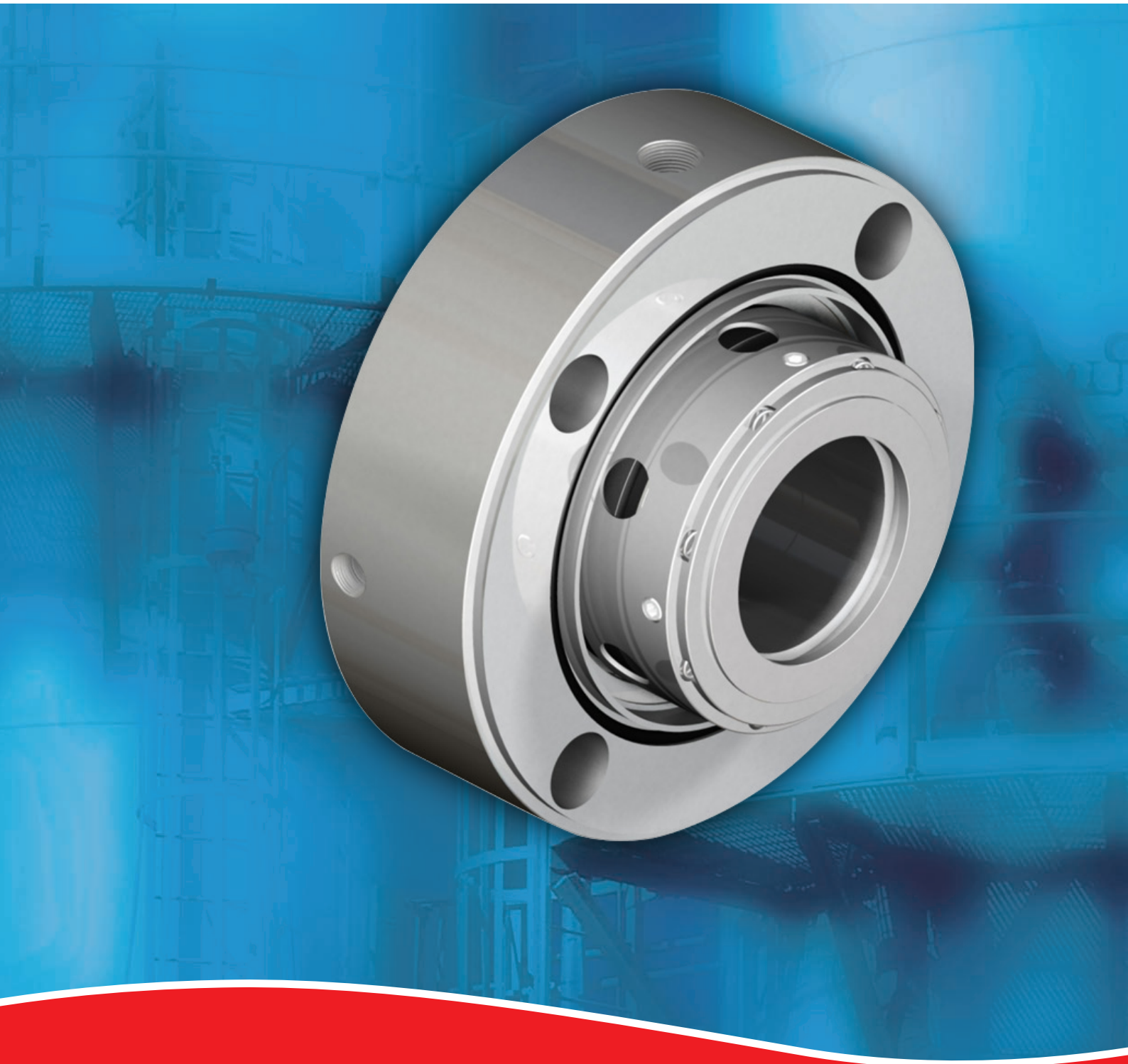
FLOWSERVE

QB Series

Balanced pusher seals

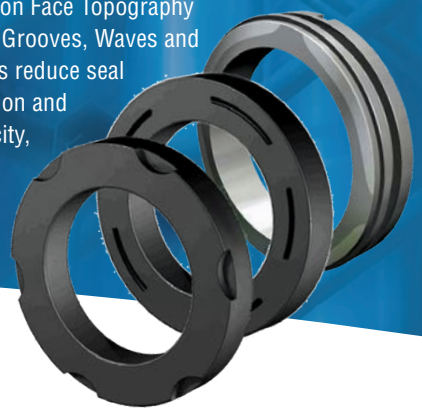


Experience In Motion

QB Series seals are balanced pusher seals available in single and dual seal configurations used for sealing environmentally-restricted products and meeting the most stringent regulations. The QB Series is fully compliant with API 682 Type A requirements.

