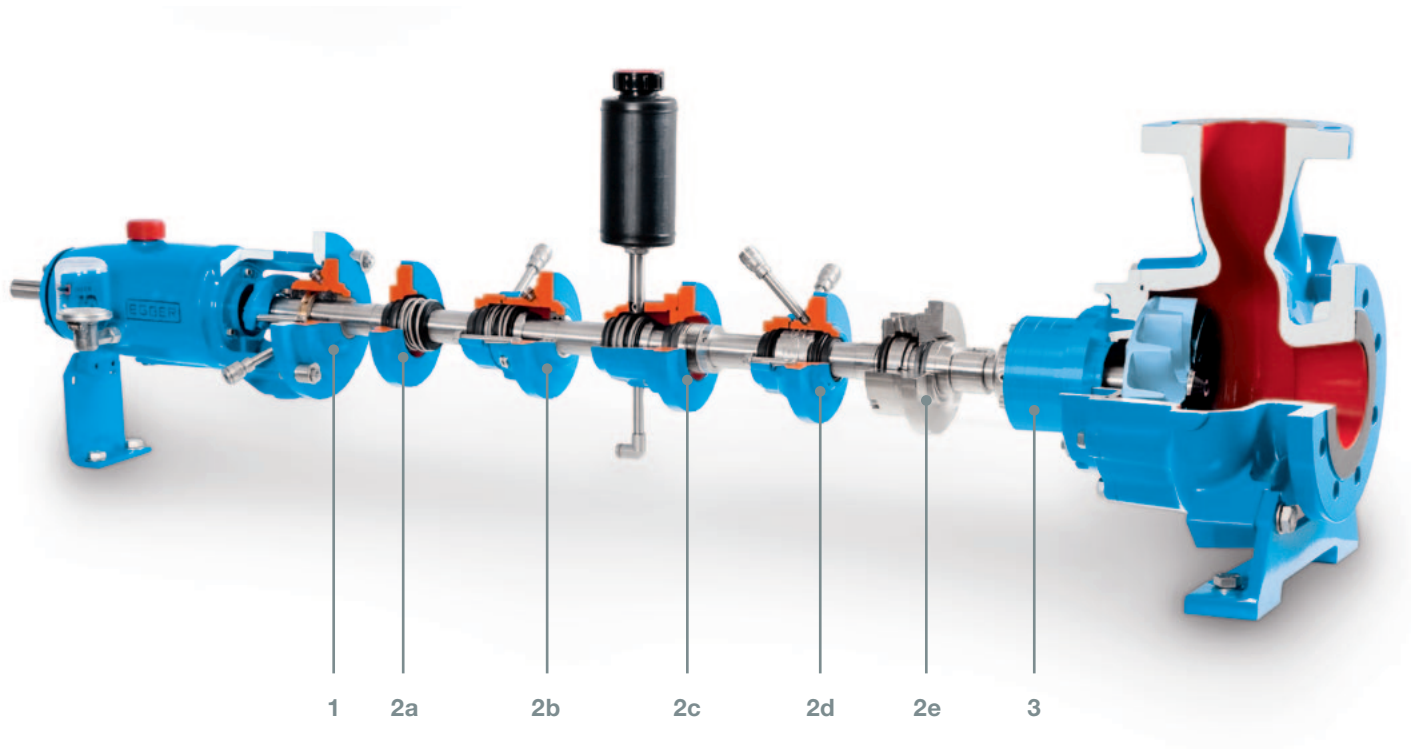


Seals

Varioseal® shaft seals: Egger's modular concept even gets extended to the design of the pump shaft seal. A variety of standard and customised seals can be configured, depending on the fluids being transported and the safety requirements. Thanks to our Varioseal® system, various shaft sealing units can be interchanged without remachining.



An overview of the Varioseal system: Explanation of the individual systems on the following pages.

Advantages

Flexibility in the choice of seal

The Egger Varioseal® system guarantees a high level of flexibility in the selection of the seal. Different seal systems can be interchanged without remachining.

