

# Maximizing opacity

## The Opacity Toolbox

Ludwigshafen, September 2021

# What matters to the exterior and interior coatings market right now?

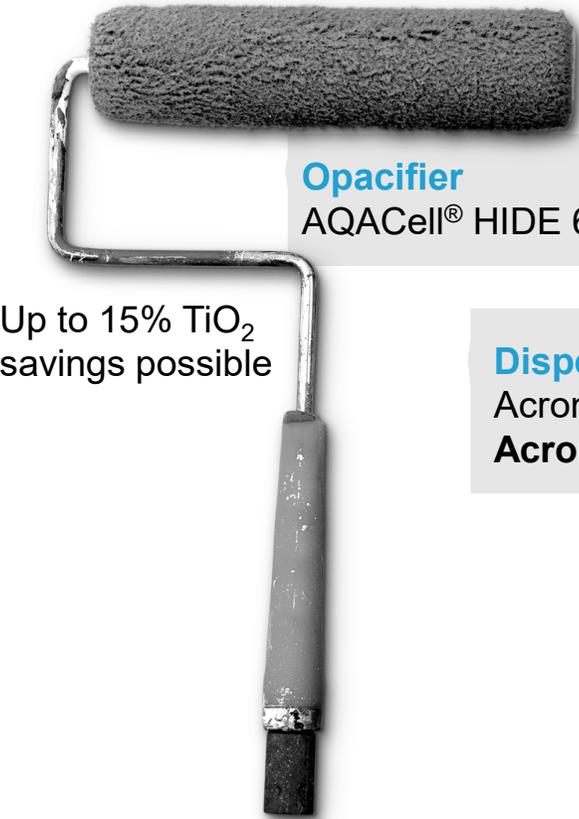
- **Cost competitive** paint formulations
- **More sustainable** paints with improved resource efficiency
- **Excellent** paint **performance properties** like hiding power, water and dirt-pick up resistance and durability
- **Successful** addressing of **Titanium Dioxide shortages**

# What can the Opacity Toolbox do for you?

- Our opacity toolbox is a set of paint components that can **help you control cost of opacity**
- This unique modular system provides **extended formulation latitude, ease of substitution** and savings in raw material cost while retaining coverage
- This results in a reduced cost of opacity and **improved sustainability** offering lower CO<sub>2</sub> footprint

