

TYPE 502 Elastomer bellows seal

Technical Specification



Applications

The Type 502 is a full convolution elastomeric bellows seal designed for confined spaces and limited gland depths. Selfaligning feature compensates for excessive shaft end play and run-out.

- All types of rotary equipment, pumps, marine, mixers, agitators, blowers, fans and compressors in a variety of service applications
- Supplied completely assembled for fast installation and field repairable
- Complies with DIN 24960, ISO 3069, and BS.5257:1975

Design Features

- · Completely assembled one-piece design for fast installation
- Unitized design incorporates positive retainer/key drive from bellows
- Non-clogging, single coil spring provides greater dependability than multiple spring designs. Will not be affected by build-up of solids
- Full convolution elastomeric bellows seal designed for confined spaces and limited gland depths. Self-aligning feature compensates for excessive shaft end play and run-out

Performance Capabilities

- Temperature: -40°C to +205°C (depending on materials used)
- Pressure: up to 40 bar g
- Speed: up to 13 m/s

Typical Applications

- · Paints and inks
- Water
- Weak acids

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
- Water systems
- Wastewater
- Treatment
- Water desalination

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Type 502 Typical Arrangement





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

*Recommended chamfer lengths:

Dim. X
3 mm
8 mm

The working length for both single, L1K, and double, 2 x L1K, Type 502 seals conforms to DIN 24960 without special spacer pieces being needed.

Type 502 Dimensional Data (mm)

Seal	Seal				D	20	
Size	Size	D1	D3	D4	Min.	Max.	L3
(mm)	Code						
14	0140	14	24	26	16.0	22.5	23.0
16	0160	16	26	28	18.0	24.5	23.0
18	0180	18	32	34	20.0	29.0	24.0
20	0200	20	34	36	22.0	31.0	24.0
22	0220	22	36	38	24.0	33.0	24.0
24	0240	24	38	40	26.0	35.2	26.7
25	0250	25	39	41	27.0	36.3	27.0
28	0280	28	42	44	30.0	39.5	30.0
30	0300	30	44	46	32.0	41.5	30.5
32	0320	32	46	48	34.0	43.5	30.5
33	0330	33	47	49	35.0	44.5	30.5
35	0350	35	49	51	37.0	46.5	30.5
38	0380	38	54	58	40.0	51.0	32.0
40	0400	40	56	60	42.0	53.0	32.0
43	0430	43	59	63	45.0	56.0	32.0
45	0450	45	61	65	47.0	58.0	32.0

Seal Seal D20 D1 D3 D4 Min. Size L3 Size Max. Code (mm) 0480 48 48 64 68 50.0 61.0 32.0 50 0500 52.0 50 66 70 63.2 34.0 0530 55.0 53 53 69 73 66.2 34.0 0550 71 55 55 75 57.0 68.2 34.0 0580 78 58 58 83 60.0 74.0 39.0 60 0600 60 80 85 62.0 76.0 39.0 63 0630 63 83 88 65.0 79.0 39.0 0650 65 90 67.0 81.0 65 85 39.0 70 0700 70 89 95 45.5 t + 0750 75 75 96 104 45.5 + + 80 0800 80 104 109 45.0 t † 85 0850 85 108 114 † 45.0 † 90 0900 90 114 119 50.0 1 124 95 0950 95 118 50.0 † 100 1000 100 124 129 50.0

Pressure/Velocity (PV) Limits



Hydrostatic Pressure Limits



To determine the maximum pressure for the size of Type 502 seal required, multiply the pressure obtained from this table by the appropriate factors given in PV multiplier factors table. The maximum operating pressures shown apply under the following conditions: carbon graphite face/primary ring running against a silicon carbide or tungsten carbide seat/mating ring up to 1800 rpm, with a lubricating sealed fluid up to 80°C.

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Pressure/Temperature Limits for Hot Water



The graph shows maximum operating pressures/ temperatures for seal sizes up to and including 68 mm when used with hot water above 80°C.

