ADVANCED COMPOSITES SOLUTIONS

HIGH PERFORMANCE EPOXY AND POLYURETHANE SYSTEMS

BUILDING TRUST

CREATING A STRONG FUTURE

Worldwide solutions in PUR and EP resins

YOUR ADDED VALUE

Reliability and Safety
Sika Advanced Resins is on your side as a strong global player. As an inherent part of the Swiss concern Sika AG you can rely on us.

Quality and Innovation
Our clients expect high-quality end products. Benefit from over 75 years of intensive expertise in the development of high-quality PUR and EP resins. With innovative and coordinated PUR and EP product systems, we help you to achieve end user satisfaction.

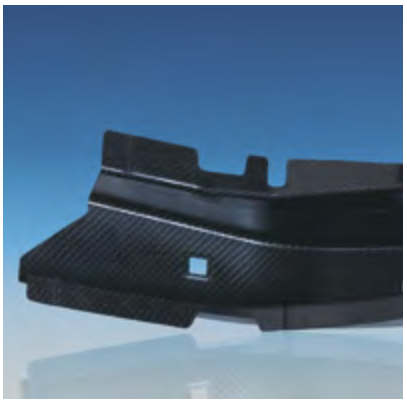
Flexibility and integrated solutions
As individual as your task. The comprehensive and integrated product range of Sika Advanced Resins offers you even more solutions for your applications.

Professional global support worldwide
Local experts provide you with personal on-site support in all issues relating to product processing and plant technology.

Global Availability
The consolidation of worldwide production sites, several development departments and our global dealer network maximizes the availability of our products – wherever you are located.

"As a global leader in Tooling and Composites it is our aim to provide our customers with best in class innovative and tailor made solutions. Being close to our customers is not only a word for us: Worldwide production and on-site support of our experts is the basis of our success. Every day, we are looking forward to create new and better solutions together with our customers."

MORTEN MUSCHAK
Head Sika Advanced Resins



CUSTOMIZED SOLUTIONS FOR ...

- Foundry model making
- Automotive industry
- Transportation industry
- Sports and leisure
- Industrial applications
- Boat and yacht building industry
- Aviation industry
- Renewable energies (wind energy, solar energy)
- Dielectrics

WITH OVER 75 YEARS OF EXPERIENCE, Sika Advanced Resins is the world leading provider and developer of high-performance resins, block materials and pastes for model and mould making. Sika Advanced Resins offers customized solutions for the composites industry – from the model to the shape and finished parts up to the fitting structural adhesive.
In addition, Sika Advanced Resins offers casting resins and functional coatings for industrial filters and dielectrics.
Sika Advanced Resins generates an annual turnover of € 150 million with 450 employees.
Sika Advanced Resins is part of Sika AG, which is headquartered in Baar, Switzerland. Sika has subsidiaries in 101 countries worldwide, with more than 200 manufacturing sites. It has approx. 19,500 employees, who generated an annual turnover of CHF 7.1 billion in 2018.

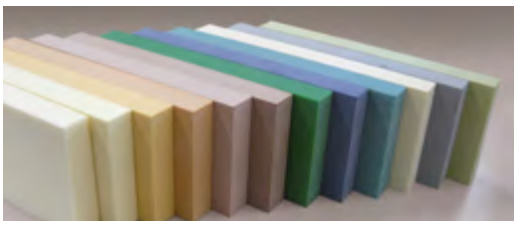
CONTENT

BOARD MATERIALS AND PASTES FOR MODEL AND MOULD MAKING

We offer a wide range of application-oriented system solutions consisting of special model and tooling boards and appropriate adhesives and filler putties.
The boards are based on Polyurethane (PUR) and Epoxy (EP) and can be used for the construction of plugs and master models as well as for diverse moulds and other manufacturing tools.
Especially for very big plugs or moulds, for example in the wind or the marine industry, we can also offer versatile model pastes based on EP and PUR for near net shape designs with completely joint-free surfaces.

BOARD MATERIALS:

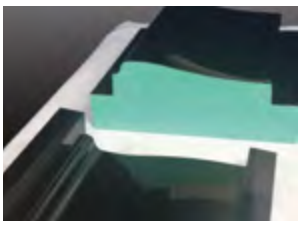
Depending on the required demands for a model or a mould it is possible to choose between different boards with densities from 0.08 up to 1.3 kg/dm³.
The wide range offering in densities enables to select suitable board in surface quality and mechanical properties.
EP boards offer particularly high heat resistance with excellent dimensional stability due to low CTE and can be used for prepreg applications.



Board materials available in different densities and performance qualities.

CNC-milling of a lightweight PUR board.

Low CTE offers a high dimensional stability.



High performance epoxy boards for prepreg tools and parts.

OVERVIEW BOARD MATERIALS ► Detailed Information see page 6/7

	Suitable for model making	Suitable for mould making	Density [g/cm³]	Colour	Characteristics
PUR					
Labelite 8GY SikaBlock® M80	○		0.08	grey yellowish	Low density boards with fine, dense non-powdery surface; easily workable with low dust formation when milled ► simple big models/moulds, backup/reinforcements constructions
Labelite 25YW SikaBlock® M330	○		0.25	peach yellow siena	
Labelite 45PK	○	○	0.45	pink	
SikaBlock® M600	○	○	0.60	light brown	Medium density boards with fine, dense surface; good compressive strength and edge stability ► models and moulds for lower number of pieces
SikaBlock® M700	○	○	0.70	light brown	
SikaBlock® M1000	○	○	1.0	white	Tooling boards with dense smooth surface, higher compressive strength and edge stability ► models and moulds for higher number of pieces
SikaBlock® M945	○	○	1.30	green	
EP					
Lab 975 New	●	●	0.70	light green	Medium density EP-boards with fine, dense surface; high heat distortion temperature and low CTE ► models and moulds for Prepreg applications
Lab 973	●	●	0.75	blue	

● highly recommended
○ recommended
○ conditionally possible

MODEL PASTES:

Model pastes are processed on 2-component mixing and metering machines. The cured resin systems are easy to finish to the correct dimensions by CNC-milling. The results are joint-free, smooth surfaces with a high level of precision.

Biresin® M72 for large scale models.

CNC-milled model of a boat deck with a homogenous, jointless and smooth surface.