# The clever combination of the components leads to success

The optimum combination of all three can save 25 to 30 wt. % of  $\text{TiO}_2$



**Opacifier**  
AQACell® HIDE 6399

Up to 15%  $\text{TiO}_2$   
savings possible



**Dispersion**  
Acronal® HIDE 6296  
**Acronal® HIDE 6610**

Up to 12%  $\text{TiO}_2$   
savings possible



**Dispersing Agent**  
Dispex® HIDE AA 4545  
Dispex® HIDE CX 4542  
Dispex® HIDE CX 4540

Up to 8%  $\text{TiO}_2$   
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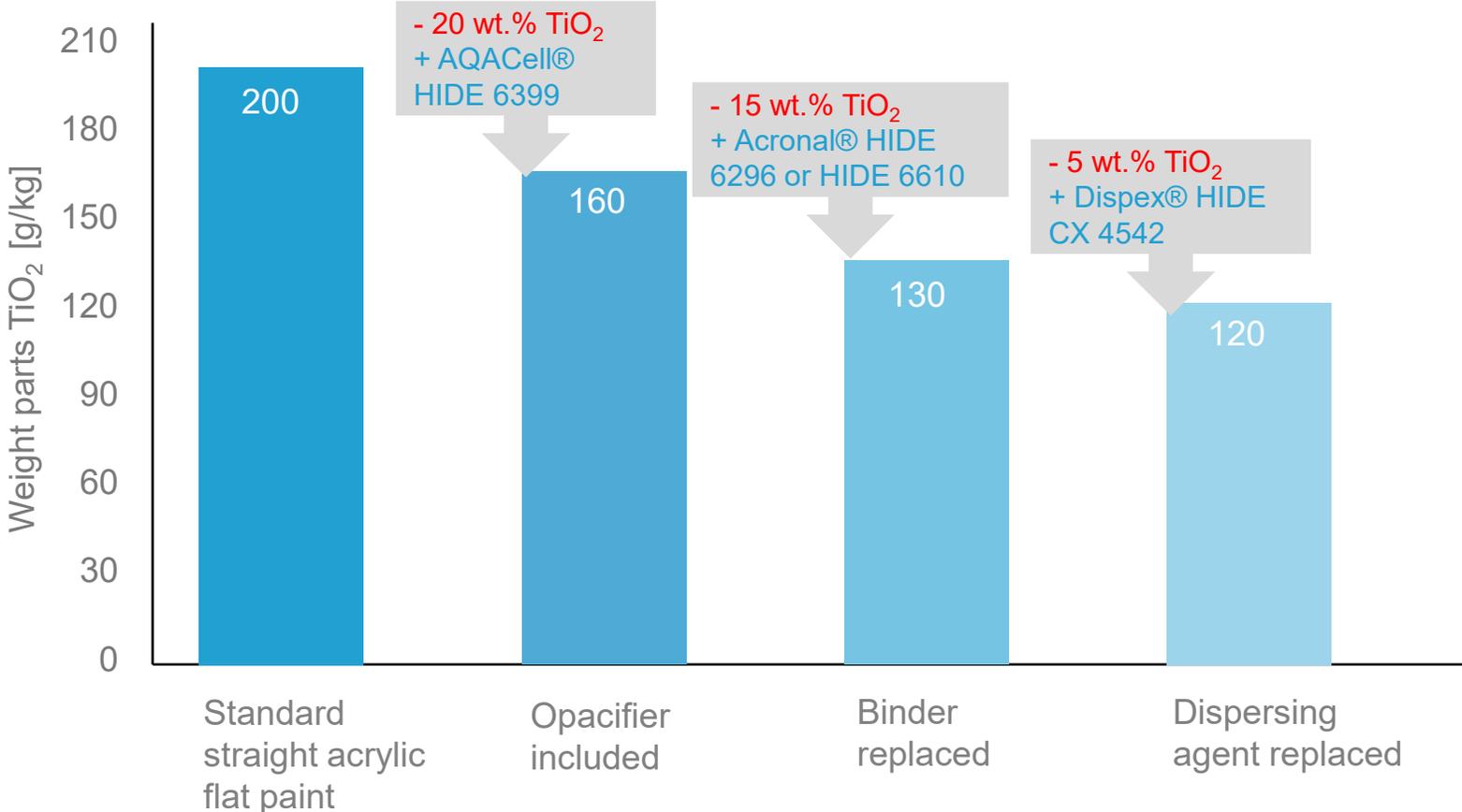
# The benefits of the opacity toolbox already have an impact

- Leading global paint manufacturer has substituted their ca. 1.5% dispersant combination with 0.2% of **Dispex® HIDE** dispersant from our opacity toolbox, thereby improving opacity while reducing cost
- Large European manufacturer has noticeably improved product properties through consolidating all of his styrene acrylic polymers into one **Acronal® HIDE** combination
- Many major paint producers have been able to substitute their organic hollow-sphere opacifier with **AQACell® HIDE** to maintain sustainability leadership
- Additional and unique benefit in market was very well welcome: AQACell HIDE is **biocide free!**
- The opacity toolbox is **setting a new standard** for paint coverage management

