



FORMULATION GUIDE FOR PAINTS AND COATINGS

Raw materials and chemical additives

Local. Global. Integrated.

CONTENT

PRODUCT CATEGORY

PAGES

ECOLABEL INDOOR WHITE PAINT FORMULATION

General information 5

ANTICORROSIVE 1K WB DTM PAINT FORMULATION

General information 9

INTUMESCENT 1K WB PAINT FORMULATION

General information 13

ALKYD COATINGS

General information 17

PIGMENT CONCENTRATES (COLOURANTS) FORMULATIONS

General information 21



ECOLABEL INDOOR WHITE PAINT FORMULATION

General information

Modern interior waterborne decorative coatings need to fulfil many requirements, concerning ecological and healthy regulations. Commission Decision of 28 May 2014 establishing the ecological criteria for the award of the EU Ecolabel for indoor and outdoor paints and varnishes, including maximum content of VOC and SVOC, as well as the minimum class of wet-scrub resistance and spreading rate at 0.98 of contrast ratio. PCC Exol products can be successfully applied in low VOC and SVOC Ecolabel paints. They provide very good dispersing properties, as well as improve crucial factors, including water resistance, which significantly contributes to high performance of the final paint formulation.



ECOLABEL INDOOR WHITE PAINT FORMULATION

– RAW MATERIALS

	RAW MATERIAL	LOADINGS (%WT)
1	Water	16.8
2	EXOdis PC540i	0.8
3	EXOdis PC185	0.2
4	Defoamer	0.2
5	Titanium white	14
6	Plastorit 0000	5
7	Calplex 2	10
8	Socal P-2	7
9	Talc M15	7
10	Dorkafill H	7
11	Water	1.3
12	Hydroxyethylcellulose (1% aqueous solution)	10
13	Synexil SAB 05	20
14	Polyether thickener	0.4
15	Biocide	0.1
16	Defoamer	0.2



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S64, 20rpm	10200 mPa·s
Wet-scrub resistance class	EN 13300	II
Contrast ratio at spreading rate 8 m²/l	ISO 6504-3	99.3%
Spreading rate at contrast ratio 98.0%	ISO 6504-3	10 m²/l
Gloss at 85°	ISO 2813	2.7

Procedure:

1. Mix components 1–4.
2. Add components 5–10 slowly, while agitating, and mix until a homogeneous liquid is obtained.
3. Grind until the desired fineness is achieved.
4. Add components 11–16 to the pigment slurry and mix until a homogeneous liquid is obtained.



ANTICORROSIVE 1K WB DTM PAINT FORMULATION

General information

The DTM (*direct to metal*) coatings are modern anticorrosive solutions for the metal protection, which are increasingly gaining their popularity. The main reason is that they combine the properties of primers and top-coat, hence they are easy to handle. DTM coating also provide several additional benefits, such as strong adhesion or excellent anticorrosive resistance. PCC Exol products, including corrosion inhibitors – EXOhib PC108 and PC500 as well as wetting and dispersing additives – EXOdis PC540A and ROKadis 900A/25 exhibit outstanding synergy and performance in WB DTM coatings.

ANTICORROSIVE 1K WB DTM PAINT FORMULATION – RAW MATERIALS

	RAW MATERIAL	LOADINGS (%WT)
1	Water	6
2	EXOdis PC540A	0.8
3	ROKadis 900A/25	0.8
4	Defoamer	0.3
5	Titanium white	16
6	Luzenac 0	7
7	Hydrophilic fumed silica	0.2
8	EXOhib PC108	1.6
9	Water	5
10	Alberdingk AC 2403	55
11	Coalescent	2.2
12	Surface wetting agent	0.2
13	EXOhib PC500	0.4
14	HEUR additive I (50% solution)	4
15	HEUR additive II (50% solution)	0.1
16	Biocide	0.1
17	Defoamer	0.3



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S64, 20rpm	3300 mPa·s
Adhesion before Machu test ¹	ISO 2409	0
Rust after 48h of Machu test ¹	ISO 4628-3	Ri 0
Blistering after 48h of Machu test ¹	ISO 4628-2	3-3 (S3), disappear after 24h
Adhesion after 48h of Machu test ¹	ISO 2409	0

Procedure:

- Mix components 1–4.
- Add components 5–7 slowly, while agitating, and mix until a homogeneous liquid is obtained.
- Grind until the desired fineness is achieved.
- Add components 8–17 to the pigment slurry and mix until a homogeneous liquid is obtained.