Good non sagging properties also on vertical surfaces.

CNC-milling of a boat deck made with epoxy extrudable paste SC175.

OVERVIEW MODEL PASTES

► Detailed Information see page 6/7

	Suitable for model making	Suitable for mould making	Density [g/cm³]	Characteristics
PUR				
Biresin® M72	●	○	0.9	Easily workable; fine, dense surface; offers various advantages especially in large scale modeling; low risk of cracks due to high flexibility
EP				
SC 175	●	○	0.63	Very good surface aspect; good behaviour on vertical support up to 30 mm; high thermal resistance
SC 380	●	○	0.82	Very good surface aspect; good behaviour on vertical support up to 30 mm; high thermal resistance and high mechanical properties; for large dimension tools/composite tooling and mocks-up production
SC 390	○	●	1.06	Very good surface aspect; good behaviour on vertical support up to 30 mm; short hardening time even for 2 mm thickness; high using temperature; low CTE: good dimensional stability, especially suitable for prepreg tools

● highly recommended
○ recommended
○ conditionally possible

DETAILED INFORMATION: BOARD MATERIALS AND PASTES

BOARD MATERIALS

	Density [g/cm³]	Colour	Dimensions [mm]; [ltr.]	Adhesive	Shore hardness	E-Modulus [MPa]	
PUR							
Labelite 8 GY SikaBlock® M80	0.08	light grey yellowish	2,000 x 1,000 x 100; 200 2,000 x 1,000 x 200; 400	Labelite Glue or Kleber orange	A 28	-	
Labelite 25YW SikaBlock® M330	0.25	peach yellow siena	1,500 x 500 x 50; 37.5 1,500 x 500 x 100; 75 1,500 x 500 x 200; 150 2,000 x 1,000 x 100; 200 2,000 x 1,000 x 150; 300 2,000 x 1,000 x 200; 400		D 25	-	
Labelite 45PK	0.45	pink	1,500 x 500 x 50; 37.5 1,500 x 500 x 75; 56.25 1,500 x 500 x 100; 75 1,500 x 500 x 150; 112.5		D 45	-	
SikaBlock® M600	0.60	light brown	1,500 x 500 x 30; 22.5 1,500 x 500 x 50; 37.5 1,500 x 500 x 75; 56.25 1,500 x 500 x 100; 75 1,500 x 500 x 150; 112.5 1,500 x 500 x 200; 150	Kleber braun or Prolab Glue	D 58	750	
SikaBlock® M700	0.70	light brown	1,500 x 500 x 30; 22.5 1,500 x 500 x 50; 37.5 1,500 x 500 x 75; 56.25 1,500 x 500 x 100; 75 1,500 x 500 x 150; 112.5		D 66	1,000	
SikaBlock® M1000	1.0	white	1,500 x 500 x 50; 37.5 1,500 x 500 x 75; 56.25 1,500 x 500 x 100; 75	Power Adhesive Thix	D 75	1,800	
SikaBlock® M945	1.30	green	1,500 x 500 x 30; 15 1,500 x 500 x 50; 25 1,500 x 500 x 75; 37.5 1,500 x 500 x 100; 50	Power Adhesive Thix or Kleber grün	D 83	3,400	
EP							
Lab 975 New	0.70	light green	1,500 x 500 x 50; 37.5 1,500 x 500 x 75; 56.25 1,500 x 500 x 100; 75 other dimensions on request	H 8973/GC 15	D 75	2,500	
Lab 973	0.75	blue	1,500 x 500 x 50; 37.5 1,500 x 500 x 75; 56.25 1,500 x 500 x 100; 75 other dimensions on request	H 8973 / GC15	D 73	2,200	

MODEL PASTES

		Mixing ratio [g]		Density [g/cm³]	Colour	Viscosity [mPas]			Potlife, after coating by machine [min]	
A	B	A	B			A	B	Mixture		
PUR										
Biresin® M72	M70	100	45	0.9	brown	15,000	175	pasty after 10–15 sec	10–15	
EP										
SC 175	SC 175	100	100	0.63	off grey	pasty	pasty	pasty	180	
SC 380	SC 380	100	100	0.82	grey	pasty	pasty	pasty	150	
SC 390	SC 390	100	100	1.06	grey	pasty	pasty	pasty	140	

*Tg (°C) ** HDT (°C)

	Flexural strength [MPa]	Compressive Strength [MPa]	CTE, αT [1/K]	Thermal resistance °C	Characteristics
	1.0	0.7	40 x 10-6	115*	Low density boards with fine, dense non-powdery surface; easily workable with low dust formation when milled ► simple big models/moulds, backup/reinforcements constructions
	5.4	3.8	60 x 10-6	75*	
	12	10	55 x 10-6	65*	
	18 – 20	16 – 18	55 x 10-6	75 – 80**	Medium density boards with fine, dense surface; good compressive strength and edge stability ► models and moulds for lower number of pieces
	26	25	55 x 10-6	90**	
	48	47	55 x 10-6	85**	Tooling boards with dense smooth surface, higher compressive strength and edge stability ► models and moulds for higher number of pieces
	100	95	65-70 x 10-6	80**	
	30	50	35–45 x 10-6	130*	Medium density EP-boards with fine, dense surface; high heat distortion temperature and low CTE ► models and moulds for Prepreg applications
	30	50	35-45 x 10-6	125*	

	Workable after [h]	Filler	Shore hardness	Flexural strength [MPa]	Tg value [°C]	Characteristics
	> 8	Spachtel braun Neu	D 65	20	47	Easily workable; fine, dense surface; offers various advantages especially in large scale modeling; low risk of cracks due to high flexibility
	on thickness 30 mm: > 24	Spachtel braun Neu	D 52	13	45	Very good surface aspect; good behaviour on vertical support up to 30 mm; high thermal resistance
	on thickness 25 mm: 24		D 65	24	50	Very good surface aspect; good behaviour on vertical support up to 30 mm; high thermal resistance and high mechanical properties; for large dimension tools/composite tooling and mocks-up production
	depending on thickness: 12 – 20		D 74	36	89	Very good surface aspect; good behaviour on vertical support up to 30 mm; short hardening time even for 2 mm thickness; high using temperature; low CTE: good dimensional stability; especially suitable for prepreg tools

Information regarding products for surface (pre-)treatment like cleaner, sealer, release agents, filler and primer can be found in the respective product data sheets

HIGH PERFORMANCE COMPOSITES SYSTEMS AND GELCOATS

Aimed for parts production as well as for mould making applications in versatile industries, these high performance composite resins are designed to meet the highest standards of production, process efficiency and end-use performance.

