

# CYTEC



## PRODUCT GUIDE – Powder Coating Resins

Binder Resins, Hardeners and Additives

Europe, Middle East and Africa

From defining more efficient processes for mining customers to developing new additives for polymer-based alternatives to wood and metals, the product lines of Cytex Specialty Chemicals are unified in their dedication to customer-driven innovation.

Working closely with our customers, we develop revolutionary technologies that enable them to improve performance and productivity, enter new markets, and refine new applications. How to improve mine profitability or coatings efficiency in the face of important environmental concerns? How to develop polymers that really stand up to UV light? How to use phosphines to create better, safer biocides and fumigants for agriculture? Our technology and sales teams work on-site with customers every day to address today's business challenges and troubleshoot tomorrow's.

The applications are diverse, but the commitment is uniform: finding better solutions for customers through continual research, ongoing collaboration and a passion for innovation.

## **An Expansive Portfolio**

Cytex Specialty Chemicals is a complete solution provider for customers requiring high-value surface technologies in industries that include industrial coatings, automotive, architectural, wood and paper, graphics, adhesives and opto-electronics.

We offer our customers advanced and diverse products and technologies for surfaces with an emphasis on solvent free or low-VOC products, such as UV/EB curable resins and additives, powder coating resins and additives, as well as water-borne and solvent-borne liquid coating resins and additives.

We are committed to working with our customers to develop environmentally advanced solutions and we are dedicated to open communication concerning the safe handling, distribution, use and disposal of the products we make.

## **A Focus on Customer Satisfaction**

Cytex Specialty Chemicals operates a globally integrated set of order fulfillment IT systems and

processes. All Spec Chem personnel in the order fulfillment processes are dedicated to delivering customer satisfaction through reliable and cost-effective supply of products to our customers.

Cytex Specialty Chemicals has specialized personnel in Customer Service, Procurement, Manufacturing, Planning and Logistics to achieve this goal. In addition to timely and accurate order fulfillment, there is an equally important focus on maintaining safety and protecting the environment at all steps in the process, from the procurement of raw materials to the delivery of finished goods to the customer's door.

## **Dedication to Operational Excellence**

Cytex's Spec Chem Manufacturing Organization operates globally to provide superior service to our customers in all regions. Our vision of operational excellence brings value to our customers through ongoing, continuous improvement initiatives, including Lean Manufacturing, Six Sigma Principles, and Best Practice Engineering. Our value proposition is driven by excellence in our Safety, Environmental, Quality Systems and Employee Development Programs. We are structured by business technology, which enables our sites to work transparently with R&D, Customer Service and the Business, to share best practices across common processes. We also are able to gain leverage from overall global manufacturing synergies to most efficiently meet customer needs.

## **Key Product Lines**

- Liquid Coating Resins and Additives
- Mining Chemicals
- Phosphine and Phosphorus Specialties
- Polymer Additives
- Powder Coating Resins and Additives
- RADCURE® UV/EB
- Specialty Additives

<b>Introduction</b>	4
<b>Product Overview</b>	5
<b>Global Support</b>	6
<b>Product Nomenclature</b>	7
<b>Polyester Resins for Hybrid Powder Coatings</b>	9
<b>Typical Properties for Hybrid Resins</b>	10
<b>Polyester Resins for Primid<sup>1</sup> Powder Coatings</b>	11
<b>Typical Properties for Primid<sup>1</sup> Resins</b>	12
<b>Polyester Resins for TGIC Powder Coatings</b>	13
<b>Typical Properties for TGIC Resins</b>	14
<b>Polyester Resins for PT910 Powder Coatings</b>	15
<b>Typical Properties for PT910 Resins</b>	16
<b>Resins and Hardeners for Urethane Powder Coatings</b>	17
<b>Typical Properties for Urethane Resins</b>	18
<b>Resins and Additives for UV-curable Powder Coatings</b>	19
<b>Typical Properties for UV-curable Resins</b>	20
<b>Masterbatches and Additives for Powder Coatings</b>	21
<b>Typical Properties for Masterbatches and Additives</b>	22
<b>Superdurable Resins for Powder Coatings</b>	23
<b>Gloss Control Systems for Powder Coatings</b>	24
<b>Health, Safety and Product Handling</b>	25
<b>Glossary of Terms</b>	26
<b>Material Source</b>	27

<sup>1</sup> Trademark of EMS-Chemie

# 4 Introduction

## One-Source Global Supplier

Cytec is a single-source, worldwide supplier of high-quality powder coating resins, hardeners and additives. We offer one of the broadest lines of resins for powder coating finishes, including top-name polyester resins, coupled with global product availability, and expert technical support.

## Leading-edge Technologies

Cytec continues to pioneer the development of innovative technologies for a wide range of surfaces:

- Superdurable resins for exterior powder applications
- Resins for clearcoat and matte finishes
- Resins for low bake powder systems
- UV curing powder systems

Our newest resin technologies are designed for cutting-edge applications where powder paints are not widely used, including industrial and automotive finishes:

- High-performance exterior durable systems
- Natural and manufactured wood products
- Plastic and other heat-sensitive substrates

## Wide Selection of Top Products

As a leading global supplier of powder coating resins, hardeners and additives, Cytec offers one of the broadest choices of resins for powder coating finishes.

Proven worldwide, our extensive selection of CRYLCOAT® polyester resins include carboxyl and hydroxyl resins for hybrid, TGIC, glycidylester, hydroxy alkyl amide, urethane, and glycoluril powder coating systems.

