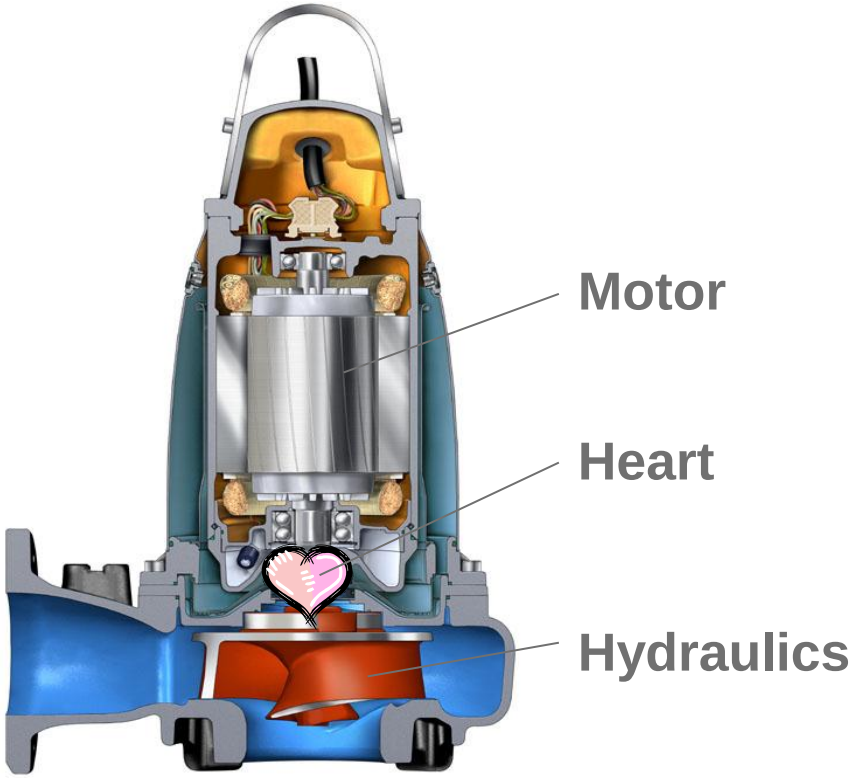
ITT Flygt Mechanical Seals

Pump anatomy

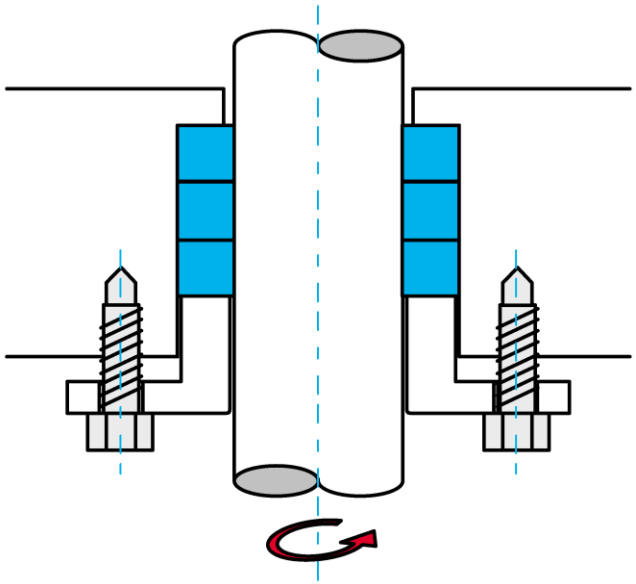


Static and Dynamic seals

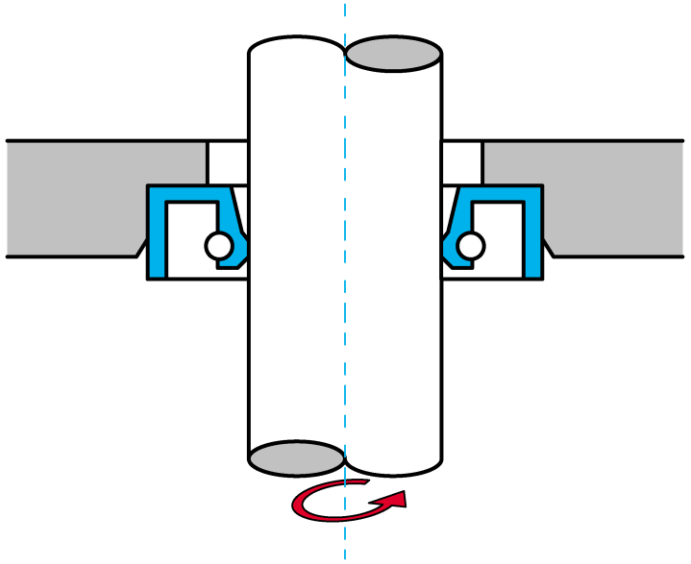
Static seals: **No relative movement between sealed surfaces**

