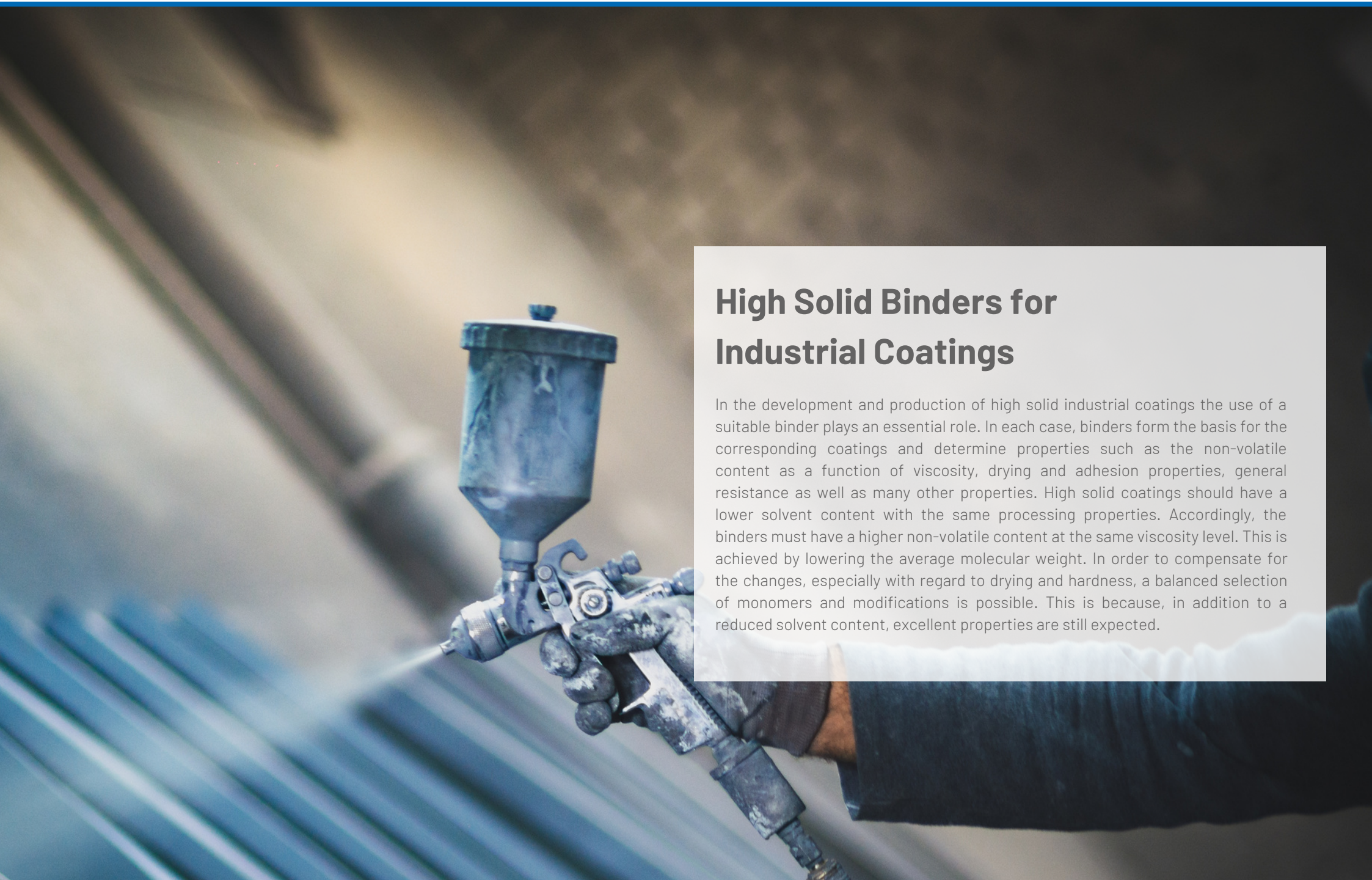

High Solid Binders for Industrial Coatings

In the development and production of high solid industrial coatings the use of a suitable binder plays an essential role. In each case, binders form the basis for the corresponding coatings and determine properties such as the non-volatile content as a function of viscosity, drying and adhesion properties, general resistance as well as many other properties. High solid coatings should have a lower solvent content with the same processing properties. Accordingly, the binders must have a higher non-volatile content at the same viscosity level. This is achieved by lowering the average molecular weight. In order to compensate for the changes, especially with regard to drying and hardness, a balanced selection of monomers and modifications is possible. This is because, in addition to a reduced solvent content, excellent properties are still expected.

Binders for high solid 1K coatings - air drying

Alkyd resins with or without modification are often used in high-quality 1K coatings. They represent a very versatile technology and are by definition based on bio-based vegetable oils or fatty acids. These vegetable oils and fatty acids, along with other raw materials, represent a major adjusting screw for the properties of the products. The various types of modification allow further optimization of the properties of corresponding alkyd resins. Thus, the drying and adhesion properties or even the resistance can be specifically influenced. Targeted modifications are useful for the specialization of corresponding products, especially in the development of highsolids systems.

