New Developments in Additives

Cleaning the Path for Formulating High Performance Waterborne Industrial and Protective Coatings

Johan Bieleman
Patcham

PATCHAM
www.patchamltd.com

Content

- Challenges in developing WB Industrial coatings
- Patcham's suggestions
- Performance of Patcham additives
- Conclusion

Solvent-borne Technology

- Need for change: regulatory, VOC reduction
- Multifunction contribution of Solvents
- Broad range of solvents, for various options

Characteristics WB vs. SB

Surface tension

Water: 72 mN/m

Organic solvents: lower than water, wide variety

Evaporation speed

Water: slow to fast, depending on RH

Organic solvents: fast to slow, depending on selection

Purity

Water: local; purified, demi-water

Organic solvents: industrial quality

Waterborne Technology

- Additives are necessary
- Water has very high surface tension
- Additives to lower ST, but risk of foam stabilization
- Dispersions are very different from polymer solutions, requiring very different procedures
- Compatibility additive / binder?
- Chemical reactivity?

Selection Additives

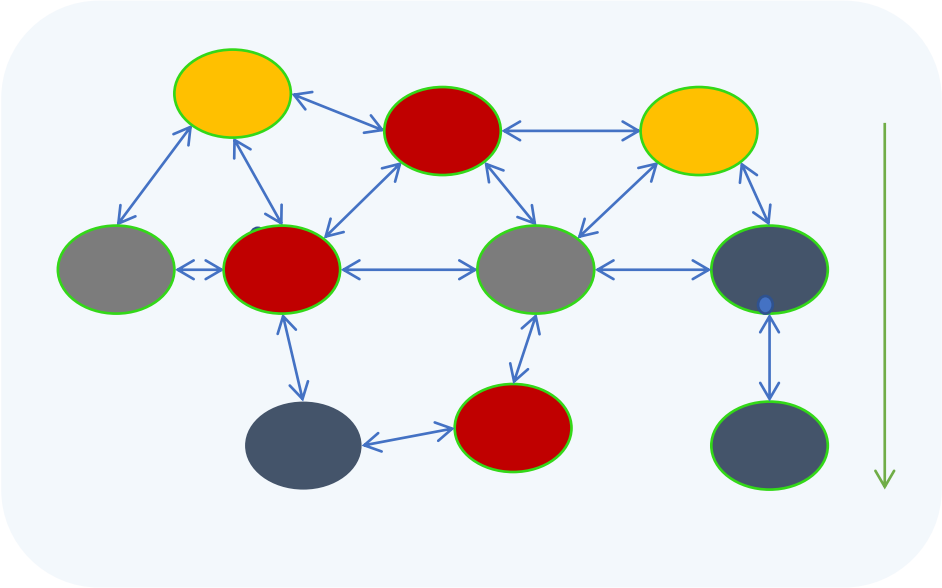
WB Industrial application

Pat-Add DA 817

WB Industrial Primers and Topcoats

Pat-Add 817

- **Introduction**



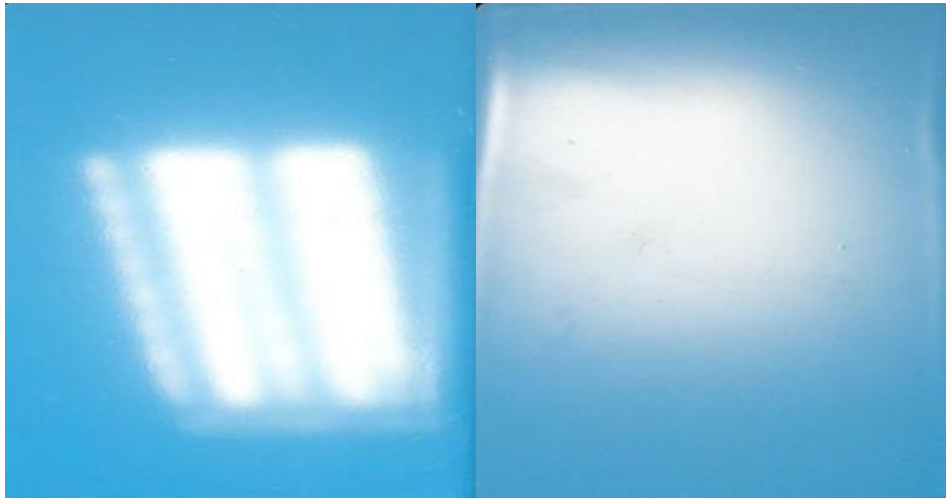
- Polymeric, “Self assembling nature”
- Tight cluster of mixed multiple pigment anchoring groups
- Electrostatic stabilization for high resistance to flocculation
- Charged nature of this structuring dispersant in aqueous environment provides nuclei for self assembly behavior
- Wide range of resin compatibility
- Provides excellent anti-settling properties for 2K aqueous epoxy and PU formulations
- **End Use- WB Primers, Topcoats, Basecoats for Industrial applications**

