

MARKETS // PRODUCTS

# INSULATING SYSTEMS

FOR THE MOTOR  
REPAIR INDUSTRY



**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

# MICA MAT<sup>®</sup> TAPES AND WRAPPERS

Mica is an excellent insulator that is commonly used in formed coil and field coil applications. The commitment of Von Roll to mica is unique, starting with mining of the raw mica followed by production of paper and mica tapes. With literally hundreds of styles and sizes available, Von Roll is the world leader in the design and production of mica tapes with many options available for almost all applications. For the repair market, these are the styles most popular in the shop. For other applications, please contact your Von Roll representative.

Product Name	Thermal Class*	Nominal finished thickness	Binder	Application Suggestions
MICA MAT <sup>®</sup> 2537XS	180°C	0.0065"	Epoxy	<ul style="list-style-type: none"> <li>• Very flexible 2 ply mica main wall tape ideal for VPI applications</li> <li>• Mica weight 160 gr/m<sup>2</sup></li> </ul>
MICA MAT <sup>®</sup> 2480XS	180°C	0.0065"	Epoxy	<ul style="list-style-type: none"> <li>• Very flexible 2 ply mica main wall tape ideal for VPI applications</li> <li>• Mica weight 180 gr/m<sup>2</sup></li> </ul>
MICA MAT <sup>®</sup> 2546XS	180°C	0.0063"	Epoxy	<ul style="list-style-type: none"> <li>• Improved design Mica Max 2 ply mica main wall tape ideal for VPI applications</li> <li>• Mica weight 160 gr/m<sup>2</sup></li> </ul>
MICA MAT <sup>®</sup> 77877	155°C	0.007"	Epoxy	<ul style="list-style-type: none"> <li>• Our premier 3 ply VPI tape with new technology to provide a flexible tape</li> <li>• Excellent voltage-endurance properties</li> <li>• Compatible with most epoxy and polyester VPI resins used in the motor repair industry</li> </ul>
MICA MAT <sup>®</sup> 77986	155°C	0.007"	Epoxy	<ul style="list-style-type: none"> <li>• An industry standard 3 ply VPI tape for many years</li> <li>• Compatible with most epoxy and polyester VPI resins used in the motor repair industry</li> </ul>
MICA MAT <sup>®</sup> 77956	155°C	0.006"	Polyester	<ul style="list-style-type: none"> <li>• Industry standard film backed tape for dip and VPI coil applications</li> <li>• The tape of choice for VPI processing with polyester resins containing DAP monomers</li> </ul>
MICA MAT <sup>®</sup> 2574XS	155°C	0.007"	Epoxy	<ul style="list-style-type: none"> <li>• This two ply B-staged tape is used to manufacture formed coils where VPI processing is not available</li> <li>• Useful in the shop for insulating connections</li> </ul>
MICA MAT <sup>®</sup> 77984	180°C	0.0085"	Solventless Epoxy	<ul style="list-style-type: none"> <li>• This three ply B-staged tape is used to manufacture formed coils where VPI processing is not available</li> <li>• Useful in the shop for insulating connections</li> </ul>
MICA MAT <sup>®</sup> 77942	180°C	0.011"	Epoxy	<ul style="list-style-type: none"> <li>• Three ply glass - mica - glass tape with very high resin content for low pressure molding</li> <li>• For high temperature traction field coils and other coils.</li> </ul>
MICA MAT <sup>®</sup> 2452XS	220°C	0.0059"	Polyimide	<ul style="list-style-type: none"> <li>• Three ply silicone resin tape for highest temperature applications</li> <li>• Woven glass, mica paper and polyimide film provide high strength for application with dielectric strength</li> </ul>

\*With suitable impregnating resin on VPI tapes

# CORONA PROTECTION

Anytime voltages are high enough to generate partial discharge or corona, semi-conductive materials are needed to manage the discharge without damaging the insulation. Von Roll offers several styles of tapes and paints that can be used to safely control destructive voltages. These products are generally used for designs of 6 kV and above, but are sometimes useful in improving the life of 4 kV machines in inverter-driven applications.

