

# AEROSOL COATINGS

A selection of binders & additives for Solvent borne and Waterborne coatings

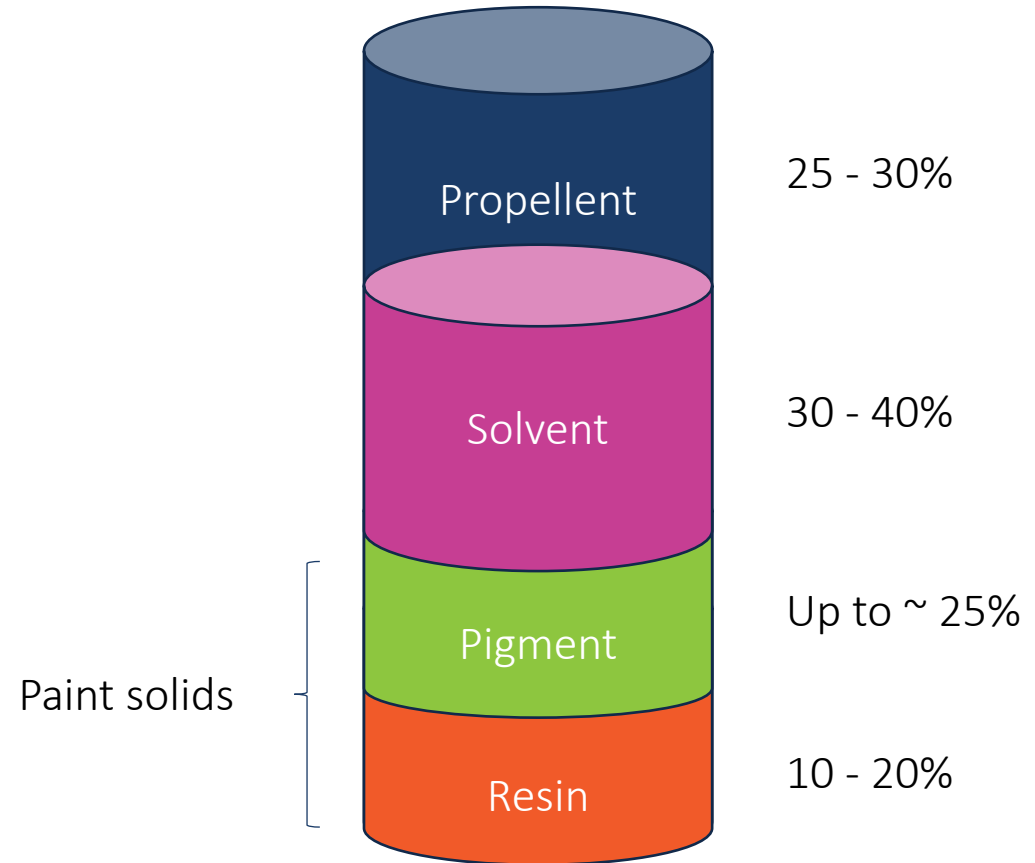


# Composition of aerosol coatings

Key Components of Aerosol Coatings are:

1. Resin
2. Pigment
3. Solvent
4. Propellant

- **Compatibility** of these elements is critical for package stability and proper application properties.

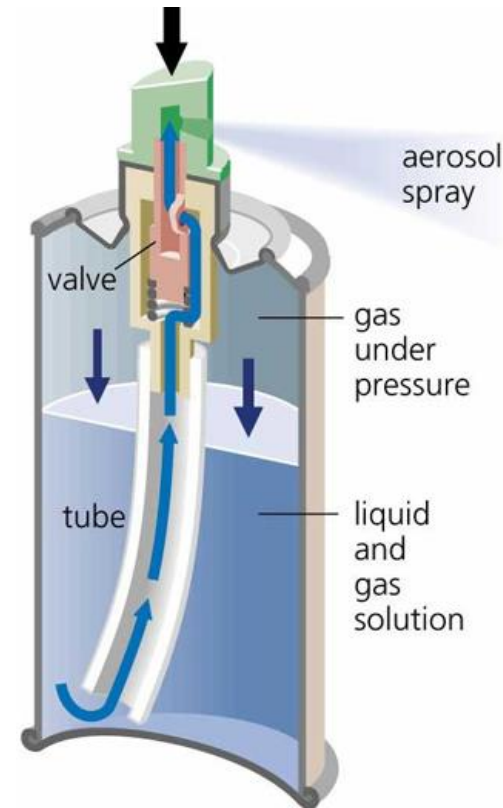


# How does it work?

Data source : Wikipedia



- Aerosol paint (commonly spray paint) is paint that comes in a sealed, pressurized container and is released in an aerosol spray when a valve button is depressed.
- The advantages of an aerosol over typical liquid coatings include the ease and speed of application, a smoother finish with no brush streaks and no post-application brush cleanup.
- The aerosol does not require the mixing and measuring of a second component. After shaking the can, the aerosol is ready to use.



