

V-Seal



V-Seals



Application

The V-Seal is a one-piece all rubber rotary shaft seal, which stretches to fit on a shaft. It is held in place by its own tension on the shaft and the seal axially mounts against a stationary counterface. It rotates with the shaft acting as a slinger, while the lip of the V-Seal provides a light, positive seal against a stationary face. It is a contaminant seal against dirt, dust, water, or oil splash as well as grease retainers. It can be used as a primary or secondary seal for an oil, mechanical or labyrinth seal.

Selection

Temperature, compatibility, tolerance and speed are all criteria in seal selection. Because the V-Seal seals with such light contact pressure, it generates very low friction and therefore lower heat than other types of seals. Lower heat translates into longer life. Its flexible construction allows it to be extremely forgiving on tolerances.

Materials

The V-Seal is available in a variety of different rubber materials for various operating conditions.

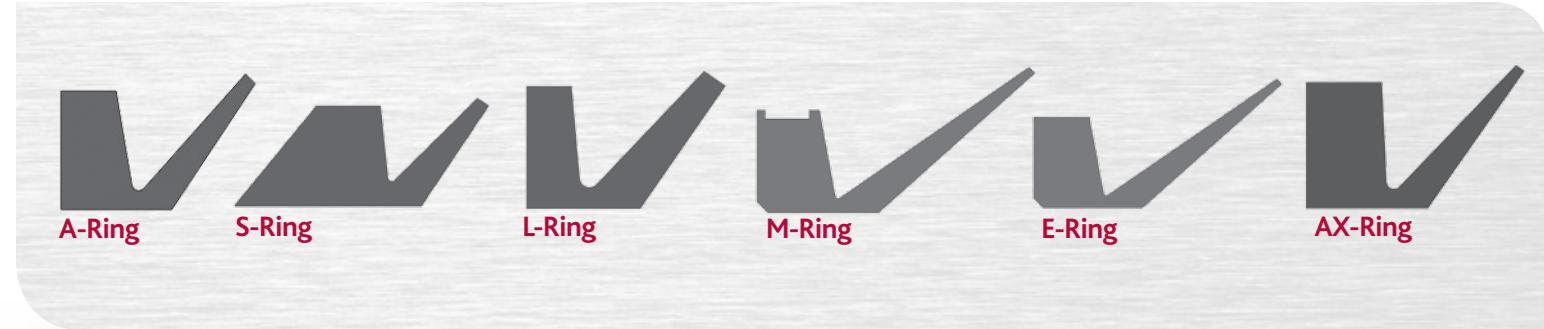
- **Nitrile (NBR):** This standard material is the most widely used V-Seal material. It has good resistance to grease, oil, water and fuels. Temperature range is -40 to 225°F.

- **Viton (Fluoroelastomer):** Higher temperature and chemical resistance than nitrile material. Temperature range is -30 to 325°F (dynamic application), -50 to 450°F (static application).
- **AFT-Anti Friction Treatment (AFT):** Our proprietary anti-friction treatment reduces friction by as much as 75% allowing for even lower heat and longer life. The treatment actually penetrates the seal surface, so that it remains present even as the seal wears.

In addition to the materials listed above we offer: **Therban (HNBR)**, **Fluorocarbon (FPM)**, **Neoprene (CR)**, **Ethylene Propylene (EPDM/EPM)**, **Silicone (VMQ)**, **Fluorosilicone (VMQ)**, **Polyacrylic (ACM)**. Food grade materials are available including FDA and NSF approved rubbers. Our compound lab can develop specialty materials for particular applications, see our materials section or contact our technical department.

Additional Capabilities

GBSA offers in-house vulcanization of large and small diameter V-Seals in order to accommodate your application and reduce lead times.



Technical Information Parts of the V-Seal

The V-Seal is composed of three basic parts, the body, lip, and hinge. The body of the seal holds it into place on the shaft or mounting surface. The cone shape, flexible lip contacts the counterface or sealing surface and does the sealing. The resilient hinge joins the body and the lip together which provides the force that keeps the lip against the counterface. It is these three parts, working together, which allow this simple one-piece seal to do what no other seal system can do.

Installation

The V-Seal can be completely assembled without the need for any tools. Being all rubber it can stretch to 40% of its molded I.D., so it can be easily stretched over flanges, collars and entire bearing housings during assembly. The same resiliency holds the seal in place without the need for springs or clamps. To assemble the seal, it is stretched onto the shaft by hand and then pushed up to the counterface to a predetermined width (B1). That's all there is to it.

