



Vulcan Wave Spring Type Seals



Section 9



Introduction

The Vulcan Wave Spring Range of Bi-Directional mechanical seals offer proven design and wave spring technology, in a multitude of material combinations, with superior designs but at very competitive pricing.

Applications

The 1688 and 1682 ranges were specifically designed for rotary lobe pumps, whose principle application is normally for liquids of high viscosity. These are commonly found in the food, dairy, brewery and pharmaceutical industries. Their compact design makes these seals an excellent choice for confined stuffing boxes areas or even external mounted applications

The 1677 Seal Type is designed as a high quality, general purpose seal, suitable for many sealing application requirements, including chemical duties.

Standard Vulcan Wave Spring Types

Types 1688

The robust wave spring seal is ideally suited for standard, rotary lobe pump, stuffing boxes, of compact design. The seal is positively driven by grub screws and supplied from Vulcan with monolithic hard face materials as our standard.

Type 1688L

As above but supplied with a Type 24 DINL pinned stat, to suit DIN standard housing dimensions.

Type 1682

A wave spring seal to suit standard rotary lobe pumps. The Type 1682 is similar in design to the Type 1688 but is driven directly from the grub screws.

Type 1677

The Type 1677 is a positively, bi-direction driven wave spring seal, utilising crest to crest wave spring technology, offering excellent axial movement capabilities. The seal is radially compacted and designed to suit DIN 24960 (EN12756).

The design of this seal head, enables easy replacement of a wide range of high quality materials and elastomers, supplied as standard.

Type 1678

Designed as per the Type 1677 but with a stepped face, to provide a balanced seal for stepped shafts.

STANDARD COMPONENTS



Type 1688 series

Type 1682

Type 1677

No	Description	No	Description
1	Face	4	Wave Spring
2	O-Ring	5	Grub Screw
3	Sleeve/Retainer	6	Backing Plate

Vulcan Design Advantages Type 168X Superior Design

Types 1688, 1688L and 1682 are supplied with monolithic rotary heads, in both standard and hard face alternatives, to improve the seal operating performance in viscous fluids. This is achieved by eliminating the possibility of spinning and damage common to inserted face designs. Competitors inserted T.C/Sic seal face rings are prone to spinning, particularly in the viscous or coagulating fluids, which are common to rotary lobe pump applications.

Common, popular sizes of Type 168x seals are fitted with our special, split Sinusoidal Wave-Springs. These split wave-springs offer a more consistent and accurate spring rate than traditional wave-springs.

The Sinusoidal waves offer a larger and more even contact and the split over-lap minimises the working stresses which frequently result in fracture, buckling or hang-up with a stamped, non-split, wave-spring.

Type 167X Superior Design

These seals utilise a double wave-spring. If the seal manufacturer's design solution is to use two wave-springs welded together, then this creates a weak spot, prone to both mechanical failure and corrosive attack.

Vulcan Type 167X seals incorporate a one-piece designed, crest to crest wave spring, removing the possibility of corrosion to weld spots. This removes the most common seal failure mode on such seals.

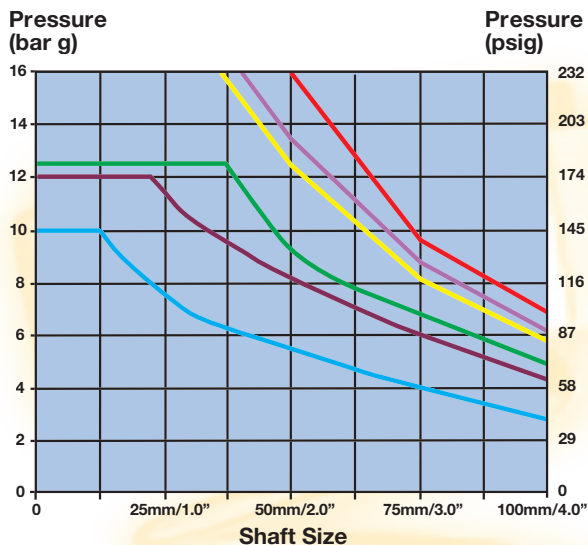
The seals contain an energised rotary 'O'-Ring, reducing shaft fretting and ensuring positive shaft sealing. Our design has a chamfer at the front wall of the 'O'-Ring groove and a dynamic ring backing plate constantly energising and pressing the 'O'-Ring forward and down onto the shaft. This overcomes 'O'-Ring hang-up on the shaft, the second common ultimate seal failure mode found on other manufacturer's designs.