**So, how does the toolbox work?**

# The general principle: Lower formulation costs while maintaining opacity

7 m<sup>2</sup>/L constant coverage/hiding power

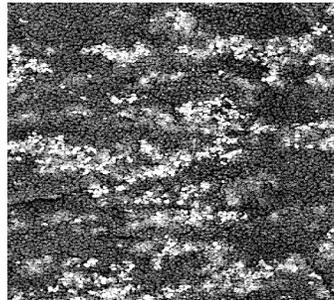


# AQACell<sup>®</sup> HIDE 6399 opacifier provides opacity and whiteness to paints

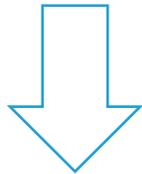
- AQACell<sup>®</sup> HIDE 6399 is an **organic opacifying pigment** that enables you to reduce the amount of TiO<sub>2</sub> in your formulation and thus the total cost alike while maintaining equal hiding power
- It facilitates more sustainable paints with its improved carbon foot print. It allows for paints free of APEO and ammonia and provides a broad latitude of formulations

# AQACell® HIDE 6399 increases scattering efficiency of TiO<sub>2</sub> by partially replacing it

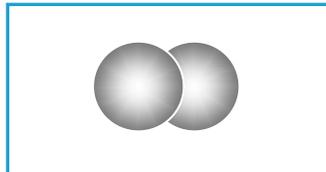
## TiO<sub>2</sub> inefficiency in standard paint formulations



For sufficient hiding in bright colored paints at reasonable spreading rates, crowding is unavoidable!

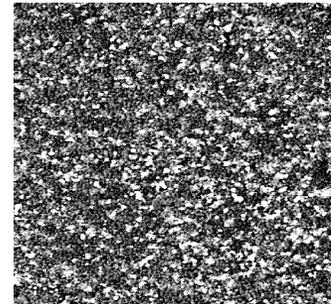


Meaning every additional pigment particle scatters less

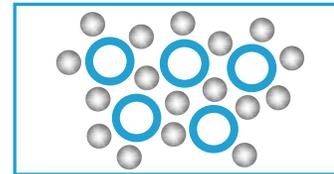


In clusters with high TiO<sub>2</sub> concentration, overlapping (crowding) creates inefficiency.

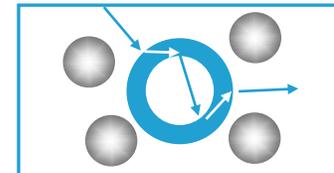
## How does AQACell® HIDE 6399 help?



AQACell® HIDE 6399 can partially replace TiO<sub>2</sub>, improving the TiO<sub>2</sub> distribution in the paint → Less TiO<sub>2</sub> is needed for the same performance.



The Opacifier improves the spacing of TiO<sub>2</sub>.



AQACell® HIDE 6399 scatters the light due to the encapsulated air in its core.

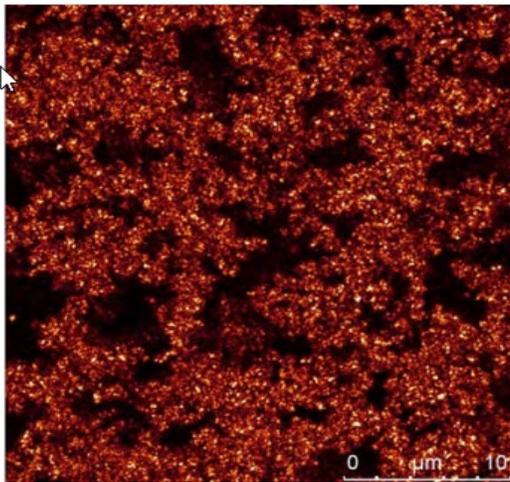
~300 nm diameter, ~50 nm wall thickness  
Unique: Complete biocide free, pH 10.5 – 11.4  
Garantie for 6 months in closed recipients

