



Uralac[®] Powder Coating Resins for

Superdurable Powder Coatings



Create brighter lives...

...for people today and for generations to come.

Uralac® powder coating resins for superdurable results

Together we can shape the world of powder coatings. DSM is the world's leading supplier, global and innovative resins supplier for powder coatings. Together with you, we are dedicated to develop new powder coating solutions that help make the planet a cleaner and greener place. Whether you need a powder coating that is easy to apply and creates less waste, or one that shrugs off the scratches and bumps endured in everyday life. Working with you we can make a world of difference in the Powder Coating industry.

Innovation and inspiration

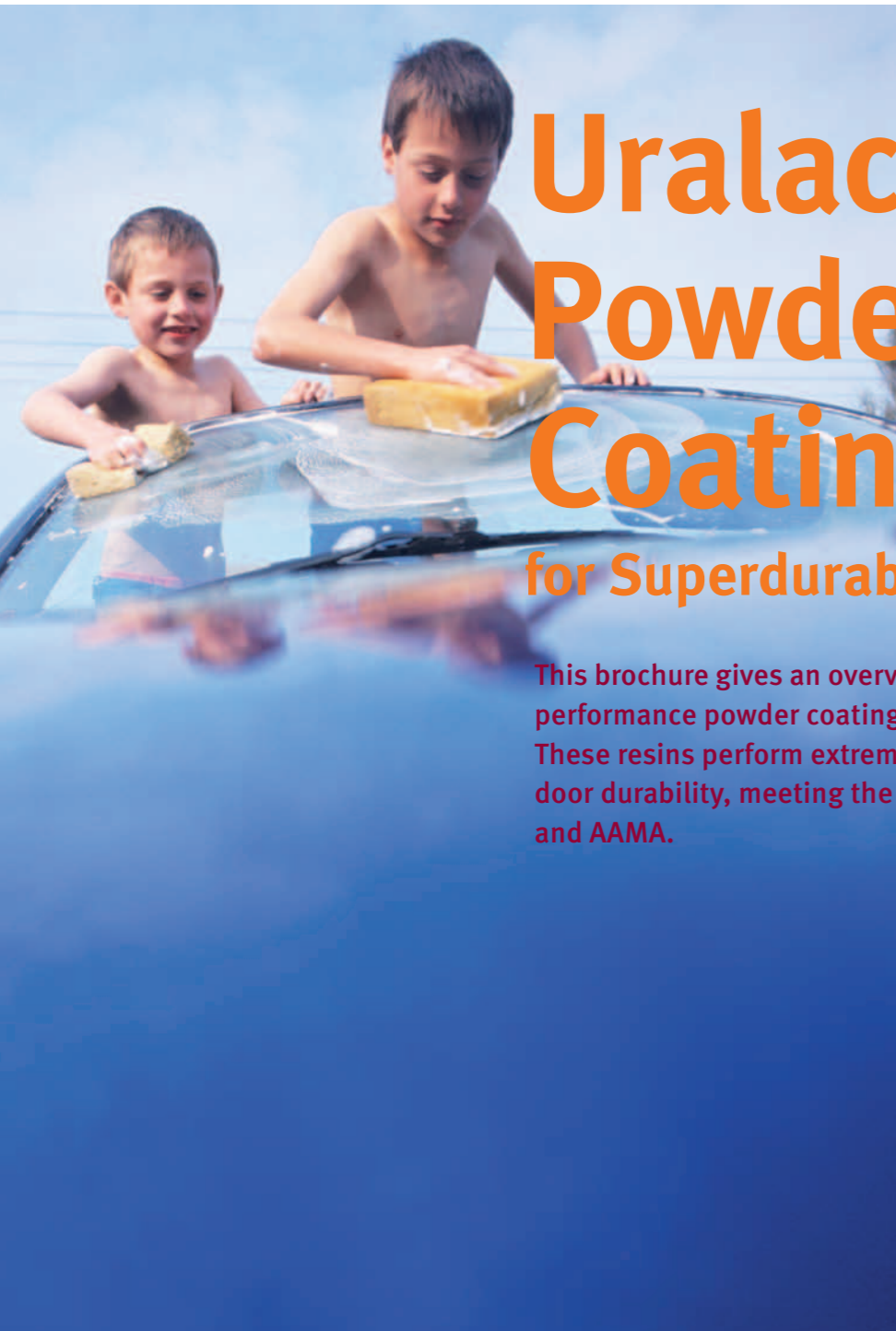
We mix bright science with an inquisitive mind to discover solutions in powder coating resins that will inspire you. For the Architectural, Automotive or Agricultural, Construction and Earth-moving equipment (ACE) markets, our strong collaborative partnerships have resulted in a broad portfolio of Uralac® powder coating resins for superdurable coatings. They meet the most stringent quality standards, including GSB Master (36 months Florida), GSB Premium (60 months Florida), Qualicoat class 2 (36 months Florida) or AAMA 2604 (60 months Florida) so they can be used in high performance coatings. The Uralac® Superdurable portfolio contains resins for all typical powder coating cross-linkers like HAA, TGIC, PT 910 and Isocyanate.

Brightening up lives across the value chain

Our innovative Uralac® powder coating resins brighten up life for our customers. And they include the people who actually apply coatings, as well as those who buy the finished products. We help customers develop formulas for specific functions and better performance. With today's technology, these coatings can be applied in thinner layers and cured at lower temperatures to speed up the process, to coat difficult substrates and reduce energy costs. Moreover, all our powder coating resins are non-hazardous, making the coater's job healthier and happier.

