



RECREATIONAL

**Freudenberg-NOK**  
Sealing Technologies



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## GLOBAL TRENDS REACHING THE FOUR CORNERS OF THE WORLD

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Efficiency, reliability and low emissions. In the recreational market, these are the mega trends that are reaching across the world. The demands brought on by legislations along with competitive markets are the driving factors in most countries that see these trends. However, these are not the only global trends in the recreational market today.

With consumer pressure focusing on reducing the environmental footprint and cost, global businesses today are trying to get one step ahead of the competition by doing things smarter, greener, cheaper and safer. This means companies need to strive for constant change to stay current with innovations in weight reduction, emissions, costs, and reliability.

Freudenberg–NOK Sealing Technologies sets the course for global innovation in the recreational

industry. The ongoing development of new materials is a fundamental part of our company philosophy. This not only gives you a competitive edge through the development of more cost-effective and reliable systems, but also gives customers a technological advantage.

Our global research centers develop solutions to precisely meet your requirements wherever your location may be. This means global customer projects can be implemented quickly and efficiently. The continual knowledge transfer between our international teams of experts provides you with valuable insights and the latest design in sealing solutions for friction and weight reduction, lower emissions and reliability.

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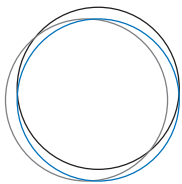
## LEADING BY EXAMPLE

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Technology is a world of extremes—extreme temperatures, pressures, altitudes, depths, sizes, and chemicals. In striving to do more, to go further and move faster, technological industries continue to push the limits of system integrity under more challenging conditions. The difference between improbable and possible at this level of innovation often comes down to the choice of critical sealing technology.

Whether your application calls for a standard material or a custom compound blended specifically for your needs, Freudenberg–NOK Sealing Technologies' materials expertise rises to virtually any challenge. Our 500+ experts continually research and develop new compounds that achieve advanced resistance to aggressive chemicals, high pressures and extreme temperatures making Freudenberg–NOK Sealing Technologies your specialist when it comes to sealing applications.





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## LOW FRICTION

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**Innovative high-quality products with a twist—low friction.** Freudenberg–NOK Sealing Technologies is able to aid fuel economy by producing a variety of low friction products for your applications.

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### DAMPER SEALS

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**Noise and friction reduction with increased performance and safety** are now available all in one seal. This lessens the component count and machining complexity to improve handling and setup. The revolutionary design not only decreases noise emissions and increases life expectancy, but reduces “stiction”, or breakaway force.



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### RFN™ COATING

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**Reduced Friction by Nanotechnology (RFN) coatings** improve engine performance by reducing friction up to 70%. RFN provides abrasion resistance, resistance to aggressive fluids, and low coefficient of friction (COF). Flex is maintained without micro cracking even with high forces, and there is no increase of surface COF with long-term exposure to fuel, ozone, and wear testing.

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### PTFE SPRING SEAL

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**With strong wear resistance and PTFE alloys** to optimize reduced friction, the PTFE Spring Seal operates under a wide range of temperatures, provides exceptional resistance to all fluids and media, and decreases stick-slip and “stiction”.





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## HIGH TEMPERATURE

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**When facing high temperature,** Freudenberg-NOK Sealing Technologies has a way to cool down. We have mastered products ranging from Exhaust Gaskets to Cylinder Head Gaskets with our state-of-the-art design and our innovative materials.

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### DIAPHRAGMS

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**Diaphragms reinforced with high temp meta-aramid fabric** withstand extended high temperatures. The innovative dome design with the addition of small rubber ribs to the fabric side to protect from abrasion. They are virtually maintenance free and long lasting. RFN coating reduces friction allowing the diaphragm to move effortlessly.



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### CYLINDER HEAD GASKET AND EXHAUST MANIFOLD

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**The engineered gasket design has been tested** for long-term durability. Several material types are available to meet application requirements, including Graphite Kormetal™, Vermiculate Kormetal™, embossed multi-layered steel (MLS) (with or without rubber coating) and high temp alloy gaskets. Single or multiple layer combinations are available to accommodate the flange flatness variations. Additionally, secondary coatings are available to prevent adhesion to hardware for easy cleanup if disassembled.



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### NEW POLYURETHANE

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**Break past limitations using the new generation polyurethane.** These new PU seals last longer than standard seals and are effective in high heat and extreme cold applications. They are extremely chemical resistant, even in aggressive working conditions, and have excellent compatibility with mineral fluids.



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### HIGH TEMP FKM O-RING

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**Formulated to exceed high temperatures** and harsh chemicals, O-rings of high-temp FKM out-perform competitive materials, exceed stress relaxation compared to standard seals, and endure high compression under high temperatures.





