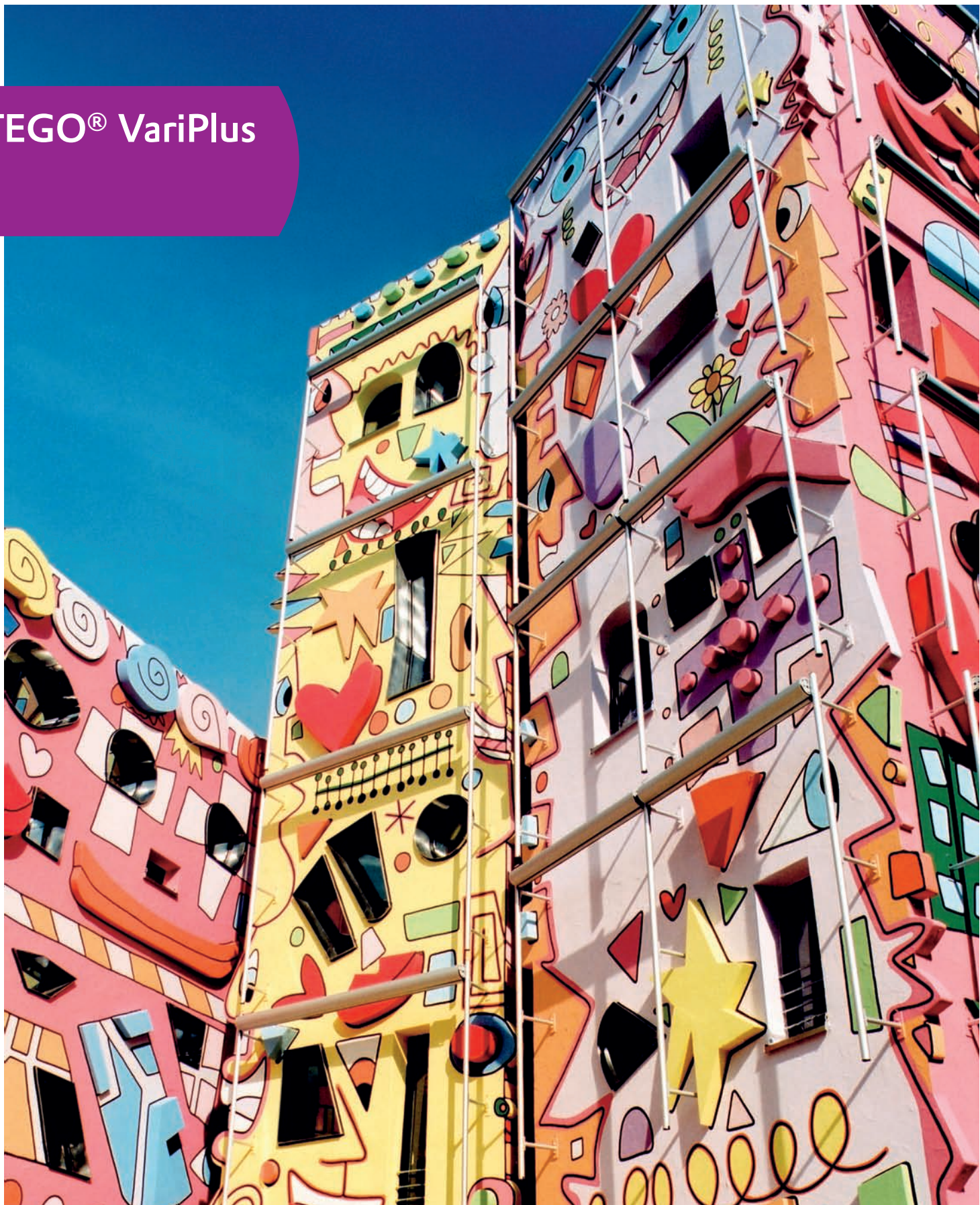


**TEGO® VariPlus –
For Tough, Brilliant Finishes**



tego

TEGO® VariPlus



TEGO® VariPlus products improve the solids content and yield of coating systems and printing inks. The products also improve hardness, adhesion and drying and are unsaponifiable and light-fast. Because of their good pigment-wetting properties, pigment loading capacity is increased so that even at high pigmentation an excellent gloss can still be obtained. Depending on the grade used, resins are soluble in a variety of solvents.

