



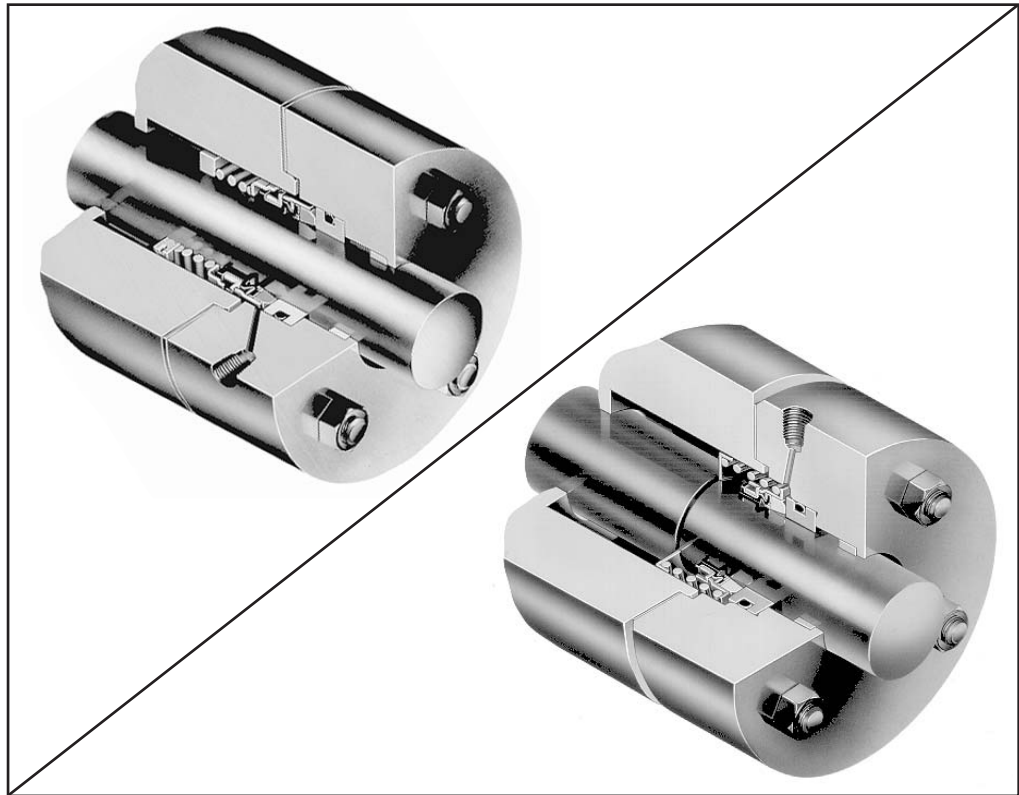
TYPE 1A and 2

Elastomer Bellows Seals

TYPE 1A and 2

Industries Served

Chemical Processing
Conveyor and Industrial Equipment
Cryogenics
Food Processing
Gas Compression
Industrial Blowers and Fans
Marine
Mixers and Agitators
Nuclear Service
Offshore
Oil and Refinery
Paint and Ink
Petrochemical Processing
Pharmaceutical
Pipeline
Power Generation
Pulp and Paper
Wastewater Treatment
Water Desalination
Water Systems



Applications

- For use in pumps, mixers, blenders, agitators, compressors and other rotary shaft equipment.
- For pulp and paper, petrochemical, food processing, wastewater treatment and other demanding applications.

Type 1A and 2 seals are suitable for a wide range of service conditions; from water and steam to chemicals and corrosive materials.

