



# Ti-Pure™ TiO<sub>2</sub> grades for High Performance Powder coatings.

Presented by:  
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Titanium Technologies, EMEA

Results of test based on Chemours testing. Paper by Dr.  
Johan Rommens, Annemie Verhaege ,Dr Michael  
Diebold,Gilbert Michiels



# Chemours Global Structure to Serve our Customers

## Leadership in Titanium Dioxide since 1931

Reliable Titanium Dioxide supply and support serving over **110 countries**

### Business Continuity Strengths

- Sites complete a variety of response and recovery exercises (e.g. emergency response, crisis management)
- Teams have experience executing site level and cross-site recovery procedures in response to incidents and larger disaster events
- >85% TT products are/can be manufactured at multiple TT locations which helps to reduce potential customer impact
- Mitigation programs and activities to help prevent a disruption and to support quicker recovery (e.g., safety, maintenance, equipment redundancy, spare parts, supply chain strategies, etc.)
- Many raw materials are used in common between sites, and inventory from one site can be used at another in times of raw material disruptions

### Warehouse

1. Montevideo, Uruguay
2. Guarulhos, Brazil
3. DF, Mexico
4. Monterrey, Mexico
5. **Kallo, Belgium**
6. South Africa
7. Cremona, Italy
8. China
9. Japan
10. Korea
11. Thailand
12. Singapore

### Technical Service Centers

1. **Chemours Discovery Hub - Newark/DE, USA**
2. **Kallo, BE**
3. Mexico City, MX
4. Shanghai, CN

### Plants

1. New Johnsonville/TN, USA
2. DeLisle/MS, USA
3. Altamira, MX
4. Kallo, BE (Hybrid setup)

Average Manufacturing Line = ~200kt

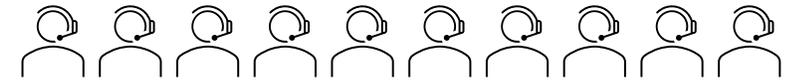
Percent of Grades Produced on Two or More Plants = ~85%

