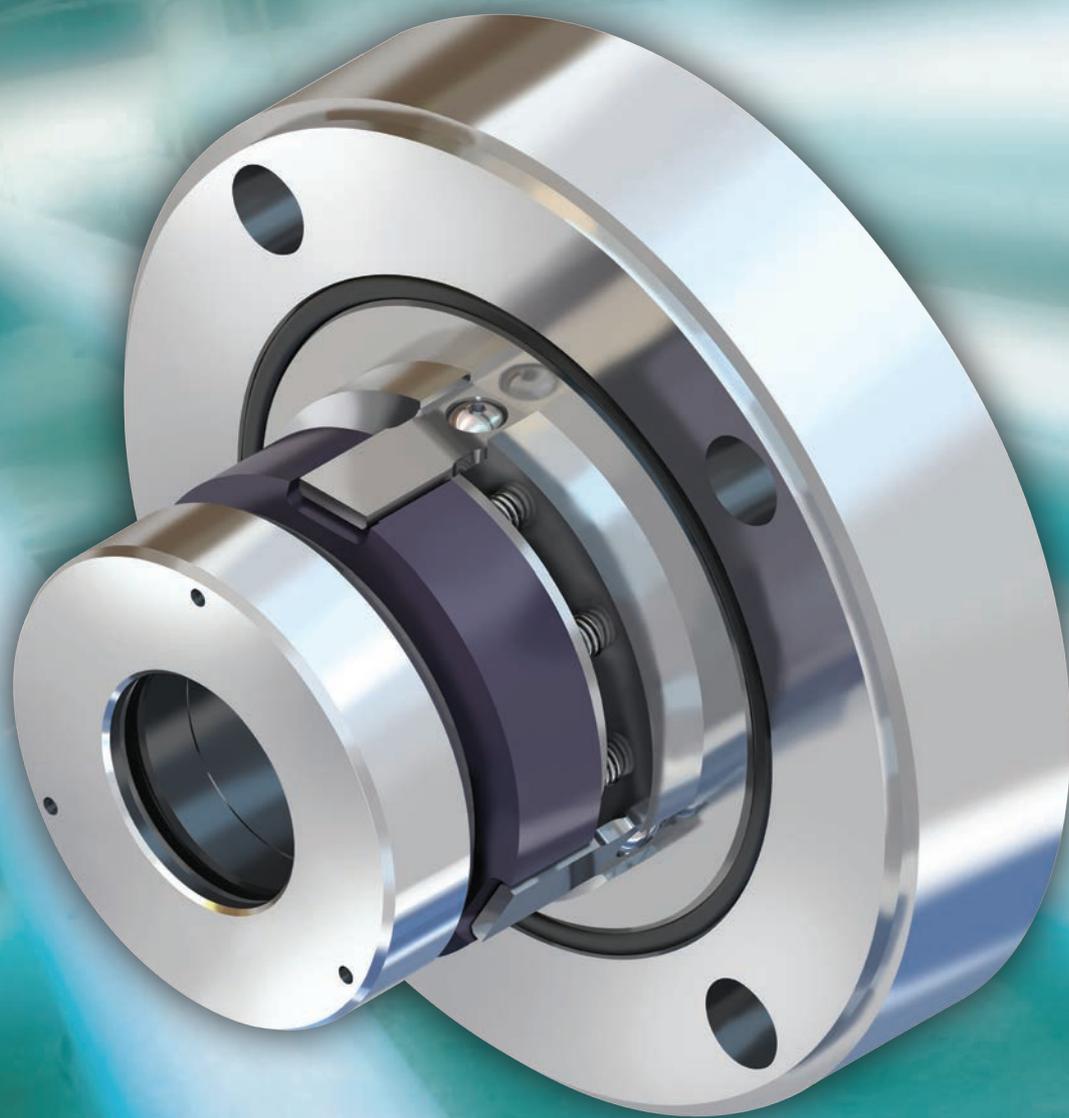


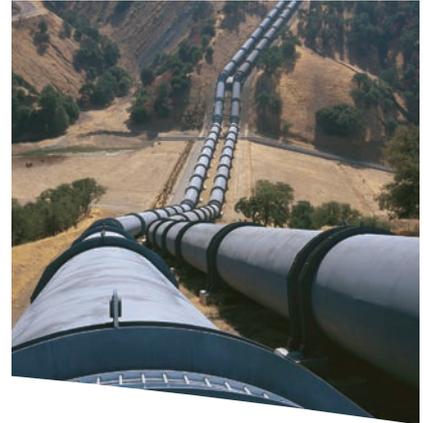


***HSH Series***  
***Balanced high pressure pusher seal***



***Experience In Motion***

*HSH seals are built for extended reliability in high pressure, high speed and highly viscous services such as mainline crude oil pipeline pumps. HSH seals are balanced, flexible stator cartridge seals with drive mechanisms and seal face geometries engineered for high torque loads and long-term performance. The HSH seal is fully compliant with API 682 Type A requirements.*



## High performance meets broad capability

Typically, high duty seals are custom designed to fit specific pieces of equipment and operating conditions. The HSH seal breaks this tradition by providing the widest standard operating range in terms of size, speed, and pressure handling capability of any Flowserve pump seal. All of this performance is included in a seal cartridge which fits in the standard seal chamber dimensions of API 610 pumps without requiring any equipment modifications.

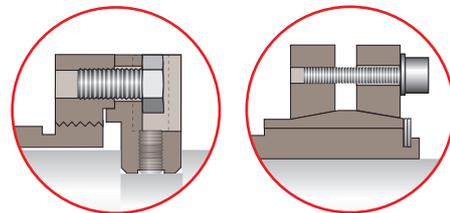
When large, high energy pumps are utilized in pipelines or inside petrochemical plants, refineries, and power plants, the HSH seal can be deployed to handle the associated high torque loads, pressures, and surface speeds.

