



Type 109 and 109B

PTFE Wedge Seals



Industries Served

Chemical Processing
Cryogenics Food
Processing
Heat Transfer
Mixers and Agitators
Offshore
Oil and Refinery
Paint and Ink
Petrochemical Processing
Pharmaceutical
Pulp and paper

109/109B

Applications

- For extremely corrosive fluid applications such as sulphuric, nitric, phosphoric or hydrochloric acids.

Type 109 & 109B seals are standards for use where expensive and corrosive liquids are being processed. Wedge construction of the secondary sealing element virtually eliminates leakage. A snap ring holds all parts together in a unitized construction design which eases installation and removal.

Operating Conditions

- **Temperature:**
Type 109: -100°C to +500°C /
-150°F to +930°F
Type 109B: -100°C to +500°C /
-150°F to +930°F
depending on materials used
- **Pressure:**
Up to 24 bar g/350 psig
- **Speed:**
Up to 25 m/s/5000 fpm

Design Features / Benefits

Wedge Sealing Member

Available in PTFE and flexible graphite materials. Creates positive seal for use in extreme temperature/chemical applications.

Precision Lapped Sealing Faces

Lapping process results in high precision finish with optimal flatness

Mechanical Drive

Reduces slippage on shaft or sleeve to eliminate galling and premature wear. Seals are bi-rotational.

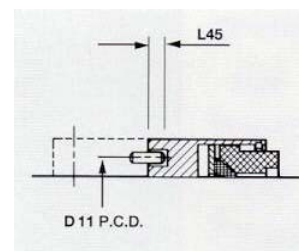
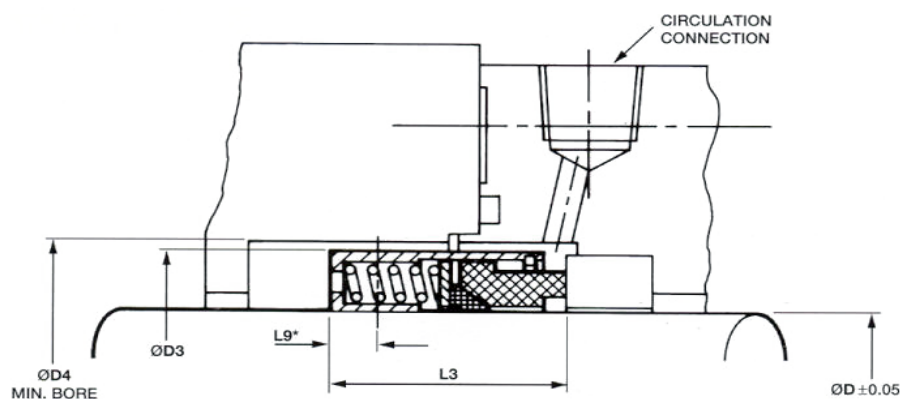
Compact Design

Permits use of all types of rotating equipment, such as centrifugal pumps, mixers and agitators. Type 9T seals comply with the dimensional and other requirements of the ANSI B73-1974 centrifugal pump standard.

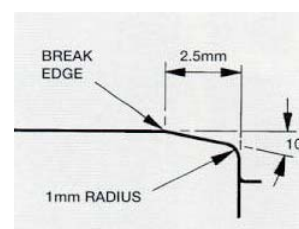
Field Repairable

Reduces inventory requirements. Seals can be repaired easily on-site or at any John Crane seal repair center and/or converted to O-ring seals.

Typical Arrangement / Dimensional Data



Alternative method of drive for Type 109 only, using one-off pin (as above) to be a press fit in driving ring: D12 is pin diameter.



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

† L9 is distance from end of seal to centerline of grub screw.

†† For these codes and dimensions in Chart 1 please consult your John Crane Sales/Service Engineer.