Seal Function

One V-Seal functions as three different seals. The single V-Seal lip keeps dirt and water out, grease in and acts as a slinger. The V-Seal can be used alone to seal lubrication in and/or contamination out. It can supplement an oil seal or mechanical seal. The V-Seal can even seal in low-pressure applications (consult GBSA engineer). The unique design of the V-Seal lip allows it to act as a check valve during grease purging.

Speed

In most applications, the V-Seal rotates with the shaft to provide a slinging action. As such, it is subject to centrifugal force. At speeds 1600 surface feet per

minute (FPM), the stretch tension of the V-Seal is sufficient to hold it to the shaft. Above 1600 FPM, axial back up is required. Above 2400 FPM, radial back up is required in the form of a mounting pocket or clamp around the V-Seal body. Above 3000 FPM, the lip of the V-Seal lifts away from the counterface resulting in a clearance seal and eliminating drag and wear. The V-Seal can also be mounted stationary and run against a rotating counterface. In this case, centrifugal force has no effect on the V-Seal.

Finishes

Since the V-Seal mounts on the shaft instead of running against it, there are no stringent requirements for shaft finish or hardness. The shaft can be soft metal or even plastic. It can be rough or have tool marks without any effect on the seal. Also, since the sealing pressure of the V-Seal is so light, the counterface surface on which the seal rides does not require a fine finish. The recommended finish is 32-63 μ RMS. The hardness of the counterface can be as low as 32 Rc, and can be any type of metal. Plastics are not recommended.

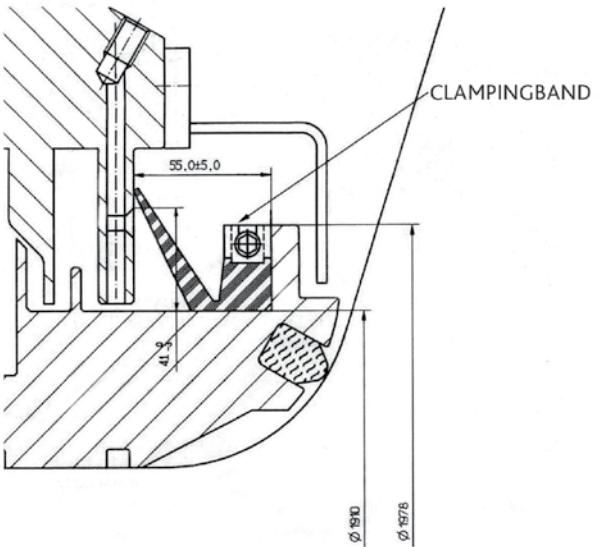
Tolerances

Because the V-Seal is all rubber, it is very forgiving with regard to tolerances. For example, the same size V-Seal made to fit a 1" diameter shaft (V-25A) will fit any shaft size, inch or metric between .95"-1.07". The recommended fitted width (B1) of this same seal is .24", but the tolerance of this dimension is $\pm .03"$. The V-Seal can accept misaligned and even out-of-round shafts. It can accept shaft wobble within limits.

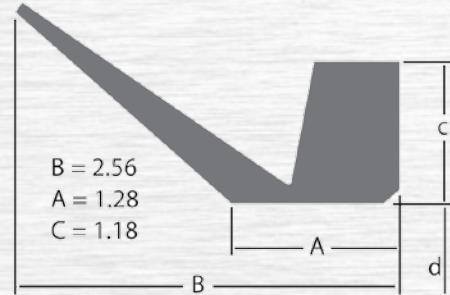


V-Seals E

Select the larger V-Seal when the dimension d_1 is on the boundary between two sizes of V-Seal. All dimensions are in inches.

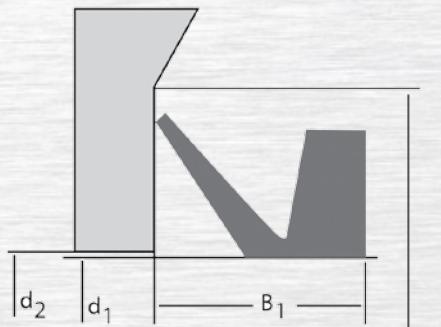


Profile Dimensions



Large diameter E-rings can be vulcanized in-house for fast delivery times.

Assembly Dimensions



V-Seal E larger than V-2000E made to special order. Profile and fitted width are the same as standard V-Seal E.

