

# RECREATIONAL



FREUDENBERG  
SEALING TECHNOLOGIES

 **FREUDENBERG**  
INNOVATING TOGETHER



01 LOW FRICTION

02 TEMPERATURE

03 POWER

04 SMART ENERGY

### LEADING BY EXAMPLE

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 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 Sealing Technologies your specialist when it comes to sealing applications.

## GLOBAL TRENDS REACHING THE FOUR CORNERS OF THE EARTH

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

With consumer pressure focusing on reducing the environmental footprint and cost, global businesses today are trying to stay a step ahead of the competition by doing things smarter, greener, safer, and more economically. They strive to be competitive with innovations in weight reduction, emissions, costs, and reliability.

Freudenberg Sealing Technologies is one of the world's leading specialists in sealing technologies. Our ongoing development of new materials is a fundamental part of our company philosophy. This gives you a competitive edge, a technological advantage through the development of more cost-effective and reliable systems.

Wherever your location, our global research centers develop solutions to most efficiently meet your requirements. Customer projects can be implemented quickly and efficiently worldwide. Knowledge transferred between our international teams of experts provides you with the latest sealing designs for low friction, weight reduction, lower emissions, and reliability.



#### FREUDENBERG QR-CODES:

Learn more about us. Download any QR app on your smartphone and scan the QR code.



# 01 LOW FRICTION

Creating seals with minimal friction is what drives us. Our engineers understand the multitude of advantages that accompany reduced-friction seals, which is why our customers trust us to meet all of their low-friction demands for the recreation industry.

02 TEMPERATURE

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## DAMPER SEALS

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 also reduces stiction, or breakaway force.



## PTFE SPRING SEALS

With strong wear resistance and PTFE alloys to optimize reduced friction, the PTFE spring seal operates under a wide range of temperatures. It provides exceptional resistance to all fluids and media and decreases stick-slip and stiction.

# Fuel efficiency...

Innovative, high-quality products with a low-friction twist: We offer a wide variety of low-friction products that are able to enhance fuel economy for any application.



## RFN COATING

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



## BLUESEAL

The BlueSeal offers weight savings of 40 percent compared to a conventional seal, and it requires only half as much installation space. The PTFE material of the seal lip stands up to aggressive substances, and its unique design allows for operation in dry conditions.

01 LOW FRICTION

## 02 TEMPERATURE

Handling a wide range of temperatures is essential for recreation industry sealing. Whether our customers' applications are for an ATV in the desert or a snowmobile in the mountains, our customers rely on our seals as the ideal solution.

03 POWER

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## DIAPHRAGMS

Withstanding temperatures down to  $-60^{\circ}\text{C}$  ( $-76^{\circ}\text{F}$ ) and up to  $80^{\circ}\text{C}$  ( $176^{\circ}\text{F}$ ), our advanced generation of diaphragms provides ultimate solutions for your next application. These silicone diaphragms provide stability in the direction of the radial force caused by pressure, and good elongation in the direction of the circumferential strain.



## POLYURETHANE

Improved polyurethane materials from Freudenberg offer outstanding performance, providing resistance to chemicals, water, high wear, and ozone damage. Our low-temperature polyurethane material ensures outstanding flexibility of these seals down to  $-50^{\circ}\text{C}$  ( $-58^{\circ}\text{F}$ ).



# Defeat the heat...

When faced with high temperatures, our seals have a way to cool down. We produce an extensive range of products in innovative and unmatched materials that our customers trust to withstand the hottest working conditions.



## HIGH-TEMP FKM O-RINGS

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



## METAL STAMPED GASKETS

Gaskets are an integral part of most sealing systems. At Freudenberg we engineer gaskets to your exact specifications, delivering ultimate sealing performance in your application. We offer a variety of material options that withstand the wide range of fluids, temperatures, and pressures found in static sealing.



01 LOW FRICTION

02 TEMPERATURE

# 03 POWER

**Horsepower and functionality** are the demands from customers as markets become more sophisticated. Freudenberg Sealing Technologies gives our customers what they want: increased horsepower and ultimate performance.

04 SMART ENERGY



## REED VALVES

With custom-designed reed stops to maximize air flow and a rubber-covered housing for reduced noise, our reed valves provide significantly longer life in two-stroke and four-stroke engines. These can also be used in oil seal circulation in case of incidents. A variety of reed materials is available, including stainless steel, polycarbonate and carbon fiber.



## MECHANICAL FACE SEALS

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



# Need for speed...

Customers want to feel speed at their fingertips with any recreational vehicle. Our sealing solutions can deliver increased power, creating speed and acceleration that will be felt in any application.