Operating conditions

Temperature: -40°C to +205°C/
-40°F to +400°F
depending on materials used

Pressure: up to 28 bar g/400 psig

Speed: up to 13 m/s/2500 fpm

Design Features/Benefits

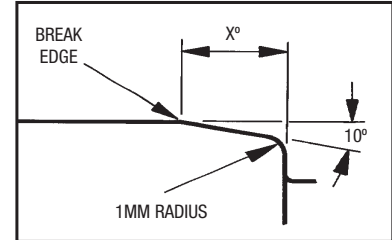
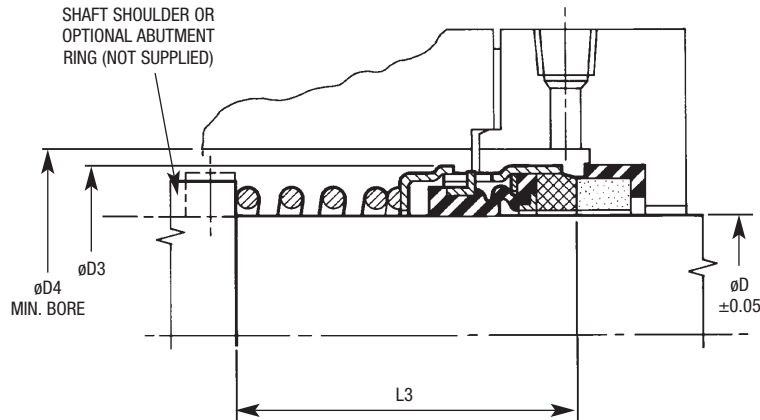
- **Self-Aligning**
Automatic adjustment compensates for abnormal shaft end play, run-out, primary sealing wear, and machinery tolerances, leading to improved service life.
- **Mechanical Drive**
The drive ring's notch design eliminates over-stressing of the elastomer bellows. Slippage is eliminated, protecting the shaft and sleeve from wear.
- **Non-Clogging, Single Coil Spring**
Provides greater dependability than multiple spring designs, and will not run foul due to fluid contact.
- **Special Balancing**
For higher pressure applications, greater operating speeds, and lower wear.
- **Short Working Height (Type 2 only)**
The single spring fits over the seal head.



TYPE 1A

Elastomer Bellows Seals

Typical Type 1A Arrangement/Dimensional Data



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

*Recommended chamfer lengths:

Seal Sizes	X
up to 1.000 in./26mm	- 5.0mm
above 1.000 in. to 2.500 in./	- 6.5mm
26mm to 60mm	- 8.0mm
above 2.500 in./60mm	- 8.0mm

Type 1A Metric Range Dimensional Data (mm)

Seal Size (mm)	Seal Size Code	Seat Size Code	D	D3	D4	L3
14	0140	0158	14	29	32	44
16	0160	0158	16	29	32	44
18	0180	0190	18	32	35	44
19	0190	0190	19	32	35	44
20	0200	0206	20	33	37	44
24	0240	0254	24	38	42	44
25	0250	0254	25	38	42	44
27	0270	0285	27	46	50	60
28	0280	0285	28	46	50	60
29	0290	0285	29	46	50	60
30	0300	0317	30	49	53	60
32	0320	0317	32	49	53	60
34	0340	0349	34	52	56	60
35	0350	0349	35	52	56	60
38	0380	0381	38	56	59	60
40	0400	0412	40	59	62	60

Seal Size (mm)	Seal Size Code	Seat Size Code	D	D3	D4	L3
42	0420	0444	42	62	65	71
45	0450	0444	45	62	65	71
48	0480	0476	48	65	69	71
50	0500	0508	50	68	72	71
54	0540	0539	54	71	75	71
55	0550	0571	55	75	78	71
60	0600	0603	60	78	81	71
65	0650	0666	65	86	89	70
70	0700	0698	70	89	92	70
73	0730	0730	73	92	96	73
75	0750	0762	75	95	99	73
80	0800	0825	80	105	108	79
90	0900	0920	90	114	118	83
95	0950	0952	95	118	121	83
100	1000	1016	100	124	127	86

Type 1A Inch Range Dimensional Data (mm)

Seal Size (inches)	Seal/Seat Size Code	D	D3	D4	L3
0.375	0095	9.52	22	26	44
0.500	0127	12.70	25	29	44
0.625	0158	15.87	29	32	44
0.750	0190	19.05	32	35	44
0.813	0206	20.63	33	37	44
0.875	0222	22.22	35	38	44
1.000	0254	25.40	38	42	44
1.125	0285	28.57	46	50	60
1.250	0317	31.75	49	53	60
1.375	0349	34.92	52	56	60
1.500	0381	38.10	56	59	60
1.625	0412	41.27	59	62	60
1.750	0444	44.45	62	65	71
1.875	0476	47.62	65	69	71
2.000	0508	50.80	68	72	71
2.125	0539	53.97	71	75	71

