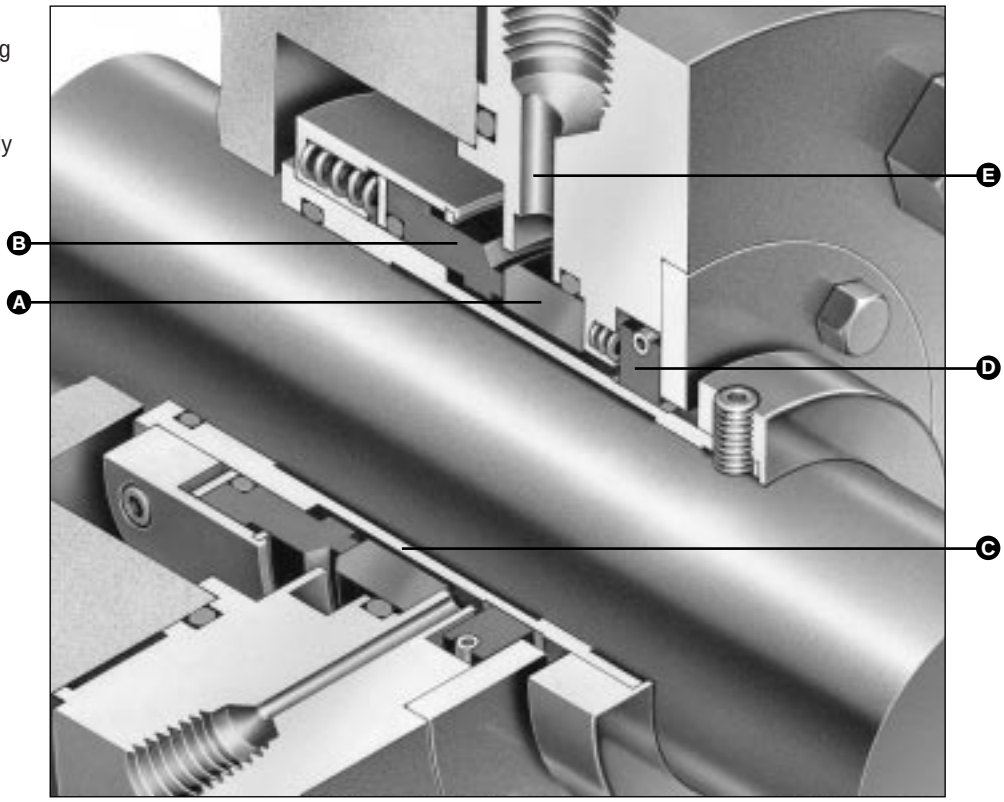
TYPE 1648/2648/3648

API 682 Type A Pusher Seals

A – Seat/Mating Ring
B – Face/Primary Ring
C – Sleeve
D – Segmented Bushing Assembly
E – Distributed Flush



Product Description

Type 1648/2648/3648 seals evolved from the successful, proven John Crane Type 48 design, the preferred choice for safe, reliable, single, and dual unpressurized and pressurized seal arrangements in petroleum services. These dependable, engineered mechanical seals were developed specifically to attain MACT (Maximum Achievable Controlled Technology) compliance in hydrocarbons and other volatile organic compounds (VOCs). Type 1648 single seals typically control emissions to less than 200 ppm.

- Fully meets the needs of the oil and gas industry for hydrocarbon and other services as defined by API 682 for Type A seal duties. This includes: heavy and light hydrocarbons, lubricating liquids, aqueous solutions, chemicals, and some acids.
- Industrial applications involved in the processing of VOCs and similar hazardous products.