For new technologies like UV curable powder coatings, we have one of the widest product ranges available, including UVECOAT® unsaturated resins.

Cytec's powder coating resin technologies also include SYNTHACRYL® matting agents, specialty hardeners, and additives which can be supplied on a silica or resin carrier.

For improving flow and leveling characteristics in all types of coatings, the versatile MODAFLOW® product family is the benchmark name among flow modifiers and powder resins in the coatings industry.

Bringing value to the formulation of powder coatings are ADDITOL® masterbatch flow modifiers, catalysts and related products. Additionally, BECKOPOX® and ADDITOL® specialty hardeners solve problems related to flow, and provide special textures or performance to finished coatings.



Products	Description
<b>Vehicle Binder Resins</b>	
CRYLCOAT®*	Polyester powder resins including superdurable and semi-crystalline products – Hydroxyl (-OH) resins for polyurethane and glycoluril powder coatings – Carboxyl (-COOH) resins for hybrid, TGIC, glycidylester and β-HAA powder coatings.
UVECOAT®*	Unsaturated resins for UV-curable powder coatings.
<b>Curing Hardeners (Powder Crosslinkers)</b>	
ADDITOL®*	Polyanhydride resin for epoxy functional (glycidyl) acrylics and urethane hardeners (where available) for hydroxyl binder resins.
BECKOPOX®	Anhydride-like resin for epoxy or hydroxyl functional binder resins.
<b>Powder Additives and Modifiers</b>	
MODAFLOW®*	Powder resins flow modifiers on a silica carrier base.
ADDITOL®	Flow additives, catalysts, and tribo masterbatches provided on resin carriers and photoinitiators to accelerate the cure of UV-curable powder coatings.
SYNTHACRYL®	GMA acrylic matting agents.



\*ADDITOL additives  
 \*CRYLCOAT polyester resins  
 \*MODAFLOW flow modifiers  
 \*SYNTHACRYL acrylic resins  
 \*UVECOAT UV-curable resins

# 6 | Global Support

Cytec provides an unmatched level of technical service for customer support on a consistent global basis. Cytec's expertise in resin development and new technology exploration is backed up by our superior powder coating applications facilities and outstanding resin and coatings analytical capability.

The Cytec manufacturing operations are state-of-the-art. Our products are made with unparalleled consistency and quality. Our production plants have achieved ISO certification; specific registration can be provided upon request. Cytec's manufacturing capability provides the powder coating industry with global coverage for sourcing and logistics.



ISO 9001 – 2000 Registration  
**Americas Technology**  
North Augusta (SC, US): SGS updated Nov 2012 (including Smyrna)  
Smyrna (GA, US): SGS updated Nov 2004  
Suzano (BR): TUV updated Nov 2011  
**Americas Manufacturing**  
North Augusta (SC, US): SGS updated Nov 2012 (including Smyrna)  
Suzano (BR): TUV updated Nov 2011

ISO 9001 – 2000 Registration  
**European Technology**  
Romano (IT): SGS updated Nov 2012  
Drogenbos (BE): SGS updated Nov 2012  
**European Manufacturing**  
ISO 9001 – 2000 Registration  
Romano (IT): SGS updated Nov 2012  
Drogenbos (BE): SGS updated Nov 2012

ISO 9001 – 2000 Registration  
**Asia Pacific Technology**  
Rayong (TH): SGS updated Nov 2012  
Fenxiang (CN): SGS updated Nov 2012  
Tokyo (JP):  
Ulsan J.V. (SK): SGS updated Nov 2012  
**Asia Pacific Manufacturing**  
Fenxiang (CN): SGS Nov 2012  
Rayong (TH): SGS updated Nov 2012  
Seremban (MY): SGS updated Nov 2012

Thermoset powder coatings are typically cured in a temperature range of 160 – 200 °C (object temperature) for 10 minutes. Low temperature cure for heat sensitive substrates or for thick metallic objects is achieved through a combination of catalysis and/or longer oven dwell times. General cure guidelines for products listed in this bulletin are summarized below.

From the wide range of resins available, users can match the desired properties with the required coating performance.

As an alternative, UV powders can be applied. The powder is made to flow with a brief IR heating followed by exposure to ultraviolet light.

Cure Temperature and Time Definitions	
Slow	190 °C or greater for 10 min
Medium	170 – 180 °C for 10 min
Fast	160 °C for 10 min
Low Bake	150 ° or lower for 10 – 30 min

Products are presented in this guide using two approaches. The charts and tables in the first section organize products by a powder coating system, and summarize typical resin characteristics.

The second section allows formulators to select resins for a given coating effect. The color background used for each product in the charts helps to delineate special product features, as summarized in the table below.



Resin Selection Guide	
<span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span>	CRYLCOAT® polyester resins
<span style="background-color: #00a68a; color: white; padding: 2px 5px;"> </span>	CRYLCOAT® new generation hybrid polyester resins
<span style="background-color: #00a0e3; color: white; padding: 2px 5px;"> </span>	CRYLCOAT polyester resins systems for matte finishes
<span style="background-color: #ffff00; color: black; padding: 2px 5px;"> </span>	CRYLCOAT polyester resins for low temperature curing
<span style="background-color: #ff9900; color: white; padding: 2px 5px;"> </span>	ADDITOL®, MODAFLOW®, and SYNTHACRYL® systems and additives
<span style="background-color: #e91e63; color: white; padding: 2px 5px;"> </span>	UVECOAT® unsaturated resins for UV-curable powder coatings

\*ADDITOL additives  
 \*CRYLCOAT polyester resins  
 \*MODAFLOW flow modifiers  
 \*SYNTHACRYL acrylic resins  
 \*UVECOAT UV-curable resins

# 8 Product Nomenclature (continued)

The Cytec product line for powder coatings has been renamed and renumbered to provide customers with a more logical understanding

of the portfolio. Translations describing how the product names were derived, and what they stand for, are provided in the tables below.

