



# COATING ADDITIVES

Product Guide - Worldwide



# About allnex



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# Facts & Figures

- Global company with over €2.1 billion in sales
- Broad Technology portfolio: liquid coating resins, energy curable resins, powder coating resins, crosslinkers and additives, composites and construction materials
- Approximately 4000 employees
- Customers in more than 100 countries
- 33 manufacturing facilities
- 23 research and technology centers
- 5 joint ventures
- Extensive range of solutions for key coating segments: automotive, industrial, packaging coating and inks, protective, industrial plastics and specialty architectural

With manufacturing, R&D and technical facilities located throughout Europe, North America, Asia Pacific and Latin America, allnex offers global and reliable supply of resins and additives combined with local, responsive customer support.

## About 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
- Marine and Protective

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 at the forefront 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 allnex.

ADDITOL®, CF Series Driers, CYCAT®, MODAFLOW® additive families serve the following applications:

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



## 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 flocculates. 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.

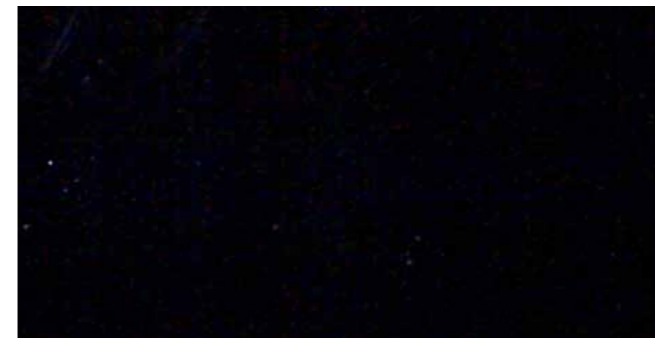
### Good to know ...

#### ... 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® VXW 6208 or ADDITOL VXW 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.
- ADDITOL XL 6577 can load up to 50% more inorganic pigments & fillers compared to other dispersants in SB paints & pigment preparations. As a result it reduces viscosity of highly filled formulations and thus enable lower VOC levels.

### Trouble shooting guide



Strong pigment floating visible "rub out test"



Improved anti-floating effect

ADDITOL XL 6514/80  
ADDITOL XL 204  
ADDITOL VXW 6208  
ADDITOL VXL 6237N  
ADDITOL XL 6577



Excellent pigment stabilization "rub out test"

## Wetting and Dispersing Additives

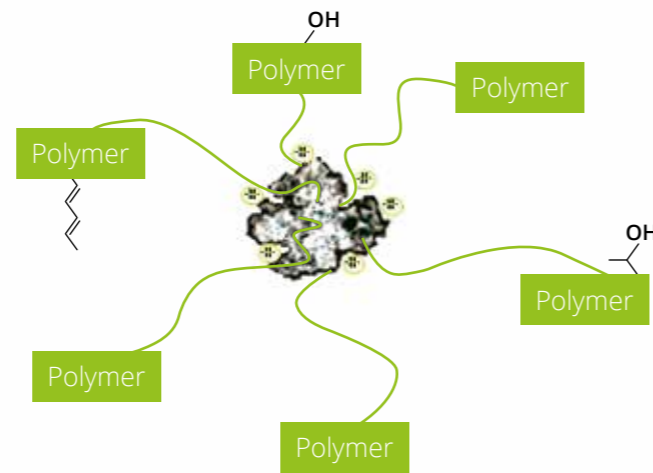
### Requirements for modern pigment pastes

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.



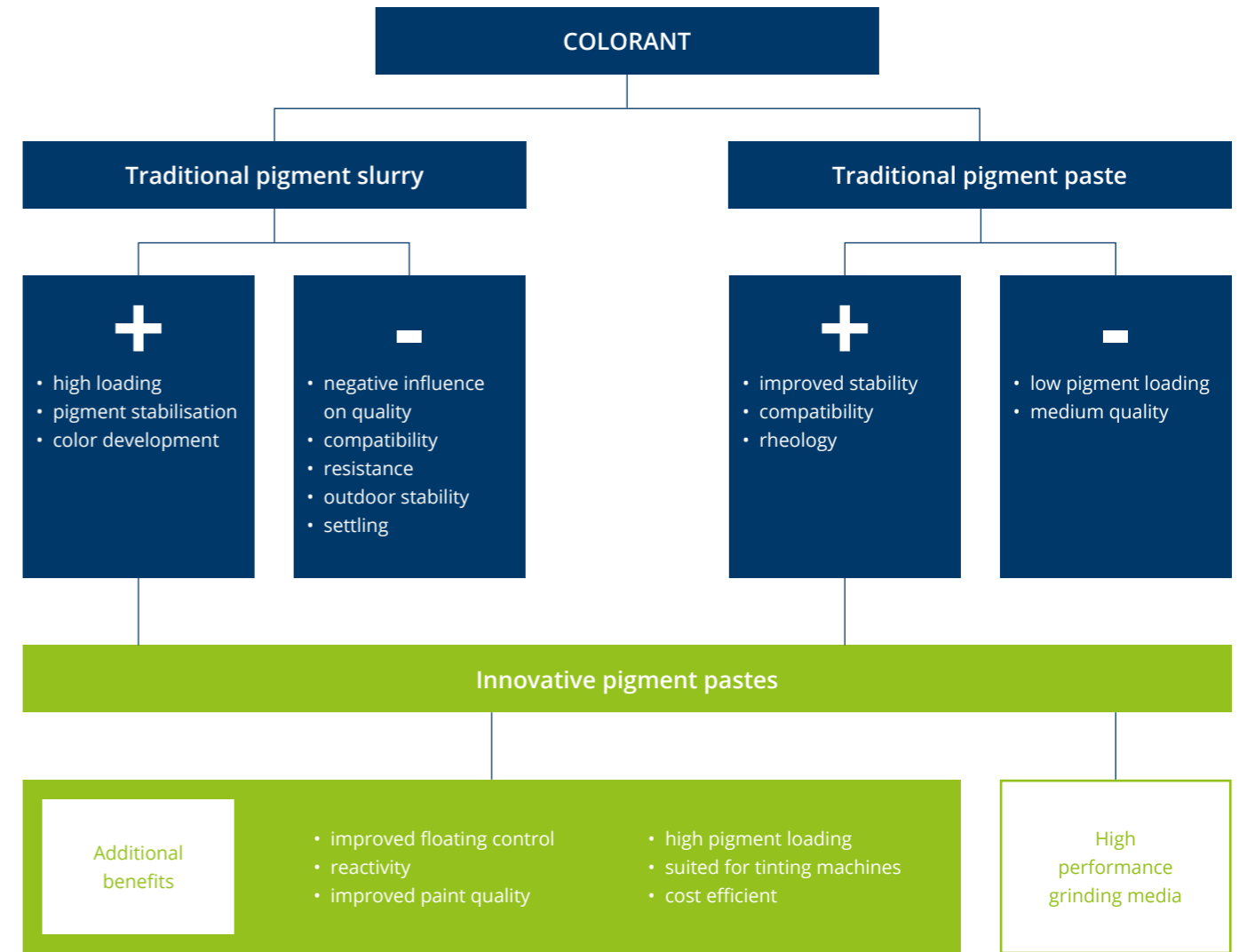
Such novel “grinding media” can be used to produce highest quality pigment pastes for Automotive OEM and Refinish paints, Industrial Coatings applications and Decorative paints.

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®* XL 6557	Cross-linkable in stoving / 2K PUR systems, supports air drying in alkyd paints. Improves chemical resistances and mechanical properties.	•		
ADDITOL XW 6528	Cross linkable in stoving / 2K PUR systems, improves corrosion protection and water resistance.	•	•	
ADDITOL XW 6535	Air drying polymer, very high pigment loading. Improved floating control and exterior stability. Ultra low VOC.	•		•
ADDITOL XW 6565	Universal high polymeric, auto-emulsifying with improved compatibility in non aqueous paints. Ultra low VOC.	•		•
ADDITOL XW 6591	Cross-linkable in stoving / 2K PUR systems, improves corrosion protection and water resistance.	•	•	

\* ADDITOL additives

## Wetting and Dispersing Additives

Additive name	Dosage	SB/WB	Automotive	Industrial	Architectural	Characteristics	Description	% Active matter
<b>Anti-floating</b>								
ADDITOL® XL 204	0,5 – 6,0 % pigment	S W	●	●	●	Silicone containing phosphoric acid ester; anionic	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 %
<b>Pigment wetting</b>								
ADDITOL XL 250	0,5 – 5,0 % pigment / extender	S W	●	●	●	Phosphoric acid ester, neutralized by amine; anionic; low molecular	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 255N	0,2 – 2,0 % inorg. 1,0 – 5,0 % org. pigment	S	●	●	●	Modified alkyd resin; neutralized	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 %
<b>Special Pigment wetting</b>								
ADDITOL VXL 4992	0,5 – 2,0 % pigment / extender	S	●			Modified polyester	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 %
<b>Dispersing Pigment slurries</b>								
ADDITOL VXL 6212	3,0 – 10 % inorg. 10 – 50 % org. pigment	S	●	●		Urethane modified acrylic copolymer; cationic; high molecular	High molecular weight dispersing additive for difficult wettable pigments. Recommended for direct grinding processes. Improved compatibility in acrylic systems.	30 %
ADDITOL VXL 6237N	3,0 – 10 % inorg. 10 – 50 % org. pigment	S	●	●		Wetting/dispersing agent; cationic; high molecular	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 VXW 6200	0,5 – 4,0 % inorg. 4 – 15 % org. pigment	W			●	Acrylic copolymer-ammonia salt; anionic; medium molecular	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 6208	3,0 – 10 % inorg. 15 – 50 % org. pigment	W		●	●	Nonionically stabilized polymer; diluted in water	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 6208/60	3,0 – 10 % inorg. 15 – 50 % org. pigment	S W		●	●	Nonionically stabilized polymer; diluted in methoxy propanol	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 6374	3,0 – 10 % inorg. 15 – 40 % org. pigment	W		●	●	Wetting and dispersing agent; free of alkylphenol ethoxylates; no VOC	Wetting additive to improve gloss and color strength of difficult wettable pigments. It allows an improved material flow.	50 %
ADDITOL VXW 6394	10 – 30 % inorg. 30 – 75 % org. pigment	W		●		High molecular weight polymer; nonionic	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 XL 260N	3,0 – 15 % inorg. 15 – 60 % org. pigment	S		●		Urethane modified acrylic copolymer; nonionic; high molecular	High molecular weight dispersing additive for difficult wettable pigments. Recommended for direct grinding processes.	30 %
ADDITOL XW 330	0,1 – 0,4 % pigment / extender	W			●	Polyacrylic acid-ammonia salt; anionic; low molecular	Low molecular weight wetting and dispersing additive especially for inorganic pigments and extenders. Strongly recommended for titanium dioxide white.	30 %

