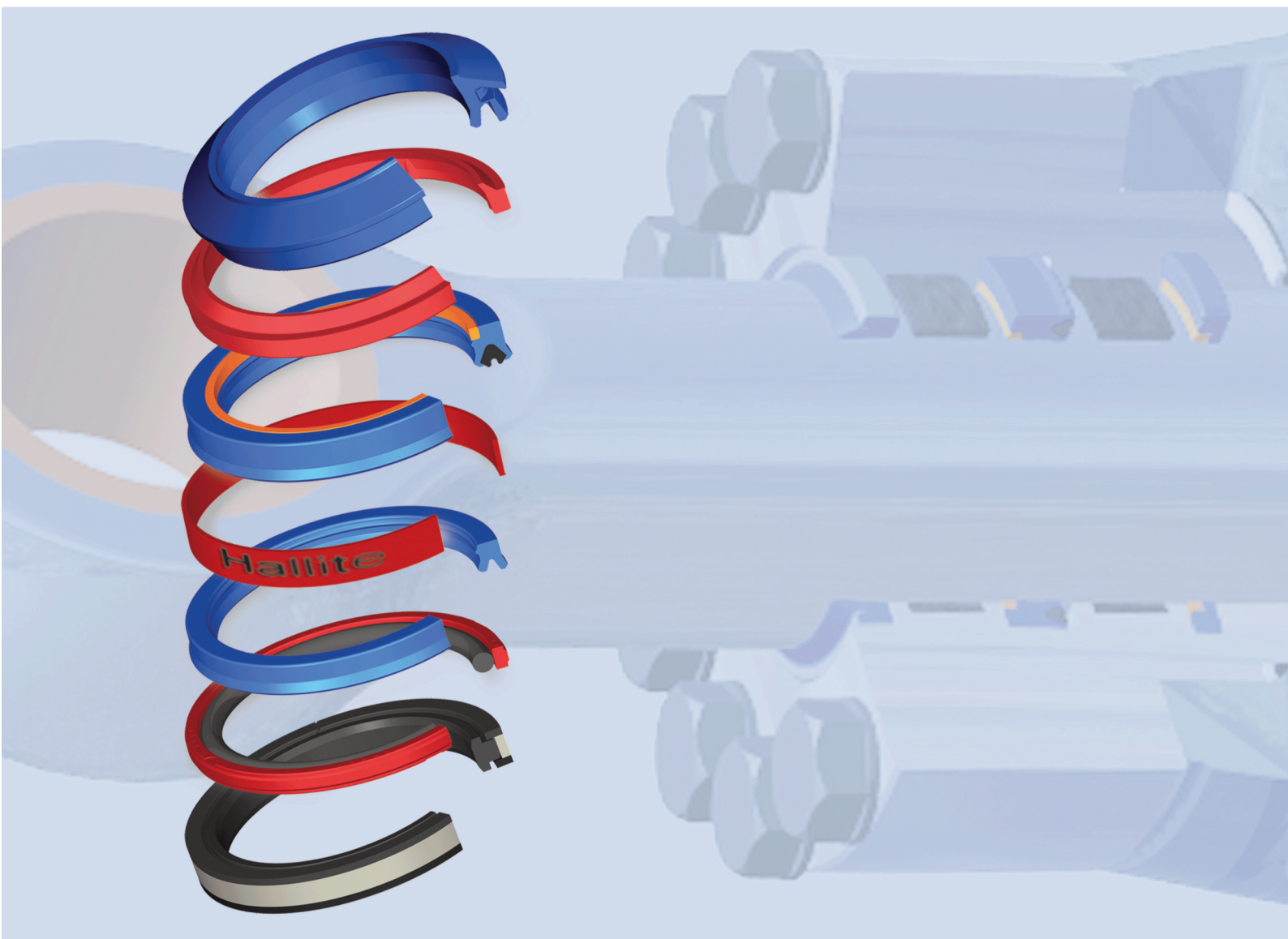


Fluid Power Seal Catalogue

EMEA



A Culture of Excellence...

Making world class products for highly specified mission critical applications goes beyond excellence in engineering and design; it involves a total commitment to quality in every aspect of our business.

Through product and service innovation in response to changing customer needs Hallite's sealing products have set new benchmarks across a wide variety of industries in just about every corner of the globe.

Hallite has been at the cutting edge of sealing technology solutions for over one hundred years and has built up an unrivalled wealth of knowledge and expertise over this period. Our stability and solid foundations have helped us support our customers and offer them the reliability they have now come to expect.



All our activities conform to the highest quality assurance systems. Hallite Seals International is accredited to ISO 9001, ISO 14001 and OHS 18001 and are approved by many of the world's foremost O.E.M.s



Hallite

Within the introductory section (pages 2 – 24) technical data is provided to ease seal selection. Seal designs are grouped according to their prime use in a hydraulic cylinder:

- Rod Seals
- Single Acting Rod and Piston Seals
- Double Acting Piston Seals
- Single Acting Piston Seals
- Unitised Piston
- Vee Pack Sets
- Wipers
- Bearings
- Swivel Seals
- Additional Products

Product types are then listed in numerical order from page 25 and within each product type, parts are listed in size order.

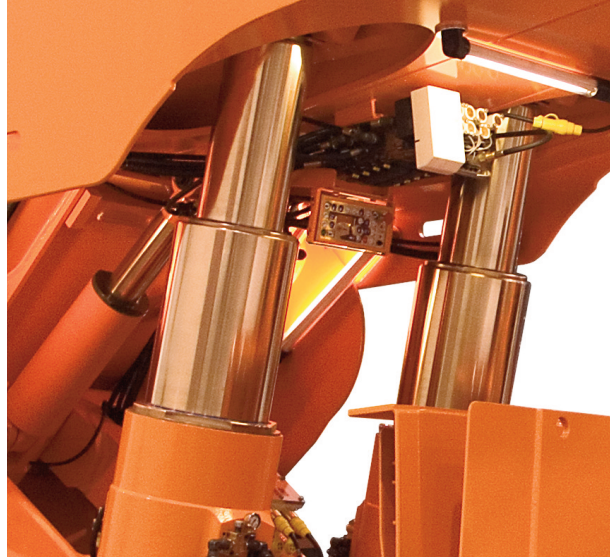
Parts suitable for ISO standard housings and Asian housings are clearly identified within each product group size lists.

A product index by function and size is included in the yellow pages section.

We are constantly adding to our range of profiles and sizes. If you cannot locate the correct profiles or size, please contact your nearest Hallite sales office or Official Hallite distributor.

The information contained within this catalogue is based on many years of fluid sealing experience, along with extensive in-house testing and is given in good faith. No warranty or guarantee is expressed save in our standard terms and conditions of sale (available on request), since the conditions of use are beyond our control.

Hallite Seals is continuously improving its range and reserves the right to withdraw or modify any item shown in this catalogue.



Rod Seals

Type	Page	Metric	Inch	Profile	Maximum Pressure bar							Temperature Range °C					Maximum Speed m/sec						
					0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200	0	1	2	3	4
Rod Seals	16	41	✓																				
	605	145	✓	✓																			
	610	163	✓																				
	616	167	✓																				
	620	169		✓																			
	621	171	✓	✓																			
	652	177	✓																				
	653	181	✓	✓																			
	663	187	✓																				

*Pressure rating of seal design can be extended by the use of a back up ring. If this option is required, please seek advice from your local Hallite sales office.

Single Acting Rod and Piston Seals

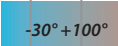
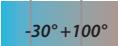
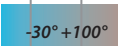
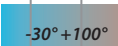
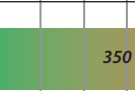
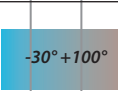
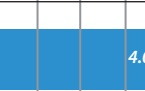
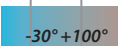
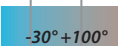
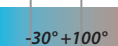
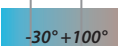
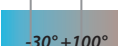
	Type	Page	Metric	Inch	Profile	Maximum Pressure bar							Temperature Range °C					Maximum Speed m/sec							
						0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200	0	1	2	3	4	5
Single Acting Rod and Piston Seals	15	39	✓																						
	18	45	✓	✓																					
	511	113	✓																						
	512	119	✓																						

Single Acting Rod and Piston Seals

Type	Page	Metric	Inch	Profile	Maximum Pressure bar							Temperature Range °C					Maximum Speed m/sec							
					0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200	0	1	2	3	4	5
Single Acting Rod and Piston Seals	513	123	✓					350							-40°+110°				0.5					
	601	137	✓	✓					400			700*			-45°+110°				1.0					

*Pressure rating of seal design can be extended by the use of a back up ring. If this option is required, please seek advice from your local Hallite sales office.

Double Acting Piston Seals

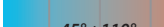
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				0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200	0	1	2	3	4
Double Acting Piston Seals	50	63	✓																			
	51	65	✓																			
	52	67	✓																			
	53	69	✓✓																			
	54	73	✓✓																			
	56	77	✓✓																			
	58	81	✓✓																			
	64	87	✓																			
	65	89	✓✓																			
	68	93	✓																			
	77	95	✓✓																			

Double Acting Piston Seals

	Type	Page	Metric	Inch	Profile	Maximum Pressure bar							Temperature Range °C					Maximum Speed m/sec					
						0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200	0	1	2	3
Double Acting Piston Seals	714	191	✓	✓																			
	730	197	✓																				
	735	201	✓	✓																			
	754	205	✓	✓																			
	755	209		✓																			
	764	211	✓	✓																			
	770	213		✓																			
	775	217		✓																			
	780	219	✓																				

**Pressure rating of seal design can be extended by the using other face material options - see Hallite 754 datasheet.

Single Acting Piston Seals

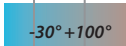
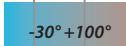
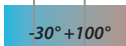
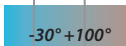
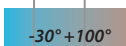
	Type	Page	Metric	Inch	Profile	Maximum Pressure bar							Temperature Range °C					Maximum Speed m/sec					
						0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200	0	1	2	3
Single Acting Piston Seals	606	159	✓	✓																			
	659	185	✓	✓																			

*Pressure rating of seal design can be extended by the use of a back up ring. If this option is required, please seek advice from your local Hallite sales office.

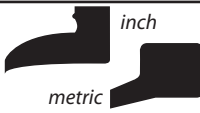
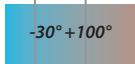
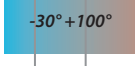
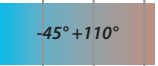
Unitised Piston

					Maximum Pressure bar							Temperature Range °C					Maximum Speed m/sec							
Type	Page	Metric	Inch	Profile	0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200	0	1	2	3	4	5
Unitised Piston	720	199	5	✓ ✓ 				350								-30°	+100°							
																				1.0				

Vee Pack Sets

	Type	Page	Metric	Inch	Profile	Maximum Pressure bar							Temperature Range °C					Maximum Speed m/sec					
						0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200	0	1	2	3
Vee Pack Sets	7	25	✓	✓																			
	9	29	✓	✓																			
	11	33	✓																				
	13	35	✓																				
	14	37	✓																				

Wipers

					Notes	Temperature Range °C						Maximum Speed m/sec						
Type	Page	Metric	Inch	Profile		-50	0	+50	+100	+150	+200	0	1	2	3	4	5	
Wipers	33	51	✓	✓	 <i>inch</i> <i>metric</i>	Additional wiper seals are available on request and include ranges for standard American grooves.												
	38	55	✓															
	335	103	✓		Hallite wipers 33 are produced in materials that are capable of operating at temperatures below 0°C, but they are not designed to scrape ice.													
	520	129	✓															

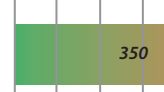
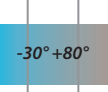
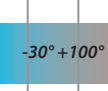
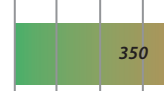
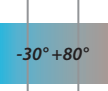
Wipers

	Type	Page	Metric	Inch	Profile	Notes	Temperature Range °C						Maximum Speed m/sec					
							-50	0	+50	+100	+150	+200	0	1	2	3	4	5
Wipers	831	227	✓			Hallite wipers 834, 839 and 846 are produced in materials that are capable of operating at temperatures below 0°C, but they are not designed to scrape ice.	-45° +110°						4.0					
	834	231	✓				-45° +110°						4.0					
	839	235	✓				-45° +110°						4.0					
	842	239	✓	✓			-45° +110°						4.0					
	844	245	✓				-45° +110°						4.0					
	846	249	✓				-45° +110°						4.0					
	860	251	✓	✓			-40° +100°						1.0					
	862	255		✓			-40° +100°						1.0					
	864	257	✓				-45° +110°						1.0					

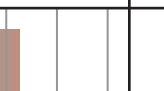
Bearings

	Type	Page	Metric	Inch	Profile	Notes	Temperature Range °C						Maximum Speed m/sec					
							-50	0	+50	+100	+150	+200	0	1	2	3	4	5
Bearings	87	99	✓			Hallite 87, 506, 533 wear strip are also suitable for oscillating and rotary applications.	-50° +200°						5.0					
	506	105	✓	✓		Hallite 87 and 506 include cross sections that satisfy the requirements of ISO 10766.	-40° +120°						5.0					
	533	133		✓		Hallite 506 is available in three different formats; spiral lengths, cut rings and flat coils, see the relevant data sheet for additional information.	-40° +120°						5.0					

Swivel Seals

TypePageMetric InchProfile						Maximum Pressure bar							Temperature Range °C					Maximum Speed m/sec					
						0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200	0	1	2	3
Swivel Seals	80	97	✓			 350							 -30°+80°					 0.1					
	310	101	✓			 300							 -30°+100°					 0.5					
	RO 800	225	✓			 350							 -30°+80°					 0.2					

Additional Products

	Type	Page	Metric	Inch	Profile	Maximum Pressure bar							Temperature Range °C					Maximum Speed m/sec			
						0	100	200	300	400	500	600	700	-50	0	+50	+100	+150	+200		
Additional Products	657	183	✓	✓														STATIC			

Material Name	Material Group	Designation	Temperature Range		Hardness	Colour	Rod
			°C	°F			
Nitrile - Medium	Synthetic Rubber	NBR	-30 +120	-22 +250	90 IRHD	Black	H
Nitrile - High	Synthetic Rubber	NBR	-10 +140	-14 +284	80 IRHD	Black	P
Nitrile - Low	Synthetic Rubber	NBR	-45 +100	-50 +212	80 IRHD	Black	H
Nitrile - Medium	Synthetic Rubber	NBR	-30 +120	-22 +250	80 IRHD	Black	
Nitrile - Medium	Synthetic Rubber	NBR	-30 +120	-22 +250	75 IRHD	Black	H
Nitrile - Medium	Synthetic Rubber	NBR	-30 +120	-22 +250	73 IRHD	Black	H
Nitrile - Medium	Synthetic Rubber	NBR	-30 +120	-22 +250	70 IRHD	Black	H
Nitrile - Low	Synthetic Rubber	NBR	-45 +100	-50 +212	70 IRHD	Black	H
Nitrile - Medium	Synthetic Rubber	NBR	-30 +120	-22 +250	70 IRHD	Black	H
Hallprene - Rubber/Fabric	Composite	Cotton/FKM	-30 +120	-22 +250		Black	H
Fluoroelastomer - Rubber/Fabric	Composite	Cotton/FKM	-20 +150	-4 +302		Black	H
Fluoroelastomer	Synthetic Rubber	FKM	-20 +200	-4 +392	75 IRHD	Black	H / P
Hythane ® 181	TPE	EU	-45 +110	-50 +230	93 IRHD	Blue	H / P
Hallite ® 361	TPE	AU	-30 +110	-22 +230	96 IRHD	Orange	H
Polyurethane	TPE	AU	-40 +100	-40 +212	94 IRHD	Dark Blue	
Polyurethane	TPE	EU	-45 +110	-50 +230	93 IRHD	Dark Blue	
Polyurethane	TPE	Eu	-45 +110	-50 +230	93 IRHD	Black	H
Polyurethane	TPE	Eu	-40 +100	-40 +212	55D	Dark Green	
Standard Polyester Elastomer	TPE		-40 +120	-40 +250	55D	Red	
Hydrolysis Stabilised Polyester Elastomer	TPE		-40 +120	-40 +250	55D	Grey	H
Hydrolysis Stabilised Polyester Elastomer	TPE		-40 +140	-40 +284	72D	Dark Red	
Hydrolysis Stabilised Polyester Elastomer	TPE		-30 +100	-22 +212	40D	Light Grey	
Lubricated Polyester Elastomer	TPE		-40 +120	-40 +250	55D	Cream	
Acetal	Engineered Plastic	POM	-45 +120	-50 +250	R115	Orange	H
PTFE Glass Filled	Engineered Plastic	PTFE	-50 +200	-58 +392	60D	White	H / P
PTFE Glass/MoS2 Filled	Engineered Plastic	PTFE	-50 +200	-58 +392	62D	Grey	H
PTFE Bronze Filled	Engineered Plastic	PTFE	-50 +200	-58 +392	65D	Bronze	H
PTFE Bronze Filled	Engineered Plastic	PTFE	-50 +200	-58 +392	72D	Bronze	
Hallite ® 506 Polyester/Polyester	Composite		-40 +120	-40 +250		Red	
Nylon 12	Engineered Plastic	PA	-40 +120	-40 +250	72D	Brown	
Nylon 6/MoS2	Engineered Plastic	PA	-40 +120	-40 +250	R115	Black	
Glass Filled Nylon	Engineered Plastic	PA	-40 +120	-40 +250	R124	Black	

Piston	Wiper	Bearing		Products	Compound Reference
	H			11, 12, 13, 14, Vee Rings, 33	9000141
P	P			Special material option	9000041
				Special material option	9000471
H			M(1)	50, 53, 694, 65, 68, 77, 730, 735, 753 Sealing elements	9001411
H				15	9000801
H				07, 18	9000271
H				16, 54, 754, 755, 770	9000771
H				Special material option 15, 18, 56, 58	9000211
				56, 58	9000111
H				07, 09, 11, 13, 14, 15, 18, 21, 51, 52, 56, 58	9400251
H				Special material option for standard rubber and rubber/ fabric products (Additional tooling may be required)	9400431
H / P	H / P			Special material option for standard rubber and rubber/ fabric products (Additional tooling may be required)	9020051
H / P	H / P		M	80, 601, 605, 606, 607, 609, 610, 616, 620, 621, 652, 653, 656, 657, 658, 659, 834, 839, 842, 846	9220181
H	H			764, 775, 844, 864	9220361
	H			860, 862	9220321
	H			520, 831	9220251
H				511, 512, 513	9220221
	H		M	Special material option 842	9220371
H	H			38, 754, 755	9270061
H			M	716, 730, 740, 750	9270111
H				754, 755, 770	9270051
			M(1)	155	9270201
H / P				754, 755, 770	9270261
H		H / P	M	AE Rings 621, Vee Pack Headers, Bearing Rings 53, 58, 65, 68, 77	9230011
H / P				16, 54	PTFE 02
H	H			416, 454, 735	CDI 702
H				16, 54, 416, 454, 735	CDI 741
		H		87	9200031
		H / P	M	506, 507	
H				Support Rings 50, 53, 64, 68	9260041
H				AE Rings 735	CDI 707
		H		533, 720	Dynamic 533

Key: H- Hydraulic

P- Pneumatic

M- Suitable for water based fluid

(1)- Static applications only

Max. continuous working temperatures °C and temperature ranges for materials, within fluid power fluids

Material	Continuous material service temperature range °C	Intermittent material service temperature range °C	Service Fluids								
			Fluids based on mineral oils				Greases		Fuels		
			Motor Oils	Hypoid Gear Oils	Automatic Transmission Fluid	ISO 6743-4 Hydraulic oils (HL, HM, HV)	Mineral oil based greases	Silicon based greases	Diesel Fuel	Fuel for gasoline/petrol engines - normal	Fuel for gasoline/petrol engines - super
			+150 -40	+150 -40	+160 -50	+100 -30	+100 -30	+250 -50			
			Maximum continuous service temperature in fluids °C								
NBR 70 IRHD NBR 90 IRHD Nitrile (medium)	+100 -30	+120 -30	+100	+90	+100	+100	+100	+100	*	*	*
FKM 75 IRHD FKM 90 IRHD Fluoro-elastomer	+200 -20	+250 -20	+150	+150	+160	+100	+100	+200	+150	+150	+150
EPDM 70 IRHD EPDM 80 IRHD	+120 -50	+150 -50	NS	NS	NS	NS	NS	+120	NS	NS	NS
VMQ 70 IRHD Silicone	+200 -55	+250 -55	*	*	*	*	+100	*	NS	NS	NS
HNBR 75 IRHD Hydrogenated Nitrile	+130 -30	+150 -30	+130	+110	+130	+100	+100	+130	*	*	*
AU Polyester PU	+100 -30	+110 -30	+100	+100	+100	+100	+100	+100	+60	+60	+60
EU Polyether PU	+100 -40	+110 -45	+100	+100	+100	+100	+100	+100	+60	+60	+60
Polyester-elastomer	+100 -40	+120 -40	+100	+100	+100	+100	+100	+100	+60	+60	+60
PA Polyamide	+100 -40	+120 -40	+100	+100	+100	+100	+100	+100	+100	+100	+100
POM Acetal	+100 -45	+120 -40	+100	+100	+100	+100	+100	+100	+100	+100	+100
PPS Polyphenylene sulphide	+200 -40	+200 -40	+150	+150	+160	+100	+100	+200	+150	+150	+150
PTFE Polytetra-fluoroethylene	+200 -200	+200 -200	+150	+150	+160	+100	+100	+200	+150	+150	+150
Thermosetting Polyester Resin	+100 -50	+130 -200	+100	+100	+100	+100	+100	+100	+100	+100	+100
PEEK Polyether-etherketone	+250 -65	+300 -65	+150	+150	+160	+100	+100	+250	+150	+150	+150

* Denotes that values vary greatly for individual elastomers within this group NS Denotes that the elastomer is not suitable
The work of the BFPA technical working group 'TC16/WG8' in the compilation of this table is acknowledged

Max. continuous working temperatures °C and temperature ranges for materials, within fluid power fluids

Service Fluids											
Fire-resistant hydraulic fluids					Environmentally acceptable fluids				Other service fluids		
ISO 6743-4 HFA-Fluids (5/95 waterbased)	ISO 6734-4 HFB-Fluids (60/40 invert emulsion)	ISO 6743-4 HFC-Fluids (water glycol)	ISO 6743-4 HFDR-Fluids (phosphate ester ALKYL (Aero))	ISO 6743-4 HFDR-Fluids (phosphate ester ARYL (ind.))	ISO 6743-4 HETG-Fluids (vegetable oil based)	ISO 6743-4 HEES-Fluids (synthetic ester based)	ISO 6743-4 HEPG-Fluid (synthetic glycol based)	ISO 6743-4 HEPR-Fluid (synthetic hydrocarbons)	Water (1)	Air	Brake Fluids
+60 +5	+60 +5	+60 -30	+100 -50	+150 +0	+60 -10	+100 -40	+100 -50	+150 -50	+60 -5	+200 +2	+130 -50
Maximum continuous service temperature in fluids °C											
+60	+60	+60	NS	NS	+60	+60	+60	+100	+80	+100	NS
+60	+60	NS	NS	+150	+60	+100	+80	+105	+100	+200	NS
NS	NS	+60	+80	+80	NS	NS	NS	NS	+120	+120	+120
NS	NS	NS	NS	NS	NS	NS	NS	*	+100	+200	+80
+60	+60	+60	NS	NS	+60	+60	+80	+130	+130	+130	NS
+40	+40	NS	NS	NS	+60	+60	+60	+100	+40	+40	NS
+60	+60	+40	NS	NS	+60	+80	+60	+100	+60	+80	NS
+60	+60	NS	NS	NS	+60	+80	+60	+100	+60	+80	NS
+60	+60	+60	+100	+100	+60	+100	+100	+100	+60	+80	+80
+60	+60	+60	+100	+100	+60	+100	+100	+100	+80	+80	+80
+60	+60	+60	+100	+150	+60	+100	+100	+150	+150	+200	+130
+60	+60	+60	+100	+150	+60	+100	+100	+150	+150	+200	+130
+60	+60	+40	+100	+100	+60	+100	+100	+100	+80	+100	NS
+60	+60	+60	+100	+150	+60	+100	+100	+150	+150	+200	+130

In view of the variations in formulation of both oils and polymers, the compatibility of all combinations should be confirmed by testing and field service performance for each application.
(1) Temperature range for water in fluid power applications

D = Dynamic Application, S = Static Application
R = Recommended, P = Possible, NS = Not Suitable

Product	Fluids based on Mineral Oil		Waterbased Fluids								Other Fluid Types					
			HFA (5/95)		HFB (60/40 invert emulsion)		HFC (water glycol)		Water		HFD (Phosphate ester ARYL Type)		Synthetic esters (HEES, HFDU)		Air / Nitrogen	
	D	S	D	S	D	S	D	S	D	S	D	S	D	S	D	S
Rod Seals																
16	R	P	P	P	P	P	P	P	P	P	R1	P1	R	P	P	NS
605, 610, 616	R	R	P	P	R	R	P	P	P	P	NS	NS	R	P	P	P
621, 652	R	R	R	R	R	R	P	P	P	P	NS	NS	R	P	P	P
653	R	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	P	NS	NS	NS
Rod/Piston Seals																
15, 18	R	R	P	R	R	R	R	R	P	R	P2	P2	P	P	P	P
511, 512, 513	R	R	P	P	P	P	P	P	P	P	NS	NS	R	R	P	P
601	R	R	P	R	R	R	P	P	P	P	NS	NS	R	R	P	P
DA Piston Seals																
50, 53, 64, 68	R	R	P	R	R	R	P3	P3	P	R	NS	NS	P	P	NS	P
51, 52, 56, 58	R	R	P	R	R	R	R	R	P	P	P2	P2	P	P	NS	P
54	R	P	P	R	P	P	P	P	P	P	R1	P1	R	P	P	NS
65, 77	R	R	P	R	R	R	R	R	P	P	NS	NS	P	P	NS	P
714	R	NS	NS	NS	NS	NS	NS	NS	NS	NS	P1	NS	R	NS	NS	NS
730	R	R	R	R	R	R	NS	NS	P	P	NS	NS	R	P	NS	P
735	R	P	NS	NS	P	P	P	P	NS	NS	NS	NS	R	P	NS	NS
753	R	R	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	R	P	NS	NS
754, 755	R	R	P	R	P	R	NS	NS	P	P	NS	NS	R	R	P	P
764	R	R	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	R	R	P	P
770	R	R	P	P	P	P	NS	NS	P	P	NS	NS	R	R	P	P
SA Piston Seals																
606, 659	R	R	P	P	R	R	P	P	P	P	NS	NS	R	P	P	P
Unitised Piston																
720	R	P	NS	NS	NS	NS	NS	NS	NS	NS	P4	P4	R	P	NS	NS
Vee Packs																
07, 08, 11, 13, 14	R	P	P	P	R	P	R	P	P	P	P2	P2	P	P	NS	NS

- 1 Suitable energiser material required e.g. FKM, EPDM. N.B. NBR unsuitable.
- 2 Suitable compounds required e.g. FKM, EP. N.B. NBR unsuitable.
- 3 Use PA backing rings, not polyester.
- 4 Suitable seal set required.

In view of the variation in formulation of oils and other hydraulic fluids, the compatibility of all combinations should be confirmed by testing and field service performance for each application.

Our quality control methods for material and manufacturing processes ensure that all seals leaving our factories are in a condition capable of giving a long and reliable service life.

We have found from many years experience, that premature seal failure can be avoided if the following recommendations are considered at the design and manufacturing stage of the cylinder:

- 1 Specify piston and gland bearings which are adequately proportioned to support the cylinder loads.

As a result of mounting misalignments and / or the working action of the cylinder, piston and gland bearings will be subjected to side-loading, causing damage to the rod or the tube surface and hence the seal, if the bearings are inadequate.

- 2 Ensure that seals are stored distortion free in a cool, dry and dark place prior to fitting. (See Storage of seals).

- 3 Check that the seal housing is free from damage likely to harm the seal. Remove all sharp edges and burrs from metal parts, paying particular attention to ports, grooves and threads over or through which the seal passes during assembly.

- 4 Clean all seal housing areas, ensuring that all metallic particles and other contaminants have been removed. Check that other surfaces adjacent to the passage of the seal on fitting are also free of dirt, swarf or other contaminants. Check that both static and dynamic housing surface finishes meet specifications.

- 5 Where the difference between a thread diameter over which the seal must pass and the seal diameter is small, use some form of protection over the thread, such as a fitting sleeve made of hard plastic.

- 6 Check that the seal is of the correct type, part number and size, and that the specified material is correct. If there is any doubt regarding the material contact your local Hallite sales office.

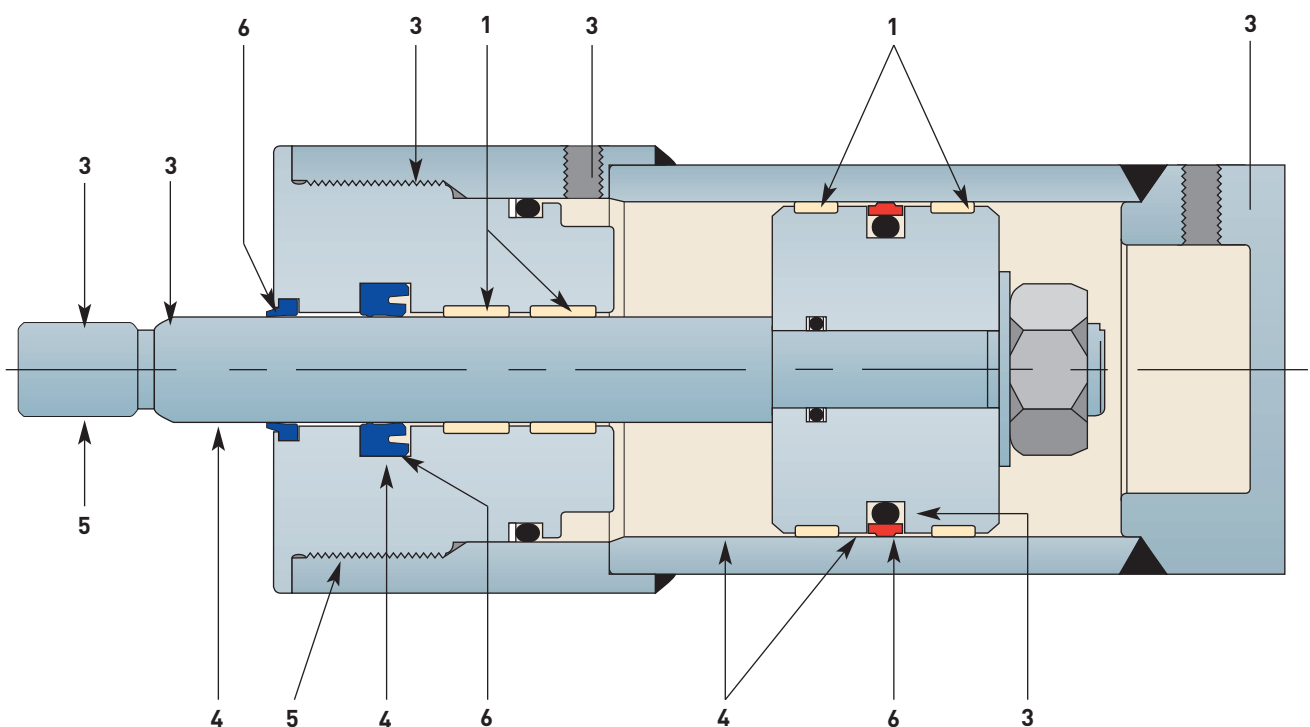
- 7 Lubricate all seals and metal components liberally with clean operating fluid or a compatible grease prior to assembly. N.B. Silicone grease should not be used in normal hydraulic applications.

- 8 Where seals fitted to sub-assemblies, such as pistons, are awaiting further fitting operations, ensure that the seals are not subjected to any misaligned or localised loading which will cause local deformation. Ensure that sub-assemblies remain clean.

- 9 The use of metal levers is not recommended but should they be used it is imperative that they are completely smooth and free from nicks and burrs. When using them ensure that the metal surfaces adjacent to the seal are not damaged.

- 10 Flush the hydraulic system thoroughly before connecting the cylinder to it.

Typical hydraulic cylinder layout showing installation features to be considered for satisfactory seal life.



Cylinder specification		Light duty	Medium duty	Heavy duty
Pressure	Max	350 bar	500 bar	700 bar
	Normal	160 bar	250 bar	400 bar
	Working	5000 psi 2300 psi No Pressure Peaks	7500 psi 3600 psi Intermittent Pressure Peaks	10000 psi 6000 psi Regular Pressure Peaks
Design		Lower operating stresses Rigid well aligned mounting, minimal side loading.	Steady operating stresses with intermittent high stress, some side loading.	Highly stressed for majority of its working life. Side loading common.
Condition of Fluid		Good system filtration no cylinder contamination likely.	Good system filtration but some cylinder contamination likely.	Contamination unavoidable from internal and external sources.
Working Environment		Clean and inside a building. Operating temperature variations limited.	Mixture of indoor and outdoors but some protection from the weather.	Outdoors all the time or a dirty indoor area. Wide variations in temperature, both ambient and working. Difficult service conditions.
Usage		Irregular with short section of stroke at working pressures. Regular usage but at low pressure.	Regular usage with most of the stroke at working pressure.	Large amount of usage at high pressure with peaks throughout the stroke.
Typical Applications		Machine tools Lifting equipment Mechanical handling Injection moulding machines Control and robot equipment Agricultural machinery Packaging equipment Aircraft equipment Light duty tippers 	Heavy duty lifting equipment Agricultural equipment Light duty off-road vehicles Cranes and lifting platforms Heavy duty machine tool Injection moulding machines some Auxiliary mining machinery Aircraft equipment Presses Heavy duty tippers (telescopic) Heavy duty mechanical handling 	Foundry and metal fabrication plant Mining machinery Roof supports Heavy duty earth moving machinery Heavy duty off-road vehicles Heavy duty presses 

Pressure, Speed, Temperature Range

From many years of application experience with sealing hydraulic equipment, supported by the results from an extensive test programme, we know that it is necessary to link the three main operating features of speed, pressure, and temperature to achieve a satisfactory seal performance.

After carefully considering each product we are able to specify the maximum speed and pressure with a temperature range within which the seal will operate safely. If your operating conditions do not comply with those recommended please send your details to your local Hallite sales office.

Cylinder Housing and Seal Options

The following diagrams illustrate how Hallite's wide range of products can be applied to a selection of some of the most popular cylinder designs servicing the world's fluid power industry.

The diagrams show different gland and piston arrangements to illustrate alternative sealing methods currently in use and a suitable Hallite product.

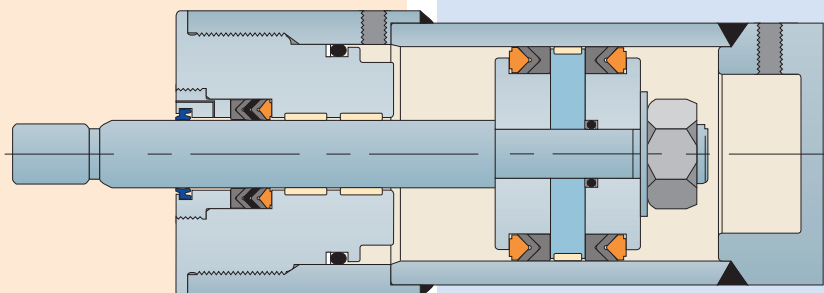
If the application which you are interested in is of a non-standard nature please contact Hallite's technical department.

Gland

Piston

Heavy duty

Type
13, 14

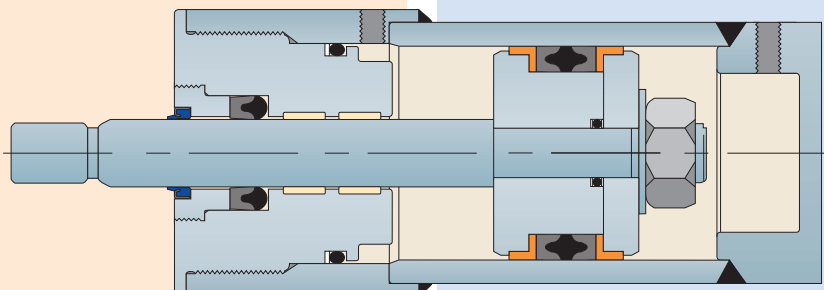


Heavy duty

Type
51, 52

Heavy duty

Type
18

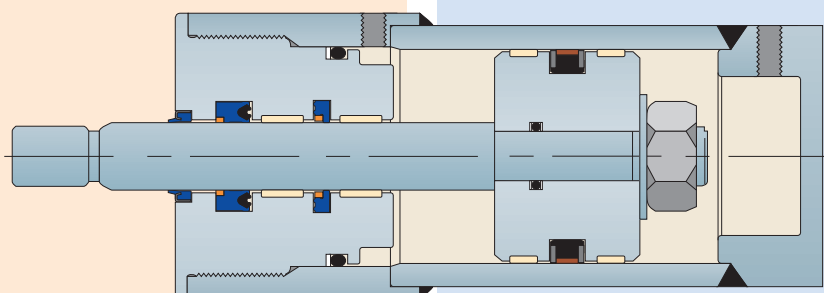


Heavy duty

Type
58

Heavy duty

Type
621, 652, 653

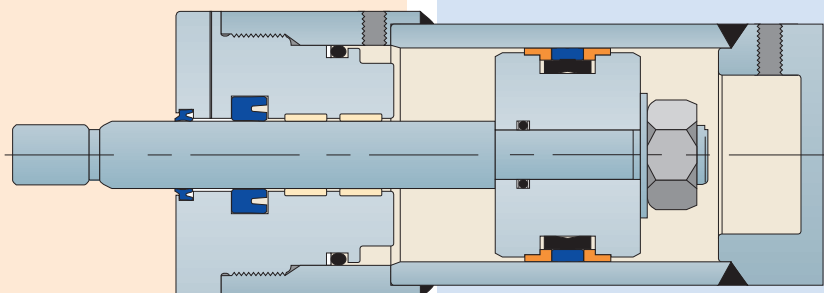


Heavy duty

Type
730, 735

Medium duty

Type
601, 605



Medium duty

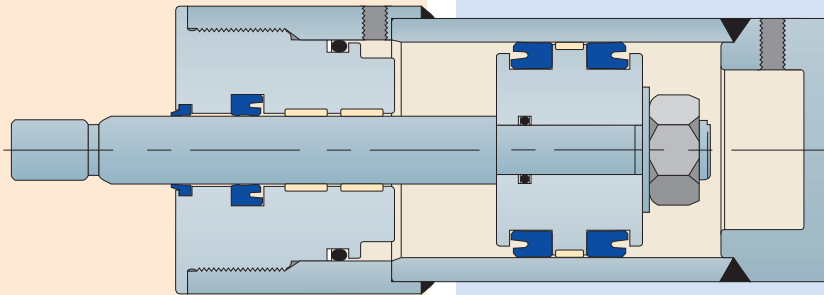
Type
753

Gland

Piston

Medium duty

Type
601, 605

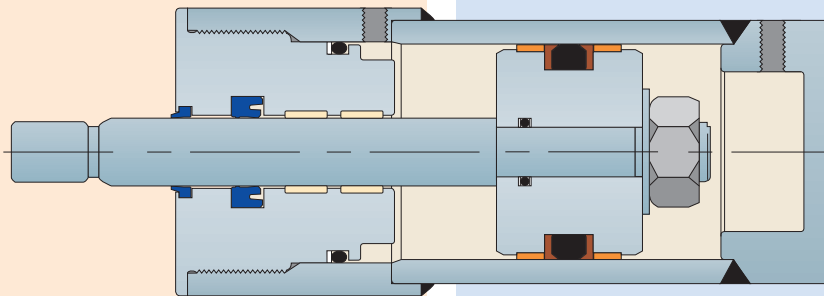


Medium duty

Type
606

Medium duty

Type
605

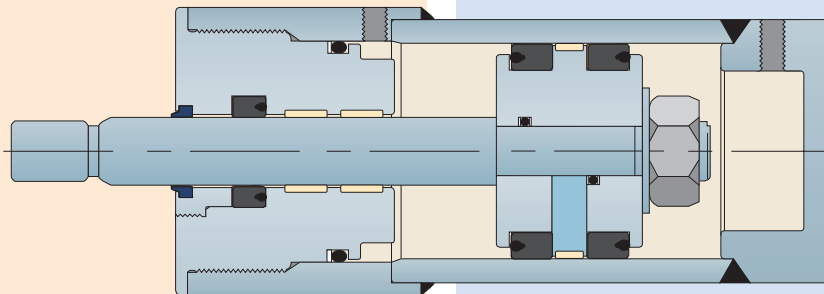


Medium duty

Type
53

Medium duty

Type
513

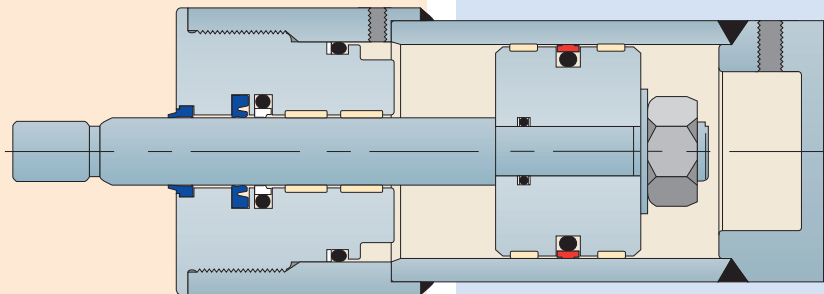


Medium duty

Type
511, 512

Light to Medium duty

Type
616, 16

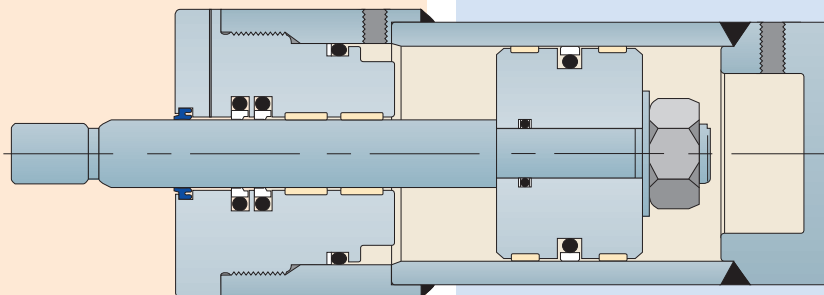


Light to Medium duty

Type
754, 755, 770

**High Speed
Light duty**

Type
16



**High Speed
Light duty**

Type
54

Hallite 87, 506 & 533 Bearing Strip

Hallite 87 strip is a low friction bronze filled PTFE compound produced in a flat tape style ready for easy cutting to size to suit individual applications and is particularly effective in friction conscious applications such as servo cylinders.

