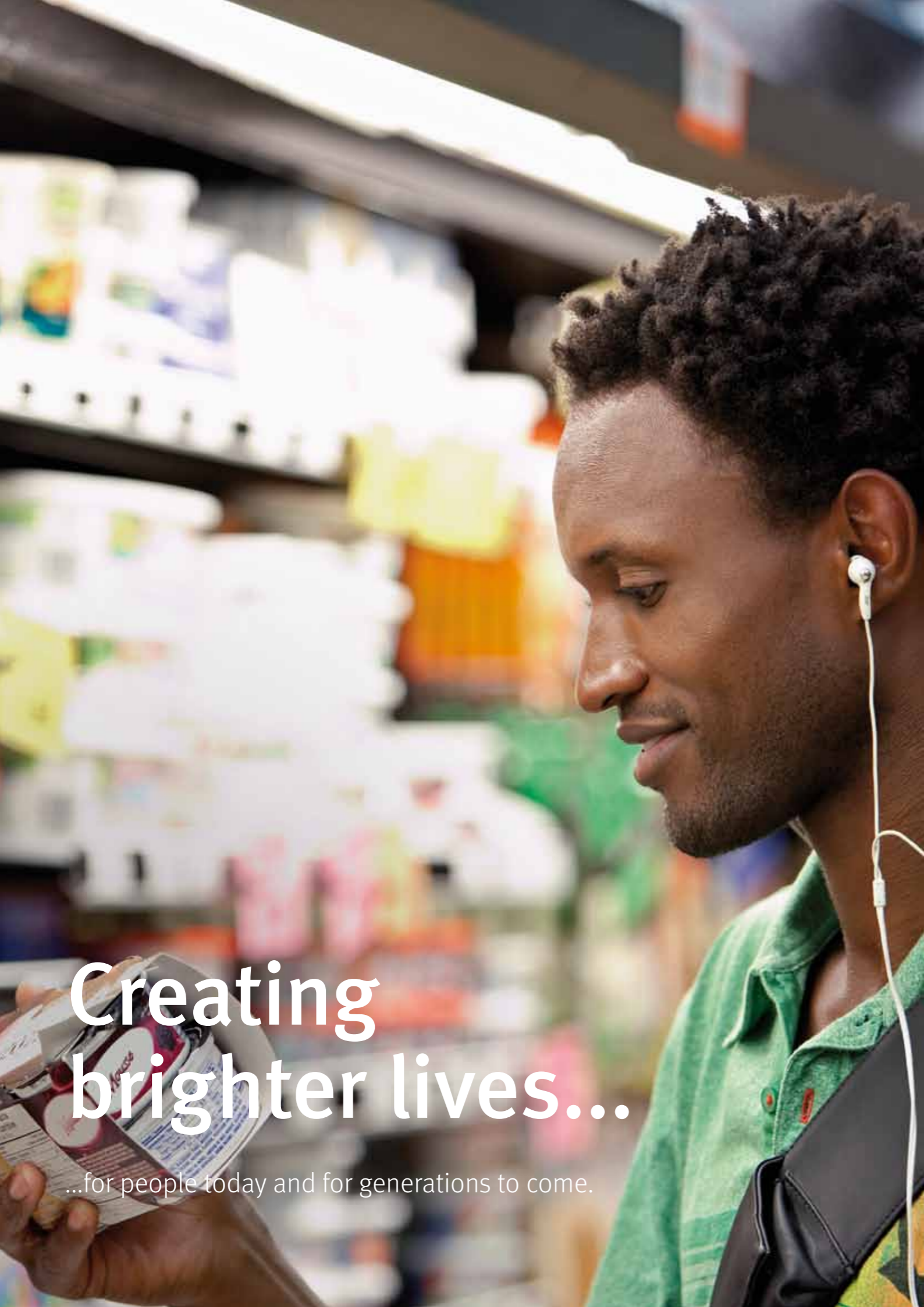


Advanced Polymer Technologies for
Graphic Arts

HEALTH • NUTRITION • MATERIALS





Creating brighter lives...

...for people today and for generations to come.

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.



Graphic Arts

We work closely with ink manufacturers and film coaters to create new solutions for the dynamic packaging and printing (or converting) industry. Our water-borne, solvent-borne and energy curable resins, and support with expertise make them achieve – or exceed – their performance goals. DSM’s broad expertise in printing technologies, application and materials science results at our customers in inks and coatings that meet the most stringent requirements, for instance different resins with food contact approval for every corner of the world.

Major manufacturers of liquid inks, paper coatings, overprint varnishes, and film coatings have relied on us for a number of decades. It’s no wonder. Our in-depth applications know-how and close partnerships with customers helps us develop new products and technologies for the graphic arts industry that are higher performing, more sustainable, reliable, and cost-effective.

Flexible packaging

The visual side of packaging is critical in the fight for attention on supermarket shelves. But the print on packaging has to meet more requirements, especially in flexible packaging where the ink is often part of a multilayer structure of different types of plastic films. The ink should not weaken the package structure and for instance be suitable for exposure to conditions in the oven, microwave or even



withstand to cook the food in the package during production of the food. For flexible packaging our NeoRez® polyurethanes are globally used as ink binders and primers. These resins are used to create vibrant graphics on a juice pouch that will not taint the child’s drink. Or a busy student can quickly prepare a meal in the microwave, without delamination of the laminated film when opening it. This is a result of our long relationships with our customers and our unique understanding of materials science and packaging applications. Take advantage of our experience to move to more sustainable processes and products, improve quality, and realize what you have never been able to realize before.



