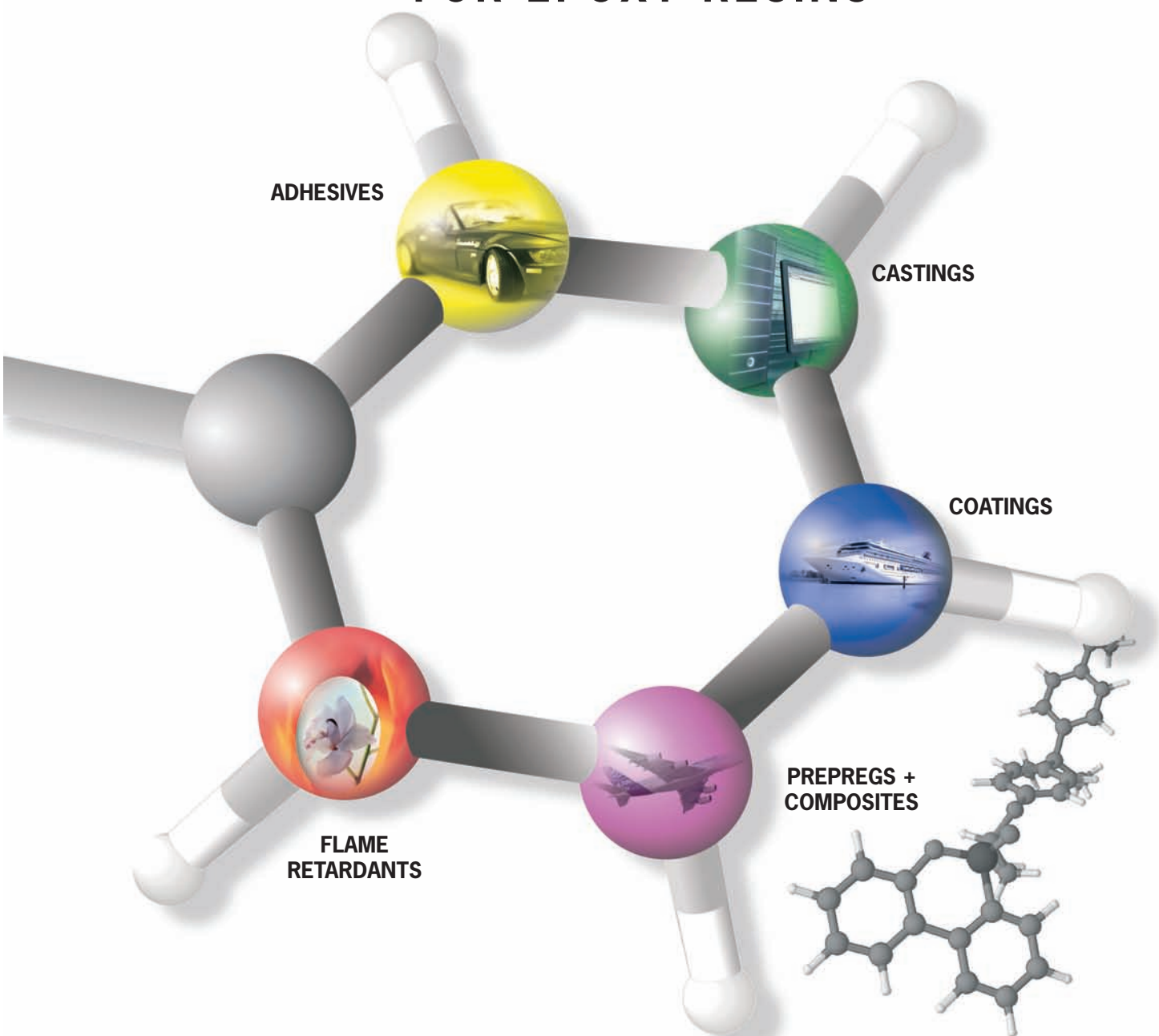




POLYDIS®

ADDITIVES AND FLAME RETARDANTS FOR EPOXY RESINS



ADHESIVES

CASTINGS

COATINGS

FLAME
RETARDANTS

PREPREGS +
COMPOSITES

THE SOLID BASE FOR YOUR SUCCESS

Schill+Seilacher

Your ideas are our challenges. And have been since 1877.



