



Products and Systems  
for the Electronics 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 ww range of insulation products, composites, process equipment, tests and services for the electro-technical 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 the construction of smaller and more efficient machines.

### Customers enjoy the following benefits:

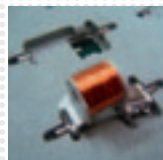
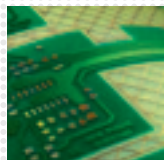
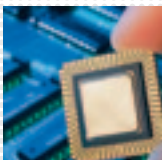
- » One single source for all insulating materials
- » Thorough expertise from power generation and transmission to its efficient utilization
- » Proven compatibility for system components
- » Testing at Von Roll of both materials and systems
- » Manufacturing technology and equipment
- » Consulting in application engineering
- » Training in insulation materials and systems

The need for electronic devices in all sectors is increasing: in the telecommunications and computer fields, in automotive, rail, military, aerospace and consumer industries. Fast technological changes in the soldering processes demand higher-performing materials. Von Roll offers solutions that enable consistent high-quality production of electronic devices such as printed circuit boards (PCBs), using state-of-the-art processes with low manufacturing costs.

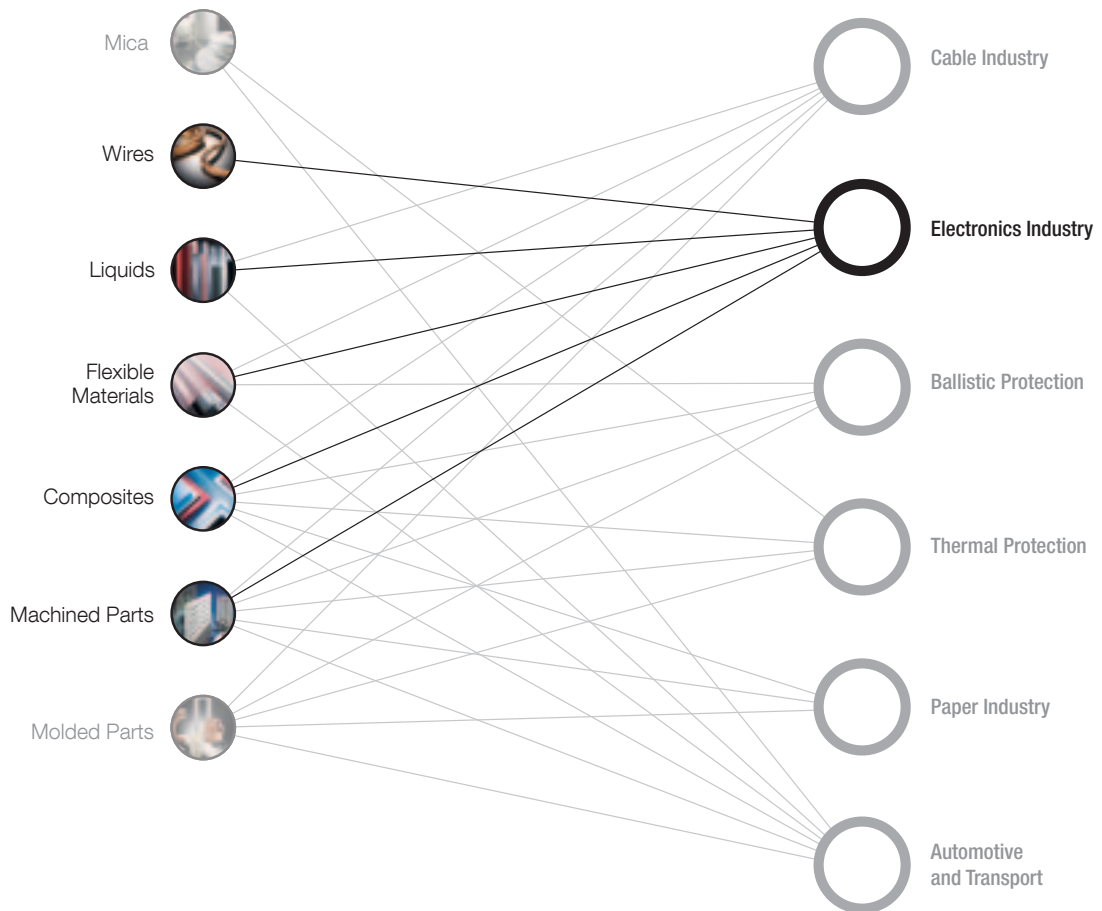
In the PCB industry, Von Roll is recognized as the original manufacturer of CDM® – Composite Delmat Material – with expertise in solder pallet and frame design. Through continued development of our CDM® and Durapol® product portfolio, Von Roll confidently meets the PCB industry demands for solder frames, pallets and test adaptors.

