



Metal & Corrosion Protection Coatings

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ALBERDINGKK BOLEY in a nutshell

 Leading global manufacturer of environmentally friendly water-based binders and oils with unique properties to refine, refurbish, bind and protect multiple types of substrates	 Medium sized, privately owned company > a partner to our customers for more than 250 years	 > 500 employees
 Dynamic, Innovative and flexible Pioneers in biobased polymer dispersions	 Dispersions: Acrylic, Vinyl acetate, Polyurethane and hybrid dispersions Oils: Linseed oil, Castor oil, Derivatives	 Locations: • Krefeld, Germany • Kerpen, Germany • Leuna, Germany • Treviso, Italy • Congleton, UK • Greensboro, USA • Shenzhen, China • Zhuhai, China

For more information about ALBERDINGKK BOLEY and our product offerings, visit www.alberdingk-boley.de.

Overview

	Primer	1K DTM coatings	1K DTM coatings for galvanized steel	Topcoats	Rust converter	Peelable coatings	Topcoats for electroplated surfaces	Chrome free metal pre-treatment (neutral pH)	Chrome free metal pre-treatment (acidic)	Heavy Corrosion Protection (Tubes / Pipelines)
AC 2003	x	x				x				
AC 2360								x		
AC 2403		x			x			x		
AC 2420		x	x					x		
AC 2433	x	x			x					
AC 25352							x			
AC 27401				x						
ALBODUR 1054										x
ALBODUR 921										x
ALBODUR 942										x
CUD 4835									x	
PUR-MATT 910				x			x	x		
Ren AC 8003	x	x				x				
Ren AC 8403		x			x			x		
SC 48	x									
U 502						x				
U 6300							x	x		
U 9000				x			x	x		
U 9380								x		
UC 84				x						

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Metal Coatings

Metal coatings protect values - experts from the NACE (National Association of Corrosion Engineers) estimated the global cost of corrosion to be approx. \$2.5 trillion!

At ALBERDINGK BOLEY we try to help protecting metal with novel waterbased products which can reach the highest protection levels.

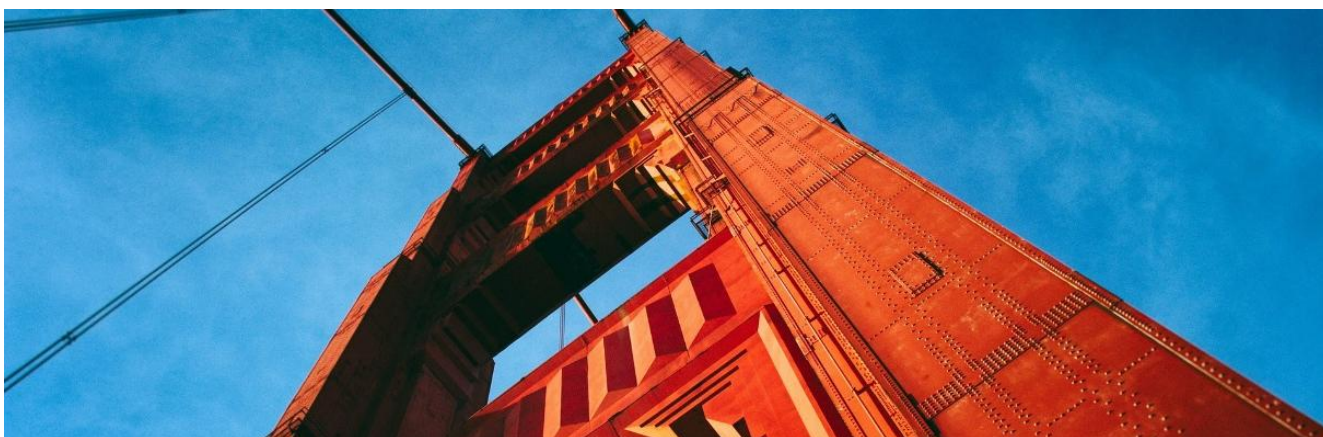
Our portfolio covers a lot of different applications, reaching from 100% solids, 2-pack heavy duty to ultra-thin film protections of < 1µm DFT.

General Metal Coatings

Primer

For primer we offer economic styrene acrylic dispersions such as **ALBERDINGK® SC 48** or pure acrylics like **ALBERDINGK® AC 2003**.

Alberdingk®-product	Solids [%]	Viscosity [mPas]	pH-value	MFFT [°C]	Features
AC 2003	49.0-51.0	20-2,000	7.0-9.0	3	Economic acrylic with excellent corrosion resistance, high PVC possible
Ren AC 8003	49.0-51.0	20-2,000	7.0-9.0	3	Biobased version of AC 2003
SC 48	49.0-51.0	3,000-5,000	7.0-7.5	14	Economic styrene-acrylic, Zn-pigment compatible
AC 2433	43.0-45.0	100-1,000	8.5-9.5	20	Hard acrylic with excellent corrosion resistance



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1K DTM coatings

For DTM our offer reaches from **ALBERDINGK® AC 2403** for very high demanding corrosion protection in low DFT to economic products like **ALBERDINGK® AC 2003** and **ALBERDINGK® AC 2433**.

Alberdingk®-product	Solids [%]	Viscosity [mPas]	pH-value	MFFT [°C]	Features
AC 2003	49.0-51.0	20-2,000	7.0-9.0	3	Economic acrylic for low VOC DTM coatings
Ren AC 8003	49.0-51.0	20-2,000	7.0-9.0	3	Biobased version of AC 2003
AC 2433	43.0-45.0	100-1,000	8.5-9.5	20	Economic, hard acrylic for coatings with C3/C4-resistance
AC 2403	46.0-48.0	200-2,000	8.0-9.0	16	Best in class corrosion resistance, meets C5I-L, super hydrophobic
Ren AC 8403	46.0-48.0	200-2,000	8.0-9.0	20	Biobased version of AC 2403
AC 2420	45.0-47.0	1,000-3,000	8.0-9.0	22	Harder version of ALBERDINGK® AC 2403 , optimized for galvanized surfaces

1K DTM coatings for galvanized steel

1K DTM coatings for galvanized require specific polymers which ensure the best possible adhesion and corrosion protection.

Our latest development **ALBERDINGK® AC 2420** offers best possible corrosion protection on steel and galvanized surfaces.

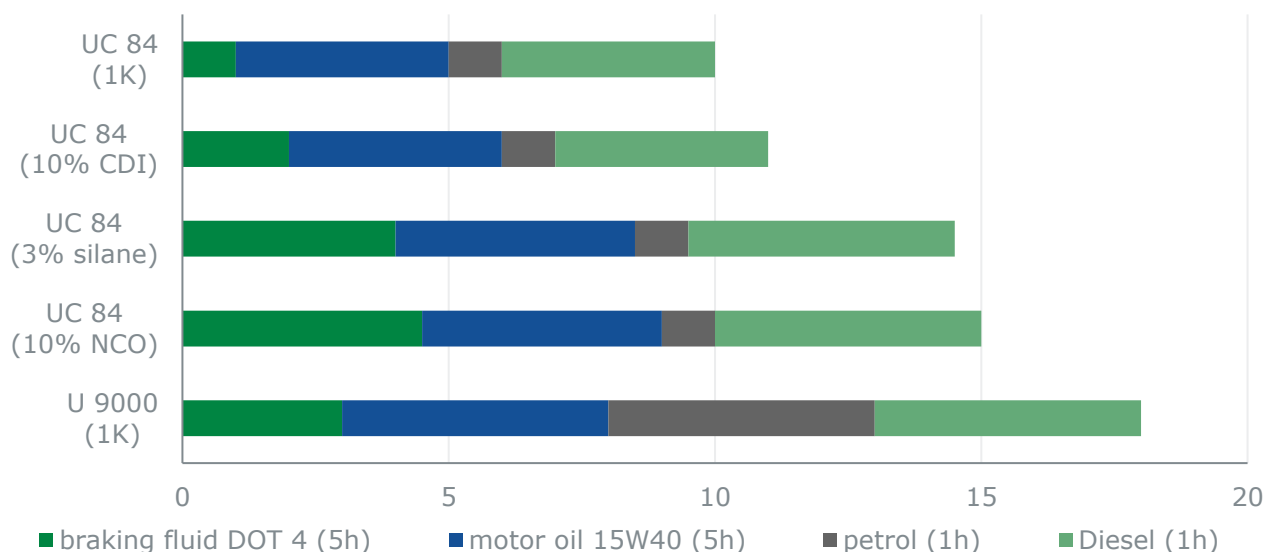
Alberdingk®-product	Solids [%]	Viscosity [mPas]	pH-value	MFFT [°C]	Features
AC 2420	45.0-47.0	1,000-3,000	8.0-9.0	22	Harder version of ALBERDINGK® AC 2403 , optimized for galvanized surfaces

Topcoats

Our products for topcoats can be used to obtain better oil and grease resistance by maintaining the anticorrosion properties of the coating underneath. Products for 1K, 2K isocyanate as well as 2K non-isocyanate are available

Alberdingk®-product	Solids [%]	Viscosity [mPas]	pH-value	MFFT [°C]	Features
AC 27401	37.0-39.0	100-1,500	7:5-8:5	15	Very high chemical resistances, especially for matt systems
PUR-MATT 910	34.0-36.0	20-2,000	7.0-9.0	15	Inherent matt PUD for low gloss coatings with high resistances
UC 84	34.0-36.0	20-200	7.5-8.5	42	Hard PC-Copolymer, for 1K, 2K and 2K-non isocyanate topcoats, superior weathering resistance
U 9000	28.0-30.0	50-1,000	7.0-8.5	0	Very hard PC-PUD with superior chemical and weathering resistance

Chemical resistances with different x-linking technologies:



Rust converter

Rust converters can be formulated by mixing tannic acid and polymer, **ALBERDINGK® AC 2403** is an ideal choice for this kind of product. Novel rust converters such as ASCOTRUST® offer the ability to formulate with high performance resins such as **ALBERDINGK® AC 2403**.

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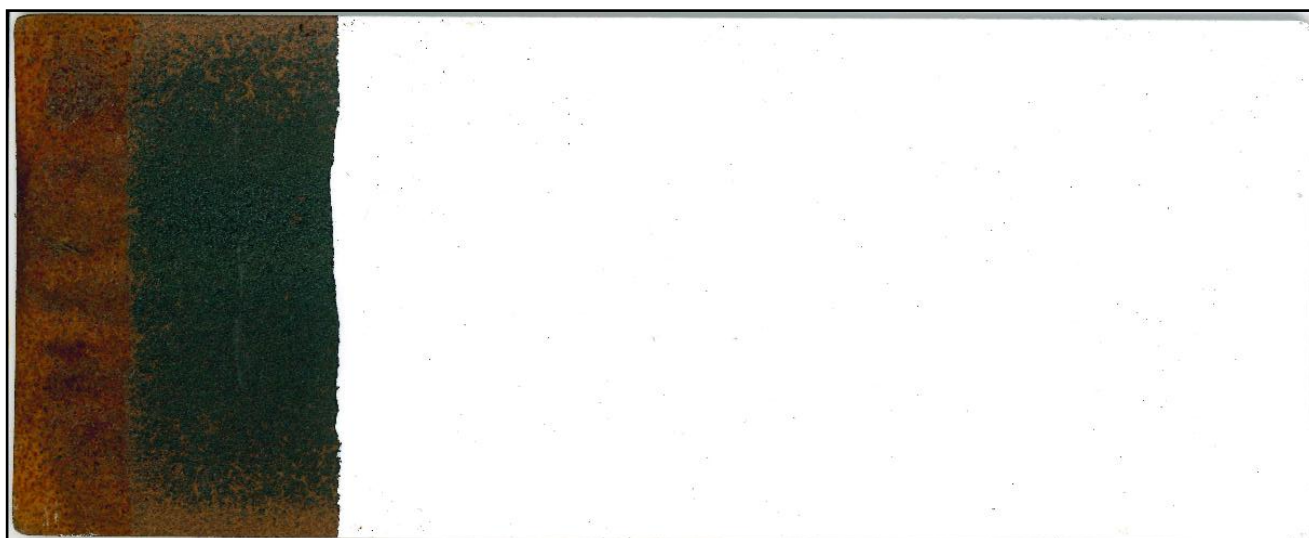
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Alberdingk®-product	Solids [%]	Viscosity [mPas]	pH-value	MFFT [°C]	Features
AC 2403	46.0-48.0	200-2,000	8.0-9.0	16	For rust converters with ASCOTRUST®, super hydrophobic and excellent corrosion resistance
Ren AC 8403	46.0-48.0	200-2,000	8.0-9.0	20	Biobased version of AC 2403

Rust converter based on **ALBERDINGK® AC 2403**:



0 | 1 | 2 | 3

Build-up:

- 0: Rusty steel-panel, covered with:
- 1: 1 layer of rust converter based on **ALBERDINGK® AC 2403** brush applied
- 2: 1 layer of FP 2403-35 (white pigm. anti-corrosive primer), brush applied
- 3: 1 layer of FP 27401-18 (2k-topcoat), brush applied