Founded in 1877 by Christoph Seilacher and his brother-in-law Karl Schill in the German city of Heilbronn, the chemical factory for the production of special products for the leather industry has always utilised its proximity to its customers as the driving force for its growth. This is the reason why the factory was relocated to Feuerbach near Stuttgart after only four years to enable the firm to work in close cooperation with the most important companies established there.

Thanks to the creativity of both company founders, and also thanks to the right products and the high quality standards, Schill+Seilacher quickly grew and became known beyond the borders of Germany. The export trade expanded to such an extent that in 1925 Schill+Seilacher founded a further company branch in Hamburg, the “Gateway to the World”, as it is known. This meant that immediate proximity was also guaranteed to the markets abroad.

Active research and development already ensured the continuous growth of the product range, which had, in the meantime, been expanded to include special chemicals for textile finishing.

Based on the experience gained in the textile industry and the availability of the relevant raw materials, the first additives for rubber processing followed.

Most of the factory premises were destroyed during a heavy air raid in 1943 and part of the production was relocated to Böblingen.

Immediately following the end of the war, a modern and expanded factory was quickly erected again in Hamburg. The Böblingen site was not only maintained but also continuously modernised and expanded.

By now, the two Schill+Seilacher factories were operating independently of each other in different product fields. However, the high standard of quality has been maintained by both sites as before. Whereas the Hamburg plant develops and manufactures special chemicals for the rubber industry, foam inhibitors, polydispersions, silicone emulsions and products used in latex processing, the Böblingen plant develops and produces special chemicals for the manufacture and finishing of fibres, textiles, leather and paper. The growing success of our products in the US market led to the foundation of the STRUKTOL® Company of America in Stow, Ohio in 1979.

In the early 90s Schill+Seilacher Chemie GmbH, Pirna, Germany, a producer of speciality chemicals for textiles, paper and the PU industry became a member of the Schill+Seilacher group.

Also the business in Hamburg expanded rapidly. During the 80s, our production capacities reached the limits. A completely new, computer controlled plant was set up and went on stream by 1990.

Against the trend in the rubber and related industries, Schill+Seilacher continuously invested into their R + D efforts in the 90s. In 1997, new laboratories and offices were built for the growing R + D group.

This highlights that the main emphasis is not only the production of special chemicals for rubber processing, foam inhibitors, latex, mineral oils and silicones, but also the provision of customer oriented solutions in the research and development division.

At the present time, over 600 employees are responsible worldwide for the success of the Schill+Seilacher group, which is still in family ownership. Tradition and innovation guaranteed by a high level of research and development activities ensure our dynamic growth.

We care for your good reputation.

After over 120 years of continuous, customer-oriented development Schill+Seilacher is now the global market leader for process additives in the rubber industry. Since the fifties, most of these products have been marketed under the brand name STRUKTOL® – and this name has become a synonym for both quality and performance.

The worldwide marketing of our STRUKTOL® products is carried out by a wide range of independent representatives. Certain of the major and important markets are handled and supported by our own companies and/or representatives:

Schill+Seilacher

STRUKTOL® Aktiengesellschaft, Hamburg

(production)

STRUKTOL® Company of America, Stow, Ohio

(production)

STRUKTOL® Company (Canada), Toronto

South America Representative Office, Buenos Aires

All of the companies listed above have their own application specialists and some have their own laboratories. Schill+Seilacher always place the intensive technical care of our clients at the forefront. Beyond simple product information our customer service also offers recipe recommendations, tests and training programs in addition to troubleshooting. Our laboratories are being continuously expanded and equipped with the latest in test equipment.

