

Clariant Advanced Surface Solutions for Coatings

Michael Watson
Business Unit Additives
BL AS Coatings and Inks
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what is precious to you?

Business Unit Additives is a global, diversified solution provider



Advanced Surface Solutions

We offer advanced wax and polymer solutions that protect and enhance surfaces in plastics, coatings & inks, adhesives, agro and care applications.



Flame Retardants

Our patented halogen-free flame retardants provide environmentally compatible fire protection and pass demanding fire safety standards.



Performance Additives

Our performance additives solutions prevent oxidation, dissipate electric charge accumulation and improve heat, light and weather resistance.



Plastics



Coatings & Inks



Consumer

Coatings & Inks



- Architectural
- Protective & Marine
- Transportation
- Wood & Furniture
- Packaging
- Industrial
- Printing Inks

~ 840

Employees

7

Production Sites

3

Application Development Centers

3

Research Centers



We are globally present ...



... and more to come

Clariant manufactures a widely diversified portfolio of waxes



What is micronized wax?

- Micronized powder based on:
 - PE / oxidized PE wax, PP wax, AMIDE wax, FT wax, Montan wax, PTFE or specialty waxes including also renewable resources
- Median particle sizes between 5 and 15 μ m, with a few exceptions



Both chemical structure, particle size, dosage and distribution play decisive roles in their use and performance



Micronized waxes enable full control of formula components and 100 % active content

COMMERCIAL LIQUID WAX



- Co-solvents
- Defoamer
- Emulsifier
- Further ingredients
- Preservative
- Thickener
- Water
- Wax

MICRONIZED WAX

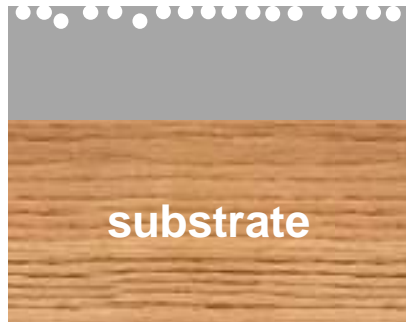


- 100% wax
- Longer shelf life
- Low inventory space
- Applicable for multiple binder system (SB/WB/UV)

Micronized wax provide unique performance benefits compared to wax emulsions

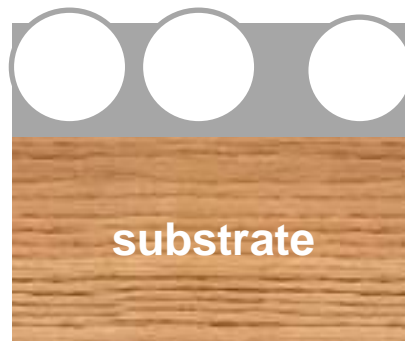
WAX EMULSION

D50 $\leq 1\mu\text{m}$



MICRONIZED WAX

D50 5~30 μm

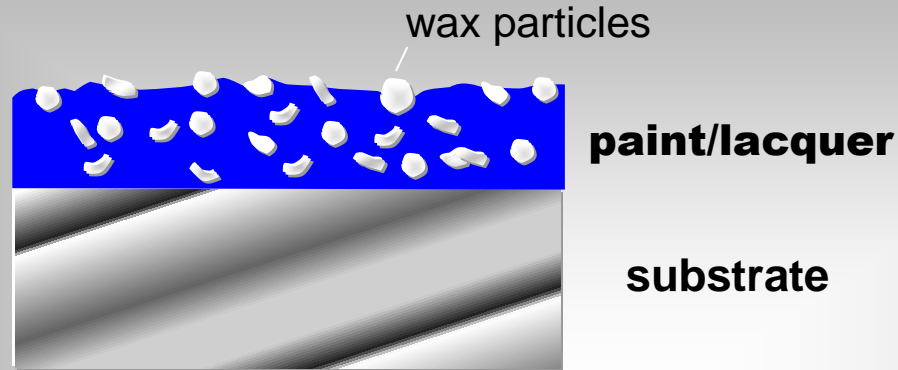


BENEFITS

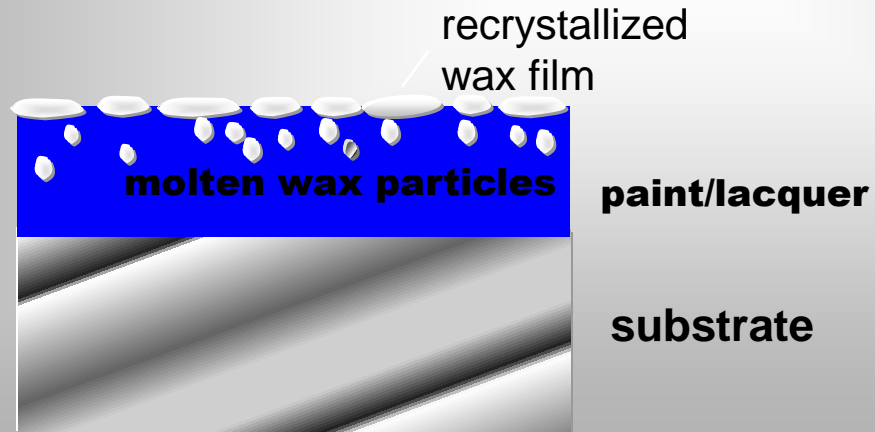
- Scratch resistance
- Good slip effect
- Anti-blocking
- Special touch
- Matting

Waxes as Surface Modifiers

1 Curing temperature below drop point of the wax



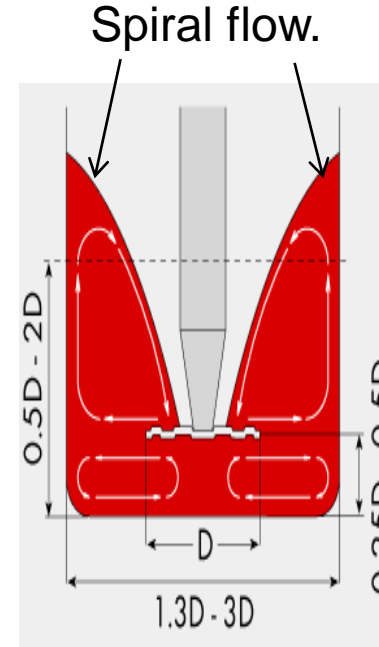
2 Curing temperature above drop point of the wax



Wax film formation depends on wax type and melt viscosity of the wax.

How to incorporate micronized wax?

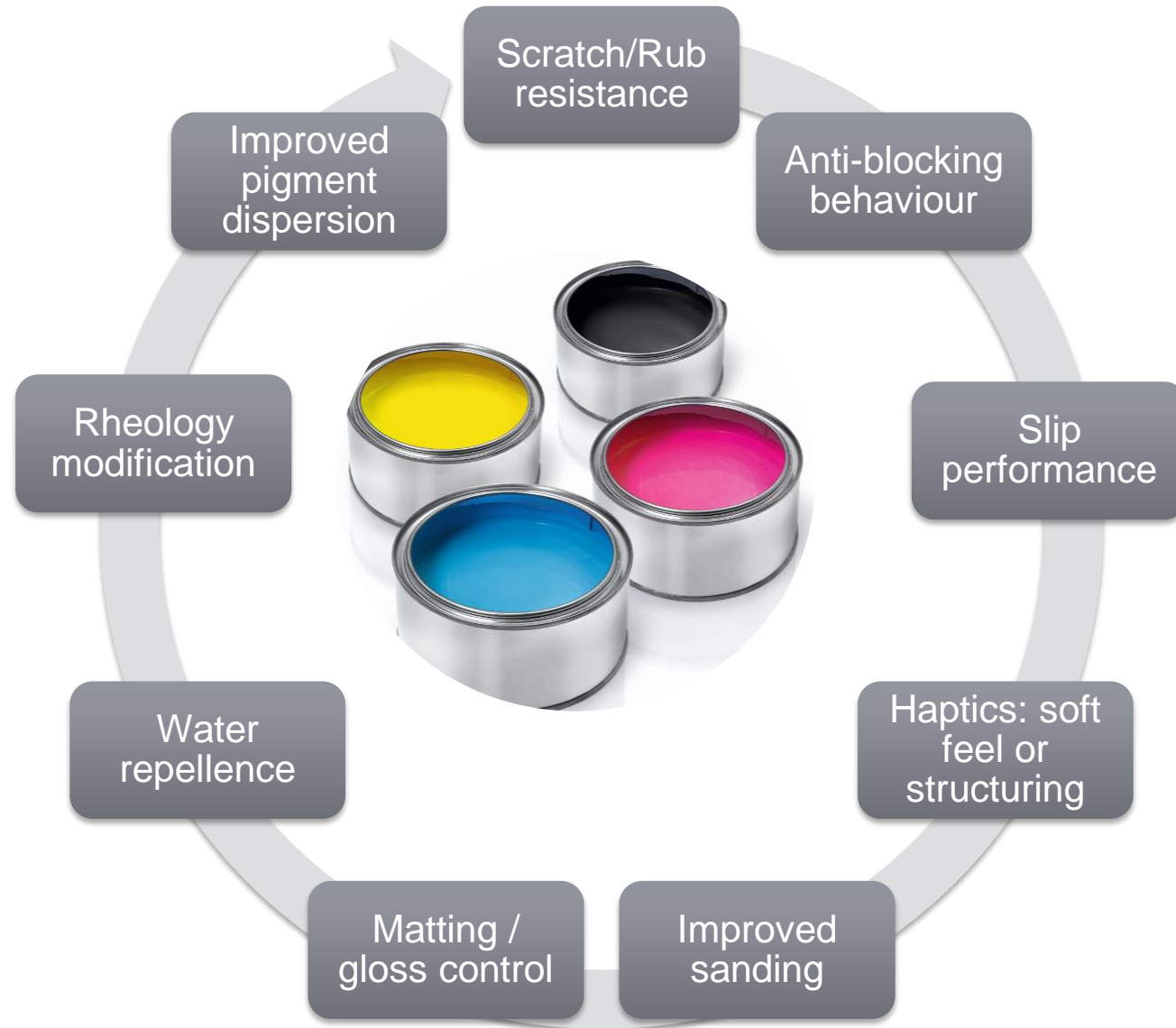
- High shear forces to prevent agglomerates : 3 roll mills, bead/ball mills, or dissolver
- Incorporated Ceridust into liquid paint during premix stage (with other solid raw material), or co-disperse with pigment, or at cutback/adjustment stage to disperse directly in paint, or prepare wax dispersion in advance (as intermediate)
- Good dispersion practice for solid powder form raw material should also apply for Ceridust. Take agitator process as example:
 - Toothed disk to generate good shear
 - Better shear with higher viscosity paint
 - Right (spiral) flow pattern by right geometric proportion of agitator
 - Add solid material slowly into liquid above the spiral flow area to avoid direct contact with metal parts of the vessel.
 - Shearing Ceridust generally sufficient:
 - Production: 1500~2000 RPM for ~20 minutes
 - Lab sample: 1500 RPM for 15 min