These pressure capabilities are based on the use of a carbon graphite face, a tungsten carbide seal and ethylene propylene elastomers. The limits are valid for shaft speeds of 3600 rpm maximum, with uncooled product recirculation.

PV Multiplier Factors

	Selection Considerations	Multiplier Factors
Sealed Fluid	Petrol, Kerosene or better	x 1.00
Lubricity	Water, Aqueous Solutions,	
	Lighter Hydrocarbons (s.g. ≤0.65)	x 0.75
Face and Seat	Carbon v. Sintered Silicon Carbide or	x 1.00
Materials	Silicon Carbide Converted Graphite v.	
	Sintered Silicon Carbide	x 0.80
	Tungsten Carbide v. Tungsten Carbide	x 0.60
	Carbon v. Aluminium Oxide or	
	Austenitic Cast Iron	x 0.60
	Sintered Silicon Carbide v.	
	Sintered Silicon Carbide	x 0.50
Sealed Fluid	up to 80°C	x 1.00
Temperature	Above 80°C to 120°C	x 0.90
	Above 120°C to 180°C	x 0.80
	Above 180°C to 230°C	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: 45mm diameter Type 502

Product: Water

Face and seat material: carbon graphite v. aluminium oxide

Operating temperature: +10°C

Operating speed: 1750 rpm

Using pressure/velocity (PV) Limits table, the maximum pressure would be 28 bar g.

From PV multiplier factors table, apply the multiplier factors for the specific service requirements:

28 bar g x 0.75 x 0.60 x 1.00 x 1.00 = 12.6 bar g

Therefore for the example given the maximum operating pressure is 12.6 bar g.

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Speed Limits

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Rotating seals may be used at speeds up to 4000 rpm according to seal size. Above the limit shown, it is necessary to stationary mount the seal unit and use a rotating seat. This would necessitate a special arrangement and would not conform to DIN 24960.

Elastomer Temperature Limits

Compound

Nitrile	-40°C to +100°C
Fluorocarbon	-30°C to +205°C
Ethylene Propylene*	-40°C to +135°C



*Not to be used for hydrocarbons or mineral oils.

+ For hydrocarbon duties the limit is +120°C.

++ For water duties the temperature should not exceed +135°C.

the limit is +150°C.

Sealant Temperature Limits

SEAL COMPONENTS	MATERIALS		
Description	Standard	Options	
Bellows	Nitrile		
Seat 0-ring	Fluorocarbon		
	Ethylene Propylene		
Face	Silicon Carbide Converted Graphite	Antimony Impregnated Carbon Graphite	
	Resin Impregnated Carbon Graphite		
Retainer/Spring/Drive Ring	316 Stainless Steel		
Assembly (Metal Parts Set)			
Securing Ring ('BC' Seat)			
'BO' Seat*	Austenitic Cast Iron (Ni-Resist)	Cobalt Bonded Tungsten Carbide	
'BC' Seat*	Aluminium Oxide Ceramic	Sintered Silicon Carbide	
Abutment Ring ⁺	316 Stainless Steel		
Setscrews ⁺			

*Seat types can be used for applications requiring a secured and/or pinned seat, with PTFE, exfoliated graphite or elastomer seat ring. †Optional parts: not supplied unless specially ordered.

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Criteria for Installation

Shaft/Sleeve	Limits
Surface Finish	0.8 to 1.2 μm Ra Fine Machined
Ovality/Out-of-Roundness	0.1mm/ 0.004 in.
End Play/ Axial Float Allowance	0.08mm/ 0.003 in.
Housing Squareness to Shaft	See Housing Squarness to Shaft table

Housing Squareness to Shaft



Breakout (Starting) Torque



The above specifications are given for general guidance only, and cannot be exact for every installation. The operating parameters shown are the recommended limits for continuous operation, and can be exceeded by a reasonable amount for limited periods. If the required performance for continuous operation is outside the specified limits, contact your John Crane representative.

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