



Energy Storage Solutions
Battery Protection

vonRoll

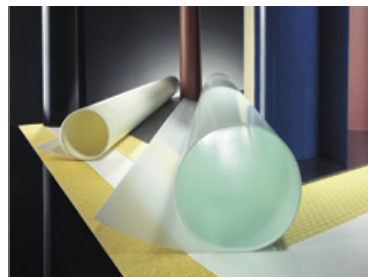
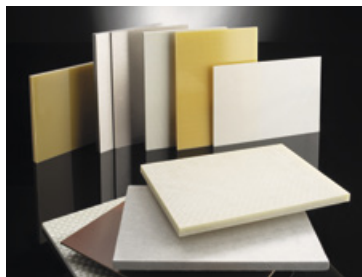
Energy Storage Solutions – Battery Protection

Fire-resistant and crash-safe lithium-ion batteries for electrical vehicles, aircrafts and grid energy storage

- » High degree of safety in operations and crashes
 - Fire resistance and flame retardance
 - Thermal insulation (700°C and higher)
 - Low thermal conductivity
 - High dielectric strength
 - Electrical insulation
 - Chemical stability
 - Mechanical strength: crash safety, prevention of thermal runaway/short-circuits
- » Optimized size and weight of battery package
- » Reduced weight, cost efficient
- » More efficient battery system
- » High reliability
- » Designs for automated manufacturing

Von Roll also prides itself on high delivery standards. We guarantee on-time supply by ensuring:

- » Availability of raw materials
- » Consistent delivery performance
- » Production capacity



Battery Protection – Inside the Lithium-Ion Batteries

Von Roll Shield

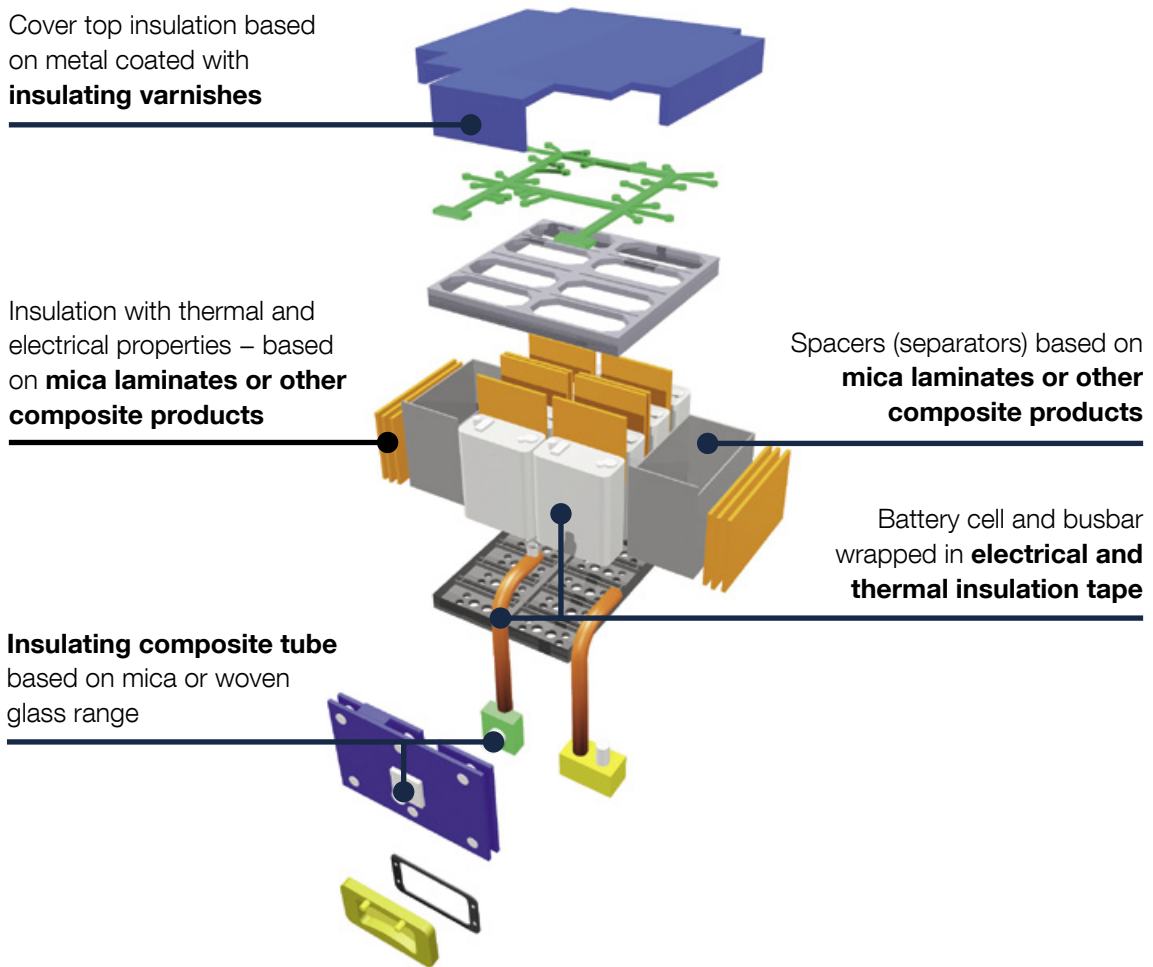
Cover top insulation based on metal coated with **insulating varnishes**

