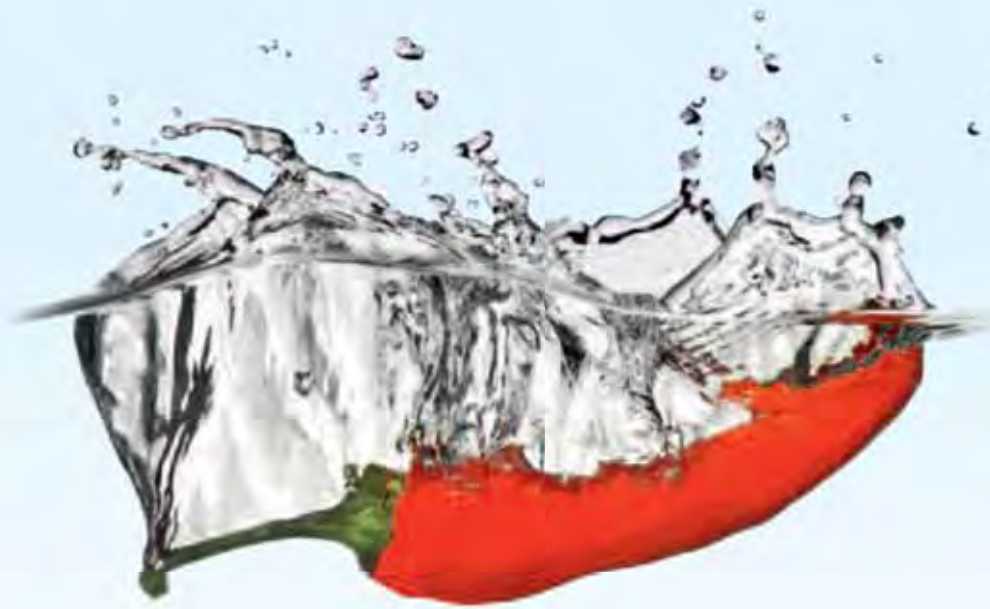


CYTEC



Coating Additives

The Sharp Addition to Your Formula

From defining more efficient processes for mining customers to developing new additives for polymer-based alternatives to wood and metals, the product lines of Cytec 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

Cytec 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 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

Cytec 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. Cytec 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

Cytec'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

- Specialty Coating Resins and Additives
- Mining Chemicals
- Phosphine and Phosphorus Specialties
- Polymer Additives
- Powder Coating Resins and Additives
- Industrial Coating Resins and Additives
- Specialty Additives



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6 About Additives

Cytec Industries is a global specialty chemicals and materials company focused on developing, manufacturing and selling value-added products. Its growth strategies are based on developing technologically advanced customer solutions for global markets including aerospace, coatings, mining and plastics.

Cytec is a leader in environmentally friendly coating technologies. We offer a comprehensive product range including energy curable systems, powder coating resins, adhesives, liquid coating resins and additives.

The coating resins and additives portfolio is on the leading edge of performance. This broad package of products enables our customers to bring coatings faster to the market, solve problems and enhance properties.

We offer a broad range of additives for the formulation of coatings. Our portfolio includes low VOC, and hazardous air pollutant substance-free (HAPS

free) technologies for solvent-borne, water-borne, high solids, powder coatings, and energy curable systems in both existing and emerging markets:

- Architectural-decorative Wall and Trim Coatings, Stains, Concrete
- Automotive and Transportation – OEM, Aerospace, Refinish, Parts and Accessories
- General Industry, Wood, Packaging, Coil, Metal Protection

Additives enhance performance by modifying rheological properties, improving flow and leveling, reducing foam, improving pigment dispersability, accelerating cure and crosslinking, improving adhesion and reducing defects.

Our high performance dispersants and grinding resins are on the leading edge of technology for the preparation of binder free pigment concentrates and pastes. The highest level of pigment, at the lowest VOC, without effects on corrosion resistance and other properties are achieved in systems using wetting and dispersing additives from Cytec.



ADDITOL[®], CYCAT[®] and MODAFLOW[®] additive families serve the following applications:

- Wetting and Dispersing Additives
- Flow and Leveling Additives
- Defoamer and Deaerater
- Rheology Modifier
- Catalysts and Drier

The Additives segment of Cytec is headquartered in Brussels Belgium and operates ISO-certified manufacturing facilities and distribution centers worldwide. Our ten technology centers – located in Europe, Asia and North America offer customers ready access to world-class technical support and applications research. We also have sales offices in more than 30 countries, enabling us to provide responsive service around the globe to help our customers achieve and profit through collaborative success.



8 | Wetting and Dispersing Additives

Additives for pigmented system – Pigments and extenders are dry solid particles, which have to be incorporated into the liquid phase, consisting of binders and solvents. Protective and decorative properties are influenced by this step in paint production. To reach a high level of performance it is important to disperse the solid components very well and to stabilize the distribution as homogeneously as possible.

Wetting agents are responsible for the first step in this process. They replace air from the surface of particles and support the liquid phase to cover pigments and extenders. Good wetting of pigments and fillers results in high gloss of coating systems. This kind of additive possesses surface activity character.

Dispersing agents are responsible for the stabilization of the homogeneous distribution of particles. These additives prevent re-agglomeration of pigments and fillers and the formation of floculates. There are different kinds of stabilization, which have to be optimized in order to reach required properties of gloss, color strength, hiding power, corrosion protection and viscosity of the formulation.

Often combinations of different types of pigments are used to obtain the desired color and hiding properties. However, combinations of organic and inorganic pigments which have different polarity and surface tensions have a tendency to separate. This separation can be horizontal, forming cell like structures (Benard cells), or vertical, which results in a color change. These effects can be evaluated by the rub out test. Multifunctional wetting agents with higher surface activity are useful to reduce these defects. These additives work as anti-floating agents.



Good to know ...

... about usage of dispersants in epoxy systems

- Ionic dispersants are not used in Epoxy coatings because of activating oxirane ring. This results in either immediate reaction or slow destruction and loss of final paint performance.



Destruction of wb Epoxy formulation by ionic dispersants



Stable wb Epoxy formulation including ADDITOL VXW 6208

- To ensure best Epoxy resin stability and performance use special developed ADDITOL® XW 6208 or ADDITOL® XW 6208/60.
- To achieve extreme high pigment loading in direct grinding processes or for pigment concentrates use ADDITOL VXW 6394. Additionally this additive allows sufficient stabilization of inorganic fillers and pigments.

Trouble shooting guide



Strong pigment floating visible "rub out test"

Improved
anti-floating
effect

ADDITOL XL 203
ADDITOL XL 204
ADDITOL VXL 6237N
ADDITOL VXW 6208
ADDITOL XL 6514/80



Excellent pigment stabilization "rub out test"

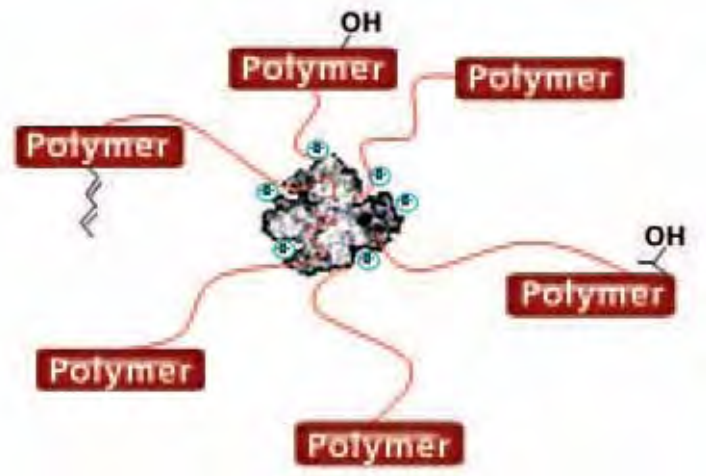
Requirements for modern pigment pastes

The preparation of modern tinting systems has become very important since cycle times, high quality standards and cost efficient production each plays a large role in overall profitability.

Formulators have been able to use “pigment slurry” or “pigment paste” technology to generate high quality coating systems. But what if there is a new system which allows the combination of both of these high performance technologies. These new systems provide: very high loading, wide pigment compatibility, excellent stability and excellent color properties. In addition the new resin systems support effective film formation while meeting VOC targets. All of this can be accomplished while generally reducing the overall system cost.

New technologies and trends for pigment pastes

To accomplish these objectives, we cannot use simply a grinding resin or a dispersing agent. Newly designed polymers are modified with strong anchoring groups. These “grinding media” combine the advantages of selective drying capacity, crosslinking into the film, anti-settling and anti-floating effect and compatibility to both solvent-borne and water-borne systems.