## PTFE LIP SEALS

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.



## VALVE STEM SEALS

The innovative design reduces valve train wear rate in the engine, ensuring improved performance and efficiency. Our valve stem seals prevent blow-by gas flow from the manifold to the engine head with a special metal case for improved seal retention and unique lip geometry further increasing Lip Opening Pressure (LOP).

# Power to innovate...

Sustainable conservation will require innovations in vehicle technology that deliver more power with less energy consumption. Freudenberg Sealing Technologies is dedicated to that challenge because we understand that our actions today have a significant impact on tomorrow and the future.



## CASCO™ SEALS

Design innovations generate friction optimization and maximum durability, helping Casco seals to deliver energy savings of up to 70 percent 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.



## ENCODERS

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 through 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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Clean and quiet without giving up high performance. Freudenberg Sealing Technologies supports sustainable solutions for vehicle transportation now and in the future, including reduced emissions, fuel economy, and reliable electric drive systems. Recreational vehicles are no exception.



## 2K-HOUSING

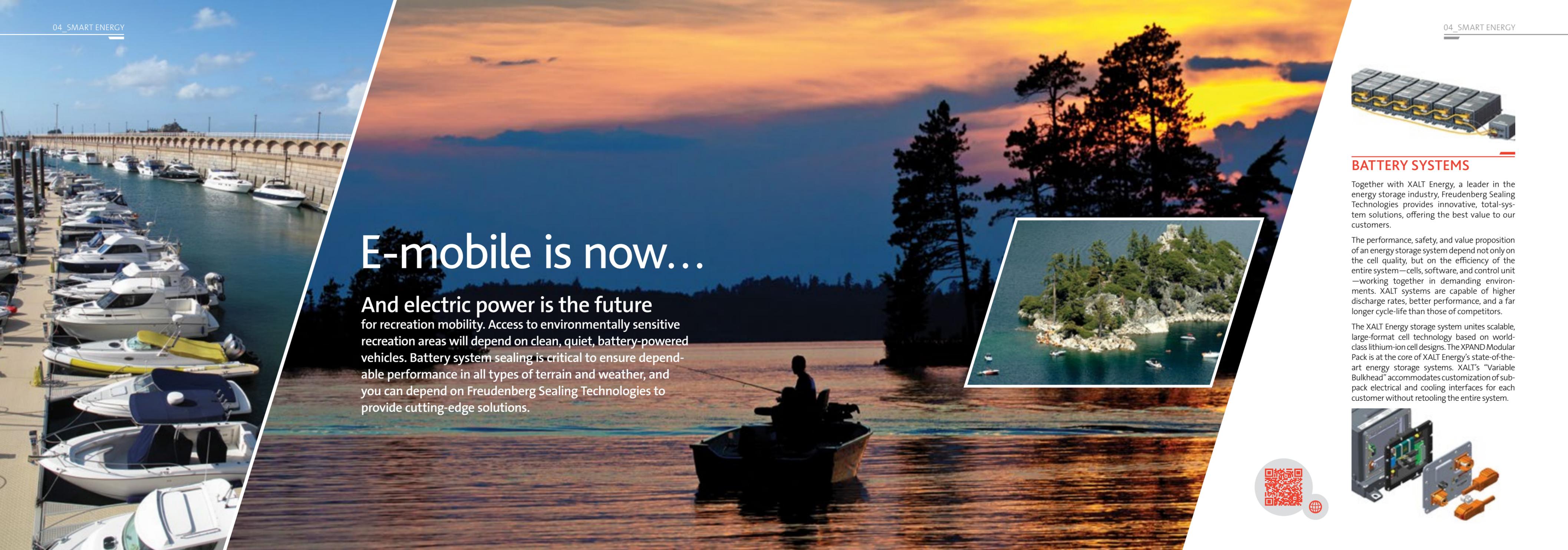
2K-Housings with seals integrated into the cover reduce dynamic stresses and provide complex, 3D sealing geometries that would not be possible in an assembled version. These housings, with both the housing and a seal integrated into a customizable lid, serve to protect electrical components from vibration and environmental damage.



## ESS™

ESS (Energy Saving Seals) boost engine efficiency, reduce power consumption, and improve 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.





# E-mobile is now...

**And electric power is the future** for recreation mobility. Access to environmentally sensitive recreation areas will depend on clean, quiet, battery-powered vehicles. Battery system sealing is critical to ensure dependable performance in all types of terrain and weather, and you can depend on Freudenberg Sealing Technologies to provide cutting-edge solutions.



