

Sealing Solutions for Advanced Bicycle Technology



BICYCLE SEALING SOLUTIONS

Ensuring Optimum Performance

Trelleborg Sealing Solutions is the leading supplier of advanced sealing solutions to high tech bicycle manufacturers and their component suppliers. We are able to match the technological demands of high-end models with innovative sealing solutions that optimize the performance of the latest bicycle designs.

Keeping fit and
being green

130 million
cycles produced in
Greater China

Booming
bicycle market



Pedal Power

The birth of the bicycle can be traced back to 1817 when German inventor Baron von Drais took to the saddle of his Laufmaschine, or running machine. Pedals were first applied to the Boneshaker in 1865 but the real revolution was made with the safety bicycle of the 1880s onto which the rear wheel chain drive, as used today, was introduced.

The late 20th and 21st century has seen a continued application of technology to bicycles. Bicycle frames and components continue to get lighter and more aerodynamic without sacrificing strength. Electronic gadgetry on the top models has expanded from just cyclocomputers to cycling power meters and electronic gear-shifting systems.

In the West, the bicycle industry, especially at the high-end, is booming as people are taking to their bike in an attempt to get fit and be more environmentally-friendly. In the East though, pedal power has always been a major mode of transport. In the Greater China area about 130 million cycles are produced each year.

Leading Sealing Solution Provider

Trelleborg Sealing Solutions is a leading global supplier of high quality sealing solutions.

With over 60 years of experience providing seals to a variety of industries, we are the leading supplier of advanced sealing solutions to high technology bicycle manufacturers.

As bicycle designs become more sophisticated, Trelleborg Sealing Solutions can provide innovations to optimize bike performance, making bicycles and their components work smoother, lighter and faster. Product reliability and customer focus are paramount.

From Boneshaker
to sophisticated
technology

Outstanding Reliability

Our sealing expertise and solutions provide outstanding reliability while operating in extremes of weather on demanding terrain.

Importantly, our advanced seal solutions ensure low frictional power loss in systems without compromising sealing integrity. Retaining lubricants within the moving parts of the bike, they prevent the ingress of contaminants to optimize the bike's performance.

Having worked on so many major projects and products worldwide, our experience and ingenuity is key in providing the optimal sealing solution for your application.

Trelleborg Sealing Solutions possesses the necessary engineering resources globally to provide the right solution for any sealing requirement. Using the latest Finite Element Analysis (FEA) techniques, we can rapidly go from design stage to manufacturing within the virtual world.

Innovation and Service

Our innovation is a key to your success. Solving sealing and bearing challenges, using pioneering techniques, we deliver better performance and overall profitability for our customers. Operations run 24 hours a day, 365 days a year, and our international logistics network can meet your scheduling requirements.

Wherever a product is originally designed, our global manufacturing capabilities allow us to produce our sealing solutions to the same specification and quality standards at any Trelleborg facility throughout the world. That means we can follow your production as it expands globally.



Innovative Online Tools

Read the Book – See the Movie

Now you have the brochure why not check out our bicycle film on YouTube!

www.tss.trelleborg.com/films



Apps at the Slide of a Finger

Check out our latest engineering tools for smart phones.

- O-Ring Calculator
- Unit and Hardness Converter
- ISO Fits & Tolerances

www.tss.trelleborg.com/apps

Online Services and Tools at the Click of a Mouse

Trelleborg Sealing Solutions offers a range of cutting-edge online services and tools on our website.

- Full range of Catalogs and Brochures
- Sealing Solutions Configurator
- CAD Service
- O-Ring Calculator

www.tss.trelleborg.com/tools



Trelleborg Sealing Solutions in General

Trelleborg Sealing Solutions offers an outstandingly comprehensive sealing portfolio – a one-stop-shop providing the best in elastomer, thermoplastic, PTFE and composite technologies; our solutions are featured in virtually every application conceivable within the aerospace, automotive and industrial industries.

- Over 80 facilities worldwide
- Internationally linked design and application centers
- Seven strategically positioned materials and development laboratories
- More than 20 manufacturing sites

BICYCLE SEALING SYSTEMS

Application Overview

A surprising number of seals and seal configurations are used on today's technologically advanced bicycles. Each seal has a vital function in ensuring user safety, cycle performance and a comfortable ride.



Seat Post

Complex sealing configurations ensure the effectiveness of the air spring damping system.