The Von Roll range for the electronics industry covers:

- » The original solder pallet materials: CDM® and Durapol®
- » Wide experience with solder pallet materials: CDM® and Durapol®
- » A dedicated product range: ESD protection systems for PCBA, PCB masking tapes, etc.
- » High-frequency Litz wires and fine wires for electronic applications



# Our Products for the Electronics Industry



Von Roll offers full system solutions for your industrial sector. Please contact us or visit our website [www.vonroll.com](http://www.vonroll.com) for further information.



# Solder Pallets for PCB Assembly

## CDM® and Durapol®: high-performing solder pallet materials

CDM® and Durapol® solder pallet materials are recognized worldwide and appreciated for their high temperature resistance, good fabrication qualities, chemical resistance, electrostatic dissipative properties and their ability to be detectable by sensors.

Due to excellent retention of mechanical strength at high temperatures, the structural composition of CDM® and Durapol® materials prevents deformation during the different process operations. This ensures pallet longevity and permits extensive production cycles.

Exceptional dimensional stability and flatness, precise thickness tolerances and excellent machining qualities contribute to solutions that meet performance needs.

## Major CDM® and Durapol® grades

Product name	Color	Surface resistivity in Ohm/square acc. to IEC 60093	Sheet size (mm)	Standard thickness tolerances +/- 0.10 (mm)	Highlights
CDM® ESD 68910 Durapol® L200	Black	Dissipative properties 10E <sup>5</sup> to 10E <sup>9</sup>	2350 x 1335 1950 x 1205 1460 x 1335 1335 x 1170	5, 6, 8, 10, 12	Good flux and temperature resistance, good machineability
CDM® ESD 68940	Gray	Dissipative properties 10E <sup>5</sup> to 10E <sup>9</sup>	2350 x 1335 1335 x 1170	5, 6, 8, 10, 12	Higher temperature resistance, very good flux resistance, excellent machineability, optical recognition by sensors

Other references available. Please consult us.

## Reliability and safety products

Von Roll products are engineered to provide passive component safety through controlled electrostatic dissipation (ESD). In order to meet the strict ESD safety measures that prevail in modern production areas, Von Roll has developed grades of CDM® and Durapol® materials that exhibit dissipative properties.

## Classification of materials according to different standards

Reference	CDM															
	1	10	10 <sup>2</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>8</sup>	10 <sup>9</sup>	10 <sup>10</sup>	10 <sup>11</sup>	10 <sup>12</sup>	10 <sup>13</sup>	10 <sup>14</sup>	
ANSI/EIA 541	conductive					dissipative					insulating					$\rho_s$ ( $\Omega/\square$ )
	conductive					dissipative					insulating					$\rho_t$ ( $\Omega\cdot\text{cm}$ )
DOD HDBK 263	conductive					dissipative					antistatic					$\rho_s$ ( $\Omega/\square$ )
Mardiguan (50)	conductive					risky					no load producing					$\rho_s$ ( $\Omega/\square$ )
ASTM D 4470	conductive					partially protective					insulating					$\rho_t$ ( $\Omega\cdot\text{cm}$ ) $\rho_s$ ( $\Omega/\square$ )
	protective			conductive		dissipator					insulating					$\rho_s$ ( $\Omega/\square$ )
CECC 00 015	protective		conductor			dissipative					insulating					$\rho_t$ ( $\Omega\cdot\text{cm}$ )
	1	10	10 <sup>2</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>8</sup>	10 <sup>9</sup>	10 <sup>10</sup>	10 <sup>11</sup>	10 <sup>12</sup>	10 <sup>13</sup>	10 <sup>14</sup>	10 <sup>15</sup>

### CDM® and Durapol®: machined solder pallets

Solder wave, SMT, selective soldering process: whatever the soldering application CDM® and Durapol® sheets can be machined into pallets according to customer requirements.

