



Vulcan P.T.F.E. Wedge Type Seals



Section

8



Introduction

Vulcan's extensive 16XX range of Multi-Sprung Seals are commonly specified for arduous applications, such as corrosive process fluids or demanding operating parameters.

The standard designs are available with a chemically resistant PTFE wedge component, which is spring loaded to force the flexible angular lip of the wedge into tight contact with the shaft. The same spring force impacts a sufficient load to the rotary face to create a suitable seal interface with a varied choice of standard stationary seats, most commonly our Type 25 V Seat.

Balanced face designs are also available for higher duty applications. 'O'-Ring variants, of both balanced and non-balanced Types, are available as standard.

All the seal faces and wedges interchange with most common competitor designs by fitting into their retainers.

Applications

The 16XX family range are ideally suited for corrosive duties and are commonly utilised in the chemical industry, due to the inertness and sealing nature of the wedge design.

These seals are also very suitable for a wide spectrum of application conditions. Their operating suitability range is enhanced by the 'O'-Ring alternative design and the wide range of available elastomers.

Standard Vulcan 16XX Types

1609 Series

Standard multi-sprung, grub screwed seal, available in a wide variety of face and secondary seal, materials and designs.

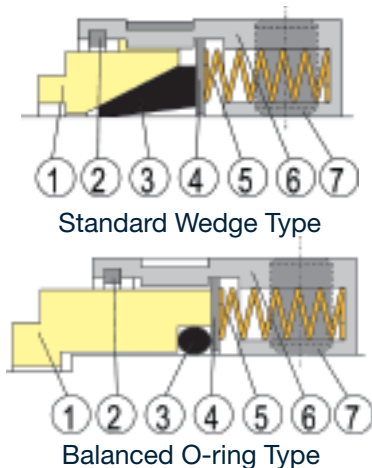
1659 Series

As above, but compact design complies to DIN 24960 (EN12756) and ISO 3069 standards.

1645 Series

Thin profiled, multi-sprung, grub screwed seal, conforming to ANSI B73 for American standard equipment.

STANDARD COMPONENTS



Standard Wedge Type

Balanced O-ring Type

No	Description	4	Plate
1	Face	5	Coils
2	Circlip	6	Retainer
3	Wedge/O-ring	7	Grub Screws

Vulcan Design Advantages

Range

A comprehensive range of these common chemical industry seals are available, from Vulcan, as standard.

Materials

Grade M825 Triple Phenolic Resin Impregnated Carbon has been adopted by Vulcan, as our standard for the 16XX range, in order to offer direct face material equivalence, as well as the ability to swap faces into our most common competitors seals.

316 stainless steel is standard throughout all metal components in the 16XX seal ranges, improving chemical resistance capabilities. Please refer to our data-sheets for all materials alternatives, such as; Hastelloy® Metal parts, Glass Filled P.T.F.E. Wedges or faces and 'O'-Ring material options.

Improved Design

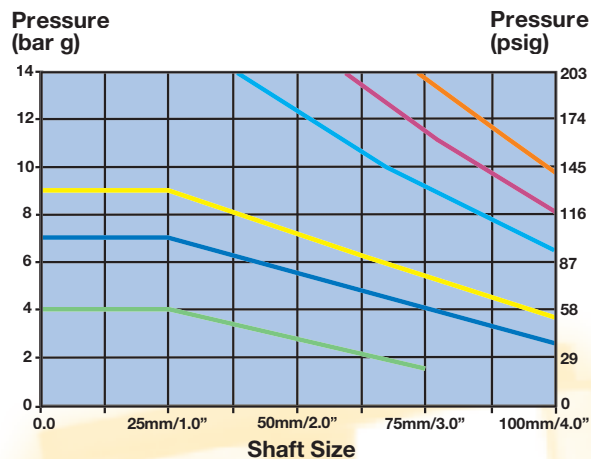
The Vulcan 16XX range are superior performance seals, specifically designed to incorporate a number of improvements, compared to the original seal design and other direct copies.