Dynamic seals: **Relative movement between sealed surfaces**

Shaft seals

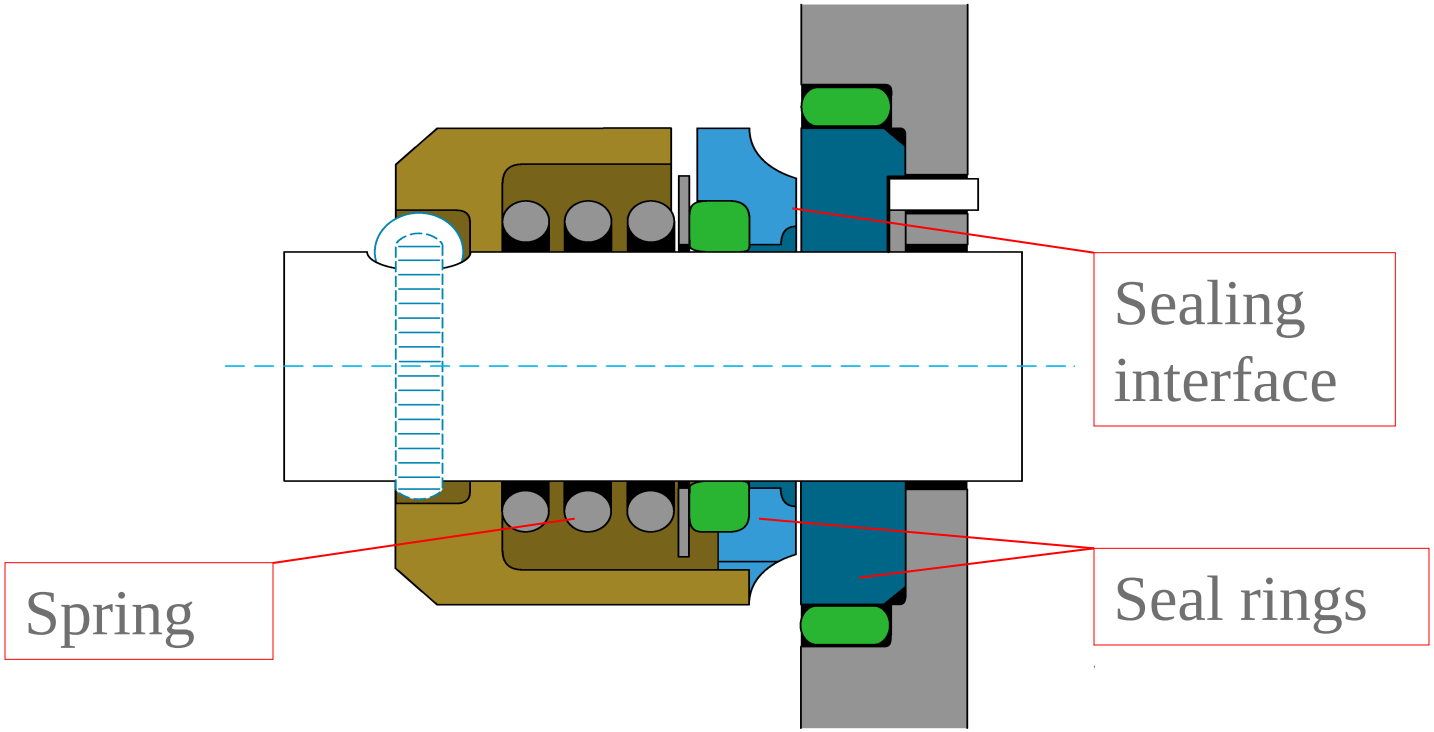


Stuffing box

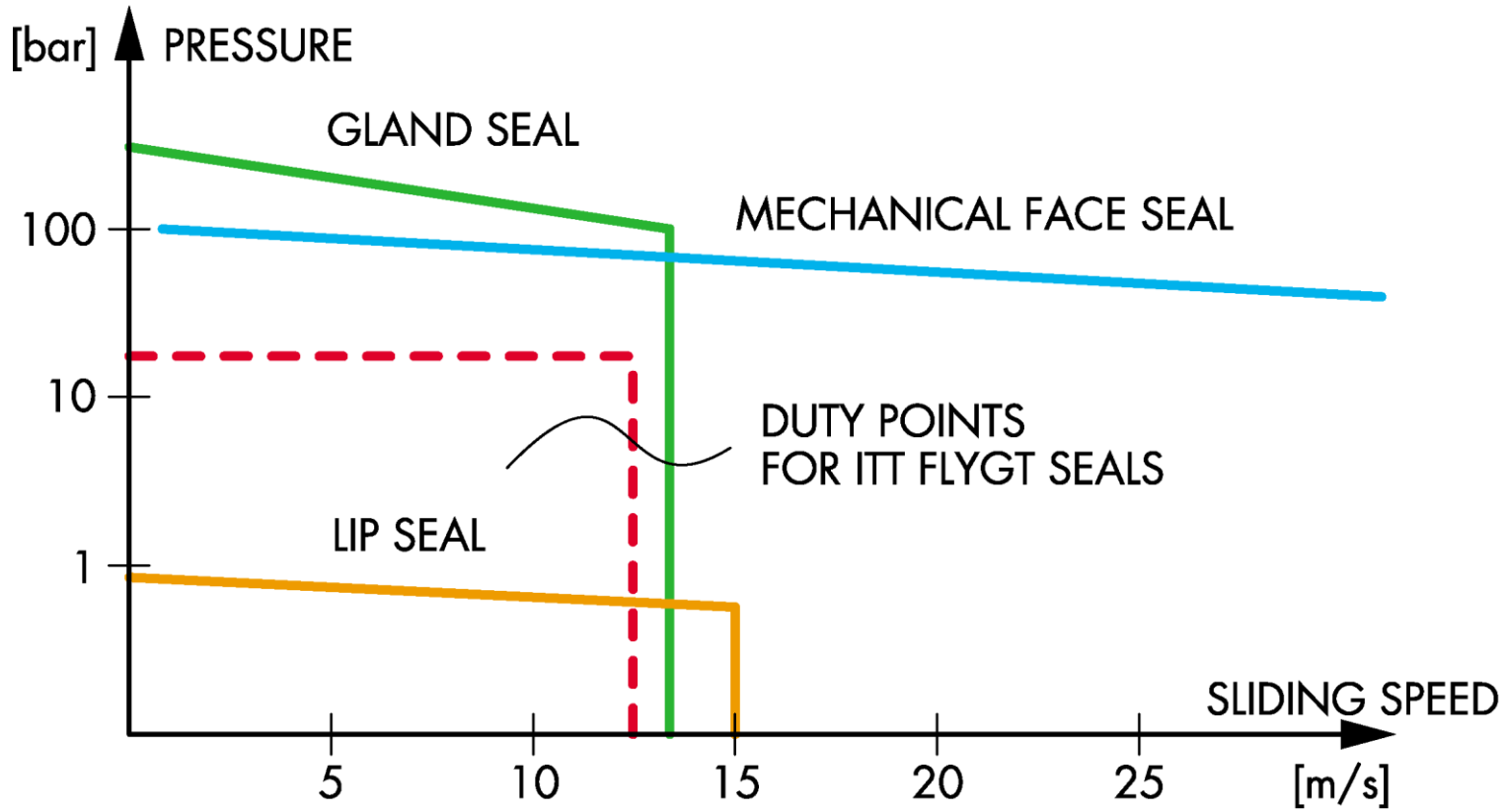


Lip seal

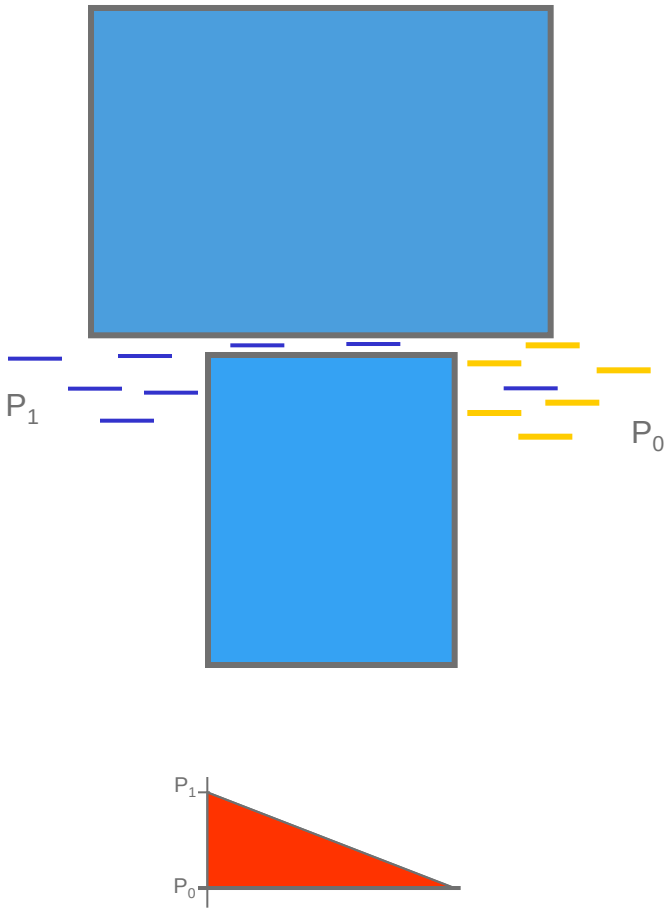
Mechanical face seal basics