## CRYLCOAT®\* System – 5 Digit System

Digit 1	Digit 2	Digit 3 + 4	Digit 5
1 = Hybrid	5 = 50/50 6 = 60/40 7 = 70/30 8 = 80/20	Whenever possible equivalent to last two digits of former product name	- 0 = Standard (no additives) - 1 = Tribo - 2 = Overbake - 3 = Tribo and overbake - 4 = Clear coat - 5 = Special - 6 = Low bake (<160 °C)
2 = Standard outdoor 4 = Superdurable outdoor 8 = Crystalline 9 = Other	4 = TGIC 5 = PT 910 6 = Primid <sup>1</sup> 8 = Urethane		

Example: CRYLCOAT 1514-2 = 314

Digit 1 : 1 for Hybrid; Digit 2 : 5 for 50 / 50; Digits 3 + 4: 14 from 314 and Digit 5 : 2 for Overbake.

## ADDITOL®\* System

Masterbatch Type	Number
Flow aid	P 800 – P 899
Tribo, catalysts, crosslinkers	P 900 – P 999

## UVECOAT®\* System

Type	Number
General purpose resin	1000 – 1999
Resins for metal substrates	2000 – 2999
Resin for wood and plastic	3000 – 3999
Specialty (i. e. Crystalline)	9000 – 9999

## SYNTHACRYL®\* System

Type	Number
Acrylic	700 – 799

\* ADDITOL additives

\* CRYLCOAT polyester resins

\* SYNTHACRYL acrylic resins

\* UVECOAT UV-curable resins

1 Trademark of EMS-Chemie

# Polyester Resins for Hybrid Powder Coatings

	50/50 AV ~ 70	60/40 AV ~ 50 – 60		70/30 AV ~ 34	80/20 AV ~ 24
210 °C	CRYLCOAT* 1544-4				
200 °C		CRYLCOAT 1622-0	CRYLCOAT 1660-0	CRYLCOAT 1783-0	
		CRYLCOAT 1622-1		CRYLCOAT 1783-1	
180 °C	CRYLCOAT 1514-2		CRYLCOAT 1626-0	CRYLCOAT 1770-0	CRYLCOAT 04143
	CRYLCOAT 1573-0		CRYLCOAT 1627-0	CRYLCOAT 1771-0	
			CRYLCOAT 1606-1	CRYLCOAT 1771-3	
			CRYLCOAT E04286	CRYLCOAT 1716-0	
				CRYLCOAT 1781-0	
170 °C	CRYLCOAT 1557-5	CRYLCOAT 1620-0			
				CRYLCOAT 1701-0	
160 °C	CRYLCOAT 1540-0	CRYLCOAT 1696-0		CRYLCOAT 1750-1	
				CRYLCOAT 1756-0	
150 °C					
140 °C	CRYLCOAT 1506-6				
	CRYLCOAT 1551-2				
130 °C	CRYLCOAT E38051				

CRYLCOAT®*	Ratio	AV	Viscosity	Tg (°C)	Cure T	Description
1506-6	50 / 50	69	9000 / 175 °C	62	140	Fast cure for metal application or for low bake textured formulation for MDF.
1514-2	50 / 50	71	9300 / 175 °C	55	180	Excellent flow and overbake resistance.
1540-0	50 / 50	71	8700 / 175 °C	58	160	Good pigment wetting, high gloss. Good for clears.
1544-4	50 / 50	70	2500 / 200 °C	54	210	Low reactivity, possible to blend with other carboxyl functional polyester resins.
1551-2	50 / 50	71	6000 / 175 °C	51	140	High reactive with good flow on metal and heat-sensitive substrates such as MDF.
1557-5	50 / 50	71	2000 / 200 °C	50	170	Medium reactivity, excellent scratch resistance.
1573-0	50 / 50	70	3500 / 200 °C	56	180	Medium reactivity new generation hybrid, excellent flow and good gloss.
1606-1	60 / 40	48	3000 / 200 °C	52	180	Tribo version of CRYLCOAT® 1626-0.
1620-0	60 / 40	60	2700 / 200 °C	54	170	Medium reactivity, can be also used as 50 / 50.
1622-0	60 / 40	60	2500 / 200 °C	54	200	Low reactivity, can be also used as 50/50.
1622-1	60 / 40	60	2600 / 200 °C	54	200	Tribo version of CRYLCOAT 1622-0.
1626-0	60 / 40	48	3000 / 200 °C	52	180	Medium reactivity new generation hybrid, excellent flow and very good gloss.
1627-0	60 / 40	44	4000 / 200 °C	62	180	Medium reactivity new generation hybrid, high Tg, excellent flow and very good gloss.
1660-0	60 / 40	48	9400 / 175 °C	50	200	Low reactivity, good flexibility and excellent flow with high filler load.
1696-0	60 / 40	47	4800 / 200 °C	56	160	Low bake with good balance of properties.
1701-0	70 / 30	36	6300 / 200 °C	62	170	Medium reactivity with good flow and overbake resistance.
1716-0	70 / 30	30	6500 / 200 °C	60	180	Medium reactivity, good flow, can be used for mattes.
1750-1	70 / 30	35	4500 / 200 °C	52	160	High reactive, tribo, non-blooming.
1756-0	70 / 30	30	5300 / 200 °C	51	160	High reactive, good gloss. TMA free.
1770-0	70 / 30	34	5400 / 200 °C	58	180	Medium reactivity with good balance of properties, can be used for mattes.
1771-0	70 / 30	33	4700 / 200 °C	56	180	Medium reactivity new generation hybrid, good balance of properties.
1771-3	70 / 30	33	4700 / 200 °C	56	180	Tribo and overbake version of CRYLCOAT 1771-0.
1781-0	70 / 30	33	5000 / 200 °C	60	180	Medium reactivity new generation hybrid, high Tg for better storage stability.
1783-0	70 / 30	34	5000 / 200 °C	58	200	Excellent flow, high gloss and elasticity. Good for clears.
1783-1	70 / 30	34	5000 / 200 °C	56	200	Tribo version of CRYLCOAT 1783-0.
E04143	80 / 20	24	10000 / 200 °C	57	180	Medium reactivity with good balance of properties.
E04286	60 / 40	50	3500 / 200 °C	57	180	Primavera 60/40 hybrid. Affordable technical performance.
E38051	50 / 50	70	5000 / 175 °C	52	130	Low bake 50/50 hybrid for MDF application.