- No awkward setting pieces - The 16XX designs have eliminated the setting clips, making the seals easier and more reliable to fit.
- Improved face loading values - Vulcan's 16XX proven face loading designs are superior to competitor designs with higher loading values, which are detrimental to seal performance and life.

Reliability

These are proven, very effective designs, highly utilised in many applications. They give extremely reliable performance based upon Vulcan's design improvements and the quality materials utilised.

VULCAN PTFE WEDGE TYPE SEALS PV CHART

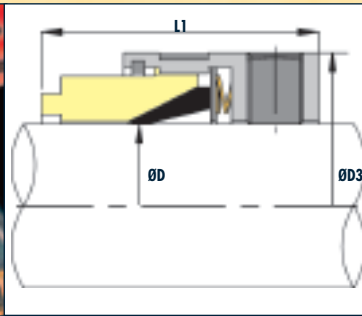


Notes:
 1. Type 1609B/1609BS/1659B/1659BS/1645B/1645BS multiply by factor 1.4
 For information on how to utilise this pV chart please refer to the technical section.

Seal Type	Metric Sizes	Imperial Sizes	DIN/ISO Standard	ANSI Standard	Balanced	Wedge Type	O-Ring	Crane @ Equivalent Type No.
1609	✓	✓	-	-	-	✓	-	109/9/909
1609B	✓	✓	-	-	✓	-	-	109B/9B
1609S	✓	✓	-	-	-	-	✓	8-1/8
1609BS	✓	✓	-	-	-	-	✓	8B1/8B
1659	✓	-	✓	-	-	-	-	59U
1659B	✓	-	✓	-	✓	-	-	59B
1659S	✓	-	✓	-	-	-	✓	58U
1659BS	✓	-	✓	-	✓	-	✓	58B
1645	-	✓	-	✓	-	✓	-	9T
1645B	-	✓	-	✓	✓	-	-	9BT
1645S	-	✓	-	✓	-	-	✓	8-1T
1645BS	-	✓	-	✓	✓	-	✓	8B1T



TYPE 1609/1609S



Multiple Spring seal with a highly effective design, commonly used in chemical and petro-chemical duties. These seals are frequently fitted with the Type 25 seat. Standard Type 1609 incorporates a PTFE Wedge secondary seal, with the alternative 'O'-Ring Type as 1609S.

VULCAN STANDARD SIZES

Shaft Size DØ Inch Metric	Code Size	Shaft Size DØ Metric Inch	Code Size	D1		L1			
				Metric	Inch	Metric	Inch		
0.625	15.88	0158	-	-	30.70	1.209	19.00	0.748	
0.750	19.05	0191	-	-	34.70	1.366	22.20	0.874	
-	-	-	20	0.787	0200	35.70	1.406	24.00	0.945
-	-	-	22	0.866	0220	37.00	1.457	24.00	0.945
0.875	22.23	0222	-	-	38.00	1.496	23.80	0.937	
-	-	-	24	0.945	0240	39.50	1.555	25.00	0.984
-	-	-	25	0.984	0250	40.50	1.594	25.00	0.984
1.000	25.40	0254	-	-	40.50	1.594	25.40	1.000	
-	-	-	28	1.102	0280	44.00	1.732	27.00	1.063
1.125	28.58	0286	-	-	43.50	1.713	27.00	1.063	
-	-	-	30	1.181	0300	47.00	1.850	27.00	1.063
1.250	31.75	0317	-	-	48.30	1.902	27.00	1.063	
-	-	-	32	1.260	0320	50.20	1.976	29.00	1.142
1.375	34.93	0349	-	-	52.00	2.047	28.60	1.126	
-	-	-	35	1.378	0350	52.00	2.047	29.00	1.142
-	-	-	38	1.496	0380	55.60	2.189	29.00	1.142
1.500	38.10	0381	-	-	55.60	2.189	28.60	1.126	
-	-	-	40	1.575	0400	59.70	2.350	35.00	1.378
1.625	41.28	0412	-	-	61.00	2.402	35.00	1.378	
1.750	44.45	0444	-	-	64.30	2.531	35.00	1.378	
-	-	-	45	1.772	0450	64.90	2.555	35.00	1.378
1.875	47.63	0476	-	-	65.10	2.563	35.00	1.378	
-	-	-	48	1.890	0480	65.10	2.563	35.00	1.378
-	-	-	50	1.969	0500	69.70	2.744	35.00	1.378
2.000	50.80	0508	-	-	70.70	2.783	35.00	1.378	
2.125	53.98	0539	-	-	77.00	3.031	43.00	1.693	