WB Epoxy Primer

Settling after 24 hours storage

Pat-Add DA 817 **Reference**

Application on MS panel @ 60 µm DFT

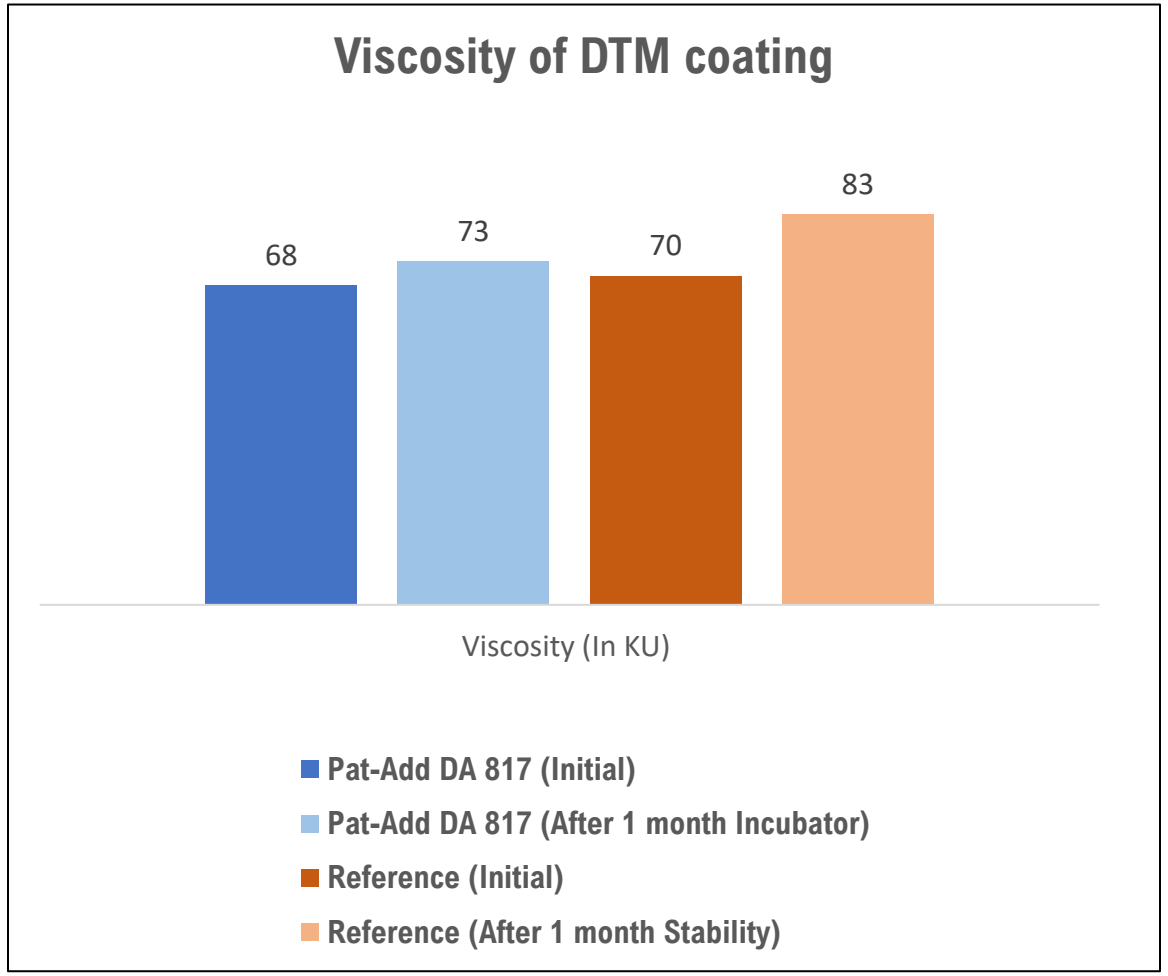


Pat-Add DA 817 **Reference**

	Pat-Add DA 817	Reference
DOI	50	5
Gloss @20° GH	75	12
Gloss @60° GH	94	48

WB Alkyd based Direct to Metal coating

	Pat-Add DA 817	Reference
DOI	59	7
Haze	27	7.6
RIQ	37	5
Gloss @20° GH	79	47



Pat-Add DA 603LV

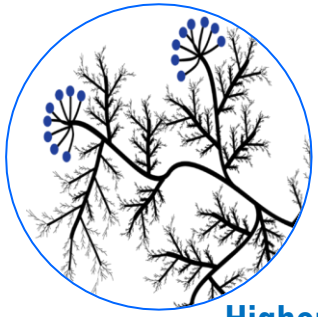
WB Pigment dispersions

Pat-Add DA 603LV

- **Introduction**

Lower MW Branched Polymeric Segments
Allows it to be used in a wider range of resin systems without incompatibility issues

Multiple anchoring groups
Faster wetting rate, Lower mill base viscosity, Stronger stabilization



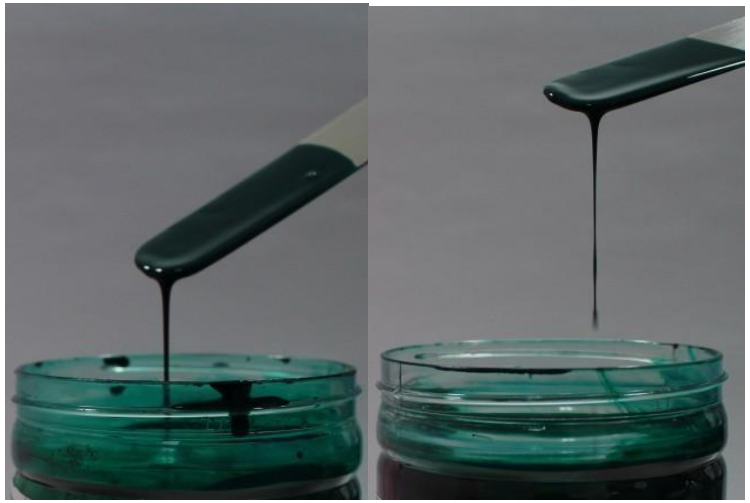
Higher volume per unit mass of polymer
Dense polymeric structure between the pigment particles creates steric repulsion

- HMV Technology inhibits the inherently prominent attractive forces to provide longer stability for dispersions
- Wider compatibility with binders and solvent
- Effective for dispersion of High Channel Carbon Blacks (HCC's) and difficult to disperse organic pigments
- Low VOC as compared to conventional Dispersing agents

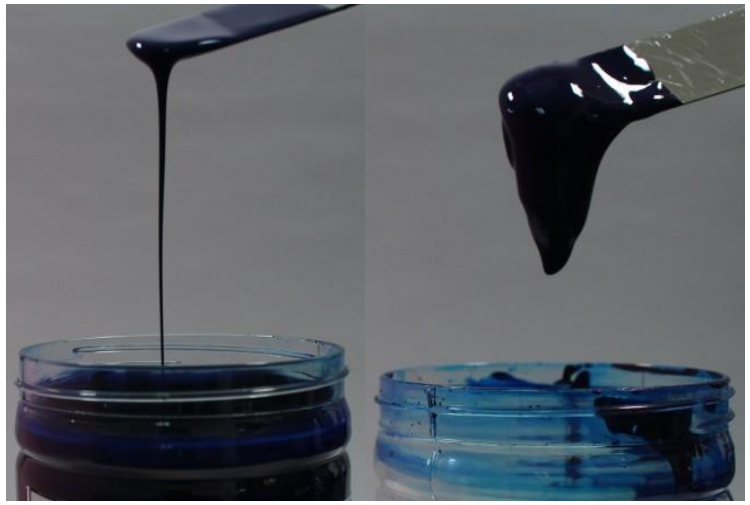
End Use- Pigment dispersions for Decorative and Industrial applications