- Propellant at the top of the can presses down on the mixture of paint and propellant in the bottom, forcing the mixture up through the dip tube when the valve is opened.
- A typical paint valve system has a "female" valve; the stem is part of the top actuator. The valve can be preassembled with the valve cup and installed on the can as one piece, before pressure-filling. The actuator is added afterward.

Video: <https://www.youtube.com/watch?v=1jbiPfR6fII>

# Solvent based & Waterbased Aerosol paints

## Solvent based Aerosol paints

- A solvent-based spray paint contains both a propellant and a film-forming paint resin formulation. Most commercial solvent-based aerosol paints contain mixtures of low molecular weight hydrocarbons as a propellant. Most often a mixture of propane and isobutane is used.
- To form a uniform and smooth coating when the paint is applied, the resins in the formulation should be in one phase with the solvents and the propellant during application. The propellant can also act as a solvent in the paint. It is important to have resins in solution for satisfactory application of paints to substrates. Compatibility resin with propellant always recommend to check first
- The introduction of dimethyl ether (DME) as an aerosol propellant has provided the opportunity to remove toxic aromatic solvents or methylene chloride and formulate attractive, low-toxicity, solvent-based aerosol paints.
- To check whether the resin is compatible with LPG (propellant), mixed the resin/binder with solvent like N-Hexane. If compatible with N-Hexane it means resin/binder compatible with LPG (propellant). Normally ratio paint : LPG is 100:33 by weight.
- 2 grade aerosol paint very popular in SEA is NC base or Acrylic base (1/2K)
- To know their aerosol base is acrylic base or NC paint base, we can mix with benchmark resin with xylene, ratio 1:1 or 1:2. If the paint is gel does mean it's a NC paint. If there is homogenous so it's a acrylic base.

## Water based Aerosol paints

- Very few VOC free aerosol paints are available at present. This is due to the necessity of having a volatile propellant in the can which will add a significant amounts of volatile organic compounds into the aerosol paint.
- Without propellants paint cannot be sprayed from an aerosol can.
- In the case of water based aerosol paints, the resins are usually incompatible with most of the common propellants used, including DME. DME is a polar, water compatible solvent, but also a very strong diluent. It will attack many common binders in a water-based solvent system.
- In order to prevent shelf life issues, the concentration of binders has to be kept low. The low concentration of binder restricts the amount of paint components (pigments, additives etc.) that can be added, and the resulting film formed may be of poor quality and low gloss.
- Components (dispersion agents, binders, etc.) should be carefully chosen to have a good affinity with DME & improve the quality of the final formulated paint system.

# Solvent borne Binders for aerosols

Product	Type	Special properties and use	Tg/ °C	Compatibility with Di-Methyl Ether
SETAL 84 XX-70	SOA	NC based aerosol, Clear and pigmented nitrocellulose lacquers.	N/A	Yes
VIACRYL SC 121/60X	TPA	Acrylic based aerosol. Good adhesion on metal & non ferrous metals. Good flexible	35	Yes
SETALUX 1261 VX-51	TPA	Acrylic based aerosol. Fast dry and good weather resistance. General purpose	50	Yes
TIRES EXP 4245	TPA	Acrylic based aerosol. Economy grade TPA, fast dry and good adhesion on plastics, woods & concrete	57	Yes
SETALUX 2127 XX-60	TPA	Acrylic based aerosol. Very good adhesion on various metals especially galvanized surface, high hardness & DPU resistance	60	Yes
VIACRYL SC 200/40X	Epoxy modified TPA	Epoxy modified with good adhesion on precious metal/glass.	66	Yes
VIACRYL VSC 6324/46BAC	TPA	Very fast dry, good gasoline resistance & durability. Can be for 2K	73	Yes
SETALUX XCS 1516 TS-45	CPO modified acrylic	Excellent adhesion to many metals and plastics and even to untreated PP.	80	Yes

