

# EagleBurgmann®

a member of **EKK** and **FREUDENBERG**

RELY ON EXCELLENCE

## Global expertise in agitator seals

Products. Systems. Service.



Discover the impressive range of  
EagleBurgmann agitator seals

Edition ACMEA





# EagleBurgmann seals create value with standard and custom-engineered solutions

## What sets us apart

### World-class expertise

We help customers find the right sealing solution based on extensive knowledge of sealing technologies, machines, media properties and industrial processes. Our customers benefit from our research centers in Germany and Japan, as well as our global network of testing institutes.

### Uncompromising quality

At its global production sites, EagleBurgmann manufactures its products to the highest standards. Our success depends on state-of-the-art equipment, optimized and standardized production processes, strong vertical integration, and our outstanding employees. Our quality management system is certified according to all major international standards.

### Customized solutions

The breadth of our product portfolio is unparalleled. With a wide range of largely standardized assemblies, components and functional add-ons, we can design seals for any customer-specific application. You can always rely on our expertise in developing new designs and solutions.

### Always close, always fast

With over 60 subsidiaries and 250 locations, EagleBurgmann is at home in all world markets. Thanks to our production network with plants in Europe, Asia, and North and South America, we can supply you reliably at any time. And with our dense network of sales and service centers, we can provide you with prompt assistance.

### Conserving resources

The conservation of resources is anchored in our guiding principles at EagleBurgmann. Our activities go well beyond the legal minimum whenever possible. We continuously strive to reduce our footprint by minimizing the impact of our production processes on the environment. At the same time, we strive to increase our positive contribution with innovative products that help improve the sustainability of our customers (handprint).



## Areas of application

The design of sealing solutions requires a great attention to detail, whether it's different manufacturing processes and varieties of media or batch processes with changing temperature and pressure conditions. Agitator seals from EagleBurgmann have established themselves as the market standard. Their robustness and long lifespan make a significant contribution to the safety and availability of systems.

### Pharmaceutical, biotech, cosmetics and food industries

Designing machines, systems, and components that are easy to clean is essential to the safe production and processing of hygienically sensitive goods. Often, component solutions must deliver an absolutely perfect fit. At EagleBurgmann, we understand the principles of hygienic design and the suitability of materials. This makes our seals the first choice for hygienic applications.

**2018**  
**Innovations for the future**  
Launch of three new product series: HSMR34, SeccoMix R and SeccoLip.

**2012**  
**Global partner in the pharmaceutical industry**  
EagleBurgmann is selected as the global supplier of dry-running seals to Novartis.

**2001**  
**Designed for the highest temperatures**  
M481 double seal features cooling flange and cooling shaft sleeve in order to process liquid magnesium and liquid phosphorus at product temperatures up to 550°C.

**1990**  
**Market-leading technology**  
EagleBurgmann introduces the first dry-running mechanical seal for agitators.

## Driving innovation in seals

**1969**  
**Going big**  
For a German chemicals company, EagleBurgmann produced an HS-D double seal for an agitator with 450 mm shaft diameter.

**2014**  
**Economy of scale is important for PTA**  
EagleBurgmann delivers the then-largest agitator seal for PTA plants to China, designed for a shaft diameter of 480 mm and weighing roughly 1.5 tons.

**2008**  
**First agitator seal with DiamondFace coating**  
For a pharmaceutical company in Belgium, EagleBurgmann delivered an HSMR333 seal with a diamond coating for partial dry running.

**1995**  
**Pioneering gas seals**  
EagleBurgmann is the first successful manufacturer of gaslubricated agitator seals both for top and side entry, as well as for bottom entry drives.