Our composites matrix systems are specially formulated to give the optimal viscosity as well as other processing parameters to meet the different specific processes in the composites industry like Wet Lay-up, Vacuuminfusion, RTM, Pultrusion, Filament Winding, etc.

The systems are specially designed for different working temperatures ranging from 80 °C up to ~ 225 °C. Additionally it is possible to adjust the reactivity of the systems by using different hardeners.

Suitable gelcoats for mould making can be found in the alongside box.

OVERVIEW COMPOSITE SYSTEMS

	Wet Lay-Up (+ optional vacuum bagging)	Vacuum-infusion	RTM	Press Processes	Filament Winding	Pultrusion	Tg [°C]
RSF816 G	●						75
Biresin® CR80	○	●	◐				85–95
Biresin® CR82	●			◐			80–90
Biresin® CR83		●	◐				80–95
Biresin® CR84 / CH84-20, CH120-6	◐			○	●		80–105
Biresin® CR84 / G30, S12	○			●			95–110
Biresin® CR120		●	◐				110–115
Biresin® CR122	●	◐	◐	◐			100–145
Biresin® CR132	●						130–165
Biresin® CR132 FR	●			○			130–145
Biresin® CR134 FR	●						125–135
Biresin® CR131		●	◐				125–140
Epolam 2500	●						100
Epolam 8064 /2026					●		140
Epolam 8064 / 8011, 8012			●				120–140
Biresin® CR135			●				150
Biresin® CR170			●		○		90–175
Biresin® CR172	●	○					170–175
Epolam 2092	○	●					225
EP with Anhydride							
Biresin® CR141 / CH141 / CA141						●	120–140
Biresin® CR144 / CH141 / CA144						●	155
Biresin® CR144 / CH141 / CA141						●	140
PUR Hybrid							
Epolam 8180			●				185

● highly recommended
◐ recommended
○ conditionally possible

GELCOATS

SIKA

Our gelcoats are very easy to apply and specially formulated to suit the particular needs of moulds or tools for composites applications. They have the necessary resistance to external influences such as mechanical, thermal or chemical stress. Some of them can be polished to a high gloss to get a shiny surface on the final parts.

OVERVIEW GELCOATS ► Detailed Information see page 10/11

	Colour	Thermal resistance	Characteristics
Biresin® S8	black	136**	Polishable to high gloss; heat resistant, good styrene resistance
Biresin® S12	grey	> 100**	Abrasion resistant; heat resistant; good solvent and styrene resistance
GC1 080	blue/white/ green	85*	Good solvent and styrene resistance. Could be sanded to glossy aspect
Biresin® S19	black	> 150*	Very high heat resistance

*Tg (°C) ** HDT (°C)

► Detailed Information see page 10–15

Characteristics
"Green", clear system for transparent laminates and good UV stability. Provides a glossy surface. (e.g. for surfboards)
GL-approved, modular standard system for infusion and injection processes with 4 hardeners for a wide range of processing times and a Tg potential up to 95 °C
GL-approved, modular standard system for wet lay-up with 4 hardeners for a wide range of processing times and a Tg potential up to 90 °C
GL-approved, modular system with an extremely low viscosity and a low tendency to crystallize. Especially suitable for big and/or complex parts
With hardeners CH84-20 and CH120-6: Thixoptropic GL-approved system for filament winding with very long processing times and very good non-draining properties.
With hardeners G30 and S12: Especially suitable for press processes to bond different substrates together (e.g. for ski and snowboard)
GL-approved, modular standard system for infusion and injection processes with 2 hardeners and a Tg potential up to 115 °C.
GL-approved, modular standard system for wet lay-up with excellent properties and with additional LBA/RHV approval to build gliders, motor gliders and ultralights.
Basic system of a 130 °C product family with standard hardeners for a wide range of processing times. The same hardeners can be used for Biresin® CR132 FR and CR134 FR to use it as a flame retardant wet lay-up system or with Biresin® CR131 to use it for infusion or injection processes.
Flame retardant version of Biresin® CR132 with UL94 V-0 classification (with CH132-2) for the production of structural parts in wet lay-up.
Flame retardant version of Biresin® CR132 with UL94 V-0 classification (with CH132-5) for the production of visual parts in wet lay-up.
Standard system for infusion and injection processes with 4 hardeners for a wide range of processing times and a Tg potential up to 140 °C. (e.g. for wind blade moulds)
Flame retardant system for wet lay-up with FAR25.853. Product meets meets the ECS2185.20 standard.
System with a low viscosity and a long open time. Tg up to 140 °C
Low viscosity RTM-system showing excellent flexibility and high reactivity.
RTM-System, which supports a high surface quality of carbon parts (Class A)
High Tg system for RTM prosesses, which provides short cycle times (< 3 min.) in variothermal processes and isothermal processes. Suitable for parts, which have to run through the catodic dip coating process. Also suitable for continous filament winding processes.
Nontoxic high Tg system for wet lay-up. Can also be used for vacuum infusion in certain cases.
High temperature resistant system for infusion and injection processes with Tg 225 °C
Anhydride cured system with GL-approval for the production of carbon fibre reinforced parts. Especially suitable for pultrusion processes (e.g. for printing rollers, pipes, high performance profiles)
Anhydride cured system with GL-approval for the production of fibre reinforced parts. Especially suitable for pultrusion processes with glass fibres due to its high elongation at break. (e.g. for printing rollers, pipes, high performance profiles)
Anhydride cured system for the production of carbon fibre reinforced parts. Especially suitable for pultrusion processes (e.g. for printing rollers, pipes, high performance profiles)
Hot curing urethane system for industrial composites applications by RTM