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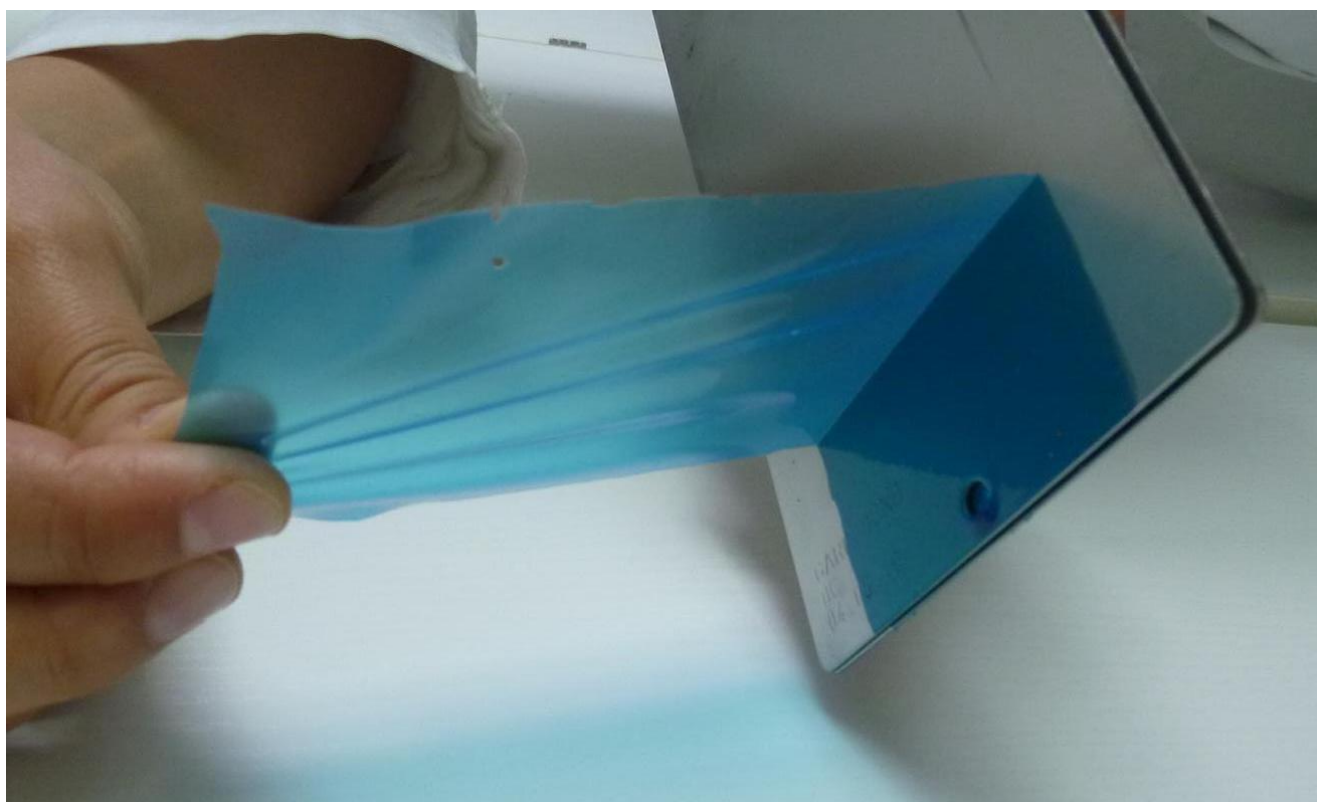
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Peelable coatings

ALBERDINGK® U 502 offers excellent peel properties thank to its high tensile strength in combination with good corrosion protection.

Alberdingk®-product	Solids [%]	Viscosity [mPas]	pH-value	MFFT [°C]	Features
U 502	39.0-41.0	10-800	7.0-8.0	0	High tensile strength, easy to peel, excellent corrosion resistance
AC 2003	49.0-51.0	20-2,000	7.0-9.0	3	Economic acrylic with good corrosion resistance
Ren AC 8003	49.0-51.0	20-2,000	7.0-9.0	3	Biobased version of AC 2003



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Topcoats for electroplated surfaces

Topcoats for electroplated materials can offer improved corrosion resistance and non-iridescent surfaces.

Neutral pH-range

Alberdingk®-product	Solids [%]	Viscosity [mPas]	pH-value	MFFT [°C]	Features
U 6300	32.0-34.0	10-2,000	7.5-8.5	0	Excellent corrosion & chemical resistance
U 9000	28.0-30.0	50-1,000	7.0-8.5	0	Highest corrosion & chemical resistance
AC 25352	50.0-52.0	300-800	7.0-8.0	20	Economic acrylic with very good corrosion resistance
PUR-MATT 910	34.0-36.0	20-2,000	7.0-9.0	15	Inherent matt PUD for low gloss / phosphated look



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Metal pre-treatment

Metal pre-treatments or thin organic coatings are permanent materials which offer excellent corrosion protection, very good intercoat adhesion and blocking resistance. Our offer ranges from polymer dispersions for highly acidic media (chrome-free) to non-chrome systems with neutral pH level. Due to environmental concerns chrome needs to be replaced by non-chrome alternatives without sacrificing the final properties.



Chrome free metal pre-treatment

Neutral pH

Alberdingk®-product	Solids [%]	Viscosity [mPas]	pH-value	MFFT [°C]	Features
U 6300	32.0-34.0	10-2,000	7.5-8.5	0	Excellent corrosion & good chemical resistance
U 9000	28.0-30.0	50-1,000	7.0-8.5	0	Highest level of chemical & corrosion resistance, superior alkaline resistance
U 9380	31.0-34.0	10-250	7.5-9.0	25	For low VOC, high chemical resistance, outstanding flexibility
PUR-MATT 910	34.0-36.0	20-2,000	7.0-9.0	15	Inherent matt PUD for phosphate look
AC 2360	46.0-48.0	100-3,000	7.0-9.0	0	Economic, multiphase, self-x-linking acrylic with very good corrosion resistance
AC 2403	46.0-48.0	200-2,000	8.0-9.0	16	Super hydrophobic, multiphase acrylic with superior corrosion resistance
Ren AC 8403	46.0-48.0	200-2,000	8.0-9.0	20	Biobased version of AC 2403
AC 2420	45.0-47.0	1,000-3,000	8.0-9.0	22	Harder version of ALBERDINGK® AC 2403 , optimized for galvanized surfaces

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Acidic

Alberdingk®-product	Solids [%]	Viscosity [mPas]	pH-value	MFFT [°C]	Features
CUD 4835	34.0-36.0	20-200	4.0-5.5	35	Harder version of ALBERDINGK® CUD 4820 , higher chemical resistance

Heavy Corrosion Protection (Tubes / Pipelines)

ALBODUR® polyols are suitable for 100% solids, 2pack coatings for heavy duty applications such as pipeline coatings.

Alberdingk®-product	Solids [%]	Viscosity [mPas]	OH-value [mg KOH/g]	Features
ALBODUR® 921	100	600	218	used in combination with. ALBODUR® 942 for 2-pack aromatic pipe coatings
ALBODUR® 942	100	500	318	polyol which forms epoxy like hard films with highest hardness and chemical resistance
ALBODUR® 1054	100	2,700-3,200	210	For aliphatic topcoats with excellent UV and chemical resistance



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Trivia about the corrosion of iron

Corrosion is an oxidation of iron or other metals and requires a presence of oxygen, an electrolyte and water. The known "red rust" is the result of intermediate reactions of iron hydroxide with oxygen.



Illustration of corrosion of iron with NaCl solution:

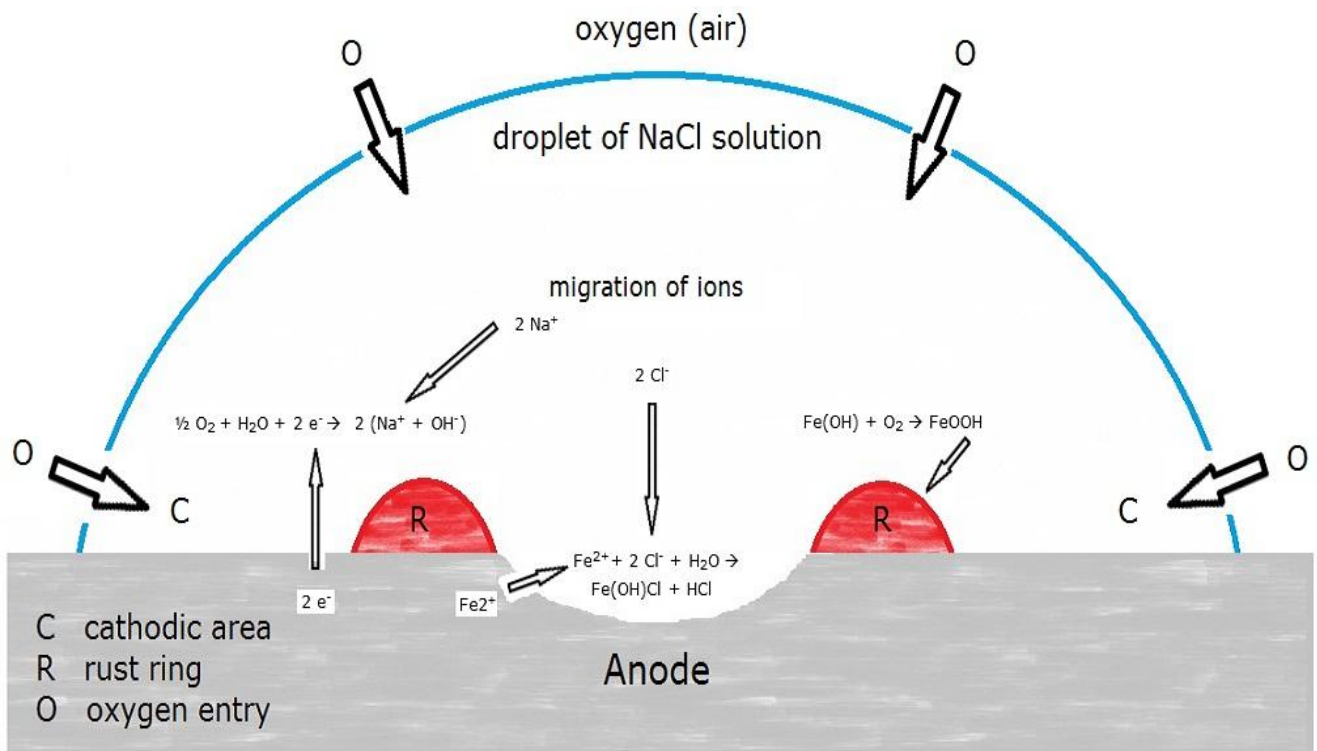


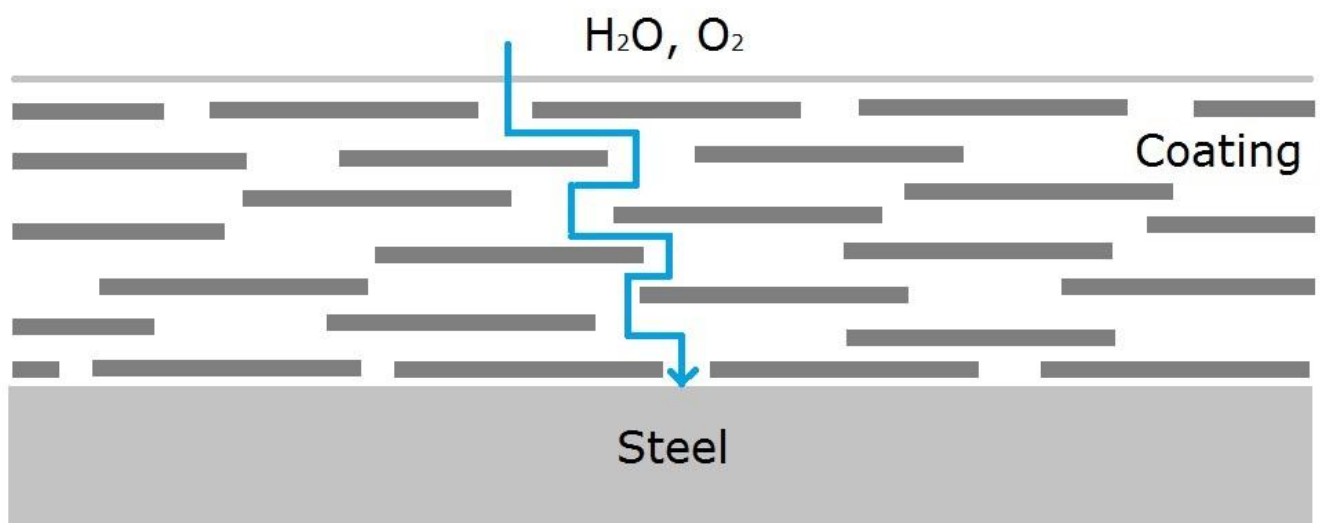
Illustration of corrosion on iron with NaCl solution (U. R. Evans model)

Ways to protect metal?

Passive anti-corrosion pigments (barrier effect, increased diffusion path):

E.g. Disc-shaped pigments like Iron-Glimmer, Calcium-silicate.