The properties of CDM® and Durapol® when converted into pallets provide the following benefits:

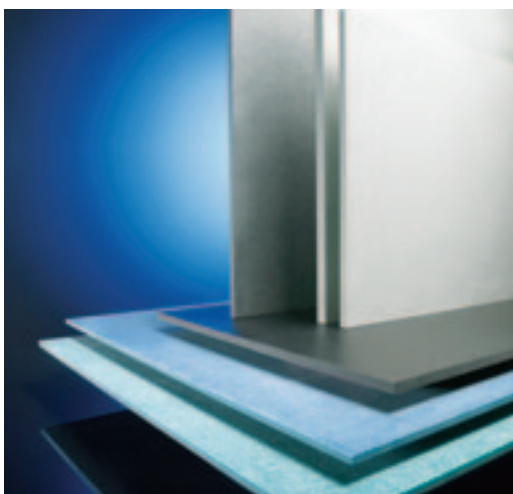
- » Significant reduction in solder defects by holding PCB flat during soldering process
- » Heat protection of sensitive components thanks to machining design of pallets
- » Prevention of damage caused by electrostatic discharge
- » Automatic and continuous functionality from screen paste or component placement to final control, increased productivity and handling reduction
- » Ability to maintain flat PCB substrate during assembly process, avoiding twisting and warpage of flexible, large or small PCBs
- » Increased productivity through optimization of several PCBs on one pallet

Being an expert in the machining of solder frames based on CDM® and Durapol® materials, Von Roll works in association with various partners.

- » Engineering and design departments, with facilities worldwide, are specialized in the design and manufacture of carriers and pallets.
- » CAD-CAM equipment is linked to CNC (Computer Numerical Controlled) machining centers.

The most suitable chemical and manufacturing processes are selected by our engineers in order to manufacture successful products compliant with the specifications of the PCB assembly processes.

Design and manufacturing departments work closely together to meet ever-increasing customer demands. The improved product performance and zero-defect processes are our focus.



CDM® and Durapol® are produced in sheets of different sizes especially adapted for the needs of the industry



CDM® and Durapol® references





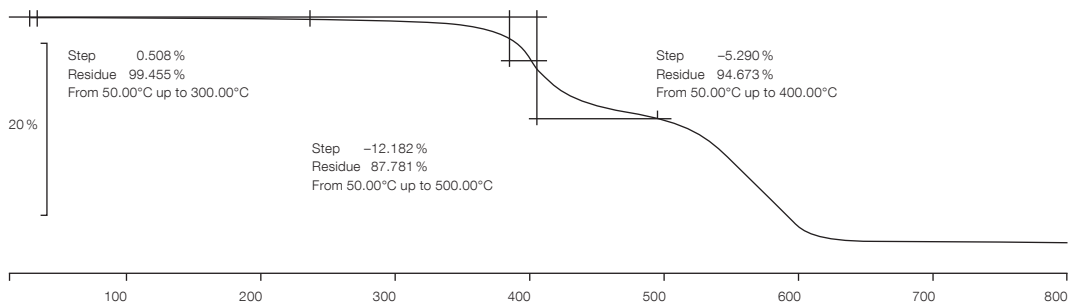
## CDM<sup>®</sup> and Durapol<sup>®</sup> Materials

Von Roll is a leading company in the composite market and dedicates significant resources to research and development. This allows the company to develop tailor-made solutions according to customer requirements in its high-performance composite materials laboratory. General mechanical, electrical and physical values can be found in the data sheets available on the Von Roll web site.

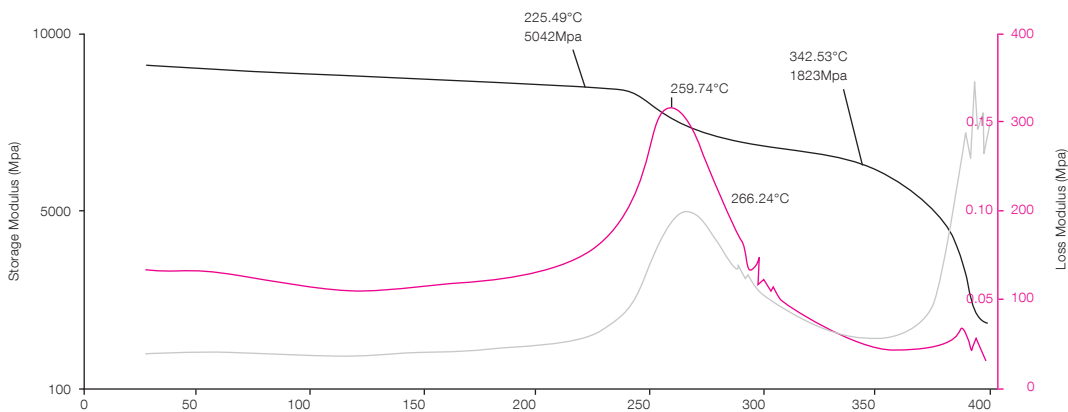
For specific applications, further detailed analysis is carried out in order to fulfill all customers' requirements and expectations.