Of course, it is the consumer who finally gets to appreciate the beauty of the end product. A more durable powder coating, on window frames that will not fade in the sun. A hard-wearing, environmentally friendly powder coating on a bike, which comes in a glorious colour and resists scratching and corrosion. All of which helps create brighter lives for generations to come.

To find out more about how our bright science can brighten your life, contact your DSM Account Manager, Technical Application Manager or visit www.dsmcoatingresins.com



Uralac® Powder Coating Resins for Superdurable Powder Coatings

This brochure gives an overview of DSM Coating Resins high performance powder coating resins for superdurable coatings. These resins perform extremely well aesthetically and in outdoor durability, meeting the high demands of GSB, Qualicoat and AAMA.



DSM Coating Resins has a broad portfolio of Uralac® powder coating resins for superdurable coatings. The availability of the grades may vary due to regional differences (chemistry popularity dependent). The portfolio of Uralac® powder coating resins for superdurable powder coatings includes resins for fast cure, dry blending, resins with flexibility (impact resistant) as well as grades that can be formulated to offer good anti-graffiti and chemical resistance.

Uralac® powder coating resins for superdurable coatings can be used in high performance systems to meet GSB Master (36 months Florida), GSB Premium (60 months Florida), Qualicoat class 2 (36 months Florida) or AAMA 2604 (60 months Florida). Typical markets for the Uralac® powder coating resins for superdurable coatings are: Architectural, Automotive or ACE (Agricultural, Construction and Earthmoving equipment). The Uralac® portfolio contains resins for all typical powder coating crosslinkers like: HAA, TGIC, PT 910 and Isocyanate.



		Standard Availability	Asia	EMEA	USA	
Products	HAA	Uralac® P 800 (96/4)		•	•	
		Uralac® P 883 (97/3), Dry Blend Matte	•	•		
		Uralac® P 885 (95/5), Flexible		•		
		Uralac® P 886 (95/5)	•			
		Uralac® P 6800 (94/6), Dry Blend Matte		•		
		Uralac® P 3230 (93/7), EasyCure™	•	•	•	
		Uralac® P 5500 (93/7), Dry Blend Matte	•	•	•	
		Uralac® P 5525 (92/8)			•	
	TGIC	Uralac® P 5500 (90/10)		•	•	•
		Uralac® P 6600 (93/7)	•			
Uralac® P 6680 (93/7)				•		
PT 910	Uralac® P 3480 (93/7)		•			
Isocyanate	Uralac® P 1580 (70/30), anti-graffiti	•	•	•		
	Uralac® P 1680 (85/15)			•		
Value proposition	Polyester resins for high performance superdurable powder coatings.					
Markets	Architectural, Automotive, ACE					
Chemistry	Carboxylated powder coating resin for curing with HAA, PT910 or TGIC. Hydroxylated powder coating resin for curing with isocyanate.					

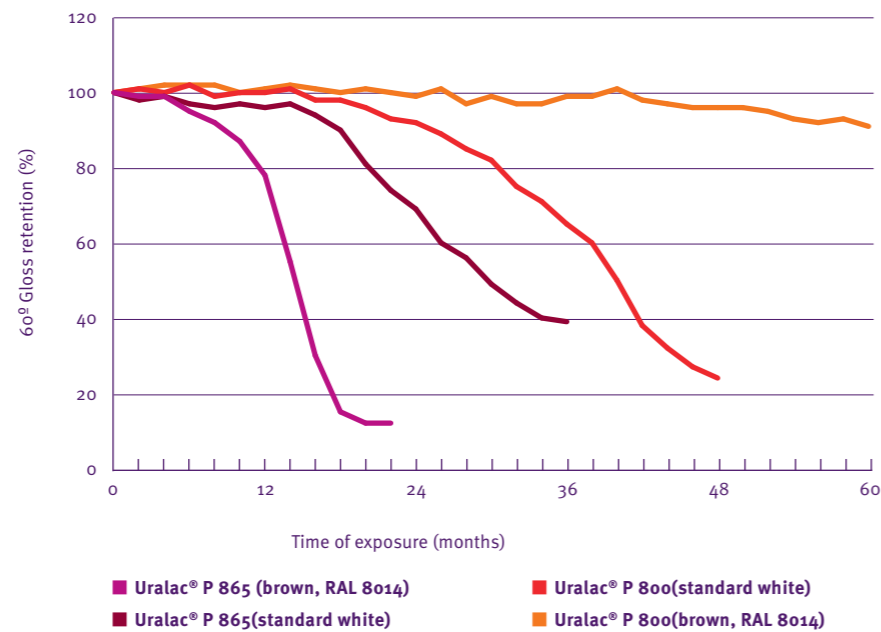
Key properties		standard white	brown (RAL 8014)
	36 months Florida, GSB Master, Qualicoat class 2	•	•
	60 months Florida, GSB Premium, AAMA 2604		•
	Chemical resistant	•	•
	Non Blooming	•	•