## Wetting and Dispersing Additives

Additive name	Dosage	SB/WB	Automotive	Industrial	Architectural	Characteristics	Description	% Active matter
<b>Dispersing Pigment slurries</b>								
ADDITOL®* XL 6521	3,0 – 10 % inorg. 15 – 60 % org. pigment	S	●	●		Modified block copolymer; high molecular; cationic	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 XW 6532	15 -50 % org. pig. 30-100 % carbon black	S W		●	●	Ionic polymeric dispersing additive	Highly efficient dispersant for organic pigments and carbon black. It can improve color acceptance of colorants in solvenborne paints. It is recommended for the production of waterborne pigment slurries.	40 %
<b>Grinding media</b>								
ADDITOL XL 6515	Grinding medium	S W		●	●	Modified alkyd polymer; universal use in DECO and Industrial systems	Special, air drying grinding medium for the production of architectural, decorative and many industrial pigment pastes.	100 %
ADDITOL XL 6557	Grinding medium	S		●		Air drying alkyd polymer	Pigment grinding medium for solventborne (SB) industrial pigment pastes. High pigment concentration. Supports air-drying, physical drying and isocyanate and amino crosslinking systems. Compatible in broadest range of SB resins.	70 %
ADDITOL XW 6528	Grinding medium	W	●	●		Polyester modified acrylic polymer; co-crosslinkable	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 6535	Grinding medium	S W		●	●	High polymeric, auto emulsifying pigment grinding medium	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 6565	Grinding medium	S W		●	●	High polymeric, auto-emulsifying pigment grinding medium; improved compatibility in non aqueous paints	Latest generation of high molecular, universal pigment grinding medium for Architectural colorant production. High pigment loading and low mill base viscosities. Designed for POS and in house tinting. Ultra low VOC and Eco labels 2009/543/EC and 2009/544/EC.	38 %
ADDITOL XW 6591	Grinding medium	W	●	●		Polyester modified acrylic polymer; co-crosslinkable	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. Improved life time stability.	35 %
<b>Special pigment wetting</b>								
ADDITOL XL 6509	5,0 – 10 % inorg. pigment 30 – 60 % matting agent	S		●		Copolymer with acidic groups	Very efficient pigment wetting additive for inorganic pigments, extenders and matting agents.	65 %
ADDITOL XL 6577	2,5% - 10% inorg. Pigment 15 - 60% matting agent	S		●		Copolymer with acidic groups	Excellent dispersant for SB and HS / UHS paints and inorganic pigment / filler preparations. Enables highest pigment loading with low viscosity. Supports low VOC formulations.	52 %
<b>Anti settling</b>								
ADDITOL XL 6514/80	0,2 -1,0 % inorg. pigment 1,0 – 5,0 % org. pigment	S		●		Salt of a basic aminoamide with an acidic polyester	Wetting and anti-settling additive to improve gloss and pigment stabilisation and flow. Especially recommended in low VOC and high solid systems.	80 %

\* ADDITOL additives

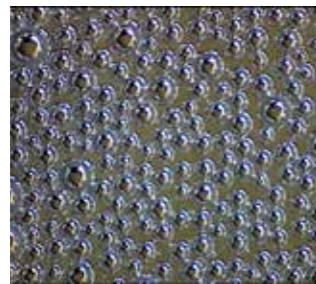
## Flow and Leveling Additives

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.

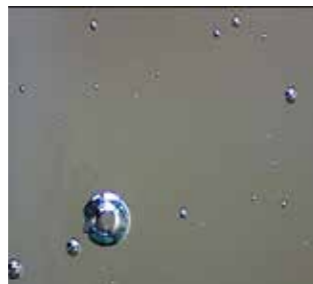
### Good to know ...

#### ... 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.



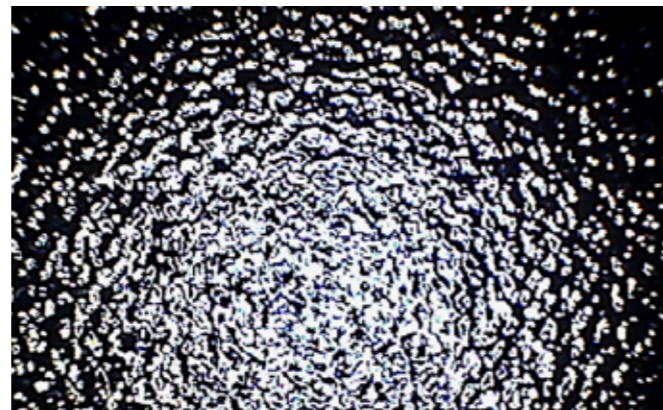
Loss of interlayer adhesion



Excellent adhesion on primer

- Use ADDITOL® XL 123N or Modaflow Lambda

### Trouble shooting guide



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

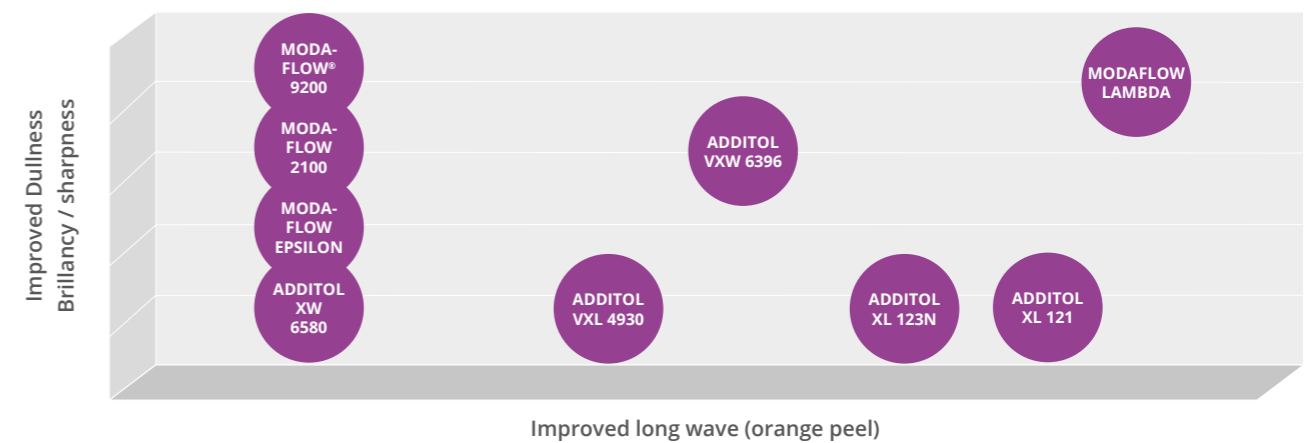
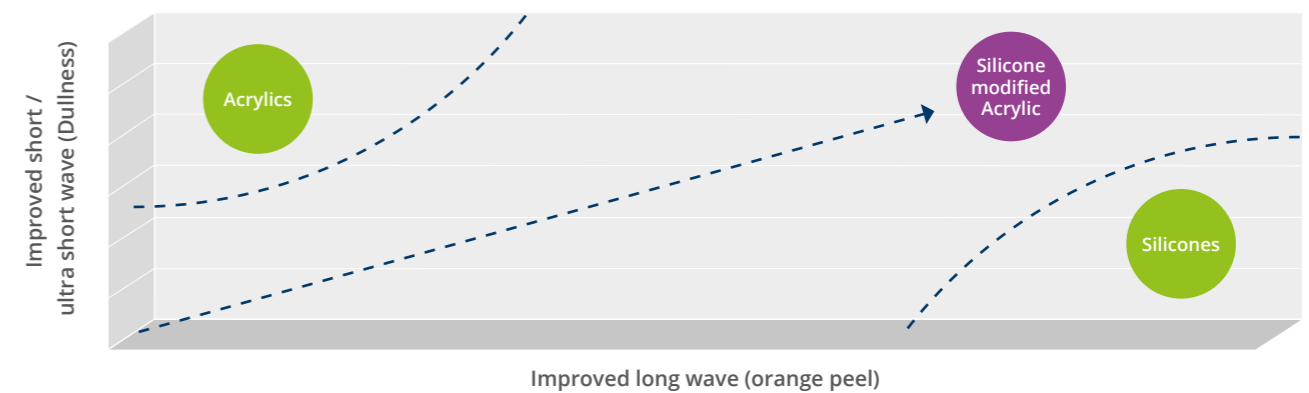
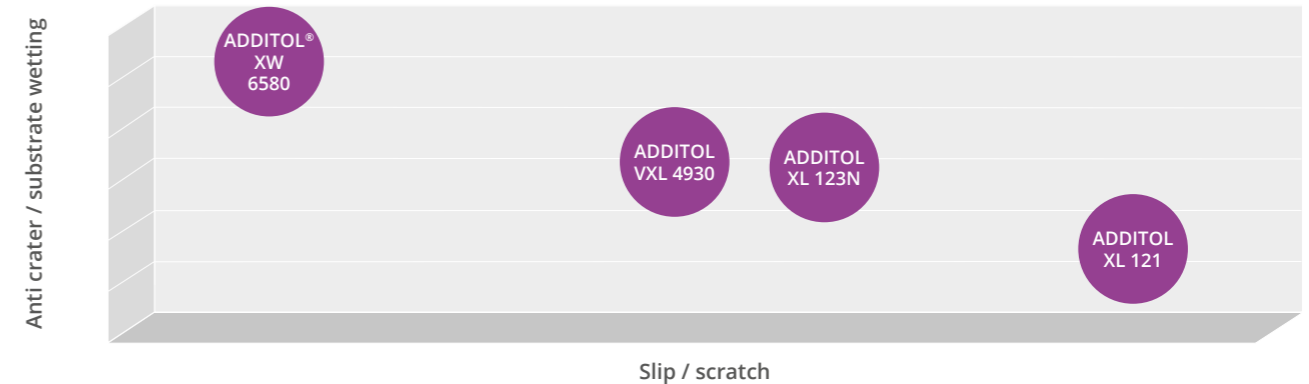
Elimination of short and long waves

