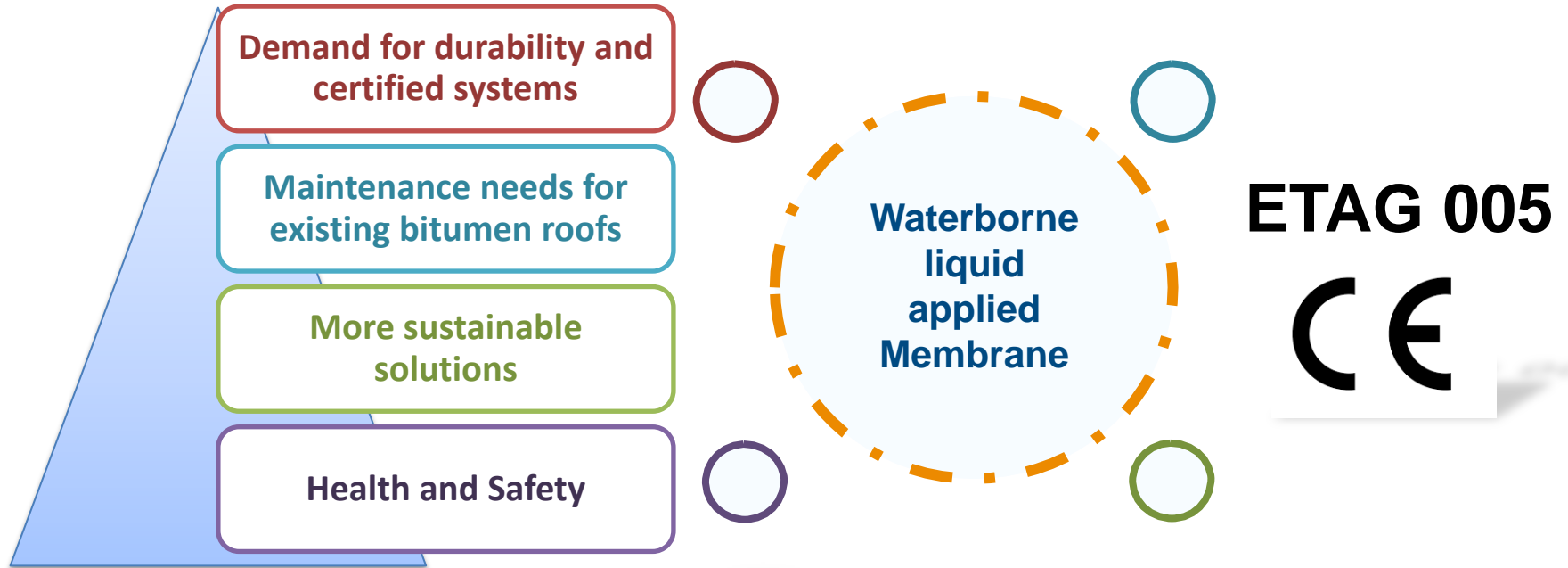
- ❖ Monolithic or seamless
- ❖ In most cases are cold applied
- ❖ Complete solutions for the new build and refurbishment sectors
- ❖ Full line of coating products: primers, basecoats and topcoats
- ❖ Liquid Applied Membranes extend the useful life of roof

More Than 1 Chemistry

- Polyureas/Polyaspartics • SB Silicones • Asphaltic coatings • WB Acrylic • SB 1 k Polyurethanes
- WB Styrene/Acrylics • 2k Polyurethanes ...