Portfolio that leads in quality, reliability and conversion efficiency

# Chemours EMEA - Local Support



We have a dedicated team based in Europe to serve our customers



**10 Customer Excellence Team Members**



**9 Account Managers**



**4 Technical Experts in Coatings, Plastics, Laminates**



Specializing for 100 years

Distributor partner in Italy

# Agenda



**Ti-Pure™ Titanium Dioxide Technology – Surface treatments**



UV Durability in coatings

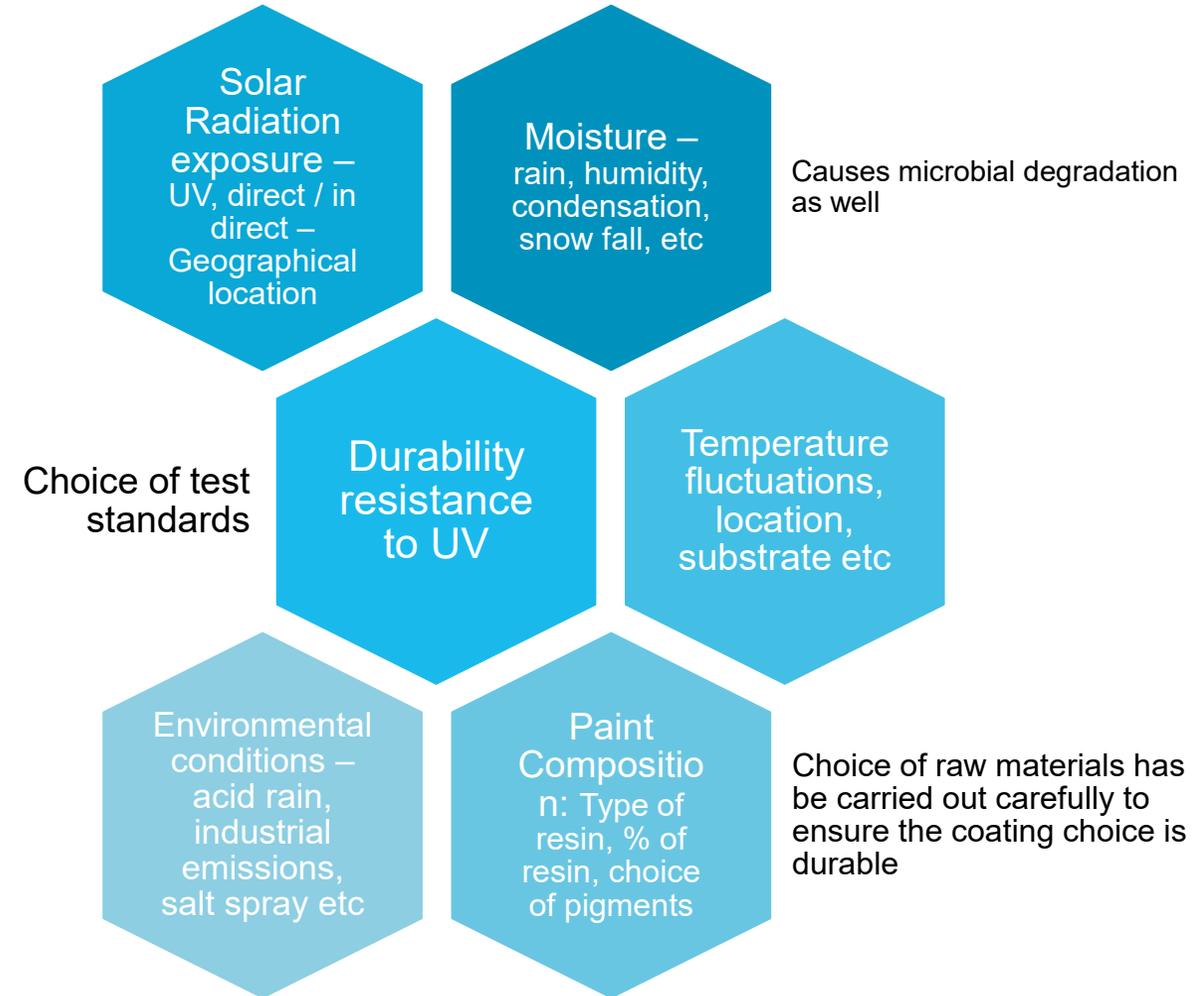


Ti-Pure™ Grade recommendation for Powder Coatings  
How to select Ti-Pure™ Grades

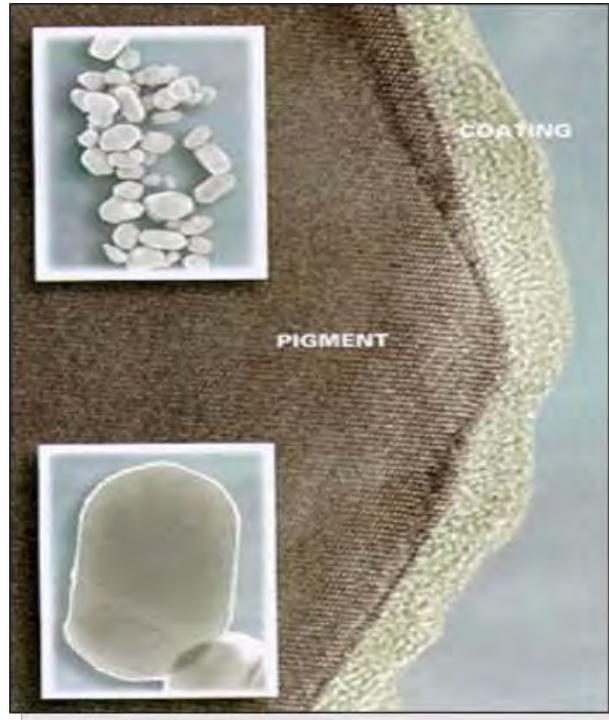
## Paint type exposed to the elements



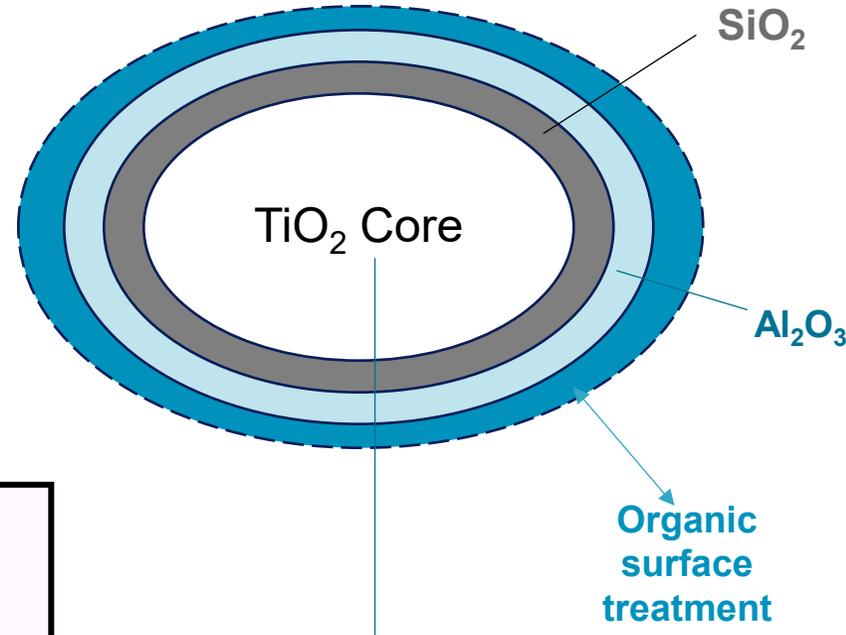
## Factors affecting Durability in Coatings (reference to resistance to UV)