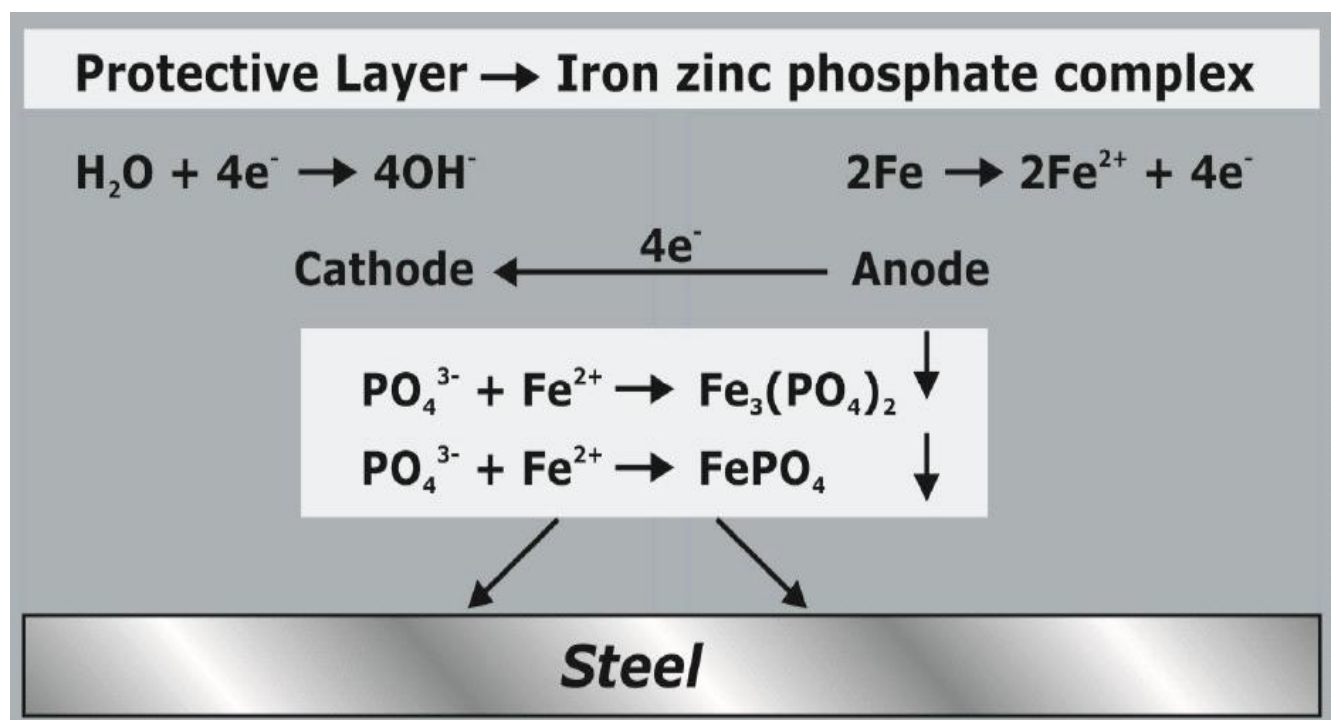
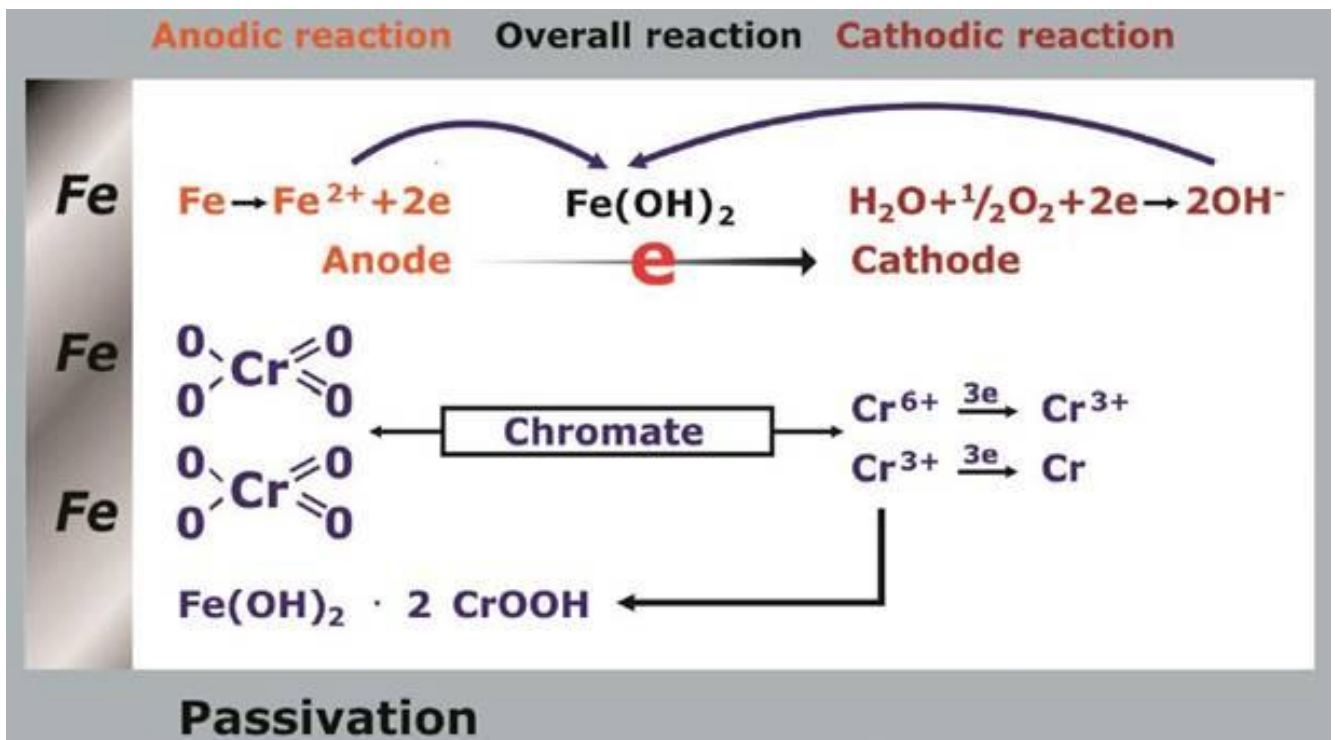
Some of these fillers have a tendency to dissociate into bivalent cations; therefore the binder requires a stable polymer, due to possible interactions of bivalent cations with the particle's surface charge. To counteract these cations the polymer needs more surfactant and surface charge, hence it will be less water resistant.



Active anti-corrosion pigments:

Zinc dust (donator-anode), zinc chromate (passivation), zinc phosphate (precipitation), red lead (saponification with alkyd resins) or nitrite salts (reducing agent -> flash rust protection). Analog to the passive anti-corrosion pigments the active pigments can also dissociate into bi- or multivalent cations, weakening the binders polymer stabilization. Labelling of these phosphates or oxides are also an issue and cans have to be classified with the phrase H 410: Very toxic to aquatic life with long lasting effects.

To get the full potential of phosphate pigments the polymer needs to have certain hydrophilic properties to ensure electro chemical reactions between the pigment with the metal surface.

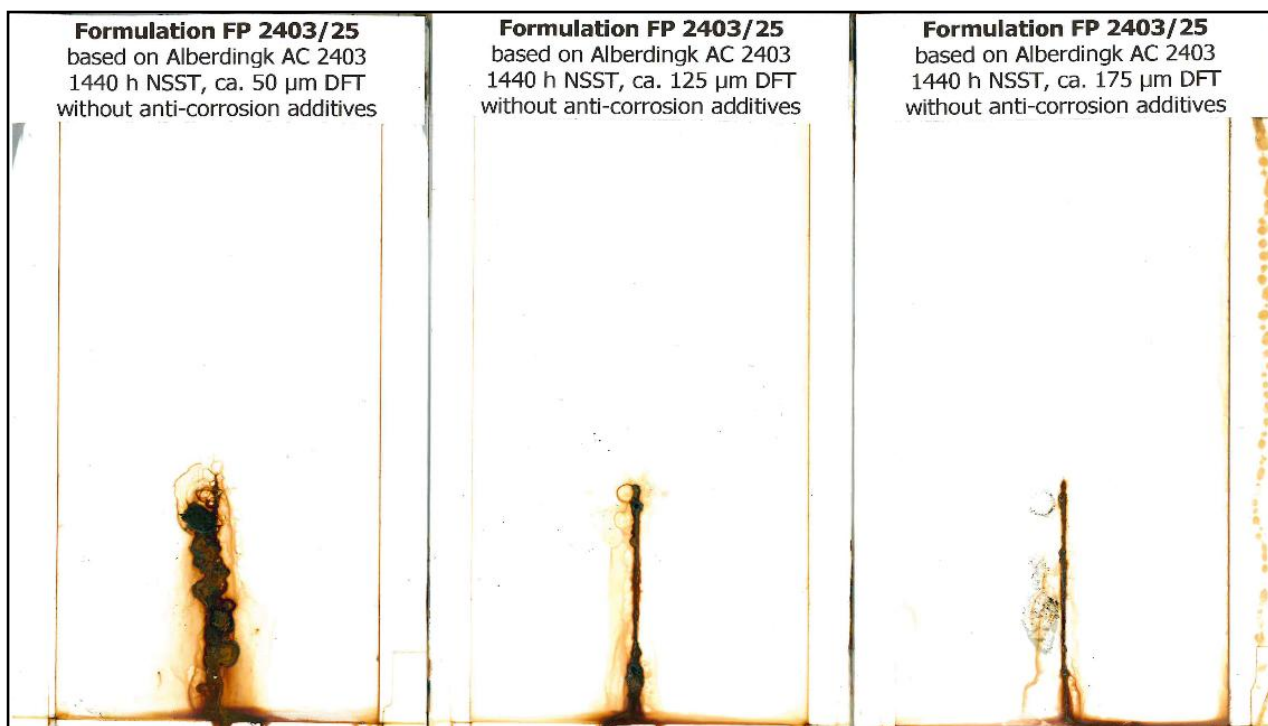
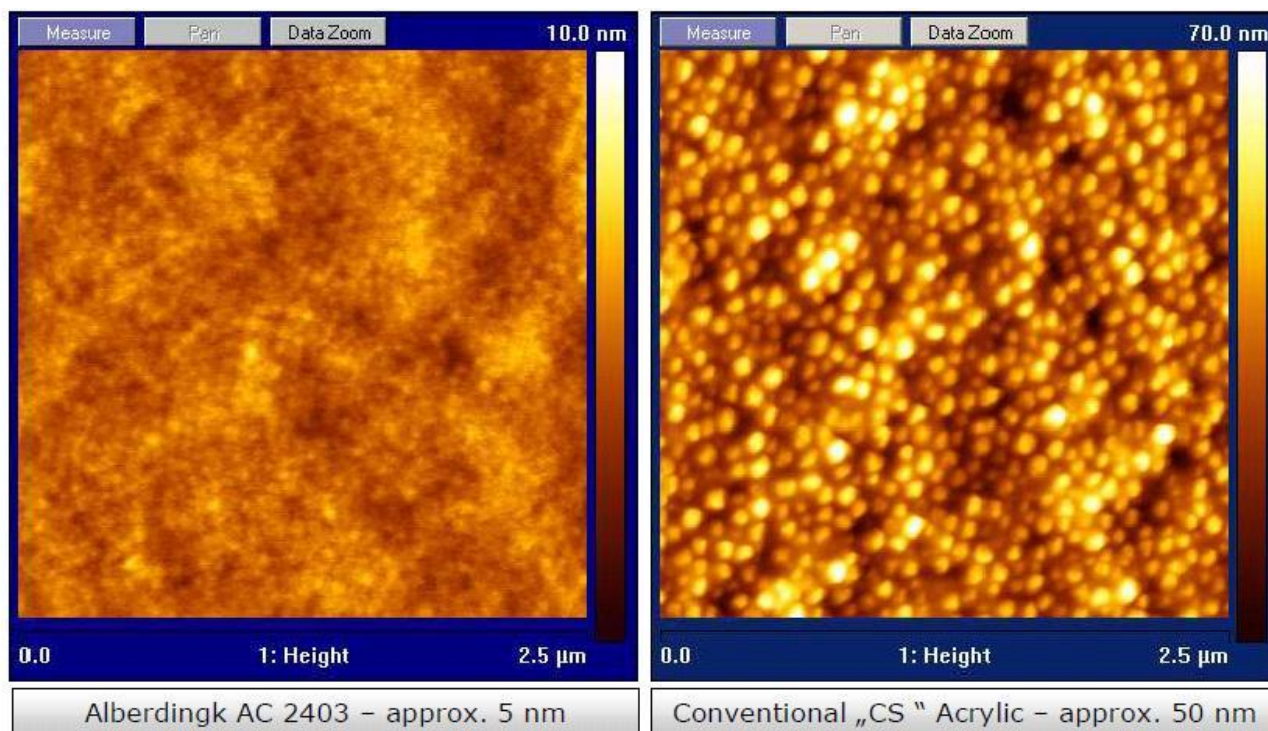


Source: Heubach

Binders with water barrier effect due to extreme hydrophobic and compact polymer matrix:

ALBERDINGK® AC 2403, 2K PU- and epoxy systems

Illustration of particle size of **ALBERDINGK® AC 2403** and a conventional multi-phase acrylic binder



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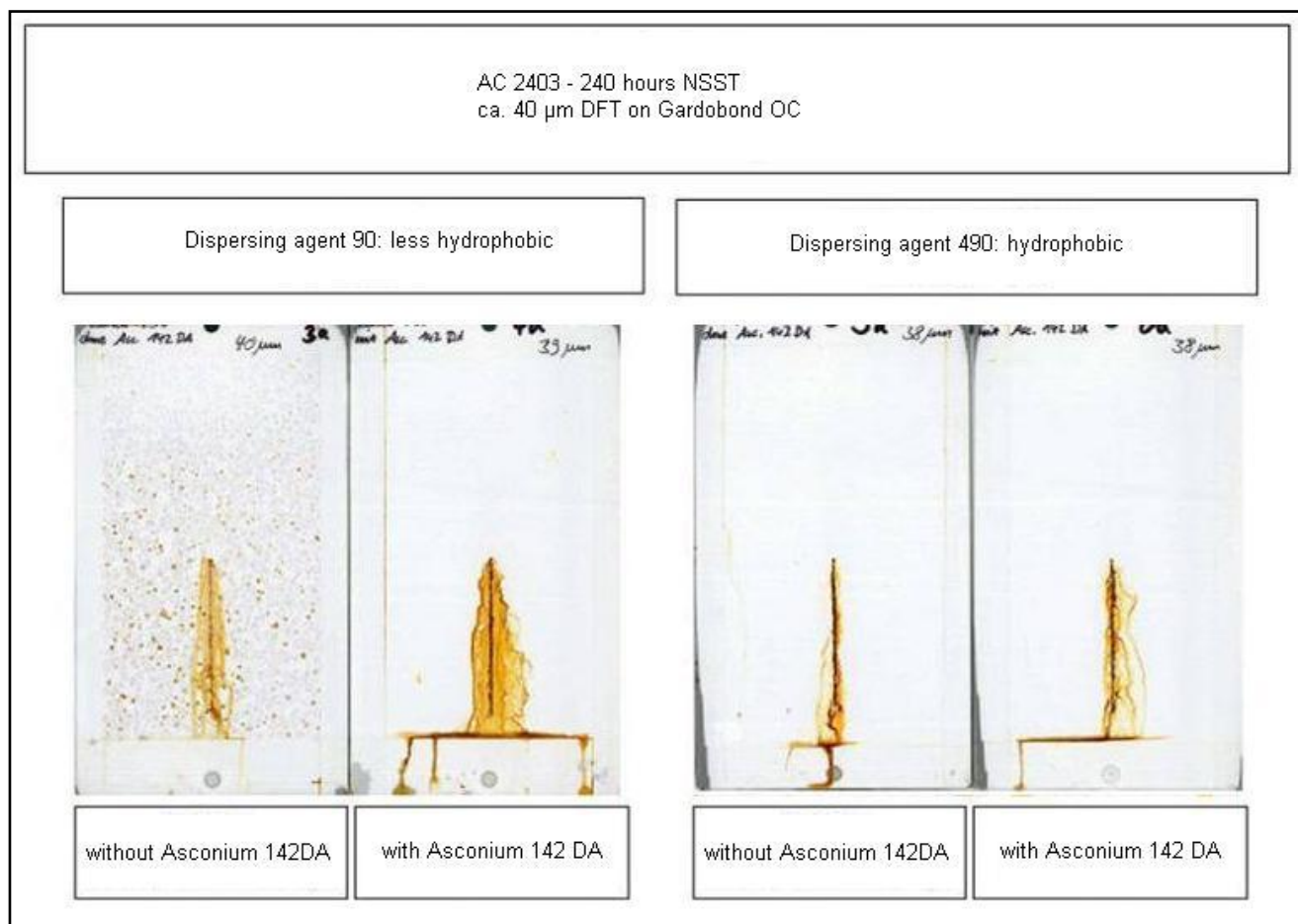
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Right choice of dispersing agents

Dispersing agents have a huge influence on the corrosion protection properties of the coating and the wrong agents can ruin the results of even the best performing binders. Very hydrophobic dispersing agents are the right choice for anti-corrosion paints.