¹ Samples of the coatings, applied on steel plates, were immersed for 48 hours at 40°C in a Machu solution (50g NaCl, 10g of acetic acid, and 5g of 30% H₂O₂ dissolved in 1L of distilled water). 24 hours of the Machu test typically correspond to 500 hours of salt spray test.



INTUMESCENT COATINGS

General information

Fire protection intumescent coatings have a broad range of applications, including industrial and end-user uses. They can be used to protect metal and wood surfaces against cellulosic or hydrocarbon fires. These products are typically based on ammonium polyphosphate/melamine/pentaerythritol intumescent systems. PCC Group products are widely used in various intumescent coatings, including solvent-based (SB) and water-based (WB) systems. Roflam B7 is an excellent solvent and plasticizer for epoxy 2K systems. The product significantly decreases the viscosity of the resin component while providing very good mechanical properties to the coating. Additionally, it supports the intumescent system, helping to create a strong, uniform char with appropriate thickness and insulation properties. For WB systems, wetting and dispersing additives such as EXOdis PC540i and EXOdis PC418 are recommended. These additives facilitate the dispersion of the system in the coating formulation and provide excellent stabilization for the final product.

INTUMESCENT 2K EPOXY COATING FORMULATION – RAW MATERIALS

COMPONENT A		LOADINGS (%WT)
1	Epoxy resin ¹	30
2	Roflam B7	15
3	APP	23.8
4	Pentaerythritol	8
5	Melamine	8
6	Defoamer	0.2
COMPONENT B		
7	Amine hardener ²	15



PARAMETER	METHOD	RESULT
Viscosity of component A	Brookfield, S64, 1rpm	53000 mPa·s
Tensile strength	ISO 527	21.7 MPa
Shore D	ISO 868	78
Char expansion factor	Internal ³	22

Procedure:

- Mix components 1-3.
- Add components 4-6 while agitating and mix on high speed under vacuum for 30 minutes. Grind until the desired fineness is achieved.
- To prepare the coating film mix Component A with Component B under vacuum in an 85:15 ratio, then apply on desired substrate and leave it to 24h to harden.

¹ BPA based, EEW = 185 – 196 g/eq, Viscosity = 10000 – 15000 mPa·s

² Amine value = 200 – 350 mg KOH/g, Viscosity = 150 – 300 mPa·s

³ coatings with dimensions of 150 x 90 x 4 mm on steel plates were placed in a furnace at a temperature of 500°C for a period of 30 minutes. The char expansion factor is determined as the ratio of the char layer height to the initial coating height

INTUMESCENT 1K WB PAINT FORMULATION – RAW MATERIALS

RAW MATERIAL		LOADINGS (%WT)
1	Water	20.95
2	Hydroxyethylcellulose	0.05
3	EXOdis PC540i	0.6
4	EXOdis PC418	0.2
5	Defoamer	0.3
6	Titanium white	7
7	APP	25
8	Pentaerythritol	9
9	Melamine	9
10	Hydrophilic fumed silica	0.1
11	Emultex FR 728	25
12	Coalescent	1.5
13	Roflam B7L	1
14	Biocide	0.1
15	Defoamer	0.2



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S64, 20rpm	6800 mPa·s
Adhesion	ISO 2409	1
Char expansion factor	Internal	55

Procedure:

- Dissolve hydroxyethylcellulose in water. Add components 2–5.
- Add components 6–10 slowly, while agitating, and mix until a homogeneous liquid is obtained.
- Grind until the desired fineness is achieved.
- Add components 11–15 to the pigment slurry and mix until a homogeneous liquid is obtained.

¹ Three layers of the coating were applied on steel plates to obtain dry thickness of the film around 1 mm. Then coatings were placed in a furnace at a temperature of 500°C for a period of 30 minutes. The char expansion factor is determined as the ratio of the char layer height to the initial coating height

ALKYD COATINGS

General information

Alkyd coatings are among the most common solventborne products on the market. Since their production process involves natural oils such as soybean, linseed, rapeseed, or tall oil, they have a significant biobased material content. Alkyd coatings provide very good properties, including adhesion, gloss or durability, therefore they can be used for exterior, wood or anticorrosive applications. EXOdis PC230 as wetting&dispersing additive exhibits very good compatibility with various systems and has positive influence on stability, gloss, adhesion and other crucial parameters of alkyds.