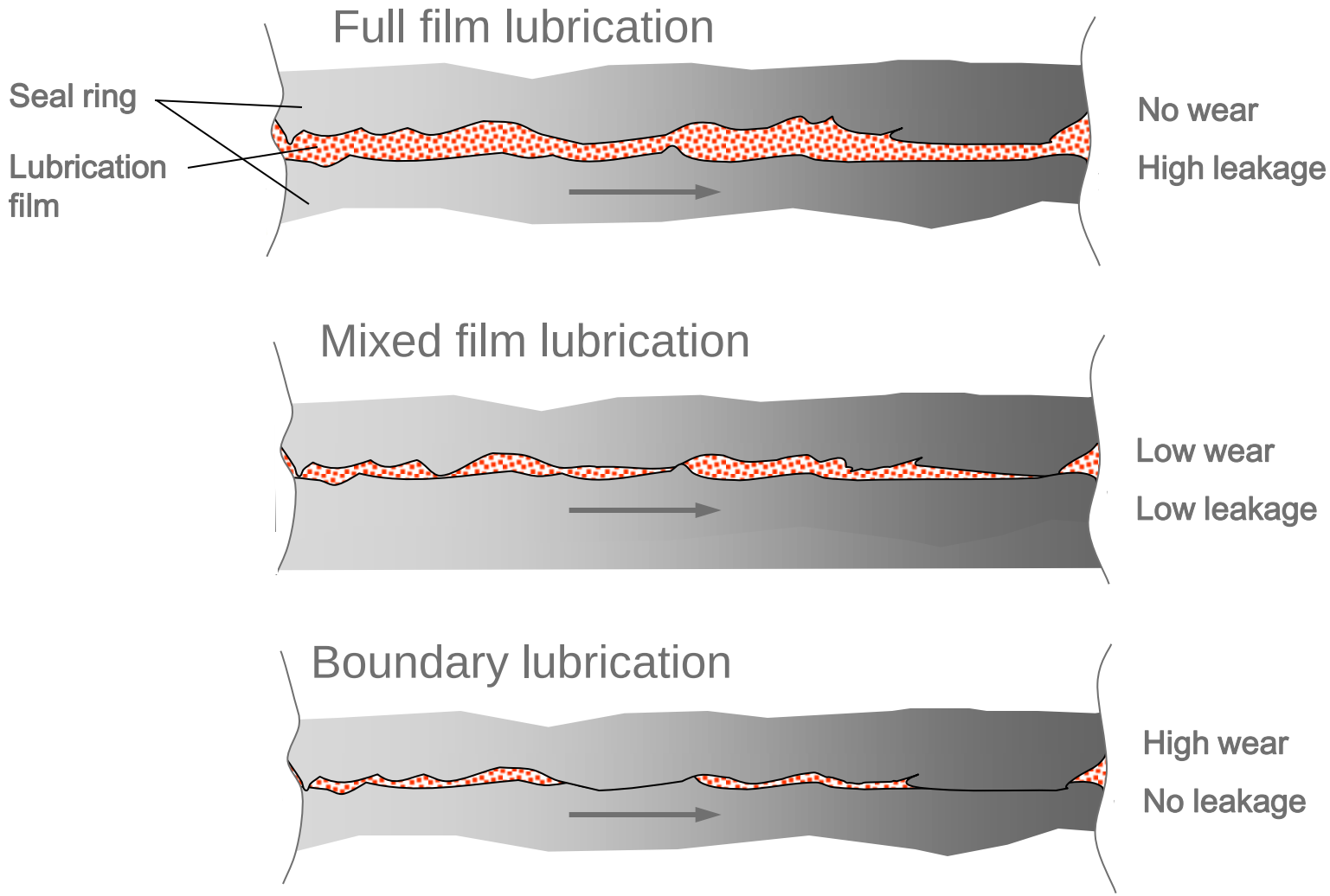
Seal rating



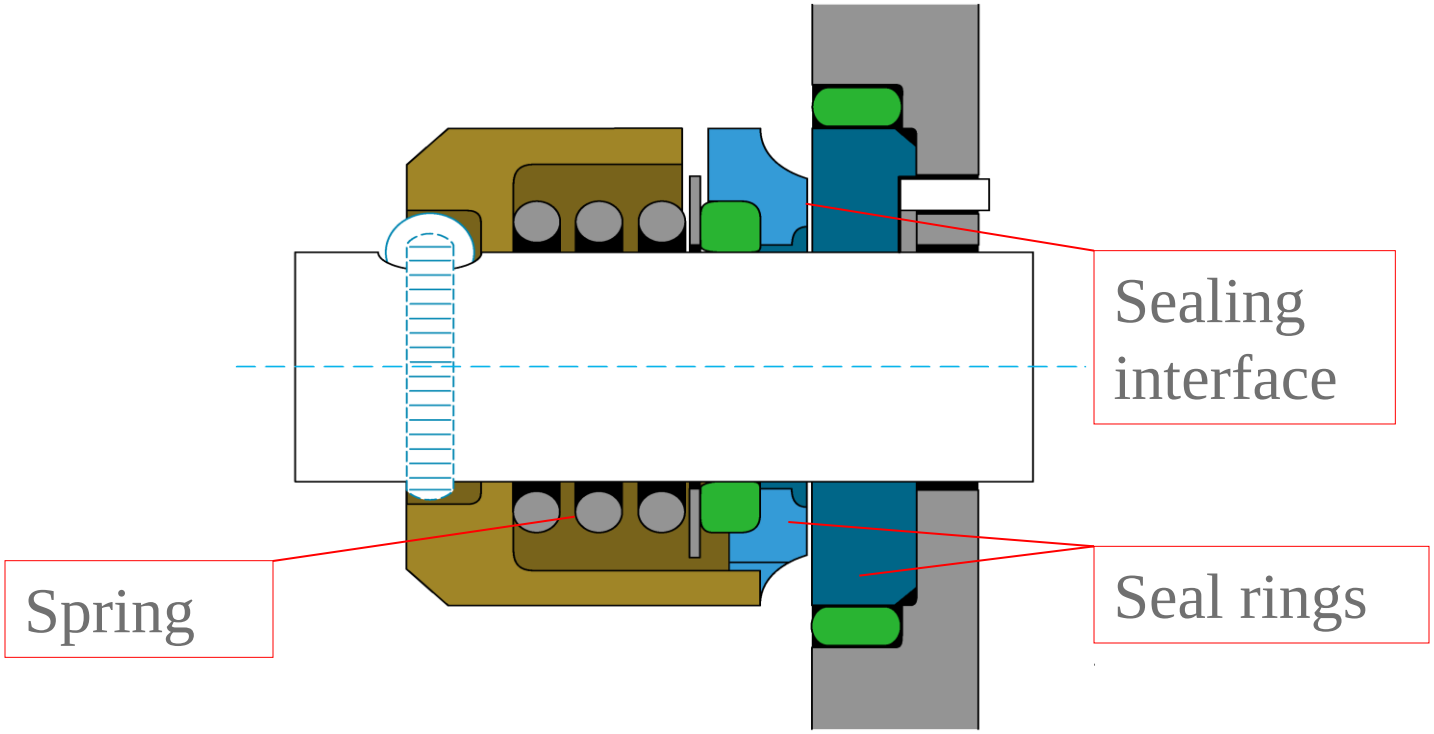
Leakage



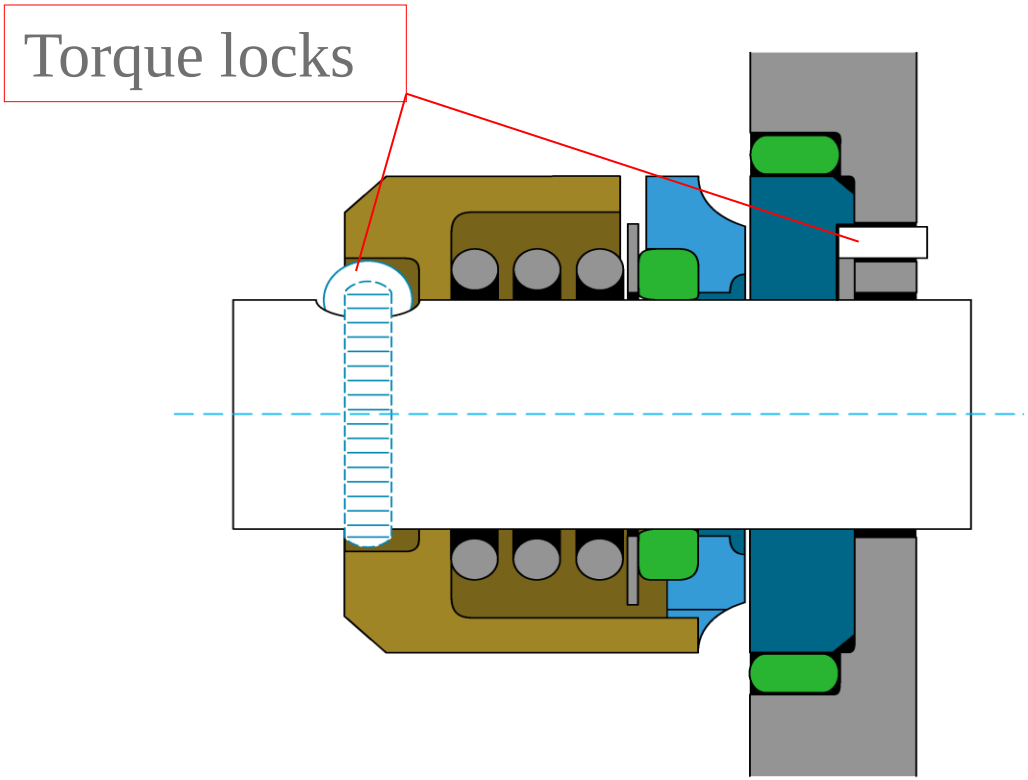
Lubrication modes



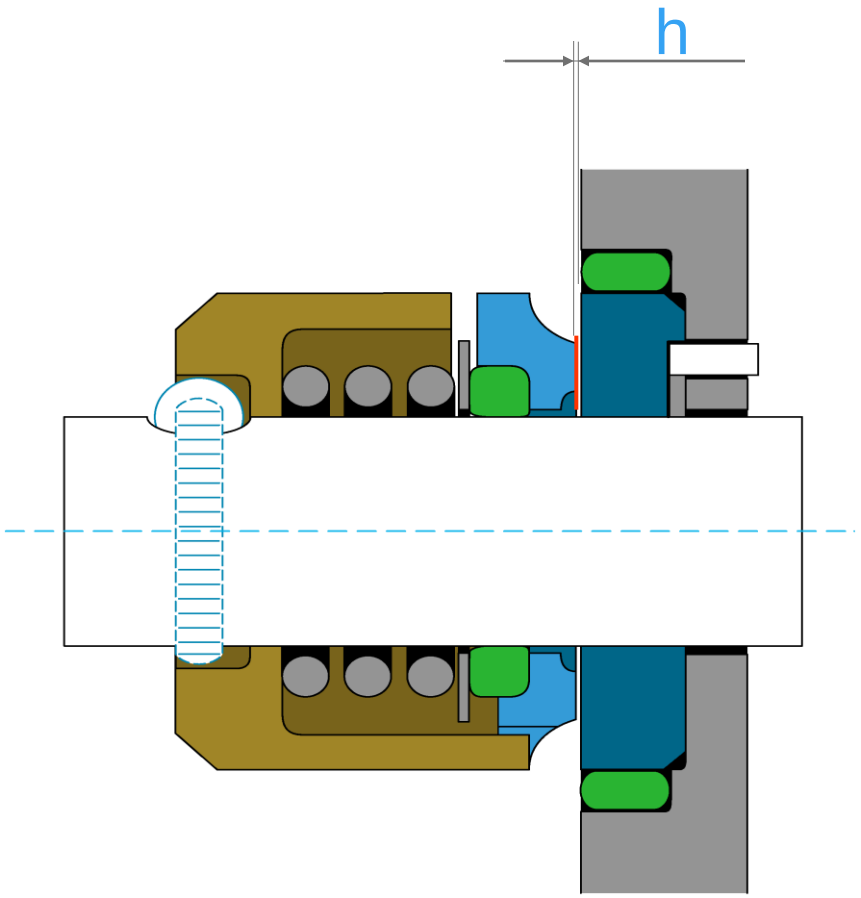
Mechanical face seal



Mechanical face Seal



Leakage



$Q \sim h^3$

Leakage

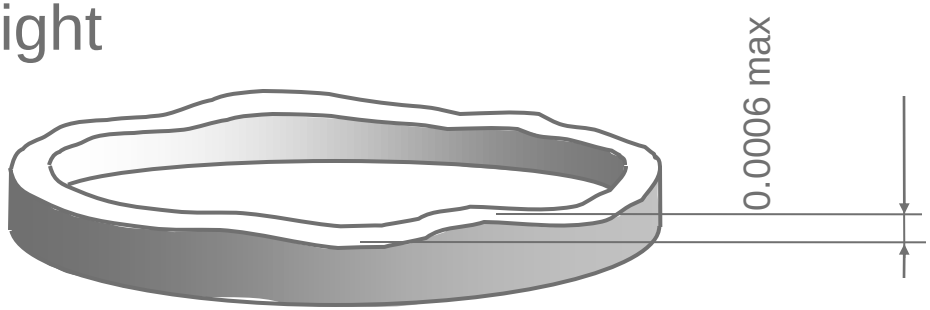
Estimated daily leakage for a 50 mm seal with different lubrication film thickness

- 0.5 µm A couple of drops
- 1 µm Two table spoons
- 2 µm One glass
- 5 µm Half a bucket