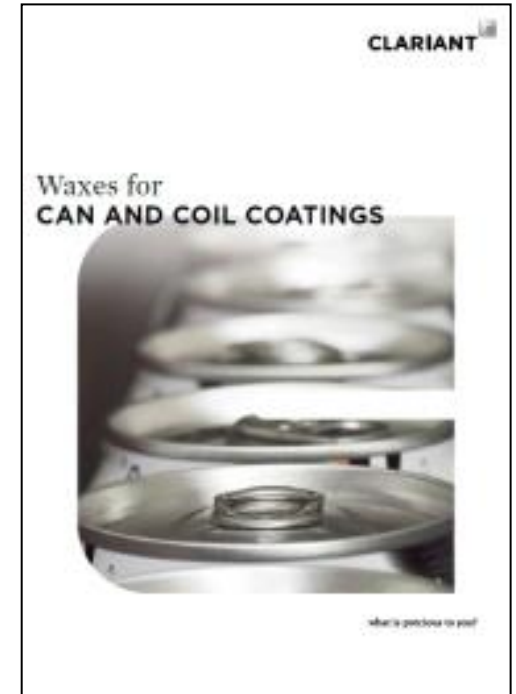
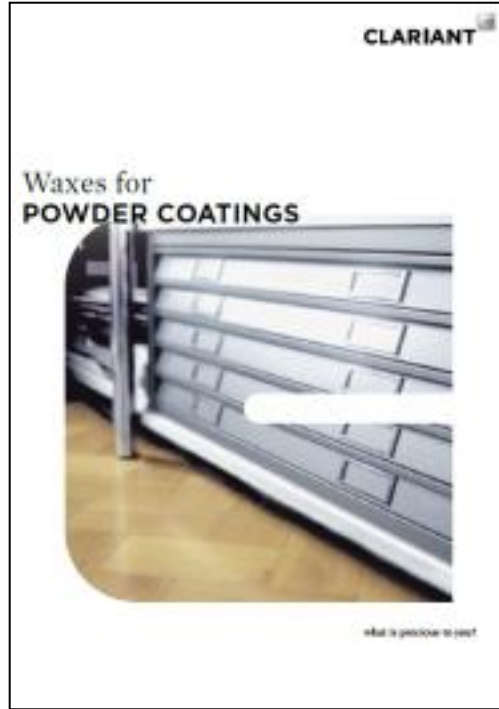
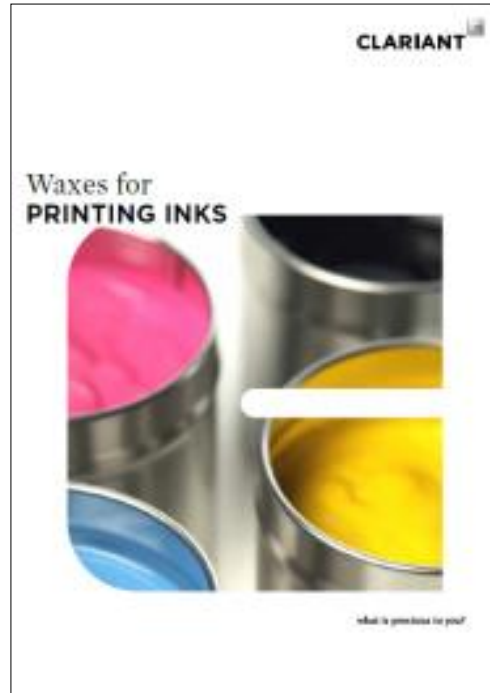
Toothed disk



Micronized waxes benefits for coatings surfaces



Application/selection guides



Waxes for WOOD COATINGS

CLARIANT

PRODUCT	TYPE	d ₅₀ [µm]										
			SOLVENT	WATER	UV (100 % SYSTEM)	SCRATCH & MAR RESISTANCE	MATTING	HIGH CLARITY	SOFT FEEL	SLIP	ANTI-BLOCKING	SANDING
Modified natural wax		- 8.0	█	█	-	█	█	█	█	█	█	-
Modified natural wax		- 12.0	█	█	-	█	█	█	█	█	█	-
Hydrocarbon wax		- 6.0	█	█	-	█	█	█	█	█	█	-
Wax compound / Amide wax		- 6.0	█	█	█	█	█	█	█	█	█	█
Polyethylene wax		- 6.0	█	-	█	█	█	█	█	█	█	-
Polyethylene wax		- 5.0	█	-	█	█	█	█	█	█	█	-
Polyethylene wax		- 8.5	█	-	█	█	█	█	█	█	█	-
Modified polyethylene wax		- 8.5	█	█	-	█	█	█	█	█	█	-
Modified polyethylene wax		- 8.5	█	█	-	█	█	█	█	█	█	-
Amide wax		- 6.5	█	█	█	█	█	█	█	█	█	█
Polyethylene wax / PTFE		- 6.0	█	-	█	█	█	█	█	█	█	-
Montan wax		- 8.5	█	█	-	█	█	█	█	█	█	-
Polypropylene wax		- 9.5	█	-	-	█	█	█	█	█	█	-
Wax compound / Amide wax		- 7.5	█	-	-	█	█	█	█	█	█	-
Functionalized copolymer wax		- 8.0	█	█	█	█	█	█	█	█	█	-
Renewable polymer		- 30.0	-	█	-	█	█	█	█	█	█	-
Renewable polymer		- 9.0	-	█	-	█	█	█	█	█	█	-
Wax compound / Renewable polymer		- 5.5	█	█	-	█	█	█	█	█	█	-
Polyethylene wax / PTFE		- 8.5	█	-	█	█	█	█	█	█	█	-
Polyethylene / Amide wax		- 6.5	█	█	-	█	█	█	█	█	█	█

Recommended system
 Effective
 Very effective
 Outstandingly effective

Waxes for POWDER COATINGS

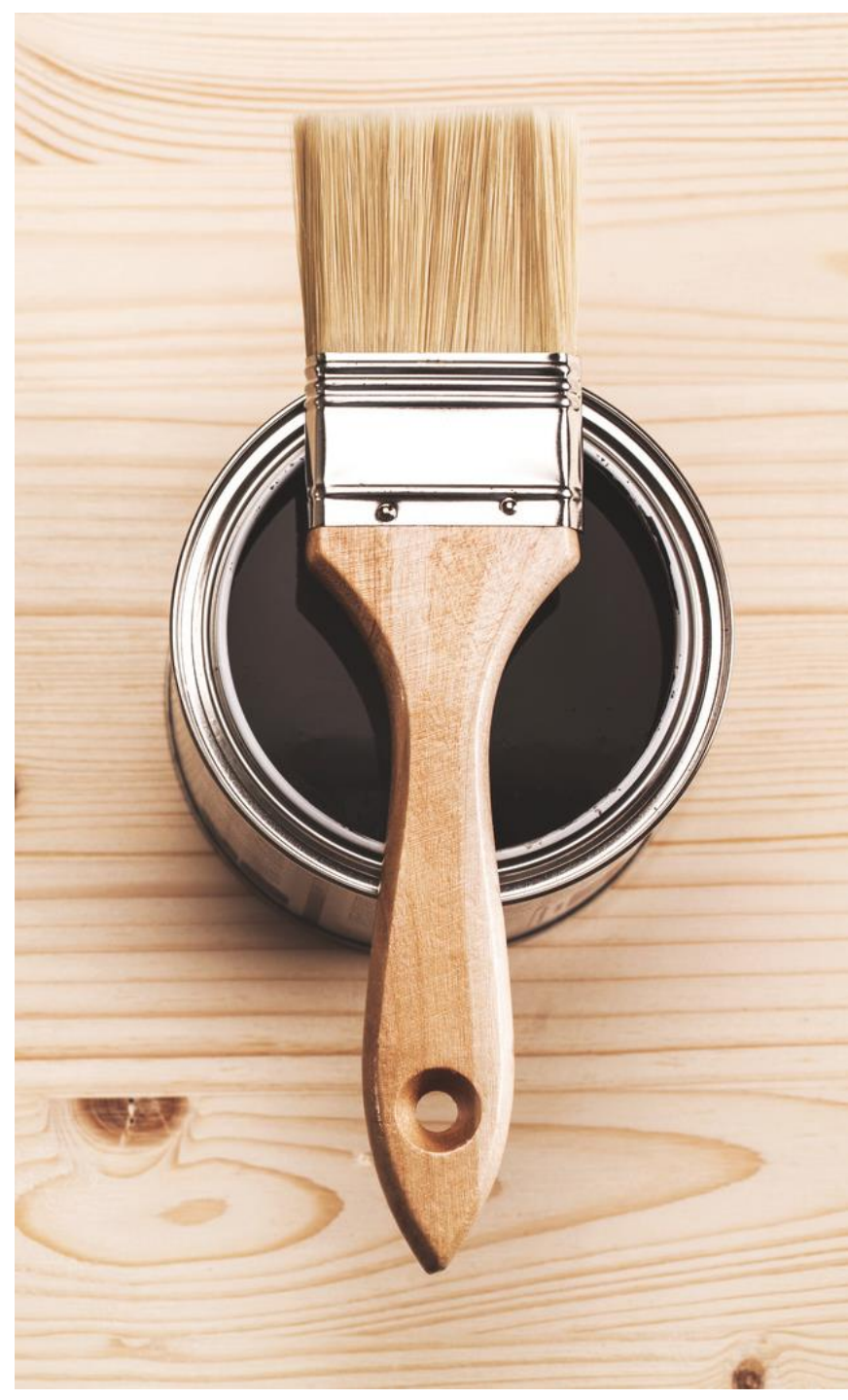
CLARIANT

CLARIANT

PRODUCT	TYPE	d ₅₀ [µm]	SCRATCH & MAR RESISTANCE	SLIP	MATTING	DEGASSING	ANTI-BLOCKING ANTI-CAKING	TEXTURING	DISPERSION & THROUGHPUT	ADHESION PROMOTER	ANTI-SLIP
	Modified natural wax	- 12.0	Very effective	-	Very effective	Very effective	-	-	Outstandingly effective	-	-
	Hydrocarbon wax	- 6.0	Effective	Very effective	Outstandingly effective	Very effective	-	-	Outstandingly effective	-	-
	Hydrocarbon wax	- 6.5	Effective	Very effective	Outstandingly effective	Very effective	-	-	Outstandingly effective	-	-
	Wax compound / Amide wax	- 6.0	Very effective	Effective	Very effective	Outstandingly effective	Very effective	-	Very effective	-	-
	Amide wax	- 6.5	-	-	Effective	Outstandingly effective	Outstandingly effective	-	Very effective	-	-
	Polyethylene wax / PTFE	- 6.0	Outstandingly effective	Outstandingly effective	Very effective	-	Very effective	-	Effective	-	-
	Polyethylene wax / PTFE	- 13.5	-	-	texture	-	Outstandingly effective	Very effective	-	-	Outstandingly effective
	Polyethylene wax / PTFE	- 13.5	-	-	texture	-	Outstandingly effective	Outstandingly effective	-	-	Outstandingly effective
	Polyethylene wax / PTFE	- 10.0	Outstandingly effective	Outstandingly effective	Very effective	-	Very effective	-	Effective	-	-
	Montan wax	- 8.5	-	Effective	Very effective	-	Effective	-	Outstandingly effective	-	-
	Polypropylene wax	- 9.5	Very effective	-	Outstandingly effective	Outstandingly effective	-	-	-	Effective	Outstandingly effective
	Wax compound / Amide wax	- 7.5	Very effective	Effective	Very effective	Very effective	Effective	-	Very effective	-	-
	PTFE	- 4.0	Outstandingly effective	Outstandingly effective	Very effective	-	-	-	-	-	-
	PTFE	- 8.0	Outstandingly effective	Outstandingly effective	Very effective	-	-	-	-	-	-
	Polyethylene / Amide wax	- 6.5	Very effective	Effective	Very effective	Outstandingly effective	Very effective	-	Very effective	-	-
	Polyethylene wax / PTFE	- 8.5	Outstandingly effective	Outstandingly effective	Very effective	-	Very effective	-	Effective	-	-
	Polyethylene wax / PTFE	- 8.0	Outstandingly effective	Outstandingly effective	Very effective	-	Very effective	-	Effective	-	-
CRUDE WAXES											
	PTFE powder	- 600	-	-	Outstandingly effective	-	Outstandingly effective	Outstandingly effective	-	-	Outstandingly effective
	Modified natural wax	-	Very effective	-	Very effective	Very effective	-	-	Outstandingly effective	-	-
	Modified natural wax	-	Very effective	-	Very effective	Very effective	-	-	Outstandingly effective	-	-
	Metallocene polyethylene wax	-	Effective	Very effective	Very effective	Very effective	Effective	-	Very effective	Effective	-
	Functionalized Metallocene polyethylene wax	-	-	-	texture	-	-	Very effective	Very effective	Very effective	-
	Amide wax	-	-	-	Effective	Outstandingly effective	Outstandingly effective	-	Very effective	-	-
	Polyethylene wax	-	Effective	Effective	Very effective	-	-	-	Very effective	-	-