ADDITOL VXL 4930  
ADDITOL VXW 6396  
ADDITOL XW 6580  
MODAFLOW 9200  
MODAFLOW AQ 3025  
MODAFLOW EPSILON  
MODAFLOW LAMBDA



Strong improved sharpness by elimination of short and long waves

### How to select leveling additives



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



Short wave: (w b,c) 0,3-1,2m



Ultra short wave: (w a) 0,1-0,3m



Micro wave. micro structure >0,1mm

### Surface topography

- The surface topography of physically drying coatings is established during the solvent evaporation stage
- In the locations where the volatile components have evaporated, the surface tension increases, and the coatings flows towards these areas, **creating waves**

Typically the total wave amplitude is in the range of 1µm whereas the wave period varies from about 0,1mm up to 12mm. Wave lengths of less than 0,1mm create dullness or matte image.



## Flow and Leveling Additives

Additive name	Dosage	SB/WB	Automotive	Industrial	Architectural	Characteristics	Description	% Active matter
<b>Acrylic flow promoters and leveling additives</b>								
ADDITOL®* VXW 4971	0,2 – 1,0 % binder	W	●	●	●	Acrylic copolymer; neutralized by amine	Crosslinkable leveling additive to improve flow and surface quality. It prevents surface defects.	50 %
ADDITOL XL 480	0,1 – 0,5 % total	S	●	●		Modified acrylic copolymer; low molecular weight; FDA-approved	Low molecular weight leveling additive for improved surface and anti crater effect. Very good compatibility in all major solventborne systems. Especially recommended for car refinish and coil coating applications.	70 %
ADDITOL XL 490	0,1 – 2,0 % binder	S	●	●		Modified acrylic copolymer	Medium molecular weight acrylic leveling additive to improve flow and surface quality. Effective against film defects.	100 %
ADDITOL XW 395	0,2 – 1,0 % binder	W	●	●		Acrylic copolymer; neutralized by amine; silicone-free; FDA-approved	Multi purpose leveling additive to improve surface conditions and prevent pin holes and crater formation. Also efficient against oil contaminations.	58 %
MODAFLOW®* 2100	0,1 – 1,0 % total	S	●	●		Acrylic copolymer; medium molecular weight; FDA-approved	Medium molecular weight, highly efficient flow modifier. Good compatibility and easy incorporation, fast mode of action. Recommended also in clear coat applications.	100 %
MODAFLOW 9200	0,1 – 0,5 % total	S	●	●		Modified acrylic copolymer; low molecular weight; crosslinkable	Low molecular weight, high efficient and crosslinkable flow modifier. It reduces film defects and strongly increases gloss levels. Recommended for all solventborne high end applications.	100 %
MODAFLOW AQ 3025	1,0 – 2,0 % total	W	●	●	●	Acrylic copolymer; neutralized by amine; silicone-free	Medium molecular weight flow and leveling additive. It supports pigment wetting and allows a fast degassing process.	25 %
MODAFLOW EPSILON	0,1 – 2,0 % total	S	●	●		Acrylic polymer, high molecular weight	Highly efficient flow promoter with excellent degassing properties. Recommended for all solventborne systems, especially for pigmented top coats. Easy handling and incorporation.	80 %
MODAFLOW RESIN	0,1 – 1,0 % total	S	●	●		Acrylic copolymer; high molecular weight; FDA-approved	Highly efficient flow promoter with excellent degassing properties. Recommended for all solventborne and high solid systems, especially for pigmented top coats.	100 %
MULTIFLOW®* RESIN	0,5 – 3,0 % binder	S	●	●		Acrylic copolymer diluted in xylene	Highly efficient flow promoter with excellent degassing properties. Recommended for all solventborne systems, especially for pigmented top coats.	50 %
<b>Substrate wetting additives (anti-crater effect)</b>								
ADDITOL VXW 6214	0,2 – 1,0 % binder	W	●	●	●	Fluoro-modified acrylic copolymer; neutralized by amine	Silicone free, substrate wetting and leveling additive for difficult wettable substrates or not perfectly cleaned surfaces. It is not foam stabilizing and does not harm intercoat adhesion.	57 %
ADDITOL VXW 6396	0,1 – 1,0 % total	W	●	●	●	Highly fluoro-modified acrylic copolymer; neutralized by amine; low molecular weight	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 6503 N	0,1 – 1,0 % total	S W		●	●	Silicone tenside	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 XW 390	0,1 – 1,0 % binder	W	●	●	●	Fluoro-modified acrylic copolymer; neutralized by amine	Silicone free, substrate wetting and leveling additive with improvement of intercoat adhesion. It is crosslinkable and does not stabilize foam.	50 %
ADDITOL XW 6580	0,05 – 0,5% total	S W	●	●	●	Silicone tenside	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.	100 %

\* ADDITOL additives

\* MODAFLOW additives

## Flow and Leveling Additives

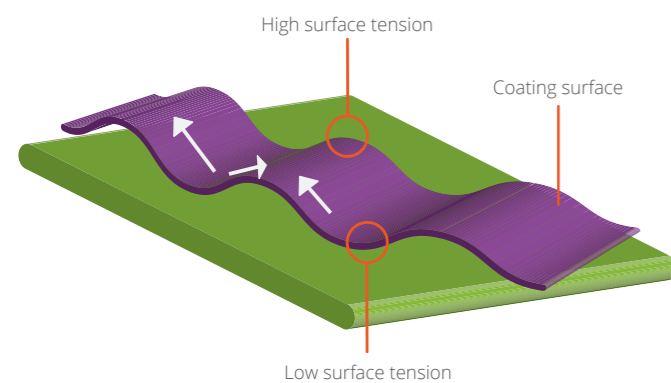
Additive name	Dosage	SB/WB	Automotive	Industrial	Architectural	Characteristics	Description	% Active matter
<b>Silicone leveling additives (slip and scratch) (anti orange peel) anti-crater effect)</b>								
ADDITOL®* VXL 4930	0,05 – 0,3 % total	S W		●	●	Polyether-modified silicone	Universal, silicone 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 XL 121	0,1 – 0,5 % total	S		●	●	Modified silicone	Silicone leveling additive that strongly increases slip and scratch resistance. Further it improves material flow.	14 %
ADDITOL XL 122N	0,05 – 0,3 % total	S		●	●	Modified silicone	Silicone leveling additive to improve surface quality, slip and substrate wetting. Very good compatibility.	45 %
ADDITOL XL 123N	0,05 – 0,5 % total	S W		●	●	Modified silicone	Silicone leveling additive to improve slip and scratch resistance. It has degassing properties and is thermostable up to 400°C.	50 %
ADDITOL XW 329	0,1 – 0,3 % total	W		●		Modified silicone	Silicone additive to improve flow and scratch resistance.	50 %
<b>Hybrid polymer leveling</b>								
MODAFLOW®* LAMBDA	0,1- 0,5% total	S	●	●		Hydroxyl functional acrylic-silicone polymer	Highly efficient, cross linkable flow promoter for improved surface characteristics such as gloss, DOI, brilliancy, anti-orange peel effect.	100 %

\* ADDITOL additives

\* MODAFLOW additives

### Silicones

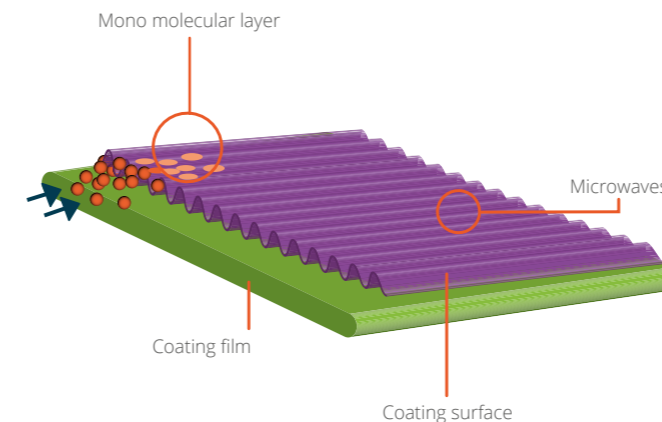
- + Reduce long wave (help to reduce orange peel)
- + Increase slip performance
- + Reduce surface tension (substrate wetting & film formation)
- Decrease interlayer adhesion



- Silicones reduce and equilibrate the surface tension of coatings during the solvent evaporation phase and directly control the formation of **long waves**.