DETAILED INFORMATION: WET LAY-UP SYSTEMS AND GELCOATS

HIGH PERFORMANCE COMPOSITES SYSTEMS – WET LAY-UP

		Mixing ratio [g]		Tg [°C]	Potlife, 100 g, RT [min]	Mixed viscosity, RT [mPas]	Impact resist. [kJ/m²]	Tensile E-Modulus [GPa]	
A	B	A	B						
Wet Lay-up									
RSF816 G	RSF 816	100	40	75	28*	500**	15	3.2***	
Biresin® CR82	CH80-1	100	27	83	50	740	68	2.9	
	CH80-2			90	80	600	70	2.9	
	CH80-6			83	220	400	55	2.9	
	CH80-10			85	330	390	56	2.9	
Biresin® CR84	CH84-20	100	30	81	600	575	76	3.6	
	CH120-6	100	28	104	300	850	32	3.2	
	S12	100	20	100	60	1,600	31	3.0	
	G30	100	32	98	100	2,950	42	2.6	
Biresin® CR122	CH122-1	100	30	103	30	310	58	2.9	
	CH122-3			114	90	370	47	2.8	
	CH122-5			119	150	380	34	2.8	
	CH122-9	100	40	145	330	680	44	2.6	
Biresin® CR132	CH132-2	100	28	130	60	360	47	2.6	
	CH132-5			135	150	550	32	2.7	
	CH132-7	100	32	135	210	550	33	2.4	
	CH122-9	100	38	162	480	940	25	2.4	
	CH172-6	100	20	159	180	550	24	2.7	
Biresin® CR172	CH170-3	100	17	170	110	800	28	2.9	
	CH172-6	100	19	174	260	810	26	2.8	
Wet Lay-up – FR systems									
Biresin® CR132 FR	CH132-2	100	20	132	60	1,330	15	3.6	
	CH132-5	100	20	142	160	2,100	10	3.6	
	CH132-7	100	23	133	200	1,900	12	3.5	
	CH172-6	100	28	157	460	2,100	15	3.1	
Biresin® CR134 FR	CH132-2	100	23	125	60	900	29	3.0	
	CH132-5	100	24	132	115	1,000	21	3.0	
	CH132-7	100	27	129	150	1,000	22	2.9	
Epolam 2500	2500	100	22	100	90*	3,500**	-	3.9***	

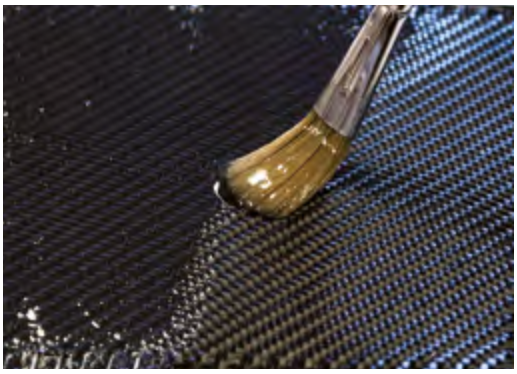
* 500g, RT ** Brookfield LVT, RT *** Flexural E-Modulus [GPa]

GELCOATS

		Mixing ratio [g]		Colour	Potlife, 500g, RT [min]	
A	B	A	B			
Gelcoats						
Biresin® S8	S8	100	20	black	25	
Biresin® S12	S12	100	8	grey	30	
GC1 080	GC 13	100	10	blue/white/ green	20*	
Biresin® S19	S19	100	12	black	45 – 60	

* 300 g, RT ** HDT (°C) *** Tg (°C)

	Tensile strength [MPa]	Elongation at break [%]	Characteristics
	60	5	"Green" system for clear laminates and good UV stability. Provides a glossy surface. (e.g. for surfboards)
	78	6.1	GL-approved, modular standard system for wet lay-up with 4 hardeners for a wide range of processing times and a Tg potential up to 90 °C
	78	6.5	
	84	6.4	
	82	6.2	
	89	5.7	With hardeners CH84-20 and CH120-6: Thixoptropic GL-approved system for filament winding but also suitable for wet lay-up if a very long potlife or good non-draining properties are required.
	85	4.2	
	86	5.5	With hardeners G30 and S12: Especially suitable for press processes (e.g. for ski and snowboard) to bond different substrates together
	75	5.2	
	86	6.3	GL-approved, modular standard system for wet lay-up with excellent properties and with additional LBA/RHV approval to build gliders, motor gliders and ultralights.
	84	5.4	
	84	5.6	
	87	6.9	
	79	5.3	Basic system of a 130 °C product family with standard hardeners for a wide range of processing times. The same hardeners can be used for Biresin® CR132 FR, Biresin® CR134 FR and Biresin® CR131.
	88	6.2	
	78	5.7	
	68	3.9	Two hardener options for Tg potential > 150 °C and long pot life.
	80	4.5	
	70	3.0	Nontoxic high Tg system for Wet Lay-up.
	76	3.9	
	52	1.6	Flame retardant version of Biresin® CR132 with UL94 V-0 classification (with CH132-2) for the production of structural parts in wet lay-up.
	43	1.4	
	42	1.4	
	48	1.8	
	62	3.3	Flame retardant version of Biresin® CR132 with UL94 V-0 classification (with CH132-5) for the production of visual parts in wet lay-up.
	65	3.9	
	58	3.0	
	–	–	Flame retardant system for wet lay-up with FAR25.853. Product meets the ECS2185.20 standard.



Top-down:
- Motorglider produced by Schempp-Hirth with Biresin® CR122.
- Biresin® CR82 with optimized mixed viscosity for Wet Lay-up.

	Density [g/cm³]	Shore hardness	Flexural strength [MPa]	Thermal resistance	Characteristics
	1.22	D 86	90	136 **	Polishable to high gloss, heat resistant, good styrene resistance
	2.1	D 92	78	> 100 **	Heat resistant, abrasion resistant, good solvent and styrene resistance
	1.74	D 89	75	85 ***	Good solvent and styrene resistance, could be sanded to glossy aspect
	1.75	D 85	73	> 150 ***	High mechanical and heat resistance

