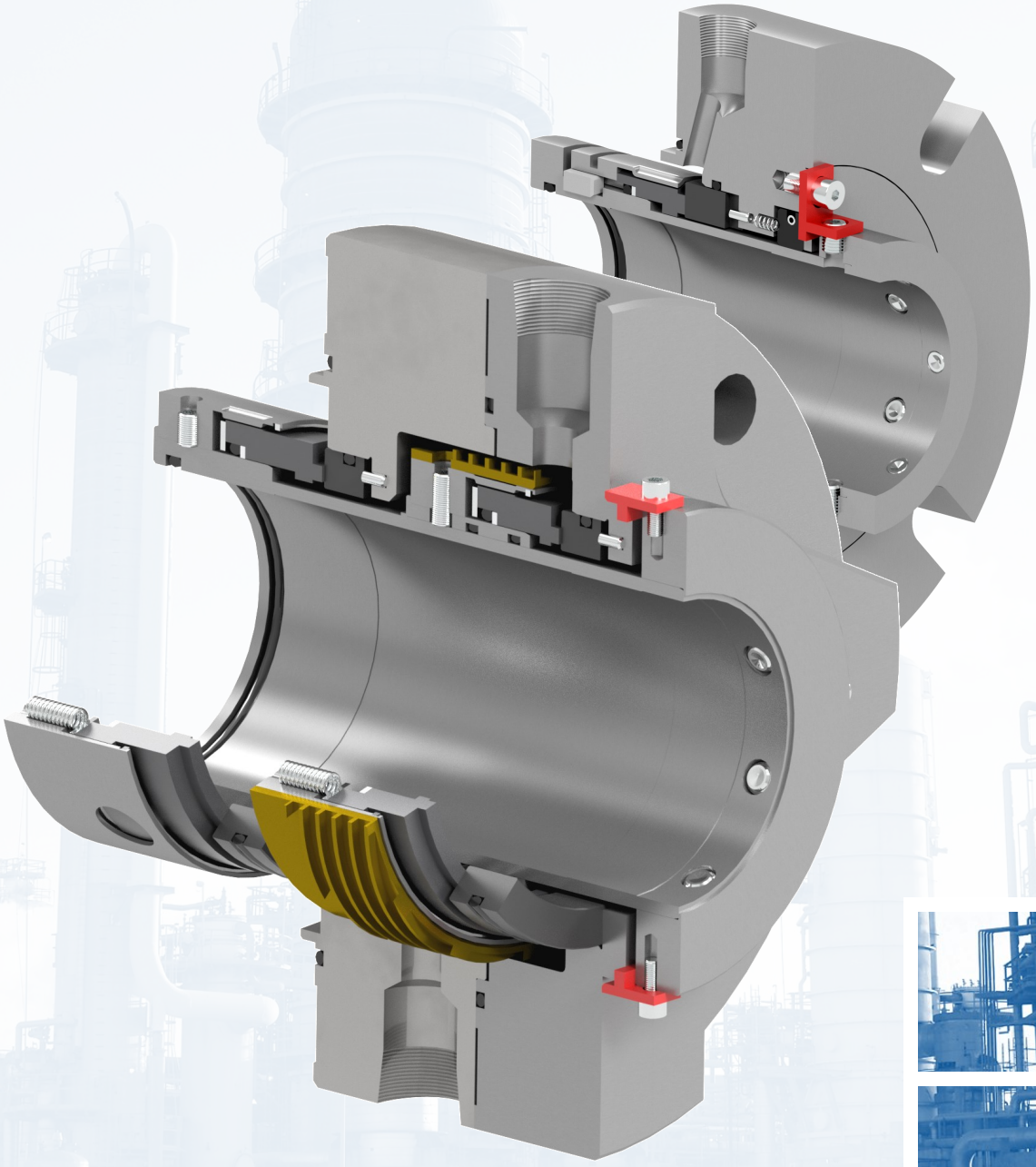
PPC
MECHANICAL SEALS™

682A Series Seals

API 682 Type A pusher seals



CREATING SEALING SOLUTIONS THROUGH INNOVATIVE ENGINEERING

MADE IN THE USA

682A Series Seals

DESCRIPTION

The 682A Series of cartridge seals represent a range of seals produced by PPC to meet the criteria of the Type A design under API Standard 682. These designs are balanced, internally mounted cartridge pusher seals with multiple springs and O-ring secondary sealing members. Designed as Category 2 seals per API 682, these designs are fully compatible with API 610 pumps.