Trelleborg products: Quad-Ring®, Zurcon® U-Cup, Zurcon® L-Cup, Slydring®, Wiper



Rear Shock Absorber

Seals for floating piston, main piston, shaft housing and air spring.

→ See Application Highlight



Wheel Hub System

Seals prevent ingress of external media into the wheel hub bearing.

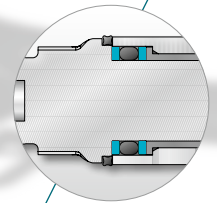
Trelleborg products: V-Ring®, Custom moldings



Seals for Bottom Bracket

Seals protect the bearing in the bottom bracket from ingress of external media.

Trelleborg products: V-Ring®, Custom moldings



Pedal

Seals keep lubricant within the pedal.

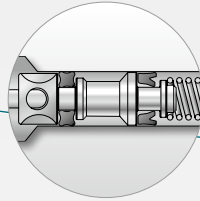
Trelleborg products: Quad-Ring®, O-Ring



Brake

Seals for the brake actuator lever.

Trelleborg products: Zurcon® U-Cup, Zurcon® L-Cup



Front Fork

Damping /Air Spring Systems include seals for air spring, rebound and lockout system.

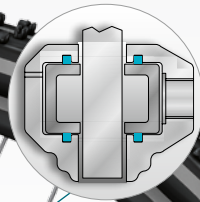
→ See Application Highlight



Disc Brake

Safety critical seals assist piston movement.

Trelleborg products: Kantseal (Square Ring), Bonded seal



APPLICATION HIGHLIGHT

Front Fork

The majority of bicycles manufactured today are fitted with suspension that suspends the rider and all or part of the bike to protect them from the roughness of the terrain over which they travel. The front fork is part of the suspension and includes a damping and air spring system.

Requirements for Sealing of Front Forks

- Outstanding sealability
- Reliable low-friction sealing
- Optimized performance for a smooth ride

Sealing within the front fork has an overall goal of maximizing the suspension system's life while preventing leakage of lubricant.



Air Spring

The sealing configuration in the air spring provides a reliable and long-life solution for front forks.

Trelleborg products: Quad-Ring, Turcon® T-Seal, Turcon® AQ-Seal, DU Bush, Zurcon® U-Cup



Lower Leg

A bumper and static seal with high compressive strength prevent the upper tube from hitting the base of the lower leg of the front fork.

Trelleborg products: Custom-molded bumper in NBR or HNBR, O-Ring, Bonded Seal





Upper Tube

A specialized Front Fork Seal prevents ingress of media and keeps lubricant in the front fork, maintaining effective movement.

Trelleborg products: Front Fork Seal



Crown

A static seal seals against the crown. A rotary seal within the remote lockout system allows the pressure in the front fork to be adjusted.

Trelleborg products: Quad-Ring®, O-Ring



Image shows an exemplary illustration of a simple air spring system; designs are customer specific.



Lockout and Rebound System

The lockout and rebound system gives a comfortable ride when the cyclist is climbing or sprinting. Dynamic seals ensure quick and efficient response.

Trelleborg products: Quad-Ring®, O-Ring, Zurcon® U-Cup, Piston Ring, DU Bush



Bicycle Solutions

Trelleborg Sealing Solutions provides sealing solutions that:

- Offer outstanding reliability
- Retain lubricating oil
- Operate in extreme weather conditions
- Give low frictional power loss without compromising seal integrity



To design a solution for your specific needs contact your local **Trelleborg Sealing Solutions** marketing company.

APPLICATION SPOTLIGHT

Rear Shock Absorber

Rear shock absorbers are often used in conjunction with front suspension on high technology bikes to improve the user's ride. Shock absorbers usually consist of two parts, a spring and a damper. The spring can be made with a steel or titanium coil, an elastomer, or in more advance models is activated with compressed air. The air spring has the distinct advantage of being lighter in weight while giving optimized performance tailored to the rider's requirements.

Requirements for Sealing of the Rear Shock Absorber

- Withstand high impact on rough terrain
- Effective long-term operation

Sealing within the rear shock absorber has an overall goal of enabling rider comfort even in the most demanding conditions.

Air Spring

Seals within the air spring give maximum service life and effective leakage control.

Trelleborg products: Quad-Ring®, Turcon® T-seal, Turcon® AQ-Seal®, Slydring®



Eyelet

A guide ring facilitates the movement of the eyelet, that links the bike to the shock absorber.

Trelleborg products: DU Bush



Floating Piston

Part of the suspension, the piston softens the ride for the cyclist. Seals have to demonstrate exceptional wear resistance and durability.