Product	Delivery Form	Technology	Special Properties	Bbc*
WorléeKyd AC 2943	75 % in butyl acetate	acrylated, short oil alkyd resin	fast drying, very good recoatability, very good adhesion to various substrates	39 %
WorléeKyd TT 3502	80 % xylene	phenolic resin modified short oil alkyd resin	good drying properties, very good wetting of pigments and fillers / high degree of filling possible	40 %
WorléeKyd S 3001	75 % in xylene / methoxy propanol	chain-stopped, short oil alkyd resin	fast drying, high gloss, good outdoor resistance	27 %
WorléeCryl L 2822	75 % xylene	self-crosslinking thermoplastic acrylate	combination partner to improve drying properties and hardness	18 %

**bio-based content on binder solid content*

WorléeKyd AC 2943 is particularly suitable for the formulation of high solid primers. The special acrylation allows good adhesion properties on different substrates and an excellent and fast recoatability with different 1 and 2K top coats.

WorléeKyd TT 3502 can be used to formulate not only primers but also topcoats and one-coat finishes. The phenolic resin modification provides good hardness development, high gloss and especially very good wetting of pigments and fillers. This allows the formulation of coating systems with very high filling levels.

WorléeKyd S 3001 is mainly used in high quality top coats. Here it allows the formulation of coatings with fast drying and high initial hardness. The coatings produced in this way exhibit good outdoor resistance.

WorléeCryl L 2822 is a modified acrylate which can be co-crosslinked in alkyd resin coatings. It was developed especially for this application. Especially in high solid systems it optimizes drying and through-drying as well as hardness development. It also exhibits excellent weather resistance. Due to oxidative drying, it has very low thermoplasticity.

Binders for 2K high solid coatings - crosslinking

Crosslinking binders for 2K high solid coatings are often based on polyacrylates. In order to ensure high reactivities despite significantly reduced solvent contents, a balanced monomer composition is required. For example, very good drying properties can be achieved even with grades containing high levels of hydroxyl groups. In addition to using different vinyl monomers, acrylates can also be modified, for example with polyester polyols. In this case, it is usually possible to improve the mechanical properties or achieve very high hydroxyl contents. Alkyd resins are also called fatty acid modified polyester resins. Due to readily available hydroxyl groups, these can also be crosslinked with isocyanates, for example.

Produkt	Delivery Form	Technology	Special Properties	OH content*
WorléeCryl VP A 2117	75 % in butyl acetate	hydroxyfunctional acrylic copolymer	very low isocyanate demand, good drying properties, good weather resistance	1.7 %
WorléeCryl VP A 2136	75 % in butyl acetate	hydroxyfunctional acrylic copolymer	very good reactivity, fast drying and high hardness, very good resistance	3.6 %
WorléeCryl VP A 2645	75 % in butyl acetate	hydroxyfunctional acrylic copolymer	very good reactivity, fast drying and high hardness especially at room temperature, very good resistance	4.5 %
WorléeCryl VP A 3145	80 % in butyl acetate	polyester modified hydroxy functional acrylic copolymer	very flexible and viscoplastic, very suitable for 1 K baking enamels, combination partner	4.5 %
WorléeCryl VP-E 2551/01	75 % in butyl acetate	hydroxyfunctional acrylic copolymer	very high OH content, highly resistant, viscoplastic	5.4 %
WorléePol 6625	75 % in xylene	hydroxy functional fatty acid modified polyester resin	good reactivity, high elasticity, good weather resistance, very good compatibility, combination partner	4.2 %
WorléeKyd VP-W 3067/00	80 % in butyl acetate	hydroxyfunctional acrylic copolymer	good reactivity, good resistance, dual cure, **bio-based content about 30 %*.**	2.0 %

**on solid content of the binder*

WorléeCryl VP A 2117 has a very low hydroxyl content of 1.7 % and therefore requires only a little amount of isocyanate for complete crosslinking. Nevertheless, it achieves good chemical and outdoor resistance. It is primarily suitable for the formulation of primers, as well as standard one-coat and topcoats. Good adhesion properties can be achieved on various substrates.

The OH content of WorléeCryl VP A 2136 is with 3.6 % significantly higher. Hereby it achieves very good chemical and exterior resistance with complete crosslinking. It is primarily suitable for the formulation of top coats but also clear coats. Here it is characterized by fast drying, high hardness and good mechanical properties. It can be accelerated excellently with suitable catalysts.

WorléeCryl VP A 2645 is suitable for the formulation of high quality top coats and clear coats with excellent resistance. In addition to excellent crosslinking at elevated temperature, it achieves, for a high solid acrylate copolymer with a hydroxyl content of 4.5 %, high hardness and early loadability even at room temperature. The catalyst requirement here is relatively low. It has a very high solid content of 79 %, which allows more freedom in the formulation of paint systems.

The polyester modified WorléeCryl VP A 3145 shows in particular a very high flexibility. With the use of e.g. blocked isocyanates, it allows the formulation of baking enamels with excellent mechanical properties and high chemical resistance. In combination with other acrylic polymers, it improves the mechanical properties and, due to the hydroxyl content of 4.5 %, allows excellent resistance. The product is primarily used in high quality topcoats.