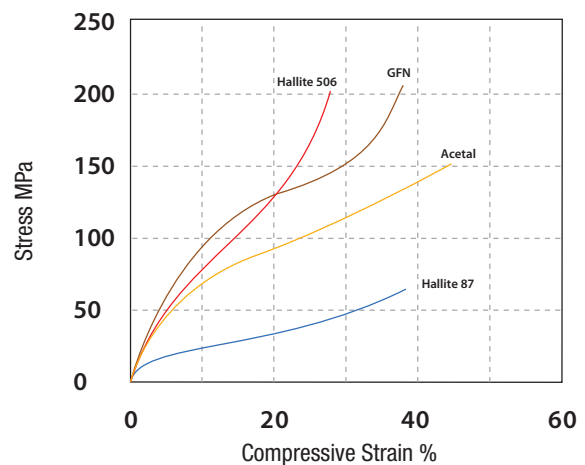
Hallite 506 can be supplied in spiral lengths, generally in 10 metre, as individual cut bearings and also in 10 metre lengths packed flat in a box dispenser. Hallite 506 bearing strip is manufactured to extremely accurate thickness tolerances, ensuring reliable cylinder alignment. Other sizes of type 506 are available on request, special sections and diameters can also be produced to suit individual requirements.

Bearing Type	Standard material
87	PTFE + Bronze
506	Polyester + PTFE
533	GFN

Bearing strip housing tolerances

As tolerances are not specified “on line” for types 87 & 506, please refer to the information below and on the next page for tolerances as indicated on the product’s data sheet.

Compressive bearing stress versus strain for non metallic materials



Hallite 506 specified tolerances

	Bearing length L ₁	Bearing cross section S
Tolerances (in)	-0.005 to -0.025	-0.001 to -0.003

Hallite 533 specified tolerances

	Bearing length L ₁	Bearing cross section S
Tolerances (in)	-0.000 to -0.010	-0.001 to -0.004

Hallite 506 specified tolerances

	Bearing length L ₁	Bearing cross section S
Tolerances (mm)	-0.1 to -0.6	-0.02 to -0.08

Hallite 87 specified tolerances

	Bearing length L ₁	Bearing cross section S
Tolerances (mm)	-0.1 to -0.5	+0.03 to -0.05

Specified Tolerances

Nominal Sizes mm		Shafts (Outside Diameter) Units 0.001 mm								Bores (Inside Diameter) Units 0.001 mm				
over	to	f8	f9	h8	h9	h10	h11	js10	js11	H8	H9	H10	H11	Js11
1.6	3	-6 -20	-6 -31	0 -14	0 -25	0 -40	0 -60	+20 -20	+30 -30	+14 0	+25 0	+40 0	+60 0	+30 -30
3	6	-10 -28	-10 -40	0 -18	0 -30	0 -48	0 -75	+24 -24	+37.5 -37.5	+18 0	+30 0	+48 0	+75 0	+37.5 -37.5
6	10	-13 -35	-13 -49	0 -22	0 -36	0 -58	0 -90	+29 -29	+45 -45	+22 0	+36 0	+58 0	+90 0	+45 -45
10	18	-16 -43	-16 -59	0 -27	0 -43	0 -70	0 -110	+35 -35	+55 -55	+27 0	+43 0	+70 0	+110 0	+55 -55
18	30	-20 -53	-20 -72	0 -33	0 -52	0 -84	0 -130	+42 -42	+65 -65	+33 0	+52 0	+84 0	+130 0	+65 -65
30	50	-25 -64	-25 -87	0 -39	0 -62	0 -100	0 -160	+50 -50	+80 -80	+39 0	+62 0	+100 0	+160 0	+80 -80
50	80	-30 -76	-30 -104	0 -46	0 -74	0 -120	0 -190	+60 -60	+95 -95	+46 0	+74 0	+120 0	+190 0	+95 -95
80	120	-36 -90	-36 -123	0 -54	0 -87	0 -140	0 -220	+70 -70	+110 -110	+54 0	+87 0	+140 0	+220 0	+110 -110
120	180	-43 -106	-43 -143	0 -63	0 -100	0 -160	0 -250	+80 -80	+125 -125	+63 0	+100 0	+160 0	+250 0	+125 -125
180	250	-50 -122	-50 -165	0 -72	0 -115	0 -185	0 -290	+92 -92	+145 -145	+72 0	+115 0	+185 0	+290 0	+145 -145
250	315	-56 -137	-56 -186	0 -81	0 -130	0 -210	0 -320	+105 -105	+160 -160	+81 0	+130 0	+210 0	+320 0	+160 -160
315	400	-62 -151	-62 -202	0 -89	0 -140	0 -230	0 -360	+115 -115	+180 -180	+89 0	+140 0	+230 0	+360 0	+180 -180
400	500	-68 -165	-68 -223	0 -97	0 -155	0 -250	0 -400	+125 -125	+200 -200	+97 0	+155 0	+250 0	+400 0	+200 -200
500	630	-76 -186	-76 -251	0 -110	0 -175	0 -280	0 -440	+140 -140	+220 -220	+110 0	+175 0	+280 0	+440 0	+220 -220
630	800	-80 -205	-80 -280	0 -125	0 -200	0 -320	0 -500	+160 -160	+250 -250	+125 0	+200 0	+320 0	+500 0	+250 -250

Nominal Sizes inch		Shafts (Outside Diameter) Units 0.001 inch								Bores (Inside Diameter) Units 0.001 inch				
over	to	f8	f9	h8	h9	h10	h11	js10	js11	H8	H9	H10	H11	Js11
0.04	0.12	-0.3 -0.9	-0.3 -1.2	0 -0.6	0 -1.0	0 -1.6	0 -2.5	+0.8 -0.8	+1.3 -1.3	+0.6 0	+1.0 0	+1.6 0	+2.5 0	+1.3 -1.3
0.12	0.24	-0.4 -1.1	-0.4 -1.6	0 -0.7	0 -1.2	0 -1.8	0 -3.0	+0.9 -0.9	+1.5 -1.5	+0.7 0	+1.2 0	+1.8 0	+3.0 0	+1.5 -1.5
0.24	0.40	-0.5 -1.4	-0.5 -1.9	0 -0.9	0 -1.4	0 -2.2	0 -3.5	+1.1 -1.1	+1.8 -1.8	+0.9 0	+1.4 0	+2.2 0	+3.5 0	+1.8 -1.8
0.40	0.71	-0.6 -1.6	-0.6 -2.3	0 -1.0	0 -1.6	0 -2.8	0 -4.0	+1.4 -1.4	+2.0 -2.0	+1.0 0	+1.6 0	+2.8 0	+4.0 0	+2.0 -2.0
0.71	1.19	-0.8 -2.0	-0.8 -2.8	0 -1.2	0 -2.0	0 -3.5	0 -5.0	+1.8 -1.8	+2.5 -2.5	+1.2 0	+2.0 0	+3.5 0	+5.0 0	+2.5 -2.5
1.19	1.97	-1.0 -2.6	-1.0 -3.4	0 -1.6	0 -2.5	0 -4.0	0 -6.0	+2.0 -2.0	+3.0 -3.0	+1.6 0	+2.5 0	+4.0 0	+6.0 0	+3.0 -3.0
1.97	3.15	-1.2 -3.0	-1.2 -4.1	0 -1.8	0 -3.0	0 -4.5	0 -7.0	+2.3 -2.3	+3.5 -3.5	+1.8 0	+3.0 0	+4.5 0	+7.0 0	+3.5 -3.5
3.15	4.73	-1.4 -3.6	-1.4 -4.8	0 -2.2	0 -3.5	0 -5.0	0 -9.0	+2.5 -2.5	+4.5 -4.5	+2.2 0	+3.5 0	+5.0 0	+9.0 0	+4.5 -4.5
4.73	7.09	-1.6 -4.1	-1.6 -5.6	0 -2.5	0 -4.0	0 -6.0	0 -10.0	+3.0 -3.5	+5.0 -5.0	+2.5 0	+4.0 0	+6.0 0	+10.0 0	+5.0 -5.0
7.09	9.85	-2.0 -4.8	-2.0 -6.5	0 -2.8	0 -4.5	0 -7.0	0 -12.0	+3.5 -3.5	+6.0 -6.0	+2.8 0	+4.5 0	+7.0 0	+12.0 0	+6.0 -6.0
9.85	12.41	-2.2 -5.2	-2.2 -7.3	0 -3.0	0 -5.0	0 -8.0	0 -12.0	+4.0 -4.0	+6.0 -6.0	+3.0 0	+5.0 0	+8.0 0	+13.0 0	+6.0 -6.0
12.41	15.75	-2.5 -6.0	-2.8 -8.0	0 -3.5	0 -6.0	0 -9.0	0 -14.0	+4.5 -4.5	+7.0 -7.0	+3.5 0	+6.0 0	+9.0 0	+14.0 0	+7.0 -7.0
15.75	19.69	-2.8 -6.5	-2.8 -8.8	0 -4.0	0 -6.0	0 -10.0	0 -16.0	+5.0 -5.0	+8.0 -8.0	+4.0 0	+6.0 0	+10.0 0	+16.0 0	+8.0 -8.0
19.69	24.80	-3.0 -7.0	-3.0 -9.9	0 -4.3	0 -6.9	0 -11.0	0 -17.3	+5.5 -5.5	+8.7 -8.7	+4.3 0	+6.9 0	+11.0 0	+17.3 0	+8.7 -8.7
24.80	31.49	-3.1 -8.1	-3.1 -11.0	0 -4.9	0 -7.9	0 -12.6	0 -19.7	+6.3 -6.3	+9.8 -9.8	+4.9 0	+7.9 0	+12.6 0	+19.7 0	+9.8 -9.8

Hallite Seals' product data sheets give information indicating the allowable extrusion gap a seal can see at pressure during its working life. The extrusion gap can be calculated using the tolerance build ups within the cylinder and any dilation that may occur under pressure.

Maximum extrusion gap = F max (see drawing below).

F max is the maximum extrusion gap for the seal

Minimum metal to metal clearance = F min (see drawing below).

F min for cylinders with minimal side loading should be >0.1mm (0.004").

Rods

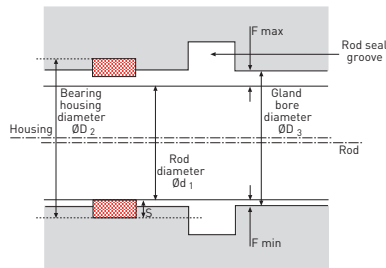
Maximum extrusion gap

$$F \max = \frac{(\varnothing D3 \max + \varnothing D2 \max)}{2} - S \min - \varnothing d1 \min$$

Minimum metal to metal clearance (extrusion gap)

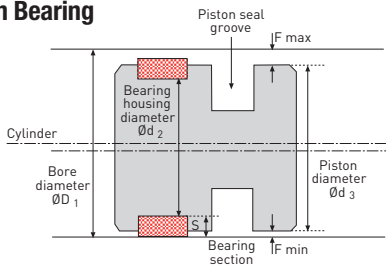
$$F \min = S \min - \frac{(\varnothing D2 \max - \varnothing D3 \min)}{2}$$

Rod Bearing



Note: Rod is not concentric with gland, because of clearances. (shown exaggerated)

Piston Bearing



Note: Piston is not concentric with cylinder bore, because of clearances. (shown exaggerated)

Pistons

Maximum extrusion gap

$$F \max = \varnothing D1 \max - S \min - \frac{(\varnothing d3 \min + \varnothing d2 \min)}{2} + \text{dilation}$$

Minimum metal to metal clearance (extrusion gap)

$$F \min = S \min - \frac{(\varnothing d3 \max - \varnothing d2 \min)}{2}$$

Calculate both F max and F min.

Ensure the F min is greater than 0.1mm (0.004") and F max is less than the maximum extrusion gap stated on the seal data sheet at the application's working pressure. For built-in metal bearings, the extrusion gap calculation is simpler.

For F max:

Rod = $\varnothing D3 \max - \varnothing d1 \min$

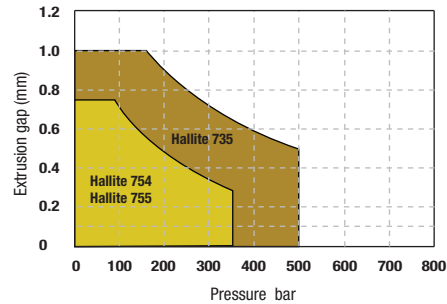
Piston = $\varnothing D1 \max - \varnothing d3 \min + \text{dilation}$

F min must be zero

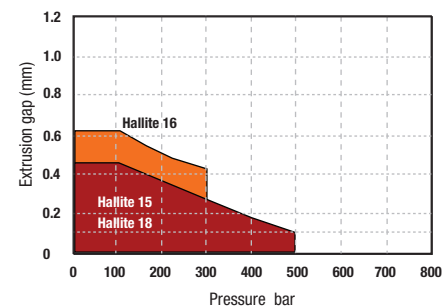
Extrusion is closely linked to pressure and temperature. In general, the best seal performance and life is provided by specifying the smallest possible extrusion gap.

The figures shown for the extrusion gap within the operating conditions of Hallite's product data sheets, relate to the maximum permissible, worst case situation with the gap all on one side.

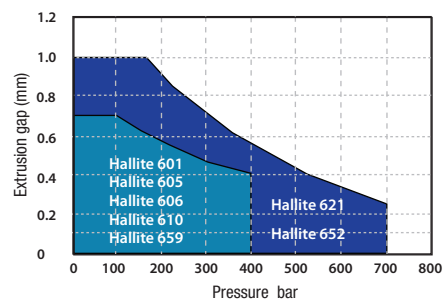
Type 735, 754, 755



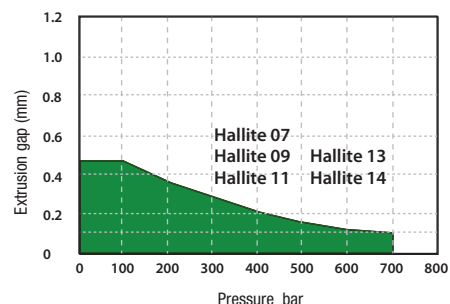
Type 15, 16, 18



Type 601, 605, 606, 610, 621, 652, 659

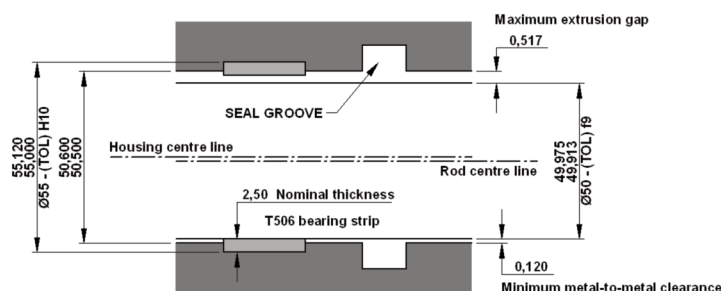


Vee pack sets

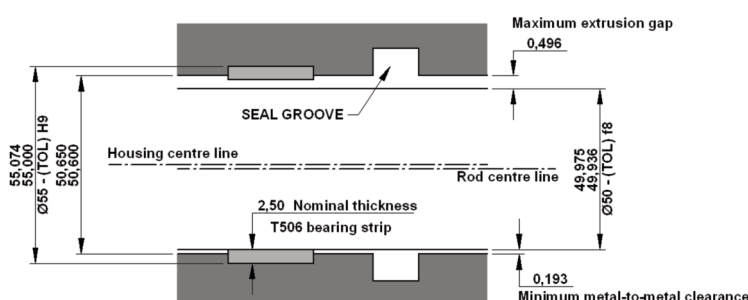


Extrusion gaps and metal-to-metal clearance

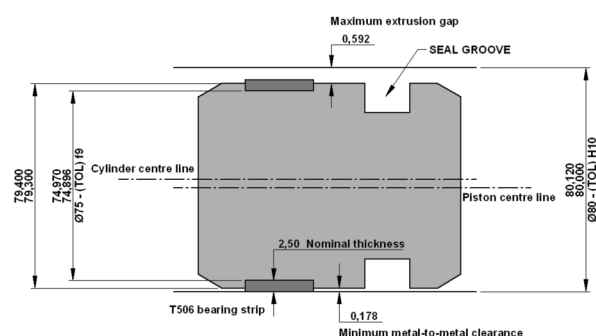
The use of remote bearing strips, such as Hallite 506, often creates a conflict between maximising the metal-to-metal clearance, to avoid metal-to-metal contact, and minimising the extrusion gap for the seal. The design decisions that have to be made in this respect are not trivial. The following examples show the effects of looser and tighter tolerances on the minimum metal-to-metal clearance and the maximum extrusion gap. The values have been calculated using the housing design formulae. No allowance has been made for the deflection of the bearings under side load, and, in the case of the piston examples, for the cylinder dilation.



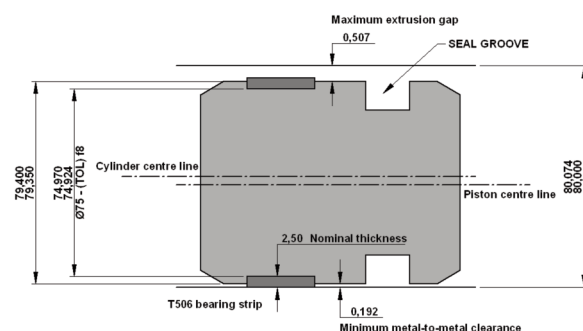
Gland for 50mm rod using 'standard' tolerances



Gland for 50mm rod with tighter tolerances, showing that the minimum metal-to-metal clearances can be increased and the maximum extrusion gap reduced.



Piston for 80mm bore using 'standard' tolerances



Piston for 80mm bore with tighter tolerances showing that minimum metal-to-metal clearance can be increased and maximum extrusion gap reduced.

Once the maximum extrusion gap has been calculated the correct seal can be specified with regard to the required operating pressure of the cylinder.

For further advice, please contact Hallite Seals.

Storage conditions

Most polymeric items including vulcanized rubber and other elastomers tend to change their properties during storage and may become unserviceable. This may be due to hardening, softening, cracking, crazing or other degradation and may be the result of oxygen, ozone, light, heat and/or humidity.

The following recommendations indicate the most suitable conditions for storing elastomeric items, whether as a single item or composite product.

1 Temperature

Storage temperatures should not exceed 50° C. Low temperatures are not permanently harmful provided the rubber items are handled carefully and not distorted. When taken from low temperatures items should be raised to approximately 30°C before they are used.

2 Humidity

Optimum humidity is about 65% in a draft-free atmosphere.

3 Light

Protection from direct sunlight and strong artificial light with a high ultraviolet content is important. Unless packed in opaque containers, it is advisable to cover windows with red or orange screens or coatings.

4 Oxygen and Ozone

Elastomeric items should be protected from circulating air wherever possible. As ozone is particularly harmful to rubber, storage rooms should be free from equipment that may give rise to electric sparks or discharge. Wrapping, storage in airtight containers or other suitable means should be used for vulcanised rubber items.

5 Deformation

Where possible, rubber items should be stored in a relaxed position, free from tension or compression. Laying the item flat and avoiding suspension or crushing keeps it free from strain and minimises deformation.

6 Contact with Liquid and Semi-Solid Material

Contact with liquids and semi-solid materials, particularly solvents, such as oils or greases should be avoided unless so packed by the manufacturer.

7 Contact with Metals

Metals such as manganese, iron and copper, or copper alloys can have a harmful effect on rubber. A layer of paper, polyethylene or cellophane will keep these separated.

8 Contact with Non-Metals

Contact with other rubbers or creosotes should be avoided.

9 Stock Rotation

Elastomers should be stored for as short a period as possible, and strict stock rotation should be practiced.

10 Cleaning

Organic solvents such as trichloroethylene, carbon tetrachloride and petroleum are the most harmful agents. Soap and water and methylated spirits are the least harmful, and all parts should be dried at room temperature before use.

11 Shelf Life

The table shows the storage life of seal components made from the more common materials under ideal conditions. Storing under less than ideal conditions will reduce the life.

Careful inspection of the following should be made before installation after storage:

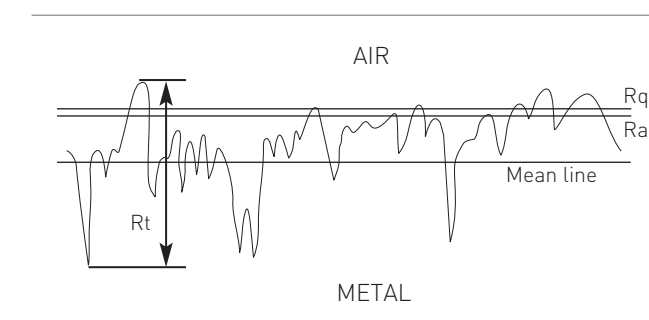
- a Mechanical damage
- b Permanent distortion
- c Cracks or surface crazing
- d Tackiness or surface softening/hardening

Thin components (less than 1.6mm {1/16in}) tend to be more critically affected.

The appearance of 'bloom' is relatively unimportant, except in certain non-toxic applications.

Base Polymer (ISO Designation)	Primary storage period (years)	Extension of storage period after re-inspection (years)
FLUOROCARBON (FKM) ETHYLENE PROPYLENE (EPDM)	10	5
NITRILE (NBR) HYTHANE (EU) THERMOPLASTIC POLYESTER ELASTOMER	7	3
POLYURETHANE (AU)	5	2
ENGINEERING THERMOPLASTICS: ACETAL (POM) POLYAMIDE (PA) GLASS FILLED NYLON (PA) PTFE POLYPHENYLENE SULPHIDE (PPS)	UNLIMITED	
ENGINEERING THERMOSETS: TYPE 506 BEARING STRIP	UNLIMITED	

Surface roughness has a very important influence on the life and leakage performance of a reciprocating sealing system.



Note : The vertical scale is 40 times the Horizontal scale

Definitions

Many parameters can be used to describe surface finishes and these are explained in ISO 4287 and ISO 4288. Those in most common use in the fluid power industry include:-

Ra, which is defined as the arithmetical mean deviation of the assessed profile. The inch equivalent parameter is CLA (centre line average). A surface finish of $0.4 \mu\text{m}$ Ra is exactly equivalent to 16 μin CLA.

Rt, which is the total height of the profile. There is no mathematical relationship between Ra and Rt.

Rq, which is the root mean square deviation of the assessed profile. The equivalent term in inches is RMS (Root Mean Square). The Rq (RMS) of a surface is approximately 10% greater than the Ra (CLA) value.

The surface roughness parameters given above do not give any indication of the sharpness of the surface. The peaks of the profile should be well rounded as sharp surface finishes can lead to rapid seal wear.

Dynamic surface finishes

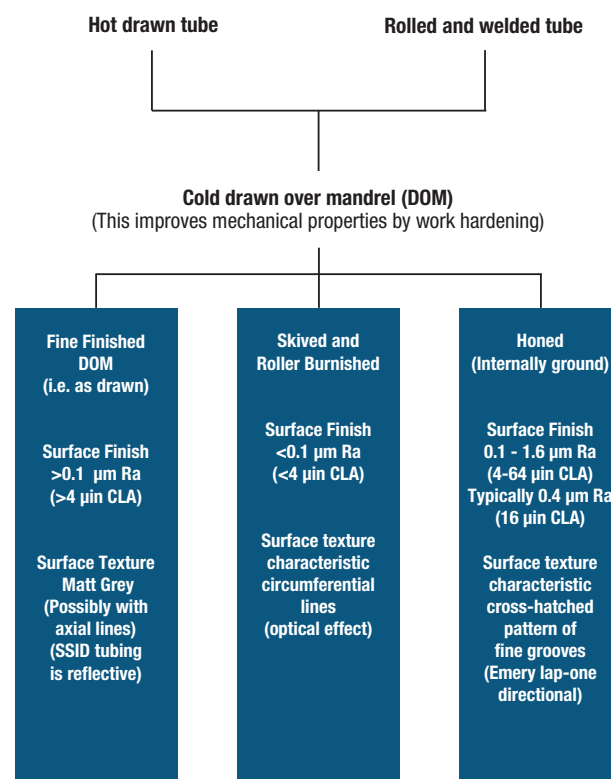
Piston rods are generally hard chrome plated. The hardness should be at least 67 Rockwell C (900 HV/10). This gives an excellent tribological surface and provided the rods are produced by an established supplier within a surface finish range of 0.1 to $0.3 \mu\text{m}$ Ra (4 - $12 \mu\text{in}$ CLA) no major problem should ensue, although the optimum surface finish may well depend on the seal material.

Bore surface finishes can be more problematic.

The typical methods of obtaining a bore finish are summarised in the figure below. Drawn over mandrel (DOM) tubing, as is, can be adequate, or a potential disaster depending on the actual surface texture achieved and the application. Increasing use is being made of Special Smooth Inside Diameter (SSID) DOM tubing, but in certain circumstances, mainly when the seal is being driven into the pressure, it can lead to wear of the seal through flow erosion. Such DOM tubing requires careful specification. The consistency of roller burnished or honed tube is to be preferred. Skived and roller burnished tubing is very smooth (less than $0.1 \mu\text{m}$ Ra) ($4 \mu\text{in}$ CLA) and may be too smooth for rubber sealing elements in some applications. True honed tube, produced between (0.1 and $0.4 \mu\text{m}$ Ra) (4 - $16 \mu\text{in}$ CLA) is the most expensive, but has the best finish.

Static surface finishes

The static sealing surface finish must not be ignored in the control of leakage. Generally, these are fine turned and should be free from chatter marks.



Methods of manufacturing of tubes for hydraulic cylinders and resulting surface textures.

Design

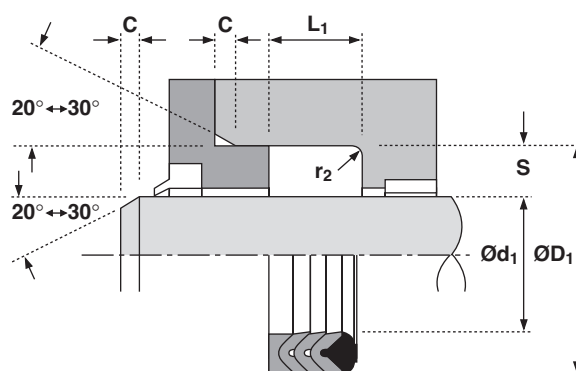
The Hallite 07 is a multi lip rod seal, for medium to heavy duty applications, composed of a header ring, vee rings and a female adaptor.

The header ring is the primary seal. It is a bonded construction of a rubberised fabric vee ring and rubber. When installed the section is pre-loaded to seal at low pressure but has the strength and durability of the fabric to operate at higher pressures. Rubberised fabric is also used for the vee rings. These provide secondary sealing as pressure acting on the header ring spreads the vee rings increasing the sealing area. The female adaptor provides the support and protection from extrusion damage. It is manufactured in either polyacetal or hard rubberised fabric. The assembly is a pressure activated packing that does not require any axial pre-load.

The range has a header ring, a female adaptor and 2 vee rings. Other sizes and constructions are available on request.

Features

- Effective Dri-Rod seal under both high and low pressure conditions
- Precision moulded vee rings
- Pressure activated
- No adjustment necessary



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	700 bar

Inch

1.5 ft/sec
-22°F +212°F
10,000 p.s.i.

Maximum extrusion gap

	160	250	400	700
Pressure bar	160	250	400	700
Maximum Gap mm	0.4	0.3	0.2	0.1
Pressure p.s.i.	2400	3750	6000	10,000
Maximum Gap in	0.016	0.012	0.008	0.004

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

Chamfers & Radii

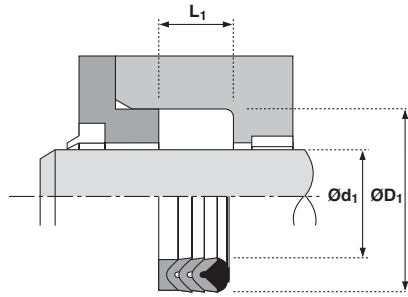
	7.5	10.0	12.5	15.0
Groove Section ≤ S mm	7.5	10.0	12.5	15.0
Min Chamfer C mm	4.0	5.0	6.5	7.5
Max Fillet Rad r ₁ mm	0.8	0.8	0.8	1.6
Groove Section ≤ S in	0.250	0.312	0.375	0.500
Min Chamfer C in	0.125	0.156	0.187	0.250
Max Fillet Rad r ₁ in	0.031	0.031	0.031	0.031

Tolerances

Ød ₁	ØD ₁	L ₁ mm	L ₁ in
f9	Js11	+0.25 -0	+0.010 -0

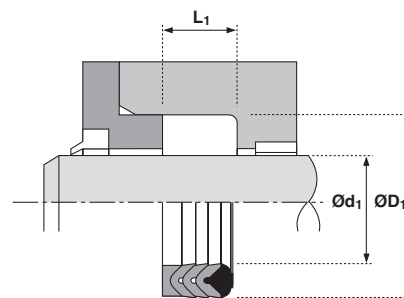


vee pack sets



Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.25-0	PART No.
25	-0.020 -0.072	40	+0.08 -0.08	22.50	6630720
30	-0.020 -0.072	45	+0.08 -0.08	22.50	0400820
32	-0.025 -0.087	47	+0.08 -0.08	22.50	6630820
35	-0.025 -0.087	50	+0.08 -0.08	22.50	0339520
40	-0.025 -0.087	55	+0.10 -0.10	22.50	6532620
45	-0.025 -0.087	60	+0.10 -0.10	22.50	0385020
50	-0.025 -0.087	70	+0.10 -0.10	30.00	6631020
55	-0.030 -0.104	75	+0.10 -0.10	30.00	6631120
56	-0.030 -0.104	76	+0.10 -0.10	30.00	0338220
60	-0.030 -0.104	80	+0.10 -0.10	30.00	0892520
63	-0.030 -0.104	83	+0.11 -0.11	30.00	0467120
65	-0.030 -0.104	85	+0.11 -0.11	30.00	0467720
70	-0.030 -0.104	90	+0.11 -0.11	30.00	6631220

Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.25-0	PART No.
75	-0.030 -0.104	95	+0.11 -0.11	30.00	0446620
80	-0.030 -0.104	100	+0.11 -0.11	30.00	6631320
85	-0.036 -0.123	105	+0.11 -0.11	30.00	6631420
90	-0.036 -0.123	110	+0.11 -0.11	30.00	6631520
100	-0.036 -0.123	120	+0.11 -0.11	30.00	6631620
110	-0.036 -0.123	130	+0.13 -0.13	30.00	0308420
125	-0.043 -0.143	140	+0.13 -0.13	22.50	1362820
125	-0.043 -0.143	145	+0.13 -0.13	30.00	2179620
125	-0.043 -0.143	150	+0.13 -0.13	37.00	1365620
140	-0.043 -0.143	160	+0.13 -0.13	30.00	1272320
180	-0.043 -0.143	210	+0.15 -0.15	47.00	0090320
200	-0.050 -0.165	230	+0.15 -0.15	45.00	1282720



Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.010-0	PART No.
1.000	-0.0008 -0.0028	1.500	+0.003 -0.003	0.750	0820120
1.125	-0.0008 -0.0028	1.625	+0.003 -0.003	0.750	0379320
1.250	-0.0010 -0.0034	1.750	+0.003 -0.003	0.750	0821420
1.500	-0.0010 -0.0034	2.000	+0.004 -0.004	0.750	0618620
1.625	-0.0010 -0.0034	2.125	+0.004 -0.004	0.750	0206420
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.750	0889320
2.000	-0.0012 -0.0041	2.500	+0.004 -0.004	0.750	0617220
2.250	-0.0012 -0.0041	2.750	+0.004 -0.004	0.750	6630620
2.375	-0.0012 -0.0041	3.000	+0.004 -0.004	0.937	0207220

Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.010-0	PART No.
2.500	-0.0012 -0.0041	3.125	+0.004 -0.004	1.000	0819220
2.750	-0.0012 -0.0041	3.375	+0.004 -0.004	1.000	0819920
3.000	-0.0012 -0.0041	3.625	+0.004 -0.004	1.000	0893020
3.250	-0.0014 -0.0048	4.000	+0.004 -0.004	1.125	0207320
3.500	-0.0014 -0.0048	4.250	+0.004 -0.004	1.125	0818420
3.750	-0.0014 -0.0048	4.500	+0.004 -0.004	1.125	1014420
4.000	-0.0014 -0.0048	4.750	+0.005 -0.005	1.125	1356620
4.500	-0.0014 -0.0048	5.250	+0.005 -0.005	1.125	0354120

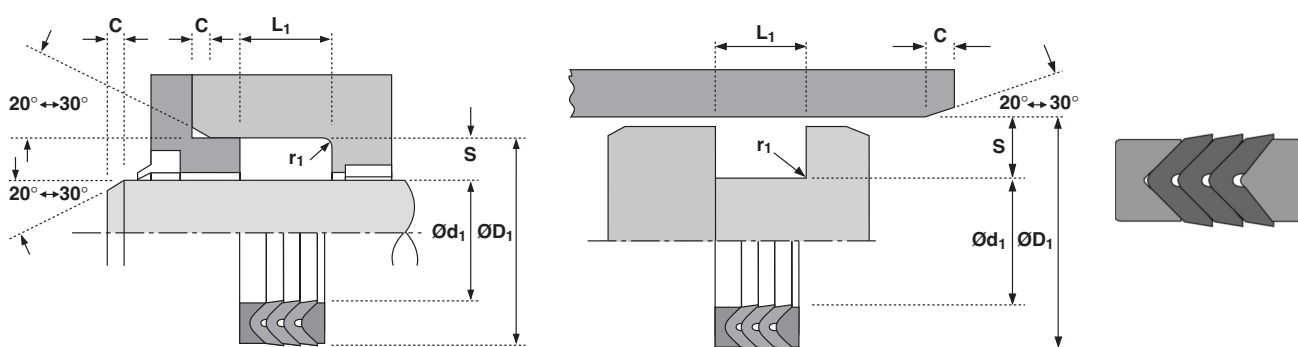
Design

Hallite 09 vee packings incorporate the Hallite 08 vee ring manufactured from fabric reinforced high grade nitrile rubber, which is normally used in multiples in a set with a male and female adaptor. The parts are 'stacked' together and must be lubricated liberally with clean operating fluid prior to assembly.

The packing must be axially pre-loaded by the housing. This preload works through the male adaptor on the pressure side, exerting a hinging action on the vees, forcing the sealing lips apart to ensure a low pressure seal. As the pressure increases, so the hinging action increases, increasing the effectiveness of the seal even where severe vibration, shock loading and knuckling may occur.

The standard Hallite 09 comprises of three vees and two adaptors, available in metric and imperial inch sizes. In addition to the ranges the Hallite 09 is also available for standard American inch housings. Some adaptors are rubber fabric while others are polyacetal resin. Individual vee rings are stocked to supplement the sets, but it should be noted that individual adaptors are only available in special circumstances.

For sizes not listed or for special requirements, please contact your Hallite sales office.



Technical details

Metric

Inch

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	400 bar

1.5 ft/sec
-22°F +212°F
6000 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side, for rod seals using minimum rod $\varnothing$ and maximum clearance $\varnothing$ and for piston seals using the minimum clearance $\varnothing$ and maximum bore $\varnothing$. Refer to Housing Design section.