# Acronal® HIDE 6296 and Acronal HIDE 6610 dispersion enables a higher TiO<sub>2</sub> efficiency

- **Acronal® HIDE 6296** is a **Styrene acrylic polymer dispersion** whose outstanding TiO<sub>2</sub> utilization makes it cost-competitive without sacrificing interior or exterior coating properties
- **Acronal HIDE 6610** is a universal **pure acrylic binder** that optimizes cost of formulation through superior TiO<sub>2</sub> efficiency.
- They enables paints with very good **water** and **superior dirt pick-up resistance** and provides a broad latitude for formulations

# Acronal® HIDE 6296 and Acronal HIDE 6610 improves the spacing of TiO<sub>2</sub>

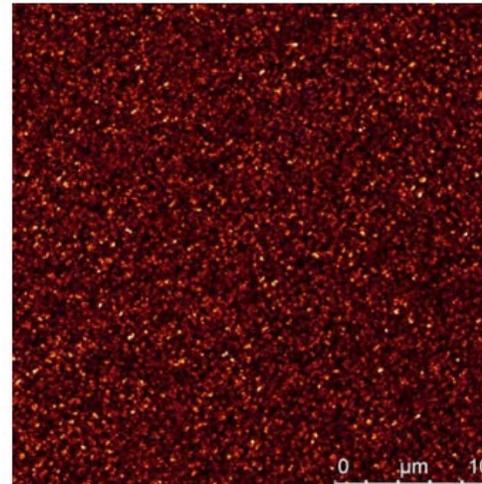
Acronal® HIDE 6296 and Acronal HIDE 6610 enables TiO<sub>2</sub> particles to place themselves in an organized way in the liquid paint



**Non-adsorbing**  
**8,2 ± 0,2 m<sup>2</sup>/L**

Dispersion state of TiO<sub>2</sub> particles

**TiO<sub>2</sub> particles agglomerated**



**Acronal HIDE 6610x**  
**9,4 ± 0,3 m<sup>2</sup>/L**

**TiO<sub>2</sub> particles well spaced**

## Acronal® HIDE 6610

- Coalescent agent is needed to enable film-formation
- Superior thickener interaction
- Good outdoor durability (also on softwood)

	Application	<b>Multi-purpose paints</b>
	MFFT (°C)	<b>18</b>
	pH value	<b>7.5-9.0</b>
	Viscosity (mPas)	<b>100-400</b>
	Particle size (µm)	<b>0.1</b>
	Solids content (%)	<b>46</b>

# Dispex® HIDE range of dispersing agents reduce the formulation cost even further

Dispex® HIDE **range of dispersing agents** support the maximum separation of TiO<sub>2</sub> particles in the dry paint and thereby enhance opacity beyond opacifier and designed latex.

You have three choices depending on your current dispersant type:

- Our best polyacrylic acid dispersant
- Our best hydrophobic dispersant
- Our best universal dispersant

# Dispex® HIDE range of dispersing agents

Selection table based on current dispersant technology:

Product name	Performance benefits	Primary use
Dispex® HIDE AA 4545	All purpose dispersing agent, excellent performance in all type of formulations, easy to use, economical	Replacement of polyacrylic acid type hydrophilic dispersants
Dispex® HIDE CX 4542	Hydrophobic dispersing agent, helps to reduce water sensitivity, excellent interaction with hydrophobic thickeners	Replacement of hydrophobic dispersants
Dispex® HIDE CX 4540	Balanced hydrophobicity combined with steric stabilization, ultra efficient	Universal replacement including dispersant blends

# So would you like to...

- be **no longer powerless** facing volatile and increasing prices of  $\text{TiO}_2$ ?
- be able to **reduce your total formulation cost**?
- formulate paints with an **improved hiding power**?
- Allow formulate **biocide free paints**?
- formulate **more sustainable paints** while not sacrificing on great performance?

... then take control of your cost of opacity now!