New scribe according to DIN EN ISO 12944-6:2018

The scribe, according to outdated DIN EN ISO 12944-6:1998, e.g. with cutting knife, van Laar pen, is no longer valid.

The new scribe has to be 2 mm wide and has to be put into the cabinet horizontally.

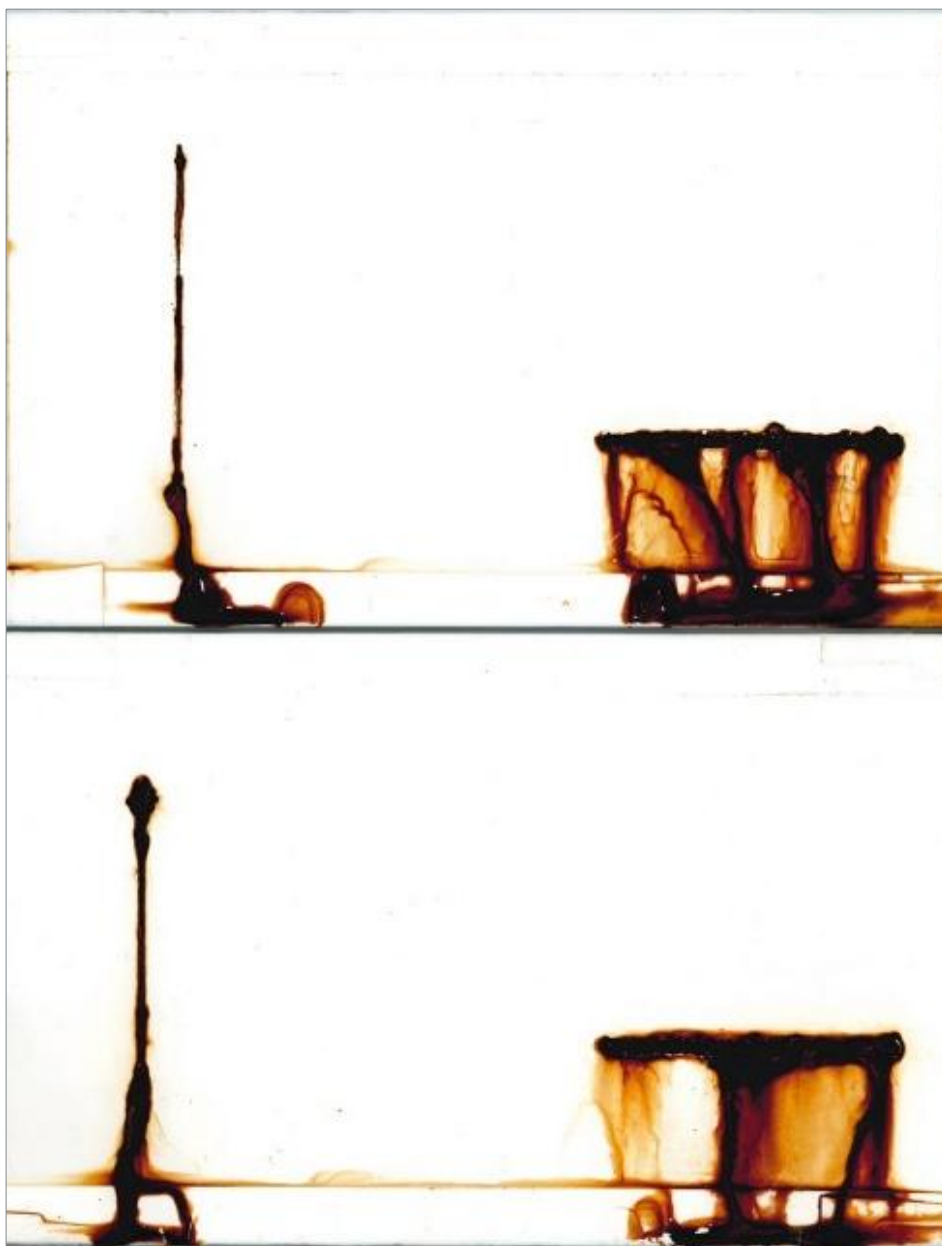
In our tests we could not see big differences in corrosion protection between the scribes.

Photo below:

Left scribe with van Laar pen

right scribe with 2 mm MTV Milling Master.

Top panel: Gardobond OC - **bottom panel:** Steel grade DC01 (1.0330)



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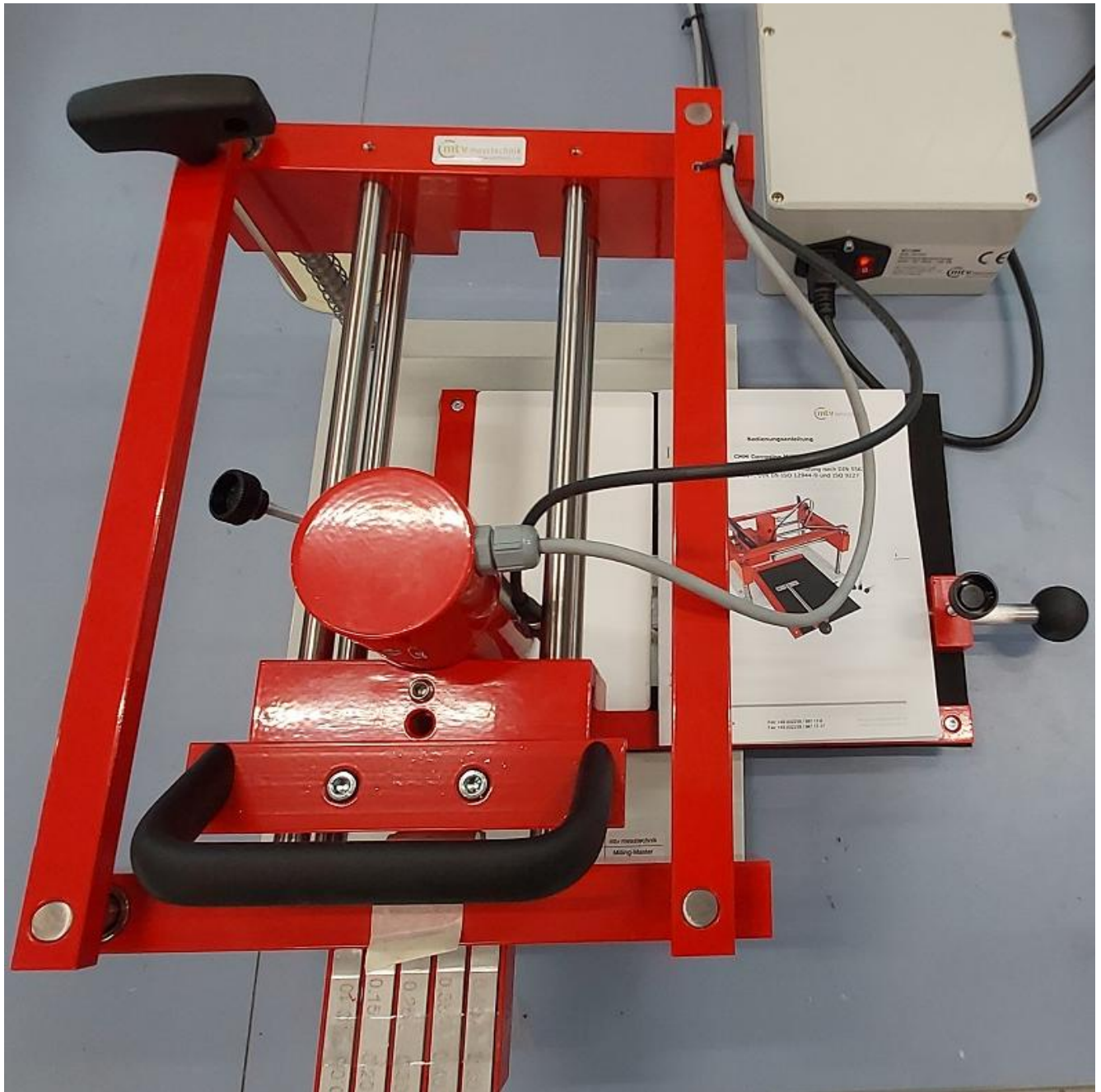
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MTV Milling Master



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Choices of Alberdingk binders for anti corrosion paints

- **ALBERDINGK® AC 2403 / Ren AC 8403**
- **ALBERDINGK® AC 2420**
- **ALBERDINGK® AC 2433**
- **ALBERDINGK® AC 2003 / Ren AC 8003**
- **ALBERDINGK® SC 48**

Binder	Solids [%]	MFFT [°C]	Type of binder	Properties
AC 2403 / Ren AC 8403	47	16 / 20	Multi-phase	Best possible corrosion protection, very good adhesion to various substrates. Suited for low DFT applications. Recommended with Asconium anti corrosion additives
AC 2420	46	22	multi-phase	Superior water-resistance, and vapor-barrier properties, high blocking resistance
AC 2433	44	20	single-phase	Binder with outstanding wet adhesion, good corrosion protection. Recommended with Asconium anti corrosion additives
AC 2003 / Ren AC 8003	50	3	single-phase	Very good corrosion protection.
SC 48	50	14	single-phase	Economic binder with good water resistance and adhesion, soft film. Compatible with Zn pigments

Binder	Type of polymer	DTM	Primer		
			PVC: < 25	PVC: 25-35	PVC: > 35
AC 2403 / Ren AC 8403	multi phase	X	X	O	-
AC 2420	multi-phase	X	X	O	-
AC 2433	single phase	X	X	X	O
AC 2003 / Ren AC 8003	single phase	X	O	X	X
SC 48	single phase	-	O	X	X

X = recommended
O = suitable
- = not suitable

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Adhesion to metal:

Formulation	Gardo-bond OC	Gardo-bond HDG/3	Gardo-bond 26S 6800 OG	Q-Panel R	ACT steel	Sand blasted steel	Zinc phosphated steel	Aluminum	Zinc plated steel
FP 2403/68	Gt 0	Gt 1	Gt 1	Gt 0	Gt 0	Gt 0	Gt 1	Gt 1	Gt 0
FP 2403/67	Gt 1	Gt 1	Gt 1	Gt 1	Gt 0	Gt 0	Gt 1	Gt 1	Gt 0
FP 2403/67 without Asc. 142DA	Gt 3	Gt 2	Gt 2	Gt 1	Gt 1	Gt 0	Gt 1	Gt 1	Gt 0
FP 2420/10	Gt1	n.d.	Gt 1	Gt 2	Gt 0	Gt 0	Gt 1	Gt 1	Gt 1
FP 2433/01	Gt 0	n.d.	Gt 0	Gt 0	Gt 1	Gt 0	Gt 0	Gt 1	Gt 0
FP 2003/08	Gt 1	n.d.	Gt 1	Gt 1	Gt 1	Gt 0	Gt 1	Gt 5	Gt 0
FP 48/02	Gt 0	Gt 0	Gt 0	Gt 0	Gt 0	Gt 0	Gt 0	Gt 0	Gt 0
FP 48/05	Gt 1	Gt 0	Gt 0	Gt 1	Gt 2	Gt 0	Gt 1	Gt 1	Gt 0