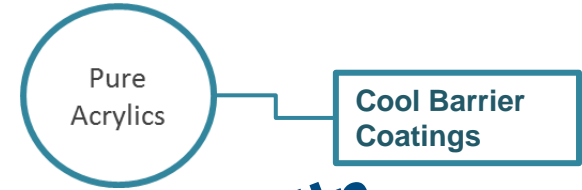
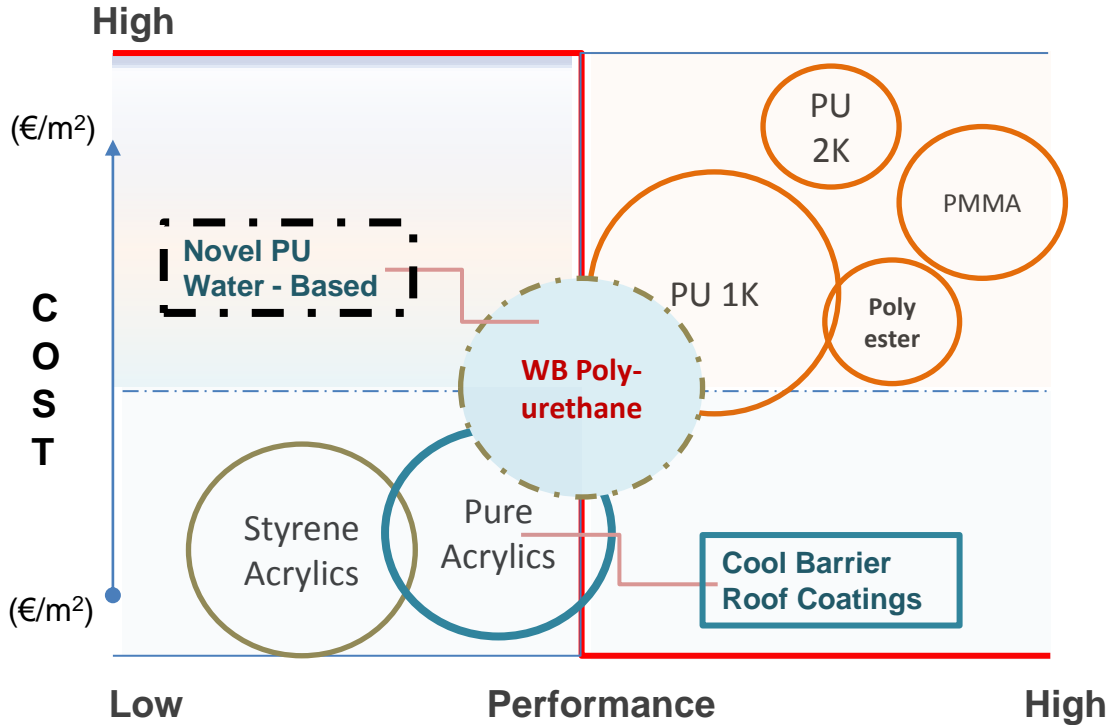
Emerging Trends: Liquid Applied Roof Waterproofing



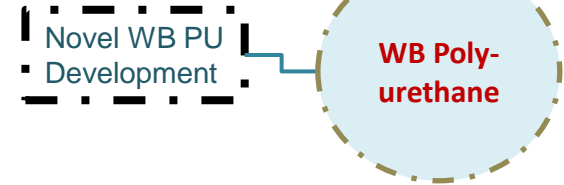
Today products meeting ETAG 005 are mainly solvent borne 1K PU



New Liquid Applied Membrane: Development



Abolin



High Performance WP with ETAG 005

High Solar Reflective, Maintenance Coatings



New Liquid Applied Membranes: Taking The Benefits

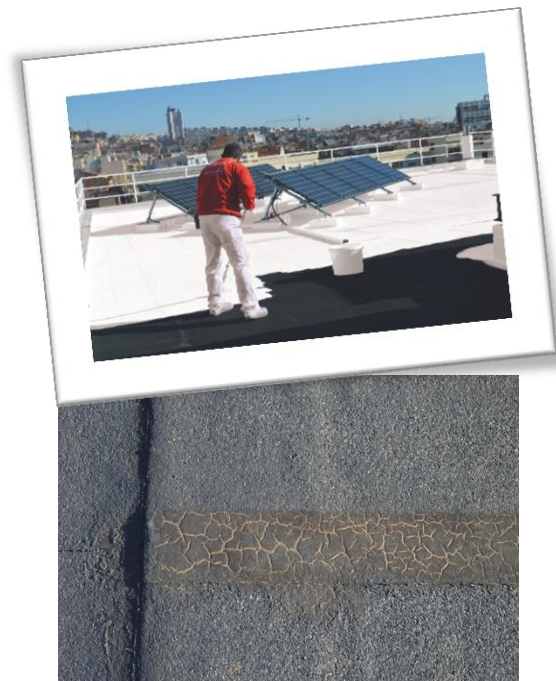
PROVIDES:

- ❖ Adhesion to multiple substrates
 - ❖ 1K Water-based
 - ❖ Waterproofing
 - ❖ Easy to apply
 - ❖ Performance to price ratio
 - ❖ Reflective Coatings
 - ❖ Minimal Environmental impact
 - ❖ Re-Coatability
- ✓ Seamless surface with no potential leaks in joints or welds
 - ✓ Higher quality types resist impact damage and foot traffic
 - ✓ Excellent to refurbish existing roofs without replacing them
 - ✓ Good solution for small and complicated roofs



Key benefits of liquid applied roofing membranes

- ❖ Seamless with no potential leaks in joints or welds
- ❖ Simple application procedure
- ❖ Higher quality types resist impact damage and foot traffic
- ❖ Excellent to refurbish existing roofs without replacing them
- ❖ Good solution for small and complicated roofs