# ... then take control of your cost of opacity now! The clever combination of the components leads to success

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# Technical data of the components of the Opacity Toolbox

	Data					
	AQACell®	Acronal®			Dispex®	
Property	HIDE 6399	HIDE 6296	HIDE 6610	HIDE AA 4545	HIDE CX 4542	HIDE CX 4540
Solids content	~ 30 %	~ 50 %	~ 46 %	~ 45 %	~ 25 %	~ 41 %
pH value	10.5 – 11.4	7.0 – 8.5	7.5 – 9.0	~ 8.5	~ 10.5	~ 8.0
Viscosity	10 – 50 mPa.s	100 – 600 mPa.s	100 – 400 mPa.s	~ 500 mPa.s	~ 50 mPa.s	~ 100 mPa.s
MFFT	~ 80 °C	~ 20 °C	~ 18 °C	-	-	-

The exact specifications can be found in the specifications data sheet

Note: The statements in this publication are based on our present technical knowledge and experience. They do not relieve processors and users of the responsibility of carrying out their own tests and experiments as many factors that could influence the results may arise during processing and application, neither do they imply any legally binding assurance of certain properties of suitability for a particular purpose. Any proprietary rights have to be respected. **Products names are usually registered trademarks of their respective owners**



We create chemistry

**Increasing Hiding power...**  
**One coat paint**

# Opacity tool box: Increasing hiding power

## ONE COAT PAINT

- The use of this opacity tool box helps us not only in the reduction of  $\text{TiO}_2$  in the formulation .....but also allows us the possibility of increasing the hiding power overcoming the problem of  $\text{TiO}_2$  crowding effect
- We can develop what is called a one coat paint with very high level of spread rate , **close to 7 m<sup>2</sup>/L (@ 99.5%!!)**

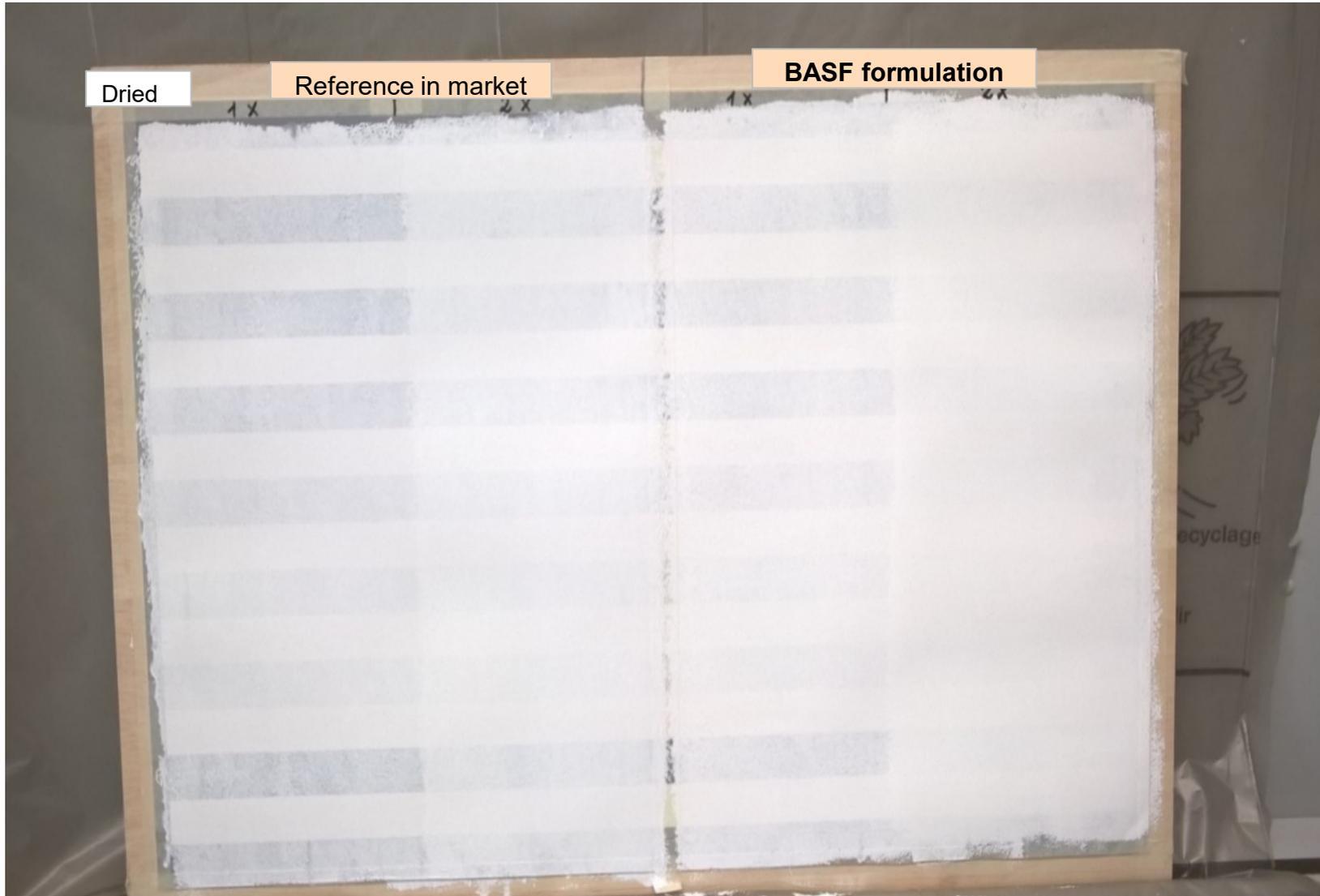
# Opacity tool box: Increasing hiding power ONE COAT PAINT:

- With only 15% TiO<sub>2</sub> (saving of more than 7% TiO<sub>2</sub>)
- Hiding power @98%: 10,6 m<sup>2</sup>/L
- Hiding power @99,5%: 6,9 m<sup>2</sup>/L
  
- Making the same exercise with **Acronal HIDE 6610** will give even higher values of hiding power and spreading rate, due to the resulting refractive index

Starting point Formulation recommendation for monocoat paint based on Acronal HIDE 6296	
Water	170.0
Natrosol 250 HR	1.5
NaOH 20%	2.0
<b>Dispex HIDE AA 4545</b>	<b>6.0</b>
<b>FoamStar SI 2210</b>	<b>2.0</b>
Tronox CR 828	150.0
Dorkafill H	80.0
Plustalc H15-AW	55.0
<b>FoamStar SI 2210</b>	<b>3.0</b>
Water	10.5
<b>Acronal HIDE 6296</b>	<b>210.0</b>
<b>AQACell HIDE 6399</b>	<b>90.0</b>
Optiwhite	115.0
Omyacarb 5GU	35.0
P820 AlSilikat	10.0
MicroMica	30.0
BDG	20.0
<b>Rheovis PE 1330</b>	<b>10.0</b>
<b>Total</b>	<b>1,000.0</b>
<b>PVC</b>	<b>64.9%</b>
<b>PVC incl. Opacifier</b>	<b>70.1%</b>
Viscosity KU after 24 h	108
Viscosity ICI after 24 h	2.6
Hiding power@98% contrast ratio	10.6 m <sup>2</sup> /l
Hiding power@99,5% contrast ratio	<b>6.9 m<sup>2</sup>/l</b>
Scrub resistance; drying 28 d/ RT; (µm)	3.0 ± 0.6
Class	<b>1</b>
Visual Evaluation [0-5]*	0
*being =: the best and 5: the worst performance	