DETAILED INFORMATION: INFUSION AND RTM SYSTEMS

HIGH PERFORMANCE COMPOSITES SYSTEMS – INFUSIONS

A	B	Mixing ratio [g] A	Mixing ratio [g] B	Tg [°C]	Potlife, 100g, RT [min]	Mixed viscosity, RT [mPas]	Impact resist. [kJ/m²]	Tensile E-Modulus [GPa]
Infusions								
Biresin® CR80	CH80-1	100	30	88	45	400	84	2.9
	CH80-2			92	80	350	75	2.9
	CH80-6			85	190	230	68	3.0
	CH80-10			85	330	210	76	3.0
Biresin® CR83	CH94-2	100	24	97	60	320	41	3.0
	CH83-2		30	84	60	155	93	3.0
	CH83-6			80	180	170	84	3.2
	CH83-10			81	300	155	83	3.1
Biresin® CR120	CH120-3	100	30	113	90	240	55	2.8
	CH120-6			115	180	250	50	2.7
Biresin® CR131	CH135-4	100	26	138	160	540	27	2.8
	CH132-5		28	136	140	410	46	2.7
	CH132-7		32	127	260	540	37	2.7
	CH135-8		21	138	260	360	29	2.8
	CH172-6		19	150	220	360	33	2.8
Epolam 2092	2092	100	50	225	400*	550**	–	4.6

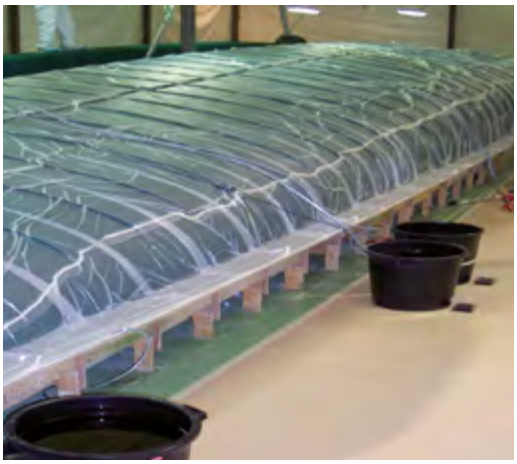
* 500g, RT ** Brookfield LVT, RT

HIGH PERFORMANCE COMPOSITES SYSTEMS – RTM

A	B	C	Mixing ratio [g] A	Mixing ratio [g] B	Mixing ratio [g] C	Tg [°C]	Potlife, 100g, RT [min]
RTM							
Epolam 8064	8011	–	100	21	–	123	45
	8012	–		25	–	140	130
Biresin® CR135	CH135-4	–	100	24	–	152	160
Biresin® CR170	CH100-1	–	100	40	–	91	12
	CH125-1	–		25	–	116	24
	CH170-3	–		16	–	172	90
	CH135-4	–		24	–	153	140
	CH150-3	–				143	60
Epolam 8180	8180	8180	49	100	1.25	185	25 – 30

** Brookfield LVT, RT

	Tensile strength [MPa]	Elongation at break [%]	Characteristics
	78	7.1	GL-approved. Modular standard system for infusion and injection processes with 4 hardeners for a wide range of processing times and a Tg potential up to 95 °C.
	81	6.1	
	83	6.3	
	80	6.5	
	78	4.6	GL-approved. Modular system with an extremely low viscosity for infusion and injection processes and a low tendency to crystallize. Especially suitable for big and/or complex parts.
	84	4.7	
	91	8.4	
	86	7.9	
	80	5.8	GL-approved. Modular standard system for infusion and injection processes with 2 hardeners and a Tg potential up to 115 °C.
	80	6.1	
	89	5.7	Standard system for infusion and injection processes with 5 hardeners for a wide range of processing times and a Tg potential up to 150 °C. (e.g. for wind blade moulds)
	86	5.9	
	84	6.7	
	89	6.3	
	87	8.2	
	26	1.0	High Tg system for infusion with a Tg potential of 225 °C



Vacuuminfusion with Biresin® CR131.

	Mixed viscosity, RT [mPas]	Impact resist. [kJ/m²]	Tensile E-Modulus [GPa]	Flexural E-Modulus [GPa]	Tensile strength [MPa]	Elongation at break [%]	Characteristics
	320	-	3.4	2.6	72	4	Low viscosity amine-cured laminating epoxy system showing excellent flexibility and high reactivity.
	550	-	3.1	2.8	78	5	
	940	27	2.9	2.9	72	3.3	RTM-System which supports a high surface quality of carbon parts (Class A)
	5,400	40	3.7	3.6	95	3.9	High Tg system for RTM processes, which provides short cycle times (< 3 min.) in variothermal processes and isothermal processes. With Biresin® CH170-3 suitable for parts, which have to run through the cathodic dip coating process. Also suitable for continous filament winding processes.
	1,250	91	2.4	2.5	77	8.1	
	1,250	28	2.8	2.8	69	6.1	
	2,000	24	2.8	2.9	91	6.0	
	1,600	42	2.7	2.8	87	6.6	
	200**	-	3.4	2.1	70	9	Hot curing urethane system for industrial composites applications (e.g. used for manhole covers)

f.l.t.r.:
- Biresin® CR80 offers ideal flowing properties and good wetting behaviour.
- Lightweight transporter made by Carbon Truck & Trailer.
- Monocoque of the lightweight transporter produced with Biresin® CR120.
- High performance – bobsleigh produced with Biresin® CR83.

DETAILED INFORMATION: FILAMENT WINDING AND PULTRUSION SYSTEMS

HIGH PERFORMANCE COMPOSITES SYSTEMS – FILAMENT WINDING + PULTRUSION

			Chemistry	Mixing ratio [g]			Tg [°C]	Potlife, 100g, RT [h]	Mixed viscosity, RT [mPas]	
A	B	C		A	B	C				
Filament Winding + Pultrusion										
Biresin® CR84	CH84-20	-	EP cured with amine	100	30	–	81	10	575	
	CH120-6	-	EP cured with amine	100	28	–	104	5	850	
Epolam 8064	2026	-	EP cured with amine	100	35	–	140	8–10	700	
Biresin® CR141	CH141	CA141	EP cured with anhydride + accelerator	100	90	2	139	> 24	600	
	CH142	-	EP cured with anhydride + accelerator	100	100	–	119	> 24	320	
Biresin® CR144	CH141	CA141	EP cured with anhydride + accelerator	100	90	2	140	12	800	
Biresin® CR144	CH141	CA144	EP cured with anhydride + accelerator	100	90	1–4	155	> 24	800	
Biresin® CR201	CH141	CA144	EP cured with anhydride + accelerator	100	115	0.5–2	201	> 24	82	

Gas bottle from LUXFER GAS CYLINDERS made with EPO912.