V-Seal Designation	For Shaft Diameter d_1	Inside Diameter d	V-Seal Designation	For Shaft Diameter d_1	Inside Diameter d
V-450E	17.72-17.91	17.28	V-830E	32.32-32.72	31.34
V-455E	17.91-18.11	17.48	V-840E	32.72-33.11	31.69
V-460E	18.11-18.31	17.64	V-850E	33.11-33.50	32.05
V-465E	18.31-18.50	17.39	V-860E	33.50-33.90	32.44
V-470E	18.50-18.70	18.03	V-870E	33.90-34.29	32.80
V-475E	18.70-18.90	18.23	V-880E	34.29-34.72	33.19
V-480E	18.90-19.09	18.43	V-890E	34.72-35.12	33.58
V-485E	19.09-19.29	18.62	V-900E	35.12-35.91	34.29
V-490E	19.29-19.49	18.82	V-920E	35.91-36.30	34.65
V-495E	19.49-19.69	19.02	V-930E	36.30-36.73	35.04
V-500E	19.69-19.88	19.21	V-940E	36.73-37.17	35.43
V-505E	19.88-20.08	19.41	V-950E	37.17-37.60	35.87
V-510E	20.08-20.28	19.57	V-960E	37.60-38.03	36.26
V-515E	20.28-20.47	19.76	V-970E	38.03-38.47	36.69
V-520E	20.47-20.67	19.96	V-980E	38.47-38.90	37.09
V-525E	20.67-20.87	20.16	V-990E	38.90-39.33	37.52
V-530E	20.87-21.06	20.35	V-1000E	39.33-39.76	37.91
V-535E	21.06-21.26	20.51	V-1020E	39.76-40.35	38.31
V-540E	21.26-21.46	20.71	V-1040E	40.35-41.14	38.98
V-545E	21.46-21.65	20.91	V-1060E	41.14-41.93	39.69
V-550E	21.65-21.85	21.10	V-1080E	41.93-42.72	40.43
V-555E	21.85-22.05	21.30	V-1100E	42.72-43.50	41.14
V-560E	22.05-22.24	21.50	V-1120E	43.50-44.29	41.93
V-565E	22.24-22.44	21.65	V-1140E	44.29-45.08	42.68
V-570E	22.44-22.64	21.85	V-1160E	45.08-45.87	43.43
V-575E	22.64-22.84	22.05	V-1180E	45.87-46.65	44.13
V-580E	22.84-23.03	22.24	V-1200E	46.65-47.44	44.84
V-585E	23.03-23.23	22.44	V-1220E	47.44-48.23	45.55
V-590E	23.23-23.62	22.64	V-1240E	48.23-49.02	46.30
V-600E	23.62-24.02	22.91	V-1260E	49.02-50.00	47.05
V-610E	24.02-24.41	23.31	V-1280E	50.00-50.98	47.95
V-620E	24.41-24.80	23.70	V-1300E	50.98-51.77	48.82
V-630E	24.80-25.20	24.09	V-1325E	51.77-52.76	49.57
V-640E	25.20-25.59	24.45	V-1350E	52.76-53.74	50.43
V-650E	25.59-25.98	24.84	V-1375E	53.74-54.72	51.38
V-660E	25.98-26.38	25.20	V-1400E	54.72-55.71	52.28
V-670E	26.38-26.77	25.59	V-1425E	55.71-56.69	53.15
V-680E	26.77-27.17	25.98	V-1450E	56.69-57.68	54.09
V-690E	27.17-27.56	26.38	V-1475E	57.68-58.66	55.00
V-700E	27.56-27.95	26.77	V-1500E	58.66-59.65	55.87
V-710E	27.95-28.35	27.13	V-1525E	59.65-60.63	56.81
V-720E	28.35-28.74	27.52	V-1550E	60.63-61.81	57.76
V-730E	28.74-29.13	27.91	V-1575E	61.81-62.99	58.86
V-740E	29.13-29.53	28.27	V-1600E	62.99-64.57	60.00
V-750E	29.53-29.84	28.66	V-1650E	64.57-66.14	61.38
V-760E	29.84-30.16	28.94	V-1700E	66.14-67.72	62.84
V-770E	30.16-30.47	29.25	V-1750E	67.72-69.49	64.25
V-780E	30.47-30.83	29.57	V-1800E	69.49-71.26	65.79
V-790E	30.83-31.18	29.88	V-1850E	71.26-73.03	67.48
V-800E	31.18-31.54	30.24	V-1900E	73.03-75.00	69.02
V-810E	31.54-31.89	30.59	V-1950E	75.00-76.97	70.63
V-820E	31.89-32.32	30.95	V-2000E	76.97-79.13	72.60

