

MARKETS // PRODUCTS

# CASTING, POTTING, ENCAPSULATION SYSTEMS



**vonRoll**

# WE ENABLE ENERGY

As one of the oldest industrial companies in Switzerland, founded in 1803, we focus on products and systems for power generation, transmission and distribution, rotating machines and mechanical engineering. Von Roll is the global market leader for insulation products and the only company to offer the complete range of insulation products, composites, consulting, tests and services for the electrotechnical industry.

For more than 100 years, we have been making outstanding contributions to this market, developing a number of highly innovative products that have enabled both steady increases in power output and smaller and more compact machines.

**Customers enjoy the following benefits:**

- + One single source for all insulating materials
- + Thorough expertise from power generation and transmission to its efficient utilization
- + Proven compatibility for system components
- + Testing at Von Roll of both materials and systems
- + Consulting for applications and technologies
- + Training in insulation materials and systems

# POLYURETHANES

Polyurethane systems improve overall productivity. Potting and casting can be quickly achieved thanks to fast hardening at room temperature. This is a noticeable advantage over traditional materials such as silicones and epoxies.

## The main advantages of polyurethane are:

- + Adaptable gel time
- + Customized processability
- + Variable flexibility of the cured resin
- + Low shrinkage
- + Low exothermic reactions
- + Excellent resistance to vibrations and rising temperature
- + Suitable for a wide range of operating temperatures, from – 60°C up to 150°C

Dolph's® polyurethane resins are designed to efficiently integrate many fields of application in the electronic, electrical, power-supply devices, medical, automotive, marine, railway, aircraft and military industries.

Product name	Mix ratio	Mix viscosity at 25°C (cps)	Shore hardness	Thermal conductivity W/m.K	UL 94	Main characteristics
Damival 13518	100/35	2000	87D	0.65	V0	Compliant with EN45545-2 railway standard, UL listed (94 V0, 94 HB, RTI 120), high glass-transition temperature. Available in several colors.
Damival 13524	100/24	1500	50D	0.33	n/a	Semi-rigid, hydrophobic, good thermal resistance, low viscosity grade.
Damival 13552	100/16	3000	50D	0.78	V0	Semi-rigid resin, compliant with EN45545-2 railway standard, Good thermal conductivity and chemical resistance.
Damival 13553	100/13	3000	90A	0.81	V0	Compliant with EN45545-2 railway standard, Good thermal conductivity and high chemical resistance. Excellent adhesion and usable up to 150°C.
Damival 13554	100/17	1400	85A	0.80	V0	Good thermal conductivity with low viscosity, semi-flexible resin.
DOLPHON® 1138	100/16	2100	40D	0.75	V0	Semi-rigid resin, available in several colors, included in UL system DV-155 Tab. IX, file E317429.

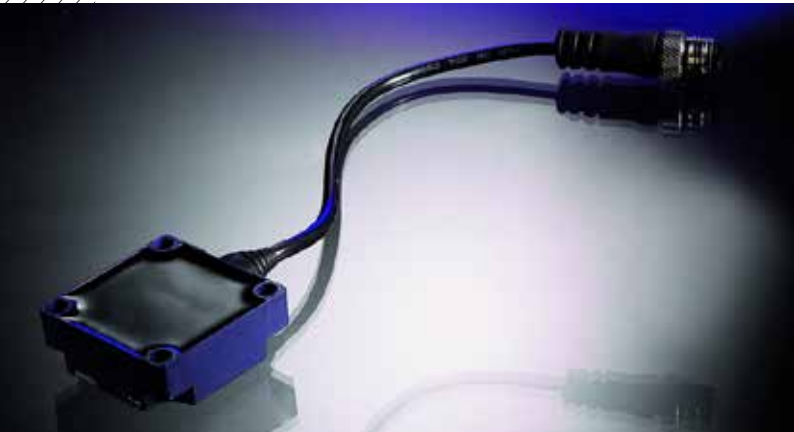
# POLYBUTADIENE POLYURETHANES

**Polybutadiene-based polyurethanes provide specific advantages:**

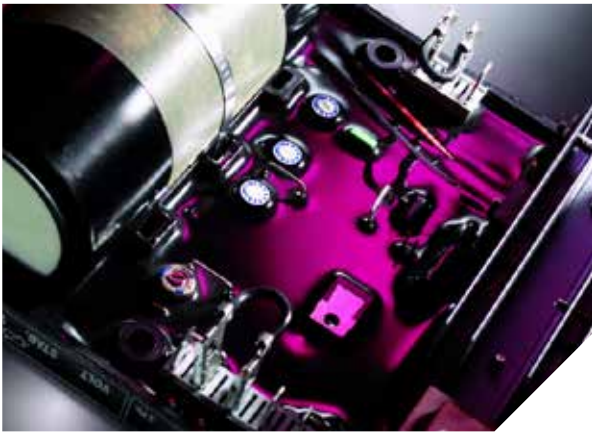
- + Low glass-transition temperature < – 40°C
- + Flexible even in very cold conditions
- + Excellent water and moisture resistance
- + Good adhesion on most surfaces
- + Excellent resistance to vibrations and rising temperature
- + Suitable for a wide range of operating temperatures, from – 60°C up to 150°C
- + Cost-effective substitutes for silicone elastomers up to 150°C operating temperature

This polybutadiene range is perfectly suited to electronic protection application needs.