Effective Very effective Outstandingly effective

Core product offering for wood coatings



Core product offer for wood coatings with conventional and sustainable materials

Polypropylene wax



- Strong matting
- Excellent scratch resistance

Oxidized Polyethylene



- Pleasant dry and slip touch
- Good clarity and good slip
- Good slip

PE/Amide blend

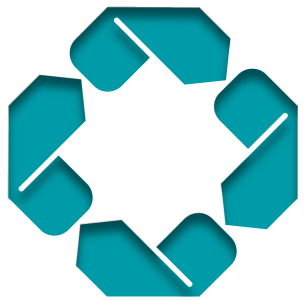


- Good well-balanced performance
- Suitable for all systems

PP/amide blend



- Strong matting
- Good scratch resistance
- Good anti-blocking



ECOTAIN[®]

100% bio-based



- Excellent scratch resistance
- High clarity
- Natural wood touch

Rice bran wax

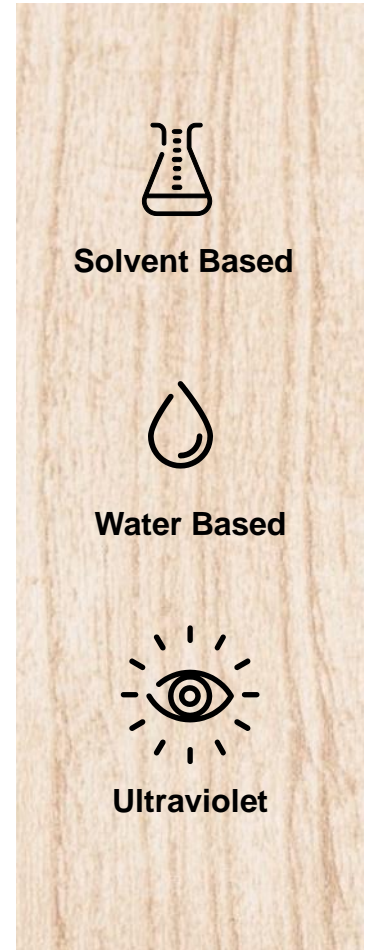


- Excellent scratch resistance
- High clarity
- Soft touch

Semi-natural wax



- Good scratch resistance
- High clarity
- Silky touch



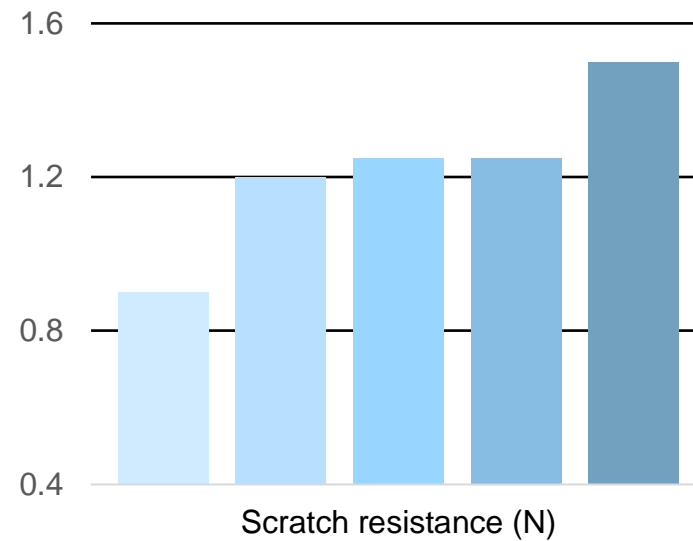


Metalocene-based polypropylene wax

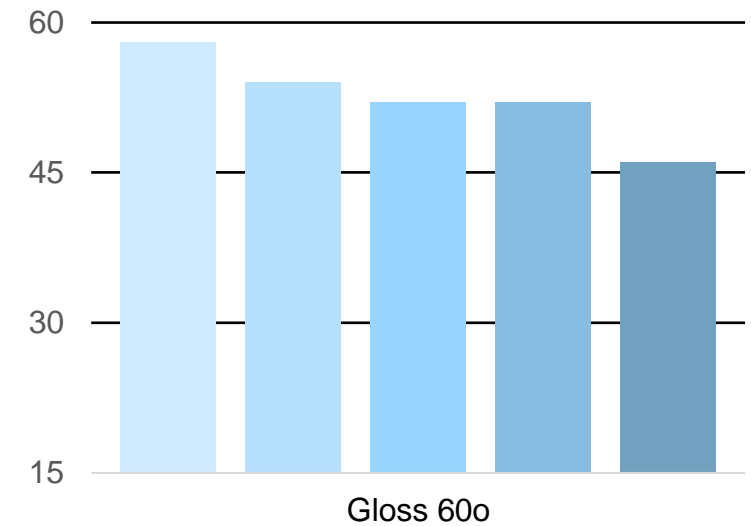
KEY PRODUCT FEATURES

- Excellent scratch resistance even at low wax dosage
- Strong matting
- Good water resistance
- Particle size D50: ~9.5um

SCRATCH RESISTANCE & MATTING



- No wax
- PE wax
- PP wax
- PE/Amide wax
- PE/PTFE wax



- No wax
- PE wax
- PP wax
- PE/Amide wax
- PE/PTFE wax

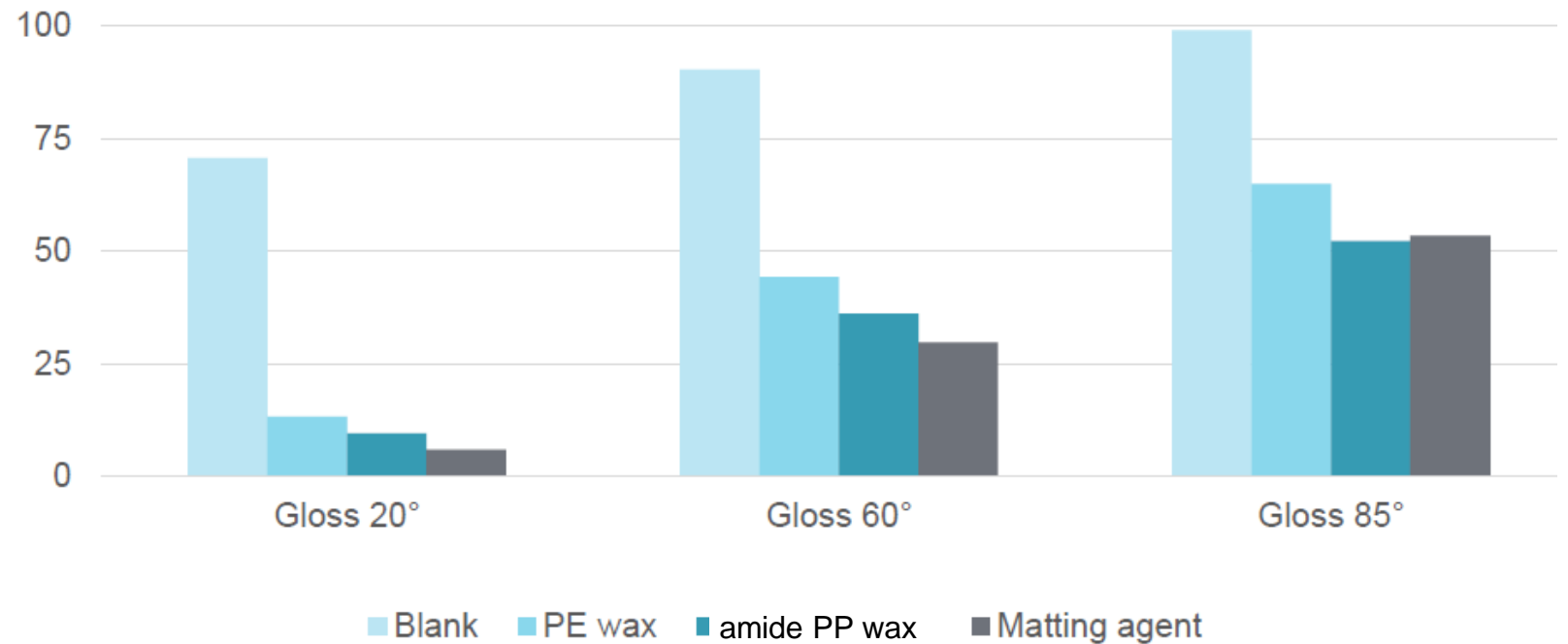
System: Solvent based 2K PU wood coating;
Dosage 1% wax in total formulation

Amide modified polypropylene wax

KEY PRODUCT FEATURES

- Strong matting (close to matting agent)
- Good scratch resistance
- Good anti blocking
- Improves sand-ability
- Particle size D50: ~7.5um

Strong Matting



System: Water based 1K PUA wood coating;
Dosage 2% wax in total formulation

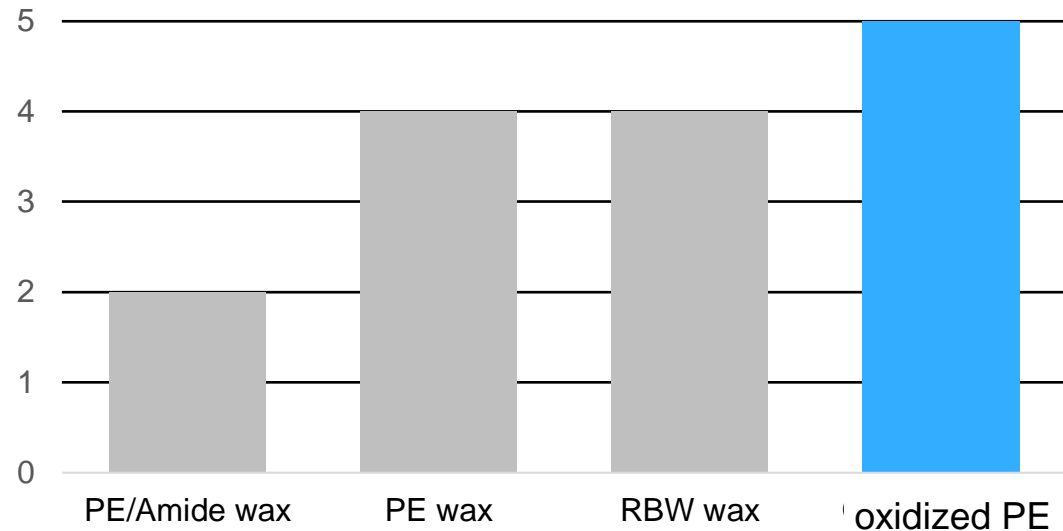
Oxidized PE wax

KEY PRODUCT FEATURES

- Pleasant slip and dry touch
- Good clarity
- Good scratch resistance
- Easy dispersibility in both solvent based and water based coatings
- Particle size D50: ~8.5um