Per API 682, the standard seal designs feature a rotating flexible element (springs), with the option of stationary spring designs as warranted by the application. Under the API Standard, the seals are applicable to process temperatures up to 350 °F (176 °C) and pressures up to 600 psig (40 bar g), although the PPC engineered seals are capable of more demanding service conditions.

682A Series seals may be provided in all three API Arrangements (single, tandem, double), and are available in custom configurations. Seal configurations can incorporate the following seal technologies:

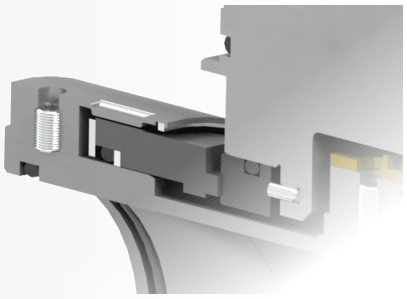
- Distributed flush designs including multi-port rings
- Contacting and non-contacting containment seals
- Solid and segmented floating throttle bushings
- Seal faces with nanocrystalline diamond treatments for extreme operating conditions

682A SERIES SEALS & ARRANGEMENTS

HB1 CARTRIDGE SEALS

The cornerstone component of our 682A mechanical seal line is our HB1 seals. The HB1 family of cartridge seals represent a proven standard in the Oil & Gas industry. The base HB1 design provides excellent capability, with multiple variations to provide an optimal sealing solution in nearly any application. Key features include balanced face loading, large cross-section faces, and design versatility. The HB1 family is available in typical API 682 configurations:

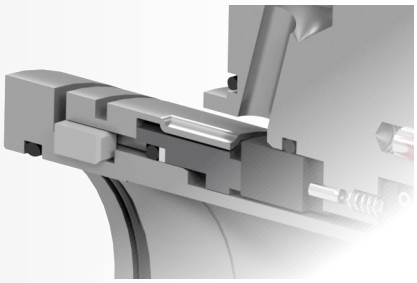
- Arrangement 1 (single), Arrangement 2 (tandem), Arrangement 3 (double)
- Contacting wet (CW) seal, Containment seal (CS)



HB CARTRIDGE SEAL

The HB is a rugged cartridge seal for use in high pressure applications. The design is hydraulically balanced to reduce seal face heat generation, and features heavy-duty drive mechanisms for handling viscous or high torque applications. The HB excels in crude oil applications, but also finds use on other services that require the pressure capability and provide moderate lubrication. The HB seal is available in the following API 682 configurations:

- Arrangement 1 (single)
- Contacting wet (CW) seal



P28LD NON-CONTACTING SEAL

The P28LD lift-off gas seal provides a contact-free sealing solution for pump applications, utilizing the latest in gas seal technology. The seal is commonly used in Arrangement 2 configurations as an outer containment seal, where it can eliminate the need for costly liquid seal pot systems and their associated maintenance. The P28LD meets the following API 682 configurations:

- Arrangement 2 (tandem) as outer seal
- Containment seal (CS)

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682A Series Seals

HB1 SEAL VARIATIONS

HB1

- Standard design with decades of proven service success.
- Balanced design reduces heat generation at faces, with geometry optimized for non-flashing hydrocarbons, aqueous solutions, and other liquids with similar lubricity.

HB1H, HB1HH, HB1HHH

- HB1 design with hydropads (HB1H), hammerhead (HB1HH), or both (HB1HHH).
- Hydropads are special face topography features designed to increase face cooling and reduce face loading in low–lubricity applications.
- Hammerhead feature increases face stiffness near sealing interface to reduce pressure-caused distortion for high-pressure applications.