Chart 1. Type 109 Metric Range Dimensional Data (mm)

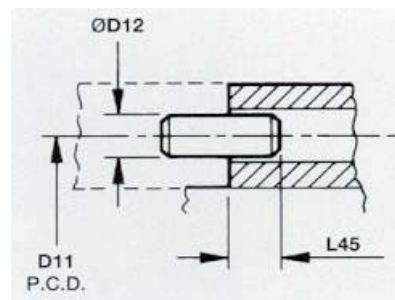
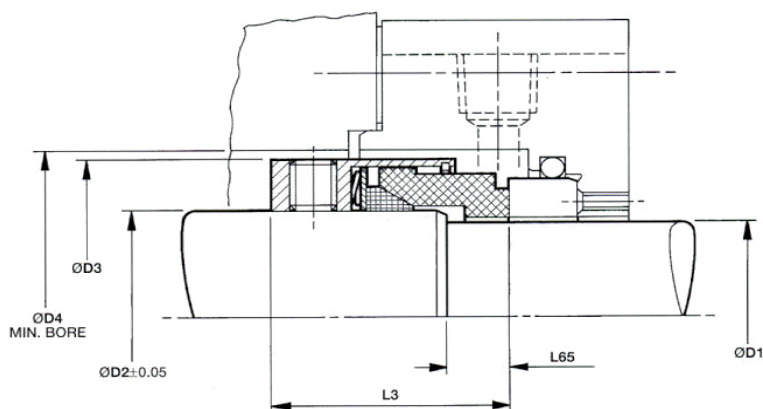
Seal Size	Seal Size Code	Seat Size Code	D	D3	D4	D11	D12	L3	L9	L45
10	100	†	10	†	27.0	16.4	3	21	4.0	3
14	140	†	14	†	31.0	20.6	3	21	4.0	3
15	150	0158	15	29.0	32.0	27.4	3	21	4.0	3
16	160	†	16	†	33.4	22.6	3	19	4.0	3
18	180	0190	18	33.8	36.5	25.8	3	22	4.8	3
20	200	†	20	†	37.0	26.8	3	24	4.8	3
22	220	†	22	†	38.1	27.9	3	24	4.8	3
24	240	†	24	†	41.3	30.6	3	25	4.8	3
25	250	0254	25	39.8	43.0	31.8	3	25	5.0	3
28	280	0285	28	43.4	46.0	36.5	5	27	5.0	5
30	300	0317	30	46.4	49.0	38.0	5	27	5.0	5
32	320	0317	32	49.7	53.0	41.3	5	29	5.0	5
35	350	0349	35	51.3	54.0	43.0	5	29	5.0	5
38	380	0381	38	54.5	58.0	46.0	5	29	5.0	5
40	400	0412	40	59.6	63.0	50.0	5	35	7.0	5
44	440	0444	44	64.0	67.0	54.0	5	35	7.0	5
45	450	0444	45	64.7	68.0	55.0	5	35	7.0	5
48	480	0476	48	67.2	70.0	57.2	5	35	7.0	5
50	500	0508	50	69.6	73.0	60.0	5	35	7.0	6
55	550	†	55	†	80.0	67.0	5	43	8.7	6
60	600	0603	60	82.7	86.0	72.0	5	43	9.0	6
65	650	†	65	†	90.0	76.0	8	43	9.0	8
70	700	0698	70	92.6	96.0	81.0	8	43	9.0	8
75	750	†	75	†	100.0	85.0	8	43	9.0	8
80	800	0793	80	101.1	104.0	90.0	8	43	9.0	8
85	850	†	85	†	110.0	96.0	8	43	9.0	8
90	900	†	90	†	115.0	101.0	8	43	9.0	8
95	950	0952	95	117.7	121.0	106.0	8	43	9.0	8
100	1000	†	100	†	125.0	111.0	8	43	9.0	8
105	1050	1047	105	137.5	141.0	121.0	8	51	10.0	8
110	1100	1111	110	142.5	146.0	126.0	8	51	10.0	8
115	1150	†	115	†	150.0	131.0	10	51	10.0	10
120	1200	1206	120	152.4	155.0	136.0	10	51	10.0	10
125	1250	1270	125	157.4	160.0	141.0	10	51	10.0	10



Type 109B

PTFE Wedge Seal

Typical Arrangement / Dimensional Data



Alternative method of drive for Type 109B only, using one-off pin (not supplied). Pin to be a press fit in the driving collar or impeller, and to engage in the seal retainer as shown.

