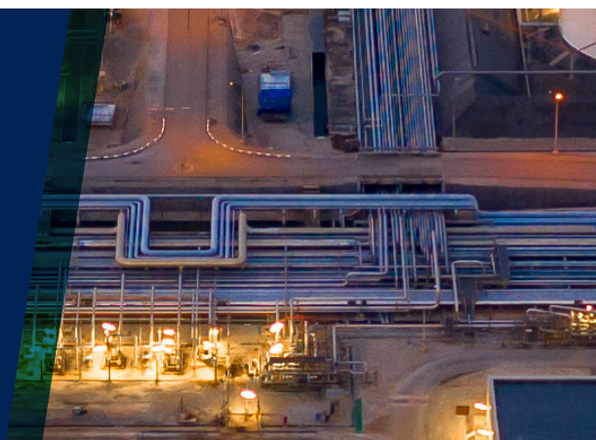
FLUITEN

Fluilift-Fluigrid-Fluidiamond

TECHNOLOGY



MECHANICAL SEALS FILMS LIQUIDS AND NEW TECHNOLOGY

Mechanical seals are used on all rotary pumps and machines with rotating shafts to prevent and control leakages. It is not only essential to choose the best and most appropriate mechanical seal to ensure proper operation, but all operating parameters need to be considered: **operating pressure, rotational shaft speed**, and - last but not least - **temperature** and chemical and **physical characteristics** of the sealed fluid. These parameters affect the necessary flatness of the seal. The main cause of seal failure is unwanted contact between the sliding rings, even only transient. If this occurs, friction causes a sudden, local increase in temperature between the contact surfaces, resulting in anomalous abrasion, deformation, and even changes in the conditions of secondary seals. Consequently, the premature failure of a mechanical seal can often be attributed to a lack or the instability of the liquid film between the sliding surfaces. The liquid film in traditional mechanical seals is achieved by appropriately dimensioning sealing surfaces, so that they determine a “hydraulic balance”. In other words, there is an equilibrium between the size of the surface on which the sealed liquid tends to close the sealing rings and the size of the surface on which it tends to open them. To make sure the seal works properly, the sealing faces are lapped so that they are perfectly flat with low roughness.

PHASE	FAILURE'S REASON	OUTCOME	EFFECT	%
Selection	Incorrect selection of materials and sliding faces	• Chemical aggression, corrosion • Liquid film evaporation	B	10%
	Incorrect selection of flushing plan	Mechanical seal's overheating	A	
	Incorrect selection of the mechanical seal type	Deformation of sealing surfaces, abnormal behaviour	A	
Installation	Incorrect mechanical seal installation	Improper behaviour of the mechanical seal, working conditions not in line with specifications	A	20%
	Incorrect flushing/cooling system installation	Mechanical seal's overheating due to insufficient flushing	A	
Start-up & steady operation	Dirt particles in the piping or in the plant	• Rings' abrasion, • Inadequate flushing, • Mechanical seal's overheating	A	60%
	Air pockets in the machine or in the plant	Mechanical seal's overheating	A	
	Incorrect auxiliary system setting	Mechanical seal's overheating	A	
	Inadequate machines alignment	Unstable liquid film	A	
	Excessive vibration	Unstable liquid film	A	
	Start-up in dry running conditions	Overheating, abnormal wear	A	
	Running not in compliance, with technical specification	Improper behaviour of the mechanical seal	A	
Post processing	Non-conforming machine maintenance	Improper behaviour of the mechanical seal	A,B,C	10%
	Incorrect mechanical seal's refurbishment	Improper behaviour of the mechanical seal	A,B,C	
	Incorrect installation after refurbishment	Improper behaviour of the mechanical seal	C	

Failures from a chemical seal are caused by: **A:** Absence or instability of liquid film between the seal's surfaces **B:** Damage **C:** Excessive leakages

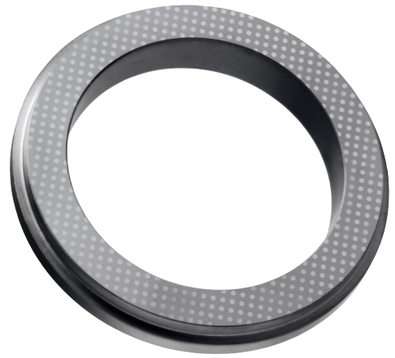
FLUILIFT

In order to reduce the possibility of contact between the sealing surfaces during rotation it's needed to maintain a stable liquid or gaseous film, which is not affected by the heat generated by the seal when it is loaded axially during rotation. **FLUILIFT Technology** was developed by Fluiten's engineers to be highly reliable when the conditions of the sealed fluid are unstable, due to chemical and physical properties, or when the pressure and rotational speed are very high. Special, appropriate grooves dimensions on the sealing surface force the sealed liquid or gas to penetrate between them. This generates a pressure increase that separates the rotating ring from the stationary one thus preventing contact even under extreme conditions.