Pat-Add DA 603LV

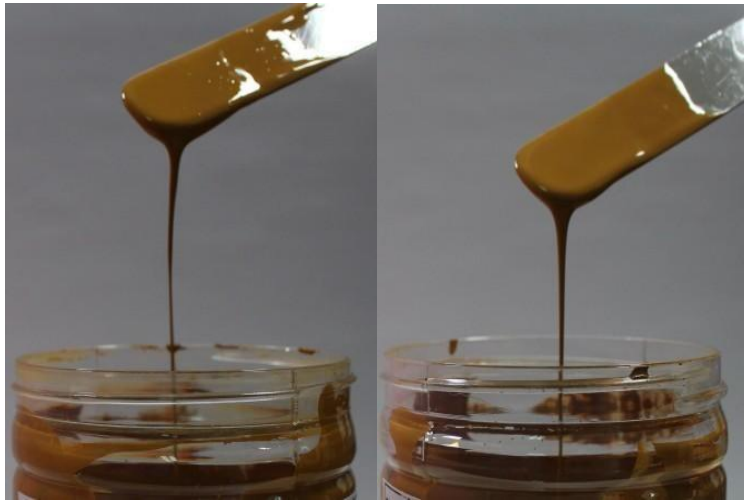
Flow of Colorants



Pat-Add DA 603LV Reference



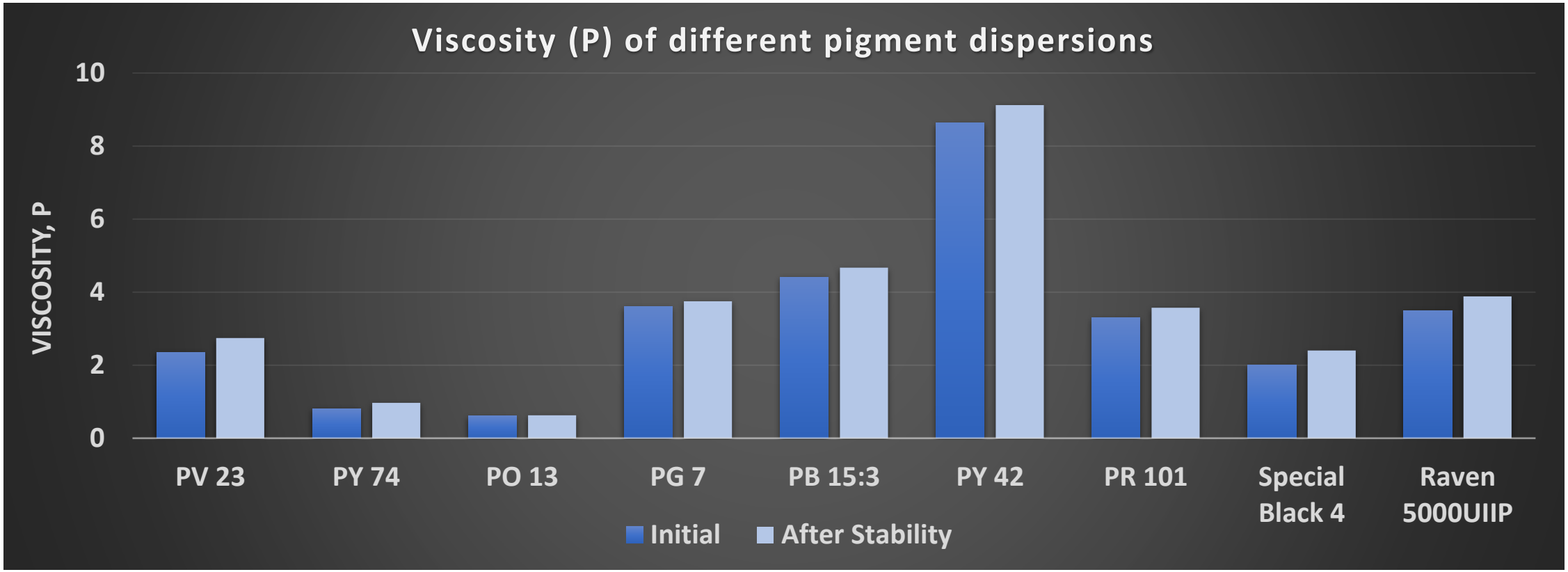
Pat-Add DA 603LV Reference



Pat-Add DA 603LV Reference

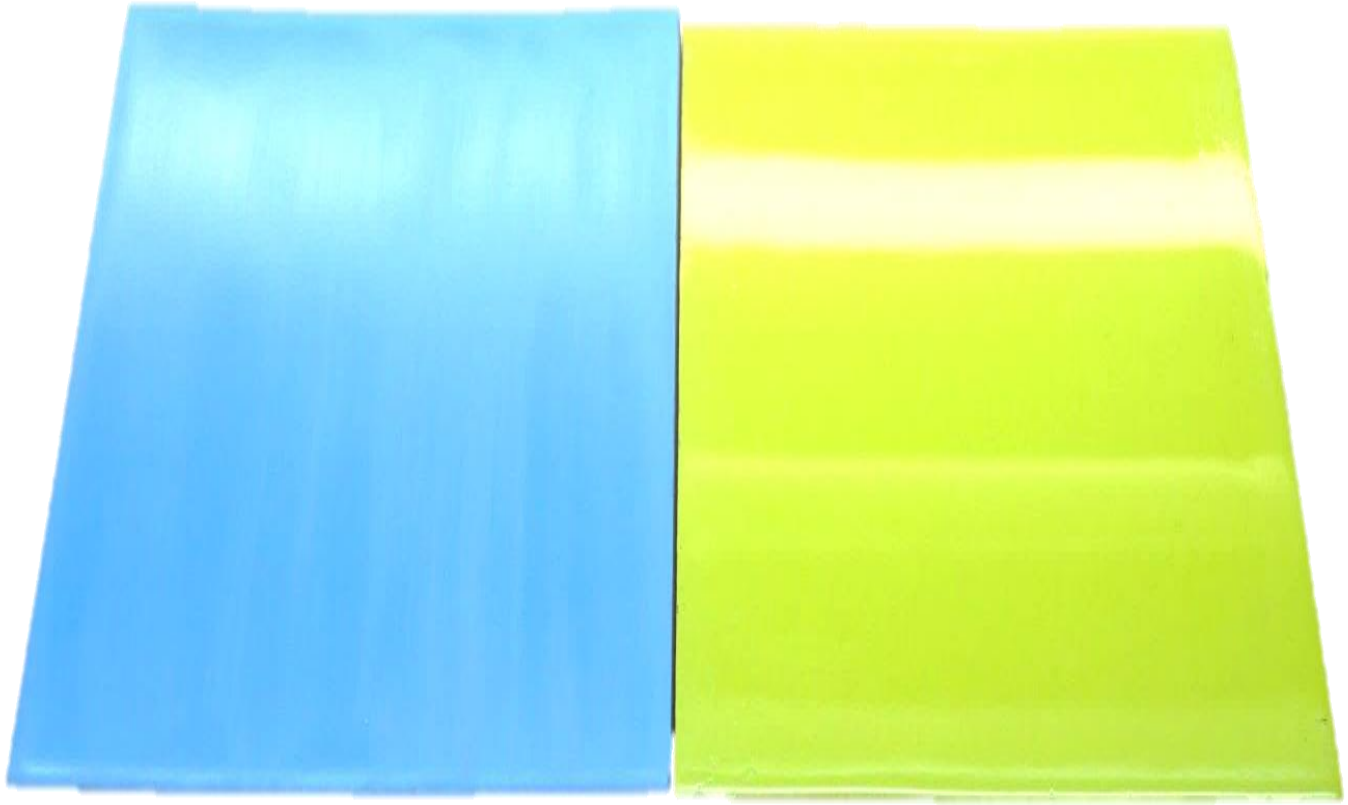
Pat-Add DA 603LV

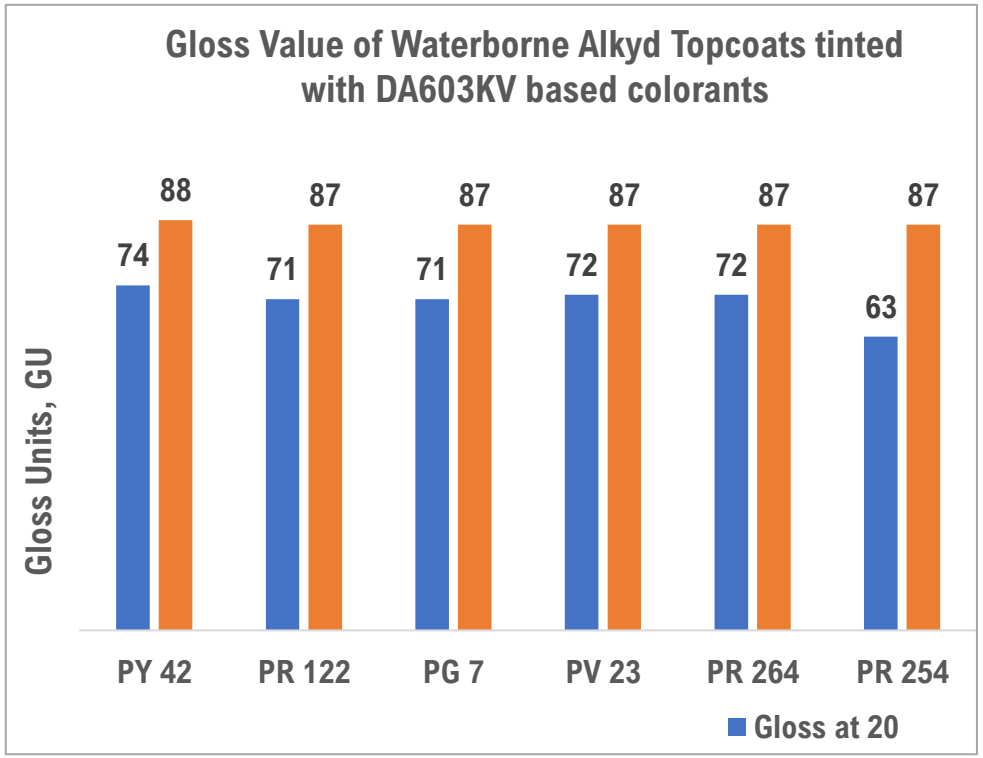
Stability of pigment dispersions



Waterborne Industrial Applications

Alkyd Emulsions topcoats tinted with Pat-Add DA 603LV based colorants





WB Auto Refinish Basecoat

Tinted with Pat-Add DA 603LV based colorants

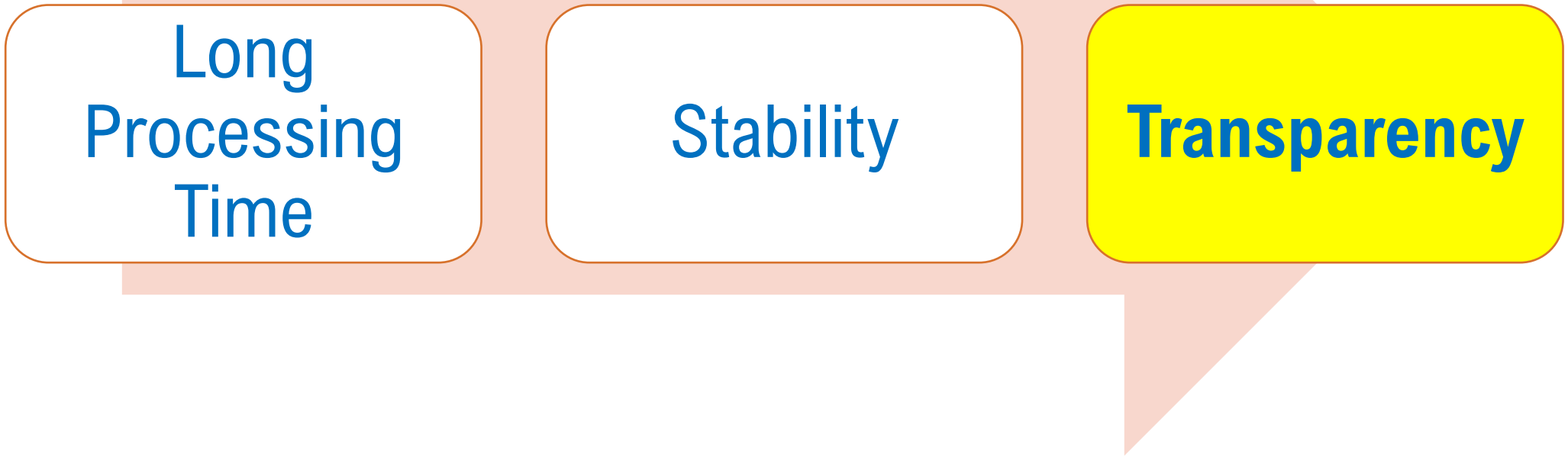
Application details of Base coat	
Panel	Plastic Demo car shape --- 2K PU WB primer --- Sanded 600 mesh emery paper --- apply WB base coat
Application viscosity	24” by FC 4 at 30°C(88°F) for Spray application if require add DM water for spray application
Curing	15 minutes flash off and cure it 80°C(176°F)/30 minutes
DFT(Dry Film Thickness)	15-18 μm

