



Advanced Polymer Technologies for

Adhesives

HEALTH • NUTRITION • MATERIALS





New innovations

...to enhance peoples lives.

Our business is all about improving people's lives. At DSM we want to make life brighter for people – today and in generations to come. We connect our unique skills in materials sciences to create solutions that nourish, protect, and improve performance. And contribute to a more sustainable world. This is reflected in how we approach the graphic arts and adhesive business.

Brighter future

Some companies see sustainability as a challenge, but at DSM we see it as an opportunity, with endless possibilities to work together for a brighter future. By exchanging ideas and collaborating openly, we are making a difference. Innovating to add value to people's lives, ensure a positive contribution to our business, and protect the planet.

Bright Science

Bright Science is at the heart of all we do in graphic arts and adhesives. Based on our intimate knowledge of our markets and our deep materials science expertise across a wide range of applications. Our global network of industry specialists travel around the world and talking to customers and other parties in the supply chains. Through these deep partnerships built on mutual trust, we create resins and technologies that enhance our customers' formulations and their customers' everyday experiences.

Brighter Living

This means Brighter Living for everyone. People around the world eat and drink food every day. This can be done safely using our resins to print, coat, label and seal the colorful packaging. Or travel abroad with their passport, which might be printed and laminated using our resins, in such a way that it is reliable, durable and of a quality that can not easily be imitated. Or receive a gift with a beautiful matt or soft touch finish, giving it that special look and feel. That's the real beauty of Bright Science, brightening lives wherever and whenever it touches them.

DSM for graphic arts and adhesives

DSM has a dedicated division that draws upon its broad know-how and understanding of the market and customer needs to develop innovative resin solutions that deliver the best performance in graphic arts and adhesives markets.

From our headquarters in the Netherlands, we provide resins for coatings and graphic arts markets around the globe. We support our customers with manufacturing sites in North America, Europe, and Asia. Our brand names are well known around the world, including

NeoCryl™, NeoRez™, NeoPac™, NeoRad™, Hybrane™, Uralac™, Uracron™, Urathix™, and Uradil™.

Customers rely on us for a unique range of tailor-made, sustainable solutions based on water-borne, UV, powder, and solvent-borne technologies. We are the largest producer of polyester resins in the world and one of the largest producers of specialty emulsions and solventbased urethanes, ensuring a supply of products that fits our customers' individual requirements.

We design resin systems with tomorrow's environmental requirements in mind, guided by our Product Stewardship principles, by an awareness of the need for continuity, and by a strong sense of responsibility. We have an outstanding sustainability record in specialty resins that we continue to improve each day.

Adhesives

We work closely with adhesive formulators to improve the sustainability and performance of everyday products. Using our specialty resins for adhesives. We draw upon our broad understanding of materials science and applications across the full resin spectrum; from water-based acrylics, urethanes, and urethane-acrylics to solvent based polyesters, in both one and two-component technologies.

Our collaborations have produced new innovations to enhance people's lives. Like an adhesive for beer bottle labels which makes them easier to recycle. Or creating a durable adhesive for identity cards so it stands up to intensive use and exposure to extreme conditions. Sustainability is a key focal area for DSM. Working together we can help you develop adhesive solutions for your products and move to more sustainable production processes to create a better future for everyone.

Packaging adhesives

For packaging materials used in food and other consumer products, we have developed specialty resins for laminating adhesives in close partnership with leading adhesives manufacturers and converters. This resulted in resins to laminate different films at lower temperatures to produce a multi-layered packaging closure, thereby reducing the time and energy needed for production. In addi-



Automotive lamination

With our customers, we develop specialty resins for the adhesive laminates in door panels and dashboards that meet the stringent demands of the automotive industry. Together with leading adhesive formulators and manufacturers, we are also creating a greener automobile. So consumers can choose to drive a more eco-friendly car. Developing water-based resins for adhesives enables more sustainable materials to be used, which weigh less and are easier to recycle. All without sacrificing performance. Thanks to our broad understanding of materials science and adhesive applications,



tion, we created a stronger package that offers better protection for computer accessories purchased in a store. Whether you want to improve adhesion, reduce odor or use more environmentally friendly materials, our unique experience in materials science and applications for adhesive laminates can help resolve your toughest problems.