\*CRYLCOAT polyester resins

# Polyester Resins for Primid<sup>1</sup> Powder Coatings

	96/4 - 97/3 AV ~ 25	95/5 AV ~ 33	92/8 - 93/7 AV ~ 50	90/10 - 88/12 AV ~ 70	Superdurable
200 °C				CRYLCOAT 2621-2	CRYLCOAT 4641-0
				CRYLCOAT 2650-3	CRYLCOAT 4420-0
190 °C					CRYLCOAT 4659-0
180 °C	CRYLCOAT®* 2619-3	CRYLCOAT 2698-3	CRYLCOAT 2671-3	CRYLCOAT 2642-0	CRYLCOAT 4655-2
	CRYLCOAT® 2670-3	CRYLCOAT 2618-3			CRYLCOAT 4626-0
	CRYLCOAT 2640-3	CRYLCOAT 2617-3			CRYLCOAT 4642-3
	CRYLCOAT 2691-2	CRYLCOAT 2686-3			CRYLCOAT 4433-4
	CRYLCOAT 2695-0	CRYLCOAT E04151			CRYLCOAT 4688-2
160 °C		CRYLCOAT E04262			
150 °C			CRYLCOAT 2655-6		

<sup>1</sup> Trademark of EMS-Chemie

# 12 Typical Properties for Primid<sup>1</sup> Resins

CRYLCOAT®*	Ratio	AV	Viscosity	Tg (°C)	Cure T	Description
2617-3	95 / 5	33	3500 / 200 °C	61	180	Tribo resin with excellent flow. Overbake and gas oven resistance.
2618-3	95 / 5	33	3100 / 200 °C	61	180	Tribo resin with excellent weathering and very good flow. Overbake and gas oven resistance.
2619-3	96.5 / 3.5	23	6500 / 200 °C	62	180	Tribo resin for low demand Primid with excellent flow. Overbake and gas oven resistance.
2621-2	88 / 12	72	9000 / 200 °C	62	200	For matt dry blend systems in combination with CRYLCOAT® 2691-2. Industrial application.
2640-3	96,5 / 3,5	23	7000 / 200 °C	60	180	Enhanced architectural low demand Primid resin.
2642-0	90 / 10	72	2500 / 200 °C	52	180	For matt dry blend systems in combination with CRYLCOAT 2691-2. Industrial application.
2650-3	90 / 10	70	6200 / 175 °C	51	200	For matt dry blend systems in combination with CRYLCOAT 2670-3. Optimised weathering resistance.
2655-6	93 / 7	48	6000 / 200 °C	58	150	Low bake Primid resin. Possible to blend with CRYLCOAT E 06055 to balance weathering and reactivity.
2670-3	97 / 3	21	8000 / 200 °C	61	180	For matt dry blend systems in combination with high demand Primid resins. Optimised weathering resistance.
2671-3	93 / 7	48	5800 / 200 °C	58	180	For matt dry blend systems in combination with CRYLCOAT 2670-3. Optimised weathering resistance.
2686-3	95 / 5	31	3300 / 200 °C	55	180	Enhanced architectural Primid resin.
2691-2	97 / 3	21	7600 / 200 °C	62	180	For matt dry blend systems in combination with high demand Primid resins.
2695-0	96 / 4	25	5500 / 200 °C	59	180	General purpose resin for low demand Primid formulations.
2698-3	95 / 5	33	3500 / 200 °C	56	180	Tribo active resin with outstanding flow and degassing properties up to 160 µ. Overbake and gas oven resistance.
4420-0	92 / 8	51	5500 / 200 °C	64	200	Resin for matt dry blend superdurable systems in combination with CRYLCOAT 4641-0.
4626-0	92 / 8	50	4300 / 175 °C	64	180	Superdurable resin suitable for high Tg powder coatings.
4641-0	97/3	20	4300 / 200 °C	60	200	Resin for matt dry blend superdurable systems in combination with high demand Primid resins.
4642-3	95 / 5	35	1900 / 200 °C	62	180	Superdurable resin withstanding 5 years Florida exposure.
4659-0	95 / 5	33	3700 / 200 °C	59	190	Superdurable resin with some flexibility. Can be used in Primid and TGIC formulations.
4688-2	95 / 5	30	5500 / 175 °C	54	180	Superdurable resin with good flexibility and excellent flow. Suitable for ACE applications.
E04151	95 / 5	32	3000 / 200 °C	55	180	Enhanced architectural Primid resin with outstanding flow.
E04262	95 / 5	31	4000 / 200 °C	55	160	Low bake Primid resin for industrial application.
4655-2	95 / 5	31	8000 / 200 °C	66	180	High functional superdurable resin.