Fluilift hydrodynamic grooves

FLUIGRID

Fluiten dry contacting face technology, called FLUIGRID, is a grid created by laser etched microcavities cut into the hard face (usually made from silicon carbide). These cavities act as small pockets into which the carbon face deposits lubricating micro particles, which result in significantly reduced friction and consequently less heat generation and face wear. To ensure total compatibility with the product, the seal can be equipped with a sanitary flange able to collect any carbon wear particles that might oth-erwise enter the process.



Fluigrid laser slots

FLUIDIAMOND

A chemical deposition treatment normally applied on silicon carbide rings, allows to have a diamond film, increasing the chemical and tribological characteristics. Thanks to this development, Fluiten Mechanical Seals developed with “FLUIDIAMOND” technology can tolerate operations with poor lubrication, in “Dry Running” conditions and to be used where the PxV factor (operating pressure x peripheral speed) reaches highly critical high.

Fluidiamond

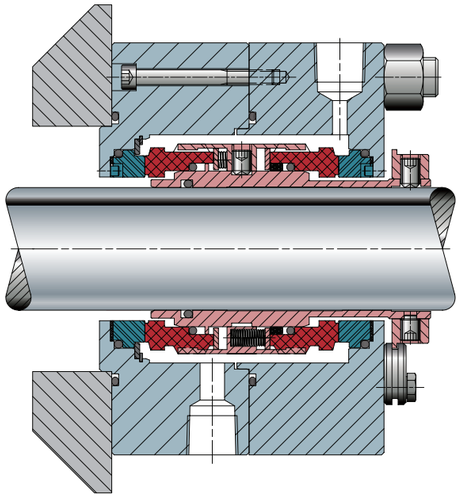
FLUILIFT

LL6D

Dual cartridge seal in compliance with standard API 682 4th edition in back-to-back version. Seal widely used and appreciated thanks to its sturdiness and capability of withstanding high mechanical stress. These gas-flushed solutions with Fluilift technology (during the rotation, the sealing surfaces are detached for a few microns or fractions of a micron and thus the friction is reduced almost to zero with remarkable energy savings).

Oil & gas
Petrolchemical

OH, BB Pumps



FEATURES

- Gas-flushed mechanical seal.
- Standard solution resulting from tested designs and made in compliance with standard API 682 4th edition.
- Balanced opposed dual cartridge solution and non-contact sealing rings.
- Zero emissions into the atmosphere.
- Fluilift laser technology developed on rotary rings to allow the sealing rings to float on the pressurised barrier gas and to avoid contact.
- On demand, possibility of dual direction of rotation.
- Springs outside the product of the pumped liquid.

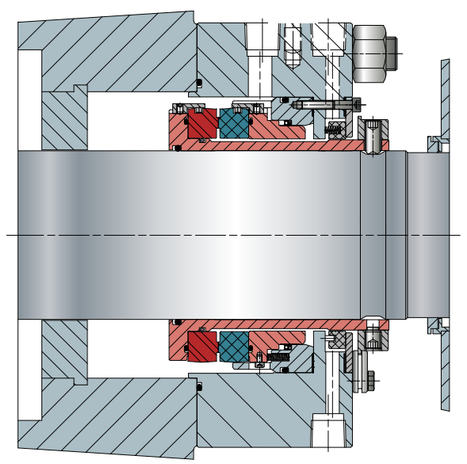
HPK

HPK design allows to maintain the planarity of seal faces by using monolithic rings carefully developed with study of fluid dynamics and an accurate FEM analysis of the critical seal parts. Thanks to accurate and unique solutions found by Fluiten engineers, HPK sliding faces are designed with regular geometry and thickness. HPK has a patented drive device which can withstand high run-out levels or even misalignment under high stressing conditions. Specific grooves developed for “wet” applications allow to keep the liquid film even at very high PxV conditions.

