John Crane

2/2B
ELASTOMER BELLOWS SEALS

Applications

John Crane Type 2 Seals are specified in more original equipment than any other seal from any other manufacturer. With the highest success rate of any seal of its type, they are suitable for a wide range of service conditions, from water to steam to chemicals and corrosive materials.

- Fits equipment with confined space requirements and limited seal chamber depths in pumps, mixers, blenders, agitators, compressors and other rotary shaft equipment.
- For pulp and paper, food processing, wastewater, chemical processing and other demanding applications.
- Type 2B is a balanced seal used in higher pressure applications, offering greater operating speeds and reduced face wear.
- Both Type 2 and 2B are field repairable, minimizing replacement costs, and lost revenue from downtime.

Non-Concurrent Operating Conditions

- **Temperatures:** -40˚C to +205˚C/ -40˚F to +400˚F
  depending on materials used
- **Pressures:** **2:** 29 bar g/425 psig
  2B: 83 bar g/1200 psig
- **Speeds:** See Chart 7 for speed requirements

2/2B

INCH RANGE

ELASTOMER BELLOWS SEALS

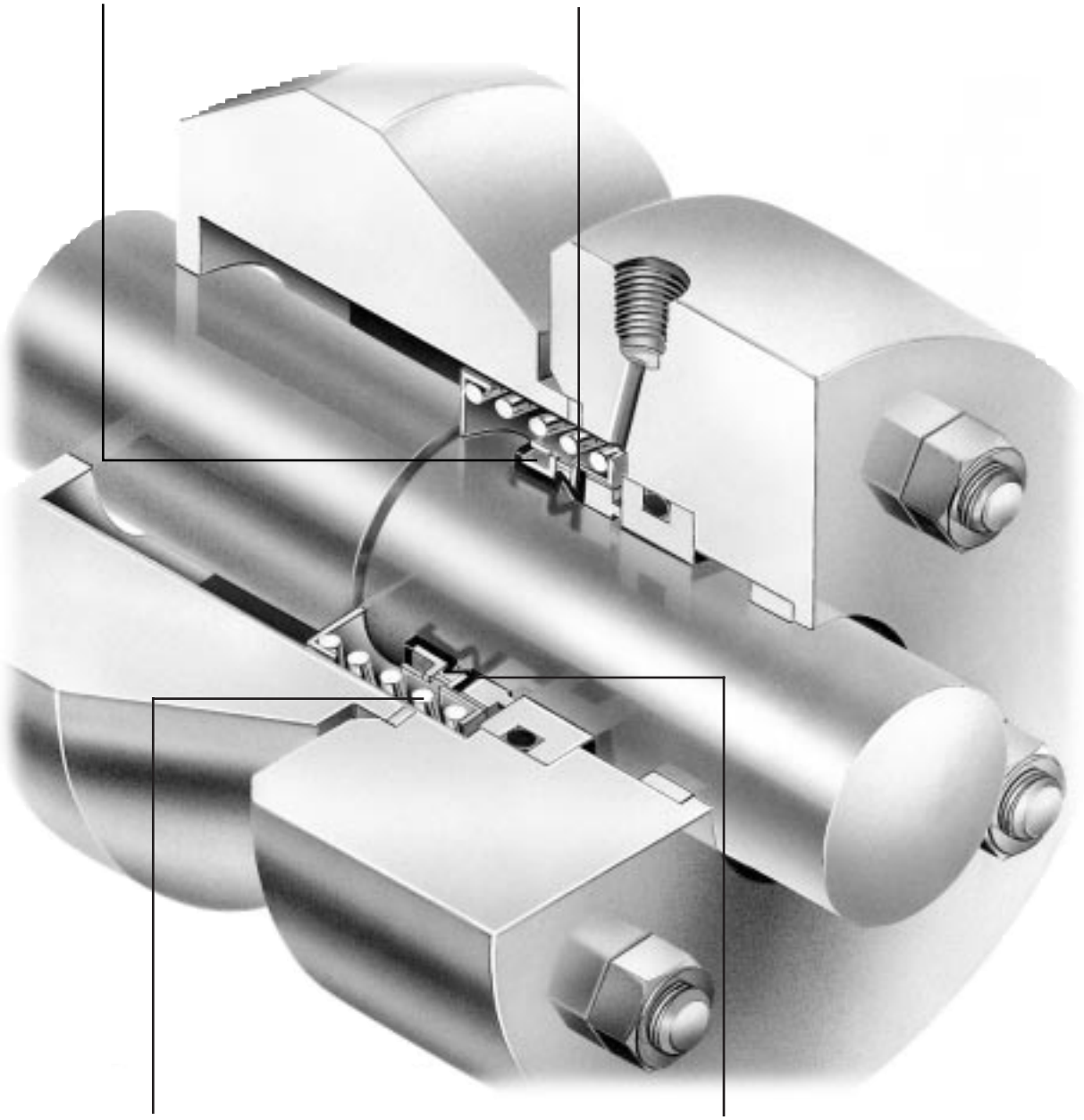
Design Features

Mechanical Drive

The drive band's notch design eliminates over-stressing of the elastomer bellows. Bellows slip is eliminated and shaft and sleeve are protected from wear.

Special Balancing

Elastomeric bellows are inherently balanced. This allows the Type 2 to operate at higher pressures than pusher seals. A balanced Type 2B provides greater sealing pressure capability.



Non-Clogging, Single Coil Spring

Provides greater dependability than multiple spring designs. Will not foul due to fluid contact. Fits over seal head.

Self-Aligning

Elastomeric bellows have automatic adjustment which compensates for abnormal shaft and play (run out), primary ring wear and equipment tolerances.

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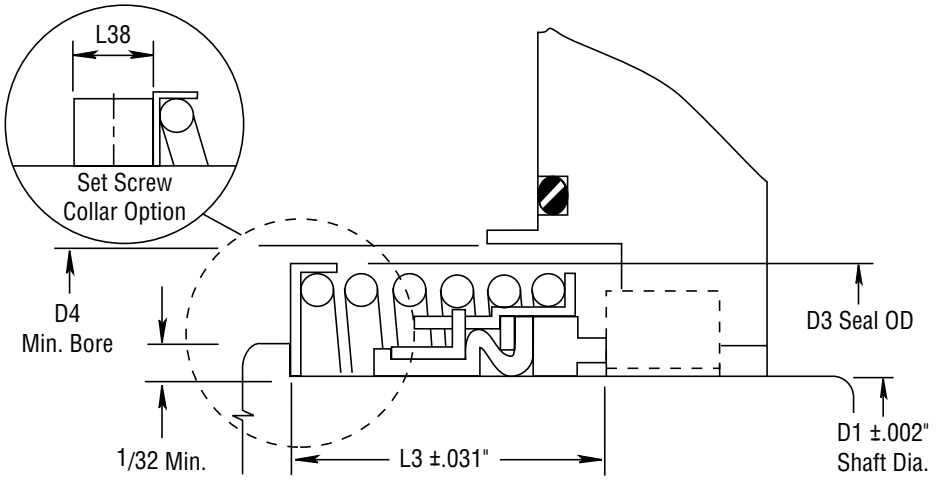
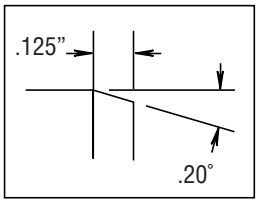
Type 2 Typical Arrangement/Dimensional Data





For ease of installation, the lead-in edge of the shaft or sleeve should be chamfered as shown.

Note: For primary ring optional contractors (hard face) design, refer to Dwg. F-SK-2649.