State-of-the-art production as well as a quality management system certified to ISO 9001 guarantee the high standard of our products.

In addition to the widely varied product range we also offer tailor-made, fast solutions to specific customer problems. This is the reason why we are the preferred development partner for several of our major customers.

And finally we supplement our own product range with suitable trade products. With one order, one delivery and one invoice we make your purchasing as efficient as possible.



Overview of typical applications for STRUKTOL® POLYDIS® 36 product range:

	PD 3604	PD 3605	VP 3606	PD 3610 (S)	VP 3611 (S)	PD 3614	PD 3615	VP 3616	PD 3622	VP 3643	PD 3652	PD 3653	VP 3654	VP 3662	PD 3670	PD 3680	VP 3681	PD 3691	PD 3693	VP 3695	
Typical application for POLYDIS 36.. (additives): In some cases mixtures are the best choice																					
1-Component adhesives	◐	○	◐	●	★	★	○				●	●	●		○	○					
2-Component adhesives	●	●	○	○	○	★	◐			●	◐	◐	◐		●		◐				
Reactive contact adhesives				◐	◐	○					◐	◐	◐		○	○	○	●	●	●	
Composites	★	●	○	○	◐	★	●								◐	◐	◐	◐	◐	◐	
Prepregs	◐	○	◐			●	○								●	★	◐	★	★	★	
Repair mass / putty	◐		◐	○	○	●	○	○			●	●	●								
Potting resins	◐	●	◐				★	●	★					◐							
Electrical applications		○			◐		★		◐					◐							
Coatings	○	◐	◐					◐	●	★				◐	○	○	○				
UV curing, coatings														◐							
Effects on properties: Depends on system and application, tests are always necessary																					
Impact resistance	◐	●	●	●	★	★	●	◐	●		●	●	●	○	◐	○	○				
Flexibilisation	○	○	○	◐	◐	◐	◐	●	◐	★	◐	◐	◐								
Lap shear strength	◐	○	●	●	●	★	◐	○		◐	●	●	●		◐	◐	◐				
T-peel strength	◐	○	●	●	★	●	◐	○		◐	●	●	●		○	◐	◐				
Adhesion to metal	●	◐	★	★	★	●	◐	○		◐	◐	◐	◐		○	◐	◐	○	○	◐	
Tack (before curing)			○	○	○													●	●	★	
Chemical resistance											◐	◐	●	○	◐	◐	◐				
Thermostability				○	○								●	◐	★	★	★				
Good low temperature performance	◐	○	●	◐	●	●		○	○	★	○	○	●	○	○	○	◐				
Handling	○	◐	○				○	◐	★	●	○	○		●	○	○					

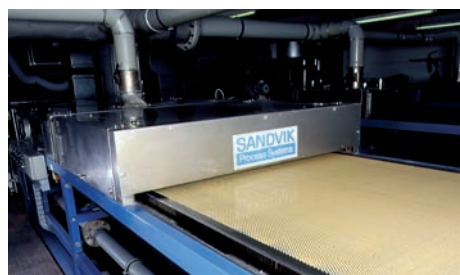
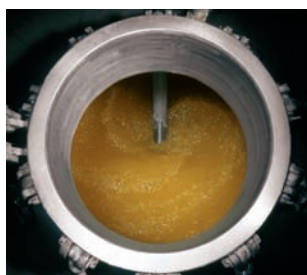
○ Improved ◐ well-suited ● best suitability ★ favorites



