



Vulcan Parallel Spring 'O'-Ring Mounted Seals



Section

7



INTRODUCTION

The Vulcan Type 95 to 98 Series (referred to below as the Type 9x range) mechanical seals are robust, general purpose, parallel spring, seals, to suit standard metric and imperial housing dimensions, that are commonly found mainly in the marine and textile industries. These are a direct replacement for John Crane®/Flexibox® Types R00, R10, R20 and R30 series, together with Pillar® US1, US2 and US3 series (CGU).

APPLICATIONS

The Type 9x seal ranges are mainly used in marine pump applications, but are designed to satisfy the sealing requirements of rotating shaft equipment for a wide variety of industrial applications, including; marine, textile, pulp and paper, refrigeration compressors, waste-water treatment etc.

STANDARD VULCAN® TYPES

Types 95, 96 and 97

These are the standard series 9x range, supplied with either solid or inserted rotary face, in a wide variety of face and elastomer materials.

All types provide a positive drive to the rotary face, by a heavy duty spring, which is supplied either with left or right-hand wound springs, depending on whether clockwise or anti-clockwise shaft direction.

Three versions are available and vary only by the method of providing the drive to the rotary seal face.

 Type 95 - Drives directly from shaft.

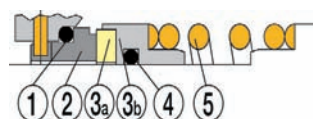
 Type 96 - Consists of the Type 95 components with the addition of a split ring and washer for simple shaft abutment.

 Type 97 - Consists of the Type 95 components with the addition of a grub screw drive collar.

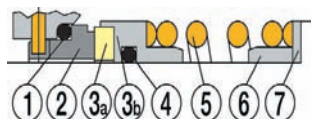
Type 98

Heavy duty, single spring, pusher type seal, supplied with either solid or inserted rotary face, in a wide variety of face and elastomer materials. Seal is driven by a grub screw collar, similar to the Type 97. The Type 98 design is unique compared to Type 95, 96 and 97, as it designed to suit different housing sizes and is supplied with a double 'O'-Ring stationary seat, as standard.

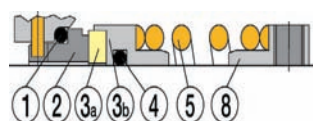
STANDARD COMPONENTS



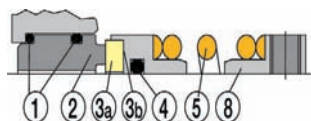
TYPE 95



TYPE 96



TYPE 97



TYPE 98

No	Description		
4	Rotary 'O'-Ring		
1	Stationary 'O'-Ring	5	Coil
2	Stationary Seat	6	Split Ring
3a	Rotary Face	7	Washer
3b	Seal Head Retainer	8	Drive Collar with Grub Screws

VULCAN® DESIGN ADVANTAGES

Face Material Options

All 9x Types are available from stock, with a wide range of face and stationary materials, including Tungsten Carbide, Silicon Carbide, Ceramic inserted rotary faces, Monolithic Stainless Steel rotary faces, and Carbon, Tungsten Carbide or Silicon Carbide stationaries.

The full range of stock materials are shown on each seal type page following.

Design

The Vulcan 9x seal ranges can either be supplied with solid rotary faces or inserted hard faces, with improved tracking capabilities to many competitors equivalents.

Seal face loading has been designed to ensure optimum seal performance and therefore prolong seal life.

Some main competitors seals do not have a linear progression of increasing spring force with shaft size nor optimum face closing forces.

Superior Face Combinations

As is evidenced from face material factors applied to the PV Chart below and from any Seal Technical literature. The competitor norms of Stainless Steel vs Carbon or Ceramic vs Carbon faces, as standard on their seals, have substantially lower capability, performance and life in comparison to Vulcans preferred face combination of Carbon vs Silicon Carbide.

This Carbon vs Reaction Bonded Silicon Carbide face combination is offered as the standard by Vulcan, at no extra price, to give the very best quality and performance.

Why compromise on quality or accept a higher price for the best seal face combination, for demanding, common marine and textile duties?