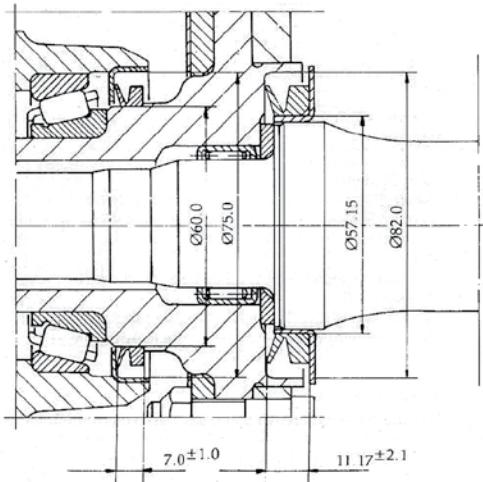
V-Seal



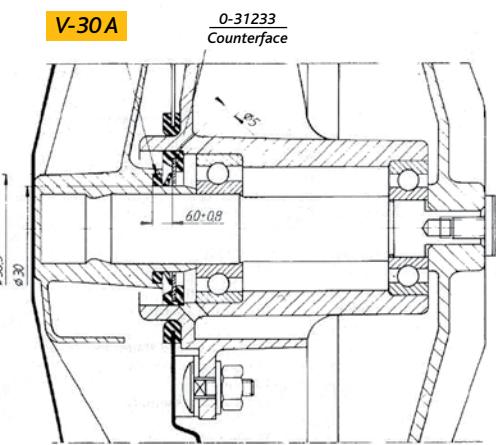
V-Seals A

Select the larger V-Seal when the dimension d_1 is on the boundary between two sizes of V-Seal. All dimensions are in inches.