Insulation with thermal and electrical properties – based on **mica laminates or other composite products**

Spacers (separators) based on **mica laminates or other composite products**

Battery cell and busbar wrapped in **electrical and thermal insulation tape**

Insulating composite tube based on mica or woven glass range

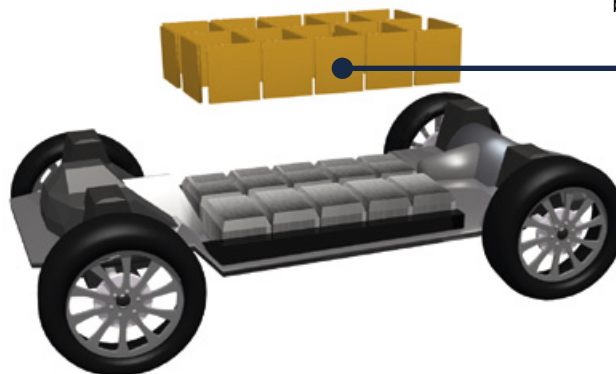


Battery Protection – Battery Package

Von Roll Shield

- » Lightweight materials
- » Combination of materials possible
- » Different battery box designs upon request

Reinforced battery housing based on **composites** for crash safety



Performance and Safety

The battery has a major influence on the “performance” of the system that it feeds. Von Roll understands the challenge to create safe batteries and improve its design in order to achieve lower-weight, higher-performance and longer-lasting systems. Von Roll offers solutions tailored to your requirements and needs.

Von Roll has a broad product range that can address requirements from fire resistance to mechanical/shock resistance.

Von Roll Shield M/B protects your energy storage system from external mechanical threats:

- » Low smoke emission and crash safety
- » High mechanical strength to avoid metal parts destroying the battery package and causing a short circuit (thermal runaway) in the battery cell
- » Fiber-reinforced composites for weight reduction in aerospace and automotive applications; light materials to replace ceramics, and metals such as steel and aluminum or that can be combined/sandwiched with metals

Von Roll Shield T/E not only insulates your system perfectly but also offers great performance at high temperatures:

- » Thermal and electrical insulation
- » High temperature resistance (up to 700°C and higher)
- » Avoids fire propagation in the case of failure by using internal insulation materials

For more information please see our brochures at www.vonroll.com or contact our customer service:

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for E-cars



for airplanes



for batteries

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