Seal faces optimized for the application

Flowserve Precision Face Topography Hydropads, Lube Grooves, Waves and Diamond Coatings reduce seal face heat generation and wear in low lubricity, flashing fluid applications.



Workhorse of the hydrocarbon processing industry

The QB Series is differentiated by its wide range of standardized feature packages and comprehensive custom options library. From hot water to light hydrocarbons, the QB Series core platform is easily configured to cover the vast majority of a plant's low and moderate duty services. QB Series seals compliment API 610 pumps by installing as a unitized cartridge without requiring pump modifications in almost all cases.

Advanced spring holder design

Rotating spring holder with radial openings at both ends of the springs uses centrifugal force to create circulation through the springs. This feature keeps springs clean and properly functioning to accommodate for shaft axial movement and thermal growth.

Standardized feature packages simplify seal selection process

The QB Series includes several feature packages for seals which operate directly on the process fluid. Package selection is largely determined by the process fluid's state at process temperature and atmospheric pressure. Under these conditions, fluids that remain liquid are considered non-flashing and fluids that exist as a gas or vapor are considered flashing.

API 682 Arrangements 1 & 2

Single QB Series seals and the inner seal of dual unpressurized seals operate directly on the process fluid and must be selected based on the type of fluid being pumped.

QB Seal face balance optimized for non-flashing water, hydrocarbon, acids, and amines

QBU Features Flowserve Precision Face Topography, Lube Grooves, for use on flashing water application such as boiler feed water

QBQ Seal face balance optimized for flashing hydrocarbons; capable of emissions levels less than 500 ppm

QBQ LZ Features Flowserve Precision Face Topography, Waves, for use on flashing hydrocarbon applications where the seal chamber pressure is at or near the fluid's vapor pressure

QBS Replaces multiple coil springs with a large single coil spring to provide the highest resistance to clogging in dirty services

API 682 Arrangement 3

Dual seals with pressurized barrier fluid are unique in that during upset conditions, the pressure acting on the seal can reverse directions. To handle these upsets, the QB Series includes double balanced seal face technology to handle pressure from either the process or barrier fluid side of the seal faces.

QBB Double balanced seal face optimized for face-to-back configured Arrangement 3 seals

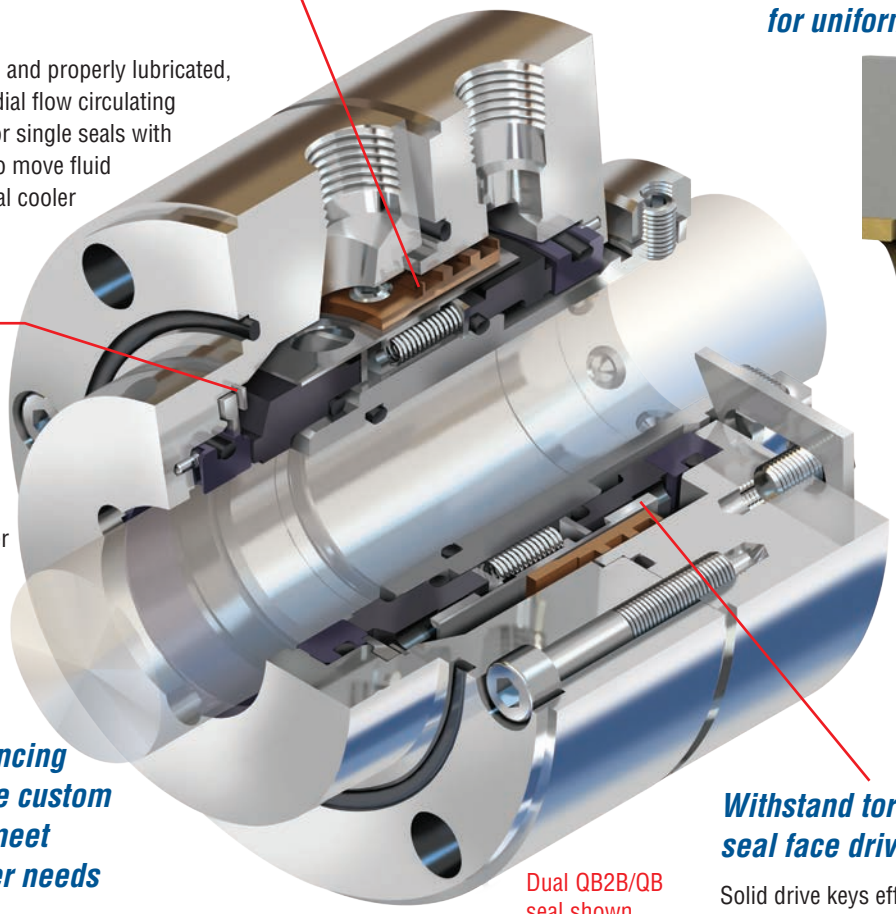
QB2B Double balanced seal face optimized for back-to-back configured Arrangement 3 seals