Properties of the STRUKTOL® POLYDIS® 36.. products

“Standard” elastomer-modified epoxy prepolymers / NBR-Types

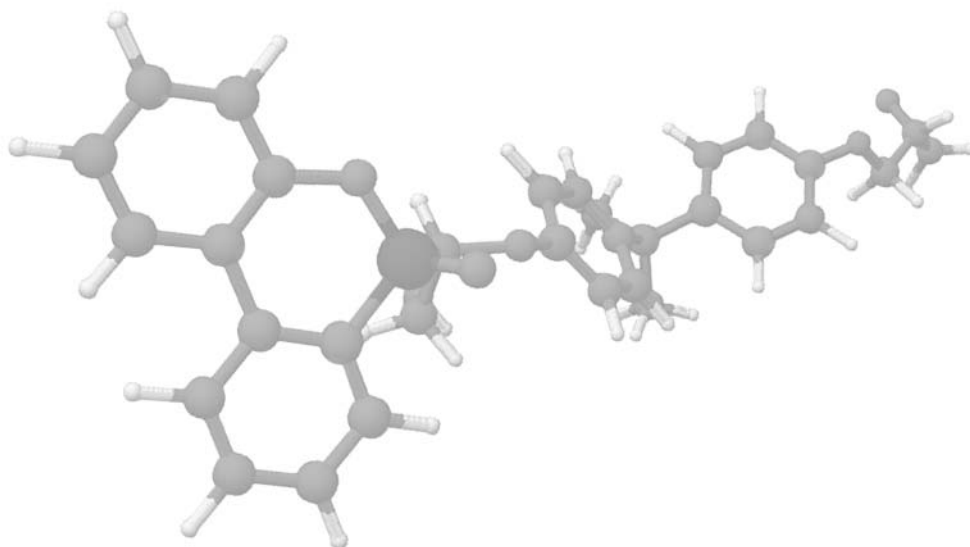
Product name:	Chemical composition:	Applications/Features:	Properties:	Appearance:
STRUKTOL® POLYDIS® 3604 (Standard-Prepolymer)	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl ether (DGEBA)	Adhesives, Composites, Potting. Significant improvements in impact strength, flexural strength, shear strength, peel strength and also low temperature behaviour.	Elastomer content [%] : 40 Epoxy equivalent weight [g/Eq] : 330 Viscosity (25 °C) [Pa.s] : 190	yellowish, liquid
STRUKTOL® POLYDIS® 3605 (Lower viscous version of STRUKTOL® POLYDIS® 3604)	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl ether (DGEBA)	A lower viscous version of STRUKTOL® POLYDIS® 3604 designed for easier processing at room temperature. It is especially suitable for the production of potting or composites with superior properties.	Elastomer content [%] : 35 Epoxy equivalent weight [g/Eq] : 300 Viscosity (25 °C) [Pa.s] : 50	yellowish, transparent, liquid
STRUKTOL® VP 3606	Nitrile rubber modified epoxy prepolymer based on bisphenol-F-diglycidyl ether (DGEBF)	Adhesives, Composites, Prepregs. With this product you perform high lap shear results and gain strength/adhesion best low temperature behaviour.	Elastomer content [%] : 40 Epoxy equivalent weight [g/Eq] : 300 Viscosity (25 °C) [Pa.s] : 180	yellowish, liquid
STRUKTOL® POLYDIS® 3614 (Standard-Prepolymer)	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl ether (DGEBA)	Adhesives, Composites, Prepregs. With this product you perform high lap shear results and gain strength/adhesion best low temperature behaviour.	Elastomer content [%] : 40 Epoxy equivalent weight [g/Eq] : 330 Viscosity (25 °C) [Pa.s] : 470	yellowish, transparent, liquid
STRUKTOL® POLYDIS® 3615	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl ether (DGEBA)	Low chlorine version of STRUKTOL® POLYDIS® 3614 with low viscosity designed for electronic applications. It is especially suitable for the production of pottings or composites with superior properties.	Elastomer content [%] : 40 Epoxy equivalent weight [g/Eq] : 300 Viscosity (25 °C) [Pa.s] : 250 Hydrolisable chlorine content [ppm] : 250	yellowish, liquid
STRUKTOL® VP 3616	Flexibilized nitrile rubber modified epoxy prepolymer (hybrid type)	Adhesives, composites. Low viscous product improving flexibility in addition to toughening and peel strength.	Elastomer content [%] : 100 Epoxy equivalent weight [g/Eq] : 800 Viscosity (25 °C) [Pa.s] : 150	amber, liquid