	Impact resist. [kJ/m²]	Tensile E-Modulus [GPa]	Tensile strength [MPa]	Elongation at break [%]	Characteristics
	76	3.6	89	5.7	With hardeners CH84-20 and CH120-6: Thixoptropic GL-approved system for filament winding. Amine cured system with very long processing time and very good non-draining properties.
	32	3.2	85	4.2	
	–	2.6	74	5	System with a low viscosity at RT and long pot life at elevated temperatures. The cured system shows excellent mechanical, dynamic and thermal (hot/wet) properties and good chemical resistance. Tg up to 140 °C
	18	3.2	78	3.3	Anhydride cured system with GL-approval for the production of carbon fibre reinforced parts. Especially suitable for pultrusion processes (e. g. for printing rollers, pipes, high performance profiles) with CH142 hardener it can be used as a two component system
	14	3.6	73	2.2	
	15	3.0	80	3.5	Anhydride cured system for the production of carbon fibre reinforced parts. Especially suitable for pultrusion processes (e.g. for printing rollers, pipes, high performance profiles)
	15	2.9	98	6.4	Anhydride cured system with GL-approval for the production of fibre reinforced parts. Especially suitable for pultrusion processes with glass fibres due to its high elongation at break. (e. g. for printing rollers, pipes, high performance profiles)
	8	2.85	50	1.9	Hot curing system with a very high Tg potential up to 201 °C

f.l.t.r.
- Mae West Sculpture in Munich (Effnerplatz) produced with Biresin® CR84.
- Segment of a 40 m pipe used for the Mae West sculpture.

ADHESIVES FOR COMPOSITES

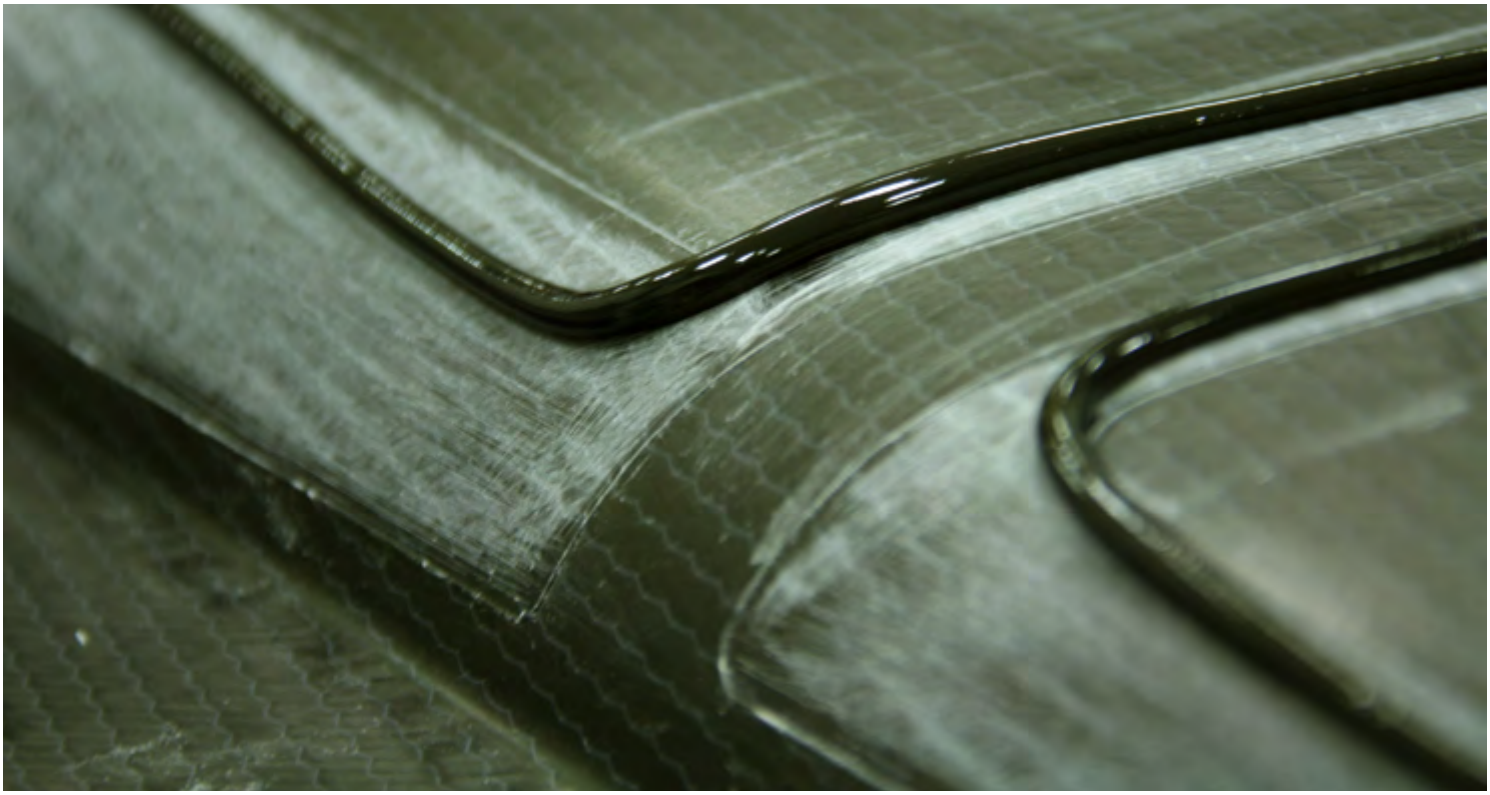
ADHESIVES

We have been formulating tailor-made polyurethane and epoxy adhesive systems for the past 70 years for a variety of highly demanding markets on a worldwide basis.
Today, we offer high end value adhesive resins for composite in automotive, aerospace, marine, general industry and wind mill industries.

Polyurethane – Structural bonding for dissimilar materials and high impact
We are offering a unique range of 2 component PUR adhesives offering a unique balance between structural properties and toughness. Polyurethane adhesives are used when dissimilar material has to be join (CTE gap absorption), or when strong impact resistance is required.

Epoxy – Structural bonding with high modulus or temperature resistance
Structural epoxy adhesives are suitable for assembly where stiffness is required. They also keep good performances with temperature increase and under chemical stress.