Main requirements

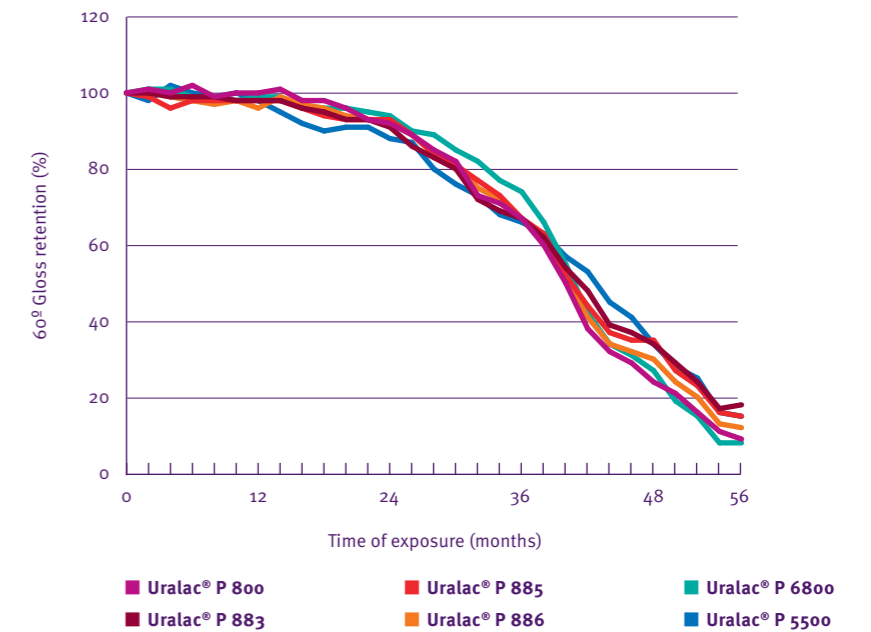
The main requirement for superdurable powder coatings is adequate performance in the Florida exposure tests. On the next pages you can see that the gloss retention of the Uralac® powder coating resins for superdurable coatings is very good. The performance of the coatings are influenced by the coating formulation as well as by the resin.

When Uralac® powder coating resins are used in standard white the requirements for 3 year Florida can be met (GSB Master and Qualicoat class 2). Formulating brown, RAL 8014, even longer exposure periods are possible. In the many years of Florida testing it is seen that superdurable formulations with dark colours are much better in gloss retention than formulations based on the same resin in white. This is opposite to the effect in standard outdoor durable resins.

Florida exposure of various Uralac® powder coating resins (standard white and brown RAL 8014) (5° direct South, washed side)



Florida exposure of various Uralac® powder coating resins (standard white) (5° direct South, washed side)



HAA (β-hydroxyalkylamide) Cure

Uralac® P 3230, EasyCure™ is a new development for superdurable powder coatings. With Uralac® P 3230, EasyCure™ it is possible to make a superdurable powder coating which can be cured at low temperature (15°-155°C, total oven time). Although no Florida data is available yet it is expected that the outdoor durability of Uralac® P 3230, EasyCure™ will be on the same level as the products shown in the graph.

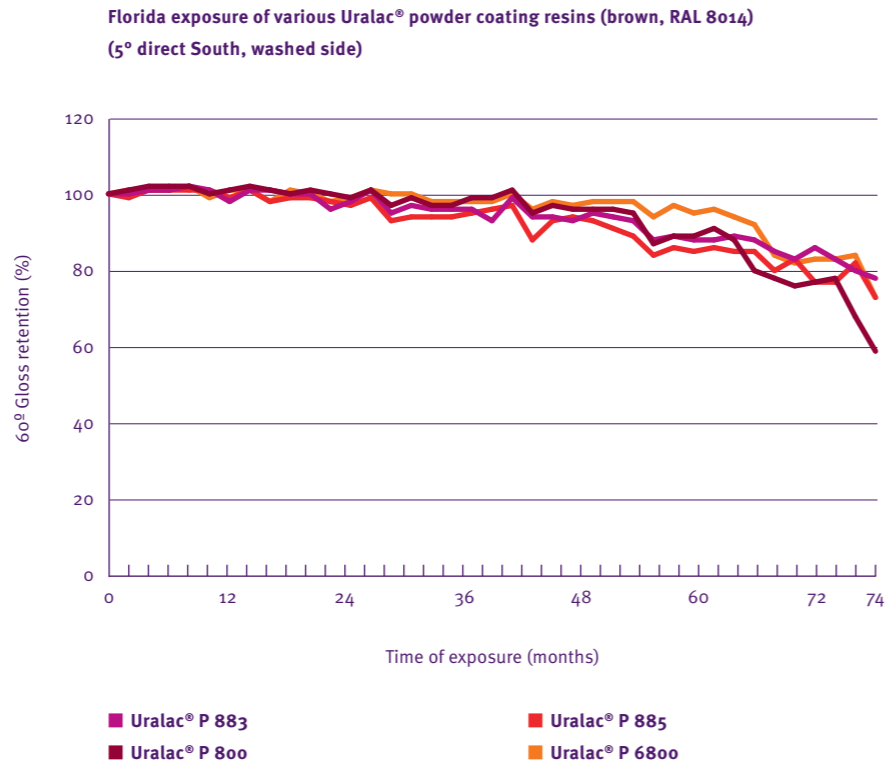
	GSB	Qualicoat	AAMA
	Master	Premium	Class 2
Natural Weathering	36 months, 45°South, 840 MJ/m² total Radiation	60 months, 45°South, 1400 MJ/m² total Radiation	36 month, 5°South
QUV-A	2000 hrs	3000 hrs	n.a
QUV-B	600 hrs	1000 hrs	n.a
Weather-o-meter	2000 hrs	3000 hrs	1000 hrs
Layer Thickness	60-80 µm	60-80 µm	60 µm
Adhesion	Gto	Gto	Gto
Falling Ball test (reverse impact)	20 inch pound No detachment, cracks allowed	20 inch pound No detachment, cracks allowed	20 inch pound No detachment, cracks allowed
Erichsen Cupping test	> 5 mm	> 5 mm	> 5 mm
Natural Salt Spray test	1000 hrs No blistering < 1 mm cfs	1000 hrs No blistering < 1 mm cfs	1000 hrs Acetic acid salt spray test <16 mm²/10 cm, <4 mm cfs
Boiling Water	2 hrs test Gto Gt1 after tape pull	2 hrs test Gto Gt1 after tape pull	2 hrs test Gto after tape pull, no detachment