WHITE GLOSS ENAMEL - RAW MATERIALS

	RAW MATERIAL	LOADINGS (%WT)
1	Setal A F 26 X	55
2	D40 solvent	15.1
3	Butanol	7.1
4	EXOdis PC230	1.2
5	Titanium white	20
6	Fumed silica	0.1
7	Co siccative 10%	0.2
8	Zr siccative 18 %	0.3
9	Ca siccative 10%	0.7
10	Anti-skinning agent	0.3



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	650 mPa·s
Gloss at 20°	ISO 2813	87
Persoz hardness	ISO 1522	0.23

RED ALKYD ANTICORROSIVE PRIMER - RAW MATERIALS

	RAW MATERIAL	LOADINGS (%WT)
1	Alkid L-40 XX-60	29.5
2	Xylene	20.8
3	Butanol	5
4	EXOdis PC230	2
5	Jacor Fe-1	30.5
6	Minex 4	5
7	SE Standard	5.6
8	Fumed silica	0.2
9	Co siccative 10%	0.2
10	Zr siccative 18 %	0.3
11	Ca siccative 10%	0.6
12	Anti-skinning agent	0.6



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S64, 1rpm	1100 mPa·s
Gloss at 60°	ISO 2813	2
Adhesion to steel	ISO 2409	0
Persoz hardness	ISO 1522	0.22

GREY ALKYD ANTICORROSIVE PRIMER - RAW MATERIALS

	RAW MATERIAL	LOADINGS (%WT)
1	Alkid L-40 XX-60	38
2	Xylene	9.65
3	Butanol	7.1
4	EXOdis PC230	1.5
5	Carbon black	0.05
6	Titanium white	2.6
7	Minex 4	6
8	Barium sulphate	23.2
9	Zinc phosphate	10
10	Fumed silica	0.3
11	Co siccative 10%	0.2
12	Zr siccative 18 %	0.4
13	Ca siccative 10%	0.7
14	Anti-skinning agent	0.3



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S64, 1rpm	1100 mPa·s
Gloss at 60°	ISO 2813	17
Adhesion to steel	ISO 2409	0
Persoz hardness	ISO 1522	0.18

General procedure for alkyd coatings

1. Mix components 1-4, siccatives and anti-skinning agent. | until homogeneous liquid is obtained.
2. Add pigments, fillers and silica slowly, while agitating
3. Grind until the desired fineness is achieved.

PIGMENT CONCENTRATES (COLOURANTS) FORMULATIONS

General information

Many coloured waterborne paints are obtained nowadays during the tinting process of the paint base (white or colourless) with appropriate waterborne colourants, which are dispersions of pigments in water stabilized by proper dispersing agents. Depending on the pigment nature, their concentration in colorants may vary from 10% up to 70%. PCC Exol wetting and dispersing additives provide excellent stability and tinting strength in the final formulation.

TITANIUM WHITE, 70%

RAW MATERIAL		LOADINGS (%WT)
1	Water	21.4
2	EXODis PC540i	2.1
3	EXODis PC800	0.7
4	EXOpast OTE3	5
5	Pigment White 6	70
6	Defoamer	0.6
7	Hydrophilic fumed silica	0.1
8	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	900 mPa·s

IRON OXIDE RED, 70%

RAW MATERIAL		LOADINGS (%WT)
1	Water	18.1
2	EXODis PC800	6
3	EXOpast OTE3	5
4	Pigment Red 101	70
5	Defoamer	0.6
6	Hydrophilic fumed silica	0.2
7	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	1400 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●

IRON OXIDE YELLOW, 60%

RAW MATERIAL		LOADINGS (%WT)
1	Water	26.7
2	EXODis PC800	7.5
3	EXOpast OTE3	5
4	Pigment Yellow 42	60
5	Defoamer	0.6
6	Hydrophilic fumed silica	0.1
7	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	2200 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●○

IRON OXIDE BLACK, 60%

RAW MATERIAL		LOADINGS (%WT)
1	Water	28.2
2	EXODis PC800	6
3	EXOpast OTE3	5
4	Pigment Black 11	60
5	Defoamer	0.6
6	Hydrophilic fumed silica	0.1
7	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S64, 20rpm	4900 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●○