# Chemours Surface Treatment Technology for TiO<sub>2</sub> Pigment – Prepares For Durability



## Surface Treatment



## Function of Surface Treatment

### Silica -SiO<sub>2</sub>

- Photo durability
- Discoloration resistance

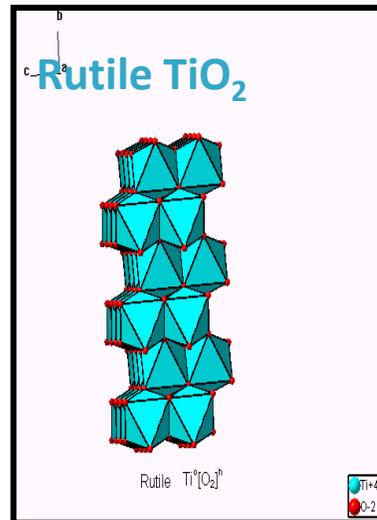
### Alumina - Al<sub>2</sub>O<sub>3</sub>

- Dispersibility - provides anchoring sites for dispersant molecules
- Flocculation resistance
- Ease of handling

### Organic Treatment

- Wettability
- Ease of handling – enhances flowability of the powder
- Dispersion

Chemours Ti-Pure grades are **Rutile** structure, manufactured using the **Chloride Process**

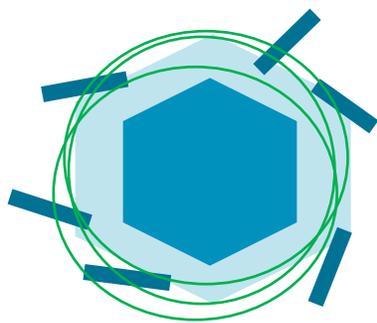


Determines optical properties (opacity, undertone, color)

Traditionally TMP (Trimethylolpropane) is used as organic treatment for TiO<sub>2</sub>

# Overview of Current Ti-Pure™ Coatings Grades and Surface Treatments

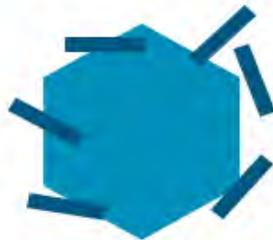
TMP Free



TS-6706  
TMP/TME Free  
Universal  
Interior/Exterior

Modified organic treatment  
(non-regulated)

TMP Free



R-900  
Interior

TMP Free

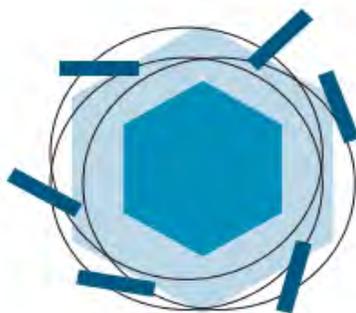


R-960  
Exterior

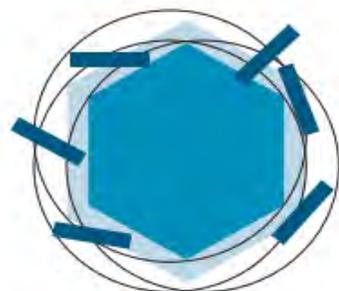
TMP Free



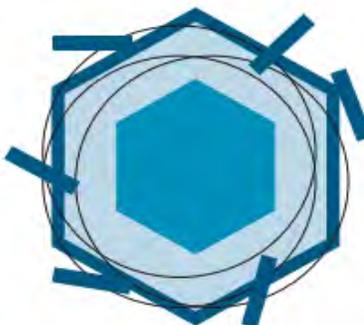
TS-6300  
Flat Grade



R-706  
Universal  
Interior/Exterior



R-902+  
Interior/Exterior



TS-6200  
Superdurable  
Exterior



TiO<sub>2</sub>



Amorphous SiO<sub>2</sub>: durability



Engineered SiO<sub>2</sub> / Al<sub>2</sub>O<sub>3</sub> for optimal spacing



Amorphous Al<sub>2</sub>O<sub>3</sub>: durability



Cristalline Al<sub>2</sub>O<sub>3</sub>: dispersability



Organic: flow & wetting

TMP: Trimethylolpropane

# Agenda



Ti-Pure™ Titanium Dioxide Technology – surface treatments



**UV Durability in Coatings**



Ti-Pure™ Grade recommendation for Powder Coatings  
How to select Ti-Pure™ Grades

# Measuring Paint Durability by Accelerated Degradation

- Degradation is initiated by energy (UV light)
- To increase the rate of degradation, we must increase the rate of energy addition.
- 3 ways to do this.