Standard sealing chamber

Egger pumps have a standardised sealing chamber for mechanical seals in accordance with DIN EN 12756 (formerly DIN 24960) and for gland packing in accordance with DIN 3780.

Standard shaft sleeve

The pump shaft is not in contact with the pumped medium and hence no special material is required. The

non-alloy steel shaft is sealed by a standard shaft sleeve which is adapted to almost all types of seals.

Reduced spare parts stock and simple maintenance

A reduced spare parts stock and a fast delivery are guaranteed, thanks to the modular system.

Special designs

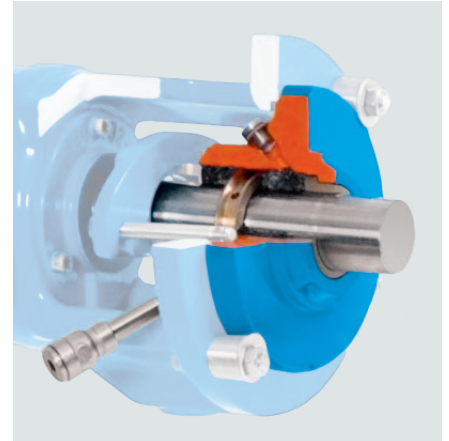
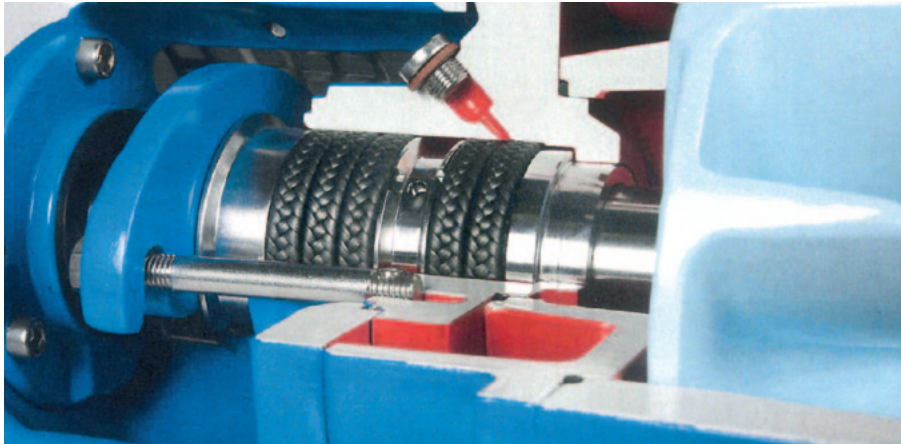
Special designs are available for specific requirements. For example: mechanical seals with integrated temperature control up to 350 °C (heating/cooling) or triple high pressure mechanical seals up to 100 bar.

1. Gland packing rings

The classic stuffing box with packing rings is still used today in certain branches of the industry.

Its robustness and simplicity are appreciated, as well as the possibility to schedule the maintenance time in advance, as a failure is generally indicated over a longer period. Usually a permanent external sealing liquid is

necessary to ensure a clean liquid film between the packing rings and the shaft sleeve for cooling and lubrication. A continuously visible small drip leak is a good sign that the outer gland packing ring is adequately lubricated



and cooled on the atmosphere side and that the seal operates properly. However the presence of leakage means that the use of packing rings is getting less popular, due to the increasingly stricter environmental regulations.

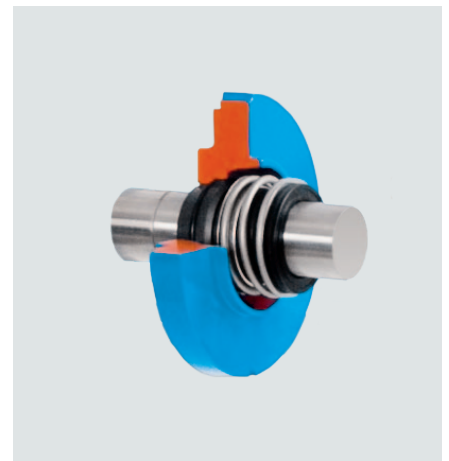
2. Mechanical seals

A thin lubricant film between the seal faces is required for the safe function of a mechanical seal. For this reason a certain leakage is always present when using mechanical seals. The amount of leakage depends on the size of the seal, the differential pressure, the rotation speed and the properties of the medium. It reaches the atmosphere as steam or drip leakage in very small quantities.

