Corrosion protective coatings

ESACOTE AC 509

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New binder for WB corrosion protection

ESACOTE AC 509

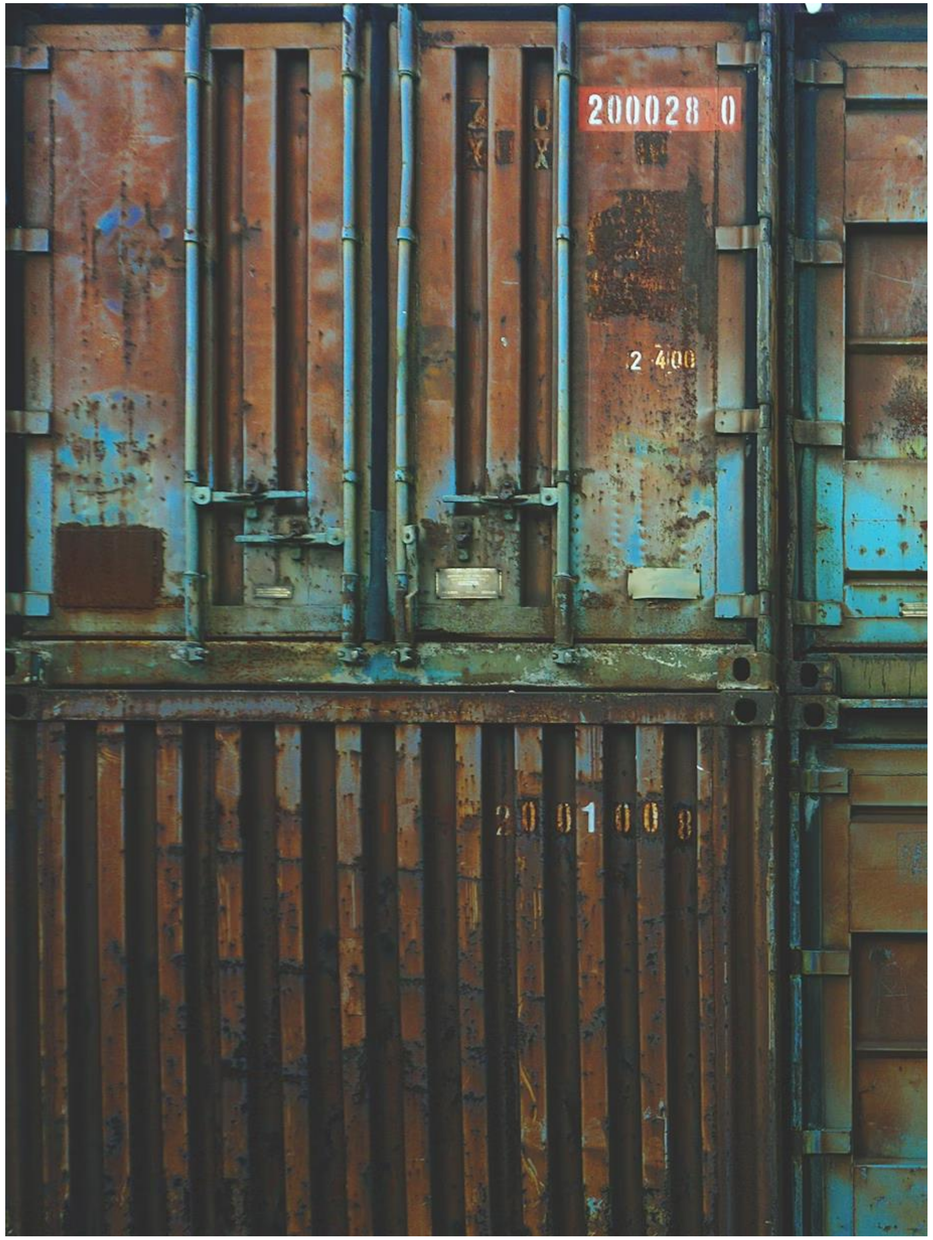
Typical values

Appearance at 25 °C:	milky liquid
pH:	7,5-8,5
(at 25°C on supplied product, ASTM E 70):	
Viscosity (mPa.s): **(Brookfield RVT @ 25 °C, 50 rpm spindle 2)**	< 1000
Solid content, %:	42.0-44.0

Product properties

Solvent content, %:	0%
Minimal film forming temperature, °C:	~25
Koenig hardness (sec):	~65
Film aspect:	transparent and glossy

Please contact our sales representatives for test methods details.