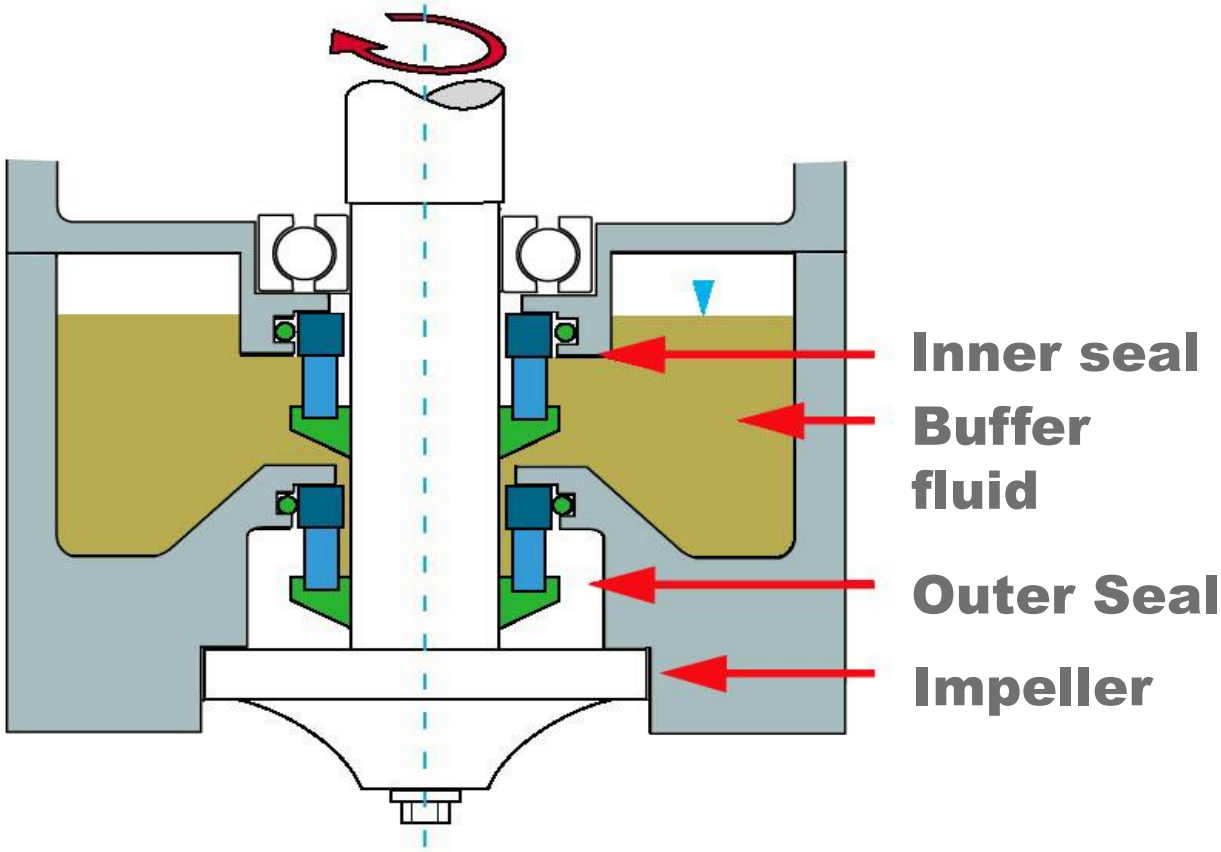
Flatness

Deviation from perfect flatness max 0.0006 mm =

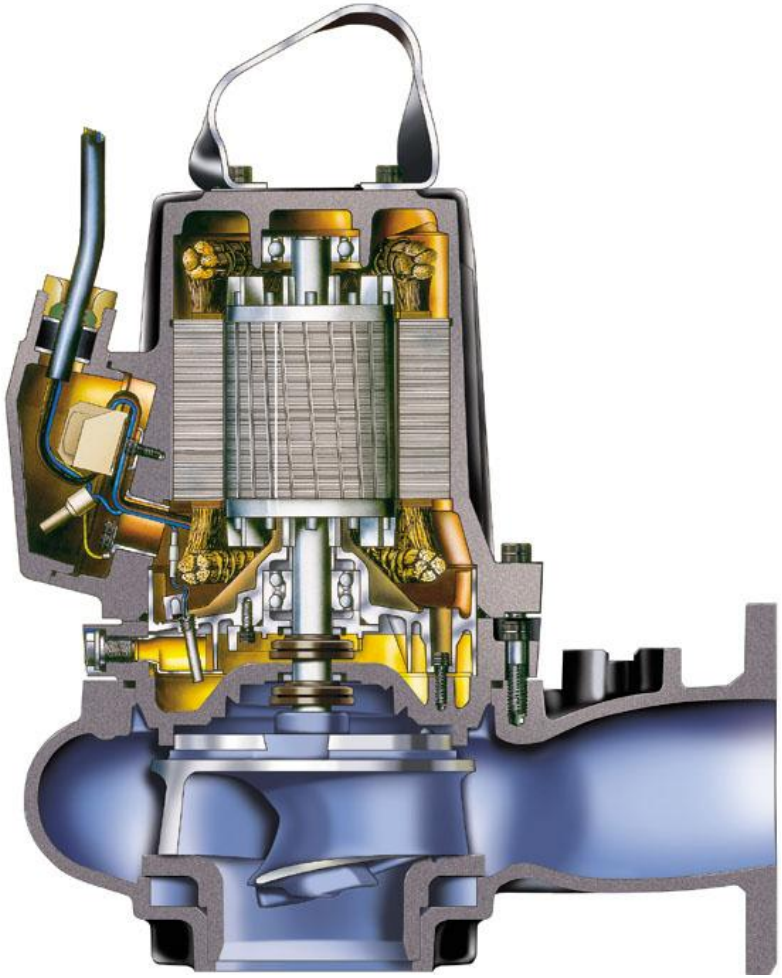
2 light band of sodium light



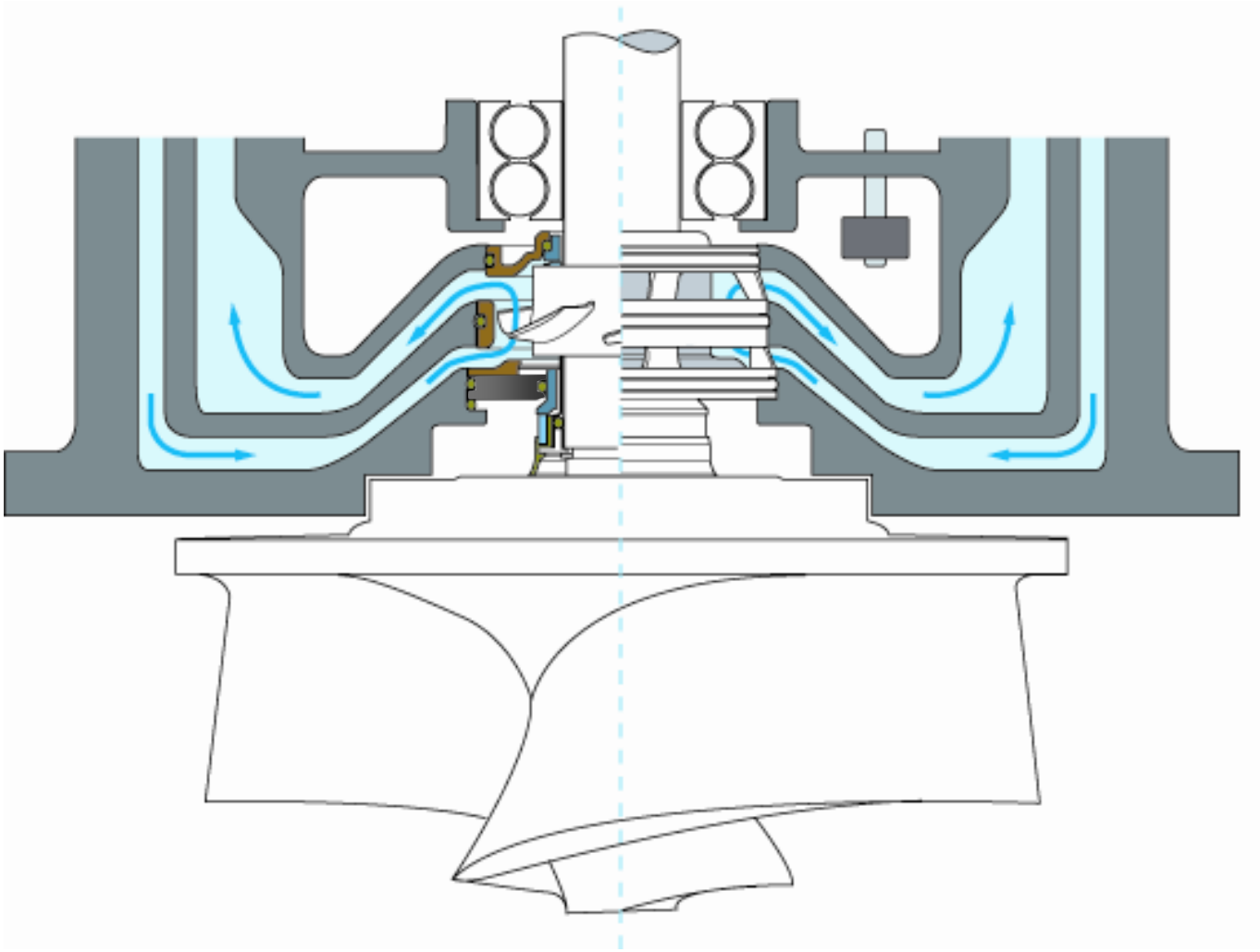
Flygt Sealing System



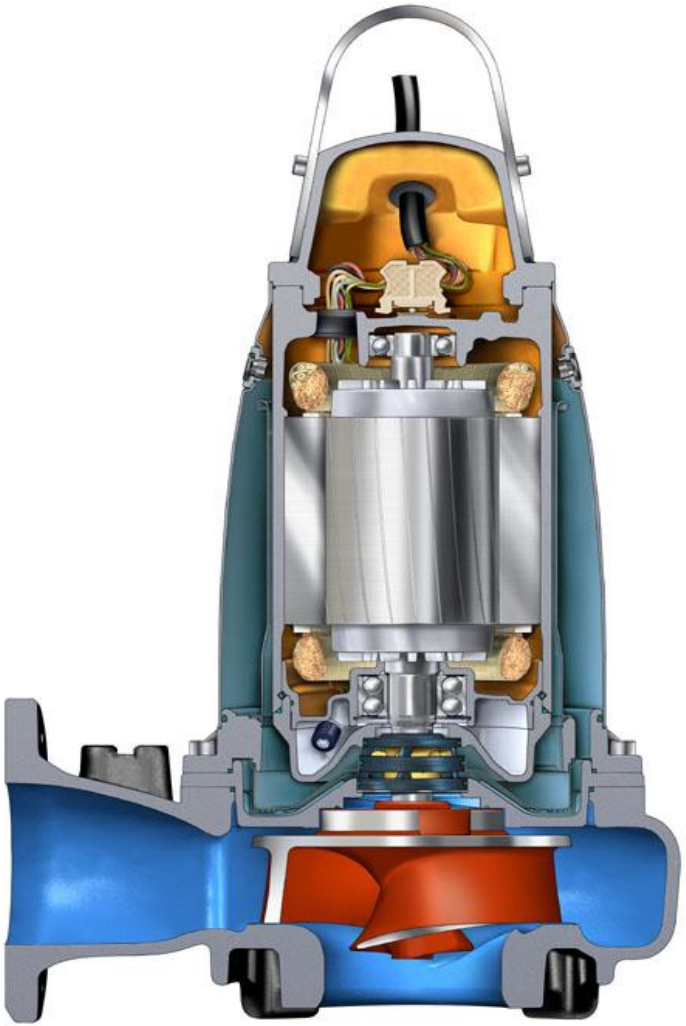
Sealing system in 3085



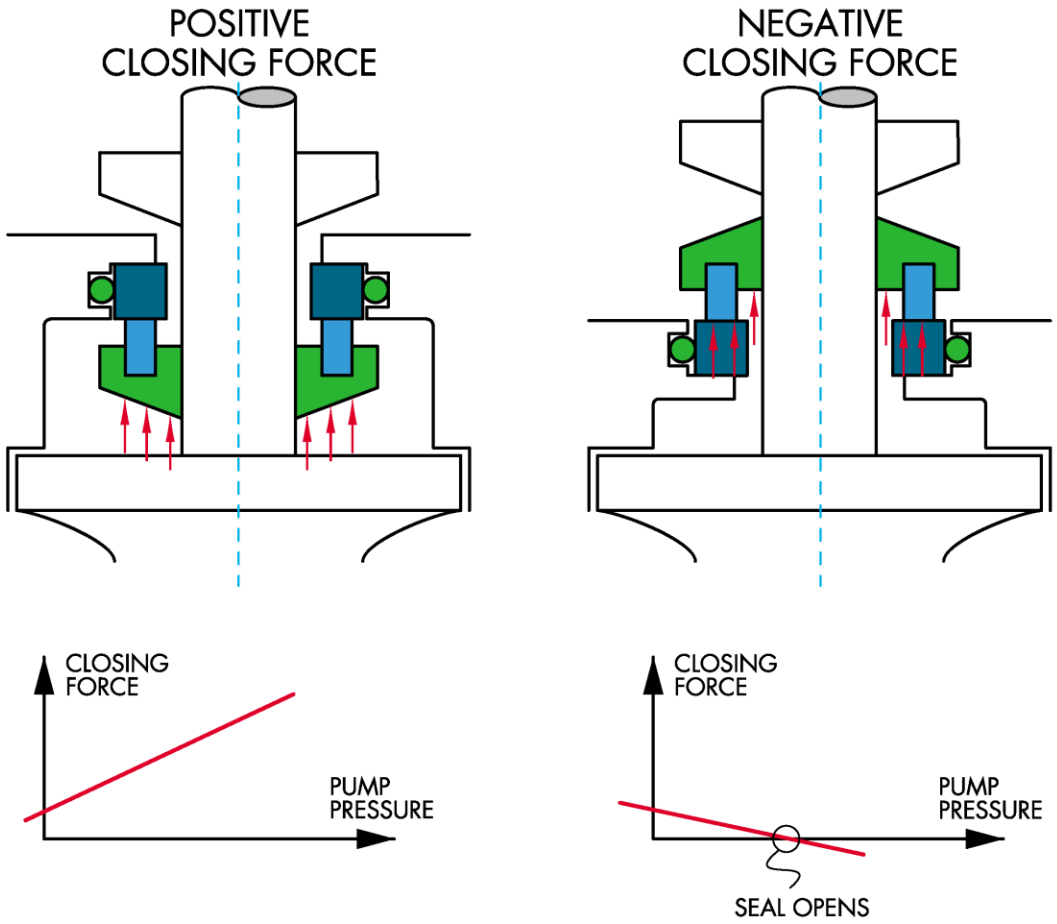
