

# WorléeAdd VP-W 3235/01

**Co-binder to improve adhesion and corrosion protection:**

WorléeAdd VP-W 3235/01 is an acrylated, fatty acid modified epoxy resin ester for improving the adhesion of waterborne paint formulations to various metals.

## Application and properties

WorléeAdd VP-W 3235/01 was mainly developed as an adhesion promoter for use in waterborne 1K paint systems. Besides an improvement of the adhesion on various metals, the corrosion protection can also be significantly improved.

WorléeAdd VP-W 3235/01 is used as a co-binder. The amount added depends on the binders and formulation details used and should be optimized in series tests. It can be up to 20% based on the solids content of the binder. In individual cases, a higher amount can also be added.

## Technical Data

Appearance	Clear, slightly yellowish liquid
Chemical characterization	Acrylic modified epoxy resin ester
Delivery form	Approx. 70% in butyl glycol
Bio-based content	Approx. 25% (on solid resin)

## Areas of application



Industrial coatings



Architectural coatings

## Evaluation in an acrylic varnish

1K one-coat paint based on an acrylate copolymer

Salt spray tests show that an addition of WorléeAdd VP-W 3235/01 as co-binder in a one-coat paint based on an acrylate copolymer leads to a significantly improved corrosion resistance. Without the addition of the epoxy resin ester, rust was already visible on the entire surface after 72 hours, while an addition of 20% WorléeAdd VP-W 3235/01 showed significantly less rust. In correlation to the improved corrosion protection results mentioned above, a significantly improved adhesion to steel could also be demonstrated.

### Formulation

Pos.	Product	Delivery form	%	Function
1	Water		9.4	Solvent
2	WorléeDisperse 8400 W	50% in water	0.9	Dispersing agent
3	WorléeAdd 6223	100%	0.1	Defoamer
4	Kronos 2310		9.4	Pigment
5	Talc-HB-M 15 B		5.2	Filler
6	Plastorit Micro		4.2	Filler
7	Heucophos ZP 10		4.7	Anti-corrosion pigment
8	Heucorin RZ		0.5	Anti-corrosion pigment
9	WorléeAdd 458	38% in water	0.9	Corrosion inhibitor
10	WorléeAdd 3410	50% in water	0.5	Substrate wetting additive
20 minutes Dissolver Level 3-5				
11	Butyl glycol		4.7	Solvent
12	WorléeCryl 7137	42% in water	46.1	Binder
13	WorléeAdd VP-W 3235/01* neutralized		11.5	Bonding agent
14	Tafigel PUR 40	1:1 in water	1.9	Thickener
<b>Total</b>			<b>100.0</b>	

\*See table "Neutralization of the adhesion promoter"

### Test result

Adhesion (cross-cut on aluminum)

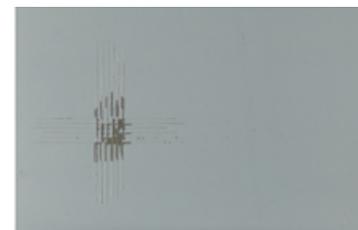


Figure 1: formulation without adhesion promoter



Figure 2: formulation with adhesion promoter

Salt spray test (after 120 h)



Figure 3: formulation without adhesion promoter



Figure 4: formulation with adhesion promoter

## Evaluation in an aqueous alkyd varnish

1K one-coat-paint-based on an alkyd emulsion

Salt spray tests of a 1K one-coat paint based on an alkyd resin emulsion also showed a significant improvement in corrosion resistance after the addition of the neutralized adhesion promoter. The hybrid system also shows a positive influence on the corrosive immigration on the cut and a lower number of rust spots on the surface. In the picture, the differences are clearly visible after 240 hours in the salt spray test.

### Formulation

Pos.	Product	Delivery form	%	Function
1	Water		10.0	Solvent
2	WorléeDisperse 8400 W	50% in water	1.0	Dispersing agent
3	WorléeAdd 6223	100%	0.1	Defoamer
4	Kronos 2310		10.0	Pigment
5	Talc-HB-M 15 B		5.5	Filler
6	Plastorit Micro		4.5	Filler
7	Heucophos ZP 10		5.0	Anti-corrosion pigment
8	Heucorin RZ		0.5	Anti-corrosion pigment
9	WorléeAdd 458		1.0	Corrosion inhibitor
10	WorléeAdd 3410		0.5	Substrate wetting additive
20 minutes Dissolver Level 3-5				
11	WorléeSol E 330 W	42% in water	49.1	Binder
12	WorléeAdd VP-W 3235/01* neutralized		12.3	Bonding agent
13	Tafigel PUR 40	1:1 in water	0.5	Thickener
Total			100.0	

\*See table "Neutralization of the adhesion promoter"

### Test result

Salt spray test (after 240 h)



Figure 5: formulation without adhesion promoter



Figure 6: formulation with adhesion promoter

## Neutralization of the epoxy resin ester

WorléeAdd VP-W 3235/01 is dissolved in butyl glycol and should be neutralized before use to achieve good water miscibility. Amine compounds such as triethylamine, AMP-90™, DMAMP-80™, or Advantex™ are suitable neutralizing agents.