Paper and board packaging

We realize that you want to enjoy a carton of milk without worrying if the print on the carton taints the milk. Or enjoy to give a box of a bottle of perfume coated with a soft-touch resin that feels as luxurious as it looks.



Or get your lunchtime sandwich in a more sustainable biodegradable packaging of paper with a barrier coating. We also realize that a printed corrugated box which should not add a lot of cost to the packed goods, requiring a very cost effective printing and ink. All of these are examples of joined developments of resins for ink and coatings with customers across the paper and board packaging industry that have a positive effect on people’s lives. Together we can help you develop innovative inks and coatings to meet new performance, cost, production, or environmental requirement, or support you in moving towards more sustainable products and processes.

Industrial graphics

For the broad industrial graphics market, we have developed a portfolio of specialty resins for inks, primers and coatings, using as well water-borne, solvent-borne as UV technologies. Currency notes are exchanged every day by millions of people containing security features like holograms and outstanding long-lasting performance inks and papers based on these products. Many houses around the world are decorated with



beautiful wallpaper designs, printed with inks based on our waterbased resins, that are more friendly for the planet. Whether you need to have a resin to formulate a product for your packaging a higher quality texture, improve performance or reduce your carbon footprint – our unique knowledge of resin chemistries and graphics applications can help you to create your industrial graphics.

Graphic Arts product selector guide
Water-borne resins

	Application	Main resin technology	Key-grade(s) for this application	Page
Paper & board	Corrugated pre-post print	Water-borne alkali soluble resin	NeoCryl® BT-107	8
	Food packaging paper prints	Water-borne acrylic emulsion	NeoCryl® A-2091	10
			NeoCryl® A-2092	10
	Waterbased OPV	Water-borne acrylic emulsion	NeoCryl® A-2091	10
			NeoCryl® A-2092	10
	Waterbased specialty OPV	Water-borne urethane	NeoRez® R-1010	14
	Paper coating	Water-borne acrylic emulsion	NeoCryl® BT-67	12
			NeoCryl® A-2092	10
	Wall paper ink	Water-borne acrylic emulsion	NeoCryl® A-1131	10
	Tissue printing ink	Water-borne acrylic emulsion	NeoCryl® A-1093	12
Security printing	confidential	confidential		
Films	Waterbased film printing	Water-borne acrylic emulsion	NeoCryl® A-1125	10
			NeoCryl® A-1127	10
	Waterbased lamination	Water-borne urethane	NeoRez® R-650	14
			NeoRez® R-9330	16
	Wall paper ink	Water-borne acrylic emulsion	NeoCryl® A-1131	10
	Waterbased OPV	Water-borne acrylic emulsion	NeoCryl® A-2091	10
			NeoCryl® A-2092	10
	Waterbased specialty OPV	Water-borne urethane	NeoRez® R-1010	14
Waterbased primer for PET	Water-borne acrylic emulsion	NeoCryl® BT-67	12	
Security printing	confidential	confidential		

Graphic Arts product selector guide
Water-borne resins

	Application	Main resin technology	Key-grade for this application	Page
Filmcoating	Heat sealable coatings	Water-borne acrylic emulsion	NeoCryl® BT-36	12
	Filmprimer for OPP	Water-borne urethane	NeoRez® R-600	14
	Print receptive coating	Water-borne acrylic emulsion	NeoCryl® XK-90	12
			NeoCryl® A-1127	10
	Anti-static	Water-borne acrylic emulsion	NeoCryl® FI-735	12

Graphic Arts product selector guide
Solvent-borne resins

	Application	Main resin technology	Key-grade for this application	Page
Films	Surface printing ink	Solvent-borne plasticizing urethane	NeoRez® U-322	22
			NeoRez® U-347	22
	Film lamination ink gravure	Solvent-borne elastomeric urethane	NeoRez® U-431	20
	Film lamination ink flexo & gravure	Solvent-borne elastomeric urethane	NeoRez® U-471	20
	Shrink sleeves	Solvent-borne acrylic beads & Solvent-borne urethanes	NeoCryl® B-819	24
NeoRez® U-410			20	

Water-borne alkaline soluble acrylics

	Solids (%)	Viscosity (mPas) @ 23°C	PH	Acid Value (mg KOH/g)	Solids at viscosity of 24 s	Tg (°C)	Description	Main benefit(s)	Surface printing ink	Lamination ink	Overprint varnish	Primer	Flexo	Gravure	Corrugated board	(Un-)coated paper	PE	BOPP	PET	PVC	Heat resistance	Gloss	Water resistance	Dry rub resistance	Ink transfer	Starting point form.
NeoCryl® BT-107	45	200	2,3	150	9,7	85	Alkali soluble resin with high viscosity after neutralization.	Key grade, with excellent economics in use for pre and post print of corrugated board. Linear dilution curve.	●		●		●	●	●						++	+	o	+	o	●
NeoCryl® BT-106	47	100	2,5	130	12,5	36	Alkali soluble resin, with relatively flat pH-viscosity curve.	Key grade with excellent transfer used mainly for post print of corrugated board. Linear dilution curve and rather flat pH-viscosity behaviour.	●		●		●	●	●						+	+	o	o	++	
NeoCryl® BT-101	40	25	2,3	150	12,1	110	Alkali soluble resin.	Printability enhancer for emulsions, heat resistant . Used in OPV and newspaper inks.	●		●		●	●	●						++	++	o	o	+	●
NeoCryl® BT-24	45	25	5,3	73	22,3	29	Alkaline soluble resin, high compatibility with other resins.	Key grade, used for pigment dispersing. Water and humidity resistant resin, for wide variety of applications. Adhesion to wide range of substrates , including polystyrene and ABS.	●	●	●		●	●	●	●	●	●	●	●	+	++	++	+	++	●
NeoCryl® BT-21	40	18	3,5	90	22,8	51	Alkaline soluble acrylic copolymer.	High gloss. Especially suitable to combine with metallic pigments.	●		●		●	●	●						o	++	++	+	++	●
NeoCryl® BT-9	40	15	5,5	72	20,3	1	Flexible alkaline soluble blending resin.	Good compatibility with emulsion and water-borne urethanes.	●		●		●	●	●						-	+	+	+	+	●
NeoCryl® XK-39	45	60	2,3	-	19,0	67	Hard alkaline soluble acrylic copolymer.	Rheology modifier. Used in flexo newspapers inks and overprint varnishes.	●		●		●	●	●						+	++	+	+	++	●