Methacrylate – Multipurpose bonding
MMA-adhesives are recommended for bonding metal or plastic when operating conditions (like temperature) are not regulate. This specific chemistry allows a curing at low temperatures.



f.l.t.r.
- Carbon body sport car bonding. Adekit A252: structural 2 components PUR adhesive with high peel and elangation.
- Carbon part bonding.
- Bonding with H9952 on the skin on honeycomb (nomex or alu).

Flexible and semi rigid structural adhesives:

- Combination of flexibility & structural performance.
- Wide range of viscosities adapted to your application.
- vertical, thick, high-speed, robotic, thin layers or gap-filling.
- Shock resistance, vibration absorption.
- Approved for their performance and the durability of the assembly by rail, automotive & aerospace industries.
- High peel resistance.

High modulus and chemical resistant structural adhesives:

- Wide range of open times adjustable to the size of your parts & viscosities according to your application: vertical, thin layers or injection.
- Outstanding ageing resistance (humidity, temperature, solvent or UV).
- Manual or machine processes.

OVERVIEW ADHESIVES

► Detailed Information see page 18/19

	Open time	LSS (MPa)	Peel (N/mm)	Elongation (%)	Characteristics
PUR					
A280 **A290**	10' 3'	16	12	95	Structural bonding of spoiler, metallic inserts/big head to composites. Vibration absorbing. Good chemical resistance. Short handling with limited heating. Impact Resist: 30 N/mm
A252	4'	12	9	300	Non sagging paste product suitable for vertical applications and to fill irregular joints. Fast setting product to reduce assembly time. High flexibility. Impact Resist: 50 N/mm
A257	5'	5	10	350	Recommended for the bonding of plastics sensitive to the phenomena of bond line witness marks (thermoplastic, composite). Low hardness. Flexible product. Short handling with limited heating. Impact Resist: 55 N/mm
A236	25' 120'	14	4	60	Allows production with gaps up to 40 mm and parts assembly with large dimensions (deck/hull, windmill). Available in various reactivity's and colours (white or grey). Lloyd's Register.
A730	6'	25	2	10	UV stable white PU. High modulus. For fast and stiff bonding.
H6235	30'	20	4	30	Large dimensions assembly. Gap filling capacity. Used in industry assembling big parts.
MMA					
A300-1 **A310-1**	5' 10'	24	9	30 35	Excellent mechanical and thermal performances up to 120 °C. Multipurpose product with thermoplastic aspect. Product able to bond dissimilar materials.
EP					
A130 **A135**	6'	17	1.5	3	Fast cure at room temperature. Suitable for injection. Bonding of subtrates such as composites, metal, wood, concrete.
A140	40'	20	6	4	Multipurpose with very good mechanical features. Pasty non sagging Gap filler material. Impact Resist: 10 N/mm
A155	60'	35	3	8.5	Pasty constructive adhesive with long pot life. For large composite parts, repair and maintenance. Good mechanical performance & chemical and temperature resistance. Impact Resist: 15 N/mm
H9011	100'	24	5	9	Multipurpose liquid adhesive. Bond most of materials. For general industry and maintenance.
H9951 **H9951T**	50'	26	4	10	Non-filled adhesive for bonding large surfaces (ie pannels) when mechanical and ageing as well as high peel resistance is needed. T for thixotropic product (hot cure process). Used in Railway.
H9952	120'	22	5	3	High shear/peel/ageing resistance. Filled with Nanoparticles. Short handling time with limited heating. Self extinguishable (EN45545 HL3 for R1, R2, R3, R6, R7, R17). Used in railway and aerospace applications.