Not a paint – comparison in application

Roof coating - membrane

Applied with a higher film thickness

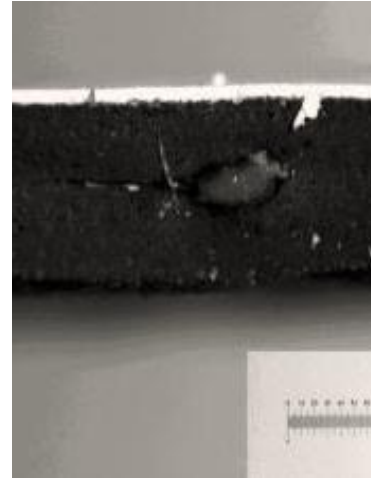
~ 2mm



Roof paint

Applied with a lower film thickness

~ 0.1mm



Common application methods

Roller



Brush



Spray



Recommended application quantity: 3+, kg/m² with fleece



Our approach

Focus of Abolin novel WB

Polyurethane membrane development

- ETAG 005 requirements
- Mechanical performance after aging
- Cold temperature flexibility - 20°C
- Adhesion to granulated bitumen and concrete
- Water resistance

1K PU competitive solution

- Pros: limited water swelling
- Cons: safety, performance after thermal aging, adhesion on moist substrate



Value proposition of novel waterproofing membrane from Abolin

When properly applied, the novel liquid applied WB PU roofing membrane can offer:

Cost Efficiency

Liquid cold applied on aged membranes to renovate and extend useful lifetime of the roof

Sustainability

Waterborne system with no use of solvent*, low odor and no EH&S concerns

Durability

Meets ETAG 005 durability tests, exceeds performance of 1K PU, easy to apply and maintain



COOL BARRIER WB PU Polyurethane: Technical properties

When properly applied, the novel liquid applied WB PU roofing membrane can offer:

- ❖ Very good mechanical properties in broad temperature range
 - ❖ Low temperature flexibility at - 20°C
 - ❖ High tensile strength and elongation at > 20°C
- ❖ Excellent aging performance (UV/thermal/water)
 - ❖ Stable elongation also after accelerated aging tests
- ❖ High water resistance:
 - ❖ Low water swelling
 - ❖ No blistering observed on concrete or bitumen
- ❖ Good dirt pick-up properties thanks to high hardness



Test results: water swell, perms, wet adhesion, water proofing and ignitability

	Water Swell 7 day	Water Swell 14 day	PERMS	Wet Peel Adh; SBS		Water tightness 7d* (EN 14891 A.7)	Ignitability (EN ISO 11925-2**, 15s)
	(%)	(%)	US Perm	N/25m m	Mode	(ml)	
F1-58 - White	8.6%	7.8%	5.75	5.25	A	0	Pass, no burning droplets
F1-58 – Light Gray	7.5%	6.9%	4.9	5.25	A	0	NA