Pressure bar	100	175	250	400
Maximum Gap mm	0.45	0.4	0.3	0.2
Pressure p.s.i.	1500	2250	3500	6000
Maximum Gap in	0.018	0.015	0.010	0.007

Surface roughness

	μmRa	μmRt	μinCLA	μinRMS
Dynamic Sealing Face – Rod $\varnothing d_1$	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face – Rod $\varnothing D_1$	1.6 max	10 max	63 max	70 max
Dynamic Sealing Face – Piston $\varnothing d_1$	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face – Piston $\varnothing D_1$	1.6 max	10 max	63 max	70 max
Static Housing Faces L_1	3.2 max	16 max	125 max	140 max

Chamfers & Radii

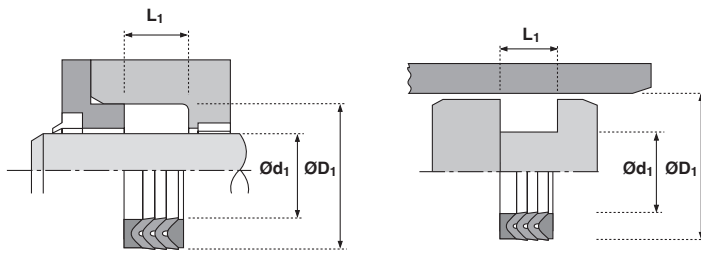
Groove Section $\leq S$ mm	5.0	7.5	10.0	12.5	15.0
Min Chamfer C mm	3.0	5.0	6.5	7.0	7.5
Max Fillet Rad r_1 mm	0.5	0.8	0.8	0.8	0.8
Groove Section $\leq S$ in	0.187	0.250	0.312	0.375	0.500
Min Chamfer C in	0.093	0.125	0.156	0.187	0.250
Max Fillet Rad r_1 in	0.020	0.031	0.031	0.031	0.031

Tolerances

	$\varnothing d_1$	$\varnothing D_1$	L_1 mm	L_1 in
Rod	f9	Js11	+0.75 -0.0	+0.030 -0
Piston	js11	H9	+0.75 -0.0	+0.030 -0

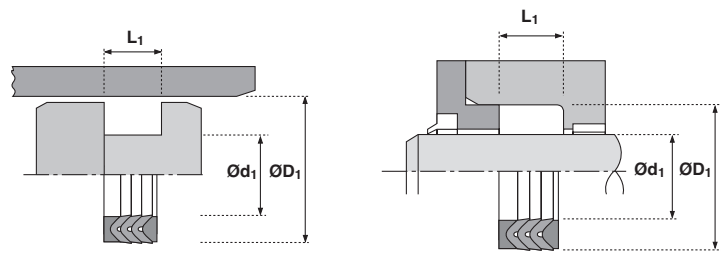


vee pack sets



Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.75-0.0	PART No.
12	-0.016 -0.059	22	+0.055 -0.055	16.00	0188730
15	-0.016 -0.059	25	+0.055 -0.055	16.00	0189530
16	-0.016 -0.059	26	+0.055 -0.055	16.00	0190130
18	-0.016 -0.059	28	+0.055 -0.055	16.00	0190530
20	-0.020 -0.072	30	+0.065 -0.065	16.00	0190930
22	-0.020 -0.072	32	+0.065 -0.065	16.00	0191730
25	-0.020 -0.072	40	+0.065 -0.065	22.50	0192630
28	-0.020 -0.072	43	+0.065 -0.065	22.50	0193430
30	-0.020 -0.072	45	+0.065 -0.065	22.50	0193930
32	-0.025 -0.087	47	+0.080 -0.080	22.50	0194330
35	-0.025 -0.087	50	+0.080 -0.080	22.50	0195130
36	-0.025 -0.087	51	+0.080 -0.080	22.50	0196030
42	-0.025 -0.087	57	+0.080 -0.080	22.50	0196830
45	-0.025 -0.087	60	+0.080 -0.080	22.50	0197430
48	-0.025 -0.087	63	+0.080 -0.080	22.50	0197730
50	-0.025 -0.087	70	+0.080 -0.080	30.00	1208430
55	-0.030 -0.104	75	+0.095 -0.095	30.00	1208230
56	-0.030 -0.104	76	+0.095 -0.095	32.00	1208630

Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.75-0.0	PART No.
60	-0.030 -0.104	80	+0.095 -0.095	32.00	1208930
63	-0.030 -0.104	83	+0.095 -0.095	32.00	1209130
70	-0.030 -0.104	90	+0.095 -0.095	30.00	1209330
75	-0.030 -0.104	95	+0.095 -0.095	30.00	1209530
80	-0.030 -0.104	100	+0.095 -0.095	30.00	1209630
80	-0.030 -0.104	105	+0.095 -0.095	44.00	0984230
85	-0.036 -0.123	105	+0.110 -0.110	30.00	1209830
90	-0.036 -0.123	110	+0.095 -0.110	30.00	1210630
100	-0.036 -0.123	120	+0.095 -0.110	30.00	1210730
105	-0.036 -0.123	125	+0.095 -0.110	30.00	1203130
110	-0.036 -0.123	130	+0.095 -0.110	30.00	1195030
120	-0.036 -0.123	140	+0.095 -0.110	30.00	4137830
125	-0.043 -0.143	150	+0.125 -0.125	34.00	1215330
135	-0.043 -0.143	160	+0.125 -0.125	34.00	1197630
140	-0.043 -0.143	160	+0.125 -0.125	33.00	0677130
150	-0.043 -0.143	180	+0.125 -0.125	45.00	1220130
170	-0.043 -0.143	200	+0.125 -0.125	45.00	1224930
200	+0.050 -0.165	230	+0.145 -0.145	45.00	1225830



Ød ₁	TOL f ₉	ØD ₁	TOL Js11	L ₁ +0.030-0.0	PART No.
0.500	-0.0006 -0.0023	1.000	+0.003 -0.003	0.715	6530830
0.750	-0.0008 -0.0028	1.250	+0.003 -0.003	0.875	1735140
0.875	-0.0008 -0.0028	1.375	+0.003 -0.003	0.825	4135930
1.000	-0.0008 -0.0028	1.375	+0.003 -0.003	0.675	4138630
1.000	-0.0008 -0.0028	1.500	+0.003 -0.003	0.710	0183330
1.125	-0.0008 -0.0028	1.625	+0.003 -0.003	0.775	4136030
1.125	-0.0008 -0.0028	1.750	+0.003 -0.003	1.065	4115330
1.250	-0.0010 -0.0034	1.750	+0.003 -0.003	0.785	4102530
1.500	-0.0010 -0.0034	2.000	+0.004 -0.004	0.710	4007630
1.500	-0.0010 -0.0034	2.125	+0.004 -0.004	1.000	4002130
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.825	1461530
1.750	-0.0010 -0.0034	2.375	+0.004 -0.004	1.000	4135130
1.875	-0.0010 -0.0034	2.500	+0.004 -0.004	0.950	4136230
2.000	-0.0012 -0.0041	2.500	+0.004 -0.004	0.715	4007430
2.000	-0.0012 -0.0041	2.625	+0.004 -0.004	0.898	6557940
2.000	-0.0012 -0.0041	2.750	+0.004 -0.004	0.986	6575730
2.250	-0.0012 -0.0041	2.750	+0.004 -0.004	0.705	6555230
2.250	-0.0012 -0.0041	2.875	+0.004 -0.004	0.937	6530730
2.250	-0.0012 -0.0041	3.000	+0.004 -0.004	0.960	4008030
2.375	-0.0012 -0.0041	3.000	+0.004 -0.004	0.990	4129530
2.500	-0.0012 -0.0041	3.000	+0.004 -0.004	0.777	0334330
2.500	-0.0012 -0.0041	3.125	+0.004 -0.004	0.961	4122230

Ød ₁	TOL f ₉	ØD ₁	TOL Js11	L ₁ +0.030-0.0	PART No.
2.500	-0.0012 -0.0041	3.250	+0.005 -0.005	1.222	4002530
2.750	-0.0012 -0.0041	3.250	+0.005 -0.005	0.795	4182430
2.750	-0.0012 -0.0041	3.500	+0.005 -0.005	0.978	4008430
3.000	-0.0014 -0.0048	3.500	+0.005 -0.005	0.725	4130730
3.000	-0.0014 -0.0048	3.625	+0.005 -0.005	0.918	4001530
3.000	-0.0014 -0.0048	3.750	+0.005 -0.005	1.159	0636930*
3.250	-0.0014 -0.0048	4.000	+0.005 -0.005	0.960	4008330
3.375	-0.0014 -0.0048	4.000	+0.005 -0.005	0.833	4002730
3.375	-0.0014 -0.0048	4.125	+0.005 -0.005	1.236	4134030
3.500	-0.0014 -0.0048	4.000	+0.005 -0.005	0.825	1461130
3.500	-0.0014 -0.0048	4.250	+0.005 -0.005	1.086	4115830
3.750	-0.0014 -0.0048	4.375	+0.005 -0.005	0.900	1365330
3.750	-0.0014 -0.0048	4.500	+0.005 -0.005	1.090	0755731*
3.875	-0.0014 -0.0048	4.500	+0.005 -0.005	0.878	4001930
4.000	-0.0014 -0.0048	4.500	+0.005 -0.005	0.775	6565930
4.000	-0.0014 -0.0048	4.750	+0.005 -0.005	1.000	6573130
4.000	-0.0014 -0.0048	5.000	+0.005 -0.005	1.440	0563630
4.250	-0.0014 -0.0048	5.000	+0.005 -0.005	1.090	0299330
5.000	-0.0016 -0.0056	6.000	+0.005 -0.005	1.765	0307530*
5.250	-0.0016 -0.0056	6.000	+0.005 -0.005	1.055	0411130
5.500	-0.0016 -0.0056	6.500	+0.005 -0.005	1.175	0048430
6.000	-0.0016 -0.0056	6.500	+0.005 -0.005	0.675	1207030

* Supplied with OD anti-extrusion ring.

Design

The Hallite 11 is a vee pack rod seal for medium duty applications offering excellent performance and long life even under difficult operating conditions such as pressure surges, vibration and some misalignment. The seal consists of a male and female adaptor and 5 vee rings.

The male adaptor is usually manufactured from polyacetal but some of the larger sizes use rubberised fabric. It has grooves across one face to ensure equal pressure to the sealing edges of the vee ring.

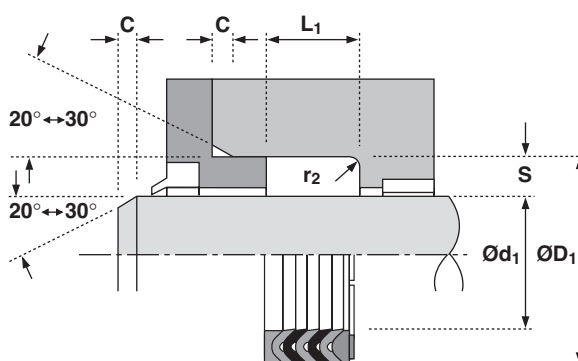
All sizes have three vee rings manufactured from rubberised fabric because this has strength and durability and permits an oil film to lubricate the other parts of the seal. Two rubber vee rings are supplied between the rubberised fabric vee rings (up to and including 140mm diameter) to aid low pressure sealing.

The female adaptor uses a hard rubberised fabric to support the vee rings and protect them from extrusion damage. At high pressure the lips of the adaptor acts as a secondary seal.

The proportions of the range have been determined to give a satisfactory performance when used with the recommended operating conditions.

Features

- Precision moulded vee rings
- Pressure distribution adaptors
- Reliable sealing



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	400 bar

Inch

1.5 ft/sec
-22°F +212°F
6,000 p.s.i.

Maximum extrusion gap

	100	160	250	400
Pressure bar				
Maximum Gap mm	0.45	0.4	0.3	0.2
Pressure p.s.i.	1500	2400	3750	6000

Figures show the maximum permissible gap all on one side using minimum rod $\varnothing$ and maximum clearance $\varnothing$. Refer to Housing Design section.

Surface roughness

	μmRa	μmRt	μinCLA	μinRMS
Dynamic Sealing Face $\varnothing d_1$	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face $\varnothing D_1$	1.6 max	10 max	63 max	70 max
Static Housing Faces L_1	3.2 max	16 max	125 max	140 max

Chamfers & Radii

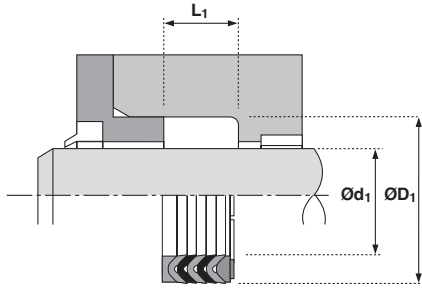
Groove Section $\leq S$ mm	7.5	10.0	12.5	15.0
Min Chamfer C mm	4.0	5.0	6.5	7.5
Max Fillet Rad r_1 mm	0.4	1.2	1.6	1.6

Tolerances

$\varnothing d_1$	$\varnothing D_1$	L_1 mm
f9	H11	+0.2 -0



vee pack sets



Ød ₁	TOL f9	ØD ₁	TOL H11	L ₁ +0.2-0	PART No.
20	-0.020 -0.072	30	+0.13 +0.00	18.50	4201750
25	-0.020 -0.072	37	+0.16 +0.00	22.50	4198950
28	-0.020 -0.072	40	+0.16 +0.00	22.50	4202050
30	-0.020 -0.072	42	+0.16 +0.00	22.50	4202150
32	-0.025 -0.087	44	+0.16 +0.00	22.50	4202250
35	-0.025 -0.087	47	+0.16 +0.00	22.50	4202350
36	-0.025 -0.087	48	+0.16 +0.00	22.50	4202450
40	-0.025 -0.087	52	+0.19 +0.00	22.50	4202550
42	-0.025 -0.087	54	+0.19 +0.00	22.50	4202650
45	-0.025 -0.087	60	+0.19 +0.00	22.50	4202750
50	-0.025 -0.087	65	+0.19 +0.00	22.50	4199050
55	-0.030 -0.104	70	+0.19 +0.00	22.50	4202950
56	-0.030 -0.104	71	+0.19 +0.00	22.50	4203050
60	-0.030 -0.104	75	+0.19 +0.00	22.50	4203150
63	-0.030 -0.104	78	+0.19 +0.00	22.50	4203250

Ød ₁	TOL f9	ØD ₁	TOL H11	L ₁ +0.2-0	PART No.
65	-0.030 -0.104	80	+0.19 +0.00	22.50	4203350
70	-0.030 -0.104	85	+0.22 +0.00	22.50	4203450
75	-0.030 -0.104	90	+0.22 +0.00	22.50	4203550
80	-0.030 -0.104	95	+0.22 +0.00	22.50	4203650
85	-0.036 -0.123	100	+0.22 +0.00	22.50	4203750
90	-0.036 -0.123	105	+0.22 +0.00	22.50	4203850
100	-0.036 -0.123	115	+0.22 +0.00	30.00	4203950
110	-0.036 -0.123	125	+0.25 +0.00	30.00	4204050
125	-0.043 -0.143	140	+0.25 +0.00	34.00	4204250
140	-0.043 -0.143	155	+0.25 +0.00	34.00	4199250
150	-0.043 -0.143	170	+0.25 +0.00	40.00	2196650
160	-0.043 -0.143	180	+0.25 +0.00	40.00	2196750
180	-0.043 -0.143	200	+0.29 +0.00	40.00	2196850
200	-0.050 -0.165	220	+0.29 +0.00	40.00	2196950

Design

The Hallite 13 is a vee pack rod seal for heavy duty applications offering excellent performance and long life even under difficult operating conditions such as pressure surges, vibration and some misalignment. The seal assembly consists a male and female adaptor and 5 vee rings.

The male adaptor is usually manufactured from polyacetal but some of the larger sizes use rubberised fabric. It has grooves across one face to ensure equal pressure to the sealing edges of the vee ring.

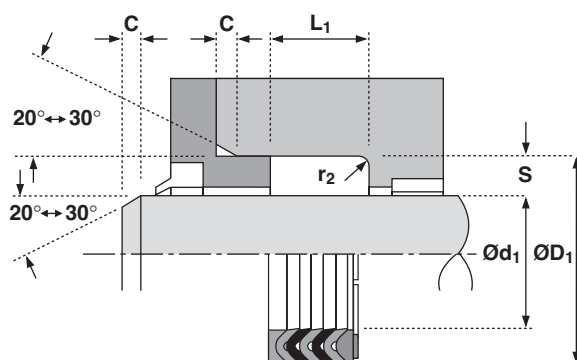
All sizes have vee rings manufactured from rubberised fabric because this has strength and durability and permits an oil film to lubricate the other parts of the seal. Some sizes are supplied with rubber vee rings between the rubberised fabric vee rings. The number and type of vee rings used are:

	up to 89mmØ	90-139mmØ	Above 139mmØ
Ruberised Fabric Vee Rings	3	4	5
Rubber Vee Rings	2	1	

The female adaptor uses a hard rubberised fabric to support the vee rings and protect them from extrusion damage. At high pressures the lips of the adaptor act as a secondary seal.

Features

- Precision moulded vee rings
- Pressure distribution adaptors
- Reliable sealing



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C + 100°C
Maximum Pressure	700 bar

Inch

1.5 ft/sec
-22°F + 212°F
10,000 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	160	250	400	700
Maximum Gap mm	0.4	0.3	0.2	0.1
Pressure p.s.i.	2400	3750	6000	10,000

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

Chamfers & Radii

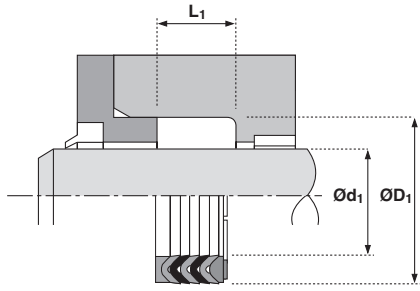
Groove Section ≤ S mm	6.0	7.5	10.0	12.5	15.0	20.0
Min Chamfer C mm	3.0	4.0	5.0	6.5	7.5	10.0
Max Fillet Rad r ₁ mm	0.4	0.4	1.2	1.6	1.6	1.6

Tolerances

Ød ₁	ØD ₁	L ₁ mm
f9	H11	+0.2 -0



vee pack sets



Ød1	TOL f9	ØD1	TOL H11	L1 +0.20-0	PART No.
20	-0.020 -0.072	32	+0.13 +0.00	22.50	4204950
25	-0.020 -0.072	40	+0.16 +0.00	22.50	4205050
30	-0.020 -0.072	45	+0.16 +0.00	22.50	4205150
35	-0.025 -0.087	50	+0.16 +0.00	22.50	4205250
40	-0.025 -0.087	55	+0.19 +0.00	22.50	4205350
45	-0.025 -0.087	65	+0.19 +0.00	27.50	4205450
50	-0.025 -0.087	70	+0.19 +0.00	30.00	4205550
55	-0.030 -0.104	75	+0.19 +0.00	30.00	4205650
60	-0.030 -0.104	80	+0.19 +0.00	37.00	4205750
65	-0.030 -0.104	85	+0.22 +0.00	40.00	4205850
70	-0.030 -0.104	90	+0.22 +0.00	40.00	4205950
75	-0.030 -0.104	95	+0.22 +0.00	40.00	4206050
80	-0.030 -0.104	100	+0.22 +0.00	40.00	4206150
90	-0.036 -0.123	110	+0.22 +0.00	40.00	4206250
100	-0.036 -0.123	120	+0.22 +0.00	40.00	4199150

Ød1	TOL f9	ØD1	TOL H11	L1 +0.20-0	PART No.
110	-0.036 -0.123	130	+0.25 +0.00	40.00	4206350
115	-0.036 -0.123	140	+0.25 +0.00	46.00	4206450
125	-0.043 -0.143	150	+0.25 +0.00	46.00	4206550
140	-0.043 -0.143	165	+0.25 +0.00	46.00	4206650
150	-0.043 -0.143	180	+0.25 +0.00	60.00	4206750
160	-0.043 -0.143	190	+0.29 +0.00	60.00	4206850
180	-0.043 -0.143	210	+0.29 +0.00	60.00	4206950
195	-0.050 -0.165	225	+0.29 +0.00	62.50	6582150
200	-0.050 -0.165	230	+0.29 +0.00	60.00	4207050
220	-0.050 -0.165	250	+0.29 +0.00	62.50	6582350
245	-0.050 -0.165	275	+0.32 +0.00	62.50	6582450
270	-0.056 -0.186	300	+0.32 +0.00	62.50	6582550
290	-0.056 -0.186	320	+0.36 +0.00	64.00	6582650
320	-0.062 -0.212	360	+0.36 +0.00	78.00	6582750
380	-0.062 -0.212	420	+0.40 +0.00	80.00	6584050

Design

The Hallite 14 is a vee pack rod seal for heavy duty applications offering excellent performance and long life even under difficult operating conditions such as pressure surges, vibration and some misalignment. The seal consists of a male and female adaptor and three vee rings.

The male adaptor is usually manufactured from polyacetal but some of the larger sizes use rubberised fabric. It has grooves across one face to ensure equal pressure to the sealing edges of the vee ring.

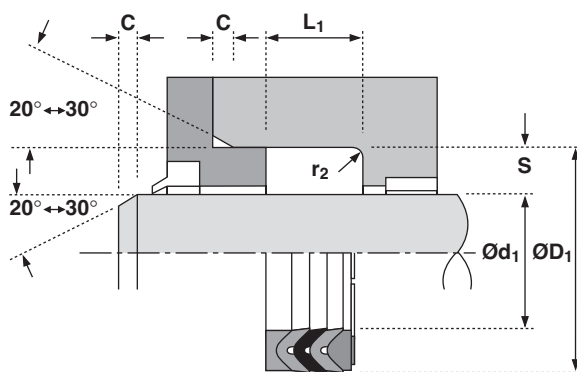
All sizes have vee rings manufactured from rubberised fabric because this has strength and durability and permits an oil film to lubricate the other parts of the seal. The smaller sizes are supplied with a rubber vee ring between the rubberised fabric vee rings. The number and type of vee rings used are :

	up to 139mmØ	Above 139mmØ
Ruberised Fabric Vee Rings	2	3
Rubber Vee Rings	1	

The female adaptor uses a hard rubberised fabric to support the vee rings and protect them from extrusion damage. At high pressures the lips of the adaptor act as a secondary seal.

Features

- Precision moulded vee rings
- Pressure distribution adaptors
- Reliable sealing



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	700 bar

Inch

1.5 ft/sec
-22°F +212°F
10,000 p.s.i.

Maximum extrusion gap

	160	250	400	700
Pressure bar				
Maximum Gap mm	0.4	0.3	0.2	0.1
Pressure p.s.i.	2400	3750	6000	10,000

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

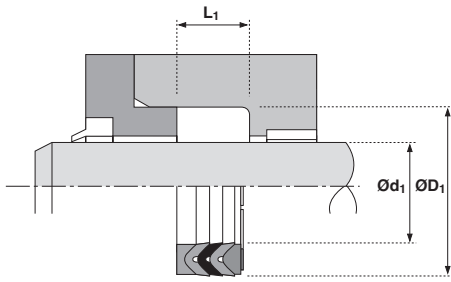
Chamfers & Radii

Groove Section ≤ S mm	6.0	7.5	10	12.5	15.0	20.0
Min Chamfer C mm	3.0	4.0	5.0	6.5	7.5	10.0
Max Fillet Rad r ₂ mm	0.4	0.4	1.2	1.6	1.6	1.6

Tolerances

Ød ₁	ØD ₁	L ₁ mm
f9	H11	+0.2 -0





$\varnothing d_1$	TOL f9	$\varnothing D_1$	TOL H11	L_1 +0.2-0	PART No.
20	-0.020 -0.072	32	+0.16 +0.00	16.50	4204930
25	-0.020 -0.072	40	+0.16 +0.00	16.50	4205030
30	-0.020 -0.072	45	+0.16 +0.00	16.50	4205130
35	-0.025 -0.087	50	+0.16 +0.00	16.50	4205230
40	-0.025 -0.087	55	+0.19 +0.00	16.50	4205330
45	-0.025 -0.087	65	+0.19 +0.00	20.50	4205430
50	-0.025 -0.087	70	+0.19 +0.00	22.00	4205530
55	-0.030 -0.104	75	+0.19 +0.00	22.00	4205630
60	-0.030 -0.104	80	+0.19 +0.00	27.00	4205730
65	-0.030 -0.104	85	+0.22 +0.00	30.00	4205830
70	-0.030 -0.104	90	+0.22 +0.00	30.00	4205930
75	-0.030 -0.104	95	+0.22 +0.00	30.00	4206030
80	-0.030 -0.104	100	+0.22 +0.00	30.00	4206130
90	-0.036 -0.123	110	+0.22 +0.00	30.00	4206230
100	-0.036 -0.123	120	+0.22 +0.00	30.00	4199130
110	-0.036 -0.123	130	+0.25 +0.00	30.00	4206330

$\varnothing d_1$	TOL f9	$\varnothing D_1$	TOL H11	L_1 +0.2-0	PART No.
115	-0.036 -0.123	140	+0.25 +0.00	34.00	4206430
125	-0.043 -0.143	150	+0.25 +0.00	34.00	4206530
140	-0.043 -0.143	165	+0.25 +0.00	34.00	4206630
150	-0.043 -0.143	180	+0.25 +0.00	45.00	4206730
160	-0.043 -0.143	190	+0.29 +0.00	45.00	4206830
180	-0.043 -0.143	210	+0.29 +0.00	45.00	4206930
195	-0.050 -0.165	225	+0.29 +0.00	47.50	6582130
200	-0.050 -0.165	230	+0.29 +0.00	45.00	4207030
220	-0.050 -0.165	250	+0.29 +0.00	47.50	6582330
245	-0.050 -0.165	275	+0.32 +0.00	47.50	6582430
270	-0.056 -0.186	300	+0.32 +0.00	47.50	6582530
290	-0.056 -0.186	320	+0.36 +0.00	49.00	6582630
320	-0.062 -0.212	360	+0.36 +0.00	58.00	6582730
380	-0.062 -0.212	420	+0.40 +0.00	60.00	6584030

Design

The Hallite 15 rod seal has been well proven in many applications requiring a compact, low friction seal to work efficiently both at low and high pressures.

The seal comprises a rubberised fabric U ring to give strength and durability, to which is moulded a rubber header. It is designed to have a controlled pre-load across the angled rubber lips which are accurately machine trimmed, to ensure a good seal at low pressure.

The seal becomes more effective as the pressure increases and the rubberised fabric deforms to the housing increasing the seal contact area. The surface of the fabric has pockets which retain lubrication to reduce friction and wear.

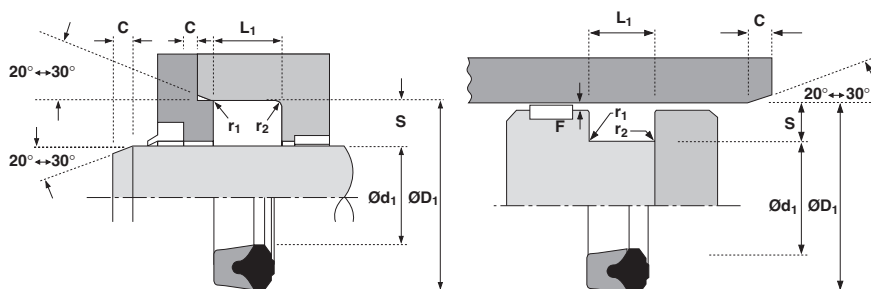
The proportions of the range have been determined to give a satisfactory performance when used with the recommended operating conditions. Many other sizes are available outside this range.

The range should be fitted to split housings as shown, but sizes marked* can be fitted to a grooved gland housing, if assembled with care.

NB: Size lists give "on line" tolerances for rod applications.

Features

- Well proven seal
- Contamination resistance
- Good wear resistance



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C + 100°C
Maximum Pressure	300 bar

Inch

1.5 ft/sec
-22°F + 212°F
4500 p.s.i.

Maximum extrusion gap

Pressure bar	100	160	250	300
Maximum Gap mm	0.45	0.4	0.3	0.25
Pressure p.s.i.	1500	2400	3750	4500

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face – Rod Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face – Rod ØD ₁	1.6 max	10 max	63 max	70 max
Dynamic Sealing Face – Piston Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face – Piston Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

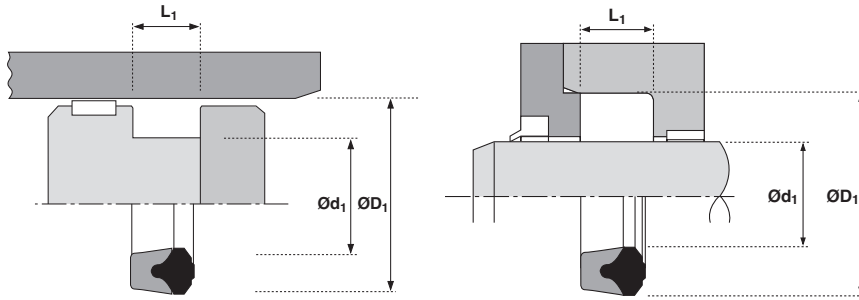
Chamfers & Radii

Groove Section ≤ S mm	4.0	5.0	6.0	7.5	10.0
Min Chamfer C mm	2.0	2.5	3.0	4.0	5.0
Max Fillet Rad r ₁ mm	0.2	0.4	0.8	0.8	0.8
Max Fillet Rad r ₁ mm	0.4	0.8	1.2	1.2	1.2

Tolerances

Ød ₁	ØD ₁	L ₁ mm
f9	Js11	+0.25 -0
js11	H9	+0.25 -0





Ød1	TOL f9	ØD1	TOL Js11	L1 +0.25-0	PART No.
16	-0.016 -0.059	26	+0.07 -0.07	8.0	0754300
20	-0.020 -0.072	28	+0.07 -0.07	6.4	2137000*
22	-0.020 -0.072	30	+0.07 -0.07	6.4	2137100*
22	-0.020 -0.072	32	+0.08 -0.08	9.0	0377300
25	-0.020 -0.072	33	+0.08 -0.08	6.4	2137200*
28	-0.020 -0.072	36	+0.08 -0.08	6.4	2137300*
28	-0.020 -0.072	40	+0.08 -0.08	9.0	0690700
30	-0.020 -0.072	38	+0.08 -0.08	6.4	2137400*
30	-0.020 -0.072	40	+0.08 -0.08	7.5	0032400*
32	-0.025 -0.087	40	+0.08 -0.08	6.4	2137500*
35	-0.025 -0.087	43	+0.08 -0.08	6.4	2137600*
35	-0.025 -0.087	50	+0.08 -0.08	11.0	0874400
36	-0.025 -0.087	44	+0.08 -0.08	6.4	2137700*
36	-0.025 -0.087	48	+0.08 -0.08	9.0	0690600*
40	-0.025 -0.087	48	+0.08 -0.08	6.4	2137800*
40	-0.025 -0.087	50	+0.08 -0.08	7.5	0188600*
40	-0.025 -0.087	50	+0.08 -0.08	10.5	1252100*
45	-0.025 -0.087	55	+0.10 -0.10	8.0	2137900*
45	-0.025 -0.087	60	+0.10 -0.10	10.0	1022800*

Ød1	TOL f9	ØD1	TOL Js11	L1 +0.25-0	PART No.
50	-0.025 -0.087	60	+0.10 -0.10	8.0	1204400*
55	-0.030 -0.104	65	+0.10 -0.10	8.0	0208700*
56	-0.030 -0.104	66	+0.10 -0.10	8.0	2138000*
56	-0.030 -0.104	71	+0.10 -0.10	12.0	0332600*
60	-0.030 -0.104	70	+0.10 -0.10	8.0	0208500*
60	-0.030 -0.104	80	+0.10 -0.10	14.0	0391400*
63	-0.030 -0.104	75	+0.10 -0.10	9.6	2138100*
65	-0.030 -0.104	77	+0.10 -0.10	9.6	2138200*
70	-0.030 -0.104	80	+0.10 -0.10	7.5	0057700*
70	-0.030 -0.104	82	+0.11 -0.11	9.6	2146800*
70	-0.030 -0.104	85	+0.11 -0.11	12.0	0384500
80	-0.030 -0.104	92	+0.11 -0.11	9.6	2138300*
90	-0.036 -0.123	102	+0.11 -0.11	9.6	2138400*
90	-0.036 -0.123	105	+0.11 -0.11	9.5	2174600*
100	-0.036 -0.123	115	+0.11 -0.11	12.0	2138500*
100	-0.036 -0.123	120	+0.11 -0.11	15.0	0466100*
110	-0.036 -0.123	125	+0.13 -0.13	12.0	0749300*
115	-0.036 -0.123	130	+0.13 -0.13	12.0	2136900*

For piston sealing tolerances refer to technical details

Design

Used in tandem, the Hallite 16 rod seal provides the designer with a compact low friction seal for light to medium duty hydraulic cylinders.

It has a special filled PTFE ring with a pre-loaded lip energised by an O ring. The lip is designed to have a contact area with the rod adequate to retain the media at low pressure. As high pressure acts on the O ring it compresses the lip against the rod increasing the contact area and the effectiveness of the seal.

The special PTFE ring has the low frictional properties normally associated with this material but is strengthened by additives to reduce creep. It has a low breakout friction so stick-slip is eliminated.

Standard seals are supplied with a nitrile O ring but other materials can be provided.

For the best results it is recommended two seals are fitted. The PTFE ring should always be mounted with the sealing lip on the pressure side. Sizes above 30mm are easily installed by deforming the PTFE ring into a kidney shape, sizes under 30mm are best installed using a tool, details of which can be provided.

A number of material options can be provided to extend operating conditions. Please ensure that the correct part number is specified for the material option as indicated.

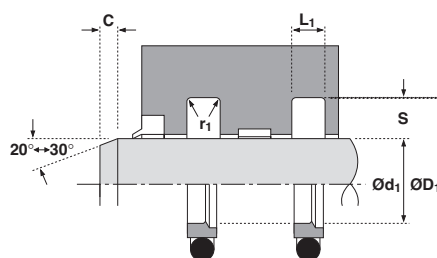
NB: Part numbers suffixed by "‡" indicate housing sizes to meet ISO7425-2.

Features

- Ultra low friction
- Compact housing
- Inch sizes available on request
- Seal ring component machined by Hallite, so any size can be catered for

Material

Face Material - O Ring	
Standard material	
15% Glass/PTFE – NBR	10
Material options:	
15% Glass/PTFE – FKM	11
Bronze/PTFE – NBR	20
Bronze/PTFE – FKM	21



Technical details

Operating conditions

Maximum Speed	4.0 m/sec
Temperature Range	-30°C + 100°C
Maximum Pressure	300 bar

Inch

12.0 ft/sec
-22°F + 212°F
4500 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	100	150	250	300
Maximum Gap mm	0.6	0.5	0.45	0.4
Pressure p.s.i.	1500	2400	3750	4500

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

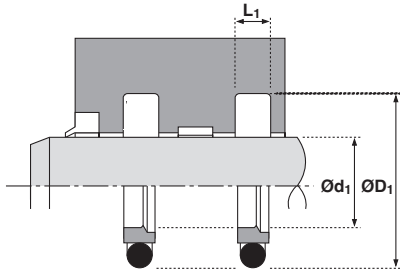
Chamfers & Radii

Groove Section ≤ S mm	3.75	5.50	7.75	10.50	12.25
Min Chamfer C mm	2.0	3.0	5.0	7.5	8.0
Max Fillet Rad r ₁ mm	0.4	0.8	1.2	1.6	1.6

Tolerances

Ød ₁	ØD ₁	L ₁ mm
f9	H11	+0.2 -0

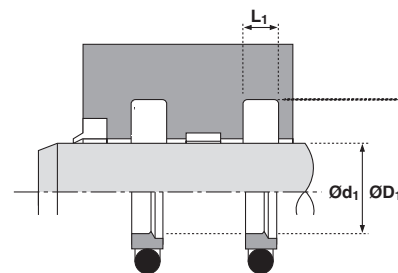




* Split housing recommended

Ød ₁	TOL f9	ØD ₁	TOL H11	L ₁ +0.2-0	PART No.
12	-0.016 -0.059	19.5	+0.13 +0.00	3.2	86106_ _ ‡
14	-0.016 -0.059	21.5	+0.13 +0.00	3.2	86098_ _ ‡
15	-0.016 -0.059	22.5	+0.13 +0.00	3.2	86179_ _
16	-0.016 -0.059	23.5	+0.13 +0.00	3.2	66225_ _ ‡
18	-0.016 -0.059	25.5	+0.13 +0.00	3.2	66226_ _ ‡
20	-0.020 -0.072	31.0	+0.16 +0.00	4.2	65948_ _ ‡*
22	-0.020 -0.072	33.0	+0.16 +0.00	4.2	65949_ _ ‡*
25	-0.020 -0.072	36.0	+0.16 +0.00	4.2	65950_ _ ‡*
28	-0.020 -0.072	39.0	+0.16 +0.00	4.2	66227_ _ ‡*
30	-0.020 -0.072	41.0	+0.16 +0.00	4.2	65951_ _
32	-0.025 -0.087	43.0	+0.16 +0.00	4.2	65952_ _ ‡
35	-0.025 -0.087	46.0	+0.16 +0.00	4.2	66228_ _
36	-0.025 -0.087	47.0	+0.16 +0.00	4.2	65953_ _ ‡
40	-0.025 -0.087	55.5	+0.19 +0.00	6.3	65954_ _
43	-0.025 -0.087	58.5	+0.19 +0.00	6.3	86075_ _
45	-0.025 -0.087	60.5	+0.19 +0.00	6.3	65955_ _
50	-0.025 -0.087	65.5	+0.19 +0.00	6.3	65956_ _
56	-0.030 -0.104	71.5	+0.19 +0.00	6.3	65957_ _
60	-0.030 -0.104	75.5	+0.19 +0.00	6.3	65958_ _
63	-0.030 -0.104	78.5	+0.19 +0.00	6.3	65959_ _ ‡
65	-0.030 -0.104	80.5	+0.22 +0.00	6.3	65960_ _
70	-0.030 -0.104	85.5	+0.22 +0.00	6.3	65961_ _ ‡
75	-0.030 -0.104	90.5	+0.22 +0.00	6.3	65962_ _

Ød ₁	TOL f9	ØD ₁	TOL H11	L ₁ +0.2-0	PART No.
78	-0.030 -0.104	93.5	+0.22 +0.00	6.3	86112_ _
80	-0.030 -0.104	95.5	+0.22 +0.00	6.3	65963_ _ ‡
85	-0.036 -0.123	100.5	+0.22 +0.00	6.3	65964_ _
90	-0.036 -0.123	105.5	+0.22 +0.00	6.3	65965_ _ ‡
95	-0.036 -0.123	110.5	+0.22 +0.00	6.3	65966_ _
97	-0.036 -0.123	112.5	+0.22 +0.00	6.3	86113_ _
100	-0.036 -0.123	115.5	+0.22 +0.00	6.3	65967_ _ ‡
105	-0.036 -0.123	120.5	+0.25 +0.00	6.3	86478_ _
110	-0.036 -0.123	125.5	+0.25 +0.00	6.3	66229_ _ ‡
115	-0.036 -0.123	130.5	+0.25 +0.00	6.3	66391_ _
120	-0.036 -0.123	135.5	+0.25 +0.00	6.3	86099_ _
125	-0.043 -0.143	140.5	+0.25 +0.00	6.3	66392_ _ ‡
130	-0.043 -0.143	145.5	+0.25 +0.00	6.3	86102_ _
135	-0.043 -0.143	150.5	+0.25 +0.00	6.3	86103_ _
140	-0.043 -0.143	155.5	+0.25 +0.00	6.3	66393_ _ ‡
145	-0.043 -0.143	160.5	+0.25 +0.00	6.3	86156_ _
150	-0.043 -0.143	165.5	+0.25 +0.00	6.3	86157_ _
160	-0.043 -0.143	175.5	+0.25 +0.00	6.3	66394_ _ ‡
170	-0.043 -0.143	185.5	+0.25 +0.00	6.3	86083_ _
180	-0.043 -0.143	195.5	+0.29 +0.00	6.3	66395_ _ ‡
190	-0.050 -0.165	205.5	+0.29 +0.00	6.3	86074_ _
200	-0.050 -0.165	221.0	+0.29 +0.00	8.1	66396_ _ ‡
210	-0.050 -0.165	231.0	+0.29 +0.00	8.1	86094_ _



* Split housing recommended

Ød ₁	TOL f9	ØD ₁	TOL H11	L ₁ +0.2-0	PART No.
220	-0.050 -0.165	241.0	+0.29 +0.00	8.1	66397_ _‡
240	-0.050 -0.165	261.0	+0.29 +0.00	8.1	86159_ _
250	-0.050 -0.165	271.0	+0.32 +0.00	8.1	66398_ _‡
270	-0.056 -0.186	294.5	+0.32 +0.00	8.1	86069_ _
280	-0.056 -0.186	304.5	+0.32 +0.00	8.1	66399_ _‡
290	-0.056 -0.186	314.5	+0.32 +0.00	8.1	86173_ _
300	-0.056 -0.186	324.5	+0.36 +0.00	8.1	66400_ _
320	-0.062 -0.202	344.5	+0.36 +0.00	8.1	86082_ _‡

Ød ₁	TOL f9	ØD ₁	TOL H11	L ₁ +0.2-0	PART No.
330	-0.062 -0.202	354.5	+0.36 +0.00	8.1	86196_ _
340	-0.062 -0.202	364.5	+0.36 +0.00	8.1	86197_ _
350	-0.062 -0.202	374.5	+0.36 +0.00	8.1	86198_ _
360	-0.062 -0.202	384.5	+0.36 +0.00	8.1	86199_ _‡
370	-0.062 -0.202	394.5	+0.36 +0.00	8.1	86200_ _
380	-0.062 -0.202	404.5	+0.40 +0.00	8.1	86201_ _
390	-0.062 -0.202	414.5	+0.40 +0.00	8.1	86202_ _
400	-0.062 -0.202	424.5	+0.40 +0.00	8.1	86203_ _

Design

A medium to heavy duty single acting seal, the Hallite 18 has shown itself over many years to be an effective and robust seal in a wide variety of applications.

The seal comprises a rubberised fabric U form base to which is bonded a rubber energiser.

The seal section is pre-loaded by the housing when installed to ensure effective sealing at low pressure. When the pressure increases the rubber energises the U form to increase the sealing area and hence the efficiency of the seal. The strength and durability of the rubberised fabric combines with its ability to retain lubricant keeping friction and wear to a minimum.

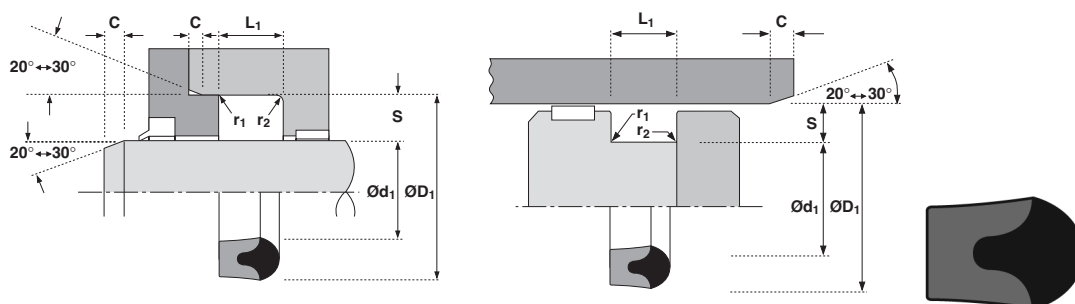
In a piston application the Hallite 18 should not be used back to back to make a double acting assembly.

The range should be fitted to split housings as shown, but sizes marked* can be fitted to a grooved gland housing, if assembled with care.

NB: Size lists give "on line" tolerances for rod applications.

Features

- The original Hallite fluid seal
- General purpose seal
- Long life



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	500 bar

Inch

1.5 ft/sec
-22°F +212°F
7500 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side, for rod seals using minimum rod Ø and maximum clearance Ø and for piston seals using the minimum clearance Ø and maximum bore Ø. Refer to Housing Design section.