Water-borne acrylic emulsions

	Solids (%)	Viscosity (mPas) @ 23°C	PH	MFFT	Freeze/ thaw stability	Tg (°C)*	Description	Main benefit(s)	Surface printing ink	Lamination	Overprint varnish	Filmic applications	Primer	Flexo	Gravure	Corrugated board	(Un-)coated paper	PE	BOPP	PET	PVC	Heat resistance	Gloss	Water resistance	Grease resistance	Flexibility	Starting point form.
NeoCryl® A-2099	45	400	8,3	17	yes	10	Tough resin with medium MFT acrylic styrene copolymer dispersion, glycol ether free.	High gloss overprint varnishes, with excellent transparency. Grease resistant. Direct food contact compliant (EU & FDA).	●		●			●	●	●	●					0	++	++	+	+	
NeoCryl® A-2092	48	300	8,2	6	yes	8	Tough and flexible acrylic copolymer dispersion, with fast film formation.	Glossy, water and grease resistance, good wetting. Used in paper coatings. Adhesion to many substrates incl. pre-treated polyolefins. Also suitable for heat sealing and print receptive applications. Direct food contact compliant (EU & FDA).	●		●	●	●	●	●	●	●	●	●	●	●	0	+	++	+	+	●
NeoCryl® A-2091	45	200	8,2	>80	yes	100	Hard, non-filmforming styrene acrylic copolymer dispersion.	Key grade with high gloss, clear and transparent, used for high gloss OPV. Hard and block resistant. Direct food contact compliant (EU & FDA).	●		●			●	●	●	●	●	●	●		++	++	++	+	-	●
NeoCryl® A-2082	44	300	8,5	<5	yes	99	Self matting acrylic styrene copolymer dispersion - non formulated.	Easy matt resin, without usage of matting agent. Generally combined with filmforming resin. Flexo and gravure inks, overprint varnishes and matt label coating.			●	●		●	●	●	●	●	●	●		+	-	+	++		●
NeoCryl® A-1131	40	250	9,4	82	yes	64	Hard, non blocking emulsion, requires coalescent for film forming.	Suitable for PVC and paper wallcovering with excellent plasticizer, water and chemical resistance. Excellent anti blocking and temperature resistance.	●		●			●	●	●	●			●	●	++	+	+	++	-	●
NeoCryl® A-1127	44	150	7,5	7	no	-18	Self-crosslinking emulsion	Best chemical and physical resistance level of the acrylics. For surface printing onto polyolefines, polyesters, polyamide and coating of metalized films. Also used in print receptive, heat-seal blister and embossing applications.	●		●	●	●	●	●	●	●	●	●	●		+	+	++	++	++	●
NeoCryl® A-1125	19,5	350	8,5		yes	14	Self cross-linking acrylic copolymer solution.	Printability modifier for NeoCryl® A-1127 without effecting adhesion properties and chemical resistance.	●	●	●			●	●	●	●	●	●	●		+	+	++	+	++	●
NeoCryl® A-1120	55	600	8,3	<0	no	-30	High solids self-crosslinking emulsion.	Fast drying and excellent adhesion to polyolefin, polyester and polyamide films. Dry and wet wrinkle resistance. Good surface hold out. Suitable for tissue paper, also used for paper to film lamination.	●	●				●	●	●	●	●	●	●		0	++	++	+	++	●
NeoCryl® A-1110	58	400	7,6	31	yes	46	Very high solid styrene acrylic emulsion.	High gloss and color strength, suitable for broad range of color paste systems. Early rub- and block-resistance, fast drying and good surface hold out. EU food contact approved.	●		●			●	●	●	●					0	+	+	0	0	●
NeoCryl® A-1105	50	70	7,5		yes	93	Hard non-filmforming acrylic copolymer dispersion.	Plasticizer resistant. Suitable for PVC and paper wallcovering with excellent chemical resistance.	●					●	●						●	++	++	+	++	-	
NeoCryl® A-1101	40	60	7	23	no	20	Crosslinkable OH functional acrylic copolymer emulsion.	Good water and chemical resistance, excellent alcohol tolerance. Suitable for metalized films.			●		●					●	●	●		+	+	++	++	0	
NeoCryl® A-1096	46,5	350	8,3	8	yes	8	Semi formulated acrylic styrene copolymer dispersion.	Glossy, water and grease resistance, rub resistance. Especially for paper applications requiring low Cobb values. Condensation resistance for deep freeze packaging. EU food contact compliant.			●			●	●	●	●	●	●	●		+	++	++	++	+	
NeoCryl® A-1095	45	450	8,4	<0	yes	-28	A low Tg, soft modified acrylic styrene copolymer dispersion with fast film formation.	Excellent adhesion onto polyolefines, PET and polyamide. Dry and wet rub resistance. Provides anti-slip properties to overprint varnishes. EU food contact compliant .	●		●			●	●	●	●	●	●	●		0	++	+	++	++	●
NeoCryl® A-1094	45,5	600	8,5	9	yes	21	Hard and flexible film forming acrylic styrene copolymer dispersion.	Excellent printability, gloss, block resistance for overprint varnishes.	●		●	●		●	●	●	●					+	++	+	+	+	●