HB1L

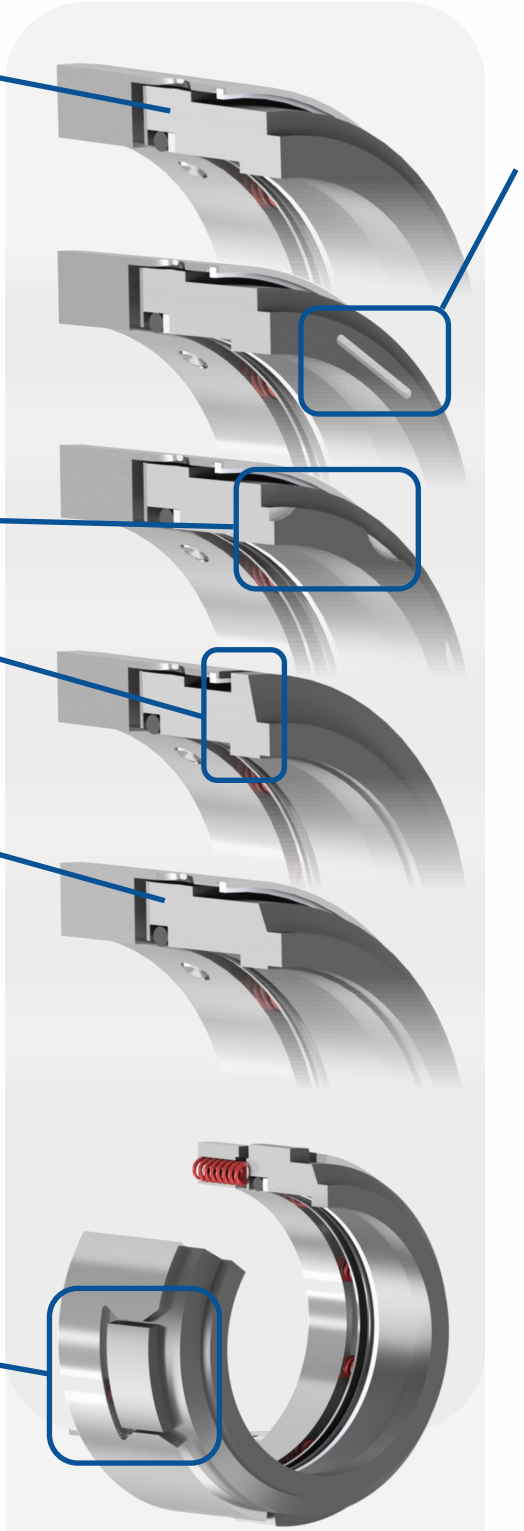
- Low-emission design evolved from the HB1 standard. Features optimized face geometry and hydraulic loading for flashing services.
- With proper equipment operation, can control emissions to less than 500 ppm.

SHB1, SHB1L

- Short length variations of the HB1 and HB1L designs, respectively.
- Primarily used as the outer seal in Arrangement 2 configurations.

HB1V

- Seal head features heavy-duty drive ear design for use in high pressure and high torque services.
- For extreme pressure applications, may utilize other special design features such as lapped seat support and high durometer elastomers.



HB1U

- HB1 design with special lube groove face topography features for use in hot water applications.
- Lube grooves modify the liquid-to-vapor phase transition across the sealing interface to provide greater lubrication and allow for seal operation at elevated temperatures without the need for cooling.

HB1-RS

- HB1 with stationary spring design, having the retainer mounted in the gland and the seat rotating with the sleeve.
- In high surface speed applications, stationary spring design resists centrifugal forces and reduces mass moment of inertia of rotating seal components.
- Greater misalignment capability between equipment shaft and seal chamber.
- Severe spring flexing and resulting fatigue due to shaft and seal chamber being out of perpendicular are nearly eliminated.