Product Name	Nominal thickness	Color	Special Properties
CoronaShield® 215	0.004"	Black	<ul style="list-style-type: none"> <li>• Coated polyester tapes in the 200 –1000 ohm/sq range used in slot sections motor or generator to prevent corona discharge</li> </ul>
CoronaShield® 217	0.009"	Gray	<ul style="list-style-type: none"> <li>• Variable resistance (grading) tapes used to safely discharge voltages on the extensions or overhangs of coils</li> <li>• Several styles available</li> </ul>
CoronaShield® 8001	Paint	Gray	<ul style="list-style-type: none"> <li>• Gray paint loaded with semi-conductive particles useful in repairing damaged grading on extensions or overhangs of high-voltage coils. Dries in 15 – 30 minutes; tack-free</li> </ul>
CoronaShield® 8003	Paint	Black	<ul style="list-style-type: none"> <li>• External corona has to be prevented by applying a conductive coating varnish or tape on the main wall insulation.</li> </ul>
CoronaShield® 8004	Rolled putty	Black	<ul style="list-style-type: none"> <li>• Conductive mastic for Roebel Coils and voids.</li> </ul>

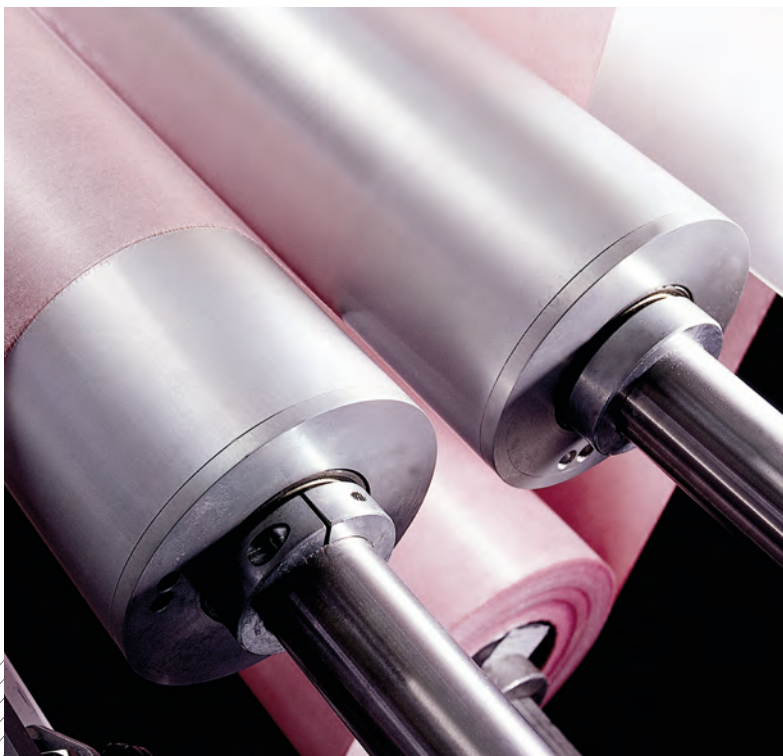


Coronashield® conductive and semi-conductive tapes.

# SLOT AND PHASE INSULATION

In random mush-wound motors, as well as some form-wound designs, a high-quality slot liner is the principal guarantee of a long electrical life of the machine. Von Roll offers a very wide range of flexible laminates and coated cloths for any application. All of the flexible laminates are available in 2, 3, 4 or more plies, and most coated materials are available with glass or Daglas® substrates.