VULCAN® PARALLEL SPRING 'O'-RING MOUNTED TYPE SEALS PV CHART

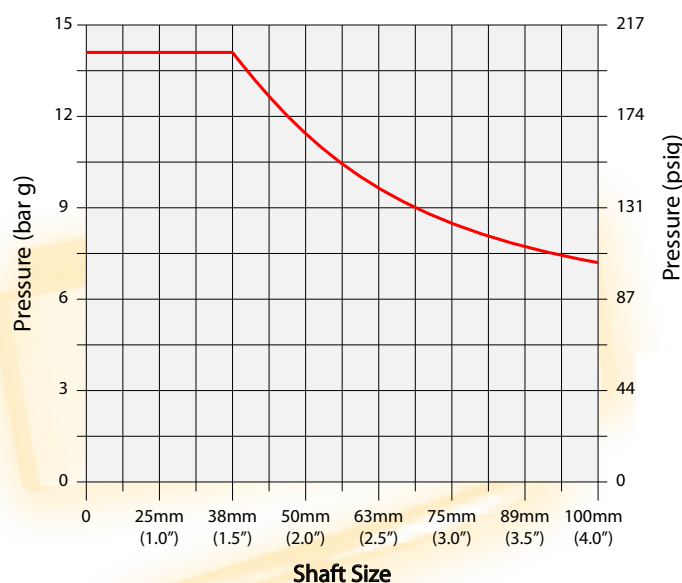
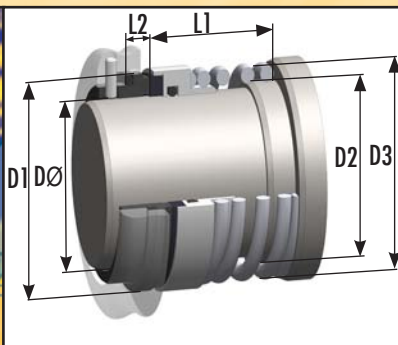
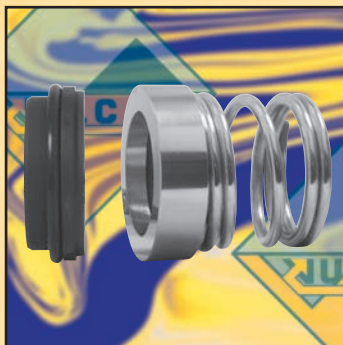


CHART BASED UPON: REACTION BONDED SILICON CARBIDE SEAL FACES VS CARBON

 95, 96, 97 AND 98



TYPE 95



Robust, general purpose, unbalanced pusher-type, 'O'-Ring mounted seal, capable of many shaft-sealing duties. The Type 95 drives directly from the shaft, via a raised area of the shaft.

Available as standard with the Type 95 stationary, with anti-rotation provision and with either Monolithic Stainless Steel head, or with inserted Carbide faces, as per the Face Material Codes shown below.