* Gt 0 = best / Gt 5 = worst

Multi-layer systems

Some applications require a multi-layer system, containing corrosion protection basecoat and a topcoat:

for unique specifications of the end user

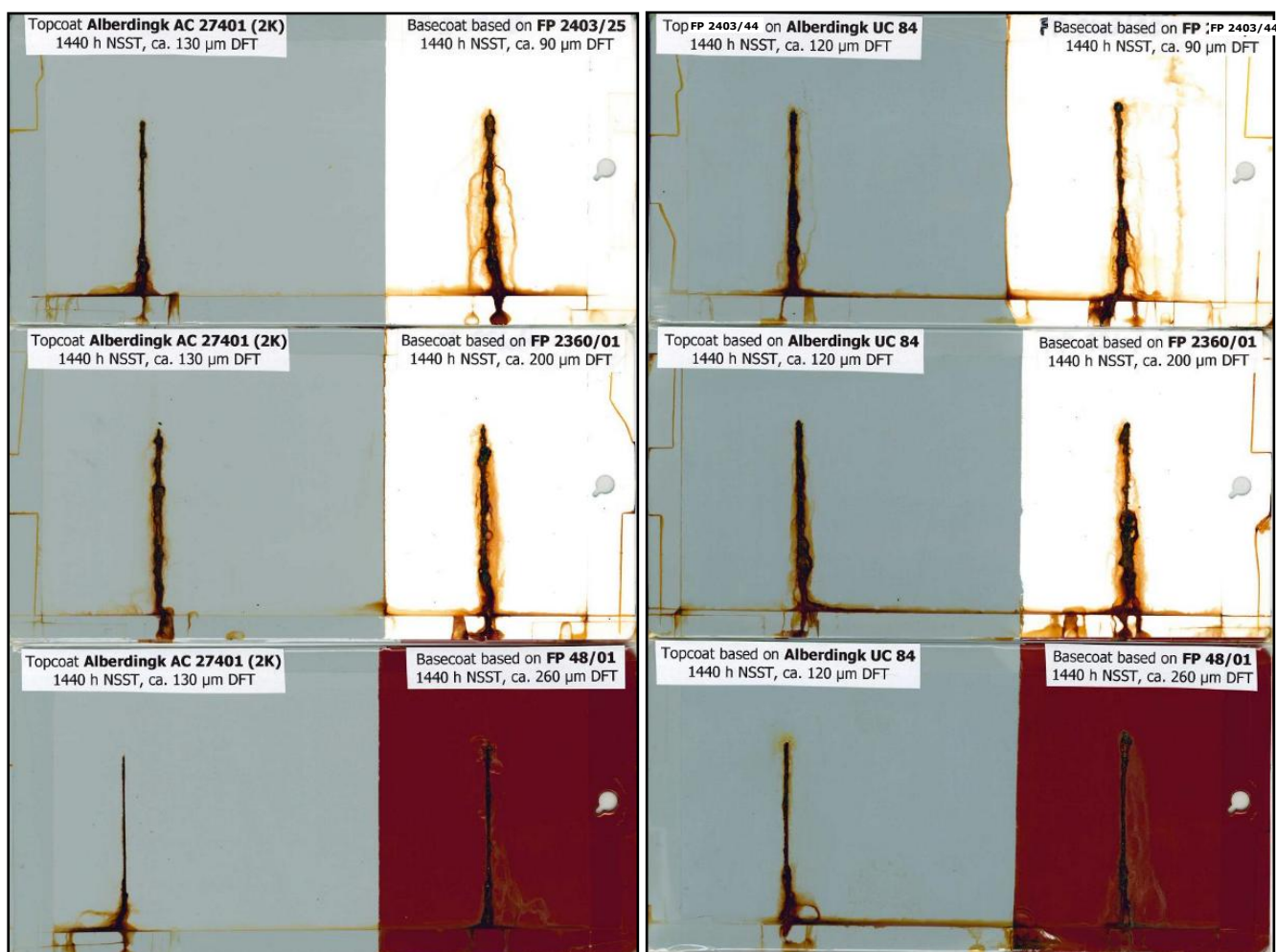
for special colour shades or gloss levels

if the corrosion base coat is soft or if it has poor mechanical resistance

to improve the chemical resistance, e.g. versus solvents, oils, acids and lyes

Topcoat: FP 27401-12
based on: **ALBERDINGK® AC 27401**

FP 84-18
ALBERDINGK® UC 84



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Formulation Proposal

FP 2403-78

anti-corrosion coatings, PVC approx. 11%,
solids approx. 49%, spray application, semi gloss recommended
nozzle size > 2.0 mm,
Gloss: approx. 45 @60°

Pos.	Raw Material	Amount	Product	Supplier
1	Alberdingk® AC 2403	68.50	acrylic dispersion	Alberdingk Boley
2	Water (deion.)*	2.00		
3	Dowanol DPM*	4.00	co-solvent	Dow Chemical
4	BYK-024	0.25	defoamer	BYK-Chemie
5	<i>Pigment preparation</i>	<i>19.50</i>		<i>see below</i>
6	Asconium-142DA**	1.90	corrosion inhibitor	Ascotec
7	AMP 90 or DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
8	Ascotran-H10	0.80	flash rust inhibitor	Ascotec
9	BYK-349	0.30	substrate wetting agent	BYK-Chemie
10	Tego Glide 494	0.30	surface additive	Evonik
11	CERAFLOUR 927 N	1.80	wax powder	BYK-Chemie
12	Tafigel PUR 61 Solution (20% PUR 61, 20% DPM, 60% water)	0.50	rheology modifier	Münzing Chemie
Total		100.00		

* Premix pos. 2 & 3

** Premix pos. 6 & 7. Use the Asconium 142DA / AMP 90 blend within 1 day or
the Asconium 142DA / DMEA blend within 5 days.

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Pigment preparation

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	17.50		
2	Edaplan 490	5.10	dispersing agent	Münzing Chemie
3	AMP 90	0.10	neutralizing agent	Angus Chemie
4	BYK-024	0.50	defoamer	BYK-Chemie
5	Kronos 2190	76.80	pigment	Kronos
Total		100.00		

Test Features

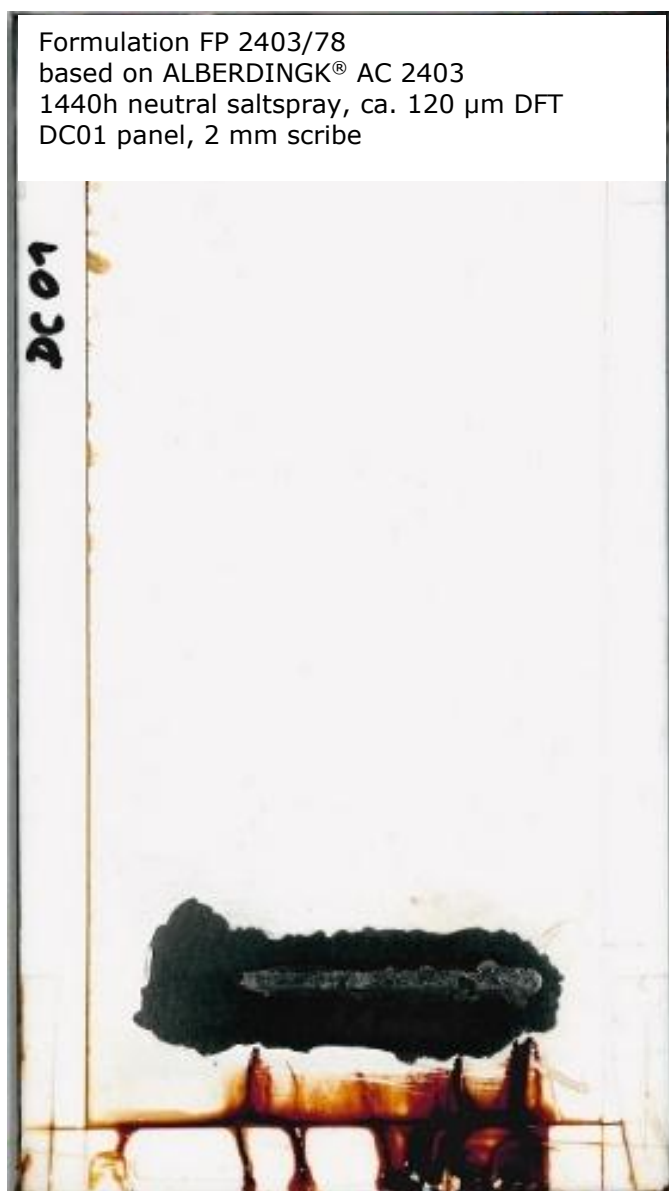
Feature	Test Conditions	Test Results
Water absorption [%]		approx. 3.0
Water vapor permeability [g/m ² per day]	wet cup method	approx. 30

Formulation Proposal

FP 2403-78

anti-corrosion coatings, PVC approx. 11%,
solids approx. 49%, spray application, semi gloss recommended
nozzle size > 2.0 mm,
Gloss: approx. 45 @60°

Test Results (after 1440 hours neutral salt-spray test)



Test report: see pages 53-61

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Formulation Proposal

FP 2403-67

anti-corrosion coatings, PVC approx. 22%,
solids approx. 54%, spray application,
recommended nozzle size > 2.0 mm

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	5.30		
2	Edaplan 490	1.20	dispersing agent	Münzing Chemie
3	AMP 90	0.02	neutralizing agent	Angus Chemie
4	BYK-024	0.10	defoamer	BYK-Chemie
5	Kronos 2190	17.70	pigment	Kronos
6	Calcilit Super	7.50	extender	Alpha Calcit
Disperse with high shear rate for 10min, then proceed with pos. 7 – 16				
7	Water (deion.)*	4.30		
8	Dowanol DPM*	2.50	co-solvent	Dow Chemical
9	ALBERDINGK® AC 2403	57.90	acrylic dispersion	Alberdingk Boley
10	BYK-024	0.15	defoamer	BYK-Chemie
11	BYK-349	0.18	wetting agent	BYK-Chemie
12	Asconium-142DA**	1.90	corrosion inhibitor	Ascotec
13	AMP 90 or DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
14	Ascotran-H10	0.60	flash rust inhibitor	Ascotec
15	Tafigel PUR 61 solution (20% PUR 61:20% Dowanol DPM: 60% water)	0.50	rheology modifier	Münzing Chemie
Total		100.00		

* Premix pos. 7 + 8

** Premix pos. 12 + 13. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days

Corrosion Class: C5-I long (@80µm DFT)

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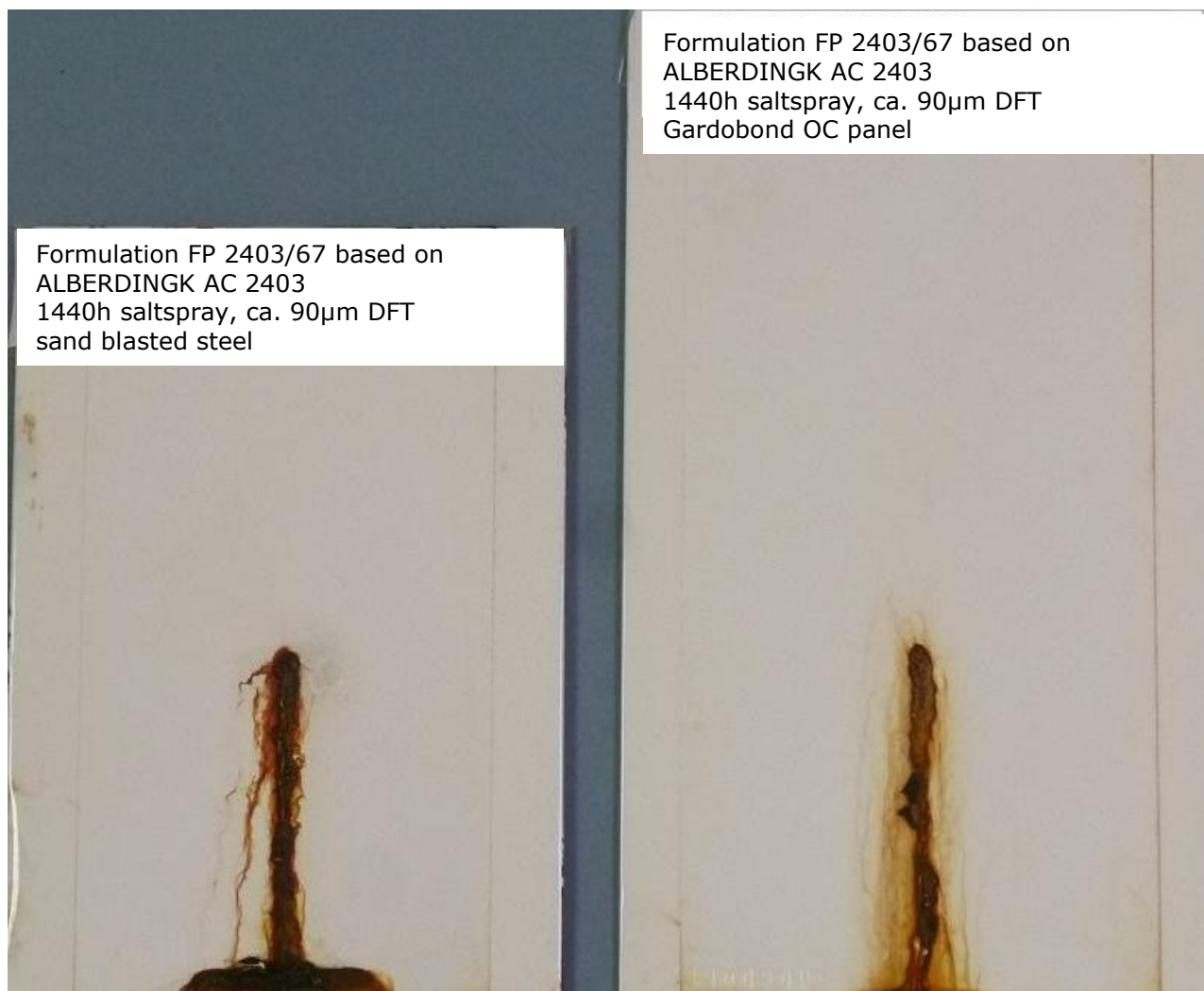
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Test Results (after 1440 hours salt-spray test)

FP 2403-67

anti-corrosion coatings, PVC approx. 22%
also suitable for sandblasted steel



Test features

Feature	Test Conditions	Test Results
Water absorption [%]		approx. 3.0
Water vapor permeability [g/m ² per day]	wet cup method	approx. 29

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Formulation Proposal

FP 2403-75

anti-corrosion coating,
PVC approx. 35%, solids approx. 56%

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	8.00		
2	Edaplan 490	1.20	dispersing agent	Münzing Chemie
3	AMP 90	0.03	neutralizing agent	Angus Chemie
4	BYK-024	0.10	defoamer	BYK-Chemie
5	Kronos 2190	5.00	pigment	Kronos
6	Durcal 5	27.50	filler	Omya
Disperse with high shear rate for 10min, then proceed with pos. 7 – 16				
7	Water (deion.)*	5.00		
8	Dowanol DPM*	2.50	co-solvent	Dow Chemical
9	ALBERDINGK® AC 2403	46.70	acrylic dispersion	Alberdingk Boley
10	BYK-024	0.10	defoamer	BYK-Chemie
11	BYK-345	0.22	wetting agent	BYK-Chemie
12	Asconium-142DA**	2.00	corrosion inhibitor	Ascotec
13	AMP 90 or DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
14	Ascotran-H10	1.00	flash rust inhibitor	Ascotec
15	Tafigel PUR 61 solution (20% PUR 61:20% Dowanol DPM:60% water)	0.50	rheology modifier	Münzing Chemie
Total		100.00		