## Temperature

- High temperature
- Accelerates the reactions once initiated

## Energy per Photons

- Same number of photons but more energy per photon
- UV-B
- QUV

## Number of photons

- Same energy per photon, but use more photons
- High intensity light
- Weather o meter and Q-Sun / EMMAQUA (natural accelerated)

# Poly Ester (PE) Powdercoat

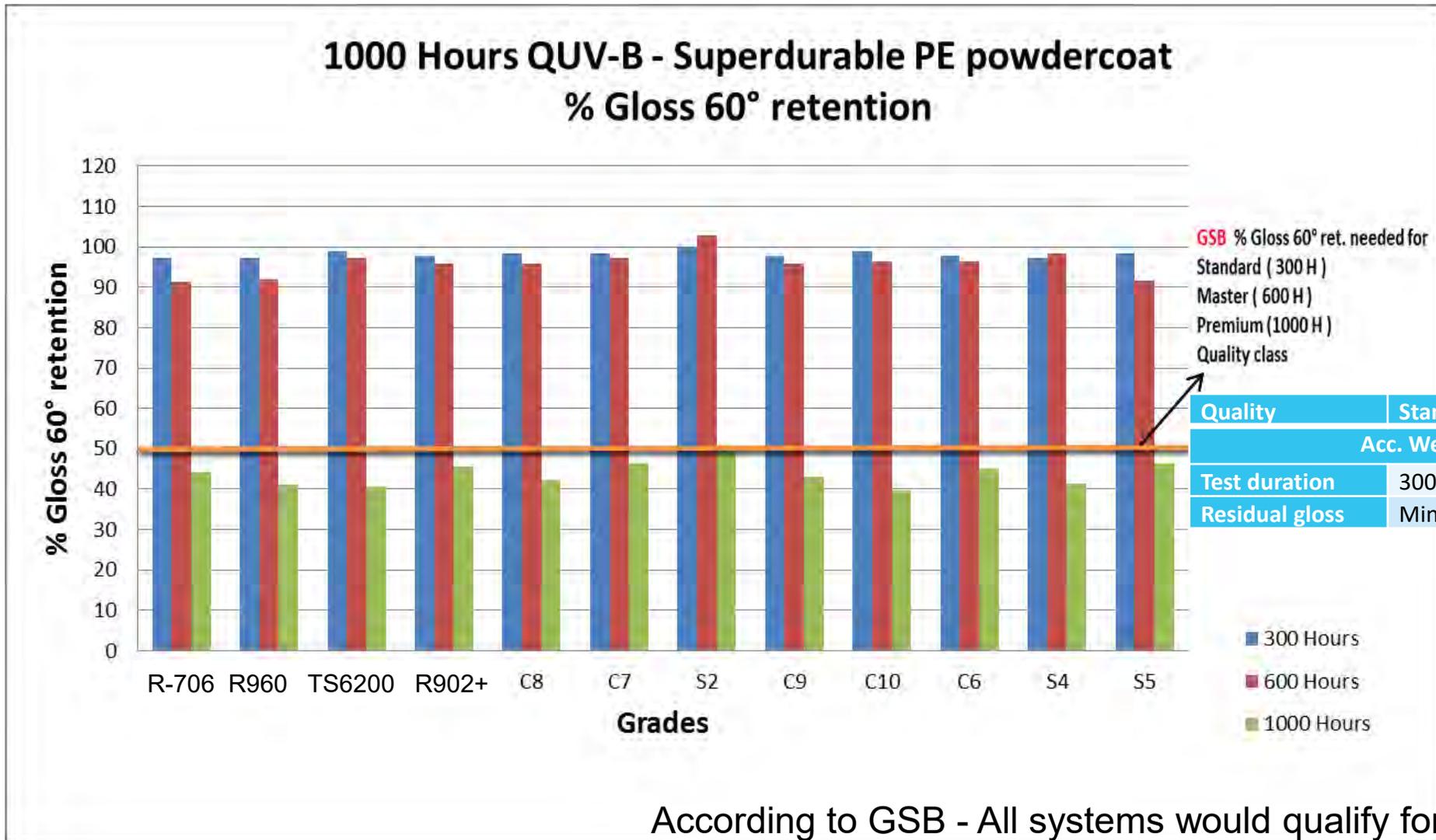
- The durability study was done with 10 types of paint systems : Powder (as below), Coil (Polyester melamine), OEM (Polyester Melamine) , Refinish (2K PU).
- This presentation will focus on results with the Powder coating system
- **Formulation :**
  - Saturated carboxylated polyester: Uralac® P-800
  - Crosslinker : Primid® XL-552
  - TiO<sub>2</sub> load : 33 %
- **Manufacturing method**
  - Prism TSE 16 PC twin screw extruder
  - Process temperature : 120 ° C
  - Screw speed : 200 rpm
- **Application procedure :**
  - Tribogun, voltage 60 kV
  - Substrate : chromated aluminum Q-panels type ALQ-46
  - Film thickness : +/- 60 microns
  - Curing in an air circulated oven : 15 min. by 180°C

# Quality standards for durability of Aluminium Building Coatings

- GSB standard: GSB AL 631 : GSB Int.
  - QUV-B as accelerated method (DIN EN ISO 11507).