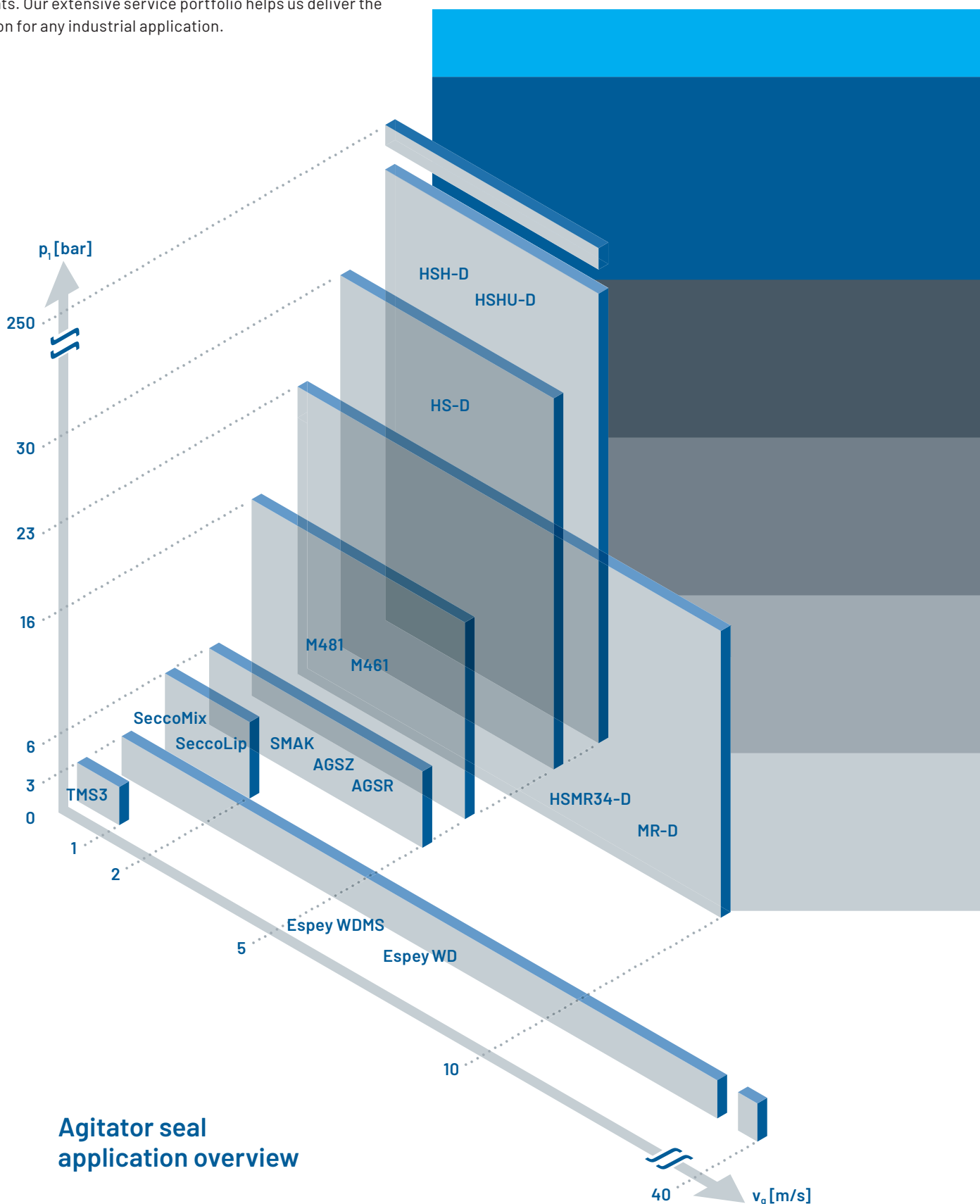
**1980**  
**First M48 mechanical seal for agitators**  
As a further development of the M44 series, the M48 mechanical seal was introduced as an official product series for DIN agitators.

**1962**  
**First mechanical seal for agitators**  
Our first mechanical seal for an agitator, the HS-D double seal, was installed at a southern German chemicals company.



# We understand the processes, machinery and challenges that make your application unique

Many different factors affect the design of agitator seals. Process-specific features, media properties, machine types, operating conditions and the sealing point can all mandate critical design requirements. Our extensive service portfolio helps us deliver the right solution for any industrial application.

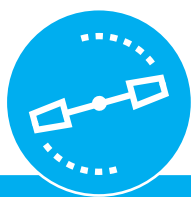






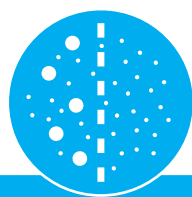
## Storing/preparing

- Holding and collecting tanks
- Storage containers
- Reservoirs



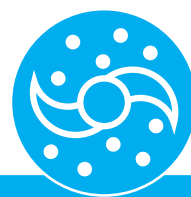
## Mixing/reacting

- Containers with agitators
- Reactors with mixing component
- Fermenters
- Mixers
- Dispersers



## Processing

- Filter strainers
- Centrifuges, e.g. decanters
- Conical dryers
- Paddle-through dryers
- Thin-film evaporators
- Crystallizers



## Comminution

- Ball/bead mills
- Filter strainers/dryers
- Choppers

### Top entry drive

TMS3, Espey WDMS, Espey WD, SeccoMix, SeccoLip, SMAK, AGSZ, AGSR, M481, M461, HSMR34-D, MR-D, HS-D, HSH-D, HSHU-D

### Side entry drive

SeccoMix R, Espey WDMS, Espey WD, AGSR, M481, M461, HSMR34-D, MR-D, HS-D, HSHU-D

### Bottom entry drive

SeccoMix R, SMAK, AGSR, M481, M461, HSMR34-D, MR-D, HS-D, HSHU-D

### Pump seals

Specialized pump seals can be used for small containers and thin, short shafts, or for high rotational speeds.

