



21

ELASTOMER BELLOWS SEAL

Applications

The Type 21, a general purpose seal, has become an industry standard with OEM designers. Made of stainless steel, it provides a service range well beyond that which is possible with comparably priced seals of other metallurgical construction.

- For centrifugal, hydraulic, rotary and turbine pumps, compressors, mixers, blenders, chillers, agitators, and other rotary shaft equipment.
- For use in appliance, automotive, food processing, petrochemical processing, pulp and paper, wastewater and water systems industries.
- Automatic adjustment compensates for abnormal shaft end play, run out, primary ring wear, and equipment tolerances.
- Type 21 can be repaired in the field to minimize replacement costs, downtime and lost revenue.

Operating Conditions

- **Temperatures:** -40°C to +205°C/
-40°F to +400°F
depending on
materials used
- **Pressures:** To 10 bar g/150 psig
- **Speeds:** To 13 m/s /2500 fpm
depending on
configuration and
shaft size

21

INCH RANGE



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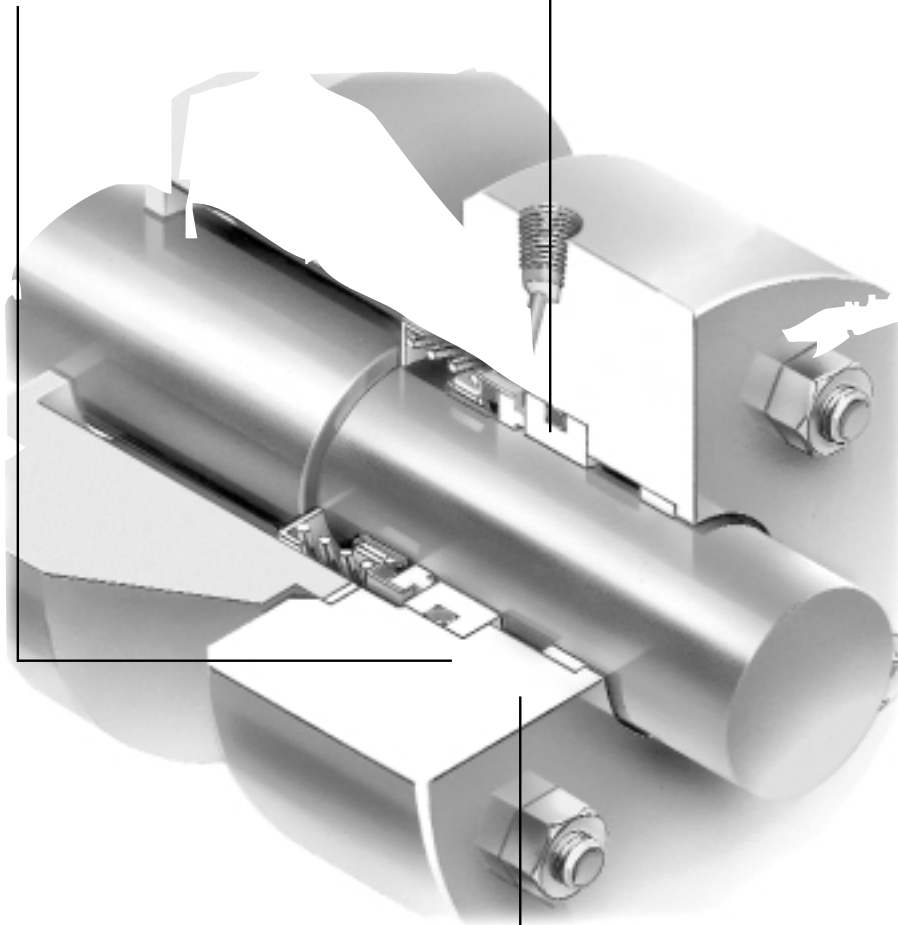
Design Features

Mechanical Drive

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

Non-Clogging, Single Coil Spring

Provides greater dependability than multiple spring designs. Will not foul due to fluid contact.

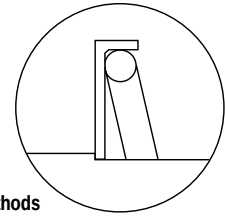
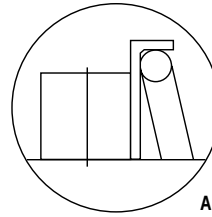
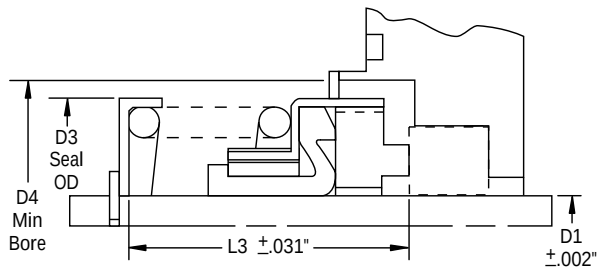


Sealing Faces

Sealing faces lapped to 0.5 micrometer flatness provide effective leakage protection.