Quality	Standard	Master	Premium
<b>Acc. Weathering UV B (313 nm)</b>			
<b>Test duration</b>	300 hrs..	600 hrs..	1000 hrs.
<b>Residual gloss</b>	Min 50%	Min 50%	Min 50%
<b>Florida weathering (Outdoor Exposure)</b>			
<b>Months</b>	12	36	60
<b>UV energy (MJ/m<sup>2</sup>)</b>	Max 300	Max 840	Max 1400
<b>Residual gloss</b>	Min 50%	Min 50%	Min 50%

# PE Powdercoat Durability vs. GSB 1000Hrs QUV-B (313nm)



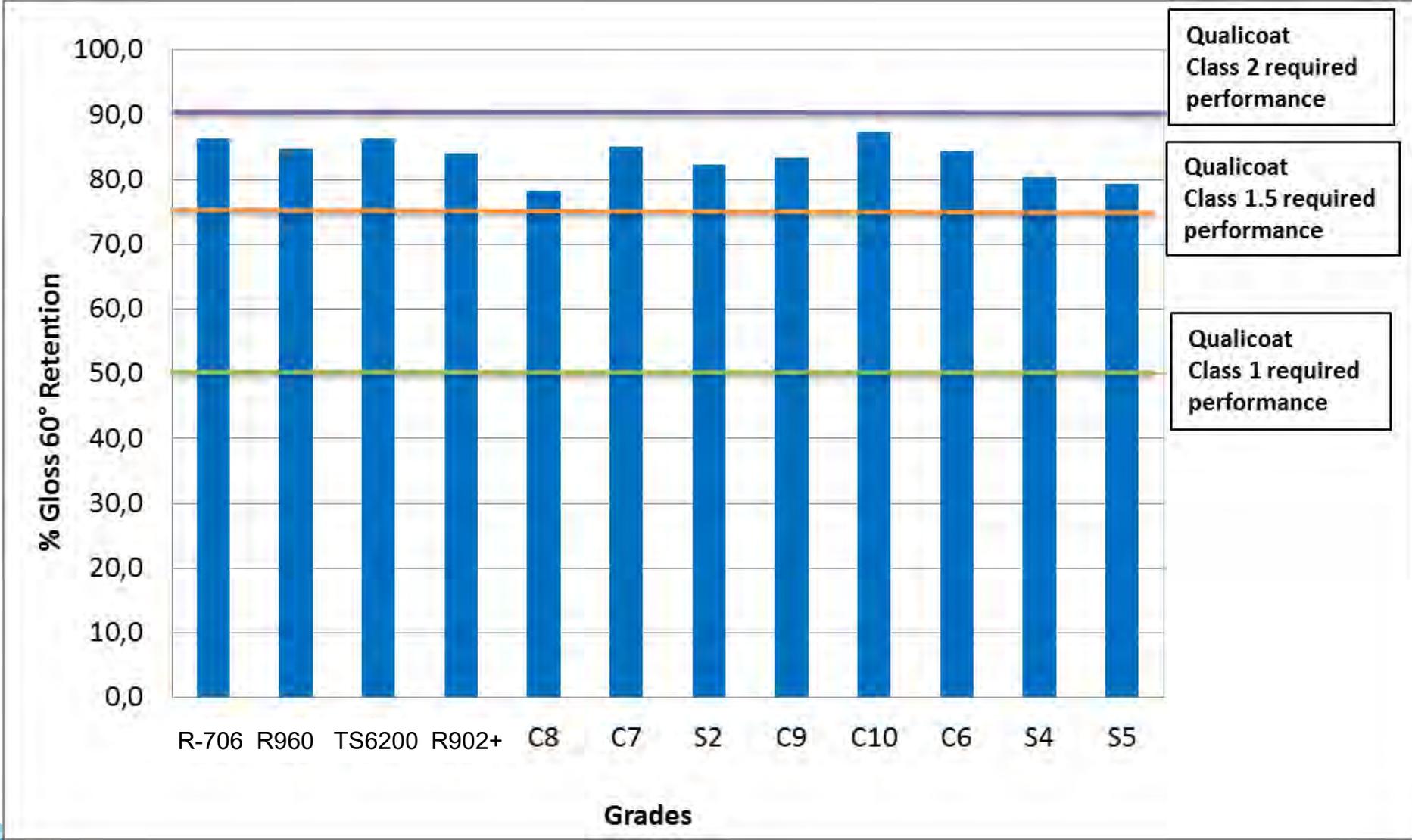
According to GSB - All systems would qualify for Master class.