Product Name	Thermal Class	Description	Application Suggestions
ACUFLEX® DMD	180°C	Nonwoven polyester mat bonded to both sides of an electrical grade polyester film	<ul style="list-style-type: none"> <li>• Preferred choice in hand-winding applications</li> <li>• Industry standard for class F designs</li> <li>• Available in either 70% or 100% saturated</li> <li>• 70% allows for improved resin absorption</li> </ul>
ACUFLEX® NMN	180°C	Aramid fiber paper bonded to both sides of an electrical grade polyester film	<ul style="list-style-type: none"> <li>• Aramid paper-based flexible laminates available in a wide range of constructions</li> <li>• Used where high-reliability performance is required</li> <li>• Also available with polyimide film for high-temperature applications</li> </ul>
THERM-AL H®	180°C	Polyester-coated glass cloth with or without an acrylic pressure-sensitive adhesive on one side	<ul style="list-style-type: none"> <li>• Used as slot liners or phase cloth where extreme flexibility is required</li> <li>• Excellent electrical, mechanical and conformability properties</li> </ul>
FUSA-FLEX®	155°C	Flexible B-stage epoxy resin on Daglas® cloth	<ul style="list-style-type: none"> <li>• When properly applied it results in a watertight sealed coil with outstanding electrical strength for use where VPI is not available</li> </ul>
FUSA-FAB®	155°C/180°C	Flexible B-stage polyester resin on glass cloth	<ul style="list-style-type: none"> <li>• Used as core insulation on field coils, as bolt insulators and repairing tubes</li> </ul>



Coronashield® conductive and semi-conductive tapes.

# SUPPORT MATERIALS

Made of 100% electrical grade glass yarns with B-staged resins, Von Roll Poly Glas® banding tapes and ropes are manufactured to provide excellent mechanical strength for supporting structures against rotational forces as well as surge inrush currents on startup. These products are normally fully cured before resin treatment, so compatibility is assured with most dip or VPI resins.

Product Name	Thermal Class	Size Range	Application Suggestions
POLY GLAS® 76843	155°C	1/4" - 1"	<ul style="list-style-type: none"> <li>• 155°C, moisture resistant banding tape used in supporting traction and industrial DC armatures</li> <li>• Also used for tying AC stators where maximum support is needed</li> </ul>
POLY GLAS® 76870	220°C	1/8" - 2"	<ul style="list-style-type: none"> <li>• 220°C banding tape used in supporting traction and industrial DC armatures</li> <li>• Also used for tying AC stators where maximum support is needed</li> </ul>
POLY GLAS® 76881	155°C	1/4" - 1"	<ul style="list-style-type: none"> <li>• Lower temperature cure tape can be used when baking ovens are not available or when thermal sensitive materials are used</li> </ul>
POLY GLAS® 76831	155°C	1/4" - 1"	<ul style="list-style-type: none"> <li>• Used in conjunction with blocking and tie cords, creating a rigid support for motor and generator windings and end turns during startup and load changes.</li> </ul>



# MICA SPLITTINGS AND TUBES

Sheet materials, plates and tubes made from traditional mica splittings or mica paper laminates provide excellent mechanical strength and unsurpassed electrical performance for the most extreme applications of heat and voltage stress. Special splitting tapes are also available where coil designs require their unique properties.

## Molding Plates

Made with high-grade mica splittings and a variety of resins, these flexible sheets can be shaped or molded to specific configurations, then heat-cured for mechanical stability. They are useful in DC armature insulation as well as many other uses in the shop.

## Segment Plates

These rigid plates, made from either mica splittings or laminated mica papers, are useful in commutator manufacturing and for mechanical machined parts where glass-based composites are not adequate. Available with modified alkyd, epoxy or inorganic binders.

## Tubes

Made from either mica splittings or paper, fully cured tubes can be quickly constructed to virtually any ID or OD. They are very resistant to high temperatures and mechanical forces and are useful as bolt insulators, shaft insulators and as resistor grid components.



# VARNISHES AND RESINS

Permafil® varnishes and resins have been used for manufacturing and repairing motors and generators for over 100 years and have broad acceptance among repair companies expecting the highest in quality and performance. Available in different chemistries, there is a product for almost any application that requires high quality and performance.