Industrial lamination

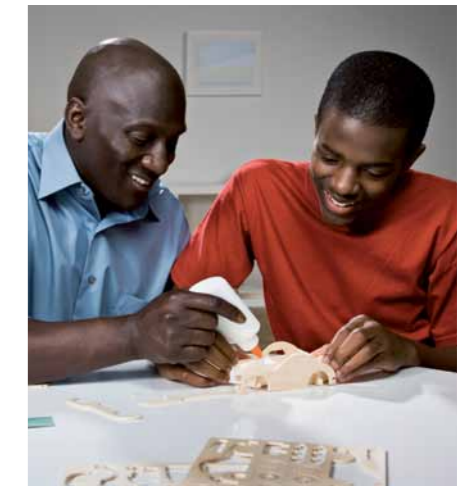
Our specialty resins for industrial lamination literally hold the world together. They help create kitchen cupboards that last longer, day in and day out, in every ambient temperature. Credit cards laminated with adhesives based on our specialty resins are easy to read and extremely durable, no matter how often they are used. We work with customers across the industrial lamination industry to develop resins for adhesive laminate systems that make people's lives easier. Our unique expertise in adhesive applications and materials science produces adhesive laminates that perform reliably around the globe and require less energy to apply. Together we can work to develop innovative adhesives to meet new performance, cost, production, or environmental requirements.



we can help our customers create adhesive laminates that withstand the most extreme interior temperatures. As a result, a car owner can live and operate in a desert environment without worrying about the automotive interior panels being damaged by the intense heat exposure.