* Premix pos. 7 + 8

** Premix pos. 12 + 13. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

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Formulation Proposal

FP 2420-10

anti-corrosion coatings, PVC approx. 11%,
solids approx. 50%

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	3.00		
2	Edaplan 490	1.00	dispersing agent	Münzing Chemie
3	Ammonia (12,5%)	<i>Some drops</i>	neutralizing agent	Angus Chemie
4	BYK-024	0.10	defoamer	BYK-Chemie
5	Kronos 2190	15.00	pigment	Kronos
Disperse with high shear rate for 10min, then proceed with pos. 6 – 14				
6	Water (deion.)*	1.50		
7	Dowanol DPM*	5.00	co-solvent	Dow Chemical
8	ALBERDINGK® AC 2420	68.90	acrylic dispersion	Alberdingk Boley
9	BYK-024	0.15	defoamer	BYK-Chemie
10	BYK-349	0.20	wetting agent	BYK-Chemie
11	Asconium-142DA**	1.90	corrosion inhibitor	Ascotec
12	Water (deion.)**	1.90		
13	DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
14	Ascotran-H10	0.80	flash rust inhibitor	Ascotec
15	Tafigel PUR 61 solution (20 % PUR 61 : 20 % Dowanol DPM: 60 % water)	0.30	rheology modifier	Münzing Chemie
16	Tafigel PUR 41	0.10	rheology modifier	Münzing Chemie
Total		100.00		

* Premix pos. 6 + 7

** Premix pos. 11 - 13. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

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Formulation Proposal

FP 2420-10

anti-corrosion coatings, PVC approx. 11%,
solids approx. 50%



1440h NSST,
Gardobond OC panel,
approx. 110µm DFT

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Formulation Proposal

FP 2433-02

anti-corrosion coatings, spray application
PVC approx. 11%, solids approx. 53%

Pos.	Raw Material	Amount	Supplier
1	Water (deion.)	2.50	
2	Edaplan 490	1.00	Münzing Chemie
3	AMP 90	0.02	Angus Chemie
4	BYK-024	0.10	BYK-Chemie
5	Kronos 2190	15.00	Kronos
Disperse with high shear rate for 10min, then proceed with pos. 6 – 14			
6	Water (deion.)*	3.90	
7	Dowanol DPM*	5.00	Dow Chemical
8	ALBERDINGK® AC 2433 VP	68.90	Alberdingk Boley
9	BYK-024	0.15	BYK-Chemie
10	BYK-349	0.18	BYK-Chemie
11	Asconium-142DA**	1.90	Ascotec
12	AMP 90 or DMEA**	0.15	Angus Chemie / Evonik
13	Ascotran-H10	0.60	Ascotec
14	Tafigel PUR 61 solution (20 % PUR 61: 20 % Dowanol DPM: 60 % water)	0.60	Münzing Chemie
Total		100.00	

* Premix pos. 8 + 9

** Premix pos. 11 & 12. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

Corrosion Class: C4-I long / C5-I middle (@100µm DFT)

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Test Features

FP 2433-02

anti-corrosion coatings, spray application
PVC approx. 11%, solids approx. 53%

Feature	Test Conditions	Test Results
Water absorption [%]		approx. 3.0
Water vapor permeability [g/m ² per day]	wet cup method	approx. 29

Test Results (after 672 hours salt-spray test)



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Formulation Proposal

FP 2003-08

anti-corrosion coating, PVC 11%, solids approx. 48%

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	5.10		
2	Edaplan 490	1.00	dispersing agent	Münzing Chemie
3	AMP 90	0.02	neutralizing agent	Angus Chemie
4	BYK-024	0.10	defoamer	BYK-Chemie
5	Kronos 2190	15.00	pigment	Kronos
Disperse with high shear rate for 10min, then proceed with pos. 6 – 14				
6	Water (deion.)	9.88		Alberdingk Boley
7	Alberdingk® AC 2003	64.00	defoamer	BYK-Chemie
8	BYK-024	0.20	wetting agent	BYK-Chemie
9	BYK-349	0.15		
10	AMP 90 or DMEA*	0.15	neutralizing agent	Angus Chemie / Evonik
11	Asconium-142DA*	1.90	corrosion inhibitor	Ascotec
12	Dowanol DPM*	1.50	co-solvent	Dow Chemical
13	Ascotran-H 10	0.80	flash rust inhibitor	Ascotec
14	Tafigel PUR 41	0.20	rheology modifier	Münzing Chemie
Total		100.00		

* Premix pos. 10 - 12. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days

Drain time DIN 6 mm cup: approx. 35 seconds

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Formulation Proposal

FP 2003-08

anti-corrosion coating, PVC 11%, solids approx. 48%



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Formulation Proposal

FP 48-02

anti-corrosion coating, iron oxide red
PVC approx. 30%, solids approx. 54%

Pos.	Raw Material	Amount	Product	Supplier
1	ALBERDINGK® SC 48	40.00	acrylic dispersion	Alberdingk Boley
2	Water (deion.)	11.05		
3	Pigment preparation	41.50	<i>see next page</i>	
4	Optifilm Enhancer 300	1.00	co-solvent	Eastman
5	BYK-024	0.40	defoamer	BYK-Chemie
6	BYK-349	0.10	substrate wetting agent	BYK-Chemie
7	Ascotran H-10	0.50	flash rust inhibitor	Ascotec
8	Ammonia (25%)	0.80	neutralizing agent	
9	Resydrol AX 237 W/70 BG	4.00	epoxy-alkyd resin	Allnex
10	Borchi OXY-Coat 1101	0.05	drier	Borchers
11	Tafigel PUR 40	0.60	rheology modifier	Münzing Chemie
Total		100.00		

Adjust the pH value of the finalized paint with Ammonia to 8.5.

Corrosion Class:

C4-I long / C5-I middle (@150µm DFT)

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Formulation Proposal

FP 48-02

pigment preparation

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	7.00		
2	Edaplan 490	0.80	dispersing agent	Münzing Chemie
3	BYK-024	0.10	defoamer	BYK-Chemie
4	Butyl Glycol (BG)	3.00	co-solvent	BASF
5	Bayferrox 130 M	9.00	pigment	Lanxess
6	Micro Talc AT 1	3.00	filler	Mondo Minerals
7	Calcilit Super	10.60	filler	Alpha Calcit
8	Heucophos ZPO	7.00	anti-corrosion pigment	Heubach
9	Heucorin RZ	1.00	anti-corrosion pigment	Heubach
Total		41.50		

Disperse with high shear rate for 10 min.

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Formulation Proposal

FP 48-05

anti-corrosion coating, iron oxide red
PVC approx. 37%, solids approx. 56%

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	8.00		
2	Edaplan 490	1.20	dispersing agent	Münzing Chemie
3	AMP 90	0.02	neutralizing agent	Angus Chemie
4	BYK-024	0.10	defoamer	BYK-Chemie
5	Bayferrox 130 M	5.00	pigment	Lanxess
6	Durcal 5	27.50	extender	Omya
Disperse with high shear rate for 10min, then proceed with pos. 7 – 16				
7	Water (deion.)	9.10		
8	ALBERDINGK® SC 48	43.90	acrylic dispersion	Alberdingk Boley
9	BYK-024	0.30	defoamer	BYK-Chemie
10	Asconium-142DA*	2.00	corrosion inhibitor	Ascotec
11	AMP 90 or DMEA*	0.15	neutralizing agent	Angus Chemie / Evonik
12	Optifilm Enhancer 300	1.00	co-solvent	Eastman
13	BYK-349	0.13	wetting agent	BYK-Chemie
14	Ascotran-H10	0.80	flash rust inhibitor	Ascotec
15	Tafigel PUR 61 (50% in Dowanol DPM)	0.80	rheology modifier	Münzing
Total		100.00		

* Premix pos. 10 + 11.

Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

Corrosion Class:

C4-I long / C5-I middle (@200µm DFT)

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Formulation Proposal

FP 48-05

anti-corrosion coating, iron oxide red
PVC approx. 35%, solids approx. 56%

Formulation Proposal FP 48/05

Based on ALBERDINGK® SC 48
1440h NSST, ca. 170µm DFT

Formulation Proposal FP 48/05

Based on ALBERDINGK® SC 48
1440h NSST, ca. 350µm DFT



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Formulation Proposal

FP 2403-70

anti corrosion, RAL 1007 daffodil yellow
solids approx. 47%, PVC approx. 9%

Pos.	Raw Material	Amount	Product	Supplier
1	ALBERDINGK® AC 2403	68.90	acrylic dispersion	Alberdingk Boley
2	Water (deion.)*	4.95		
3	Dowanol DPM*	2.50	co-solvent	Dow Chemical
4	Pigment preparation	20.00		<i>see below</i>
5	BYK-024	0.20	defoamer	BYK-Chemie
6	Asconium-142DA**	2.00	corrosion inhibitor	Ascotec
7	AMP 90 or DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
8	Ascotran-H10	0.50	flash rust inhibitor	Ascotec
9	Tego Wet KL 245	0.20	wetting agent	Evonik
10	OPTIFLO-T 1000	0.60	rheology modifier	BYK-Chemie
Total		100.00		

* Premix pos. 2 + 3

** Premix pos. 6 + 7. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

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Pigment preparation RAL 1007 Daffodil yellow / Narzissengelb

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	16.40		
2	Borchi Gen 1750	4.65	dispersing agent	Borchers
3	AMP 90	0.05	neutralizing agent	Angus Chemie
4	BYK-024	0.40	defoamer	BYK-Chemie
5	Brufablend E 27015 yellow	65.00	pigment	Bruchsaler Farben
6	Tafigel PUR 40	0.20	rheology modifier	Münzing Chemie
7	Water (deion.)	13.30		
Total		100.00		



FP 2403/70:
Pos. 2 = Edplan 490



FP 2403/70:
Pos. 2 = Borchi Gen 1750

100µm DFT
1440h NSST
Brufablend Paste 20%
RAL 1007

Formulation Proposal

FP 2403-71

anti corrosion, RAL 3001 signal red
solids approx. 44%, PVC approx. 9%

Pos.	Raw Material	Amount	Product	Supplier
1	ALBERDINGK® AC 2403	68.90	acrylic dispersion	Alberdingk Boley
2	Water (deion.)*	4.85		
3	Dowanol DPM*	2.50	co-solvent	Dow Chemical
4	Pigment preparation	20.00		<i>see below</i>
5	BYK-024	0.20	defoamer	BYK Chemie
6	Asconium-142DA**	2.00	corrosion inhibitor	Ascotec
7	AMP 90 or DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
8	Ascotran-H10	0.60	flash rust inhibitor	Ascotec
9	Tego Wet KL 245	0.20	wetting agent	Evonik
10	OPTIFLO-T 1000	0.60	rheology modifier	BYK-Chemie
Total		100.00		

* Premix pos. 2 + 3

** Premix pos. 6 + 7. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

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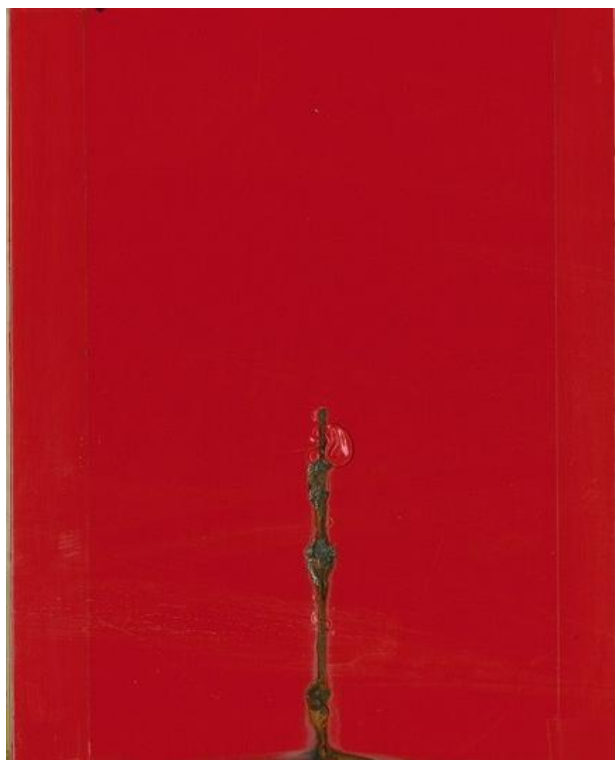
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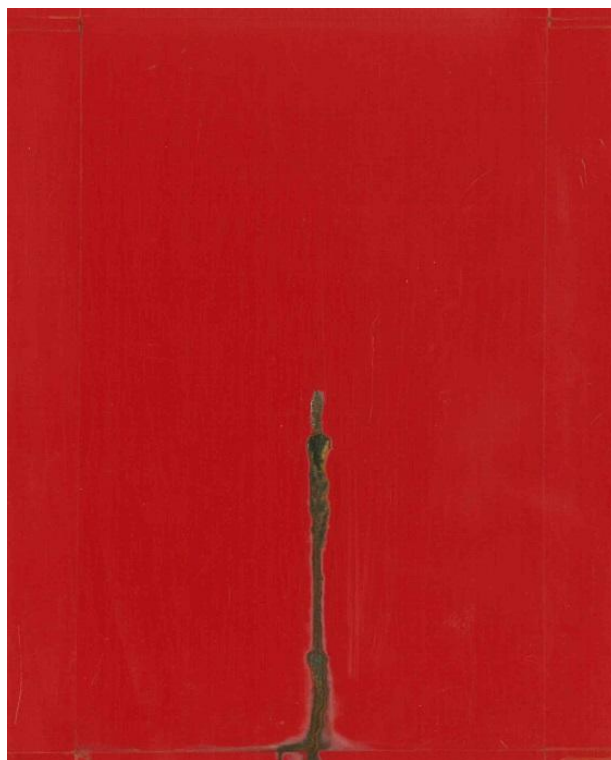
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Pigment preparation RAL 3001 Signal red / Signalrot