### Some examples of research for product development:

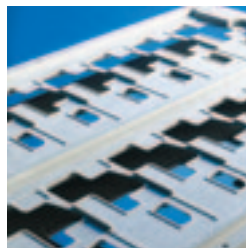
#### Thermogravimetric analysis (TGA)



#### Dynamical mechanical analysis (DMA)



CDM<sup>®</sup> and Durapol<sup>®</sup> to fit customer demands



One of the largest production capacities worldwide



Wide experience with machined solder pallets



Optimized materials with CDM<sup>®</sup> and Durapol<sup>®</sup>



## Protective Systems for PCBA

Conformal coatings and potting compounds play a key role in the improvement of electronic component reliability. Printed circuit board assemblies (PCBAs) are increasingly used in home appliances, transport equipment (automotive and railway sector), and scientific and medical products, and provide maximum safety and comfort. In severe environments they are subject to vibration, high humidity and dust. The reliability of all these electronic devices is dependent on the choice of optimum protective system.

### Conformal coatings

A range of thin coatings for the overall protection of assembled PCBs.

#### » Damicoat® 2405-01

Damicoat® 2405-01 is a fast, clear air-drying alkyd varnish for good tropical protection, compliant with various selective coating processes, free of toluene and CMR (Carcinogenic, Mutagenic or Toxic to Reproduction) components.

#### » Damilux 4700F

Damilux 4700F is a UV-curable urethane resin that provides a thick coating (200 µm) for outstanding moisture resistance. It is free of volatile organic compounds (VOCs) and cures with exposure to the appropriate UV light.

### Potting compounds

Overmolding, encapsulating, bonding, sealing, filling voids, helping thermal dissipation and protecting against moisture, vibration and other environmental factors: Damival two-component casting compounds provide the ideal solution for such application technology.

Damival® compounds are made to be easily processed, with low shrink characteristics and low sensitivity to moisture, enabling smooth out-gassing during curing. Excellent adhesion to a variety of materials and temperature cycling resistance are essential properties in electronic applications. The Damival® range has been designed accordingly. All grades are free of halogens and VOCs. Damival® formulations are compliant with RoHS (Restriction of Hazardous Substances) regulation 2002/95/EC.

Product name	Color	Mix viscosity mPa.s, 25°C	Gel time Min, 25°C	Shore hardness	Glass transition °C	Main characteristics
Damival® 13551	White	2300	50	70A	-10	Compliant with NF16-101 railway standard, UL94V0 listed, good resistance to severe thermal variation.
Damival® 13552	White, Black	4500	70	50D	10	Compliant with NF16-101 railways standard, UL94V0 listed, thermal resistance (130°C continuous)
Damival® 13553	Black	3000	35	50D	9	Compliant with NF16-101 railway standard, UL94V0 listed, high thermal resistance (155°C continuous, 180°C peak)
Damival® 13653	Black	3000	90	75A	-68	Remain flexible at low temperature, very hydrophobic, high adhesion
Damival® 13654	Beige	4000	60	25A	-53	Ultra soft and very hydrophobic, excellent adhesion



## PCB Masking Tapes

To complete our selection of products for the PCB and electronic industries, Von Roll has, in recent years, produced a large range of adhesive tapes:

- » For hot air leveling (HAL) processes, Isotape® 54921PV4 guarantees a finished PCB without tin overflow.
- » During the electroplating process, polyester-based tapes like Intertape® 6130 and Isotape® 6215PV3 prevent plating over areas of the PCB where it is not required. This guarantees correct masking of gold finger connections.
- » For wave soldering processes, the polyimide Isotape® 4428 series ensures high temperature resistance in the soldering bath.

Von Roll provides engineered product solutions for every application. The following tables detail our comprehensive range. Each tape enables “clean” production, without unnecessary residue deposits.

