Slurry Seals
Advanced mechanical seals for the complete range of slurry applications
Years of extensive product development, field testing and successful operation in all types of conditions allow us to offer mechanical seals and support equipment to succeed in the broadest range of demanding slurry applications.

**Flowserve offers a complete range of sealing solutions for light, medium and heavy slurries**

Mineral and ore processing of alumina, cement, clay, coal, copper, gold, gypsum, mineral sands, nickel, phosphate, potash, silver, trona, taconite, titanium and zinc represents the toughest machinery and sealing environments around. Taking raw material from the earth, extracting and refining finished mineral products requires rugged equipment capable of surviving abrasive and corrosive services, often at extreme pressures and temperatures.

Flowserve research and development programs have delivered advanced sealing systems to decrease maintenance expenditures, limit or eliminate water usage, maintain safety and reliability, and help reduce plant energy costs while ensuring equipment availability with increased mean time between repair and providing higher production throughput.

**Flowserve slurry seal advantages**

- Resistance to highly abrasive liquids and corrosive substances
- A wide range of materials of construction for long seal life
- Designs engineered to fit slurry pumps of all major OEMs
- Broadest performance window for flushless applications
- Maximum interchangeability of components to reduce inventories
- Ability to isolate highly toxic and corrosive fluids from the atmosphere
- Ability to recover from low or lost suction upset conditions
- Auxiliary systems to enhance slurry seal reliability
### Materials of Construction

<table>
<thead>
<tr>
<th>Wetted Metal Parts</th>
<th>Light Duty</th>
<th>Medium Duty</th>
<th>Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>316 Stainless Steel Alloy 20</td>
<td>316 Stainless Steel Duplex Alloy C-276</td>
<td>High Chrome Iron Duplex Alloy C-276</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seal Faces</th>
<th>Light Duty</th>
<th>Medium Duty</th>
<th>Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sintered Silicon Carbide Reaction Bonded Silicon Carbide Tungsten Carbide</td>
<td>Sintered Silicon Carbide Tungsten Carbide</td>
<td>Sintered Silicon Carbide Tungsten Carbide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Springs</th>
<th>Light Duty</th>
<th>Medium Duty</th>
<th>Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alloy C-276 17-7PH Steel</td>
<td>Alloy C-276 17-7PH Steel</td>
<td>Alloy C-276 17-7PH Steel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gaskets</th>
<th>Light Duty</th>
<th>Medium Duty</th>
<th>Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TFE Elastomer Fluoroelastomer</td>
<td>TFE Elastomer Fluoroelastomer EPDM</td>
<td>TFE Elastomer Fluoroelastomer EPDM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Coating</th>
<th>Light Duty</th>
<th>Medium Duty</th>
<th>Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>TFE Elastomer Fluoroelastomer EPDM</td>
</tr>
</tbody>
</table>

### Operating Parameters

<table>
<thead>
<tr>
<th>Percent solids by weight</th>
<th>Light Duty</th>
<th>Medium Duty</th>
<th>Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10%</td>
<td>20%</td>
<td>60%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Pressure psi (bar)</th>
<th>Light Duty</th>
<th>Medium Duty</th>
<th>Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>150 (10.3)</td>
<td>175 (12.0)</td>
<td>300 (20.7)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Temperature</th>
<th>Light Duty</th>
<th>Medium Duty</th>
<th>Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200°F (93°C)</td>
<td>275°F (135°C)</td>
<td>300°F (149°C)</td>
</tr>
</tbody>
</table>
Heavy duty slurry seals

**SLC**

- **Type of Seal**: Single pusher
- **Standard Sizes**: 32 to 220 mm (1.250 to 8.661 inch)
- **Pressure**: up to 20.6 bar (300 psi)
- **Temperature**: -18 to 110°C (0 to 230°F)

Designed to operate without a flush to increase plant efficiency, reduce operating costs and eliminate product dilution. Incorporates a unique non-clogging cone spring design that increases seal reliability. A self-contained single cartridge slurry seal designed to operate in tough slurry.

*For more information on the SLC, see the Flowserve brochure FSD120.*

Medium duty slurry seals

**SLM-6000**

- **Type of Seal**: Single pusher
- **Standard Sizes**: 28.6 to 235.0 mm (1.250 to 9.250 inch)
- **Pressure**: up to 17.2 bar (250 psi)
- **Temperature**: -40 to 135°C (275°F)

A single cartridge seal in a flexible stator design with rugged primary seal faces of sintered silicon carbide in a monoblock configuration. Available with a Quench Containment Device (QCD) as an outboard seal that can be run with a low pressure water closed loop barrier system or as a single seal with the Synthetic Lubrication Device (SLD) that requires no other equipment.

