



Mechanical Seals For Slurry Applications In Flue Gas Desulfurization (FGD)

Slurry applications are an integral part of the Flue Gas Desulfurization (FGD) process containing abrasives and solids that require engineered sealing solutions and appropriate piping plans.

Limestone Slurry

Limestone slurry transfer and feed pumps are heavy-duty slurry pumps that can handle slurries which can contain solids content as high as 50%. Operating temperature is usually ambient to 51°C. A small amount of water flush is often allowed when utilizing a liquid quench. This helps cool the mechanical seal to keep it operational. Grease quenches have also been successfully applied. Fly ash scrubber systems require special consideration because of their extreme abrasiveness.

Recirculation Slurry

Recirculation slurry is a heavy-duty slurry requiring large-shaft pump designs that are generally single-stage centrifugal pumps. Due to the abrasive nature of the slurries and possible high concentration of chloride ions and low pH (5.5), these pumps are often manufactured with high-nickel alloy materials, such as Alloy C-276, or are rubber-lined. These pumps are subject to cavitation due to entrained air in the slurry. Solids will be in the 15% to 20% range. Often, a small water flush or liquid quench is used to extend mechanical seal life.

Thickener Underflow Slurry

Thickener underflow slurry is comprised of 45% to 50% gypsum that is pumped into a surge tank. Heavy-duty slurry pump designs with relatively large shaft sizes are used to move this slurry and they are generally single-stage centrifugal pumps. The slurry is abrasive and can have high concentrations of chloride ions (up to 20,000 ppm) and a low pH. The pumps are often constructed from a high nickel-alloy such as C-276 or are rubber-lined. Alloy C-276 is used to prevent stress corrosion cracking. The pumped slurry also has high concentrations of solids in the 45% to 50% range. Operating temperature will be around 38°C.

Sealing Recommendations:

Slurry Seal

BR Single & Dual Mechanical Seal

This single & dual cartridge mechanical seal encompasses many of the advantages associated with heavy duty mechanical seal design in a cost-effective construction. It is available with robust seal face materials, making it the perfect general-purpose seal for slurry applications. This mechanical seal is designed to operate in harsh, abrasive slurry environments. Available as a single or double mechanical seal, the unique design features allow the seal to operate without a flush, reducing the total cost of ownership.

Split Seal

SPX

This fully split mechanical seal helps significantly reduce maintenance on larger, difficult-to-seal equipment. They are ideal for use on large, heavy-duty rotating shaft equipment. Its outside-mounted design is used on both vertical and horizontal applications.

Plans

Plan 02

Non-circulating flush plan where adequate vapor suppression is assured. This plan is generally ideal with large bore/tapered bore ASME B73.1 or specialized ISO 3069 mechanical seal chambers, and where natural venting occurs. Plan 02 can be used where dilution of the pumped fluid cannot be tolerated. One key advantage of plan 02 is that solids are not continually introduced into the seal chamber with the need for external hardware.

Plan 62

This is a common plan to improve the environment on the atmospheric side of single mechanical seals by providing intermittent or continuous quenching with water (liquid) on single-mechanical seal arrangements, and offers a low-cost alternative to tandem mechanical seals. The quenching provides some cooling along with preventing or slowing product crystallization or build-up on the seal faces.

Plan 32 (With PTFE Bushing)

Uses a flush system brought in from an external source to the mechanical seal. A Plan 32 is typically used on highly abrasive duties to reduce solids from accumulating around the seal faces and keep abrasives from entering the seal or damaging the seal faces. This plan is almost always used in conjunction with a close clearance throat bushing. A significant advantage of this system is that the external flush fluid, when selected properly, can result in vastly extended seal life. When an outside flush source is used, concerns regarding product dilution and/or economics must be considered by the user.