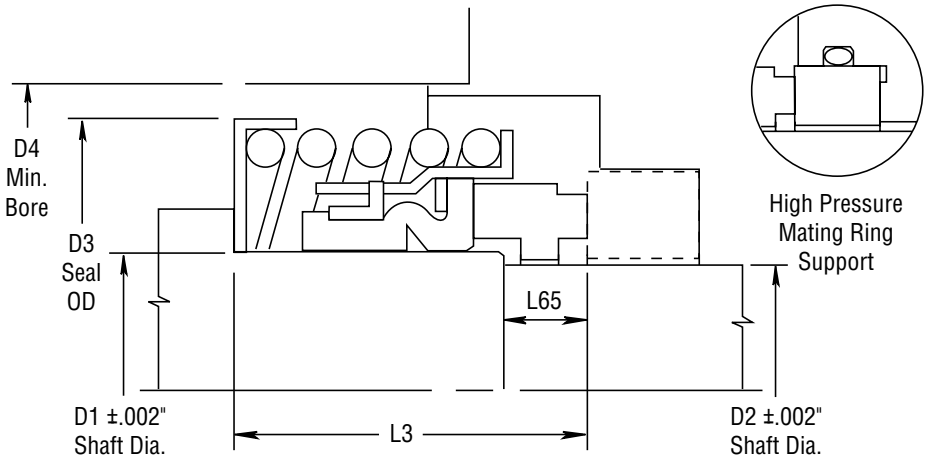
Chart 1. Type 2 Dimensional Data

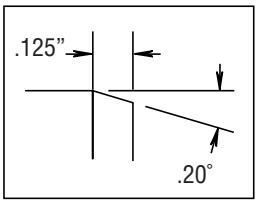
Seal Size (Inches)	D1	D3	D4	L3	L38
1.000	1.000	1.812	2.000	1.000	.375
1.125	1.125	1.937	2.125	1.062	.375
1.250	1.250	2.062	2.250	1.062	.375
1.375	1.375	2.250	2.437	1.125	.375
1.500	1.500	2.375	2.562	1.125	.375
1.625	1.625	2.718	2.937	1.375	.375
1.750	1.750	2.750	3.062	1.375	.375
1.875	1.875	2.875	3.187	1.500	.375
2.000	2.000	3.000	3.312	1.500	.375
2.125	2.125	3.250	3.625	1.687	.500
2.250	2.250	3.375	3.750	1.687	.500
2.375	2.375	3.500	3.875	1.812	.500
2.500	2.500	3.625	4.000	1.812	.500
2.625	2.625	3.875	4.312	1.937	.500
2.750	2.750	4.000	4.437	1.937	.500
2.875	2.875	4.125	4.562	2.062	.500
3.000	3.000	4.250	4.687	2.062	.500
3.125	3.125	4.562	5.000	2.187	.500
3.250	3.250	4.687	5.125	2.187	.500
3.375	3.375	4.812	5.250	2.187	.500
3.500	3.500	4.937	5.500	2.187	.500
3.625	3.625	5.125	5.687	2.312	.562
3.750	3.750	5.250	5.812	2.312	.562
3.875	3.875	5.437	6.000	2.312	.562
4.000	4.000	5.562	6.125	2.312	.562

Chart 2. Type 2B Dimensional Data

Seal Size (Inches)	D1	D2	D3	D4	L3	L65
1.000	1.000	0.875	1.812	2.000	1.312	.343
1.125	1.125	1.000	1.937	2.125	1.375	.343
1.250	1.250	1.125	2.062	2.250	1.375	.343
1.375	1.375	1.250	2.250	2.437	1.437	.343
1.500	1.500	1.375	2.375	2.562	1.437	.343
1.625	1.625	1.500	2.718	2.937	1.750	.437
1.750	1.750	1.625	2.750	3.062	1.750	.437
1.875	1.875	1.750	2.875	3.187	1.875	.437
2.000	2.000	1.875	3.000	3.312	1.875	.437
2.125	2.125	2.000	3.250	3.625	2.062	.500
2.250	2.250	2.125	3.375	3.750	2.062	.500
2.375	2.375	2.250	3.500	3.875	2.187	.500
2.500	2.500	2.375	3.625	4.000	2.187	.500
2.625	2.625	2.500	3.875	4.312	2.312	.562
2.750	2.750	2.625	4.000	4.437	2.312	.562
2.875	2.875	2.750	4.125	4.562	2.437	.562
3.000	3.000	2.875	4.250	4.687	2.437	.562
3.125	3.125	2.875	4.562	5.000	2.562	.625
3.250	3.250	3.000	4.687	5.125	2.562	.625
3.375	3.375	3.125	4.812	5.250	2.562	.625
3.500	3.500	3.250	4.937	5.500	2.562	.625
3.625	3.625	3.375	5.125	5.687	2.687	.625
3.750	3.750	3.500	5.250	5.812	2.687	.625
3.875	3.875	3.625	5.437	6.000	2.812	.625
4.000	4.000	3.750	5.562	6.125	2.812	.625