Properties of the **STRUKTOL® POLYDIS® 36..** products

“Low viscous” elastomer-modified epoxy prepolymers (Polyether- and NBR types)

Product name:	Chemical composition:	Applications/Features:	Properties:	Appearance:
STRUKTOL® POLYDIS® 3622	Polyol modified epoxy prepolymer based on bisphenol-A-diglycidylether (DGEBA)	Coating, Casting. This product has its strong points in toughening.	Elastomer content [%] : 40 Polyether Epoxy equivalent weight [g/Eq] : 330 Viscosity (25 °C) [Pa.s] : 12	yellowish, transparent, liquid
STRUKTOL® VP 3643	Blend of elastomer modified epoxy prepolymers based on bisphenol-A-epoxy resin	Coating. Especially recommended to improve elongation and cold flexibility.	Elastomer content [%] : 20 Epoxy equivalent weight [g/Eq] : 340 Viscosity (25 °C) [Pa.s] : 10	yellowish liquid
STRUKTOL® VP 3662	Polyol modified cycloaliphatic epoxy prepolymer	Coating, Casting. UV-Curing or at elevated temperatures. The lowest viscosity enables a handling without restriction.	Elastomer content [%] : 40 Polyether Epoxy equivalent weight [g/Eq] : 260 Viscosity (25 °C) [Pa.s] : 2	yellowish, transparent, liquid



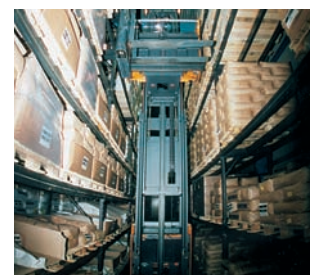
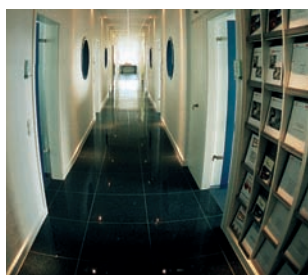
“Higher functional” elastomer-modified epoxy prepolymers / NBR-types

Product name:	Chemical composition:	Applications/Features:	Properties:	Appearance:
STRUKTOL® POLYDIS® 3670	80% solution of a nitrile rubber modified epoxidized Novolak in methylethylketone (MEK)	Prepregs, Composites, Coatings. Especially recommended where in addition to improve toughness, high chemical resistance or heat distortion resistance is required.	Elastomer content [%]* : 25 Solvent (MEK) : 20 % Epoxy equivalent weight [g/Eq] : 300 Viscosity (25 °C) [Pa.s] : 2.1	yellowish, cloudy, low viscous, liquid
STRUKTOL® POLYDIS® 3680	80% solution of a nitrile rubber modified epoxidized Novolak in methylethylketone (MEK)	Prepregs, Composites, Coatings. Especially recommended where in addition to improve toughness, high chemical resistance or heat distortion resistance is required. Suitable for electronic laminates.	Elastomer content [%]* : 25 Solvent (MEK) : 20 % Epoxy equivalent weight [g/Eq] : 370 Viscosity (25 °C) [Pa.s] : 85	yellowish, viscous, liquid
STRUKTOL® VP 3681 (solid form of STRUKTOL® POLYDIS® 3680)	Nitrile rubber modified high functional epoxidized Novolak, only as blend available	Prepregs, Composites, Coatings. Especially recommended for epoxy systems which have to withstand extreme thermal and chemical conditions (e.g. high performance adhesives).	Elastomer content [%] : 25 Epoxy equivalent weight [g/Eq] : 300 Melting point [°C] : 85	yellowish, solid resin

