

ARKEMA COATING RESINS

Resins for Powder Coatings

Featuring

- REAFREE® Resins
- CRAYVALLAC® Additives for Powder Coatings



ARKEMA
INNOVATIVE CHEMISTRY

ARKEMA COATING RESINS

PERFORMANCE, VALUE AND VERSATILITY IN RESINS AND ADDITIVES FOR POWDER COATINGS

The REAFREE® line of resins for powder coatings offers you a wide range of choices to meet your needs in a formulated powder coating. Our focus is on delivering performance, value and versatility to the powder coating formulator.

- Versatility – REAFREE® powder resins cover all kind of curing and functional technologies for the formulation of powder coatings.

- Performance – REAFREE® powder resins characteristics are adapted to fit the strict needs of powder coating production.

- Value – our combination of innovative technology, global support and broad product line helps you to achieve the highest quality paint manufacture.

Our extensive line of additives enables you to add value to your powder coating formulations. You can choose from rheology modifiers or specific performance-enhancing additives.

Fine-tune your formulations with specialized additives for powder coatings to achieve:

- Rheology control
- Matting agents
- Slip and mar resistance
- Scratch resistance
- Flow and levelling agents

Global technical and manufacturing support

Arkema Coating Resins provides global support for powder coating formulators, enabling us to meet your needs virtually anywhere you operate.

- Manufacturing – powder resin plants are located in Spain and the United States
- R&D – extensive research and development centers are located with each plant
- Technical Service – technical service teams are based in Europe and the United States

Arkema Coating Resins A global resource for your world of coatings

In addition to REAFREE® resins for powder coatings, Arkema Coating Resins is a leading global supplier for the coatings formulator. Our line of innovative products includes binders for waterborne and solventborne coatings for use in architectural and industrial coatings, specialty coatings, traffic coatings, graphic arts and inks, floor maintenance products, and adhesives. Arkema Coating Resins also supplies opaque polymers, as well as additives for both aqueous and non-aqueous systems. Arkema Coating Resins now operates 20 plants and eight technical and R&D centers worldwide, employing more than 1600 people in coatings-related activities.

Table of Contents

PRIMID®	2
PT-910.....	3
TGIC.....	3
Superdurable.....	4
Polyurethane	4
Hybrid.....	5
UV Resins	7
Masterbatch Additives	7
CRAYVALLAC® Additives.....	8
Test Procedures	9