**SLM-6100**

Same rugged design as the SLM-6000 except the Quench Containment Device (QCD) is replaced with a multiple spring mechanical seal. The tandem seal must be supported by a barrier fluid of lower pressure than the process fluid.

*For more information on the SLM-6000 and SLM-6100, see the Flowserve brochure FSD166.*

Light duty slurry seals

**ISC2-PX**

- **Type of Seal**: Single pusher
- **Standard Sizes**: 25 to 200mm (1.000 to 8.000 inch)
- **Pressure**: up to 20.6 bar (300 psi)
- **Temperature**: -40 to 204°C (400°F)

ISC2 standard cartridge seals are designed for a wide variety of process equipment in multiple applications including chemical leaching, extraction, water and general services. Single pusher seals with hard-on-hard seal faces are suitable for light slurries up to 10% solids by weight. The ISC2 seal’s smooth geometry reduces the opportunity for erosion and the springs are located outside the process fluid to resist clogging. ISC2 seals extend reliability by tolerating dry running events with our exclusive thermal management technology.

1. These parameters are to be used as a general indication only. Slurry seal applications cover a huge range of parameters in vastly differing mineral ores. These include pressure, temperature, percent solids by weight, the size (500) and hardness of solid particles in the slurry. The best seal selection needs to take into account all of these variables. e.g. The smallest (<10 micron) ‘soft’ slurry particles, like limestone, effect less damage to the seal faces than ‘hard’ slurry particles, like silicates. For specific seal applications contact your local Flowserve representative.
A unique non-clogging component seal design for Flue Gas Desulphurization (FGD) applications with no springs or bellows and does not require a flush. Seal is installed from the wet end of the pump in components, an added advantage when dealing with large shaft sizes. The stationary seal face is attached to a rubber-in-shear element which absorbs relative shaft movement.

For more information on the RIS, see the Flowserve brochure FSD151.

Ideal dual slurry seal to isolate the seal faces from the pump operating environment. A true cartridge dual seal that can be operated in a “pressure over” mode where the pressure of the fluid (water) is at a greater pressure than the pump. Simply connect the packing water line to the supply tank to create the pressure over effect. Product is not diluted as water is force circulated around the closed loop system between the seals and supply tank.

For more information on the SLM-6200, see the Flowserve brochure FSD166.

A cartridge slurry seal in a flexible stator design with rugged primary seal faces with springs isolated from the process fluid. By virtue of these design features, it enjoys a large installed base in Flue Gas Desulphurization (FGD) scrubber pumps. This seal is also available with integral bearings and is applied in FGD agitator/mixer applications.

For more information on the Allpac, see the Flowserve brochure FSD129.

Dual pressurized ISC2 seals provide zero emissions when process leakage to the atmosphere must be strictly avoided and greater tolerance to upset conditions is desired. ISC2 seals have an optimized circulating feature including an advanced design volute groove to significantly increase barrier fluid flow. High barrier fluid flow provides a cool environment for the seal faces and extends dual seal reliability. Dual pressurized seals lubricate both the inboard and outboard seal faces, keeping solids off the seals faces to minimize abrasive wear.

For more information on the ISC2 Series, see the Flowserve brochure FSD243.
Flowserve slurry seals succeed in a wide range of challenging applications

**Coal Processing/Washing**
- Thickener Underflow & Overflow
- SLC

**Uranium Processing**
- Pregnant Feed, Tailings, Cyclone Feed
- SLC
- Pyrolysate Distribution, Underflow
- SLC

**Copper Refining**
- Concentrator Slimes Thickener Tailings
- SLC
- Slimes Pumps
- SLM

**Zinc Refining**
- Thickener Overflow & Underflow
- SLM
- Jarosite Residue Transfer Pumps
- SLM

**Nickel Refining**
- Slurry Transfer, Thickener Overflow
- SLC & SLM
- Thickener Underflow, Acid Slurry
- SLC
- Reactor, Autoclave & Heater Feed
- SLM
- Mill Hydrocyclone Feed, Tailings Transfer
- SLC
- Counter Current Decant 'CCD'
- SLM
- Circuit Pump
- Solution Pumps (Nickel and Cobalt)
- SLM
- Spray Dryer Transfer Pumps
- SLC
- Tailings Underflow
- SLM