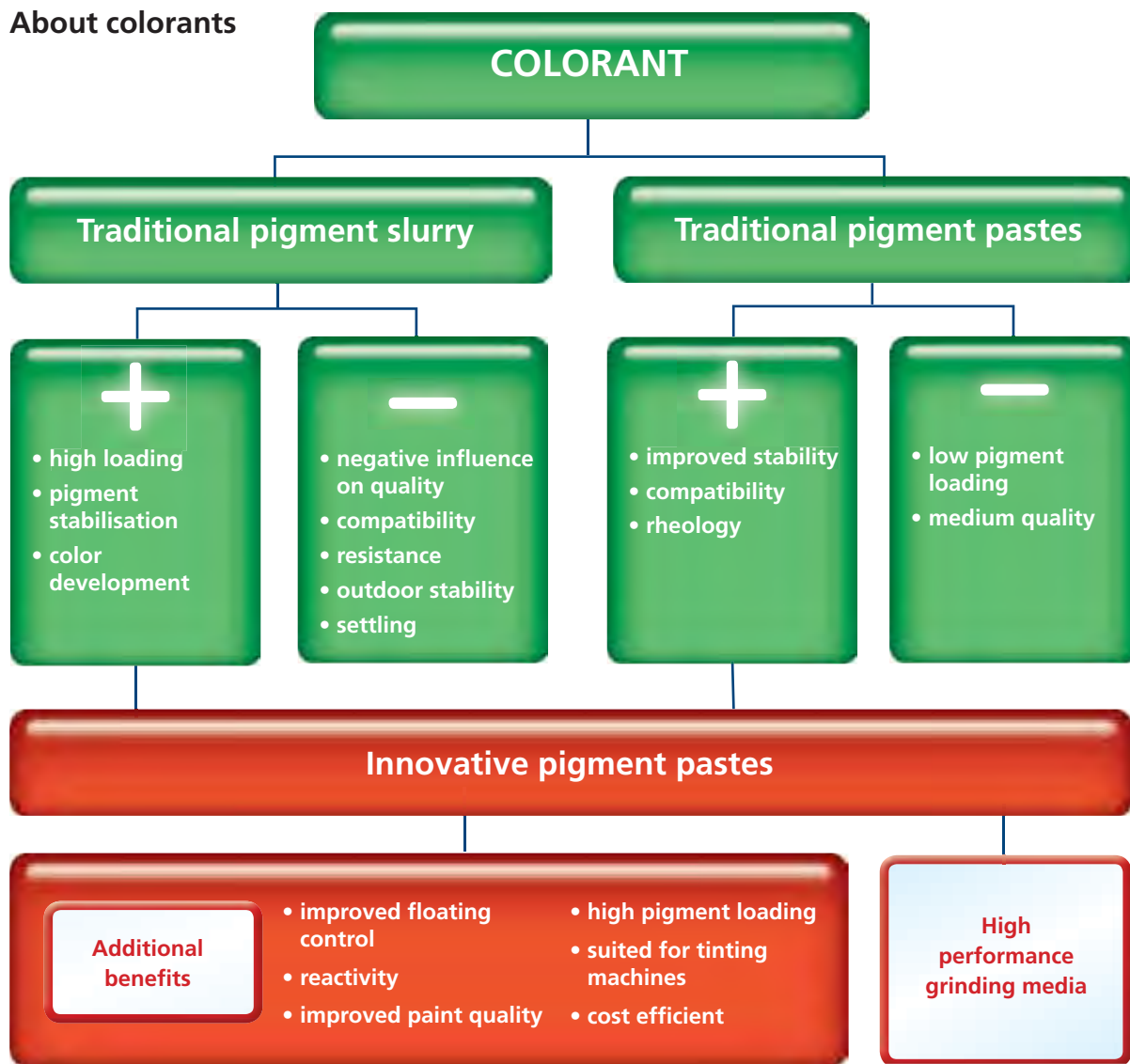
Such novel “grinding media” can be used to produce highest quality pigment pastes for Automotive OEM and Refinish paints, Industrial Coatings applications and Decorative paints.

In stoving and 2 pack systems they can improve chemical resistances and contribute to film hardness.

In anti-corrosive formulations the new grinding media maintain the high corrosion protection designed into the base coating.

In Decorative paints the pigment loading is significantly improved compared to conventional paste and slurry technologies. Furthermore a special modification provides compatibility in both solvent-borne and water-borne paints.

About colorants



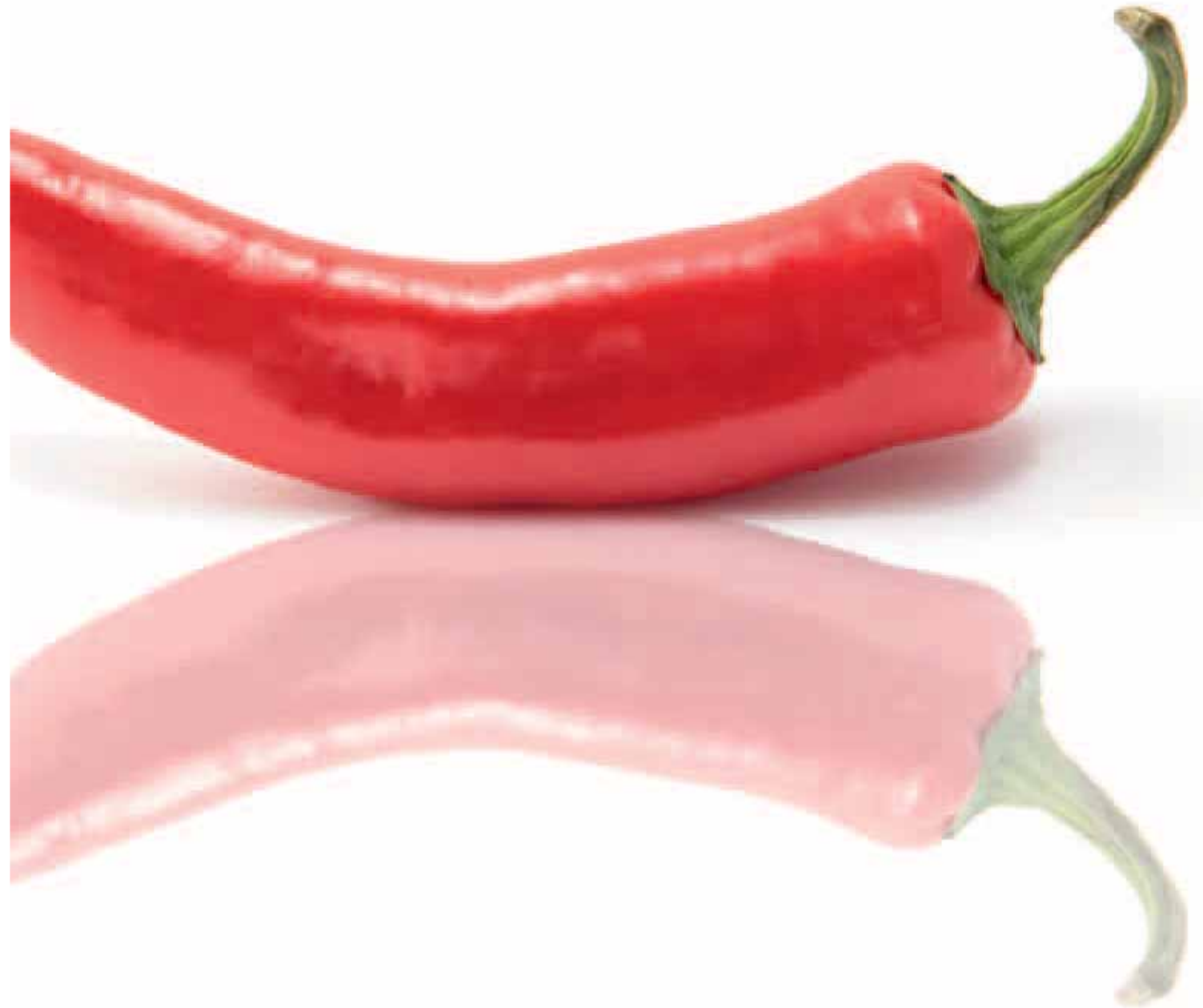
PRODUCT	CHARACTERISTICS	General Industry	Automotive	Architecture
ADDITOL® XW 6528	Cross linkable in stoving / 2K PUR systems, improves corrosion protection and water resistance.			
ADDITOL® XW 6529	Cross linkable in stoving / 2K PUR systems, improves corrosion protection and water resistance. High reactivity.			
ADDITOL XW 6539	Cross linkable in stoving / 2K PUR systems, improves corrosion protection and water resistance. Ultra low VOC.			
ADDITOL XW 6535	Air drying polymer, very high pigment loading. Improved floating control and exterior stability. Zero VOC.			
ADDITOL XW 6540	Cross linkable in 2K PUR systems. Improved chemical resistance.			