Flygt Sealing System- New products



Flygt Sealing System in 3153



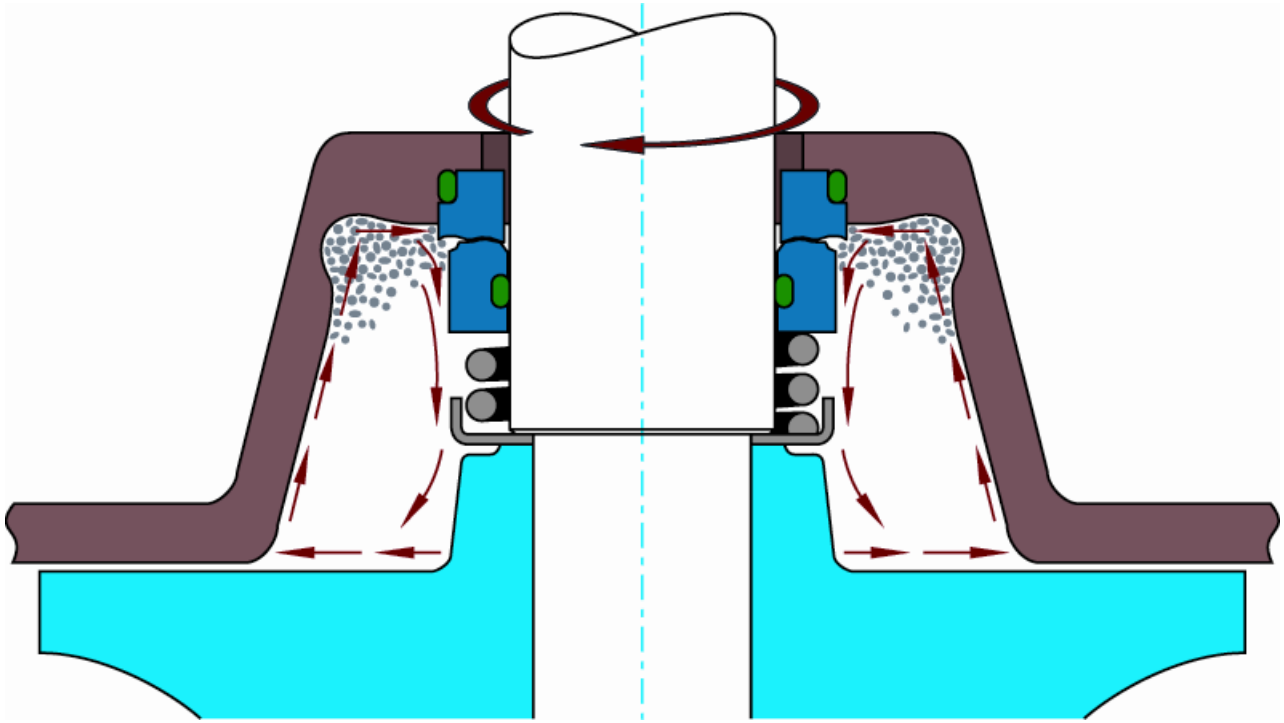
Positive closing force



Buffer fluid

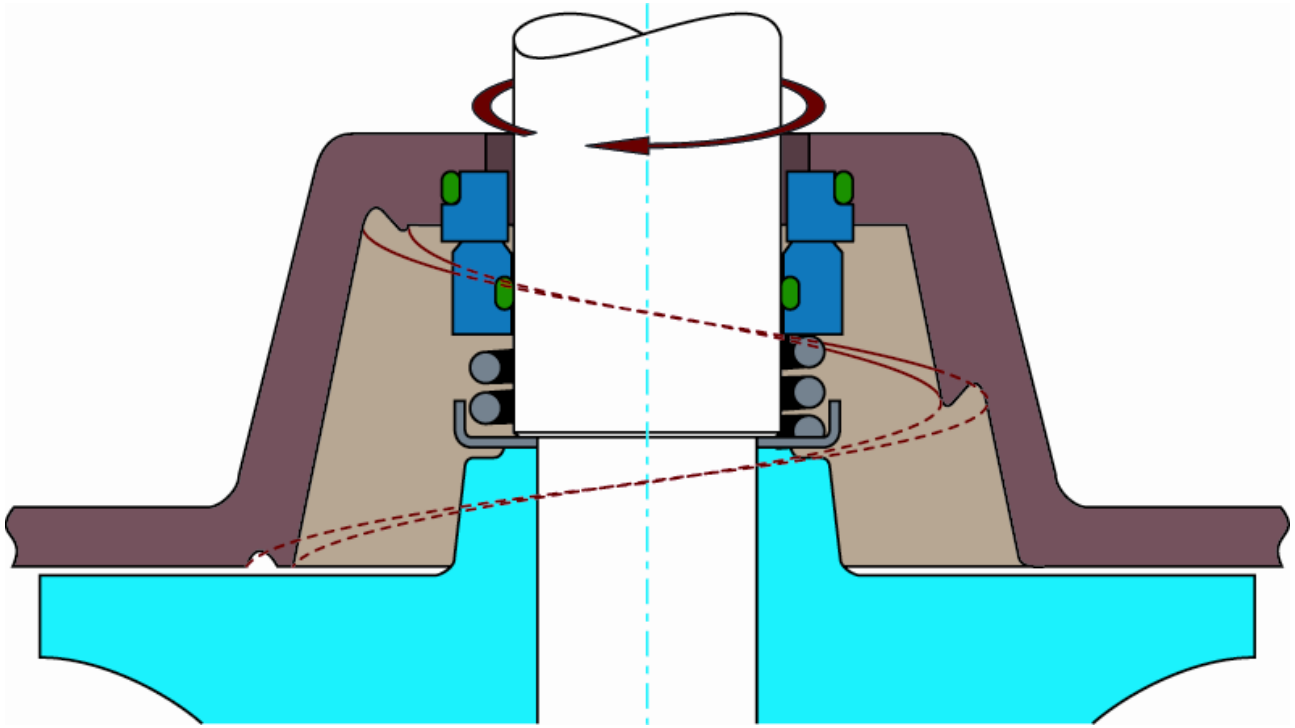
- Lubricates the seal faces
- Cools seal rings and other components
- Dilutes leakage to minimize risk of crystallization
- Doubles as coolant for new drive units.