### (Meth-)Acrylics

- + Reduce micro structure
- + No impact on surface tension
- + No impact on interlayer adhesion (can be used in multilayer systems)



- (Meth-)Acrylics copolymers have tendency to concentrate on the liquid/air interface during the drying period and form a mono molecular layer that efficiently reduces the formation of **short waves** caused by the shrinkage.

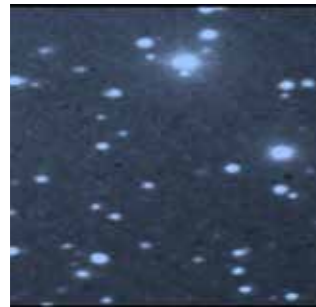
## Defoamer and Deaerater

Surface Additives – In many stages of production, handling and application, air is incorporated and finally dispersed into resins, lacquers and paints. During production and handling, the increase of volume by foam and the incorporated air will cause handling and filling problems. After application of coatings, air inside the system should leave the film while the viscosity is low enough to allow bubble marks to reflow. These larger bubbles are macro foam, which is eliminated by Defoamers. The dispersed air in the system which remains is called micro foam. Deaeraters or air release agents are used to carry these very small bubbles to the surface of the liquid phase. The technique of defoaming is based on controlled incompatibility in the system and it is important to calculate the right balance between activity and compatibility to avoid defects.

### 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.



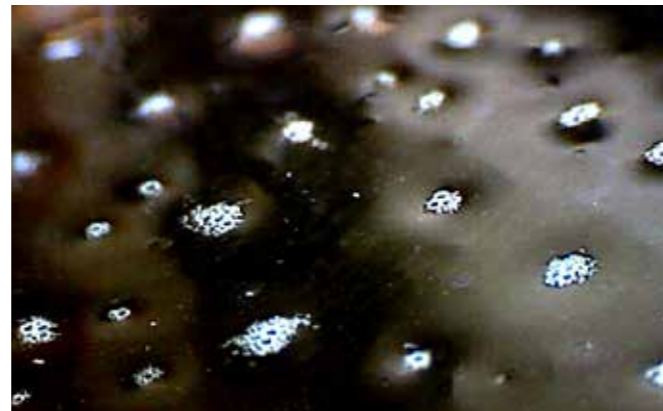
Pinholes in thick layer Epoxy primer



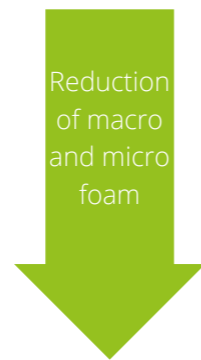
Closed surface obtained with ADDITOL XW 6544

- 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.

### Trouble shooting guide



Presence of macro foam in wet clear coat



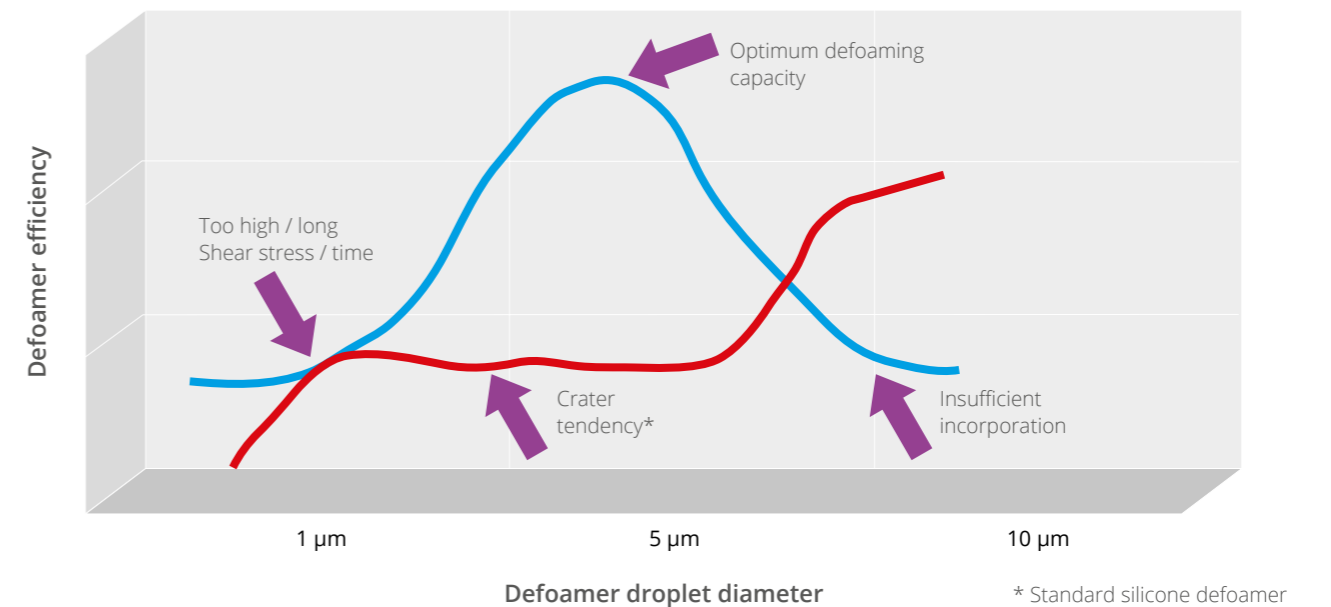
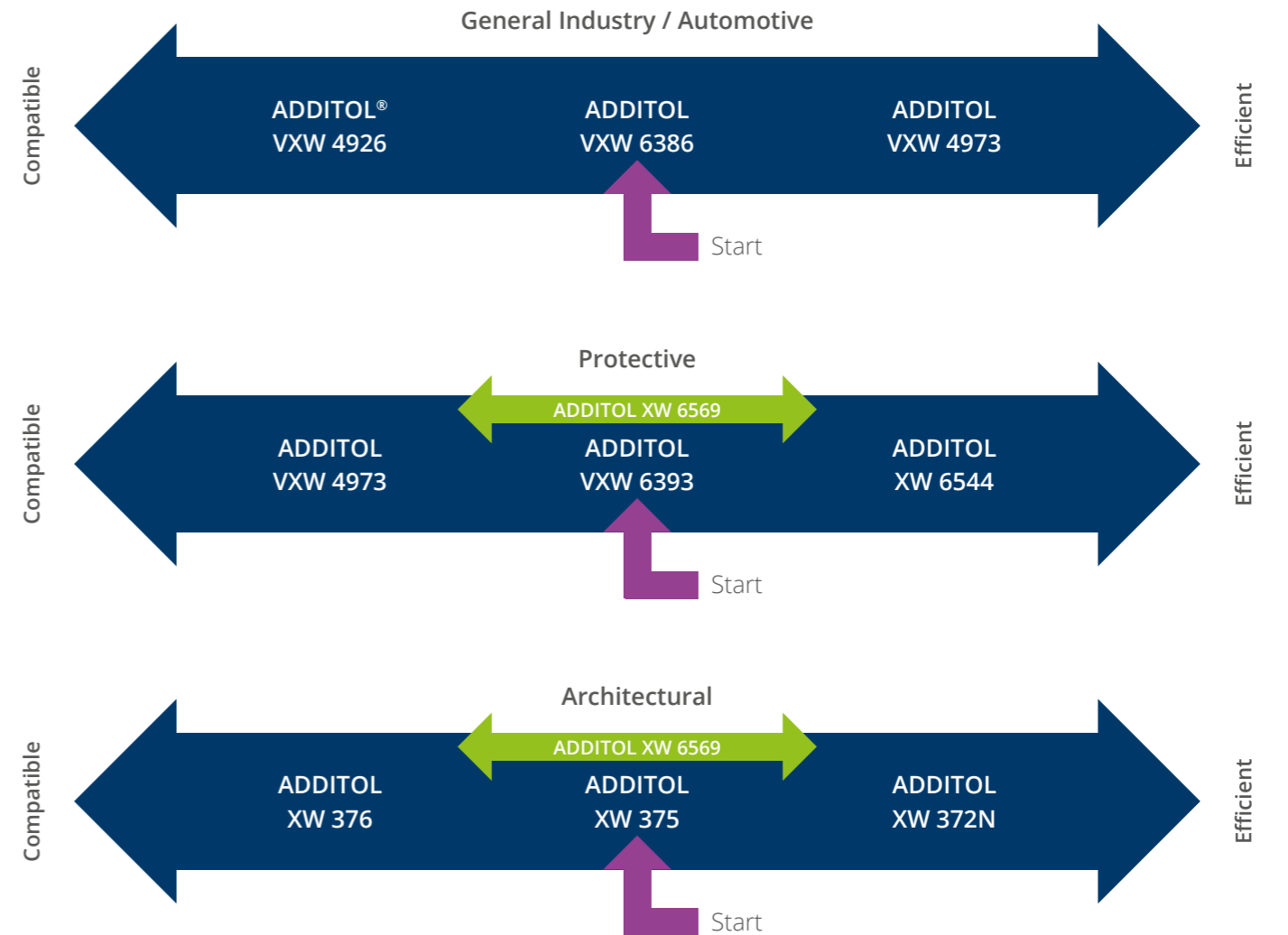
Reduction of macro and micro foam