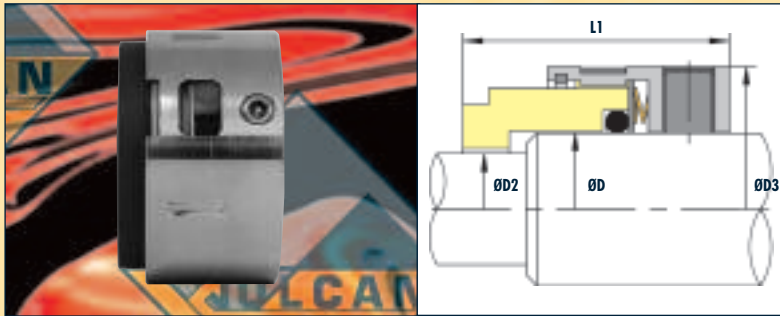
Shaft Size DØ Inch Metric	Code Size	Shaft Size DØ Metric Inch	Code Size	D1		L1			
				Metric	Inch	Metric	Inch		
-	-	-	55	2.165	0550	78.00	3.071	43.00	1.693
2.250	57.10	0571	-	-	-	79.90	3.146	43.00	1.693
2.375	60.30	0603	60	2.362	0600	83.10	3.272	43.00	1.693
2.500	63.50	0635	-	-	-	86.60	3.409	43.00	1.693
-	-	-	65	2.559	0650	88.20	3.472	43.00	1.693
2.625	66.60	0666	-	-	-	89.60	3.528	43.00	1.693
2.750	69.80	0698	-	-	-	92.80	3.654	43.00	1.693
-	-	-	70	2.756	0700	92.80	3.654	43.00	1.693
2.875	73.00	0730	73	2.874	0730	95.50	3.760	43.00	1.693
-	-	-	75	2.953	0750	96.20	3.787	43.00	1.693
3.000	76.20	0762	-	-	-	97.70	3.846	43.00	1.693
3.125	79.40	0794	-	-	-	100.50	3.957	43.00	1.693
-	-	-	80	3.150	0800	101.00	3.976	43.00	1.693
3.250	82.50	0825	-	-	-	105.30	4.146	43.00	1.693
-	-	-	85	3.346	0850	107.50	4.232	43.00	1.693
3.375	85.70	0857	-	-	-	108.30	4.264	43.00	1.693
3.500	88.90	0889	-	-	-	111.50	4.390	43.00	1.693
-	90.00	0900	90	3.543	0900	112.50	4.429	43.00	1.693
3.625	92.10	0921	-	-	-	114.90	4.524	43.00	1.693
-	-	-	95	3.740	0950	117.50	4.626	43.00	1.693
3.750	95.30	0953	-	-	-	118.00	4.646	43.00	1.693
3.875	98.40	0984	-	-	-	121.20	4.772	43.00	1.693
-	-	-	100	3.937	1000	122.50	4.823	43.00	1.693
4.000	101.60	1016	-	-	-	124.60	4.906	43.00	1.693
5.000	127.00	1270	-	-	-	159.00	6.260	51.00	2.008
5.500	139.70	1397	-	-	-	172.00	6.772	51.00	2.008

STANDARD STOCK FACE MATERIALS
Rotary Face: Carbon.
OTHER FACE MATERIALS TO ORDER

Suggested Operating Limits	
PRESSURE 240psi	SPEED 25m/s
TEMPERATURE -100 +200°C	
Dependent upon shaft diameter and speed + Temperature and media to be sealed	



TYPE 1609B/1609BS



Multiple Spring, stepped shaft, balanced seal, alternative to the Type 1609/1609S. Standard Type 1609B utilises a PTFE wedge shaft seal, or specify Type 1609BS for the 'O'-Ring version. Commonly fitted with the next shaft size down Type 25 seat.