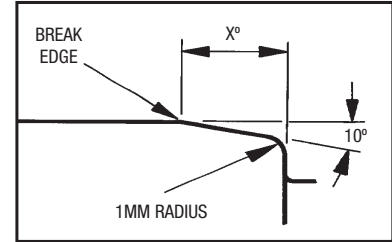
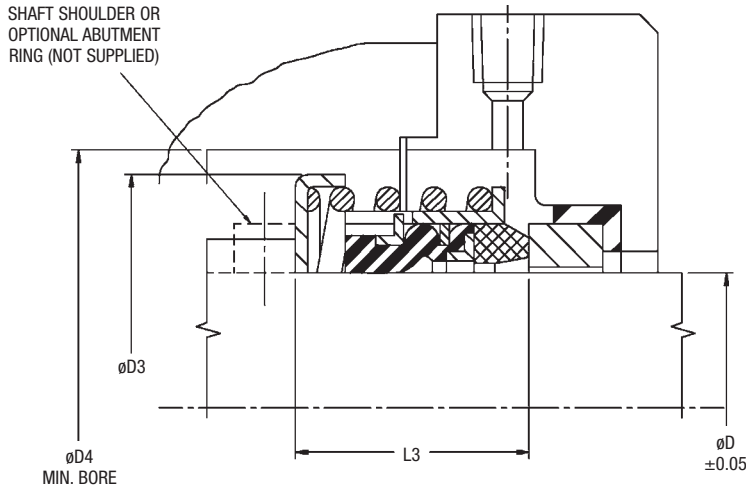
Seal Size (inches)	Seal/Seat Size Code	D	D3	D4	L3
2.250	0571	57.15	75	78	71
2.375	0603	60.32	78	81	71
2.500	0635	63.50	81	84	71
2.625	0666	66.67	86	89	70
2.750	0698	69.85	89	92	70
2.875	0730	73.02	92	96	73
3.000	0762	76.20	95	99	73
3.125	0793	79.37	102	105	79
3.250	0825	82.55	105	108	79
3.375	0857	85.72	108	111	79
3.500	0889	88.90	111	115	79
3.625	0920	92.07	114	118	83
3.750	0952	95.25	118	121	83
3.875	0984	98.42	121	124	86
4.000	1016	101.60	124	127	86



TYPE 2

Elastomer Bellows Seals

Type 2 Typical Arrangement/Dimensional Data



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

*Recommended chamfer lengths:

Seal Sizes	X
up to 1.000 in./26mm	- 5.0mm
above 1.000 in. to 2.500 in./ 26mm to 60mm	- 6.5mm
above 2.500 in./60mm	- 8.0mm

Type 2 Metric Range Dimensional Data (mm)

Seal Size (mm)	Seal Size Code	Seat Size Code	D	D3	D4	L3
12	0120	0127	12	32	35	25
13	0130	0127	13	32	35	25
15	0150	0158	15	35	39	25
16	0160	0158	16	35	39	25
17	0170	0190	17	40	43	25
18	0180	0190	18	40	43	25
19	0190	0190	19	40	43	25
20	0200	0206	20	41	45	25
22	0220	0222	22	43	46	25
24	0240	0254	24	47	50	25
25	0250	0254	25	47	50	25
26	0260	0254	26	47	50	25
28	0280	0285	28	56	59	33
30	0300	0317	30	59	62	33
32	0320	0317	32	59	62	33
34	0340	0349	34	63	66	33
35	0350	0349	35	63	66	33
38	0380	0381	38	67	70	33