Trelleborg products: Turcon® Slydring®, Stepped Cut Slydring®, Quad-Ring® with Back-up Ring, Turcon® T-Seal, Turcon® AQ-Seal





Shaft Housing

Within the shaft housing seals retain oil or air within the damping system. The seals must demonstrate low friction and exceptional wear resistance.

Trelleborg products: Zurcon® U-Cup, Zurcon® L-Cup, Slydring®, Turcon® T-Seal, Turcon® AQ Seal®, Quad-Ring®



Damping System

A bumper and static seal with high compressive strength are key to the operation of the damping system and rider comfort.

Trelleborg products: Custom-molded bumper in NBR or HNBR, O-Ring



Rear Shock Body

Minimized leakage of the damping system is ensured with a configuration of seals that retain oil or air in the shaft.

Trelleborg products: Scraper DA22, Scraper WSA



Bicycle Solutions

Trelleborg Sealing Solutions provides sealing solutions that:

- Exclude contaminants
- Are compatible with advanced hydraulic oils and grease
- Work with the lowest friction and wear possible
- Facilitate different dynamic conditions including short stroke/high frequency operation



To design a solution for your specific needs contact your local **Trelleborg Sealing Solutions** marketing company.

PRODUCT SPOTLIGHT

Rotary Seals

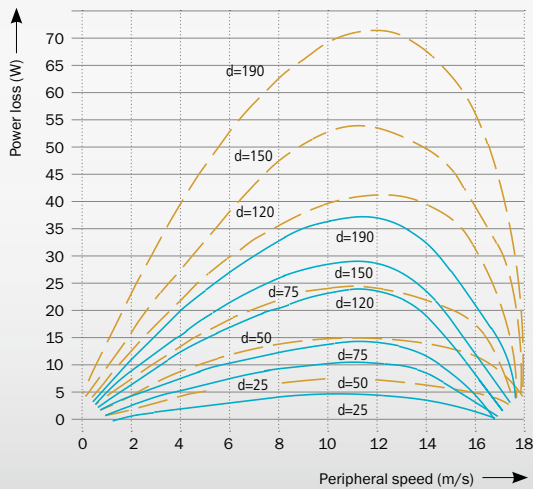
Rotary seals are used in wheel hubs and the bottom bracket of the pedal. They keep lubrication fluids in place while preventing the ingress of contaminants.

Trelleborg Sealing Solutions components are proven to improve the life and long-term performance of your application, demonstrating superior low-friction properties and excellent resistance to wear.



Rotary application:
Wheel hub

V-Ring® Friction Graph



— V-Ring® in low friction Nitrile (N6T5C)
 - - - V-Ring® for general use (N6T50)
 d = shaft diameter (mm)

Technical Data:

- Dry running
- Mating surface steel, unhardened

Note:

Since this graph is based on a specific test, the values should only be regarded as indicative.



V-Ring®

A unique all-rubber seal for rotary shafts that is suitable for a wide range of bearing types.

- Frictional losses and heat kept to a minimum
- Low contact pressure allows dry running in many applications
- Excellent wear characteristics
- Extended seal life
- Can perform even with certain amounts of run out, eccentricity and shaft misalignment
- Easy to install
- Can be installed over various other components without need for dismantling

The V-Ring® is the perfect seal to prevent the ingress of dirt, dust, water or combinations of these media while positively retaining grease. It can also be used as a secondary seal to protect primary seals that do not perform well in hostile environments.

Pressure	Not Applicable
Speed	Up to 12 m/s / 40 ft/s
Temperature	-54 °C to +170 °C / -65 °F to +338 °F

Quad-Ring®

The four-lipped design of the Quad-Ring® means that it does not twist in the groove, giving greater stability. Its geometry provides a high sealing effect due to an improved pressure profile over the seal's cross-section.

- Twisting in the groove avoided to improve stability
- Low friction
- Very good sealing efficiency
- A lubricant reservoir formed between the sealing lips improves start up
- Both Quad-Ring® and O-Rings can be supplied with friction reducing coatings, such as Flexcoat™

Pressure	Up to 40 MPa / 5,800 psi
Speed	Up to 0.5 m/s / 1.6 ft/s
Temperature	-30 °C to +200 °C / -20 °F to +390 °F

PRODUCT SPOTLIGHT

Hydraulic Seals

It is challenging to ensure seal life and performance in hydraulic applications such as a bicycle’s front fork or air spring. Not only must minimized leakage be achieved, but low friction must be ensured to give long life and optimum performance.