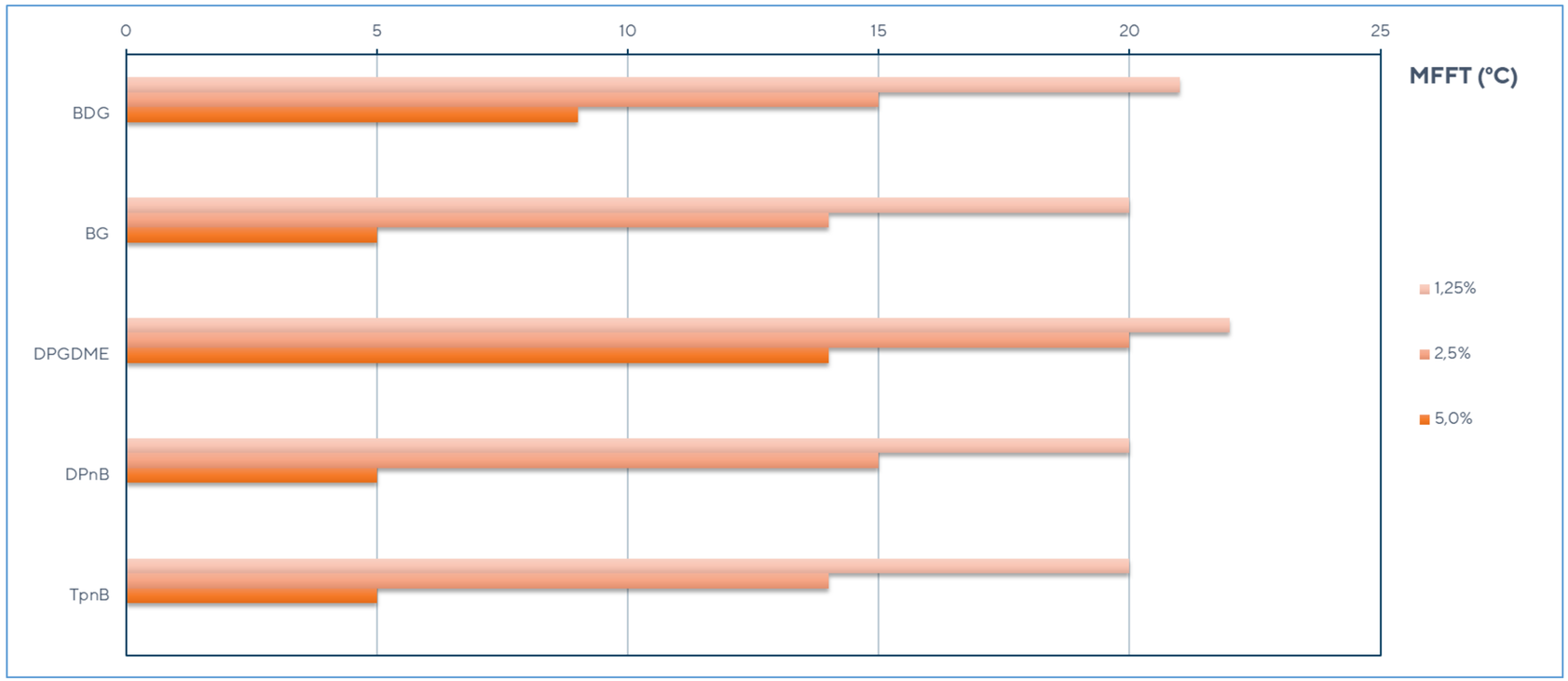


Performed test & conditions

- MFFT evaluation
- Adhesion
- Water resistance
- Salt spray test
- QUV / condensation test
- Film hardness
- Blocking resistance
- ACET evaluation
- CRS QD 36 panels
- 50 µm dry
- Spray application
- Drying 7 days 23 °C 50% RH