Chart 2. Type 109B Metric Range Dimensional Data (mm)

Seal Size (inch)	Seal Size Code	Seat Size Code	D	D2	D3	D4	D11	D12	L3	L65	L45
0.625	0158	0127	12.7	15.87	30.8	34	22.6	3	27	3	4.8
0.750	0190	0158	15.9	19.05	34.0	37	25.8	3	30	3	4.8
0.875	0222	0190	19.1	22.22	37.2	40	29.0	3	32	3	6.4
1.000	0254	0222	22.2	25.40	40.3	43	32.2	3	33	3	6.4
1.125	0285	0254	25.4	28.58	43.5	46	36.5	5	35	5	7.9
1.250	0317	0285	28.6	31.75	48.3	51	39.7	5	35	5	7.9
1.375	0349	0285	18.6	34.93	51.5	54	42.9	5	37	5	8.7
1.500	0381	0317	31.8	38.10	54.6	57	46.0	5	37	5	8.7
1.625	0412	0349	34.9	41.28	61.0	64	50.8	5	45	5	8.7
1.750	0444	0381	38.1	44.45	64.2	67	54.0	5	45	5	9.5
1.875	0476	0412	41.3	47.63	67.3	70	57.2	5	45	5	9.5
2.000	0508	0444	44.5	50.80	70.5	73	60.3	5	45	5	9.5
2.125	0539	0476	47.6	53.98	76.9	80	65.9	6	52	6	11.1
2.250	0571	0508	50.8	57.15	80.0	83	69.1	6	52	6	11.1
2.375	0603	0539	54.0	60.33	83.2	86	72.2	6	52	6	11.1
2.500	0635	0571	57.2	63.50	86.4	89	75.4	6	52	6	11.1
2.625	0666	0603	60.3	66.68	89.6	92	77.8	8	52	8	11.1
2.750	0698	0635	63.5	69.85	92.7	96	81.0	8	52	8	11.1
2.875	0730	0666	66.7	73.03	95.9	99	84.1	8	52	8	11.1
3.000	0762	0698	69.9	76.20	97.5	100	86.5	8	52	8	11.1
3.125	0793	0730	73.0	79.38	100.7	104	89.7	8	52	8	11.1
3.250	0714	0762	76.2	82.55	105.4	108	92.7	8	52	8	14.3
3.375	0857	0793	79.4	85.73	108.6	111	96.8	8	52	8	14.3
3.500	0889	0825	82.6	88.90	111.8	115	100.0	8	52	8	14.3
3.625	0920	0857	85.7	92.08	115.0	118	103.2	8	52	8	14.3
3.750	0952	0889	88.9	95.25	118.1	121	106.4	8	52	8	14.3
3.875	0984	0920	92.1	98.43	121.3	124	109.5	8	52	8	14.3
4.000	1016	0952	95.3	101.60	124.5	127	112	8	52	8	14.3
4.125	1047	0984	98.4	104.78	127.7	131	115.9	8	52	8	14.3
4.250	1079	1016	101.6	107.95	130.8	134	119.1	8	52	8	14.3
4.375	1111	1047	104.8	111.13	134.0	137	122.2	8	52	8	14.3
4.500	1143	1079	108.0	114.30	137.2	140	125.4	8	52	8	14.3
4.625	1174	1079	108.0	117.48	149.9	153	133.4	10	64	10	15.9
4.750	1206	1111	111.1	120.65	153.1	156	136.5	10	64	10	15.9
4.875	1238	1143	114.3	123.83	156.2	159	139.7	10	64	10	15.9
5.000	1270	1174	117.5	127.00	159.4	165	142.9	10	64	10	15.9
5.125	1301	1206	120.7	130.18	162.6	168	146.1	10	64	10	15.9
5.250	1333	1238	123.8	133.35	165.8	172	149.2	10	64	10	15.9
5.375	1365	1270	127.0	136.53	168.9	175	152.4	10	64	10	15.9
5.500	1397	1301	130.2	139.70	172.1	178	155.6	10	64	10	15.9
5.625	1428	1333	133.4	142.88	175.3	181	158.8	10	64	10	15.9
5.750	1460	1365	136.5	146.05	178.5	184	161.9	10	64	10	15.9
5.875	1492	1397	139.7	149.23	181.6	187	165.1	10	64	10	15.9
6.000	1524	1428	142.9	152.40	184.8	191	168.3	10	64	10	15.9