Trelleborg offers one of the most extensive ranges of hydraulic seals on the market. Highlighted here are a few of the most important seals for bicycle applications.



Zurcon® U-Cup RU9

Boasting long service life, high wear and extrusion resistance with low friction operation, the Zurcon® U-Cup RU9 is the preferred U-Cup seal for bicycle applications.

- Lower friction and heat generation than standard U-Cups
- High extrusion resistance and seal stability within the groove
- Back-pumping ability over the entire pressure range achieved by grooved profile
- Suitable for use with the Zurcon® Buffer Seal as secondary seal in tandem design

Pressure	Up to 40 MPa / 5,800 psi
Speed	Up to 0.5 m/s / 20 in/s
Temperature	-45 °C to +110 °C / -49 °F to +230 °F

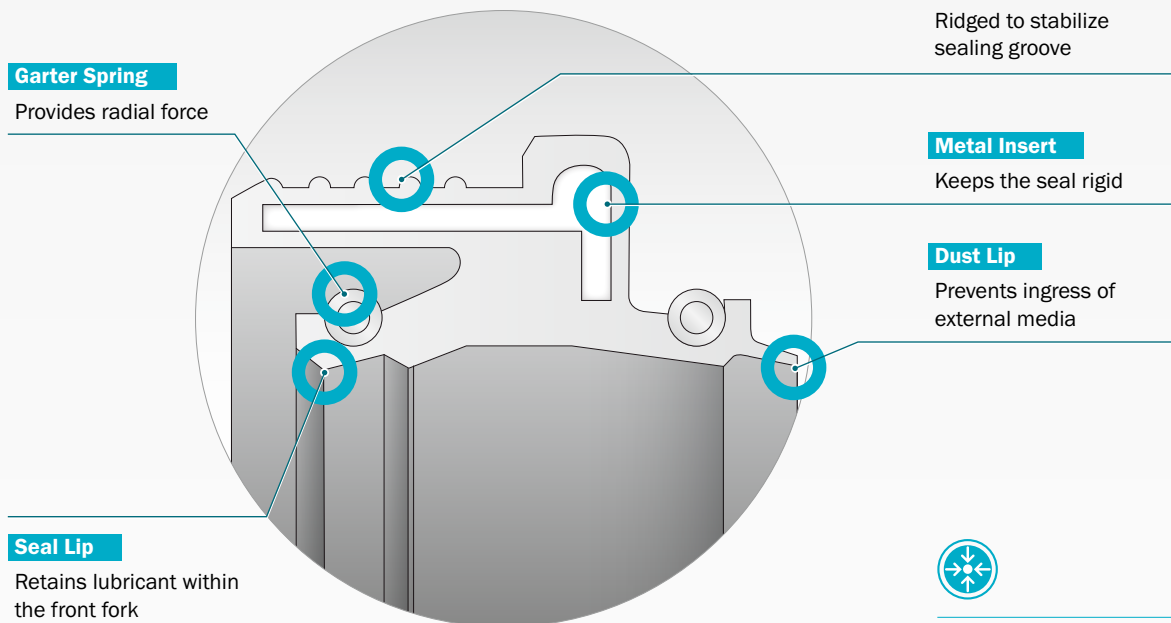
Slydring®

Slydring® eliminates local stress concentrations and dampens mechanical vibrations. This simple non-metallic guide ring has decades of engineering behind it, offering major benefits compared to its traditional metal counterpart.

- Simple closed groove, easy installation
- High load bearing capacity
- Wear-resistant, long service life
- Favourable friction behaviour

Pressure	Up to 100 N/mm ²
Speed	Up to 15 m/s / 50 ft/s
Temperature	-60 °C to +200 °C / -75 °F to +392 °F

Front Fork Seal in Detail



For more information on our complete range of seals go to www.tss.trelleborg.com



Front Fork Seal

The front fork seal is a specialty seal for bicycles. Its main functions are to seal lubricating oil in the fork while its integrated wiper prevents external media from entering the system.

- Minimized leakage
- Low friction
- Lightweight
- Integrated component fits into small design window
- Available in custom designs
- Can be easily retrofitted

Pressure	Up to 1.4 MPa / 200 psi
Speed	Up to 2 m/s / 6.5 ft/s
Temperature	-32 °C to +100 °C / -25 °F to +212 °F

Turcon® AQ Seal®

The AQ-Seal® combines the benefits of a low-friction Turcon® slipper seal with the high sealing characteristics of an elastomer seal. It does this by incorporating a limited foot print X-Ring on the dynamic sealing face to optimize leakage control while minimizing friction.