Compact Seal

The uniform wave spring forces, provide excellent axial movement capabilities, compared to conventional mechanical seals.

Use of a wave-spring allows the seal design to be very compact, giving an assured seal for short, confined glands.

VULCAN WAVE SPRING TYPE SEALS PV CHART



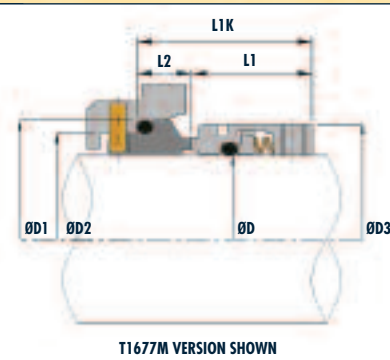
- Carbon/TC
- SC/SC
- TC/TC
- Carbon/SS
- Type 1677-Carbon/SIC
- Type 1677-SIC/SIC

Notes:
 1. Type 1678 multiply 1677 charts by factor 1.2.
 2. Do not use Type 1688 series seals above 12 bar.

For information on how to utilise this pV chart please refer to the technical section.



TYPE 1677/1677M



Note: As standard Vulcan stocks this seal as the type 1677M. If inserted face are required, please ask for Type 1677 Specifically.

Wave-spring , 'O'-Ring mounted seal commonly utilised in the European chemical process industries. Manufactured to suit DIN 24960 (EN12756) dimensions. Supplied as Type 1677 with an inserted face or increasingly as Type 1677M, with a Monolithic face design for exceptional performance. Type 8 Din Long Seat shown is standard, with other variants available.

VULCAN STANDARD SIZES

Metric Shaft Size D	Size Code	D1	D2	D3	L1	L2	L1K
14	0140	25.00	21.00	24.00	25.00	10.00	35.00
16	0160	27.00	23.00	26.00	25.00	10.00	35.00
18	0180	33.00	27.00	32.00	26.00	11.50	37.50
20	0200	35.00	29.00	34.00	26.00	11.50	37.50
22	0220	37.00	31.00	36.00	26.00	11.50	37.50
24	0240	39.00	33.00	38.00	28.50	11.50	40.00
25	0250	40.00	34.00	39.00	28.50	11.50	40.00
28	0280	43.00	37.00	42.00	31.00	11.50	42.50
30	0300	45.00	39.00	44.00	31.00	11.50	42.50
32	0320	48.00	42.00	46.00	31.00	11.50	42.50
33	0330	48.00	42.00	47.00	31.00	11.50	42.50
35	0350	50.00	44.00	49.00	31.00	11.50	42.50
38	0380	56.00	49.00	54.00	31.00	14.00	45.00
40	0400	58.00	51.00	56.00	31.00	14.00	45.00
43	0430	61.00	54.00	59.00	31.00	14.00	45.00
45	0450	63.00	56.00	61.00	31.00	14.00	45.00
48	0480	66.00	59.00	64.00	31.00	14.00	45.00
50	0500	70.00	62.00	66.00	32.50	15.00	47.50
53	0530	73.00	65.00	69.00	32.50	15.00	47.50
55	0550	75.00	67.00	71.00	32.50	15.00	47.50
58	0580	78.00	70.00	78.00	37.50	15.00	52.50
60	0600	80.00	72.00	80.00	37.50	15.00	52.50
63	0630	83.00	75.00	83.00	37.50	15.00	52.50
65	0650	85.00	77.00	85.00	37.50	15.00	52.50
68	0680	90.00	81.00	88.00	34.50	18.00	52.50
70	0700	92.00	83.00	90.00	42.00	18.00	60.00
75	0750	97.00	88.00	99.00	42.00	18.00	60.00
80	0800	105.00	95.00	104.00	41.80	18.20	60.00
85	0850	110.00	100.00	109.00	41.80	18.20	60.00
90	0900	115.00	105.00	114.00	46.80	18.20	65.00
95	0950	120.00	110.00	119.00	47.80	17.20	65.00
100	1000	125.00	115.00	124.00	47.80	17.20	65.00