	Additive name	w/lb s/lb	Automotive coatings	Industrial-protective packaging coatings	Architectural coatings	Characteristics	
Anti-floating	ADDITOL® XL 203	s w				Silicone containing polymer; cationic; high molecular	
	ADDITOL® XL 204	s w				Silicone containing phosphoric acid ester; anionic	
Pigment wetting	ADDITOL XL 250	s w				Phosphoric acid ester, neutralized by amine; anionic; low molecular	
	ADDITOL XL 251	s				Polyadduct containing acid groups	
	ADDITOL XL 255N	s				Modified alkyd resin; neutralized	
Special Pigment wetting	ADDITOL VXL 4992	s				Modified polyester	
	ADDITOL VXL 6244N	s				Salt of a polyadduct	
Dispersing Pigment slurries	ADDITOL VXL 6237N	s				Wetting/dispersing agent; cationic; high molecular	
	ADDITOL XL 260N	s				Urethane modified acrylic copolymer; nonionic; high molecular	
	ADDITOL VXL 6212N	s				Urethane modified acrylic copolymer; cationic; high molecular	
	ADDITOL XW 330	w				Polyacrylic acid-ammonia salt; anionic; low molecular	
	ADDITOL VXW 6200	w				Acrylic copolymer-ammonia salt; anionic; medium molecular	
	ADDITOL VXW 6205	w				Acrylic copolymer-sodium salt; anionic; medium molecular; VOC-free	
	ADDITOL VXW 6394	w				High molecular weight polymer; nonionic	
	ADDITOL VXW 6208	w				Nonionically stabilized polymer; diluted in water	
	ADDITOL VXW 6208/60	s w				Nonionically stabilized polymer; diluted in methoxy propanol	
	ADDITOL VXW 6374	w				Wetting and dispersing agent; free of alkylphenol ethoxylates; no VOC	
	ADDITOL XL 6521	s				Modified block copolymer; high molecular; cationic	
	ADDITOL XW 6545	w				High molecular weight polymer; reduces surface tension; nonionic	
	Grinding media	ADDITOL XW 6504	w				Water dilutable grinding medium for cationically stabilized systems
		ADDITOL XW 6528	w				Polyester modified acrylic polymer; co-crosslinkable
		ADDITOL XW 6529	w				Polyester modified acrylic polymer; co-crosslinkable, highly reactive
		ADDITOL XW 6539	w				Polyester modified acrylic polymer; co-crosslinkable
ADDITOL XW 6535		s w				Special modified polyester with strong pigment wetting capacity; universal due to auto emulsification in solvent-borne systems	
ADDITOL XL 6515		s w				Modified alkyd polymer; universal use in DECO and Industrial systems	
Pigment wetting Anti-settling	ADDITOL XL 6509	s				Copolymer with acidic groups	
	ADDITOL XL 6514/80	s				Salt of a basic aminoamide with an acidic polyester	
	ADDITOL XL 6514/50	s				Salt of a basic aminoamide with an acidic polyester	

* ADDITOL additives

Description	% Active matter	Acrylics, thermopl.	Acrylics, stoving	Acrylics, thermopl. w/b	Acrylics, stoving, w/b	Alkyds air-drying	Alkyd/Amino systems	Alkyds air-drying, w/b	Alkyd/Amino systems, w/b	Dispersion paints	Dispersion lacquers	2K-Epoxy-systems	Epoxy esters, stoving	Epoxy esters air-drying	2K-Epoxy systems, w/b	PE/Amino systems, oil-free	Additive name
Anti-floating additive to improve significantly floating of inorganic and organic pigments.	40 %	●	●	●	●	●		●	●			●	●	●		●	ADDITOL XL 203
Anti-floating additive to improve significantly floating of inorganic and organic pigments and prevents the formation of Bénard cells. It has a strong pigment wetting character and helps to reduce dispersing time.	55 %	●	●	●	●	●	●	●	●	●	●		●	●		●	ADDITOL XL 204
Pigment wetting additive with very strong pigment affinity especially to inorganic and metallic pigments. Besides reduced dispersing time it improves gloss and color strength as well as material flow.	55 %	●	●	●	●	●	●	●	●				●	●		●	ADDITOL XL 250
Low molecular pigment wetting additive to improve gloss and color strength. It allows the reduction of dispersing time and mill base viscosity.	80 %	●	●			●	●					●	●	●		●	ADDITOL XL 251
Pigment wetting additive to improve gloss and color strength; for all types of pigment recommended. It may be used for direct grinding or pigment paste process.	55 %	●	●			●	●					●	●	●		●	ADDITOL XL 255N
Multi purpose additive for UP - putties with strong wetting power for inorganic pigments and extenders. It reduces dispersing time and improves degassing and rheology.	50 %																ADDITOL VXL 4992
Multi purpose additive for UP - putties with strong wetting power for inorganic pigments and extenders. It reduces dispersing time and improves degassing and rheology.	70 %																ADDITOL VXL 6244N
High efficient, high molecular weight dispersing additive for all types of pigment. Recommended for direct grinding as well as for binder free pigment concentrates.	30 %	●	●			●	●					●	●	●		●	ADDITOL VXL 6237N
High molecular weight dispersing additive for difficult wettable pigments. Recommended for direct grinding processes.	30 %	●	●				●										ADDITOL XL 260N
High molecular weight dispersing additive for difficult wettable pigments. Recommended for direct grinding processes. Improved compatibility in acrylic systems.	30 %	●	●				●										ADDITOL VXL 6212N
Low molecular weight wetting and dispersing additive especially for inorganic pigments and extenders. Strongly recommended for titanium dioxide white.	30 %			●						●							ADDITOL XW 330
Powerful dispersing additive especially for inorganic pigments. It reduces dispersing time and offers very good pigment stabilization. Especially recommended for glossy paints.	40 %			●						●	●						ADDITOL VXW 6200
Powerful dispersing additive especially for inorganic pigments. It reduces dispersing time and offers very good pigment stabilization. Especially recommended for glossy paints. VOC - free.	40 %			●						●	●						ADDITOL VXW 6205
Very sufficient, high molecular weight dispersing additive for all types of pigment. Due to its non ionic polymer structure it is highly recommended in formulations containing sensitive resins. Further it can be used for the production of highly loaded, binder free pigment concentrates.	40 %			●						●	●						ADDITOL VXW 6394
High molecular weight dispersing additive for all types of pigment. Due to its non ionic polymer structure it is highly recommended in formulations containing sensitive resins. It is recommended for both, direct grinding and pigment concentrate processes.	50 %			●	●			●	●	●	●				●		ADDITOL VXW 6208
High molecular weight dispersing additive for all types of pigment. Due to its non ionic polymer structure it is highly recommended in formulations containing sensitive resins. It is recommended for both, direct grinding and pigment concentrate processes. Highly recommended in 2K Epoxy formulations.	60 %											●			●		ADDITOL VXW 6208/60
Wetting additive to improve gloss and color strength of difficult wettable pigments. It allows an improved material flow.	50 %			●	●			●	●						●		ADDITOL VXW 6374
Powerful, high molecular weight dispersing additives for very difficult wettable pigments. Especially recommended for all carbon black pigments in order to achieve perfect color properties and extreme high gloss.	60 %	●	●			●	●									●	ADDITOL XL 6521
Multi purpose dispersing and substrate wetting additive for all types of pigment. Non ionic, high molecular weight polymer for formulations containing sensitive resins. Especially recommended in 1K and 2K Epoxy formulations.	50 %			●	●			●	●	●	●				●		ADDITOL XW 6545
Special grinding medium for cationic systems.	35 %																ADDITOL XW 6504
Co - crosslinkable grinding medium with high pigment loading capacity. Due to its special composition and reactivity it can improve chemical resistance and corrosion protection. Broad compatibility.	35 %			●	●				●								ADDITOL XW 6528
Co - crosslinkable grinding medium with high pigment loading capacity. Due to its special composition and reactivity it can improve chemical resistance and corrosion protection. Especially recommended for low stove conditions.	35 %			●	●				●								ADDITOL XW 6529
Co - crosslinkable grinding medium with high pigment loading capacity. Due to its special composition and reactivity it can improve chemical resistance and corrosion protection. Broad compatibility. Ultra low VOC.	35 %			●	●				●								ADDITOL XW 6539
Universal grinding medium for the production of pigment pastes used in all types of tinting machines. For improved color properties and better exterior performance. Recommended for all architectural, decorative and many industrial pigment pastes.	45 %	●	●	●	●	●	●	●	●	●	●		●	●			ADDITOL XW 6535
Special, air drying grinding medium for the production of architectural, decorative and many industrial pigment pastes.	100 %					●		●									ADDITOL XL 6515
Very efficient pigment wetting additive for inorganic pigments, extenders and matting agents.	65 %	●	●			●	●						●	●		●	ADDITOL XL 6509
Wetting and anti-settling additive to improve gloss and pigment stabilisation and flow. Especially recommended in low VOC and high solid systems.	80 %	●	●			●	●									●	ADDITOL XL 6514/80
Wetting and anti-settling additive to improve gloss and pigment stabilisation and flow. Recommend for all solvent-borne paints and lacquers.	80 %	●	●			●	●									●	ADDITOL XL 6514/50

NC combi systems	Phenolic systems	Polyurethane systems	Powder Coatings	Acid curing systems	Hybrid systems	UV s/b and 100%	UV w/b	2K-Polyurethanes, w/b
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Surface additives – Demands on optical performance are very high in most coating application areas. Defects in paint film are divergences from surface evenness and are proof of an imperfect coating process. Flow and Leveling agents are used to prevent or reduce surface defects like poor leveling, orange peel

or cratering. These additives are surface active materials with a tendency to concentrate at the air coating interface. Poly (methyl) acrylates, modified silicones and surfactants based on fluorine-containing compounds are used for this application.

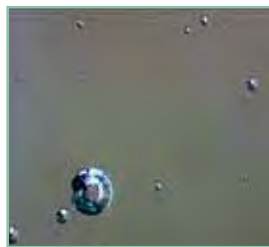
Good to know ...

... that some additives bring extra value

- High molecular weight flow promoters can bring added value in systems with entrapped micro foam. They allow for easy degassing even in high viscous formulations.



Micro foam bubbles in a solvent-borne clear coat



Micro foam disappears from liquid phase

- Use MODAFLOW® Resin or MODAFLOW EPSILON

... that standard silicones destroy adhesion

- Standard silicone additives are not heat stable and may create condensation products when heated over 150°C. The resultant silicone aggregates lead to crater formation or loss of intercoat adhesion.