Products	HAA	Standard Availability	Asia	EMEA	USA
Uralac® P 800 (96/4)				•	•
Uralac® P 883 (97/3), Dry Blend Matte			•	•	
Uralac® P 885 (95/5), Flexible				•	
Uralac® P 886 (95/5)			•		
Uralac® P 6800 (94/6), Dry Blend Matte				•	
Uralac® P 3230 (93/7), EasyCure™			•	•	•
Uralac® P 5500 (93/7), Dry Blend Matte			•	•	•
Uralac® P 5525 (92/8)					•
Value proposition	Polyester resins for high performance superdurable powder coatings.				
Markets	Architectural, Automotive, ACE				
Chemistry	Carboxylated powder coating resin for curing with HAA (β-hydroxyalkylamide)				

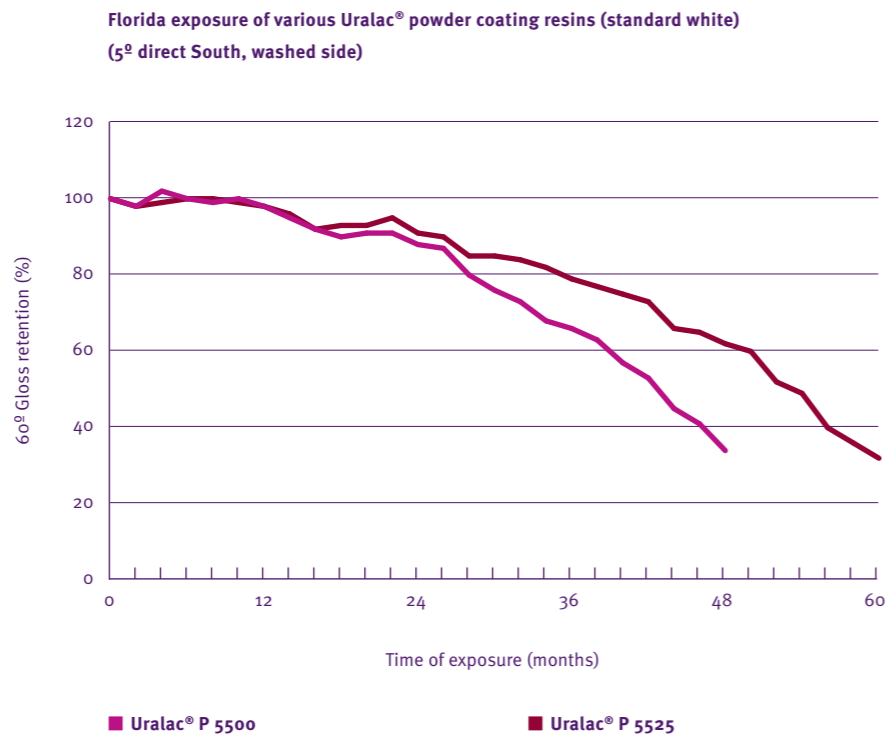
Key properties		standard white	brown (RAL 8014)
	36 months Florida, GSB Master, Qualicoat class 2	•	•
	60 months Florida, GSB Premium, AAMA 2604		•
	Chemical resistant	•	•
	Non Blooming	•	•

HAA (β -hydroxyalkylamide) Cure

Brown (RAL 8014) superdurable powder coatings show superior performance compared to white formulations: The graph below shows that formulations based on Uralac® P 800, Uralac® P 883, Uralac® P 885 and Uralac® P 6800 surpass 60 month Florida exposure with more than 50% gloss retention, with that the products meet GSB Premium, Qualicoat class 2 as well as AAMA 2604 requirements.