PRIMID®

Saturated Carboxylated Polyester for β -Hydroxyalkylamide Curing Agents

(1) PRIMID® XL-552 and QM-1260 Hardeners

REAFREE®	Ratio XL-552 or QM-1260	Curing t(min.)/ T (°C) object	Gardner Colour ASTM D-1544	Glass transition temperature (DSC) (°C)	Melt viscosity 165°C ICI Cone-plate (Pa.s)	Acid value ASTM D-1639 (mg KOH/g.)	Characteristics
8180	90 / 10 88 / 12	15/180	max. 2	approx. 52	5 - 15	70 - 78	To be combined with REAFREE® 8300 alone or with REAFREE® 8780 for matt powder coatings by dry blending. Different glosses depending on REAFREE® 8780/8180 mixing ratios.
8188	90 / 10 88 / 12	15/180	max. 2	approx. 60	9 - 18	70 - 78	High Tg version of REAFREE® 8180. For matt powder coatings by dry blending. Different glosses depending on REAFREE® 8780/8188 mixing ratios.
8300*	96,5 / 3,5 96 / 4	15/180	max. 2	approx. 58	10 - 30	20 - 28	Low PRIMID® demand. For matt powder coatings by dry blending combined with REAFREE® 8180, 8188 and 8780.
8302*	96,5 / 3,5 96 / 4	15/200	max. 2	approx. 55	15 - 35	18 - 24	For matt powder coatings by dry blending combined with REAFREE® 8782.
8308*	96,5 / 3,5 95,5 / 4,5	10/200	max. 2	approx. 57	18 - 32	24 - 29	Low PRIMID® demand. Excellent flow and degassing properties.
8400*	96 / 4 95,5 / 4,5	15/180	max. 2	approx. 58	18 - 38	26 - 30	Low PRIMID® demand. Good degassing properties.
8580*	95 / 5 94,5 / 5,5	15/160	max. 2	approx. 60	15 - 25	30 - 36	General purpose. Standard curing from 12-15' at 160°C.
8585*	95 / 5 94,5 / 5,5	15/180	max. 2	approx. 58	14 - 26	28 - 34	Improved flow version of REAFREE® 8580 with better degassing properties. Curing from 20' at 160°C.
8589*	95 / 5 94,5 / 5,5	15/180	max. 2	approx. 58	14 - 26	28 - 34	Improved outdoor durability versus standard 95/5 resin.
8596*	95 / 5 94,5 / 5,5	12/200	max. 2	approx. 58	12 - 24	28 - 34	For high gloss. Excellent out-gassing properties.
8598*	95 / 5 94,5 / 5,5	10/190	max. 2	approx. 58	14 - 26	28 - 34	Excellent out-gassing properties. Low reactivity.
8780*	93 / 7 91,5 / 8,5	15/180	max. 2	approx. 57	7 - 20	49 - 56	To be combined with REAFREE® 8300 alone or with REAFREE® 8180-8188 for matt powder coatings by dry blending. Different glosses depending on REAFREE® 8780/8180-8188 mixing ratios.
8782*	93 / 7 91,5 / 8,5	15/180	max. 2	approx. 58	12 - 32	48 - 53	For matt powder coatings by dry blending combined with REAFREE® 8302.

ALL POLYESTER RESINS FOR β -HYDROXYALKYLAMIDE CURING AGENTS ARE GAS OVEN STABILIZED

ALL POLYESTER RESINS CAN BE SUPPLIED FOR TRIBOCHARGING GUNS (-T versions)

*TMA free types.

PT-910

Saturated Carboxylated Polyester for Araldite® PT-910 Curing Agent

REAFREE®	Ratio	Curing t(min.)/ T (°C) object	Gardner Colour ASTM D-1544	Glass transition temperature (DSC) (°C)	Melt viscosity 165°C ICI Cone-plate (Pa.s)	Acid value ASTM D-1639 (mg KOH/g.)	Characteristics
2707*	93 / 7	15/200	max. 2	approx. 67	50 - 90	24 - 29	Low ratio of PT-910. For pigmented and clear coats.
2776*	93 / 7	20/170	max. 2	approx. 68	50 - 90	22 - 30	Catalysed version of REAFREE® 2796.
2796*	93 / 7	15/200	max. 2	approx. 68	50 - 90	22 - 30	Low ratio of PT-910. For pigmented and clear coats.
2892*	92 / 8	15/190	max. 2	approx. 70	60 - 90	30 - 35	Medium reactivity. Good boiling water resistance.

ALL POLYESTER RESINS CAN BE SUPPLIED FOR TRIBOCHARGING GUNS (-T versions), GAS-OVEN STABILIZED (-S version) or BOTH (-TS versions).
*TMA free types.