STANDARD STOCK FACE MATERIALS

Rotary Face: Sintered Silicon Carbide.

Stat Ring: Sintered Silicon Carbide, Carbon.

OTHER FACE MATERIALS TO ORDER

Suggested Operating Limits

PRESSURE 250psi

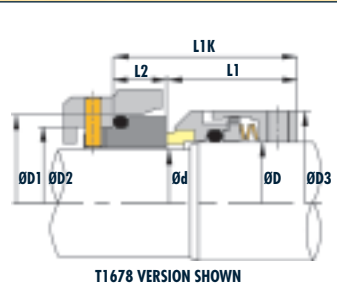
SPEED 15m/s

TEMPERATURE -40 +200°C

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



TYPE 1678/1678M



Stepped shaft balanced seal, otherwise similar to our Types 1677M/1677. All our 1677/8 versions are energised by a special continuous wave spring with no weld spots. Supplied as Monolithic version 1678M, as standard. The inserted version is also available to production order.

VULCAN STANDARD SIZES

Metric Shaft Size D	Size Code	Stat Size d	D1	D2	D3	L1	L2	L1K
18	0180	14	25.0	21.0	32.0	32.5	10.0	42.5
20	0200	16	27.0	23.0	34.0	32.5	10.0	42.5
22	0220	18	33.0	27.0	36.0	33.5	11.5	45.0
24	0240	20	35.0	29.0	38.0	33.5	11.5	45.0
28	0280	24	39.0	33.0	42.0	36.0	11.5	47.5
30	0300	25	40.0	34.0	44.0	36.0	11.5	47.5
33	0330	28	43.0	37.0	47.0	38.5	11.5	50.0
35	0350	30	45.0	39.0	49.0	38.5	11.5	50.0
38	0380	33	48.0	42.0	54.0	38.5	11.5	50.0
40	0400	35	50.0	44.0	56.0	38.5	11.5	50.0
43	0430	38	56.0	49.0	59.0	38.5	14.0	52.5
45	0450	40	58.0	51.0	61.0	38.5	14.0	52.5
50	0500	45	63.0	56.0	66.0	38.5	14.0	52.5
53	0530	48	66.0	59.0	69.0	38.5	14.0	52.5
55	0550	50	70.0	62.0	71.0	42.5	15.0	57.5
60	0600	55	75.0	67.0	80.0	42.5	15.0	57.5

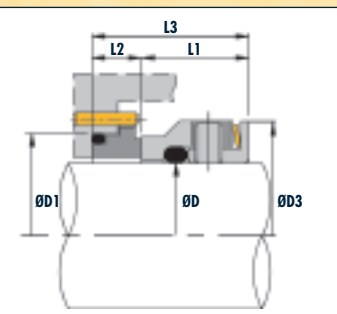
Suggested Operating Limits

PRESSURE 280psi SPEED 20m/s
 TEMPERATURE -40 +200°C
Dependent upon shaft diameter and speed + Temperature and media to be sealed

STANDARD STOCK FACE MATERIALS

Rotary Face: Sintered Silicon Carbide.
 Stat Ring: Sintered Silicon Carbide, Carbon.
 OTHER FACE MATERIALS TO ORDER

TYPE 1682



Rotary based, bi-directional, wave-spring seal to suit standard rotary lobe SSP® pumps. The Type 1682 is driven directly from the grub-screws. Most commonly found in the food, brewing and dairy industries.