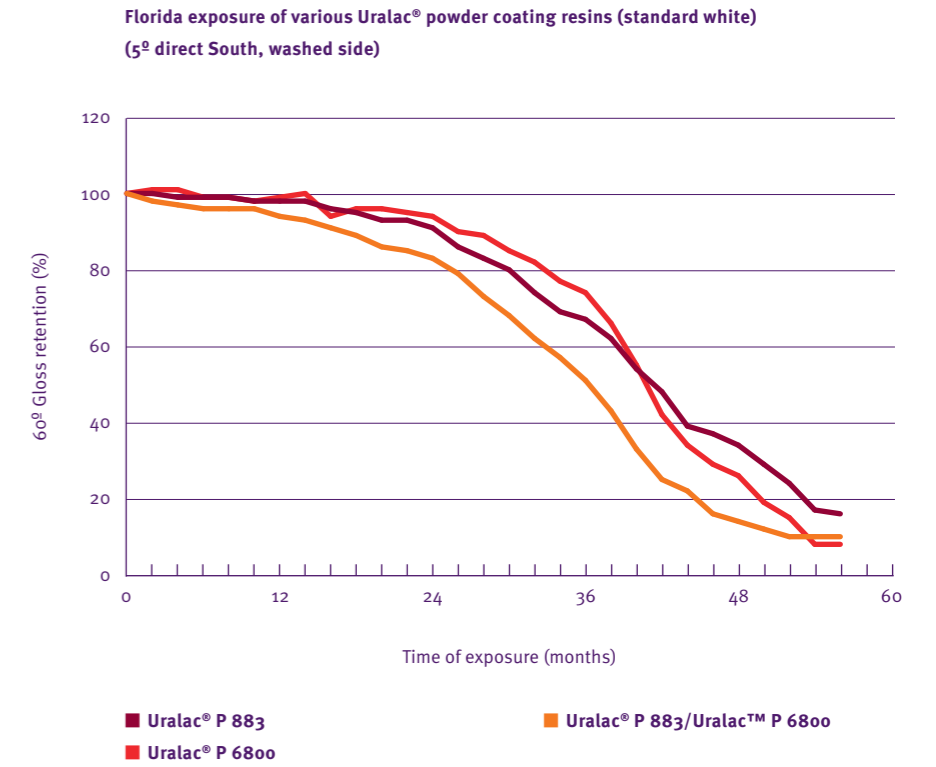


White is a difficult colour for superdurable powder coatings. Uralac® P 5525 is developed because of our continuous effort to improve our existing systems. Uralac® P 5525 passed the 50% gloss retention level after 54 months. Currently tests are running to improve the system to an even higher level.

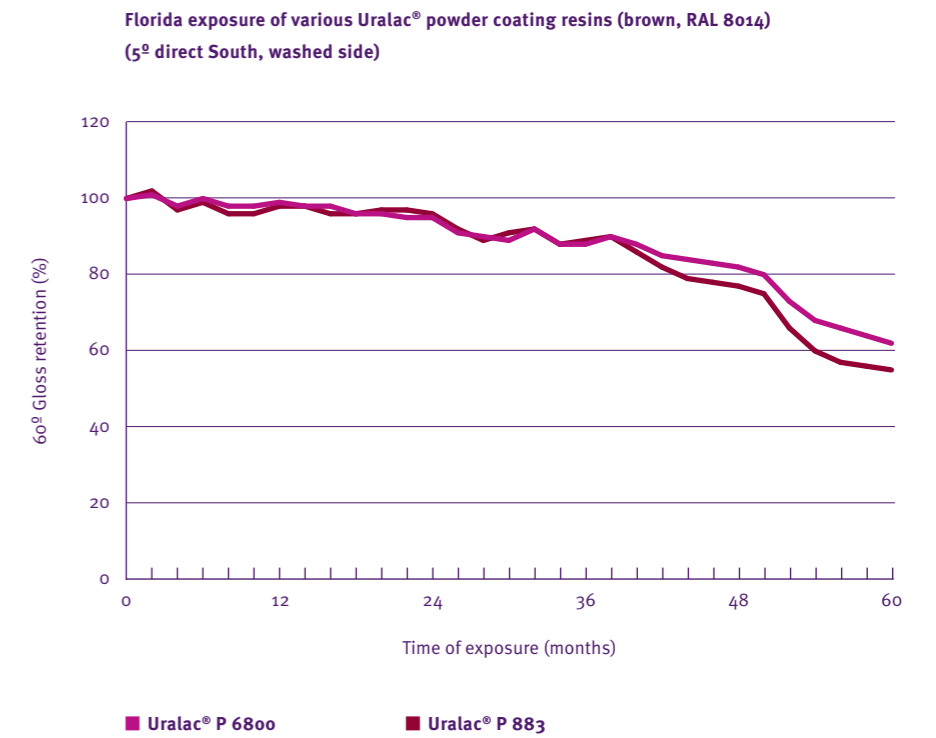


HAA (β -hydroxyalkylamide) Cure, Dry Blend Matte

The product range of Uralac® powder coating resins for superdurable coatings also contain resins that can be formulated for dry blend matte. The most important combination for dry blending is Uralac® P 883 / Uralac® P 6800.



The results in brown (RAL 8014) of the individual products give a positive indication for the durability of the mixtures.