TGIC

Saturated Carboxylated Polyester for TGIC Systems

REAFREE®	Ratio	Curing t(min.)/ T (°C) object	Gardner Colour ASTM D-1544	Glass transition temperature (DSC) (°C)	Melt viscosity 165°C ICI Cone-plate (Pa.s)	Acid value ASTM D-1639 (mg KOH/g.)	Characteristics
4002-S*	90/10	10/200	max. 2	approx. 57	15 - 30	44 - 50	For matt paints by dry blend with REAFREE® 4401-S. Gas oven stabilized. Good outdoor resistance.
4401-S*	96/4	20/200	max. 2	approx. 57	50 - 80	20 - 26	For matt paints by dry blend with REAFREE® 4002-S. Gas oven stabilized. Low TGIC ratio.
4703*	93/7	12/200	max. 2	approx. 60	15 - 25	30 - 36	Excellent flow and outdoor resistance. Clear coats.
4704*	93/7	10/200	max. 2	approx. 70	40 - 65	33 - 38	Good flow and outdoor resistance. High binding power.
4705*	93/7	10/200	max. 2	approx. 68	20 - 35	35 - 40	Excellent flow and outdoor resistance. Higher Tg than REAFREE® 4703.
4762*	93/7	10/160	max. 2	approx. 60	23 - 35	30 - 36	Good balance between high reactivity and mechanical properties.
4763-S*	93/7	15 / 160 1 / 290	max. 2	approx. 60	15 - 25	30 - 36	Excellent flexibility, for PCM and coil coatings enamels. Possibility to cure 1' / 290°C.
4781*	93/7	15/180	max. 2	approx. 68	20 - 35	33 - 38	Good balance between flow reactivity and outdoor resistance.
4783*	93/7	12/180	max. 2	approx. 60	15 - 25	30 - 36	Excellent balance between reactivity, flow, flexibility and outdoor resistance.
4798*	93/7	10/180	max. 2	approx. 68	35 - 50	28 - 34	Excellent flow, high Tg, medium cure.
9700*	93/7	10/200	max. 2	approx. 60	11,1 - 17	35 - 40	Smooth finishes at lower film thicknesses.
9704*	93/7	10/200	max. 2	approx. 65	17,5 - 26,5	35 - 40	Excellent flow, slow cure.

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*TMA free types.

SUPERDURABLE

Saturated Carboxylated Polyester for Superdurable finishes

REAFREE®	Ratio TGIC or XL-552	Curing t(min.)/T (°C) object	Gardner Colour ASTM D-1544	Glass transition temperature (DSC) (°C)	Melt viscosity 165°C ICI Cone-plate (Pa.s)	Acid value ASTM D-1639 (mg KOH/g.)	Characteristics
5002*	90 / 10 93/7	15/200 20/180	max. 2	approx. 66	30 - 60	45 - 50	High acid value for matt "dry-blend" superdurable finishes combined with REAFREE® 5401.
5401*	96/4 97/3	15/200 20/180	max. 2	approx. 64	20 - 40	20 - 25	Low acid value for matt "dry-blend" superdurable finishes combined with REAFREE® 5002.
5700*	93/7 95/5	10/200 15/160	max. 2	approx. 61	9,1 - 15	32 - 38	Superdurable. Excellent exterior durability.
5701*	93/7 95/5	10/200 15/160	max. 2	approx. 61	9 - 20	32 - 38	Superdurable. Excellent exterior durability. Improved flexibility.
5707*	93/7 95/5	10/200 15/160	max. 2	approx. 66	30 - 42	28 - 33	Superdurable. Excellent exterior durability.
5709*	93/7 95/5	12/200 15/160	max. 2	approx. 67	20 - 50	30 - 38	Superdurable. Excellent exterior durability.

ALL POLYESTER RESINS CAN BE SUPPLIED FOR TRIBOCHARGING GUNS (-T versions), GAS-OVEN STABILIZED (-S version) or BOTH (-TS versions).
*TMA free types.

POLYURETHANE

Saturated Hydroxylated Polyesters for Polyurethane Coatings

To be used in combination with blocked HDT and IPDI derivatives or uretidiones crosslinkers.