Design Features

- Cartridge Seal Design
- Computer Optimized Low Emission Seal Faces
- API 682 Test Qualification

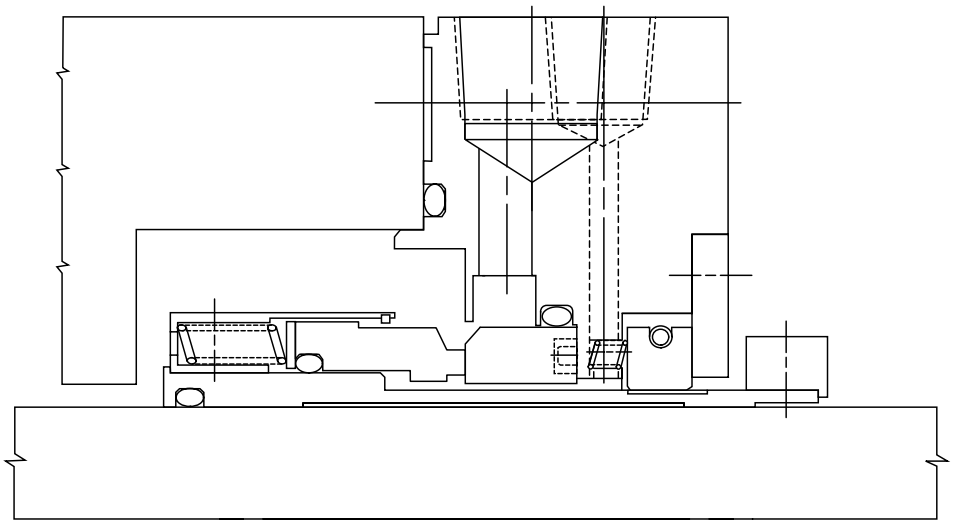
Performance Capabilities

- Temperature:
  -40°C to 260°C/-40°F to 500°F
- Pressure:
  Up to 69 bar g/1000 psig max.
- Speed:
  Up to 25 m/s/5000 fpm

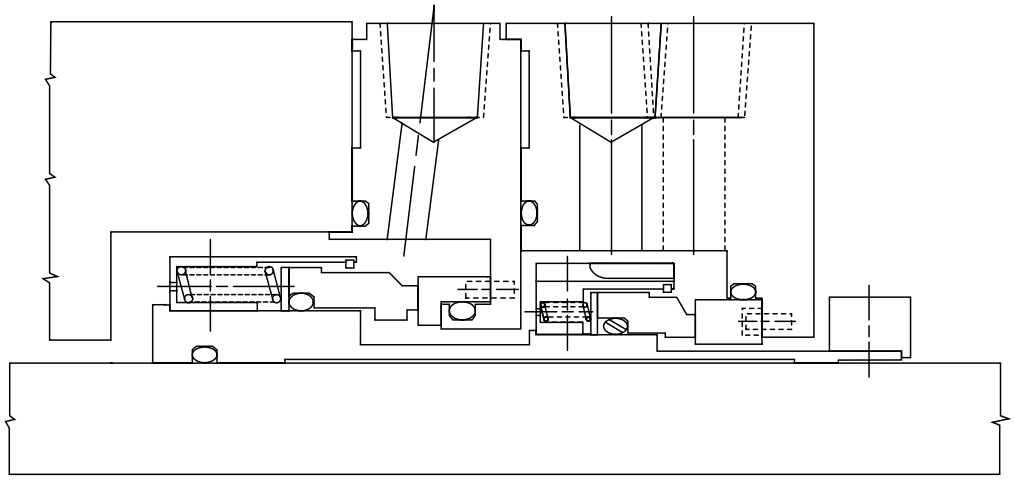
TYPE 1648/2648/3648

API 682 Type A Pusher Seals

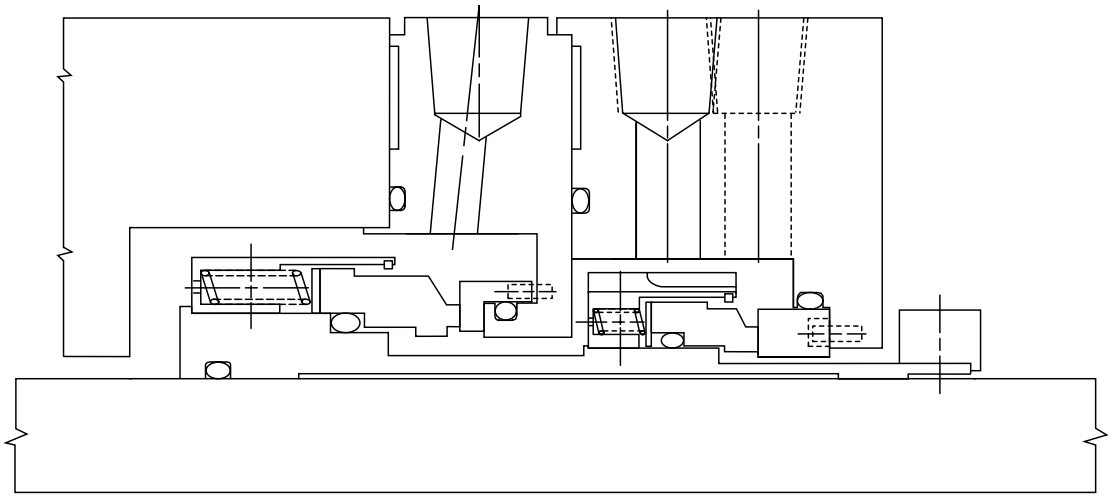
Type 1648 - API Type A Arrangement 1 - Single Cartridge