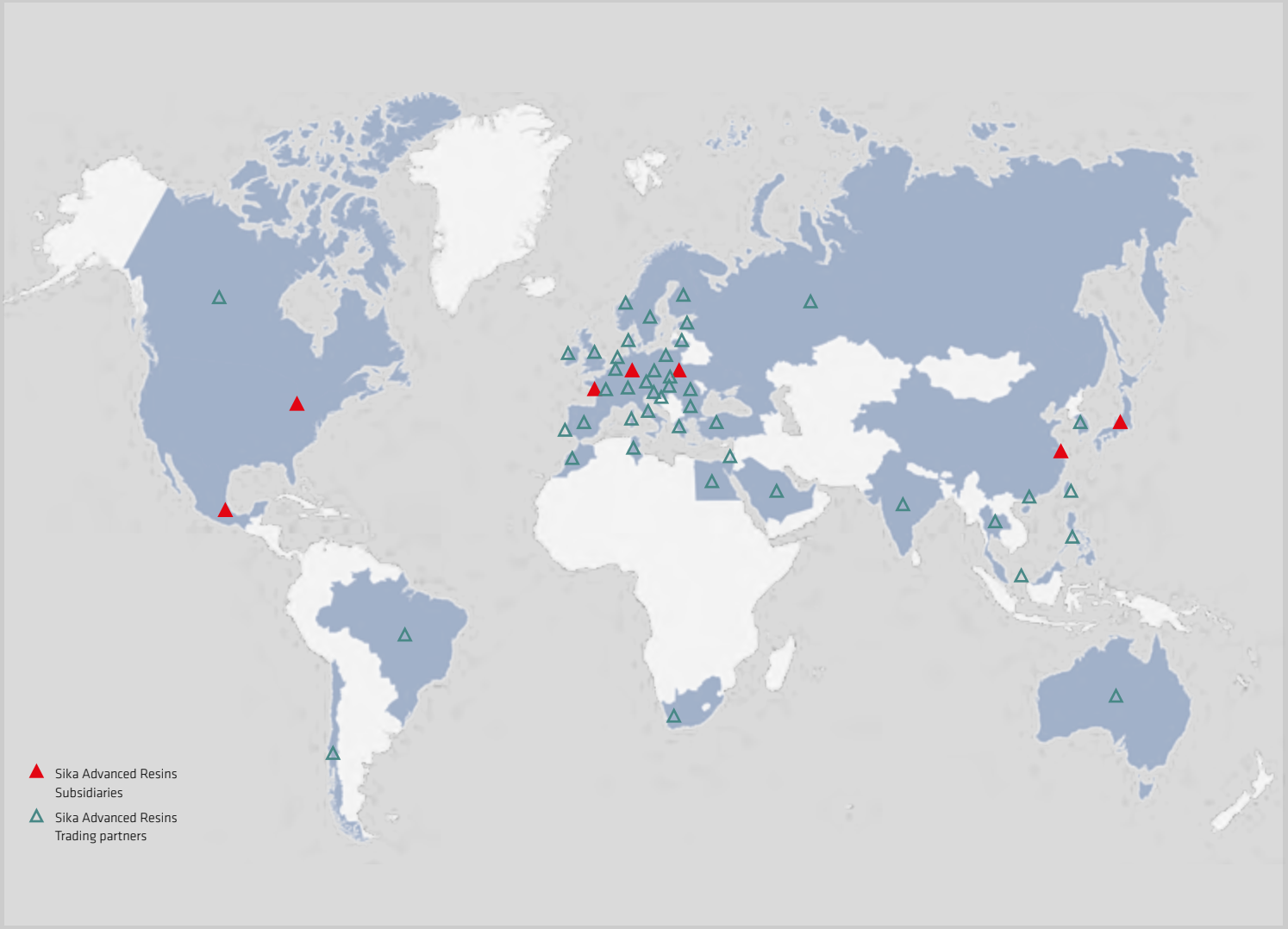
DETAILED INFORMATION: ADHESIVES

ADHESIVES

	Application, description	Colour	Liquid	Viscous	Pasty	Open time	Hardness (shore)	Viscosity (Pa.s)	Handling time	Lap shear strength (MPa)	
PUR											
H6235	Large dimensions assembly. Gap filling capacity. Used in industry assembling big parts.	grey			x	30'	45 D	70	4 h	20	
A236 H6236	Allows gaps up to 40mm and parts assembly with large dimensions (deck/hull, wind mill). Various reactivities and colours. Available in pail, cartridge and ready to use kit. Lloyd's Register.	grey / black / green / white			X	25' 120'	55 D	pasty	3,5 h 6 h	18	
A252	Non sagging paste product suitable for vertical applications and to fill irregular joints. Fast setting product to reduce assembly time. High flexibility. Impact Resist: 50 N/mm	black			x	4'	75 A	600	60'	12	
A257	Recommended for the bonding of plastics sensitive to the phenomena of bond line witness marks (thermoplastic, composite). Low hardness. Flexible product. Short handling with limited heating. Impact Resist: 55 N/mm	black			x	5'	60 A	pasty	90'	5	
A280 A290	Structural bonding of spoiler, metallic inserts/big head to composites. Vibration absorbing. Good chemical resistance. Short handling with limited heating. Impact Resist: 30 N/mm	beige / black			x	10' 3'	48 D	150	45' 10'	16	
A730	UV stable white PU. High modulus. For fast and stiff bonding.	white		x		6'	85 D	20	30'	25	
MMA											
A300-1 A310-1	Excellent mechanical and thermal performances up to 120 °C. Multipurpose product with thermoplastic aspect. Product able to bond dissimilar materials.	light-brown			x	5' 10'	75 D	pasty	20' 40'	24	
Epoxies											
A130 A135	Fast cure at room temperature. Suitable for injection. Bonding of subtrates such as composites, metal, wood, concrete.	trans-parent		x		6'	80 D	45	15'	17	
A140	Multipurpose with very good mechanical features. Pasty non sagging Gap filler material. Impact Resist: 10 N/mm	light-brown / black			x	40'	80 D	430	4 h 30'	20	
A155	Pasty constructive adhesive with long pot life. For large composite parts, repair and maintenance. Good mechanical performance & chemical and temperature resistance. Impact Resist: 15 N/mm	white			x	60'	84 D	160	10 h	35	
H9011	Multipurpose liquid adhesive. Bond most of materials. For general industry and maintenance.	trans-parent	x			100'	75 D	45	7 h	24	
H9951 H9951T	Non-filled adhesive for bonding large surfaces (ie panels) when mechanical and ageing as well as high peel resistance is needed . T for thixotropic product (hot cure process). Used in Railway.	light-pink	x			40'	75 D	9	6 h	26	
H9952	High shear/peel/ageing resistance. Filled with Nanoparticles. Short handling time with limited heating. Self extinguishable (EN45545 HL3 for R1, R2, R3, R6, R7, R17). Used in railway and aerospace applications. FAR 25.853, ABD 0031.	black			x	120'	85 D	230	8 h	22	

Bonding of SMC parts with Adekit A280.

	Peel resistance (kN/m)	Elongation at break (%)	Substrates								Resistance						50ml	400ml	Other sizes	Industrial packages
			Ferrous metals	Non ferrous metals	Composites, laminates	Thermo-plasts	Glass, ceramics	Foam materials (PUR, PS)	Elastomer, rubber	Polyurethane (hard)	Temperature	Chemically	Water	Shear stress	Peel stress	Ageing				
	6	5	++	++	++	+	o	++	o	+	+	o	++	++	+	+				Drum
	5	60	++	++	++	o	o	++	o	+	+	++	++	++	+	++		x		Drum
	9	300	o	+	++	+	++	+	++	+	o	o	++	o	++	+	x	x		Drum: H 6252
	10	350	+	+	++	++	++	++	o	+	+	+	++	+	++	++		x		Drum: H 6257
	12	95	+	+	++	+	+	+	+	++	+	+	++	++	++	+	x	x		Drum: H 6280 Drum: H 6290
	2	10	++	++	++	+	o	o	o	+	+	++	++	++	+	++		x		
	9	30 35	++	++	++	++	o	o	o	o	++	+	++	++	+	++	x	x		Drum
	1.5	3	+	+	+	o	+	++	o	++	o	o	+	++	o	+	x		200ml	Kit & Drum: H 9930
	6	4	++	++	++	o	++	++	o	++	++	+	++	++	+	+	x	x		Kit & Drum: H 9940 / H 9945
	3	8.5	+	+	++	o	+	++	+	++	++	+	++	++	o	++		x		Drum: H 9955
	5	9	++	++	++	+	+	++	+	+	+	+	++	++	+	++	x	x	200ml	Kit & Drum
	4	10	++	++	++	+	+	+	o	++	++	+	+	++	+	++				Kit & Drum
	5	3	++	++	++	+	o	++	o	+	++	++	++	++	+	++	x	x		Drum



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