\*CRYLCOAT polyester resins

1 Trademark of EMS-Chemie

# Polyester Resins for TGIC Powder Coatings

	93/7 AV ~ 33	96/4 AV ~ 20	90/10 AV ~ 50	Superdurable
200 °C	CRYLCOAT® 2401-2	CRYLCOAT 2432-0	CRYLCOAT 2414-0	CRYLCOAT 4420-0
				CRYLCOAT 4430-0
	CRYLCOAT® 2441-2			
	CRYLCOAT 2441-3			
	CRYLCOAT 2440-2			
	CRYLCOAT 2471-4			
190 °C	CRYLCOAT 2425-0			
180 °C	CRYLCOAT 2450-2			
160 °C	CRYLCOAT 2433-2			

# 14 Typical Properties for TGIC Resins

CRYLCOAT®*	Ratio	AV	Viscosity	Tg (°C)	Cure T	Description
2401-2	93/7	33	3500 / 200 °C	60	200	Low reactive resin with outstanding flow, high flexibility and excellent outdoor resistance.
2414-0	90/10	47	4700 / 200 °C	57	200	For matt dry blend systems in combination with CRYLCOAT® 2432-0.
2425-0	93/7	34	6200 / 200 °C	70	190	Medium reactivity, high Tg.
2432-0	96/4	20	7900 / 200 °C	53	200	For matt dry blend systems in combination with CRYLCOAT 2414-0.
2433-2	93/7	33	3500 / 200 °C	60	160	High reactivity, good flow and flexibility.
2440-2	93/7	33	5100 / 200 °C	67	200	Low reactive resin, good flow and flexibility, stabilized.
2441-2	93/7	33	5000 / 200 °C	67	200	Low reactive resin, excellent flow, stabilized.
2441-3	93/7	33	4600 / 200 °C	67	200	Tribo version of CRYLCOAT 2441-2.
2450-2	93/7	33	5000 / 200 °C	67	180	Accelerated version of CRYLCOAT 2441-2.
2471-4	93/7	33	3500 / 200 °C	58	200	Low reactive resin for clear coat formulations, excellent smoothness and clarity.
4420-0	90/10	51	5500 / 200 °C	64	200	Superdurable resin. May be used alone or as part of matt dry blend system in combination with CRYLCOAT 4430-0.
4430-0	93/7	35	2000 / 200 °C	62	200	Superdurable resin with outstanding flow. May be used alone or as part of matt dry blend system in combination with CRYLCOAT 4420-0.

\*CRYLCOAT polyester resins

# Polyester Resins for PT910 Powder Coatings

	93/7 AV ~ 26	92/8 AV ~ 33	91/9-90/10 AV ~ 40	Superdurable
200 °C	CRYLCOAT®* 2593-0		CRYLCOAT 2501-2	CRYLCOAT 4540-0
	CRYLCOAT® 2592-0			
	CRYLCOAT 2592-1			
180 °C	CRYLCOAT 2503-2		CRYLCOAT 2506-1	
			CRYLCOAT 2536-0	
170 °C		CRYLCOAT 2578-0		

CRYLCOAT®*	Ratio	AV	Viscosity	Tg (°C)	Cure T	Description
2501-2	91/9	33	9400 / 200 °C	73	200	Excellent flow, flexibility and chemical resistance.
2503-2	93/7	24	8500 / 200 °C	68	180	Very high heat resistance.
2506-1	91/9	33	5000 / 200 °C	67	180 (15')	General purpose tribo resin.
2536-0	90/10	40	7000 / 200 °C	68	180	For matt dry blend systems in combination with CRYLCOAT® 2593-0.
2578-0	92/8	33	9000 / 200 °C	71	170	Resin suitable for low temperature curing.
2592-0	93/7	26	10500 / 200 °C	70	200	General purpose resin.
2592-1	93/7	26	9500 / 200 °C	69	200	Tribo version of CRYLCOAT 2592-0.
2593-0	93/7	26	10500 / 200 °C	70	200 (15')	Outstanding flow, recommended for use in clear. For matt dry blend systems in combination with CRYLCOAT 2536-0.
4540-0	93/7	25	9000 / 200 °C	67	200	Superdurable resin with excellent properties.