# Quality standards for durability of Aluminium Building Coatings

- Qualicoat : Quality Label for coatings on Aluminium
  - Weathering according to ISO 16474-2

Quality	Class 1	Class 1.5	Class 2	Class 3
<b>Gloss (60 deg)</b>				
<b>1000 Hrs. WOM (ISO 16474-2)</b>	Min 50%	Min 75%	Min 90%	
<b>Florida weathering (Outdoor Exposure)</b>				
<b>1 yr Florida</b>	Min 50%	Min 65%	Min 75%	
<b>2 yr Florida</b>		Min 50%	Min 65%	
<b>3 yr Florida</b>			Min 50%	Min 80%
<b>7 yr Florida</b>				Min 55%
<b>10 yr Florida</b>				Min 50%

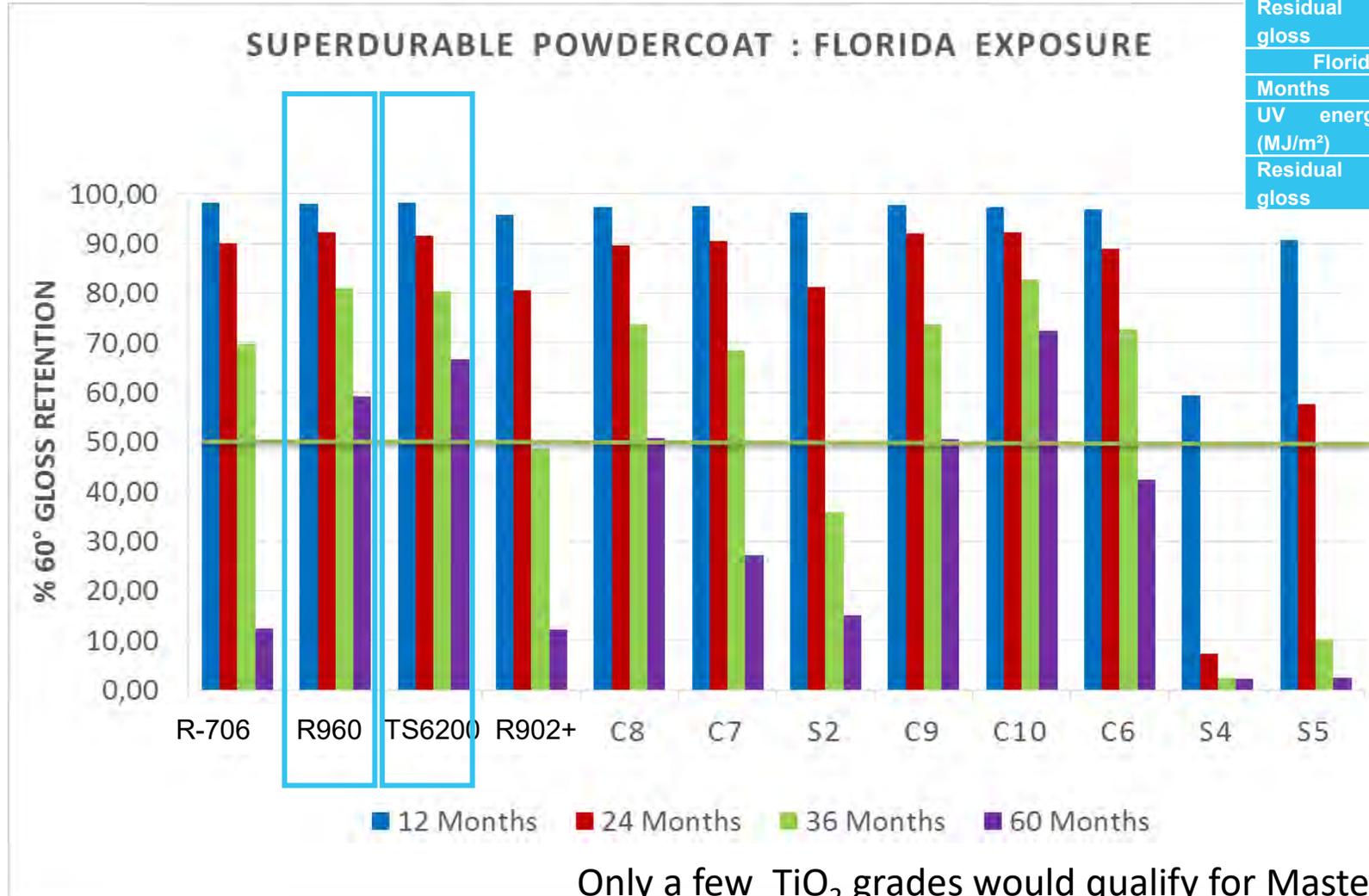
# PE Powdercoat Durability vs. Qualicoat 1000Hrs Xenon



WOM (Qualicoat) not much differentiation is seen. All qualify for Class 1.5.

# PE Powdercoat Florida Exposure : % Gloss Retention

Quality	Standard	Master	Premium
Acc. Weathering UV B (313 nm)			
Test duration	300 hrs.	600 hrs.	1000 hrs.
Residual gloss	Min 50%	Min 50%	Min 50%
Florida weathering (Outdoor Exposure)			
Months	12	36	60
UV energy (MJ/m <sup>2</sup> )	Max 300	Max 840	Max 1400
Residual gloss	Min 50%	Min 50%	Min 50%



Only a few TiO<sub>2</sub> grades would qualify for Master or Class 2.