# Opacity tool box: Increasing hiding power

## ONE COAT PAINT



Applied by Roller in  
big surface contrast  
paper

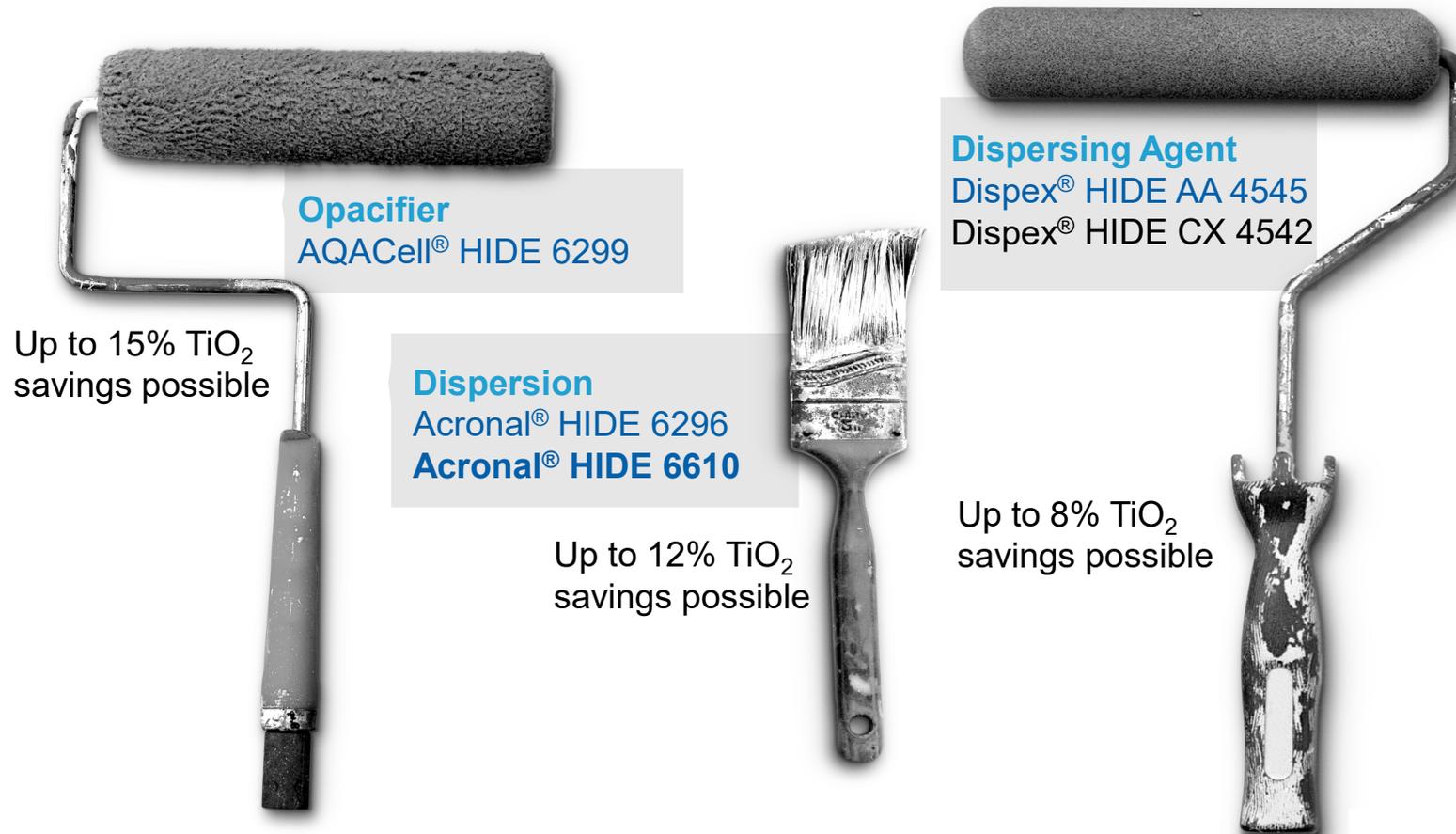
# Opacity tool box: Increasing hiding power **ONE COAT PAINT**

Premium **one coat paint** based on  
BASF opacity tool box concept

AQACell HIDE 6399

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