

# SLURRY FLUSHLESS SEAL

BY  
SLURRY DYNAMICS  
&  
SAFE-T HYDRO INC.

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# PANACEAL

- THIS WORD'S ORIGIN COMES FROM "PANACEA" WHICH MEANS A CURE-ALL

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# OUR SEALS RUN IN THE PROCESS

- LIME SLURRY
- COAL SLURRY
- POTASH
- SODA ASH
- ALUMINA HYDRATE
- PHOSPHATE SLURRY
- CATALYST SLURRY
- RAW SEWAGE
- PULP STOCK

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WITH  
NO  
FLUSH!

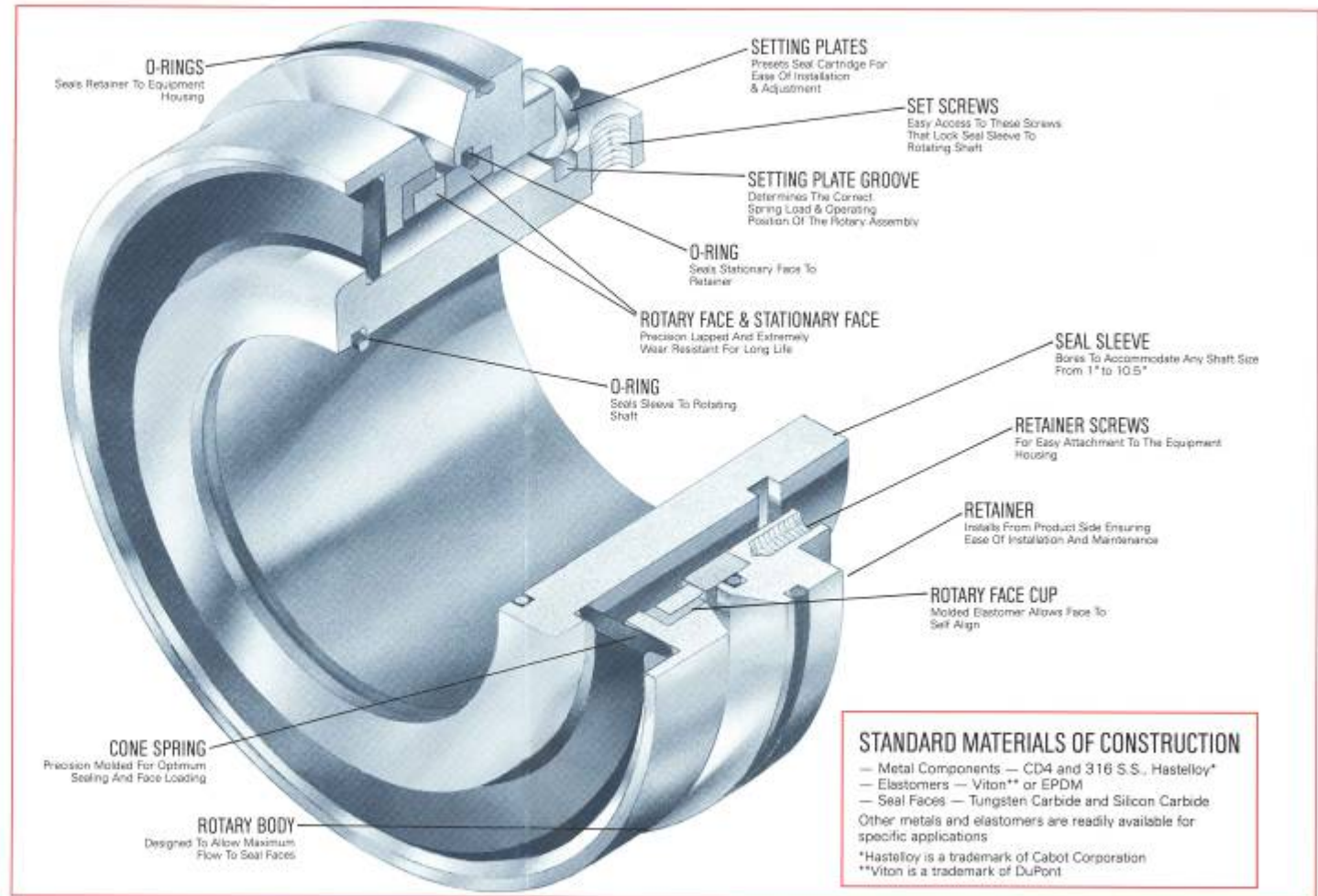


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# HOW DOES IT WORK?