Pressure bar	160	250	400	500
Maximum Gap mm	0.4	0.3	0.2	0.1
Pressure p.s.i.	2400	3750	6000	7500
Maximum Gap in	0.016	0.012	0.008	0.004

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face – Rod Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face – Rod ØD ₁	1.6 max	10 max	63 max	70 max
Dynamic Sealing Face – Piston ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face – Piston Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

Chamfers & Radii

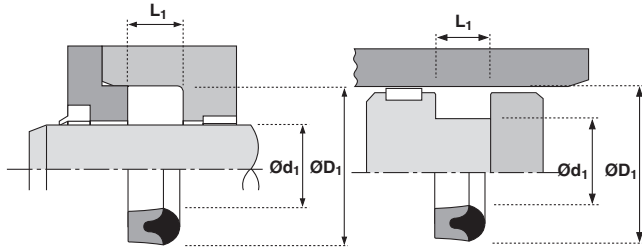
Groove Section ≤ S mm	4.0	5.0	7.5	10.0	12.5	15.0	20.0
Min Chamfer C mm	2.0	2.5	4.0	5.0	6.5	7.5	10.0
Max Fillet Rad r ₁ mm	0.2	0.4	0.8	0.8	1.2	1.6	1.6
Max Fillet Rad r ₂ mm	0.4	0.8	1.2	1.2	1.6	2.4	2.4
Groove Section ≤ S in	0.187	0.250	0.312	0.375	0.500	0.625	0.750
Min Chamfer C in	0.093	0.125	0.156	0.187	0.217	0.250	0.375
Max Fillet Rad r ₁ in	0.008	0.016	0.032	0.032	0.032	0.047	0.047
Max Fillet Rad r ₂ in	0.016	0.032	0.047	0.047	0.047	0.062	0.062

Tolerances

	Ød ₁	ØD ₁	L ₁ mm	L ₁ in
Rod	f9	Js11	+0.25 -0	+0.010 -0
Piston	js11	H9	+0.25 -0	+0.010 -0



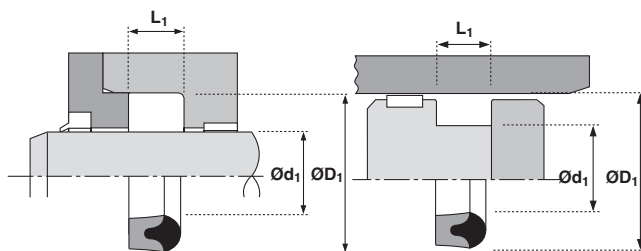
rod/piston seals



for piston sealing tolerances refer to technical details

Ød ₁	TOL f ₉	ØD ₁	TOL Js11	L ₁ +0.25-0	PART No.
6	-0.010 -0.040	14	+0.05 -0.05	6.0	0202200
8	-0.013 -0.049	16	+0.05 -0.05	6.0	0202400
10	-0.013 -0.049	18	+0.06 -0.06	6.0	0202500
12	-0.016 -0.059	20	+0.07 -0.07	6.0	0202600
14	-0.016 -0.059	24	+0.07 -0.07	7.5	0202700
15	-0.016 -0.059	25	+0.07 -0.07	7.5	0202800
16	-0.016 -0.059	26	+0.07 -0.07	7.5	0615900
18	-0.016 -0.059	28	+0.07 -0.07	7.5	0202900
20	-0.020 -0.072	30	+0.07 -0.07	7.5	0200500
22	-0.020 -0.072	30	+0.07 -0.07	6.0	0817600
22	-0.020 -0.072	32	+0.08 -0.08	7.5	0203300
25	-0.020 -0.072	40	+0.08 -0.08	11.0	0472800
28	-0.020 -0.072	43	+0.08 -0.08	11.0	0204300
30	-0.020 -0.072	45	+0.08 -0.08	11.0	0204400
30	-0.020 -0.072	50	+0.08 -0.08	14.0	0282100
32	-0.025 -0.087	47	+0.08 -0.08	11.0	0204600
35	-0.025 -0.087	45	+0.08 -0.08	7.5	0052300
35	-0.025 -0.087	50	+0.08 -0.08	11.0	0474600
36	-0.025 -0.087	44	+0.08 -0.08	6.0	1204900*
36	-0.025 -0.087	51	+0.10 -0.10	11.0	0978800
40	-0.025 -0.087	50	+0.08 -0.08	10.5	0202000*
40	-0.025 -0.087	55	+0.10 -0.10	11.0	0475000
45	-0.025 -0.087	60	+0.10 -0.10	11.0	0979400

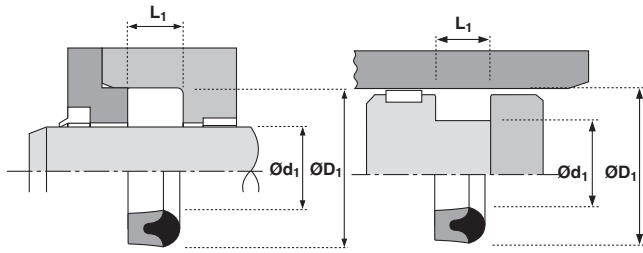
Ød ₁	TOL f ₉	ØD ₁	TOL Js11	L ₁ +0.25-0	PART No.
45	-0.025 -0.087	65	+0.10 -0.10	14.0	0281700
50	-0.025 -0.087	60	+0.10 -0.10	7.5	0179300*
50	-0.025 -0.087	65	+0.10 -0.10	10.0	0208400*
50	-0.025 -0.087	65	+0.10 -0.10	11.0	0383800*
50	-0.025 -0.087	70	+0.10 -0.10	14.0	0294600
55	-0.030 -0.104	65	+0.10 -0.10	8.0	0242600*
56	-0.030 -0.104	76	+0.10 -0.10	14.0	0646100
60	-0.030 -0.104	72	+0.10 -0.10	9.5	1397700*
60	-0.030 -0.104	80	+0.10 -0.10	14.0	0294900
63	-0.030 -0.104	83	+0.11 -0.11	14.0	0646300
65	-0.030 -0.104	80	+0.11 -0.11	11.0	0740700*
70	-0.030 -0.104	90	+0.11 -0.11	14.0	0296000
75	-0.030 -0.104	90	+0.11 -0.11	12.0	0740600*
75	-0.030 -0.104	95	+0.11 -0.11	14.0	0412700
80	-0.030 -0.104	95	+0.11 -0.11	12.0	0732700*
80	-0.030 -0.104	100	+0.11 -0.11	14.0	0295100*
90	-0.036 -0.123	110	+0.11 -0.11	10.0	0306700*
90	-0.036 -0.123	110	+0.11 -0.11	14.0	0071700*
90	-0.036 -0.123	110	+0.11 -0.11	15.0	0712400*
100	-0.036 -0.123	115	+0.11 -0.11	12.0	0740500*
100	-0.036 -0.123	120	+0.11 -0.11	14.0	0296100*
100	-0.036 -0.123	125	+0.13 -0.13	19.0	0418600*
110	-0.036 -0.123	125	+0.13 -0.13	11.0	0558300*



for piston sealing tolerances refer to technical details

Ød ₁	TOL f ₉	ØD ₁	TOL Js11	L ₁ +0.25-0	PART No.
110	-0.036 -0.123	135	+0.13 -0.13	19.0	0304300*
115	-0.036 -0.123	135	+0.13 -0.13	14.0	0639900*
120	-0.036 -0.123	140	+0.13 -0.13	12.0	0250500*
120	-0.036 -0.123	145	+0.13 -0.13	19.0	0070400*
125	-0.043 -0.143	150	+0.13 -0.13	19.0	0070500*
130	-0.043 -0.143	145	+0.13 -0.13	11.3	0634500*
135	-0.043 -0.143	160	+0.13 -0.13	19.0	0080400*
140	-0.043 -0.143	160	+0.13 -0.13	14.0	0304600*
140	-0.043 -0.143	165	+0.13 -0.13	19.0	0080500*
150	-0.043 -0.143	170	+0.13 -0.13	14.0	0303300*
160	-0.043 -0.143	180	+0.13 -0.13	15.0	1283100*
160	-0.043 -0.143	190	+0.15 -0.15	24.0	0136100*
175	-0.043 -0.143	200	+0.15 -0.15	19.0	0838800*

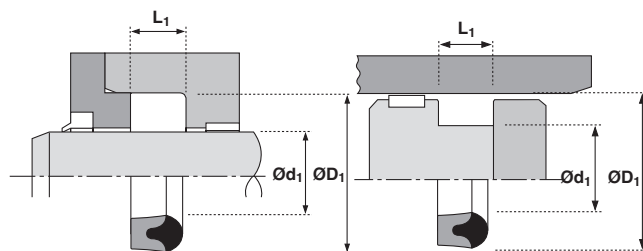
Ød ₁	TOL f ₉	ØD ₁	TOL Js11	L ₁ +0.25-0	PART No.
180	-0.043 -0.143	210	+0.15 -0.15	24.0	0087200*
200	-0.050 -0.165	220	+0.15 -0.15	15.0	1284100*
200	-0.050 -0.165	230	+0.15 -0.15	24.0	2010000*
220	-0.050 -0.165	250	+0.15 -0.15	22.0	0958900*
250	-0.050 -0.165	280	+0.16 -0.16	24.0	1055500*
270	-0.056 -0.186	300	+0.16 -0.16	24.0	0094800*
280	-0.056 -0.186	310	+0.16 -0.16	24.0	0094900*
300	-0.056 -0.186	330	+0.18 -0.18	24.0	0095000*
320	-0.062 -0.212	360	+0.18 -0.18	30.0	1054000*
360	-0.062 -0.212	400	+0.18 -0.18	30.0	1054300*
380	-0.062 -0.212	420	+0.20 -0.20	30.0	0095100*
400	-0.062 -0.212	440	+0.20 -0.20	30.0	0095200*



for piston sealing tolerances refer to technical details

Ød ₁	TOL f ₉	ØD ₁	TOL Js11	L ₁ +0.010-0	PART No.
0.375	-0.0005 -0.0019	0.750	+0.003 -0.003	0.281	1379300
0.500	-0.0006 -0.0023	0.875	+0.003 -0.003	0.281	0406700
0.625	-0.0006 -0.0023	0.875	+0.003 -0.003	0.187	1435600*
0.625	-0.0006 -0.0023	1.000	+0.003 -0.003	0.281	1247600
0.750	-0.0008 -0.0028	1.093	+0.003 -0.003	0.281	1364200
0.750	-0.0008 -0.0028	1.250	+0.003 -0.003	0.375	0403700
0.875	-0.0008 -0.0028	1.375	+0.003 -0.003	0.375	0401300
1.000	-0.0008 -0.0028	1.375	+0.003 -0.003	0.250	0282600*
1.000	-0.0008 -0.0028	1.500	+0.003 -0.003	0.375	0422400
1.125	-0.0008 -0.0028	1.625	+0.003 -0.003	0.375	0287000
1.125	-0.0008 -0.0028	1.750	+0.003 -0.003	0.437	0778200
1.250	-0.0010 -0.0034	1.625	+0.003 -0.003	0.281	0282400*
1.250	-0.0010 -0.0034	1.875	+0.003 -0.003	0.437	0404100
1.375	-0.0010 -0.0034	2.000	+0.004 -0.004	0.437	0778400
1.500	-0.0010 -0.0034	2.000	+0.004 -0.004	0.281	1447800*
1.500	-0.0010 -0.0034	2.125	+0.004 -0.004	0.437	0967600
1.625	-0.0010 -0.0034	2.250	+0.004 -0.004	0.437	1432600
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.312	1404300*
1.750	-0.0010 -0.0034	2.375	+0.004 -0.004	0.437	0939800
1.875	-0.0010 -0.0034	2.500	+0.004 -0.004	0.437	0867200*
2.000	-0.0012 -0.0041	2.625	+0.004 -0.004	0.437	1371000*
2.000	-0.0012 -0.0041	2.750	+0.004 -0.004	0.562	1369100
2.250	-0.0012 -0.0041	2.875	+0.004 -0.004	0.437	0424300*

Ød ₁	TOL f ₉	ØD ₁	TOL Js11	L ₁ +0.010-0	PART No.
2.250	-0.0012 -0.0041	3.000	+0.004 -0.004	0.562	1098400
2.500	-0.0012 -0.0041	3.000	+0.004 -0.004	0.312	0641200*
2.500	-0.0012 -0.0041	3.250	+0.004 -0.004	0.562	0782400
2.750	-0.0012 -0.0041	3.500	+0.004 -0.004	0.562	0437800
3.000	-0.0012 -0.0041	3.750	+0.004 -0.004	0.562	0410500
3.250	-0.0014 -0.0048	4.000	+0.004 -0.004	0.562	1407700
3.500	-0.0014 -0.0048	4.000	+0.004 -0.004	0.375	1468200
3.500	-0.0014 -0.0048	4.250	+0.004 -0.004	0.562	1128800
3.750	-0.0014 -0.0048	4.500	+0.004 -0.004	0.500	1414800
4.000	-0.0014 -0.0048	4.875	+0.005 -0.005	0.656	1424100
4.000	-0.0014 -0.0048	5.000	+0.005 -0.005	0.750	0443000
4.250	-0.0014 -0.0048	5.250	+0.005 -0.005	0.750	0892200
4.500	-0.0014 -0.0048	5.250	+0.005 -0.005	0.469	0447800*
4.500	-0.0014 -0.0048	5.500	+0.005 -0.005	0.750	0133200
5.000	-0.0017 -0.0056	6.000	+0.005 -0.005	0.750	1367000
5.250	-0.0017 -0.0056	6.000	+0.005 -0.005	0.562	0487700*
5.500	-0.0017 -0.0056	6.500	+0.005 -0.005	0.750	1164100
6.000	-0.0017 -0.0056	7.000	+0.005 -0.005	0.750	1188800
6.500	-0.0017 -0.0056	7.750	+0.006 -0.006	1.000	1192700
7.000	-0.0017 -0.0056	8.000	+0.006 -0.006	0.875	6501200
7.000	-0.0017 -0.0056	8.250	+0.006 -0.006	1.000	1219200
7.500	-0.0020 -0.0065	8.750	+0.006 -0.006	1.000	0418100
8.000	-0.0020 -0.0065	9.000	+0.006 -0.006	0.750	1269400



for piston sealing tolerances refer to technical details

Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.010-0	PART No.
8.000	-0.0020 -0.0065	9.250	+0.006 -0.006	1.000	0455700
8.500	-0.0020 -0.0065	9.750	+0.006 -0.006	1.000	1332300
9.000	-0.0020 -0.0065	10.250	+0.006 -0.006	1.000	0437500
9.500	-0.0020 -0.0065	10.750	+0.006 -0.006	1.000	1320400
10.000	-0.0022 -0.0073	11.250	+0.006 -0.006	1.000	0452200
10.500	-0.0022 -0.0073	11.750	+0.006 -0.000	1.000	1331300
11.000	-0.0022 -0.0073	12.250	+0.006 -0.006	1.000	1331000
12.000	-0.0022 -0.0073	13.250	+0.007 -0.007	1.000	1329100
13.000	-0.0024 -0.0083	14.250	+0.007 -0.007	1.000	0864800
14.000	-0.0024 -0.0083	15.250	+0.007 -0.007	1.208	0174900

Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.010-0	PART No.
14.500	-0.0024 -0.0083	16.000	+0.008 -0.008	1.500	1345000
15.000	-0.0024 -0.0083	17.000	+0.008 -0.008	1.500	1345300
16.500	-0.0027 -0.0088	17.750	+0.008 -0.008	1.000	1318800
17.000	-0.0027 -0.0088	17.750	+0.008 -0.008	0.625	1345900*
18.000	-0.0027 -0.0088	19.250	+0.008 -0.008	1.250	1314500
19.000	-0.0027 -0.0088	20.750	+0.009 -0.009	1.312	1342200
20.000	-0.0030 -0.0099	21.500	+0.009 -0.009	1.750	0093600
30.000	-0.0031 -0.0110	31.500	+0.011 -0.011	1.125	1337900
30.000	-0.0031 -0.0110	32.000	+0.011 -0.011	1.500	2109700
38.000	-0.0034 -0.0124	39.500	+0.011 -0.011	1.125	0159200

Design

The Hallite 33 wiper has a lip designed to remove lightly adhered dirt from the rod i.e. mud, dust or moisture.

The wiper is manufactured from a hard nitrile rubber suitable for installing in a grooved housing. Rod diameters ($\varnothing d_1$) of 20mm and below require a two piece housing.

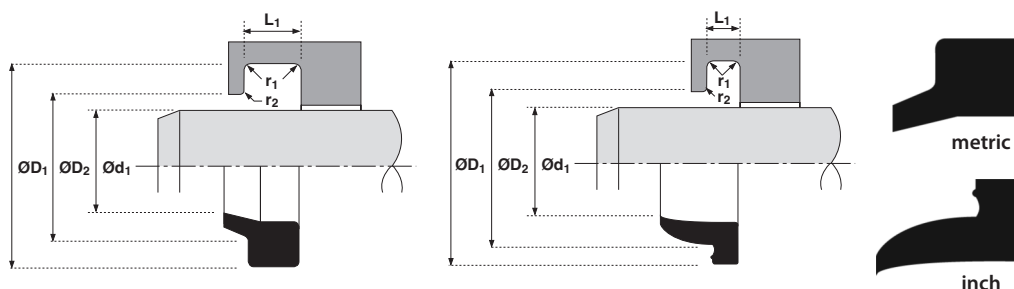
To prevent dirt passing the outside of the wiper and to reduce the pumping action, the outside diameter is an interference fit with the housing. Certain sizes of the standard Hallite 33 metric range are suitable for ISO 6195 Housing Type A.

It should also be noted that the Hallite 33 inch profile differs from the metric profile.

NB: Part numbers suffixed by “†” indicate housing sizes to meet ISO6195A. Many of the metric sizes are also available as polyester wipers – see Hallite 38.

Features

- General purpose wiper
- Wide size ranges
- Effective seal on housing as well as rod



Technical details

Operating conditions

Maximum Speed	4.0 m/sec
Temperature Range	-30°C +100°C

Inch

12.0 ft/sec
-22°F +212°F

Surface roughness

	μmRa	μmRt
Dynamic Sealing Face $\varnothing d_1$	0.1 < > 0.4	4 max
Static Sealing Face $\varnothing D_1$ $\varnothing D_2$	2.5 max	16 max
Static Housing Faces L_1	2.5 max	16 max

$\mu inCLA$	$\mu inRMS$
4 < > 16	5 < > 18
100 max	111 max
100 max	111 max

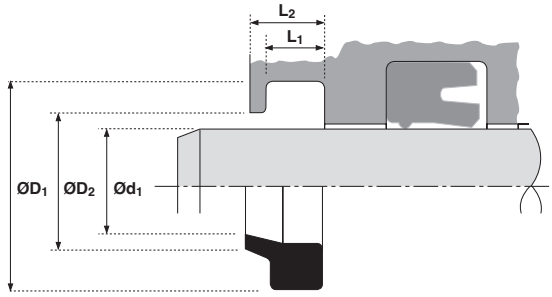
Radii

Rod Diameter $\varnothing d_1$ mm	≤ 50	≤ 90	≤ 200	> 200
Max Fillet Rad r_1 mm	0.4	0.4	0.4	0.8
Max Fillet Rad r_2 mm	0.2	0.4	0.6	0.8
Rod Diameter $\varnothing d_1$ in	all			
Max Fillet Rad r_1 in	0.010			
Max Fillet Rad r_2 in	0.020			

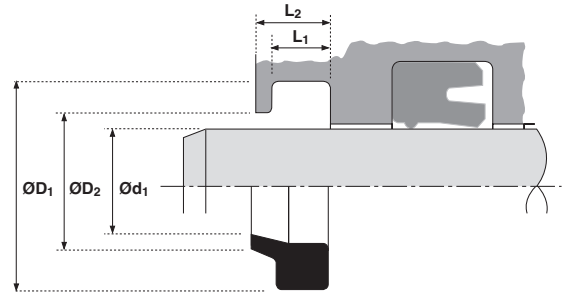
Tolerances

	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1
mm	f9	H11	H11	+0.2 -0
in	f9	+0.020 +0.010	± 0.005	+0.020 +0.010

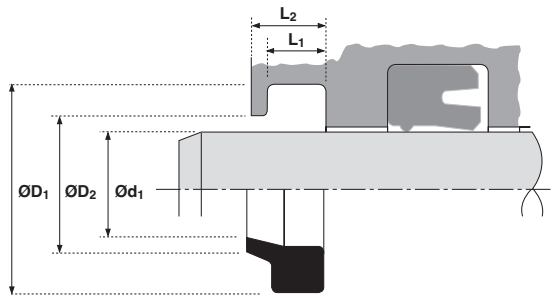




Ød1	TOL f9	ØD1	TOL H11	ØD2	TOL H11	L1 +0.2 - 0	L2	PART No.
12	-0.016 -0.059	20.0	+0.13 +0.00	16.0	+0.11 +0.00	4.0	6.0	2232500
14	-0.016 -0.059	22.0	+0.13 +0.00	18.0	+0.11 +0.00	4.0	6.0	2232600
16	-0.016 -0.059	24.0	+0.13 +0.00	20.0	+0.13 +0.00	4.0	6.0	2232800
18	-0.016 -0.059	26.0	+0.13 +0.00	22.0	+0.13 +0.00	4.0	6.0	2232900
20	-0.020 -0.072	28.0	+0.13 +0.00	24.0	+0.13 +0.00	4.0	6.0	2233000
22	-0.020 -0.072	30.0	+0.13 +0.00	26.0	+0.13 +0.00	4.0	6.0	2233100
25	-0.020 -0.072	33.0	+0.16 +0.00	29.0	+0.13 +0.00	4.0	6.0	2233200
25	-0.020 -0.072	33.0	+0.16 +0.00	30.5	+0.16 +0.00	5.0	6.4	6586200‡
28	-0.020 -0.072	36.0	+0.16 +0.00	32.0	+0.16 +0.00	4.0	6.0	2233300
28	-0.020 -0.072	36.0	+0.16 +0.00	33.5	+0.16 +0.00	5.0	6.4	6586300‡
30	-0.020 -0.072	42.0	+0.16 +0.00	36.0	+0.16 +0.00	6.0	9.0	2233400
32	-0.025 -0.087	40.0	+0.16 +0.00	37.5	+0.16 +0.00	5.0	6.4	6586400‡
32	-0.025 -0.087	44.0	+0.16 +0.00	38.0	+0.16 +0.00	6.0	9.0	2233500
35	-0.025 -0.087	47.0	+0.16 +0.00	41.0	+0.16 +0.00	6.0	9.0	2233600
36	-0.025 -0.087	44.0	+0.16 +0.00	41.5	+0.16 +0.00	5.0	6.4	6586500‡
36	-0.025 -0.087	48.0	+0.16 +0.00	42.0	+0.16 +0.00	6.0	9.0	2233700
40	-0.025 -0.087	48.0	+0.16 +0.00	45.5	+0.16 +0.00	5.0	6.4	6586600‡
40	-0.025 -0.087	52.0	+0.19 +0.00	46.0	+0.16 +0.00	6.0	9.0	2233800
42	-0.025 -0.087	54.0	+0.19 +0.00	48.0	+0.16 +0.00	6.0	9.0	2233900
45	-0.025 -0.087	53.0	+0.19 +0.00	50.5	+0.19 +0.00	5.0	6.4	6586700‡
45	-0.025 -0.087	57.0	+0.19 +0.00	51.0	+0.19 +0.00	6.0	9.0	2234000
50	-0.025 -0.087	58.0	+0.19 +0.00	55.5	+0.19 +0.00	5.0	6.4	6586800‡
50	-0.025 -0.087	62.0	+0.19 +0.00	55.0	+0.19 +0.00	6.0	9.0	2234200
55	-0.030 -0.104	67.0	+0.19 +0.00	61.0	+0.19 +0.00	6.0	9.0	2234300
56	-0.030 -0.104	66.0	+0.19 +0.00	63.0	+0.19 +0.00	6.3	8.1	6586900‡



Ød1	TOL f9	ØD1	TOL H11	ØD2	TOL H11	L1 +0.2 - 0	L2	PART No.
56	-0.030 -0.104	68.0	+0.19 +0.00	62.0	+0.19 +0.00	6.0	9.0	2234400
60	-0.030 -0.104	72.0	+0.19 +0.00	66.0	+0.19 +0.00	6.0	9.0	2234500
63	-0.030 -0.104	73.0	+0.19 +0.00	70.0	+0.19 +0.00	6.3	8.1	6587000‡
63	-0.030 -0.104	75.0	+0.19 +0.00	69.0	+0.19 +0.00	6.0	9.0	2234600
65	-0.030 -0.104	77.0	+0.19 +0.00	71.0	+0.19 +0.00	6.0	9.0	2234700
70	-0.030 -0.104	80.0	+0.19 +0.00	77.0	+0.19 +0.00	6.3	8.1	6587100‡
70	-0.030 -0.104	82.0	+0.22 +0.00	76.0	+0.19 +0.00	6.0	9.0	2234800
80	-0.030 -0.104	90.0	+0.22 +0.00	87.0	+0.22 +0.00	6.3	8.1	6587200‡
90	-0.036 -0.123	100.0	+0.22 +0.00	97.0	+0.22 +0.00	6.3	8.1	6587300‡
90	-0.036 -0.123	106.0	+0.22 +0.00	98.0	+0.22 +0.00	8.0	12.0	2235200
100	-0.036 -0.123	115.0	+0.22 +0.00	110.0	+0.22 +0.00	9.5	12.5	6587400‡
100	-0.036 -0.123	116.0	+0.22 +0.00	108.0	+0.22 +0.00	8.0	12.0	2235300
105	-0.036 -0.123	121.0	+0.25 +0.00	113.0	+0.22 +0.00	8.0	12.0	2235400
110	-0.036 -0.123	125.0	+0.25 +0.00	120.0	+0.22 +0.00	9.5	12.5	6587500‡
125	-0.043 -0.143	140.0	+0.25 +0.00	135.0	+0.25 +0.00	9.5	12.5	6587600‡
140	-0.043 -0.143	155.0	+0.25 +0.00	150.0	+0.25 +0.00	9.5	12.5	6587700‡
140	-0.043 -0.143	156.0	+0.25 +0.00	148.0	+0.25 +0.00	8.0	12.0	1222800
150	-0.043 -0.143	166.0	+0.25 +0.00	158.0	+0.25 +0.00	8.0	12.0	1222900
160	-0.043 -0.143	175.0	+0.25 +0.00	170.0	+0.25 +0.00	9.5	12.5	6587800‡
160	-0.043 -0.143	176.0	+0.25 +0.00	168.0	+0.25 +0.00	8.0	12.0	1223000
180	-0.043 -0.143	200.0	+0.29 +0.00	190.0	+0.29 +0.00	10.0	15.0	1226300
190	-0.050 -0.165	210.0	+0.29 +0.00	200.0	+0.29 +0.00	10.0	15.0	1226400
200	-0.050 -0.165	220.0	+0.29 +0.00	210.0	+0.29 +0.00	10.0	15.0	1226500
220	-0.050 -0.165	240.0	+0.29 +0.00	233.5	+0.29 +0.00	12.5	16.6	6588100‡



Ød1	TOL f9	ØD1 +0.020 +0.010	ØD2 ±0.005	L1 +0.020 +0.010	L2	PART No.
0.500	-0.0006 -0.0023	0.900	0.700	0.125	0.250	1464100
0.625	-0.0006 -0.0023	1.025	0.825	0.125	0.250	1470700
0.750	-0.0008 -0.0028	1.150	0.950	0.125	0.250	1347700
0.875	-0.0008 -0.0028	1.275	1.075	0.125	0.250	1056700
1.000	-0.0008 -0.0028	1.400	1.200	0.125	0.250	1456300
1.125	-0.0008 -0.0028	1.625	1.425	0.125	0.375	1476700
1.250	-0.0010 -0.0034	1.750	1.550	0.125	0.375	1453100
1.375	-0.0010 -0.0034	1.875	1.675	0.125	0.375	1471800
1.500	-0.0010 -0.0034	2.000	1.800	0.125	0.375	0696900
1.625	-0.0010 -0.0034	2.125	1.925	0.125	0.375	0269600
1.750	-0.0010 -0.0034	2.250	2.050	0.125	0.375	0266400
2.000	-0.0012 -0.0041	2.500	2.300	0.125	0.375	0228100
2.250	-0.0012 -0.0041	2.750	2.550	0.125	0.375	0851100
2.500	-0.0012 -0.0041	3.000	2.800	0.125	0.375	1450000
2.750	-0.0012 -0.0041	3.250	3.050	0.125	0.375	2222400
3.000	-0.0012 -0.0041	3.500	3.300	0.125	0.375	0951300
3.250	-0.0014 -0.0048	4.000	3.650	0.187	0.500	1472500
3.500	-0.0014 -0.0048	4.250	3.900	0.187	0.500	1445000
4.000	-0.0014 -0.0048	4.750	4.400	0.187	0.500	1453300
4.500	-0.0014 -0.0048	5.250	4.900	0.187	0.500	1613600
5.000	-0.0017 -0.0056	5.750	5.400	0.187	0.500	0258600
5.500	-0.0017 -0.0056	6.250	5.900	0.187	0.500	0223500
6.000	-0.0017 -0.0056	6.750	6.400	0.187	0.500	0222500
6.500	-0.0017 -0.0056	7.500	7.000	0.250	0.625	1613100
7.000	-0.0017 -0.0056	8.000	7.500	0.250	0.625	1614600
8.000	-0.0020 -0.0065	9.000	8.500	0.250	0.625	0786500

Design

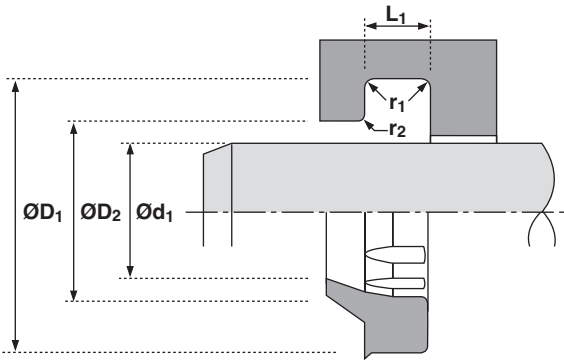
The Hallite 38 wiper has been designed so that the proportions of the wiping lip ensure it maintains contact with the rod surface to remove heavily deposited mud, ice etc. The outside diameter contacts the housing and has a sealing lip to prevent moisture entering the groove.

A polyester based material is used to provide a tough abrasion resistant wiper for the difficult conditions usually found in mining or earth moving applications. All the range can be used with a split housing, however, the majority can be installed in a blind housing with care.

NB: Part numbers suffixed by “±” indicate housing sizes to meet ISO 6195A.

Features

- Outside lip for effective housing seal
- Pressure relief ribs
- Effective scraping lip



Technical details

Operating conditions

Maximum Speed 4.0 m/sec
Temperature Range -40°C +120°C

Surface roughness

Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max
Static Sealing Face ØD ₁ ØD ₂	1.6 max	10 max
Static Housing Faces L ₁	3.2 max	16 max

Radii

Rod Diameter Ød ₁ mm	≤ 50	≤ 90
Max Fillet Rad r ₁ mm	0.4	0.4
Max Fillet Rad r ₂ mm	0.2	0.4

Tolerances

Ød ₁	ØD ₁	ØD ₂	L ₁ mm
f9	H11	H11	+0.2-0

Inch

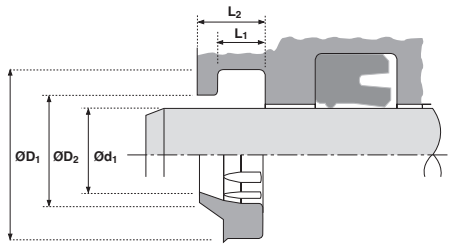
12.0 ft/sec
-40°F +250°F

µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

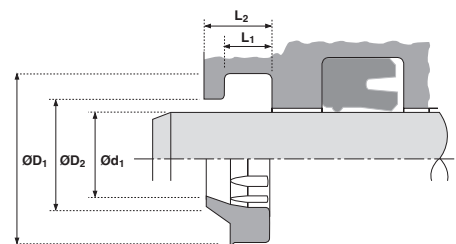
≤ 200	> 200
0.4	0.8
0.6	0.8



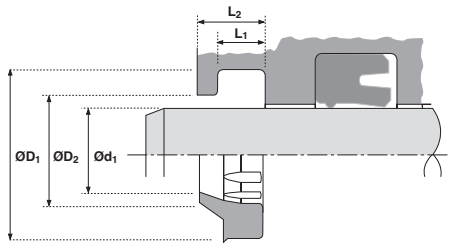
wipers



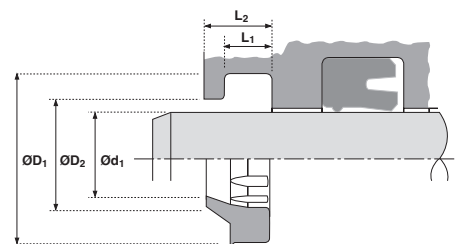
Ød1	TOL f9	ØD1	TOL H11	ØD2	TOL H11	L1 +0.2 - 0	L2	PART NUMBER
18	-0.016 -0.059	24	+0.13 +0.00	21	+0.13 +0.00	5.0	7.0	4392000
20	-0.020 -0.072	28	+0.13 +0.00	25.5	+0.13 +0.00	5.0	8.0	4321900‡
22	-0.020 -0.072	30	+0.13 +0.00	27.5	+0.13 +0.00	5.0	8.0	4322000‡
25	-0.020 -0.072	33	+0.16 +0.00	30.5	+0.16 +0.00	5.0	8.0	6617700‡
28	-0.020 -0.072	36	+0.16 +0.00	33.5	+0.16 +0.00	5.0	8.0	6617800‡
30	-0.020 -0.072	38	+0.16 +0.00	35.5	+0.16 +0.00	5.0	8.0	4419200
30	-0.020 -0.072	41.2	+0.16 +0.00	37	+0.16 +0.00	7.5	10.0	4528900
32	-0.025 -0.087	40	+0.16 +0.00	37.5	+0.16 +0.00	5.0	8.0	6617900‡
35	-0.025 -0.087	43	+0.16 +0.00	40.5	+0.16 +0.00	5.0	8.0	4724800
36	-0.025 -0.087	44	+0.16 +0.00	41.5	+0.16 +0.00	5.0	8.0	6618000‡
40	-0.025 -0.087	48	+0.16 +0.00	45.5	+0.16 +0.00	5.0	8.0	6618100‡
40	-0.025 -0.087	50.6	+0.16 +0.00	43	+0.16 +0.00	5.3	7.0	4784100
41.28	-0.025 -0.087	49.28	+0.16 +0.00	46.8	+0.16 +0.00	5.0	8.0	4599900
45	-0.025 -0.087	53	+0.19 +0.00	50.5	+0.19 +0.00	5.0	8.0	6618200‡
45	-0.025 -0.087	55.6	+0.19 +0.00	48	+0.16 +0.00	5.3	7.0	4531201
50	-0.025 -0.087	58	+0.19 +0.00	55.5	+0.19 +0.00	5.0	8.0	6618300‡
50	-0.025 -0.087	58.6	+0.19 +0.00	53	+0.19 +0.00	5.3	7.0	4300400
50	-0.025 -0.087	60.6	+0.19 +0.00	53	+0.19 +0.00	5.3	7.0	4458000
55	-0.030 -0.104	65.6	+0.19 +0.00	58	+0.19 +0.00	5.3	7.0	4531401
56	-0.030 -0.104	66	+0.19 +0.00	63	+0.19 +0.00	6.3	10.0	6618400‡
56	-0.030 -0.104	66.6	+0.19 +0.00	59	+0.19 +0.00	5.3	7.0	4458100
60	-0.030 -0.104	70	+0.19 +0.00	66	+0.19 +0.00	5.3	7.0	4386200
60	-0.030 -0.104	70.0	+0.19 +0.00	67.0	+0.19 +0.00	6.3	10.0	4270200



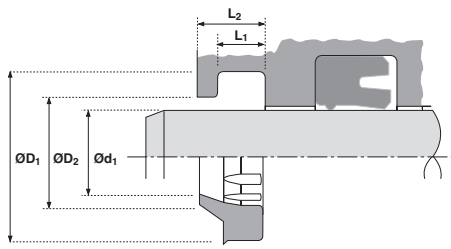
Ød ₁	TOL f ₉	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 - 0	L ₂	PART NUMBER
60	-0.030 -0.104	70.6	+0.19 +0.00	63.0	+0.19 +0.00	5.3	7.0	4456400
63	-0.030 -0.104	73.0	+0.19 +0.00	70.0	+0.19 +0.00	6.3	10.0	6618500‡
63	-0.030 -0.104	73.6	+0.19 +0.00	66.0	+0.19 +0.00	5.3	7.0	4283600
65	-0.030 -0.104	75.0	+0.19 +0.00	72.0	+0.19 +0.00	6.3	10.0	4343800
65	-0.030 -0.104	75.6	+0.19 +0.00	68.0	+0.19 +0.00	5.3	7.0	4784200
70	-0.030 -0.104	80.0	+0.19 +0.00	77.0	+0.19 +0.00	6.3	10.0	6618600‡
70	-0.030 -0.104	80.6	+0.22 +0.00	73.0	+0.19 +0.00	5.3	7.0	4454000
70	-0.030 -0.104	82.2	+0.22 +0.00	76.0	+0.19 +0.00	7.2	12.0	4243900
75	-0.030 -0.104	83.6	+0.22 +0.00	78.0	+0.19 +0.00	5.3	7.0	4539500
75	-0.030 -0.104	85.0	+0.22 +0.00	82.0	+0.22 +0.00	6.3	10.0	4532500
75	-0.030 -0.104	87.2	+0.22 +0.00	81.0	+0.22 +0.00	7.2	12.0	4384400
80	-0.030 -0.104	90.0	+0.22 +0.00	87.0	+0.22 +0.00	6.3	10.0	6618700‡
80	-0.030 -0.104	91.0	+0.22 +0.00	85.0	+0.22 +0.00	7.5	11.0	4493200
80	-0.030 -0.104	92.2	+0.22 +0.00	86.0	+0.22 +0.00	7.2	12.0	4242800
82.6	-0.036 -0.123	92.2	+0.22 +0.00	85.7	+0.22 +0.00	5.3	7.1	4415500
85	-0.036 -0.123	93.6	+0.22 +0.00	88.0	+0.22 +0.00	5.3	7.0	4292100
85	-0.036 -0.123	97.2	+0.22 +0.00	91.0	+0.22 +0.00	7.2	12.0	4784300
85	-0.036 -0.123	98.0	+0.22 +0.00	92.0	+0.22 +0.00	7.5	11.5	4332800
88	-0.036 -0.123	100.2	+0.22 +0.00	94.0	+0.22 +0.00	7.2	12.0	4269400
90	-0.036 -0.123	100.0	+0.22 +0.00	97.0	+0.22 +0.00	6.3	10.0	6618800‡
90	-0.036 -0.123	102.2	+0.22 +0.00	96.0	+0.22 +0.00	7.2	12.0	4324500
95	-0.036 -0.123	107.2	+0.22 +0.00	101.0	+0.22 +0.00	7.2	12.0	6667600
100	-0.036 -0.123	110.6	+0.22 +0.00	104.0	+0.22 +0.00	5.3	7.0	4300200