Product range/supply form

TEGO® VariPlus AP	Ketone-aldehyde condensation resin, pelletized
TEGO® VariPlus SK	Polyol resin, pelletized
TEGO® VariPlus EP-1201 TF*	Polyurethane polyol resin, free of organo tin, 49 % by wt. in ethyl acetate
TEGO® VariPlus CA	Ketone-aldehyde condensation resin, gritty white powder
TEGO® VariPlus TC	Ketone-aldehyde condensation resin, pelletized
TEGO® VariPlus DS 50	Aqueous dispersion of a polyurethane polyol resin, 33 % by wt. in dem. water, free of organic solvents, neutralizer: Dimethylaminoethanol
TEGO® VariPlus EP-UC*	Modified polyether ketone resin, liquid, 100 % active matter
TEGO® VariPlus UC W 40	Modified polyether ketone resin, 40 % by wt. in water
TEGO® VariPlus 3350 UV	Special polyester, 50 % by wt. in Tripropylene glycol diacrylate

* EP = Experimental product

Applications

Ball-point pen pastes, pigment preparations, printing inks, nitrocellulose paints, hot melt compounds, vinyl chloride copolymer systems, PUR systems, adhesives, hot stamping foils, paper varnishes, inks, toners, coatings, dry cleaners.

Packaging

TEGO® VariPlus EP-1201 TF:

Screw cap drum, enameled, net content: 50 kg (U.S.: 110 lbs)

TEGO® VariPlus AP, SK, CA, TC:

Paper bag, net content: 25 kg (U.S.: 55 lbs)

TEGO® VariPlus DS 50, EP-UC, UC W 40:

Plastic drum, net content: 25 kg or 200 kg (U.S.: 55 lbs or 441 lbs)

TEGO® VariPlus 3350 UV:

Screw cap drum, net content: 25 kg

Iron drum, net content: 200 kg (U.S.: 55 lbs or 441 lbs)

Storage stability

When protected against light and humidity and at storage temperatures of less than 25 °C (77 °F), TEGO® VariPlus AP, SK, EP-1201 TF, CA, EP-UC and TC have a storage stability of 1 year. TEGO® VariPlus DS 50 has a shelf life of 1 year when stored between 5 °C and 25 °C (41 °F and 77 °F) in the absence of light. Temporary occurrence of temperatures of +5 to -15 °C (41 °F to 5 °F), e.g. during transport or storage, does not narrow the use of the product after its redefrosting.

When protected against light and humidity and at storage temperatures of less than 25 °C, TEGO® VariPlus 3350 UV has a storage stability of 6 months.

Safety

Any safety information needed may be obtained from our MSDS.

Contact with foods

The status in force of each TEGO® VariPlus product, as defined by national and international regulations limiting the use of TEGO® VariPlus products for food packaging, can be provided upon request.

Properties and applications

Ball-point pen pastes

Ball-point pen pastes owe their special rheological properties to the special chemistry and structure of **TEGO® VariPlus CA**, and, in particular, **TEGO® VariPlus SK**. These prevent the pastes and the inks in writing instruments from drying out, but also to set quickly after writing.

Pigment concentrates

TEGO® VariPlus TC features nearly universal solubility in organic solvents and compatibility and excellent pigment wetting. For this reason it is particularly suitable as a carrier resin for pigment concentrates. Combined with a dispersing aid, these concentrates exhibit high color strength and low viscosity. **TEGO® VariPlus EP UC** is especially designed for high solid pigment concentrates with high-

est pigment loading capacity. **TEGO® VariPlus EP-1201 TF** is used as a gloss-promoting supplementary resin in high-performance pigment concentrates. Because of its very good wetting properties **TEGO® VariPlus DS 50** increases the pigment loading capacity, making it possible to obtain very stable pigment concentrates and inks with an outstanding gloss even at high levels of pigmentation. The use of dispersing additives can be reduced significantly. **TEGO® VariPlus UC W 40** is designed for universal high performance pigment preparations with utmost compatibility.

Printing inks

Soluble in alcohol, **TEGO® VariPlus SK, CA** and **EP-1201 TF** are used in printing inks based on polyvinyl butyral, nitrocellulose, alkyd resins, maleic resins, or rosin resins to accelerate drying and improve adhesion and gloss. **TEGO® VariPlus EP-1201 TF** is particularly suitable for the production of printing inks that must exhibit good blocking resistance after rapid through-drying. Furthermore, in numerous binder combinations, **TEGO® VariPlus EP-1201 TF** improves adhesion, even on PVC and polyolefin substrates (like OPP). Special benefits are given in hot stamping foils. **TEGO® VariPlus DS 50** is used in waterborne printing inks to give higher gloss, better adhesion and faster drying.