“Tackifier” elastomer modified / NBR-types

Product name:	Chemical composition:	Applications/Features:	Properties:	Appearance:
STRUKTOL® POLYDIS® 3691	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl ether (DGEBA)	Tackifier for prepregs. Excellent tack of the prepregs can be achieved.	Elastomer content [%] : 5 Epoxy equivalent weight [g/Eq] : 205 Viscosity (25 °C) [Pa.s] : 200	yellowish, cloudy, viscous, liquid
STRUKTOL® POLYDIS® 3693	Nitrile rubber modified epoxy prepolymer based on bisphenol-F-diglycidyl ether (DGEBF)	Tackifier for prepregs. Excellent tack of the prepregs can be achieved.	Elastomer content [%] : 5 Epoxy equivalent weight [g/Eq] : 180 Viscosity (25 °C) [Pa.s] : 75	yellowish, cloudy, viscous, liquid
STRUKTOL® VP 3695	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl-ether (DGEBA)	Tackifier for prepregs. Excellent tack of the prepregs can be achieved. Long term tack improvement.	Elastomer content [%] : 10 Epoxy equivalent weight [g/Eq] : 195 Viscosity (25 °C) [Pa.s] : 400	yellowish, cloudy, viscous, liquid

*without solvent



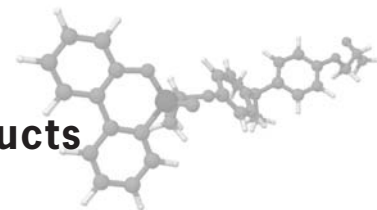
Properties of the STRUKTOL® POLYDIS® 36.. products

“Advanced Types” elastomer-modified epoxy prepolymers / NBR-Types

Product name: composition:	Chemical	Applications/Features:	Properties:	Appearance:
STRUKTOL® POLYDIS® 3610	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl ether (DGEBA)	Adhesives and composites. This provides ultimate block-copolymer toughening and best adhesion (on oily steel) for 1-component-systems.	Elastomer content [%] (without solvent) : 40 Epoxy equivalent weight [g/Eq] (incl. solvent) : 600 Viscosity (80 °C) [Pa.s] : 70	amber, solid, exhibiting cold flow
STRUKTOL® POLYDIS® 3610 S	Nitrile rubber modified epoxy prepolymer on bisphenol-A-diglycidyl ether (DGEBA) in Methylethylketon	Adhesives and composites. This provides ultimate block-copolymer toughening and best adhesion (on oily steel) for 1-component-systems.	Elastomer content [%]* : 40 Epoxy equivalent weight [g/Eq] : 950 Viscosity (25 °C) [Pa.s] : 0.9	amber, liquid, low-viscous
STRUKTOL® VP 3611	Nitrile rubber modified epoxy prepolymer based on bisphenol-F-diglycidyl ether (DGEBF) only as blend available	Adhesives and composites. This provides ultimate block-copolymer toughening and best adhesion (on oily steel) for 1-component-systems.	Elastomer content [%] : 40 Epoxy equivalent weight [g/Eq] : 560 Viscosity (80 °C) [Pa.s] : 30	amber, pasty
STRUKTOL® POLYDIS® 3611 S (Solution of STRUKTOL® VP 3611)	Nitrile rubber modified epoxy prepolymer based on bisphenol-F-diglycidyl ether (DGEBF) in Methylethylketon	Adhesives and composites. This provides ultimate block-copolymer toughening and best adhesion (on oily steel) for 1-component-systems.	Elastomer content [%]* : 40 Epoxy equivalent weight [g/Eq] : 695 Viscosity (25 °C) [Pa.s] : 0.5	amber, liquid, low-viscous
STRUKTOL® POLYDIS® 3652	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl ether (DGEBA)	Reactive hot melt adhesives. This product improves the elastic properties of epoxy formulations.	Elastomer content [%] : 10 Epoxy equivalent weight [g/Eq] : 360 Viscosity (80 °C) [Pa.s] : 15	yellowish, high-viscous, liquid
STRUKTOL® POLYDIS® 3653	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl ether (DGEBA)	Reactive hot melt adhesives. This product improves the elastic properties of epoxy formulations. Other formulations are available.	Elastomer content [%] : 10 Epoxy equivalent weight [g/Eq] : 300 Viscosity (80 °C) [Pa.s] : 3	yellowish, high-viscous, liquid
STRUKTOL® VP 3654	Nitrile rubber modified epoxy prepolymer based on bisphenol-A-diglycidyl ether (DGEBA)	Reactive hot melt adhesives. This product improves the elastic properties of epoxy formulations. High elastomer content.	Elastomer content [%] : 40 Epoxy equivalent weight [g/Eq] : 980 Viscosity (80 °C) [Pa.s] : 500	yellowish, paste-like liquid