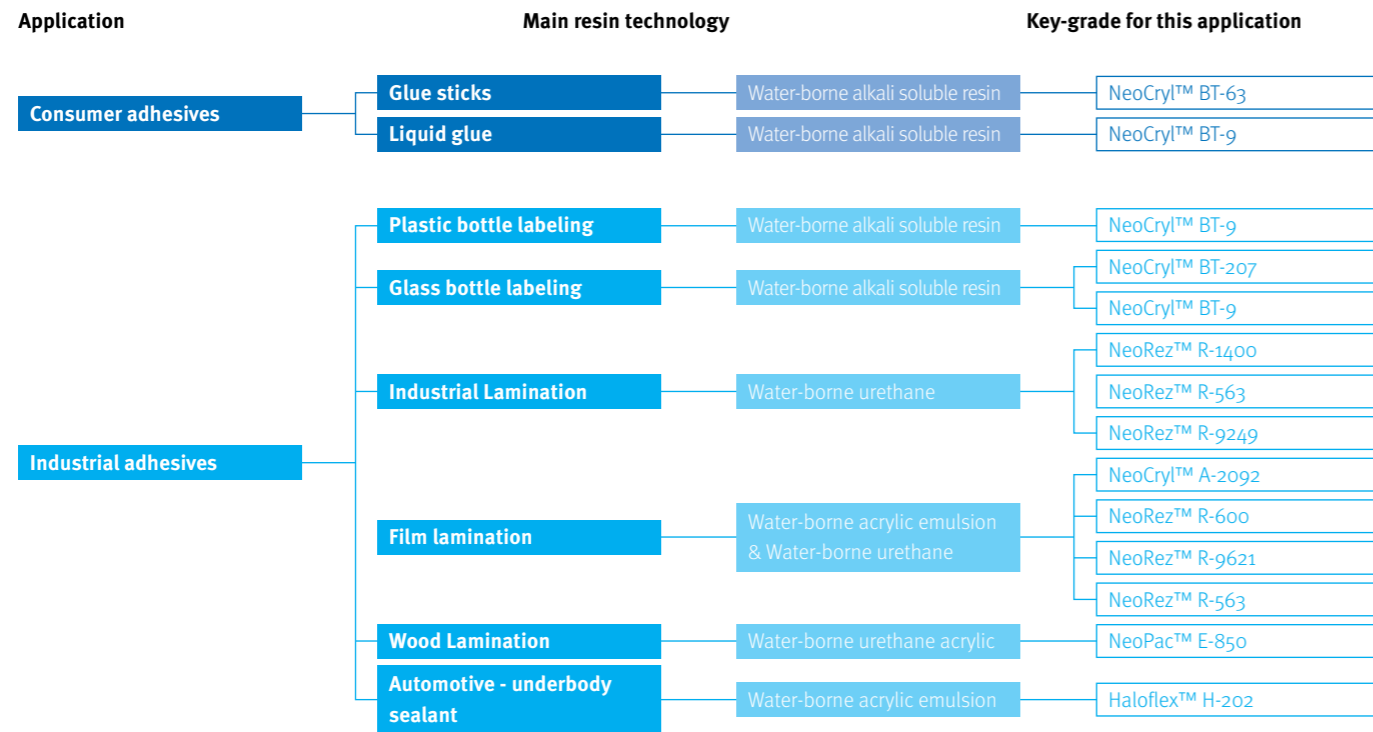
Consumer adhesives

By using our specialty resins, the consumer adhesive manufacturer is able to create universal adhesives for children that will dry as a clear film on their artwork and washes off easily with soap and water and from clothing in a typical detergent wash.. They can also develop a more economical affordable glue

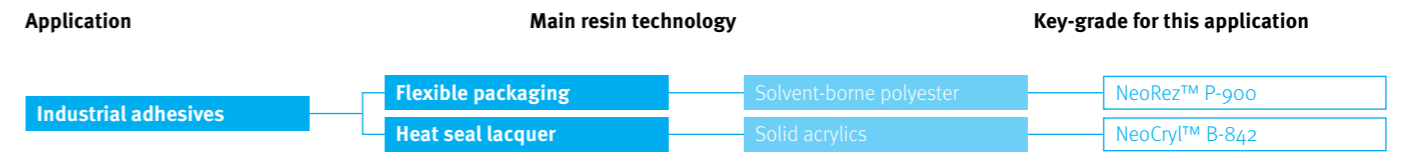


stick. These are some of the bright ideas that have resulted from our close co-operation with adhesive formulators and manufacturers. ...All based on our cutting edge understanding of resin chemistries and adhesive applications. Do you want to improve performance, lower costs, or move to more sustainable adhesives? We have the experience and know-how in specialty resins to help.

Adhesives applications Water-borne



Adhesives applications Solvent-borne



Water-borne alkali soluble resins

	Solids (%)	Viscosity (mPas) @ 23°C	pH	Acid Value (mg KOH/g)	Tg (°C)	Description	Main benefit(s)	Bottle labeling	Consumer adhesives	Industrial lamination	Film lamination	Wood lamination	General assembly	Paper / Paperboard	Wood	Metal (aluminum, steel)	Glass	BOPP	PET	PVC	Activation temperature	Bond strength	Broad substrate adhesion	Heat resistance	Water resistance	Ice water resistance	Resolubility	Formulation guidelines	
NeoCryl™ BT-9	40	15	5,5	72	1	Flexible alkaline soluble resin	Broad adhesion characteristics; PET, glass and paper. Flexible clear film, excellent resolubility. Suitable for bottle labeling as well as consumer hobby adhesives.	●	●					●	●	●				●	●	n/a	++	++	n/a	+	+	++	●
NeoCryl™ BT-63	30	50	2,5	---		Alkaline soluble acrylic copolymer emulsion	Good open time and tack, good bond strength on paper, cardboard and fabrics. Easily formulated for glue sticks.		●					●	●						n/a	+	+	n/a	n/a	n/a	+	●	
NeoCryl™ BT-207	43	50	3	200	10	Alkali soluble resin, with flat pH-viscosity properties	Synthetic alternative to casein. Very high and stable viscosity profile in pH range of 8.2-8.6. Good adhesion to glass, caustic resolubility, hyper-condensation resistant.	●						●			●				n/a	++	+	n/a	++	++	++	●	
NeoCryl™ CL-300	40	150	7,0	---	---	Alkaline soluble, metal complexed acrylic copolymer	High gloss, glass adhesion, caustic resolubility	●						●			●				n/a	+	+	n/a	++	+	+	●	
NeoCryl™ XK-39	45	60	2,3	129	67	Hard non-blocking alkaline soluble acrylic copolymer emulsion	Rheology modifier, blending resin too increase hardness and improve block resistance.		●					●	●						n/a	+	+	+	n/a	n/a	n/a	●	