REAFREE®	Gardner Colour ASTM D-1544	Glass transition temperature (DSC) (°C)	Melt viscosity 165°C ICI Cone-plate (Pa.s)	Acid value ASTM D-1639 (mg KOH/g.)	Hydroxyl value G/07-1 (mg KOH/g.)	Characteristics
17009*	max. 3	approx. 55	20 - 50	max. 7	25 - 35	High gloss exterior paints. Wrinkle finishes with POWDERLINK™ systems.
17013	max. 2	approx. 62	10 - 30	max. 7	37 - 47	PUR paints with excellent mechanical properties.
17014*	max. 2	approx. 60	20 - 40	max. 2	38 - 48	PUR paints with excellent mechanical properties. Heat Transfer Matt paints.
17030*	max. 2	approx. 57	30 - 60	max. 10	90 - 110	Surface hardness improvement. Anti-graffiti paints.
17091*	max. 2	approx. 50	10 - 30	max. 7	280 - 320	Modifier polyester to increase cross-linking density. Anti-graffiti paints. Heat Transfer Matt paints.

*TMA free types.

HYBRID

Saturated Carboxylated Polyester for Hybrid Systems

RATIO: 80/20

REAFREE®	Curing t(min.)/ T (°C) object	Gardner Colour ASTM D-1544	Glass transition temperature (DSC) (°C)	Melt viscosity 165°C ICI Cone-plate (Pa.s)	Acid value ASTM D-1639 (mg KOH/g.)	Characteristics
6200-T	15/80	max. 3	approx. 55	30 - 70	23 - 26	Low epoxy ratio for gloss coatings. For hybrid matt dry-blend systems with REAFREE® 6877. Tribochargeable.

Saturated Carboxylated Polyester for Hybrid Systems

RATIO: 70/30

REAFREE®	Curing t(min.)/ T (°C) object	Gardner Colour ASTM D-1544	Glass transition temperature (DSC) (°C)	Melt viscosity 165°C ICI Cone-plate (Pa.s)	Acid value ASTM D-1639 (mg KOH/g.)	Characteristics
6400*	10/200	max. 2	approx. 52	10 - 20	30 - 36	Low reactivity, excellent flow.
6402*	10/200	max. 3	approx. 57	17 - 38	34 - 40	Better chemical resistance compared to 6400.
6460*	10/160	max. 2	approx. 52	10 - 20	30 - 36	High reactivity, with good flow.
6480*	10/180	max. 2	approx. 52	10 - 15	30 - 36	Excellent balance of flow and reactivity.
6481*	10/170	max. 2	approx. 48	12 - 20	31 - 36	Improved overbake resistance compared to 6480. Lower gloss in matt formulations with Vestagon B-68 (CREANOVA) and Dyhard PC-45 (SKW Trostberg) matting agents.
6482*	10/180	max. 4	approx. 57	17 - 38	34 - 40	Better chemical resistance compared to 6480.
6484*	12/180	max. 3	approx. 56	20 - 30	30 - 36	Excellent balance of flow and reactivity.
6489*	10/180	max. 3	approx. 57	22 - 30	31 - 37	Better chemical resistance compared to 6480. For matt systems formulated with CRAYVALLAC® EF-30P.

ALL POLYESTER RESINS CAN BE SUPPLIED FOR TRIBOCHARGING GUNS (-T versions), GAS-OVEN STABILIZED (-S version) or BOTH (-TS versions).
*TMA free types.