PIGMENT YELLOW 74, 50%

RAW MATERIAL		LOADINGS (%WT)
1	Water	41.3
2	EXOdis PC800	8
3	EXOpplast OTE3	5
4	Pigment Yellow 74	45
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	750 mPa.s
Tinting strength WB coatings	Colorimetry	●●●●○

PIGMENT RED 254, 45%

RAW MATERIAL		LOADINGS (%WT)
1	Water	44.3
2	EXOdis PC800	5
3	EXOpplast OTE3	5
4	Pigment Red 254	45
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	100 mPa.s
Tinting strength WB coatings	Colorimetry	●●●●○

PIGMENT BLUE 15:3, 45%

RAW MATERIAL		LOADINGS (%WT)
1	Water	40.3
2	EXOdis PC800	9
3	EXOpplast OTE3	5
4	Pigment Blue 15:3	45
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	340 mPa.s
Tinting strength WB coatings	Colorimetry	●●●●○

PIGMENT RED 122, 25%

RAW MATERIAL		LOADINGS (%WT)
1	Water	64.3
2	EXOdis PC800	5
3	EXOpplast OTE3	5
4	Pigment Red 122	25
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	10 mPa.s
Tinting strength WB coatings	Colorimetry	●●●●○

EXODIS PC416

PIGMENT YELLOW 74, 50%

RAW MATERIAL		LOADINGS (%WT)
1	Woda	39.3
2	EXOdis PC416	5
3	EXOpplast OTE3	5
4	Pigment Yellow 74	50
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	650 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

PIGMENT RED 254, 45%

RAW MATERIAL		LOADINGS (%WT)
1	Water	44.8
2	EXOdis PC416	4.5
3	EXOpplast OTE3	5
4	Pigment Red 254	45
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	90 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

PIGMENT BLUE 15:3, 45%

RAW MATERIAL		LOADINGS (%WT)
1	Water	41.8
2	EXOdis PC416	7.5
3	EXOpplast OTE3	5
4	Pigment Blue 15:3	45
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	260 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

PIGMENT RED 122, 25%

RAW MATERIAL		LOADINGS (%WT)
1	Water	61.3
2	EXOdis PC416	8
3	EXOpplast OTE3	5
4	Pigment Red 122	25
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	700 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

CARBON BLACK, 30%

RAW MATERIAL		LOADINGS (%WT)
1	Water	54.3
2	EXOdis PC416	10
3	EXOplast OTE3	5
4	Pigment black 7	30
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	1100 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●



PIGMENT YELLOW 74, 50%

	RAW MATERIAL	LOADINGS (%WT)
1	Woda	39.5
2	EXODIS PC417	4.5
3	AMP95	0.3
4	EXOpast OTE3	5
5	Pigment Yellow 74	50
6	Defoamer	0.6
7	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	650 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

PIGMENT RED 254, 45%

	RAW MATERIAL	LOADINGS (%WT)
1	Water	46.2
2	EXODIS PC417	2.9
3	AMP95	0.2
4	EXOpast OTE3	5
5	Pigment Red 254	45
6	Defoamer	0.6
7	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	80 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

PIGMENT BLUE 15:3, 45%

	RAW MATERIAL	LOADINGS (%WT)
1	Water	43.4
2	EXODIS PC417	5.5
3	AMP95	0.4
4	EXOpast OTE3	5
5	Pigment Blue 15:3	45
6	Defoamer	0.6
7	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	220 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

PIGMENT RED 122, 25%

	RAW MATERIAL	LOADINGS (%WT)
1	Water	61.8
2	EXODIS PC417	7
3	AMP95	0.5
4	EXOpast OTE3	5
5	Pigment Red 122	25
6	Defoamer	0.6
7	Biocide	0.1