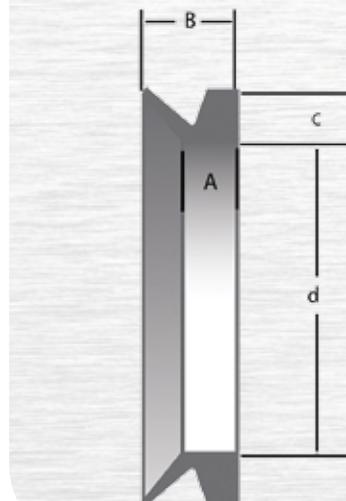
Automotive Industry
4x4 Front Axle



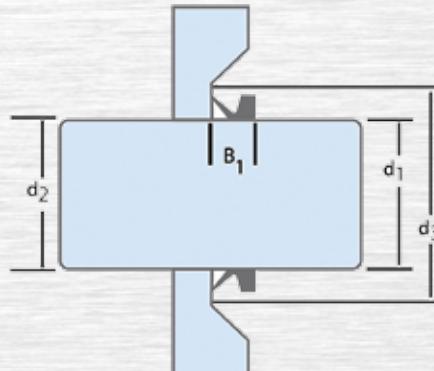
Domestic Appliances
Washing Machine



Profile Dimensions



Assembly Dimensions



V-Seal Designation	For Shaft Diameter d_1	Inside Diameter d	Height of Cross Section c	Dimension A	Free Width B	Maximum d_2	Minimum d_3	Fitted Width B_1
V-3A	0.11-0.14	0.10	0.06	0.08	0.12	$d_1 + 0.04$	$d_1 + 0.16$	0.10 ± 0.012
V-4A	0.14-0.18	0.13	0.08	0.09	0.15		$d_1 + 0.25$	0.12 ± 0.016
V-5A	0.18-0.21	0.16						
V-6A	0.21-0.26	0.20						
V-7A	0.26-0.31	0.24						
V-8A	0.31-0.37	0.28	0.08	0.09	0.15	$d_1 + 0.04$	$d_1 + 0.25$	0.12 ± 0.016
V-10A	0.37-0.45	0.35	0.12	0.13	0.22	$d_1 + 0.08$	$d_1 + 0.35$	0.18 ± 0.02
V-12A	0.45-0.49	0.41						
V-13A	0.49-0.53	0.46						
V-14A	0.53-0.61	0.49						
V-16A	0.61-0.69	0.55						
V-18A	0.69-0.75	0.63	0.12	0.13	0.22		$d_1 + 0.35$	0.18 ± 0.02
V-20A	0.75-0.83	0.71	0.16	0.18	0.30		$d_1 + 0.45$	0.24 ± 0.03
V-22A	0.83-0.95	0.79						
V-25A	0.95-1.07	0.87						
V-28A	1.07-1.14	0.98					$d_1 + 0.08$	
V-30A	1.14-1.22	1.06					$d_1 + 0.12$	
V-32A	1.22-1.30	1.14						
V-35A	1.30-1.42	1.22						
V-38A	1.42-1.50	1.34	0.16	0.18	0.30		$d_1 + 0.45$	0.24 ± 0.03
V-40A	1.50-1.70	1.42	0.20	0.21	0.35		$d_1 + 0.60$	0.28 ± 0.04
V-45A	1.70-1.89	1.57						
V-50A	1.89-2.09	1.77						
V-55A	2.09-2.29	1.93						
V-60A	2.29-2.48	2.13						
V-65A	2.48-2.68	2.28	0.20	0.21	0.35	$d_1 + 0.12$	$d_1 + 0.60$	0.28 ± 0.04
V-70A	2.68-2.88	2.48	0.24	0.26	0.43	$d_1 + 0.16$	$d_1 + 0.70$	0.35 ± 0.05
V-75A	2.88-3.07	2.64						
V-80A	3.07-3.27	2.83						
V-85A	3.27-3.47	2.99						
V-90A	3.47-3.66	3.19						
V-95A	3.66-3.86	3.35						
V-100A	3.86-4.14	3.54	0.24	0.26	0.43		$d_1 + 0.70$	0.35 ± 0.05
V-110A	4.14-4.53	3.90	0.28	0.31	0.50		$d_1 + 0.80$	0.41 ± 0.06
V-120A	4.53-4.92	4.25						
V-130A	4.92-5.32	4.61						
V-140A	5.32-5.71	4.96						
V-150A	5.71-6.10	5.31	0.28	0.31	0.50	$d_1 + 0.16$	$d_1 + 0.80$	0.41 ± 0.06
V-160A	6.10-6.50	5.67	0.32	0.35	0.57	$d_1 + 0.20$	$d_1 + 0.95$	0.47 ± 0.07
V-170A	6.50-6.89	6.02						
V-180A	6.89-7.29	6.38						
V-190A	7.29-7.68	6.73						
V-199A	7.68-8.27	7.09	0.32	0.35	0.57	$d_1 + 0.20$	$d_1 + 0.95$	0.47 ± 0.07
V-200A	7.48-8.27	7.09	0.59	0.56	0.98	$d_1 + 0.39$	$d_1 + 1.75$	0.79 ± 0.16
V-220A	8.27-9.25	7.80						
V-250A	9.25-10.43	8.86						
V-275A	10.43-11.42	9.72						
V-300A	11.42-12.20	10.63						
V-325A	12.20-13.19	11.50						
V-350A	13.19-14.37	12.40						
V-375A	14.37-15.35	13.27						
V-400A	15.35-16.93	14.17						
V-450A	16.93-18.90	15.94						
V-500A	18.90-20.87	17.72						
V-550A	20.87-22.83	19.349						
V-600A	22.83-24.80	21.26						
V-650A	24.80-26.18	23.62						
V-700A	26.18-27.76	24.80						
V-725A	27.76-29.33	26.38						
V-750A	29.33-30.91	27.76						
V-800A	30.91-32.68	29.33						
V-850A	32.68-34.45	30.91						
V-900A	34.45-36.22	32.48						
V-950A	36.22-37.99	34.06						
V-1000A	37.99-39.96	35.83						
V-1050A	39.96-41.93	37.60						
V-1100A	41.93-43.90	39.37						
V-1150A	43.90-45.87	41.14						
V-1200A	45.87-47.84	42.91						
V-1250A	47.84-50.00	44.69						
V-1300A	50.00-51.97	46.46						
V-1350A	51.97-53.94	48.23						
V-1400A	53.94-55.91	50.00						
V-1450A	55.91-57.87	51.77						
V-1500A	57.87-59.84	53.54						
V-1550A	59.84-61.81	55.32						
V-1600A	61.81-63.78	57.09						
V-1650A	63.78-65.75	58.86						
V-1700A	65.75-67.72	60.63						
V-1750A	67.72-69.69	62.40						
V-1800A	69.69-71.65	64.17						
V-1850A	71.65-73.62	65.95						
V-1900A	73.62-75.59	67.72						
V-1950A	75.59-77.56	69.49						
V-2000A	77.56-79.53	71.26	0.59	0.56	0.98	$d_1 + 0.39$	$d_1 + 1.75$	0.79 ± 0.16

