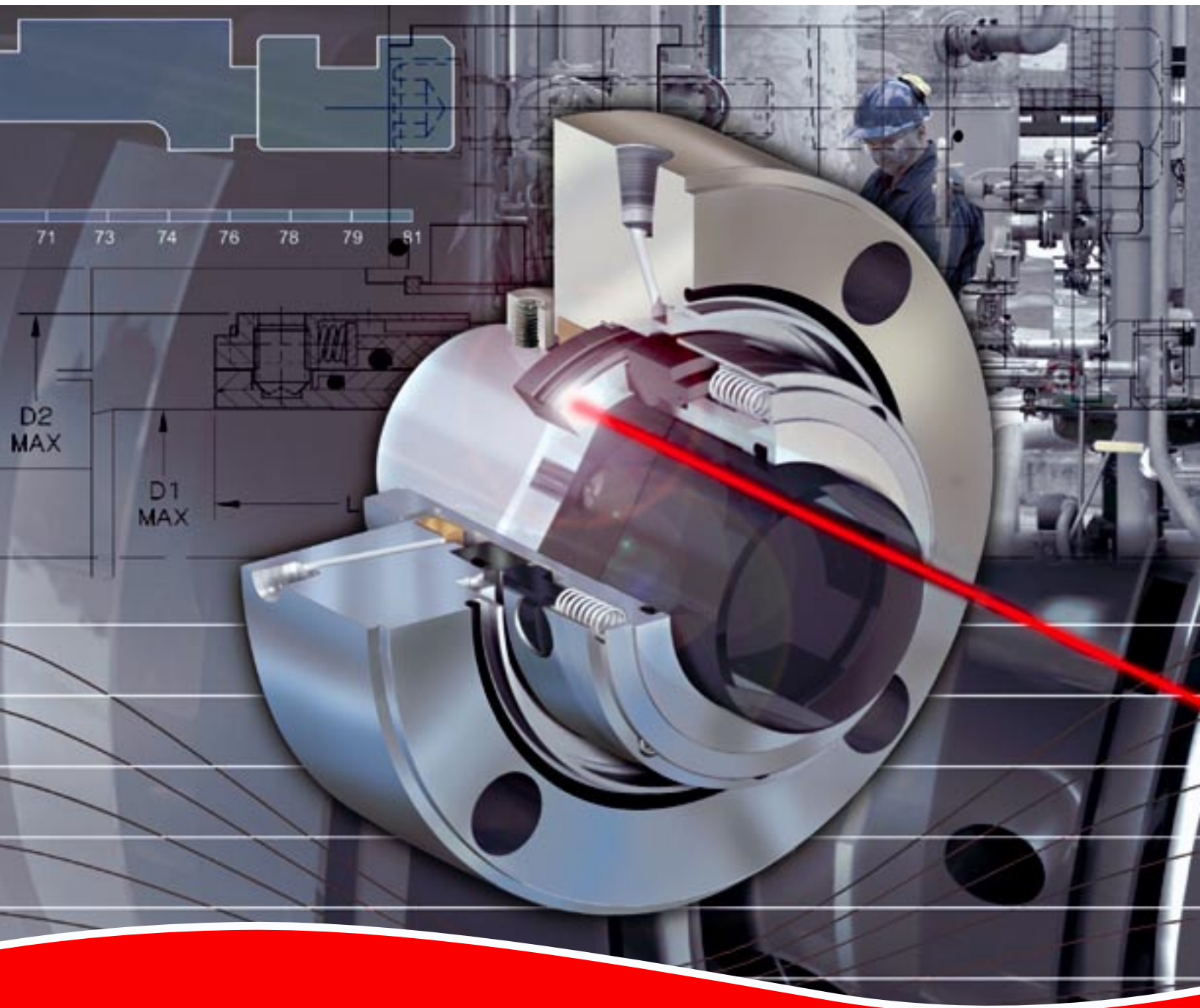




***QBQ LZ***

***featuring Precision Face Topography***

Leading-edge solutions for light hydrocarbon applications



***Experience In Motion***

*Precision Face Topography enhances the surface profile and performance of mechanical seal faces*



## **The technology leader in sealing light hydrocarbons**

Reliability and safety are top priorities in hydrocarbon processing plants today with emphasis on profitability and meeting governmental regulations of hydrocarbon emissions. Light hydrocarbons present unique challenges because of their natural tendency to flash from liquid to vapor even at ambient pressure and temperature conditions. In a mechanical seal application, vaporization can lead to dry running of the seal faces and premature seal failure, which results in failure of both emissions and reliability objectives. Keeping equipment running in the presence of vaporization conditions is an ongoing battle that consumes maintenance time and energy.