VULCAN STANDARD SIZES

Imperial Shaft Size DØ	Metric Shaft Size DØ	Size Code	D1	D2	D3	L1	L2	SLOT WIDTH	SLOT DEPTH
0.625		0158	28.57	19.05	29.00	24.50	9.00	5.00	5.00
0.750		0191	31.75	22.23	32.50	24.50	9.00	5.00	5.00
	20	0200	33.32	24.00	34.50	27.50	9.00	5.00	5.00
0.875		0222	34.93	25.40	34.93	26.00	9.00	5.00	5.00
	25	0250	39.85	28.57	38.10	30.00	10.00	5.00	5.00
1.000		0254	39.85	28.57	38.10	30.00	10.00	5.00	5.00
	28	0280	43.05	31.75	42.60	31.50	10.00	5.00	5.00
1.125		0286	43.05	31.75	42.60	31.50	10.00	5.00	5.00
	30	0300	44.63	33.32	45.50	31.50	10.00	5.00	5.00
1.250		0317	46.32	34.92	46.20	34.50	10.00	5.00	5.00
	32	0320	46.32	34.92	46.20	34.50	10.00	5.00	5.00
1.375		0349	49.48	38.10	49.50	37.50	10.00	5.00	5.00
	35	0350	49.48	38.10	49.50	37.50	10.00	5.00	5.00
	38	0380	52.56	42.88	52.50	37.50	10.00	5.00	5.00
1.500		0381	52.56	42.88	52.50	37.50	10.00	5.00	5.00
	40	0400	54.25	44.45	55.00	37.50	10.00	5.00	5.00
1.625		0412	55.83	46.02	55.50	37.50	10.00	5.00	5.00
	42	0420	55.83	46.02	55.50	37.50	10.00	5.00	5.00
	44	0440	59.02	49.20	59.20	37.50	10.00	5.00	5.00
1.750		0444	59.02	49.20	59.20	37.50	10.00	5.00	5.00
	45	0450	59.02	49.20	59.20	37.50	10.00	5.00	5.00
1.875		0476	63.68	52.37	59.20	42.50	10.00	5.00	6.50
	50	0500	65.37	53.97	66.00	45.50	10.00	5.00	6.50
2.000		0508	66.85	55.57	66.68	45.50	10.00	5.00	6.50
2.125		0539	70.03	58.72	70.20	47.00	10.00	5.00	6.50
	55	0550	70.03	58.72	70.20	47.00	10.00	5.00	6.50
2.250		0571	73.20	61.90	73.02	47.00	10.00	5.00	6.50
	60	0600	76.38	65.07	77.00	50.50	10.00	5.00	6.50
2.375		0603	76.38	65.07	76.20	50.50	10.00	5.00	6.50
2.500		0635	79.56	68.28	79.38	50.50	10.00	5.00	6.50
	65	0650	81.23	69.85	82.00	53.50	10.00	5.00	6.50
2.625		0666	82.73	71.42	82.55	53.50	10.00	5.00	6.50
2.750		0698	85.90	74.60	86.20	53.50	10.00	5.00	6.50
	70	0700	85.90	74.60	86.20	53.50	10.00	5.00	6.50
2.875		0730	89.08	77.77	90.00	56.50	10.00	5.00	6.50
	75	0750	90.77	79.37	91.50	56.50	10.00	5.00	6.50
3.000		0762	95.43	80.97	95.25	63.00	10.00	5.00	6.50
	80	0800	100.29	85.73	99.50	63.00	10.00	5.00	6.50
3.250		0825	101.78	87.30	101.60	63.00	10.00	5.00	6.50
	85	0850	104.77	89.40	105.50	63.00	10.00	5.00	6.50
3.375		0857	105.59	89.40	104.85	63.00	10.00	5.00	6.50
3.500		0889	108.13	93.67	107.95	63.00	10.00	5.00	6.50
	90	0900	109.82	95.25	110.50	68.00	10.00	5.00	6.50
	95	0950	114.30	100.00	115.50	68.00	10.00	5.00	6.50
	100	1000	119.33	104.77	120.00	68.00	10.00	5.00	6.50
4.000		1016	124.00	107.95	124.50	72.50	10.00	5.00	6.50
	120	1200	142.87	126.00	144.00	78.90	10.00	5.00	6.50

All types, sizes and materials shown are part of Vulcan's Guaranteed Ex-Stock Range, unless marked with an asterisk*. However, the asterisked seal and / or seat face materials are stocked in many, but not all, sizes.

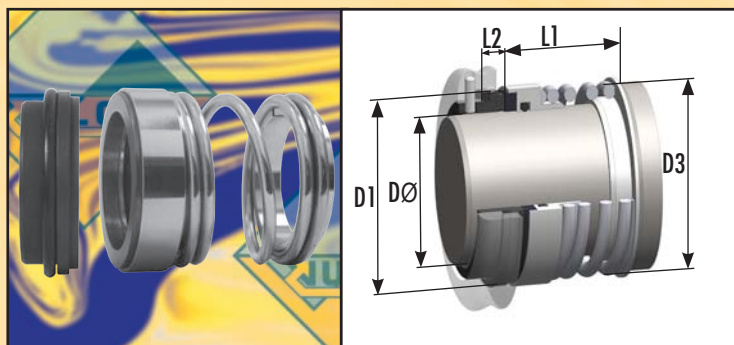
GUARANTEED STOCK MATERIALS AND FACE MATERIAL CODE					
Seal And Seat Assembly		Rotary Face		Stationary Face	
Face Reference Term	Code	Material	Code	Material	Code
SOFT	P	304 Stainless Steel	P	M106K Carbon	P
SOFT VS HARD	T	VES2 RB SIC	S	M106K Carbon	P
HARD VS SOFT	U	Tungsten Carbide*	H	M106K Carbon	P
HARD	S	VES2 RB SIC	S	VES2 RB SIC	S
HARD	I	VES2 RB SIC	S	Tungsten Carbide*	H
HARD	J	Tungsten Carbide*	H	VES2 RB SIC	S
HARD 1st ALT	H	Tungsten Carbide*	H	Tungsten Carbide*	H
Guaranteed Stock Elastomers: Viton®, E.P. and Nitrile			Guaranteed Stock Metallurgy: 304SS		