# Key Take Aways

- TiO<sub>2</sub> plays a key role in improving paint durability, particularly when paired with high-durability resins.
  - Super-durable TiO<sub>2</sub> grades provide optimal UV protection.
- Relying solely on accelerated durability tests can lead to inaccurate conclusions, especially for long-term performance assessments.
- Florida outdoor exposure testing confirms that super-durable TiO<sub>2</sub> grades enhance coating durability.
- Findings based only on accelerated tests should therefore be interpreted with caution

# Agenda



Ti-Pure™ Titanium Dioxide Technology – surface treatments

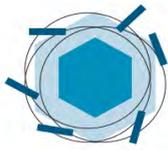


UV Durability in Coatings



**Ti-Pure™ Grade recommendation for Powder Coatings**

How to select Ti-Pure™ Grades

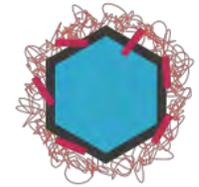


R-706  
Universal  
Interior/Exterior

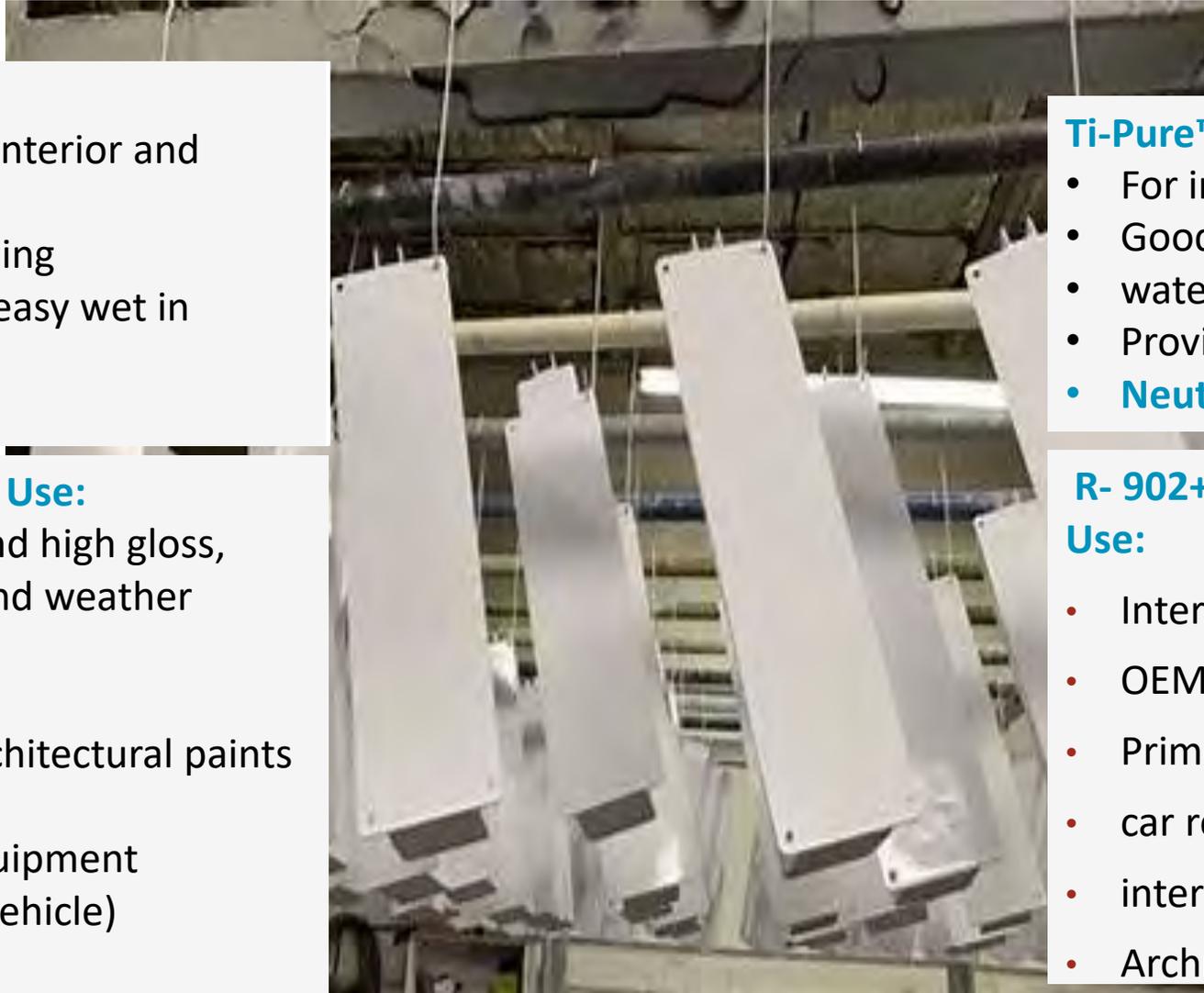


TS-6706  
TMP/TME Free

## Ti-Pure™ Grades with Good Durability For interior and exterior coatings



R-902+  
Interior/Exterior



### Ti-Pure™ R-706 / TS-6706

- Universal pigments for interior and exterior coatings
- High gloss and good hiding
- Excellent dispersibility, easy wet in
- Good Durability
- **Blue undertone**

