



Mechanical face seals for  
extremely harsh environments

**GOETZE**

## Mechanical face seals

Within the last 60 years, Federal-Mogul has built a strong position in the global face seals market. We have a reputation for solving even the hardest sealing tasks. Face seals bearing the GOETZE brand have proven themselves highly durable under the most arduous conditions.

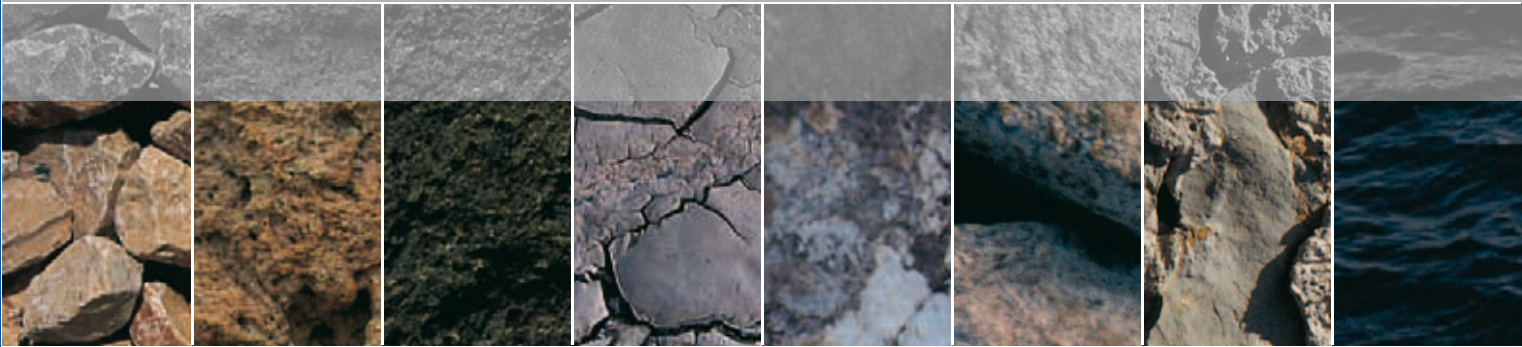
### The productivity challenge

Technical equipment that needs to operate in an environment full of dust, mud, sand, stones or earth is not just expensive. To harvest the desired return on investment, the equipment needs to run continuously and without costly breakdowns and unforeseen repair work. Safety and environmental concerns are as much behind this priority as is economic reasoning. Fully understanding this, we are dedicated to uncompromising quality and underlying material and design innovation. Our highly qualified team at the Friedberg plant ensures flexible production and delivers dedicated international customer service.

Federal-Mogul offers proven design options, high-performance materials and high-quality manufacturing, along with rigorous testing and inspection processes, which result in sealing technology that reliably protects axial joints against the ingress of abrasive particles and against lubricant leakage. Our products meet increasingly stringent environmental regulations, and in even more difficult applications, GOETZE face seals withstand above average thermal loads.

Driving excellence in all we do.

When the going gets tough...



Federal-Mogul GOETZE face seals are found wherever the going gets really tough: They seal wheel hubs and axles, the tread, support and guide roller bearings of tracked vehicles, transmissions, and many more axial connections in heavy technical equipment such as construction machinery, conveyors, mining machinery, concrete and cement mixers, tunnel boring, and agricultural equipment. Our portfolio of designs and advanced materials covers applications which include some of the biggest equipment around: We manufacture face seals with a diameter of up to 1,425 mm – in fact the world's largest cast iron face seals.

Performance



Durability



Enabling Technologies



Green Technologies



# A global team dedicated to world-class quality and service.

## Every application has its solution

Many face seal applications can be solved with standard seal designs. However, the variety of function, design and manufacturing details often necessitates customization. In fact some of our current design options go back to individual applications which at some point asked for modifications. For over 60 years, our team of application engineers has amassed a wealth of experience which we leverage for new requirements. In particular our experts look to the adjacent system not just the seal itself. Keeping this and the overall function in mind, we design the optimum solution. Challenge us to take care of your application!

## Metallic material innovation

Two decades of continuous R&D have resulted in various high-performance materials. Our face seals' long service life is due to the use of chilled cast iron. This class of materials is very hard, resists abrasive wear and corrosion, and has excellent tribological properties.

Our standard material is Duronit V, a ledeburite with fine graphite in its microstructure. Even under extreme operating conditions Duronit V demonstrates excellent resistance to micro-welding and material transfer.

Our latest innovation is the new Coronit material, having a ledeburite micro structure with free graphite. This patented material has a high carbide content and shows evenly distributed lamellar graphite. The free graphite in the matrix further improves the material's thermal conductivity, thus helping to dissipate heat in order to prevent a thermal degradation of the oil film. At a hardness of 47 to 57 HRC, Coronit resists fretting and scoring. On top of that, Coronit facilitates peripheral speeds of up to 12 m/s thanks to its excellent thermal and tribological properties. Such superior material characteristics can help to extend service intervals and/or to operate the seal at higher temperatures.

## Tunnel boring and mining



# Proven seal principles and characteristics

Our face seals are based on a common principle of operation: Two metallic seal rings are flexibly located in opposite housing bores via elastomers. The elastomeric rings act as springs to create the axial pressure for static sealing between seal rings. Rotary motion, e.g. of a shaft or axle, is facilitated by the sliding properties of the two mating metallic seal faces, one of which is stationary during operation, while the other rotates.