BLIND TOUCH TEST - CHINA COATING SHOW

(1~5, 5 as most popular)



System: Water based wood coating; Dosage: 1% wax in total formulation



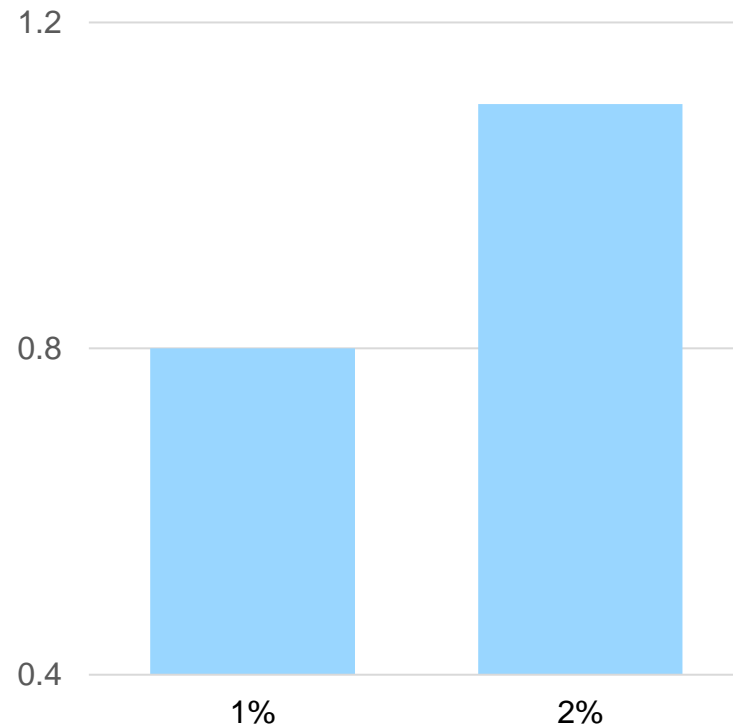


Polyethylene/Amide wax

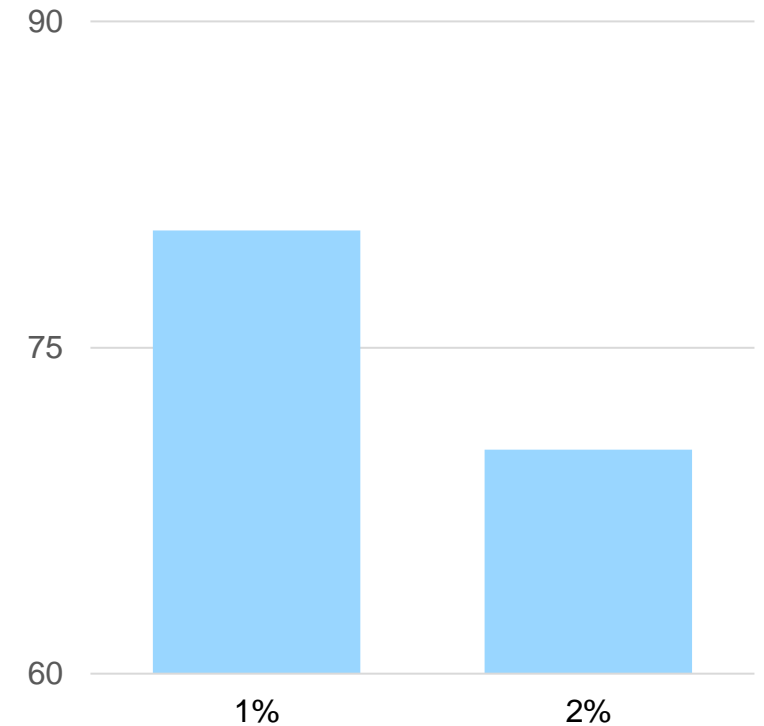
KEY PRODUCT FEATURES

- Good overall balanced performance
- Good matting
- Good slip
- Good scratch resistance
- Good water repellence
- Good anti-blocking
- Suitable for all platforms: SB, WB & UV coatings
- Particle size D50: ~6.5um

SCRATCH RESISTANCE (N)



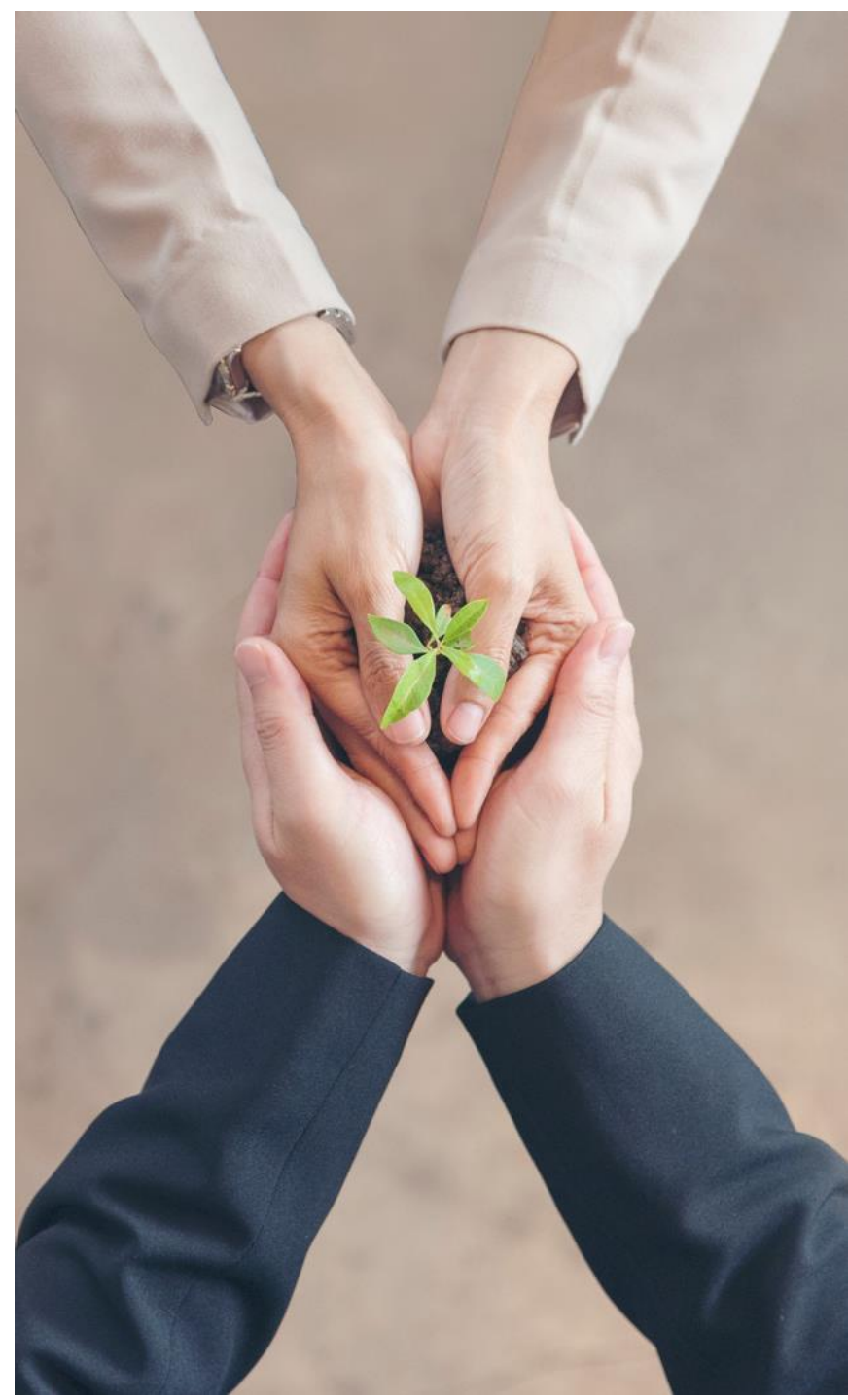
CLARITY



System: WB 1K Acrylic wood coating;
Dosage: see x axis

Sustainable solutions

- Renewable based waxes for wood coatings



EcoTain[®] label – our approach to sustainability



EcoTain[®] is our **flagship label for sustainability** excellence products and solutions. It highlights solutions offering outstanding sustainability advantages and add value to customers and the society as a whole.

Each product and solution carrying the EcoTain[®] label has undergone a systematic, **in-depth screening process** using 36 criteria spanning all three sustainability dimensions: **social, environmental and economic**.

Its ambitious benchmark **distinguishes products** that

- significantly exceed market standards in general,
- have best-in-class performance in one or several criteria, and
- make overall sustainability contributions.

EcoTain[®] products support actively the sustainability efforts of our customers, **without compromising on performance**.

Sustainability designators help customers and value chains identify products and solutions with key sustainability benefits

Clariant sustainability designators give clear orientation by highlighting sustainability with trade name suffixes.
Additives' portfolio carrying sustainability designators:



Renewable Feedstock
TERRA

Products with significant (**at least 50% RCI**) content based on renewable resources with a mass-balance certification or real renewable content:

5 base waxes to choose from



Natural Ingredients
VITA

Products from **natural origin** with real renewable content (**at least 98% RCI**):

Renewable based crude waxes

6 products to choose from

Renewable based micronized grades

4 products to choose from

Easy dispersibility in water based systems

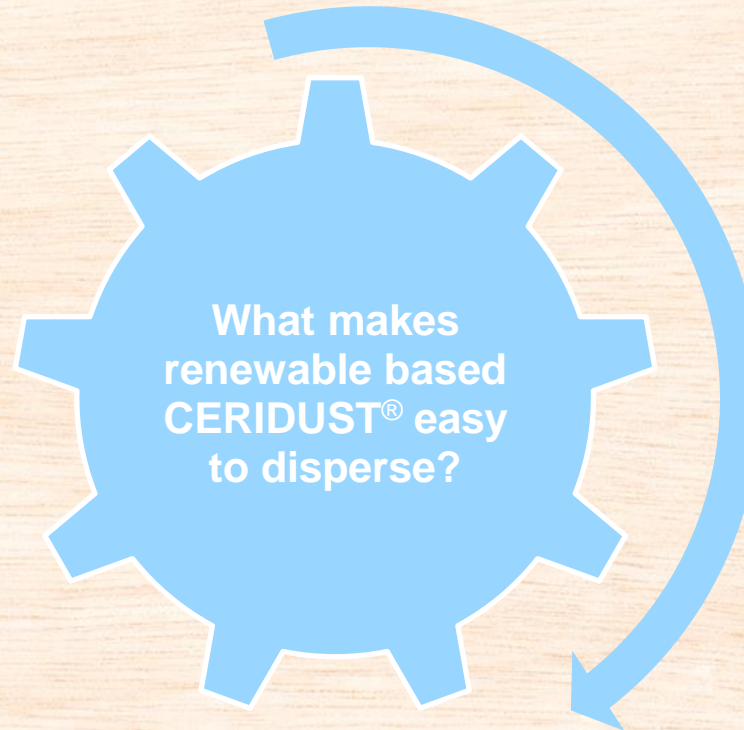
All Clariant renewable based micronized waxes are suitable for water based systems