*Pressure ramp: 24h 0.5 bar, 24h 1 bar, 24h 1.5 bar, 24h 2.0 bar, 3d 2.5 bar

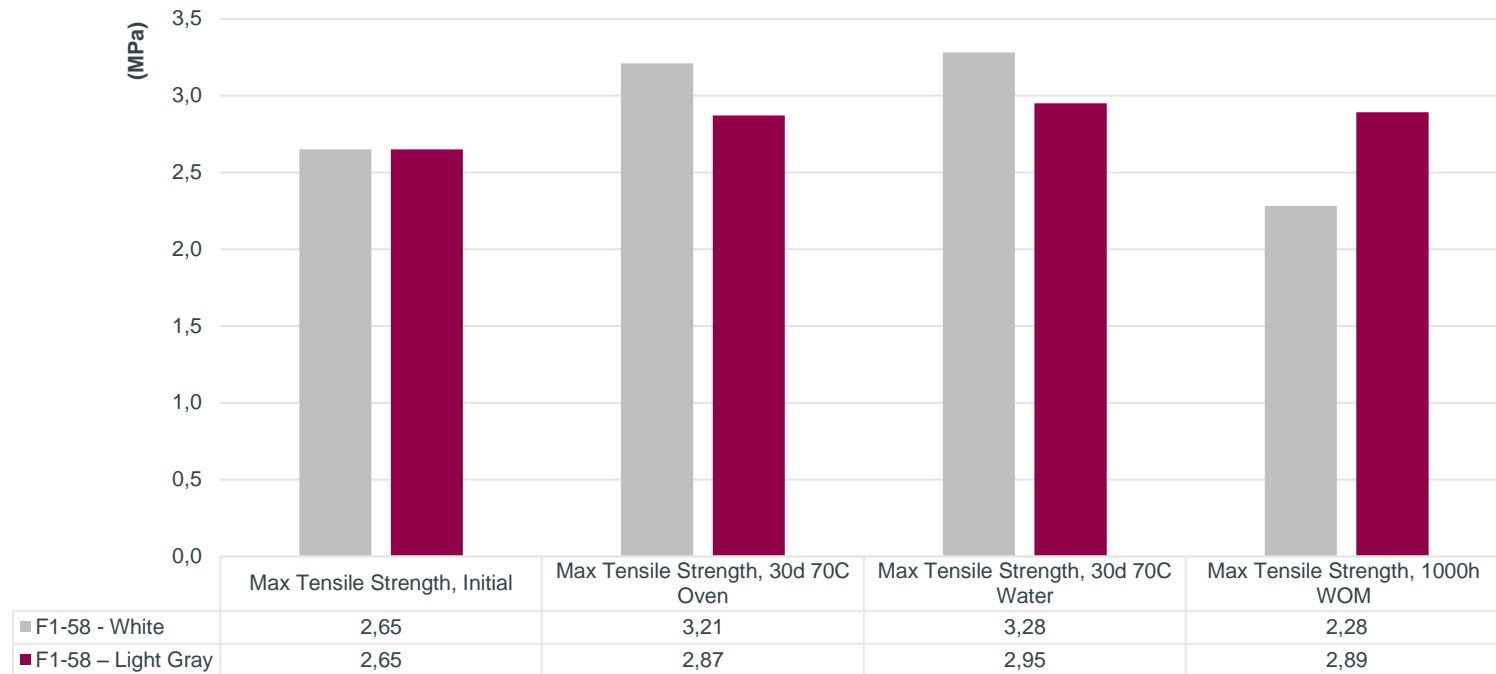
** surface test with 3 parallel points deviating from standard