SPX Single Seals



Product Description

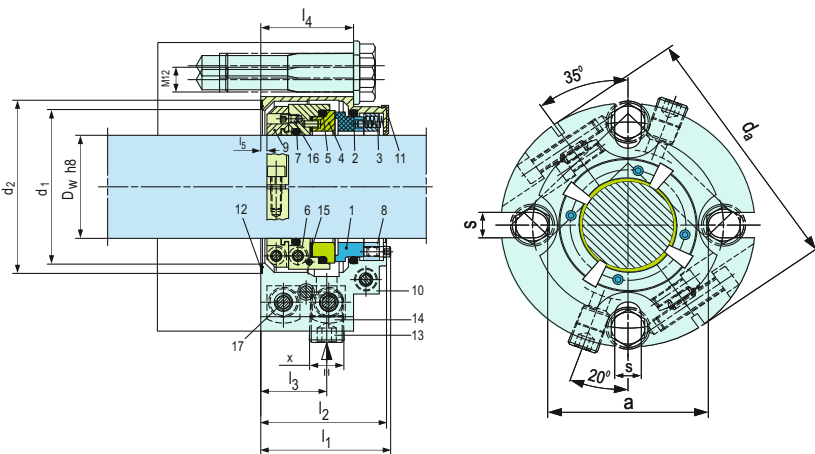
1. Single seal in split configuration
2. Balanced design
3. Independent of direction of rotation
4. For plain shafts
5. Semi-cartridge construction
6. Built-in flushing connections
7. Designed with external pressurization
8. Factory assembled fully split single seal, 2 x 2 segments
9. Stationary design with multiple springs

Performance Capabilities

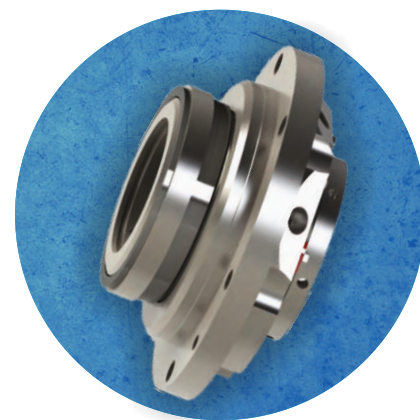
- Shaft diameter: $d = \text{Upto...150mm (Upto...6.000")}$
- Pressure: $p_1 = 10 \text{ bar (145 PSI)}$
- Temperature: $t = -40 \text{ °C...+150 °C}$
(-40 °F...+300 °F),
above 80 °C (175 °F) flush is recommended
- Speed = 10 m/s (33 ft/s)
- Axial movement: $\pm 1.5 \text{ mm (1/16")}$
- Radial movement: $\pm 0.8 \text{ mm (1/32")}$
- 9. Springs are product protected to avoid contamination and clogging

Technical Features

1. Economical to assemble as the complete dismantling of the equipment is not necessary to install the seal.
2. Reduces down time due to ease in installation.
3. Rugged seal construction.
4. Distortion of the seat is avoided by mechanical decoupling of the clamping ring
5. Ease in installation and no modifications are required because the seal is located outside of the stuffing box.
6. Due to the stationary design and the elastic seat mounting a high tolerance of shaft deflections can be accommodated.
7. Low leakage is achieved by the elimination of secondary seals which eliminates leakage paths between split components.
8. Shaft is protected by uniform torque transmission through the clamping ring which prevents damage caused by set screws.



BR Single & Dual Seals



Product Description

1. Single and Dual seal configuration
2. Balanced design
3. Independent of direction of rotation
4. Cartridge construction
5. Stationary design with multiple springs
6. Seat arrangement is designed behind the impeller
7. Seat design is rotary
8. Specially designed sleeve to protect the springs from contamination
9. Variable designs available with guide sleeve for applications with or without quench

Performance Capabilities

- Sizes: $d_N = \text{Upto } 270 \text{ mm (Upto } 10.625\text{")}$
- Pressure: $p_1^*) = 16 \text{ bar (230 PSI)}$
- Temperature: $t = -20 \text{ °C ...+160 °C}$
(-4 °F ...+320 °F)
- Speed = 10 m/s (33 ft/s)
- *) For operation under vacuum it is necessary to arrange for quenching on the atmosphere side.

Technical Features

1. Accommodates shaft deflections due to stationary design
2. Designed to handle media containing solids
3. O-ring is dynamically vacuumed to prevent shaft damage.
4. Can operate under vacuum without locking the seat
5. Pumping device available for increased efficiency in circulation
6. Springs are product protected to avoid contamination