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# Simplicity In Motion



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# CONVENTIONAL SEAL DESIGN

- Conventional Mechanical seals use multiple coil springs or a single coil spring systems. In slurry service, once the solids get in between the coils of the spring, it can no longer compress.
- To prevent the solids from getting to the springs, O-rings are used. These O-rings, which are exposed directly to the process solids, can fail hence the need for a flush to keep the solids away.

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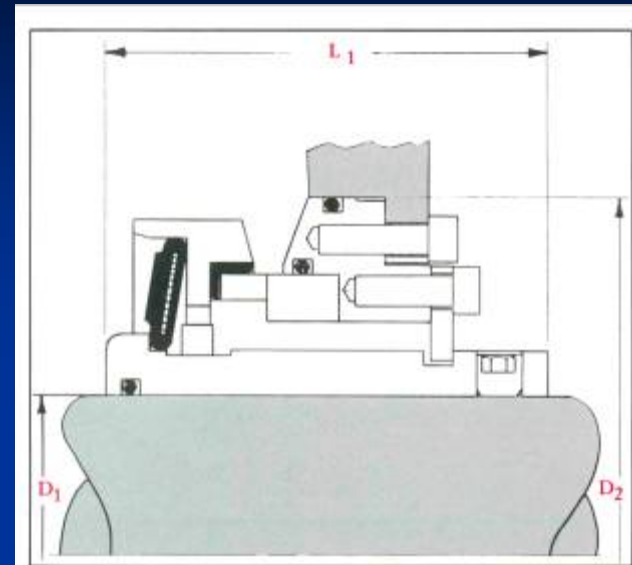
# THE PANACEAL UNIQUE DESIGN

- Our Cone spring design rides in the slurry and there is no way to foul it. It acts like a Belleville washer and it is encapsulated in rubber.
- We also run two hard faces together rather than a hard and soft face combination. This is necessary in slurries because the faces must be harder than the process pumped. We use both Silicon Carbide and Tungsten Carbide faces.
- Our seal does not need an external source of flush but it does require that the pump has fluid in it to cool and lubricate the faces. We can't run dry for long periods of time.

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# SHORT CARTRIDGE DESIGN

- The Short Cartridge is designed for pumps, mixers and agitators with short stuffing boxes, that can be readily adapted to accept a short cartridge slurry seal.

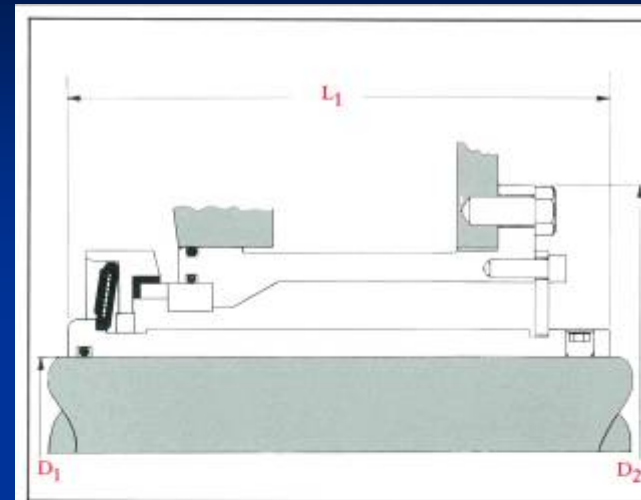


Seal Group	D <sub>1</sub>		D <sub>2</sub>		L <sub>1</sub>	
	Inches	MM	Inches	MM	Inches	MM
A	1-2	25-51	4.75	121	3.57	91
B	2-3	51-76	6.00	152	3.57	91
C	3-4	76-102	7.00	178	3.60	91
D	4-5.5	102-140	8.25	210	3.65	93
E	5.5-7	140-178	11.12	282	5	127
F	7-9	178-229	12.25	311	5	127
G	9-10.5	229-267	13.75	349	6	152

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# LONG CARTRIDGE DESIGN

- The Long Cartridge design is engineered for horizontal split case and side suction pumps which have a large stuffing box depth.



Seal Group	$D_1$		$D_2$		$L_1$	
	Inches	MM	Inches	MM	Inches	MM
A	1-2	25-51	6.50	165	These dimensions can vary to suit the application and/or equipment.	
B	2-3	51-76	7.75	197		
C	3-4	76-102	9.25	235		
D	4-5.5	102-140	10.37	263		
E	5.5-7	140-178	11.7	297		
F	7-9	178-229	12.88	327		
G	9-10.5	229-267	14.63	372		

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# OPERATING PARAMETERS

- Maximum Pressure: 350 psig
- RPM: 3600 (subject to size)
- Radial Misalignment: .025 thou
- Axial Misalignment: .040 thou

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# STANDARD MATERIALS

- Metal Components: CD4 – 316 SS – Hastelloy
- Elastomers: Viton – EPDM - Neoprene
- Seal Faces: Tungsten Carbide & Silicon Carbide
- \* Other metals and elastomers are readily available for specific applications.