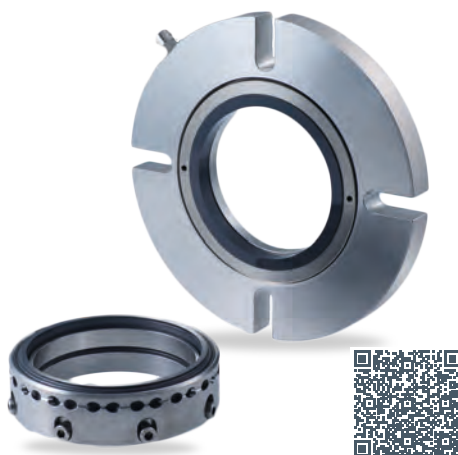
# Uncompromising shaft seals for all application areas

## Dry-running agitator seals

Dry-running agitator seals are used in mixers, agitators and dryers, especially those with top entry drives, moderate operating conditions of up to 6 bar and surface speeds of up to 2 m/s. In comparison with liquid-lubricated sealing solutions, a simple supply system is sufficient for double seals. For simple dry-running seals, no supply system is required at all. Both options lead to significant savings. Furthermore, they are extremely easy to operate and there is no risk of contamination by a liquid barrier medium.

Our range of dry-running agitator seals includes single and double seals for

- Shaft diameters from 25 to 220 millimeters
- Operating temperature limits from -20°C to +200°C (with cooling flange, up to 250°C)
- Steel and enameled containers



### SeccoMix 1

- Semi-cartridge seal
- Suitable for vacuum operation
- Intrinsically safe design, with no temperature monitoring
- Direction-independent
- Available with or without base flange

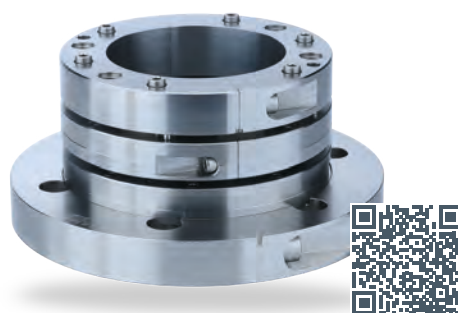


### SeccoMix 481

- Cartridge seal
- Especially for steel containers as per DIN or non-DIN
- Direction-independent
- Available with or without bearing

### SeccoMix 461

- As SeccoMix 481, but for enameled containers as per DIN or non-DIN



### TMS3

- Fully split cartridge seal
- Suitable for vacuum operation
- Direction-independent
- Available with or without basic flange