Type 2648 - API Type A Arrangement 2 - Dual Unpressurized Cartridge



Type 3648 - API Type A Arrangement 3 - Dual Pressurized Cartridge



TYPE 1648/2648/3648

API 682 Type A Pusher Seals

The Type 48 Seal Family

The primary default seal selection per API 682 is the Type A, multiple-spring pusher seal that is supplied in single, dual unpressurized and dual pressurized arrangements.The John Crane Type 48 is the seal on which our API 682 offering is based. The Type 48 family includes the following seals:

- **Type 48LP**
  Balanced pusher seal with plain-face design for lower pressure applications. Used as a single inboard seal on dual unpressurized arrangements and as an outboard seal on either dual pressurized or unpressurized arrangements.
- **Type 48MP**
  Balanced pusher seal with plain-face design that incorporates a hammerhead to increase primary ring stiffness for medium to high pressure applications. Used as a single inboard seal on dual unpressurized arrangements and as an outboard seal on either dual pressurized or unpressurized arrangements.
- **Type 48HP**
  Balanced pusher seal with hammerhead geometry that incorporates hydropads to increase face lubrication stiffness for high pressure applications. Used as a single inboard seal on dual unpressurized arrangements, and occasionally as an outboard seal on dual pressurized arrangements.
- **Type 48RP**
  Double balanced pusher seal primarily designed for ID pressure applications. Commonly referred to as a reverse pressure design. Used as an inboard seal on dual pressurized arrangements and occasionally as an inboard seal on dual unpressurized arrangements.
- **Type S48**
  Shorter balanced seal designed for OD pressures only. Used as an outboard seal on either dual unpressurized or dual pressurized arrangements.

Multiplier Factors

	Selection Considerations	Multiplier Factor
Sealed Fluid Temperature	Below 80˚C/175˚F	x 1.00
	Above 80˚C to 125˚C/175˚F to 250˚F	x 0.90
	Above 125˚C to 180˚C/250˚F to 350˚F	x 0.80
	Above 180˚C/350˚F	x 0.65
Materials	Tungsten Carbide vs. Silicon Carbide	x 0.50

Notes:

1. The above temperature derating factors apply to seals with Carbon primary rings only, not hard face vs. hard face combinations.
2. The temperatures noted are product temperatures for single seals or the expected average temperature of the product and buffer/barrier fluid for dual seals.

Example for Determining Pressure Rating Limits:

Seal: 75mm/3" Diameter Type 48LP
Product: Lube Oil
Temperature: 82˚C/180˚F
Speed: 3600 rpm

Using the Type 48LP Pressure Ratings Limit graph, the pressure limit is 37 bar g/535 psig. From the Multiplier Factors chart, apply the appropriate value, in this case 0.90. For this service condition, the maximum operating pressure is:

535 psig x 0.90 = 33 bar g/481 psig

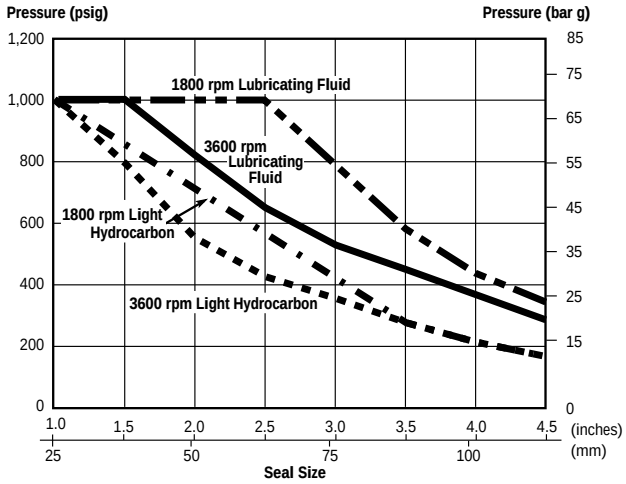
TYPE 1648/2648/3648

API 682 Type A Pusher Seals

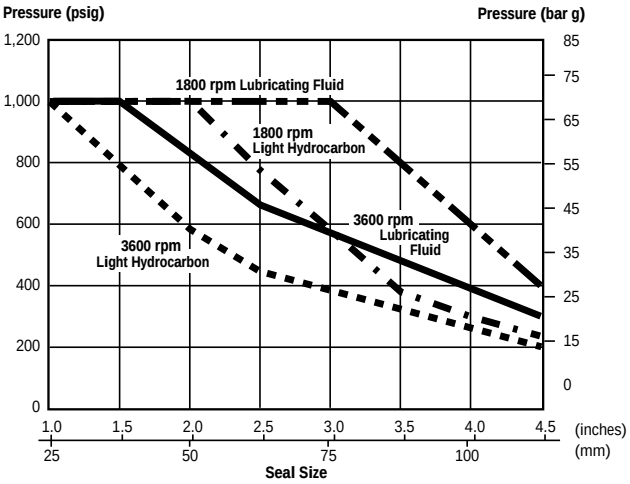
Pressure Limits

Carbon vs. Reaction Bonded Silicon Carbide
(Other application-specific limits may apply. Contact John Crane Engineering for application assistance.)