WAX CHEMISTRY

- Polarity
- Wettability in water

DENSITY

- density very close to water





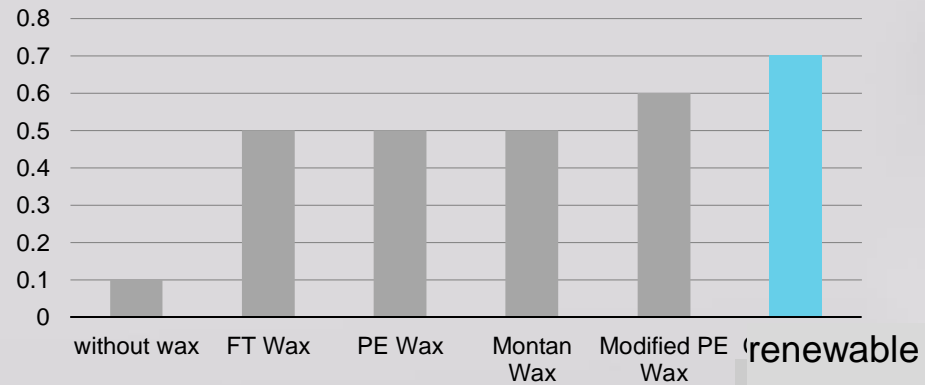
100% renewable additive for wood coatings

Excellent scratch resistance and natural wood touch

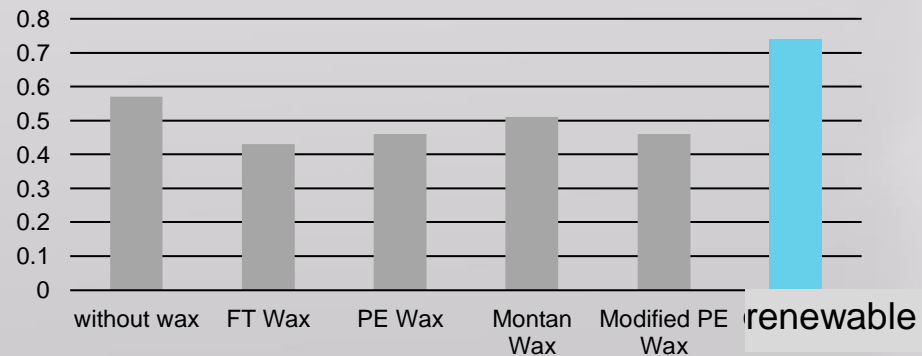
KEY PRODUCT FEATURES

- 100% renewable-based additive
- Natural and soft touch surface that feels like untreated wood
- Outstanding scratch resistance performance
- Increased coefficient of friction
- **D50 ~ 30 μ m**
- Suitable for water based formulations

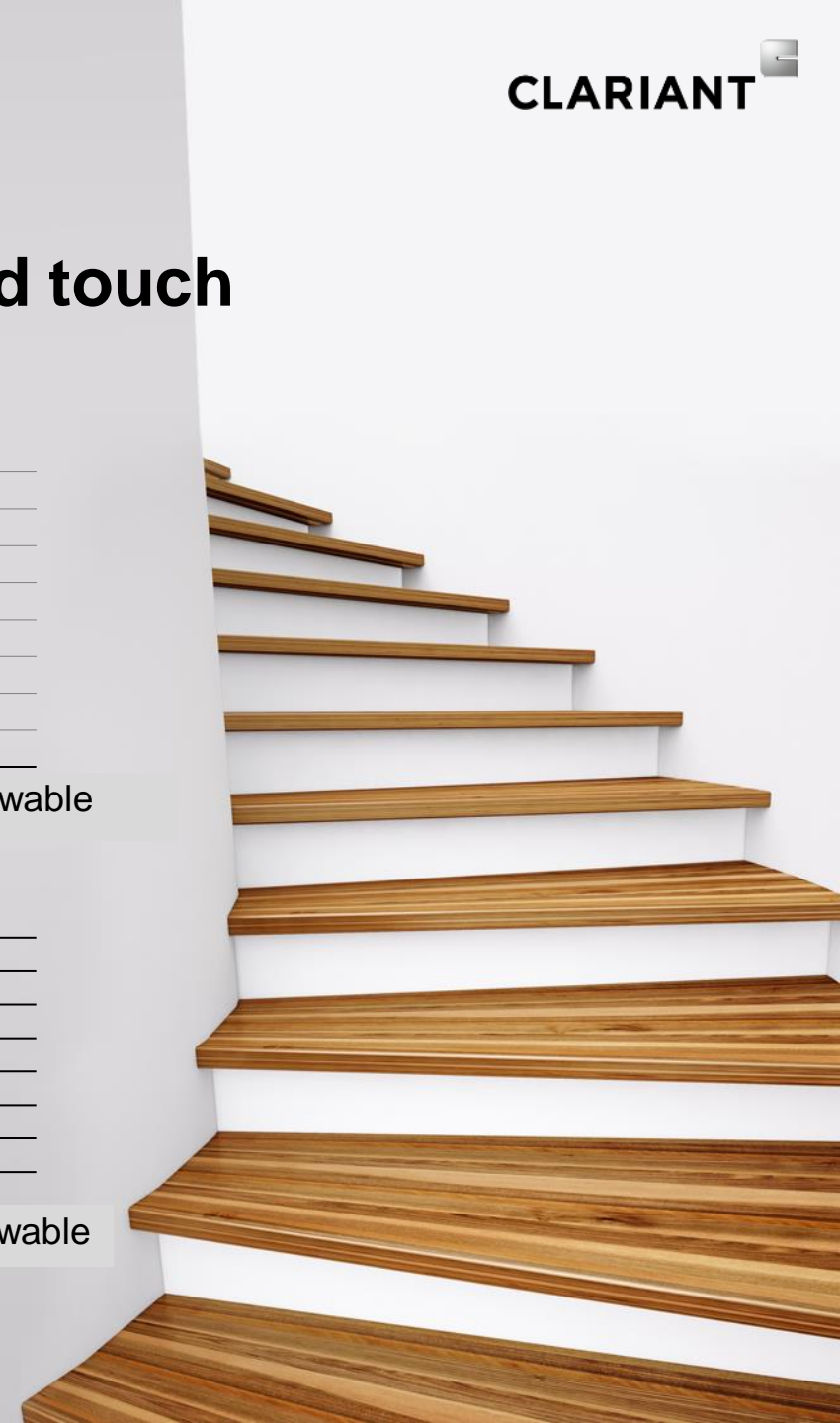
SCRATCH RESISTANCE PERFORMANCE [N]



COEFFICIENT OF FRICTION (COF) []



System: water based PUR; Dosage: 4% wax in total formulation





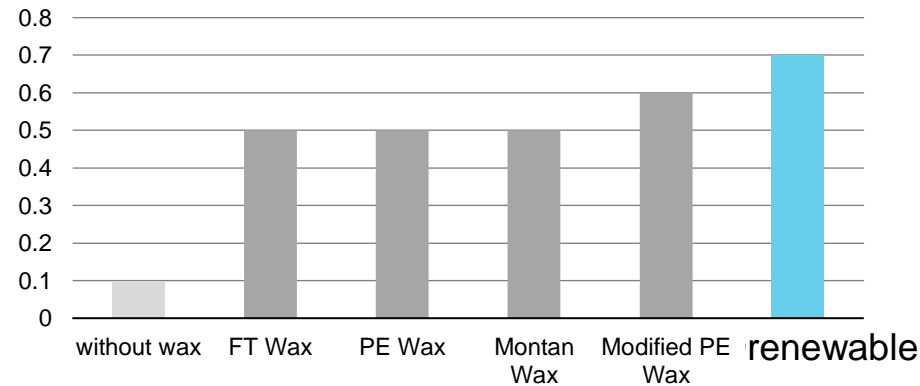
100% renewable additive

Excellent scratch resistance and soft touch

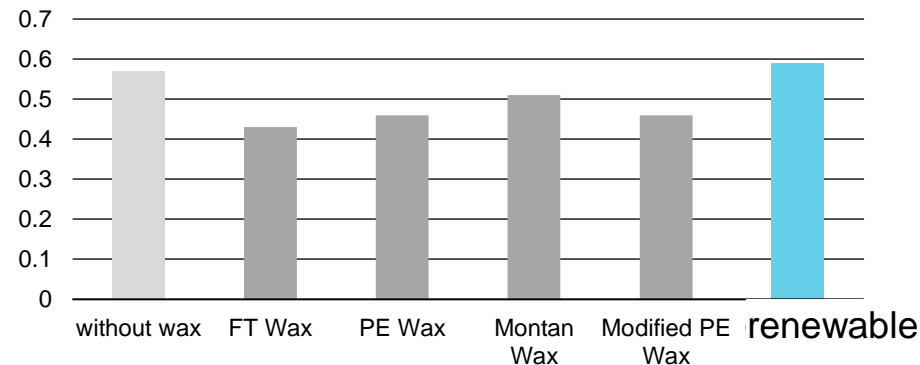
KEY PRODUCT FEATURES

- 100% renewable-based additive
- Outstanding scratch resistance performance
- Soft and silk touch surface
- Keeping high coefficient of friction
- **Particle size ~ 8 μm**
- Suitable for water based formulations

SCRATCH RESISTANCE PERFORMANCE [N]



COEFFICIENT OF FRICTION (COF) []



System: Water based PUR; Dosage: 4% wax in total formulation



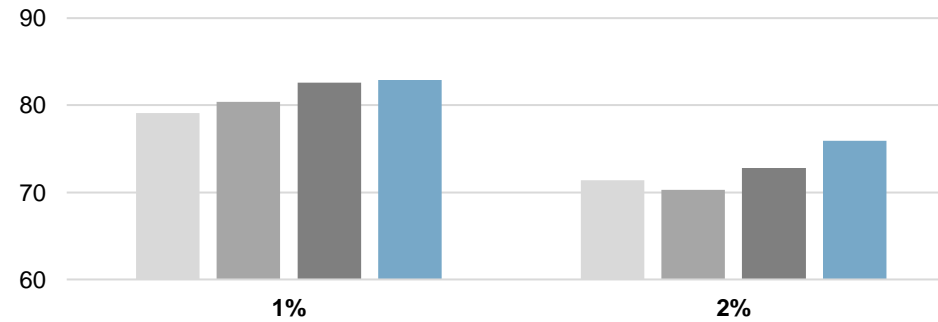


Semi - renewable based additive

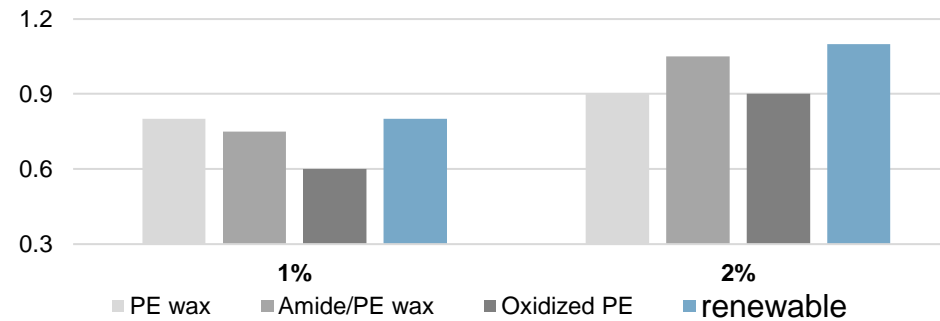
KEY PRODUCT FEATURES

- Renewable based feedstock
- Good Clarity
- Good scratch resistance
- Smooth, silky touch feel
- Fine particle size: D50 ~5.5µm
- Suitable for solvent based and water based coatings