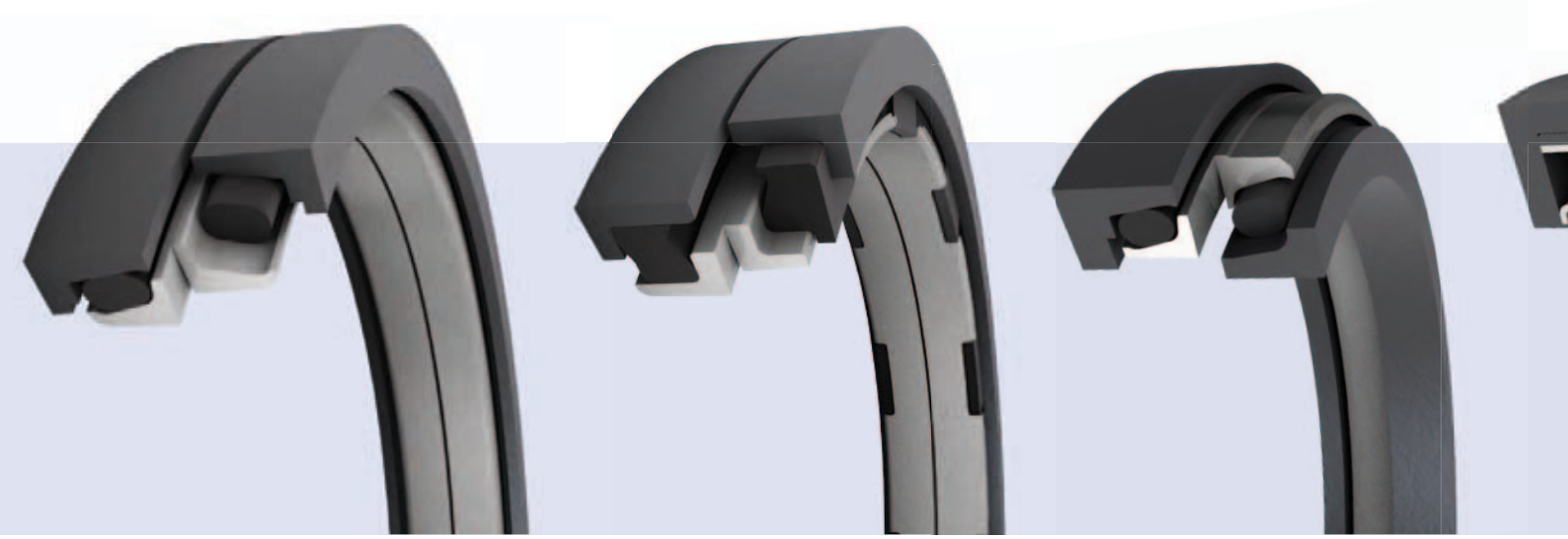
Our design adds particularly beneficial operating characteristics to this principle. For instance, a seal face taper underneath the parallel seal face section opens up a cone-shaped gap, which gives the lubricant good access to the sliding area. The resulting capillary effect and centrifugal forces increase oil supply and thereby controls frictional heat build-up. During service the normal wear will gradually shift the seal face area down towards the center of the ring. In practice this means that our seals have a substantial reserve of wear. Together with the GOETZE cast iron materials and the seal face lap finish, our materials allow peripheral speeds of up to 10 m/s

## Modular design and customizing options

### High-performance elastomeric materials

Depending on the ambient and operating temperature of the face seal, the O-rings or trapezoidal rings can be made from a choice of four proven basic elastomeric materials in different grades. Acrylnitrile butadiene rubber (NBR) is the standard material. Various shore grades of hydrogenated nitrile butadiene rubber (HNBR) cover even higher temperatures, while Fluoroelastomer (FPM) extends the maximum temperature while offering excellent oil compatibility.





## Application-specific Support and Engineering

Finally, silicone (VMQ) covers temperature in minus and plus degrees. Within their respective temperature span, each elastomeric material is highly resilient and will show very little permanent set which ensures a reliable static seal and clamping action.

The materials for next generation of O-rings which are under development in our research department will even increase performance in challenging applications.

Our application engineering team has worked closely with many customers to develop modifications of our standard design with O-rings (seal face type 76.90 H / 76.97 H).

Type 76.95 for instance has stiffer elastomeric rings with trapezoidal cross section, which makes the seal a little more compact and offers even better protection against axial movement of the elastomeric ring. To adapt our face seals to shafts, we have developed the inverse type 76.93, which saves space and production costs for our customers. A very special style is developed for applications which are exposed to extreme amounts of mud.

In some situations 76.90 face seal fo If the seal has to bore for instance, provides a solution and more econom retaining lip of th

## Construction machinery





s, it can be difficult to use the type  
or reasons of geometry and design.  
be mounted in a cylindrical housing  
type 76.91 with adapter rings  
n. This design also makes it easier  
nic to replace a face seal when the  
e housing bore has been worn out.



## From foundry to finish

We control the complete lifecycle from application analysis, to making design choices and doing foundry work, right through to machining, finishing, 100 % inspection and testing. Various test rigs ensure the product performance and put our innovations to the test. Our certified production processes are tuned to high environmental standards.

From the first contact with our customers to shipping the finished face seal we take full responsibility. The Federal-Mogul GOETZE brand on a face seal is a quality branding that signals face seals of the highest quality and precision for a long service life under the most arduous conditions.



## Agricultural machinery





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