HYBRID

Saturated Carboxylated Polyester for Hybrid Systems

RATIO: 60/40

REAFREE®	Curing t(min.)/T (°C) object	Gardner Colour ASTM D-1544	Glass transition temperature (DSC) (°C)	Melt viscosity 165°C ICI Cone-plate (Pa.s)	Acid value ASTM D-1639 (mg KOH/g.)	Characteristics
6604	10/200	max. 3	approx. 52	14 - 20	51 - 56	Good flow, moderate cure rate. Good chemical resistance.
6608	15/180	max. 3	approx. 58	10 - 20	56 - 63	Good balance between cure and flow.
6660*	10/160	max. 2	approx. 49	7,5 - 20	50 - 55	High reactivity, without TMA.
6680*	15/180	max. 2	approx. 49	7,5 - 20	50 - 55	Good balance between cure and flow, without TMA.
6681*	15/180	max. 2	approx. 57	7,5 - 20	50 - 55	Good balance between cure and flow. High Tg version of REAFREE® 6680.
6682	10/180	max. 4	approx. 65	13 - 30	50 - 55	Good combination of cure and flow. High Tg.
6684	10/180	max. 3	approx. 52	12 - 20	50 - 56	Higher reactivity than REAFREE® 6604.
6687	10/180	max. 3	approx. 50	14 - 28	48 - 53	High flexibility, OT. For PCM interior use.
6689	12/180	max. 3	approx. 50	10 - 20	47 - 53	Good balance between cure and flow.

Saturated Carboxylated Polyester for Hybrid Systems

RATIO: 50/50

REAFREE®	Curing t(min.)/T (°C) object	Gardner Colour ASTM D-1544	Glass transition temperature (DSC) (°C)	Melt viscosity 165°C ICI Cone-plate (Pa.s)	Acid value ASTM D-1639 (mg KOH/g.)	Characteristics
6803	10/200	max. 3	approx. 50	5 - 15	70 - 76	General purpose. Tribochargeable. Excellent flow. Semigloss finishes with Matting Agent DT-125 (Huntsman).
6809	–	max. 3	approx. 70	30 - 65	90 - 100	Uncatalysed resin for fast curing systems (ULB) in combination with REAFREE® C4705-10.
6818	–	max. 3	approx. 54	5 - 15	90 - 100	Uncatalysed resin for fast curing systems (ULB) in combination with REAFREE® C4705-10. Flow improved version of REAFREE® 6809.
6877	10/170	max.3	approx. 55	7 - 16	70 - 80	General purpose. High reactivity. Suitable for thinner film coatings.
6881	10/180	max. 3	approx. 58	10 - 30	70 - 82	High reactivity. Good flow.

ALL POLYESTER RESINS CAN BE SUPPLIED FOR TRIBOCHARGING GUNS (-T versions), GAS-OVEN STABILIZED (-S version) or BOTH (-TS versions).

*TMA free types.

UV RESINS

Resins for UV Curing Powder Coatings

REAFREE®	Type	Gardner Colour ASTM D-1544	Unsaturation value (meqdb/g)	Free NCO value (%)	T _g (°C)	T _m (°C)	Viscosity approx. (dPa.s) 110°C 165°C	Acid value ASTM D-1639 (mg KOH/g.)	Characteristics
UV 1605	Aromatic UA Semi-crystalline	max. 2		0,2 max		90 - 100	1 - 5		Designed to formulate sealers and clear coats for wood composites (MDF).
UV 2130	Epoxy Acrylate	max. 3	1,1 - 1,4		40 - 50		20 - 50	5	Designed to formulate clear varnishes and pigmented paints in combination with REAFREE® UV 2223.
UV 2223	Methacrylated Polyester	max. 3	0,5 - 0,7		40 - 50		10 - 25	<15	Designed to formulate clear varnishes and pigmented paints.
UV 2335	Aliphatic UA Semi-crystalline	max. 2		0,5 max		70-80	2-10		Designed to provide high flexibility and chemical resistance to cured film.