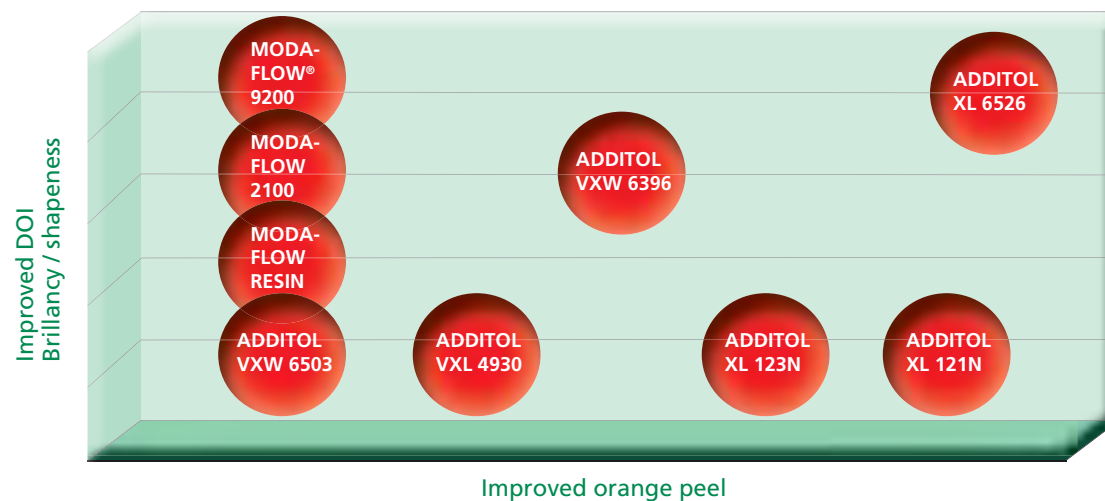
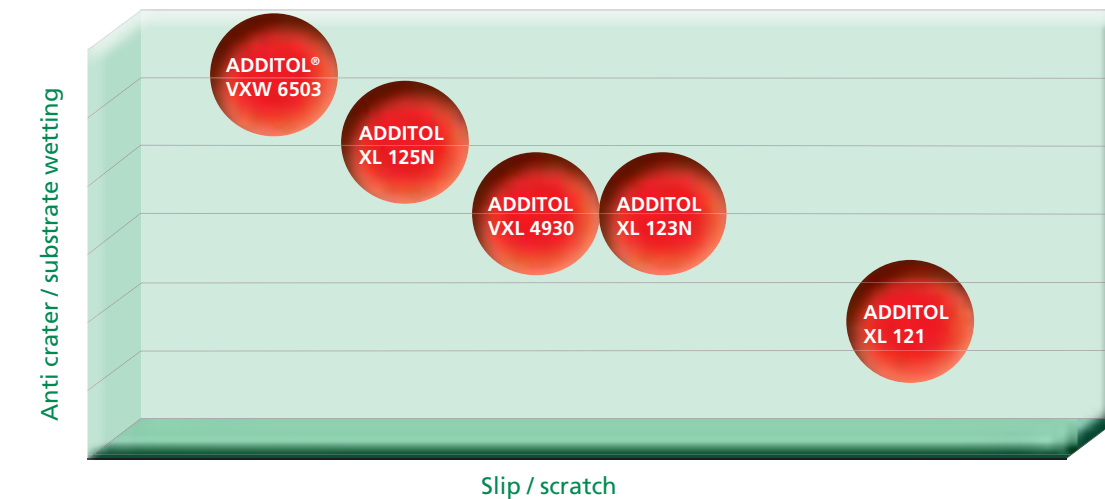
Loss of interlayer adhesion



Excellent adhesion on primer

- Use ADDITOL® XL 123N or ADDITOL® XL 6524.

How to select leveling additives



Long wave (w d, e) 1,2 - 12mm



Short wave (w b, c) 0,3 – 1,2mm



Ultra short wave (w a) 0,1 – 0,3mm

Only silicones

(ADDITOL XL123N, ADDITOL XL 121)

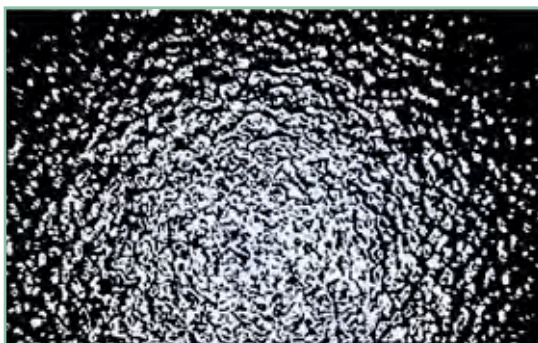
Medium Mw polymers

(MODAFLOW 2100)

Low Mw polymers

(MODAFLOW 9200, ADDITOL XL 6526)

Trouble shooting guide



Co- existence of short and long waves in black top coat

Elimination
of short and
long waves

ADDITOL® VXL 4930
ADDITOL XW 395
ADDITOL VXW 6396
ADDITOL VXW 6503
ADDITOL XL 125
MODAFLOW® 9200
MODAFLOW EPSILON
MODAFLOW AQ 3025



Strong improved sharpness by elimination of short and long waves

Additive name	w/b s/b	Automotive coatings	Industrial-protective-packaging coatings	Architectural coatings	Characteristics
ADDITOL®* XW 395	w				Acrylic copolymer; neutralized by amine; silicone-free; FDA-approved
ADDITOL® XL 480	s				Modified acrylic copolymer; low molecular weight; FDA-approved
ADDITOL XL 490	s				Modified acrylic copolymer
ADDITOL XL 490/50BAC	s				Modified acrylic copolymer
ADDITOL VXW 4971	w				Acrylic copolymer; neutralized by amine
MODAFLOW EPSILON	s				Acrylic polymer, high molecular weight
MODAFLOW RESIN	s				Acrylic copolymer; high molecular weight; FDA-approved
MODAFLOW 2100	s				Acrylic copolymer; low molecular weight; FDA-approved
MODAFLOW 9200	s				Modified acrylic copolymer; low molecular weight; crosslinkable
MULTIFLOW RESIN	s				Acrylic copolymer diluted in xylene
MODAFLOW AQ 3025	w				Acrylic copolymer; neutralized by amine; silicone-free
ADDITOL XW 6502	w				Neutralized acrylic copolymer
ADDITOL XW 6508	w				Acrylic copolymer; neutralized by amine
ADDITOL XW 390	w				Fluoro-modified acrylic copolymer; neutralized by amine
ADDITOL VXW 6214	w				Fluoro-modified acrylic copolymer; neutralized by amine
ADDITOL VXL 6230	s				Fluoro-modified acrylic copolymer
ADDITOL VXW 6396	w				Highly fluoro-modified acrylic copolymer; neutralized by amine; low molecular weight
ADDITOL VXW 6503	s w				Silicone tenside
ADDITOL XL 121	s				Modified silicone
ADDITOL XL 122N	s				Modified silicone
ADDITOL XL 123N	s w				Modified silicone
ADDITOL XL 125N	s w				Modified silicone
ADDITOL XL 132	s				Silicone-modified acrylic copolymer
ADDITOL XW 329	w				Modified silicone
ADDITOL VXL 4930	s w				Polyether-modified silicone
ADDITOL XL 6524	s w				Modified silicone
ADDITOL XL 6526	s				Modified acrylic polymer

Acrylic flow promoters
and leveling additives

Substrate wetting
additives
(anti-crater effect)

Silicone leveling
additives
(slip and scratch)
(anti orange peel)
(anti-crater effect)