Product name	Mix ratio	Mix viscosity at 25°C (cps)	Shore hardness	Thermal conductivity W/m.K	UL 94	Main characteristics
Damival 13653	100/25	3000	75A	0.24	n/a	Very hydrophobic, long-term sea water resistance. High adhesion.
Damival 13681	100/22	3300	51A	0.28	n/a	MDI-free system. High thermal resistance: usable up to 150°C.
Damival 13682	100/9	5000	46A	0.95	V0	MDI-free system. High thermal conductivity. Usable up to 150°C. Compliant with EN45545-2 railway standard.
Damival 13683	100/9	5600	61A	1.3	V0	MDi free system, high thermal resistance up to 150°C. Highest thermal conductivity.
DOLPHON® 1109	100/15	3000	45A	0.35	n/a	Very flexible, with excellent moisture resistance even in severe conditions such as PCT.
DOLPHON® 1120	100/20	2000	25A	0.20	n/a	Very soft system, with low viscosity. Clear potting for low-stress applications.



Potting of a sensor as it is used in the automated industry.



Protection of electronic assembly.



# EPOXIES

Epoxy systems include a resin and a specific hardener that must be blended together. Cold-curing resins are suitable up to class F (155°C) insulating systems. Hot-curing epoxies can be used in potting of class H (180°C) coils and windings. They can be processed under vacuum to improve penetration of the resin.

## The main advantages of epoxies are:

- + Low viscosity
- + High glass-transition temperature
- + Dimensional stability at elevated temperatures
- + High thermal conductivity >1W/m.K
- + Resistance to vibration and thermal shock
- + Outstanding adhesion
- + Thermal endurance up to 180°C
- + Resistance to moisture, water and chemicals

Product name	Mix ratio	Typical curing °C	Mix viscosity (mPa.s)	Max. operating temperature	Thermal conductivity W/m.K	Main characteristics
Damival 15225	100/100	120	500 80°C	180°C	0.45	Semi-rigid epoxy. Excellent resistance to thermal shocks, low viscosity for good impregnation.
DOLPHON® 1024	100/10	25	2500 25°C	155°C	0.2	Flexibilized epoxy system, unfilled.
DOLPHON® 1078	100/5	25	6000 25°C	155°C	0.5	Black filled resin with good thermal conductivity and low shrinkage.
DOLPHON® 1114	100/13	25	2000 25°C	180°C	0.8	UL94 V0 approved, good thermal conductivity. Low mix viscosity. Good thermal shock resistance. EN45545-2 approval for railway application.
DOLPHON® 1107	100/20	25	3000 25°C	155°C	0.9	Semi-rigid epoxy. Shore hardness D45. Cold-curing system. Low shrinkage. Self-extinguishing according to UL94 V0. MDI-free alternative to polyurethane resins.
DOLPHON® 1123	100/9	25	3000 25°C	180°C	1.3	High thermal conductivity with low mix viscosity. Self-extinguishing according to UL94 V0. Available in several colors.
DOLPHON® 1037	100/100	120	4500 60°C	180°C	0.7	Good mechanical properties at high temperature, high glass-transition temperature. Excellent crack resistance after thermal shocks.
DOLPHON® 1220	100/100	150	750 80°C	180°C	1.3	Good mechanical properties at high temperature. Low coefficient of thermal expansion (CTE). High thermal conductivity. Low mix viscosity.

# TESTING



Materials and systems have to be tested in order to ensure the requested specifications concerning mechanical, electrical and thermal characteristics.

At Von Roll HV laboratories we are able to test our customers' materials and systems according to IEC, UL and other specifications.

- + Thermal, electrical and mechanical aging tests
- + Tan  $\delta$ -measurements at different temperatures
- + Partial discharge measurements with different voltage ranges



Testing in the Von Roll laboratory



Training courses

# TRAINING

For a number of years we have been offering a unique program of high-voltage insulation training within our Von Roll Corporate University. The objectives of this program are:

- + Better understanding of high-voltage insulation technology for rotating machines and up-to-date knowledge on insulating materials and systems
- + Practical experience in the application of electrical insulating materials

# WE ENABLE ENERGY

Von Roll is the sole full-range supplier of materials and systems for the insulation of electrical machines as well as high-performance products for various high-tech industries.



## Mica

All materials related to high-voltage insulation. Von Roll's commitment to mica starts with mining and ends with finished tapes.



## System components

Producer of integrated and ready-to-install system components for high-voltage electric motors, railway drives and generators.



## Cables

Mica tapes for fire-resistant cables. Von Roll provides a wide range of products that are ideally suited to all commonly used standards.



## Resins

Impregnation resins for high- and low-voltage, potting resins, casting resins, as well as encapsulating and conformal coatings.



## Composites

Engineered materials made from a resin and a support structure with distinct physical, thermal and electrical properties. We offer molded, machined or semi-finished products.



## Flexibles

Insulating flexible materials for low-voltage applications.



## Ballistic Protection

High-quality systems for armored defense based on thermoset / thermoplastic products in single-use or tailored combinations.



## Testing

Von Roll provides electrical, thermal and mechanical testing of individual materials as well as of complete insulating systems.



## Training

Von Roll Corporate University provides a training program in high- and low-voltage insulation for its customers.

As one of Switzerland's longest-established industrial companies, Von Roll focuses on products and systems for electrical power generation, transmission, storage and industrial applications.

Von Roll's business portfolio is divided into the following businesses: Von Roll Insulation offers electrical insulation products, systems and services for generators, high- and low-voltage motors, transformers and other applications. Von Roll Composites produces composite materials and parts for a variety of industrial equipment.

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The logo for vonRoll, featuring the word 'von' in a lowercase, bold, sans-serif font, followed by 'Roll' in a larger, bold, sans-serif font. The 'v' and 'R' are particularly prominent.