Spin-out



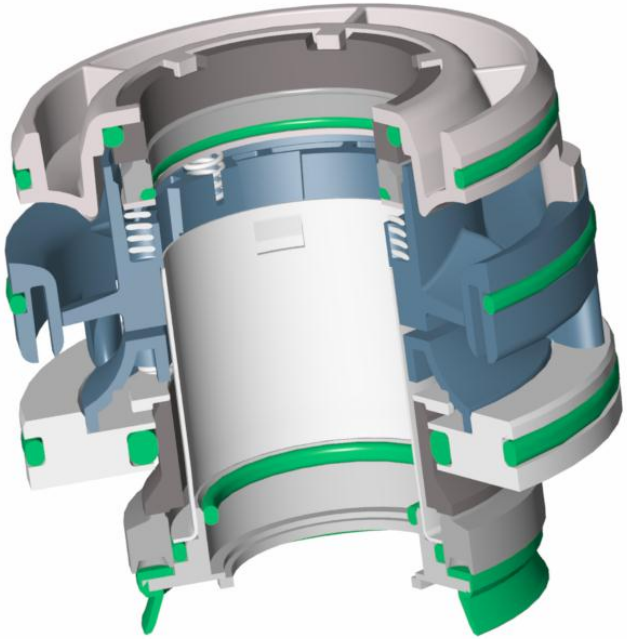
Wear caused by abrasive particles trapped by boundary current

Spin-out



The spin out groove directs the abrasive particles out to the pump housing

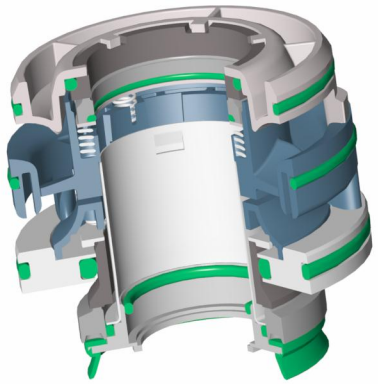
Plug-In seal



45 mm Plug-in seal

Plug-in Seal

- Only one part to fit
- Fast service
- Protected seal faces
- Correct mounting guaranteed
- Same procedure for all seals
- Correct and precise spring load
- Pre tested
- Cooling pump incorporated



Plug-in Seal

Plug-In seal series

Seal ring material

- ✓ High Hardness
- ✓ High Stiffness
- ✓ Good Sliding Properties
- ✓ High Thermal Conductivity
- ✓ Low Thermal Expansion

Seal ring material

WCCR
Corrosion resistant tungsten carbide.
Standard material in Flygt seals

RSiC
Silicon carbide. Optional material.

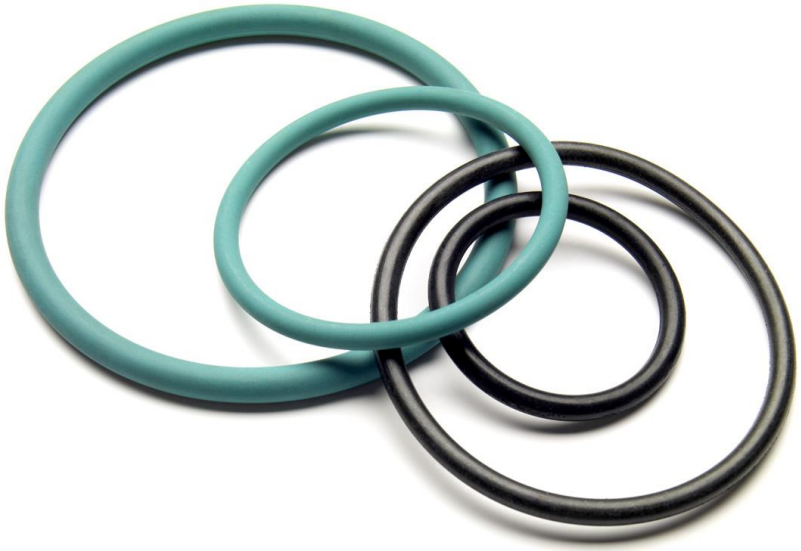
Al_2O_3
Aluminium Oxide.

C
Carbon. Almost phased out. Only for inner seals in small products.

Rubber Material

Flourinated rubber (Viton) (FPM)

High temperature limit and good chemical resistance.
Standard in most face seals due to high temperature limit.



Nitrile (NBR)

Good for most applications. Cost effective

Other materials

Metals

Stainless steel AISI 329

Plastic

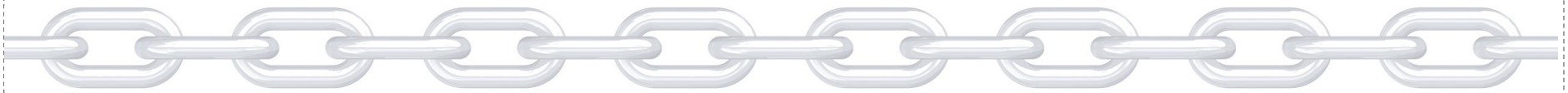
Only PPS . High temperature limit, strong and stable. Excellent chemical resistance.

Qualification testing

Seal face materials and Seal designs are approved separately.

Materials are tested for tribological properties.

Seal designs are tested for mechanical performance and operational performance



Qualification testing

Approval of mechanical design properties

Lab rig tests

- Leakage
- Pressure limit
- Negative pressure opening level
- Duration and wear of seal components
- Power loss
- Dry running capability
- Media temperature limit
- Torque lock and torque transmission capability

Qualification testing

Approval of operational performance

Field test in products

- Leakage
- Wear from abrasive pump media
- Clogging and wind-up of fibrous media
- “Snoring operation” capability
- Compatibility with product

Performance

Seal life is dependent of

- Leakrate
- Temperature
- Presence of abrasives
- Clogging
- Pressure
- Vibrations
- Dry running
- rpm