# SB solutions for aerosol paint (NC system)





# SB solutions – TPA as 1K air dry application



# Compatibility with Aerosol Propellant

Setalux 2127 XX-60		30.0
Additol XL 123N (levelling)		0.10
BYK 052N (defoamer)		0.20
Butyl acetate		17.40
IBA		7.00
Toluene		24.30
Xylene		10.50
MIBK		10.50
Total		100.00
<b><u>Compatibility</u></b>		
N- Hexane	Clear, no turbid or hazy appearance observed	
LPG Gas ( test at customer site)	Clear, no turbid or hazy appearance observed	
Spray out film	Smooth/ glossy	



# Solvent based System – based on SETAL 84 XX-70



## STARTING POINT FORMULATION

### SETAL 84 XX-70

Description : nitro-cellulose based white topcoat for vehicle refinishing  
 Reference : VR; REC 00066

	Weight	Function	Supplier
Setal 84 XX-70	42.0		
Kronos 2310	95.0	pigment	Kronos International Inc.
Nuosperse FA 601	2.0	wetting agent	Condea Servo
Xylene	25.0		
<i>Grind in a pearl-mill till &lt; 5 µm and add:</i>			
Setal 84 XX-70	124.0		
Nitro-cellulose solution, 25% non-volatiles	380.0		
385 parts H 24, 35%		nitro-cellulose ½ sec	Hagedorn AG
240 parts toluene			
120 parts xylene			
140 parts ethyl acetate			
90 parts butyl acetate			
25 parts ethanol			
Laropal K 80 (50% in butyl acetate)	13.0	ketone resin	BASF AG
Resamin HF 480	25.5	plasticizer	
Addbond LTW	8.5	adhesive resin	Tego
Baysilon PL (2% in toluene)	4.0	levelling agent	Borchers GmbH
BYK 306	1.0	substrate wetting	BYK Chemie GmbH
Butanol	15.0		
Toluene	85.0		
Butyl acetate	63.0		
Xylene	85.0		
Solvesso 100	32.0		
Thinner till application viscosity	1 000.0 .....		

#### Thinner

Toluene	: 400
Xylene	: 200
Butyl acetate	: 200
Methyl isobutyl ketone	: 100
Ethyl acetate	: 50
Butanol	: 50
	1000

#### Ratio solid binders

Setal 84	: 50
NC	: 45
Addbond LTW	: 2
Laropal K 80	: 3

#### Application

Spray viscosity	: 14 - 16 seconds DIN 4, 23°C
Spray pressure	: 300 - 400 kPa
Drying schedule	: at ambient temperature

#### Parameters

Non volatiles (without thinner)	: 35%
Pigment : Binder ratio	: 45 : 100

## Solvent based System – based on SETALUX 2127 XX-60

Setalux 2127 XX-60	20.60
Additol XL 6577	0.50
Pegasol 100	3.00
Sylsia 350	0.60
Tiona 595	8.00
<i>HSD until fineness &lt; 20 microns</i>	
Black pigment paste (FW-2V)	0.40
BYK 306	0.20
BYK 052	0.05
BAC:Xyl:PMA(30:40:30)	66.65
<b>Total</b>	<b>100.00</b>
Adhesion on tin plate	Gt 0*
Recoat with 2K PU Clear	Gt 0*



# Water borne binders for aerosols

Product	Type	Special properties and use	Compatibility with Propane/Butane	Compatibility with Di-Methyl Ether
VIACRYL® VSC 6279w/45WA	Copolymer emulsion based on styrene and acrylic acid esters. Free of organic cosolvents	Excellent compatibility with alkyd resin emulsions. High shear stability. Very quick set- and through drying. Excellent non yellowing properties and outdoor durability.	No	Yes
RESYDROL® AY 466w/45WA	Oxidatively drying acrylic modified alkyd resin as aqueous emulsion	Rapid initial and through-drying. High gloss. Excellent water and weather resistance. Good storage and drying stability. Free from organic amines. Sole binder for waterborne industrial topcoats	No	Yes
RESYDROL AY 6150w/45WA	Air-drying, acrylic modified alkyd resin emulsion	quick drying, high gloss and corrosion protection, good adhesion on various substrates and very good re-coatability at any time. Can also be used as sole binder or in combination with dispersions for the formulation of wood stains, primers and paints.	No	Yes
RESYDROL VAY 6096w/39WA	Short-oil, oxidatively drying, acrylic modified alkyd resin as aqueous emulsion	very quick drying, high film hardness, good gloss in decorative top coats , high water resistance and outdoor durability	No	Yes
RESYDROL AX 6267w/43WA	Epoxy-acrylic-hybrid system as aqueous emulsion	Extremely fast physical initial and good oxidative through drying, excellent adhesion to various substrates, high water and corrosion resistance	No	Yes
DAOTAN® TW 6442/42WA	Polyurethane dispersion modified with drying fatty acids	Very fast set and through drying. Very high gloss in decorative top coats together with high film hardness and good water and weather resistance. Free of organic amines.	No	Yes
DAOTAN TW 6439/30WA	Aqueous aliphatic polyurethane dispersion, polyester based	Extremely fast physical drying, clear and crack free films at ambient temperature without co-solvents. Very good mechanical properties (elasticity) and adhesion an various plastic substrates.	No	Yes