Test performed in Dow labs in 2015-2016



Test results: tensile strength

100mm/min, rectangular specimen, 500 µm DFT

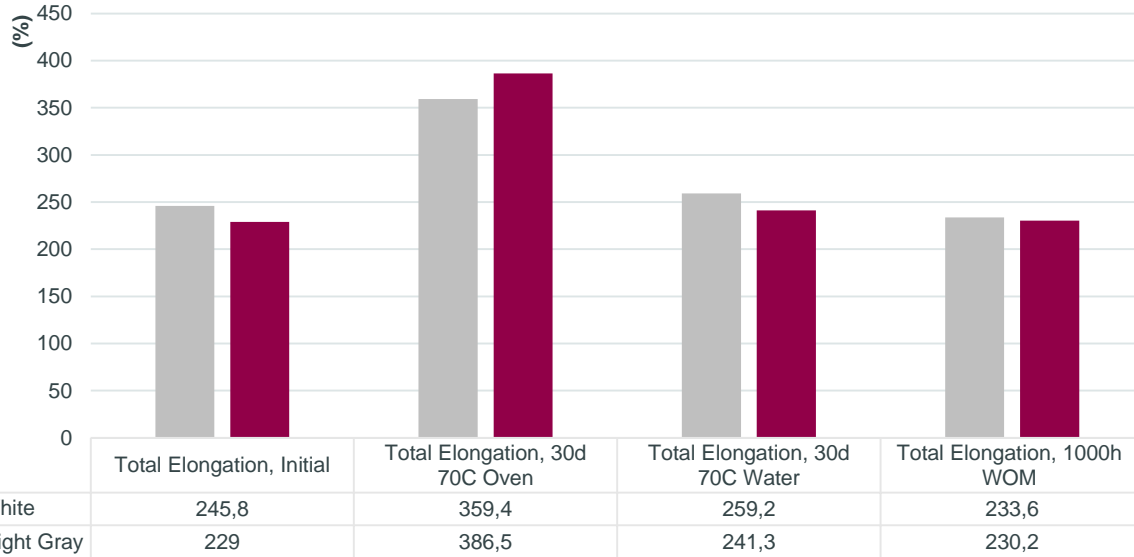


Test performed in Dow labs in 2015-2016



Test results: elongation @ RT

100mm/min, rectangular specimen, 500 µm DFT



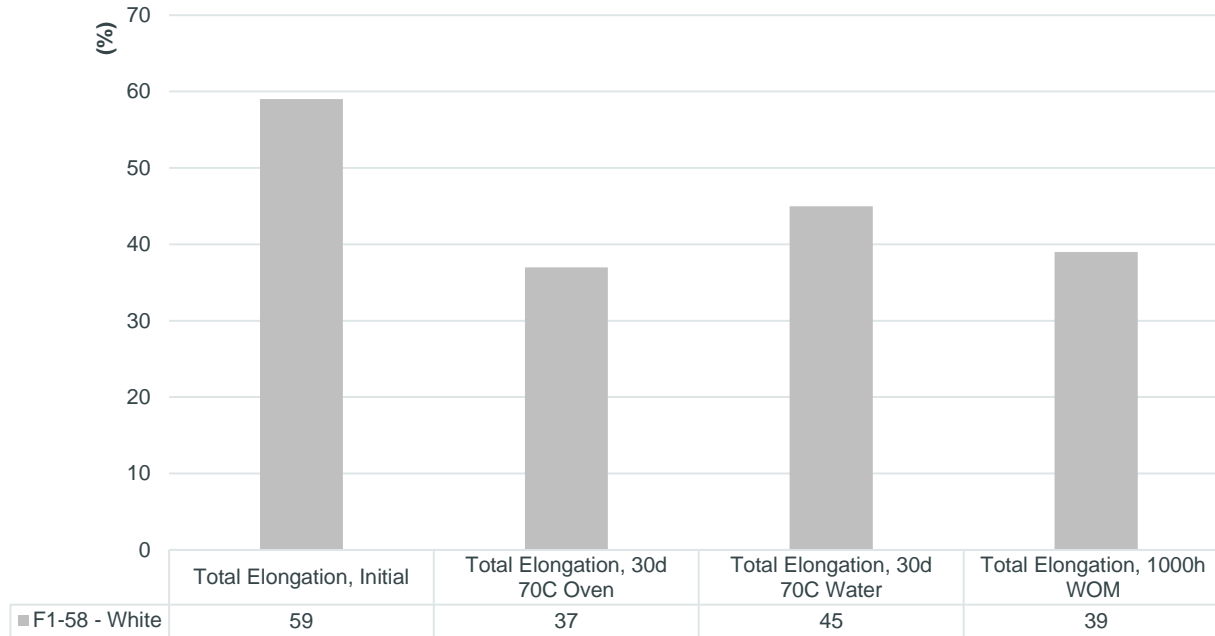
- Elongation values are very stable after thermal, water and WOM aging.
- Earlier test comparing 30d and 100d 80°C thermal aging showed only ca. 30% reduction in elongation.
- Earlier test comparing 1000h and 2000h showed <20% change in elongation.

Test performed in Dow labs in 2015-2016



Test results: elongation @ -20°C

100mm/min, rectangular specimen, 500 µm DFT

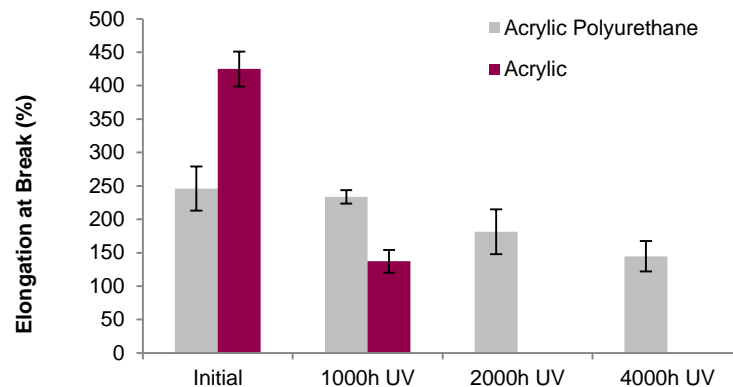
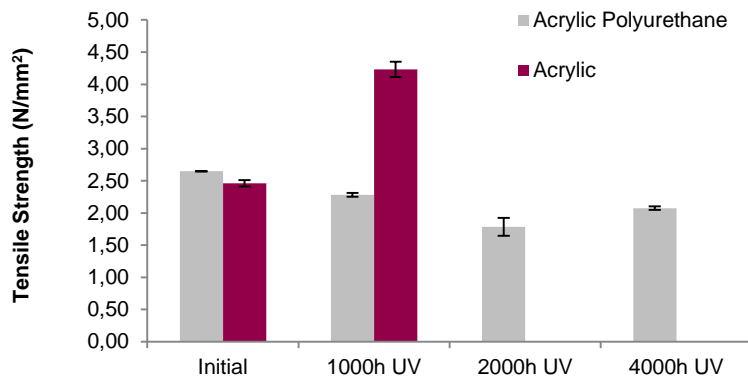


- Elongation values at -20° C are very stable after thermal, water and WOM aging.