*without solvent



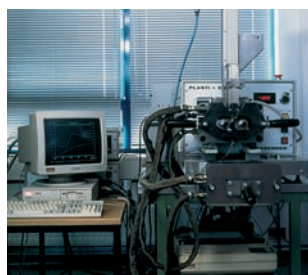


Properties of the STRUKTOL® POLYDIS® 37.. products

Reactive organophosphorous flame retardant and flame-retarded resins

Product name:	Chemical composition:	Applications/Features:	Properties:	Appearance:
STRUKTOL® POLYDIS® 3710 -DOPO-9,10-Dihydro-9-oxaprophaprenanthren-10-oxide	Hydrogen-functional organophosphorous compound; halogen-free	Raw material for the prereaction with epoxies, phenolics, urethanes to build flame-retarded resins. Synergies with other FR's are existing. The phosphite structure can also act as an UV-stabilizer.	Halogen-free, toxicologically harmless Melting point [°C] : 116 Phosphorous content [%] : 14.3	white flakes
STRUKTOL® VP 3735	Multi-functional, organophosphorous modified epoxy Novolac resin (based on STRUKTOL® POLYDIS® 3710), also as blend available	Flame-retarded epoxy resin (Additive to meet UL 94-V0) used to formulate paste adhesives or for coatings and casting.	Epoxy equivalent weight [g/Eq] : 350 Softening point [°C] : 80 Phosphorous content [%] : 3.8	yellowish, amber solid resin
STRUKTOL® VP 3742	Phosphoric reactive, flame retardant modified epoxy resin (based on STRUKTOL® POLYDIS® 3710)	Polyfunctional epoxy resin, which contains a chemical-bound organo-phosphorous substance. Designed for special prepreg equipment, etc. aerospace and transportation application.	Epoxy equivalent weight [g/Eq] : 370 Softening point [°C] : 57 Phosphorous content [%] : 4.0	yellowish resin
STRUKTOL® POLYDIS® 3725	Based on STRUKTOL® VP 3735, 20 % solvent	Flame-retarded epoxy resin (Additive to meet UL 94-V0) used to formulate impregnation solutions (e.g. for laminates with fibres or fabric).	Epoxy equivalent weight [g/Eq] : 450 Viscosity (25 °C) [Pa.s] : 10 Phosphorous content [%]* : 3.8 Solvent [%] : 20	yellowish, amber solution
STRUKTOL® VP 3742 S	Based on STRUKTOL® VP 3742, 20 % solvent	Polyfunctional epoxy resin, (solved in MEK), which contains a chemically bound organo-phosphorous substance. Prepregs, FR for aerospace and transportation interior parts. Tack and flexibility improved at B-State.	Epoxy equivalent weight [g/Eq] : 460 Phosphorous content [%]* : 4.0 Solids content [%] : 80 Solvent [%] : 20	yellowish resin
STRUKTOL® VP 3750 S	Phosphoric reactive, flame retardant modified epoxy resin in solvent	Polyfunctional epoxy resin (solved in MEK), which contains a chemically bound organo-phosphorous substance. Prereacted halogen free phosphoric concentrate, for formulators. Prepregs for aerospace and transportation.	Epoxy equivalent weight [g/Eq] : 660 Phosphorous content [%]* : 5.0 Solids content [%] : 80 Solvent [%] : 20	yellowish resin

*without solvent



Our excellent know-how in chemical specialties is your solid base for success.