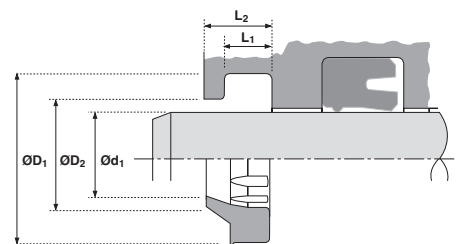
Ød1	TOL f9	ØD1	TOL H11	ØD2	TOL H11	L1 +0.2 - 0	L2	PART NUMBER
100	-0.036 -0.123	112.2	+0.22 +0.00	106.0	+0.22 +0.00	7.2	12.0	4324600
100	-0.036 -0.123	115.0	+0.22 +0.00	110.0	+0.22 +0.00	9.5	14.0	6618900‡
101.6	-0.036 -0.123	116.6	+0.22 +0.00	111.6	+0.22 +0.00	9.5	14.0	6619010
105	-0.036 -0.123	113.0	+0.22 +0.00	110.5	+0.22 +0.00	5.0	8.0	4290300
105	-0.036 -0.123	120.0	+0.22 +0.00	112.0	+0.22 +0.00	7.2	12.0	4539100
110	-0.036 -0.123	122.2	+0.25 +0.00	116.0	+0.22 +0.00	7.2	12.0	4459200
110	-0.036 -0.123	125.0	+0.25 +0.00	120.0	+0.22 +0.00	9.5	14.0	6619000‡
115	-0.036 -0.123	127.2	+0.25 +0.00	121.0	+0.25 +0.00	7.2	12.0	4324800
120	-0.036 -0.123	132.2	+0.25 +0.00	126.0	+0.25 +0.00	7.2	12.0	4454300
120	-0.036 -0.123	135.0	+0.25 +0.00	130.0	+0.25 +0.00	9.5	14.0	4385600
125	-0.043 -0.143	133.0	+0.25 +0.00	130.8	+0.25 +0.00	5.3	7.0	4393000
125	-0.043 -0.143	137.2	+0.25 +0.00	131.0	+0.25 +0.00	7.7	12.0	4233500
125	-0.043 -0.143	140.0	+0.25 +0.00	135.0	+0.25 +0.00	9.5	14.0	6619100‡
125	-0.043 -0.143	140.0	+0.25 +0.00	132.6	+0.25 +0.00	10.2	16.0	4784400
128	-0.043 -0.143	143.0	+0.25 +0.00	138.0	+0.25 +0.00	9.5	14.0	4581800
130	-0.043 -0.143	142.2	+0.25 +0.00	136.0	+0.25 +0.00	7.2	12.0	4304300
130	-0.043 -0.143	145.0	+0.25 +0.00	137.6	+0.25 +0.00	10.2	16.0	4784500
132	-0.043 -0.143	144.2	+0.25 +0.00	138.0	+0.25 +0.00	7.2	12.0	4269500
135	-0.043 -0.143	150.0	+0.25 +0.00	145.0	+0.25 +0.00	9.5	14.0	4278700
140	-0.043 -0.143	148.6	+0.25 +0.00	143.0	+0.25 +0.00	5.3	7.0	4763800
140	-0.043 -0.143	152.2	+0.25 +0.00	146.0	+0.25 +0.00	7.7	12.0	4324900
140	-0.043 -0.143	155.0	+0.25 +0.00	150.0	+0.25 +0.00	9.5	14.0	6619200‡
140	-0.043 -0.143	155.0	+0.25 +0.00	147.6	+0.25 +0.00	10.2	16.0	4784600



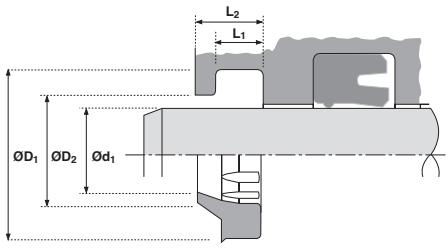
Ød1	TOL f9	ØD1	TOL H11	ØD2	TOL H11	L1 +0.2 - 0	L2	PART NUMBER
145	-0.043 -0.143	153.6	+0.25 +0.00	148.0	+0.25 +0.00	5.3	7.0	4732200
145	-0.043 -0.143	160.0	+0.25 +0.00	155.0	+0.25 +0.00	9.5	14.0	4560600
150	-0.043 -0.143	162.2	+0.25 +0.00	156.0	+0.25 +0.00	7.7	12.0	4278900
150	-0.043 -0.143	165.0	+0.25 +0.00	158.0	+0.25 +0.00	7.2	12.0	6668500
150	-0.043 -0.143	165.0	+0.25 +0.00	157.6	+0.25 +0.00	10.2	16.0	4342500
150	-0.043 -0.143	166.0	+0.25 +0.00	161.0	+0.25 +0.00	8.0	12.0	4336700
155	-0.043 -0.143	163.0	+0.25 +0.00	160.5	+0.25 +0.00	5.0	8.0	4290200
155	-0.043 -0.143	167.2	+0.25 +0.00	161.0	+0.25 +0.00	7.7	12.0	4288200
155	-0.043 -0.143	175.0	+0.25 +0.00	165.0	+0.25 +0.00	10.2	18.0	4226400
160	-0.043 -0.143	172.2	+0.25 +0.00	166.0	+0.25 +0.00	7.7	12.0	4405700
160	-0.043 -0.143	175.0	+0.25 +0.00	170.0	+0.25 +0.00	9.5	14.0	6619300‡
160	-0.043 -0.143	175.0	+0.25 +0.00	167.6	+0.25 +0.00	10.2	16.0	4454100
165	-0.043 -0.143	180.0	+0.25 +0.00	175.0	+0.25 +0.00	9.5	14.0	4537000
170	-0.043 -0.143	180.6	+0.29 +0.00	174.0	+0.25 +0.00	5.3	7.0	4732300
170	-0.043 -0.143	182.2	+0.29 +0.00	176.0	+0.25 +0.00	7.7	12.0	4233600
170	-0.043 -0.143	185.0	+0.29 +0.00	180.0	+0.25 +0.00	9.5	14.0	4745100
177	-0.043 -0.143	192.0	+0.29 +0.00	187.0	+0.29 +0.00	9.5	14.0	4287900
180	-0.043 -0.143	195.0	+0.29 +0.00	190.0	+0.29 +0.00	9.5	14.0	6619400‡
180	-0.043 -0.143	200.0	+0.29 +0.00	190.0	+0.29 +0.00	10.2	18.0	4460900
185	-0.050 -0.165	200.0	+0.29 +0.00	192.6	+0.29 +0.00	10.2	16.0	4777300
185	-0.050 -0.165	205.0	+0.29 +0.00	195.0	+0.29 +0.00	10.2	18.0	4776100
190	-0.050 -0.165	198.6	+0.29 +0.00	193.0	+0.29 +0.00	5.3	7.0	4771100
190	-0.050 -0.165	205.0	+0.29 +0.00	200.0	+0.29 +0.00	9.5	14.0	4753100



Ød1	TOL f9	ØD1	TOL H11	ØD2	TOL H11	L1 +0.2 - 0	L2	PART NUMBER
190	-0.050 -0.165	210.0	+0.29 +0.00	200.0	+0.29 +0.00	10.2	18.0	4781000
195	-0.050 -0.165	210.0	+0.29 +0.00	202.5	+0.29 +0.00	10.2	16.0	4325100
200	-0.050 -0.165	208.6	+0.29 +0.00	203.0	+0.29 +0.00	5.3	7.0	4391600
200	-0.050 -0.165	215.0	+0.29 +0.00	210.0	+0.29 +0.00	9.5	14.0	6619500‡
200	-0.050 -0.165	220.0	+0.29 +0.00	210.0	+0.29 +0.00	10.2	18.0	4387100
205	-0.050 -0.165	213.6	+0.29 +0.00	208.0	+0.29 +0.00	5.3	7.0	4773800
205	-0.050 -0.165	220.0	+0.29 +0.00	215.0	+0.29 +0.00	9.5	14.0	4560500
210	-0.050 -0.165	225.0	+0.29 +0.00	220.0	+0.29 +0.00	9.5	14.0	4598000
210	-0.050 -0.165	226.0	+0.29 +0.00	221.0	+0.29 +0.00	9.0	12.0	4336600
210	-0.050 -0.165	230.0	+0.29 +0.00	220.0	+0.29 +0.00	10.2	18.0	4325300
212	-0.050 -0.165	232.0	+0.29 +0.00	225.5	+0.29 +0.00	12.5	18.0	4293900
220	-0.050 -0.165	235.0	+0.29 +0.00	227.6	+0.29 +0.00	10.2	16.0	4325400
220	-0.050 -0.165	240.0	+0.29 +0.00	230.0	+0.29 +0.00	10.2	18.0	4799000
220	-0.050 -0.165	240.0	+0.29 +0.00	233.5	+0.29 +0.00	12.5	18.0	6619600‡
225	-0.050 -0.165	240.0	+0.29 +0.00	235.0	+0.29 +0.00	9.5	14.0	4287800
225	-0.050 -0.165	245.0	+0.29 +0.00	235.0	+0.29 +0.00	10.2	18.0	4325500
230	-0.050 -0.165	238.6	+0.29 +0.00	233.0	+0.29 +0.00	5.3	7.0	4514000
230	-0.050 -0.165	245.0	+0.29 +0.00	240.0	+0.29 +0.00	9.5	14.0	4767400
230	-0.050 -0.165	246.0	+0.29 +0.00	240.7	+0.29 +0.00	7.5	12.0	4290700
230	-0.050 -0.165	250.0	+0.29 +0.00	240.0	+0.29 +0.00	10.2	18.0	4325600
235	-0.050 -0.165	255.0	+0.32 +0.00	245.0	+0.29 +0.00	10.2	18.0	4325700
240	-0.050 -0.165	255.0	+0.32 +0.00	250.0	+0.29 +0.00	9.5	14.0	4745200
240	-0.050 -0.165	260.0	+0.32 +0.00	250.0	+0.29 +0.00	10.2	18.0	4520900



Ød1	TOL f9	ØD1	TOL H11	ØD2	TOL H11	L1 +0.2 - 0	L2	PART NUMBER
240	-0.050 -0.165	260.0	+0.32 +0.00	253.5	+0.29 +0.00	12.5	18.0	4787100
245	-0.050 -0.165	265.0	+0.32 +0.00	258.5	+0.32 +0.00	12.5	18.0	4539600
250	-0.050 -0.165	270.0	+0.32 +0.00	260.0	+0.32 +0.00	10.2	18.0	4460100
250	-0.050 -0.165	270.0	+0.32 +0.00	263.5	+0.32 +0.00	12.5	18.0	6619700‡
255	-0.056 -0.186	270.0	+0.32 +0.00	265.0	+0.32 +0.00	9.5	14.0	4578200
260	-0.056 -0.186	275.0	+0.32 +0.00	270.0	+0.32 +0.00	9.5	14.0	4573100
260	-0.056 -0.186	280.0	+0.32 +0.00	270.5	+0.32 +0.00	10.2	18.0	4325900
265	-0.056 -0.186	280.0	+0.32 +0.00	272.6	+0.32 +0.00	10.2	16.0	4762900
265	-0.056 -0.186	285.0	+0.32 +0.00	275.0	+0.32 +0.00	10.2	15.0	4560400
270	-0.056 -0.186	278.6	+0.32 +0.00	273.0	+0.32 +0.00	5.3	7.0	4391700
270	-0.056 -0.186	286.0	+0.32 +0.00	280.7	+0.32 +0.00	7.5	12.0	4786400
275	-0.056 -0.186	295.0	+0.32 +0.00	285.0	+0.32 +0.00	10.2	15.0	4807400
280	-0.056 -0.186	295.0	+0.32 +0.00	290.0	+0.32 +0.00	9.5	14.0	4716100
280	-0.056 -0.186	300.0	+0.32 +0.00	290.0	+0.32 +0.00	10.2	15.0	4763900
285	-0.056 -0.186	300.0	+0.32 +0.00	295.0	+0.32 +0.00	9.5	14.0	4767300
285	-0.056 -0.186	305.0	+0.32 +0.00	298.5	+0.32 +0.00	12.5	18.0	4537100
288	-0.056 -0.186	308.0	+0.32 +0.00	301.5	+0.32 +0.00	10.2	15.0	4265300
290	-0.056 -0.186	310.0	+0.32 +0.00	303.5	+0.32 +0.00	12.5	18.0	4467300
295	-0.056 -0.186	315.0	+0.32 +0.00	308.5	+0.32 +0.00	12.5	18.0	4598100
300	-0.056 -0.186	316.0	+0.36 +0.00	310.7	+0.32 +0.00	7.5	12.0	4290800
300	-0.056 -0.186	320.0	+0.36 +0.00	313.5	+0.32 +0.00	12.5	18.0	4525300
305	-0.056 -0.186	325.0	+0.36 +0.00	318.5	+0.36 +0.00	12.5	18.0	4473200
320	-0.062 -0.202	340.0	+0.36 +0.00	330.0	+0.36 +0.00	10.2	18.0	4454200



Ød ₁	TOL f ₉	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 - 0	L ₂	PART NUMBER
325	-0.062 -0.202	345.0	+0.36 +0.00	335.0	+0.36 +0.00	10.2	18.0	4801100
330	-0.062 -0.202	346.0	+0.36 +0.00	340.7	+0.36 +0.00	7.5	12.0	4587300
335	-0.062 -0.202	355.0	+0.36 +0.00	345.0	+0.36 +0.00	10.2	18.0	4776800
340	-0.062 -0.202	360.0	+0.36 +0.00	350.0	+0.36 +0.00	10.2	18.0	4732500
350	-0.062 -0.202	370.0	+0.36 +0.00	360.0	+0.36 +0.00	10.2	18.0	4717900
355	-0.062 -0.202	375.0	+0.36 +0.00	365.0	+0.36 +0.00	10.2	18.0	4578300
360	-0.062 -0.202	380.0	+0.36 +0.00	370.0	+0.36 +0.00	10.2	18.0	4781200
370	-0.062 -0.202	390.0	+0.36 +0.00	383.5	+0.36 +0.00	12.5	18.0	4579800
370	-0.062 -0.202	390.0	+0.36 +0.00	380.0	+0.36 +0.00	10.2	18.0	4763000
380	-0.062 -0.202	400.0	+0.36 +0.00	393.5	+0.36 +0.00	12.5	18.0	4752100
390	-0.062 -0.202	410.0	+0.40 +0.00	400.0	+0.36 +0.00	10.2	18.0	4851600
395	-0.062 -0.202	415.0	+0.40 +0.00	405.0	+0.40 +0.00	10.2	18.0	4807200
400	-0.062 -0.202	420.0	+0.40 +0.00	410.0	+0.40 +0.00	10.2	18.0	4769900
415	-0.068 -0.223	435.0	+0.40 +0.00	425.0	+0.40 +0.00	10.2	18.0	4820800
445	-0.068 -0.223	465.0	+0.40 +0.00	455.0	+0.40 +0.00	10.2	18.0	4838400
455	-0.068 -0.223	475.0	+0.40 +0.00	465.0	+0.40 +0.00	10.2	18.0	4777900
460	-0.068 -0.223	490.0	+0.40 +0.00	475.0	+0.40 +0.00	15.0	25.0	4849800
470	-0.068 -0.223	490.0	+0.40 +0.00	480.0	+0.40 +0.00	10.2	18.0	4814800

Design

The Hallite 50 is a double acting seal designed for light duty applications using either one piece or split pistons to ISO 6547 housings.

It comprises a rubber seal, two split support rings and two split bearings, located either side of the seal. The nitrile rubber seal has proved itself to be extremely wear resistant in service.

It is designed to be compressed by the housing to ensure a low pressure seal and when pressurised be protected from extrusion damage by the extending lips of the support ring. A tough flexible polymer is used for the support ring which is scarf cut for assembly and to protect the seal from damage.

A rectangular reinforced nylon bearing completes the assembly and provides the seal and piston with support and guidance.

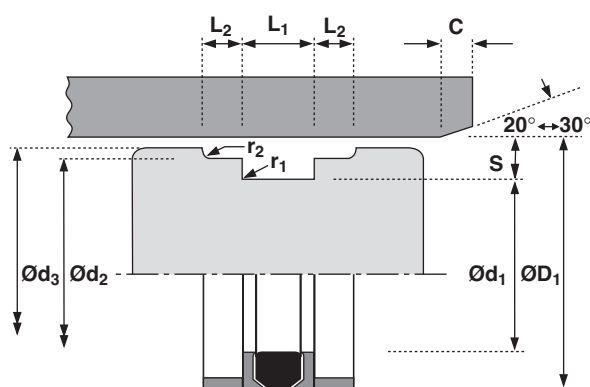
The proportions of this range of piston seals have been determined to give a satisfactory performance when used with the recommended operating conditions.

Note: Other sizes of this design of seal are shown under Hallite 53, 64 and 68.

NB: Part numbers suffixed by “‡” indicate housing sizes to meet ISO 6547.

Features

- Compact groove design
- Easy assembly
- Positive no drift seal



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	350 bar

Inch

1.5 ft/sec
-22°F +212°F
5000 p.s.i.

Surface roughness

	µmRa	µmRt
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max
Static Sealing Face Ød ₁ Ød ₂	1.6 max	10 max
Static Housing Faces Ød ₃ L ₁ L ₂	3.2 max	16 max

µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

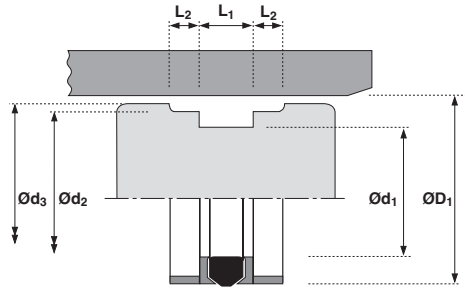
Chamfers & Radii

Groove Section ≤ S mm	4.0	5.0	7.5	10.0
Min Chamfer C mm	2.0	2.5	4.0	5.0
Max Fillet Rad r ₁ mm	0.4	0.4	0.4	0.4
Max Fillet Rad r ₂ mm	0.4	0.4	0.4	0.4

Tolerances

	ØD ₁	Ød ₁	Ød ₂	Ød ₃	L ₁	L ₂
mm	H10	h9	h9	h11	+0.35 +0.1	+0.1 -0





ØD ₁	TOL H10	Ød ₁	TOL h9	Ød ₂	TOL h9	Ød ₃	TOL h11	L ₁ + 0.35 + 0.1	L ₂ + 0.1 - 0	PART No.
25	+0.08 +0.00	17	+0.00 -0.04	22.0	+0.000 -0.052	24.0	+0.00 -0.13	10.0	4.0	6607810‡
32	+0.10 +0.00	24	+0.00 -0.05	29.0	+0.000 -0.052	31.0	+0.00 -0.16	10.0	4.0	6607910‡
40	+0.10 +0.00	32	+0.00 -0.06	37.0	+0.000 -0.062	39.0	+0.00 -0.16	10.0	4.0	6608010‡
50	+0.10 +0.00	40	+0.00 -0.06	47.0	+0.000 -0.062	49.0	+0.00 -0.16	12.5	4.0	6608110‡
63	+0.12 +0.00	53	+0.00 -0.07	60.0	+0.000 -0.074	62.0	+0.00 -0.19	12.5	4.0	2199513‡
80	+0.12 +0.00	65	+0.00 -0.07	76.0	+0.000 -0.074	78.5	+0.00 -0.19	20.0	5.0	6608210‡
100	+0.14 +0.00	85	+0.00 -0.09	96.0	+0.000 -0.087	98.5	+0.00 -0.22	20.0	5.0	6608310‡
125	+0.16 +0.00	105	+0.00 -0.09	120.0	+0.000 -0.087	123.0	+0.00 -0.25	25.0	6.3	6608410‡
140	+0.16 +0.00	120	+0.00 -0.09	135.0	+0.000 -0.087	138.0	+0.00 -0.25	25.0	6.3	2317030
160	+0.16 +0.00	140	+0.00 -0.10	155.0	+0.000 -0.100	158.0	+0.00 -0.25	25.0	6.3	6608510‡

Design

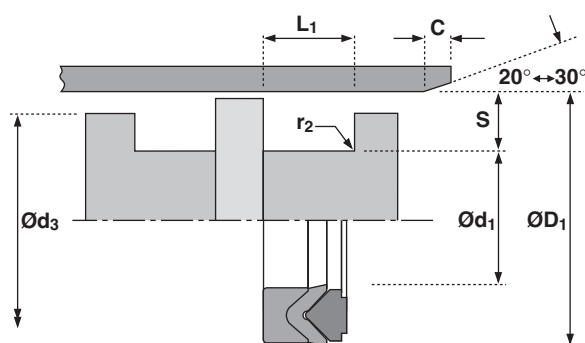
The Hallite 51 is a heavy duty piston seal which, when installed in pairs, provides an excellent double acting piston design. It is particularly suitable for difficult operating conditions such as pressure surging, vibration or some misalignment.

The seal is an assembly of three parts, a male adaptor, a V ring and a female adaptor. Both the V ring and the female adaptor are made from rubberised fabric which has durability and strength, it also retains lubricant at the sliding surfaces so friction and wear are kept to a minimum. The V ring being the primary seal is more flexible than the adaptor which supports it and prevents extrusion damage. At higher pressures the adaptor deforms and becomes a secondary seal.

The polyacetal male adaptor has grooves across the face to ensure pressure is evenly applied to the V ring.

Features

- Effective seal for extreme applications
- Precision moulded vee packs
- High load capability
- Pressure activating grooves



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	700 bar

Inch

1.5 ft/sec
-22°F +212°F
10,000 p.s.i.

Maximum extrusion gap

Pressure bar	160	250	400	700
Maximum Gap mm	0.35	0.3	0.2	0.1
Pressure p.s.i.	2400	3750	6000	10000

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø.

Surface roughness

Dynamic Sealing Face ØDd ₁
Static Sealing Face Ød ₁
Static Housing Faces L ₁

µmRa	µmRt	µinCLA	µinRMS
0.1 < > 0.4	4 max	4 < > 16	5 < > 18
1.6 max	10 max	63 max	70 max
3.2 max	16 max	125 max	140 max

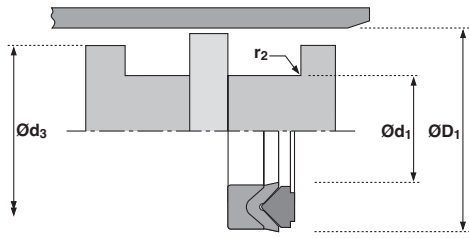
Chamfers & Radii

Groove Section ≤ S mm	7.5	10.0	12.5	15.0
Min Chamfer C mm	4.0	5.0	6.5	7.5
Max Fillet Rad r ₁ mm	0.8	1.2	1.6	1.6

Tolerances

mm	ØD ₁	Ød ₁	Ød ₃	L ₁
	H9	h11	+0 -0.3	+0.25 -0





ØD ₁	TOL H9	Ød ₁	TOL h11	Ød ₃ +0 -0.3	L ₁ +0.25 -0	PART No.
30	+0.05 +0.00	20	+0.00 -0.13	29.0	9.30	4208310
40	+0.06 +0.00	25	+0.00 -0.13	39.0	11.50	4208010
50	+0.06 +0.00	35	+0.00 -0.16	49.0	11.50	4207610
55	+0.07 +0.00	40	+0.00 -0.16	54.0	11.50	4207110
60	+0.07 +0.00	45	+0.00 -0.16	59.0	11.50	4207210
63	+0.07 +0.00	48	+0.00 -0.16	62.0	13.00	4207410
70	+0.07 +0.00	50	+0.00 -0.16	68.5	15.20	4208210
80	+0.07 +0.00	60	+0.00 -0.19	78.5	15.20	4208110
90	+0.09 +0.00	70	+0.00 -0.19	88.5	21.20	4207710
100	+0.09 +0.00	80	+0.00 -0.19	98.5	21.20	4207510
110	+0.09 +0.00	90	+0.00 -0.22	108.5	21.20	4207910

ØD ₁	TOL H9	Ød ₁	TOL h11	Ød ₃ +0 -0.3	L ₁ +0.25 -0	PART No.
125	+0.10 +0.00	100	+0.00 -0.22	123.5	25.80	4207810
140	+0.10 +0.00	115	+0.00 -0.22	138.5	25.80	4208410
150	+0.10 +0.00	120	+0.00 -0.22	148.0	29.00	4208510
160	+0.10 +0.00	130	+0.00 -0.25	158.0	29.00	4208710
180	+0.10 +0.00	150	+0.00 -0.25	178.0	31.50	4208610
200	+0.12 +0.00	170	+0.00 -0.25	198.0	33.50	4209010
225	+0.12 +0.00	195	+0.00 -0.29	223.0	33.50	6582110
250	+0.12 +0.00	220	+0.00 -0.29	248.0	33.50	6582310
275	+0.13 +0.00	245	+0.00 -0.29	273.0	33.50	6582410
300	+0.13 +0.00	270	+0.00 -0.32	298.0	33.50	6582510
320	+0.14 +0.00	290	+0.00 -0.36	318.0	33.50	6582610

Design

The Hallite 52 is a two piece piston seal for heavy duty applications which, when installed in pairs, provides an excellent double-acting piston design. It is suitable for difficult operating conditions such as pressure surging, vibration or some misalignment.

Both parts are manufactured from rubberised fabric which gives strength and durability and retains lubrication to keep friction low and reduce wear.

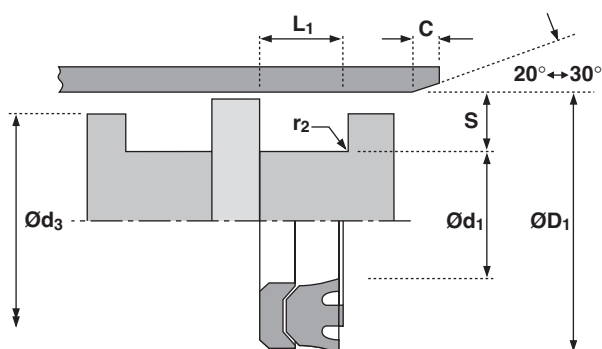
By extending the centre of the seal past the sealing edges, they are protected from damage should inter-seal pressure force the seal against the housing wall. Grooves across the protruding face allow pressure to reach both sealing edges.

The support ring is manufactured from a hard rubberised fabric to protect the seal from extrusion damage. The 'U' shape of the ring provides a secondary seal as pressure deforms the lips to increase the sealing area.

NB: Part numbers suffixed by "±" indicate housing sizes to meet ISO 5597.

Features

- Effective seal for extreme applications
- Precision moulded vee packs
- High load capability
- Pressure activating grooves



Technical details

Operating conditions

Maximum Speed	0.8 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	600 bar

Inch

2.4 ft/sec
-22°F +212°F
9000 p.s.i.

Maximum extrusion gap

	160	250	400	600
Pressure bar				
Maximum Gap mm	0.35	0.3	0.2	0.1
Pressure p.s.i.	2400	3750	6000	9000

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

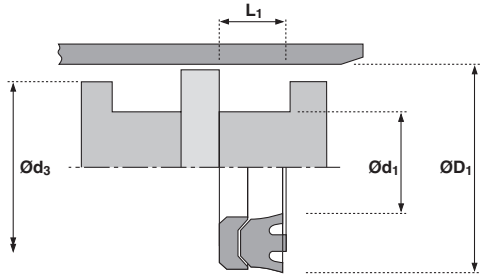
Chamfers & Radii

Groove Section ≤ S mm	5.0	7.5	10.0	12.5	15.0
Min Chamfer C mm	2.5	4.0	5.0	6.5	7.5
Max Fillet Rad r ₁ mm	0.8	0.8	0.8	1.2	1.6

Tolerances

	ØD ₁	Ød ₁	Ød ₃	L ₁
mm	H9	h11	+0 -0.3	+0.3 -0





ØD ₁	TOL H9	Ød ₁	TOL h11	Ød ₃ +0 -0.3	L ₁ +0.3 -0	PART No.
25	+0.05 +0.00	15	+0.00 -0.11	24.0	6.30	6619810‡
32	+0.06 +0.00	20	+0.00 -0.13	31.0	7.80	1791610
32	+0.06 +0.00	22	+0.00 -0.13	31.0	6.30	6619910‡
40	+0.06 +0.00	25	+0.00 -0.13	39.0	10.00	2149810
40	+0.06 +0.00	30	+0.00 -0.13	39.0	6.30	6620010‡
45	+0.06 +0.00	30	+0.00 -0.13	44.0	10.00	2150010
50	+0.06 +0.00	35	+0.00 -0.16	49.0	9.50	2150210‡
55	+0.07 +0.00	40	+0.00 -0.16	54.0	10.00	2150410
60	+0.07 +0.00	45	+0.00 -0.16	59.0	10.00	2150610
63	+0.07 +0.00	48	+0.00 -0.16	62.0	9.50	2150810‡
70	+0.07 +0.00	50	+0.00 -0.16	68.5	13.00	2151010
80	+0.07 +0.00	60	+0.00 -0.19	78.5	12.50	2151210‡
90	+0.09 +0.00	70	+0.00 -0.19	88.5	13.00	2151410

ØD ₁	TOL H9	Ød ₁	TOL h11	Ød ₃ +0 -0.3	L ₁ +0.3 -0	PART No.
100	+0.09 +0.00	80	+0.00 -0.19	98.5	12.50	2151610‡
110	+0.09 +0.00	90	+0.00 -0.22	108.5	13.00	2151810
125	+0.10 +0.00	100	+0.00 -0.22	123.5	16.00	2152010‡
140	+0.10 +0.00	115	+0.00 -0.22	138.5	16.20	2152210
160	+0.10 +0.00	130	+0.00 -0.25	158.0	19.80	2152410
160	+0.10 +0.00	135	+0.00 -0.25	158.0	16.00	6620110‡
180	+0.10 +0.00	150	+0.00 -0.25	178.0	19.80	2152610
200	+0.12 +0.00	170	+0.00 -0.25	198.0	20.00	2152810‡
225	+0.12 +0.00	195	+0.00 -0.29	223.0	19.80	2197010
250	+0.12 +0.00	220	+0.00 -0.29	248.0	20.00	2197210‡
275	+0.13 +0.00	245	+0.00 -0.29	273.0	19.80	2197410
300	+0.13 +0.00	270	+0.00 -0.32	298.0	19.80	2188310

Design

A robust assembly designed specifically for one piece pistons, the Hallite 53 double acting seal uses a rubber sealing element which has proved itself in service to be extremely wear resistant and capable of working most effectively in a wide variety of medium duty applications. The seal is also suitable for two piece pistons.

The assembly comprises a rubber seal, two split support rings and two split bearings, one of each located either side of the seal.

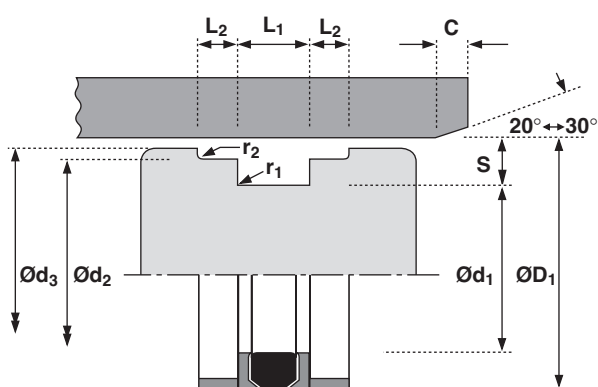
The nitrile rubber seal is designed to have its section compressed by the housing, to ensure a low pressure seal and, when pressurised, be protected from extrusion damage by the extending lips of the support ring. The support ring is manufactured from a tough flexible polymer and scarf cut for assembly.

The proportions of the range have been determined to give a satisfactory performance when used with the recommended operating conditions.

Note: Other sizes of this design are shown under Hallite 50, 64 and 68. Also see Hallite 753 for interchangeable sizes.

Features

- Well proven design
- Long life



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	500 bar

Inch

1.5 ft/sec
-22°F +212°F
7500 p.s.i.

Surface roughness

Dynamic Sealing Face Ød ₁	0.1 < > 0.4
Static Sealing Face Ød ₁ Ød ₂	1.6 max
Static Housing Faces Ød ₃ L ₁ L ₂	3.2 max

µmRa

0.1 < > 0.4
1.6 max
3.2 max

µmRt

4 max
10 max
16 max

µinCLA

4 < > 16
63 max
125 max

µinRMS

5 < > 18
70 max
140 max

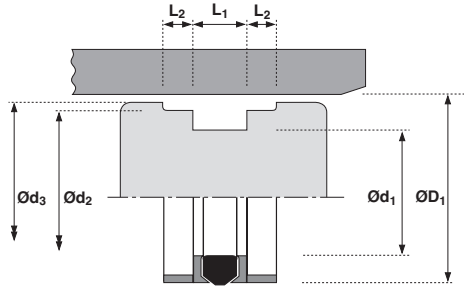
Chamfers & Radii

Groove Section ≤ S mm	5.0	7.5	8.0	10.0	12.5	15.0
Min Chamfer C mm	2.4	4.0	5.0	5.0	6.5	7.5
Max Fillet Rad r ₁ mm	0.4	0.4	0.4	0.4	0.8	0.8
Max Fillet Rad r ₂ mm	0.4	0.4	0.4	0.4	0.8	0.8
Groove Section ≤ S in	0.312	0.375	0.500			
Min Chamfer C in	0.156	0.187	0.217			
Max Fillet Rad r ₁ in	0.016	0.016	0.032			
Max Fillet Rad r ₂ in	0.016	0.016	0.032			

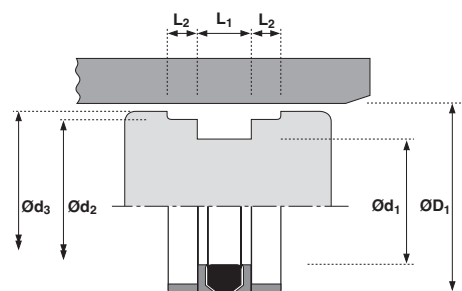
Tolerances

	ØD ₁	Ød ₁	Ød ₂	Ød ₃	L ₁	L ₂
mm	H11	h10	f9	h11	+0.4 +0.15	+0.1 -0
in	H11	h10	f9	h11	+0.016 +0.005	+0.004 -0

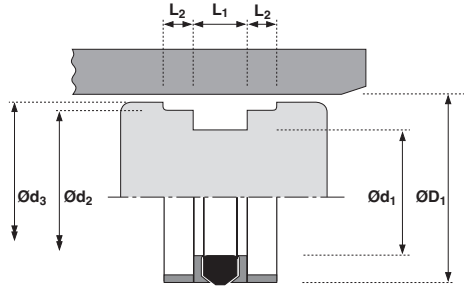




ØD ₁	TOL H11	Ød ₁	TOL h10	Ød ₂	TOL f9	Ød ₃	TOL h11	L ₁ + 0.4 + 0.15	L ₂ + 0.1 - 0	PART No.
25	+0.13 +0.00	17	+0.00 -0.07	22.1	-0.020 -0.072	24.0	+0.00 -0.13	8.0	4.00	2249212
32	+0.16 +0.00	22	+0.00 -0.08	28.5	-0.020 -0.072	31.0	+0.00 -0.16	10.0	5.00	2249312
40	+0.16 +0.00	30	+0.00 -0.08	36.5	-0.025 -0.087	39.0	+0.00 -0.16	10.0	5.00	2249412
45	+0.16 +0.00	35	+0.00 -0.10	40.4	-0.025 -0.087	44.0	+0.00 -0.16	16.4	6.35	2199411
50	+0.16 +0.00	34	+0.00 -0.10	45.4	-0.025 -0.087	49.0	+0.00 -0.16	18.0	6.35	0209912
50	+0.16 +0.00	35	+0.00 -0.10	46.0	-0.025 -0.087	49.0	+0.00 -0.16	15.0	7.5	0074012
55	+0.19 +0.00	39	+0.00 -0.10	50.4	-0.030 -0.104	54.0	+0.00 -0.19	18.0	6.35	1352212
60	+0.19 +0.00	44	+0.00 -0.10	55.4	-0.030 -0.104	58.5	+0.00 -0.19	18.0	6.35	1361412
63	+0.19 +0.00	47	+0.00 -0.10	58.4	-0.030 -0.104	61.5	+0.00 -0.19	19.0	6.35	0209712
65	+0.19 +0.00	50	+0.00 -0.10	60.4	-0.030 -0.104	63.5	+0.00 -0.19	18.0	6.35	1350512
70	+0.19 +0.00	50	+0.00 -0.10	64.0	-0.030 -0.104	68.0	+0.00 -0.19	22.0	10.00	0075112
70	+0.19 +0.00	50	+0.00 -0.10	64.2	-0.030 -0.104	68.0	+0.00 -0.19	22.0	6.35	0075122
75	+0.19 +0.00	55	+0.00 -0.12	69.0	-0.030 -0.104	73.0	+0.00 -0.19	22.0	10.00	0075612
75	+0.19 +0.00	55	+0.00 -0.12	69.2	-0.030 -0.104	73.0	+0.00 -0.19	22.0	6.35	0075622
80	+0.19 +0.00	60	+0.00 -0.12	74.0	-0.030 -0.104	78.0	+0.00 -0.19	22.0	10.00	0073812
80	+0.19 +0.00	60	+0.00 -0.12	74.2	-0.030 -0.104	78.0	+0.00 -0.19	22.0	6.35	0073822
85	+0.22 +0.00	65	+0.00 -0.12	79.2	-0.030 -0.104	83.0	+0.00 -0.22	22.0	6.35	0075722
90	+0.22 +0.00	70	+0.00 -0.12	84.0	-0.036 -0.123	88.0	+0.00 -0.22	22.0	10.00	0075812
90	+0.22 +0.00	70	+0.00 -0.12	84.2	-0.036 -0.123	88.0	+0.00 -0.22	22.0	6.35	0075822
95	+0.22 +0.00	75	+0.00 -0.12	89.2	-0.036 -0.123	93.0	+0.00 -0.22	22.0	6.35	1352512
100	+0.22 +0.00	75	+0.00 -0.12	93.2	-0.036 -0.123	98.0	+0.00 -0.22	22.0	6.35	0073712
100	+0.22 +0.00	80	+0.00 -0.12	94.0	-0.036 -0.123	98.0	+0.00 -0.22	22.0	10.00	0083612
105	+0.22 +0.00	80	+0.00 -0.12	98.1	-0.036 -0.123	103.0	+0.00 -0.22	22.0	6.35	1352812
110	+0.22 +0.00	85	+0.00 -0.14	103.1	-0.036 -0.123	108.0	+0.00 -0.22	22.0	6.35	0091113



ØD ₁	TOL H11	Ød ₁	TOL h10	Ød ₂	TOL f9	Ød ₃	TOL h11	L ₁ + 0.4 + 0.15	L ₂ + 0.1 - 0	PART No.
115	+0.22 +0.00	90	+0.00 -0.14	108.1	-0.036 -0.123	113.0	+0.00 -0.22	22.0	6.35	0084222
120	+0.22 +0.00	95	+0.00 -0.14	113.1	-0.036 -0.123	118.0	+0.00 -0.22	22.0	6.35	0090012
125	+0.25 +0.00	100	+0.00 -0.14	118.1	-0.036 -0.123	123.0	+0.00 -0.25	25.0	6.35	0087522
130	+0.25 +0.00	105	+0.00 -0.14	122.6	-0.043 -0.143	128.0	+0.00 -0.25	25.0	9.52	0089622
135	+0.25 +0.00	110	+0.00 -0.14	127.6	-0.043 -0.143	133.0	+0.00 -0.25	25.0	9.52	0091222
135	+0.25 +0.00	110	+0.00 -0.14	128.0	-0.043 -0.143	133.0	+0.00 -0.25	25.0	12.70	0091212
140	+0.25 +0.00	115	+0.00 -0.14	132.6	-0.043 -0.143	138.0	+0.00 -0.25	25.0	6.35	0091032
140	+0.25 +0.00	115	+0.00 -0.14	132.6	-0.043 -0.143	138.0	+0.00 -0.25	25.0	9.52	0091022
145	+0.25 +0.00	120	+0.00 -0.14	137.6	-0.043 -0.143	143.0	+0.00 -0.25	25.0	9.52	0091422
150	+0.25 +0.00	125	+0.00 -0.16	142.6	-0.043 -0.143	148.0	+0.00 -0.25	25.0	9.52	0091522
150	+0.25 +0.00	125	+0.00 -0.16	143.0	-0.043 -0.143	148.0	+0.00 -0.25	25.0	12.70	0091512
155	+0.25 +0.00	130	+0.00 -0.16	147.6	-0.043 -0.143	153.0	+0.00 -0.25	25.0	9.52	0091622
160	+0.25 +0.00	135	+0.00 -0.16	152.6	-0.043 -0.143	158.0	+0.00 -0.25	25.0	9.52	0089922
165	+0.25 +0.00	140	+0.00 -0.16	158.0	-0.043 -0.143	163.0	+0.00 -0.25	25.0	12.70	1257612
170	+0.25 +0.00	145	+0.00 -0.16	161.7	-0.043 -0.143	168.0	+0.00 -0.25	25.0	12.70	0088012
175	+0.25 +0.00	150	+0.00 -0.16	166.7	-0.043 -0.143	173.0	+0.00 -0.25	25.0	12.70	1260712
180	+0.25 +0.00	155	+0.00 -0.16	171.7	-0.043 -0.143	178.0	+0.00 -0.25	25.0	12.70	0091712
190	+0.29 +0.00	165	+0.00 -0.16	181.7	-0.050 -0.165	188.0	+0.00 -0.29	25.0	12.70	1270012
195	+0.29 +0.00	170	+0.00 -0.16	186.7	-0.050 -0.165	193.0	+0.00 -0.29	25.0	12.70	1265412
200	+0.29 +0.00	170	+0.00 -0.16	192.0	-0.050 -0.165	197.0	+0.00 -0.29	30.0	15.00	1270112
200	+0.29 +0.00	175	+0.00 -0.16	191.6	-0.050 -0.165	198.0	+0.00 -0.29	25.0	12.70	0089712
220	+0.29 +0.00	190	+0.00 -0.19	212.0	-0.050 -0.165	217.0	+0.00 -0.29	30.0	15.00	1714810
250	+0.29 +0.00	220	+0.00 -0.19	242.0	-0.050 -0.165	247.0	+0.00 -0.29	30.0	15.00	1264312
280	+0.29 +0.00	250	+0.00 -0.19	272.0	-0.056 -0.186	277.0	+0.00 -0.32	30.0	15.00	1261712



ØD ₁	TOL H11	Ød ₁	TOL h10	Ød ₂	TOL f9	Ød ₃	TOL h11	L ₁ +0.016 +0.005	L ₂ +0.004 -0	PART No.
2.000	+0.007 +0.000	1.375	+0.000 -0.004	1.821	-0.001 -0.003	1.950	+0.000 -0.007	0.750	0.250	6593410
2.250	+0.007 +0.000	1.625	+0.000 -0.004	2.071	-0.001 -0.004	2.200	+0.000 -0.007	0.750	0.250	6593510
2.500	+0.007 +0.000	1.875	+0.000 -0.004	2.321	-0.001 -0.004	2.450	+0.000 -0.007	0.750	0.250	6593610
2.750	+0.007 +0.000	2.000	+0.000 -0.005	2.524	-0.001 -0.004	2.690	+0.000 -0.007	0.937	0.250	6593710
3.000	+0.007 +0.000	2.250	+0.000 -0.005	2.774	-0.001 -0.004	2.940	+0.000 -0.007	0.937	0.250	1377612
3.250	+0.009 +0.000	2.500	+0.000 -0.005	3.023	-0.001 -0.004	3.190	+0.000 -0.009	0.937	0.250	6593910
3.500	+0.009 +0.000	2.750	+0.000 -0.005	3.274	-0.001 -0.005	3.440	+0.000 -0.009	0.937	0.250	0082412
3.750	+0.009 +0.000	3.000	+0.000 -0.006	3.524	-0.001 -0.005	3.690	+0.000 -0.009	0.937	0.250	2361010
4.000	+0.009 +0.000	3.250	+0.000 -0.006	3.773	-0.001 -0.005	3.940	+0.000 -0.009	0.937	0.250	0082313
4.250	+0.009 +0.000	3.500	+0.000 -0.006	4.024	-0.001 -0.005	4.187	+0.000 -0.009	0.937	0.250	0082211
4.500	+0.009 +0.000	3.500	+0.000 -0.006	4.232	-0.001 -0.005	4.428	+0.000 -0.009	1.250	0.250	6594210
4.750	+0.010 +0.000	3.750	+0.000 -0.006	4.463	-0.001 -0.005	4.660	+0.000 -0.010	1.250	0.375	2360910
5.000	+0.010 +0.000	4.000	+0.000 -0.006	4.712	-0.001 -0.005	4.910	+0.000 -0.010	1.250	0.375	6594310
5.500	+0.010 +0.000	4.500	+0.000 -0.006	5.213	-0.002 -0.006	5.410	+0.000 -0.010	1.250	0.375	6594410
6.000	+0.010 +0.000	5.000	+0.000 -0.006	5.713	-0.002 -0.006	5.910	+0.000 -0.010	1.250	0.375	6594510

Design

The Hallite 54 double acting piston seal provides the designer with a compact, low friction seal for light to medium duty hydraulic cylinders.