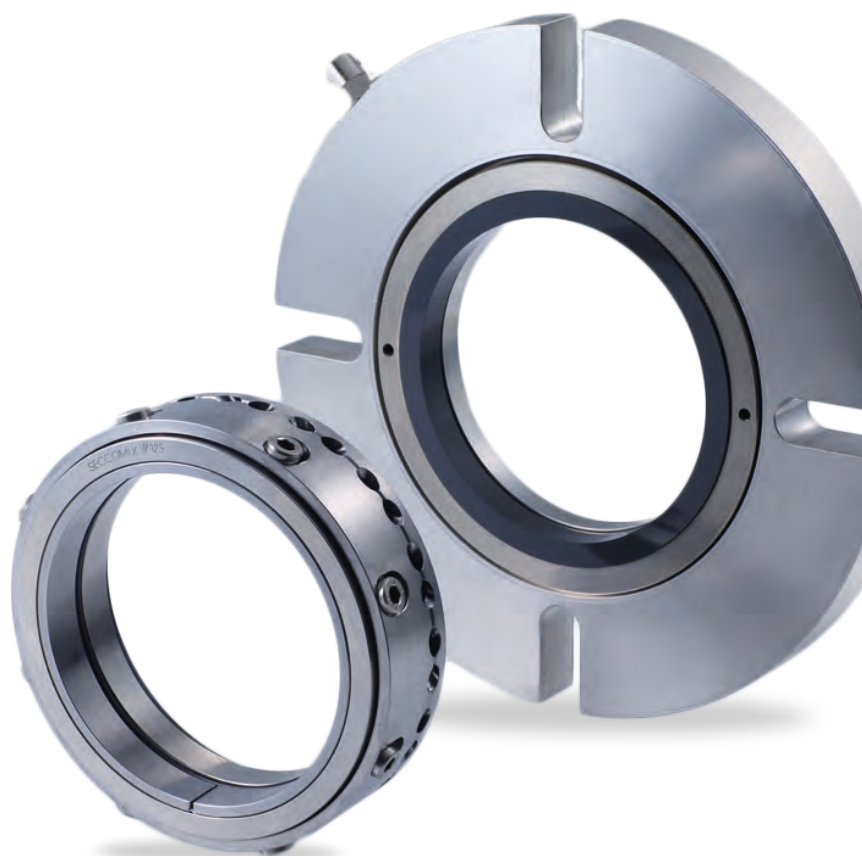
### SeccoMix R

- Cartridge seal
- Standard hygienic design prepared
- Robust design; excellently suited for difficult media
- Direction-independent
- Available with or without bearing



## SeccoLip

- Patented combination of PTFE sealing lip and sliding bearings
- Patented compensation function for shaft deflection
- Designs with 2, 3, or 4 sealing lips possible



Product features	SeccoMix 1	SeccoMix 481/461	TMS3	SeccoMix R	SeccoLip
Top entry drive	•	•	•	•	•
Side/bottom entry drive	-	-	-	•	-
Dry-running	•	•	•	•	•
Single seal	•	•	•	-	2 sealing lip
Double seal	-	•	-	•	3-4 sealing lips
With bearing	-	•	-	•	•
Without bearing	•	•	•	•	•
DIN	-	•	-	-	•
Non-DIN	•	•	•	•	•
Metal-free on product side - as option	-	•	-	•	•
CIP-/SIP-compatibility	Limited	Limited	-	•	Limited
ATEX - on request	• (TE*)	•	•	•	• (TE*)
FDA-compliant materials - as option	•	•	-	•	•
Functional add-ons (see pages 11, 16, 17)	Cooling flange Wear trap with flushing connection Hygiene flange	Cooling flange Wear trap with flushing connection Polymerization barrier Hygiene flange Flushing Axial expansion joint / wiper	-	Cooling flange Flushing Axial expansion joint / wiper ring DiamondFace technology	Cooling flange Hygiene flange Flushing

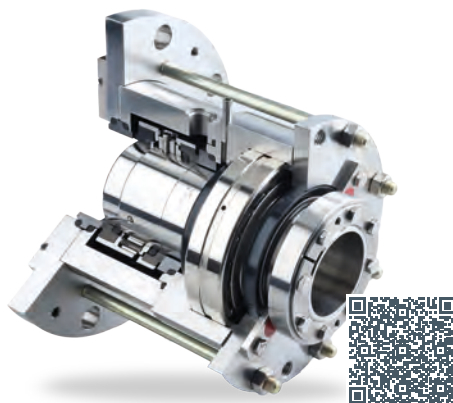
\* Type examination

## Liquid-lubricated agitator seals

Liquid-lubricated mechanical seals cover a wide range of agitator systems applications. They can be used in systems with top, bottom or side entry drives. With regard to pressure and speed, the operating limits are higher than for dry-running agitator seals. Thanks to liquid lubrication, heat is more effectively dissipated and the temperature changes are reduced overall.

Our portfolio includes double seals for

- Shaft diameters from 20 to 500 millimeters
- Pressures up to 250 bar
- Operating temperature limits from -40°C to +200°C (with cooling flange, up to 350°C)
- Steel and enameled containers



**M481**

- Cartridge seal
- For DIN and non-DIN steel containers
- Direction-independent
- Available with or without bearing



**M461**

- As M481, but for enameled containers as per DIN or non-DIN
- Complete unit is removable – the sensitive basic flange can remain on the container



**HSMR34-D, MR-D**

- Cartridge seal
- Standard hygienic design prepared
- Robust design; excellently suited for difficult media
- Direction-independent
- Available with or without bearing



**HS-D**

- Cartridge seal
- Sliding surfaces with hydrodynamic lubrication grooves as standard
- Direction-independent
- Available with or without bearing





## HSH-D

- Cartridge seals for high-pressure applications
- Sliding surfaces with hydrodynamic lubrication grooves as standard
- Direction-independent
- Available with or without bearing

## HSHU-D

- Cartridge seals for high-pressure applications and bottom entry drive
- Sliding surfaces with hydrodynamic lubrication grooves as standard
- Direction-independent
- Available with or without bearing