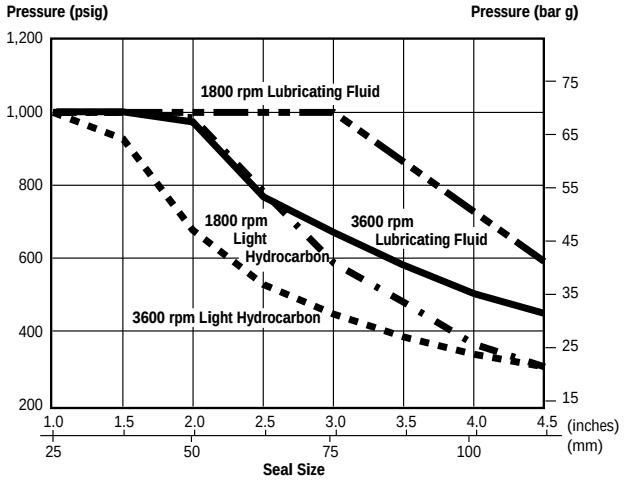
Type 48LP



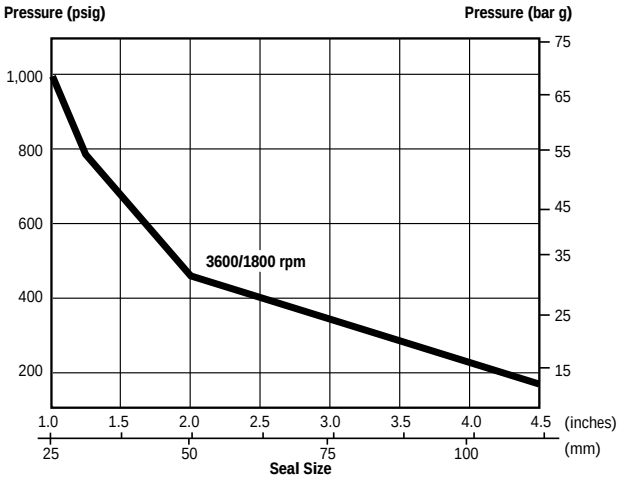
Type 48MP



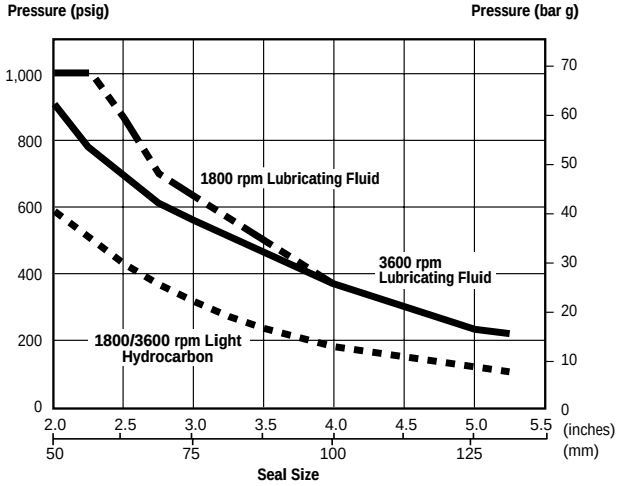
Type 48HP



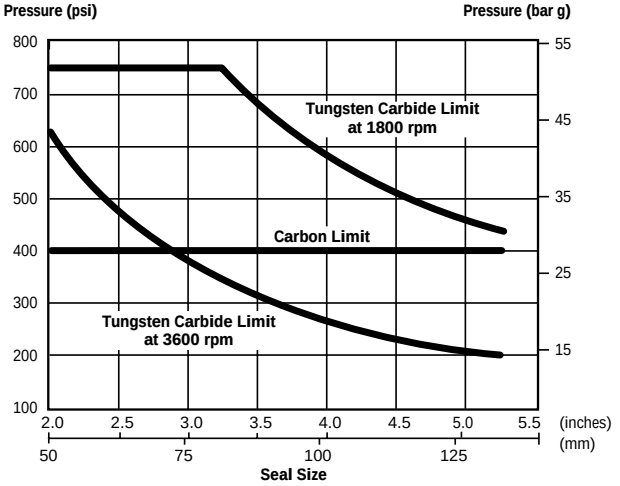
Type S48



Type 48RP OD Pressure



Type 48RP ID Pressure



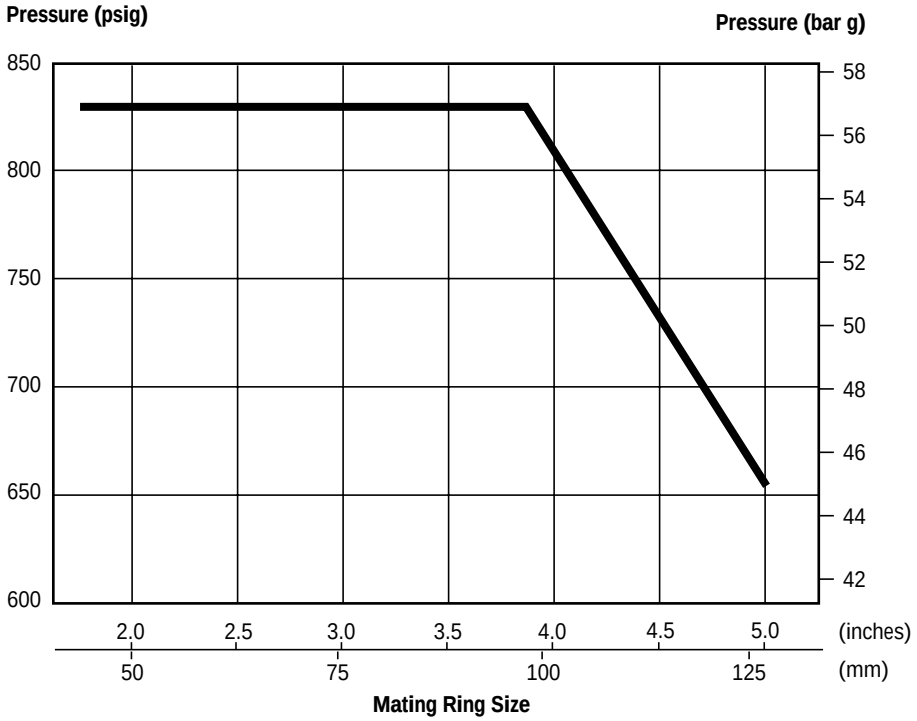
TYPE 1648/2648/3648

API 682 Type A Pusher Seals

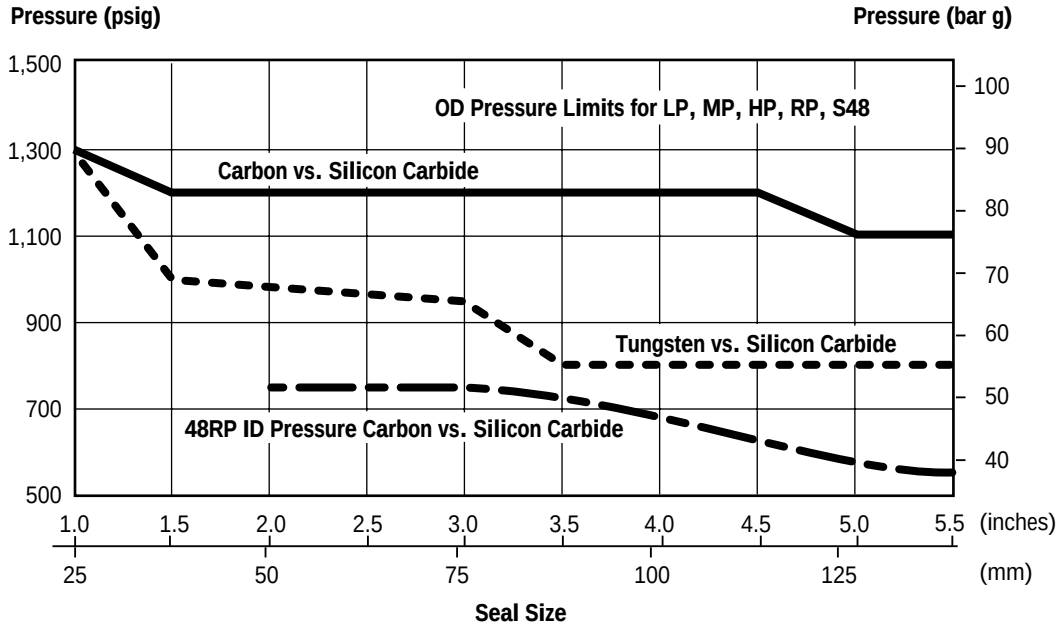
L-Shaped Mating Ring Internal Pressure Limits

The L-shaped mating ring used for dual seal arrangements is designed to be hydraulically balanced when used with the proper seal size. The pressure limit of the mating ring should be considered along with the seal head pressure limit when selecting dual seal arrangements.

The pressure limit with OD pressure is 57.2 bar g/830 psig for Silicon Carbide. This chart shows the ID pressure limit for the Silicon Carbide mating ring.



Type 48 Series Hydrostatic/Static Pressure Limits



NOTE: The hydrostatic and static limits are based upon O-ring extrusion limits, not component stresses. Therefore, hydrostatic and static limits are the same.

TYPE 1648/2648/3648

API 682 Type A Pusher Seals

Materials of Construction

SEAL COMPONENTS	MATERIALS	
Description	**Standard**	**Options**
