**New Sealing Material For Safe Battery Cells**

**Material and sealing expert Freudenberg Sealing Technologies develops new, highly compatible elastomer material**

**Weinheim (Germany), April 10, 2025. Freudenberg offers an optimized sealing material for e-mobility applications as an alternative to PFAS-containing thermoplastic and FKM seals. This new material series is processed by injection molding, delivers superior sealing performance, ensures battery life and meets increasingly stringent environmental regulations.**

In the rapidly growing electric vehicle market, improved battery performance with shorter charging times, maximum temperature resistance and a longer battery life are key factors for success. To meet these demands, OEMs in Europe and the United States need materials that also comply with stricter national and international environmental standards. One high-performance material for such applications comes from the elastomer material group. Freudenberg Sealing Technologies has successfully developed a material that outperforms thermoplastics in the event of thermal runaway and takes battery applications in e-mobility to an entirely new level.

**Using material advantages – elastomer seals instead of thermoplastics**

Thermoplastics that are traditionally used for battery seals have macromolecules with long-chain molecular structures that are not chemically cross-linked but instead held together by weak intermolecular forces. While thermoplastics can be elastically deformed to some degree, the constant charging and discharging of the battery cell also causes them to undergo functionally relevant plastic deformation over time. This is different in elastomers whose molecular chains are chemically cross-linked. In their basic state, the polymer chains form a tangled ball that stretches or compresses under tensile and compressive loads. Due to the entropy elasticity, these cross-linked materials react elastically and reversibly, maintaining their shape exceptionally well during the cyclical volume change of the battery cells under load.

“Our O-rings made from the new elastomer therefore prevent electrolyte from leaking out of the battery cell or impurities from entering the cell,” explains David Kuhne, Application Engineer at Freudenberg Sealing Technologies. “You shouldn’t think of a battery cell as a rigid construct – it ‘breathes’. When the temperature in the battery cell rises from ambient levels to – as a rule – ranges of up to 60°C, the cell expands and then contracts in the same way as it cools. Elastomers show significant advantages over thermoplastics during this continuous stress.” explains Kuhne the charging and discharging process:

**Materials expertise – from cutting-edge research to large-scale production**

The development of new battery materials prioritizes sustainability as well as economic aspects. In general, the longer a battery can be used, the more sustainable the electric vehicles become. The new sealing material from Freudenberg Sealing Technologies contributes to this goal.

When used in customer projects, the new material was able to improve the performance-relevant leakage rate of the battery cells by an order of magnitude – in other words, resulting in a tenfold improvement compared to conventional thermoplastic seals.

Another essential aspect is the extreme sensitivity of battery cell electrochemistry to potential contamination. Dr. Stefan Schneider, Head of Material Development at the O-Rings lead center, explains: “Premature capacity loss, which has been observed in cells sealed with conventional elastomers, can result from minimal but still present impurities in the sealing material. The infiltration of moisture into the cell has a similar effect, as it can cause the decomposition of electrolyte components. These aspects were considered when the new material was developed.” In addition, Process Engineering has optimized manufacturing techniques to such a degree that it is possible to produce these high-performance battery cell seals in large series.

**Rising demand for batteries fuels electric vehicle expansion**

As a leading provider of high-performance materials and innovative products, Freudenberg Sealing Technologies is instrumental in developing safe and sustainable e-mobility. And the timing is perfect: The International Energy Agency’s (IEA) annual “Global Electric Vehicle Outlook” reveals the global developments in electric mobility. According to “Outlook 2024”, the worldwide electric vehicle fleet must expand from less than 45 million vehicles in 2023 to 250 million by 2030 to stay on track for net-zero emissions. This will also drive a sharp increase in the demand for high-performance batteries. Freudenberg Sealing Technologies is pleased: “As a development partner for customer-specific projects, we contribute many years of expertise in materials and innovation. Thanks to our advanced analytical methods and vertically integrated manufacturing processes, we can develop and implement competitive production solutions with great agility,” concludes David Kuhne.

*Foto:* *FST\_img\_batterycell\_elastomer\_ENG.jpg / © Freudenberg Sealing Technologies 2025*

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**About Freudenberg Sealing Technologies**

Freudenberg Sealing Technologies is a long-standing technology expert and global market leader for sophisticated and innovative applications in sealing technology and electromobility. With its unique materials and technology expertise, the company is a proven supplier of sophisticated products and applications as well as a development and service partner for customers in the automotive industry and general industry. In the 2024 financial year, Freudenberg Sealing Technologies generated sales of around €2.5 billion and employed around 13,000 people. Further information at [www.fst.com](http://www.fst.com).

The company is part of the global Freudenberg Group, which generated sales of almost 12 billion euros in the 2024 financial year with its Seals and Vibration Control Technology, Nonwovens and Filtration, Household Products and Specialties divisions and employed around 52,000 people in some 60 countries. Further information at [www.freudenberg.com](http://www.freudenberg.com)

**Media Contact**

Freudenberg Sealing Technologies

Silke Herzog

Phone: +49 6201 960 6385

Email: [silke.herzog@fst.com](mailto:silke.herzog@fst.com)

Freudenberg-NOK Sealing Technologies

Josh Barnett

Phone: +1 734 354 2406

Email: josh.barnett@fnst.com

[www.fst.com](http://www.fst.com)  
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