Pos.					
1	WorléeAdd VP-W 3235/01	60.0	60.0	60.0	60.0
2	Butyl glycol	15.0	15.0	15.0	15.0
3	Triethylamine	2.8			
3	AMP-90™		2.7		
3	DMAMP-80™			4.0	
3	Advantex™				3.2
4	Water	22.2	22.3	21.0	21.8
Total		100.0	100.0	100.0	100.0

\*Neutralization of the adhesion promoter (Level of neutralization 70%)

Corrosion protection results with the Advantex™ neutralized adhesion promoter tended to be slightly better compared to the other neutralized samples.





## Sustainability of WorléeAdd VP-W 3235/01

As a co-binder for improving the adhesion and corrosion resistance of paints and coatings, WorléeAdd VP-W 3235/01 also impresses when it comes to sustainability. Due to the extended durability and protection of substrates, renovation and maintenance intervals can be extended and resources as well as raw materials can be saved. In addition, WorléeAdd VP-W 3235/01 offers a renewable raw material content of approx. 25%.

## Sustainable product development

The development of sustainable products has accompanied us for a very long time. Even without legal or societal pressure, it has always been our ambition to offer better and more durable products and solutions for a wide range of applications. Developing high quality products in collaboration with our customers remains our primary focus.

Over the decades, we have gained a lot of experience in developing various resin technologies based on different raw materials to make products more sustainable from different perspectives. Sustainable product development must ultimately benefit the environment and society, but also take into account economic aspects.

The entire supply chain must benefit. Already in our proven developments, we can take many of these different aspects into account and make resins and additives ever more sustainable. For example, we can determine factors such as the proportion of renewable and renewable raw materials, the proportion of secondary raw materials, regionality and longevity, the hazard potential of our products, and the competition of our raw materials with the food industry.

Technologically, we are well positioned with our creative departments in research, development and application technology to continue to move toward sustainable products in collaboration with our customers and partners. Every new development is related to sustainability factors such as climate change and resource conservation.



**Bio-based content**  
**approx. 25%\***

*\*The proportion can be increased as desired by varying the raw materials.*

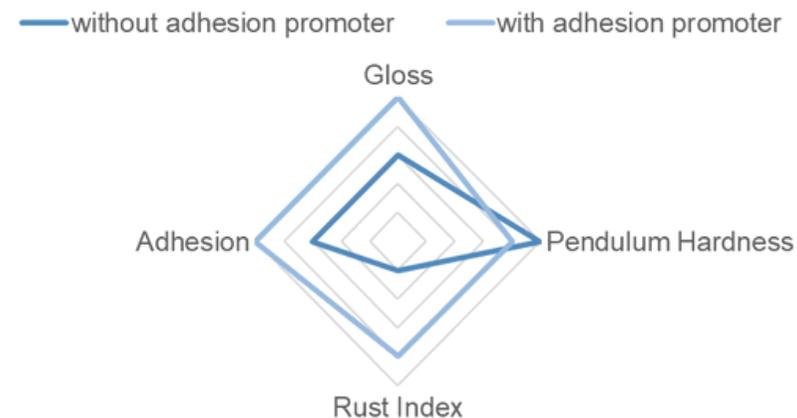
## Key Facts



- Acrylated, fatty acid modified epoxy resin ester
- Co-binder with an application rate of up to 20%
- To improve adhesion and corrosion resistance

According to the modular principle, the ratios of the individual components of the adhesion promoter can be easily adapted to each other. Thus, in addition to adhesion, other properties such as flexibility, hardness, resistance, etc. can be controlled. The structure of the adhesion promoter enables us to develop a perfect solution for the customer's needs.

## Property Overview WorléeAdd VP-W 3235/01



## Customized products by:

- Targeted synthesis of fatty acid-modified epoxy resin esters
- Epoxy fatty acid ratio → oil length / OH content
- Fatty acid → type and content of polymerizable double bonds
- Acrylate content and monomer composition
  - Aromatic monomers → high glass transition temperature, hardness, resistance
  - Aliphatic monomers → low glass transition temperature, flexibility, compatibility
  - Acidic monomers → water solubility, adhesion
- Acrylic reaction conditions → molecular weight and viscosity