VULCAN STANDARD SIZES

Metric Shaft Size D	Size Code	D1	D3	L1	L2	L3
20	0200	30.00	32.40	20.00	10.50	30.50
30	0300	41.30	44.00	21.40	11.10	32.50
35	0350	46.95	50.80	22.00	12.00	34.00
45	0450	58.26	62.40	22.90	12.60	35.50
55	0550	69.55	76.00	29.30	13.20	42.50
75	0750	92.15	99.20	31.10	14.40	45.50

STANDARD STOCK FACE MATERIALS

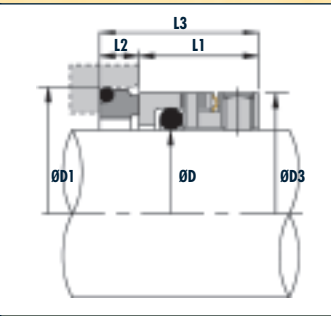
Rotary Face: Stainless Steel, Tungsten Carbide.
 Stat Ring: Carbon, Tungsten Carbide.
 OTHER FACE MATERIALS TO ORDER

Suggested Operating Limits

PRESSURE 180psi SPEED 15m/s
 TEMPERATURE -40 +200°C
Dependent upon shaft diameter and speed + Temperature and media to be sealed



TYPE 1688



Wave spring mechanical seal with thin cross section and short working length. Most commonly used on rotary lobe pumps, found extensively in the food, process, dairy and brewery industries. Popular, common sizes are fitted with Vulcan's Sinusoidal Split Wave-Springs.

VULCAN STANDARD SIZES

Inch Shaft Size D	Size Code	Metric Shaft Size D	Size Code	D1	D3	L1	L2	L3
0.625	0158	16	0160	28.50	27.00	19.10	6.30	25.40
0.750	0191			31.70	30.00	19.10	6.30	25.40
		24	0240	35.40	34.10	19.10	7.60	26.70
		28	0280	42.00	39.00	19.10	7.60	26.70
1.125	0286			41.20	39.50	19.10	7.60	26.70
		30	0300	42.70	41.00	19.10	7.60	26.70
1.250	0317			44.40	42.40	19.10	7.60	26.70
		32	0320	44.40	42.40	19.10	7.60	26.70
1.375	0349	35	0350	47.60	45.50	19.10	7.60	26.70
1.500	0381	38	0380	53.90	51.80	21.10	8.10	29.20
1.750	0444			60.30	58.20	21.10	8.10	29.20
1.875	0476			63.50	61.40	21.10	8.10	29.20
		50	0500	63.90	61.90	21.10	8.10	29.20
2.000	0508			66.60	64.60	22.10	9.60	31.70
2.125	0539			73.00	71.00	22.10	9.60	31.70
		54	0540	73.90	71.00	22.10	9.60	31.70
2.150	0546	55	0550	75.00	72.00	22.10	9.60	31.70
		63	0630	83.00	79.30	25.80	9.10	34.90
2.500	0635			88.90	79.30	25.80	9.10	34.90
2.750	0698			95.20	90.80	25.80	9.10	34.90
2.875	0730	73	0730	98.40	94.00	25.80	9.10	34.90
		75	0750	100.40	96.00	25.80	9.10	34.90
3.000	0762			101.60	96.90	25.80	9.10	34.90
		80	0800	104.00	101.00	25.80	9.10	34.90
		95	0950	125.00	116.00	25.80	9.10	34.90
		100	1000	130.00	121.00	25.80	9.10	34.90

STANDARD STOCK FACE MATERIALS

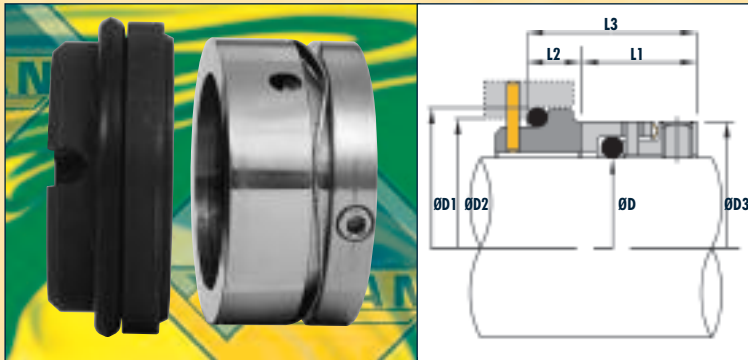
Rotary Face: Stainless Steel or Tungsten Carbide.
 Stat Ring: Carbon, Silicon Carbide or Tungsten Carbide.
 OTHER FACE MATERIALS TO ORDER