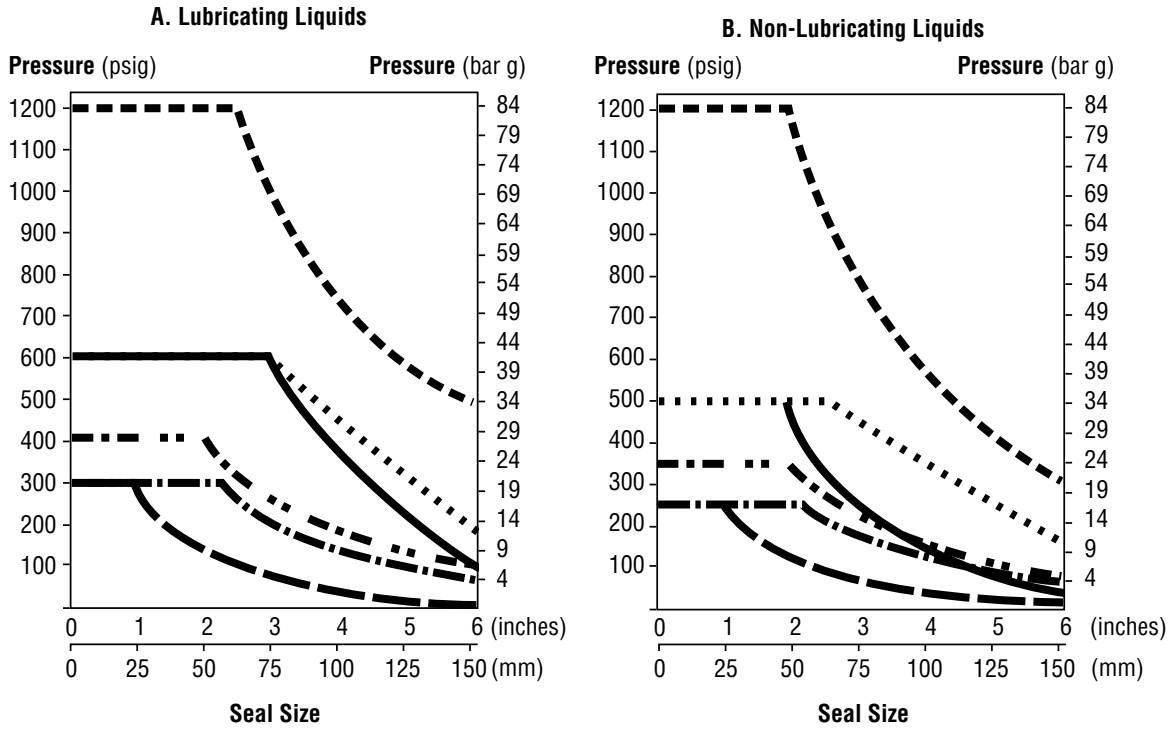
Type 2B Typical Arrangement/Dimensional Data





For ease of installation, the lead-in edge of the shaft or sleeve should be chamfered as shown.