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Type 21 Typical Arrangement/Dimensional Data



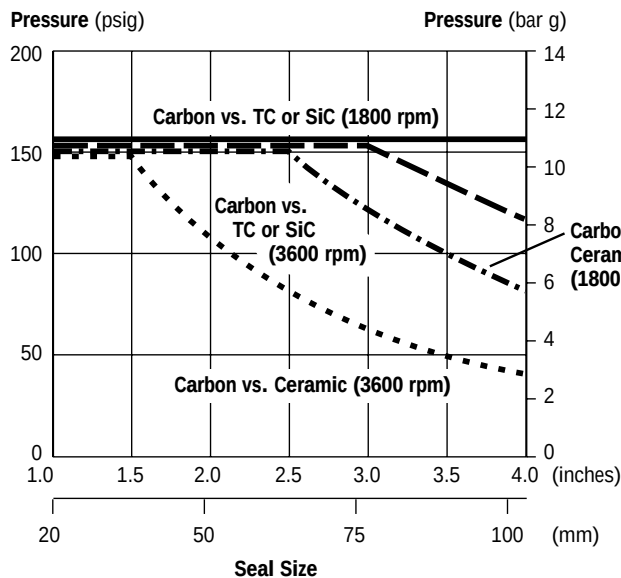
Alternate Methods

Note: For primary ring optional Hard Face Design refer to Drawing F-SK-2665.

Chart 1. Type 21 Dimensional Data (Inches)

Seal Size (Inches)	D1	D3	D4	L3	Seal Size (Inches)	D1	D3	D4	L3
0.250	0.250	0.718	0.843	0.625	2.250	2.250	3.125	3.437	1.687
0.375	0.375	0.812	0.937	0.812	2.375	2.375	3.250	3.562	1.812
0.500	0.500	0.937	1.187	0.812	2.500	2.500	3.343	3.687	1.812
0.625	0.625	1.062	1.187	0.875	2.625	2.625	3.500	4.000	1.937
0.750	0.750	1.187	1.312	0.875	2.750	2.750	3.750	4.125	1.937
0.875	0.875	1.312	1.437	0.937	2.875	2.875	3.875	4.375	2.062
1.000	1.000	1.687	1.937	1.000	3.000	3.000	4.000	4.500	2.062
1.125	1.125	1.812	2.062	1.062	3.125	3.125	4.125	4.750	2.187
1.250	1.250	1.937	2.187	1.062	3.250	3.250	4.250	4.875	2.187
1.375	1.375	2.062	2.312	1.125	3.375	3.375	4.500	5.250	2.187
1.500	1.500	2.187	2.437	1.125	3.500	3.500	4.625	5.375	2.187
1.625	1.625	2.500	2.750	1.375	3.625	3.625	4.750	5.500	2.312
1.750	1.750	2.625	2.875	1.375	3.750	3.750	4.875	5.625	2.312
1.875	1.875	2.750	3.000	1.500	3.875	3.875	5.000	5.750	2.437
2.000	2.000	2.875	3.187	1.500	4.000	4.000	5.125	5.875	2.437
2.125	2.125	3.000	3.312	1.687					

Chart 2. Pressure/Velocity (PV) Limits



1. Lubricating liquid is defined as having lubricating properties of gasoline or better.
2. Pressure capabilities to 10 bar g/150 psig are based on lubricating oil service, F₅₀ carbon vs. tungsten carbide.

TC = Tungsten Carbide
SiC = Silicon Carbide



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Chart 3. Multiplier Factors

To determine the maximum pressure for the size Type 21 Seal required, multiply the maximum pressure from Chart 2 by the following factors to obtain the maximum operating pressure.

	Selection Considerations	Multiplier
Seal Fluid	Gasoline, Kerosene or better	x 1.00
	Aqueous solutions, etc.	x .67
Lubricity		
Sealed Fluid	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

Example for Determining PV Limits:

Seal: 64 mm/2.5 inches diameter Type 21

Product: Gasoline

Face Material: Carbon vs. Ceramic

Temperature: 65°C/150°F

Speed: 3600 rpm

Using Chart 2, the maximum pressure would be 6 bar g/82 psig.

From Chart 3, apply the multipliers for the specific service requirements to determine the maximum operating pressure for the application.

$82 \text{ psig} \times 1 \times 1 = 82 \text{ psig}/6 \text{ bar g}$

The maximum operating pressure for this 2.5 inch diameter Type 21 Seal is 82 psig.