It comprises a PTFE ring, strengthened with additives to resist creep, which is pre-loaded by an O ring to be effective for the operating pressure range recommended. As the pressure rises the O ring deforms and compresses the PTFE ring against the tube wall increasing the sealing force and the effectiveness of the seal. As only the PTFE ring is in contact with the sliding surface, friction is very low and stick-slip movement is eliminated.

The housing width allows the designer to use a narrow width piston, but it is recommended an adequate bearing is mounted either side of the seal as shown.*

A number of material options can be provided to extend operating conditions. Please ensure that the correct part number is specified for the material option as indicated.

The Hallite 54 seal is not recommended for applications where it is necessary for the pressurised cylinder to maintain the load in a set position.

*See Hallite 87 and 506 wear ring data sheets.

NB: Part numbers suffixed by “±” indicate housing sizes to meet ISO 7425-1.

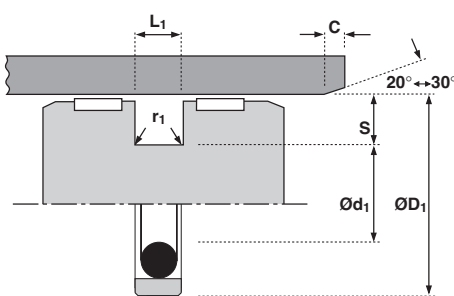
Note: Technical details shown are for 15% Glass/PTFE and NBR energiser. Technical details for material options should be requested from Hallite Seals.

Features

- Low stick / slip
- Low break out & running friction
- High maximum speed
- Compact piston design
- Seal ring component can be machined to any size

Material

Face Material - O Ring	
Standard material	
15% Glass/PTFE – NBR	10
Material options:	
15% Glass/PTFE – FKM	11
Bronze/PTFE – NBR	20
Bronze/PTFE – FKM	21



Technical details

Operating conditions

Maximum Speed	4.0 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	350 bar

Inch

12.0 ft/sec
-22°F +212°F
5000 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	100	160	250	350
Maximum Gap mm	0.60	0.50	0.45	0.35
Pressure p.s.i.	1500	2400	3750	5250
Maximum Gap in	0.024	0.020	0.018	0.014

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

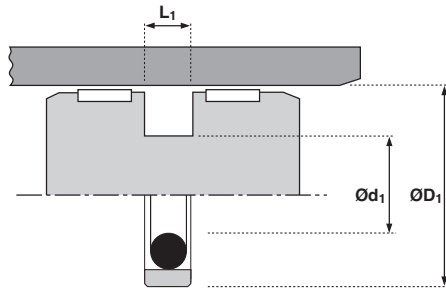
Chamfers & Radii

Groove Section ≤ S mm	3.75	5.50	7.75	10.50	12.25
Min Chamfer C mm	2.00	2.50	5.00	7.50	10.00
Max Fillet Rad r ₁ mm	0.40	0.80	1.20	1.60	2.00
Groove Section ≤ S in	0.147	0.216	0.305	0.413	0.483
Min Chamfer C in	0.093	0.125	0.156	0.187	0.305
Max Fillet Rad r ₁ in	0.016	0.016	0.032	0.032	0.032

Tolerances

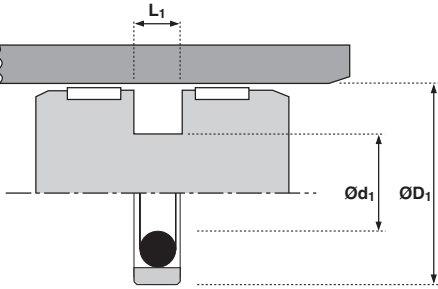
	ØD ₁	Ød ₁	L ₁
mm	H9	h9	+0.2 -0
in	H9	h9	+0.008 -0





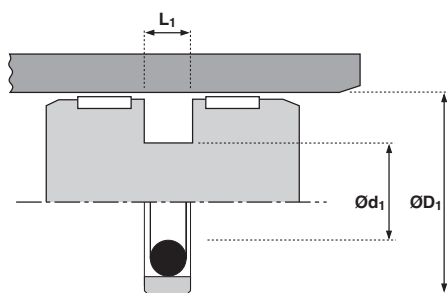
ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
12	+0.04 +0.00	7.1	+0.000 -0.036	2.20	66239_ _
15	+0.04 +0.00	7.5	+0.000 -0.036	3.20	86163_ _
16	+0.04 +0.00	8.5	+0.000 -0.036	3.20	66240_ _ ‡
20	+0.05 +0.00	12.5	+0.000 -0.043	3.20	66241_ _ ‡
24	+0.05 +0.00	16.5	+0.000 -0.043	3.20	66154_ _
25	+0.05 +0.00	17.5	+0.000 -0.043	3.20	66242_ _ ‡
30	+0.05 +0.00	22.5	+0.000 -0.052	3.20	65968_ _
32	+0.06 +0.00	24.5	+0.000 -0.052	3.20	65969_ _ ‡
35	+0.06 +0.00	27.5	+0.000 -0.052	3.20	65970_ _
38	+0.06 +0.00	30.5	+0.000 -0.062	3.20	66475_ _
40	+0.06 +0.00	29.0	+0.000 -0.062	4.20	65971_ _ ‡
42	+0.06 +0.00	31.0	+0.000 -0.062	4.20	65972_ _
45	+0.06 +0.00	34.0	+0.000 -0.062	4.20	65973_ _
50	+0.06 +0.00	39.0	+0.000 -0.062	4.20	65974_ _ ‡
55	+0.07 +0.00	44.0	+0.000 -0.062	4.20	65975_ _
60	+0.07 +0.00	49.0	+0.000 -0.062	4.20	65976_ _
63	+0.07 +0.00	52.0	+0.000 -0.074	4.20	66243_ _ ‡
65	+0.07 +0.00	54.0	+0.000 -0.074	4.20	86118_ _
70	+0.07 +0.00	59.0	+0.000 -0.074	4.20	65977_ _
75	+0.07 +0.00	64.0	+0.000 -0.074	4.20	66244_ _
80	+0.07 +0.00	64.5	+0.000 -0.074	6.30	65978_ _ ‡
90	+0.09 +0.00	74.5	+0.000 -0.074	6.30	65979_ _
95	+0.09 +0.00	79.5	+0.000 -0.074	6.30	86084_ _

ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
100	+0.09 +0.00	84.5	+0.000 -0.087	6.30	65980_ _ ‡
110	+0.09 +0.00	94.5	+0.000 -0.087	6.30	65981_ _
115	+0.09 +0.00	99.5	+0.000 -0.087	6.30	65982_ _
120	+0.09 +0.00	104.5	+0.000 -0.087	6.30	66361_ _
125	+0.10 +0.00	109.5	+0.000 -0.087	6.30	65983_ _ ‡
130	+0.10 +0.00	114.5	+0.000 -0.087	6.30	66476_ _
135	+0.10 +0.00	114.0	+0.000 -0.087	8.10	66477_ _
140	+0.10 +0.00	119.0	-0.000 -0.087	8.10	65984_ _
145	+0.10 +0.00	124.0	+0.000 -0.100	8.10	86080_ _
150	+0.10 +0.00	129.0	+0.000 -0.100	8.10	65985_ _
155	+0.10 +0.00	134.0	+0.000 -0.100	8.10	86177_ _
160	+0.10 +0.00	139.0	+0.000 -0.100	8.10	65986_ _ ‡
165	+0.10 +0.00	144.0	+0.000 -0.100	8.10	66491_ _
170	+0.10 +0.00	149.0	+0.000 -0.100	8.10	65987_ _
180	+0.10 +0.00	159.0	+0.000 -0.100	8.10	65988_ _
185	+0.12 +0.00	164.0	+0.000 -0.100	8.10	66478_ _
190	+0.12 +0.00	169.0	+0.000 -0.100	8.10	65989_ _
200	+0.12 +0.00	179.0	+0.000 -0.100	8.10	65990_ _ ‡
210	+0.12 +0.00	189.0	+0.000 -0.115	8.10	86146_ _
220	+0.12 +0.00	199.0	+0.000 -0.115	8.10	66245_ _
225	+0.12 +0.00	204.0	+0.000 -0.115	8.10	66246_ _
230	+0.12 +0.00	209.0	+0.000 -0.115	8.10	66247_ _
240	+0.12 +0.00	219.0	+0.000 -0.115	8.10	86154_ _



ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
250	+0.12 +0.00	229.0	+0.000 -0.115	8.10	66401_ _ ‡
260	+0.13 +0.00	239.0	+0.000 -0.115	8.10	66479_ _
280	+0.13 +0.00	259.0	+0.000 -0.130	8.10	66402_ _
300	+0.13 +0.00	279.0	+0.000 -0.130	8.10	66403_ _
310	+0.13 +0.00	289.0	+0.000 -0.130	8.10	66480_ _
320	+0.14 +0.00	299.0	+0.000 -0.130	8.10	86086_ _ ‡
330	+0.14 +0.00	305.5	+0.000 -0.130	8.10	86081_ _

ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
340	+0.14 +0.00	315.5	+0.000 -0.140	8.10	66481_ _
350	+0.14 +0.00	325.5	+0.000 -0.140	8.10	86155_ _
360	+0.14 +0.00	335.5	+0.000 -0.140	8.10	86218_ _
370	+0.14 +0.00	345.5	+0.000 -0.140	8.10	86219_ _
380	+0.14 +0.00	355.5	+0.000 -0.140	8.10	86220_ _
390	+0.14 +0.00	365.5	+0.000 -0.140	8.10	86221_ _
400	+0.14 +0.00	375.5	+0.000 -0.140	8.10	66482_ _ ‡



$\varnothing D_1$	TOL H9	$\varnothing d_1$	TOL h9	L_1 +0.008 -0	PART No.
1.000	+0.002 +0.000	0.704	-0.0000 -0.0016	0.125	66248_ _
1.500	+0.002 +0.000	1.204	-0.0000 -0.0025	0.125	66249_ _
2.000	+0.003 +0.000	1.568	-0.0000 -0.0025	0.165	66250_ _
2.500	+0.003 +0.000	2.068	-0.0000 -0.0030	0.165	66251_ _
3.000	+0.003 +0.000	2.568	-0.0000 -0.0030	0.165	66252_ _
3.250	+0.003 +0.000	2.640	-0.0000 -0.0036	0.250	66253_ _
3.500	+0.003 +0.000	2.890	-0.0000 -0.0036	0.250	66254_ _

$\varnothing D_1$	TOL H9	$\varnothing d_1$	TOL h9	L_1 +0.008 -0	PART No.
4.000	+0.003 +0.000	3.390	-0.0000 -0.0035	0.250	66255_ _
4.500	+0.003 +0.000	3.890	-0.0000 -0.0035	0.250	66256_ _
5.000	+0.004 +0.000	4.390	-0.0000 -0.0035	0.250	66257_ _
6.000	+0.004 +0.000	5.174	-0.0000 -0.0040	0.320	66258_ _
7.000	+0.004 +0.000	6.174	-0.0000 -0.0040	0.320	66259_ _
8.000	+0.004 +0.000	7.174	-0.0000 -0.0045	0.320	66260_ _

Design

A medium to heavy duty double acting seal, the Hallite 56 has shown itself over many years to be an effective and robust piston seal in a wide variety of applications. Designed for split pistons it offers the benefits in terms of sealing efficiency and low friction gained from rubber/fabric and a specific proportion of rubber in contact with the cylinder surface.

The centre of the seal is rubber which is bonded to two 'U' section bases of rubberised fabric, and is compressed by the housing to obtain an effective low pressure seal. When the pressure increases the rubber energises the 'U' section and deforms it to the housing, increasing the sealing area and improving the seal.

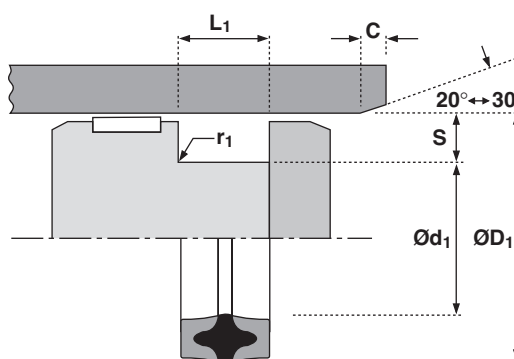
Rubberised fabric is used to protect the rubber because it has strength and durability which combines with its ability to retain lubricant, to help keep friction low and reduce wear.

The proportions of the range have been determined to give a satisfactory performance when used with the recommended operating conditions.

Many other sizes are available outside this range.

Features

- Well proven design
- Tolerant to contamination
- Wide range of non standard sizes



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	500 bar

Inch

1.5 ft/sec
-22°F +212°F
7500 p.s.i.

Maximum extrusion gap

	160	250	400	500
Pressure bar				
Maximum Gap mm	0.35	0.3	0.2	0.1
Pressure p.s.i.	2400	3750	6000	7500
Maximum Gap in	0.016	0.012	0.008	0.004

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

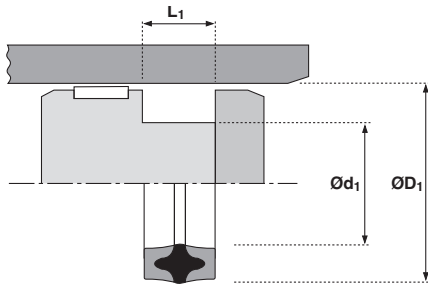
Chamfers & Radii

Groove Section ≤ S mm	5.0	7.5	8.0	10.0	12.5
Min Chamfer C mm	2.4	4.0	5.0	5.0	6.5
Max Fillet Rad r ₁ mm	0.4	0.8	0.8	1.2	1.6
Groove Section ≤ S in	0.250	0.312	0.375	0.500	0.625
Min Chamfer C in	0.125	0.156	0.187	0.217	0.250
Max Fillet Rad r ₁ in	0.016	0.016	0.032	0.032	0.047

Tolerances

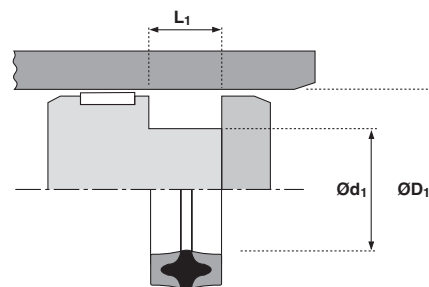
	ØD ₁	Ød ₁	L ₁
mm	H11	js11	+0.25 +0
in	H11	js11	+0.030 +0.020





ØD ₁	TOL H11	Ød ₁	TOL js11	L ₁ +0.25 -0	PART No.
30	+0.13 +0.00	20	+0.07 -0.07	12.5	0200540
40	+0.16 +0.00	25	+0.07 -0.07	19.0	0472840
50	+0.16 +0.00	35	+0.08 -0.08	19.0	0474640
55	+0.19 +0.00	40	+0.08 -0.08	19.0	0475040
60	+0.19 +0.00	40	+0.08 -0.08	25.0	0282040
60	+0.19 +0.00	45	+0.08 -0.08	19.0	0979440
63	+0.19 +0.00	43	+0.08 -0.08	25.0	0646740
65	+0.19 +0.00	50	+0.08 -0.08	19.0	0383840
70	+0.19 +0.00	50	+0.08 -0.08	25.0	0294640
75	+0.19 +0.00	55	+0.10 -0.10	25.0	0818640
80	+0.19 +0.00	60	+0.10 -0.10	25.0	0294940
85	+0.22 +0.00	65	+0.10 -0.10	25.0	0388640
90	+0.22 +0.00	70	+0.10 -0.10	25.0	0296040
100	+0.22 +0.00	80	+0.10 -0.10	25.0	0295140
110	+0.22 +0.00	90	+0.11 -0.11	25.0	0712440
120	+0.22 +0.00	100	+0.11 -0.11	25.0	0296140
125	+0.25 +0.00	100	+0.11 -0.11	19.0	1007440
125	+0.25 +0.00	100	+0.11 -0.11	32.0	0418640
140	+0.25 +0.00	120	+0.11 -0.11	25.0	0250540
150	+0.25 +0.00	120	+0.11 -0.11	38.0	1289540

ØD ₁	TOL H11	Ød ₁	TOL js11	L ₁ +0.25 -0	PART No.
160	+0.25 +0.00	135	+0.13 -0.13	32.0	0080440
170	+0.25 +0.00	150	+0.13 -0.13	25.0	0303340
180	+0.25 +0.00	160	+0.13 -0.13	25.0	1283140
190	+0.29 +0.00	160	+0.13 -0.13	38.0	0838440
200	+0.29 +0.00	170	+0.13 -0.13	38.0	0087140
220	+0.29 +0.00	190	+0.15 -0.15	38.0	0087340
230	+0.29 +0.00	200	+0.15 -0.15	38.0	2010040
240	+0.29 +0.00	210	+0.15 -0.15	38.0	0094340
250	+0.29 +0.00	220	+0.15 -0.15	38.0	1056340
260	+0.32 +0.00	230	+0.15 -0.15	38.0	0094540
300	+0.32 +0.00	270	+0.16 -0.16	38.0	0094840
330	+0.36 +0.00	300	+0.16 -0.16	38.0	0095040
360	+0.36 +0.00	320	+0.18 -0.18	45.0	1054040
400	+0.36 +0.00	360	+0.18 -0.18	45.0	1054340
420	+0.40 +0.00	380	+0.20 -0.20	45.0	0095140
460	+0.40 +0.00	420	+0.20 -0.20	45.0	0095340
480	+0.40 +0.00	440	+0.20 -0.20	45.0	0095440
500	+0.40 +0.00	460	+0.20 -0.20	45.0	0134740
540	+0.44 +0.00	500	+0.20 -0.20	45.0	2018240
580	+0.44 +0.00	540	+0.22 -0.22	50.0	2020940



ØD ₁	TOL H11	Ød ₁	TOL js11	L ₁ +0.030 +0.020	PART No.
1.250	+0.006 +0.000	0.750	+0.003 -0.003	0.625	0403740
1.500	+0.006 +0.000	1.000	+0.003 -0.003	0.625	0422440
1.750	+0.006 +0.000	1.125	+0.003 -0.003	0.750	0778240
2.000	+0.007 +0.000	1.375	+0.003 -0.003	0.750	0778440
2.250	+0.007 +0.000	1.625	+0.003 -0.003	0.750	1432640
2.375	+0.007 +0.000	1.750	+0.003 -0.003	0.750	0939840
2.500	+0.007 +0.000	1.875	+0.003 -0.003	0.750	0867240
2.750	+0.007 +0.000	2.000	+0.004 -0.004	0.937	1369140
2.875	+0.007 +0.000	2.125	+0.004 -0.004	0.937	0779640
3.000	+0.007 +0.000	2.250	+0.004 -0.004	0.937	1098440
3.250	+0.009 +0.000	2.500	+0.004 -0.004	0.937	0782440
3.500	+0.009 +0.000	2.750	+0.004 -0.004	0.937	0437840
3.750	+0.009 +0.000	3.000	+0.004 -0.004	0.937	0410540
4.000	+0.009 +0.000	3.250	+0.004 -0.004	0.719	6504740
4.000	+0.009 +0.000	3.250	+0.004 -0.004	0.937	1407740
4.250	+0.009 +0.000	3.500	+0.004 -0.004	0.937	1128840
4.500	+0.009 +0.000	3.500	+0.004 -0.004	1.250	0448840
4.625	+0.009 +0.000	3.625	+0.004 -0.004	1.250	0449040
4.750	+0.010 +0.000	3.750	+0.004 -0.004	1.250	1007040
5.000	+0.010 +0.000	4.000	+0.004 -0.004	1.250	0443040
5.250	+0.010 +0.000	4.250	+0.004 -0.004	1.250	0892240
5.500	+0.010 +0.000	4.500	+0.004 -0.004	1.250	0133240
6.000	+0.010 +0.000	5.000	+0.005 -0.005	1.250	1367040
6.500	+0.010 +0.000	5.500	+0.005 -0.005	1.250	1164140

ØD ₁	TOL H11	Ød ₁	TOL js11	L ₁ +0.030 +0.020	PART No.
7.000	+0.010 +0.000	6.000	+0.005 -0.005	1.250	1188840
7.250	+0.011 +0.000	6.000	+0.005 -0.005	1.625	0424140
7.500	+0.011 +0.000	6.250	+0.005 -0.005	1.625	1255240
8.000	+0.011 +0.000	6.750	+0.005 -0.005	1.625	0426540
8.000	+0.011 +0.000	7.000	+0.005 -0.005	1.000	0224340
8.250	+0.011 +0.000	7.000	+0.005 -0.005	1.625	1219240
8.500	+0.011 +0.000	7.250	+0.005 -0.005	1.625	1286440
9.000	+0.011 +0.000	7.750	+0.006 -0.006	1.625	1266640
9.250	+0.011 +0.000	8.000	+0.006 -0.006	1.625	0455740
9.500	+0.011 +0.000	8.250	+0.006 -0.006	1.625	1332240
9.750	+0.011 +0.000	8.500	+0.006 -0.006	1.625	1332340
10.000	+0.013 +0.000	8.750	+0.006 -0.006	1.625	0436140
10.500	+0.013 +0.000	9.250	+0.006 -0.006	1.625	1331940
10.750	+0.013 +0.000	9.500	+0.006 -0.006	1.625	1320440
11.000	+0.013 +0.000	9.750	+0.006 -0.006	1.625	0433940
11.500	+0.013 +0.000	10.250	+0.006 -0.006	1.625	1331640
12.000	+0.013 +0.000	10.750	+0.006 -0.006	1.625	1331440
13.250	+0.013 +0.000	12.000	+0.006 -0.006	1.625	1329140
14.500	+0.013 +0.000	13.000	+0.006 -0.006	1.500	0270940
15.000	+0.013 +0.000	13.750	+0.007 -0.007	1.500	0787040
16.000	+0.016 +0.000	14.750	+0.007 -0.007	1.800	2117440
19.500	+0.016 +0.000	18.000	+0.008 -0.008	2.500	2108240
20.000	+0.017 +0.000	18.500	+0.009 -0.009	1.750	2111240

Design

The Hallite 58 double acting piston seal combines the Hallite 56 seal with bearing rings to give a very robust heavy duty seal assembly for split pistons. It enables the designer to use larger clearances and, with the integral bearing rings, to restrict the piston length.

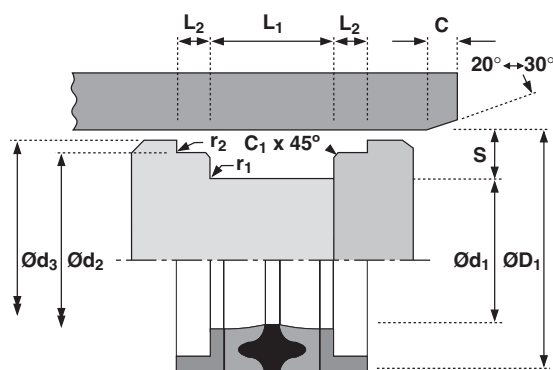
The assembly comprises a seal and two L shaped bearings. The centre of the seal is rubber which is bonded to two 'U' section bases of rubberised fabric, and is compressed by the housing to obtain an effective low pressure seal. When the pressure increases the rubber energises the 'U' section and deforms it to the housing, increasing the sealing area and improving the seal.

Rubberised fabric is used to protect the rubber, because it has strength and durability which combines with its ability to retain lubricant to help keep friction low and reduce wear.

Supporting the seal at either end is a polyacetal bearing proportioned to react to the pressure on the seal to prevent extrusion damage, and support the piston and its side load.

Features

- Well proven design
- Tolerant to contamination
- High pressure capability



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	700 bar

Inch

1.5 ft/sec
-22°F +212°F
10,000 p.s.i.

Surface roughness

Dynamic Sealing Face ØD ₁	0.1 < > 0.4
Static Sealing Face Ød ₁ Ød ₂	1.6 max
Static Housing Faces Ød ₃ L ₁ L ₂	3.2 max

µmRa

0.1 < > 0.4
1.6 max
3.2 max

µmRt

4 max
10 max
16 max

µinCLA

4 < > 16
63 max
125 max

µinRMS

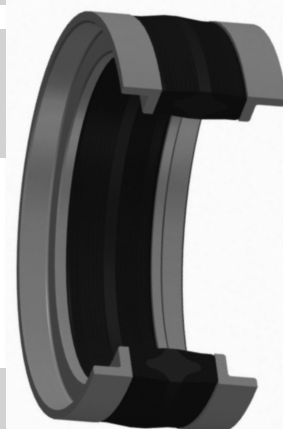
5 < > 18
70 max
140 max

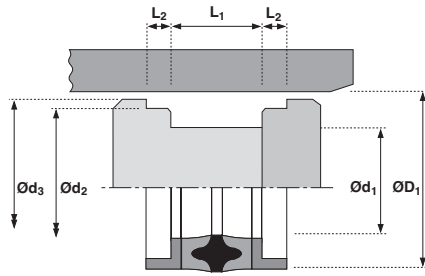
Chamfers & Radii

Groove Section ≤ S mm	5.0	7.5	10.0	12.5	15.0	
Min Chamfer C mm	2.5	4.0	5.0	6.5	7.5	
Min Chamfer C ₁ mm	1.0	1.0	1.0	1.5	1.5	
Max Fillet Rad r ₁ mm	0.2	0.2	0.2	0.4	0.4	
Max Fillet Rad r ₂ mm	0.2	0.2	0.2	0.4	0.4	
Groove Section ≤ S in	0.187	0.250	0.312	0.375	0.500	0.625
Min Chamfer C in	0.093	0.125	0.156	0.187	0.217	0.250
Min Chamfer C ₁ in	0.032	0.032	0.032	0.062	0.062	0.062
Max Fillet Rad r ₁ in	0.008	0.008	0.008	0.008	0.016	0.016
Max Fillet Rad r ₂ in	0.008	0.008	0.008	0.008	0.016	0.016

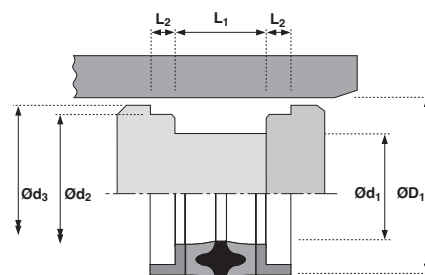
Tolerances

	ØD ₁	Ød ₁	Ød ₂	Ød ₃	L ₁	L ₂
mm	H11	js11	h9	js11	+0.25 -0	0 -0.15
in	H11	js11	h9	js11	+0.035 +0.025	0 -0.005

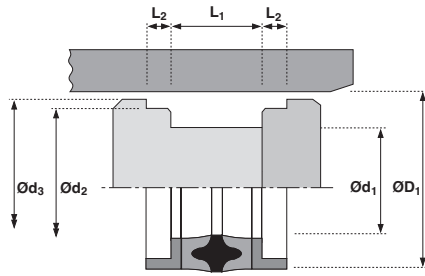




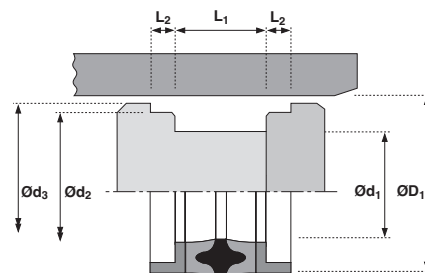
ØD_1	TOL H11	Ød_1	TOL js11	Ød_2	TOL h9	Ød_3	TOL js11	L_1 +0.25 -0	L_2 0 -0.15	PART No.
40	+0.16 +0.00	25	+0.07 -0.07	34.85	+0.000 -0.062	39.0	+0.08 -0.08	24.0	6.00	0472850
45	+0.16 +0.00	26	+0.07 -0.07	38.85	+0.000 -0.062	44.0	+0.08 -0.08	31.0	6.50	0474050
50	+0.16 +0.00	34	+0.08 -0.08	45.54	+0.000 -0.062	48.5	+0.08 -0.08	18.0	6.45	0814850
50	+0.16 +0.00	35	+0.08 -0.08	44.85	+0.000 -0.062	48.5	+0.08 -0.08	24.0	6.00	0474650
55	+0.19 +0.00	40	+0.08 -0.08	49.85	+0.000 -0.062	53.5	+0.10 -0.10	24.0	6.00	0475050
60	+0.19 +0.00	40	+0.08 -0.08	53.85	+0.000 -0.074	58.5	+0.10 -0.10	31.0	7.00	0282050
63	+0.19 +0.00	43	+0.08 -0.08	56.85	+0.000 -0.074	61.5	+0.10 -0.10	31.0	7.00	0646750
63	+0.19 +0.00	48	+0.08 -0.08	57.85	+0.000 -0.074	61.5	+0.10 -0.10	24.0	6.00	0205250
65	+0.19 +0.00	50	+0.08 -0.08	59.85	+0.000 -0.074	63.5	+0.10 -0.10	24.0	6.00	0383850
70	+0.19 +0.00	50	+0.08 -0.08	63.85	+0.000 -0.074	68.0	+0.10 -0.10	31.0	7.00	0294650
75	+0.19 +0.00	55	+0.10 -0.10	68.85	+0.000 -0.074	73.0	+0.10 -0.10	31.0	7.00	0818650
80	+0.19 +0.00	60	+0.10 -0.10	73.85	+0.000 -0.074	78.0	+0.10 -0.10	31.0	7.00	0294950
85	+0.22 +0.00	65	+0.10 -0.10	78.85	+0.000 -0.074	83.0	+0.11 -0.11	31.0	7.00	0388650
85	+0.22 +0.00	65	+0.10 -0.10	79.16	+0.000 -0.074	83.0	+0.11 -0.11	22.0	6.45	0314550
90	+0.22 +0.00	70	+0.10 -0.10	83.85	+0.000 -0.087	88.0	+0.11 -0.11	31.0	7.00	0296050
95	+0.22 +0.00	75	+0.10 -0.10	88.85	+0.000 -0.087	93.0	+0.11 -0.11	31.0	7.00	0412750
100	+0.22 +0.00	75	+0.10 -0.10	93.24	+0.000 -0.087	98.0	+0.11 -0.11	22.0	6.45	0034950
100	+0.22 +0.00	75	+0.10 -0.10	93.85	+0.000 -0.087	98.0	+0.11 -0.11	26.0	9.50	0891650
100	+0.22 +0.00	80	+0.10 -0.10	93.85	+0.000 -0.087	98.0	+0.11 -0.11	31.0	7.00	0295150
110	+0.22 +0.00	85	+0.11 -0.11	103.50	+0.000 -0.087	108.0	+0.11 -0.11	22.0	6.45	1188250
110	+0.22 +0.00	90	+0.11 -0.11	103.85	+0.000 -0.087	108.0	+0.11 -0.11	31.0	7.00	0712450
115	+0.22 +0.00	95	+0.11 -0.11	108.85	+0.000 -0.087	113.0	+0.11 -0.11	31.0	7.00	0796450
120	+0.22 +0.00	100	+0.11 -0.11	113.85	+0.000 -0.087	118.0	+0.11 -0.11	31.0	7.00	0296150
125	+0.25 +0.00	100	+0.11 -0.11	118.50	+0.000 -0.087	123.0	+0.13 -0.13	25.0	6.45	1007450



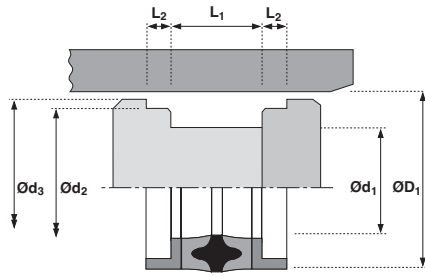
ØD ₁	TOL H11	Ød ₁	TOL js11	ØD ₂	TOL h9	Ød ₂	TOL js11	L ₁ +0.25 -0	L ₂ 0 -0.15	PART No.
125	+0.25 +0.00	100	+0.11 -0.11	118.85	+0.000 -0.087	123.0	+0.13 -0.13	38.0	9.50	0418650
130	+0.25 +0.00	104	+0.11 -0.11	123.85	+0.000 -0.100	128.0	+0.13 -0.13	38.0	9.50	0244350
130	+0.25 +0.00	105	+0.11 -0.11	123.50	+0.000 -0.100	128.0	+0.13 -0.13	25.0	6.45	0044850
135	+0.25 +0.00	110	+0.11 -0.11	128.35	+0.000 -0.100	133.0	+0.13 -0.13	38.0	9.50	0304350
140	+0.25 +0.00	115	+0.11 -0.11	133.50	+0.000 -0.100	138.0	+0.13 -0.13	25.0	6.45	1008450
140	+0.25 +0.00	120	+0.11 -0.11	133.85	+0.000 -0.100	138.0	+0.13 -0.13	31.0	7.00	0250550
145	+0.25 +0.00	125	+0.11 -0.11	138.85	+0.000 -0.100	143.0	+0.13 -0.13	31.0	7.00	0640150
150	+0.25 +0.00	120	+0.11 -0.11	143.85	+0.000 -0.100	148.0	+0.13 -0.13	44.0	9.50	1289550
150	+0.25 +0.00	125	+0.11 -0.11	143.50	+0.000 -0.100	148.0	+0.13 -0.13	25.0	6.45	1008050
160	+0.25 +0.00	130	+0.13 -0.13	153.50	+0.000 -0.100	158.0	+0.13 -0.13	25.0	6.45	1008250
160	+0.25 +0.00	135	+0.13 -0.13	153.85	+0.000 -0.100	158.0	+0.13 -0.13	38.0	9.50	0080450
160	+0.25 +0.00	140	+0.13 -0.13	153.85	+0.000 -0.100	158.0	+0.13 -0.13	31.0	7.00	0304650
170	+0.25 +0.00	140	+0.13 -0.13	162.54	+0.000 -0.100	168.0	+0.13 -0.13	25.0	6.45	1222250
170	+0.25 +0.00	150	+0.13 -0.13	163.85	+0.000 -0.100	168.0	+0.13 -0.13	31.0	7.00	0303350
180	+0.25 +0.00	150	+0.13 -0.13	173.00	+0.000 -0.100	178.0	+0.13 -0.13	35.0	6.45	0679850
180	+0.25 +0.00	160	+0.13 -0.13	173.85	+0.000 -0.100	178.0	+0.13 -0.13	31.0	7.00	1283150
190	+0.29 +0.00	160	+0.13 -0.13	183.85	+0.000 -0.115	188.0	+0.15 -0.15	44.0	9.50	0838450
200	+0.29 +0.00	170	+0.13 -0.13	193.85	+0.000 -0.115	198.0	+0.15 -0.15	44.0	12.00	0087150
200	+0.29 +0.00	175	+0.13 -0.13	193.85	+0.000 -0.115	198.0	+0.15 -0.15	38.0	9.5	0838850
210	+0.29 +0.00	180	+0.13 -0.13	203.13	+0.000 -0.115	208.0	+0.15 -0.15	31.7	6.45	1198450
220	+0.29 +0.00	200	+0.15 -0.15	213.85	+0.000 -0.115	218.0	+0.15 -0.15	31.0	7.0	1056450
250	+0.29 +0.00	220	+0.15 -0.15	243.85	+0.000 -0.115	248.0	+0.15 -0.15	44.0	12.0	1056350
280	+0.32 +0.00	250	+0.15 -0.15	273.85	+0.000 -0.130	278.0	+0.16 -0.16	44.0	12.0	1055550



ØD ₁	TOL H11	Ød ₁	TOL js11	Ød ₂	TOL h9	Ød ₃	TOL js11	L ₁ +0.25 -0	L ₂ 0 -0.15	PART No.
1.000	+0.005 +0.000	0.625	+0.002 -0.002	0.868	+0.000 -0.002	0.968	+0.003 -0.003	0.594	0.187	1247650
1.250	+0.006 +0.000	0.750	+0.003 -0.003	1.118	+0.000 -0.002	1.218	+0.003 -0.003	0.750	0.250	0403750
1.500	+0.006 +0.000	1.000	+0.003 -0.003	1.362	+0.000 -0.002	1.460	+0.003 -0.003	0.625	0.188	6504850
1.500	+0.006 +0.000	1.000	+0.003 -0.003	1.362	+0.000 -0.002	1.460	+0.003 -0.003	0.625	0.254	1441150
1.500	+0.006 +0.000	1.000	+0.003 -0.003	1.371	+0.000 -0.002	1.468	+0.003 -0.003	0.750	0.250	0422450
1.625	+0.006 +0.000	1.000	+0.003 -0.003	1.428	+0.000 -0.002	1.562	+0.003 -0.003	0.937	0.250	0540650
1.750	+0.006 +0.000	1.125	+0.003 -0.003	1.555	+0.000 -0.002	1.687	+0.003 -0.003	0.937	0.250	0778250
1.750	+0.006 +0.000	1.125	+0.003 -0.003	1.572	+0.000 -0.002	1.710	+0.003 -0.003	0.750	0.254	6504450
2.000	+0.007 +0.000	1.375	+0.003 -0.003	1.805	+0.000 -0.002	1.937	+0.004 -0.004	0.937	0.250	0778450
2.000	+0.007 +0.000	1.375	+0.003 -0.003	1.822	+0.000 -0.002	1.962	+0.004 -0.004	0.750	0.254	0639150
2.125	+0.007 +0.000	1.500	+0.003 -0.003	1.928	+0.000 -0.002	2.062	+0.004 -0.004	0.937	0.250	0967650
2.250	+0.007 +0.000	1.625	+0.003 -0.003	2.055	+0.000 -0.003	2.187	+0.004 -0.004	0.937	0.250	1432650
2.250	+0.007 +0.000	1.625	+0.003 -0.003	2.071	+0.000 -0.003	2.211	+0.004 -0.004	0.750	0.254	0640450
2.375	+0.007 +0.000	1.750	+0.003 -0.003	2.180	+0.000 -0.003	2.312	+0.004 -0.004	0.750	0.250	0890850
2.375	+0.007 +0.000	1.750	+0.003 -0.003	2.180	+0.000 -0.003	2.312	+0.004 -0.004	0.937	0.250	0939850
2.500	+0.007 +0.000	1.875	+0.003 -0.003	2.305	+0.000 -0.003	2.437	+0.004 -0.004	0.937	0.250	0867250
2.500	+0.007 +0.000	1.875	+0.003 -0.003	2.321	+0.000 -0.003	2.460	+0.004 -0.004	0.750	0.254	6502250
2.625	+0.007 +0.000	2.000	+0.004 -0.004	2.428	+0.000 -0.003	2.562	+0.004 -0.004	0.937	0.250	1371050
2.750	+0.007 +0.000	2.000	+0.004 -0.004	2.485	+0.000 -0.003	2.687	+0.004 -0.004	1.187	0.250	1369150
2.750	+0.007 +0.000	2.000	+0.004 -0.004	2.524	+0.000 -0.003	2.710	+0.004 -0.004	0.937	0.254	0783250
2.875	+0.007 +0.000	2.125	+0.004 -0.004	2.610	+0.000 -0.003	2.812	+0.004 -0.004	1.187	0.250	0779650
3.000	+0.007 +0.000	2.250	+0.004 -0.004	2.735	+0.000 -0.003	2.937	+0.004 -0.004	1.187	0.250	1098450
3.000	+0.007 +0.000	2.250	+0.004 -0.004	2.774	+0.000 -0.003	2.960	+0.004 -0.004	0.937	0.254	6502450