\*CRYLCOAT polyester resins

# Resins and Hardeners for Urethane Powder Coatings

## Hydroxyl Polyester Resins for Urethane Powder Coatings

	OHV 30	OHV 50	OHV 80 –100	OHV 300	Superdurable
200 °C	CRYLCOAT®* 2840-2	CRYLCOAT® 2883-0		CRYLCOAT 2814-0	CRYLCOAT 4890-0
		CRYLCOAT 2839-0			
		CRYLCOAT 2860-0			
190 °C			CRYLCOAT 2818-0		

## Special Hydroxyl Polyester Resins and Hardeners

Wrinkle System	Anhydride Hardener	NCO Hardeners	Utility Resins
CRYLCOAT 2920-0	BECKOPOX®* EH 694	ADDITOL® P932	CRYLCOAT 9292-0
ADDITOL®* P920		ADDITOL P965	CRYLCOAT 9246-0

\*ADDITOL additives  
 \*BECKOPOX epoxy resins  
 \*CRYLCOAT polyester resins

# 18 Typical Properties for Urethane Resins

CRYLCOAT®*	OHV	Viscosity	Tg (°C)	Cure T	Description
2814-0	300	3200 / 200 °C	52	200	Outstanding hardness, chemical and stain resistance. Useful for low gloss formulations.
2818-0	100	3000 / 200 °C	58	190	Improved chemical and stain resistance. Can be used to produce thermally stable coatings.
2839-0	50	5500 / 200 °C	57	200	Good flow and resistance properties. Good for clears.
2840-2	30	8200 / 200 °C	56	200	Resin with excellent performance recommended for internally blocked polyisocyanate crosslinkers.
2860-0	50	3500 / 200 °C	52	200	Resin for one shot matt systems in combination with CRYLCOAT® 2814-0. Product under development.
2883-0	47	4000 / 200 °C	61	200	Excellent flow, high hardness and good outdoor durability. High Tg.
2920-0	33	12700 / 200 °C	67	200	Produces durable wrinkle finishes in combination with ADDITOL® P 920.
4890-0	30	5000 / 200 °C	58	200	Superdurable resin with excellent properties.

ADDITOL®*	OHV	Visc.	Tg (°C)	Cure T	Description
P 920	42	8500 / 200 °C	N / A	N / A	Catalyst masterbatch for CRYLCOAT 2920-0 to obtain durable wrinkle finish. 5% active substance.

ADDITOL	NCO %	Visc.	Tg (°C)	Cure T	Description
P 932	9 –10	N / A	47	N / A	Aliphatic urethane pre-polymer crosslinker. Not available in the US or Canada.
P 965	16 –17	N / A	51	N / A	Aromatic urethane adduct crosslinker. For indoor applications.

BECKOPOX®*	AV		MT (°C)	Cure T	Description
EH 694	275		50 – 60	N / A	Anhydride hardener for OH polyester or acrylic or epoxy resins. Outstanding chemical and overbake resistance.

CRYLCOAT	OHV	Visc.	Tg (°C)	Cure T	Description
9246-0	35	12500 / 200 °C	62	NA	Suitable as organic filler or as cleaning material for extruders.
9292-0	37	4000 / 200 °C	58	200 °C	For use as organic filler or for indoor coatings with aromatic urethane hardeners.

## Resins for UV-curable Powder Coatings

Metal	MDF / Wood	Plastics
UVECOAT®* 2100		UVECOAT 3003
UVECOAT® 2200	UVECOAT 3002	
	UVECOAT 3005	
UVECOAT 9539		

## Additives and Specialty Resins for UV-curable Powder Coatings

Additives	Co-Reactant	Semi-crystalline
	UVECOAT 9146	UVECOAT 9010

\*ADDITOL additives  
 \*BECKOPOX epoxy resins  
 \*CRYLCOAT polyester resins  
 \*UVECOAT UV-curable resins

UVECOAT®*	AV	Viscosity	Tg (°C)	Description
2100	≤ 3	5500 / 200 °C	57	For metal applications. Exterior durable. Can be pigmented or used as clear.
2200	< 2	4500 / 175 °C	54	Outstanding weathering for metal applications. Can be pigmented or used as clear.
3002	≤ 3	4000 / 175 °C	49	High performance wood-based substrate coating. Good for textured and clear coats. Good yellowing resistance.
3003	≤ 3	3200 / 175 °C	49	For PVC flooring applications. Improved chemical and abrasion resistance with good flexibility. Not for exterior applications.
3005	≤ 10	4000 / 200 °C	48	For wood and wood substrate applications. May be pigmented or used as a clear. Excellent scratch resistance.
9010	≤ 3	350 / 100 °C	MT = 85	Semi-crystalline co-resin for UV-curable formulations giving improved mechanical performance, flexibility, and smoothness.
9146	≤ 15	55000 / 140 °C	55	Unsaturated urethane acrylate for use as a "crosslinker" in UV powder coatings. Enhances reactivity, surface hardness and chemical resistance.
9539	≤ 13	4000 / 200 °C	44	For metal applications. To provide excellent adhesion of UV curable powder to a wide variety of metal substrates.

\*ADDITOL additives

\*CRYLCOAT polyester resins

\*MODAFLOW flow modifiers

\*SYNTHACRYL acrylic resins

\*UVECOAT UV-curable resins

## Masterbatches and Additives for Powder Coatings

Catalysts	Flow Promoters	Flow Aids	Tribo Additives
ADDITOL® P964	ADDITOL P896	MODAFLOW® POWDER III	ADDITOL P950
ADDITOL® P966	ADDITOL P824		
		MODAFLOW® POWDER 6000	
	ADDITOL P891		
	ADDITOL P890		