Suggested Operating Limits

Maximum Operating Pressure Limits primarily depend upon Face Materials, Shaft Size, Speed and Media. Please refer to the Seal Type Specific PV Chart, found at the front of this Brochure Section, in combination with the Vulcan Multiplying Factors found in Technical and Material Standards Section 2.



TYPE 96



Robust, general purpose, unbalanced pusher-type, 'O'-Ring mounted seal, capable of many shaft-sealing duties. The Type 96 drives from the shaft via a split ring, inserted in the coil tail.

Available as standard with the Type 95 stationary, with anti-rotation provision and with either monolithic stainless steel head, or with inserted carbide faces, as per the Face Material Codes shown below.

VULCAN STANDARD SIZES

Imperial Shaft Size DØ	Metric Shaft Size DØ	Size Code	D1	D3	L1	L2	SLOT WIDTH	SLOT DEPTH
0.625		0158	28.57	29.00	26.00	9.00	5.00	5.00
0.750		0191	31.75	32.50	26.00	9.00	5.00	5.00
	20	0200	33.32	34.50	29.00	9.00	5.00	5.00
0.875		0222	34.93	34.93	27.50	9.00	5.00	5.00
	25	0250	39.85	38.10	31.50	10.00	5.00	5.00
1.000		0254	39.85	38.10	31.50	10.00	5.00	5.00
	28	0280	43.05	42.60	33.00	10.00	5.00	5.00
1.125		0286	43.05	42.60	33.00	10.00	5.00	5.00
	30	0300	44.63	45.50	33.00	10.00	5.00	5.00
1.250		0317	46.32	46.20	36.00	10.00	5.00	5.00
	32	0320	46.32	46.20	36.00	10.00	5.00	5.00
1.375		0349	49.48	49.50	39.00	10.00	5.00	5.00
	35	0350	49.48	49.50	39.00	10.00	5.00	5.00
	38	0380	52.56	52.50	39.00	10.00	5.00	5.00
1.500		0381	52.56	52.50	39.00	10.00	5.00	5.00
	40	0400	54.25	55.00	39.00	10.00	5.00	5.00
1.625		0412	55.83	55.50	39.00	10.00	5.00	5.00
1.750		0444	59.02	59.20	39.00	10.00	5.00	5.00
	45	0450	59.02	59.20	39.00	10.00	5.00	5.00
1.875		0476	63.68	59.20	44.00	10.00	5.00	6.50
	50	0500	65.37	66.00	47.00	10.00	5.00	6.50
2.000		0508	66.85	66.68	47.00	10.00	5.00	6.50
2.125		0539	70.03	70.20	48.50	10.00	5.00	6.50
	55	0550	70.03	70.20	48.50	10.00	5.00	6.50
2.250		0571	73.20	73.02	48.50	10.00	5.00	6.50
	60	0600	76.38	77.00	52.00	10.00	5.00	6.50
2.375		0603	76.38	76.20	52.00	10.00	5.00	6.50
2.500		0635	79.56	79.38	52.00	10.00	5.00	6.50
	65	0650	81.23	82.00	55.00	10.00	5.00	6.50
2.625		0666	82.73	82.55	55.00	10.00	5.00	6.50
2.750		0698	85.90	86.20	55.00	10.00	5.00	6.50
	70	0700	85.90	86.20	55.00	10.00	5.00	6.50
2.875		0730	89.08	90.00	60.00	10.00	5.00	6.50
	75	0750	90.77	91.50	60.00	10.00	5.00	6.50
3.000		0762	95.43	95.25	66.00	10.00	5.00	6.50
	80	0800	100.29	99.50	66.00	10.00	5.00	6.50
3.250		0825	101.78	101.60	66.00	10.00	5.00	6.50
	85	0850	104.77	105.50	66.00	10.00	5.00	6.50
3.500		0889	108.13	107.95	66.00	10.00	5.00	6.50
	90	0900	109.82	110.50	71.00	10.00	5.00	6.50
	95	0950	114.30	115.50	71.00	10.00	5.00	6.50
	100	1000	119.33	120.00	71.00	10.00	5.00	6.50
4.000		1016	124.00	124.50	75.50	10.00	5.00	6.50

All types, sizes and materials shown are part of Vulcan's Guaranteed Ex-Stock Range, unless marked with an asterisk*. However, the asterisked seal and / or seat face materials are stocked in many, but not all, sizes.