CLARITY



SCRATCH RESISTANCE (N)

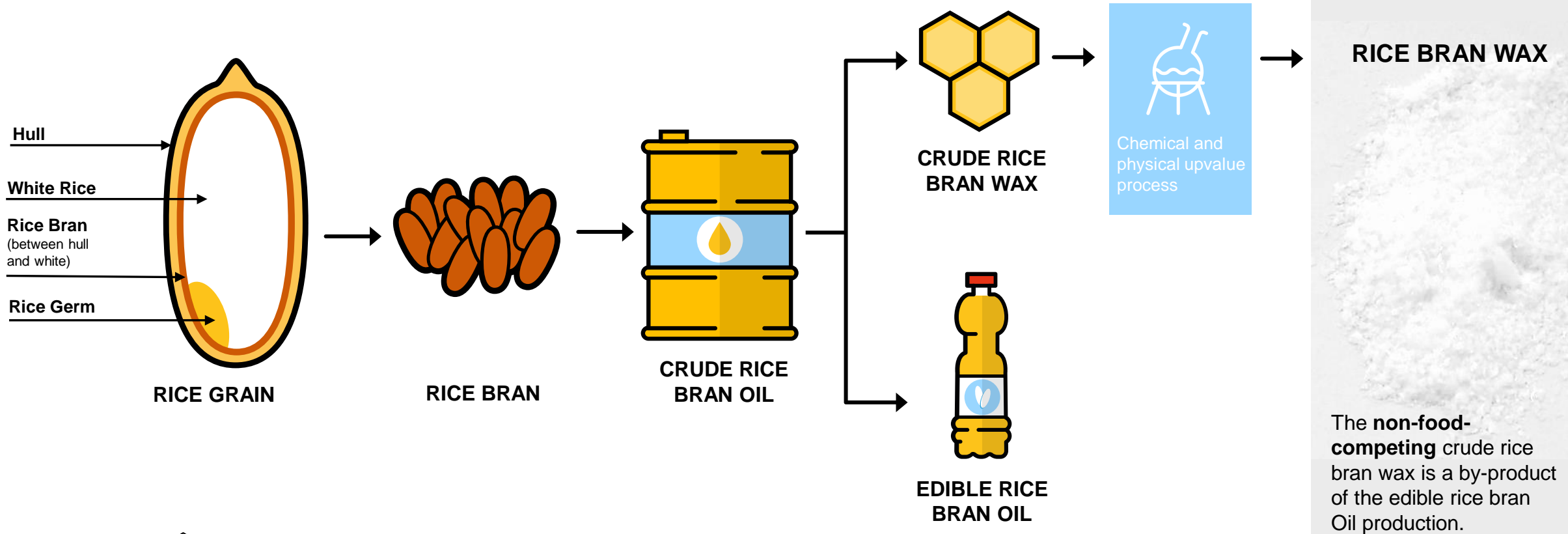


System: water based PUR; Dosage: see x axis

d50~12µm is also available



We convert non-food-competing residues of rice bran oil production into high performing waxes



We **chemically & physically upvalue** crude rice bran wax into our high-performing rice bran waxes to achieve the properties our customers need

Advantages for Coatings – micronized rice bran wax

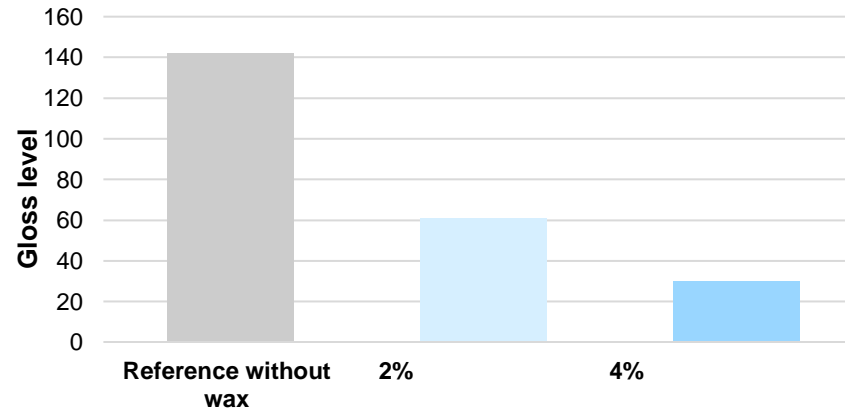
KEY PRODUCT FEATURES

- Smooth and soft surface touch in wood coatings
- Pleasant surface touch feel
- Excellent slip and matting properties
- Easy dispersibility in aqueous and solvent based systems
- Improved scratch and rub resistance

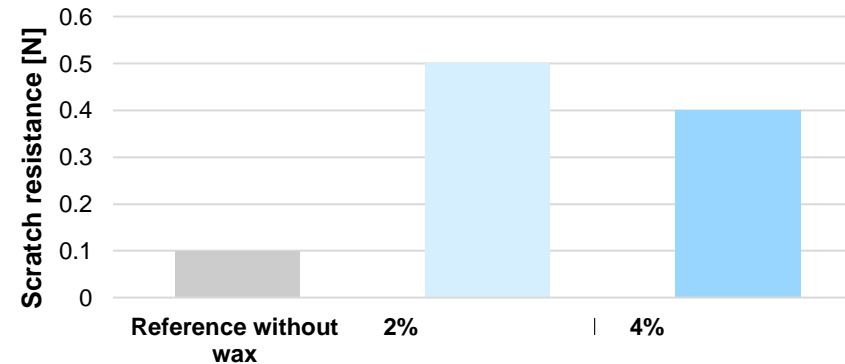
Micronized RBW FOR WOOD COATINGS:

- Desired appearance, touch feel and protection
- Drop point 78 °C, D50 ~ 8 µm

GLOSS 60° (1K PUR LACQUER)



SCRATCH RESISTANCE (1K PUR LACQUER)

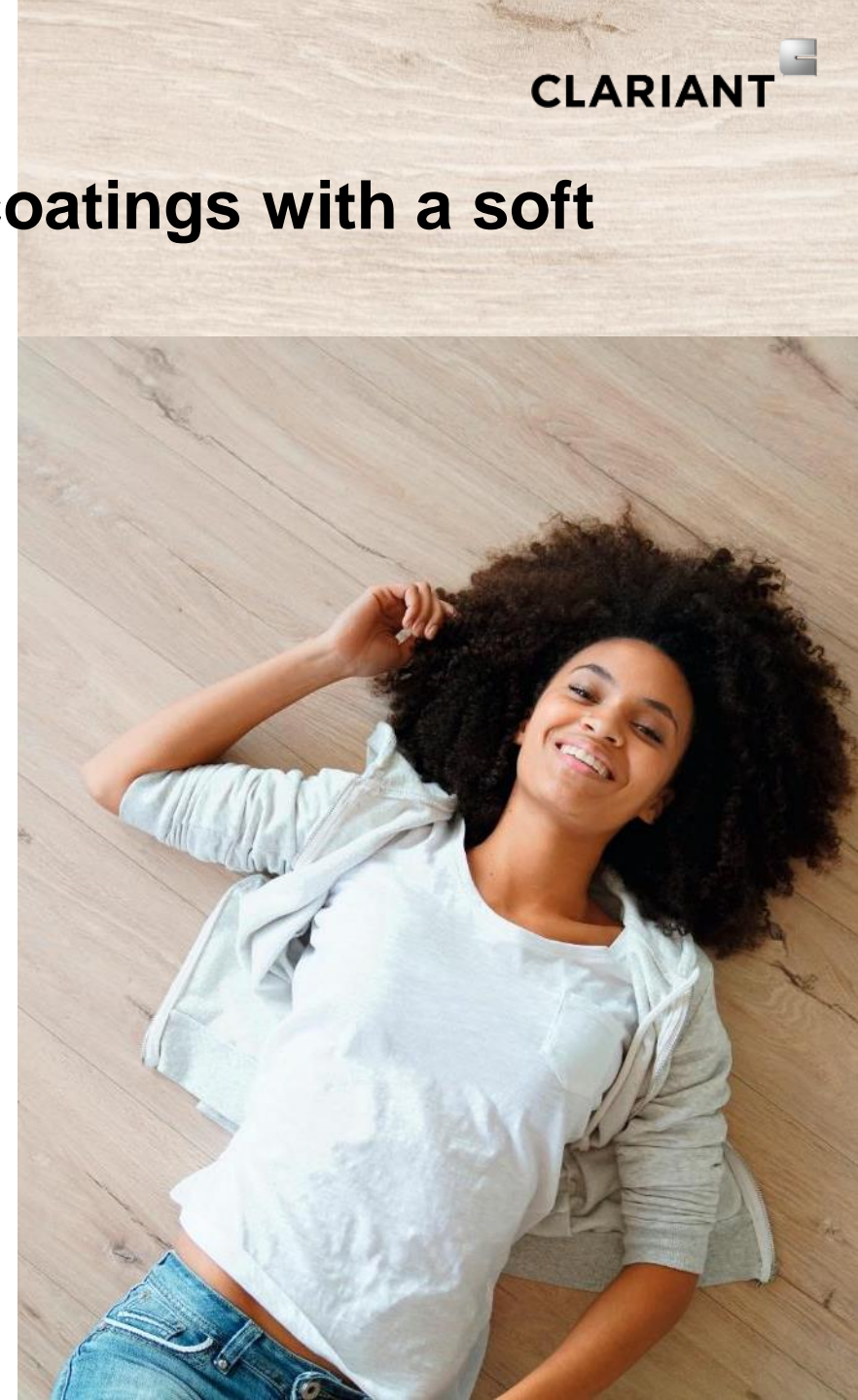
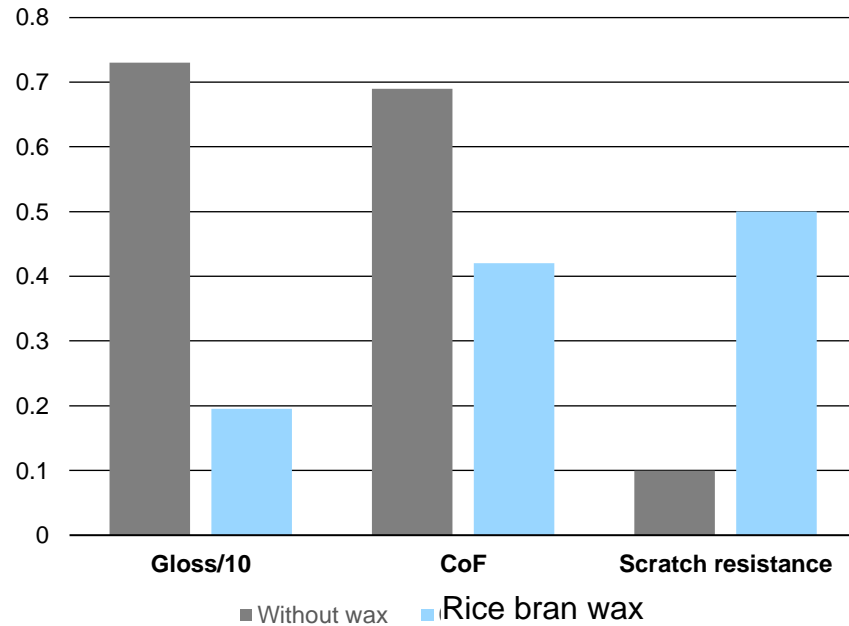