Seal Size (mm)	Seal Size Code	Seat Size Code	D	D3	D4	L3
40	0400	0412	40	71	74	33
42	0420	0444	42	74	77	41
43	0430	0444	43	74	77	41
44	0440	0444	44	74	77	41
45	0450	0444	45	74	77	41
48	0480	0476	48	77	81	41
50	0500	0508	50	81	85	41
54	0540	0539	54	84	88	41
55	0550	0571	55	88	91	41
60	0600	0603	60	91	94	41
65	0650	0666	65	100	106	49
70	0700	0698	70	103	109	49
73	0730	0730	73	108	113	52
75	0750	0762	75	111	116	52
80	0800	0825	80	121	127	56
85	0850	0857	85	125	130	56
95	0950	0952	95	134	140	59
100	1000	1016	100	142	147	62

Type 2 Inch Range Dimensional Data (mm)

Seal Size (inches)	Seal/Seat Size Code	D	D3	D4	L3
0.375	0095	9.52	28	32	25
0.500	0127	12.70	32	35	25
0.625	0158	15.87	35	39	25
0.750	0190	19.05	40	43	25
0.813	0206	20.63	41	45	25
0.875	0222	22.22	43	46	25
1.000	0254	25.40	47	50	25
1.125	0285	28.57	56	59	33
1.250	0317	31.75	59	62	33
1.375	0349	34.92	63	66	33
1.500	0381	38.10	67	70	33
1.625	0412	41.27	71	74	33
1.750	0444	44.45	74	77	41
1.875	0476	47.62	77	81	41
2.000	0508	50.80	81	85	41
2.125	0539	53.97	84	88	41

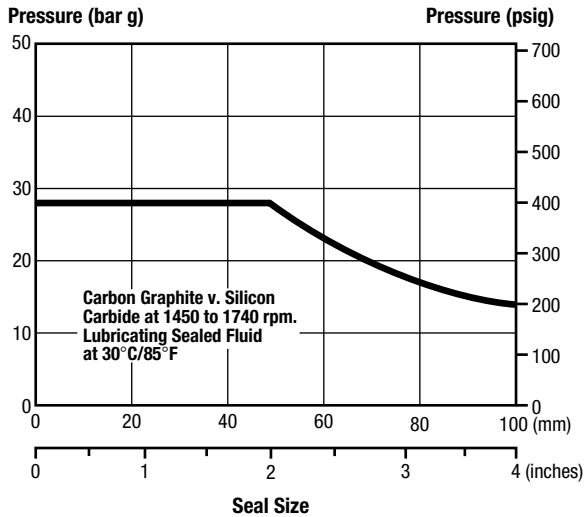
Seal Size (inches)	Seal/Seat Size Code	D	D3	D4	L3
2.250	0571	57.15	88	91	41
2.375	0603	60.32	91	94	41
2.500	0635	63.50	94	97	41
2.625	0666	66.67	100	106	49
2.750	0698	69.85	103	109	49
2.875	0730	73.02	108	113	52
3.000	0762	76.20	111	116	52
3.125	0793	79.37	118	123	56
3.250	0825	82.55	121	127	56
3.375	0857	85.72	125	130	56
3.500	0889	88.90	128	133	56
3.625	0920	92.07	131	137	59
3.750	0952	95.25	134	140	59
3.875	0984	98.42	139	144	62
4.000	1016	101.60	142	147	62



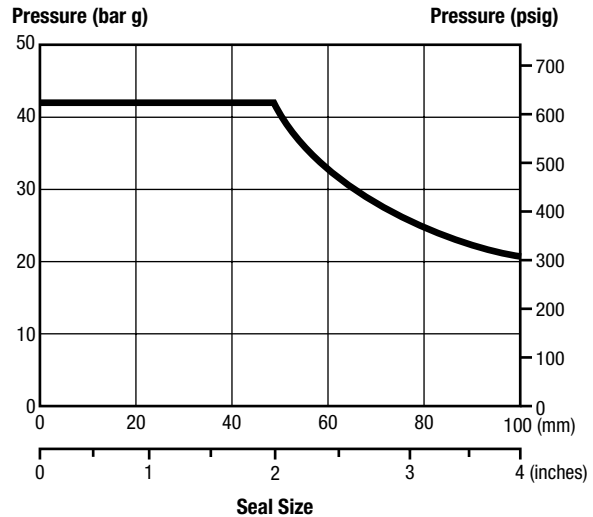
TYPE 1A and 2

Elastomer Bellows Seals

Pressure/Velocity (PV) Limits



Hydrostatic Pressure Limits



To determine the maximum pressure for the size of Type 1A and 2 seal required, multiply the pressure obtained from this table by the appropriate factors given in Hydrostatic Pressure Limits table.