## Acrylic Resins and Additives for Powder Coatings

Polyanhydride Hardener	Matting Hardener
ADDITOL P791	SYNTHACRYL® 700

## Typical Properties for Masterbatches and Additives

Products	#	Viscosity	Tg (°C)	Description
ADDITOL® P824	OHV 45	1400 / 200 °C	49	Flow-aid masterbatch for pigmented durable coatings. 15 % active substance in an outdoor resistant hydroxylated polyester matrix.
ADDITOL® P891	AV 35	2300 / 200 °C	56	Flow-aid masterbatch for clear powder coatings. 5 % active substance in an outdoor resistant carboxylated polyester matrix.
ADDITOL P896	OHV 45	1700 / 200 °C	57	Flow-aid masterbatch for pigmented powder coatings. 15 % active substance in an outdoor resistant hydroxylated polyester matrix.
ADDITOL P890	OHV 45	1500 / 200 °C	52	Flow-aid masterbatch for clear powder coatings. 10 % active substance in an outdoor resistant hydroxylated polyester matrix.
ADDITOL P950	OHV 28	7500 / 200 °C	N / A	Tribo masterbatch for indoor and outdoor coatings. 5 % active substance.
ADDITOL P964	AV 33	3200 / 200 °C	N / A	Catalyst masterbatch for hybrids, TGIC or PT 910 systems. 5 % active substance.
ADDITOL P966	AV 35	1800 / 200 °C	N / A	Catalyst masterbatch in a superdurable matrix for TGIC or PT 910 systems. 5 % active substance.

Products	Active %	Volatile Loss %	Density g/cm <sup>3</sup>	Description
MODAFLOW® POWDER III	Min 65	Max 4	0.58 – 0.64	Addition at 0.6 – 1.5 % of the total formulation. Based on FDA listed monomers.
MODAFLOW® POWDER 6000	Min 65	Max 4	0.58 – 0.64	Addition at 0.75 – 1.0 % of the total formulation. Excellent flow and gloss. Lessens cross-contamination issues.

Products	EEW	Visc.	Tg (°C)	Description
SYNTHACRYL® 700	774	39800 200 °C	80	Glycidyl poly-acrylic resin designed as a matting hardener. Not available in US or Canada.

Products	PAV	Visc.	MT (°C)	Description
ADDITOL P791	317	N / A	85	Aliphatic polyanhydride hardener for use with solid acrylic resins containing glycidyl groups.

\* ADDITOL additives

\* CRYLCOAT polyester resins

\* MODAFLOW flow modifiers

\* SYNTHACRYL acrylic resins

TGIC	Primid	PT 910	Urethane
CRYLCOAT®* 4430-0	CRYLCOAT 4688-2	CRYLCOAT 4540-0	CRYLCOAT 4890-0
CRYLCOAT® 4420-0			
	CRYLCOAT 4642-3		
	CRYLCOAT 4659-0		
	CRYLCOAT 4626-0		
	CRYLCOAT 4641-0		
	CRYLCOAT 4420-0		
	CRYLCOAT 4655-2		

# Gloss Control Systems for Powder Coatings

## Dry-Blend Systems

	Primid Standard	Primid Superdurable	TGIC Standard	TGIC Superdurable
Min 30 %	CRYLCOAT® 2670-3 AV 21	CRYLCOAT 4641-0 AV 20	CRYLCOAT 2414-0 AV 47	CRYLCOAT 4420-0 AV 51
	CRYLCOAT® 2671-3 AV 48	CRYLCOAT 4420-0 AV 51	CRYLCOAT 2432-0 AV 20	CRYLCOAT 4430-0 AV 35
	CRYLCOAT 2691-2 AV 21			
	CRYLCOAT 2642-0 AV 72			
Min 20 %	CRYLCOAT 2670-3 AV 21			
	CRYLCOAT 2650-3 AV 70			
	CRYLCOAT 2691-2 AV 21			
	CRYLCOAT 2621-2 AV 72			

## One-Shot Systems

	Urethane	Acrylic	Wrinkle
Min 20 %	CRYLCOAT 2860-0 OHV 50		
	CRYLCOAT 2814-0 OHV 300		
< 12 %	CRYLCOAT 2860-0 OHV 50	SYNTHACRYL® 700	CRYLCOAT 2920-0
	CRYLCOAT 2814-0 OHV 300	CRYLCOAT 2441-2	ADDITOL® P920

\*ADDITOL additives

\*CRYLCOAT polyester resins

\*MODAFLOW flow modifiers

\*SYNTHACRYL acrylic resins

\*UVECOAT UV-curable resins

## Toxicity

CRYLCOAT® polyester products are solid, non-flammable resins with minimal toxicity. MODAFLOW® products have been subjected to acute toxicity and mutagenicity studies. Details on specific coverage of individual studies are available upon request.

Resin containers may contain polymer dust that could be irritating. Prevent dusty conditions and avoid breathing dust. Also, avoid contact with eyes and prolonged or repeated contact with skin. Use only with adequate ventilation. Equipment should be ground to prevent electrical sparking. For more information on each product, please consult the current material safety data sheet (MSDS) which will be provided by Cytec. Take into account the potential risk resulting in formulation with other materials such as catalysts, hardeners, pigments, and fillers.

## Storage

CRYLCOAT®, UVECOAT®, SYNTHACRYL® and ADDITOL® resins should be stored in a dry location at room temperature. Keep away from heat sources and direct sunlight. Do not stack more than two pallets high.

MODAFLOW® powder products should not be stored in environments of high heat or humidity. The ideal storage temperature is between 4 °C (40 °F) and 38 °C (100 °F). Keep away from sparks and flame.