Product features	M481 / M461	HSMR34-D / MR-D	HS-D	HSH-D	HSHU-D
Top entry drive	•	•	•	•	•
Side/bottom entry drive	•**	•	•**	–	•**
Liquid-lubricated	•	•	•	•	•
Single seal	–	–	–	–	–
Double seal	•***	•	•	•	•
With bearing(L)	•	•	•	•	•
Without bearing	•	•	•	•	•
DIN	•	–	–	–	–
Non-DIN	•	•	•	•	•
Metal-free on product side – as option	•	•	–	–	–
CIP-/SIP-compatibility	Limited	•	Limited	Limited	Limited
ATEX – on request	• (TE*)	• (TE*)	•	•	•
FDA-compliant materials – as option	•	•	•	•	•
Functional add-ons (see pages 11, 16, 17)	Cooling flange / heating flange Leakage drain Polymerization barrier Hygiene flange Flushing Axial expansion joint / wiper ring Temperature sensor	Cooling flange / heating flange Flushing Axial expansion joint / wiper ring Temperature sensor DiamondFace technology	Cooling flange / heating flange Leakage drain Polymerization barrier Hygiene flange Flushing Axial expansion joint / wiper ring Temperature sensor	Cooling flange / heating flange Leakage drain Polymerization barrier Hygiene flange Flushing Axial expansion joint / wiper ring Temperature sensor	Cooling flange / heating flange Leakage drain Polymerization barrier Hygiene flange Flushing Axial expansion joint / wiper ring Temperature sensor

\* Type examination

\*\* Only with additional measure

\*\*\* Operation either with unpressurized quench fluid or pressurized as buffered double seal

## Gas-lubricated agitator seals

Gas-lubricated agitator seals are used to prevent contamination of the process medium with barrier medium and the introduction of frictional heat. This is achieved with a stable gas film between the sliding surfaces of the seal, in order to prevent wear that could contaminate the product. This also eliminates maintenance work, such as refilling the barrier liquid.

The design of the supply system is compact and inexpensive. Our portfolio includes double seals in cartridge design for

- Shaft diameters from 20 to 220 millimeters
- Pressures up to 6 bar
- Operating temperature limits from 0°C to +200°C (with cooling flange, up to 250°C)
- Steel and enameled containers



Product features	AGSZ	AGSR
Top entry drive	•	•
Side/bottom entry drive	–	•
Gas-lubricated, contact-free	•	•
Single seal	–	–
Double seal	•	•
With bearing	•	•
Without bearing – on request	•	•
DIN	•	–
Non-DIN	•	•
Metal-free on product side – as option	•	•
CIP-/SIP-compatibility	Limited	•
ATEX – on request	• (TE*)	•
FDA-compliant materials – as option	•	•
Functional add-ons (see pages 16, 17)	Cooling flange / heating flange Hygiene flange Flushing	Flushing

\* Type examination





## DiamondFace: Innovative sliding surface technology for maximum operational performance of agitator and pump seals

DiamondFace is an innovative microcrystalline diamond technology for mechanical seals. It is characterized by extreme hardness, high wear resistance, excellent heat conductivity, maximum chemical resistance and low friction coefficients. The coating adhesion also exceeds all known practical requirements. For example, this

makes partial dry running possible while increasing the lifespan of mechanical seals by many times, prolonging the maintenance intervals and significantly reducing the life cycle costs.



### AGSZ

- Cartridge seal
- For DIN and non-DIN steel containers and enameled containers
- Central rotating seat
- Direction-independent
- Bearing included as standard



### AGSR

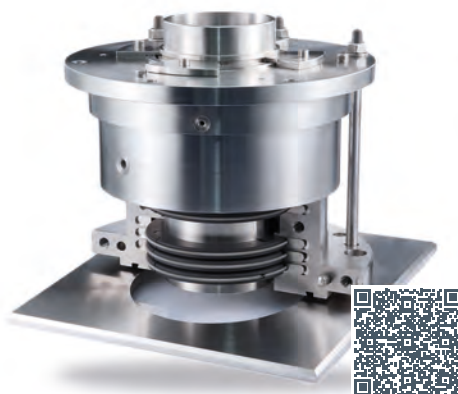
- Cartridge seal
- Robust design; excellently suited for difficult media
- Standard hygienic design prepared
- Direction-independent
- Bearing included as standard

## Carbon floating ring seals

Our carbon floating ring seals are robust, maintenance-free, compact cartridge labyrinth seals, featuring a long service life, low leakage and optimal performance. They are used for sealing mixers, dryers, filters and reactors in the food and pharmaceutical industries.