Product Name	Thermal Class	Chemistry	Flash Point, °F	Application Suggestions
SYNTHITE® AC-41	180°C	Solventless Polyurethane	81	<ul style="list-style-type: none"> <li>High-temperature, fast-cure, air-dry polyurethane varnish with excellent circuit board-coating properties</li> <li>Available in aerosol</li> </ul>
SYNTHITE® AC-43	180°C	Solvent Polyester	81	<ul style="list-style-type: none"> <li>High-temperature, fast-cure, air-dry polyester varnish</li> <li>Perfect for dip, spray or brushing</li> <li>Air-dries in 1 hour or can be baked to speed-cure</li> </ul>
SYNTHITE® AC-46	180°C	Solventless Polyurethane	81	<ul style="list-style-type: none"> <li>Air-dry polyurethane that has excellent moisture and fungus resistance</li> <li>Available in aerosol spray</li> </ul>
SYNTHITE® ER-41/EB-41	180°C	Solventless Polyurethane	81	<ul style="list-style-type: none"> <li>Red or black high-temperature, fast-cure, air-dry varnish, used as an insulator coating</li> <li>Both are available in aerosol spray cans</li> </ul>
PERMAFIL® 1217	180°C	Solvent Polyester	88	<ul style="list-style-type: none"> <li>Fast RT curing polyester varnish for general purpose applications</li> <li>Available in clear, red or yellow</li> </ul>
HI-THERM® BC-346A	220°C	Solvent Polyester	88	<ul style="list-style-type: none"> <li>High-temperature varnish used in a wide range of dip and bake applications</li> </ul>
HI-THERM® BC-352	200°C	Solvent Epoxy	81	<ul style="list-style-type: none"> <li>Excellent dipping varnish used for motors exposed to moisture and harsh environments or hermetic applications</li> </ul>
PERMAFIL® 716	220°C	Solventless Polyester	200/132	<ul style="list-style-type: none"> <li>PERMAFIL® 716 contains a blend of monomers allowing it to be used in a dip or VPI application</li> <li>High build resin with improved stability</li> </ul>
PERMAFIL® 707/724	220°C	Solventless Polyester	127	<ul style="list-style-type: none"> <li>707 sets the standard for performance in high-vibration and high-temperature applications</li> <li>Used in many VPI tanks</li> <li>An excellent choice for repair shops that support the steel and mining industries</li> <li>724 is a general purpose resin used in industrial and commercial applications</li> </ul>
PERMAFIL® 74035/74041	180°C	Solventless Epoxy	200	<ul style="list-style-type: none"> <li>High-performance resin for general purpose industrial and mining motors in VPI applications</li> </ul>
PERMAFIL® 74050	220°C	Solventless Epoxy	127	<ul style="list-style-type: none"> <li>High-performance resin used in high-voltage insulation systems</li> <li>When used with the proper mica tapes this insulation system can be used for motors and generators up to 18 kV</li> </ul>
DOLPHON® CC-1105	220°C	Solventless Polyester	>200	<ul style="list-style-type: none"> <li>High-flash, high-bond solventless polyester resin which provides excellent storage at room temperature</li> </ul>
DOLPHON® XL-2103	220°C	Solventless Polyester	>200	<ul style="list-style-type: none"> <li>Low-odor, high-flash very low VOC solventless polyester resin. Formulated for high build in dip and bake applications</li> </ul>
DOLPHON® XL-3102	180°C	Solventless Polyester	>200	<ul style="list-style-type: none"> <li>New family of Green Solventless Polyesters with outstanding strength and high temperature performance</li> </ul>



# KITS AND COMPOUNDS

Often, repairing electric motors and generators for special applications requires many specialty compounds, potting materials and top coats. Here are just a few of the materials available from Von Roll.