ADDITOL VXL 4951N  
 ADDITOL XL 6507  
 ADDITOL VXW 4926  
 ADDITOL VXW 4973  
 ADDITOL VXW 6386  
 ADDITOL VXW 6393  
 ADDITOL XW 6544  
 ADDITOL XW 6569



Efficient destruction of macro foam

### How to select leveling additives



## Defoamer and Deaerater

Additive name	Dosage	SB/WB	Automotive	Industrial	Architectural	Characteristics	Description	% Active matter
<b>Defoamers (silicone free)</b>								
ADDITOL®* VXW 4973	0,1 – 0,6 % total	W	●	●	●	Mineral oil, waxes	Highly efficient defoamer with good compatibility and easy incorporation. Broad field of application.	100 %
ADDITOL VXW 6211	0,05 – 0,5 % total	W		●	●	Hydrocarbons; hydrophobic solid particles	Very strong defoamer for highly pigmented paints or pigment pastes.	100 %
ADDITOL VXW 6235	0,2 – 1,0 % powder	W		●		Defoaming compounds applied on silica; dry powder	Powder defoamer for flooring systems or epoxy cement applications.	60 %
ADDITOL VXW 6386	0,5 – 1,5 % total	W	●	●		Hydrocarbons, waxes	Defoamer for high quality lacquers with good compatibility. Homogenize prior use!	100 %
ADDITOL VXW 6393	0,1 – 0,5 % total	W		●	●	Special mineral oil, waxes; low odor	Highly efficient defoamer for architectural and decorative coatings. Low odor, especially for interior applications.	100 %
ADDITOL XW 375	0,1 – 0,6 % total	W		●	●	Mineral oil, waxes	High efficient defoamer for architectural and decorative paint mainly.	100 %
ADDITOL XW 376	0,05 – 0,5 % paint	W		●	●	Mineral oil / wax emulsion	High efficient, easy to incorporate defoamer emulsion for architectural and decorative paints mainly.	50 %
ADDITOL XW 6544	0,05 – 0,5 % total	W	●	●	●	Polymer defoamer, VOC free	Very efficient defoamer and deaerator for high viscous systems with strong gas incorporations. Excellent re-flow effect improves surface quality.	100 %
ADDITOL XW 6567	0,05 – 0,5%	W		●		Modified hydrocarbon, waxes	Food contact compliant defoamer for B&B, DWI, general line containers, caps, closures and aerosol industry.	100 %
<b>Defoamers (silicone)</b>								
ADDITOL VXL 4951 N	0,05 – 1,0 % total	S		●		Fluoro-modified silicone	Very efficient defoamer for solventborne paints and lacquers. Strong anti blistering effect during processing and application.	20 %
ADDITOL VXW 6210N	0,05 – 0,5 % total	W	●	●	●	Modified silicone; blend of hydrocarbons	Heavy duty defoamer recommended for preparation of pigment concentrates and strong foaming systems.	100 %
ADDITOL XW 372N	0,1 – 0,5 % total	W		●		Mineral oil, waxes; silicone containing	Defoamer with excellent long term stability, enhances flow and leveling.	100 %
ADDITOL XW 6569	0,05 – 0,5%	W		●	●	Emulsifier free silicone emulsion, hydrophobic solid particles	Highly efficient defoamer for transparent and high gloss systems. Suitable for high and low PVC formulations. No interference with associative thickeners – no impact on rheology profile.	20 %
<b>Air release agents (silicone free)</b>								
ADDITOL®* XW 393	0,5 – 3,0 % binder	W		●		Foam reducing compounds	Defoamer to prevent pin hole formation and improves flow.	35 %
ADDITOL VXW 4909	2,0 – 10,0 % binder	W	●	●		Special fatty acid ester	Defoamer and deaerator with broad compatibility and easy incorporation, crosslinkable.	79 %
ADDITOL VXW 4926	2,0 – 15,0 % binder	W	●	●		Special fatty acid ester	Defoamer and deaerator with rheology improvement in order to allow better film build-up. Very fast mode of action, crosslinkable.	100 %
ADDITOL VXW 5907	2,0 – 3,0 % binder	W	●	●		Degassing / defoaming polymer; surface active	Defoamer and deaerator to reduce flash-off time. Recommended for spray applications.	100 %
ADDITOL VXW 6397	0,1 – 1,0 % total	W	●	●		Solution of defoaming polymers in special hydrocarbons; silicone-free	Deaerator with strong efficiency in forced drying and stoving systems. Easy to incorporate and very good in pigmented formulations.	100 %
ADDITOL XL 6507	0,1 – 1,5 % total	S		●		Degassing / defoaming polymers; silicone-free	Defoamer and deaerator for all industrial paints and lacquers, high efficient.	10 %
ADDITOL XL 6531	0,1 - 0,5 % total	S		●		Polymer defoamer	Special polymer defoamer/deaerator, recommended for pigmented systems.	40 %

\* ADDITOL additives

## Rheology Modifier

The rheological properties of coating systems primarily are designed to improve paint handling, application and leveling properties. Rheology modifiers are compounds which interact with formulation components, building up a three dimensional network or modifying the fluid phase only. These additives optimize the viscosity profile of coating systems.

However viscosity control is also very important to shelf storage stability, to reduce the tendency of pigment and extender sedimentation in the container. During storage, pigments and extenders may show a tendency to settle into a soft or hard layer in the container. This is caused by the higher density of these components in relation to the liquid phase. Sedimentation can be overcome by using additives which form three dimensional networks. Anti-settling agents modify the viscosity at extremely low shear rates which governs sedimentation.

### 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



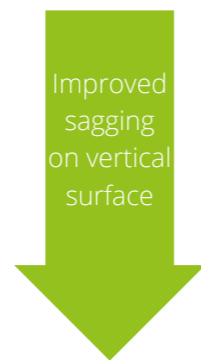
Improved sagging control

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

### Trouble shooting guide



Sagging of paint on vertical substrate



Improved sagging on vertical surface

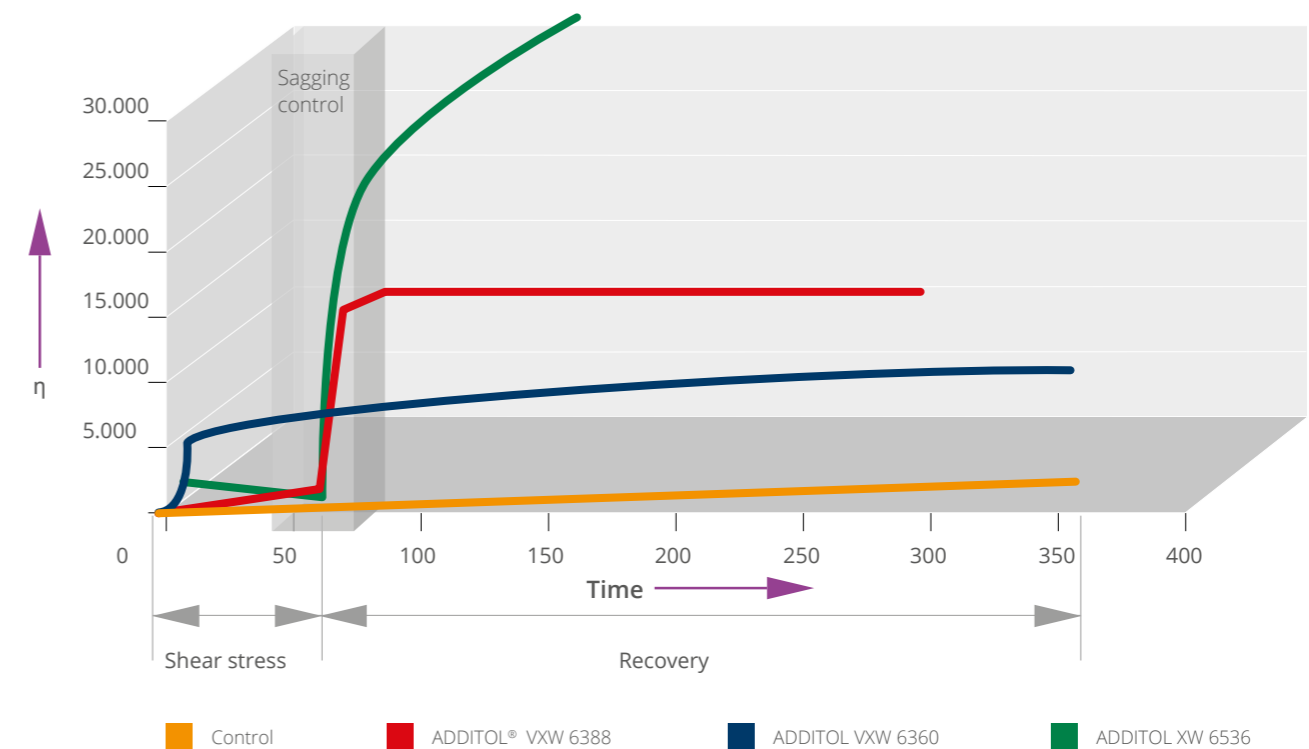
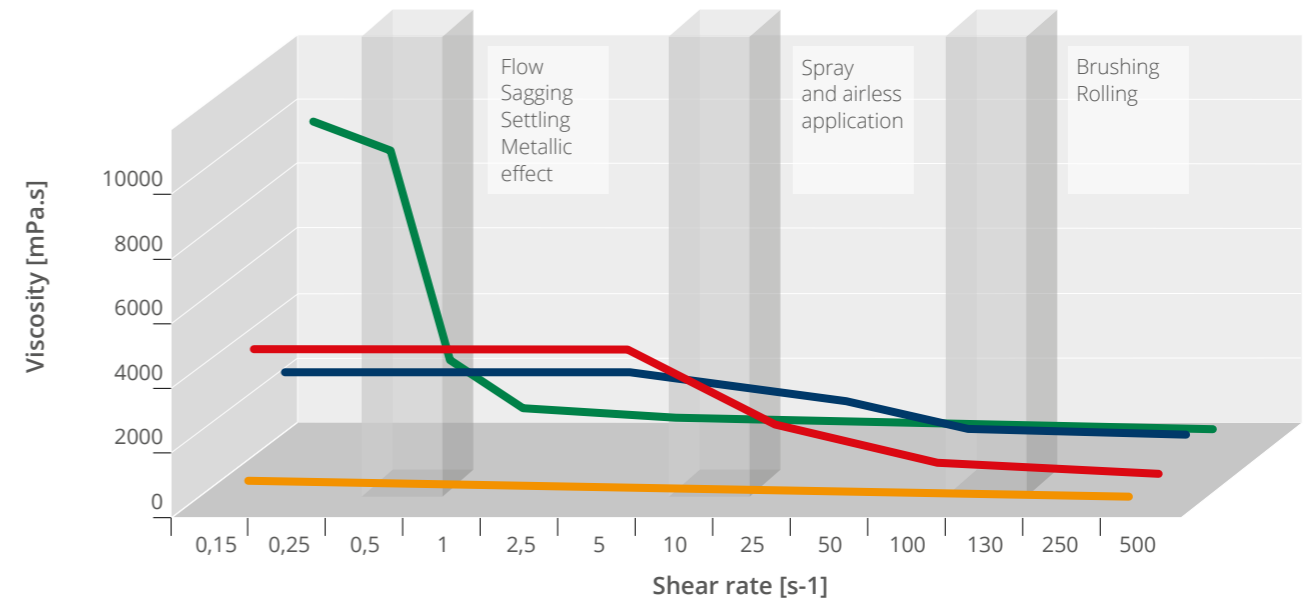
ADDITOL VXW 6360  
ADDITOL VXW 6387  
ADDITOL VXW 6388  
ADDITOL XW 6536