From boiler feed water to crude oil and light hydrocarbons, the HSH seal is easily configured to cover the vast majority of moderate and high duty services.

### Applications

Crude oil	Amine
Bitumen	Middle distillates
Produced water	Sea water
Boiler feed water	Ammonia
Liquefied natural gas, ethane, and ethylene	

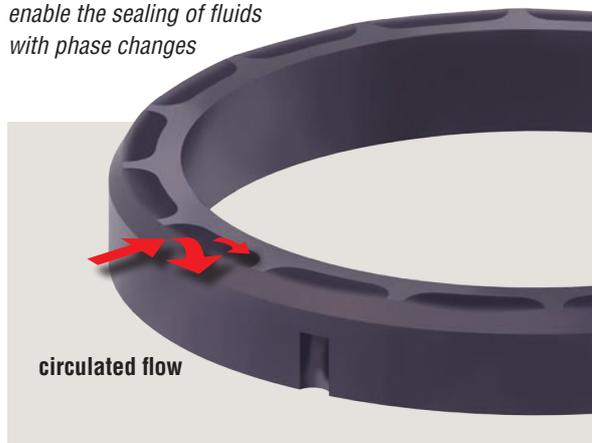
### Available high pressure drives



Split ring

Shrink disc

*Available Precision Face Topography Waves enable the sealing of fluids with phase changes*



### Available Configurations

Arrangement 1 single seal  
(Common Piping Plans 11, 13, 23, 32, 62)

#### HSH

Arrangement 2 unpressurized dual liquid buffer seal face-to-back configuration (Common Piping Plans 52, 55)

#### HSH/HSH

Arrangement 2 unpressurized dual seal with dry running containment seal (Common Piping Plans 72, 75, 76)

#### HSH/GSL

Arrangement 3 pressurized dual liquid barrier seal face-to-face configuration  
(Common Piping Plans 53A, 53B, 53C, 54)

#### HSH/HSH

***Multiport flush design improves heat dissipation for uniform face cooling***

A standard distribution ring connected to the seal's flush port and located co-axially with the sealing interface improves the cooling efficiency of Piping Plan 11, 14, 21, 31, and 32 by injecting the flush flow 360° around the seal faces.