Pat-Add DA 861 and DA 401

Transparent pigment dispersions

Transparent Iron Oxides

- CHALLENGES



Conditions for optimal performance

Key performance ingredients (next to TR Pigment selection)

- Wetting & Dispersing agent
- Proven success with ***Pat-Add DA 401 in conjunction with Pat-Add DA 861***!
- Providing optimal stabilization through presence of high density of electrostatic and entropic functionalities
- Optimal wetting and stabilization, notably for small particle sized inorganic pigments

Pat-Add DA 861 and DA 401

PC of Transparent Yellow and Red Iron Oxides

PC Transparent Iron Oxides

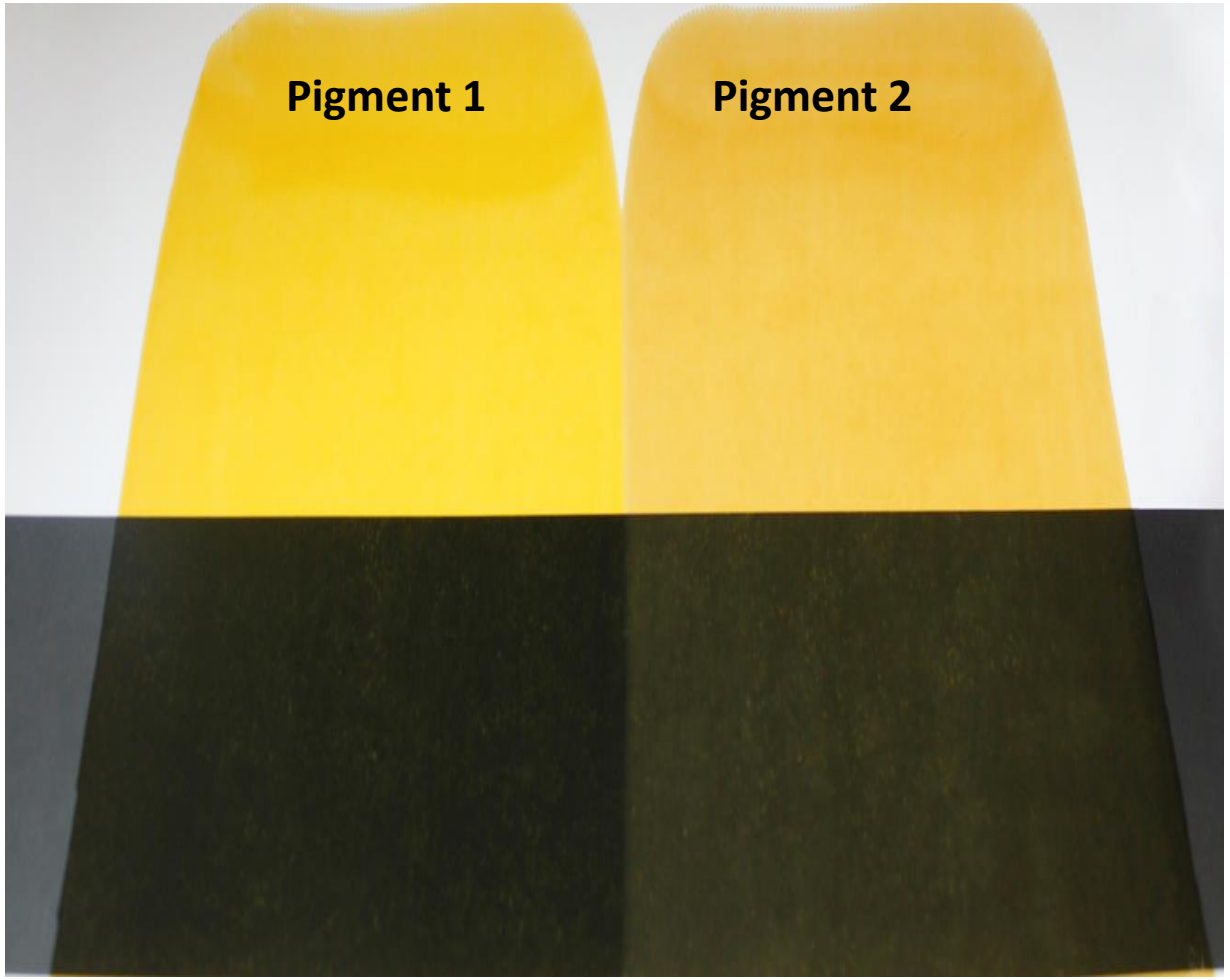
Yellow

Red

Properties	PC Transparent Iron Oxides	
	Yellow (Pigment 1)	Red (Pigment 3)
Viscosity in P (CAP 2000+ @200rpm, sp #1)		
Initial	4.763	0.131
After Stability*	7.88	0.853
Fineness of Grind, µm	<8	<8
Flow of PC after stability	Flowy	Flowy