Chart 4. Elastomer Temperature Limits

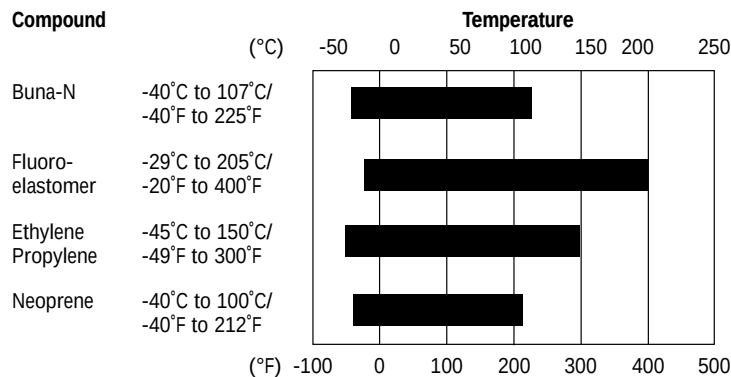
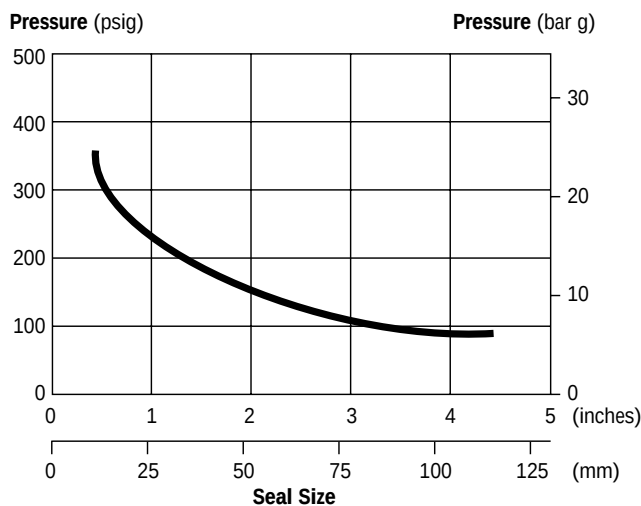


Chart 5. Hydrostatic Pressure Limits





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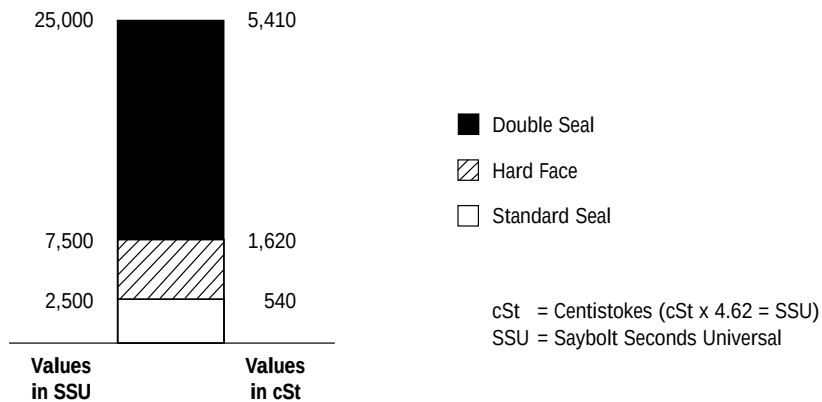
Chart 6. Materials of Construction

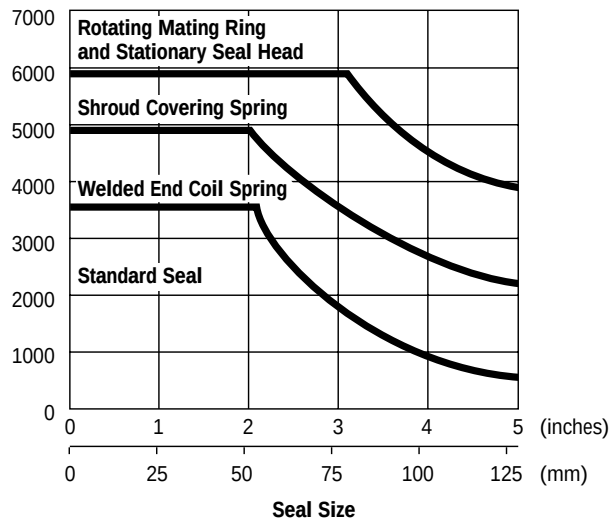
Seal Component Materials		Secondary Sealing Elements Bellows/Mating Rings	Primary Ring	Hardware Retainer, Drive Band, Spring Holder	Mating Ring	Mechanical Loading Device Springs
Material	Standard	Buna-N	Carbon General Service	18-8 Stainless Steel		18-8 Stainless Steel
		Fluoroelastomer	Carbon Hot Water Chromate Resistance	316 Stainless Steel		316 Stainless Steel
		Ethylene Propylene				
		Neoprene				
	Options		Siliconized Graphite	Monel		Monel
			Tungsten Carbide Nickel Binder			
			Solid Silicon Carbide General Service			
			Solid Silicon Carbide Chemical Service			

Chart 7. Criteria for Installation

Shaft/Sleeve	Limits
Surface Finish (Shaft or Sleeve)	Up to 3.125" diameter 125 Ra Over 3.125" diameter 63 Ra
Ovality/Out of Roundness (Shaft)	0.051 mm/0.002"
End Play/ Axial Float Allowance	± 0.13 mm/0.005"

Chart 8. Recommendations for Viscous Fluids



**ELASTOMER BELLOWS SEAL****Chart 9. Speed Limits****Shaft Speed (rpm)****John Crane Mechanical Seals**
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