Our Espey series of carbon floating ring seals is specially designed for

- Sealing high viscosity media that generates high radial shaft deflection
- Applications with high temperatures far exceeding 500°C
- Pressures up to 6 bar
- Shaft diameters from 45 to 340 millimeters



**Espey WDMS500**

- Cartridge seal with split housing
- For DIN and non-DIN steel containers
- Direction-independent
- Available with or without bearing



**Espey WD200/500**

- Cartridge seal with split housing
- Especially for use with powdery media
- For DIN and non-DIN steel containers
- Direction-independent
- Without bearing



Product features	Espey WDMS500	Espey WD200/500
Top entry drive	•	•
Side entry drive	•	•
Bottom entry drive	–	–
Operating principle	With/without supply medium	With/without supply medium
With bearing	•	–
Without bearing	•	•
DIN	•	•
Non-DIN	•	•
CIP-/SIP-compatibility	Limited	Limited
ATEX – on request	•	•
FDA-compliant materials – as option	•	•
Functional add-ons (see pages 16, 17)	Axial expansion joint / wiper ring	Axial expansion joint / wiper ring



# Magnetic couplings

Our MAK series is a hermetically sealed and low-maintenance solution for agitators with top or bottom entry drives. Hazardous and expensive media stay where they belong: in the closed container. At the same time, they are protected from external contamination.

- Our portfolio includes seals for
- Temperature ranges up to +250°C
  - Speeds up to 400 rpm
  - Viscosity up to 5,000 mPas



## SMAK

- Sterilizable design, ready to install
- For DIN and non-DIN steel containers
- Direction-independent
- Available with or without bearing

SMAK
•
-
•
Hermetically sealed design
•
•
•
•
•
•
•
-



## Static seals

We offer the right product for nearly any sealing need. A broad product spectrum, innovative materials, material combinations, and special impregnation and lubrication media deliver optimal solutions for challenging applications.

## Gaskets and compression packings



# Supply systems to keep everything running smoothly

Supply systems manage the input and output of the supply medium within sealing systems. Our systems also monitor leakage, cool or heat the seal as needed and ensure the necessary pressure build inside the buffered seal. We offer supply units of various types and complexity, perfectly adapted to meet your needs.



## Quench fluid systems

Quench fluid systems are used for unpressurized liquid supply to single or tandem mechanical seals. The fluid circulates according to the thermosiphon principle or by forced circulation, e.g. with a pumping screw in the seal or with a pump. EagleBurgmann offers systems in various designs.

## Thermosiphon systems and barrier pressure units

Thermosiphon systems and barrier pressure units ensure the circulation and cooling of the barrier medium in double mechanical seals as well as application of the barrier pressure and compensation for leakage. Due to the modular design of the thermosiphon systems from EagleBurgmann, the containers can be combined with numerous system components.





## Pressure booster systems

Pressure booster systems apply pressure to mechanical seals, thereby enabling safe operation despite pressure fluctuations. The function is similar to that of a thermosiphon system, but in this case, the barrier pressure is generated by the reference pressure without additional superimposition of nitrogen. The pressure booster system from EagleBurgmann can supply double and tandem seals operating in a broad range of applications.



## Automatic refill units

Automatic refill units refill the barrier fluid during operation. Our product portfolio includes manual refilling pumps, automatic refill units for container sizes from 20 to 200 liters and mobile systems.



## Gas supply systems

Gas supply systems (GSS) are specially designed for contact-free gas-lubricated mechanical seals, dry-running seals and lip seals. The gas from the supply network (such as air or nitrogen) is regulated and monitored by the system according to the requirements of the supplied seals. According to the safety requirements, gas supply systems are equipped with alarms and/or shut-off points. Central monitoring of the measured values is possible.

## Other systems and components

- Instrumentation
- Pumps
- Heat exchangers
- Cyclone separators
- Filters

We offer you a broad range of systems and components to meet your needs of your application perfectly.

Discover the benefits and the wide range of systems and components from EagleBurgmann

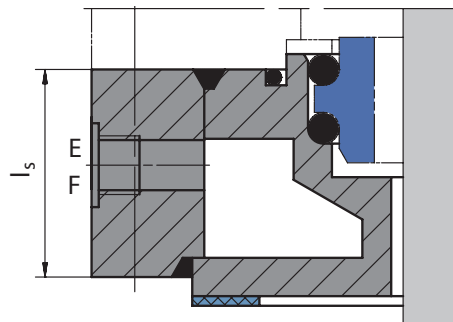






## Functional add-ons to meet your needs

Special conditions often demand special solutions. Our offering includes a number of add-ons to ensure flawless operation even under the most difficult conditions.