*Stability Checking 1 month x 60^0C/140^0F

Transparent Yellow Iron Oxide



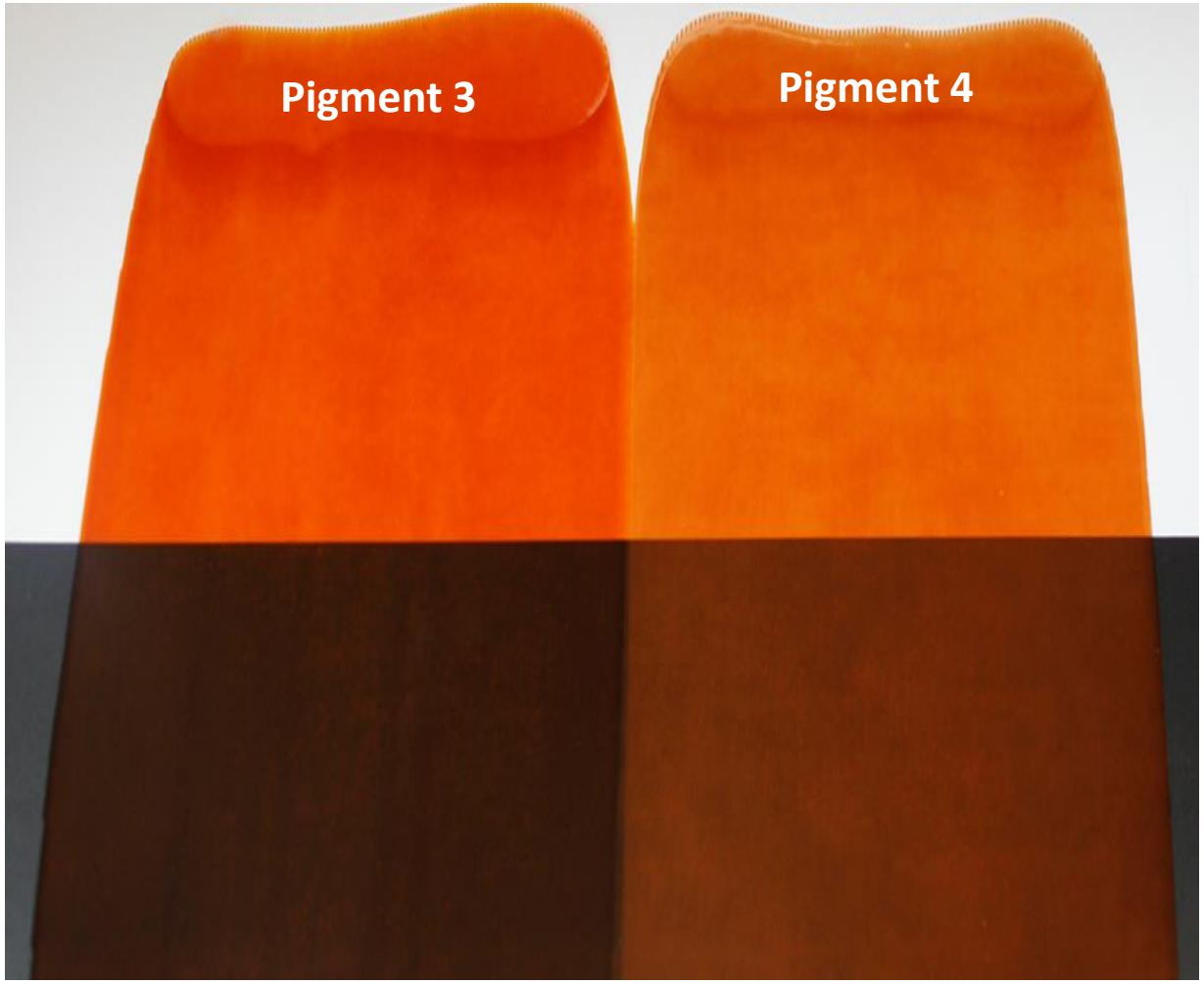
2% Pigment Loading in WB 2K PU Clear

Properties	Pigment 1	Pigment 2
L*	75.09	74.45
a*	12.57	15.34
b*	58.82	64.93
%Transparency	86.74	81.44
Gloss at 20°	152	100
Gloss at 60°	134	102
Haze	0	7.6

Spray Application of WB Basecoats

Substrate:	CRS Panel
Primer:	SB Epoxy/PA
Primer Surfacer:	SB 2K PU
Basecoat:	WB Aluminum B/C
Topcoat	SB 2K PU Clear

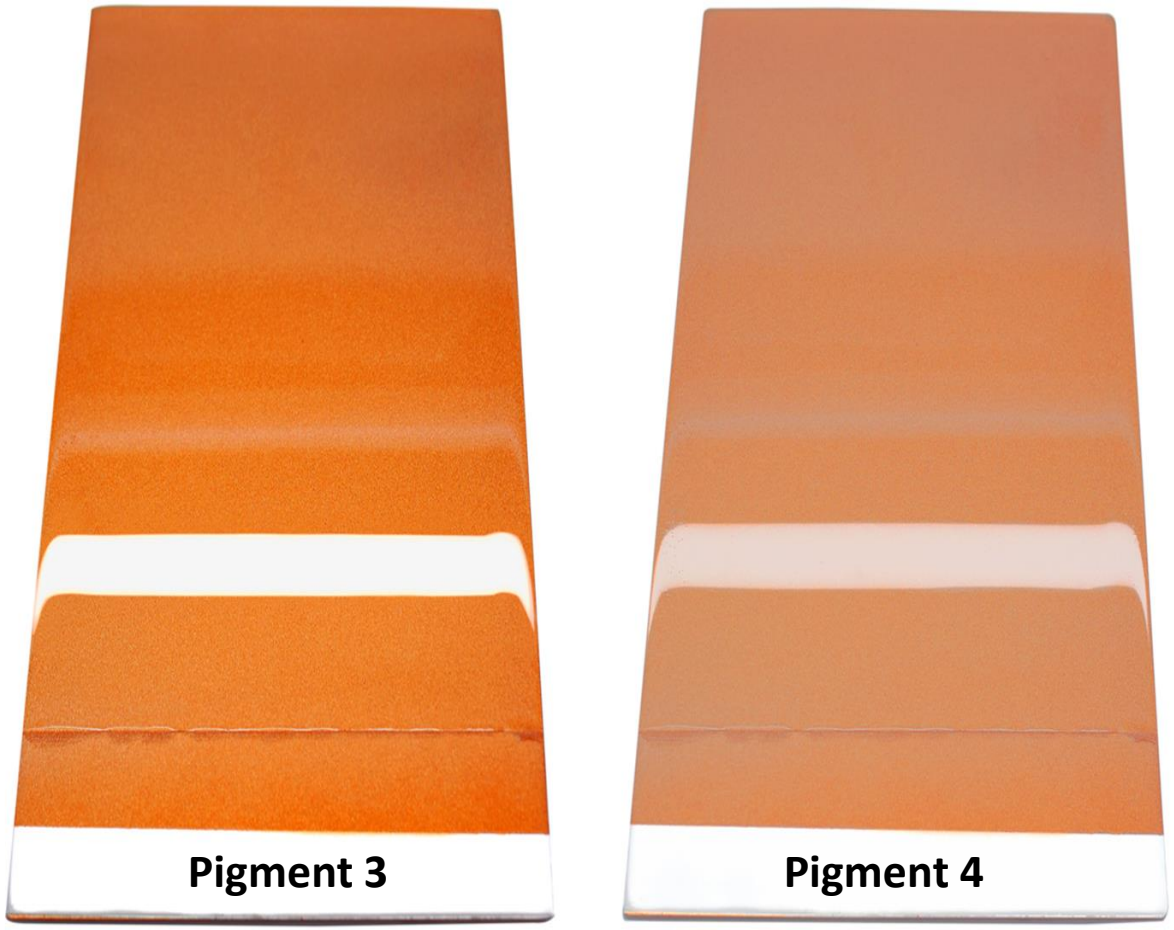
Transparent Yellow Iron Oxide



2% Pigment Loading in WB 2K PU Clear

Properties	Pigment 3	Pigment 4
L*	55.16	48.7
a*	41.08	42.7
b*	49.78	38.94
%Transparency	76.84	59.28
Gloss at 20°	118	75
Gloss at 60°	108	91
Haze	5	7.8