Chart 3. Pressure/Velocity (PV) Limits



- Type 2B - Carbon vs. Silicon Carbide 1800, 3600 rpm
- Type 2B - Carbon vs. Ceramic 1800 rpm
- Type 2B - Carbon vs. Ceramic 3600 rpm
- Type 2 - Carbon vs. Silicon Carbide 1800, 3600 rpm
- Type 2 - Carbon vs. Ceramic 1800 rpm
- Type 2 - Carbon vs. Ceramic 3600 rpm

1. Lubricating liquid is defined as having lubricating properties of gasoline or better. Non-lubricating liquid is defined as having lubricating properties of water or worse.
2. Pressure capabilities to 1200 psig/ 83 bar g are based on lubricating oil service, carbon vs. silicon carbide, and high pressure mating ring support.

Chart 4. Multiplier Factors

To determine the maximum operating pressure for the size of Type 2 or 2B seal required, multiply the maximum pressure from Chart 3 (A or B) by the factors in Chart 4.

	Selection Considerations	Multiplier
Speed	Up to 3600 rpm	x 1.00
	Above 3600 rpm	**
Sealed Fluid Temperature	Below 79˚C/175˚F	x 1.00
	Above 79˚C to 121˚C/175˚F to 250˚F	x .90
	Above 121˚C to 177˚C/250˚F to 350˚F	x .80
	Above 177˚C/350˚F	x .65

** Multiplier = 3600/new speed
Example: If new speed = 4000 rpm
Multiplier = 3600/4000 = .90

Example for Determining PV Limits:

Seal: 51 mm/2 inches diameter Type 2B

Product: Water

Face Material: Carbon vs. Ceramic

Temperature: +80˚C/176˚F

Speed: 1800 rpm

Using Chart 3B, the maximum pressure would be 34 bar g/495 psig.

From Chart 4, apply the multipliers for the specific service requirements to determine the maximum operating pressure for the application.

495 x 1 x .9 = 445 psig/30.7 bar g

The maximum operating pressure of this 2 inch Type 2B Seal is 445 psig/30.7 bar g.

ELASTOMER BELLOWS SEALS

Chart 5. Hydrostatic Pressure Limits

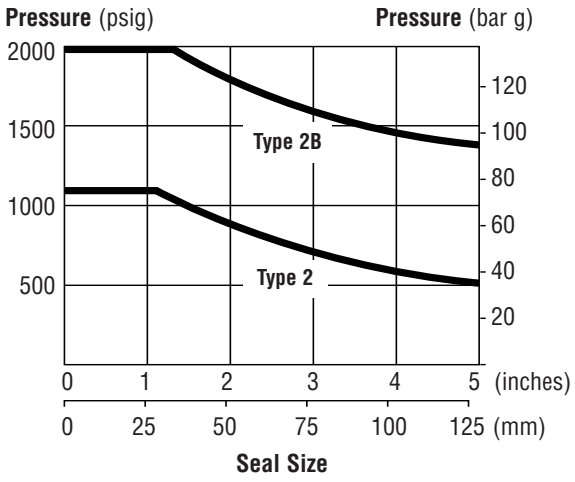


Chart 6. Elastomer Temperature Limits

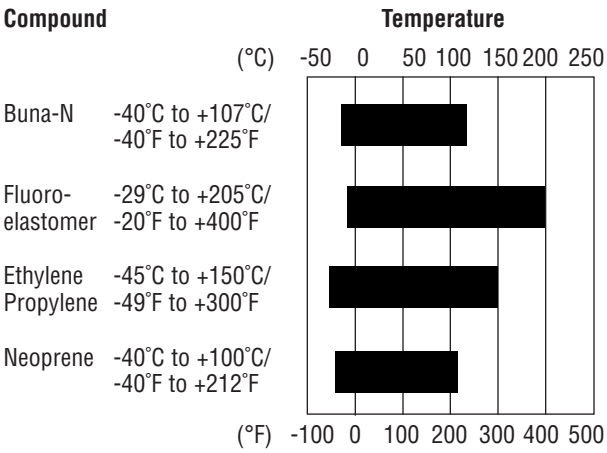
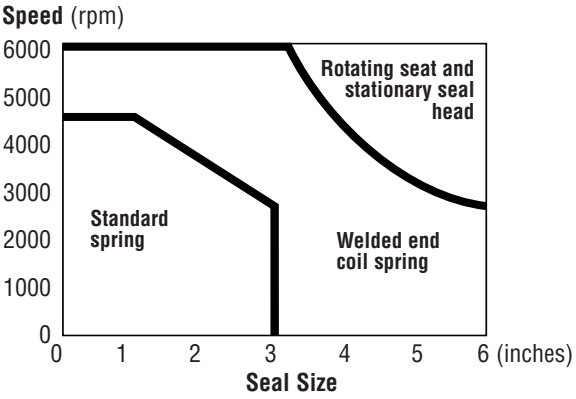