The hydroxyl content of WorléePol VP-E 2551/01 is 5.4 %, which is at the upper limit for acrylate copolymers. When fully crosslinked, this hydroxyl content allows particularly high chemical resistance. On the other hand, the product leads to viscoplastic coating films with excellent mechanical properties. It is primarily used for the formulation of particularly high-quality top coats.

WorléePol 6625 is a polyester resin modified with synthetic fatty acids. This gives it particularly good wetting properties. Due to its good compatibility with various binders, it is therefore suitable for use in pigment pastes for a wide range of applications. Furthermore, it is mostly used as a combination partner in top coats. Here it optimizes the flexibility without influencing the reactivity too much.

WorléeKyd VP-W 3067/00 is a drying alkyd resin with well available, mainly primary hydroxyl groups. The hydroxyl content is relatively low at 2 %. At about 30 %, it is based on a relevant proportion of bio-based raw materials. The largest share results from the use of tall oil fatty acid, which is a by-product of pulp production. In combination with isocyanates, the product shows good reactivity, achieves high hardness and good resistance. By adding small amounts of cobalt-free siccatives, especially the initial drying and initial hardness can be significantly increased. The product allows very high gloss levels. In addition to isocyanate-curing systems, it can also be used in highly reactive baking enamels with melamine or urea resins. It is suitable for the formulation of primers and top coats.

Binders for high solids 2K coatings - moisture curing

The products of the WorléePur Si series are silane-functional polyurethane-urea binders which crosslink by activation with a suitable catalyst at room temperature. They allow the formulation of coating systems with very good drying and especially curing times in combination with very long processing times. The products are characterized by early chemical and mechanical resistance. By using suitable reactive diluents, very high solid coating systems can be formulated.

Product	Delivery form	Technology	Special Properties
WorléePur VP Si 2021	75 % in butyl acetate / n-propanol	polyester-based, silane-functional polyurethane-urea binder	very fast drying, very high hardness, excellent resistance
WorléePur VP Si 2031	75 % in butyl acetate / n-propanol	polyester-based, silane-functional polyurethane-urea binder	very fast drying, high hardness, excellent resistance, good balance between hardness and flexibility
WorléePur VP Si 2041	75 % butyl acetate / n-propanol	polyester-based, silane-functional polyurethane-urea binder	very fast drying, high hardness, excellent resistance, higher gloss possible
WorléePur VP Si 4011	80 % in butyl acetate / n-propanol	carbonate diol-modified, silane-functional polyurethane-urea binder	fast drying, excellent resistance, high elasticity

For more information: Our whitepaper on the WorléePur Si product range.

WorléePur VP Si 2021 is based on a hard-segment modified polyester polyol. In paint systems, it achieves very fast drying with very high hardness. Mechanically and chemically resistant films are obtained after only a very short drying time. In principle, both primers and top coats can be formulated. If necessary WorléePur VP Si 4011 or suitable additives are required for flexibility.

WorléePur VP Si 2031 is also based on a polyester polyol, but without modification with a hard segment. This allows the formulation of coating systems with a good balance of hardness and flexibility. Coating systems based on the this product dry and crosslink quickly and are chemically and mechanically resilient after a short time.

WorléePur VP Si 2041 is based on the same polyester polyol as WorléePur VP Si 2021. This product also allows a very fast drying and high hardness, slightly lower than WorléePur VP Si 2021. Due to a further modification the product allows a higher gloss in top coats. It should therefore be used where the gloss level of the products WorléePur VP Si 2021 or WorléePur VP Si 2031 is not sufficient.

In WorléePur VP Si 4011 a carbonate diol was used as polyol base. The product achieves a high flexibility compared to the other products. Despite a significantly lower hardness, mechanically loadable films are obtained. Drying and crosslinking are fast and loadable films are obtained within a short time. The permanent flexibility of coatings based on the product is excellent. It can be used as a sole binder or in combination with the other types to improve flexibility.

Let's work together!

Do you have ideas for product developments? Please contact us. We would be pleased about a cooperation or a joint project with you.

Even though the binder used plays a major role in the formulation of high solid coating systems, other raw materials also have an influence on the properties. For example, siccatives or catalysts are needed for good drying properties.

Complementary products

Category	1K air drying	2K crosslinking	2K moisture curing
Dispersing agent	WorléeDisperse VP 8100 S		
Defoamer	WorléeAdd 62336		
Surface additive	WorléeAdd 3545	WorléeAdd 3545 WorléeAdd 315	WorléeAdd 3545
Siccative	WorléeAdd 2560		
Catalyst		K-KAT XK 662 K-KAT XK 651	WorléeAdd 2100
Levelling agent		Resiflow FM4	Resiflow W 52
Anti-skin agent	WorléeAdd 4415		
Rheology	WorléeAdd 800 Series suitable for the application		
Thixotropic binder	WorléeThix D 46 WorléeThix MH 439	WorléeThix A 2126 WorléeThix A 2335	
Isocyanate		Tolonate™ HDT-LV LM Tolonate™ HDB-LV	

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