Spray Application of WB Basecoats



Substrate:	CRS Panel
Primer:	SB Epoxy/PA
Primer Surfacer:	SB 2K PU
Basecoat:	WB Aluminum B/C
Topcoat	SB 2K PU Clear

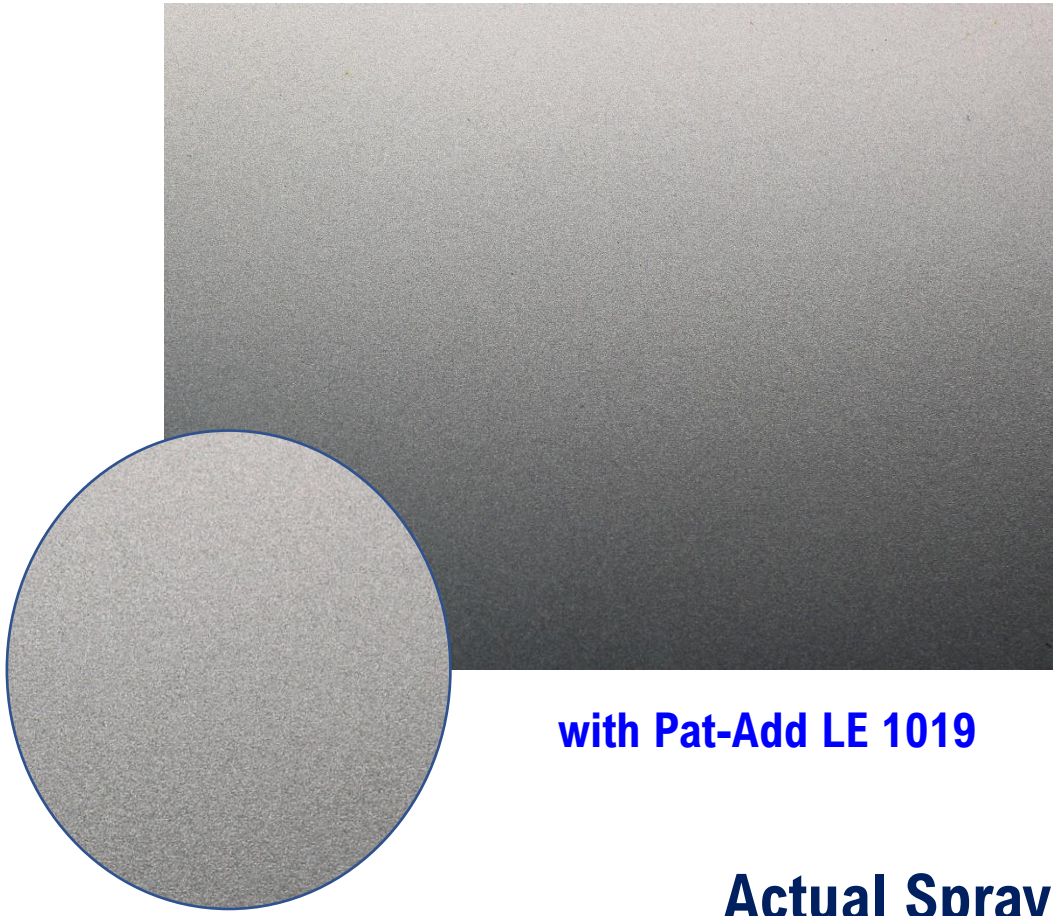
Substrate Wetting and Leveling

Pat-Add LE 1019

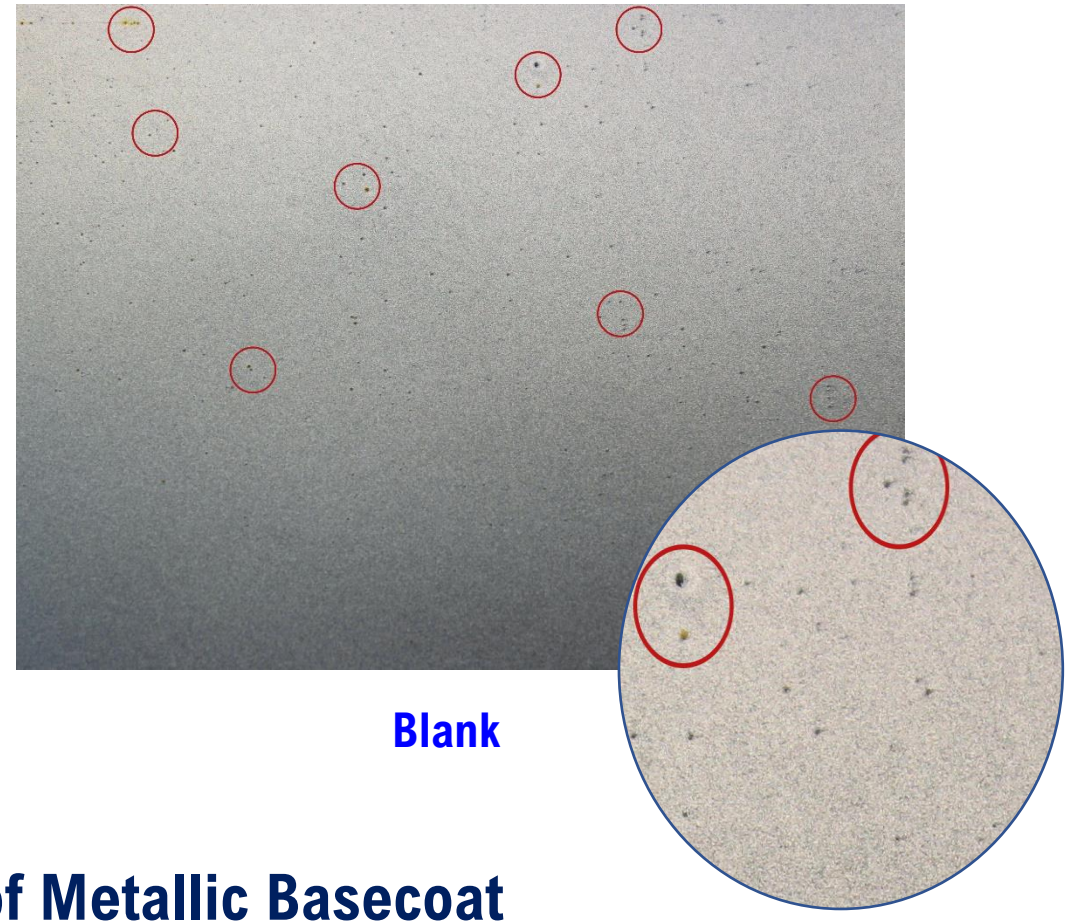
Introduction

- 100% solvent-free polyether modified polysiloxane
- Universal surface modifier, for solventborne, solvent free and waterborne application
- Excellent gloss, flow, levelling, slip and anti cratering properties helps to reduce defects
- Eliminate in-can and film defects like floatation and flocculation
- Improve orientation of effect pigments like matting agents, aluminum and mica pigments
- No side effects like intercoat or recoat adhesion in low bake as well as high bake system