Suggested Operating Limits

PRESSURE 150psi SPEED 15m/s
 TEMPERATURE -40 +200°C

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

TYPE 1688L



Rotary based wave sprung mechanical seal with thin cross section and short working length, supplied as standard with Vulcan Type 24 DIN Long seat. Most commonly used on rotary lobe pumps found extensively in the food, process, dairy and brewery industries. Popular, common sizes are fitted with Vulcan's Sinusoidal Split Wave-Springs.

VULCAN STANDARD SIZES

Inch Shaft Size D	Size Code	D1	D2	D3	L1	L2	L3	Slot width	Slot Depth
16	0160	27.00	23.00	27.00	19.10	8.60	27.70	4.00	5.00
20	0200	35.00	29.00	31.20	19.10	10.00	29.10	5.00	5.50
22	0220	37.00	31.00	33.00	19.10	10.00	29.10	5.00	5.50
24	0240	39.00	33.00	34.10	19.10	10.00	29.10	5.00	5.50
25	0250	40.00	34.00	36.00	19.10	10.00	29.10	5.00	5.50
28	0280	43.00	37.00	39.00	19.10	10.00	29.10	5.00	5.50
30	0300	45.00	39.00	41.00	19.10	10.00	29.10	5.00	5.50
32	0320	48.00	42.00	42.40	19.10	10.00	29.10	5.00	5.50
33	0330	48.00	42.00	44.00	19.10	10.00	29.10	5.00	5.50
35	0350	50.00	44.00	45.50	19.10	10.00	29.10	5.00	5.50
38	0380	56.00	49.00	51.80	21.10	11.00	32.10	5.00	5.50
40	0400	58.00	51.00	53.80	21.10	11.00	32.10	5.00	5.50
43	0430	61.00	54.00	56.80	21.10	11.00	32.10	5.00	5.50
45	0450	63.00	56.00	58.20	21.10	11.00	32.10	5.00	5.50
48	0480	66.00	59.00	61.40	21.10	11.00	32.10	5.00	5.50
50	0500	70.00	62.00	61.90	21.10	13.00	34.10	5.00	5.50
55	0550	75.00	67.00	72.00	22.10	13.00	35.10	5.00	5.50
60	0600	80.00	72.00	77.00	25.80	13.00	38.80	5.00	5.50
63	0630	83.00	75.00	79.30	25.80	13.00	38.80	5.00	5.50
65	0650	85.00	77.00	82.30	25.80	13.00	38.80	5.00	5.50
70	0700	92.00	83.00	87.00	25.80	15.30	41.10	5.00	5.50
75	0750	97.00	88.00	96.00	25.80	15.30	41.10	5.00	5.50
80	0800	105.00	95.00	101.00	25.80	15.70	41.50	5.00	5.50
85	0850	110.00	100.00	106.00	25.80	15.70	41.50	5.00	5.50
90	0900	115.00	105.00	111.00	25.80	15.70	41.50	5.00	5.50
95	0950	120.00	110.00	116.00	25.80	15.70	41.50	5.00	5.50
100	1000	125.00	115.00	121.00	25.80	15.70	41.50	5.00	5.50

Suggested Operating Limits

PRESSURE 150psi SPEED 15m/s
 TEMPERATURE -40 +200°C

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

STANDARD STOCK FACE MATERIALS

Rotary Face: Stainless Steel or Tungsten Carbide.

Stat Ring: Carbon, Silicon Carbide or Tungsten Carbide.

OTHER FACE MATERIALS TO ORDER