Hybrid polymer leveling

* ADDITOL additives

Description	% Active matter	Acrylics, thermopl.	Acrylics, stoving	Acrylics, thermopl. w/b	Acrylics, stoving, w/b	Alkyds air-drying	Alkyd/Amino systems	Alkyds air-drying, w/b	Alkyd/Amino systems, w/b	Dispersion paints	Dispersion lacquers	2K-Epoxy-systems	Epoxy esters, stoving	Epoxy esters air-drying	2K-Epoxy systems, w/b	PE/Amino systems, oil-free	Additive name
Multi purpose leveling additive to improve surface conditions and prevent pin holes and crater formation. Also efficient against oil contaminations.	58 %							•	•						•		ADDITOL XW 395
Low molecular weight leveling additive for improved surface and anti-crater effect. Very good compatibility in all major solvent-borne systems. Especially recommended for car refinish applications.	70 %		•			•	•						•	•		•	ADDITOL XL 480
Medium molecular weight acrylic leveling additive to improve flow and surface quality. Effective against film defects.	100 %	•	•			•	•					•	•	•		•	ADDITOL XL 490
Medium molecular weight acrylic leveling additive to improve flow and surface quality. Effective against film defects.	50 %	•	•			•	•					•	•	•		•	ADDITOL XL 490/50BAC
Crosslinkable leveling additive to improve flow and surface quality. It prevents surface defects.	50 %				•				•								ADDITOL VXW 4971
Highly efficient flow promoter with excellent degassing properties. Recommended for all solvent-borne systems, especially for pigmented top coats. Easy handling and incorporation.	80 %	•	•			•	•					•	•	•		•	MODAFLOW EPSILON
Highly efficient flow promoter with excellent degassing properties. Recommended for all solvent-borne and high solid systems, especially for pigmented top coats.	100 %	•	•			•	•					•	•	•		•	MODAFLOW RESIN
Medium molecular weight, highly efficient flow modifier. Good compatibility and easy incorporation, fast mode of action. Recommended also in clear coat applications.	100 %	•	•			•	•					•	•	•		•	MODAFLOW 2100
Low molecular weight, high efficient and crosslinkable flow modifier. It reduces film defects and strongly increases gloss levels. Recommended for all solvent-borne high end applications.	100 %		•				•					•	•			•	MODAFLOW 9200
Highly efficient flow promoter with excellent degassing properties. Recommended for all solvent-borne systems, especially for pigmented top coats.	50 %	•	•			•	•					•	•	•		•	MULTIFLOW RESIN
Medium molecular weight flow and leveling additive. It supports pigment wetting and allows a fast degassing process.	25 %			•	•			•	•	•	•						MODAFLOW AQ 3025
Special flow and leveling additive.	65 %				•				•								ADDITOL XW 6502
Low molecular weight, high efficient and crosslinkable flow modifier. It reduces film defects and strongly increases gloss levels. Recommended for all water-borne paints and lacquers.	44 %				•				•								ADDITOL XW 6508
Silicone free, substrate wetting and leveling additive with improvement of intercoat adhesion. It is crosslinkable and does not stabilize foam.	50 %			•	•			•	•								ADDITOL XW 390
Silicone free, substrate wetting and leveling additive for difficult wettable substrates or not perfect cleaned surfaces. It is not foam stabilizing and does not harm intercoat adhesion.	57 %			•	•			•	•	•	•				•		ADDITOL VXW 6214
Silicone free, substrate wetting and leveling additive for difficult wettable substrates or not perfect cleaned surfaces. It is recommended especially in solvent-borne systems.	70 %		•				•					•	•			•	ADDITOL VXL 6230
Silicone free, substrate wetting and leveling additive for difficult wettable substrates or not perfect cleaned surfaces. Very low molecular weight allows fast mode of action. It is not foam stabilizing and does not harm intercoat adhesion.	55 %			•	•			•	•	•	•				•		ADDITOL VXW 6396
Special silicone tenside with very strong influence on surface tension and excellent substrate wetting performance. It is not foam stabilizing and does not show problems in recoatability.	50 %			•	•			•	•	•	•				•		ADDITOL VXW 6503
Silicone leveling additive that strongly increases slip and scratch resistance. Further it improves material flow.	14 %	•	•			•	•						•			•	ADDITOL XL 121
Silicone leveling additive to improve surface quality, slip and substrate wetting. Very good compatibility.	45 %	•	•			•	•						•			•	ADDITOL XL 122N
Silicone leveling additive to improve slip and scratch resistance. It has degassing properties and is thermostable up to 400°C.	50 %	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	ADDITOL XL 123N
Troubleshooting additive with very strong anti-crater and anti-orange peel effect. It reduces Bénard cells formation and is recommended as post additive.	50 %	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	ADDITOL XL 125N
Special silicone leveling additive to enhance flow and reduce pin holes. Very good degassing effect. Especially recommended for Epoxy systems.	30 %	•	•			•	•					•	•	•		•	ADDITOL XL 132
Silicone additive to improve flow and scratch resistance.	50 %			•	•			•	•		•				•		ADDITOL XW 329
Universal, silicone leveling additive with very good compatibility. It is very well balanced in order to improve spray mist absorption, orange peel, cratering and leveling. Highly efficient and not foam stabilizing.	40 %	•	•	•	•	•	•	•	•		•	•	•	•	•	•	ADDITOL VXL 4930
Silicone leveling additive to improve slip and scratch resistance. It has degassing properties and is thermostable up to 400°C. Highly efficient.	100 %	•	•	•	•	•	•	•	•		•	•	•	•	•	•	ADDITOL XL 6524
Very strong, crosslinkable flow and leveling additive with strong anti-crater and substrate wetting performance. It does not contain free silicone.	100 %	•	•			•	•					•	•	•		•	ADDITOL XL 6526

Good to know ...

... that some defoamers even enhance the system further

- Highly viscous and strong pseudo plastic paints applied with high wet film thicknesses e.g. by airless spray gun are very susceptible to entrapped foam. The foam within the coating may lead to pinhole formation and can weaken anti-corrosion performance of paints.



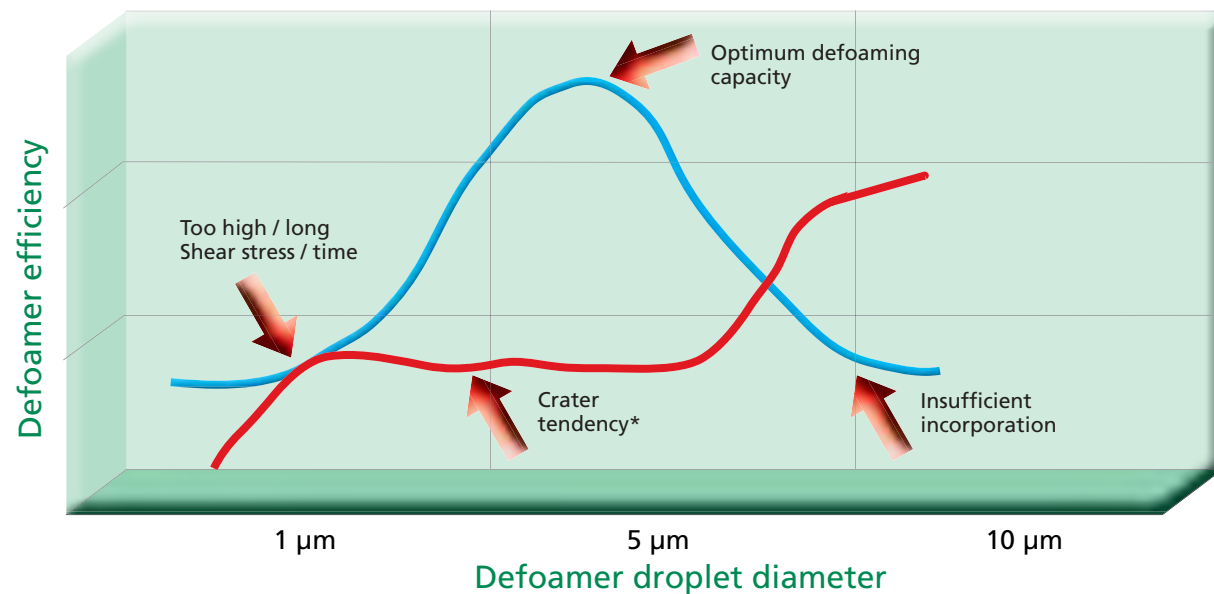
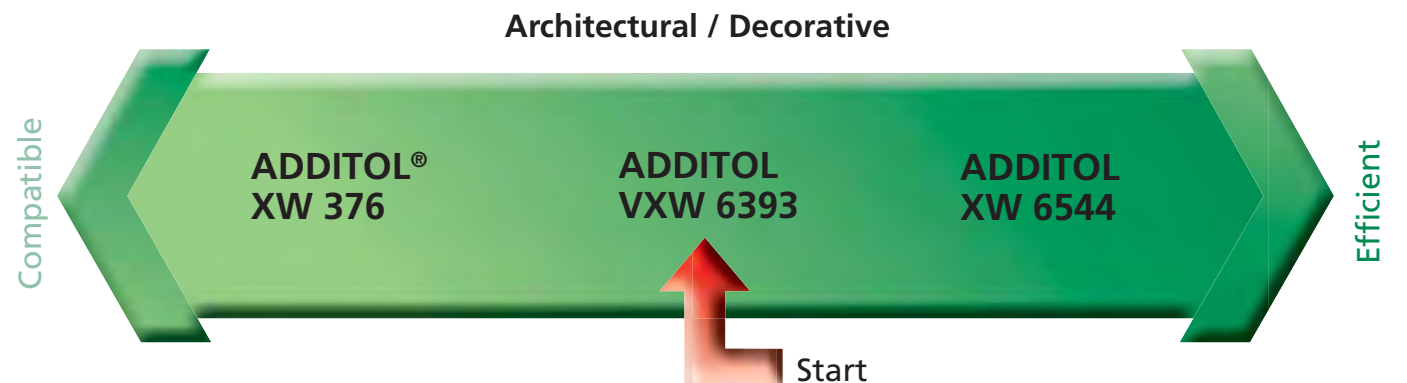
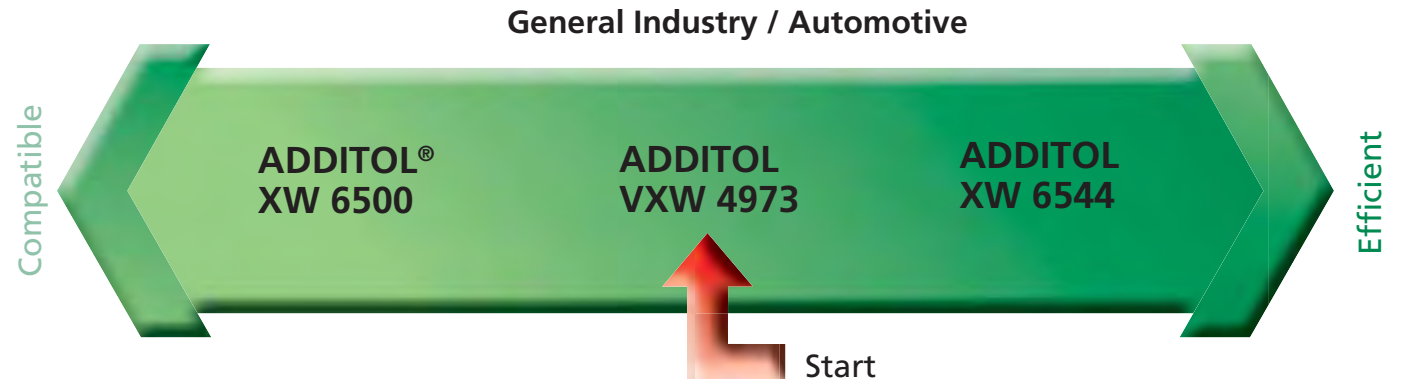
Pinholes in thick layer Epoxy primer