Test performed in Dow labs in 2015-2016



Accelerated aging* with acrylic polyurethane



- *4000h exposure time is approx. 2 yr equivalent and exceeds ETAG 005 10 yr lifetime test for UV exposure.
- Acrylic polyurethane meets or exceed 1.5 N/mm² strength and 150 % elongation at break after aging up to 4000h.
- Mechanical performance maintained after extended UV aging.

Test performed in Dow labs in 2015-2016



Abolin New WB Polyurethane Liquid Applied Membrane

Classification for use by the client:*

Useful life:	Category W2, expected useful life 10 years
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Climate zones:	Category M & S, moderate and severe climate
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Category TL3, severe low temperature

Category TH4, severe high temperature

Roof Slope:	Category S1 – S4 Slope (<5 till >30) %
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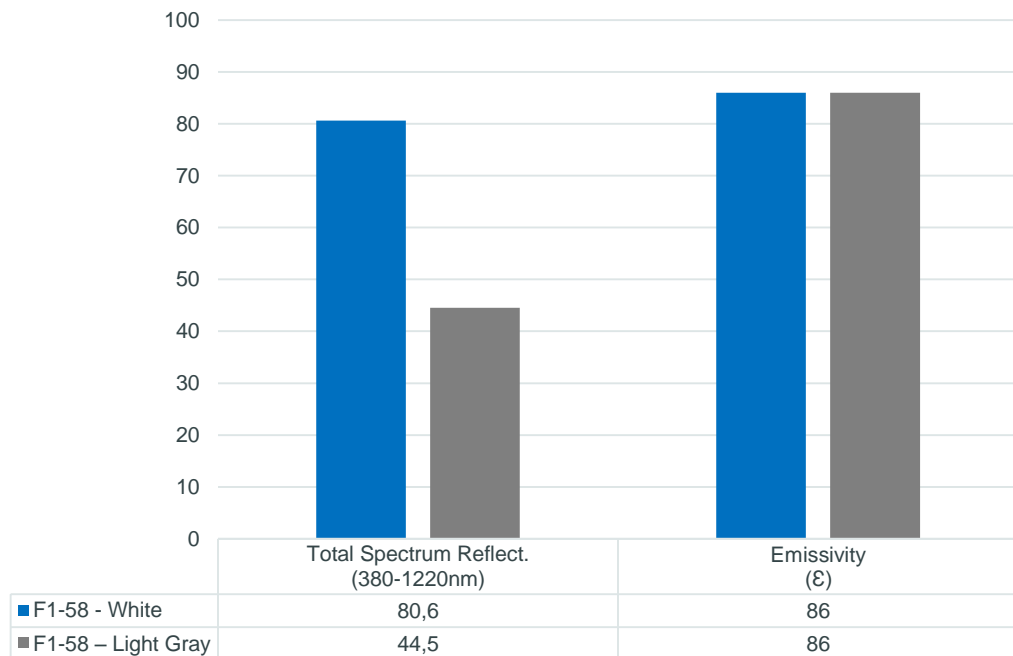
User load:	Category P3, normal
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Please note that the values shown are typical values for your guidance. They are not to be taken as specifications



Test results: reflectivity and emissivity

500 μm DFT



Test performed in internal labs in 2016-2017



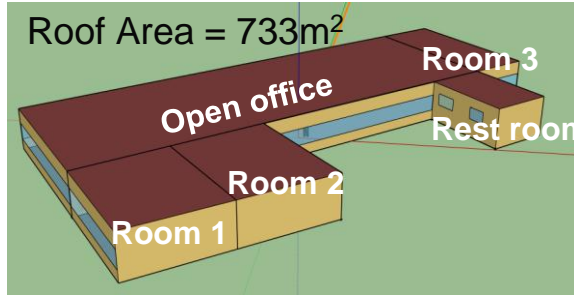
Cool Roofing and Energy Savings

Energy savings from installing a Cool Roofing Product depends on the local climate, existing insulation levels, the type of roof replaced, the type of roof installed, and maintenance. In the best applications, cool roofs have no incremental cost and deliver a nearly instant payback.

Winter Penalty, also known as heating penalty. Just as cool roofs reflect solar radiation throughout the summer, they also reflect wintertime sunlight. Thus, the winter penalty is the potential for increased heating demand in winter due to reflected solar radiation by light colored roofs.