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# FEATURES & BENEFITS

- **FEATURE:** Simplicity of design.
- **BENEFIT:** Minimize the number of parts facilitating ease of assembly and installation. Fewer O-rings compared to other slurry seals reducing the number of possible leak paths.
- **FEATURE:** Easy to repair.
- **BENEFIT:** Customer can repair in their own facility without special tools or equipment.

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# Features continued

- **FEATURE:** No Flush required
- **BENEFIT:** No flush piping or system to install and maintain. No product dilution saving you the energy costs incurred to remove the flush fluid.
- **FEATURE:** Conical spring assembly.
- **BENEFIT:** Will not clog when immersed in slurries. It remains free to flex.

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# Features continued

- **FEATURE:** Cartridge seal assembly.
- **BENEFIT:** No special tools, equipment or measuring is required during installation.
- **FEATURE:** Seal is internally mounted.
- **BENEFIT:** Seal can be installed and removed from the wet end of the pump; the drive end does not have to be disturbed saving on labour costs.

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# Features continued

- **FEATURE:** Thick cross-section of seal components to compensate for wear.
- **BENEFIT:** Longer operating life.
- **FEATURE:** Large clearances at the inside diameter of the rotary head.
- **BENEFIT:** No seal hang-up due to product crystallization on the atmospheric side of the rotary assembly. (Product crystallization is a normal result of face lubrication).

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# Features continued

- **FEATURE:** Patented tungsten carbide rotary face insert with cobalt binder.
- **BENEFIT:** Better wear characteristics. Will not heat check quickly. Can tolerate intermittent periods of dry running. High thermal shock resistance. Higher corrosion resistance than other tungsten carbide grades.

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# Features continued

- **FEATURE:** Abrasive resistant silicon carbide stationary face.
- **BENEFIT:** Extremely hard material gives longer life in abrasive applications. Low coefficient of thermal expansion. High thermal conductivity allowing better dissipation of frictional heat generated at the seal faces.

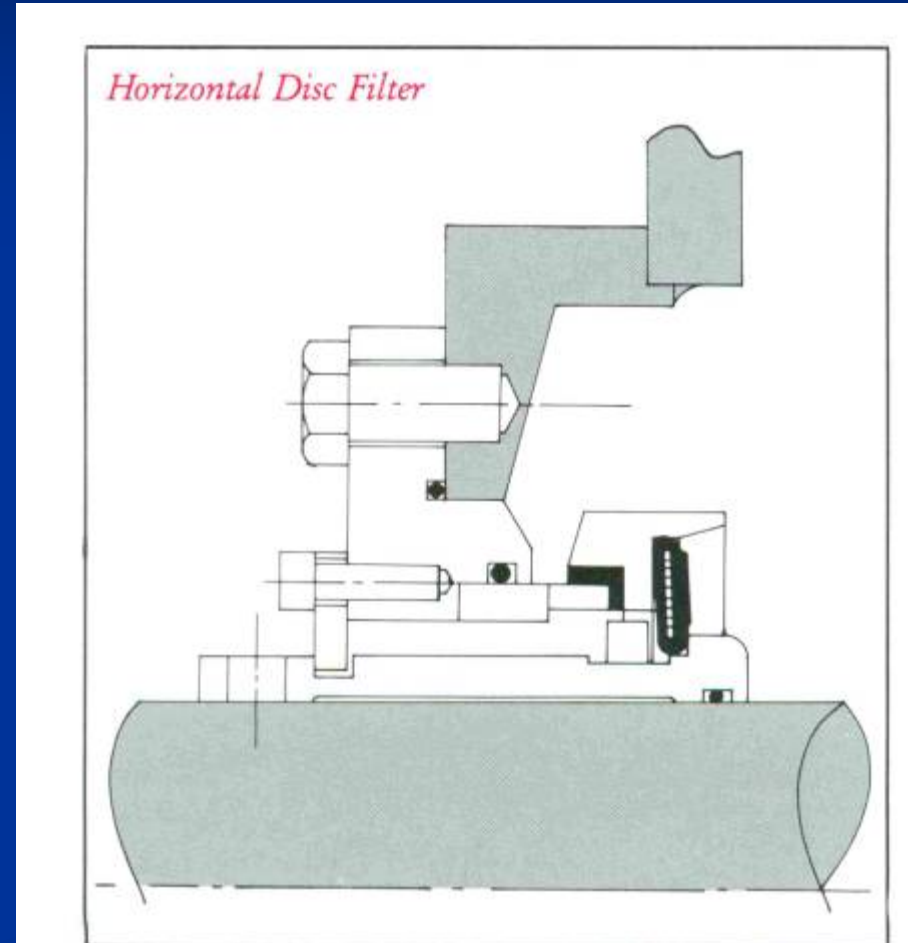
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# Features continued