Closed surface obtained with ADDITOL XW 6544

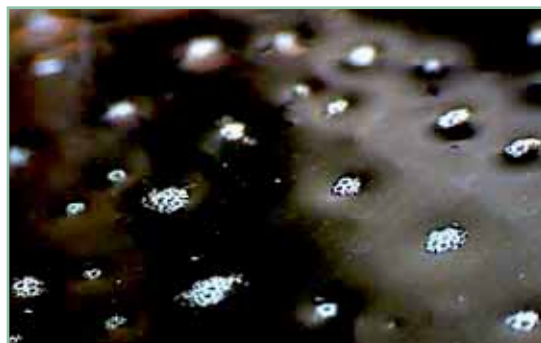
- Use ADDITOL® XW 6544 for:
 - All high viscous and high film thickness coatings
 - All airless / mix applied paints
 - All water-based pigment pastes
 - High molecular weight flow promoters can bring added value in systems with entrapped foam
- Use MODAFLOW® Resin or MODAFLOW EPSILON.

How to select defoamers



* Standard silicone defoamer

Trouble shooting guide



Presence of macro foam in wet clear coat

Reduction
of macro
and micro
foam

ADDITOL® VXW 4973
ADDITOL XW 6544
ADDITOL VXW 6386
ADDITOL VXW 6393
ADDITOL VXL 4951
ADDITOL VXW 4926
ADDITOL VXW 6500
ADDITOL VXL 6501



Efficient destruction of macro foam

Additive name	w/b s/b	Automotive coatings	Industrial-protective-packaging coatings	Architectural coatings	Characteristics
ADDITOL®* XW 375	w				Mineral oil, waxes
ADDITOL® XW 376	w				Mineral oil / wax emulsion
ADDITOL VXW 4973	w				Mineral oil, waxes
ADDITOL VXW 6211	w				Hydrocarbons; hydrophobic solid particles
ADDITOL VXW 6235	w				Defoaming compounds applied on silica; dry powder
ADDITOL VXW 6381	w				Mineral oil, waxes
ADDITOL VXW 6386	w				Hydrocarbons, waxes
ADDITOL VXW 6392	w				Special mineral oil, waxes; low odor
ADDITOL VXW 6393	w				Special mineral oil, waxes; low odor
ADDITOL VXW 6399	w				Hydrocarbons; hydrophobic solid particles
ADDITOL XW 6544	w				Polymer defoamer, VOC free
ADDITOL XW 372N	w				Mineral oil, waxes; silicone containing
ADDITOL VXL 4951	s				Fluoro-modified silicone
ADDITOL VXW 6210N	w				Modified silicone; blend of hydrocarbons
ADDITOL VXW 6356	w				Emulsion of special silicones
ADDITOL XW 393	w				Foam reducing compounds
ADDITOL VXW 4909	w				Special fatty acid ester
ADDITOL VXW 4926	s w				Special fatty acid ester
ADDITOL VXW 5907	w				Degassing / defoaming polymer; surface active
ADDITOL VXW 6397	w				Solution of defoaming polymers in special hydrocarbons; silicone-free
ADDITOL VXW 6500	w				Degassing polymers; hydrocarbons; silicone-free
ADDITOL XL 6507	s				Degassing / defoaming polymers; silicone-free
ADDITOL VXL 6501	s				Degassing / defoaming polymers; silicone containing

* ADDITOL additives

Description	% Active matter	Acrylics, thermopl.	Acrylics, stoving	Acrylics, thermopl. w/b	Acrylics, stoving, w/b	Alkyds air-drying	Alkyd/Amino systems	Alkyds air-drying, w/b	Alkyd/Amino systems, w/b	Dispersion paints	Dispersion lacquers	2K-Epoxy-systems	Epoxy esters, stoving	Epoxy esters air-drying	2K-Epoxy systems, w/b	PE/Amino systems, oil-free	Additive name
High efficient defoamer for architectural and decorative paint mainly.	100 %			•				•		•	•						ADDITOL XW 375
High efficient, easy to incorporate defoamer emulsion for architectural and decorative paints mainly.	50 %			•				•		•	•						ADDITOL XW 376
Highly efficient defoamer with good compatibility and easy incorporation. Broad field of application.	100 %			•	•			•	•	•	•						ADDITOL VXW 4973
Very strong defoamer for highly pigmented paints or pigment pastes.	100 %							•			•				•		ADDITOL VXW 6211
Powder defoamer for flooring systems or epoxy cement applications.	60 %														•		ADDITOL VXW 6235
FDA-approved defoamer for water-borne systems. Strongly recommended in all water-borne can and coils systems.	100 %			•				•		•	•				•		ADDITOL VXW 6381
Defoamer for high quality lacquers with good compatibility. Homogenize prior use.	100 %			•	•			•	•	•	•						ADDITOL VXW 6386
Defoamer for wall paints ! Homogenize prior use!	100 %									•	•						ADDITOL VXW 6392
Highly efficient defoamer for architectural and decorative coatings. Low odor, especially for interior applications.	100 %					•		•		•	•				•		ADDITOL VXW 6393
Defoamer for high quality pigmented systems with very good compatibility in many paint systems.	100 %				•				•		•						ADDITOL VXW 6399
Very efficient defoamer and deaerator for high viscous systems with strong gas incorporations. Excellent re flow effect improves surface quality.	100 %							•			•				•		ADDITOL XW 6544
Defoamer with excellent long term stability, enhances flow and leveling.	100 %			•				•		•	•				•		ADDITOL XW 372N
Very efficient defoamer for solvent-borne paints and lacquers. Strong anti-blistering effect during processing and application.	20 %	•	•			•											ADDITOL VXL 4951
Heavy duty defoamer recommended for preparation of pigment concentrates and strong foaming systems.	100 %			•				•		•	•				•		ADDITOL VXW 6210N
Defoamer for clear and top coats, easy to incorporate.	30 %							•			•						ADDITOL VXW 6356
Defoamer to prevent pin hole formation and improves flow.	35 %				•				•								ADDITOL XW 393
Defoamer and deaerator with broad compatibility and easy incorporation, crosslinkable.	79 %			•	•			•	•								ADDITOL VXW 4909
Defoamer and deaerator with rheology improvement in order to allow better film build-up. Very fast mode of action, crosslinkable.	100 %			•	•	•	•	•	•								ADDITOL VXW 4926
Defoamer and deaerator to reduce flash-off time. Recommended for spray applications.	100 %			•	•				•								ADDITOL VXW 5907
Deaerator with strong efficiency in forced drying and stoving systems. Easy to incorporate and very good in pigmented formulations.	100 %			•	•		•	•	•								ADDITOL VXW 6397
Deaerator with strong efficiency in forced drying and stoving systems. Easy to incorporate and very good in clear coat formulations.	100 %			•	•		•	•	•	•					•		ADDITOL VXW 6500
Defoamer and deaerator for all industrial paints and lacquers, high efficient.	100 %	•	•			•	•					•	•	•		•	ADDITOL XL 6507
Defoamer and deaerator for all industrial paints and lacquers, high efficient, silicone containing.	100 %	•	•			•	•					•	•	•		•	ADDITOL VXL 6501

Good to know ...

... that there is a way to increase wet film thickness without sagging

- In case of high wet film thicknesses applied e.g. by airless spray gun or in case of overlap areas, PUR thickeners have their limits. The paint will start sagging on vertical substrates.