MFFT evaluation

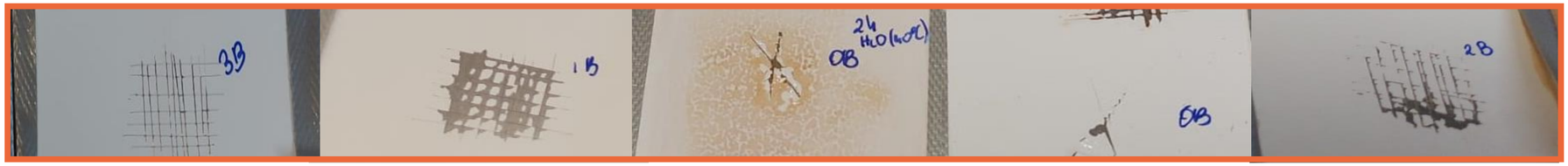
AC 09- Co-solvent	0,0%	1,25%	2,5%	5,0%
BDG	25	21	15	9
BG	25	20	14	5
DPGDME	25	22	20	14
DPnB	25	20	15	5
TpnB	25	20	14	5



MFFT evaluation has been performed on pure binder.

Adhesion

- Dry conditions (ASTM 3359-02)
- Wet conditions (24h immersion @40°C)
- Starting formulation on slide 16

	AC 509	Ref 1	Ref 2	Ref 3	Ref 4
Dry					
Wet					

Adhesion

Sample	Dry Adhesion	Wet Adhesion
ESACOTE AC 509	2B	3B
Reference 1	3B	1B
Reference 2	3B	0B
Reference 3	1B	0B
Reference 4	2B	2B

5B best – 0B worst

Water resistance

- 40 °C up to 21 days depending on performance
- Starting formulation on slide 16

Water resistance

Sample	Result
ESACOTE AC 509	Blistering after 21 days
Reference 1	Roughness after 7 days
Reference 2	Blistering after 1 day
Reference 3	Blistering after 1 day
Reference 4	Blistering after 4 days

Salt spray test

- ASTM B 117 – 2 weeks 330 hours
- No anticorrosion pigments, only Asconium A142-DA
- Starting formulation on slide 16

AC 509 **Ref 1** **Ref 2** **Ref 3** **Ref 4**

Salt spray test

Sample	Ranking
ESACOTE AC 509	1
Reference 4	2
Reference 1	3
Reference 2	4
Reference 3	5

1 best – 5 worst

QUV test

- Temperature 60 °C
- Lamp UVA 340 nm
- Starting formulation on slide 16

	Time 0			After 4 weeks			Δgloss
Gloss	20	60	85	20	60	85	60
AC 509	51,1	80,7	90,4	53,3	81,0	88,4	0,3
Reference 1	52,3	83,0	93,2	58	84,7	91,7	1,7

	Time 0			After 4 weeks			ΔE
	L	a	b	L	a	b	
AC 509	94,52	-1,28	1,54	93,89	-1,30	2,24	0,94
Reference 1	95,14	-1,20	1,39	94,47	-1,26	2,28	1,12

Humidity test

- Temperature 60 °C
- Condensation program
- Starting formulation on slide 16

	Time 0			After 4 weeks			Δgloss
Gloss	20	60	85	20	60	85	60
AC 509	56,2	82,9	86,9	2,5	14,9	29,3	68,0
Reference 1	51,9	83,5	83,3	3,1	27,1	69,6	56,4

	Time 0			After 4 weeks			ΔE
	L	a	b	L	a	b	
AC 509	94,52	-1,28	1,41	95,40	-0,79	3,03	1,8
Reference 1	95,18	-1,20	1,41	96,84	-0,79	2,95	2,3

MFFT, Hardness & Blocking

- 3 kg/cm^2 pressure
- Starting formulation on slide 16

Sample	MFFT (°C)	Koenig Hardness (sec)	Blocking evaluation				
			2h RT	4h RT	16h RT	3h 40°C	24h 40°C
ESACOTE AC 509	25	65	•	•	•	••	•••
Reference 1	20	40	•	•	•	••	•••