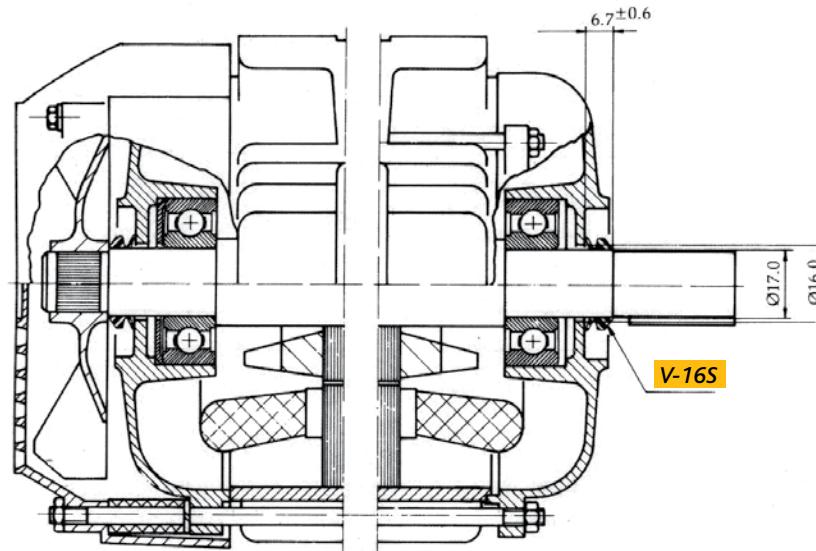
V-Seal A larger than V-2000A are made to special order. Profile and axial fitted width are the same for V-200A –V2000A.



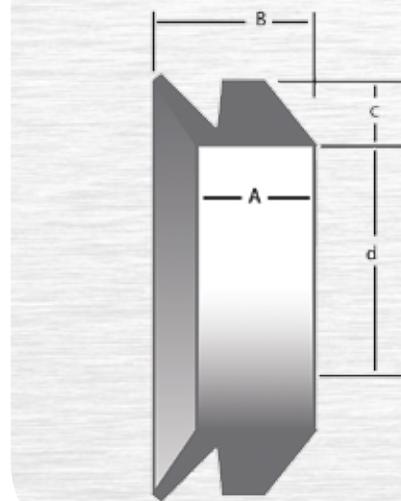
V-Seals S

Select the larger V-Seal when the dimension d_1 is on the boundary between two sizes of V-Seal. All dimensions are in inches.