Strong sagging of paint

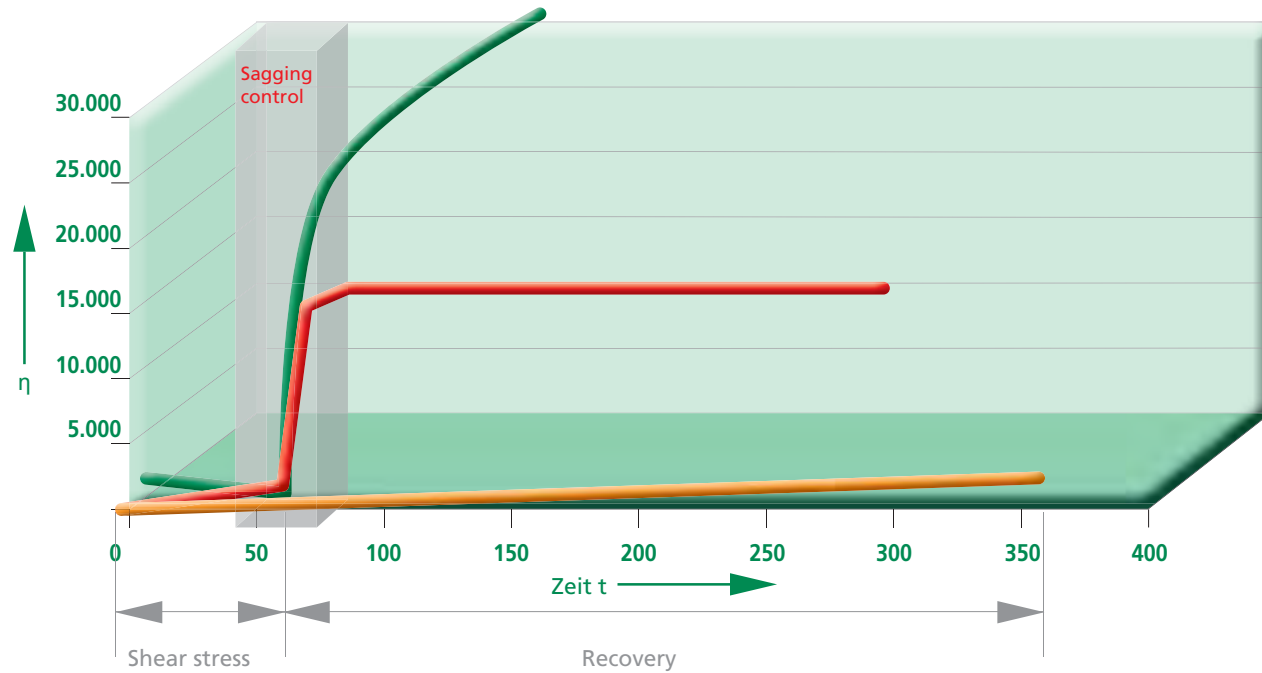
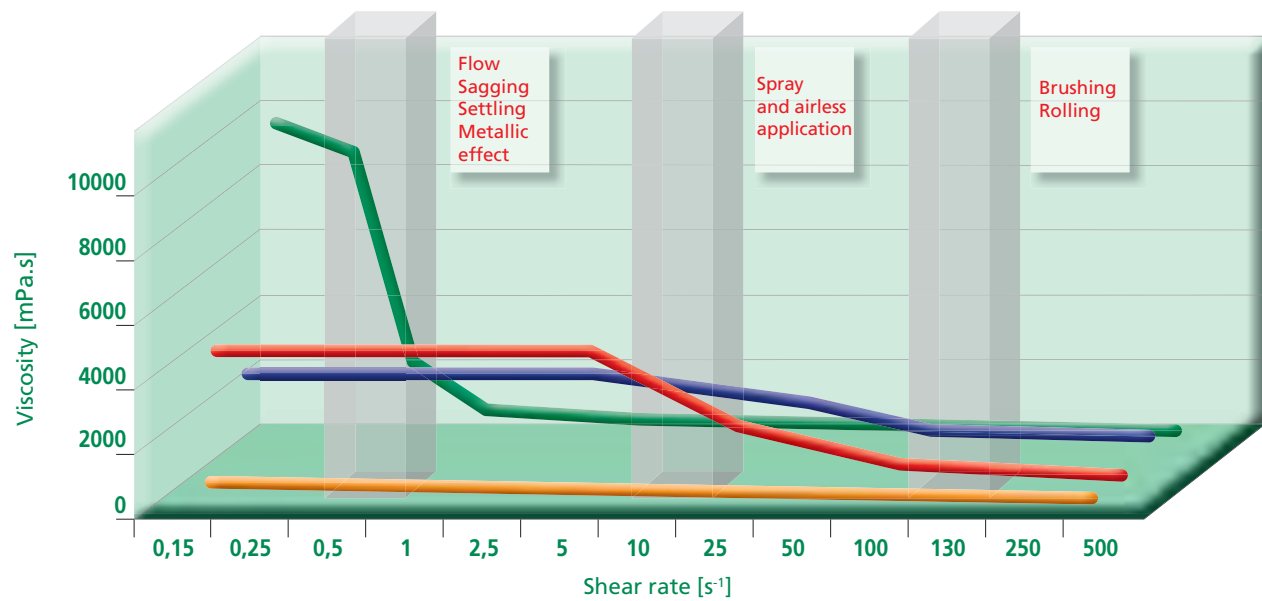


Improved sagging control

- Use ADDITOL® XW 6536 to achieve extreme high film thickness without sagging.

How to select rheology modifiers

Rheology profile of a water-based acrylic clear coat



■ Control
 ■ ADDITOL® VXW 6388
 ■ ADDITOL VXW 6360
 ■ ADDITOL XW 6536

Trouble shooting guide

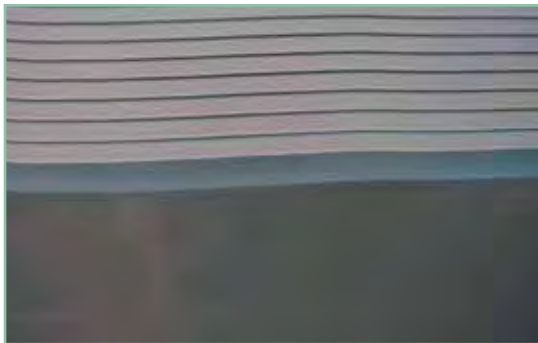


Sagging of paint on vertical substrate



Improved sagging on vertical surface

- ADDITOL® VXW 6388**
- ADDITOL VXW 6360**
- ADDITOL XW 6536**
- ADDITOL VXW 6387**



Paint stays on vertical substrate without sagging

Rheology modifiers

Additive name	w/b s/b	Automotive coatings	Industrial-protective-packaging coatings	Architectural coatings	Characteristics
ADDITOL®* XL 270	s w				Modified silicone; amine neutralized
ADDITOL® XL 280	s				Specially modified montmorillonite clay
ADDITOL VXW 4934	w				Modified wax emulsion
ADDITOL VXW 6387	s w				Special fatty acids; amine neutralized; silicone-free
ADDITOL XW 6536	w				Special organic activated clay
ADDITOL VXW 6360	w				Polyurethane thickener
ADDITOL VXW 6388	w				Polyurethane thickener

* ADDITOL additives

Description	% Active matter	Acrylics, thermopl.	Acrylics, stoving	Acrylics, thermopl. w/b	Acrylics, stoving, w/b	Alkyds air-drying	Alkyd/Amino systems	Alkyds air-drying, w/b	Alkyd/Amino systems, w/b	Dispersion paints	Dispersion lacquers	2K-Epoxy-systems	Epoxy esters, stoving	Epoxy esters air-drying	2K-Epoxy systems, w/b	PE/Amino systems, oil-free	Additive name
Multi purpose additive to improve rheology and prevent from settling and floating. Also recommended in high gloss systems.	55 %	●				●		●					●	●	●		ADDITOL XL 270
Rheology modifier to prevent powerful settling of pigments and extenders, improves sagging.	36 %	●				●		●						●			ADDITOL XL 280
Reduces settling and sagging, enhances edge covering.	35 %				●				●								ADDITOL VXW 4934
Rheology modifier to prevent pigment sedimentation and improves sagging and storage stability.	60 %	●		●	●	●		●	●		●		●	●	●		ADDITOL VXW 6387
Special rheology modifier with extremely fast viscosity recovery. Recommended for all high wet film thicknesses e.g. in case of air less application. Prevents sagging and settling at low zero and low shear stress sufficiently.	-																ADDITOL XW 6536
Associative thickener to control rheology and flow. It improves applicability by roller or brush. Easy to incorporate.	30 %			●				●		●	●				●		ADDITOL VXW 6360
Associative thickener to control rheology at low shear stress. Excellent against sedimentation and sagging.	35 %			●				●		●	●				●		ADDITOL VXW 6388

NC combi systems	Phenolic systems	Polyurethane systems	Powder Coatings	Acid curing systems	Hybrid systems	UV s/b and 100%	UV w/b	2K-Polyurethanes, w/b
					•			
•					•		•	•
					•		•	•
					•		•	
					•		•	•



Driers and Catalyst selection are very important elements to ensure the desired performance in reactive and crosslinked coatings.

The cross linking reaction of air drying alkyd systems is based on a radical mechanism, starting with the incorporation of oxygen from air. The absorption step is accelerated by Driers, which are carboxylic salts of metals. Cobalt, manganese and iron are the most important active drying metals whereas barium, zirconium or calcium belong to the group of secondary drying metals. Pre-emulsified combination driers allow efficient set and through drying with easy incorporation in water-borne paint formulations.

Catalysts are used to speed up cross linking reactions of two-component polyurethane systems or improve curing conditions in stoving enamels. The reaction of melamine resins and polyols is complex and require acidic catalysts. The relative efficiency of catalysts correlates to the acidity and the overall reaction rate is direct proportional to the concentration of the catalyst. Frequently used catalysts are p-toluene sulfonic acid (PTSA), dodecyl benzene sulfonic acid (DDBSA), dinonyl naphthalene di sulfonic acid (DNNDSA), phosphoric acid derivatives or organic acids.

Ionic or covalently blocked sulfonic acid catalysts are used in amino resin based stoving systems. The heat sensitive deactivation of the sulfonic acid is a very important tool to achieve the desired balance of storage stability of a catalyzed system and then rapid cure when the coating reaches the desired cure temperature.

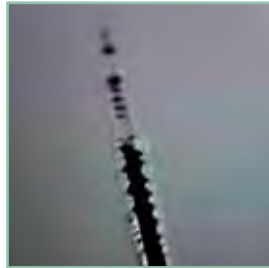
Good to know ...

... that we have a fast reactivity cobalt-free drier

- Use ADDITOL® XW 6533 as a real alternative to Cobalt - containing driers. It allows fast set and through drying and can be used in water-borne as well as in solvent-borne paints.