### Axial expansion joint / wiper ring

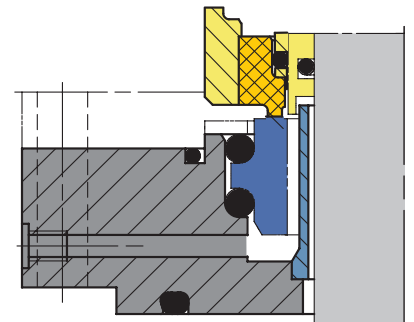
An axial expansion joint or wiper ring is used for large axial relative movements between the shaft and container, which can result in thermal expansion or active shaft movement.

### Temperature sensor

A temperature sensor is generally used only in applications with explosive atmosphere (ATEX). It monitors the seal temperature, either directly or via the temperature of the barrier medium in the sealing chamber.

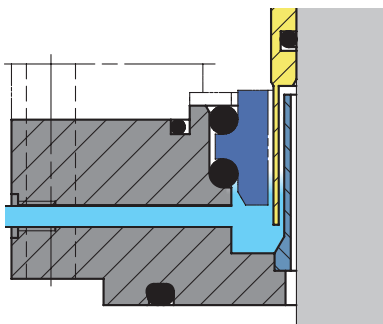
### Cooling flange / heating flange

A cooling flange is used for high temperatures, generally above the 200°C mark, to lower the temperature of the seal. This is generally due to the maximum permissible temperature of materials, especially the O-rings. A heating flange is used, for instance, if the temperature of the product must be kept above a high solidification point or for process temperatures below -20°C.



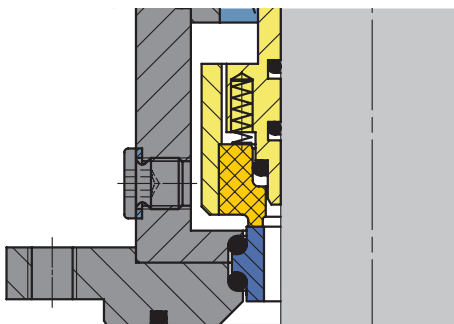
### Leakage drain / wear trap

For liquid-lubricated seals, a leakage drain with flushing connection can be used to remove product-side leakage in a controlled fashion. This is always useful if no barrier medium can be tolerated in the product. The flushing connection serves for cleaning the area of the leakage drain or wear trap while the system is stopped. This option can also be used as a flush. With dry-running seals, carbon particles can contaminate the product. To prevent this, the leakage drain is used as a wear trap for the abraded material.



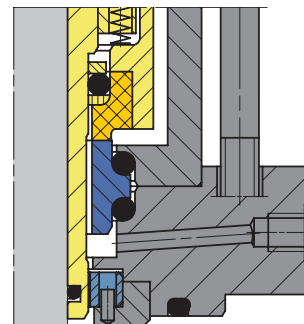
#### Polymerization barrier

A polymerization barrier is a concentric labyrinth positioned between the seal and the product space. A fluid reservoir serves as a barrier for the process medium and prevents deposits building up on the seal. It is recommended in particular for top entry drives in which the process medium is not always in direct contact with seal as well as for difficult media, such as foaming, polymerizing, crystallizing or highly viscous media.



#### Hygiene flange

A hygiene flange is an open design in which the flange is sloped, for example. As a result, the spray of the cleaning nozzles reaches a larger area of the seal. This allows the lower seal area to be cleaned more easily than the standard design. The use of an open flange design is useful if the mechanical seal has no direct product contact and is therefore also not contaminated with product. This design should only be used in production processes in which the hygienic design requirements are relatively low.



#### Flushing

Flushing means introducing a clean external medium into the sealing chamber in the area of the shaft seal to be protected. Either liquid or gas, usually nitrogen, is directed through a flow limiter into the medium to be sealed. Flushing can be used in top, bottom or side entry drives. The mechanism is generally designed as a floating throttle; however, other designs can be useful in individual cases, such as lip seals, U-caps, flushing holes in the seal housing or a flushing flange.

# Our results speak for themselves

## DiamondFace increases MTBF

In Singapore, four fermenters for pharmaceutical production were modified for double seals, type DF-MR333S1L-D with our DiamondFace coating. The former seals were unable to prevent frequent failures as a result of partial dry running. The extremely hard and wear-resistant diamond coating on the sliding surfaces led to a significantly extended mean time before failure (MTBF).