Coatings

By its high Tg and special structure **TEGO® VariPlus DS 50** improves the resistance of waterborne coatings to water, solvents and chemicals, the film hardness and the gloss. When **TEGO® VariPlus DS 50** is used in plastic coatings or automotive OEM coatings, respectively, it improves adhesion to the substrate and intercoat adhesion. In wood coatings **TEGO® VariPlus DS 50** accelerates the surface drying, through-cure, hardness and gloss. **TEGO® VariPlus DS 50** used in leather coatings influences gloss, adhesion and hardness positively. **TEGO® VariPlus SK** and **CA** are applicable as resin modifiers mainly to improve hardness and drying of solventborne coatings.

PUR systems

Owing to the high reactivity of their OH groups with isocyanates, **TEGO® VariPlus CA, SK, EP-1201 TF** and **DS 50** are used in PUR systems. In the case of **TEGO® VariPlus CA**, due account must be taken of the residual moisture content.

Nitrocellulose paints

The product group **TEGO® VariPlus** can be used in the manufacture of all types of nitrocellulose paints. In nitrocellulose-wood paints, they improve polishing and adhesion. If **TEGO® VariPlus SK** is used, additional elasticity and resistance, as demonstrated by the Cold Check Test, is improved.

Radiation-curing systems

In radiation-curing systems **TEGO® VariPlus AP** and **SK** are used to lower volume shrinkage that occurs during curing and thus to improve adhesion. **TEGO® VariPlus SK** improves hardness and gloss and can be used as a grinding resin in pigment systems. Due to its acetophenone basis **TEGO® VariPlus AP** acts as a poly-

meric photoinitiator in combination with an amine synergist. **TEGO® VariPlus 3350 UV** reduces volume shrinkage and tends to increase curing speed.

Vinyl chloride copolymer systems

The unsaponifiability of **TEGO® VariPlus AP** and **CA** is a plus when they are incorporated into weather-resistant exterior paints based on vinyl chloride copolymers. Good pigment wetting and high softening points make for paints with a high solids content and a high degree of hardness. Used in the right roadmarking paints, processibility is improved.

Inks, toners

TEGO® VariPlus CA lends alcohol-based inks used in roller-ball, felt and fiber-tip pens their high water resistance. **TEGO® VariPlus SK** is used in toners.

Paper varnishes

When **TEGO® VariPlus CA** or **SK** is used in paper varnishes, its brightness, lightfastness, neutrality, and unsaponifiability are an advantage. For example, systems based on cellulose acetobutyrate are water-clear and dry rapidly to produce a non-abrasive surface with high gloss and elasticity.

Hot melt compounds

In hot melt compounds, which are used to protect tools and machine parts, **TEGO® VariPlus CA** and **SK** are used to control the melt viscosity and the hardness of the cooled mass.

Adhesives

In the manufacture of adhesives, **TEGO® VariPlus AP** acts as a hard resin in combination with soft resins and polychloroprene. The products of the **TEGO® VariPlus** series are also used in isocyanate-based reactive adhesives and in radiation-curing and water-clear adhesives.

Dry cleaners

TEGO® VariPlus AP and **SK** are used by dry cleaners to make fabrics water-repellent.

Recommended formulations are available on request.



- 1) solid resin
 2) DIN EN ISO 4625-1
 3) DIN 53 181
 4) DIN EN ISO 3146
 5) 50 % by wt. in ethyl acetate
 6) 50 % by wt. in butyl acetate / n-butanol = 85/15

Typical properties

Product	Softening point °C	Non-volatile matter % by wt.	Color number Gardner	pH-value
	see left	DIN EN ISO 3251	DIN EN ISO 4630	DIN ISO 976
TEGO® VariPlus AP	approx. 95 ²⁾	100	≤ 3 ⁵⁾	–
TEGO® VariPlus SK	approx. 115 ³⁾	100	≤ 1 ⁵⁾	–
TEGO® VariPlus EP-1201 TF	approx. 163 ¹⁾³⁾	44	≤ 2	–
TEGO® VariPlus CA	approx. 102 ⁴⁾	100	≤ 2 ⁶⁾	–
TEGO® VariPlus TC	approx. 82 ²⁾	100	≤ 3 ⁵⁾	–
TEGO® VariPlus DS 50	approx. 150 ¹⁾³⁾	33	(whitely-opaque)	8.5 - 9.5
TEGO® VariPlus UC W 40	–	40	–	–
TEGO® VariPlus EP-UC	–	100	≤ 7	–
TEGO® VariPlus 3350 UV	–	100	≤ 2	–