- Low-friction, increasing performance and working life
- Stick-slip-free
- Capable of operating successfully at high sliding speeds
- High abrasion resistance
- Compatible with virtually all media
- Simple groove design in a small installation space

Pressure	Up to 40 MPa / 5,800 psi
Speed	Up to 2 m/s / 6.6 ft/s
Temperature	-45 °C to +260 °C / -49 °F to +500 °F

MATERIAL SPOTLIGHT

Specialized Materials

Our extensive range of innovative seal materials and continuous material development helps us deliver exceptional sealing integrity.

Any size of O-Ring (standard or custom) is offered alongside custom-molded seal designs and bonded products. These are available in materials ranging from basic elastomer grades to leading edge, high specification compounds. Our innovative sealing materials help optimize performance while ensuring sealing integrity. Relying on decades of experience, working with leading equipment manufacturers and end users around the globe, we have developed a portfolio of materials that are ideal for bicycle applications.





For more information on choosing the right material for your bicycle application contact your local Trelleborg Sealing Solutions marketing company.

Turcon®

Outstanding Friction Characteristics

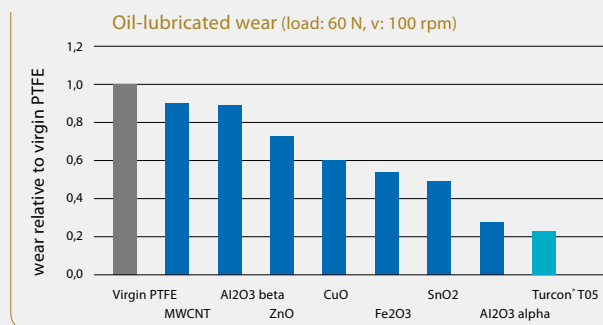
Turcon® is the brand name of the Trelleborg Sealing Solutions range of proprietary materials based on premium-grade Polytetrafluoroethylene (PTFE). The materials demonstrate low friction, with minimized wear in dynamic and even high speed applications. They are compatible to virtually all media, even at elevated temperatures, and are resistant to aging.

Operating temperatures: -196 °C to +260 °C / -320 °F to +500 °F

Recommended Materials for Bicycle Applications : Turcon® T05 and Turcon® M12

These compounds are ideal for many bike applications as they offer superior wear resistance, prolonging the life of seals and the components they are fitted in.

Turcon® T05 Wear Comparison



Zurcon®

Exceptional Wear Resistance

Zurcon® engineered polyurethane-based materials exhibit outstanding friction characteristics. That means they are ideal for reciprocating, very slow rotating and oscillating situations where high wear resistance is required.

Operating temperatures: -60 °C to +260 °C / -76 °F to +500 °F

Recommended Material for Bicycle Applications: Zurcon® Z20

This compound outperforms old technology polyester and polyether materials in all critical properties. Continuous testing and outstanding field performance have shown leak-free performance, high abrasion resistance, low compression set, high extrusion resistance and a wide temperature range.

Turcite®

Low-friction bearing strip

Turcite® is a low friction linear bearing strip that is dimensionally stable, maintenance-free and can be operated with or without lubrication. Recommended for bicycle applications are Turcite® A and Turcite® X.

Advanced Elastomer Materials

Trelleborg Sealing Solutions has developed an industry leading group of best-in-class materials within each material type. Bicycle component manufacturers can take their choice of the compound that best suits their needs.

NBR (Nitrile Butadiene Rubber)

NBR is primarily used with mineral-based oils and greases and in general the material has good mechanical operating temperatures.

Operating temperatures: -30 °C to +100 °C / -22 °F to +212 °F

EPDM (Ethylene Propylene Diene Monomer)

EPDM is often used in applications with brake fluids, based on glycol and hot water. The materials give good heat, ozone, and aging resistance. They also exhibit high levels of elasticity, good low temperature behavior as well as good insulating properties.

Operating temperatures: -45 °C to +150 °C / -49 °F to +302 °F

HNBR (Hydrogenated Nitrile Butadiene Rubber)

HNBR is often used in high-temperature applications due to its excellent abrasion resistance and good mechanical properties.

Operating temperatures: -30 °C to +140 °C / -22 °F to +284 °F

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Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative engineered solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has local presence in over 40 countries around the world.

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