Suggested Operating Limits

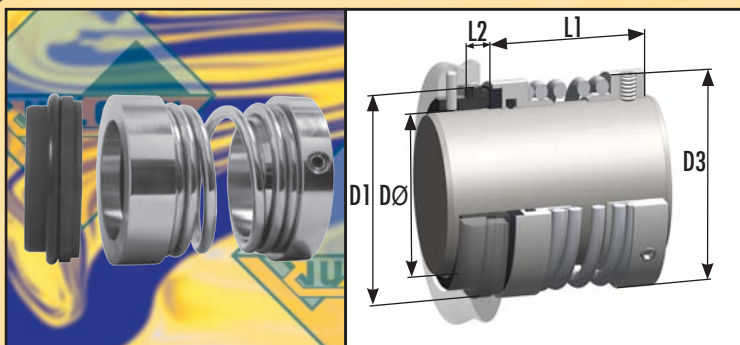
Maximum Operating Pressure Limits primarily depend upon Face Materials, Shaft Size, Speed and Media. Please refer to the Seal Type Specific PV Chart, found at the front of this Brochure Section, in combination with the Vulcan Multiplying Factors found in Technical and Material Standards Section 2.

GUARANTEED STOCK MATERIALS AND FACE MATERIAL CODE					
Seal And Seat Assembly		Rotary Face		Stationary Face	
Face Reference Term	Code	Material	Code	Material	Code
SOFT	P	304 Stainless Steel	P	M106K Carbon	P
SOFT VS HARD	T	VES2 RB SIC	S	M106K Carbon	P
HARD VS SOFT	U	Tungsten Carbide*	H	M106K Carbon	P
HARD	S	VES2 RB SIC	S	VES2 RB SIC	S
HARD	I	VES2 RB SIC	S	Tungsten Carbide*	H
HARD	J	Tungsten Carbide*	H	VES2 RB SIC	S
HARD 1st ALT	H	Tungsten Carbide*	H	Tungsten Carbide*	H
Guaranteed Stock Elastomers: Viton®, E.P. and Nitrile			Guaranteed Stock Metallurgy: 304SS		

Please refer to the Technical and Material Standards Section for advice and information on our full range of materials, guaranteed stock policies and more advice on operating limits.



TYPE 97



Robust, general purpose, unbalanced pusher-type 'O'-Ring mounted seal capable of many shaft-sealing duties. The Type 97 drives from the shaft, via the drive collar with grub screws, inserted in the spring coil tail.

Available as standard with the Type 95 stationary, with anti-rotation provision and with either Monolithic Stainless Steel head, or with inserted Carbide faces, as per the Face Material Codes shown below.