PV Multiplier Factors

	Selection Considerations	Multiplier Factors
Sealed Fluid Lubricity	Petrol, Kerosene or better	x 1.00
	Water, Aqueous Solutions, Lighter Hydrocarbons (s.g. ≤ 0.65), etc.	x 0.75
Face and Seat Materials	Carbon v. Silicon Carbide or Tungsten Carbide	x 1.00
	Carbon v. Aluminium Oxide or Austenitic Cast Iron	x 0.60
	Sintered Silicon Carbide v. Sintered Silicon Carbide	x 0.50
Sealed Fluid Temperature	up to 80°C/175°F	x 1.00
	Above 80°C to 120°C/175°F to 250°F	x 0.90
	Above 120°C to 180°C/250°F to 355°F	x 0.80
	Above 180°C to 230°C/355°F to 445°F	x 0.65
Speed	up to 1800 rpm	x 1.00
	Above 1800 to 3600 rpm	x 0.85

Example for Determining PV Limits:

Seal: 2 in. diameter Type 1A and 2

Product: Water

Face materials: Carbon graphite v. tungsten carbide

Operating temperature: 30°C/85°F

Operating speed: 3000 rpm

Using Pressure/Velocity (PV) Limits table, the maximum pressure would be 26 bar g/375 psig.

From PV Multiplier Factors table, apply the multiplier factors for the specific service requirements: 26 bar g/375 psig x 0.75 x 1.00

x 1.00 x 0.85 = 16.6 bar g/240 psig

Therefore, for the example given, the maximum operating pressure is 16.6 bar g/240 psig.

Recommendations for Viscous Fluids

	Standard Seal and Seat	Standard Seal and Pinned or Clamped Seat	Standard Seal with Hard Face and Pinned or Clamped Hard Seat					Refer to John Crane*
Fluid Viscosity (cSt)	0 to 750	750 to 1000	1000 to 3500					Above 3500
Max. Shaft Velocity (m/s)	20		10	8	6	4	3	*
Min. Radial Seal Clearance (mm)	Std.	5	10					
Heating at Start-Up	Optional		Recommended					

cSt = Kinetic Viscosity Centistokes (cSt x 4.62 = SSU) SSU = Saybolt Seconds Universal



TYPE 1A and 2

Elastomer Bellows Seals

Component and Material Identification Codes

SEAL COMPONENTS		MATERIALS			
Description	Part No.	Standard		Options	
		Material	Code	Material	Code
Bellows	005	Nitrile	130		
Seat O-Ring ('W' & 'WM' Seats)	123	Fluorocarbon	134		
Seat Cup Ring ('N' Seat)	132	Ethylene Propylene	135		
Standard Face	003	Resin Impregnated Carbon		Sintered Silicon Carbide	277
Drive Sleeve	011	316 Stainless Steel	001		
Spring Adaptor	012	Alloy 400 (Monel)	011		
Ferrule	004				
Thrust Ring	*007				
Drive Ring	006	–	–		
Spring	013				
Abutment Ring†	715				
Set Screws†	305				
'WM' Seat	713	99.5% Aluminium Oxide Ceramic	059	Sintered Silicon Carbide (2.500 in. to 4.000 in.)	277
		Cobalt Bonded Tungsten Carbide (up to 2.500 in.)	025		
'N' Seat	131	99.5% Aluminium Oxide Ceramic (up to 2.750 in.)	059	–	–
		Sintered Silicon Carbide (up to 2.750 in.)	277		