Paint stays on vertical substrate without sagging

### How to select rheology modifiers

#### Rheology profile of a water-based acrylic clear coat



## Rheology Modifier

Additive name	Dosage	SB/WB	Automotive	Industrial	Architectural	Characteristics	Description	% Active matter
<b>Rheology modifiers</b>								
ADDITOL®* VXW 4934	1,0 – 10,0 % binder	W	●	●	●	Modified wax emulsion	Reduces settling and sagging, enhances edge covering.	35 %
ADDITOL VXW 6360	0,1 – 3,0 % total	w	●	●	●	Polyurethane thickener	Associative thickener to control rheology and flow. It improves applicability by roller or brush. Easy to incorporate.	30 %
ADDITOL VXW 6387	0,1 – 5,0 % pigment	S W	●	●	●	Special fatty acids; amine neutralized; silicone-free	Rheology modifier to prevent pigment sedimentation, sagging and storage stability.	60 %
ADDITOL VXW 6388	0,1 – 3,0 % total	W	●	●	●	Polyurethane thickener	Associative thickener to control rheology at low shear stress. Recommended for spray application. Excellent against sedimentation and sagging.	35 %
ADDITOL XL 270	0,1 – 2,0 % pigment	S W	●	●	●	Special fatty acid modified silicone; amine neutralized	Multi purpose additive to improve rheology and prevent from settling and floating. Also recommended in high gloss systems.	55 %
ADDITOL XL 280	5,0 – 10,0 % pigment	S	●	●	●	Special modified montmorillonite clay	Rheology modifier to prevent powerful settling of pigments and extenders, reduces sagging.	36 %
ADDITOL XW 6536	0,2 -0,8 % total	W	●	●	●	Special organic activated clay	Special rheology modifier with extremely fast viscosity recovery. Recommended for all high wet film thicknesses e.g. in case of airless application. Prevents sagging and settling at zero and low shear stress sufficiently.	37 %

\* ADDITOL additives

## Driers & Catalysts

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.

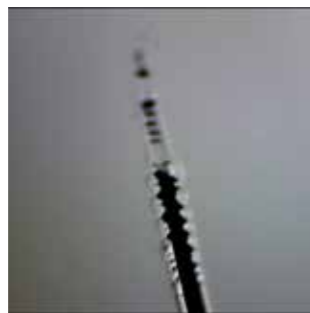
### Good to know ...

#### ... that we have fast reactivity Cobalt-free driers

- Next generation Cobalt-free driers are as efficient as Cobalt metal driers and fully in line with latest legislations. ADDITOL® dry CF series are universal driers for SB/HS/UHS and WB Architectural & Industrial formulations. Very fast set, through drying and hardness development. Supports anti corrosive performance and long lasting effect during paint storage.



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.

### Trouble shooting guide



Weak corrosion protection in 2 layer system



CYCAT® 4040  
CYCAT VVK 6395

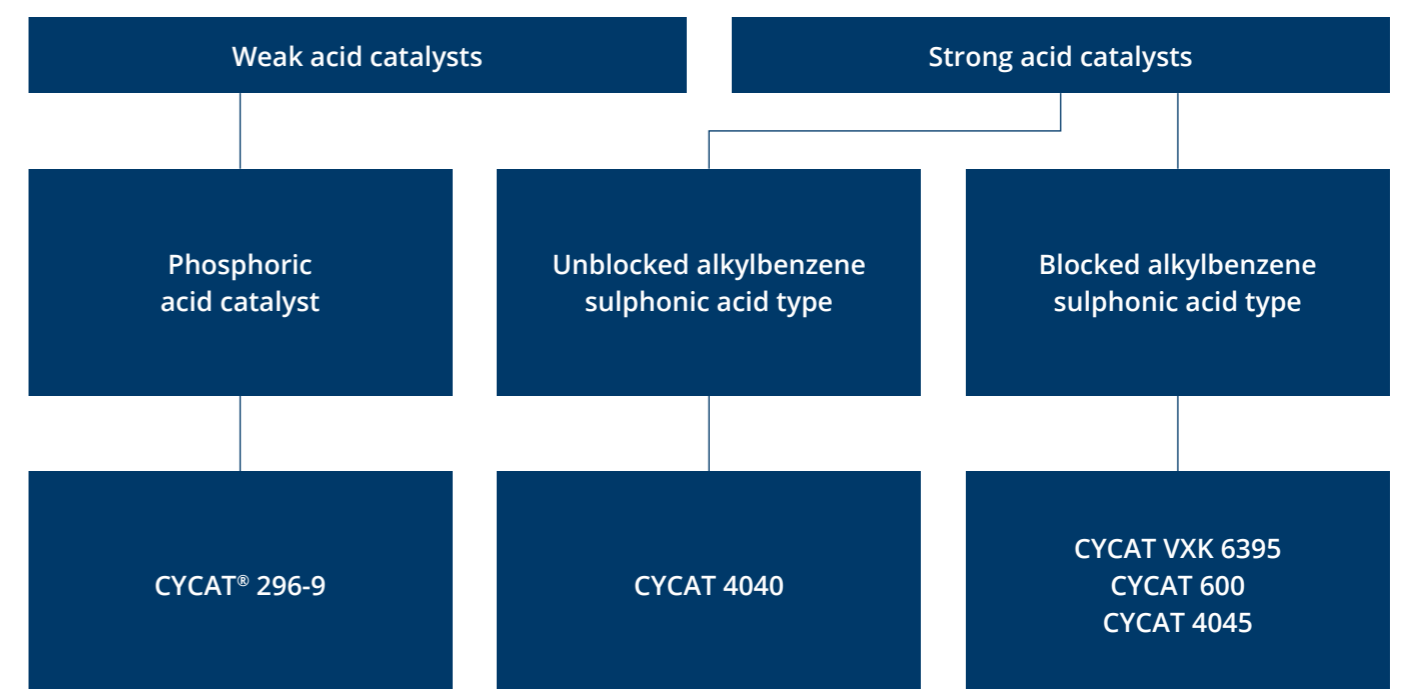
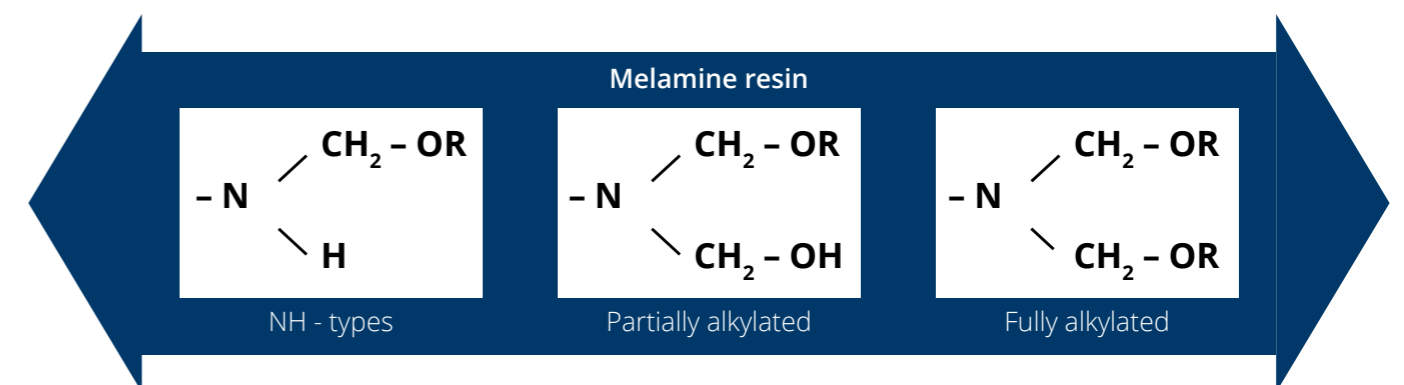


Improved corrosion protection by choosing the right catalyst

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.