*) Glass temperature of resin, in case of multiple components, Tg is indicated for major component

Water-borne acrylic emulsions

	Solids (%)	Viscosity (mPas) @ 23°C	PH	MFFT	Freeze/ thaw stability	Tg (°C) ^{*)}	Description	Main benefit(s)	Surface printing ink	Lamination	Overprint varnish	Filmic applications	Primer	Flexo	Gravure	Corrugated board	(Un-)coated paper	PE	BOPP	PET	PVC	Heat resistance	Gloss	Water resistance	Grease resistance	Flexibility	Starting point form.
NeoCryl® A-1093	47,5	450	8,4	10	yes	17	Acrylic styrene copolymer dispersion.	Water resistance and gloss, used for paper coatings. EU food contact compliancy. Used also for tissue printing.	●		●			●	●		●					0	++	++	+	+	●
NeoCryl® A-1092	48,5	450	8,4	6	yes	9	Filmforming acrylic styrene copolymer dispersion.	Resin with excellent printability and transparency. Combines grease and water resistance. EU food contact compliant.	●		●			●	●	●	●	●	●	●		0	+	++	++	+	●
NeoCryl® A-1091	45	250	8,3	>80	yes	98	Non-filmforming styrene copolymer dispersion.	Providing a glossy and scratch resistant ink and overprint varnishes, with high transparency. EU food contact compliant.	●		●			●	●	●	●	●	●			++	++	+	+	-	●
NeoCryl® A-45	37,5	30	9,8	<4	no	-15	Highly flexible, acrylic copolymer emulsion	High adhesion to PP, water and solvent resistant. Modifier for waterbased urethanes.	●			●	●	●	●			●	●	●	●		-	+	+		++
NeoCryl® BT-67	39	150	9	20	yes	17	Metal crosslinking semi-colloidal resin with low residual odour.	Heat resistant resin. Good adhesion to aluminum. Primer and top coat for vacuum metalized films. Used as paper barrier coating. Food contact compliant(EU & FDA).	●		●		●	●	●	●	●		●	●		++	++	+	+	+	●
NeoCryl® BT-62	40	250	8,2	10	yes	22	Semi-colloidal acrylic styrene copolymer with low residual odour	Water resistance (low Cobb value). High wet/dry rub resistance, used also for tissue printing. EU food contact compliant.	●				●	●	●	●	●					0	+	++	+	+	●
NeoCryl® BT-36	20	15	10,5	45	no	61	Acrylic anionic alkali solubilized resin, co-solvent free.	Heat sealable resin for PP packaging film with high seal strength. Excellent clarity, low residual odour and good aroma barrier. Printable with water and solvent based inks. Suitable for embossing for holographic applications			●		●			●			●		●		-	+	+		0
NeoCryl® FL-735	20	25	6,5	<0	no		Anti-static anionic acrylic copolymer dispersion	Anti-static coating for plastic packaging films. Excellent printability performance.			●	●			●			●	●	●			-	0	-		0
NeoCryl® FL-711	20	20	10	30	no	55	Anionic acrylic emulsion.	Low temperature heat-sealable and printable topcoat				●							●				-	+	+		0
NeoCryl® XK-151	42,5	130	7,1	35	yes	40	Hard acrylic copolymer emulsion with good UV resistance	Glossy, clear, water and household chemicals resistant. Plasticizer resistance. Used for PVC gravure inks.	●		●	●					●				●	0	++	++		0	
NeoCryl® XK-95	41	30	8,7	<4	yes	16	Anionic acrylic emulsion, with easy film formation and outdoor durability.	Printable topcoat, on various plastic films. Excellent block resistance and gloss. Alcohol and water resistant.	●		●	●							●		●	++	+	++		+	
NeoCryl® XK-90	45	75	8,7	<0	yes	3	Anionic acrylic emulsion, with easy film formation and outdoor durability.	Printable topcoat, on various plastic films and metal. High block resistance and gloss. Alcohol and water resistant.	●		●	●										++	+	++		+	
NeoCryl® XK-85	40	150	9,2	19	yes	29	Low particle size acrylic styrene emulsion	Low MVTR barrier coating on paper. High gloss. Adhesion to various metals, corrosion and humidity resistant.			●		●			●						0	++	++	0	+	●
NeoCryl® XK-52	40	15	5,1	>100	no	108	Hard methacrylic polymer emulsion	Used as co-resin to improve anti blocking and increases hardness. Suitable for wall paper applications.	●		●			●	●	●					●	++	++	+	+	-	
NeoCryl® XK-14	40	150	8,6	33	yes	50	Hard self crosslinking, emulsifier free copolymer emulsion small particle size	Non blocking resin, transparent, with chemical, alcohol and detergent resistance. Good adhesion to plastics including polystyrene and polyamide.	●		●			●	●		●	●		●		++	++	++	+	-	

*) Glass temperature of resin, in case of multiple components, Tg is indicated for major component