## BATTERY SYSTEMS

Together with XALT Energy, a leader in the energy storage industry, Freudenberg Sealing Technologies provides innovative, total-system solutions, offering the best value to our customers.

The performance, safety, and value proposition of an energy storage system depend not only on the cell quality, but on the efficiency of the entire system—cells, software, and control unit—working together in demanding environments. XALT systems are capable of higher discharge rates, better performance, and a far longer cycle-life than those of competitors.

The XALT Energy storage system unites scalable, large-format cell technology based on world-class lithium-ion cell designs. The XPAND Modular Pack is at the core of XALT Energy's state-of-the-art energy storage systems. XALT's "Variable Bulkhead" accommodates customization of sub-pack electrical and cooling interfaces for each customer without retooling the entire system.



# RECREATION PORTFOLIO

| SEAL TYPE                 | RECIPROCATING       |                            |            |                       |            |             |                   |                   |             |                   |                  |         | ROTATING       |                              |                       |                    |                           | STATIC                      |                   |                          |                     |          |                   |                    |                       |             |                 |                          |   |
|---------------------------|---------------------|----------------------------|------------|-----------------------|------------|-------------|-------------------|-------------------|-------------|-------------------|------------------|---------|----------------|------------------------------|-----------------------|--------------------|---------------------------|-----------------------------|-------------------|--------------------------|---------------------|----------|-------------------|--------------------|-----------------------|-------------|-----------------|--------------------------|---|
|                           | Bonded piston seals | Damper seals (shock seals) | Diaphragms | Floating piston seals | Fork seals | Guide rings | PTFE spring seals | Rear damper seals | Shaft boots | Urethane bushings | Valve stem seals | X-rings | Cassette seals | Lip seals (closed cartridge) | Mechanical face seals | Multipole encoders | PTFE oil seals (BlueSeal) | Reduced-friction Simmerring | Boots and bellows | Covers and sealing plugs | Elastomeric gaskets | Grommets | Head gasket seals | MCU jounce bumpers | O-rings with coatings | Reed valves | Stamped gaskets | Wet cylinder liner seals |   |
| MOTORCYCLE                | +                   | +                          | +          | +                     | +          | +           | +                 | +                 | +           | +                 | +                |         | +              | +                            | +                     | +                  | +                         | +                           | +                 | +                        | +                   | +        | +                 | +                  | +                     | +           | +               | +                        | + |
| BOAT                      | +                   | +                          | +          |                       |            |             | +                 |                   | +           |                   | +                |         |                |                              | +                     | +                  | +                         | +                           | +                 |                          | +                   | +        | +                 | +                  |                       | +           | +               | +                        | + |
| ALL-TERRAIN VEHICLE       | +                   | +                          | +          | +                     | +          | +           | +                 |                   | +           | +                 | +                | +       | +              | +                            | +                     | +                  | +                         | +                           | +                 | +                        | +                   | +        | +                 | +                  | +                     | +           | +               | +                        | + |
| SNOWMOBILE                | +                   | +                          | +          | +                     | +          | +           | +                 | +                 | +           |                   | +                | +       |                | +                            | +                     | +                  | +                         | +                           | +                 | +                        | +                   | +        | +                 | +                  | +                     | +           | +               | +                        | + |
| PERSONAL WATERCRAFT       | +                   | +                          | +          |                       |            |             | +                 |                   | +           |                   | +                |         |                | +                            | +                     | +                  | +                         | +                           | +                 | +                        | +                   | +        | +                 | +                  | +                     | +           | +               | +                        |   |
| BICYCLE AND ELECTRIC BIKE | +                   | +                          |            | +                     | +          | +           | +                 |                   | +           |                   | +                |         | +              |                              |                       |                    | +                         | +                           | +                 | +                        | +                   | +        | +                 | +                  | +                     |             |                 |                          |   |

# PORTFOLIO

Our unrelenting drive for innovation, along with our extensive material knowledge and wide product range, allows us to offer an unmatched product portfolio for the recreation industry.

## OUR SERVICE KNOWS NO BOUNDARIES

Freudenberg Sealing Technologies brings its global expertise and technical service to you, no matter where in the world you are doing business. Our network brings you the world's largest single-source product range, material and manufacturing expertise, exceptional customer service, and revolutionary solutions to your next sealing application. Freudenberg Sealing Technologies goes beyond boundaries on your behalf.



## THE FREUDENBERG E-CATALOG

Ordering products from Freudenberg has never been easier. Customers can find thousands of parts and rapid purchasing options online at <https://ecatalog.fst.com/>. You can also get assistance in selecting just the right parts for your applications by calling a customer service representative while referencing the online catalog.

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