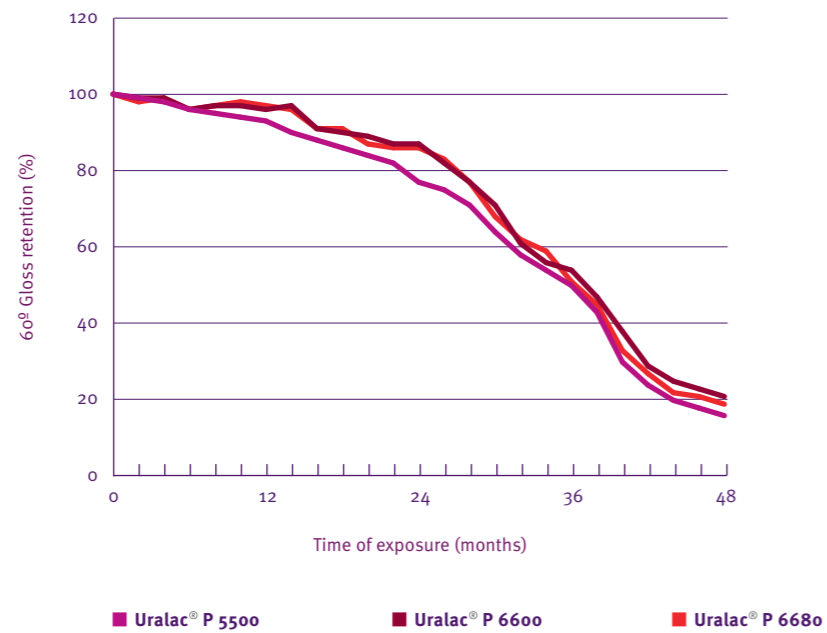


TGIC Cure

Products	TGIC	Standard Availability	Asia	EMEA	USA
		Uralac® P 5500 (90/10)	•	•	•
Uralac® P 6600 (93/7)	•				
Uralac® P 6680 (93/7)			•		
Value proposition	Polyester resins for high performance superdurable powder coatings.				
Markets	Architectural, Automotive, ACE				
Chemistry	Carboxylated powder coating resin for curing with TGIC.				

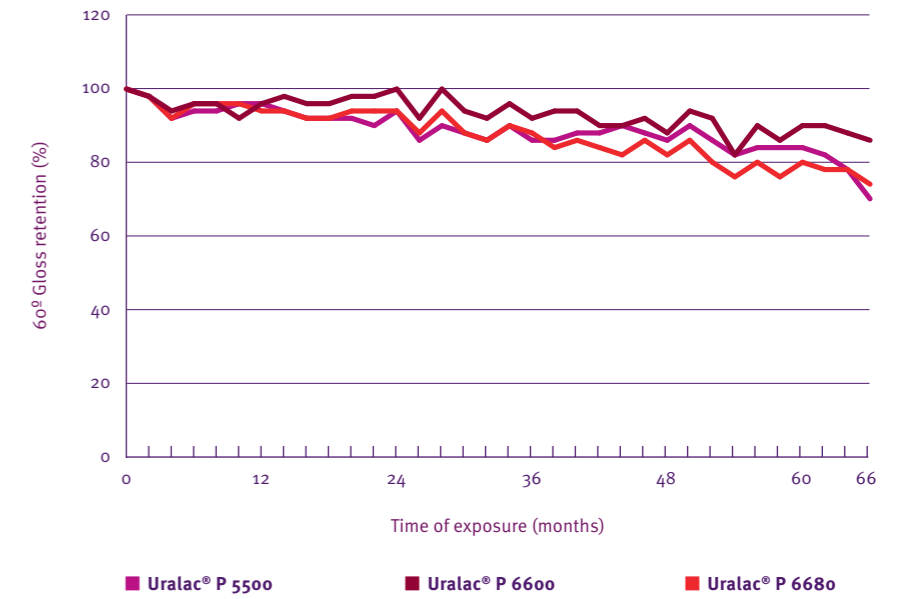
Key properties		standard white	brown (RAL 8014)
36 months Florida, GSB Master, Qualicoat class 2		•	•
60 months Florida, GSB Premium, AAMA 2604			•
Chemical resistant		•	•
Non Blooming		•	•

Florida exposure of various Uralac® powder coating resins (standard white)
(5° direct South, washed side)



TGIC Cure

Florida exposure of various Uralac® powder coating resins (brown, RAL 8014)
(5° direct South, washed side)

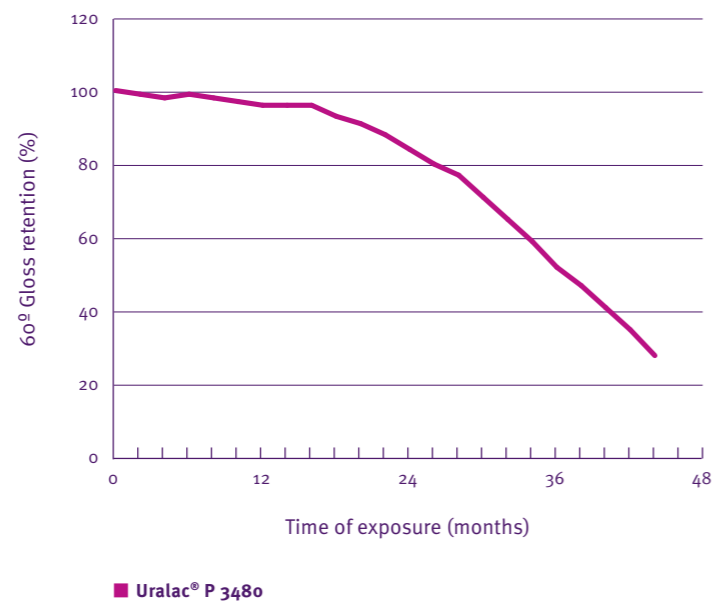


PT 910 Cure

		Standard Availability	Asia	EMEA	USA
Products	PT 910	Uralac® P 3480 (93/7)		•	
Value proposition	Polyester resins for high performance superdurable powder coatings.				
Markets	Architectural, Automotive, ACE				
Chemistry	Carboxylated powder coating resin for curing with PT910.				