2a. Single mechanical seal

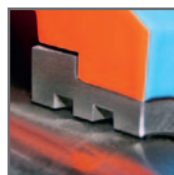
The single mechanical seal uses a simple face pair (rotating face and static face) to seal the hydraulic part from the atmosphere. Generally, a mechanical seal failure leads to abrupt leakage on the atmospheric side, thus

the conveyed liquid escapes to the environment without hindrance. When the type is selected correctly, the single mechanical seal is a reliable and cost-effective seal version.

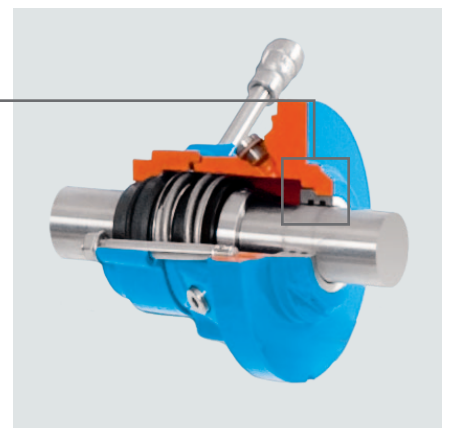


2b. Single mechanical seal with external flushing liquid

For this design, flushing liquid is permanently fed into the sealing space via a flushing connection according to API-Plan 12/32 and thus into the pump housing. An external liquid or pumped medium extracted from the pressure side (and previously cleaned as required) can be used for flushing. To maintain low flushing quantities, a throttle bush (see detail) is provided to keep the solids away from the mechanical seal



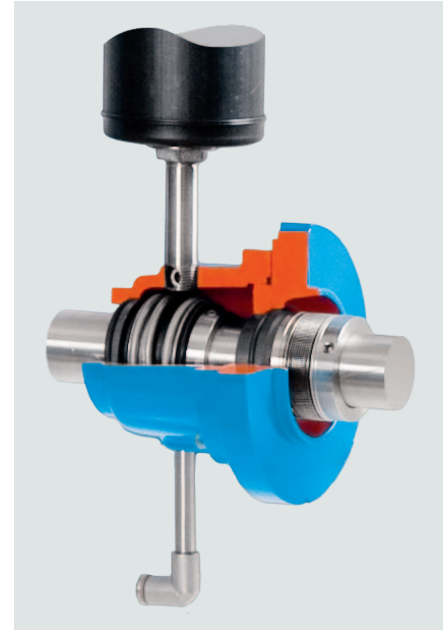
by means of a narrow gap. This is a cost-effective seal version for pumped media containing solids when a flushing liquid can be used.



2c. Double mechanical seal in tandem arrangement

Design with pressureless internal sealing liquid. Unlike the single design, double mechanical seals prevent any leakage to the atmosphere for a certain period, in the event that the primary seal breaks during operation.

Two single mechanical seals are positioned in series as a double seal for the tandem version. The sealing space is lubricated with a pressureless internal sealing liquid (quench). The tandem version also guarantees protection from a brief dry run and is versatile as it can be used for media up to 80 °C.



2d. Double mechanical seal in back-to-back arrangement

Design with pressurized sealing liquid. For the back-to-back arrangement, two single mechanical seals are positioned opposite each other (back-to-back). The chamber between the two seals is filled with a sealing liquid, which pressure must always be higher than the discharge pressure. This is generally ensured and monitored by an external sealing supply system (API-Plan 53/54).