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	18.70		
2	Borchi Gen 1750	4.65	dispersing agent	Borchers
3	AMP 90	0.05	neutralizing agent	Angus Chemie
4	BYK-024	0.40	defoamer	BYK-Chemie
5	Brufablend E 27488 S red	55.00	pigment	Bruchsaler Farben
6	Tafigel PUR 40	0.10	rheology modifier	Münzing Chemie
7	Water (deion.)	21.10		
Total		100.00		



FP 2403/71:
Pos. 2 = Edaplan 490



FP 2403/71:
Pos. 2 = Borchi Gen 1750

100µm DFT
1440h NSST
Brufablend Paste 20%
RAL 3001

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Formulation Proposal

FP 2403-72

anti corrosion, RAL 6011 reseda green
solids approx. 48%, PVC approx. 8%

Pos.	Raw Material	Amount	Product	Supplier
1	ALBERDINGK® AC 2403	68.90	acrylic dispersion	Alberdingk Boley
2	Water (deion.)*	4.85		
3	Dowanol DPM*	2.50	co-solvent	Dow Chemical
4	Pigment preparation	20.00		see below
5	BYK-024	0.20	defoamer	BYK-Chemie
6	Asconium-142DA**	2.00	corrosion inhibitor	Ascotec
7	AMP 90 or DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
8	Ascotran-H10	0.60	flash rust inhibitor	Ascotec
9	Tego Wet KL 245	0.20	wetting agent	Evonik
10	OPTIFLO-T 1000	0.60	rheology modifier	BYK-Chemie
Total		100.00		

* Premix pos. 2 + 3

** Premix pos. 6 + 7. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

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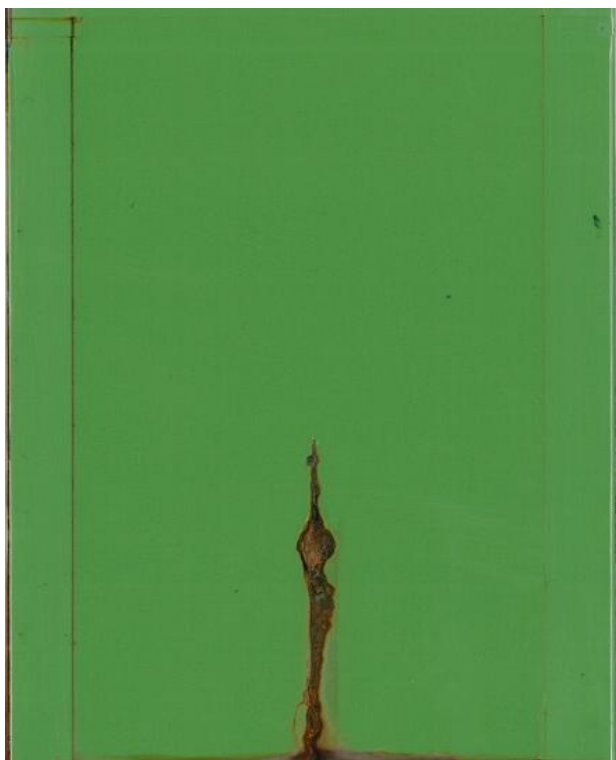
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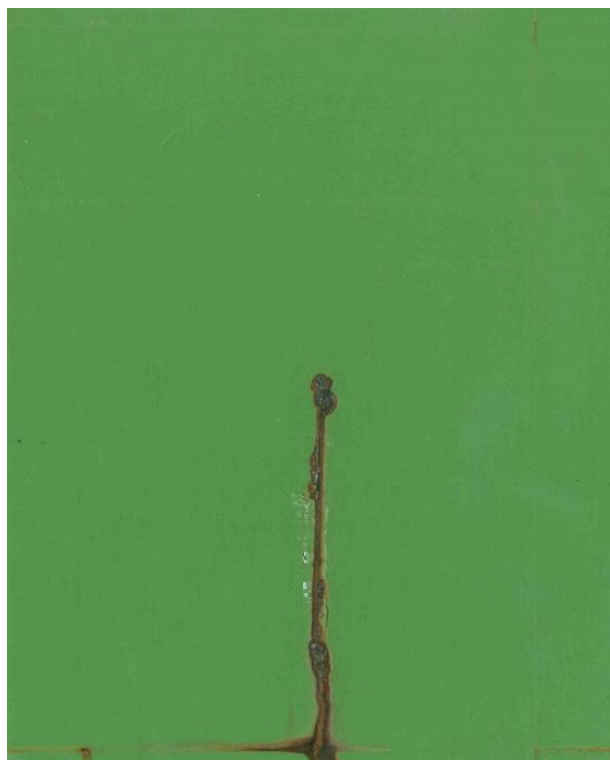
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Pigment preparation RAL 6011 Reseda green / Resedagrün

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	14.00		
2	Borchi Gen 1750	4.65	dispersing agent	Borchers
3	AMP 90	0.05	neutralizing agent	Angus Chemie
4	BYK-024	0.40	defoamer	BYK-Chemie
5	Brufablend E 26971 green	70.00	pigment	Bruchsaler Farben
6	Tafigel PUR 40	0.20	rheology modifier	Münzing Chemie
7	Water (deion.)	10.70		
Total		100.00		



FP 2403/72:
Pos. 2 = Edaplan 490



FP 2403/72:
Pos. 2 = Borchi Gen 1750

100µm DFT
1440h NSST
Brufablend Paste 20%
RAL 6011

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Formulation Proposal

FP 2403-73

anti corrosion, RAL 9005 jet black
solids approx. 38

Pos.	Raw Material	Amount	Product	Supplier
1	ALBERDINGK® AC 2403	74.30	acrylic dispersion	Alberdingk Boley
2	Water (deion.)*	12.00		
3	Dowanol DPM*	2.50	co-solvent	Dow Chemical
4	Pigment preparation	7.50		see below
5	BYK-024	0.10	defoamer	BYK-Chemie
6	Asconium-142DA**	2.00	corrosion inhibitor	Ascotec
7	AMP 90 or DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
8	Tego Wet KL 245	0.20	wetting agent	Evonik
9	Ascotran-H10	0.60	flash rust inhibitor	Ascotec
10	Tego Glide 494	0.15	surface additive	Evonik
11	Tafigel PUR 45	0.50	rheology modifier	Münzing Chemie
Total		100.00		

* Premix pos. 2 + 3

** Premix pos. 6 + 7. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

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Pigment preparation RAL 9005 jet black

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	68.85		
2	Borchi Gen 1750	15.00	dispersing agent	Borchers
3	Ammonia (25%)	0.65	neutralizing agent	
4	Agitan 351	0.50	defoamer	Münzing Chemie
5	Color black FW 200	15.00	pigment	Orion Engineered Carbons
Total		100.00		



FP 2403/73:
Pos. 2 = Edaplan 490



FP 2403/73:
Pos. 2 = Borchi Gen 1750

approx. 110µm DFT
1440h NSST
FW 200 Paste 7.5%
RAL 9005

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Formulation Proposal

FP 2403-74

anti corrosion, RAL 5011 steel blue
solids approx. 48%, PVC approx. 8%

Pos.	Raw Material	Amount	Product	Supplier
1	ALBERDINGK® AC 2403	68.90	acrylic dispersion	Alberdingk Boley
2	Water (deion.)*	4.85		
3	Dowanol DPM*	2.50	co-solvent	Dow Chemical
4	Pigment preparation	20.00		see below
5	BYK-028	0.20	defoamer	BYK-Chemie
6	Asconium-142DA**	2.00	corrosion inhibitor	Ascotec
7	AMP 90 or DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
8	Ascotran-H10	0.60	flash rust inhibitor	Ascotec
9	Tego Wet KL 245	0.20	wetting agent	Evonik
10	OPTIFLO-T 1000	0.60	rheology modifier	BYK-Chemie
Total		100.00		

* Premix pos. 2 + 3

** Premix pos. 6 + 7. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

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Pigment preparation RAL 5011 steel blue

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	14.00		
2	Borchi Gen 1750	4.65	dispersing agent	Borchers
3	AMP 90	0.05	neutralizing agent	Angus Chemie
4	BYK-028	0.20	defoamer	BYK-Chemie
5	Brufablend E 27352 blue	70.00	pigment	Bruchsaler Farben
6	Tafigel PUR 40	0.20	rheology modifier	Münzing Chemie
7	Water (deion.)	10.90		
Total		100.00		



FP 2403/74:
Pos. 2 = Edaplan 490



FP 2403/74:
Pos. 2 = Borchi Gen 1750

approx. 100µm DFT
1440h NSST
Brufablend Paste 20%
RAL 5011

Formulation Proposal

FP 2403-76

anti-corrosion coatings, PVC approx. 11%, **nitrite-free**
solids approx. 50%, spray application,
recommended nozzle size > 2.0mm

Pos.	Raw Material	Amount	Product	Supplier
1	Water (deion.)	2.50		
2	Borchi Gen 1750	1.00	dispersing agent	Borchers
3	AMP 90	0.02	neutralizing agent	Angus Chemie
4	BYK-024	0.10	defoamer	BYK-Chemie
5	Kronos 2190	15.00	pigment	Kronos
Disperse with high shear rate for 10min, then proceed with pos. 6 – 15				
6	Water (deion.)*	6.20		
7	Dowanol DPM*	2.50	co-solvent	Dow Chemical
8	ALBERDINGK® AC 2403	68.90	acrylic dispersion	Alberdingk Boley
9	BYK-024	0.15	defoamer	BYK-Chemie
10	BYK-349	0.18	wetting agent	BYK-Chemie
11	Asconium-142DA**	1.90	corrosion inhibitor	Ascotec
12	AMP 90 or DMEA**	0.15	neutralizing agent	Angus Chemie / Evonik
13	Habikor FRI 1001	0.80	flash rust inhibitor	Habich GmbH
14	Tafigel PUR 61 solution (20% PUR 61: 20% Dowanol DPM: 60% water)	0.60	rheology modifier	Münzing Chemie
Total		100.00		

* Premix pos. 6 + 7

** Premix pos. 11 + 12. Use the Asconium 142DA / AMP 90 blend within 1 day or the Asconium 142DA / DMEA blend within 5 days.

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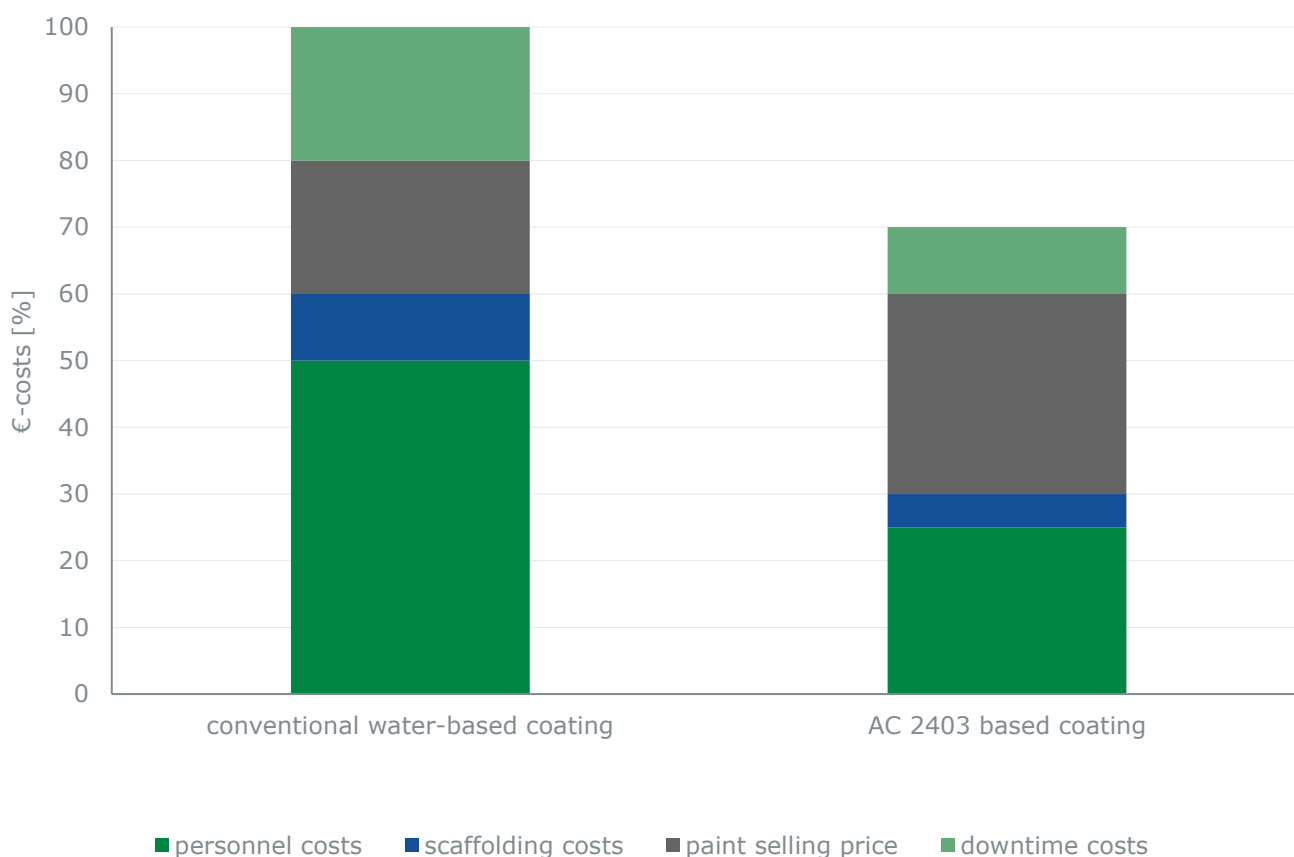
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Conclusion

Today's challenge of Paint producers are cost efficient solutions at a very high level of quality.