### ***The challenges of a tough application***

Hydrocarbon processing plants exercise many methods of vapor suppression to keep equipment running properly, especially when the vapor pressure margin is otherwise low. Unfortunately, plant systems are complex and variations can produce unexpected low margins even on stable equipment. Modifying pump hydraulics and optimizing cooling systems are typical expenses incurred to aid reliability in light hydrocarbon applications. However, if vaporization takes hold inside a seal chamber or at the mechanical seal, the seal may not recover despite the best vapor suppression methods.

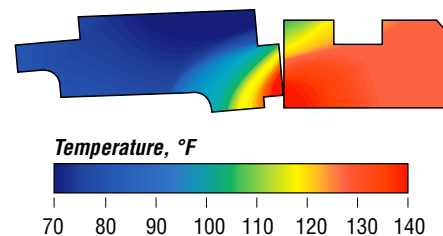
### ***Our Precision Face Topography solution***

Instead of reacting to the symptoms of vaporization in a mechanical seal, a better approach is to address the basic physics of pressure and temperature where it matters most: on the seal faces.

The Flowserve QBQ LZ seal features Precision Face Topography to satisfy the demands of light hydrocarbons particularly at low vapor pressure margins. Smooth, low amplitude waves are engineered specifically for light hydrocarbon fluids to provide a stable hydrodynamic effect that changes the pressure profile on the seal faces and reduces contact loads without increasing leakage. Low contact loads lead to less temperature rise and allow the QBQ LZ seal to operate in services with lower vapor pressure margins than any other contacting seal face design. With less sensitivity to vapor pressure margin, reliability is increased notably when upset conditions arise. Reduced contact loading also minimizes start-up torque and face damage associated with start-ups and shutdowns. *The Flowserve QBQ LZ seal with Precision Face Topography sets new industry standards of reliability and safety margin when vapor pressure margin is scarce.*

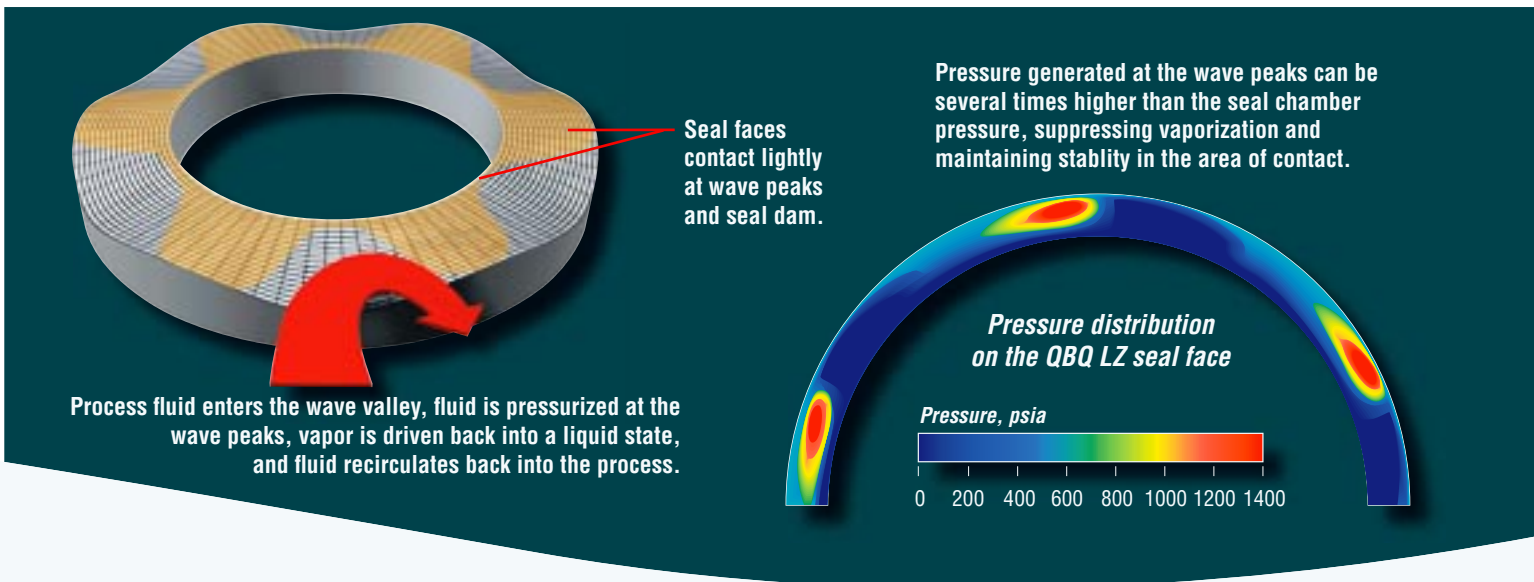
### ***Cooler running faces extend seal life***