Micronized rice bran wax for durable wood coatings with a soft touch

KEY PRODUCT FEATURES

- Fully based on renewable feedstock (Rice bran wax)
- Easy dispersible in water and solvent based wood coatings
- Excellent matting, as well as slip and scratch resistance properties
- Gives wood a smooth, soft touch feel
- Particle size ~ 12 μ m
- Suitable for both solvent based and water based coatings



Key product overview for powder coatings

<p>Excellent degassing for high gloss system AMIDE wax</p>	<p>Excellent degassing & matting PP wax</p>	<p>Multipurpose additives PE/amide wax</p>
<p>Texturing effects PE/PTFE blends</p>	<p>Matting and high scratch resistance PE/PTFE blends</p>	<p>Excellent edge covering or PTFE free structuring Modified PE</p>
<p>Sustainable & excellent pigment dispersion Rice bran wax</p>	<p>Processing aid & pigment dispersion PE (non-micronized)</p>	<p>Excellent pigment dispersion and cost performance PE (non-micronized)</p>



Micronized pure amide wax

- ✓ Excellent degassing agent
- ✓ Permits reduced benzoin concentration
- ✓ Sharp drop point and very low melt viscosity
- ✓ For high gloss applications
- ✓ Increased anti-stick properties & water repellence
- ✓ Processing aid during extrusion
- ✓ Grinding aid

Delivery Specifications and (*) General Properties

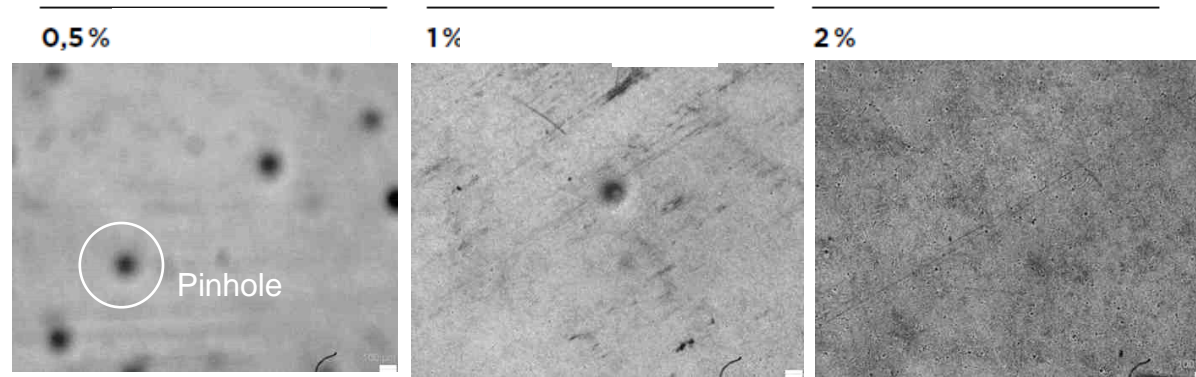
Characteristics	Unit	Target value	Test method
Appearance		white micronized powder	QM-AA-634
Acid value	[mg KOH/g]	5,0 - 8,0	ISO 2114
Drop point	[°C]	139 - 144	ISO 2176
Particle size d50	[µm]	5,5 - 7,5	QM-AA-112
*Density (23°C)	[g/cm ³]	~ 1,00	ISO 1183

micropowder PM Pure amide wax

- ✓ Lower cost alternative for customers who can handle higher particle size
- ✓ Only if no post-blending is needed

Metalocene-based polypropylene wax

- ✓ Excellent degassing properties
- ✓ Outstanding matting properties
- ✓ Excellent adhesion of sealants
- ✓ Excellent scratch resistance
- ✓ Outstanding Anti-slip properties
/ increased CoF



Adding PP wax significantly decrease pinhole formation.

Characteristics	Unit	Target value
Appearance		white micronized powder
Acid value	[mg KOH/g]	0
Drop point	[°C]	142 - 148
Particle size d50	[µm]	6,5 - 12,5
*Density (23°C)	[g/cm³]	~ 0,90

Metallocene-based polypropylene

IMPROVE ADHESION OF SEALANT

WITHOUT WAX



1%



2 %



COHESION BREAK OF SILICONE SEALANT



— Silicon sealant was easy to peel off – adhesion failure.

— Sealant was partially destroyed.

— Unable to remove sealant – cohesion failure.

Characteristics	Unit	Target value
Appearance		white micronized powder
Acid value	[mg KOH/g]	0
Drop point	[°C]	142 - 148
Particle size d50	[µm]	6,5 - 12,5
*Density (23°C)	[g/cm³]	~ 0,90

Texturing additives



CERIDUST texturing additives for powder coatings

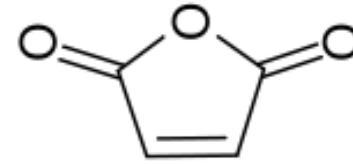
Particle size D50	PTFE content & Texturing effect
~ 13.5 μm	★ ★ ★ ★ ★
~ 13.5 μm	★ ★ ★ ★ ★
~ 600 μm	★ ★ ★ ★ ★



**High edge covering
or PTFE free structure
modified PE wax**



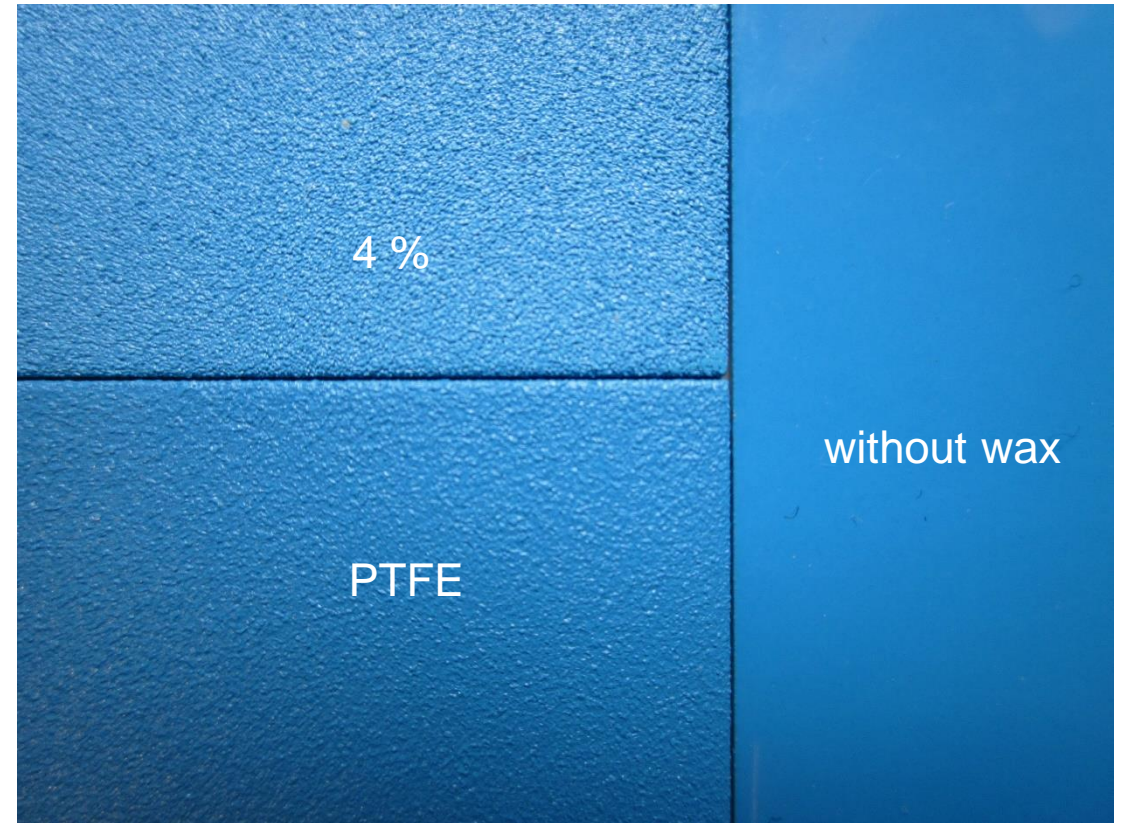
Metalocene based, chemical modified PE wax



KEY PRODUCT FEATURES

- **PTFE free structuring with TiO₂**
- Adjusting gloss and structure
- Improved flow properties
- Improved edge covering
- Improved adhesion properties
- Easy blending in extrusion process

NOTE: black formulations without TiO₂ don't achieve a structured effect



Characteristics	Unit	Target value
Appearance		yellowish granules
Acid value	[mg KOH/g]	42 - 49
Density (23°C)	[g/cm ³]	0,98 - 1,00
Drop point	[°C]	120 - 126
Viscosity	[mPa·s]	200 - 500

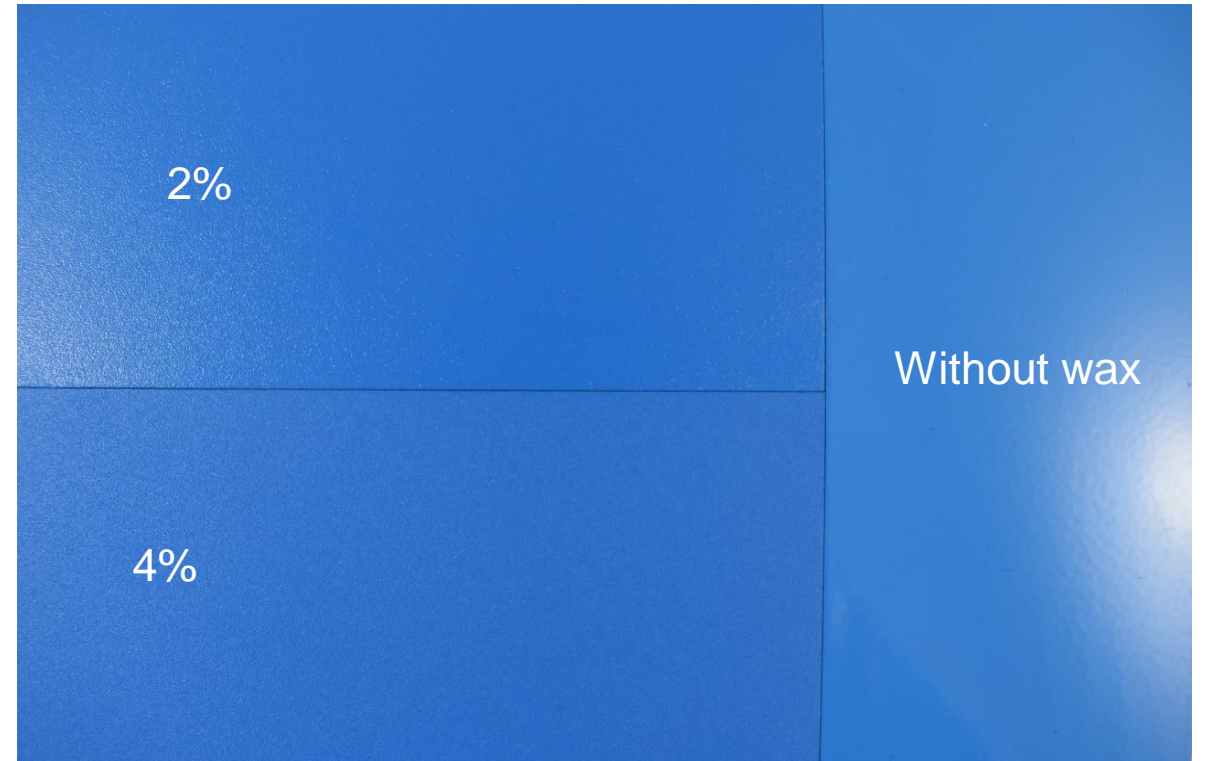
adjusting structured gloss levels

Adjusting gloss and structure properties with different wax and TiO₂ concentrations