HB2

- Variation of HB1 seal head designed primarily for configurations where the higher sealed pressure is present at the ID of the seal faces.
- Designed to reduce heat generation whether pressurized from the ID or OD (double balanced).
- Handles pressure reversals without the opening of the seal faces.
- Primarily used as the inner seal in Arrangement 3 configurations

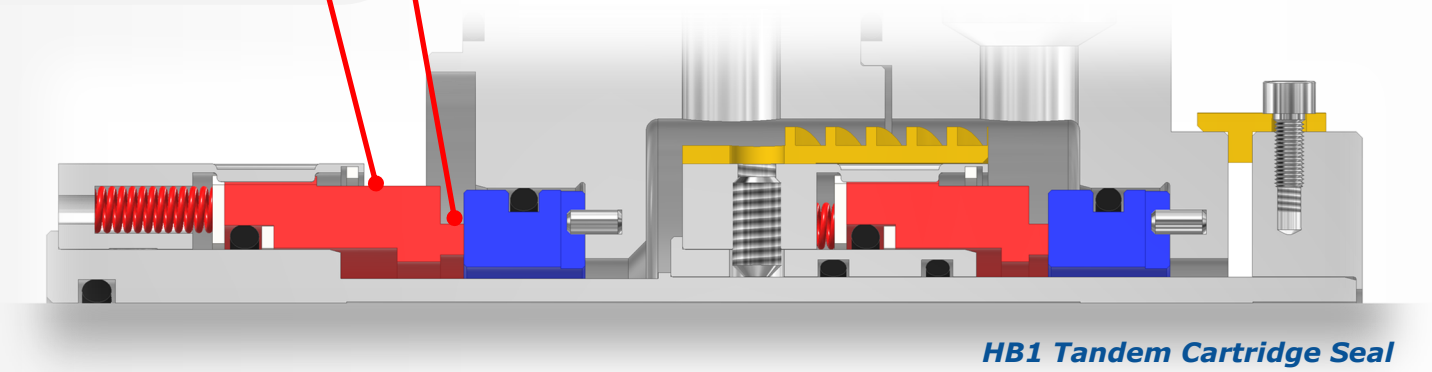
CBL

- Special version of HB1 design that utilizes spring-energized seals in place of O-rings.
- Allows for sealing of cryogenic liquids in pump applications.

682A Series Seals

HB1 SEAL FEATURES

- Balanced seal faces reduce heat generation for greater performance.
- Large cross-section, monolithic faces resist pressure and temperature caused deflection.
- Design versatility allows for custom configurations to fit specific applications.
- Available in all 3 API 682 Arrangements and designed to fit API 610 seal chambers.
- Available with contacting and non-contacting containment seals (CS) for relevant services and appropriate piping plans.
- Multiple flush arrangements available depending on heat load, including multi-port injection ring.