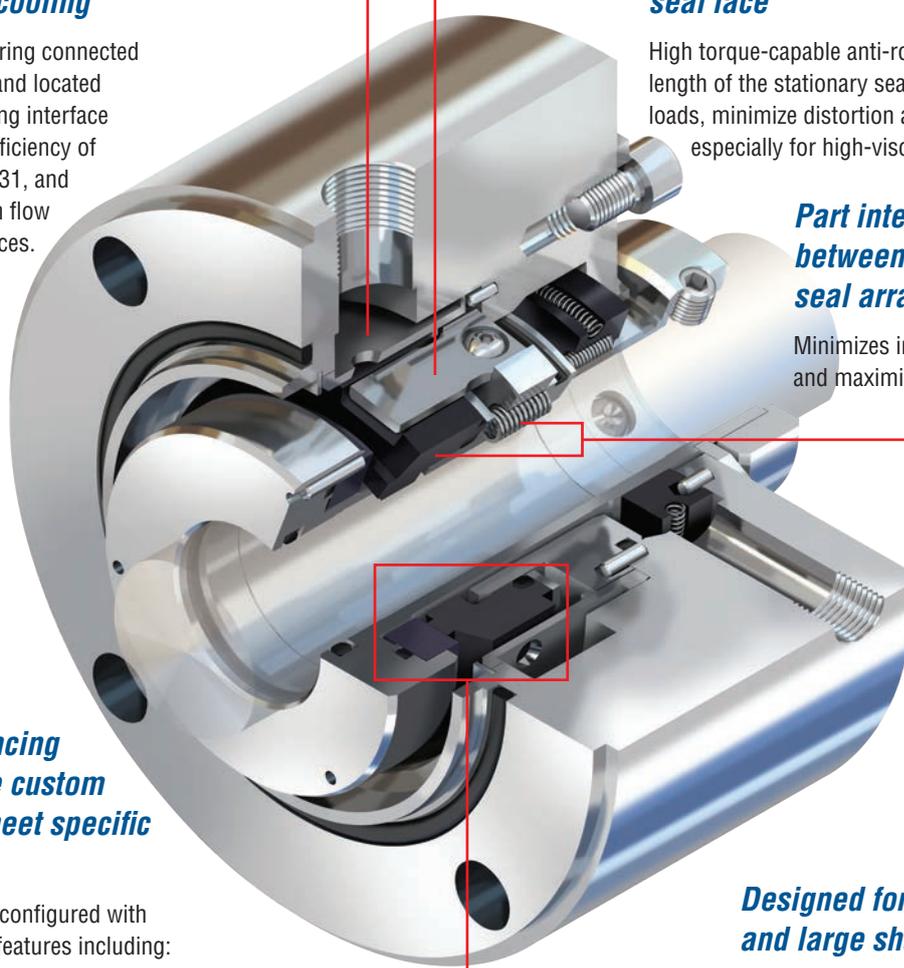
***Withstand high torque with heavy duty anti-rotation lugs engaged in seal face***

High torque-capable anti-rotation lugs along the length of the stationary seal face distribute contact loads, minimize distortion and minimize wear especially for high-viscosity applications.

***Part interchangeability between single and dual seal arrangements***

Minimizes inventory requirements and maximizes design flexibility.

Single HSH seal model shown with floating segmented throttle bushing outboard



***Reliability-enhancing features from the custom options library meet specific customer needs***

The HSH Series can be configured with a number of additional features including:

- Flow circulating devices
- Isolating seal chamber throat bushings
- Wear resistant overlays for metal parts
- Secondary containment devices
- High pressure sleeve drive collars
- Thermal isolation devices and cooling jackets

***Designed for high pressures***

Thick cross-section seal faces are designed with proven FEA techniques to minimize deflections and stresses for reliable, low-leakage operation

Block-style rotating seal face is mounted squarely against a lapped support surface and driven by equally distributed pins to stabilize the effects of mechanical and thermal loads.

***Designed for high speeds and large shaft diameters***

Flexible stator design with Alloy C-276 springs allows high speed operation and is better able to tolerate out-of-square misalignment of the pump shaft to the seal chamber face.

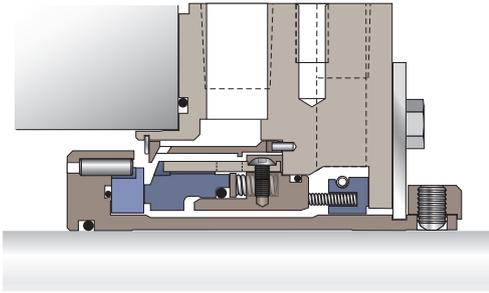
Low drag rotating element minimizes turbulence around the seal faces and the associated seal generated heat from fluid shearing.