••• High •• Medium • Low

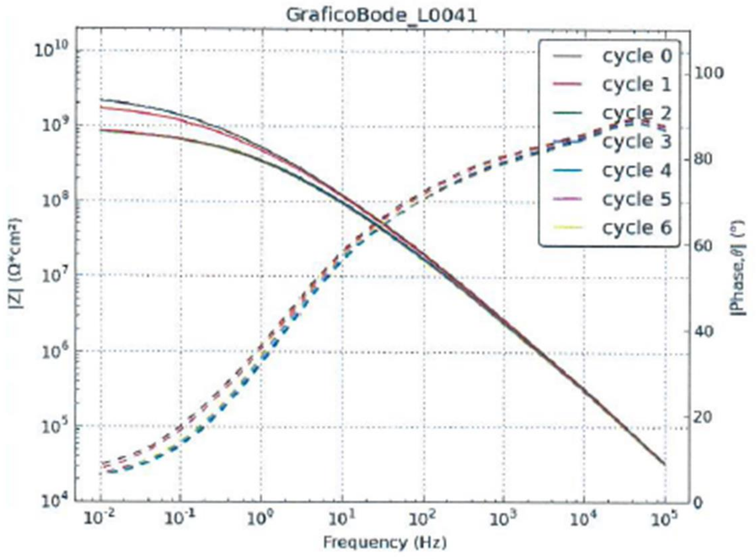
ACET (Accelerated Cyclic Electrochemical Technique)

The ACET method allows the corrosion resistance of organic coatings applied to any metal surface to be studied in just 24 hours.

The method, regulated by the ISO 17463 standard, is an alternative to the salt spray corrosion resistance test.

The technique consists in applying a potential difference (than an electrochemical stress) to the painted sample and measuring, after a relaxation time, the impedance of the system. Impedance is a physical quantity that represents the force of opposition of the sample to the passage of current.

The impedance measurment is repeated up to 6 times.



ACET analysis confirmed that ESACOTE AC 509 has good barrier performance

Starting formulation

Phase		Trade name	% w/w
A			
1	Titanium oxide white paste	White paste 490	16.93
B			
1	Binder (Lamberti)	ESACOTE AC 509	68.7
C			
	Water	DEMI WATER	2.6
D			
1	Defoamer (BYK)	BYK 024	0.14
E			
1	Wetting agent (BYK)	BYK 349	0.16
F			
1	Corrosion inhibitor (ASCOTEC)	ASCONIUM 142 DA	1.73
2	Neutralizer amino alcohol (ANGUS)	AMP 90	0.13
3	Water	DEMI WATER	1.73
G			
1	Coalescent (DOW)	Butyl CARBITOL (butyl diglycol)	2.1
2	Water	DEMI WATER	2.1
H			
1	Antiflash rust (ASCOTEC)	ASCOTRANS H 10	0.45
I			
1	Rheology modifier (Munzing)	TAFIGEL PUR 60 (10% PUR 60; 20% DPM; 70% water)	0.8
L			
1	Water	DEMI WATER	2.43
tot			100

)ose A1. Under stirring add B1,C1, D1,E1, mix of F1, F2 and F3, mix of G1 and G2, H1, I1, L1.
olid Content ≈ 45.5%. Substrates: QD36 CRS panel (Q panel)
o apply one layers of formulation 55 micron dry (120 micron wet), and dry at room temperature for 7 days.

Properties and Applications: DTM 1K pigmented glossy formulation (suggested for CRS substrate)

Code: white paste 490

Phase		Trade name	% w/w
A			
1	Water	DEMI WATER	2.27
B			
1	Dispersant (Münzing Chemie)	EDAPLAN 490	0.91
C			
1	Neutralizer amino alcohol (ANGUS)	AMP 90	0.02
D			
1	Defoamer (BYK)	BYK 024	0.09
E			
1	TIO_2 (KRONOS)	KRONOS 2190	13.64
Tot			16.93

Dose A1. Under stirring add a mix of B1,C1,D1,E1. Solid Content ≈80%. Pigment grinding below 10 microns.