## SeccoMix R ensures product quality

A global pharmaceutical production company from Switzerland selected easy-to-clean, dry-running SeccoMix R seals from EagleBurgmann in the modification of paddle-through dryers as part of a quality assurance offensive. Axial movements arising at the shaft required special modifications. The project resulted in service periods of three years or more.

## Low maintenance, hermetic seals with SMAK

In France, SMAK magnetic coupling is used successfully as a frequency-controlled bottom entry drive with speed monitoring. The design allows for sterilization, and the elastomers are FDA-compliant. The SMAK solution delivers the system-inherent hermetic sealing of the container and the low-maintenance operation with no need for a supply system.

## M461 seals prove reliable in enameled containers

In the production of intermediate pharmaceutical products, a company in Germany has relied for many years on ready-to-install seals of type M461KL-D20/100 from EagleBurgmann. They are installed in an enameled stirring reactor with a top entry drive. The barrier fluid system TS1016/A007 is also used.

## Espey protects against leakage

In the production of an intermediate product for plastic production, a competitor's seal repeatedly failed in a paddle-through dryer. Following modification to install an Espey carbon floating ring seal, the gaseous leaks were reliably prevented. The seal is designed to prevent any contamination of the process with barrier gas.

## AGSR enables production of high purity crystals

The production of liquid crystals for LCD flat screen displays requires the highest degree of purity. A German manufacturer has been successfully using the gas-lubricated AGSR seal from EagleBurgmann for years to seal its horizontal paddle-through dryers. The customer appreciates the flushing integrated on the product side, as well as easy cleaning during batch operation.

## HSH-D secures high-pressure application

A major global chemicals company uses the agitator seal HSHLV-D in multiple high-pressure reactors with top entry drives for the production of polymer dispersion. All seals are equipped with cooling flanges and are supplied by a common barrier fluid system.

## TMS simplifies installation

In its search for a sealing solution, a global manufacturer of filling systems for cosmetics products wanted to ensure the satisfaction of subsequent system operators. As a result, the company chose the fully split cartridge seal TMS, which offers impressive ease of installation and servicing and has proven its quality for years.





# The service and expertise you need: With TotalSealCare, the choice is yours

The idea behind TotalSealCare is simple. Individual modules and service programs offer everything you expect for optimal service. From the maintenance of all installed seals to inventory management, engineering, training and electronic documentation. You benefit from reduced costs, increased system availability and improved seal performance. Choose only the services you need. And since our modules can be combined individually, TotalSealCare can be tailored to perfectly meet your needs, to ensure that it is completely customizable, uniquely flexible and transparent.



1

## Consulting & engineering

After inventorying and analyzing all the seals present in a system, we develop standardization concepts based on the current situation. The goal is to optimize the number of seal types, sizes and materials used and to improve system performance figures. We advise you on regulations and statutory requirements and point out necessary measures.

2

## Service agreements

Whether for individual sealing systems, critical process machines, specific plant areas or comprehensive seal service for whole plants, our service programs offer specific agreements according to your individual needs.

- Bad actor program
- Repair class program
- Fixed fee program
- Primary source program
- Individual service agreements

3

## On-site service

Our on-site service encompasses inspection, modifications and service containers. We set up a service unit right at your location and advise you on the selection and installation of seals. Our service spectrum even includes complete modification.

4

## Maintenance

In the plant or at the service center, qualified fitters and technicians handle every aspect of seal maintenance. This enables continuous evaluation of the seal lifespans, maintenance costs and measures for extending the service intervals.

5

## Inventory management

According to your specific needs, we take over the inventory management of entire seals and replacement parts on site or at the EagleBurgmann service center. This reduces your administrative burden, allowing you to focus on your own operations entirely.

6

## Seminars & training

Following the motto "practical experience for practical solutions", we offer group seminars, individual training and special training customized to meet your needs - at our locations or wherever you need us.

7

## Technical analysis & support

A team of seal specialists takes care of your "bad actors". With state-of-the-art methods, critical positions for the operation of the plant are diagnosed and corrective measures are defined. In addition, we can carry out application-specific tests on test benches or in original pumps at our research and development centers.



## EagleBurgmann – at the leading edge of industrial sealing technology

Our products are used wherever safety and reliability count: in the industries of oil & gas, refineries, petrochemicals, chemicals, pharmaceuticals, food, energy, water, mining, paper, aviation and aerospace and many more. Over 5,600 employees contribute their ideas, solutions and dedication every day to ensure that customers around the globe can rely on our seals. With our modular TotalSealCare Service, we emphasize our strong customer orientation and offer custom-tailored services for every need.

### Wherever you need us

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