Water-borne urethanes

	Solids (%)	Viscosity (mPas) @ 23°C	PH	MFFT	Freeze/ thaw stability	Tg (°C)	Description	Main benefit(s)	Surface printing ink	Lamination	Overprint varnish	Filmic Applications	Primer	Flexo	Gravure	Corrugated board	(Un-)coated paper	PE	BOPP	PET	PVC	Heat resistance	Gloss	Water resistance	Grease resistance	Starting point form.
NeoRez® R-9330	40	340	6,8	< 0	yes	n/a	Polyurethane dispersion compatible with different types of pigment dispersions	High adhesion resin for plastics, including untreated polyester and ABS. Suitable mainly for in-line film lamination ink.	●					●	●			●	●	●	●	-	++	0	++	●
NeoRez® R-2202	35	350	8	81	yes	n/a	APEO free, hard polyurethane dispersion.	Hard, abrasion resistant, high gloss. Water, humidity, solvent. Use in high performance top coats.			●	●	●								●	●	++	++	++	+
NeoRez® R-1010	32	600	8	< 5	yes	n/a	Specialty aliphatic polyurethane dispersion, with large particle size. APEO free. Non formulated product.	Excellent soft feel effect resin with matt appearance. Mainly used for OPV, also over offset print. EU food contact compliant.	●		●	●		●	●	●	●	●	●	●	●	+	-	0	+	●
NeoRez® R-1007	40	120	7,6	< 0	no	n/a	Anionic, APEO free, flexible, aliphatic polyurethane dispersion, elongation 650%	Flexibilising resin for acrylic emulsions. Abrasion and UV resistant. Adhesion to polyamide and aluminum. Suitable for printing on textiles.	●		●				●			●			●	0	+	++	++	
NeoRez® R-1005	39	140	7,2	< 0	no	n/a	Flexible, APEO-free, anionic, aliphatic polyurethane dispersion, elongation 460%	Tough and flexibilising resin, which can be combined with acrylic emulsions. Suitable for flexible substrates and textiles.	●		●				●			●	●			0	+	++	++	
NeoRez® R-981	32	150	8,5	< 0	yes	n/a	Aliphatic urethane dispersion with UV resistance, elongation 330%. NMP containing.	Hard, water and chemical resistant polyurethane dispersion for use in high performance top coats and screen inks.	●		●			●				●		●		++	++	++	++	●
NeoRez® R-972	34	100	8	6	yes	n/a	Colloidal aliphatic urethane dispersion with UV resistance, elongation 410%, NMP containing.	Flexible resin with high resistance level. Used in coatings and inks for flexible substrates, like printing on textile. Also good adhesion to polyamide.	●			●						●	●	●	●	+	++	++	++	●
NeoRez® R-650	38	180	< 0	< 0	yes	n/a	Flexible aliphatic polyurethane resin, non tin based. APEO free.	High reversibility. Excellent adhesion to a wide variety of packaging films including OPA and aluminum. Suitable for lamination ink for films. EU food contact compliant.	●	●				●	●			●		●		0	++	0	0	●
NeoRez® R-620	36	100	8,0	33	yes	n/a	Anionic aliphatic polyurethane dispersion	Block-free / flexible, exhibits outstanding adhesion characteristics to a wide variety of plastic substrates. Provides excellent ink adhesion and printability performance.				●	●					●	●			+	++	+	+	●
NeoRez® R-610	28	100	8,7	< 0	yes	n/a	Anionic aliphatic polyurethane dispersion	Primer for filmic applications. The product provides excellent adhesion to a variety of plastic substrates and can be topcoated with acrylic, urethane and PVDC resins. Ideal for humid conditions .				●	●					●	●			-	+	+	+	●
NeoRez® R-600	33	100	8,2	< 0	yes	n/a	Anionic aliphatic polyurethane dispersion	A primer for filmic primer applications. The product provides excellent adhesion to a variety of plastic substrates and can be topcoated with various polymers including acrylic, urethane and PVDC.				●	●					●	●	●	●	-	+	+	+	●
NeoRez® R-563	38	500	8,0	< 0	no	n/a	Co-solvent free, anionic aliphatic polyurethane	A primer for filmic primer applications. The product provides excellent adhesion to a variety of plastic substrates and can be topcoated with various polymers including acrylic, urethane and PVDC.				●	●					●	●	●	●	-	++	+	+	
NeoRez® R-9660	33	300	8,8		no	n/a	Anionic aliphatic urethane, APEO free.	Universal topcoat for filmic applications with a balance of hardness/flexibility combined with chemical and abrasion resistance suitable for outdoor applications.				●						●	●			+	+	++	++	
NeoRad™ R-444	40	150	8,5	< 0	no	n/a	Water based UV curable urethane acrylate oligomer	Non-blocking modifier for print receptive applications giving excellent UV ink adhesion. Also used in UV curable inks and OPVS.	●		●	●					●		●	●		++ ^{*2}	+	++ ^{*2}	++ ^{*2}	●

*2) Properties obtained after UV curing

Water-borne urethane acrylics

	Solids (%)	Viscosity (mPas) @ 23°C	PH	MFFT	Freeze/ thaw stability	Tg (°C)	Description	Main benefit(s)	Surface printing ink	Lamination	Overprint varnish	Filmic Applications	Primer	Flexo	Gravure	Corrugated board	(Un-)coated paper	PE	BOPP	PET	PVC	Heat resistance	Gloss	Water resistance	Grease resistance	Flexibility	Starting point form.
NeoPac™ E-200	39	170	8.4	< 0	yes	n/a	Non TEA neutralized aliphatic urethane acrylic resin, non tin.	Good reversible emulsion. High adhesion to film substrates, suitable for water-borne lamination ink. Sterilization resistance in laminates. EU food contact complaint.	●					●	●			●	●	●	●	+	+	o	++	++	●
NeoPac™ E-125	35,5	100	8	29	yes	n/a	Water based self crosslinking aliphatic urethane acrylic copolymer, APEO free.	Superb performance with respect to chemical resistance. Requires coalescence in formulation.	●				●					●	●	●	●	+	+	++	++	o	
NeoPac™ R-9020	40	<100	8				NMP-free, hard/flexible, aliphatic polyurethane dispersion.	High performance polymer with excellent adhesion to BOPP and PET and ideally suited for the formulation of printable and/or protective coatings for application onto for film and ridge plastics.				●							●	●		+	+	++	++	+	