The back-to-back version provides a high level of safety against the leakage of dangerous liquids but only has limited usage for media containing solids or crystallizing fluids. It is preferably used for aggressive media, as no metallic components of the mechanical seal can come into contact with the pumped medium. The sealing liquid can optionally be circulated by means of a pumping screw, that is integrated in the mechanical seal.



2e. Cartridge mechanical seal

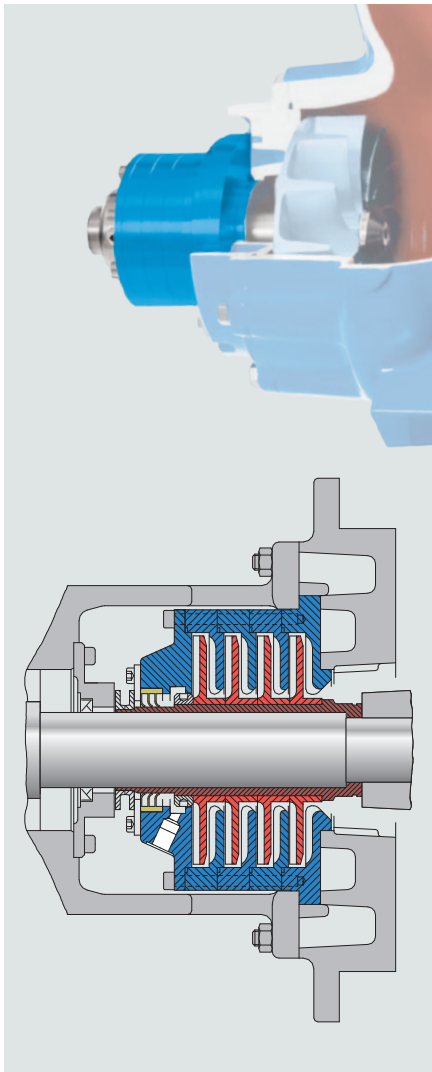
Cartridge mechanical seals are assembled and tested by the mechanical seal manufacturer. Their installation and replacement are therefore very easy and assembly errors can almost be excluded. Cartridge mechanical seals

are available in different versions (single, double, with liquid barrier or/and quenching connection, etc.) and generally have an integrated shaft sleeve. They are either mounted directly on the shaft or alternatively on an additional shaft sleeve.



3. Hydrodynamic shaft seal Eurodyn®

Hydrodynamic shaft seals collect the fluid behind the impeller and rotate it. As a result, a liquid ring is created, which seals the pump to the atmosphere. The Eurodyn® hydrodynamic shaft seal operates without friction nor wear and is mainly suited for continuous pump operation. Eurodyn® seals have a long service life, high system availability, low maintenance and are very reliable and safe. They are also suitable for media with a high solid concentration and viscosity.



Similar to the gland packing rings, the hydrodynamic shaft seal is a seal system that has been known and used for a very long time. It features contact-free operation and is practically maintenance-free depending on the pumped medium. At least one repeller is installed behind the impeller and generates enough counter-pressure by means of a liquid ring to withstand the internal pump pressure. As a result a leak-free seal to the atmosphere is guaranteed as long as the pump is in operation. Hydrodynamic seals often require special pump designs – one reason why this type of seal is not widely used.

A special feature of the Egger Eurodyn® hydrodynamic seal is its seamless integration within the Varioseal® system. No special designs are required for the pump. It also has four repellers and is available as a completely mounted unit with its own shaft sleeve. Like a cartridge, Eurodyn® is therefore very easy to assemble. At standstill, a seal ring withstands the static pressure in the Eurodyn® housing. The static seal of the Eurodyn® can be adapted to different media requirements and applications. In addition to the classic Elring seal, we offer a friction free HTS static ring as well as a special Prelon ring on a hardened shaft sleeve. Eurodyn® is also available with a grease chamber and a permanent lubrication for applications with a high level of solids. If greasing is not allowed, Eurodyn® can be provided with permanent flushing

to keep solids away from the static seal. Eurodyn® has been successfully used for continuous as well as intermediate operation especially for vertical designs with clean fluids, media containing solids or viscous liquids.



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