Face/Primary Ring	Antimony Carbon	Nickel Binder Tungsten Carbide Alpha Sintered Silicon Carbide Resin Carbon
Seat/Mating Ring	Reaction Bonded Silicon Carbide	Alpha Sintered Silicon Carbide
Retainer Spring Disc Snap Screw Set Screw Sleeve Collar Segmented Bushing Gland Plate Auxiliary Gland	316 Stainless Steel	—
Spring	Alloy C-276 (UNS N10276)	316 Stainless Steel (Single Spring Only)
O-Ring	Fluoroelastomer	Amine-Resistant Perfluoroelastomer Low Temp Buna-N Perfluoroelastomer

Angular and Radial Movement

Excessive runout will have a detrimental effect on seal performance in the form of component wear or excessive leakage. API 682 limits runout as follows:

- Centering of the seal is to be by a register fit. The register fit surface shall be concentric to the shaft and have a total indicated runout (TIR) of not more than 125 micrometers/0.005".
- Squareness of the seal chamber face to the shaft shall not exceed 0.0005" per inch of seal chamber bore (15 micrometers/3cm).
- Runout of the sleeve outer diameter to the inner diameter shall be 0.001"/25 micrometers TIR.
- Shaft-to-sleeve diametrical clearance shall be to Tolerance Grade G7/h6.

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