**Micro Seals – Small Scale, Big Impact**

**Freudenberg Sealing Technologies develops customized Micro Seals for medical technology applications.**

Weinheim, 12. August 2025– Micro Seals are high-precision micro components that are indispensable in vital devices such as anesthesia and respiratory equipment. Thanks to a close collaboration with leading manufacturers and its own comprehensive material expertise, Freudenberg Sealing Technologies meets the stringent requirements for hygiene, safety and reliability in modern medicine.

**Hygienic seals for the smallest shafts**

These tiny components are primarily used in fluid-handling valves, pumps, mixers and small electric motors. Their dimensions don’t exceed around 20 mm, but they prevent leaks and ensure that devices function reliably. Freudenberg has already developed a wide range of customized hygienic, micro sealing components in close cooperation with manufacturers. These include solutions for sealing rotating and moving parts, such as the Micro-Simmerring® and a brake and sealing disc designed specifically for use in dental drills. This disc makes it possible for the dentist to stop the drill within fractions of a second – an instant stop that increases patient safety and comfort during dental treatments. Made from durable elastomers, the brake and sealing disc can withstand extreme stress at high speeds without losing its function or sealing performance. This micro component also prevents the backflow of fluids, which greatly increases hygiene during treatment.

**Micro Seals for precise control of fluids and gases**

Another key application area for Micro Seals is the control and regulation of fluids and gases in miniature valve and pump systems. Valve armatures, for example, control the flow of anesthetic gases in anesthesia devices and enable precise dosing, which is critical for patient safety during surgery. Made from a combination of metal and FFKM, a high-performance fluorocarbon rubber, a valve armature ensures maximum precision and chemical resistance. This choice of material allows the component to withstand even the most aggressive anesthetic gases, which is crucial for the long-term safety and performance of these devices.

In addition to the anesthesia machines, ventilators play a key role during surgeries. Known for their high media resistance, miniature flipper valve seals are indispensable for the precise control of breathing gases. These smallest seals, made from FKM (fluororubber) and EPDM (ethylene propylene diene rubber), offer a long service life even under extreme conditions and can perform up to 10 million switching cycles without losing their functionality.

Micro Seals are also essential in high-precision laboratory analysis devices, pipetting robots and HPLC systems. Specially developed hammer seals, rocker valves and valve seat seals are used in these applications. Rocker valves ensure precise control of fluid dosing during automated pipetting, while the valve seat seals in HPLC devices prevent leaks and provide reliable test results. Preparing drinkable water for dental treatment units is another application of Micro Seals in dentistry. Here, an elastomer composite part – whose shape earned it the nickname “dog bone” – regulates the water supply.

**High-quality materials and customized solutions**

Freudenberg Sealing Technologies manufactures its Micro Seals from highly resistant elastomers such as FKM, FFKM and EPDM. These materials offer specific advantages depending on their application. FKM excels with strong chemical resistance and temperature stability up to 200 °C, which makes it an especially good choice for environments with aggressive media. FFKM offers extremely high chemical resistance and can reliably withstand temperatures up to 230 °C – an ideal material for the most demanding applications. EPDM, in turn, is particularly resistant to ozone, UV radiation and hot water and is well-suited for environments with high humidity or steam.

This variety of materials makes it possible to develop customized sealing elements for a wide range of medical applications where precision and hygiene are crucial. “Our customers demand very small components that are not only extremely precise but also meet the highest standards of durability and hygiene,” explains Tobias Gutsch, Product Manager, Division Special Sealing Industry at Freudenberg Sealing Technologies. “Our Micro Seals meet these requirements thanks to advanced manufacturing technologies and our unique material expertise. The high durability and reliability of our products play a major role in ensuring the smooth operation of devices even in critical applications.” Critical applications are ventilators, anesthesia systems and highly sensitive analysis devices.

**Global standards and certifications**

Freudenberg Sealing Technologies manufactures its Micro Seals in line with the strictest international standards to meet the high demands for precision, hygiene and durability. They must withstand extreme conditions while performing reliably at all times, especially in critical medical applications. To ensure this, the components meet relevant hygiene standards for medical devices as well as FDA, USP, and NSF compliance. This guarantees that the products deliver precise control and sealing performance in sterile environments, contributing to the safety and functionality of vital systems.

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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)

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