### How to select catalysts



## Catalysts

Additive name	Dosage	SB/WB	Automotive	Industrial	Architectural	Characteristics	Description	% Active matter
<b>Catalysts</b>								
CYCAT** 296-9	0,5 – 5,0 % solid binder	S W		●		Weak phosphoric acid catalyst	To accelerate the cure reactions of high imino and partially alkylated resins	50 %
CYCAT 4040	0,5 – 5,0 % solid binder	S W	●	●		Strong alkyl benzene sulfonic acid	Strong acid catalyst for highly alkylated melamine, benzoguanamine, glycoluril and urea resins	40 %
CYCAT 4045	0,5 – 5,0 % solid binder	S W	●	●		Amine blocked alkyl benzene sulfonic acid catalyst	For highly alkylated melamine, benzoguanamine, glycoluril and urea resins. Provides excellent stability in wb and high solid systems	35 %
CYCAT 500	0,5 – 5,0 % solid binder	S W		●		Strong naphthalene sulfonic acid catalyst	Especially recommended for electrocoating and electrostatic spray systems with improved water resistance	40 %
CYCAT 600	0,5 – 5,0 % solid binder	S W		●		Strong dodecyl benzene sulfonic acid catalyst	Especially recommended for high solids formulations with hydrocarbon solubility	70 %
CYCAT VXK 6357	5,0 – 15 % melamine resin	S W		●		pTSA ester	Reduces stoving temperature/time	90 %
CYCAT VXK 6364	1,0 – 7,0 % melamine resin	S W		●		pTSA neutralized by amine	Reduces stoving temperature/time	50 %
CYCAT VXK 6365	5,0 – 15 % binder	W		●		Resinous, tin containing catalyst	Catalyst for waterborne PU-systems	1 %
CYCAT VXK 6395	0,4 – 8,0 % total	S W	●	●		Amine blocked sulfonic acid	Especially for low temperature stoving applications in general industry and OEM	25 %
CYCAT XK 406N	2,0 – 5,0 % binder	S		●		Phosphoric acid based catalyst	Accelerates curing of phenolic and phenolic / epoxy systems	9 %

\* CYCAT additive

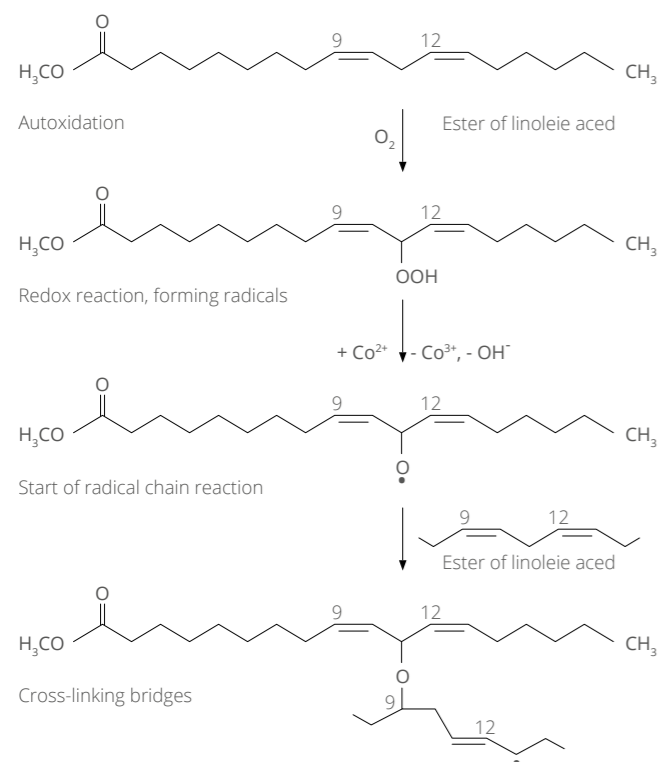


## Driers

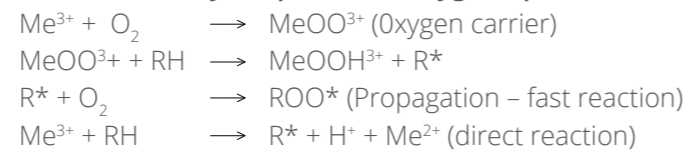
Additive name	Dosage	SB/WB	Automotive	Industrial	Architectural	Characteristics	Description	% Active matter
<b>Driers</b>								
ADDITOL®* VXW 4940N	2,0 – 3,0 % binder	W		•	•	Combination drier; 3 % Co / 3 %Ba / 5 %Zr in form of emulsion; NPE-free	Easy to incorporate; enhances surface and through drying	–
ADDITOL VXW 4952	2,0 – 3,0 % binder	W		•	•	Combination drier; 3 % Co / 2 % Mn / 4 % Zr in form of emulsion	Easy to incorporate; enhances surface and through drying	–
ADDITOL VXW 6206	1,0 – 3,0 % solid binder	S W		•	•	Combination drier; 5 % Co / 0,22 %Li / 7,5 %Zr; NPE-free	Enhances surface and through drying	–
ADDITOL VXW 6240	0,5 – 2,5 % solid binder	S W		•	•	Combination drier; 4 % Co / 3,7 % Ba / 6,5 % Zr; water-free form of delivery	Enhances surface and through drying	–
ADDITOL XW 6533	4,0 – 6,0 % binder	S W		•	•	Special accelerated cobalt free combination drier; contains Mn and Zr	Allows fast set and through drying and excellent hardness development. Recommended for primers and top coats.	–
ADDITOL XW 6555	3,0 – 6,0% solid binder	S W		•	•	Nontoxic polymeric cobalt containing combination drier; 1,5% Co-polymer / 2,5% Zr / 1,3% Ba / VOC <25g/l	Easy incorporation in WB & SB alkyd paints. Very good through drying. This drier requires app 48 hours activation time after completing the formulation.	–
ADDITOL XW 6560	1,4 - 4,3 % binder	W		•	•	Ultra low VOC combination drier; 3,5 % Co / 0,16 % Li / 5,50 % Zr; NPE-free	Enhances surface and through drying; VOC < 50g/l	–
ADDITOL XW 6566	2,5 – 7,5% solid binder	S W		•	•	Nontoxic polymeric cobalt containing combination drier; 2% Co-polymer / 3% Zr / 0,1% Li / VOC < 25g/l	Easy incorporation in WB & SB alkyd paints. Very fast set drying. This drier requires app 48 hours activation time after completing the formulation.	–
ADDITOL dry CF100	0,3 – 1,3% solid binder	S W		•	•	Cobalt free drier; twin accelerated Manganese; ligand protection	Universal high performance drier for SB and WB alkyd paints. Designed for Architectural and Industrial formulations. Fast set & through drying with excellent hardness development. Can replace all Cobalt containing driers (!) Synergy drier recommendation SB: Ca / Zr or Li / Zr. Auxiliary drier for WB systems - ADDITOL dry CF200.	–
ADDITOL dry CF101	0,3 - 1,3% solid binder	S W		•	•	Cobalt free drier; single accelerated Manganese; ligand protection	Universal high performance drier for SB and WB alkyd paints. Single accelerated Manganese type ligand. Same auxiliary drier recommendation as for ADDITOL dry CF100.	–
ADDITOL dry CF200	0,75 - 1,35% solid binder	W		•	•	Auxiliary drier combination for ADDITOL dry CF series (WB systems) 10% Zr 0,3% Li	Balanced auxiliary drier metal combination to be used together with ADDITOL dry CF series in WB alkyd paint formulations. Ready to use, easy incorporation in all WB alkyd formulations.	–
BESCHLEUNIGER Co 1		S		•		Dissolved Cobalt octoate (contains xylene)	Cobalt accelerator for radical polymerisation of unsaturated polyester products.	–