ØD ₁	TOL H11	Ød ₁	TOL js11	Ød ₂	TOL h9	Ød ₃	TOL js11	L ₁ +0.25 -0	L ₂ 0 -0.15	PART No.
3.125	+0.007 +0.000	2.375	+0.004 -0.004	2.858	+0.000 -0.003	3.062	+0.004 -0.004	1.187	0.250	1024850
3.250	+0.009 +0.000	2.500	+0.004 -0.004	2.985	+0.000 -0.003	3.187	+0.004 -0.004	1.187	0.250	0782450
3.250	+0.009 +0.000	2.500	+0.004 -0.004	3.024	+0.000 -0.003	3.210	+0.004 -0.004	0.937	0.254	1154150
3.500	+0.009 +0.000	2.750	+0.004 -0.004	3.235	+0.000 -0.003	3.437	+0.004 -0.004	1.187	0.250	0437850
3.500	+0.009 +0.000	2.750	+0.004 -0.004	3.273	+0.000 -0.003	3.460	+0.004 -0.004	0.937	0.254	6500550
3.625	+0.009 +0.000	2.875	+0.004 -0.004	3.360	+0.000 -0.003	3.562	+0.004 -0.004	1.187	0.250	1474550
3.750	+0.009 +0.000	3.000	+0.004 -0.004	3.485	+0.000 -0.003	3.687	+0.004 -0.004	1.187	0.250	0410550
3.875	+0.009 +0.000	3.125	+0.004 -0.004	3.610	+0.000 -0.003	3.812	+0.004 -0.004	1.187	0.250	0295850
4.000	+0.009 +0.000	3.250	+0.004 -0.004	3.735	+0.000 -0.003	3.937	+0.004 -0.004	1.187	0.250	1407750
4.000	+0.009 +0.000	3.250	+0.004 -0.004	3.772	+0.000 -0.003	3.958	+0.004 -0.004	0.937	0.254	6504750
4.250	+0.009 +0.000	3.500	+0.004 -0.004	3.985	+0.000 -0.003	4.187	+0.004 -0.004	1.187	0.250	1128850
4.250	+0.009 +0.000	3.500	+0.004 -0.004	4.022	+0.000 -0.003	4.210	+0.004 -0.004	0.937	0.254	6504550
4.500	+0.009 +0.000	3.500	+0.004 -0.004	4.231	+0.000 -0.003	4.450	+0.004 -0.004	1.250	0.254	6504250
4.500	+0.009 +0.000	3.500	+0.004 -0.004	4.234	+0.000 -0.003	4.437	+0.004 -0.004	1.500	0.375	0448850
4.750	+0.010 +0.000	3.750	+0.004 -0.004	4.483	+0.000 -0.003	4.700	+0.005 -0.005	1.250	0.254	0038250
4.750	+0.010 +0.000	3.750	+0.004 -0.004	4.485	+0.000 -0.003	4.687	+0.005 -0.005	1.500	0.375	1007050
5.000	+0.010 +0.000	4.000	+0.004 -0.004	4.730	+0.000 -0.004	4.956	+0.005 -0.005	1.250	0.254	6500650
5.000	+0.010 +0.000	4.000	+0.004 -0.004	4.735	+0.000 -0.004	4.937	+0.005 -0.005	1.500	0.375	0443050
5.250	+0.010 +0.000	4.250	+0.004 -0.004	4.980	+0.000 -0.004	5.187	+0.005 -0.005	1.500	0.375	0892250
5.500	+0.010 +0.000	4.500	+0.004 -0.004	5.236	+0.000 -0.004	5.437	+0.005 -0.005	1.500	0.375	0133250
5.500	+0.010 +0.000	4.500	+0.004 -0.004	5.235	+0.000 -0.004	5.456	+0.005 -0.005	1.250	0.254	6504150
5.750	+0.010 +0.000	4.750	+0.005 -0.005	5.484	+0.000 -0.004	5.687	+0.005 -0.005	1.500	0.375	1366950
6.000	+0.010 +0.000	5.000	+0.005 -0.005	5.728	+0.000 -0.004	5.954	+0.005 -0.005	1.250	0.254	0557950



ØD ₁	TOL H11	Ød ₁	TOL js11	Ød ₂	TOL h9	Ød ₃	TOL js11	L ₁ +0.25 -0	L ₂ 0 -0.15	PART No.
6.000	+0.010 +0.000	5.000	+0.005 -0.005	5.736	+0.000 -0.004	5.937	+0.005 -0.005	1.500	0.375	1367050
6.250	+0.010 +0.000	5.250	+0.005 -0.005	5.984	+0.000 -0.004	6.187	+0.005 -0.005	1.500	0.375	0083350
6.500	+0.010 +0.000	5.500	+0.005 -0.005	6.236	+0.000 -0.004	6.437	+0.005 -0.005	1.500	0.375	1164150
6.750	+0.010 +0.000	5.750	+0.005 -0.005	6.484	+0.000 -0.004	6.687	+0.005 -0.005	1.500	0.375	1286150
7.000	+0.010 +0.000	6.000	+0.005 -0.005	6.736	+0.000 -0.004	6.937	+0.005 -0.005	1.500	0.375	1188850
7.500	+0.010 +0.000	6.250	+0.005 -0.005	7.240	+0.000 -0.005	7.437	+0.006 -0.006	1.875	0.375	1255250
8.000	+0.011 +0.000	7.000	+0.005 -0.005	7.740	+0.000 -0.005	7.937	+0.006 -0.006	1.250	0.375	0224350
9.000	+0.011 +0.000	7.750	+0.006 -0.006	8.740	+0.000 -0.005	8.937	+0.006 -0.006	1.875	0.375	1266650
9.000	+0.011 +0.000	8.000	+0.006 -0.006	8.736	+0.000 -0.005	8.937	+0.006 -0.006	1.250	0.375	1273750
10.000	+0.013 +0.000	9.000	+0.006 -0.006	9.740	+0.000 -0.005	9.937	+0.006 -0.006	1.250	0.375	0697650

Design

A robust seal assembly designed specifically for one piece pistons, the Hallite 64 double acting seal uses a rubber sealing element which has proved itself in service to be extremely wear resistant and capable of working most effectively in a wide variety of medium to heavy duty applications.

The assembly comprises a rubber seal, two split support rings and two split bearings, one of each located either side of the seal. The nitrile rubber seal is designed to have its section compressed by the housing, to ensure a low pressure seal, and when pressurised be protected from extrusion damage by the extending lips of the support ring. The support ring is manufactured from a tough but flexible polymer and scarf cut for assembly.

L section bearings provide the support and guidance for the piston and the other parts of the seal.

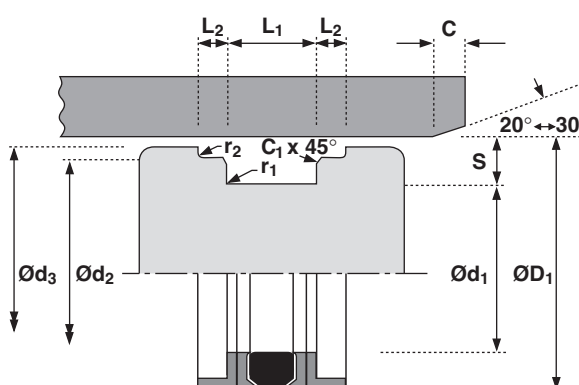
For seals up to 90mm diameter $\varnothing d_3$ is not required. Above 90mm diameter the seals benefit from the additional support of the L-section bearings.

All seals are also suitable for two piece housings.

Note: Other sizes of this design of seal are shown under Hallite 50, 53 and 68. Also see Hallite 753 for interchangeable sizes.

Features

- Compact seal design
- Easy assembly
- Positive no drift seal



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	400 bar

Inch

1.5 ft/sec
-22°F +212°F
6000 p.s.i.

Surface roughness

	μmRa	μmRt
Dynamic Sealing Face $\varnothing D_1$	0.1 < > 0.4	4 max
Static Sealing Face $\varnothing d_1$ $\varnothing d_2$	1.6 max	10 max
Static Housing Faces $\varnothing d_3$ L_1 L_2	3.2 max	16 max

$\mu inCLA$	$\mu inRMS$
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

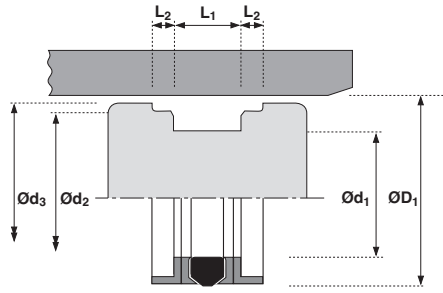
Chamfers & Radii

Groove Section $\leq S$ mm	5.0	7.0	8.0	9.0	11.0	12.5
Min Chamfer C mm	2.5	4.0	5.0	5.0	6.5	6.5
Max Chamfer C_1 mm	0.4	0.4	0.4	0.8	0.8	0.8
Max Fillet Rad r_1 mm	0.4	0.4	0.4	0.4	0.4	0.4
Max Fillet Rad r_2 mm	0.2	0.2	0.2	0.2	0.4	0.4

Tolerances

	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	$\varnothing d_3$	L_1	L_2
mm	H10	h9	h9	h11	+0.2 -0	+0.1 -0





ØD ₁	TOL H10	Ød ₁	TOL h9	Ød ₂	TOL h9	Ød ₃	TOL h11	L ₁ +0.2 -0	L ₂ +0.1 -0	PART No.
32	+0.10 +0.00	22	+0.00 -0.05	28.0	+0.000 -0.052	31.0	+0.00 -0.16	15.5	2.60	6600100
40	+0.10 +0.00	26	+0.00 -0.05	36.0	+0.000 -0.062	39.0	+0.00 -0.16	15.5	2.60	6600200
50	+0.10 +0.00	34	+0.00 -0.06	46.0	+0.000 -0.062	49.0	+0.00 -0.16	20.5	3.10	6600300
55	+0.12 +0.00	39	+0.00 -0.06	51.0	+0.000 -0.074	54.0	+0.00 -0.19	20.5	3.10	6600400
60	+0.12 +0.00	44	+0.00 -0.06	56.0	+0.000 -0.074	59.0	+0.00 -0.19	20.5	3.10	6600500
63	+0.12 +0.00	47	+0.00 -0.06	59.0	+0.000 -0.074	62.0	+0.00 -0.19	20.5	3.10	6600600
65	+0.12 +0.00	49	+0.00 -0.06	61.0	+0.000 -0.074	64.0	+0.00 -0.19	20.5	3.10	1705210
70	+0.12 +0.00	54	+0.00 -0.07	66.0	+0.000 -0.074	69.0	+0.00 -0.19	20.5	3.10	6600700
80	+0.12 +0.00	62	+0.00 -0.07	76.0	+0.000 -0.074	79.0	+0.00 -0.19	22.5	3.60	1705110
90	+0.14 +0.00	72	+0.00 -0.07	86.0	+0.000 -0.087	89.0	+0.00 -0.22	22.5	3.60	6600800
100	+0.14 +0.00	82	+0.00 -0.09	96.0	+0.000 -0.087	99.0	+0.00 -0.22	22.5	3.60	6600900
110	+0.14 +0.00	92	+0.00 -0.09	106.0	+0.000 -0.087	109.0	+0.00 -0.22	22.5	3.60	6601000
125	+0.16 +0.00	103	+0.00 -0.09	121.0	+0.000 -0.100	124.0	+0.00 -0.25	26.5	5.10	6601100
140	+0.16 +0.00	118	+0.00 -0.09	136.0	+0.000 -0.100	139.0	+0.00 -0.25	26.5	5.10	6601200
160	+0.16 +0.00	138	+0.00 -0.10	156.0	+0.000 -0.100	159.0	+0.00 -0.25	26.5	5.10	6601300
250	+0.19 +0.00	225	+0.00 -0.12	246.0	+0.000 -0.115	249.0	+0.00 -0.29	31.5	6.60	6601400

Design

Ideal for light duty one piece piston applications, the Hallite 65 double acting seal is a simple, effective and economical design for pressures up to 160 bar/2500 p.s.i. Its compact dimensions enable the designer to keep the length of the piston to a minimum.

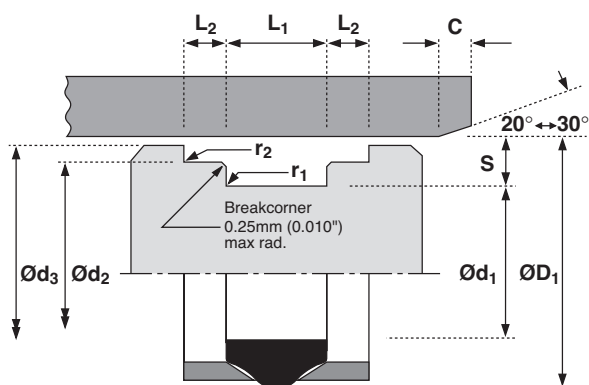
It is an assembly of a continuous rubber seal and two scarf cut bearings.

The nitrile rubber seal is designed to be pre-loaded by the housing to ensure an effective seal at low pressure. The outward thrust of the rubber seal on the bearings as it reacts to increasing pressure prevents any extrusion damage in the sealing area.

The polyacetal bearings are proportioned to support the piston and its side load.

Features

- Compact design
- Easy assembly
- Low wear
- Long life



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	160 bar

Inch

1.5 ft/sec
-22°F +212°F
2500 p.s.i.

Surface roughness

Dynamic Sealing Face ØD ₁	0.1 < > 0.4
Static Sealing Face Ød ₁ Ød ₂	1.6 max
Static Housing Faces Ød ₃ L ₁ L ₂	3.2 max

µmRa

0.1 < > 0.4
1.6 max
3.2 max

µmRt

4 max
10 max
16 max

µinCLA

4 < > 16
63 max
125 max

µinRMS

5 < > 18
70 max
140 max

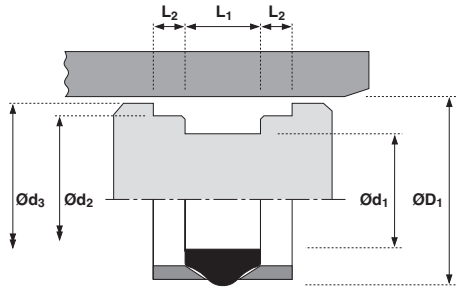
Chamfers & Radii

Groove Section ≤ S mm	3.75	5.00	6.50	8.00	10.00
Min Chamfer C mm	2.00	2.50	4.00	5.00	5.00
Max Fillet Rad r ₁ mm	0.40	0.40	0.40	0.80	0.80
Max Fillet Rad r ₂ mm	0.20	0.20	0.20	0.40	0.40
Groove Section ≤ S in	0.156	0.187	0.250	0.312	0.375
Min Chamfer C in	0.078	0.093	0.125	0.156	0.187
Max Fillet Rad r ₁ in	0.016	0.016	0.016	0.032	0.032
Max Fillet Rad r ₂ in	0.008	0.008	0.008	0.016	0.016

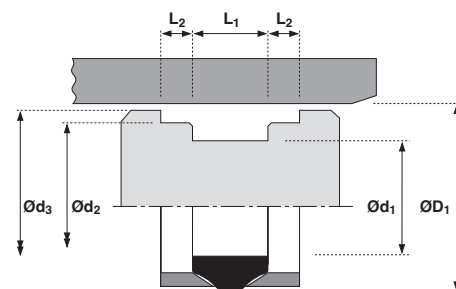
Tolerances

mm	ØD ₁	Ød ₁	Ød ₂	Ød ₃	L ₁	L ₂
	H10	h9	h9	h11	+0.4 +0.13	0 -0.13
in	H10	h9	h9	h11	+0.015 +0.005	0 -0.005





ØD ₁	TOL H10	Ød ₁	TOL h9	Ød ₂	TOL h9	Ød ₃	TOL h11	L ₁ +0.4 +0.13	L ₂ 0 -0.13	PART No.
25	+0.08 +0.00	17.5	+0.00 -0.04	21.3	+0.000 -0.052	24.0	+0.00 -0.13	8.50	3.25	2218210
32	+0.10 +0.00	22	+0.00 -0.05	27.5	+0.000 -0.052	31.0	+0.00 -0.16	11.00	4.00	2218110
40	+0.10 +0.00	30	+0.00 -0.05	35.5	+0.000 -0.062	39.0	+0.00 -0.16	11.00	4.00	2218010
50	+0.10 +0.00	40	+0.00 -0.06	45.5	+0.000 -0.062	49.0	+0.00 -0.16	11.00	4.00	2217910
63	+0.12 +0.00	53	+0.00 -0.07	58.5	+0.000 -0.074	61.5	+0.00 -0.19	11.00	4.00	2217810
80	+0.12 +0.00	70	+0.00 -0.07	75.5	+0.000 -0.074	78.5	+0.00 -0.19	11.00	4.00	2217610
92	+0.14 +0.00	82	+0.00 -0.09	87.5	+0.000 -0.087	90.5	+0.00 -0.22	11.00	4.00	2240410
100	+0.14 +0.00	87	+0.00 -0.09	93.8	+0.000 -0.087	98.5	+0.00 -0.22	14.00	6.00	0352510
125	+0.16 +0.00	112	+0.00 -0.09	118.8	+0.000 -0.087	123.5	+0.00 -0.25	14.00	6.00	0315810
140	+0.16 +0.00	124	+0.00 -0.10	132.0	+0.000 -0.100	138.5	+0.00 -0.25	17.50	8.75	0317710
160	+0.16 +0.00	140	+0.00 -0.10	151.4	+0.000 -0.100	158.5	+0.00 -0.25	25.00	12.50	0315910
180	+0.16 +0.00	160	+0.00 -0.10	171.4	+0.000 -0.100	178.5	+0.00 -0.25	25.00	12.50	0316010
200	+0.19 +0.00	180	+0.00 -0.10	191.4	+0.000 -0.115	198.5	+0.00 -0.29	25.00	12.50	0316910



ØD ₁	TOL H10	Ød ₁	TOL h9	Ød ₂	TOL h9	Ød ₃	TOL h11	L ₁ +0.015 +0.005	L ₂ 0 -0.005	PART No.
1.000	+0.003 +0.000	0.687	+0.000 -0.002	0.829	+0.000 -0.002	0.937	+0.000 -0.005	0.343	0.125	2221210
1.250	+0.004 +0.000	0.937	+0.000 -0.002	1.079	+0.000 -0.002	1.187	+0.000 -0.006	0.343	0.125	2221310
1.500	+0.004 +0.000	1.125	+0.000 -0.002	1.324	+0.000 -0.002	1.437	+0.000 -0.006	0.437	0.150	2219610
1.750	+0.004 +0.000	1.375	+0.000 -0.002	1.574	+0.000 -0.002	1.687	+0.000 -0.006	0.437	0.150	2220910
2.000	+0.005 +0.000	1.625	+0.000 -0.002	1.824	+0.000 -0.002	1.937	+0.000 -0.006	0.437	0.150	2224010
2.250	+0.005 +0.000	1.875	+0.000 -0.002	2.075	+0.000 -0.003	2.187	+0.000 -0.007	0.437	0.150	2221110
2.500	+0.005 +0.000	2.125	+0.000 -0.003	2.325	+0.000 -0.003	2.437	+0.000 -0.007	0.437	0.150	2224110
2.750	+0.005 +0.000	2.375	+0.000 -0.003	2.575	+0.000 -0.003	2.687	+0.000 -0.007	0.437	0.150	2219510
2.875	+0.005 +0.000	2.500	+0.000 -0.003	2.700	+0.000 -0.003	2.812	+0.000 -0.007	0.437	0.150	2225210
3.000	+0.005 +0.000	2.625	+0.000 -0.003	2.825	+0.000 -0.003	2.937	+0.000 -0.007	0.437	0.150	2224210
3.250	+0.006 +0.000	2.875	+0.000 -0.003	3.075	+0.000 -0.003	3.187	+0.000 -0.009	0.437	0.150	2219710
3.500	+0.006 +0.000	3.000	+0.000 -0.003	3.270	+0.000 -0.003	3.437	+0.000 -0.009	0.562	0.210	0177610
3.750	+0.006 +0.000	3.250	+0.000 -0.003	3.520	+0.000 -0.003	3.687	+0.000 -0.009	0.562	0.210	0178810
4.000	+0.006 +0.000	3.500	+0.000 -0.003	3.770	+0.000 -0.003	3.937	+0.000 -0.009	0.562	0.210	1172310
4.250	+0.006 +0.000	3.750	+0.000 -0.003	4.020	+0.000 -0.003	4.187	+0.000 -0.009	0.562	0.210	0309210
4.500	+0.006 +0.000	4.000	+0.000 -0.003	4.270	+0.000 -0.003	4.437	+0.000 -0.009	0.562	0.210	0418910
4.750	+0.006 +0.000	4.250	+0.000 -0.003	4.520	+0.000 -0.003	4.687	+0.000 -0.009	0.562	0.210	1155810
5.000	+0.006 +0.000	4.375	+0.000 -0.003	4.689	+0.000 -0.003	4.937	+0.000 -0.010	0.687	0.344	1175410
5.250	+0.006 +0.000	4.625	+0.000 -0.003	4.938	+0.000 -0.004	5.187	+0.000 -0.010	0.687	0.344	1173710
5.500	+0.006 +0.000	4.875	+0.000 -0.004	5.188	+0.000 -0.004	5.437	+0.000 -0.010	0.687	0.344	1173610
6.000	+0.006 +0.000	5.250	+0.000 -0.004	5.712	+0.000 -0.004	5.937	+0.000 -0.010	1.000	0.500	0300110
6.500	+0.006 +0.000	5.750	+0.000 -0.004	6.212	+0.000 -0.004	6.437	+0.000 -0.010	1.000	0.500	0047010
7.000	+0.006 +0.000	6.250	+0.000 -0.004	6.712	+0.000 -0.004	6.937	+0.000 -0.010	1.000	0.500	0314110
8.000	+0.007 +0.000	7.250	+0.000 -0.005	7.712	+0.000 -0.005	7.937	+0.000 -0.011	1.000	0.500	0045110
9.000	+0.007 +0.000	8.250	+0.000 -0.005	8.712	+0.000 -0.005	8.937	+0.000 -0.011	1.000	0.500	0045510

Design

A robust seal assembly designed specifically for one piece pistons, the Hallite 68 double acting seal uses a rubber sealing element which has proved itself in service to be extremely wear resistant and capable of working most effectively in a wide variety of medium to heavy duty applications. The seal is also suitable for two piece pistons.

The assembly comprises a rubber seal, two split support rings and two split bearings, one of each located either side of the seal. The nitrile rubber seal is designed to have its section compressed by the housing, to ensure a low pressure seal, and when pressurised be protected from extrusion damage by the extending lips of the support ring. The support ring is manufactured from a tough but flexible polymer and scarf cut for assembly.

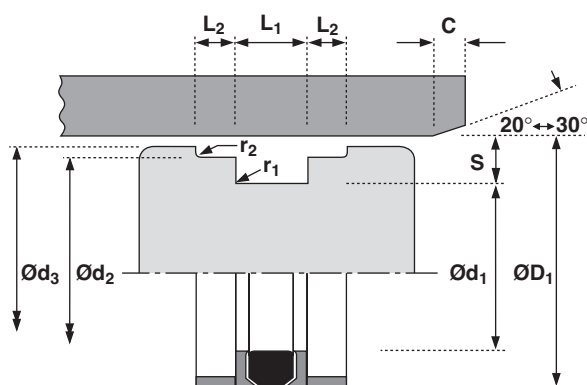
Polyacetal rectangular section bearings provide the support and guidance for the piston and the other parts of the seal.

NB: All sizes are suitable for the larger radial section housings to ISO 6547 and are suffixed $\pm$

Other sizes of this design of seal are shown under Hallite 50, 53 and 64.

Features

- ISO 6547 housing
- Compact groove design
- Positive no drift seal



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	500 bar

Inch

1.5 ft/sec
-22°F +212°F
7500 p.s.i.

Surface roughness

Dynamic Sealing Face ØD ₁	0.1 > 0.4
Static Sealing Face Ød ₁ Ød ₂	1.6 max
Static Housing Faces Ød ₃ L ₁ L ₂	3.2 max

µmRa

0.1 > 0.4
1.6 max
3.2 max

µmRt

4 max
10 max
16 max

µinCLA

4 < > 16
63 max
125 max

µinRMS

5 < > 18
70 max
140 max

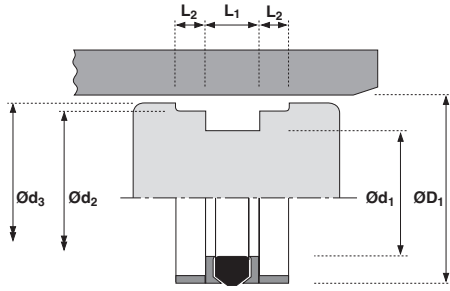
Chamfers & Radii

Groove Section ≤ S mm	5.0	7.5	10.0	12.5	15.0
Min Chamfer C mm	2.5	4.0	5.0	6.5	7.5
Max Fillet Rad r ₁ mm	0.4	0.4	0.4	0.8	0.8
Max Fillet Rad r ₂ mm	0.4	0.4	0.4	0.8	0.8

Tolerances

	ØD ₁	Ød ₁	Ød ₂	Ød ₃	L ₁	L ₂
mm	H10	h9	h9	h11	+0.35 +0.1	+0.1 -0





ØD ₁	TOL H10	Ød ₁	TOL h9	Ød ₂	TOL h9	Ød ₃	TOL h11	L ₁ +0.35 +0.1	L ₂ +0.1 -0	PART No.
25	+0.08 +0.00	15	+0.00 -0.04	22.0	+0.000 -0.052	24.0	+0.00 -0.13	12.50	4.0	6594610‡
32	+0.10 +0.00	22	+0.00 -0.05	29.0	+0.000 -0.052	31.0	+0.00 -0.16	12.50	4.0	2249320‡
40	+0.10 +0.00	30	+0.00 -0.05	37.0	+0.000 -0.062	39.0	+0.00 -0.16	12.50	4.0	2249420‡
50	+0.10 +0.00	35	+0.00 -0.06	46.0	+0.000 -0.062	48.5	+0.00 -0.16	20.00	5.0	0074020‡
63	+0.12 +0.00	48	+0.00 -0.06	59.0	+0.000 -0.074	61.5	+0.00 -0.19	20.00	5.0	6594710‡
80	+0.12 +0.00	60	+0.00 -0.07	75.0	+0.000 -0.074	78.0	+0.00 -0.19	25.00	6.3	0073830‡
100	+0.14 +0.00	80	+0.00 -0.07	95.0	+0.000 -0.087	98.0	+0.00 -0.22	25.00	6.3	0083620‡
125	+0.16 +0.00	100	+0.00 -0.09	119.0	+0.000 -0.087	123.0	+0.00 -0.25	32.00	10.0	0087540‡
160	+0.16 +0.00	135	+0.00 -0.10	154.0	+0.000 -0.100	158.0	+0.00 -0.25	32.00	10.0	0089930‡
200	+0.19 +0.00	170	+0.00 -0.10	192.0	+0.000 -0.115	197.0	+0.00 -0.29	36.00	12.5	1270120‡
250	+0.19 +0.00	220	+0.00 -0.12	242.0	+0.000 -0.115	247.0	+0.00 -0.29	36.00	12.5	1264320‡

Design

Ideal for light to medium duty one piece piston applications, the Hallite 77 seal is a simple, effective and economical design. Its compact dimensions enable the designer to keep the length of the piston to a minimum.

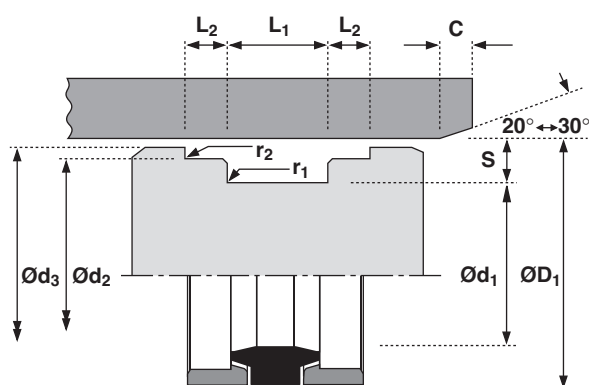
It is an assembly of a continuous rubber seal and two scarf cut bearings.

The nitrile rubber seal is designed to be pre-loaded by the housing to ensure an effective seal at low pressure. The outward thrust of the rubber seal on the bearings as it reacts to increasing pressure prevents any extrusion damage in the sealing area.

The pair of polyacetal bearings are proportioned to support the piston and its side load.

Features

- Compact design
- Easy assembly
- Low wear
- Long life



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C + 100°C
Maximum Pressure	350 bar

Inch

1.5 ft/sec
-22°F + 212°F
5000 p.s.i.

Surface roughness

Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max
Static Sealing Face Ød ₁ Ød ₂	1.6 max	10 max
Static Housing Faces Ød ₃ L ₁ L ₂	3.2 max	16 max

µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

Chamfers & Radii

Groove Section ≤ S mm	3.75	5.00	6.50
Min Chamfer C mm	2.00	2.50	4.00
Max Fillet Rad r ₁ mm	0.40	0.40	0.40
Max Fillet Rad r ₂ mm	0.20	0.20	0.20
Groove Section ≤ S in	0.156	0.187	0.250
Min Chamfer C in	0.078	0.093	0.125
Max Fillet Rad r ₁ in	0.016	0.016	0.016
Max Fillet Rad r ₂ in	0.008	0.008	0.008

Tolerances

ØD ₁	Ød ₁	Ød ₂	Ød ₃	L ₁	L ₂
H10	h9	h9	h11	+0.4 +0.13	0 -0.13
H10	h9	h9	h11	+0.015 +0.005	0 -0.005

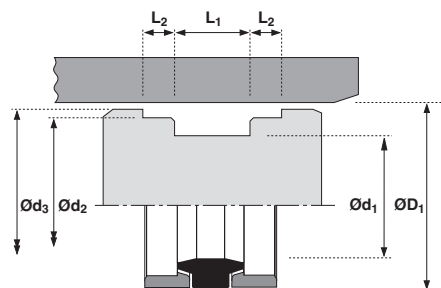


metric

$\varnothing D_1$	TOL H10	$\varnothing d_1$	TOL h9	$\varnothing d_2$	TOL h9	$\varnothing d_3$	TOL h11	L_1 +0.4 +0.13	L_2 0 -0.13	PART No.
25	+0.08 +0.00	17.5	+0.00 -0.04	21.3	+0.000 -0.052	24.0	+0.00 -0.13	8.50	3.25	6111410
40	+0.10 +0.00	30	+0.00 -0.05	35.5	+0.000 -0.062	39.0	+0.00 -0.16	11.00	4.00	6111210
50	+0.10 +0.00	40	+0.00 -0.06	45.5	+0.000 -0.062	49.0	+0.00 -0.16	11.00	4.00	2326110
60	+0.10 +0.00	48	+0.00 -0.06	55.9	+0.000 -0.062	59.2	+0.00 -0.16	20.50	4.20	2326210
63	+0.12 +0.00	53	+0.00 -0.07	58.5	+0.000 -0.074	61.5	+0.00 -0.19	11.00	4.00	2325810
80	+0.12 +0.00	70	+0.00 -0.07	75.5	+0.000 -0.074	78.5	+0.00 -0.19	11.00	4.00	2325710
100	+0.14 +0.00	87	+0.00 -0.09	93.8	+0.000 -0.087	98.5	+0.00 -0.22	14.00	6.00	2326010
125	+0.16 +0.00	112	+0.00 -0.09	118.8	+0.000 -0.087	123.5	+0.00 -0.25	14.00	6.00	2325910

inch

$\varnothing D_1$	TOL H10	$\varnothing d_1$	TOL h9	$\varnothing d_2$	TOL h9	$\varnothing d_3$	TOL h11	L_1 +0.015 +0.005	L_2 0 -0.005	PART No.
1.250	+0.004 +0.000	0.937	+0.000 -0.002	1.079	+0.000 -0.002	1.187	+0.000 -0.005	0.343	0.125	6567790
2.375	+0.005 +0.000	2.000	+0.000 -0.003	2.200	+0.000 -0.003	2.312	+0.00 -0.005	0.437	0.150	6918060
2.500	+0.005 +0.000	2.125	+0.000 -0.003	2.325	+0.000 -0.003	2.437	+0.000 -0.005	0.437	0.150	2360210
3.250	+0.005 +0.000	2.875	+0.000 -0.003	3.270	+0.000 -0.004	3.437	+0.000 -0.005	0.437	0.150	2360310



Design

The Hallite 80 rotary pressure seal is a seal designed specifically for use in hydraulic swivel joints.

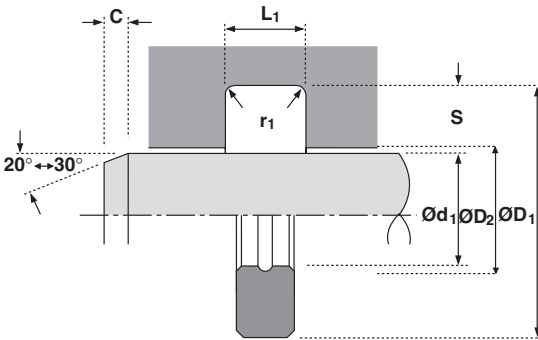
The Hallite 80 is manufactured in Hallite’s high specification polyurethane, Hythane® 181, to provide ease of installation and excellent sealing characteristics.

The elastic and flexible nature of the Hythane® material enables the Hallite 80 to be easily fitted in its groove. The Hallite 80 swivel seal is a one-piece double acting seal and replaces two part seals typically used in swivel joints. The hardwearing nature of Hallite’s Hythane® material provides long life in service.

Special pressure activation grooves are incorporated in the seal’s design to enable an immediate seal of the joint.

Features

- Easy installation into groove
- Replaces two-part seals
- Hardwearing
- Instant sealing
- Excellent service range



Technical details

Operating conditions

Maximum Speed	0.1 m/sec
Temperature Range	-30°C + 80°C
Maximum Pressure	350 bar

Surface roughness

Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max
Static Sealing Face ØD ₁	1.6 max	10 max
Static Housing Faces L ₁	3.2 max	16 max

Chamfers & Radii

Groove Section ≤ S mm	5.2
Min Chamfer C mm	2.4
Max Fillet Rad r ₁ mm	0.4

Tolerances

Ød ₁	ØD ₁	ØD ₂	L ₁ mm
f8	H10	H8	+0.3 -0

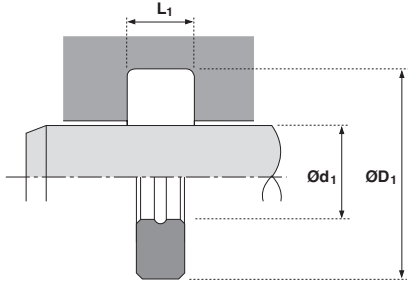
Inch

0.3 ft/sec
-22°F +76°F
5000 p.s.i.

µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max



rotary pressure seal



$\varnothing d_1$	TOL f8	$\varnothing D_1$	TOL H10	L_1 +0.3 -0.0	PART No.
57.20	-0.030 -0.076	70.00	+0.14 -0.00	7.50	4563000
80.00	-0.030 -0.076	90.00	+0.14 -0.00	5.00	4563000
90.00	-0.036 -0.090	100.00	+0.14 -0.00	5.00	4563100

$\varnothing d_1$	TOL f8	$\varnothing D_1$	TOL H10	L_1 +0.3 -0.0	PART No.
100.00	-0.036 -0.090	110.00	+0.14 -0.00	5.00	4563200
125.00	-0.043 -0.106	135.40	+0.16 -0.00	5.00	4578800

Design

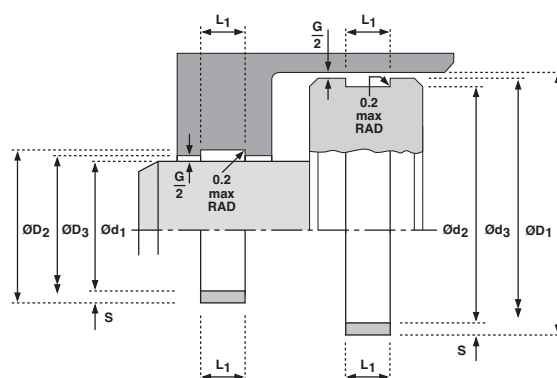
Hallite 87 bearing strip has the ability to support side loads and eliminate 'stick slip' between moving parts. The accurately dimensioned rectangular cross section is produced from a special combination of PTFE and Bronze materials. It has excellent heat resistance and strength to resist creep, making it suitable for bearings with reciprocating, oscillating or rotary movement, whether lubricated or not. Our standard range of cross section sizes are proportioned to be wrapped around a wide range of rod or piston diameters. Installation of the bearing is an easy task. Calculate and measure length L2 (see overleaf), cut the strip with a sharp blade and fit to the groove. If required we will be pleased to supply bearings to your sizes. Independent testing has established the typical properties which make the Hallite 87 worthwhile considering for many applications other than hydraulic or pneumatic cylinders. When using the compressive stress at yield in your calculation it is suggested a 4:1 factor of safety is applied.

The material is compatible with hydraulic mineral oil, lubricating oil, water based and synthetic fire resistant fluids and lubricating grease. Although the material is rated at 200°C, the recommended maximum temperature for bearing applications is 60°C.

Please send us details of your application for advice on this or any other problem where the Hallite 87 may solve your bearing problem.

Features

- Low friction
- Infinite length range
- Easy installation
- Extremely flexible



Technical details

Operating conditions

Maximum Speed 5.0 m/sec
Temperature Range -50°C +200°C

Typical Physical Properties

Specific Gravity 3.1
Compression Stress at Yield 23°C 20 MN/m²
Compression Stress at Yield 80°C 9 MN/m²
Coefficient of Thermal Conductivity 2.5 W/mK
Coefficient of Thermal Expansion Length & Thickness
6.5 x 10⁻⁵ per °C

Coefficient of Dynamic Friction
Dry 0.25 Lubricated 0.05

Bearing Strip Tolerances

L ₁		S	
-0.1	-0.5	+0.03	-0.05

Surface roughness

	µmRa	µmRt
Dynamic Sealing Face Ød ₁ ØD ₁	0.4	4 max
Static Housing Faces ØD ₂ L ₁ Ød ₂	3.2 max	16 max

Housing Details & Tolerances

Rod	Ød ₁	f9
	ØD ₂ =Ød ₁ +2S	up to: Ø80 H10 above: Ø80 H9
	ØD ₃ =Ød ₁ +G	G min / max
	L ₁	-0 + 0.2
	ØD ₁	H11
Piston	Ød ₂ =ØD ₁ -2S	f9
	Ød ₃ =ØD ₁ -G	G min / max
	L ₁	-0 + 0.2

Inch

15.0 ft/sec
-58°F +390°F

3.1
73°F 2900 p.s.i.
176°F 1300 p.s.i.
1.4Btu/hft°F

µinCLA	µinRMS
16	18
125 max	140 max

G min controls the minimum metal to metal clearance between the gland and rod or bore and piston.

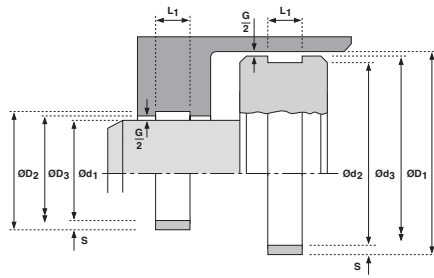
G max controls the maximum extrusion gap seen by a seal associated with the bearing.

Typically, G min should be 0.7mm / 0.028" but can be reduced when required by the extrusion gap for the seal and the build up of tolerances.