VULCAN STANDARD SIZES

Shaft Size DØ		Code Size	D2		D3		L1	
Inch	Metric		Metric	Inch	Metric	Inch	Metric	Inch
0.625	15.88	0158	12.70	0.500	30.70	1.209	27.00	1.063
0.750	19.05	0191	15.80	0.622	34.70	1.366	30.00	1.181
0.875	22.23	0222	19.10	0.752	38.00	1.496	32.00	1.260
1.000	25.40	0254	22.20	0.874	40.50	1.594	33.00	1.299
1.125	28.58	0286	25.40	1.000	43.50	1.713	35.00	1.378
1.250	31.75	0317	28.60	1.126	48.30	1.902	35.00	1.378
1.375	34.93	0349	28.60	1.126	52.00	2.047	37.00	1.457
1.500	38.10	0381	31.80	1.252	55.60	2.189	37.00	1.457
1.625	41.28	0412	34.90	1.374	61.00	2.402	45.00	1.772
1.750	44.45	0444	38.10	1.500	64.30	2.531	45.00	1.772
1.875	47.63	0476	41.30	1.626	65.10	2.563	45.00	1.772
2.000	50.80	0508	44.50	1.752	70.70	2.783	45.00	1.772
2.125	53.98	0539	47.60	1.874	77.00	3.031	52.00	2.047
2.250	57.15	0571	50.80	2.000	79.90	3.146	52.00	2.047
2.375	60.33	0603	54.00	2.126	83.10	3.272	52.00	2.047
2.500	63.50	0635	57.20	2.252	86.60	3.409	52.00	2.047
2.625	66.68	0666	60.30	2.374	89.60	3.528	52.00	2.047
2.750	69.85	0698	63.50	2.500	92.80	3.654	52.00	2.047
2.875	73.03	0730	66.70	2.626	95.50	3.760	52.00	2.047
3.000	76.20	0762	69.90	2.752	97.70	3.846	52.00	2.047
3.125	79.38	0794	73.00	2.874	100.50	3.957	52.00	2.047
3.250	82.55	0825	76.20	3.000	105.30	4.146	52.00	2.047
3.375	85.73	0857	79.40	3.126	108.30	4.264	52.00	2.047
3.500	88.90	0889	82.60	3.252	111.50	4.390	52.00	2.047
3.625	92.08	0921	85.70	3.374	114.90	4.524	52.00	2.047
3.750	95.25	0953	88.90	3.500	118.00	4.646	52.00	2.047
3.875	98.43	0984	92.10	3.626	121.20	4.772	52.00	2.047
4.000	101.60	1016	95.30	3.752	124.60	4.906	52.00	2.047

Suggested Operating Limits

PRESSURE 320psi SPEED 25m/s
 TEMPERATURE -100 +200°C

Dependent upon shaft diameter and speed + Temperature and media to be sealed

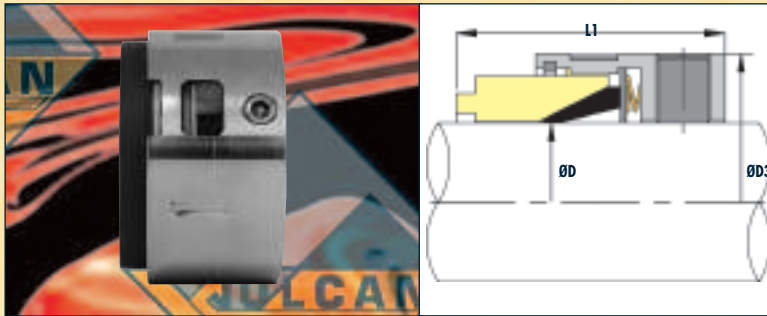
STANDARD STOCK FACE MATERIALS

Rotary Face: Carbon.