Barrier fluid circulation extends seal reliability

To keep seal faces cool and properly lubricated, integrated axial and radial flow circulating devices are available for single seals with Plan 23 or dual seals to move fluid from the seal to the seal cooler or reservoir.

Handle upset conditions

Fully retained parts and double balanced inner seals enable dual QB Series seals to survive seal chamber over-pressurization or loss of barrier fluid pressure.



Dual QB2B/QB seal shown

Multiport flush design improves heat dissipation for uniform face cooling

A 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 torque with solid seal face drive keys

Solid drive keys efficiently transmit torque loads from the seal face without deforming. The large radius on the drive key couples with a similar radius on the seal face providing full-length engagement to prevent edge chipping.

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

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

- 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

Part interchangeability between single and dual seal arrangements

Minimizes inventory requirements and maximizes design flexibility.

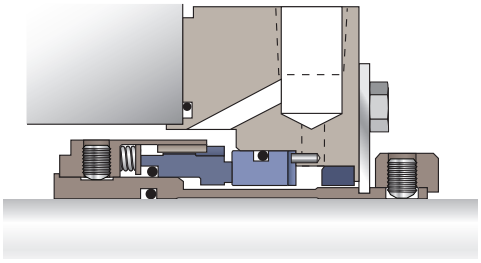
Operating Parameters

Pressure	up to 51.7 bar (750 psi)
Temperature	-40 to 204°C (400°F)
Speed	up to 23 m/s (75 fps)
Shaft Sizes	12.7 to 139.7 mm (0.500 to 5.500 inch)

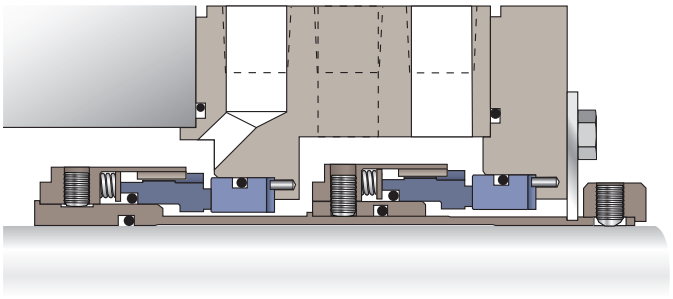
Materials of Construction

Metal Components	316 Stainless Steel, Alloy C-276, Alloy 20
Rotating Face	Carbon, Silicon Carbide, Diamond Coating
Stationary Face	Silicon Carbide, Tungsten Carbide, Diamond Coating
Gaskets	Fluoroelastomer, Perfluoroelastomer
Springs	Alloy C-276

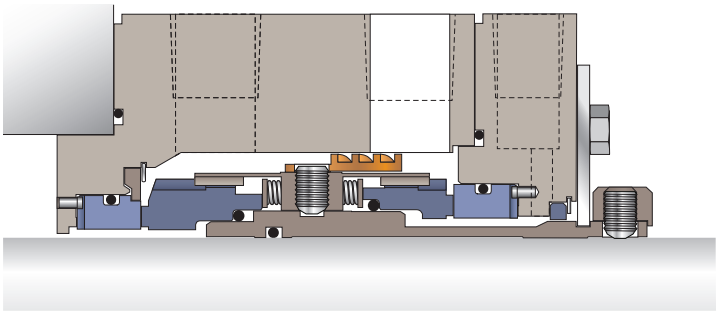
Arrangement 1 QB single seal with fixed throttle bushing for secondary containment



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



Arrangement 3 QB2B/QB back-to-back pressurized dual seal with barrier fluid provides zero emissions sealing



FSD152eng REV 05-16 Printed in USA

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