ESACOTE AC 509

Compatibility additives

- **DISPERSING AGENT**: **EDAPLAN 490**, BYK 2080 (BYK), BYK 2081 (BYK), TEGO DISPERS 755W (EVONIK), FLUIJET 1725 (LAMBERTI)
- **RHEOLOGY MODIFIER**: VISCOLAM PS 202 AIR, VISCOLAM PS 170 AIR, VISCOLAM 630
- **CORROSION INHIBITOR**: ASCONIUM 142 DA
- **ANTI FLASH-RUST**: ASCOTRAN H-10
- ***ANTICORROSIVE PIGMENT**: PZ 20 (SNCZ), PZ 40 (SNCZ), HEUCOPHOS ZMP, HEUCOPHOS ZCP PLUS, NUBIROX 302, K-WHITE 140W
- **CO-SOLVENT**: **BDG**, DPGDME, BDG: DPnB (3:2)
- ***TiO_2**: KRONOS 2190, KRONOS 2310

*Some settling that could be easily redispersed. Test done without dispersing agent for anticorrosive pigment

Some extra test...

Different substrates & thicknesses evaluations

CRS R 36 evaluation

- 50µ dry film thickness

Adhesion

QD 36 R 36

Dry

Wet

Sample	Dry	Wet
QD 36	2B	3B
R 36	3B	3B

5B best – 0B worst

SST

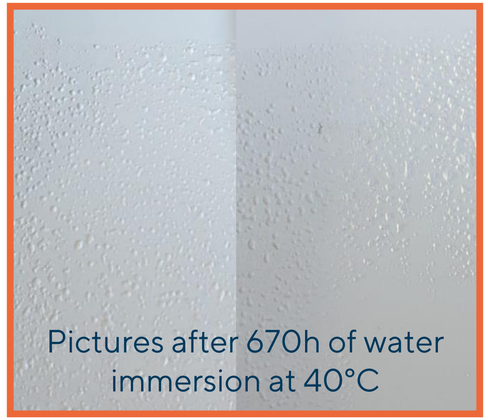
QD 36 R 36

Pictures after 330h of SST without anticorrosive pigments

No significant difference between QD and R 36

Water resistance