The many excellent properties of epoxy resins, like good adherence on very different substrates, making them suitable for most different applications and areas, are reduced by the high brittleness of these systems.

The most elegant method to reduce brittleness without loss of other important properties, consists in the use of elastomer-modified epoxy prepolymers.

The **STRUKTOL® POLYDIS® 36..** products are prepolymers, synthesized by the reaction of end-capped reactive elastomers with epoxy resins. The prepolymers can be used in combination with conventional resins and hardeners. No special hardeners are necessary. In most cases the hardener concentration needs to be adjusted to the different epoxy equivalent weight.

For high performance applications with optimal mechanical, thermal and chemical properties we recommend to use **STRUKTOL® POLYDIS® 36..**-types. Possible applications are adhesives, composites, castings and coatings. By using different epoxy prepolymers, depending on the dosage, the optimal property profile for each application can be achieved. Improved will be

- impact strength
- flexural strength
- shear strength
- peel strength
- low temperature behaviour
- great adherence on oily steel

Adhesives as a modern method for joining different materials are indisputable gaining ground. Quite a few adhesive joints are in parts or semi-finished products where the final product is subject of fire safety regulations. Constructions based systems for composites or adhesives are used for aircrafts, railways, car constructions or other applications for example in the electronic field.

In principle for adhesives the same flame retardants are used as for other applications with the same basic polymers. Well-known and established flame retardants or epoxies based on halogen are used less and less because of toxicological and ecological reasons.



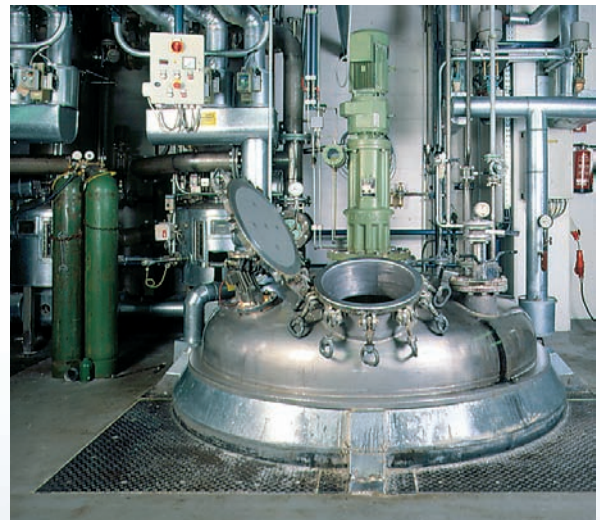
Reactive, phosphorous organic substances, like our **STRUKTOL® POLYDIS® 37..** product range, are toxicologically harmless, even in the case of fire. As they are chemically linked to the resin matrix, the mechanical and chemical properties are not influenced. With the amount of phosphorous organic substance added (means the amount of phosphorous in the system) the optimal property profile for the respective application can be achieved. Fire protection regulations are met without loss of important product properties like Tg, modulus etc.

Your ideas are our challenges

Call us for your individual solution.



With our new and well equipped laboratories and our know-how in chemical specialties, we work together with our customers on new developments and future projects.



We assure our customers continuously good quality of our products.



We stand for ontime deliveries.



Our production is completely computerised.

... And have been since 1877.

Please contact us at:



Hamburg

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Speciality chemicals for:

- Rubber additives
- Additives for epoxy systems
- Antifoams
- Latex additives
- Silicones
- Release agents



Böblingen

Schill+Seilacher Aktiengesellschaft

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Speciality chemicals for:

- Fibres
- Textiles
- Leather
- Paper



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Speciality chemicals for:

- Rubber additives
- Plastic additives
- Personal care products



Pirna

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Speciality chemicals for:

- PU Industry
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- Paper