Type 109 and 109B

PTFE Wedge Seal

109/109B

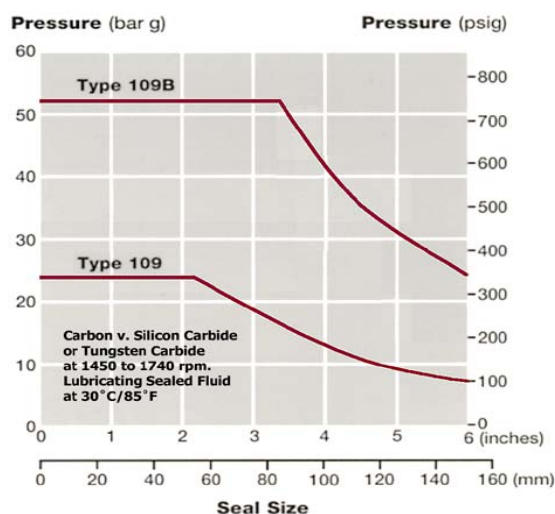
Chart 3. Operating Limits

Pressure	Temperature	Speed
Refer to chart 4	Refer to Chart 6	25m/s/ 5000 fpm and 4000 rpm Maximum

Note: For applications with speeds greater than 25 m/s or 4000 rpm, a rotating seat (RS) arrangement is recommended.

For certain applications it may be possible to exceed the operating parameters shown. If the required performance is outside the specified limits, please contact your John Crane Sales/Service Engineer.

Chart 4. Pressure/Velocity (PV) Limits



To determine the maximum pressure for the size of seal required, multiply the pressure obtained from this chart by the appropriate factors given in Chart 7.

Chart 5. PV Multiplier Factors

	Selection Considerations	Press. Factor
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. tungsten carbide or Silicon carbide	x 1.00
	Carbon v. alumina ceramic or ni-resist	x 0.60
Sealed Fluid Temperature	Bellow 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 0.80

Example for Determining PV Limits:

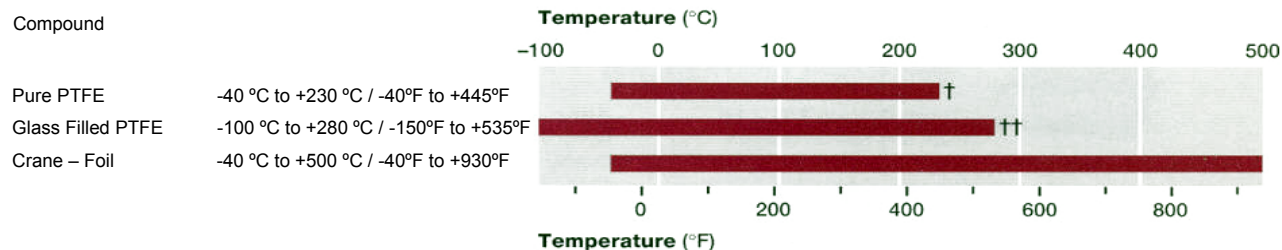
Seal: 2 in. diameter Type 109
Product: Light Hydrocarbon
Face materials: Carbon v. tungsten carbide
Operating temperature: 6CTC/140° F
Operating speed: 2900 rpm

Using Chart 4, the maximum pressure would be 24 bar g/350 psig.

From Chart 5, apply the multiplier factors for the specific service requirements:
24 bar g/350 psig x 0.75 x 1.00 x 1.00 x 0.85 = 15.3 bar g/223 psig.

Therefore for the example given, the maximum operating pressure is 15.3 bar g/223 psig.