Product Name	Chemistry	Flash Point, °F	Gel Time	Main Characteristics
PERMAFIL® 704	Polyester	132	RT Cure	<ul style="list-style-type: none"> <li>Two-component pour-through resin for general purpose motors</li> </ul>
PERMAFIL® 74010	Epoxy	200	RT Cure	<ul style="list-style-type: none"> <li>High-performance two-component clear coating for spray or flooding applications</li> </ul>
PERMAFIL® 74115	Epoxy	200	Heat Cure	<ul style="list-style-type: none"> <li>Thixotropic wet winding compound for DC pole-wound coils</li> </ul>
PERMAFIL® 74118	Epoxy	200	Heat Cure	<ul style="list-style-type: none"> <li>1 W/m·K thermally conductive wet winding compound for DC pole wound coils</li> </ul>
DOLPHON® CB-1069	Epoxy	200	RT Cure	<ul style="list-style-type: none"> <li>General purpose, high thermal conductivity black epoxy casting compound for use in all types of electrical assemblies</li> </ul>
DOLPHON® CB-1078	Epoxy	200	RT Cure	<ul style="list-style-type: none"> <li>Black epoxy compound for use in all electrical assemblies</li> <li>Also used to cast end windings of wind generators and induction heaters</li> </ul>
DOLPHON® CB-1109	Polybutadiene	200	RT Cure	<ul style="list-style-type: none"> <li>Two-part low-viscosity polybutadiene compound</li> <li>Can be used for potting, casting and coating electrical apparatus</li> </ul>
DOLPHON® CB-1128	Polybutadiene	200	RT Cure	<ul style="list-style-type: none"> <li>Two-part flexible black polybutadiene compound formulated for motor and generation encapsulation</li> <li>Excellent for high abrasion and moisture environments</li> </ul>
DOLPHON® CC-1120	Polybutadiene	200	RT Cure	<ul style="list-style-type: none"> <li>Low viscosity</li> <li>Clear compound for potting coils and transformers</li> <li>Easily repaired</li> </ul>
DOLPHON® CR-1034-H	Epoxy	200	RT Cure	<ul style="list-style-type: none"> <li>Two-part semi-rigid epoxy compound specifically formulated for encapsulation by "buttering" on electric motors</li> </ul>
DOLPHON® CB-1107	Epoxy	200	RT Cure	<ul style="list-style-type: none"> <li>Semi rigid black epoxy for use in all electrical assemblies</li> <li>Good thermal conductivity, V0 flammability rating</li> </ul>
DOLPHON® CN-1037	Epoxy	200	Heat Cure	<ul style="list-style-type: none"> <li>Heat cured 2 part epoxy with good thermal resistance and cycling properties</li> <li>Good thermal conductivity and crack resistant in cycling from -40°C to 240°C</li> </ul>

# RESIN AND VARNISH ANALYSIS PROGRAM

At Von Roll, our focus is always on customer satisfaction and long-term relationships forged in the industry, based in part on the technical support we offer before, during and after the decision to purchase has been made. An example of this is our unique, pro-active resin analysis program, designed to promote regular testing and adjustment, if required, of resins and varnishes at our many installations at both manufacturing and repair facilities. The periodic testing of resin properties ensures manufacturing consistency yielding predictable results. An added benefit is the peace of mind that comes from the knowledge that your resin or varnish is safe and stable. The provided shipping kits and friendly reminders help keep your testing on a regular schedule, and all required adjusters are shipped directly from the factory, assuring prompt delivery and fresh material.

Basic stability tests – viscosity, gel time, moisture content, liquid and cured appearance – are performed free of charge. Additional testing such as film build, dielectric strength and helical coil bond strength is available for a nominal charge. All of this is to keep your facility producing good machines every day. Join the many Von Roll customers who have secured their investment through timely analysis, feedback and recommendations from Von Roll on keeping their tanks stable.

**Materials and systems have to be tested in order to ensure the requested specifications concerning mechanical, electrical and thermal characteristics. At Von Roll High-Voltage and Low-Voltage laboratories we are able to test our customers' materials and systems according to IEC, UL and other specifications.**

- + Insulation materials and systems testing to ASTM standards
- + High-voltage testing
- + IEEE 1043 voltage-endurance testing
- + IEEE 1776 systems performance testing
- + Partial discharge evaluation and testing
- + US Army Corps of Engineers qualified testing
- + Accelerated testing capabilities
- + Thermal conductivity testing

**For a number of years we have been offering a unique program of high-voltage and low-voltage insulation training within our Von Roll Corporate University.**



# 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 Schweiz AG  
Passwangstrasse 20  
4426 Breitenbach  
Switzerland  
P +41 61 785 5111  
F +41 61 785 5188  
[cs.europe.mica@vonroll.com](mailto:cs.europe.mica@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](mailto: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](mailto: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](mailto: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](mailto: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](mailto:cs.asia.india@vonroll.com)

# **vonRoll**