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## HORSEPOWER AND SPEED

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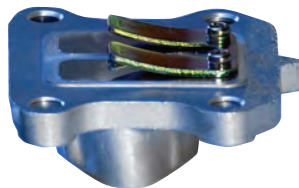
**Horsepower and functionality** are the demands of the customer as we see a turn to a more sophisticated market. With Freudenberg–NOK Sealing Technologies you can give your customers what they want; increased horsepower and ultimate performance

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### REED VALVES

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**Custom-designed reed stops to maximize air flow** and a rubber-covered housing for reduced noise provide significantly longer life in two-stroke engines. A variety of reed materials are available, including stainless steel, poly carbonate and carbon fiber.



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### MECHANICAL FACE SEALS

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**Delivering exceptional resistance to all fluids** and media, these long-life designs are specifically indicated for water pump applications. Face materials include stainless steel or ceramics.



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### PTFE LIP SEAL

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**Increase horsepower without the worry** of seal failure. With PTFE, reduced friction leads to greater efficiency and more power with the same fuel consumption. The PTFE lip seal allows for increased shaft speed without seal deterioration or wear.



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### PTFE SPRING SEAL

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**Reducing friction with strong wear resistance,** the PTFE Spring Seal has a wide operational temperature range with excellent resistance to all fluids and media. The seal allows for minimal stick-slip and "stiction", lessens breakaway force.





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## LOW EMISSIONS

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**Manufacturers across the globe** have been developing new engine designs and applications of new technology in an attempt to meet today's emission standards. To assist manufactures in obtaining this goal, Freudenberg-NOK Sealing Technologies offers a variety of products to achieve ultimate low emissions.

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### ENCODER

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**Encoders reduce emissions by providing precise data** on rotational speed and angle. Zero speed detection provides a constant digital output down to zero speed. Consistent signal quality is maintained due to the unique design of a ferrite-loaded polymer, shaped and magnetized to a specified pole pair configuration. This integration allows for parts reduction, as well as a simpler installation, resulting in lower costs.



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### VALVE STEM SEALS

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**The innovative design reduces valve train wear rate** in the engine ensuring improved engine performance and efficiency over the life of the engine. The design decreases oil consumption and internal temperature, and helps prevent causes of excessive oil flow.



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### CASCO™

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**Design innovations generate friction optimization** and maximum durability, helping CASCO seals to deliver energy savings of up to 70% over standard engine seals. This efficiency contributes to a reduction of CO<sub>2</sub> emissions, and the "axial" seal lip design provides reliable protection from oil leakage and contaminants. CASCO adds reliability with endurance over 1,000,000 miles.



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### ENERGY SAVING SEALS (ESS™)

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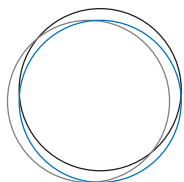
**ESS boosts engine efficiency, reducing power consumption and improving fuel economy.** High performing FKM rubber provides resistance to extreme engine conditions and temperature fluctuations. ESS demonstrate a significant reduction of power loss in drive assemblies as opposed to standard sealing methods. ESS virtually eliminate coked oil failure mode and reduce the heat aging of rubber.





# PORTFOLIO

Seal type	Motorcycle	Boat	All Terrain Vehicle	Snow-mobile	Personal Watercraft	Bicycle
<b>Rotating</b>						
Reduced friction RSS	+	+	+	+	+	+
Cassette seals			+			
Multipole encoders	+	+	+	+	+	
Mechanical face seals	+	+	+	+	+	
Shaft boots	+		+	+		
<b>Reciprocating</b>						
Valve stem seals	+	+	+	+	+	
PTFE seals	+		+			+
Diaphragms	+					+
Damper seals (shock seals)	+		+	+		+
Banded piston seals	+		+	+		+
Reed valves		+		+		
Urethane bushings	+		+			+
Lip seals (closed cartridge)	+		+			+
Guide rings	+					+
<b>Static</b>						
Elastomeric gaskets	+	+	+	+	+	
Stamped gaskets	+	+	+	+	+	
O-rings with coatings						+
Head gasket seals	+	+	+	+	+	
Wet cylinder liner seals	+	+	+	+	+	
Boots & bellows	+	+	+	+	+	+
Covers and sealing plugs	+	+	+	+	+	
MCU jounce bumpers	+		+			+
Grommets	+	+	+	+	+	+
Isolation mounts	+	+	+	+	+	



## OUR SERVICE KNOWS NO BOUNDARIES

**Freudenberg–NOK Sealing Technologies brings a unique combination of services** and wherever you do business we are there for you, globally. Always delivering superior customer service, our network offers the world's largest product range from a single source, both materials and manufacturing expertise, along with revolutionary solutions for your next sealing application. With Freudenberg–NOK Sealing Technologies, there are no boundaries to superior service.

**Freudenberg-NOK Sealing Technologies**

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