1K WB Metallic Basecoat



with Pat-Add LE 1019

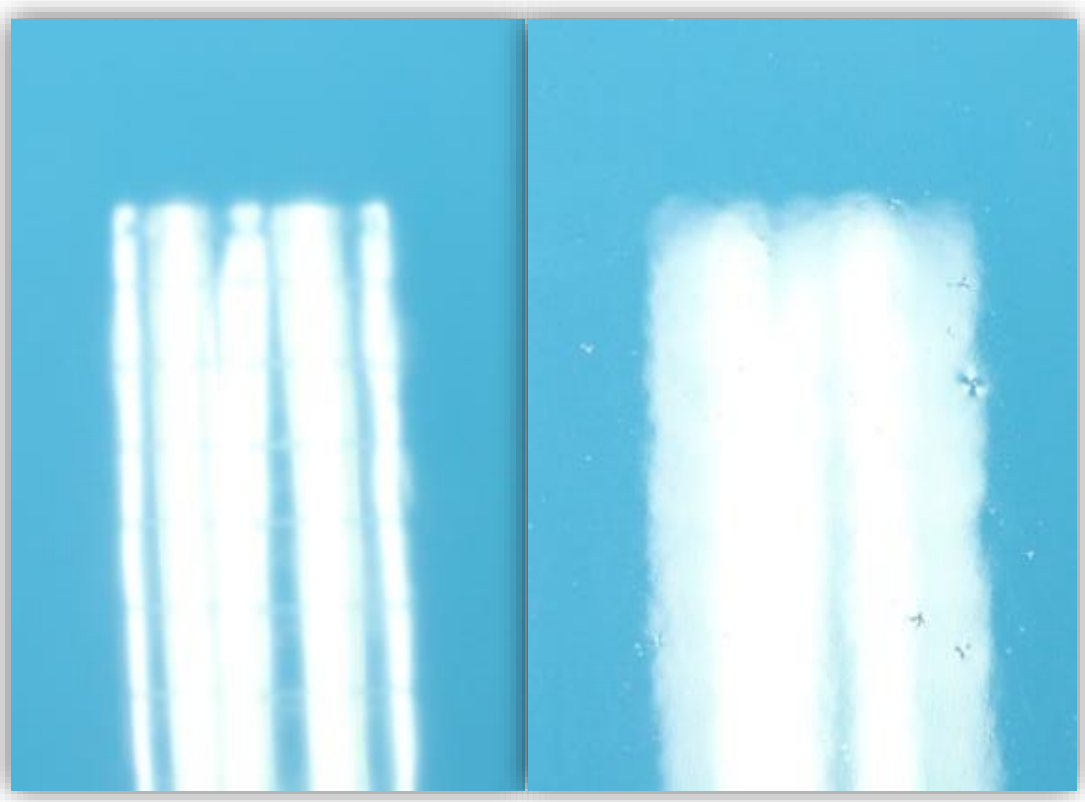


Blank

Actual Spray out of Metallic Basecoat

WB Industrial Topcoats

Pat-Add LE 1019 **Reference**



WB Floor coating based on Epoxy

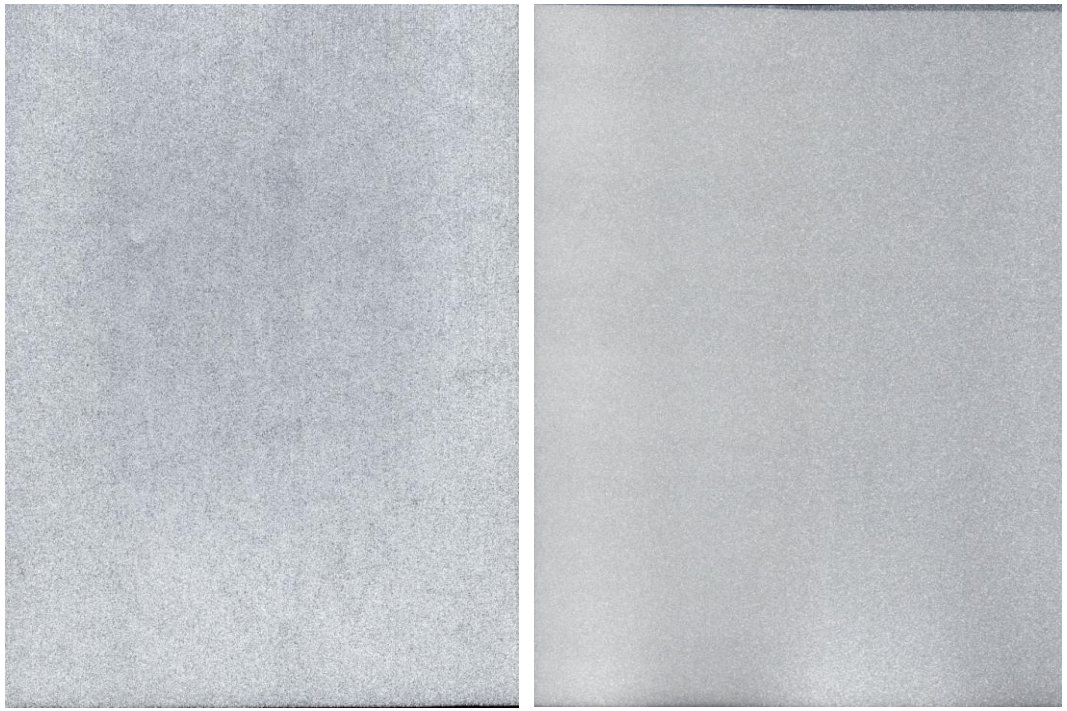
Pat-Add LE 1019 **Reference**

2K PU Topcoat

Orientation

2K PU control

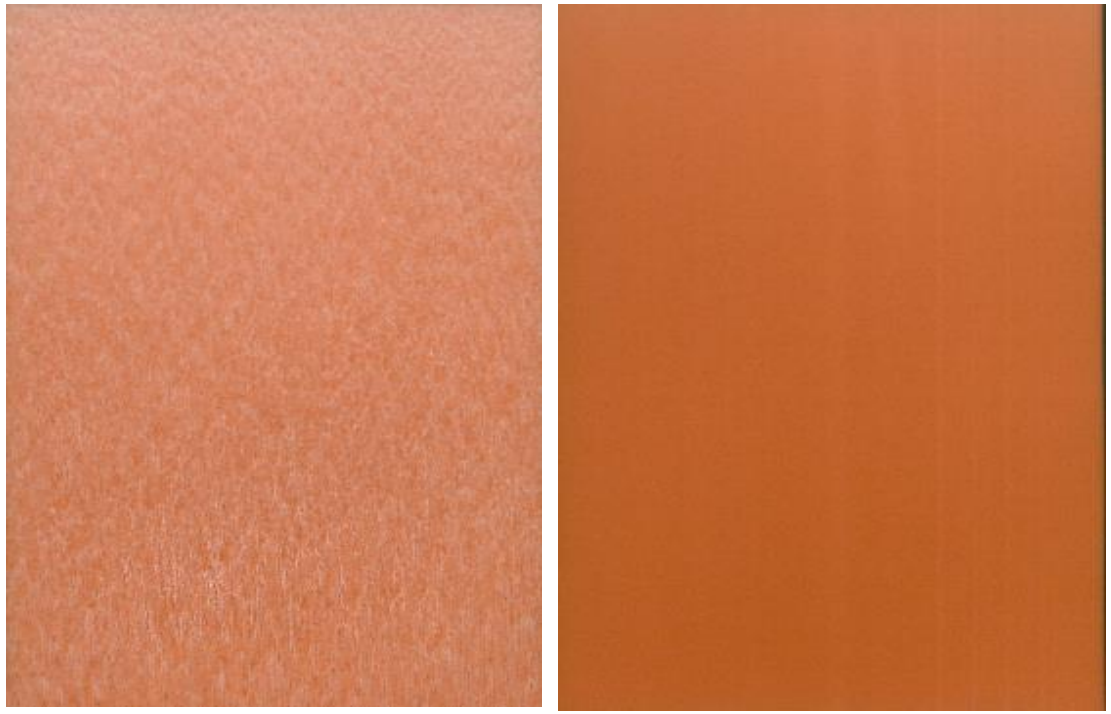
2K PU + 0.3% Pat-Add LE-1019



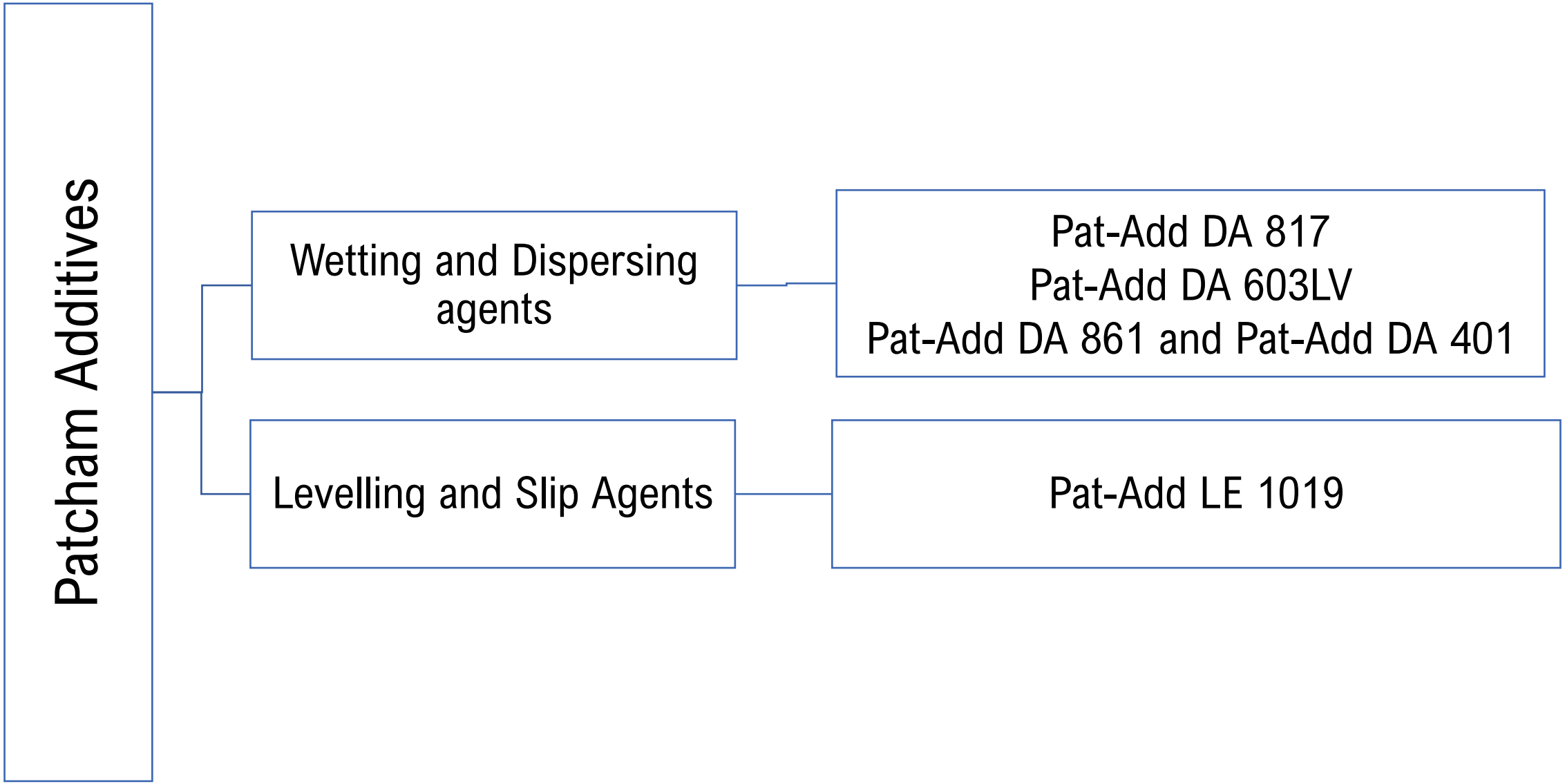
Aluminum pigments orientation

2K PU control

2K PU + 0.3% Pat-Add LE-1019



Special effects pigments orientation


Patcham Additives
Wetting and Dispersing agents
Pat-Add DA 817
Pat-Add DA 603LV
Pat-Add DA 861 and Pat-Add DA 401
Levelling and Slip Agents
Pat-Add LE 1019

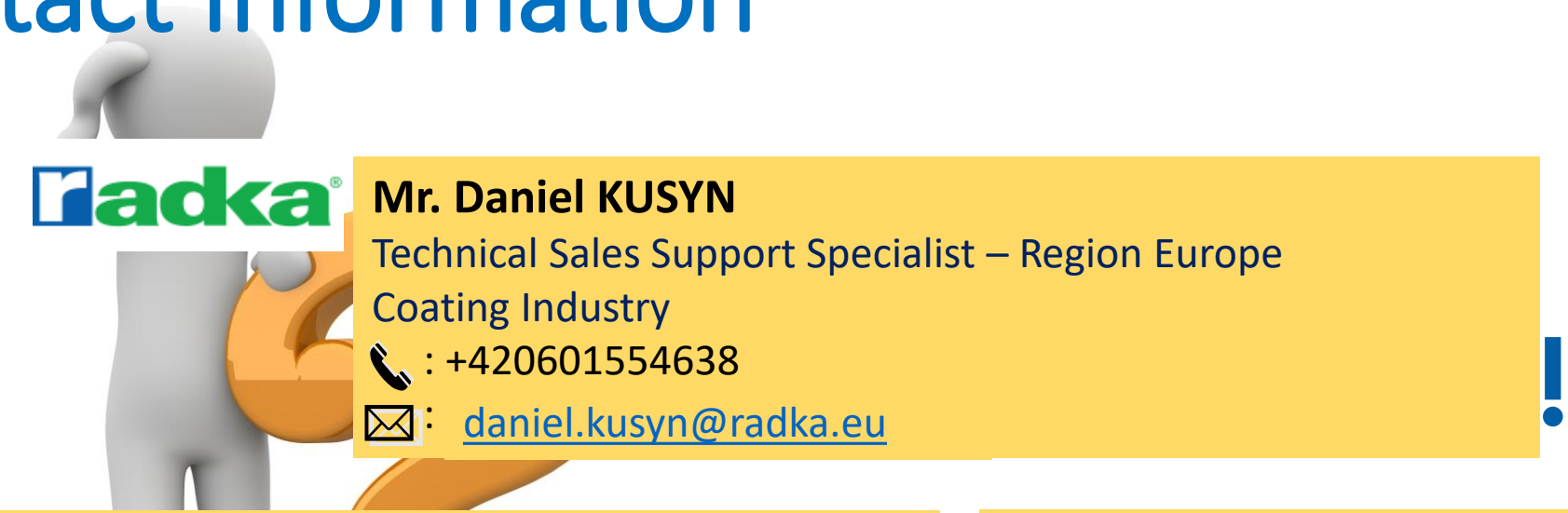
Conclusion

High Performance of Waterborne Industrial Coatings are formulated by proper selection of Additives

Selection process includes, questioning:

- Where is the additive to be located to function
- What is the proper amount of additive
- Dependent on interaction of ALL components

Contact Information



Mr. Daniel KUSYN
Technical Sales Support Specialist – Region Europe
Coating Industry
: +420601554638
: daniel.kusyn@radka.eu

Patcham Europe BV
Dorpsstraat 24 A, 7451 BV Holten, Netherlands.
: +31630723609
: eu@patchamltd.com

Sukanya Chakraborty
Technical and Sales Manager
PATCHAM (FZC)
: +971529694383
:sukanya@patchamltd.com

Thank You!

Disclaimer

While every effort is made to provide accurate and complete information on The **PATCHAM ADDITIVES,** various data may vary depending upon different raw materials, formulations, test procedures and test conditions.

The accuracy, reliability, or totality of the information are not guaranteed or warranted in any way. The **PATCHAM FZC** and its representatives disclaim liability of any kind whatsoever, including liability for quality, performance and fitness for a particular purpose arising out of the use, or inability to use the information.