QD 36 R 36



Pictures after 670h of water immersion at 40°C

Sample	Result
QD 36	Blistering after 21 days
R 36	Blistering after 21 days

Thickness comparison

- CRS QD 36 panels

Adhesion

50µ 100µ

Dry

Wet

Sample	Dry	Wet
50µ	2B	3B
100µ	3B	3-4B

5B best – 0B worst

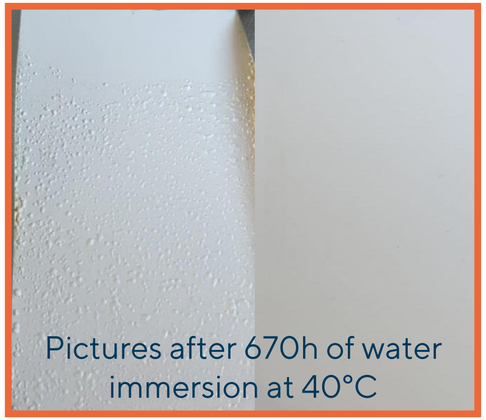
SST

50µ 100µ

Pictures after 330h of SST without anticorrosive pigments

Water resistance

50µ 100µ



Pictures after 670h of water immersion at 40°C

Sample	Result
50µ	Blistering after 21 days
100µ	No blistering after 28 days

Salt Spray Test

- CRS QD 36 panels

330 hours

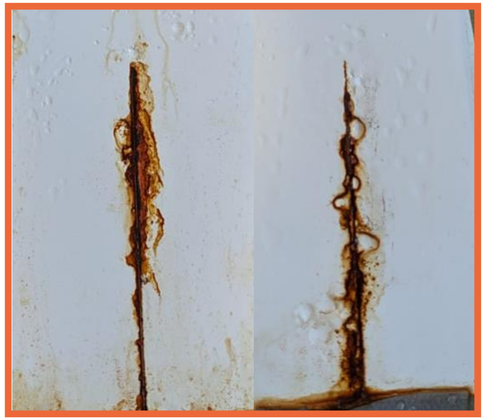
50µ 100µ

500 hours

50µ 100µ

700 hours

50µ 100µ



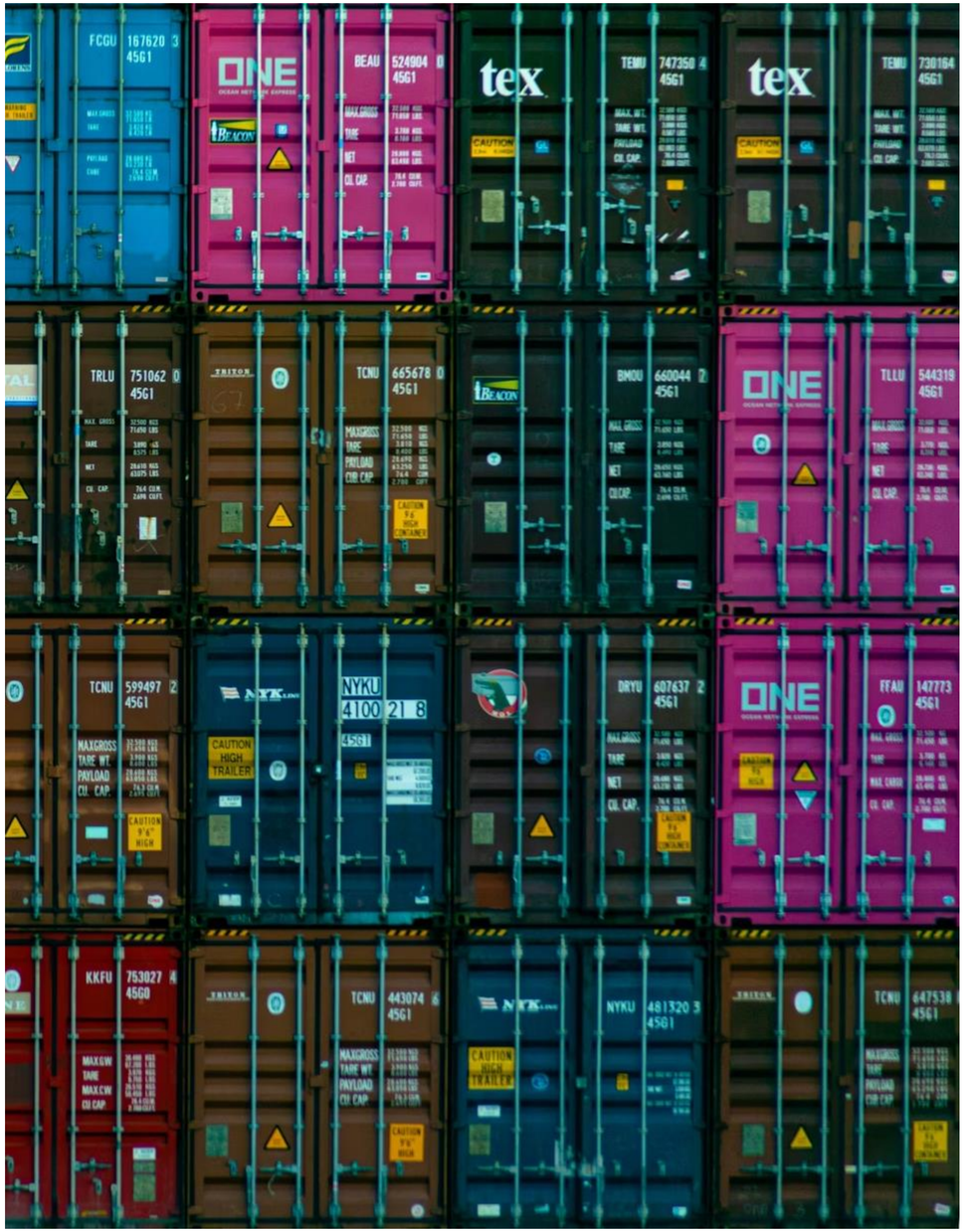
Pictures without anticorrosive pigments

Conclusions

ESACOTE® AC 509

Solid content: 42-44%
MFFT: 25°C
Koenig hardness: 65 s

Main benefits:
- Good dry adhesion on CRS (tested QD-36 and R-36)
- Good corrosion resistance
- Good hardness development
- Good dirt pick-up
- Blocking comparable to benchmark




Lamberti