Water-borne acrylic emulsions

	Solids (%)	Viscosity (mPas) @ 23°C	pH	MFFT	Tg (°C)	Description	Main benefit(s)	Bottle labeling	Consumer adhesives	Industrial lamination	Film lamination	Wood lamination	General assembly	Paper / Paperboard	Wood	Metal (aluminum, steel)	Glass	BOPP	PET	PVC	Activation temperature	Bond strength	Broad substrate adhesion	Heat resistance	Water resistance	Ice water resistance	Resolubility	Formulation guidelines	
Haloflex™ H-202	60	50	1,5	12		Vinyl acrylic copolymer latex	Low moisture vapour transmission, excellent adhesion to metal						●			●						n/a	++	n/a	n/a	++	n/a	n/a	
NeoCryl™ A-45	375	30	9,8	<4	-15	Highly flexible, modified acrylic copolymer emulsion	High adhesion to PP, good water and solvent resistance. Compatible with water based urethanes. Blending resin.			●	●		●	●	●			●	●	●		n/a	+	++	+	+	n/a	n/a	
NeoCryl™ A-662	40	20	7,5	>90		Acrylic styrene copolymer emulsion	Adhesion to plastic substrates such as: ABS, PS and PC			●	●		●	●					●	●		n/a	+	+	n/a	+	n/a	n/a	
NeoCryl™ A-1120	55	600	8,3	<0	-9	High solids self-crosslinking emulsion	Very fast drying and excellent adhesion to polyolefin and polyamide films. Suitable for paper to film wet lamination.			●	●		●	●		●		●	●			n/a	+	++	++	++	n/a	n/a	
NeoCryl™ A-1121	50	90	8,3	<0	-9	High solids self-crosslinking emulsion	Very fast drying and excellent adhesion to polyolefin films. Suitable for paper to film lamination.			●	●			●		●		●	●			n/a	+	++	++	++	n/a	n/a	
NeoCryl™ A-2092	48	300	8,2	6	8	Tough and flexible modified acrylic styrene copolymer dispersion	Water and grease resistant and good wetting. Adhesion to many substrates incl. pre-treated polyolefins. Suitable for heat sealing applications. Direct food contact approved (EU & FDA).	●		●	●			●		●		●	●			+	+	+	+	++	+	n/a	