### R- 706 Suggestions for End Use:

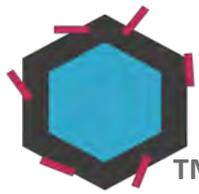
- Applications that demand high gloss, distinctness of image, and weather resistance
- **Powder Coatings**
- Gloss and semi-gloss architectural paints
- Wood coatings
- Refinish and original equipment manufacturers (OEM) (vehicle)
- Coil coatings

### Ti-Pure™ R-902+

- For interior/ exterior
- Good for gloss / semi-gloss
- water based / solvent based)
- Provides high whiteness
- **Neutral undertone.**

### R- 902+ Suggestions for End Use:

- Interior/exterior powder coat
- OEM topcoat
- Primer surfacer
- car repair topcoat & primer
- interior / exterior coil
- Architectural

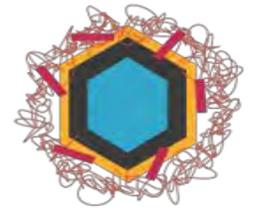


TMP/TME Free

R-960  
Exterior

# Ti-Pure™ R-960 and TS-6200

## Historical benchmark (durable applications)



TS-6200  
Superdurable Exterior

### Ti-Pure™ R-960

- Provides proven protection in the most demanding and unforgiving weather and industrial environments.
- Chalk resistance
- Excellent color & gloss retention
- Excellent resistance to overbake yellowing
- **Yellow / Neutral undertone**

### R- 960 Suggestions for End Use:

- **High durability exterior coatings**
- Aerospace coatings
- **Powder coatings**
- Coil coatings
- Automotive OEM topcoat and refinish
- Functional exterior – marine, protective and industrial OEM (machinery)

### Ti-Pure™ TS 6200

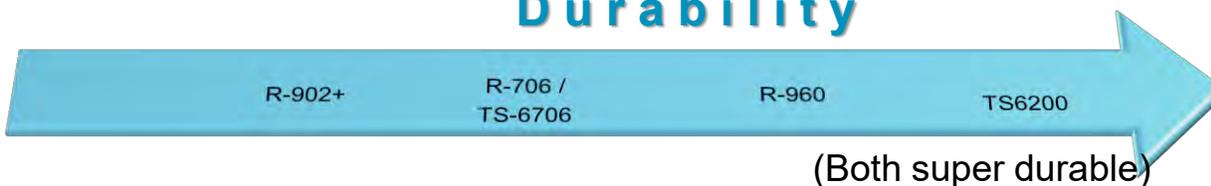
- Most demanding environments
- Super processibility
- Easy and shorter dispersion times
- Lower energy consumption
- Low dispersant demand
- **Blue undertone**

### TS 6200 Suggestions for End Use:

- OEM topcoats and refinishes
- Functional exterior – marine, protective and aerospace coatings
- **Powder coatings**
- Coil coatings
- Durable industrial coatings

TM

# Durability



Property/ TiO <sub>2</sub> Dry Grade	R-902+	R-706	TS-6706 (TMP Free)	R-960 (TMP Free)	TS-6200
TiO <sub>2</sub> , wt.%, min	93	93	93	90	93
Alumina, wt.%	4.3	2.5	2.5	3.3	3.6
Silica, wt.%	1.4	3.0	3.0	5.5	3.3
Specific Gravity	4.0	4.0	4.0	3.9	4.0
Bulking Value, L/kg	0.250	0.250	0.250	0.255	0.250
Organic Treatment	Yes	Yes	Yes	No	Yes
Color, CIE L*	<b>99.6</b>	<b>99.4</b>	<b>99.4</b>	<b>99.9</b>	<b>99.4</b>
Median Particle Size, μm	<b>0.405</b>	<b>0.36</b>	<b>0.36</b>	<b>0.50</b>	<b>0.39</b>
Oil Absorption	16.2	13.9	13.9	18.7	16.0
pH	7.9	8.2	8.2	7.2	8.0
Resistance at 30°C (86°F), k-ohm	8.1	10	10	6	10
Carbon Black Undertone	<b>11.7</b>	<b>13.8</b>	<b>13.8</b>	<b>11.6</b>	<b>13.0</b>
	Neutral undertone	Bluer undertone	Bluer undertone	Neutral undertone	Bluer undertone



# Contact and additional resources:

Contact us if you have additional questions:

- Shalinder ([Shalinder.Dhillon@chemours.com](mailto:Shalinder.Dhillon@chemours.com)) – Technical Support
- Michael ([Michael.Rauhe@chemours.com](mailto:Michael.Rauhe@chemours.com)) – Account Manager
- Or contact Garzanti Specialties (Italy) - [info@garzantispecialties.it](mailto:info@garzantispecialties.it)



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**Technical Data Sheet**



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