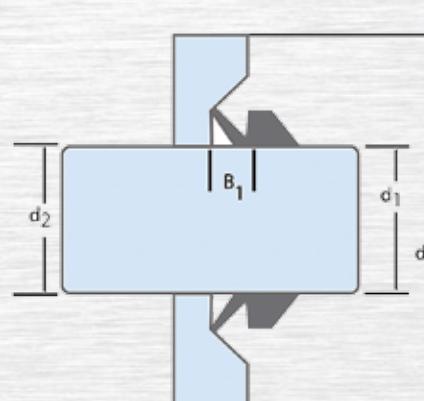
Electrical Motors



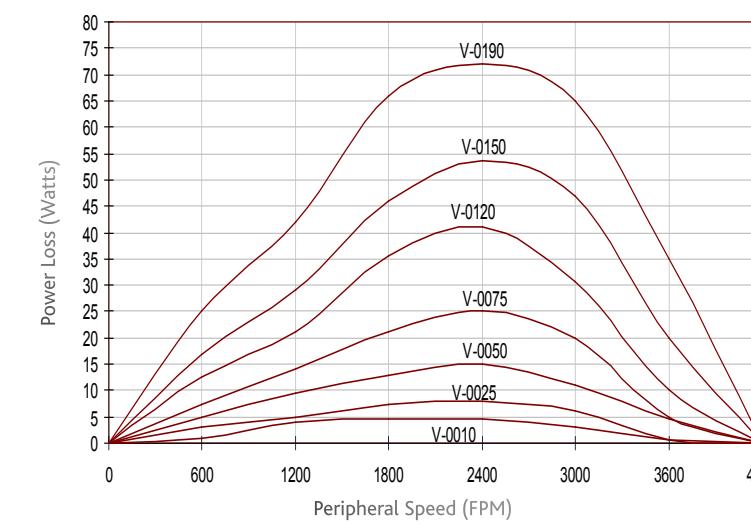
Profile Dimensions



Assembly Dimensions



V-Seal Designation	For Shaft Diameter d_1	Inside Diameter d	Height of Cross Section c	Dimension A	Free Width B	Maximum d_2	Minimum d_3	Fitted Width B_1
V-5S	0.18-0.21	0.16	0.08	0.15	0.21	$d_1 + 0.04$	$d_1 + 0.25$	0.18±0.016
V-6S	0.21-0.26	0.20						
V-7S	0.26-0.31	0.24						
V-8S	0.31-0.37	0.28	0.08	0.15	0.21	$d_1 + 0.04$	$d_1 + 0.25$	0.18±0.016
V-10S	0.37-0.45	0.35	0.12	0.22	0.30	$d_1 + 0.08$	$d_1 + 0.35$	0.26±0.02
V-12S	0.45-0.53	0.41						
V-14S	0.53-0.61	0.49						
V-16S	0.61-0.69	0.55						
V-18S	0.69-0.77	0.63	0.12	0.22	0.30	$d_1 + 0.35$	0.26±0.02	
V-20S	0.77-0.83	0.71	0.16	0.31	0.41	$d_1 + 0.45$	0.35±0.03	
V-22S	0.83-0.95	0.79						
V-25S	0.95-1.07	0.87						0.18±0.08
V-28S	1.07-1.14	0.98						0.18±0.12
V-30S	1.14-1.22	1.06						
V-32S	1.22-1.30	1.14						
V-35S	1.30-1.42	1.22						
V-38S	1.42-1.50	1.34	0.16	0.31	0.41	$d_1 + 0.45$	0.35±0.03	
V-40S	1.50-1.70	1.42	0.20	0.37	0.51	$d_1 + 0.60$	0.43±0.04	
V-45S	1.70-1.89	1.57						
V-50S	1.89-2.09	1.77						
V-55S	2.09-2.29	1.93						
V-60S	2.29-2.48	2.13						
V-65S	2.48-2.68	2.28	0.20	0.37	0.51	$d_1 + 0.12$	$d_1 + 0.60$	0.43±0.04
V-70S	2.68-2.88	2.48	0.24	0.44	0.61	$d_1 + 0.16$	$d_1 + 0.70$	0.53±0.05
V-75S	2.88-3.07	2.64						
V-80S	3.07-3.27	2.83						
V-85S	3.27-3.47	2.94						
V-90S	3.47-3.66	3.19						
V-95S	3.66-3.86	3.35						
V-100S	3.86-4.14	3.54	0.24	0.44	0.61	$d_1 + 0.70$	0.53±0.05	
V-110S	4.14-4.53	3.90	0.28	0.52	0.71	$d_1 + 0.80$	0.61±0.06	
V-120S	4.53-4.92	4.25						
V-130S	4.92-5.32	4.61						
V-140S	5.32-5.71	4.96						
V-150S	5.71-6.10	5.31	0.28	0.52	0.71	$d_1 + 0.16$	$d_1 + 0.80$	0.61±0.06
V-160S	6.10-6.50	5.67	0.32	0.59	0.81	$d_1 + 0.20$	$d_1 + 0.95$	0.71±0.07
V-170S	6.50-6.89	6.02						
V-180S	6.89-7.29	6.38						
V-190S	7.29-7.68	6.73						
V-199S	7.68-8.27	7.09	0.32	0.59	0.81	$d_1 + 0.20$	$d_1 + 0.95$	0.71±0.07



Power Losses are Minimal

The pressure of the lip against the counterface is very light, resulting in low power loss and small heat increase. Above peripheral speeds of 2400 FPM the friction decreases.

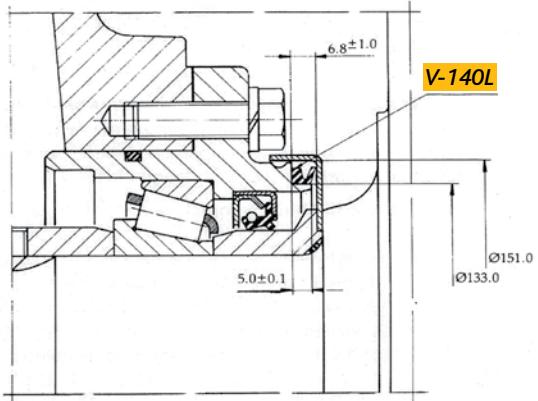
V-Seal



V-Seals L

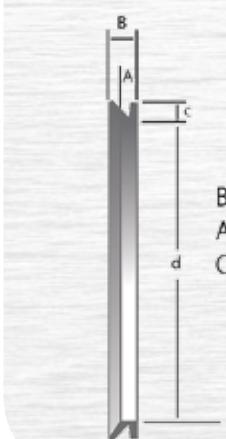
Select the larger V-Seal when the dimension d_1 is on the boundary between two sizes of V-Seal. All dimensions are in inches.

Agricultural Equipment Tractor Axle



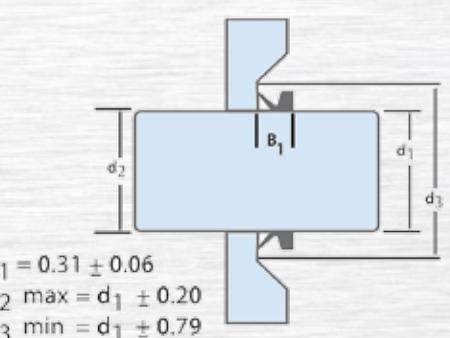
V-Seal Designation	For Shaft Diameter d_1	Inside Diameter d	V-Seal Designation	For Shaft Diameter d_1	Inside Diameter d
V-140L	5.32-5.71	4.96	V-250L	9.17-10.24	8.86
V-150L	5.71-6.10	5.31	V-275L	10.24-11.22	9.72
V-160L	6.10-6.50	5.67	V-300L	11.22-12.20	10.63
V-170L	6.50-6.89	6.02	V-325L	12.20-13.19	11.50
V-180L	6.89-7.29	6.38	V-350L	13.19-14.37	12.40
V-190L	7.29-7.68	6.73	V-375L	14.37-15.15	13.27
V-200L	7.68-8.27	7.17	V-400L	15.15-16.73	14.17
V-220L	8.27-9.17	7.80	V-450L	16.73-18.70	15.94