VULCAN STANDARD SIZES

Imperial Shaft Size DØ	Metric Shaft Size DØ	Size Code	D1	D3	L1	L2	SLOT WIDTH	SLOT DEPTH
0.625		0158	28.57	29.00	32.50	9.00	5.00	5.00
0.750		0191	31.75	32.50	32.50	9.00	5.00	5.00
	20	0200	33.32	34.50	35.50	9.00	5.00	5.00
0.875		0222	34.93	34.93	35.50	9.00	5.00	5.00
	25	0250	39.85	38.10	39.00	10.00	5.00	5.00
1.000		0254	39.85	38.10	39.00	10.00	5.00	5.00
	28	0280	43.05	42.60	41.00	10.00	5.00	5.00
1.125		0286	43.05	42.60	41.00	10.00	5.00	5.00
	30	0300	44.63	45.50	41.00	10.00	5.00	5.00
1.250		0317	46.32	46.20	44.00	10.00	5.00	5.00
	32	0320	46.32	46.20	44.00	10.00	5.00	5.00
1.375		0349	49.48	49.50	47.00	10.00	5.00	5.00
	35	0350	49.48	49.50	47.00	10.00	5.00	5.00
	38	0380	52.56	52.50	47.00	10.00	5.00	5.00
1.500		0381	52.56	52.50	47.00	10.00	5.00	5.00
	40	0400	54.25	55.00	47.00	10.00	5.00	5.00
1.625		0412	55.83	55.50	47.00	10.00	5.00	5.00
	42	0420	55.83	55.50	47.00	10.00	5.00	5.00
1.750		0444	59.02	59.20	47.00	10.00	5.00	5.00
	45	0450	59.02	59.20	47.00	10.00	5.00	5.00
1.875		0476	63.68	59.20	55.00	10.00	5.00	6.50
	50	0500	65.37	66.00	58.50	10.00	5.00	6.50
2.000		0508	66.85	66.68	58.50	10.00	5.00	6.50
2.125		0539	70.03	70.20	60.00	10.00	5.00	6.50
	55	0550	70.03	70.20	60.00	10.00	5.00	6.50
2.250		0571	73.20	73.02	60.00	10.00	5.00	6.50
	60	0600	76.38	77.00	63.00	10.00	5.00	6.50
2.375		0603	76.38	76.20	63.00	10.00	5.00	6.50
2.500		0635	79.56	79.38	63.00	10.00	5.00	6.50
	65	0650	81.23	82.00	66.00	10.00	5.00	6.50
2.625		0666	82.73	82.55	66.00	10.00	5.00	6.50
2.750		0698	85.90	86.20	66.00	10.00	5.00	6.50
	70	0700	85.90	86.20	66.00	10.00	5.00	6.50
2.875		0730	89.08	90.00	71.00	10.00	5.00	6.50
	75	0750	90.77	91.50	71.00	10.00	5.00	6.50
3.000		0762	95.43	95.25	77.50	10.00	5.00	6.50
	80	0800	100.29	99.50	77.50	10.00	5.00	6.50
3.250		0825	101.78	101.60	77.50	10.00	5.00	6.50
	85	0850	104.77	105.50	77.50	10.00	5.00	6.50
3.500		0889	108.13	107.95	77.50	10.00	5.00	6.50
	90	0900	109.82	110.50	82.00	10.00	5.00	6.50
	95	0950	114.30	115.50	82.00	10.00	5.00	6.50
	100	1000	119.33	120.00	82.00	10.00	5.00	6.50
4.000		1016	124.00	124.50	88.50	10.00	5.00	6.50
	115	1150	136.52	137.50	88.50	10.00	5.00	6.50
	120	1200	142.87	144.00	95.00	10.00	5.00	6.50

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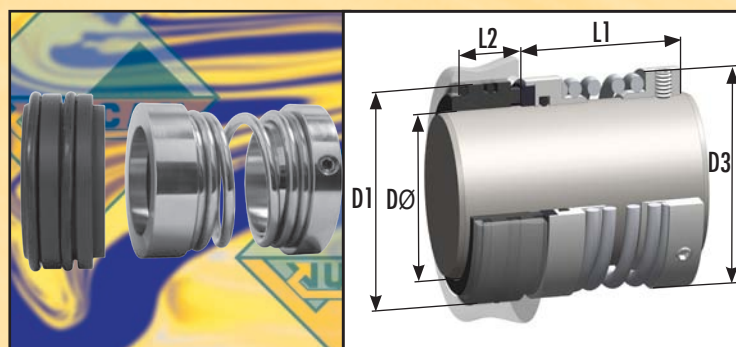
GUARANTEED STOCK MATERIALS AND FACE MATERIAL CODE					
Seal And Seat Assembly		Rotary Face		Stationary Face	
Face Reference Term	Code	Material	Code	Material	Code
SOFT	P	304 Stainless Steel	P	M106K Carbon	P
SOFT VS HARD	T	VES2 RB SiC	S	M106K Carbon	P
HARD VS SOFT	U	Tungsten Carbide*	H	M106K Carbon	P
HARD	S	VES2 RB SiC	S	VES2 RB SiC	S
HARD	I	VES2 RB SiC	S	Tungsten Carbide*	H
HARD	J	Tungsten Carbide*	H	VES2 RB SiC	S
HARD 1st ALT	H	Tungsten Carbide*	H	Tungsten Carbide*	H
Guaranteed Stock Elastomers: Viton®, E.P. and Nitrile			Guaranteed Stock Metallurgy: 304SS		

Suggested Operating Limits

Maximum Operating Pressure Limits primarily depend upon Face Materials, Shaft Size, Speed and Media. Please refer to the Seal Type Specific PV Chart, found at the front of this Brochure Section, in combination with the Vulcan Multiplying Factors found in Technical and Material Standards Section 2.