### Electroplating tapes for the protection of connectors (during the plating process)

Product name	Intertape® 6120	Intertape® 6130	Isotape® 6215PV3	Isotape® 4428PV4
Backing	Polyester	Polyester	Polyester	Polyimide
Adhesive	Silicone	Silicone	Silicone	Silicone
Total thickness	0.087mm	0.101mm	0.089mm	0.070mm
Adhesive strength	13.4N/25mm	12.3N/25mm	8N/25mm	6.25N/25mm
Temperature resistance	Short term up to 218°C	Short term up to 218°C	Short term up to 260°C	Short term up to 400°C
Color	Blue	Red	Green	Amber

### Wave soldering masking tapes

Product name	Isotape® 54921PV4	Isotape® 4638PV3	Isotape® 4428PV4	Isotape® 4428PV3-32
Backing	Polyester/flat paper	Glass cloth	Polyimide	Polyimide
Adhesive	Silicone	Silicone	Silicone	Silicone
Total thickness	0.240mm	0.190mm	0.070mm	0.055mm
Adhesive strength	9.5N/25 mm	6.50N/25 mm	6.25N/25mm	6.00N/25mm
Temperature resistance	Short term up to 260°C	Short term up to 260°C	Short term up to 400°C	Short term up to 400°C
Color	Red	White	Amber	Amber

### Kapton® or Polyimide: A very high temperature masking tape with a short-term temperature resistance of up to 300°C.

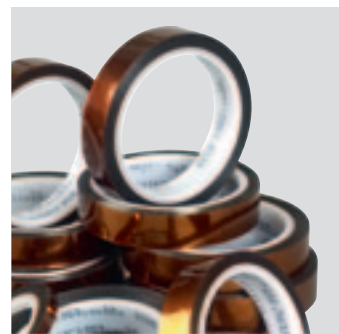
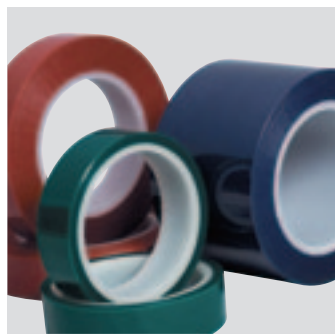
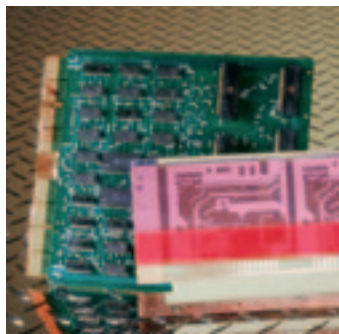
Isotape® 4428PV4, with a high-density adhesive coating weight, is particularly suitable for application on uneven PCB surfaces – the ultimate in PCB protection! Thin and conformable, with outstanding puncture resistance at elevated temperatures, it provides optimum protection of gold fingers during wave soldering of PCBs.



### Hot air leveling (HAL) masking tapes

HAL is a high-temperature process involving exposure to compressed air. Due to the challenging nature of the process, standard polyester and polyimide film tapes are not suitable. Our specially developed tape Isotape® 54921PV4 provides the best balance between high mechanical and thermal resistance and residue-free removal.

Product name	Isotape® 54921PV4
Backing	Polyester/flat paper
Adhesive	Silicone
Total thickness	0.240mm
Adhesive strength	9.5N/25mm
Temperature resistance	Short term up to 260°C
Color	Red



Complete set of adhesive tapes you may require for production and protection purposes.

## Typical applications

Printed circuit boards are used in almost all industries today. Thanks to continually optimized processes the PCB products show improving performance and enable many innovations and helpful tools for:

- » Automotive industry: Central locking system, window regulator, infotainment, ABS, parking assistant and injection systems, LED and XENON lamps
- » Rail industry: Measure and control centers, service systems, etc.
- » Home-Entertainment: TV and HiFi-components
- » Household: Multifunctional, small and high-performance consumer goods
- » Telecommunications: Lighter and better-performing mobile phones
- » Computer industries: Light-weight laptops, gear
- » Information boards in train stations, airports, sports stadiums
- » Alert systems
- » And many more ...



## Litz Wires and Fine Wires

High-frequency Litz wire consists of bunched, enameled strands. Our standard single wire is Soldex<sup>®</sup>, which is directly solderable without prior removal of the enamel.

### Litz wire structure

We can offer customized solutions for the bunching, stranding, pitch and twisting direction.