OTHER FACE MATERIALS TO ORDER



TYPE 1645/1645S



Narrow profile, multiple-spring seal, designed for common American installation dimensions, in chemical process industry equipment. Complies with ANSI B73-1974 centrifugal pump standard. Standard Type 1645 utilises a PTFE Wedge secondary seal and Type 1645S uses an 'O'-Ring. Commonly fitted with Vulcan Type 25 seat.

VULCAN STANDARD SIZES

Shaft Size DØ			D3		L1	
Inch	Metric	Code Size	Metric	Inch	Metric	Inch
0.500	12.70	0127	23.80	0.937	23.80	0.937
0.625	15.88	0158	27.00	1.063	23.80	0.937
0.750	19.05	0191	30.20	1.189	23.80	0.937
0.875	22.23	0222	33.40	1.315	23.80	0.937
1.000	25.40	0254	36.50	1.437	25.40	1.000
1.125	28.58	0286	39.70	1.563	25.40	1.000
1.250	31.75	0317	42.90	1.689	25.40	1.000
1.375	34.93	0349	49.30	1.941	34.90	1.374
1.437	36.50	0365	49.30	1.941	28.60	1.126
1.500	38.10	0381	49.30	1.941	28.60	1.126
1.625	41.28	0412	57.20	2.252	29.40	1.157
1.750	44.45	0444	58.80	2.315	34.90	1.374
1.875	47.63	0476	63.50	2.500	34.90	1.374
2.000	50.80	0508	66.70	2.626	34.90	1.374
2.125	53.98	0539	71.50	2.815	42.80	1.685
2.250	57.15	0571	72.30	2.846	34.90	1.374
2.375	60.33	0603	76.20	3.000	42.80	1.685
2.500	63.50	0635	79.40	3.126	34.90	1.374
2.625	66.68	0666	82.60	3.252	42.80	1.685
2.750	69.85	0698	85.70	3.374	42.80	1.685
2.875	73.03	0730	88.90	3.500	42.80	1.685
3.000	76.20	0762	92.10	3.626	42.80	1.685
3.125	79.38	0794	95.30	3.752	42.80	1.685
3.250	82.55	0826	98.40	3.874	42.80	1.685
3.375	85.73	0857	101.60	4.000	42.80	1.685
3.500	88.90	0889	104.80	4.126	42.80	1.685
3.625	92.08	0921	108.00	4.252	42.80	1.685
3.750	95.25	0953	111.10	4.374	42.80	1.685
3.875	98.43	0984	114.30	4.500	42.80	1.685
4.000	101.60	1016	117.50	4.626	42.80	1.685

STANDARD STOCK FACE MATERIALS

Rotary Face: Carbon.

OTHER FACE MATERIALS TO ORDER

Suggested Operating Limits

PRESSURE 240psi

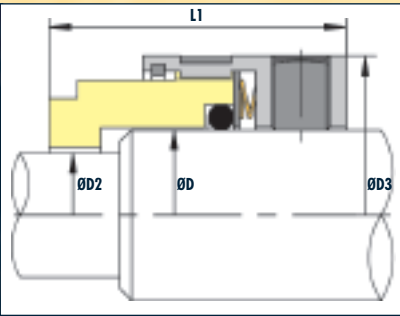
SPEED 25m/s

TEMPERATURE -100 +200°C

Dependent upon shaft diameter and speed + Temperature and media to be sealed



TYPE 1645B/1645BS



Multiple-Spring, stepped shaft, balanced seal to common American Installation dimensions.

Standard Type 1645B incorporates a PTFE Wedge secondary seal with Type 1645BS being the 'O'-Ring variant. Commonly fitted with the next shaft size down Type 25 seat.