Profile Dimensions



$$\begin{aligned} B &= 0.41 \\ A &= 0.24 \\ C &= 0.26 \end{aligned}$$

Assembly Dimensions

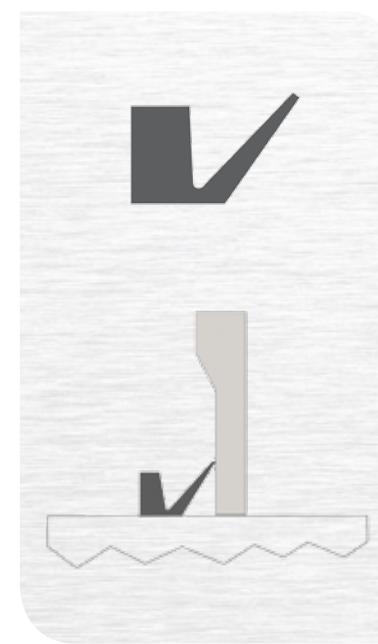


$$\begin{aligned} B_1 &= 0.31 \pm 0.06 \\ d_2 \max &= d_1 \pm 0.20 \\ d_3 \min &= d_1 \pm 0.79 \end{aligned}$$

V-Seals AX

Select the larger V-Seal when the dimension d_1 is on the boundary between two sizes of V-Seal. All dimensions are in inches.

V-Seal Designation	For Shaft Diameter d_1	Inside Diameter d	Height of Cross Section c	Dimension A	Free Width B	Maximum d_2	Minimum d_3	Fitted Width B_1
V-220AX	8.267-8.740	7.874	0.701	0.681	1.220	$d_1 + 0.472$	$d_1 + 1.968$	0.984±0.197
V-230AX	8.740-9.251	8.267						
V-240AX	9.251-9.645	8.740						
V-250AX	9.645-10.236	9.094						
V-265AX	10.236-10.826	9.645						
V-280AX	10.826-11.417	10.236						
V-300AX	11.417-12.204	10.629						
V-325AX	12.204-13.188	11.496						
V-350AX	13.188-14.370	12.401						
V-375AX	14.370-15.354	13.267						
V-400AX	15.354-16.535	14.173						
V-425AX	16.535-17.322	15.354						
V-450AX	17.322-18.897	15.944						
V-500AX	18.897-20.866	17.716						
V-550AX	20.866-22.834	19.488						
V-600AX	22.834-24.803	21.259						
V-650AX	24.803-26.181	23.622						
V-700AX	26.181-27.755	24.803						
V-725AX	27.755-29.330	26.377						
V-750AX	29.330-30.905	27.755						
V-800AX	30.905-32.677	29.330						
V-850AX	32.667-34.448	30.905						
V-900AX	34.448-36.220	32.480						
V-950AX	36.220-37.992	34.055						
V-1000AX	37.992-39.960	35.826						
V-1050AX	39.960-41.929	37.598						
V-1100AX	41.929-43.897	39.370						
V-1150AX	43.879-45.866	41.410						
V-1200AX	45.866-47.834	42.913						
V-1250AX	47.834-50.000	44.685						
V-1300AX	50.000-51.968	46.456						
V-1350AX	51.968-53.937	48.228						
V-1400AX	53.937-55.905	50.000						
V-1450AX	55.905-57.874	51.771						
V-1500AX	57.874-59.842	53.543						
V-1550AX	59.842-61.811	55.314						
V-1600AX	61.811-63.779	57.086						
V-1650AX	63.779-65.748	58.858						
V-1700AX	65.748-67.716	60.629						
V-1750AX	67.716-69.685	62.401						
V-1800AX	69.685-71.653	64.173						
V-1850AX	71.653-73.622	65.944						
V-1900AX	73.622-75.590	67.716						
V-1950AX	75.590-77.559	69.488						
V-2000AX	77.559-79.527	71.259	0.701	0.681	1.220	$d_1 + 0.472$	$d_1 + 1.968$	0.984±0.197



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