Over an entire year, decreases in summer energy use typically exceed any wintertime increases. (US Environmental Protection Agency – EPA)

Energy Efficiency Modeling: Barcelona



- Building type
- HVAC schedule
- People Occupancy
- Lighting and equipment
- Air Infiltration



Building Stratigraphy

Glass window = 3mm
With shading (curtains) during Summer time

Roof

Coated /uncoated Concrete (200mm)
Air space
Acoustic tile (19mm)

Wall

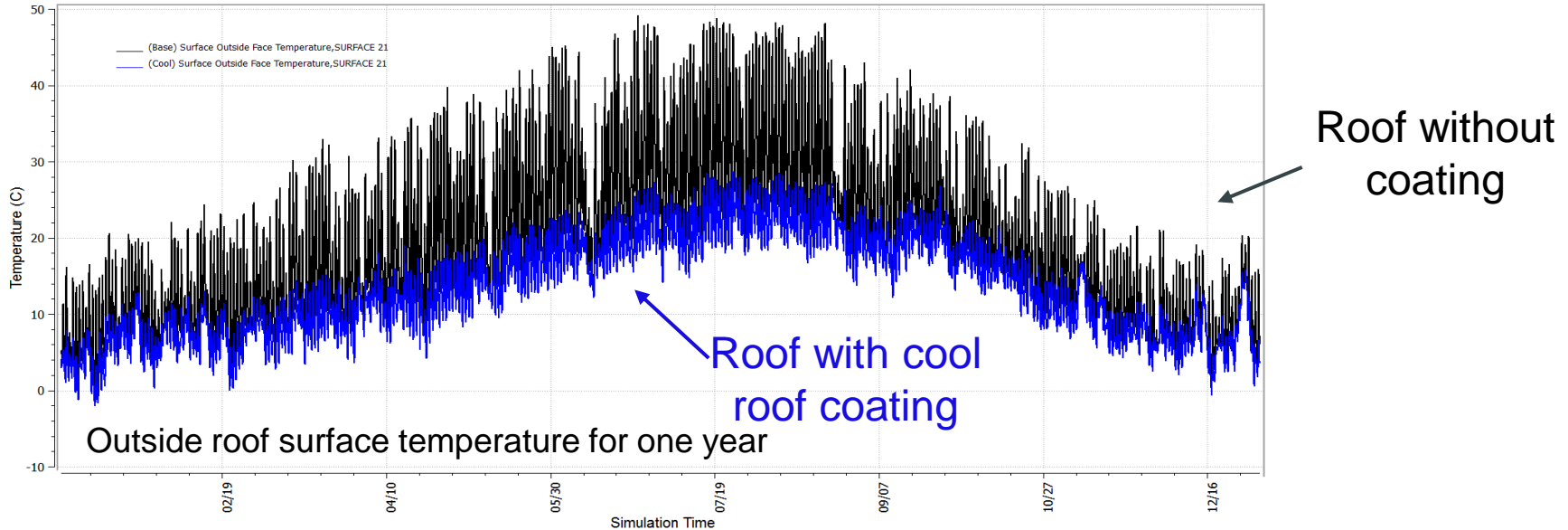
Stucco (25mm)
Concrete (200mm)
Air space
Gypsum(12mm)

Floor

Carpet pad
Concrete (100mm)

Modeling Output

Roof Surface Temperature Data Barcelona



20°C max reduction on roof surface temperature with Cool Roof

Modeling Output Energy Saving Barcelona

Barcelona	Baseline	Cool roof	Savings
Heating (kWh)	29,800	36,966	-7,166
Cooling (kWh)	26,433	16,672	9,761
Total (kWh)	56,233	53,638	2,595
Total Energy Saving (%)			4.6%
Energy consumption (kWh/m²)	139.7	136.2	3.5

Cool Roof coating provides

- 4.6% energy saving

Best case scenario considering only topmost floor

Cool Barrier Roof Case Studies: Insulated Buildings

GREECE Athens, Egaleo Insulated Building, Heat Pumps

Roof made of concrete slab with glass wool insulation layer sealed with black bituminous

- **Energy consumption for cooling is reduced by at least 18%** under the observed operation schedule and reaching a 49% reduction for a common operation schedule
Thermal comfort conditions below the cool roof are improved by approx. 35%

Report:
National
Renewable
energy Center



ITALY Milan: Carrefour. Insulated, **A/C Building**

The roof is made of 0.15 m thick concrete slab with a 0.04 m insulation layer sealed with black bituminous

- **“We are about 25% reduction in electricity consumption for air conditioning “** “Around 65.000€ savings per year”
“Payback period: 2.5 Years”
Energy Manager: Mr. Giovanni Piano

Report:
Carrefour
Energy Manger



UNITED KINGDOM, London, Brunel Insulated, Non A/C Building

The roof is made of 0.15 m thick concrete slab with a 0.04 m insulation layer sealed with black bituminous

- **Thermal comfort can be improved by as much as 2.5 °C** but heating demand could be increased by 10%. Cooling load is decreased. although the overall contribution is positive

Report:
Btunel
University



Cool Barrier Roof Case Studies: **Non Insulated Buildings**

GREECE School building in Kesariani, Athens, Non Insulated - No A/C

The load bearing structure of the building is made of reinforced concrete and an overall concrete masonry construction which is not insulated. The school building is occupied by 120 children and 15 adults (the school staff) and is non-cooled and naturally ventilated. There is an installed heating system using natural gas. Walls: U value = 2.846 W/m²K , Roof: U value = 1.971 W/m²K , Windows : U value = 2.95 W/m²K .