VULCAN STANDARD SIZES

Shaft Size DØ	Code	D2		D3		L1		
		Inch	Metric	Inch	Metric	Inch	Metric	
0.750	0191	19.05	15.80	0.622	30.20	1.189	31.70	1.248
0.875	0222	22.23	19.10	0.752	33.40	1.315	31.70	1.248
1.000	0254	25.40	22.20	0.874	37.50	1.476	33.30	1.311
1.125	0286	28.58	25.40	1.000	40.70	1.602	34.90	1.374
1.250	0317	31.75	28.60	1.126	43.90	1.728	34.90	1.374
1.375	0349	34.93	28.60	1.126	49.30	1.941	42.80	1.685
1.500	0381	38.10	31.70	1.248	49.30	1.941	36.40	1.433
1.625	0412	41.28	34.90	1.374	57.20	2.252	40.40	1.591
1.750	0444	44.45	38.10	1.500	58.80	2.315	44.40	1.748
1.875	0476	47.63	41.20	1.622	63.50	2.500	44.40	1.748
2.000	0508	50.80	44.40	1.748	66.70	2.626	44.40	1.748
2.125	0539	53.98	47.60	1.874	71.50	2.815	52.30	2.059
2.250	0571	57.15	50.80	2.000	72.30	2.846	44.40	1.748
2.375	0603	60.33	53.90	2.122	76.20	3.000	52.30	2.059
2.500	0635	63.50	57.10	2.248	79.40	3.126	44.40	1.748
2.625	0666	66.68	60.30	2.374	82.60	3.252	52.30	2.059
2.750	0698	69.85	63.50	2.500	85.70	3.374	52.30	2.059
2.875	0730	73.03	66.60	2.622	88.90	3.500	52.30	2.059
3.000	0762	76.20	69.80	2.748	92.10	3.626	52.30	2.059
3.125	0794	79.38	73.00	2.874	95.30	3.752	52.30	2.059
3.250	0826	82.55	76.20	3.000	98.40	3.874	52.30	2.059
3.375	0857	85.73	79.30	3.122	101.60	4.000	52.30	2.059
3.500	0889	88.90	82.50	3.248	104.80	4.126	52.30	2.059
3.625	0921	92.08	85.70	3.374	108.00	4.252	52.30	2.059
3.750	0953	95.25	88.90	3.500	111.10	4.374	52.30	2.059
3.875	0984	98.43	92.00	3.622	114.30	4.500	52.30	2.059
4.000	1016	101.60	95.20	3.748	117.50	4.626	52.30	2.059

Suggested Operating Limits

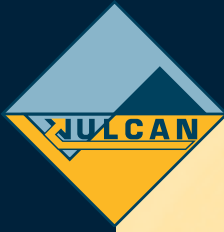
PRESSURE 320psi SPEED 25m/s
TEMPERATURE -100 +200°C

Dependent upon shaft diameter and speed + Temperature and media to be sealed

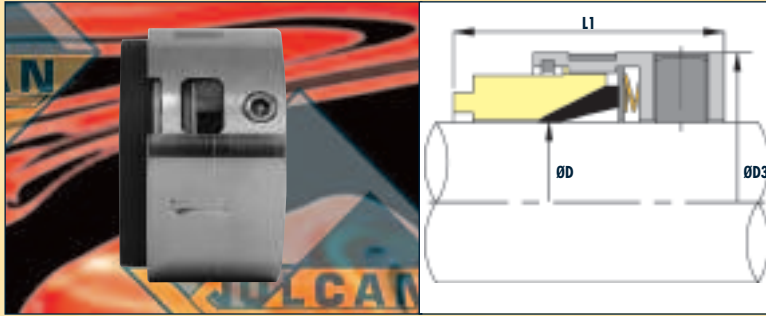
STANDARD STOCK FACE MATERIALS

Rotary Face: Carbon.

OTHER FACE MATERIALS TO ORDER



TYPE 1659/1659S



Narrow profile, multiple spring seal with a highly efficient design, frequently specified in chemical process industry pumps. Use Type 1659 with a PTFE Wedge or Type 1659S for 'O'-Ring variant. Commonly fitted with Vulcan Type 24 DIN Long or Type 24 DIN Short Stats.

