

MARKETS // **PRODUCTS**

# WINDING INSULATION

IMPREGNATING RESINS,  
VARNISHES & COATINGS

MOTORS, GENERATORS  
AND TRANSFORMERS



**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

# TRICKLE AND ROLL THROUGH PROCESS

Trickling and roll through processes are more convenient when high productivity is required on standard small/medium motors and generators. These two processes enable a higher resin filling factor with less resin usage.

Due to hot processes, the resin quality has to be carefully managed. Von Roll has developed and optimized a complete range of resins that combine safety, quality and fast processing.



Dipping process for stator impregnation.

Product Name	Chemistry	Viscosity @ 23°C (mPa.s)	Typical curing temperature (°C)	Thermal rating UL1446 TP (°C)	Main Characteristics
DOLPHON® CC-1105 OPT	Polyester	300	160	200/220	VOC free. Low smell, low viscosity . Good bonding strength. High reactivity.
DOLPHON® XL-3101 OPT	Cyclo-Polyester	500	150	180	VOC free. Low smell , low viscosity. Very good thermal ageing behaviour. High reactivity.
Damisol® 3631 HiR	Polyester Imide	500	150	180	VOC free. Low smell , low viscosity. Excellent thermal ageing behaviour. Very low emissions grade. High thermal conductivity grade available.
DOLPHON® CC-1180 HiR	Epoxy	550	170	180	VOC free. Highly chemical and moisture resistant. Superior adhesion. High reactivity. High Thermal Conductivity version available .
Damisol® 3500 HTC	Epoxy	1400	160	180	VOC free. Filled version for a better resin build and improved thermal dissipation. Highly chemical and moisture resistant. Superior adhesion. High reactivity

# ATMOSPHERIC DIP AND HOT DIP PROCESS

Dipping is the most common impregnation process for any kind of low-voltage electrical component, such as motors, generators or transformers. It is highly versatile with simple processing equipment.

Nevertheless, the resin choice is always highly critical due to environmental constraints (smell, fire risks, irritation, toxicity and more), process issues (stability, viscosity, reactivity, productivity, etc.) and technical properties (thermal class, chemical resistance, electrical properties, bonding strength, etc.).

Product Name	Chemistry	Viscosity @ 23°C (mPa.s)	Typical curing temperature (°C)	Thermal rating UL1446 TP (°C)	Main Characteristics
<b>Solvent-based</b>					
HI-THERM® B(a)-346-A	Modified Polyester	230	150	200/240	High temperature resistant, tough, flexible. Also available in black and grey colors. Universal use.
HI-THERM® BC-359	Polyurethane	260	120	180	Low temperature curing, flexible with superior moisture and chemical resistance
<b>Water-based</b>					
AQUA-THERM® BC-365	Polyester	Adjustable	135	180/220	Environmentally friendly, low VOCs. Easy to dilute
AQUA-THERM® BC-367	Polyurethane	Adjustable	110	180	Fast curing at low temperature. VOC free, flexible, and no smell.
AQUA-THERM® BC-390	Epoxy	Adjustable	150	180	VOC free, high chemical resistant varnish including freons. Strong bonding properties
<b>Solvent free – Low Emissions – VOC free</b>					
DOLPHON® CC-1105 range	Polyester	600	150	200/220	Low smell, low viscosity with good tank storage stability. Good bonding strength. LV version available.
DOLPHON® XL-21xx range	Polyester	550	150	180/220	Low smell, low viscosity with excellent tank storage stability. EN45545-2 approved for railway applications. UV curing version available.
DOLPHON® XL-3101	Cyclo-Polyester	500	150	180	Low smell , low viscosity. Very good thermal ageing behaviour.
Damisol® 3630 range	Polyester Imide	300-600	150	180	Low smell , very low viscosity. Excellent thermal ageing behaviour.
DOLPHON® CC-1180 LoV	Epoxy	550	150	180	Highly chemical and moisture resistant. Excellent bonding properties. Superior adhesion.

# VACUUM PRESSURE IMPREGNATION

Vacuum (Pressure) Impregnation V(P) is mainly used when the penetration and filling factor of the resin need to be improved. Von Roll offers a large choice of resins suited to a wide range of properties with a long storage tank stability.