Crosslinkers & additives

	Solids (%)	Viscosity (mPas) @ 23°C	PH	Description	Main benefit(s)	Surface printing ink	Lamination	Overprint varnish	Filmic Applications	Primer	Flexo	Gravure	Corrugated board	(Un-)coated paper	PE	BOPP	PET	PVC	Heat resistance	Gloss	Water resistance	Grease resistance	Flexibility	Formulation guidelines
Crosslinker™ CX-100	100	200	10,5	Polyaziridine crosslinker	Performance improvement of carboxyl functional resins, addition typical 1-3%. In waterbased systems improves water, chemical, abrasion and humidity resistance and enhances adhesion to specific, like non-polar, substrates. In solvent based polymers increases resistance properties	●	●	●	●	●	●	●			●	●	●	●	++	o	++	++	o	
Crosslinker™ CX-300	50			Carbodiimide crosslinker in methoxypropyl acetate	Performance improvement of carboxyl functional resins, addition typical 3-12%. In waterbased systems improves water, chemical and humidity resistance and enhances (wet) adhesion to specific substrates.	●	●	●	●	●	●	●			●	●	●	●	+	o	+	+	o	



Solvent-borne

Solvent-borne elastomeric urethanes

	Solids (%)	Viscosity (mPas) @ 23°C	Solvents	Non tin and TDI based ^{*)}	Description	Main benefit(s)	Surface printing ink	Lamination	Overprint varnish	Primer	Flexo	Gravure	PE	OPP	CPP	PET	PA	Bondstrength	Heatseal resistance in the laminate	Tack free binder	Sterilisation resist.	Printability	Sole binder white inks	Starting point form.
NeoRez® U-471	51	3000	36% EtOH, 13% EtAc	x	Non-tacky, hydroxyl functional aliphatic film forming polyurethane. Tin and TDI free.	Excellent bond strength in a broad variety of laminates, especially PET. Excellent alcohol tolerance, also in combination with NC. Non yellowing. Suitable for retorting, sterilization and pasteurization applications.	●	●			●	●	●	●	●	●	●	++	++	++	++	+	++	●
NeoRez® U-431	33	2000	53% EtAc, 13% IPA	x	Non-tacky aliphatic film forming polyurethane. Tin and TDI free.	Gravure binder for wide variety, including low surface tension, substrates. Suitable for retort applications and for sole binder inks. High bondstrength in adhesive and extrusion lamination.		●				●	●	●	●	●	●	++	++	++	++	++	++	●
NeoRez® U-410	54	8000	19% EtAc 27% EtOH	x	Hydroxyl functional semi aliphatic filmforming urethane. Tin and TDI free.	Excellent printability; reduced tendency for defects like scumming, and cob-webbing. Block and heat resistance.	●	●			●	●	●	●	●	●	●	++	+	++	++	++	+	●
NeoRez® U-397	45	1800	18% PrAc 36% n-Prop	x	Ethanol free hydroxyl functional semi aliphatic filmforming polyurethane. Tin and TDI free.	Suitable to formulate ethanol free laminating inks.	●	●			●	●	●	●	●	●	●	++	++	++	+	+	++	●
NeoRez® U-395	45	3500	12.5% EtAc 42.5% EtOH	x	Key grade filmforming urethane. Tin and TDI free.	Workhorse for laminating inks for wide variety of substrates. Low solvent retention and good NC compatibility.	●	●			●	●	●	●	●	●	●	+	+	+	o	+	o	●
NeoRez® U-371	42	1200	16% EtAc 42% EtOH		Hydroxyl functional semi aliphatic film forming polyurethane.	Tough resin, with excellent blocking resistance. Low co-resin (nitro demand). Organic pigment grinding.	●	●			●	●	●	●	●	●	●	++	++	++	o	+	++	●
NeoRez® U-335	45	1850	13% EtAc 42% EtOH		Aromatic film forming polyurethane.	Predecessor of NeoRez® U-395. Low solvent retention and good NC compatibility.	●	●			●	●		● ^{*5}	● ^{*5}	●		+	+	+	o	+	o	●
NeoRez® U-329	55	8000	11% EtAc 34% EtOH		High solids, semi aliphatic high molecular weight polyurethane.	Economical laminating ink binder for PET lamination.		●			●	●		● ^{*5}	● ^{*5}	●		+	+	+	o	+	o	●

^{*)} All products are free of organo tin, this indicates that also no tin salts are used ^{*)} For adhesion the usage of an adhesion promotor is recommended

