john crane
a smiths company

UPSTREAM PUMPING

Seal Face Technology

Type 5620USP | Type 588USP | Type 8600USP | Type SB2USP

Transforming the Traditional Concept of Sealing

CHEMICAL
FOOD & BEVERAGE
MINERALS & MINING
OIL & GAS
POWER GENERATION
PULP & PAPER
WATER & WASTEWATER

Upstream Pumping (USP) is a seal face technology for mechanical seals installed in rotating equipment. It helps **save water, reduce operating costs, extend seal life** and **improve pump reliability.**

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JOHN CRANE

Benefits of USP Seal Face Technology

Extends Seal Life / Improves Pump Reliability / Saves Water / Reduces Costs

Value and Advantages of USP Technology

John Crane's unique, engineered, non-contacting USP seal face technology borrows from gas seal designs to deliver a breakthrough in liquid sealing technology. The typical mean time between repair (MTBR) for traditional seals is three years, while USP seals are more than five. Here are the benefits:

Extended MTBR
Exceptional record when installed on bad-actor assets

Nearly Eliminates Cooling Water Requirements
Potentially saves thousands of dollars in utility costs

Energy Savings
Extremely low torque

Zero Emissions
Process fluid does not leak into the atmosphere

Increase Reliability

USP is transforming the traditional concept of sealing for seal life extension. Applying gas seal spiral groove technology to pump seals will help increase reliability.

It promotes hydrodynamic lift to minimize face-generated heat and enhance lubricity in poor lubricity conditions. It solves the problem of friction caused by poor lubrication which leads to premature seal wear, causing a reduction in seal life. You will benefit from an increased equipment life cycle for improved productivity.

Why USP?

USP seal face technology helps overcome the most rigorous sealing challenges. It improves seal and pump reliability, prevents unplanned downtime and reduces operating costs across a broad range of severe-service conditions, such as:

- Low-lubricity conditions
- Dry running conditions
- High heat
- Friction
- Caustics/liquors
- Viscous fluids
- Polymerizing fluids/solidifying
- Dirty fluids

It is also suitable for a variety of process industries with challenging process fluids, for example:

- Chemical process liquids
- Volatile organic compounds (VOCs)
- Poor lubricity fluids
- Sour services (H2S)
- Foul water
- Abrasives

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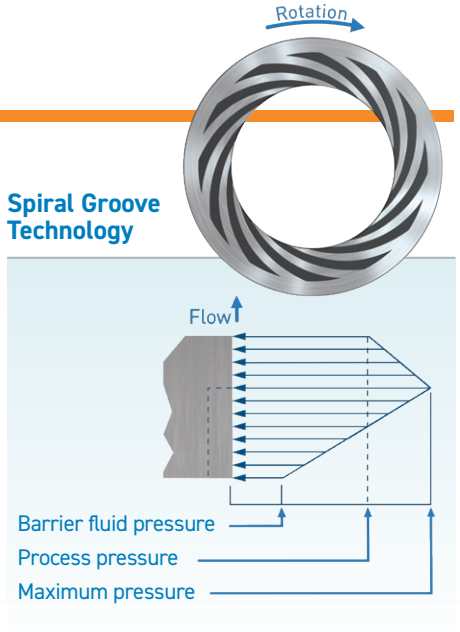
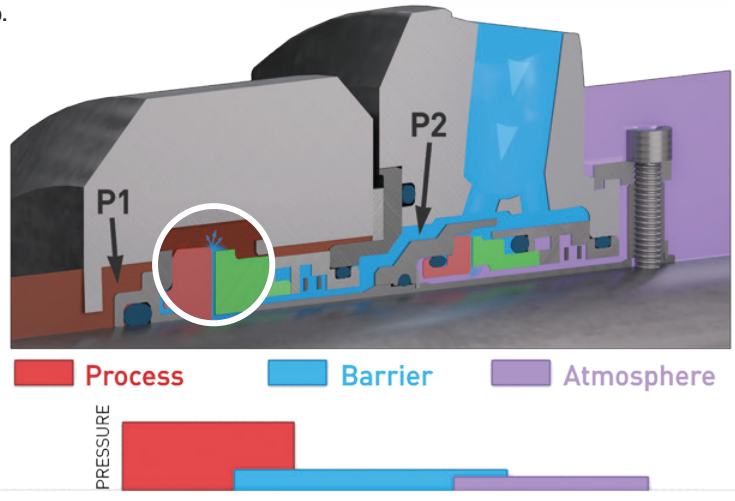
How it Works

This unique technology has been used for decades to replace a conventional seal with a low-volume, high-pressure "pump"—the USP seal. This pump propels a minute quantity of barrier liquid along the path usually sealed by the mechanical seal faces and into the product side. Because the product side is at a higher pressure than the barrier liquid, this seal is said to pump "upstream."