**Full contacting face heat generation and resulting deflection**



**Reduced heat generation and face deflection with QBQ LZ**





Patented wave patterned silicon carbide

Zero net deflection carbon

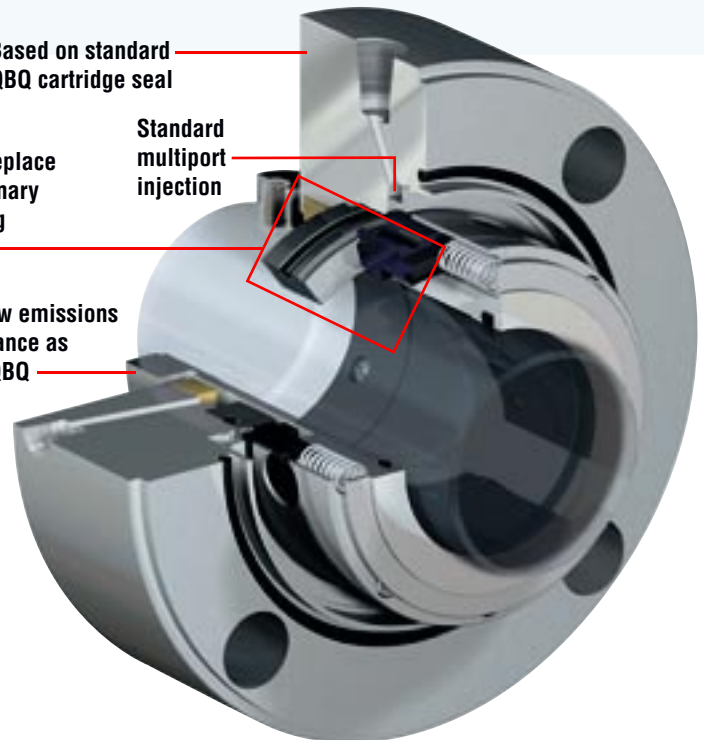


Based on standard QBQ cartridge seal

Retrofits replace only stationary and rotating seal faces

Same low emissions performance as typical QBQ

Standard multiport injection



### Flowserve is dedicated to improving your equipment reliability

The QBQ LZ advantage:

- Addresses the fundamental challenges of low vapor pressure margin light hydrocarbons to extend equipment reliability even with variable process conditions
- Low face contact pressure means less seal generated heat and less start-up torque at the same low emissions level of typical contacting seals
- Utilizes Flowserve Precision Face Topography with a patented wave pattern custom engineered for the physical properties of low vapor pressure margin light hydrocarbons
- Unique technology satisfies all API 682/ISO 21049 design requirements for single and dual arrangement seals
- Based on standard QBQ seals so retrofits easily solve existing low vapor pressure margin problems and new applications start with minimal inventory impact

### Standard Operating Limits

<b>Temperature</b>	-40 to 400°F (-40 to 203°C)
<b>Pressure</b>	0 to 750 psi (0 to 51.7 bar)
<b>Speed</b>	20 to 75 fps (6.1 to 22.9 m/s)
<b>Specific gravity</b>	0.40 to 0.60
<b>Vapor pressure margin</b>	5.0 to 50 psi (0.34 to 3.4 bar)
<b>Shaft size</b>	1.750 to 5.125 inches (44.45 to 130.2 mm)



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