- 1) solid resin

Product	T _G °C	OH value mg KOH/g	Acid number mg KOH/g	Viscosity at 23 °C mPas	Water-content % by wt
	DIN 53 765	DIN 53 240 mod.	DIN EN ISO 2114	DIN 53 015	DIN 51 777 pt. 1
TEGO® VariPlus AP	approx. 50	approx. 5	< 1	–	–
TEGO® VariPlus SK	approx. 90	approx. 325	< 1	–	–
TEGO® VariPlus EP-1201 TF	approx. 130 ¹⁾	approx. 200 ¹⁾	< 1	approx. 1,000	–
TEGO® VariPlus CA	approx. 75	approx. 200	< 1	–	≤ 4
TEGO® VariPlus TC	approx. 40	approx. 10	< 1	–	–
TEGO® VariPlus DS 50	approx. 120	approx. 190	–	approx. 400	–
TEGO® VariPlus EP-UC	approx. -47	approx. 40	≤ 1	approx. 25,000	–
TEGO® VariPlus UC W 40	approx. -47 ¹⁾	approx. 40 ¹⁾	≤ 1	approx. 150	–
TEGO® VariPlus 3350 UV	approx. 30 ¹⁾	approx. 16 ¹⁾	approx. 8	approx. 9,000	–

- + useful application
 O possible application
 – limited application

Areas of application

	AP	SK	EP-1201 TF	CA	TC	DS 50	EP-UC/ UC W 40	3350 UV
Paints and varnishes for wood	+	+	–	+	O	+	–	–
Paints for plastics	O	+	+	+	+	+	–	–
Anticorrosion paints	+	+	–	+	O	O	–	–
Paints for concrete	+	–	–	+	O	–	–	–
Road marking paints	+	+	–	+	O	–	–	–
Industrial coatings	+	+	–	+	O	+	O	–
Lacquers for papers	–	+	+	+	–	+	–	–
Ball point pen pastes	–	+	–	O	–	+	–	–
Adhesives	+	O	–	+	+	O	–	–
Pigment preparations	O	O	+	O	+	+	+	–
Printing inks (flexo, gravure)	–	+	+	+	–	+	–	–
Hot stamping foils	–	+	+	O	–	–	–	–
Radiation-curing	+	+	–	O	O	O	O	+

Solubility

Solvent	AP	SK	EP-1201 TF	CA	TC	EP-UC
Aliphatic hydrocarbons	-	-	-	-	O	-
Aromatic hydrocarbons	+	-	O	O	+	+
Alcohols	-	+	+	+	+	+
Esters	+	+	+	+	+	+
Glycol ethers	+	+	+	+	+	+
Ethers	O	+	O	O	+	+
Ketones	+	+	+	+	+	+

+ soluble
 O limited soluble
 - insoluble

Solubility was determined up to 50 % by wt.

Compatibility

Binder	AP	SK	EP-1201 TF	CA	TC	DS 50	EP-UC
Acrylic resins	O	+	O	O	+	O	+
Aldehyde resins	O	+	+	+	+		+
Alkyd resins	O	O	-	+	+	O	+
Calcium resins	-	-	-	O	+		
Carbamide resins	+	+	+	+	+		+
Cyclized rubber	-	-	-	+	+		
Epoxy resins	+	+	O	+	+	O	+
Glycerine ester resins	+	+	-	+	+		
Hydrocarbon resins	O	-	-	-	+		+
Ketone resins	+	+	+	+	+		+
Maleic resins	O	+	+	+	+		+
Melamine resins	O	+	+	+	+		+
Nitrocellulose	+	+	+	+	+		O
Phenolic resins	+	-	O	+	+		
Phthalic resins	+	+	+	+	+		
Polyester resins	+	+	+	+	+		+
Polyurethane resins	O	+	+	+	+	+	+
Resols, non-plasticized	+	+	+	+	+		
Rosin-modified resins	+	+	-	+	+		
VC copolymers	+	-	-	+	+		
Zinc resins	-	O	O	+	+		

+ compatible
 O limited compatible
 - incompatible

Compatibility was determined up to 40 % by wt. solid resin to total binder.

This solubility/compatibility table was prepared with a selection of different solvents/binders. Thus, the findings listed therein are not generally applicable. Prior to using a TEGO® VariPlus product, its solubility/compatibility should be tested.

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