ADVANCED PUMP UPGRADES

K-ISS™ MECHANICAL SEAL
KETO K-ISS™ MECHANICAL SEAL

KETO Pumps have developed a range of slurry pump products which feature patented innovative designs that can significantly reduce the operational costs of slurry pumping. By addressing key performance areas, KETO Pumps provide reliability, longer service life and greater efficiency. KETO advanced pump upgrades include the K-ISS™ mechanical seal which combines the best features of sealing solutions into one cost effective choice. It automatically compensates against changes in suction pressure and wet end wear and utilises up to 90% less seal water than alternative solutions.

KETO PUMPS K-ISS™ MECHANICAL SEAL ELIMINATES TYPICAL MECHANICAL SEAL PROBLEMS

Typical slurry mechanical seals are not only expensive but also require modified parts for the pumps to operate including:

- A special order of impeller with back vanes removed or filled
- A modified frame plate liner or frame plate liner insert
- A special mechanical seal adaptor and shaft sleeve (these parts are made of materials that can be costly)

All the modifications invite new problems:

- Impellers without back vanes (filled or removed) result in a very high pressure seal chamber for the seal to operate against. If a flush is used the pressure sits above the maximum discharge pressure of the pump. The additional pressure means the mechanical seal is working harder
- The removal of impeller back vanes increases the thrust bearing loads
- Impeller boss caps are often prematurely damaged when ‘opened’ throats are used in slurry seal applications

KETO PUMPS K-ISS™ MECHANICAL SEAL ADVANTAGES

- Fits into existing parts - No modifications required on the impeller, seal adaptor, shaft sleeve, frame plate liner or frame plate insert
- Less maintenance - Just as simple as a gland or expeller seal to set up but requires less maintenance
- Dry running - System protects the mechanical seal so efficiently that as long as the seal remains flush, the wet end can continuously run on dry
- Low NPSHA / high solids content - As the seal is sealing against water and not slurry, the solids content and NPSHA has no impact on the seal, it can even last in services where the pump is cavitating
- High suction pressures - Unlike expellers, K-ISS™ mechanical seals are able to cope with high suction pressures while remaining leak free, the water flush pressure is automatically adjusted by the constant flow valve in the system
- Significantly reduced water consumption - Utilises up to 90% less seal water than alternative solutions

KETO PUMPS K-ISS™ FLOW CONTROL VALVE SOLUTION FOR REDUCED WATER USAGE

A constant flow control valve improves gland water flow control and enables the packing to operate at minimal pressure thereby reducing wear. Using a constant flow control valve, the seal chamber is maintained at a pressure slightly above wet end pressure. There is minimal flow through the seal chamber to cool the mechanical seal. As the water flow is always present through the mechanical seal chamber, passing through the flow restricting bush and under the flush loss seal into the wet end, the seal chamber and all its components are sealing against water not slurry. A substantially lower water flush rate can be used to cool the mechanical seal versus gland packing (a saving of 90%).

Flush flow rate is 10% of normal gland packing flowrate. Please refer to KETO requirements when flush water is not available.

PERFORMANCE GRAPH - TYPICAL OF ALL PRECISION VALVES IRRESPECTIVE OF BODY SIZE OR FLOW RATE

Expressed as a percentage of full rated flow

<table>
<thead>
<tr>
<th>Pressure Drop (P.D.) across valve</th>
<th>120%</th>
<th>110%</th>
<th>100%</th>
<th>90%</th>
<th>80%</th>
<th>70%</th>
<th>60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLOW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

SEALING SOLUTION COMPARISON

<table>
<thead>
<tr>
<th>SHAFT SEAL METHOD</th>
<th>HIGH PRESSURE WHEN RUNNING</th>
<th>LEAK FREE WHEN OFF</th>
<th>LOW WATER FLUSH</th>
<th>HIGH SUCTION LIFT</th>
<th>LOW NPSHA</th>
<th>ADJUSTMENT FREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PACKED GLAND</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EXPELLER</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>K-ISS™ MECHANICAL SEAL</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
KETO K-ISS™ MECHANICAL SEAL SYSTEM
- FEATURES & BENEFITS

1. MECHANICAL SEAL
   - Located close to bearing housing with minimal shaft overhang, resulting in virtually no shaft deflection at seal faces

2. LIP SEAL AND FLUSH LOSS SEAL
   - Flush water flows underneath seal, protecting the mechanical seal and keeping it clean during shut down periods
   - In the event of flush water loss, will close and prevent reverse flow of slurry into seal chamber
   - Keeps seal chamber clean when pump is offline

3. SEAL CHAMBER
   - Spigots directly onto the labyrinth bearing isolator to solve concentricity issues

4. SHAFT SLEEVE WITH SHOULDER
   - Allows the mechanical seal to self-set during the initial fit and when the impeller is reset. This eliminates the need for setting clips

5. CONSTANT FLOW CONTROL VALVE
   - Seal chamber is maintained to a pressure slightly above the pressure in the wet end
   - Flow to the seal chamber is controlled which automatically compensates against changes in suction pressure and wet end wear

6. RESTRICTOR BUSH
   - Helps to control water flow

7. MECHANICAL SEAL ADAPTOR
   - HARDENED 27% Chrome White Iron as standard
   - The only component with direct slurry contact is the seal adaptor. With no drilled or tapped parts, is well protected from erosion
   - Seal adaptor can be supplied with a ceramic coating, a range of exotic alloys or elastomer coated

8. ADAPTOR O-RINGS
   - Prevents seal water leakage from adaptor
   - Allows seal chamber to move relative to the pump

SEAL SIZE CHART

<table>
<thead>
<tr>
<th>FRAME SIZE</th>
<th>B</th>
<th>C, CC, CCM, P</th>
<th>D, DD, DDM, Q</th>
<th>E, EE, EEM, R</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLAND FLOW (L/MIN)</td>
<td>1.75</td>
<td>2.5</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>CONTROL VALVE P/NO</td>
<td>CV1.75CR</td>
<td>CV2.5CR</td>
<td>CV2.5CR</td>
<td>CV3.2CR</td>
</tr>
</tbody>
</table>

- K-ISS™ mechanical seal systems are fully compatible with much of the KETO slurry horizontal pump range. Legacy pumps can be easily upgraded by installing a KETO K-IIK™ bearing isolator kit.
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- Chamber is always filled with water
- FLUSH WATER OUT
- Up to frame size L200
- Discharge pressures to 1,200kPa max
FOR MORE INFORMATION PLEASE VISIT KETOPUMPS.COM
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