HB1 Tandem Cartridge Seal
Arrangement 2, Contacting Wet (2CW-CW) seal

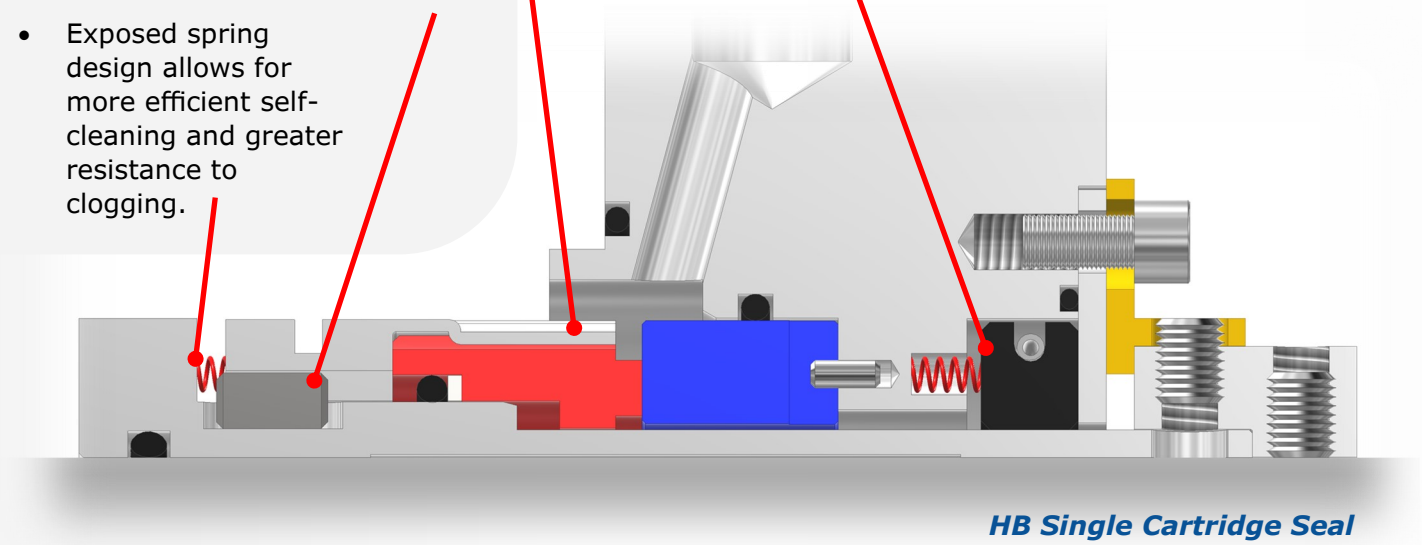
HB1 FAMILY OPERATING CONDITIONS

Seal Chamber Pressure:	Up to 1000 psig (69 bar g) Up to 1440 psig (99 bar g) for *Carbon face* ***HB1V*** designs Up to 2160 psig (149 bar g) for *SC face* ***HB1V*** designs Up to 250 psig (17 bar g) for ***HB1U*** designs with 30 psi (2 bar) vapor margin *Dependent on size, speed, and sealed fluid properties*
Process Temperature:	-40 to 500 °F (-40 to 260 °C)* Up to 340 °F (171 °C) for ***HB1U*** designs on water service using Plan 11 **Dependent on elastomer material, contact PPC for applications above 500* °F
Surface Speed:	Up to 4500 fpm (23 m/s) for rotary spring designs Up to 7500 fpm (38 m/s) for ***HB1-RS*** and other stationary spring designs
Size Availability:	Shaft sizes 0.500” to 7.750”
	Contact PPC for specific applications outside these parameters

682A Series Seals

HB SEAL FEATURES

- Large drive notch contact surface provides greater contact area for rotary face, reducing stress concentration.
- Shrouded rotary design protects seal face from product abrasives.
- Mechanical key drive for seal rotary allows for use in high torque and pressure applications without slippage.
- Exposed spring design allows for more efficient self-cleaning and greater resistance to clogging.
- Seal retainer moves axially with rotary face, preventing drive notch wear.
- Available segmented floating throttle bushing minimizes clearance over seal sleeve, maximizing routing of leakage to drain.



HB Single Cartridge Seal
Arrangement 1, Contacting Wet (1CW-FL) seal

HB OPERATING CONDITIONS

Seal Chamber Pressure:	Up to 1500 psig (103 bar g) *Dependent on size, speed, and sealed fluid properties*
Process Temperature:	-40 to 500 °F (-40 to 260 °C) *Dependent on elastomer material, contact PPC for applications above 500* °F
Surface Speed:	Up to 4500 fpm (23 m/s)
Size Availability:	Shaft sizes 1.250” to 5.750”
	Contact PPC for specific applications outside these parameters

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MATERIALS OF CONSTRUCTION

Metallurgy: 316 SS Standard
Other materials available, including Duplex SS, Alloy C-276 & Titanium

Seal Face Options:

Standard	Optional
Carbon (Metal-filled)	Carbon (Resin-filled)
Reaction Bonded Silicon Carbide	Tungsten Carbide, Nickel Bound
	Sintered Silicon Carbide
	Graphite Loaded Sint. Silicon Carbide
	Diamond-treated Sint. Silicon Carbide

Elastomers: Fluoroelastomer (FKM), AFLAS®, Perfluoroeslastomer (Kalrez®/ Chemraz®)
Other materials available upon request

Springs: Alloy C-276

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Chemraz® is a registered trademark of Greene, Tweed & Company

APPLICATIONS

- Alkylation
- Catalytic Cracking
- Crude Handling & Treatment
- Distillation
- Heavy Oil
- Hydrocracking
- Pipelines
- Solvents
- Terminal Pumps
- Waste Processing
- Water

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