## Shelf Stability

CRYLCOAT, UVECOAT®, SYNTHACRYL®, and ADDITOL® resins have a minimum shelf life of one year when stored in a dry location at room temperature. The shelf life of MODAFLOW powder products is typically at least four years, when stored in the recommended environment.

## Packaging Information

CRYLCOAT, UVECOAT, SYNTHACRYL, and ADDITOL resins are typically provided in 25 kg (55.1 lb) polyethylene bags. Supersack containers of 500 kg or 1000 kg are available upon request. MODAFLOW powder products are typically provided in 68 kg (150 lbs) fiber drums. Upon special request, 454 kg (1000 lbs) polypropylene bulk bags are available.



Key Word	Description
<b>Acid Value (AV)</b>	The amount of KOH, reported in mg, necessary to neutralize the acid content of one gram of polyester.
<b>Blooming</b>	A hazy appearance on the surface of the coating brought on by migration of low molecular weight material during low temperature cure or extended exposure to heat.
<b>Curing Temperature</b>	The metal or object temperature required to fully cure the powder coating system in 10 minutes.
<b>Epoxy Equivalent Weight (EEW)</b>	The weight of resin, in grams, which contains one gram-equivalent of epoxy.
<b>Florida Exposure</b>	Standard outdoor exposure test to approximate the natural weathering performance of a coating under severe conditions. The test panels are exposed in south Florida.
<b>Glass Transition Temperature (Tg)</b>	The characteristic temperature in °C of an amorphous polymer corresponding to the change from a solid to liquid state as measured by DSC.
<b>Gloss</b>	Degree to which a surface reflects light.
<b>Hydroxyl Value (OHV)</b>	The amount of KOH, reported in mg, equivalent to the hydroxyl content of one gram of polyester.
<b>Matte</b>	A coating appearance that reflects a minimal amount of light.
<b>Melting Temperature (MT)</b>	The characteristic temperature in °C at which a solid material becomes a liquid.
<b>Polyester/Hardener Ratio</b>	Weight ratio between the polyester resin and the hardener recommended for optimal properties.
<b>Storage Stability</b>	Ability of powder coatings to maintain uniform powder flow properties after being subjected to a specified storage condition.
<b>Superdurable</b>	A polyester resin that exhibits extended outdoor weathering characteristics, typically maintaining > 50 % gloss after 3 years (EU) and 5 years (US).
<b>Viscosity</b>	The melt viscosity of the polymer, measured with a Brookfield <sup>1</sup> viscometer in mPa.s at a specified temperature.
<b>Wrinkle</b>	A unique, special effect finish characterized by closely associated ridge-like structures.

<sup>1</sup> Trademark of Brookfield Engineering Laboratories

Product Designation	Suppliers
Acrylic Powder Coating Resin	Cytec
Acrylic Resin – Additive	Cytec
ADDITOL® Resin	Cytec
BECKOPOX® Resin	Cytec
Beta Hydroxy Alkyl Amides	EMS-CHEMIE HOLDING AG
Carboxyl Polyester Resin	Cytec
CRYLCOAT® Resin	Cytec
Epoxy Powder Resin	Huntsman International LLC, Dow Corning Corporation and other suppliers
Glycoluril Resin	Cytec
Hydroxyl Polyester Resin	Cytec
MODAFLOW® Powder	Cytec
Polyester Resin	Cytec
Polyanhydride Hardener	Cytec
Polyurethane Hardener	Cytec, Bayer AG, Degussa GmbH
Primid	EMS-CHEMIE HOLDING AG
Superdurable Resin	Cytec
SYNTHACRYL® Resin	Cytec
TGIC (triglycidyl isocyanurate)	Huntsman International LLC, Nissan Motor Co. Ltd
PT 910	Huntsman International LLC
UVECOAT® Resin	Cytec

\*ADDITOL additives

\*BECKOPOX epoxy resins

\*CRYLCOAT polyester resins

\*MODAFLOW flow modifiers

\*SYNTHACRYL acrylic resins

\*UVECOAT UV-curable resins

# Contacts

## EUROPE

### Cytec Surface Specialties SA/NV

Square Marie Curie, 11  
B-1070 Brussels  
Belgium

Tel: +32 2 560 4511

Fax: +32 2 560 4521

## Technical Service

### Cytec Italy s.r.l.

Via Matteo Bianchin, 62  
I-36060 Romano d'Ezzelino (VI)  
Italy

Tel: +39 042 451 6611

Fax: +39 042 451 6725

# CYTEC

Delivering Technology Beyond  
Our Customers' Imagination™

#### Trademark notice:

The ® indicates a Registered Trademark in the United States, and the TM or \* indicates a Trademark in the United States. The mark may also be registered, the subject of an application for registration, or a trademark in other countries.

**Notice:** Cytec Industries Inc. in its own name and on behalf of its affiliated companies (collectively, "Cytec") decline any liability with respect to the use made by anyone of the information contained herein. The information contained herein represents Cytec's best knowledge thereon without constituting any express or implied guarantee or warranty of any kind (including, but not limited to, regarding the accuracy, the completeness or relevance of the data set out herein). Cytec is the sole owner or authorized user of the intellectual property rights relating to the information communicated. The information relating to the use of the products is given for information purposes only. No guarantee or warranty is provided that the product is adapted for any specific use. The user or purchaser should perform its own tests to determine the suitability for a particular purpose. The final choice of use of a product remains the sole responsibility of the user.

Pub. No. PCR-0004-C-EN-EU-03C

[www.Cytec.com](http://www.Cytec.com)