**Alumina Refining**
- Digester Feed, Caustic Cleaning
- SLC
- Preparation, Bauxite Grinding Pumps
- SLC
- Desilicacter Discharge Pump, Seed
- SLC
- Filtrate Pump, Coarse Seed Filter
- SLM
- Feed Pumps, Seed Charge
- SLM
- Liquor to Digestion Pumps
- SLM
- Spent Liquor Pumps
- SLM
- Alumina Hydrate/Clarification
- RIS

**Hard Rock Mining**
- Ground Dewatering
- SLC

**Tar Sands Extraction**
- Froth, Pad Pumps, Tailings Transfer
- SLC

**Mineral Sands Ore Mining**
- Slimes Pump, Concentrator Feed
- SLC
- Tailings/Tailings Booster Pumps
- SLM
- Mineral Sand Slurry & Concentrate

**Synthetic Rutile Plant**
- Slurry Transfer & Acidic Slurry
- SLC
- Transfer Pumps

**Pigment Plant**
- Finished Slurry & Neutralization
- SLC
- Feed Pumps, Chlorine Compressors (GARO)

**Flue Gas Desulphurization (FGD)**
- Limestone & Calcium Sulfate Slurry
- SLC
- Recycle Limestone/Gypsum
- RIS
- Gypsum Slurry
- SLC & SLM
- Filtrate Return
- SLC
- Thickener Underflow
- RIS

**Power**
- Bottom Ash Removal
- RIS

**Gold Mining**
- Carbon In Leach Tails
- SLC
- Decant & Saline Water
- SLC
- Concentrate & Cyanide Transfer
- SLC
- Conditioning Tank Feed
- SLC & SLM
- Conditioning Tank Discharge
- SLM
- Lime Slurry
- SLM
- Thickener Underflow
- SLM
- Tails Thickener Feed
- SLC & SLM
- Thickener Overflow
- SLM
- De-slime Cyclone Feed
- SLM
- Concentrate Storage Feed
- SLM

**Potash Plant**
- Circulation Pumps
- SLC

**Phosphate Plant**
- Phosphoric Acid/Gypsum
- RIS

**Iron Ore**
- Taconite Concentrate
- RIS
Auxiliary devices to increase equipment reliability

SLD - Synthetic Lubrication Device

The SLD seal support system dispenses lubrication to the atmospheric side of mechanical seals. It is ideal for seals subjected to intermittent, short periods of time when product liquid does not provide adequate film between the seal faces. The SLD is proven to greatly extend flushless seal life in harsh slurry conditions.

For more information on the SLD, see the Flowserve brochure FSD148.

QCD - Quench Containment Device

Equipment cavitation, air ingestion, starved suction or improper venting can cause a mechanical seal to run dry and damage seal faces, resulting in leakage and potential seal failure. The hard carbide face material combinations required in single flushless seals for abrasive services are subject to thermal distortion, severe heat checking, galling, seal face fracture and eventual seal failure when operated dry. The use of a liquid (water) or synthetic lubricant quench on the atmospheric side of a seal in rugged slurry services can greatly minimize seal face damage from dry running.

Used in conjunction with a Flowserve Seal, the QCD helps quench fluid protect the seal faces in dry running slurry applications to improve equipment's Mean Time Between Repair (MTBR).

For more information on the QCD, see the Flowserve brochure FSD146.

EPD - Erosion Protection Device

High impeller speeds and large or hard abrasive particles found in the pumped liquid can cause wetted equipment or mechanical seal components to wear prematurely. The EPD modifies the fluid flow pattern generated in the seal cavity located behind the impeller.

The interrupted fluid flow helps to eject particles and air bubbles to improve overall seal performance. The EPD provides a renewable surface for economical repairs and is an innovative solution to prevent abrasive wear on expensive equipment and small cross section seal components.

For more information on the EPD, see the Flowserve brochure FSD163.
Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation, and maintenance of Flowserve products. The purchaser/user should read and understand the installation instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

While the information and specifications contained in this literature are believed to be accurate, they are supplied for informative purposes only and should not be considered certified or as a guarantee of satisfactory results by reliance thereon. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding any matter with respect to this product. Because Flowserve is continually improving and upgrading its product design, the specifications, dimensions, and information contained herein are subject to change without notice. Should any questions arise concerning these provisions, the purchaser/user should contact Flowserve Corporation at any one of its worldwide operations or offices.

© 2012 Flowserve Corporation