VULCAN STANDARD SIZES

Metric Shaft Size D	Size Code	D3	L1
16	0160	26.00	23.00
18	0180	32.20	24.00
20	0200	34.20	24.00
22	0220	36.50	24.00
24	0240	38.60	26.70
25	0250	40.00	27.00
28	0280	43.00	30.00
30	0300	45.00	30.50
32	0320	47.10	30.50
33	0330	48.20	30.50
35	0350	50.00	30.50
38	0380	54.00	32.00
40	0400	56.00	32.00
43	0430	59.00	32.00
45	0450	61.00	32.00
48	0480	64.00	32.00
50	0500	66.30	34.00
53	0530	68.70	34.00
55	0550	70.80	34.00
58	0580	78.00	39.00
60	0600	79.80	39.00
63	0630	82.80	39.00
65	0650	85.50	39.00
68	0680	87.80	39.00
70	0700	90.00	45.50
75	0750	95.20	45.50
80	0800	103.80	45.00
85	0850	109.10	45.00
90	0900	113.80	50.00
95	0950	118.50	50.00
100	1000	123.50	50.00

STANDARD STOCK FACE MATERIALS

Rotary Face: Carbon.

OTHER FACE MATERIALS TO ORDER

Suggested Operating Limits

PRESSURE 240psi

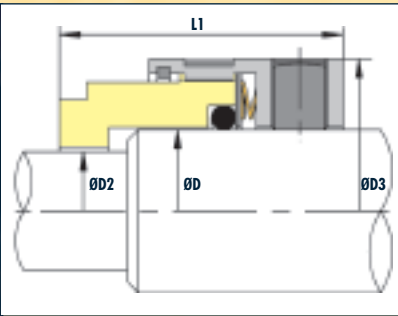
SPEED 25m/s

TEMPERATURE -100 +200°C

Dependent upon shaft diameter and speed + Temperature and media to be sealed



TYPE 1659B/1659BS



Multiple-Spring, stepped shaft, balanced seal. Standard Type 1659B incorporates a PTFE Wedge shaft seal, or specify Type 1659BS for the 'O'-Ring version.

Commonly supplied with a suitable smaller shaft size Type 24 DIN Long or Type 24 DIN Short Seat.

VULCAN STANDARD SIZES

Metric Shaft Size D	Size Code	D2	D3	L1
18	0180	14.00	32.20	30.50
20	0200	16.00	34.20	30.50
22	0220	18.00	36.50	31.50
24	0240	20.00	38.60	31.50
28	0280	24.00	43.00	34.20
30	0300	25.00	45.00	34.50
33	0330	28.00	48.20	37.50
35	0350	30.00	50.00	38.00
38	0380	33.00	54.00	38.00
40	0400	35.00	56.00	38.00
43	0430	38.00	59.00	39.50
45	0450	40.00	61.00	39.50
48	0480	43.00	64.00	39.50
50	0500	45.00	66.30	39.50
53	0530	48.00	68.70	39.50
55	0550	50.00	70.80	44.00
58	0580	53.00	78.00	44.00
60	0600	55.00	79.80	44.00
63	0630	58.00	82.80	49.00
65	0650	60.00	85.50	49.00
68	0680	63.00	87.80	49.00
70	0700	65.00	90.00	49.00
75	0750	70.00	95.50	55.50
80	0800	75.00	103.80	55.50
85	0850	80.00	109.10	55.00
90	0900	85.00	113.80	60.00
95	0950	90.00	118.50	60.00
100	1000	95.00	123.50	60.00

Suggested Operating Limits

PRESSURE 320psi SPEED 25m/s

TEMPERATURE -100 +200°C

Dependent upon shaft diameter and speed + Temperature and media to be sealed

STANDARD STOCK FACE MATERIALS

Rotary Face: Carbon.

OTHER FACE MATERIALS TO ORDER