ALBERDINGK® AC 2403 is a prominent example for a high quality dispersion which combines all these advantages with the objective target of high corrosion protection performance at a maximum of efficiency.

Schematical cost calculation for a 1000m² corrosion protection renovation project:



ALBERDINGK® AC 2403 advantages at a glance:

- Less working hours, due to 1 coat system
- Less downtime, due to 1-coat system
- Reduced scaffolding costs
- Primer and topcoat are combined in one single coating
- Higher security due to a maximum of corrosion protection performance
- Eco-friendly (water-based, without Zn^{2+} -ions), low VOC
- Less weight due to lower dry film thickness

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External test results ALBERDINGK® AC 2403

Test report no. 20DE-03227OR01		
<u>Kiwa GmbH, Voltastraße 5, 13355 Berlin</u>		Kiwa GmbH MPA Berlin-Brandenburg Voltastr. 5 13355 Berlin
Alberdingk Boley GmbH Düsseldorfer Straße 53 47829 Krefeld		T: +49 (0) 30 467761 – 0 F: +49 (0) 30 467761 – 10 E: de.info.kiwabern@kiwa.com www.kiwa.com
Project:	Testing of a corrosion protection	
Plant:	Alberdingk Boley GmbH Düsseldorfer Straße 53 47829 Krefeld	
Order date:	March 16th, 2021	
Request for testing:	Testing of a corrosion protection according to DIN EN ISO 12944-6:2018 in the category "C5 very high"	
Sample description:	see section 1	
Number of samples:	see section 1	
Sample(s) taken by:	a representative of Alberdingk Boley GmbH. If the test material has not been used up, it will be stored for 4 weeks. A longer storage period requires a written agreement.	
Sample(s) received:	May 21st, 2021	
Test period:	May – October 2021	
Berlin, October 21st, 2021		
 - Digitally signed see http://cs.kiwa-deutschland.de for more details - i.V. Dr. Ronny Stadie Unit leader		 - Digitally signed see http://cs.kiwa-deutschland.de for more details - i.A. Thorben Strate Project engineer
OMF P A 101_B_R 6_18.05.2021		
The test results refer exclusively to the test items mentioned. No part of the test report may be reproduced without the written permission of the testing laboratory. ⓘ Information from the client. ⓘ Change. Managing Directors: Prof. Dr. Roland Hüttl, Dr. Gero Schönwaßer Hamburg Local Court, HRB 130568, St.Nr.: 46/736/03268		
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Test report no. 20DE-03227OR01



1. General

Kiwa GmbH, MPA Berlin-Brandenburg was commissioned by Alberdingk Boley GmbH to carry out the tests in the category "C5 very high" on with the corrosion protection systems

"FP 2403/78" 3-layered on the basis of "ALBERDINGK® AC 2403"

coated panels according to DIN EN ISO 12944-6:2018-06 "Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Part 6: Laboratory performance test methods; German Version".

For this purpose, the coated panels were subjected to the cyclic ageing test according to Annex B of DIN EN ISO 12944-6:2018-06 in accordance with test programme 2 of Table 1 of DIN EN ISO 12944-6:2018-06.

1.1 Material

Kiwa GmbH, MPA Berlin-Brandenburg was handed over nine panels coated with corrosion protection.

Coating	
Layer thickness in [µm] ^{a)}	280 – 320; 300 – 340; 290 – 325; 300 – 335; 295 – 340; 300 – 340; 300 – 345; 295 – 315; 295 – 325
Stahlplatte	
Steel grade ^{a)}	S235JR
Material number ^{a)}	1.0038
Surface roughness ^{a)}	"medium G"
Surface texture ^{a)}	Sa 2 ½ (sandblasted)

1.2 Scope of testing

Table 1 Scope of testing

Test	Test basis	Product
Assessment before artificial ageing		
Pull-off test	DIN EN ISO 4624:2016-08	coated panels
Evaluation after artificial ageing		
Evaluation according to ISO 4628 and corrosion at the incision	DIN EN ISO 4628-2:2016-07, DIN EN ISO 4628-3:2016-07, DIN EN ISO 4628-4:2016-07, DIN EN ISO 4628-5:2016-07, DIN EN ISO 12944-6:2018-06 Annex A	coated panels
Pull-off test	DIN EN ISO 4624:2016-08	coated panels

1.3 Basis of evaluation

The properties / requirements are taken from DIN EN ISO 12944-6: 2018-06.

^{a)} Information from the client. ^{b)} Change. ^{c)} The conformity statement is made according to the requirements of the specifications mentioned and according to the first binary Kiwa decision rule and the respective confidence level. This assessment is a pure statement of conformity by the testing body. It does not replace the subsequent assessment and evaluation of the certification body or the confirmation of conformity...

Test report no. 20DE-03227OR01



2. Test results

2.1 Evaluation before artificial ageing

2.1.1 Pull-off test

Manufacturing, storage and testing conditions:

Test basis:	DIN EN ISO 4624:2016-08
Examination(s) on:	coated panels
Testing device:	Freundt F20D EASY
Storage:	(23 ± 2) °C and (50 ± 10) % r.h
Testing conditions:	(23 ± 2) °C and (50 ± 10) % r.h Testing stamp: 20 mm diameter Method B Glue on basis of epoxy (2 days curing time)

Test results:

Table 2 Pull-off test before artificial ageing

Specimen	Test spot	Bond strength [N/mm²]	Separation case with division in [%]					
			A	A/B	B	B/Y	Y	Y/Z
2.1	1	8,13			100			
	2	9,59			100			
2.2	1	10,00			100			
	2	7,71			100			
2.2	1	8,07			100			
	2	10,90			100			
Mean		9,07	Requirement: 2,5 N/mm² with 0 % separation case A/B 5,0 N/mm² otherwise					
min. value		7,71						
Standard deviation		1,28						
Limit		2,5 (5,0)						
Evaluation ²⁾		passed						

Legend:

Cohesive failure in:

A: Substrate
B: Corrosion protection
Y: Glue

Adhesive failure between:

A/B: Substrate and corrosive protection
B/Y: Corrosive protection and glue
Y/Z: Glue and stamp

CMF P A 101 a_R 6_18.05.2021

³⁾ Information from the client. ⁴⁾ Change. ²⁾ The conformity statement is made according to the requirements of the specifications mentioned and according to the first binary Kiwa decision rule and the respective confidence level. This assessment is a pure statement of conformity by the testing body. It does not replace the subsequent assessment and evaluation of the certification body or the confirmation of conformity...

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Test report no. 20DE-03227OR01



Figure 1 Failure patterns of the conditioned samples

CMFPA 101 a_R 6_18.05.2021

¹⁾ Information from the client. ²⁾ Change. ³⁾ The conformity statement is made according to the requirements of the specifications mentioned and according to the first binary Kiwa decision rule and the respective confidence level. This assessment is a pure statement of conformity by the testing body. It does not replace the subsequent assessment and evaluation of the certification body or the confirmation of conformity...

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Test report no. 20DE-03227OR01



2.2 Evaluation after artificial ageing

2.2.1 Evaluation according to ISO 4628 and corrosion at the incision

Manufacturing, storage and testing conditions:

Test basis:	DIN EN ISO 4628-2:2016-07 (degree of blistering) DIN EN ISO 4628-3:2016-07 (degree of rusting) DIN EN ISO 4628-4:2016-07 (degree of cracking) DIN EN ISO 4628-5:2016-07 (degree of flaking) DIN EN ISO 12944-6:2018-06, Annex A (corrosion at the incision)
Examination(s) on:	coated panels
Storage:	2.688 h cyclic ageing according to DIN EN ISO 12944-6:2018-06, Annex B Cycle: a) 72 h UV-conditioning and condensation according to ISO 16474-3:2013, Method A, Cycle 1: 4 h radiation, 4 h condensation b) 72 h neutral salt spray according to DIN EN ISO 9227:2017-07 c) 24 h at $(-20 \pm 2) ^\circ\text{C}$
Testing conditions:	$(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 10) \% \text{ r.h.}$

Test results:



Figure 2 Panels before artificial ageing



Figure 3 Panels after artificial ageing

CMF P A 101 a_R 6_18.05.2021

³⁾ Information from the client. ⁴⁾ Change. ⁵⁾ The conformity statement is made according to the requirements of the specifications mentioned and according to the first binary Kiwa decision rule and the respective confidence level. This assessment is a pure statement of conformity by the testing body. It does not replace the subsequent assessment and evaluation of the certification body or the confirmation of conformity...

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Test report no. 20DE-03227OR01


Table 3 Evaluation according to ISO 4628 after artificial ageing

Specimen	Degree of blistering	Degree of rusting	Degree of cracking	Degree of flaking
1.1	0 (S0)	Ri 0	0 (S0)	0 (S0)
1.2	0 (S0)	Ri 0	0 (S0)	0 (S0)
1.3	0 (S0)	Ri 0	0 (S0)	0 (S0)
1.4	0 (S0)	Ri 0	0 (S0)	0 (S0)
1.5	0 (S0)	Ri 0	0 (S0)	0 (S0)
Requirement	0 (S0)	Ri 0	0 (S0)	0 (S0)
Evaluation ²⁾	passed	passed	passed	passed

The corrosion protection softened after artificial ageing. The coated panels thus partially stuck to the frame. The rust spot visible on plate P 1.2 is due to this and was not included in the assessment.

Table 4 Corrosion at the incision after artificial ageing

Specimen	corrosion at the incision [mm]	
	Single value	Mean
P 1.1	0,7	0,7
P 1.2	0,5	
P 1.3	0,6	
P 1.4	0,9	
P 1.5	0,6	
Requirements		≤ 3,0
Evaluation ²⁾		passed

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2.2.2 Pull-off test

Manufacturing, storage and testing conditions:

Test basis:	DIN EN ISO 4624:2016-08
Examination(s) on:	coated panels
Testing device:	Freundt F20D EASY
Storage:	2.688 h cyclic ageing according to DIN EN ISO 12944-6:2018-06, Annex B Cycle: a) 72 h UV-conditioning and condensation according to ISO 16474-3:2013, Method A, Cycle 1: 4 h radiation, 4 h condensation b) 72 h neutral salt spray according to DIN EN ISO 9227:2017-07 c) 24 h at $(-20 \pm 2) ^\circ\text{C}$
Testing conditions:	$(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 10) \% \text{ r.h}$ Testing stamp: 20 mm diameter Method B Glue on basis of epoxy (2 days curing time)

Test results:

Table 5 Pull-off test after artificial ageing

Specimen	Test spot	Bond strength [N/mm ²]	Separation case with division in [%]					
			A	A/B	B	B/Y	Y	Y/Z
P1.3	1	3,08			100			
	2	9,14			100			
P1.4	1	6,75			100			
	2	10,30			100			
P1.5	1	6,55			100			
	2	9,07			100			
Mean		7,48	Requirement: 2,5 N/mm ² with 0 % separation case A/B 5,0 N/mm ² otherwise					
min. value		3,08						
Standard deviation		2,61						
Limit		2,5 (5,0)						
Evaluation ²⁾		erfüllt						

Legend:

Cohesive failure in:

- A: Substrate
B: Corrosion protection
Y: Glue

Adhesive failure between:

- A/B: Substrate and corrosive protection
B/Y: Corrosive protection and glue
Y/Z: Glue and stamp

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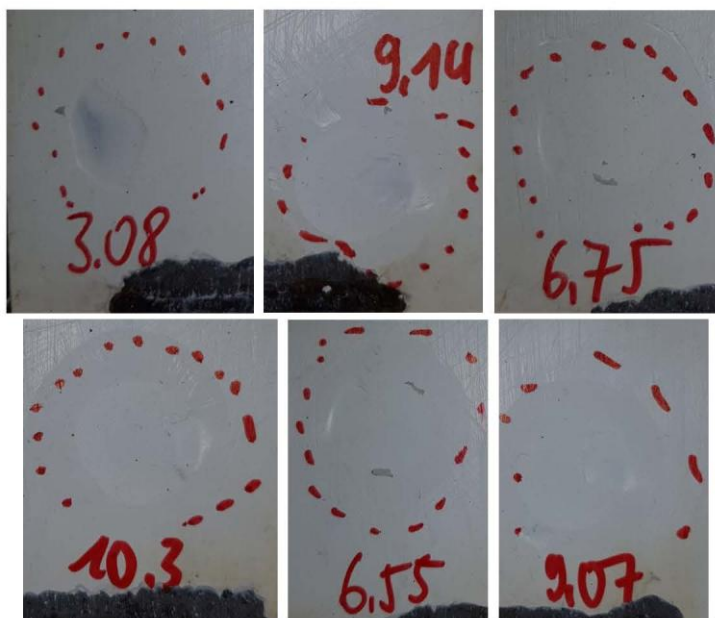


Figure 4 Failure patterns of the conditioned samples

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3. Summary and conclusion

Kiwa GmbH, MPA Berlin-Brandenburg was commissioned by Alberdingk Boley GmbH to carry out the tests in the category "C5 very high" on with the corrosion protection systems

"FP 2403/78" 3-layered on the basis of **"ALBERDINGK® AC 2403"**

coated panels according to DIN EN ISO 12944-6:2018-06 *"Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Part 6: Laboratory performance test methods; German Version"*.

For this purpose, the coated panels were subjected to the cyclic ageing test according to Annex B of DIN EN ISO 12944-6:2018-06 in accordance with test programme 2 of Table 1 of DIN EN ISO 12944-6:2018-06.

The coated panels with the coating system "FP2403/78" meet all the requirements of the tests required in DIN EN ISO 12944-6:2018-06 for the corrosivity category "C5" (very strong) according to DIN EN ISO 12944-2 in conjunction with the protection duration range "Very high" (> 25 years) according to DIN EN ISO 12944-1. The coating system is thus suitable as corrosion protection for the category "C5 very high" according to Table 1 of DIN EN ISO 12944-6:2018-06.

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Notes:

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