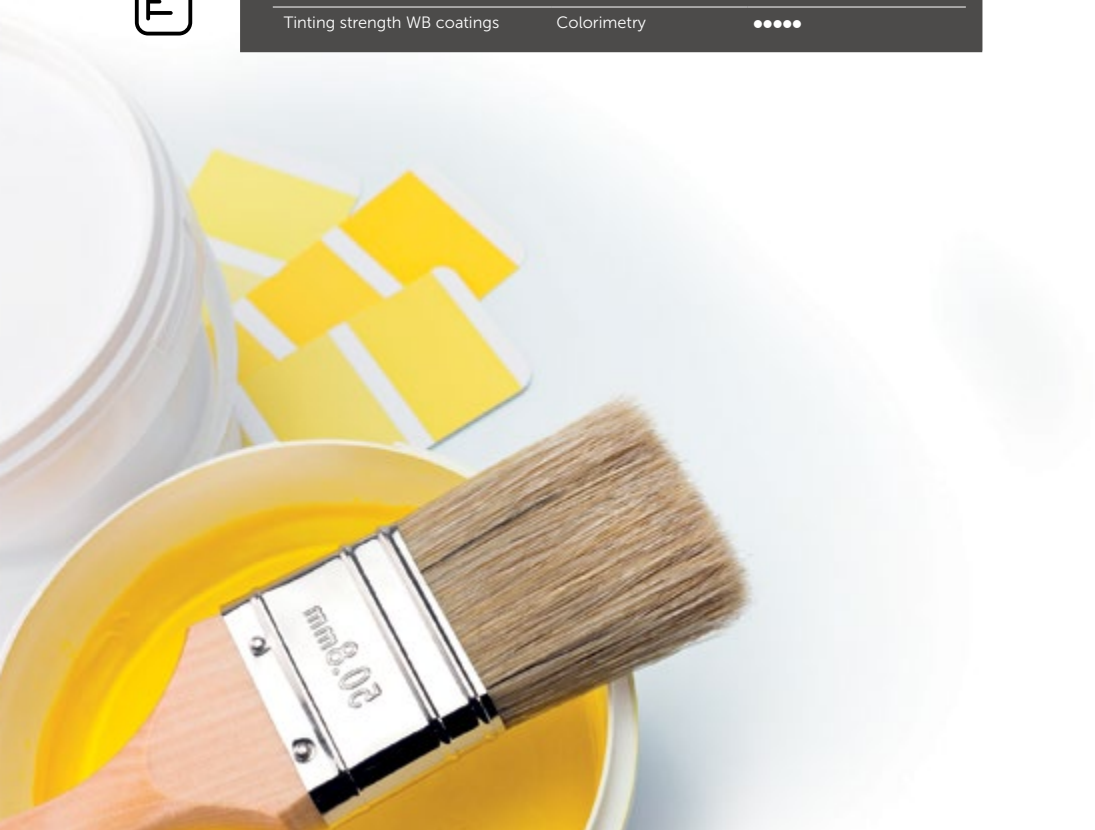
PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	930 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

CARBON BLACK, 30%

RAW MATERIAL		LOADINGS (%WT)
1	Water	55.6
2	EXOdís PC417	8.1
3	AMP95	0.6
4	EXOpplast OTE3	5
5	Pigment black 7	30
6	Defoamer	0.6
7	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	459 mPa.s
Tinting strength WB coatings	Colorimetry	●●●●



EXODIS PC418

PIGMENT YELLOW 74, 50%

	RAW MATERIAL	LOADINGS (%WT)
1	Woda	39.8
2	EXODis PC418	4.5
3	EXOpplast OTE3	5
4	Pigment Yellow 74	50
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	1900 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

PIGMENT RED 254, 45%

	RAW MATERIAL	LOADINGS (%WT)
1	Water	45.3
2	EXODis PC418	4
3	EXOpplast OTE3	5
4	Pigment Red 254	45
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	530 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

PIGMENT BLUE 15:3, 45%

	RAW MATERIAL	LOADINGS (%WT)
1	Water	42.5
2	EXODis PC418	6.8
3	EXOpplast OTE3	5
4	Pigment Blue 15:3	45
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	640 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

PIGMENT RED 122, 25%

	RAW MATERIAL	LOADINGS (%WT)
1	Water	62.1
2	EXODis PC418	7.2
3	EXOpplast OTE3	5
4	Pigment Red 122	25
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	490 mPa·s
Tinting strength WB coatings	Colorimetry	●●●●●

CARBON BLACK, 30%

RAW MATERIAL		LOADINGS (%WT)
1	Water	55.3
2	EXOdís PC418	9
3	EXOplast OTE3	5
4	Pigment black 7	30
5	Defoamer	0.6
6	Biocide	0.1



PARAMETER	METHOD	RESULT
Viscosity	Brookfield, S34, 20rpm	1400 mPa·s
Tinting strength WB coatings	Colorimetry	•••••







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