Key properties		standard white	brown (RAL 8014)
	36 months Florida, GSB Master, Qualicoat class 2	•	•
	60 months Florida, GSB Premium, AAMA 2604		•
	Chemical resistant	•	•
	Non Blooming	•	•

Florida exposure of various Uralac® powder coating resins (standard white)
(5° direct South, washed side)

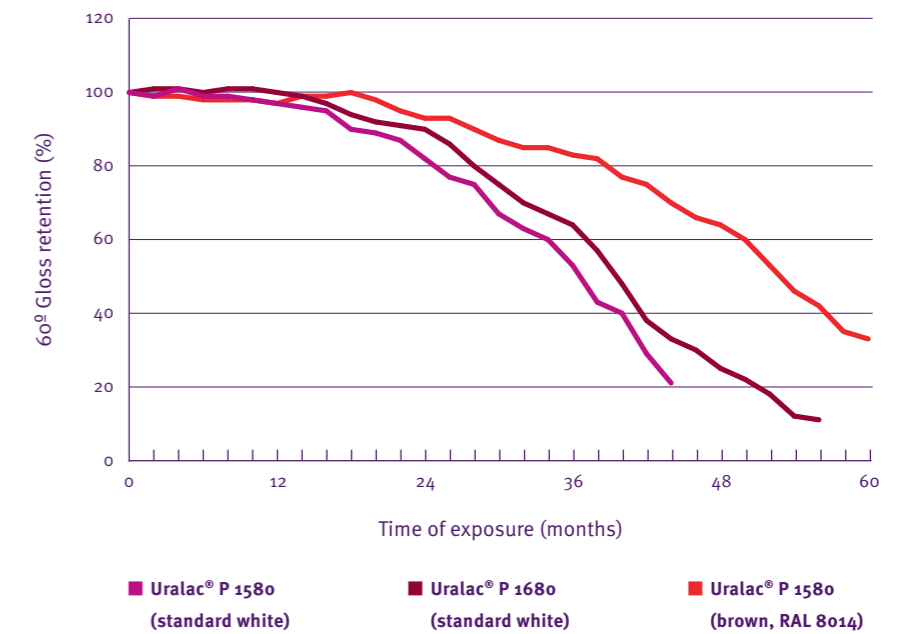


Isocyanate Cure

		Standard Availability	Asia	EMEA	USA
Products	Isocyanate	Uralac® P 1580 (70/30), Anti-Graffiti Uralac® P 1680 (85/15)	•	•	•
Value proposition	Polyester resins for high performance superdurable powder coatings.				
Markets	Architectural, Automotive, ACE				
Chemistry	Hydroxylated powder coating resin for curing with isocyanate.				

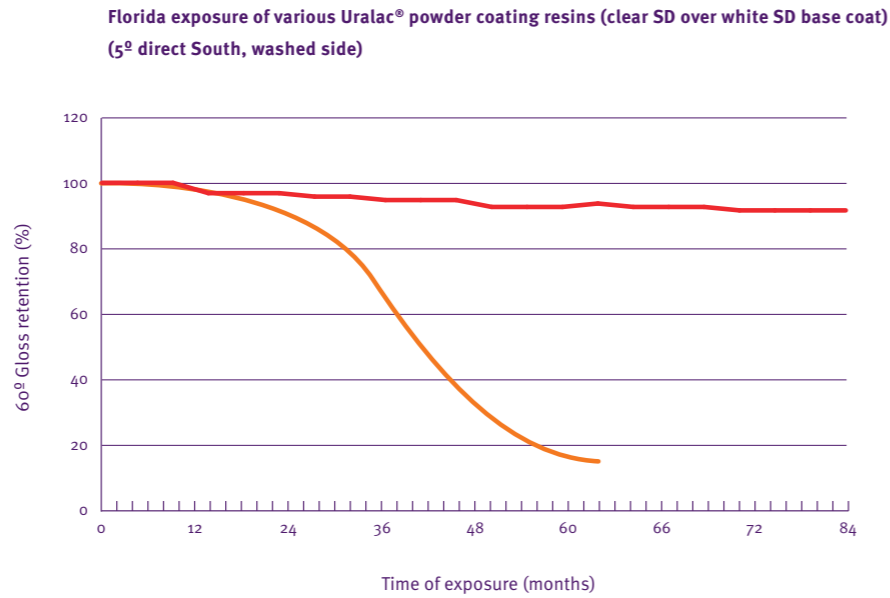
Key properties		standard white	brown (RAL 8014)
	36 months Florida, GSB Master, Qualicoat class 2	•	•
	60 months Florida, GSB Premium, AAMA 2604		•
	Chemical resistant	•	•
	Non Blooming	•	•

Florida exposure of various Uralac® powder coating resins (5° direct South, washed side)