\*This list of materials is not exhaustive

# Orientating formulation – Water based System - – based on RESYDROL® AY 6150w/45WA



## STARTING POINT FORMULATION

### RESYDROL® AY 6150w/45WA

#### Thinner

Deionized water : 80  
Isopropanol : 20  
100

**REC20058:** water borne industrial aerosol topcoat, RAL 3000

	Weight	Function	Supplier
<b>Topcoat</b>			
RESYDROL AY 6150w/45WA	67.80	alkyd emulsion	<i>allnex</i>
Ammonia 25 % in water	0.70		
ADDITOL VXW 4940 N (1:1 in demin. water)	1.70	combination drier	<i>allnex</i>
Solvent Naphtha 80-120	2.50		
Shellsol T	1.70		
<i>Mix and then add:</i>			
Paliogen Red L 3880 HD	4.20	pigment	BASF
Sicotrans Red L 2915 D	0.70	pigment	BASF
Kronos 2059	0.30	pigment	Kronos
Nuodex Web Cobalt 8	0.25	drier	Huntsman
ADDITOL XL 270	0.40	wetting & anti-settling	<i>allnex</i>
ADDITOL XL 297	0.40	anti-skin additive	<i>allnex</i>
ADDITOL VXL 4930 N	0.50	leveling additive	<i>allnex</i>
BYK-023	0.50	defoamer	BYK
Deionized water	10.20		
<i>Disperse 60 min on a pearl mill, then add while mixing:</i>			
Deionized water	7.85		
BYK-023	0.30	defoamer	BYK
<b>Total</b>	<b>100.00</b>		

#### Application

Paint dilution : 100 g paint + 20 g thinner  
Paint viscosity : 14 – 16 seconds (DIN EN ISO 2431 - 4mm, 23°C)  
Propellant : Dimethyl ether (ratio to determine)

#### Parameters calculated

Solids content by weight : approx. 37 %  
Solids content by volume : approx. 33 %  
Pigment / binder ratio : approx. 0.2 / 1  
Pigment Volume Concentration : approx. 10 %  
VOC content : approx. 165 g/l (excluding water)  
: approx. 70 g/l (including water)

#### Parameters measured

Viscosity : 30 – 80 seconds (DIN EN ISO 2431 - 4mm, 23°C)  
pH : 8.8 – 9.2 (correct with ammonia, 25 % in water)  
Flash point : not flammable (DIN 51758)  
Tack free time : approx. 60 minutes (approx. 152 µm wet film thickness, room temperature)

# Additives for Aerosol applications

Product	Technology	Special properties and use
ADDITOL® XL 122	For SB systems	Silicone based slip & Leveling Additive.
ADDITOL XL 123 N	For SB systems	Silicone based slip, leveling & foam control Additive..
MODAFLOW® EPSILON	For SB systems	Air release Additive & flow. For SB
ADDITOL VXL 4930 N	For SB & WB systems	Silicone based slip & substrate wetting Additive.
ADDITOL XW 6580	For SB & WB systems	Special silicone modified surface energy control Additive.
ADDITOL XL 270	For SB & WB systems	Wetting, dispersing & anti settling / sagging.
ADDITOL XL 255 N	For SB & WB systems	Highly effective wetting & dispersing Additive for all pigments & fillers. Strong viscosity reduction
ADDITOL XL 204	For SB & WB systems	Anti floating Additive, Silicone based
ADDITOL dry CF 100	For SB & WB systems	Cobalt free primary drier.
ADDITOL VXW 6208	For WB systems	Dispersing Additive for all pigments – non ionic
ADDITOL VXW 4973	For WB systems	Foam control Additive, mineral oil based.
ADDITOL XW 6584	For WB systems	Foam control Additive, silicone based.



# *allnex*

*The Coating Resins Company*

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