Oil & gas
Petrolchemical

OH, BB Pumps

- Pipeline
- Boiler feed water



FEATURES

- Single seal “engineered” pre-assembled unit with flange and sleeve, for quick and easy installation
- Monolithic sliding faces and geometry developed with FEM to minimize deformations at high pressures and temperature variations. Patented drive system, which does not have bad influence on ring structure
- Insensitive to shaft deflections due to stationary design
- Increase operational performances and reduce maintenance cost
- Different materials available for mechanical seals and metal parts.
- **FLUIDIAMOND** for high level of operating limits

FLUILIFT

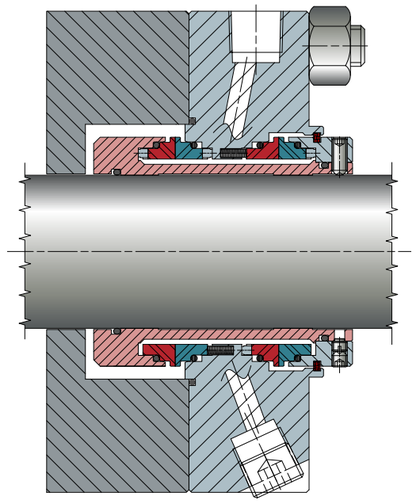
CB4F

Gas lubricated double seal developed to safeguard the environment and eliminate process contamination. The seal is designed with “Fluilift “ non contacting face technology and is pressurised with an inert gas that lubricates the faces and provides a gas barrier between process and atmosphere. The seal incorporates laser etched grooves that maintain a controlled gap between the faces, even at low rotating speeds, eliminati ng friction, heat generation and process contamination. Power consumption is also reduced.

Food,
Pharma industries

Top entry
Mixers

OH, BB Pumps



FEATURES

- Seal rings designed using FEA to ensure correct flatness in all operating conditions.
- Springs outside the product for high reliability even with viscous media. Clean profile enables seal to tolerate products that crystalise during manufacture.
- Increased sleeve thickness and space under the seal rings to prevent deformation and enable the seal to tolerate higher run-out levels.
- Connection for gas flushing. Slotted flange for greater versatility.
- Fluistrip: seal setting device easily pulled clear aft er seal is installed.
- **FLUIDIAMOND** for high level of operating limits

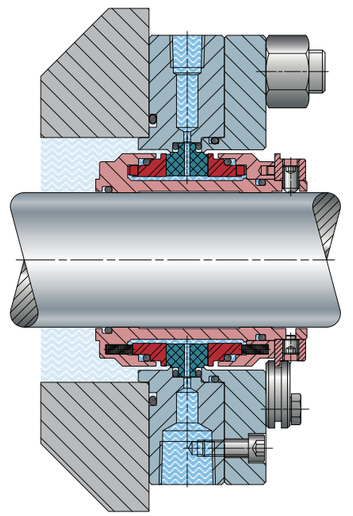
LL8F

Dual cartridge seal in face-to-face arrangement, designed in compliance with standard API 682 4th edition. Especially compact in size, it can be used as an auxiliary solution to a single seal for checking emissions into the atmosphere avoiding the barrier liquid. These gas-flushed solutions with Fluilift technology (during the rotation, the sealing surfaces are detach ed for a few microns or fractions of a micron and thus the friction is reduced almost to zero with remarkable energy savings).

Chemical,
Oil & Gas industries

OH pumps

Blowers



FEATURES

- Gas-flushed mechanical seal.
- Standard solution resulting from tested designs and made in compliance with standard API 682 4th edition.
- Balanced face-to-face dual cartridge solution and non-contact sealing rings.
- Zero emissions into the atmosphere.
- Fluilift laser technology
- Possibility of dual direction of rotation.
- Springs outside the product of the pumped liquid.
- Supplied with a primary seal became a triple arrangement.
- **FLUIDIAMOND** for high level of operating limits.