\* ADDITOL additives

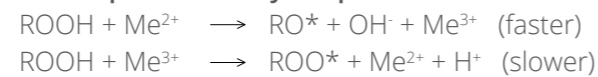
### Possible drying reactions



### Formation of hydro-peroxide (oxygen uptake)



### Decomposition of hydro-peroxide



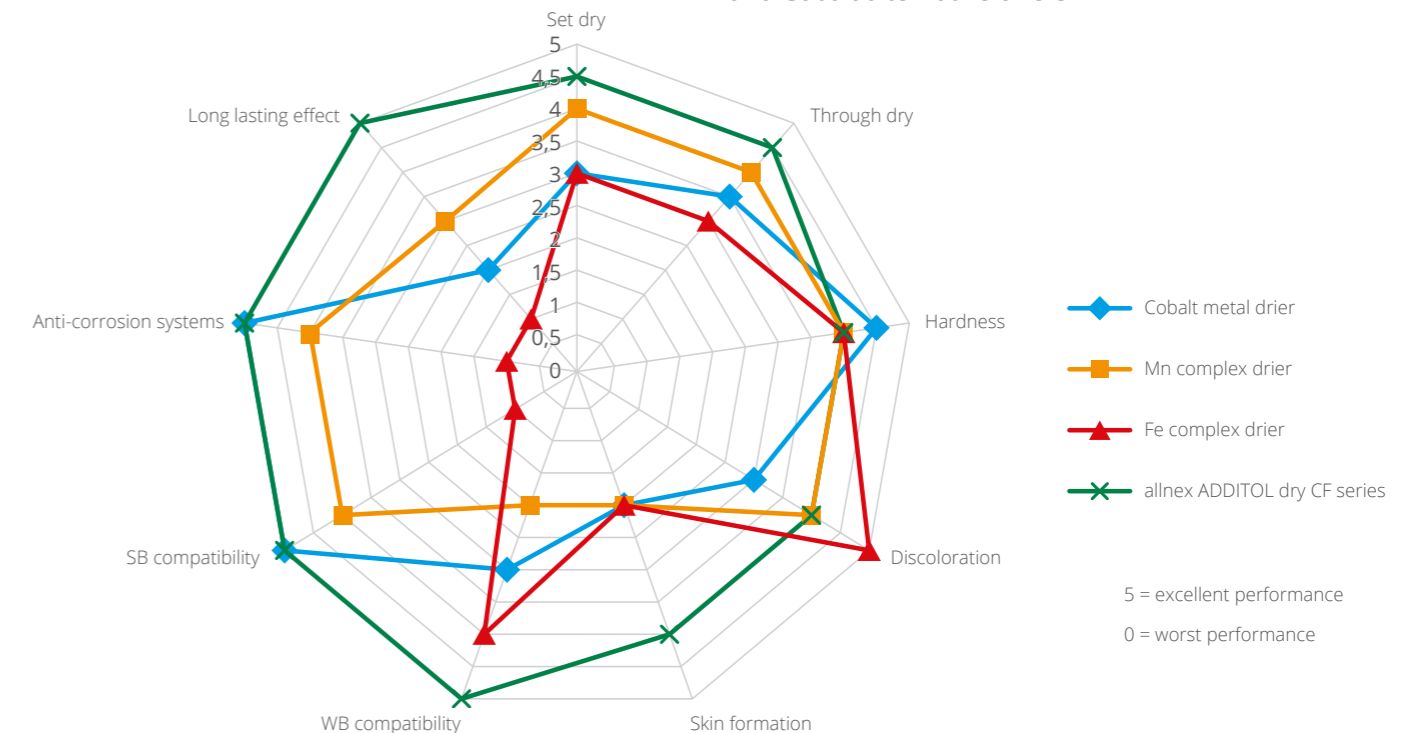
### Combination with another unsaturated side chain (start of auto polymerization)

### Generation of a carbon-based radical > Further polymerization

### ADDITOL dry CF Series cobalt-free driers

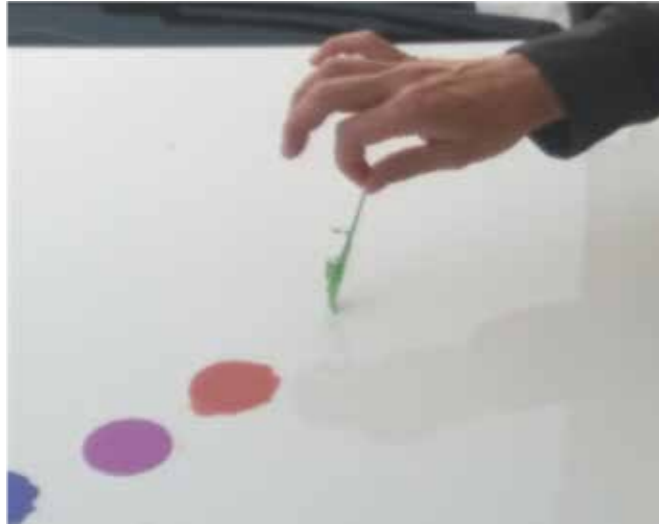
### Overall performance diagram

allnex's next generation drier vs competitive Cobalt and Cobalt alternative driers

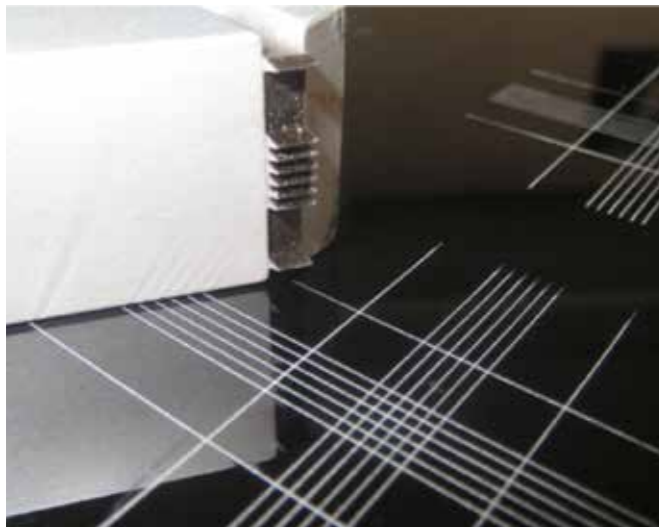


## Specialty Additives

allnex offers a selection of specialty additives which can be used for special effects in paint and coating applications as well as for other non related businesses.



- Highly efficient ANTI-ADHESION promoter technology enables most of WB & SB paints to be removed from nearly any substrate after drying/ curing. Formulations available for temporary protection coating systems. Be creative for new innovative peelable coating systems and order a sample of ADDITOL® XL 6568.



- Adhesion is often a challenge as soon as required on critical substrates such as plastics, special metals and alloys, porous substrates or wood. Also interlayer adhesion in multilayer systems requires special attention and sometimes the addition of certain additives. ADDITOL® XL 180 and ADDITOL® XL 186 are designed to deal with a variety of adhesion problems.



### Good to know ...

#### ... that we have the most effective surface energy control additives available

- Improving adhesion of WB and SB paints on porous substrates such as concrete or wood, keep dynamic surface tension low as long as drying/curing effectively takes place. ADDITOL® XW 6580 is a zero VOC surface energy control additive that helps you with substrate wetting and adhesion.



## Specialty Additives

Additive name	Dosage	SB/WB	Automotive	Industrial	Architectural	Characteristics	Description	% Active matter
<b>Adhesion promoters</b>								
ADDITOL®* VXL 4950	Flash primer	S	●	●		Halogenated polyolefin	Flash primer for plastic substrates; recommended dilution 1:8 in aromatic solvents	43 %
ADDITOL XL 180	0,1 – 1 ,0 % total	S W	●	●	●	Phosphoric acid compound	Adhesion promoter for ferrous & non ferrous metals. Interlayer adhesion improvement in multilayer systems	98 %
ADDITOL XL 186	0,3– 1,0 % total	S W	●	●	●	Phosphoric acid compound	Adhesion promoter for ferrous & non ferrous metals. Very good interlayer adhesion improvement in multilayer systems.	90 %
<b>Anti - adhesion promotor</b>								
ADDITOL XL 6568	2 - 5% total	S W	●	●	●	Amino modified fatty acid polymer	Special anti adhesion additive for the production of peelable coatings (temporary protection and moulding). Recommended for various substrates	96 %
<b>Anti -skinning additives</b>								
ADDITOL XL 109/50LG	2 - 5% total	S W		●	●	Phenol resin type	Anti skinning additive that prevent in can skin formation and control through drying by scavanging oxygen radicals	50 %
ADDITOL XL 197	2 - 5% total	S W		●	●	Oxime modified phenol resin	Anti skinning additive that prevent in can skin formation and control through drying by scavanging oxygen radicals	45 %
ADDITOL XL 297	2 - 5% total	S W		●	●	Oxime type	Anti skinning additive that prevent in can skin formation. No impact on set drying in applied film.	100 %
<b>Conductive additive</b>								
ADDITOL VXL 4920	0,1 - 0,8% total	S W	●	●	●	Quarternary ammonium compound	Conductive additive that increases conductivity in electrostatic applied coating systems.	50 %
<b>Paint remover</b>								
ADDITOL XL 102	2 - 3% total	S		●	●	Blend of anionic surfactants	Strongly improves effectiveness of paint removers based on waxes / paraffines.	27 %
<b>Flexibility / durability improver</b>								
RESAMIN® HF 480	0,5 - 5% total	S	●	●	●	Carbamic resin type compound	Special plasitcizing and compatibilizing additive for physical, forced drying, 2K and stoving paints. Heat and hydrolisis stable polymer that improves flexibility, adhesion, gloss and outdoor durability. Also recommended for metallic effect paints to improve flip/flop effect.	100%
<b>Special alkyd additive</b>								
TUNGOPHEN® B NV	1 - 3% solid binder	S W		●	●	Modified phenol/formaldehyde polymer	Special (oxidative) drying control additive to accellerate through drying, improve gloss and flow of SB alkyd systems. Especially recommended for pigmented (non white) mono/topcoats based on medium oil alkyd resins.	





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The operating allnex group is legally owned by Allnex Holdings S.à r.l., a company based in Luxembourg, which also provides long term strategic decisions relating to its investment in allnex.

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