MASTERBATCH ADDITIVES

Additives for Powder Coatings

REAFREE®	Additive type	Glass transition temperature (DSC) (°C)	Acid value ASTM D-1639 (mg KOH/g.)	Hydroxyl value G/07-1 (mg KOH/g.)	Observations
F3300-A15	Flow control agent	approx. 60	< 7	30 - 40	Masterbatch at 15% of an acrylic polymer in a Hydroxylated polyester. Recommended to improve levelling of pigmented powder coatings.
F3300-R10	Flow control agent	approx. 55	< 6	33 - 43	Masterbatch at 10% of an acrylic polymer in a Hydroxylated polyester. Recommended to improve levelling of pigmented and clear coatings.
F8585-R10	Flow control agent	approx. 55	24 - 32	–	Masterbatch at 10% of an acrylic polymer in a Carboxylated polyester. Recommended to improve levelling of PRIMID® based pigmented powder coatings.
T4705-5	Tribo charging	approx. 62	30 - 38	–	Masterbatch at 5% of a tribo additive in a carboxylated polyester. Recommended to enhance tribochargeability of powder coatings.
C4705-10	Catalyst	approx. 66	30 - 40	–	Masterbatch at 10% of a special catalyst in a carboxylated polyester. Recommended to accelerate curing of hybrid, PT-910 (Huntsman) and TGIC polyester powder coatings.

CRAYVALLAC® ADDITIVES

Additives for Powder Coatings

CRAYVALLAC®	Additive type	Glass transition temperature (DSC) (°C)	Melting point (°C)	Acid value ASTM D-1639 (mg KOH/g.)	Particle size µm, average	Observations
PC	Rheological Modifier		83 - 89		4 - 20	Micronised hydrogenated castor oil derivative. To improve flow, levelling and degassing properties. Specially indicated for PRIMID® systems.
EF-30P	Matting agent	125		275 - 285		Matting agent for pure epoxy and epoxy/polyester powder coating formulations. Excellent results in combination with REAFREE® 6489. Very good stability.
WN-1135	PP wax		148 - 154		4,0 - 7,0	Surface modifier, matting agent, lubricating and degassing agent. Slip and mar resistance.
WN-1150	Modified PE wax		110 - 115			Matting agent used to control gloss for Hybrid, TGIC and PRIMID® systems. No effects on weatherability or physical properties.
WN-1265	Modified amide wax		143 - 148		4,0 - 7,0	Improve flow, levelling and degassing properties. Indicated for PRIMID® system.
WN-1442	PE wax		110 - 115		5,0 - 7,0	Slip and mar resistance, degassing aid.
WN-1875	Polymeric wax		>200		5,0 - 7,0	High melting point polymeric wax. Increases temperature resistance, hardness, scratch resistance and UV resistance. Reduces Pill Flow.
WN-2000	PE wax		115 - 120		5,0 - 7,0	Improve flow, levelling and degassing properties. Indicated for PRIMID® system.
WF-1039	PE wax PTFE modified		110 - 115		max. 80	Textured finishes effects (fine textured).
WF-3200	PE wax PTFE modified		110 - 115		3,5 - 6,5	Enhanced slip and mar resistance.

TEST PROCEDURES

Definitions

Ratio

Recommended weight ratio between the polyester and the hardener.

Curing

Oven time (t in min) and temperature (T in °C) necessary to fully cure the paint. Full cure means more than 200 double rubs of MEK and mechanical properties.

Gardner Colour

Colour of a 50% solution in DMF of the polyester resin.

Glass transition temperature, T_g

Indicates a phase change resembling a thermodynamic second-order transition. Determined as the inflection point of the calorimetric curve measures by DSC (Differential Scanning Calorimetry).

Melt viscosity 165°C

Viscosity of the polyester measured in a modified ICI cone plate or Brookfield CAP-2000.

Acid Value

Refers to mg of KOH needed to neutralize the carboxyl groups in 1g of polyester resin.

Hydroxyl Value

Refers to mg of KOH equivalent to the hydroxyl content of 1 g of polyester.

Meq DB/g

Mili-equivalents of reactive double bonds per gram.

T_m (°C)

Melting temperature in centigrade by DSC.

M_n

Mean Molecular weight by number. (GPC, gel permeation chromatography).

ULB

Ultra Low Bake. Powder coatings cured at temperature below 150°C.

To learn more about REAFREE® and CRAYVALLAC® product availability in a specific geographical region, please contact your local sales representative, or visit us at www.arkemacoatingresins.com.

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