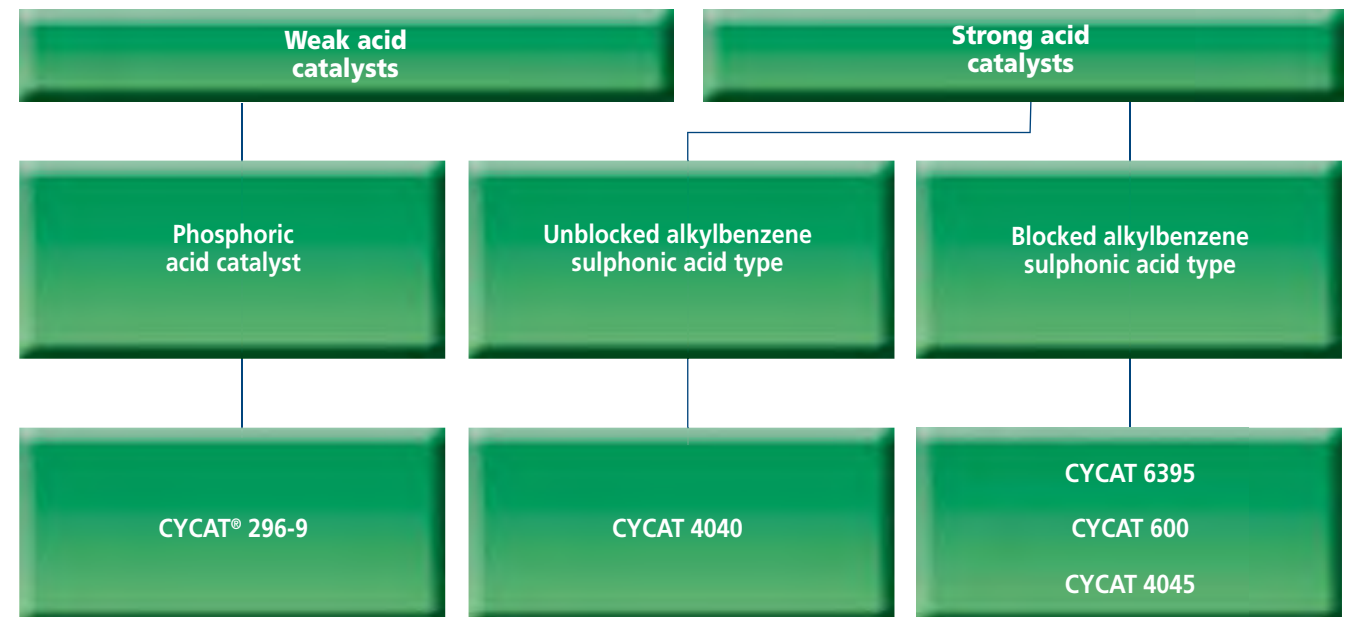
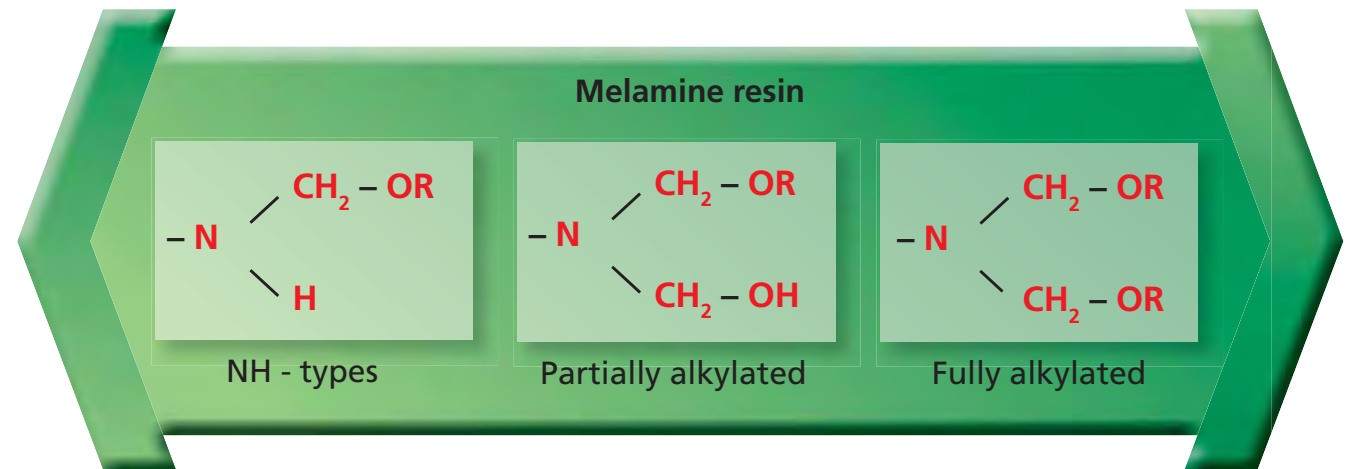
Air drying paint without drier on drying recorder



Rapidly drying paint on drying recorder

- Some driers have compatibility problems when incorporated in water-based paints. In these cases pre-mixing amine with the drier immediately prior to incorporation may solve the problem.

How to select catalysts



Trouble shooting guide



Weak corrosion protection in 2 layer system

Improved
corrosion
protection

CYCAT® 4040
CYCAT VXK 6395



Improved corrosion protection by choosing the right catalyst

Catalysts

Driers

Additive name	w/b s/b	Automotive coatings	Industrial-protective-packaging coatings	Architectural coatings	Characteristics
CYCAT®* XK 406N	s				Phosphoric acid based catalyst
CYCAT® VXK 6395	s w				Amine blocked sulfonic acid
CYCAT XK 350	s				Organic acid based catalyst
CYCAT XK 391	s				Organic phosphoric acid compound in solvent
CYCAT VXK 6357	s w				pTSA ester
CYCAT VXK 6364	s w				pTSA neutralized by amine
CYCAT VXK 6365	w				Resinous, tin containing catalyst
CYCAT VXK 6378N	s w				Organic phosphoric acid compound in solvent
CYCAT 296-9	s w				Weak phosphoric acid catalyst
CYCAT 500	s w				Strong naphthalene sulfonic acid catalyst
CYCAT 600	s w				Strong dodecyl benzene sulfonic acid catalyst
CYCAT 4040	s w				Strong alkyl benzene sulfonic acid
CYCAT 4045	s w				Amine blocked alkyl benzene sulfonic acid catalyst
ADDITOL®* VXW 4940N	w				Combination drier; 3 % Co/3 % Ba/5 % Zr in form of emulsion
ADDITOL® VXW 4952N	w				Combination drier; 3 % Co/2 % Mn/4 % Zr in form of emulsion
ADDITOL VXW 6206	w				Combination drier; 5 % Co/0,22 % Li/7,5 % Zr; free of nonylphenol ethoxylates
ADDITOL VXW 6240	w				Combination drier; 4 % Co/3,7 % Ba/6,5 % Zr; water-free form of delivery
ADDITOL XW 6533	sw				Special accelerated cobalt free combination drier; contains Mn and Zr

* ADDITOL additives

* CYCAT additives

Description	% Active matter	Acrylics, thermopl.	Acrylics, stoving	Acrylics, thermopl. w/b	Acrylics, stoving, w/b	Alkyds air-drying	Alkyd/Amino systems	Alkyds air-drying, w/b	Alkyd/Amino systems, w/b	Dispersion paints	Dispersion lacquers	2K-Epoxy-systems	Epoxy esters, stoving	Epoxy esters air-drying	2K-Epoxy systems, w/b	PE/Amino systems, oil-free	Additive name
Accelerates curing of phenolic and phenolic / epoxy systems	9 %																CYCAT XK 406N
Especially for low temperature stoving applications in general industry and OEM	25 %		●		●		●		●				●			●	CYCAT VXK 6395
Mild catalyst for melamine systems with improved anti-corrosion performance	62 %		●				●										CYCAT XK 350
Catalyst for 1K-systems	21 %		●				●										CYCAT XK 391
Reduces stoving temperature/time	90 %		●		●		●		●								CYCAT VXK 6357
Reduces stoving temperature/time	50 %		●		●		●		●								CYCAT VXK 6364
Catalyst for water-borne PU-systems	1 %																CYCAT VXK 6365
Catalyst for 1K-systems	30 %		●		●		●		●								CYCAT VXK 6378N
To accelerate the cure reactions of high imino and partially alkylated resins	50 %		●		●		●		●				●			●	CYCAT 296-9
Especially recommended for electrocoating and electrostatic spray systems with improved water resistance	40 %		●		●		●		●				●			●	CYCAT 500
Especially recommended for high solids formulations with hydrocarbon solubility	70 %		●		●		●		●				●			●	CYCAT 600
Strong acid catalyst for highly alkylated melamine, benzoguanamine, glycoluril and urea resins	40 %		●		●		●		●				●			●	CYCAT 4040
For highly alkylated melamine, benzoguanamine, glycoluril and urea resins. Provides excellent stability in wb and high solid systems.	35 %		●		●		●		●				●			●	CYCAT 4045
Contains APEO's; easy to incorporate; enhances surface and through drying	-							●									ADDITOL VXW 4940N
Easy to incorporate; enhances surface and through drying	-							●									ADDITOL VXW 4952N
Free of APEO's; enhances surface and through drying	-							●									ADDITOL VXW 6206
Enhances surface and through drying	-							●									ADDITOL VXW 6240
Allows fast set and through drying and excellent hardness development. Recommended for primers and top coats.	-							●									ADDITOL XW 6533

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