Guideline formulation:

- 30 % TiO₂ + 2 – 4%

Hint: black formulations without TiO₂ don't achieve a structured effect



**Sustainable wax for brighter powder
coating colors
with rice bran waxes**



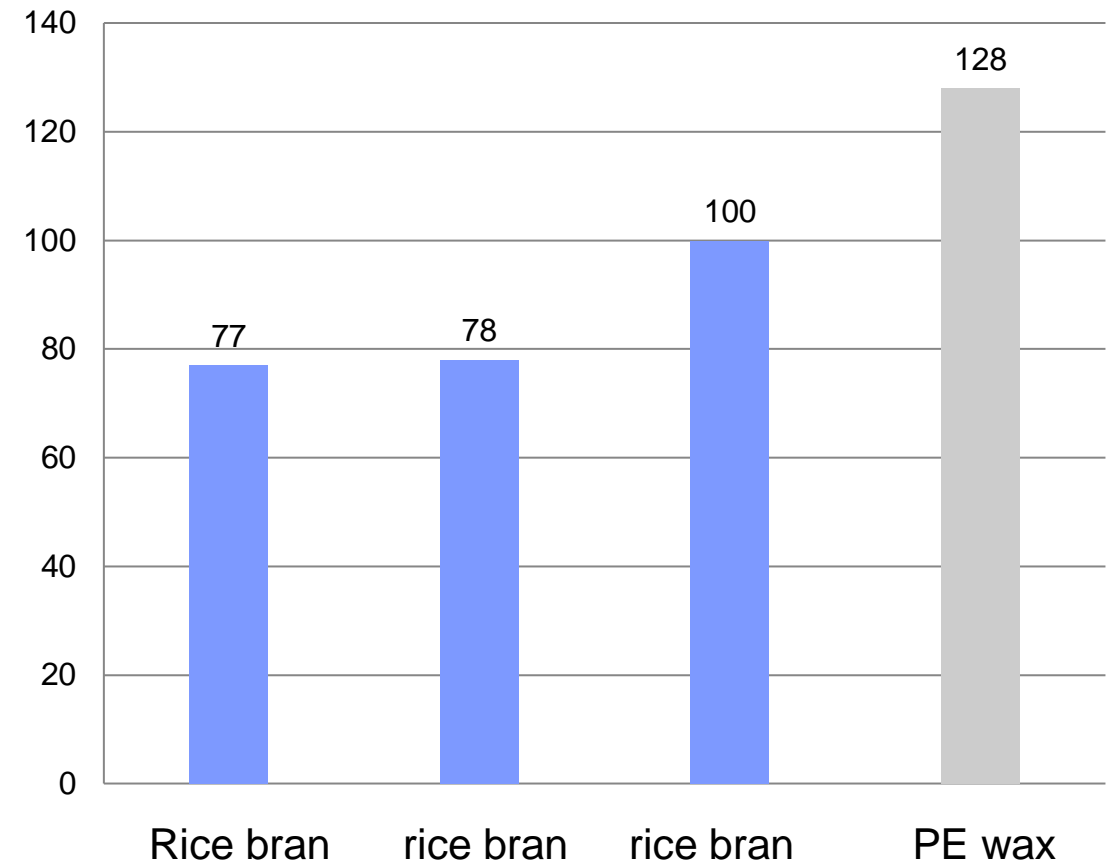
LICOCARE RBW Vita fits for low temperature powder coatings

- Hard, modified wax with medium polarity based on renewable resource
- Highly polar-modified wax based on renewable resource
- Partially saponified wax based on renewable resource

Potential benefits of rice bran waxes:

- Improved degassing
- Good pigment dispersion & processing aid
- Easy to use: Good grind-ability
- Post blend also possible with micronized grade

Dropping point of various waxes

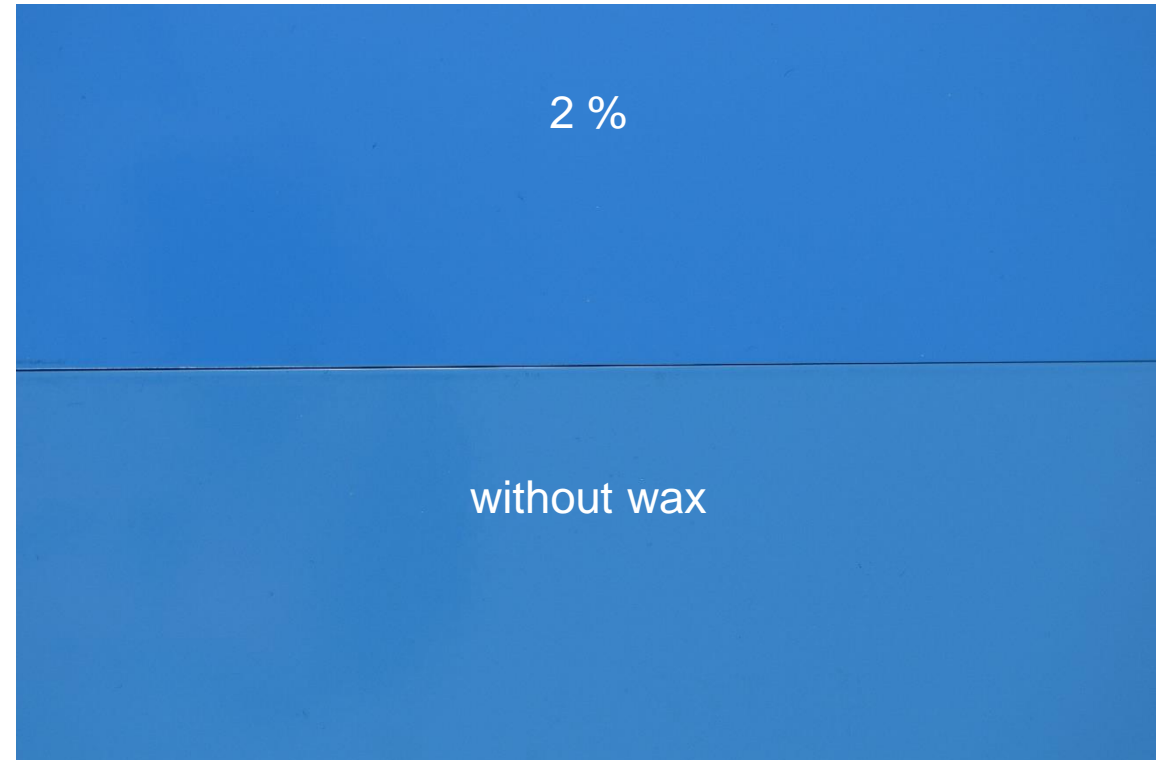
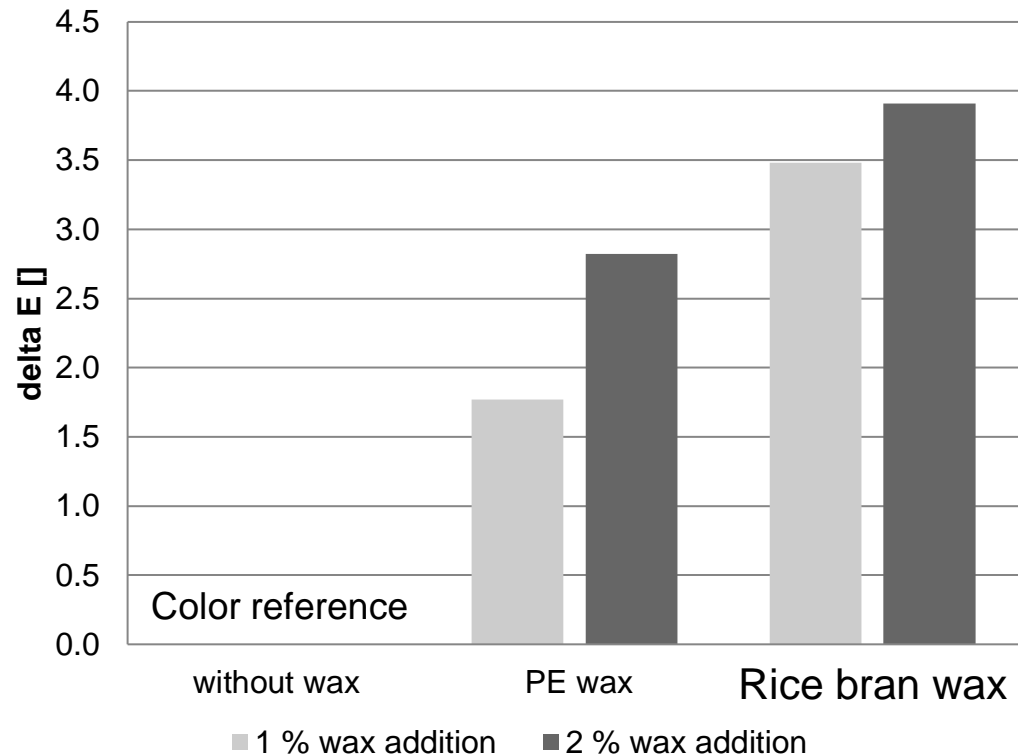




Micronized RBW for outstanding pigment dispersion in powder coatings

PIGMENT DISPERSION

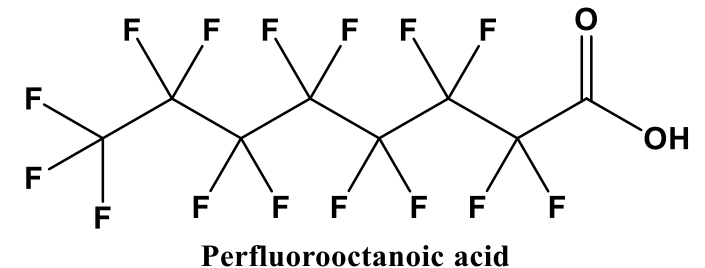
Color difference in reference to coating without wax



PFOA/PFAS REACH regulations

- Perfluorooctanoic acid (PFOA) belongs to the group of perfluoroalkyl substances (PFAS)
 - Release by industrial facilities, landfill, laundry wash water
 - Persistent, bioaccumulating
- Mainly related to PTFE products:
 - Deliberate addition
 - Unintended generation during processing steps

PFOA = Perfluoro-octanoic Acid CAS # 335-67-1 & EC # 206-397-9



Thank You!

Michael Watson | BU Additives/BL Advanced Surface Solutions

Technical Business Development Manager AMERICAS - Coatings and Inks

Clariant Corporation, 500 E Morehead, Suite 400, Charlotte, NC 28202

(home office – Austin, Texas, USA)

: michael.watson@clariant.com



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