TYPE 98



Robust, general purpose, unbalanced pusher-type, 'O'-Ring mounted seal, very similar to the Type 97, but with a double elastomeric Type 98 'O'-Ring mounted stationary and dimensions to suit common Asian marine pump dimensions.

The Type 98 drives from the shaft, via the drive collar with grub screws, inserted in the spring coil end.

VULCAN STANDARD SIZES

Metric Shaft Size DØ	Size Code	D1	D3	L1	L2
20	0200	37.00	34.50	38.00	23.00
22	0220	39.00	34.93	38.00	23.00
25	0250	40.00	38.10	38.00	23.00
28	0280	44.00	42.00	40.00	23.00
30	0300	47.00	43.50	40.00	24.00
32	0320	48.00	47.00	40.00	24.00
35	0350	51.00	50.00	40.00	24.00
38	0380	54.00	53.00	45.00	24.00
40	0400	57.00	55.00	45.00	24.00
42	0420	60.50	55.50	50.00	24.00
45	0450	61.00	60.00	50.00	24.00
48	0480	64.00	62.00	55.00	24.00
50	0500	67.00	66.00	55.00	24.00
52	0520	70.00	68.00	58.00	24.00
55	0550	73.00	71.00	58.00	24.00
58	0580	76.00	74.00	58.00	24.00
60	0600	80.00	77.00	60.00	26.00
62	0620	83.00	78.00	60.00	26.00
65	0650	86.00	82.00	62.00	26.00
68	0680	89.00	84.00	62.00	26.00
70	0700	89.00	87.00	65.00	26.00
75*	0750	95.00	91.50	65.00	26.00
80*	0800	99.00	99.50	70.00	26.00
85*	0850	105.00	105.50	70.00	26.00
90*	0900	111.00	110.50	70.00	26.00
95*	0950	114.00	115.50	75.00	26.00
100*	1000	118.00	120.00	75.00	26.00
105*	1050	132.00	128.00	75.00	28.00
110*	1100	137.00	133.00	80.00	28.00
115*	1150	140.00	137.50	80.00	28.00
120*	1200	147.00	144.00	85.00	28.00
125*	1250	150.00	149.00	85.00	28.00
130*	1300	156.00	154.00	85.00	28.00

All types, sizes and materials shown are part of Vulcan's Guaranteed Ex-Stock Range, unless marked with an asterisk*. However, most asterisked sizes are stocked in some, but not all, materials. And the asterisked materials in many sizes.

Suggested Operating Limits

Maximum Operating Pressure Limits primarily depend upon Face Materials, Shaft Size, Speed and Media. Please refer to the Seal Type Specific PV Chart, found at the front of this Brochure Section, in combination with the Vulcan Multiplying Factors found in Technical and Material Standards Section 2.

GUARANTEED STOCK MATERIALS AND FACE MATERIAL CODE					
Seal And Seat Assembly		Rotary Face		Stationary Face	
Face Reference Term	Code	Material	Code	Material	Code
SOFT	P	304 Stainless Steel	P	M106K Carbon	P
SOFT VS HARD	T	VES2 RB SiC	S	M106K Carbon	P
HARD VS SOFT	U	Tungsten Carbide*	H	M106K Carbon	P
HARD	S	VES2 RB SiC	S	VES2 RB SiC	S
HARD	I	VES2 RB SiC	S	Tungsten Carbide*	H
HARD	J	Tungsten Carbide*	H	VES2 RB SiC	S
HARD 1st ALT	H	Tungsten Carbide*	H	Tungsten Carbide*	H
Guaranteed Stock Elastomers: Viton®, E.P. and Nitrile			Guaranteed Stock Metallurgy: 304SS		

Please refer to the Technical and Material Standards Section for advice and information on our full range of materials, guaranteed stock policies and more advice on operating limits.