Mechanical seals require a narrow gap between faces to allow a lubricating film to work; the gap must also be optimized to eliminate leakage. Debris in process fluids can create deposits, damage faces and cause hang-ups. This is where USP comes in—it extends seal life and the MTBR of the pump.





Seals and Support Systems

A Seal for Any Application

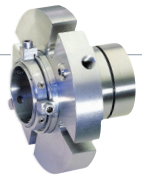
Type 5620USP

Components are interchangeable to provide the flexibility to cover more applications with less inventory to simplify maintenance, reduce downtime, increase plant operating efficiency and lower costs. This seal is used on ANSI/DIN equipment and performs well on applications that involve abrasives and scaling.

Type 8600USP

Available in a variety of arrangements, this seal ensures stable and predictable operation across wide pressure ranges, including resistance to high reverse-pressure scenarios. This high duty seal handles extreme fluids and is designed for the most demanding conditions.

Type SB2USP



A dual-cartridge seal that ensures seal reliability and longevity in the most demanding conditions and is ideal for use with environmentally hazardous and abrasive fluids.

Type 588USP

Provides the environmental protection of a pressurized double seal arrangement with the inherent safety and relative simplicity of a tandem seal arrangement. This is a high duty seal for larger pumps with high pressures and speeds. It provides excellent resistance to abrasives.

Support System for Optimal Performance and Reliability

The Global Standardized Upstream Pumping Support System (GS USP) is a best-practice solution that significantly reduces specification review and delivery schedules and delivers unpressurized barrier water for optimal mechanical seal performance and reliability on seals using Upstream Pumping technology.

This product underscores John Crane's commitment to GS USP to supporting your performance metrics by optimizing mechanical seal life and controlling costs. You will benefit from a standardized support system with:

- **Reduced complexity**
- **Small footprint**
- **Lower total cost of ownership**

Using the right seal support system and piping plan, eliminates reliability issues due to poor water quality. Not to mention, water savings is an integral part of USP, and we've got the data to back it up.

Reservoir System (GS USP-R)

Includes a reservoir of stored barrier fluid. This product is limited to the barrier pressure it can provide to the mechanical seal but contains a stored volume of barrier fluid allowing the seal to run for several hours if the water supply is lost.

Direct Connect System (GS USP-D)

Omits the reservoir and connects the seal directly to the water supply. The pressure-reducing valve allows higher pressure to be passed on to the barrier fluid from the supply.

Environmental Benefits

The Power of Water and Energy Savings

With USP, the quantity of water required for cooling is nearly eliminated. Energy usage is also significantly reduced compared to traditional sealing methods.

	Seal MTBR	Annual Water Use	Annual Power Use	Average Running Cost/Year*
Traditional Seal	3 years	4,200 m^3 (920,000 gallons)	19,500 kWh	≈ $4,200
USP Seal with GS USP Support System	5+ years	4.9 m^3 (1,070 gallons)	1,970 kWh	≈ $290
Net Results	2 years additional MTBR	4,195 m^3 (918,930 gallons) Water savings	17,530 kWh Power savings	≈ $3,910 Net cost reduction

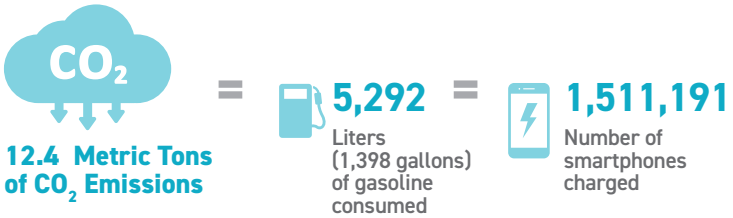
** Assumes a water cost of $0.35 per m^3. Water cost varies greatly depending on geographical location and water source.*

** Power cost is based on $0.142 per kWh, which is typical average cost for the US in Q3 2022.*

Note: Additional savings for maintenance, such as cost to top-up reservoirs, cost for seal refurbishment or equipment downtime are not included in this example and will also be realized.

Reduce Your Carbon Footprint

John Crane supports your corporate CO_2 emissions reduction strategies. 12.4 metric tons of CO_2 can be saved annually by adding a John Crane USP seal to one pump.



Source: United States Environmental Protection Agency

Global Service Network

- Over 200 facilities in more than 50 countries
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