***Materials of Construction***

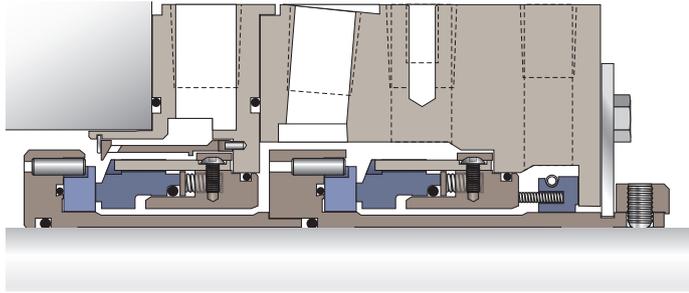
<b>Rotating Face</b>	Silicon Carbide, Tungsten Carbide, Diamond Coating
<b>Stationary Face</b>	Silicon Carbide, Carbon, Diamond Coating
<b>Metal Components</b>	316 Stainless Steel, 17-4 PH Stainless Steel, Alloy C-276
<b>Gaskets</b>	Fluoroelastomer, Perfluoroelastomer
<b>Springs</b>	Alloy C-276
<b>Bushing</b>	Carbon

***Operating Parameters***

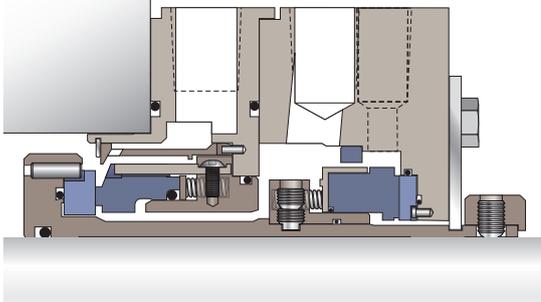
<b>Dynamic Pressure</b>	up to 103.4 bar (1500 psi)
<b>Static Pressure</b>	up to 206.8 (3000 psi)
<b>Temperatures</b>	-40° to 260°C (-40° to 500°F)
<b>Specific Gravity</b>	0.3 and higher
<b>Surface Speed</b>	up to 46 m/s (150 fps)
<b>Shaft Sizes</b>	25.4 to 156 mm (1.000 to 6.125 inches)



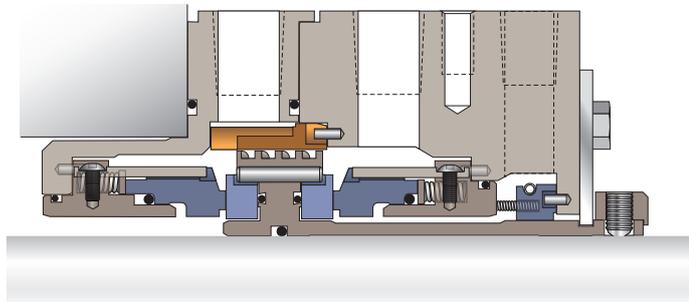
Arrangement 1 HSH single seal with floating balanced segmented throttle bushing for secondary containment



Arrangement 2 HSH/HSH unpressurized dual seal with liquid buffer fluid provides near-zero emissions sealing



Arrangement 2 HSH/GSL unpressurized dual seal with gas buffer fluid provides near-zero emissions sealing



Arrangement 3 HSH/HSH face-to-face pressurized dual seal with barrier fluid provides zero emissions sealing and reverse pressurization containment capability

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#### **USA and Canada**

Kalamazoo, Michigan USA  
Telephone: 1 269 381 2650  
Telefax: 1 269 382 8726

#### **Europe, Middle East, Africa**

Roosendaal, The Netherlands  
Telephone: 31 165 581400  
Telefax: 31 165 554590

#### **Asia Pacific**

Singapore  
Telephone: 65 6544 6800  
Telefax: 65 6214 0541

#### **Latin America**

Mexico City  
Telephone: 52 55 5567 7170  
Telefax: 52 55 5567 4224