Chart 6. Elastomer Seal Seat Ring Temperature Limits



For seat ring duties, PTFE temperature limits are:

† -20°C to +180°C / -5°F to +355°F
†† -50°C to +230°C / -60°F to +445°F



Type 109 and 109B

Specifications

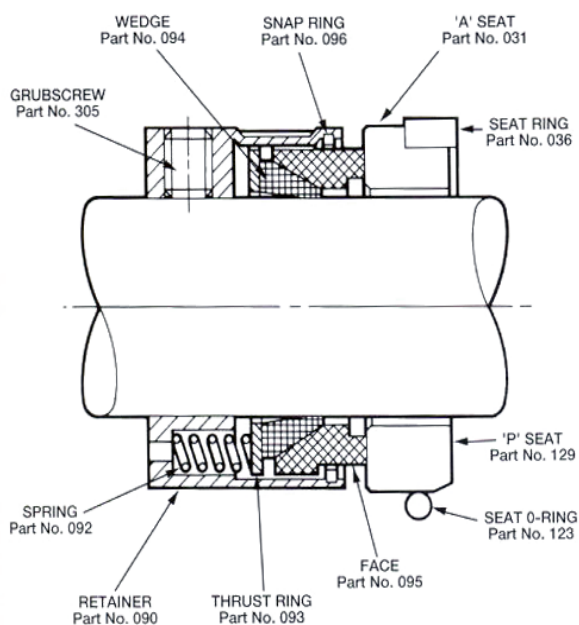
109/109B

Chart 7. Component and Material Identification Codes

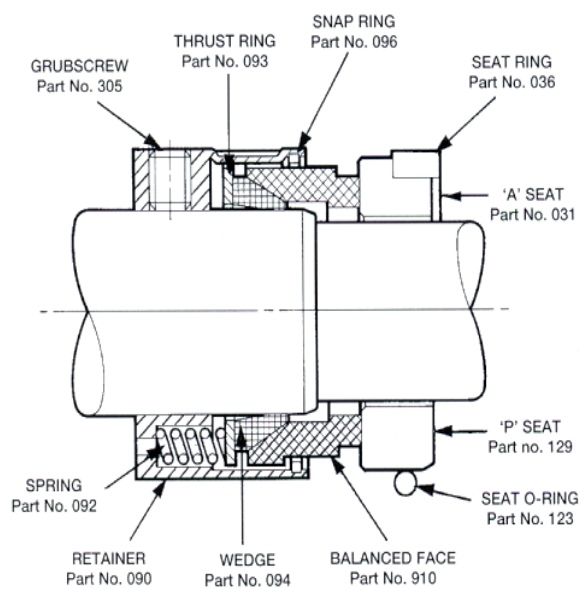
SEAL COMPONENTS			MATERIALS			
Description	Part No.		Standard		Optional	
	Type 109	Type 109B	Material	Code	Material	Code
Wedge	094	032	Pure PTFE Crane foil	138 323	Glass Filled PTFE	139
Seat O-Ring (‘P’ Seat)	123	123	Medium Nitrite Fluorocarbon Ethylene Propylene	130 134 135	Perfluoroelastomer	230
Seat Ring (‘A’ Seat)	036	036	Pure PTFE Crane foil	138 212	Glass Filled PTFE	139
Face	095	395	Resin Impregnated Carbon Glass Filled PTFE	171 139	Carbon Tungsten Carbide Silicon Carbide	218 027 088
Thrust Ring Snap Ring Retainer Grubscrews Spring	093 096 090 305 092	393 096 300 305 392	316 Stainless Steel Monel Alloy C 276 (UNS 10276)	001 011 033	Hastelloy B	012
‘A’ Seat	031	031	Tungsten Carbide Ni-resist Ceramic	025 007 059	Silicon Carbide Hard-Faced Stainless Steel	088 009
‘P’ Seat	129	129	Ni-Resist Tungsten Carbide	007 025	Silicon Carbide	088

Components part Diagram

Type 109



Type 109B





Type 109 and 109B

Specifications

109/109B

Chart 8. Criteria for Installation

Shaft / Sleeve	Limits
Surface Finish	0.1 to 0.25 μ m Ra Polished
Out-Of-Round (Ovality)	0.025 mm / 0.001 in.
Axial Float (End Play)	$\pm$ 0.13 mm / 0.005 in.

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