Chart 7. Speed Limits for Coil Springs



Coil spring requirements for rotating Type 2 and 2B seal heads with standard stuffing box diameter.

Chart 8. Recommendation for Viscous Fluids

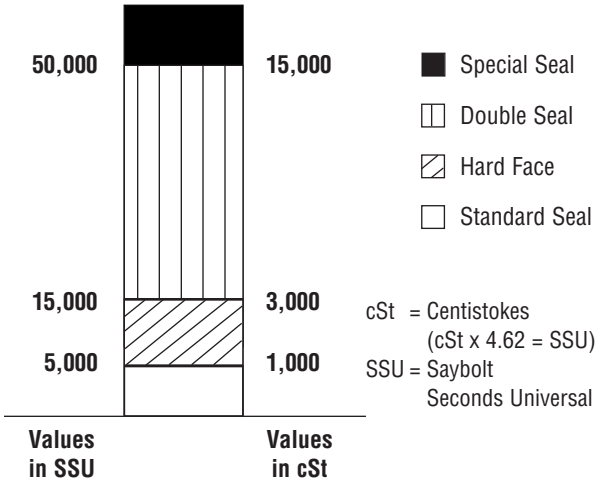


Chart 9. Materials of Construction

Seal Component Materials		Secondary Sealing Elements O-Rings/Mating Rings	Primary Ring	Hardware Retainer, Disc, Drive Band, Spring Holder	Mating Ring	Mechanical Loading Device Springs
Material	Standard	**Buna-N**	**Carbon**	**316 Stainless Steel**		**316 Stainless Steel**
		Fluoroelastomer				
		Ethylene Propylene				
		Neoprene (chloroprene)				
	Options	**Ethylene Propylene** Nuclear Service	**Carbon** Nuclear Service	**Monel**		**Monel**
		Aflas*	**Tungsten Carbide** Nickel Binder	**20 CB-3 SS** Alloy 20		**20 CB-3 SS** Alloy 20
			Solid Silicon Carbide			

* Aflas is a trademark of the Asahi Glass Co. Ltd.

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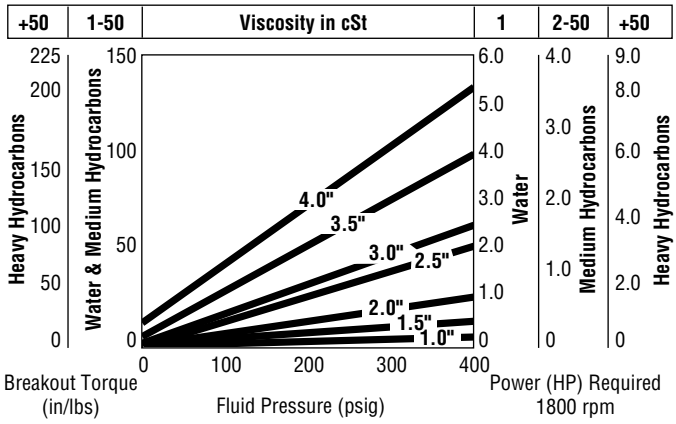
Chart 10. Criteria for Installation

Shaft/Sleeve	Limits
Surface Finish	1.000” to 3.125” dia. 63 Ra
	3.125” dia. and up. 32 Ra
Ovality/Out of Roundness (Shaft)	0.051 mm/0.002”
End Play/ Axial Float Allowance	± 0.13 mm/0.005”

Chart 11. Breakout (Starting) Torque Consumption for Seal



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