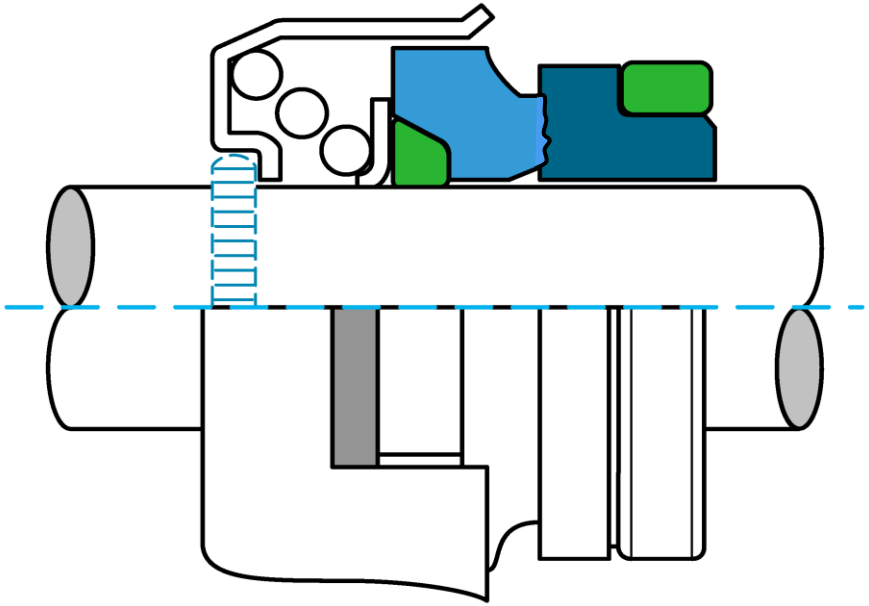
performance

SEAL FAILURE

- High leakage
- Overheating
- Abrasive wear
- Thermo cracking
- Solid film build up
- Corrosion
- Incorrect mounting
- Mechanical failure

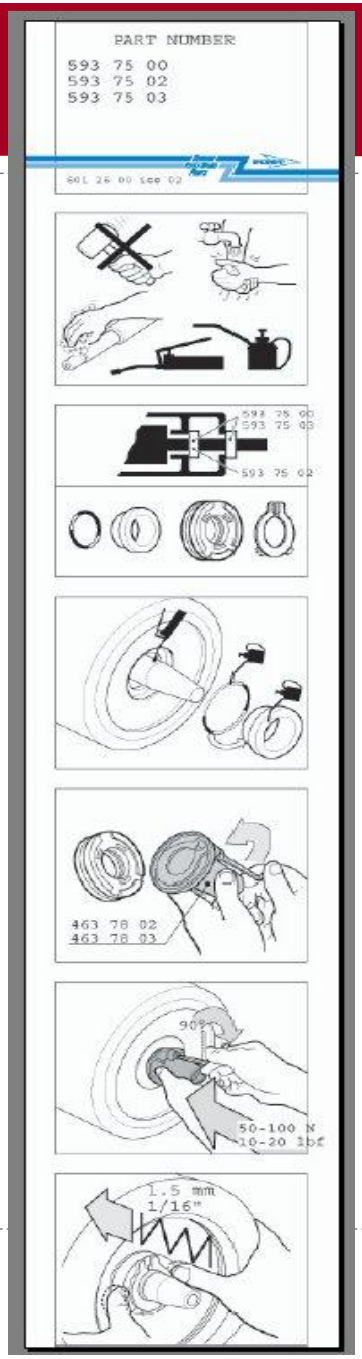
Service

Do not remount mechanical face seals.



The seal rings will wear matching grooves into each other. If the seal is re mounted after service, the grooves will not match.

Pay attention to where to apply oil and where to apply grease



Service

Keep hands and tools clean.

Microscopic particles left on the seal faces can cause leakage.

Service

Clean shaft and check for damage that can cause the o-ring to leak

Service

Lubricate stationary o-ring. Use oil if the seal ring lacks mechanical torque lock. Otherwise, use oil or grease.

Service

Grease the shaft

Service

Apply some DROPS of oil on the seal surface to prevent sticking

Place the rotating ring in place

Service

Apply just 20 Newton of power on the tool when mounting the grip ring.

Service

Check the clearance

Service

Check the seal housing and shaft for defects.

Grease the shaft.

Service

Oil the stationary O-rings (works as a torque lock)

Service

Place the Plug in seal in place, be aware of the torque lock gets in right position

Service

Mount the Retaining ring, be sure that it gets in to the groove in the shaft

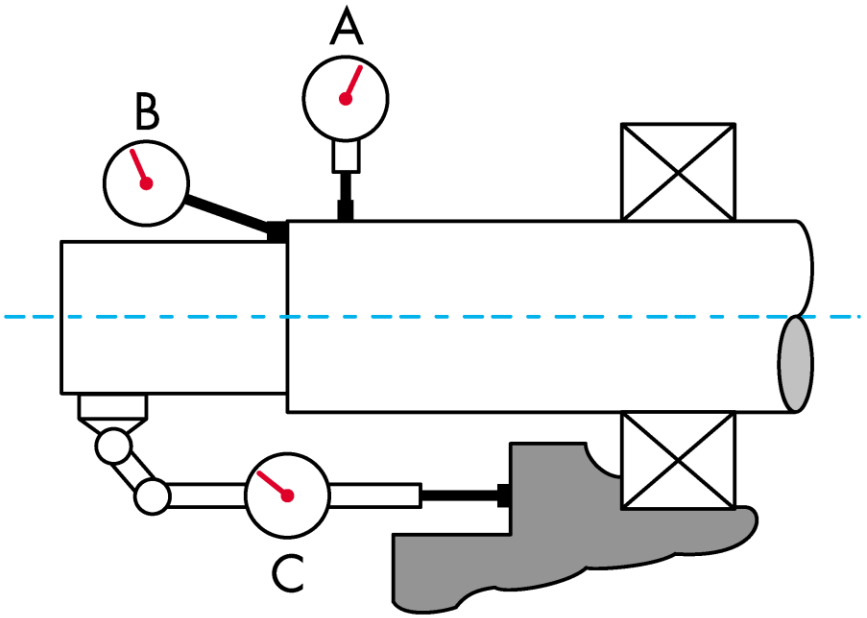
Service

Service

Service

Apply grease on the retaining ring to protect it from corrosion

Run-out tolerances



Shaft Diameter* [mm]	Max Deviation [mm]		
	A	B	C
≤35	0,03	0,1	0,1
45–80	0,05	0,03	0,1
≥90	0,05	0,1	0,1

*At Seal Position

Service

Seals can run dry if the pump or mixer is filled with correct amount of buffer fluid.

Seals for 80mm shafts or larger should be limited to a few minutes of dry running to avoid overheating.

Tightness check

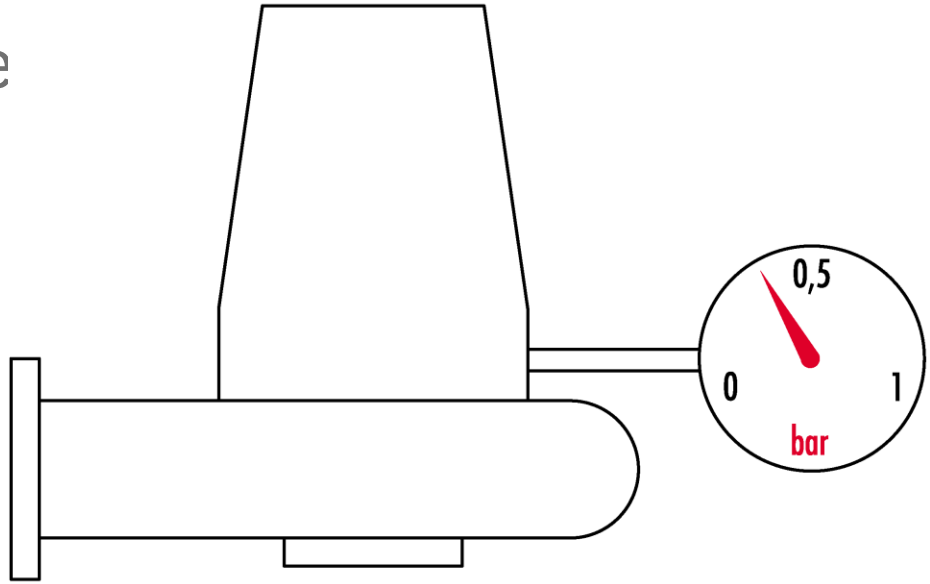
ΔPmax=0,017*Po*t/V [bar]

ΔPmax=Pressure drop

Po=pressure in test object [bar]

t =test time [min]

V =volume of the test obje



Flygt mechanical seals

– No worries