	(kWh/m ²)	Annual Cooling Loads	Annual
Heating Loads Un-insulated building			
+10%			-40%
Insulated building			
+ 4%			-35%

Monitoring internal temperatures and Modeling with scenario
U-value of 0.417 W/m²K for walls and U-value of 0.302 W/m²K for roof.

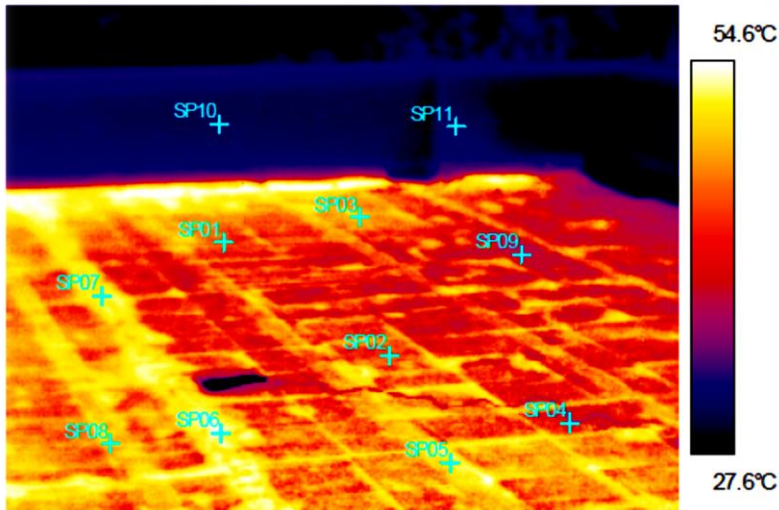


Report:
University of
Athens

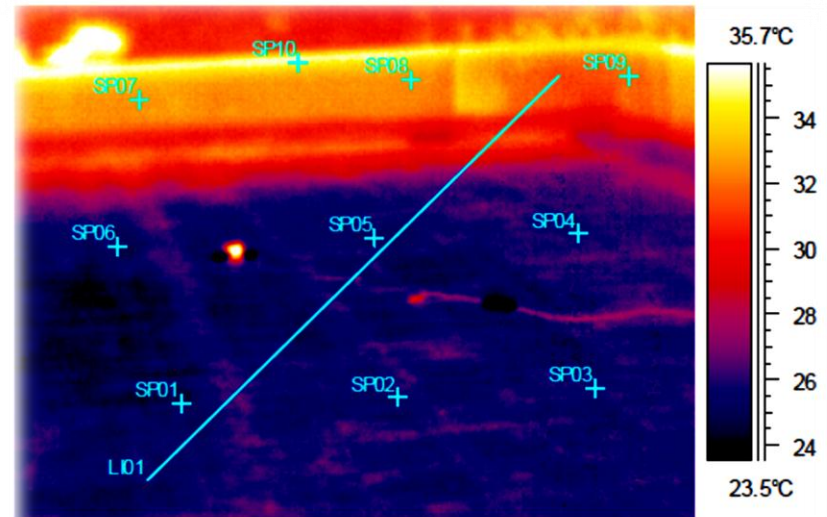
Infrared Camera Depiction: Athens Case Study

GREECE Athens, Egaleo Insulated Building

Without Cool Roof



Cool Roof



Measurements demonstrate an indoor air temperature reduction by about 2.5°C,

Summary

Novel COOL BARRIER WB Polyurethane key benefits:

Cost efficiency

Liquid cold applied on aged membranes to renovate and extend lifetime of the roof

Sustainability

Waterborne system with no use of solvent*, low odor and no EH&S concerns

Durability

Meeting ETAG 005 durability tests, exceeding the performance of 1K PU, whilst being easy to apply and maintain

* Solvent is not intentionally added and not knowingly introduced from another raw material.





THANK YOU

Benefit from our deep technical knowhow and let us help you develop liquid applied roofing materials that meet high quality standards.

For more information:
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