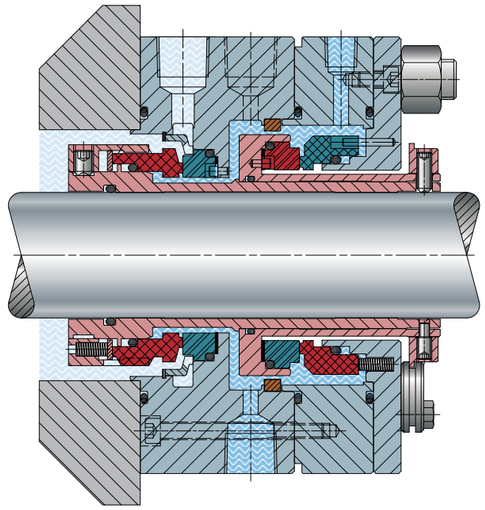
FLUIGRID

BM6L

Dual cartridge seal designed in compliance with standard API 682 4th edition with auxiliary seal suitable for dry running. Product side seal widely used and appreciated thanks to its sturdiness and capability of withstanding high mechanical stress. The secondary mechanical containment seal is stationary type for high surface speeds. Fluiten's Fluigrid technology reduces the heat generated by the seal faces.

Oil & gas
Petrolchemical

OH, BB Pumps



FEATURES

- Standard solution resulting from tested designs and made in compliance with standard API 682 4th edition.
- Cartridge solution, single balanced contacting with process and secondary containment mechanical seal.
- Dual direction of rotation.
- Solid sealing rings.
- Drive system with three "Fluiten designed spine" recognised as being the only one reliable and resistant to vibrations and shaft misalignments.
- Stationary mechanical containment seal with Fluiten's Fluigrid technology.
- Connections for flushing or vent and control of the physiological leakages of the seal on the process side.

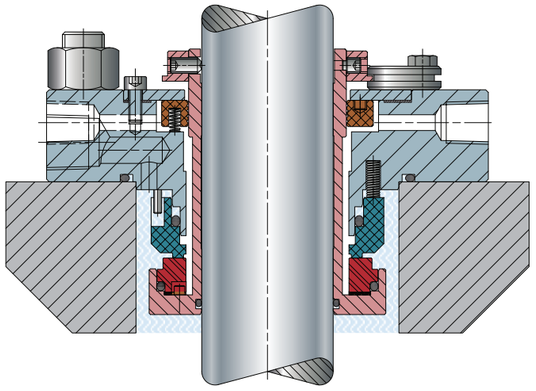
BM4L

Single cartridge seal designed in compliance with standard API 682 4th, suitable for dry running contacting especially recommended on vertical side delivery pumps for containment of the vapours of the pumped product. Also suitable as an ancillary safety solution in magnetic driven pumps to avoid leakage of liquid in case of breakage of the shell. The secondary mechanical containment seal is the stationary type for high peripherical speeds. Fluiten's Fluigrid technology reduces the heat generated by the seal faces to a minimum.

Oil & gas
Petrolchemical

VS4 Pumps

Blowers



FEATURES

- Standard solution resulting from tested designs and made in compliance with standard API 682 4th edition.
- Dual direction of rotation.
- Connections for flushing or vent and control of physiological leakages of the seal on the process side.
- Possibility of sizing the shaft's flange and sleeve according to customer request.
- Solution developed for installation in existing machines.
- Recommended for vertical API pumps.
- Usable as a containment seal for magnetic driven pumps API 685.
- Can be installed on process blowers.

FLUIGRID

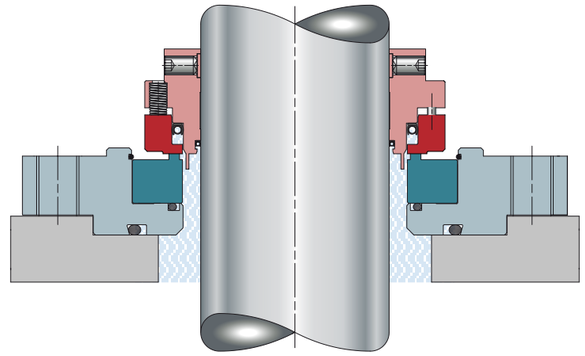
GT 2888A

Single external seal suitable for dry running. The rotating component is pre-assembled to optimal working length. The stationary seal ring is supplied complete with mounting flange. "Fluigrid" technology ensures superior operating performance and its constructi on details ensure high shaft run-out values.

Food,
Pharma industries

Chemical
industries

Top entry
Mixers



FEATURES

- Solid rotary seal ring in silicon carbide with "Fluigrid" technology.
- Retained stationary ring to prevent blow out during reverse pressure.
Flange designed to guarantee correct alignment of stationary seal ring.
- Optional: sanitary flange to prevent product contaminati on and cooling flange for high temperature applications.
- **FLUIDIAMOND** for high level of operating limits.

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