- **FEATURE:** Elastomeric cup on rotary face with external elastomeric drive lugs.
  - **BENEFIT:** Absorption of any shock loading at start-up or a slip-stick condition during operation. Also, compensates for misalignment of seal faces.
- \*Rotary face is also available with a O-ring mount as well as shrink-fit

# CASE STUDIES

- Panaceals were installed on “disc filter” agitator shafts, which due to their design, always required a high volume of gland water. These are 24 ft. long shafts, supported only at the outboard ends, and were therefore subject to significant deflections resulting in shaft runout during operation. Bearing supports were adapted to include “seal chambers” to allow for the installation of the seal and allowing the product to circulate around the seal to provide lubrication and cooling. **NO FLUSH WAS CONNECTED.** NO modifications were made to the rotating shaft assembly in an attempt to improve runout. These seals have run for over one year without any product leakage or product dilution due to a water flush.



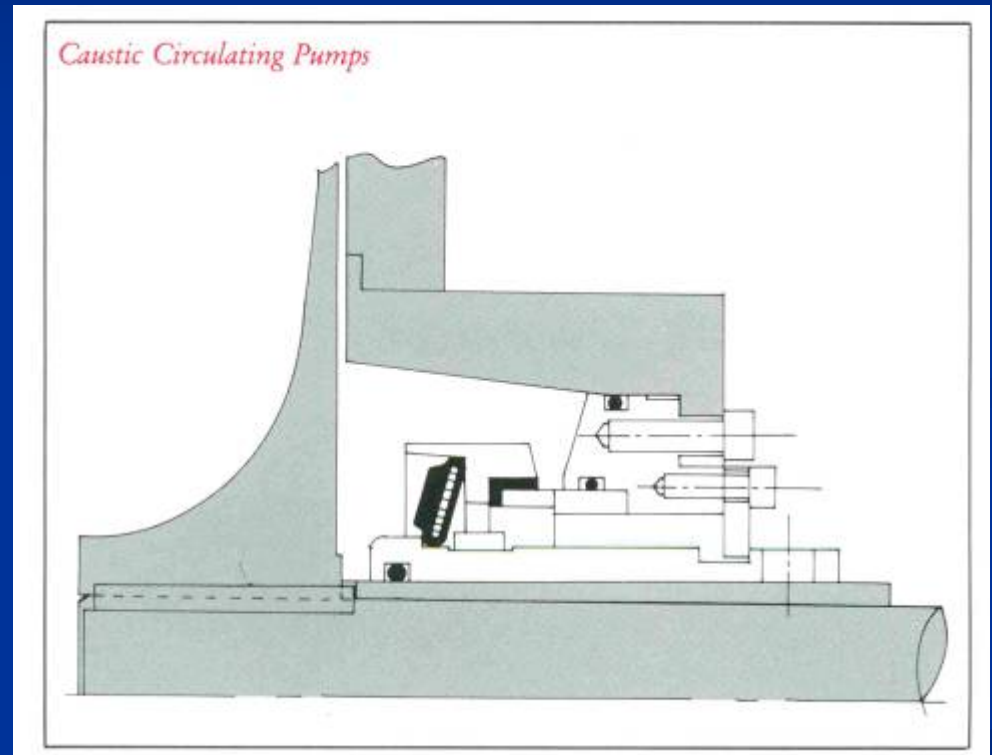
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# CASE STUDIES CON'T

- A number of centrifugal pumps are being used in a plywood manufacturing facility for circulating a "hot caustic" solution in which logs are immersed prior to "peeling". Over a period of time this liquid becomes heavily concentrated with resins and gums from the tree log, as well as other abrasive waste material such as tree bark, sand and dirt.

Prior to fitting our PANACEAL, these pumps were regularly stripped down every 4-5 months to replace worn shaft sleeves, and bearings due to the ingress of the liquor into the bearing housing.

The first PANACEAL was installed in November 1987, with the conversion of another 11 pumps following shortly thereafter. These seals were in operation in excess of 3 years, with no leakage, or the pumps having to be removed from service due to premature bearing failure.



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