Water-borne (acrylic) urethanes

	Solids (%)	Viscosity (mPas) @ 23°C	pH	Elongation (%)	Description	Main benefit(s)	Consumer adhesives	Industrial lamination	Film lamination	Wood lamination	General assembly	Paper / Paperboard	Wood	Metal (aluminum, steel)	Glass	BOPP	PET	PVC	Activation temperature	Bond strength	Broad substrate adhesion	Heat resistance	Water resistance	Formulation guidelines
NeoPac™ E-850	40	100	9	---	Aliphatic urethane acrylic copolymer system	Formaldehyde-free resin developed for use in wood furniture adhesives		●		●	●		●						+	++	+	++	++	●
NeoRez™ R-551	35,5	350	8	650	Cosolvent free polyurethane dispersion, for use in contact and lamination adhesives	One component system. Good heat resistance, clear, water white and stable. Excellent adhesion to a variety of substrates.		●			●		●					●	+	++	+	++	++	●
NeoRez™ R-563	38	300	8,2	630	Cosolvent free polyurethane dispersion for use in laminating adhesives	Clear, water white and light stable, excellent adhesion to a variety of substrates, particularly plastics. Heat-activatable.		●	●	●	●		●					●	+	++	++	+	+	
NeoRez™ R-600	33	100	8,2	---	Aliphatic urethane dispersion designed with excellent adhesion to a variety of plastic substrates	Excellent adhesion to a large variety of substrates, including olefinic materials. Suitable as primer for various olefin materials		●	●						●	●		n/a	++	++	++	+	+	
NeoRez™ R-1400	40	200	7,5	1200	Aliphatic polyurethane dispersion with high heat resistance and low activation temperature.	Broad substrate adhesion. Low temperature activation. Ideal for use with temperature sensitive substrates. High temperature resistance upon crosslinking.		●	●	●	●		●				●	●	++	++	++	++	++	
NeoRez™ R-9249	50	<200	5	600	Cosolvent free, nonionic, water-borne aromatic urethane	Heat activatable resin. High heat resistance when crosslinked. Broad formulation compatibility.		●	●	●	●		●				●	●	++	++	++	++	++	
NeoRez™ R-9330	40	340	6,8	---	Non-ionic polyester urethane dispersion	High adhesion resin for plastics, including untreated polyester and ABS		●	●	●	●		●		●	●	●	●	++	++	++	+	+	●
NeoRez™ R-9621	38	300	8,2	630	Cosolvent free polyurethane dispersion for use in laminating adhesives	Clear, water white, excellent adhesion to plastics. Good green strength		●	●	●	●		●					●	+	++	++	+	+	

Solvent-borne polyesters

	Solids (%)	Viscosity (mPas) @ 23°C	pH	Acid Value (mg KOH/g)	Description	Main benefit(s)	Bottle labeling	Consumer adhesives	Industrial lamination	Film lamination	Wood lamination	General assembly	Paper / Paperboard	Wood	Metal (aluminum, steel)	Glass	BOPP	PET	PVC	Activation temperature	Bond strength	Broad substrate adhesion	Heat resistance	Water resistance	Ice water resistance	Resolubility	Formulation guidelines
NeoRez™ P-900	50	3500	N/A	---	High molecular weight polyester film lamination resin. Solution in Ethyl Acetate	Flexible Packaging applications. Film lamination resin offering retort performance and food contact compliance.				●					●		●	●		n/a	++	+	++	++	++	n/a	●

Solid acrylics

	Solids (%)	T _g (°C)	Solubility in solvent *1	Acid Value (mg KOH/g)	OH Value (mg KOH/g)	R&B	Description	Main benefit(s)	Bottle labeling	Consumer adhesives	Industrial lamination	Film lamination	Wood lamination	General assembly	Paper / Paperboard	Wood	Metal (aluminum, steel)	Glass	BOPP	PET	PVC	Activation temperature	Bond strength	Broad substrate adhesion	Heat resistance	Water resistance	Ice water resistance	Resolubility	Formulation guidelines
NeoCryl™ B-723	100	54	C,E,H,K	5,5	<1	194	BMA/MMA copolymer	Heat resistant and durable resin. Good adhesion to metal, NC-compatible.						●		●						n/a	+	+	+	+	n/a	n/a	
NeoCryl™ B-842	100	38	C,E,H,K	<1	<1	155	High flexible BMA copolymer	Glossy resin with broad compatibility. High adhesion to many substrates like aluminum and polystyrene. Used in heat seal lacquers on aluminum yoghurt-lids. Also used in ceramic glazing.						●		●	●					++	++	++	+	+	n/a	n/a	●

*1) C Aromatic solvents (e.g. xylene) E Esters (e.g. ethylacetate) H Higher alcohols (e.g. butanol) K Ketons (e.g. acetone, MEK)

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