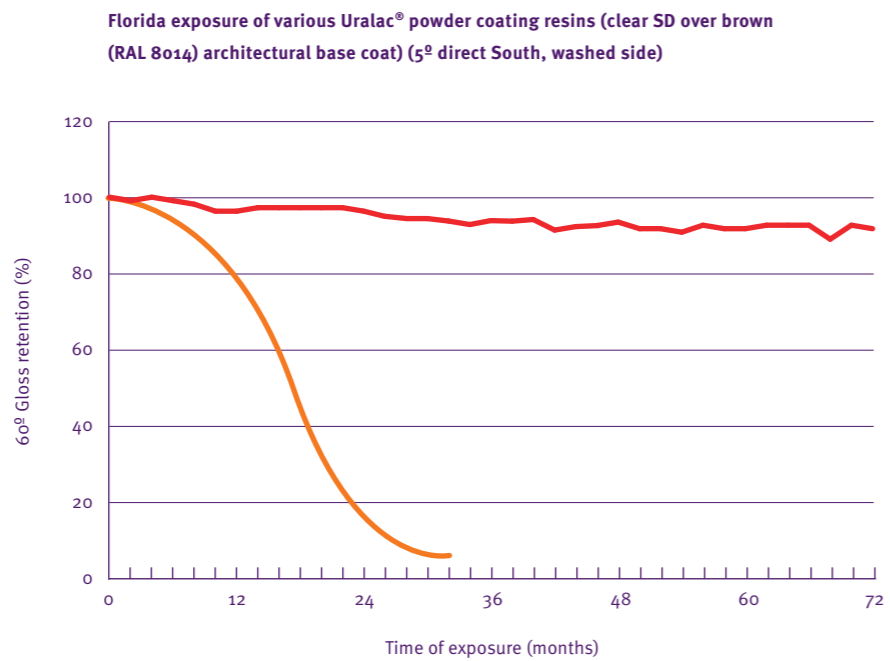
Dual Layer (Superdurable clear coat on base coat)

As an alternative to PVDF or liquid acrylic systems, DSM Coating Resins is testing superdurable powder coatings in dual layer systems (clear over a base coat). The main benefit is that the system cost of this dual layer system is more competitive.



- Represents all dual layer chemistries
- White basecoat

The dual layer system also shows superior gloss retention results when the clear superdurable coating is sprayed on top of a brown architectural (RAL 8014) powder coating. We conclude that the dual layer system offers an extra benefit compared to existing PVDF systems being: total freedom of colour selection!



- Represents all dual layer chemistries
- Brown basecoat

Uralac® superdurable one pagers

Powder Coating Resins
Outdoor

Uralac®

Superdurable - dual layer system

Concept
The dual layer system is based on a two coat polyester system. The base coat (1) is based on an Uralac® architectural resin and the clear top coat (2) is based on one of the below mentioned Uralac® superdurable resins.

Key properties
Using our high-performance Uralac® resins as clear topcoat, provides protection against environmental weathering.
- Extremely good outdoor durability
- No discoloration
- Good chemical resistance
- No cracking
- Good intercoat adhesion
- Cost competitive in comparison with PVDF or liquid acrylic systems
- Base coat in all colors possible

Product
Uralac® P 885 (5% HAA) Uralac® P 800 (4% HAA)
Uralac® P 3280 (7% TGIC) Uralac® P 6600 (7% TGIC)
Uralac® P 6680 (7% TGIC) Uralac® P 3480 (7% PFGI-0)
Uralac® P 1680 (5% Isocyanate) Uralac® P 1580 (30% Isocyanate)

Value proposition
High performance dual layer polyester system which can reach the GSB Premium & AAMA 2605 requirements. The dual layer system is an alternative for PVDF or liquid acrylic systems.

Markets
High-end architectural, institutional & commercial applications.

Coating chemistry
Carboxylated powder coating resin for curing with HAA, PT910 or TGIC.
Hydroxylated powder coating resin for curing with isocyanate.

HEALTH · NUTRITION · MATERIALS

Powder Coating Resins
Outdoor

Uralac®

Superdurable - flexible

Product
Uralac® P 885 (5% HAA)
Uralac® P 3330 (7% HAA)
Uralac® P 5500 (30% TGIC)
Uralac® P 1580 (30% Isocyanate)

Markets
Architectural, Automotive & ACE.

Coating chemistry
Carboxylated powder coating resin for curing with HAA or TGIC.
Hydroxylated powder coating resin for curing with isocyanate.

Value proposition
Good flexible polyester for high performance superdurable powder coatings.

Key properties

	P 885	P 3330	P 5500	P 1580	General Superdurable
Resin	5% HAA	7% HAA	30% TGIC	30% TGIC	30% TGIC
Cure	150°C/20min	150°C/20min	150°C/20min	150°C/20min	150°C/20min
Non-blooming	✓	✓	✓	✓	✓
Outdoor durability	+++++	+++++	+++++	+++++	+++++
Chemical resistance	++	++	++	++	++
Flexibility (BSP)	> 8 mm	> 8 mm	> 8 mm	> 8 mm	> 8 mm
Flexibility (Impact)*	> 2.5 Nm	> 2.5 Nm	> 2.5 Nm	> 2.5 Nm	> 2.5 Nm
Flexibility (Critical Mandrel)	30 mm	30 mm	30 mm	30 mm	30 mm
Adhesion (Gitterschlag)	0/0	0/0	0/0	0/0	0/0
35 months Florida, GSB Master, Qualicoat class 2	✓	✓	✓	✓	✓
Standard white	✓	✓	✓	✓	✓
Brown, RAL 8014	✓	✓	✓	✓	✓
Black, RAL 9005	✓	✓	✓	✓	✓
Brown, RAL 8014	✓	✓	✓	✓	✓

* 2.5 Nm = 20 inch pound

HEALTH · NUTRITION · MATERIALS

DSM
BRIGHT SCIENCE. BRIGHTER LIVING.

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