### Selection of single wire

Enameled to Grade 0, 1, 2 or 3. Diameter from 0.030mm to 1.00mm.

Type of wire	Base	Temperature class	Characteristics
Soldex <sup>®</sup>	PU	155, 180	Solderable at approx. 375°C
Thermex <sup>®</sup> S180	PEI, modified	180	Tinnable enamel at approx. 470°C
Thermex <sup>®</sup> 200	PEI, PEI+PA	200	Good thermal stability
Thermibond <sup>®</sup> 158	PEI+PAI+thermosetting adhesive	200	Self-bonding

### Additional Types of Insulations

Depending on your application, different tapes can be applied as additional insulation, such as the commonly used polyamide yarn or natural silk, or others, for example:

- » One or more layers of lapping/braiding made of a range of yarns, e.g. polyamide, cotton, glass, polyester, aramide, etc.
- » One or more layers made of polyester foils, polyimide foils, Nomex<sup>®1)</sup> aramide paper, glass tape or Samica<sup>®</sup> with up to 75% overlap.
- » Insulation consisting of adhesive-coated foils such as polyester tape and polyimide is heat-treated to obtain good bonding.

Many combinations are possible.



High-frequency Litz wire



Toroid coil  
© Schaffner BMW



Wide product range for Litz wire

Especially for outdoor applications, the high-frequency Litz wire can also be extruded with polyurethane (PUR), polyvinyl chloride (PVC), halogen-free flame retardant (HFFR) or silicone.

<sup>1)</sup> Nomex<sup>®</sup> is a registered trade mark of Dupont<sup>®</sup>

### Applications for high-frequency Litz wires

In the electronics industry high-frequency Litz wires are used in applications with a frequency over the usual 50/60 Hertz. Typical examples for such applications are:

- » Induction boiler plates
- » High-frequency transformers
- » EMI filter
- » Testing instruments (medical equipment, ultra sonic testing)
- » Welding equipment
- » Tools with contactless energy transfer: e.g. electronic tooth-brush



Induction boiler plate



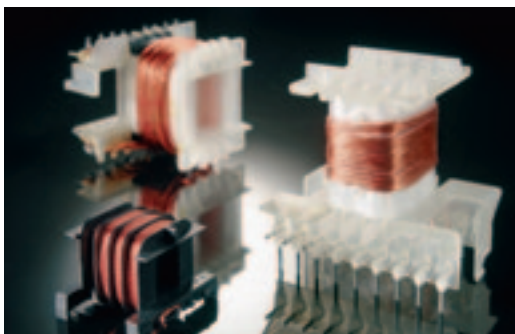
Contactless energy transfer

### Benefits

- » Extensive range of Litz wire combinations to suit customized applications: selection of a single wire diameter, strand number and pitch with stranding direction.
- » Wide range of machines for lapping, braiding and taping of Litz wire

## Wires

Fine wires for magnet coils are available in various qualities. Soldex® wire is solderable and therefore often used in electronic applications. The qualities of Thermex® 200 make this wire suitable for high temperature applications. The self bonding wire type Thermi-bond® offers advantages for the manufacturing process and shows thermal and mechanical stability.



High-frequency transformers



Fine wire for magnet coils

# 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.



## Wires

Insulated round, flat and Litz wires for high-voltage, low-voltage and electronic applications.



## Cables

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



## Liquids

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 and adhesive tapes.



## Ballistic Protection

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



## Transformers

High-performance transformers for power transmission and distribution, tailored solutions to all applications of today's energy-supply companies.



## Testing

Von Roll provides electrical, thermal and mechanical testing of individual materials as well as complete insulating systems. We are UL-certified.



## Training

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

Please contact us or visit our website [www.vonroll.com](http://www.vonroll.com) for further information

### Customer Service

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### About Von Roll

We Enable Energy – As one of Switzerland's longest established industrial companies, Von Roll focuses on products and systems for power generation, transmission and distribution. Von Roll's business portfolio is divided into five business segments: **Von Roll Insulation** is the global market leader in insulation products, systems and services. **Von Roll Composites** produces composite materials and parts for assorted industry appliances. **Von Roll Transformers** offers complete solutions for the fast expanding market of high performance transformers. **Von Roll Water** provides solutions for process engineering tasks in the field of water and waste water management. **Von Roll Solar** is developing a third-generation solar cell.