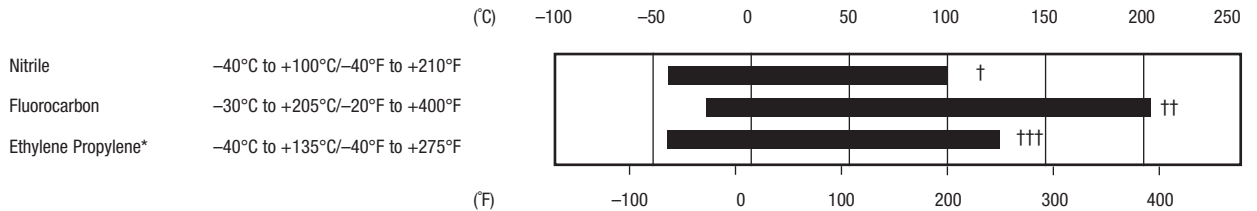
*Thrust ring is not required for seals above size code 0635.

†Optional parts: not supplied unless specially ordered.

Elastomer Temperature Limits

Compound

Temperature



*Not to be used for hydrocarbons or mineral oils.

† For hydrocarbon duties the limit is +120°C/250°F.
 †† For water duties the temperature should not exceed +135°C/275°F.
 ††† For water or steam duties the limit is +150°C/300°F.

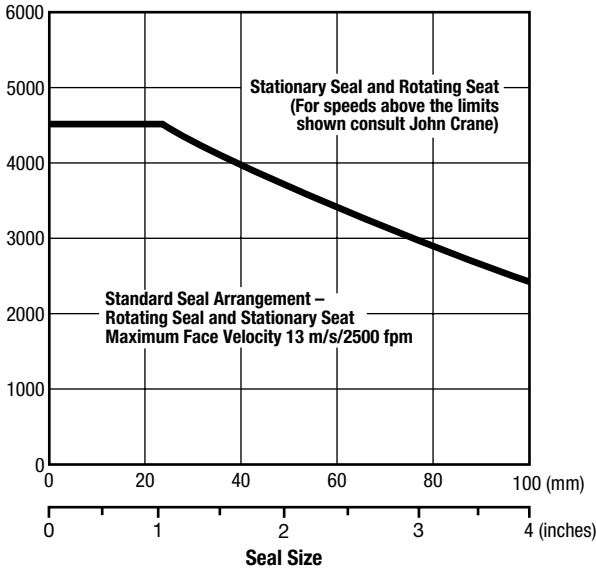


TYPE 1A and 2

Elastomer Bellows Seals

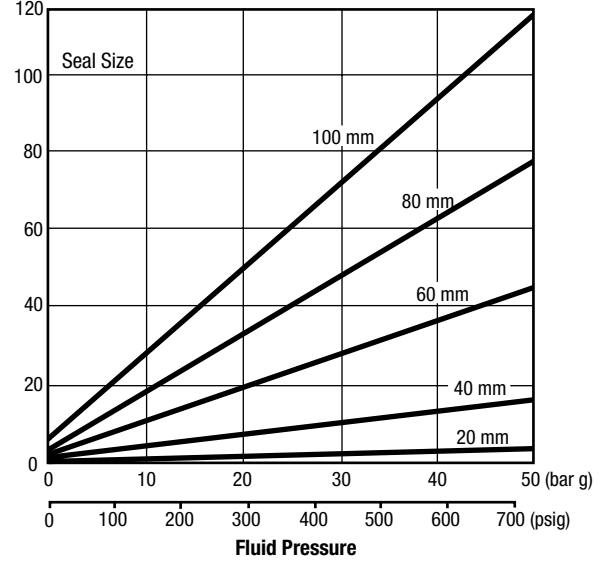
Speed Limits

Shaft Speed (rpm)



Breakout (Starting) Torque

Torque (Nm)



Criteria for Installation

Shaft/Sleeve	Limits
Surface Finish	0.8 to 1.2 $\mu\text{m Ra}$ Fine Machined
Ovality/Out-of-Roundness (Shaft)	0.1mm/ 0.004 in.
End Play/ Axial Float Allowance	0.08mm/ 0.003 in.

Note: The above specifications are given for general guidance only, and cannot be exact for every installation.
If recommendations are required for a specific application, please contact your John Crane Sales/Service Engineer.



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