Solvent-borne plasticizing urethanes

	Solids (%)	Viscosity (mPas) @ 23°C	Solvents	Non tin and TDI based ^{*)}	Description	Main benefit(s)	Surface printing ink	Lamination	Overprint varnish	Primer	Flexo	Gravure	PE	OPP	PET	Aluminium	Bondstrength	Heatseal resistance	Anti blocking	Dry/wet wrinkle resistance	Printability	Grease resistance	Starting point form.
NeoRez® U-394	70	1000	23% EtAc 7% IPA		Non-reactive plasticizing polyurethane resin. TDI free.	Co-binder for gravure inks in surface printing and some easy laminates (OPP/OPP).	●					●	●	●	● ^{*)}	●	○	+	++	○	++	++	●
NeoRez® U-392	75	150	25% EtAc	x	Non-reactive plasticizing polyurethane resin.	Highly flexible co-binder with good deep-freeze resistance. Compatibility with NC, PVB and Vinyl. Used mainly for surface printing and in simple laminates (OPP/PE and ALU/PE).	●				●	●	●	●		●	○	++	+	++	++	+	●
NeoRez® U-391	70	800	29.5% EtAc 0.5% EtOH	x	Tough semi-film forming polyether polyurethane,	Co-binder for (mono-solvent) gravure inks in surface printing of OPP and polyester films. Fat and grease resistant. Also suitable for simple laminate structures of OPP. Highest bonstrength of all plasticizing grades.	●	●				●	●	●	● ^{*)}	●	+	+	++	○	++	++	●
NeoRez® U-347	75	1100	22% EtAc 3% EtOH		Non-reactive plasticizing polyurethane resin. TDI free.	Highly versatile co-binder for surface printing. Low solvent retention. Also suitable for simple laminate structures (OPP with PE, OPP or ALU and ALU/PE).	●	●			●	●	●	●		●	+	+	+	++	++	++	●
NeoRez® U-322	75	1100	22% EtAc 3% EtOH		Non-reactive aromatic flexible plasticizing polyurethane resin.	Key grade for surface printing inks, adhesion promoting and flexibilising resin for film forming ink binders. Used for simple laminates, (OPP/PE and Alu/PE).	●		●		●	●	●	●		●	○	++	○	++	++	+	●

^{*)} All products are free of organo tin, this indicates that also no tin salts are used ^{*)} Only in surface printing

Acrylics

	Molecular weight (Dalton)	Tg (°C)	Solubility in solvent **6	Acid Value (mg KOH/g)	OH Value (mg KOH/g)	Softening temperature (°C)	Description	Main benefit(s)	Surface printing ink	Lamination	Overprint varnish / coating	Primer	Flexo	Gravure	Screen	PET	Aluminum	PVC	Flexibility	Water resistance	Chemical resistance	Nitrocellulose compatibility	Use in zK system	Starting point form.
NeoCryl® B-891	33000	77	C,E,H,K	13	<1	170	Hard and tough BMA/MMA copolymer.	Clear resin with good plasticizer, chemical and petrol resistance. Adhesion to plastics and some metals. Used in a variety of relative high solid inks.	●		●		●	●	●		●	●	○	○	○			●
NeoCryl® B-890	12500	85	E,G,H, K	75	25	-	Hard and brittle modified MMA/BMA.	Excellent compatibility with NC; CAP; PVB and PU-resins, soluble in ethanol and water. Suitable for low residual odour printing inks and coatings. Suitable for a release coating on PET.	●		●		●					●	-	-	-	+*7	+	●
NeoCryl® B-864	160000	65	C, E,K,	< 1	< 1	175	High molecular weight IBMA homopolymer.	Clear, tough and flexible resin. Low residual odour. Suitable to combine with aluminum and bronze pigments.	●		●		●	●			●		+	++	++			●
NeoCryl® B-851	150000	60	C,E,H,K	15	74	>175	Tough and flexible BMA/styrene copolymer. Isocyanate crosslinkable.	Pigment dispersant. Suitable for printing on aluminum and flexible packaging substrates.			●	●	●				●		++	+	+		++	●
NeoCryl® B-842	110000	38	C,E,H,K	<1	<1	155	High flexible BMA copolymer.	Used in heat seal lacquers on aluminum. Glossy resin with broad compatibility. High adhesion to many substrates like aluminum and polystyrene. Also used in ceramic glazing.	●	●	●		●	●	●		●		++	++	+	+*7		●
NeoCryl® B-819	50000	70	C,E,G,H,K	17	68	140	Styrene/ BMA copolymer.	Good NC compatibility, also in flexo. Used for shrink sleeves applications. Excellent grinding vehicle, good alcohol solubility.	●	●	●		●	●			●	●	+	○	○	++	+	●
NeoCryl® B-818	38000	60	C,E,G,H,K	50	25	143	EA/EMA copolymer.	Good alcohol/water tolerance. Flexo inks on film and paper. excellent solubility in alcohols. Compatible with other resins like NC, CAP, PVB and PU.	●		●		●				●	●	+	○	○	+*7	+	●
NeoCryl® B-817	23000	64	C,E,G,H,K	60	30	130	Alkali soluble acrylic copolymer, good water dissolution at pH>8.	Pigment dispersant. Modifying binder for inks & OPV's. Good alcohol/water tolerance. Compatible with NC, CAP and acrylic and acrylic-styrene copolymer dispersions.	●		●		●	●			●		○	-	-	+*7	+	●
NeoCryl® B-814	50000	52	C,E,G,H,K	10	<1	135	Flexible EA/EMA/MMA copolymer.	Flexibility, wide adhesion characteristics, fast drying and low residual odour. Used in transfer printing of metalized PET. Also used in overprint varnishes and flexo printing inks, also on paper.	●		●	●	●	●			●	●	++	○	+	+*7		●
NeoCryl® B-813	40000	64	C,E,G,H,K	10	<1	160	Hard EMA homo polymer.	Clear, non blocking, good alcohol tolerance and low odour. Plasticizer migration resistant. Compatible with NC.			●		●	●			●		-	○	+	+*7		●
NeoCryl® B-811	40000	110	C,E,K	<1	<1	200	Hard MMA homo polymer.	Durable resin with plasticizer and chemical resistance. Good aluminum adhesion. Used as release coating on PET, for PVC printing, and metallic inks.	●		●		●	●			●		-	○	++			●
NeoCryl® B-810	55000	59	C,E,H,K	7	<1	155	Hard and tough BMA/MMA copolymer.	Durable resin with broad compatibility suitable for upgrading vinyl and NC systems. Easy solubility, good solvent release giving low residual odour.	●		●		●	●	●		●	●	○	+	+	+*7		●
NeoCryl® B-807	100000	118	C,E,K	6,5	<1	>200	Very hard MMA homo polymer.	Most durable resin with plasticizer and chemical resistance. High heat and abrasion resistance.	●		●		●	●			●		○	-	++	+*7		●
NeoCryl® B-805	85000	99	C,E,K	<1	<1	190	Hard MMA/BMA copolymer.	Durable resin, alcohol, petrol, plasticizer resistant. Good compatibility with vinyl, NC and acrylic. Suitable for a release coating on PET.	●		●			●			●		-	+	++	+*7		●
NeoCryl® B-804	160000	33	C,E,H,K	7	<1	160	Soft and flexible BMA homo polymer.	Highly thermoplastic resin, used as adhesion promoter for flexo and gravure printing inks. Adhesion to aluminum. Good tolerance with wide range of binders.	●		●		●	●	●		●		++	+	+	+*7		●
NeoCryl® B-736	100000	98	C,E,K	<1	<1	155	Tough MMA copolymer.	Exterior durability for use in high performance coatings and inks. Good solubility and chemical (alcohol/plasticizer) resistance.	●		●		●	●	●		●		+	++	++			●