Product Name	Chemistry	Viscosity at 23°C (mPa.s)	Typical curing temperature (°C)	Thermal rating UL1446 TP (°C)	Main Characteristics
<b>Low Voltage</b>					
DOLPHON® CC-1105	Polyester	600	150	200/220	VOC free. Low smell, low viscosity with good tank storage stability. Good bonding strength. Semi rigid type available.
DOLPHON® XL-21xx range	Polyester	550-1800	150	180/220	VOC free. Low smell, low viscosity with excellent tank storage stability. Thixotropic grade available.
DOLPHON® XL-31xx range	Cyclo-Polyester	900-2500	150	180	VOC free. Low smell, low viscosity. Very good thermal ageing behaviour. Thixotropic version available. Very low emissions. Label free.
Damisol® 3630 range	Polyester Imide	300-3200	150	180	VOC free. Low smell, very low viscosity. Excellent thermal ageing behaviour. Thixotropic version available.
DOLPHON® XL-5100	Polyester Imide	2000	150	180	VOC free. Flexibilized polyester imide with excellent crack resistance. Very low emissions.
DOLPHON® CC-1118	Epoxy	6000	150	200	VOC free. Thixotropic grade for high resin build: good moisture protection and better corona resistance. Superior adhesion. EN45545-2 approved for railway applications.
DOLPHON® CC-1180 range	Epoxy	550-4000	150	180	VOC free. Highly chemical and moisture resistant. Superior adhesion. High viscosity and thixotropic versions available.
<b>High Voltage motors and generators (&gt;1000V)</b>					
Damisol® 3309	Polyester Imide	170	150	not applicable	Very low viscosity resin of our Samica-bond Insulation system for class H 180 electrical machines up to 15KV.
Damisol® 3630 MEV	Polyester Imide	500	150	not applicable	VOC free. Low emissions resin for class H 180 medium voltage electrical machine
Damisol® 3420	Epoxy	1200	160	not applicable	VOC free. Low emissions resin for class F 155 medium voltage electrical machine. Also approved for low voltage machine as class H (UL1446). High chemical resistance.
Damisol® 3418	Epoxy	400	160	not applicable	VOC free. Low emissions resin for class H 180 electrical machine up to 15KV. Thermal index 200°C. High chemical resistance.
Damisol® 3310	Polyester Imide	300	150	not applicable	VOC free. Low emissions resin for class H 180 electrical machine up to 15KV.

# COATINGS

Coating is used mainly for protection of fragile or exposed components. The coating process has to be adjusted according to the varnish choice and expected properties. Several coatings are available with different colors and chemical properties to be used on many processes (brushing, spraying or dipping).

Product Name	Chemistry	Viscosity @ 23°C (mPa.s)	Typical curing conditions (°C)	Thermal rating UL1446 TP (°C)	Main Characteristics
<b>Standard Protection</b>					
Synthite® 41 range	Urethane	175-300	30 minutes at 25°C	180	Tough, flexible and fast drying protective varnish. Available in clear, red and black colors.
Synthite® 43 range	Alkyd-based	50-500	60 minutes at 25	180	Tough, flexible and air drying protective varnish. Available in clear, red, grey and black colors. EN45545-2 approved for railway applications.
<b>High Protection</b>					
HI-THERM® BG-346	Modified polyester	275	3h at 150°C	200/240	High temperature resistant. Glossy grey finish.
<b>Very High Protection</b>					
DOLPHON® CW-1081	Epoxy	Thixotropic	2h at 60°C or 72h at 25°C	no	Two component epoxy resin, with very high abrasion and chemical resistance.

# 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



# 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.



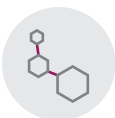
## Cables

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. They can be molded, machined or semi-finished.



## Flexibles

Insulating flexible materials for low-voltage applications such as flexible laminates.



## 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 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.



# CONTACT US:

## EUROPE

Von Roll France SA  
145, rue de la République,  
BP 128  
69883 Meyzieu Cedex  
France  
T +33 478 04 59 04  
cs.europe.liqu@vonroll.com

Von Roll Italia S.r.l.  
Via Rigolfo, n° 73 (zona Vadò)  
10028 Trofarello (TO)  
Italy  
T +39 011 649 31 11  
cs.europe.liqu@vonroll.com

## AMERICA

Von Roll USA, Inc.  
200 Von Roll Drive  
Schenectady,  
NY 12306  
USA  
P +1 518-344-7100  
F +1 518-344-7288  
sales.us@vonroll.com

Von Roll do Brasil Ltda  
Rua Vaticano, No. 179  
06713-040, Jd. Fontana Cotia,  
Sao Paulo  
Brazil  
P +55 11 4208 5995  
F +55 11 4193 6789  
cs.south.america@vonroll.com

## ASIA/PACIFIC

Von Roll Asia Pte Ltd.  
6 Serangoon North Avenue 5  
#03-01  
Singapore 554910  
Singapore  
P +65 6556 4788  
F +65 6556 4959  
cs.asia@vonroll.com

Von Roll Shanghai Co., Ltd.  
Unit C, No.1235, Minqiang Road  
Songjiang District  
Shanghai, 201612  
China  
P +86 21 6768 7020  
F +86 21 5768 7891  
cs.asia.china@vonroll.com

Von Roll India Pvt Ltd.  
15/1/2, 20/1B,  
Kempalinganahalli  
NH-48, Kunigal Road,  
Nelamangala  
Bangalore-562123  
India  
P +91 80 230 87 700  
cs.asia.india@vonroll.com

The logo for vonRoll, featuring the word 'vonRoll' in a bold, dark blue, sans-serif font. The 'v' is lowercase and the 'o' is lowercase, while 'nRoll' is uppercase.