**6) C Aromatic solvents (e.g. xylene) E Esters (e.g. ethylacetate) G Lower alcohols (e.g. ethanol) H Higher alcohols (e.g. butanol) K Ketons (e.g. acetone, MEK)
*) only in gravure formulations

	Molecular weight (Dalton)	Tg (°C)	Solubility in solvent **6	Acid Value (mg KOH/g)	OH Value (mg KOH/g)	Softening temperature (°C)	Description	Main benefit(s)	Surface printing ink	Lamination	Overprint varnish / coating	Primer	Flexo	Gravure	Screen	PET	Aluminum	PVC	Flexibility	Water resistance	Chemical resistance	Nitrocellulose compatibility	Use in zK system	Starting point form.
NeoCryl® B-735	40000	74	C,E,K	11	<1	160	Hard and tough MMA/BMA copolymer	Used in PVC inks due to vinyl and NC compatibility. Good plasticizer and chemical resistance. Used for high solids inks. Also adhesion to metal.	●	●	●	●	●	●	●	●	●	●	+	○	++	+	+	●
NeoCryl® B-731	55000	56	C,E,K	1,5	<1	140	Tough and flexible IBMA copolymer	Good pigment wetting of non-polar surfaces, superior adhesion on plastics.			●		●	●	●			●	++	+	+	+	+	●
NeoCryl® B-728	65000	111	C,E,K	6,5	<1	>200	Hard MMA homo polymer	Durable and abrasion resistant. Excellent water, solvent, chemical and heat resistance. Suitable for wallpaper printing and hot stamping.	●		●			●	●		●	●	-	++	++	+	+	●
NeoCryl® B-723	200000	54	C,E,H, K	5,5	<1	194	BMA/MMA copolymer	Heat resistant and durable resin with good color retention. Good adhesion to aluminum. NC-compatible. Used for specialty gravure inks (gold, pearlescent).	●		●			●		●	●	●	++	+	+	+	+	●
NeoCryl® B-722	55000	43	C,E,G-partly,H, K	7,5	<1	135	Flexible EA/MMA copolymer	Plasticizer resistant, compatible with NC, vinyls and CAB,	●		●			●		●		●	++	○	+	+	+	●
NeoCryl® B-705	125000	67	C,E,K	<1	<1	150	Hard IBMA copolymer	Durable resin with excellent flow and leveling. Compatible with broad range of waxes, plasticizers, binders etc.			●	●		●				●	○	++	+	+	+	
NeoCryl® B-700	125000	56	C,E,K	<1	<1	170	Hard and tough IBMA homo polymer	Outdoor durable with broad solubility/compatibility. Used for metallic gravure inks.	●		●			●	●			●	+	++	++	+	+	

*6) C Aromatic solvents (e.g. xylene) E Esters (e.g. ethylacetate) G Lower alcohols (e.g. ethanol) H Higher alcohols (e.g. butanol) K Ketons (e.g. acetone, MEK)
 **) only in gravure formulations

Abbreviations	
EU	European Union
FDA	Food and Drugs Administration (US)
EtOH	Alcohol
IPA	Isopropyl alcohol
n-Prop	n-Propanol
EtAc	Ethylacetate
PrAc	Propylacetate

Alu	Aluminum
CPP	Cast polypropylene
PE	Polyethylene
PET	Polyester, polyethylene terephthalate
PVC	Vinyl, polyvinylchloride
OPA	Oriented polyamide
OPP	Oriented polypropylene

NC	Nitrocellulose
PVB	Polyvinylbutyral
CAB	cellulose acetate butyrate resin
CAP	cellulose acetate propionate resin

APEO	Alkylphenol ethoxylates
MMA	methylmethacrylate
BMA	butylmethacrylate
IBMA	isobornylmethacrylate
EA	ethylacrylate

EMA	ethylmethacrylate
NMP	n-Methylpyrrolidone
TDI	Toluene diisocyanate
TEA	Triethylamine
UV	Ultraviolet

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