The absolute minimum metal to metal clearance recommended is 0.1mm / 0.004"

For applications not using a seal G max – see overleaf.





Ø RANGE		L ₁	S	G MAX	G MIN	W	PART NUMBER
Ød ₁	ØD ₁						
8 - 20	10 - 25	2.5	1.55	AS REQUIRED BY THE SEAL EXTRUSION GAP (see note below)	0.6	1.0 - 2.0	6663000
8 - 20	10 - 25	4.0	1.55		0.6	1.0 - 2.0	6663100
20 - 75	25 - 80	5.6	2.50		0.7	2.0 - 3.5	6663200
35 - 300	40 - 320	9.7	2.50		0.7	2.5 - 7.0	6658800
35 - 300	40 - 320	10.0	2.00		0.7	2.5 - 7.0	6663300
120 - 900	125 - 900	15.0	2.50		0.8	5.0 - 18.0	6658900
120 - 900	125 - 900	15.0	2.00		0.8	5.0 - 18.0	6663400
200 - 900	200 - 900	20.0	2.00		0.8	7.0 - 18.0	6663500
200 - 900	200 - 900	20.0	2.50		1.0	7.0 - 18.0	6663600
300 - 900	300 - 900	25.0	2.50		1.0	10.0 - 18.0	6663700

For applications not using a seal G Max can be :

S	G Max
1.55	1.0
2.00	1.1
2.50	1.6

Cutting strip to length

Calculate the developed length of the strip, L₂ (the developed length is the circumferential length of the centre line of the strip when installed).

for piston mounting :

the developed length = $\pi \times$ (cylinder bore diameter - strip section) - required split

i.e. $L_2 = \pi \times (\text{ØD}_1 - S) - W$

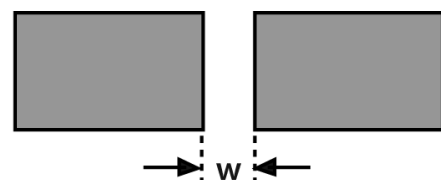
for gland mounting :

the developed length = $\pi \times$ (rod diameter + strip section) - required split

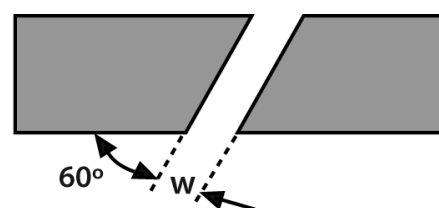
i.e. $L_2 = \pi \times (\text{Ød}_1 + S) - W$

Cut to length, (L₂), using a sharp knife.

Bearing strip cutting angle



Alternative



Design

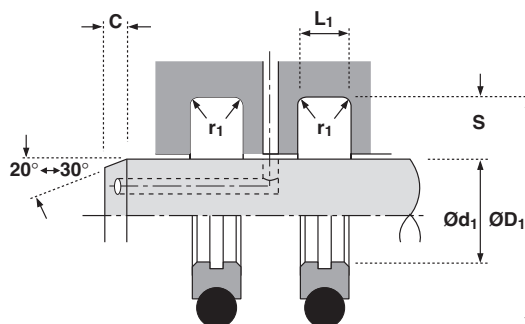
The Hallite 310 rotary pressure seal is designed specifically for use in hydraulic swivel joints. The seal assembly consists of a carbon filled PTFE seal ring energised by an NBR O ring. For aggressive media an FKM O ring can be substituted. The face material and design provides high abrasion resistance and low friction to allow running at low rotational speeds with minimal stick-slip. The low friction is helped by the groove in the sliding face, which provides an oil reservoir. The groove also reduces the contact area with the rotating counterface and allows a higher contact pressure. The circular recess in the outer diameter increases the contact of the face with the O ring and minimises the possibility of the sealing components rotating relative to each other.

NB: Part numbers suffixed by “†” indicate housing sizes to meet ISO7425-2.

Note: When the Hallite 310 is used as an end seal, it is recommended that it is protected with a wiper.

Features

- Minimal stick-slip
- Very low friction
- Can be mounted into one piece housings (over 30mm rod diameter)
- High temperature capability
- Low counterface wear
- Good extrusion resistance
- Compact housings - small installation space



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Maximum Temperature	-30°C + 100°C
Maximum Pressure	300 bar
Limiting PV Value Lubricated	40 bar m/sec

Inch

1.5 ft/sec
-22°F +212°F
4,500 p.s.i.
1900 p.s.i ft/sec

Maximum extrusion gap

Pressure bar	100	200	350
Maximum gap L ₁ =4.2mm	0.20	0.10	H7/f7 fit
Maximum gap L ₁ =6.3mm	0.30	0.25	H7/f7 fit

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.5 > 0.2	2.5 max	2 > 8	2 > 9
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	2.5 max	16 max	100 max	110 max

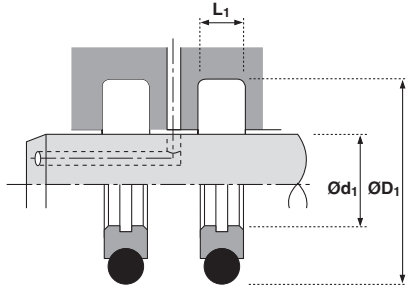
Chamfers & Radii

Groove Section ≤ S mm	5.5	7.75
Min Chamfer C mm	3.0	5.0
Max Fillet Rad r ₁ mm	0.8	1.2

Tolerances

Ød ₁	ØD ₁	L ₁ mm
f9	H11	+0.2 -0





Ød ₁	TOL f9	ØD ₁	TOL H11	L ₁ +0.2 -0	PART No.
40	-0.025 -0.087	51.0	+0.19 +0.00	4.2	8679710‡
45	-0.025 -0.087	56.0	+0.19 +0.00	4.2	8679810‡
50	-0.025 -0.087	61.0	+0.19 +0.00	4.2	8679910‡
56	-0.030 -0.104	67.0	+0.19 +0.00	4.2	8680010‡
60	-0.030 -0.104	71.0	+0.19 +0.00	4.2	8680110
63	-0.030 -0.104	74.0	+0.19 +0.00	4.2	8680210‡
70	-0.030 -0.104	81.0	+0.22 +0.00	4.2	8680310
75	-0.030 -0.104	86.0	+0.22 +0.00	4.2	8680410
80	-0.030 -0.104	91.0	+0.22 +0.00	4.2	8680510
90	-0.036 -0.123	101.0	+0.22 +0.00	4.2	8680610
100	-0.036 -0.123	111.0	+0.22 +0.00	4.2	8680710
110	-0.036 -0.123	121.0	+0.25 +0.00	4.2	8680810
115	-0.036 -0.123	126.0	+0.25 +0.00	4.2	8680910

Ød ₁	TOL f9	ØD ₁	TOL H11	L ₁ +0.2 -0	PART No.
120	-0.036 -0.123	131.0	+0.25 +0.00	4.2	8681010
125	-0.043 -0.143	136.0	+0.25 +0.00	4.2	8681110
130	-0.043 -0.143	141.0	+0.25 +0.00	4.2	8681210
140	-0.043 -0.143	151.0	+0.25 +0.00	4.2	8681310
150	-0.043 -0.143	161.0	+0.25 +0.00	4.2	8681410
160	-0.043 -0.143	171.0	+0.25 +0.00	4.2	8681510
170	-0.043 -0.143	181.0	+0.29 +0.00	4.2	8681610
180	-0.043 -0.143	191.0	+0.29 +0.00	4.2	8681710
190	-0.050 -0.165	201.0	+0.29 +0.00	4.2	8681810
200	-0.050 -0.165	215.5	+0.29 +0.00	6.3	8681910
210	-0.050 -0.165	225.5	+0.29 +0.00	6.3	8682010
220	-0.050 -0.165	235.5	+0.29 +0.00	6.3	8682110
250	-0.050 -0.165	265.5	+0.32 +0.00	6.3	8682210

Design

The Hallite 335 is an O-ring energised double lip wiper, which is designed to exclude dirt from entering the cylinder and to collect traces of fluid passing the rod seal.

The standard design is made from bronze filled PTFE, activated by an NBR O-ring.

A number of other material options can be provided to extend operating conditions. Please ensure that the correct part number is specified for the material option as indicated.

The housing sizes listed meet ISO6195D.

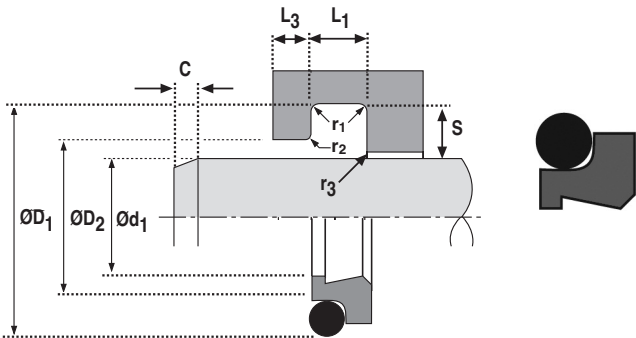
NB: A vent between the seal and wiper is recommended to avoid a pressure trap

Features

- Protects primary seal from contamination
- Extends seal life
- Low friction no stick-slip
- High strength machined PTFE wiper
- Wide range of materials and dimensions available for special applications

Material

Face Material - O Ring	
Standard material	
PTFE/Bronze – NBR	20
Material options:	
PTFE/Bronze – FKM	21
PTFE/Glass – NBR	10
PTFE/Glass – FKM	11



Technical details

Operating conditions

Maximum Speed	5.0 m/sec
Temperature Range	-30°C +100°C

Inch

15.0 ft/sec
-22°F +212°F

Surface roughness

Dynamic Sealing Face $\varnothing d_1$	$0.1 < > 0.4$	4 max
Static Sealing Face $\varnothing D_1$ $\varnothing D_2$	1.6 max	10 max
Static Housing Faces L_1	3.2 max	16 max

μinCLA	μinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

Chamfers & Radii

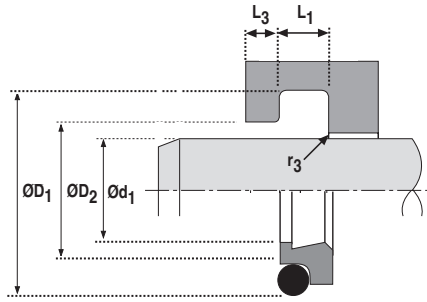
Groove Section $\leq S$ mm	3.4	4.4	6.1	8.0
Min Chamfer C mm	2.0	2.0	2.5	4.0
Max Fillet Rad r_1 mm	0.5	0.5	0.5	0.5
Max Fillet Rad r_2 mm	0.5	0.5	0.5	0.5

Tolerances

mm	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1
	f9	H9	H11	+0.2 -0



wipers



Ød ₁ f9	ØD ₁ H11	L ₁ +0.2	ØD ₂ H11	L ₃ min	r ₃ max	PART No.
20	26.80	5.00	21.50	2.00	0.80	87151_ _ *
22	28.80	5.00	23.50	2.00	0.80	87152_ _ *
25	31.80	5.00	26.50	2.00	0.80	87153_ _ *
28	34.80	5.00	29.50	2.00	0.80	87154_ _ *
32	38.80	5.00	33.50	2.00	0.80	87156_ _
36	42.80	5.00	37.50	2.00	0.80	87157_ _
40	46.80	5.00	41.50	2.00	0.80	87158_ _
40	48.80	6.30	41.50	3.00	0.80	87159_ _
45	51.80	5.00	46.50	2.00	0.80	87160_ _
45	53.80	6.30	46.50	3.00	0.80	87161_ _
50	56.80	5.00	51.50	2.00	0.80	87162_ _
50	58.80	6.30	51.50	3.00	0.80	87163_ _
56	62.80	5.00	57.50	2.00	0.80	87164_ _
56	64.80	6.30	57.50	3.00	0.80	87165_ _
63	69.80	5.00	64.50	2.00	0.80	87166_ _
63	71.80	6.30	64.50	3.00	0.80	87167_ _
70	78.80	6.30	71.50	3.00	1.00	87168_ _
70	82.20	8.10	72.00	4.00	1.00	87169_ _
80	88.80	6.30	81.50	3.00	1.00	87170_ _

Ød ₁ f9	ØD ₁ H11	L ₁ +0.2	ØD ₂ H11	L ₃ min	r ₃ max	PART No.
80	92.20	8.10	82.00	4.00	1.00	87171_ _
90	98.80	6.30	91.50	3.00	1.00	87172_ _
90	102.20	8.10	92.00	4.00	1.00	87173_ _
100	108.80	6.30	101.50	3.00	1.00	87174_ _
100	112.20	8.10	102.00	4.00	1.00	87175_ _
110	118.80	6.30	111.50	3.00	1.00	87176_ _
110	122.20	8.10	112.00	4.00	1.00	87177_ _
125	133.80	6.30	126.50	3.00	1.00	87178_ _
125	137.20	8.10	127.00	4.00	1.00	87179_ _
140	152.20	8.10	142.00	4.00	1.00	87180_ _
140	156.00	9.50	142.50	5.00	1.50	87181_ _
160	172.20	8.10	162.00	4.00	1.00	87182_ _
160	176.00	9.50	162.50	5.00	1.50	87183_ _
180	192.20	8.10	182.00	4.00	1.00	87184_ _
180	196.00	9.50	182.50	5.00	1.50	87185_ _
200	212.20	8.10	202.00	4.00	1.00	87186_ _
200	216.00	9.50	202.50	5.00	1.50	87187_ _
220	232.20	8.10	222.00	4.00	1.00	87188_ _
220	236.00	9.50	222.50	5.00	1.50	87189_ _

* split housings recommended

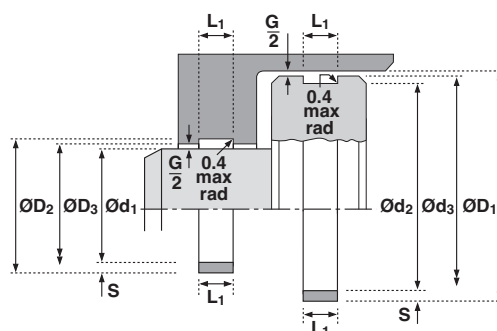
Design

Hallite 506 bearing strip is available in three forms: cut rings, spiral lengths and flat coils. Hallite 506 provides an extremely effective, hard wearing and easy to use bearing material.

Manufactured to very tight tolerances and providing bearing solutions for reciprocating, oscillating and slow rotary movement applications, Hallite 506 bearing strip is used in many of today's most arduous hydraulic applications around the world. Commonly fitted in reciprocating cylinders as rod and piston bearings, Hallite 506 is capable of withstanding extreme side-loads preventing metal to metal contact.

The material's design incorporates micro indentations on the bearing strip's surface to trap fluid and provide built-in lubrication to the bearing. The 506 bearing strip is manufactured by a patented process, using a woven fabric reinforced polyester resin material and is proven to be compatible with a wide range of fluids, including mineral oils, water based fluids and phosphate esters, to produce a rectangular section strip which is available in a wide range of inch and metric sizes including cross sections specified in ISO 10766.

* Please note that for reciprocating applications, the compressive stress at yield should be used for design calculations. For rotary shafts use the limiting P.V. values. It is suggested that a 2:1 factor of safety is applied.



Technical details

Operating conditions

Temperature Range
Limiting PV Values Lubricated*

Metric

-40°C +120°C	
Speed m/sec	Pressure MN/m ²
0.1	10.0
1.0	6.0
5.0	0.8

Inch

-40°F +250°F	
Speed ft/sec	Pressure p.s.i.
0.3	1500
3.0	900
16.0	120

Typical physical properties

Specific Gravity
Compression Stress at Failure
Compression Stress at Yield*
Compression Stress at Yield*
Coefficient of Thermal Conductivity
Coefficient of Thermal Expansion
Coefficient of Dynamic Friction on steel surface (0.2 µm Ra) / (8 µin CLA)

	1.27
(Temp 23°C)	450 MN/m ²
(Temp 23°C)	115 MN/m ²
(Temp 80°C)	58 MN/m ²
	0.27 W/mK
Length	Thickness
9 X 10 ⁻⁵	13 X 10 ⁻⁵
per °C	per °C
Dry	Lubricated
0.50	0.06

	1.27
(Temp 73°F)	65,000 p.s.i.
(Temp 73°F)	16,500 p.s.i.
(Temp 176°F)	8,500 p.s.i.
	0.16 Btu/hft °F
Length	Thickness
5 X 10 ⁻⁵	7.3 X 10 ⁻⁵
per °F	per °F
Dry	Lubricated
0.50	0.06

Surface Roughness

Dynamic Sealing Face ØD₁, ØD₁
Static Sealing Face ØD₂, ØD₂, L₁

µm Ra	µm Rt
0.4	4 max
3.2 max	16 max

µin CLA	µin RMS
16	18
125 max	140 max

Bearing Strip Tolerances

L ₁	S
-0.1 to -0.6	-0.02 to -0.08

L ₁	S
-0.005 to -0.025	-0.001 to -0.003

Width of Bearing Split – W

ØD ₁ / ØD ₁	W
Up to 50	3.00 - 1.50
Up to 120	5.00 - 3.50
Up to 250	9.00 - 7.25
Up to 550	17.00 - 15.00

ØD ₁ / ØD ₁	W
Up to 2"	0.12 - 0.06
Up to 5"	0.19 - 0.14
Up to 10"	0.35 - 0.29
Up to 22"	0.67 - 0.59

Housing Details & Tolerances

Rod

ØD ₁	f9
ØD ₂ = ØD ₁ + 2S	up to : Ø80 H10
	above : Ø80 H9
ØD ₃ = ØD ₁ + G	G min / max
L ₁	+ 0.2 -0 mm

ØD ₁	f9
ØD ₂ = ØD ₁ + 2S	up to : Ø ₃ in H10
	above : Ø ₃ in H9
ØD ₃ = ØD ₁ + G	G min / max
	+ 0.008 -0 in

Piston

ØD ₁	H11
ØD ₂ = ØD ₁ - 2S	f9
ØD ₃ = ØD ₁ - G	G min / max
L ₁	+ 0.2 -0 mm

ØD ₁	H11
ØD ₂ = ØD ₁ - 2S	f9
ØD ₃ = ØD ₁ - G	G min / max
L ₁	+ 0.008 -0 in



bearings

Hallite 506 bearing strip is available in three forms:

Cut Rings

Ready made bearings, cut to size and to customer specifications, and ready for installation, Hallite 506 bearings have become an industry standard favoured by designers and specifiers alike. Generally produced for the medium to high volume user.



Spiral Lengths

Available in a wide range of preformed diameters, spirals are supplied in continuous lengths to suit a range of inside and outside diameters. Ideal for lower volume users requiring various diameters.



Flat Coils

Packaged in a dispenser for ease of storage and handling, flat coils are supplied in 10 metre lengths suitable for a wide range of diameters and are ideal for those using or supplying one off bearings for small volume requirements.



The ranges shown on the following pages are Hallite's most popular sizes. The section ranges identify section and groove width; from these nearly any diameter of cut ring or spiral length can be manufactured. If you cannot find the size you are looking for, please contact your local Hallite sales office for additional size information.

All standard bearing strip is printed with a size reference and includes distance marking every 100mm on metric size sections and every six inches on inch size sections for guidance only.

When ordering please clearly state whether cut rings, spiral lengths or flat coils are required. For cut rings and spiral lengths please state whether rod or piston application and provide inside ($\varnothing d$) or outside ($\varnothing D$) diameters, groove width (L_1) and section (S) dimensions and where spiral lengths are ordered also specify length required. For flat coils please specify groove width (L_1) and section (S) dimensions.

Features

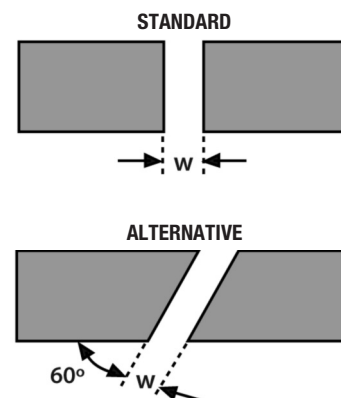
- Ultra low friction
- Compact housing
- Inch sizes available on request
- Seal ring component machined by Hallite, so any size can be catered for

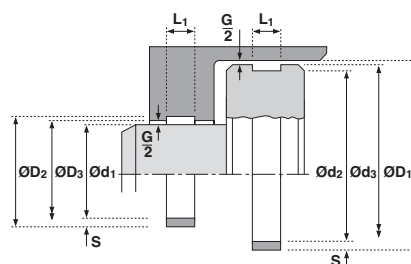
Cutting bearing strip to size

1. Select the groove width (L_1) and section (S) required.
2. In the case of a rod bearing, position the bearing strip around the rod or in the case of a piston bearing, place it in the piston groove and mark the point of overlap. Determine the correct width of bearing split (W) for the $\varnothing d$ or $\varnothing D$ being used, as indicated in the technical details, and make a second mark.
3. Remove the strip and cut at the second marked position to the desired angle using secateurs or other similar cutting tool.

It is recommended that the standard cutting angle is used for the majority of applications.

Bearing split cutting angle





Metric – Section Range

S	L ₁
1.50	5.6
2.00	9.7
2.00	10.0
2.00	15.0
2.00	20.0
2.00	22.0
2.00	25.0
2.50	5.6 ‡
2.50	6.3
2.50	7.0
2.50	8.0
2.50	9.7 ‡
2.50	12.0
2.50	13.0

S	L ₁	
2.50	15.0	‡
2.50	16.0	
2.52	19.5	
2.50	20.0	
2.50	25.0	‡
2.52	30.0	
2.50	40.0	
2.50	50.0	
3.00	9.7	
3.00	12.0	
3.00	12.8	
3.02	15.0	
3.00	16.0	
3.00	20.0	

S	L ₁
3.00	25.0
3.00	30.0
3.00	35.0
3.00	40.0
3.20	9.7
3.20	19.7
3.50	25.0
4.00	6.1
4.00	9.7
4.00	20.0
4.00	25.0 ‡
4.00	30.0
4.00	35.0
4.00	40.1

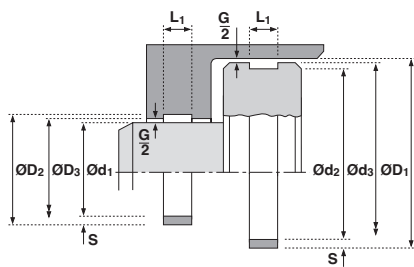
Inch – Section Range

S	L ₁
0.063	0.375
0.125	0.375
0.125	0.500
0.125	0.625
0.125	0.750
0.125	1.000
0.125	1.500

Within the size range, items suffixed ‡ indicate cross sections to ISO 10766.

Metric – Spiral Lengths

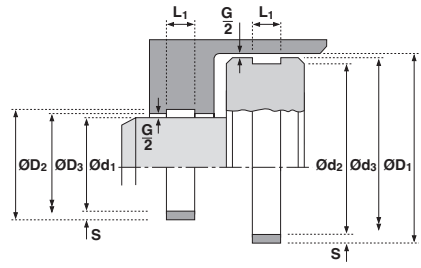
Ød ₁	Ø RANGE	ØD ₁	S	L ₁	G MAX	G MIN*	PART No.
25 - 41		45 - 90	2.0	10.0	As required by the seal extrusion gap	0.7	8501310
35 - 70		74 - 160	2.0	10.0		0.7	8502610
70 - 155		159 - 310	2.0	10.0		0.7	8502252
35 - 50		54 - 110	2.0	15.0		0.7	8503357
50 - 100		104 - 210	2.0	15.0		0.7	8503175
90 - 180		184 - 370	2.0	15.0		0.7	8503358
25 - 30		35 - 70	2.5	5.6		0.7	8502000‡
25 - 50		55 - 110	2.5	5.6		0.7	8502020‡
50 - 100		105 - 210	2.5	5.6		0.7	8502040‡
25 - 40		45 - 90	2.5	9.7		0.7	8502100‡
35 - 70		75 - 150	2.5	9.7	For applications not using a seal G MAX can be 1.6mm	0.7	8502120‡
70 - 150		155 - 310	2.5	9.7		0.7	8502140‡
40 - 50		55 - 110	2.5	13.0		0.7	8502200
50 - 100		105 - 210	2.5	13.0		0.7	8502220
90 - 180		185 - 370	2.5	13.0		0.8	8502230
40 - 50		55 - 110	2.5	15.0		0.7	8502300‡
50 - 100		105 - 210	2.5	15.0		0.7	8502330‡
90 - 180		185 - 370	2.5	15.0		0.8	8502350‡
50 - 80		85 - 170	2.5	20.0		0.7	8502400
75 - 150		155 - 310	2.5	20.0		0.8	8502410
125 - 250		255 - 510	2.5	20.0		0.8	8502430
60 - 80		85 - 170	2.5	25.0		0.7	8502500‡
70 - 150		155 - 310	2.5	25.0		0.8	8502520‡
125 - 250		255 - 510	2.5	25.0		0.8	8502530‡
40 - 50		56 - 100	3.0	9.7		0.8	8503369



Metric - Spiral Lengths

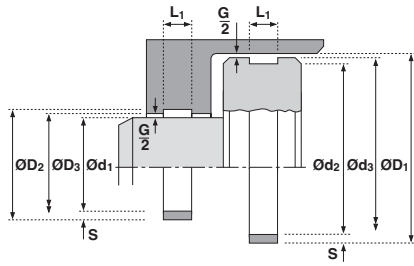
Ød ₁	Ø RANGE	ØD ₁	S	L ₁	G MAX	G MIN*	PART No.
50 - 100		106 - 210	3.0	9.7	As required by the seal extrusion gap For applications not using a seal G MAX can be 1.6mm	0.8	8503370
100 - 150		156 - 310	3.0	9.7		0.8	8503371
50 - 60		66 - 120	3.0	12.8		0.7	8503037
60 - 104		110 - 220	3.0	12.8		0.8	8503038
90 - 149		155 - 300	3.0	12.8		0.8	8503039
55 - 80		86 - 170	3.0	20.0		0.8	8503124
80 - 150		156 - 310	3.0	20.0		0.8	8502635
140 - 250		256 - 510	3.0	20.0		0.8	8503189
50 - 75		81 - 160	3.02	15.0		0.7	8502734
60 - 80		68 - 170	4.0	6.1		0.8	8503359
80 - 150		158 - 310	4.0	6.1		0.8	8503360
150 - 250		258 - 510	4.0	6.1		0.8	8503361
60 - 80		88 - 170	4.0	9.7		0.8	8503362
80 - 150		158 - 310	4.0	9.7		0.8	8503363
150 - 250		258 - 510	4.0	9.7		0.8	8503364
60 - 80		88 - 170	4.0	20.0		0.8	8503365
80 - 150		158 - 310	4.0	20.0		0.8	8503366
150 - 250		258 - 510	4.0	20.0		0.8	8503191
120 - 150		158 - 310	4.0	25.0		0.8	8503367‡
150 - 250		258 - 510	4.0	25.0		0.8	8503192‡
120 - 150		158 - 310	4.0	30.0		0.8	8503368
150 - 250		258 - 510	4.0	30.0		0.8	8503193
170 - 200		208 - 410	4.0	40.1		0.8	8503179
200 - 300		308 - 610	4.0	40.1		0.8	8503180

Within the size range, items suffixed ‡ indicate cross sections to ISO 10766.



Inch - Spiral Lengths

$\varnothing d_1$	$\varnothing$ RANGE	$\varnothing D_1$	S	L ₁	G MAX	G MIN*	PART No.
1.000 - 1.375	1.625 - 3.500		0.125	0.375	As required by the seal extrusion gap	0.031	8502098
1.250 - 1.875	2.125 - 4.250		0.125	0.375		0.031	8502099
2.000 - 3.500	3.750 - 6.250		0.125	0.375		0.031	8502183
1.250 - 1.750	2.000 - 4.000		0.125	0.500		0.031	8502089
1.750 - 3.500	3.750 - 6.250		0.125	0.500		0.031	8502090
3.500 - 6.000	6.250 - 10.000		0.125	0.500		0.031	8502091
8.000 - 12.500	12.750 - 25.000		0.125	0.500		0.031	8502720
2.000 - 3.500	3.750 - 6.250		0.125	0.625		0.031	8502092
3.500 - 6.000	6.250 - 10.000		0.125	0.625		0.031	8502093
2.000 - 3.500	3.750 - 6.250		0.125	0.750		0.031	8502094
3.500 - 6.000	6.250 - 10.000		0.125	0.750	For applications not using a seal G MAX can be 0.080in	0.031	8502095
2.500 - 3.500	3.750 - 6.250		0.125	1.000		0.031	8502096
3.500 - 6.000	6.250 - 10.000		0.125	1.000		0.031	8502097
8.000 - 12.500	12.750 - 25.000		0.125	1.000		0.031	8502222



Metric – Flat Coils

Ød ₁	Ø RANGE	ØD ₁	S	L ₁	G MAX	G MIN*	PART No.
140		190	1.5	5.6	As required by the seal extrusion gap For applications not using a seal G MAX can be 1.6mm	0.7	8581810
140		210	2.0	9.7		0.7	8581910
140		210	2.0	10.0		0.7	8584610
140		210	2.0	20.0		0.7	8582210
140		210	2.0	15.0		0.7	8581210
140		230	2.5	5.6		0.7	8580010‡
140		230	2.5	6.3		0.7	8581310
140		230	2.5	8.0		0.7	8581610
140		230	2.5	9.7		0.7	8580110‡
140		230	2.5	13.0		0.7	8581110
140		230	2.5	15.0		0.7	8580210‡
140		230	2.5	20.0		0.8	8580310
140		230	2.5	25.0		0.8	8580410‡
140		230	2.5	30.0		0.7	8582010
140		240	3.0	9.7		0.7	8581410
140		240	3.0	12.8		0.7	8581010
140		240	3.0	20.0		0.7	8581510
140		240	3.02	15.0		0.7	8581710

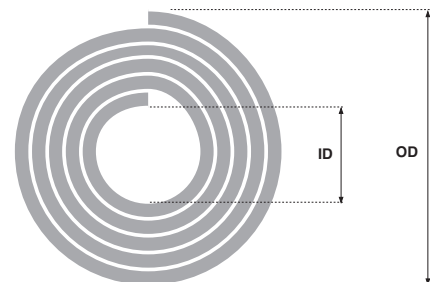
Inch – Flat Coils

5.500	9.750	0.125	0.375	As required by the seal extrusion gap	0.031	8580510
5.500	9.750	0.125	0.500		0.031	8580610
5.500	9.750	0.125	0.625	For applications not using a seal G MAX can be 0.080in	0.031	8580710
5.500	9.750	0.125	0.750		0.031	8580810
5.500	9.750	0.125	1.000		0.031	8580910

Within the size range, items suffixed ‡ indicate cross sections to ISO 10766.
ID and OD are indicated as approximate values for guidance only.

* This value can be reduced if required by the seal's maximum extrusion gap- Refer to Housing Design section.

If necessary coil diameters can be re-sized by curing on a suitable mandrel in an oven for 1 hr at 120°C 250°F and allowing to cool on the mandrel.



General

The Hallite 500 series is a family of high performance loaded

'U' cups are designed to interchange in standard North American housings. Since the launch in 1988, these seals have become accepted as the leading alternative choice for quality and cost effectiveness.

Hallite offer three profiles of single acting seals in the 500 Series (511,512,513). Covering most applications from mobile hydraulics to industrial cylinders, all have been well proven and are standard fitment in many of the leading cylinder and O.E.M. manufacturers worldwide. Each catalogue page outlines the operating condition parameters to give optimum performance and life. For applications outside, or at the extreme, of these figures, it is recommended that guidance is sought from Hallite Seals.

Material

All Hallite materials are subject to stringent quality

controls to ensure consistency both in the manufacture and in use. The 500 series are manufactured, as a standard, in polyurethane / nitrile 'O' ring. Other materials are available for combating the effects of temperature extremes or fluid variations.

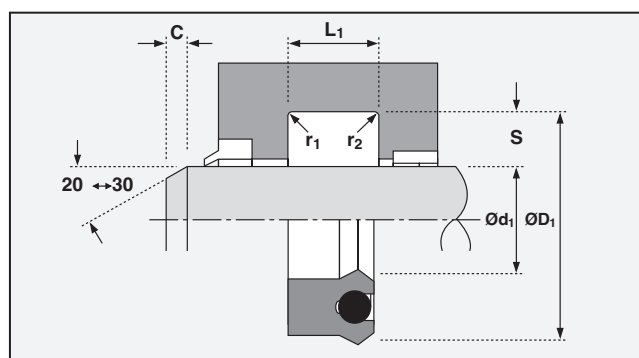
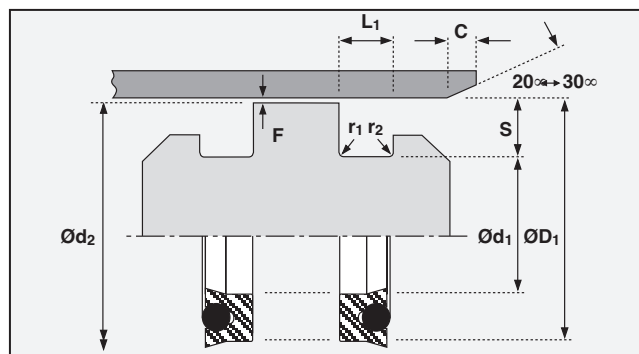
Media

All seals are suitable for mineral based hydraulic fluids. As the fluid can have enormous consequences for the life and performance, particularly at higher temperatures, it is advised that guidance is sought if non-standard fluid is used.

Extrusion Gaps

Extrusion gaps can be minimised by the use of glands or pistons with integral bearings. However, better bearing performance is often achieved by the use of remote bearings, which inevitably means that the extrusion gap is increased to achieve adequate metal to metal clearance, (refer to data sheets for individual seal types).

For this reason, guidance should be sought from the Hallite technical department if remote bearings are to be used with seals under 1/4" cross section.



500 series (inch) - specified tolerances for piston applications

Seal Cross Section (S)	Bore Tolerance (ØD ₁)	Piston Spigot Tolerance (Ød ₁)	Groove Width Tolerance (L ₁)
1/8" (.125)	+0.002 -0.000	+0.000 -0.002	+0.015 -0.000
3/16" (.187)	+0.002 -0.000	+0.000 -0.002	+0.015 -0.000
1/4" (.250)	+0.003 -0.000	+0.000 -0.003	+0.015 -0.000
5/16" (.312)	+0.003 -0.000	+0.000 -0.004	+0.015 -0.000
3/8" (.375)	+0.003 -0.000	+0.000 -0.005	+0.015 -0.000
1/2" (.500)	+0.004 -0.000	+0.000 -0.007	+0.015 -0.000

500 series (inch) - specified tolerances for rod applications

Seal Cross Section (S)	Rod Tolerance (ØD ₁)	Gland Bore Tolerance (Ød ₁)	Groove Width Tolerance (L ₁)
1/8" (.125)	+0.000 -0.001	+0.002 -0.000	+0.015 -0.000
3/16" (.187)	+0.000 -0.002	+0.002 -0.000	+0.015 -0.000
1/4" (.250)	+0.000 -0.002	+0.003 -0.000	+0.015 -0.000
5/16" (.312)	+0.000 -0.002	+0.004 -0.000	+0.015 -0.000
3/8" (.375)	+0.000 -0.002	+0.005 -0.000	+0.015 -0.000
1/2" (.500)	+0.000 -0.003	+0.007 -0.000	+0.015 -0.000

Design

The Hallite 511 is a loaded U cup utilising a polyurethane or polyester shell energised by a high specification resilient O ring.

At zero or low pressure, the O ring helps to increase the sealing force preventing any bypass. As pressure rises the sealing force increases and the O ring ensures complete lip actuation under most conditions.

The symmetry of the seal allows it to be used on both rod and piston applications and its flexibility enables easy installation. Ideally suited for single acting applications, the Hallite 511 can also be fitted back to back for use in double acting applications.

Features

- Flexible for easy installation
- Excellent resistance to abrasion
- Positive lip actuation
- Knife trimmed precision sealing lips
- Compact housing
- Wide range of sizes

Material

Face Material - O Ring
Standard material
Polyurethane – NBR

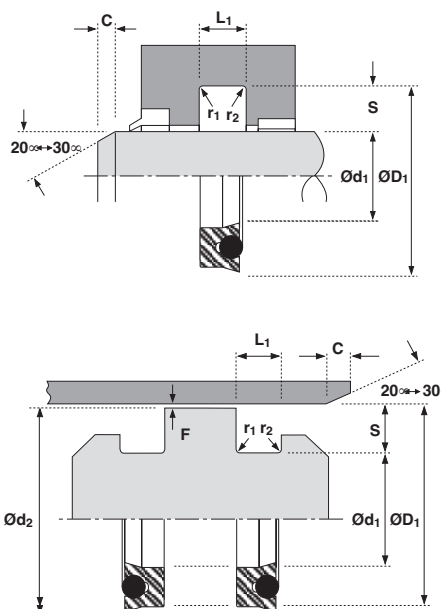
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Material options:
Polyester – NBR

----- 11

Hallite 361 – NBR

----- 16



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-40°C +110°C
Maximum Pressure	350 bar

Inch

1.5 ft/sec
-40°F +230°F
5000 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side, for rod seals using minimum rod $\varnothing$ and maximum clearance $\varnothing$ and for piston seals using the minimum clearance $\varnothing$ and maximum bore $\varnothing$. Refer to Housing Design section.

(1/4" section and above)

Pressure bar	160	250	350
Pressure p.s.i.	2400	3750	5000
Maximum Gap in	0.024	0.020	0.016

Surface roughness

	μmRa	μmRt	μinCLA	μinRMS
Dynamic Sealing Face – Rod $\varnothing d_1$	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face – Rod $\varnothing D_1$	1.6 max	10 max	63 max	70 max
Dynamic Sealing Face – Piston $\varnothing d_1$	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face – Piston $\varnothing d_1$	1.6 max	10 max	63 max	70 max
Static Housing Faces L_1	3.2 max	16 max	125 max	140 max

Chamfers & Radii

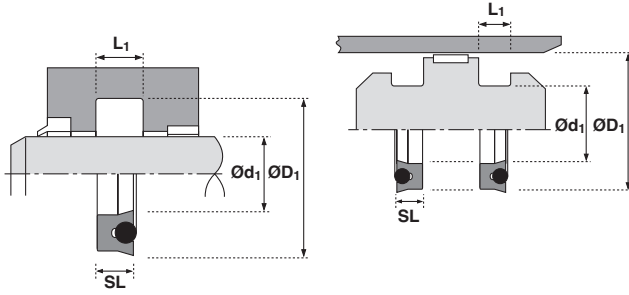
Groove Section $\leq S$ in	0.125	0.187	0.250	0.312	0.375	0.500	0.625
Min Chamfer C in	0.093	0.093	0.125	0.156	0.187	0.187	0.217
Max Fillet Rad r_1 in	0.008	0.008	0.016	0.032	0.032	0.032	0.047
Max Fillet Rad r_2 in	0.016	0.016	0.032	0.047	0.047	0.047	0.062

Tolerances

Please refer to specified tolerances in the introduction page - Hallite 500 Series

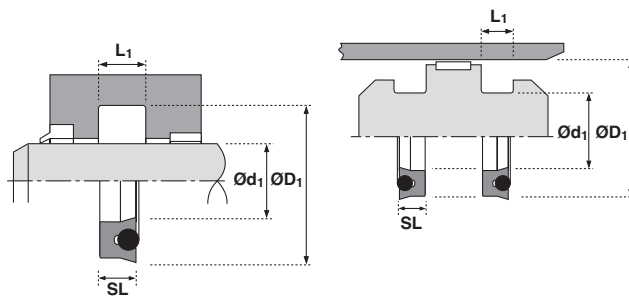


rod/piston seals



Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
1/8 CROSS SECTION					
.125	.375	.125	.138	12500125	8900810
.188	.438	.125	.138	12500187	8800110
.250	.500	.125	.138	12500250	8800210
.313	.563	.125	.138	12500312	8902810
.375	.625	.125	.138	12500375	8800410
.437	.687	.125	.138	12500437	8905110
.500	.750	.125	.138	12500500	8800610
.563	.813	.125	.138	12500562	8844610
.625	.875	.125	.138	12500625	8800810
.688	.938	.125	.138	12500687	8801010
.750	1.000	.125	.138	12500750	8801110
.813	1.063	.125	.138	12500812	8815310
.875	1.125	.125	.138	12500875	8801410
.938	1.188	.125	.138	12500937	8844810
1.000	1.250	.125	.138	12501000	8801610
1.063	1.313	.125	.138	12501062	8801810
1.125	1.375	.125	.138	12501125	8801910
1.250	1.500	.125	.138	12501250	8802210
1.375	1.625	.125	.138	12501375	8802410
1.500	1.750	.125	.138	12501500	8802610
1.625	1.875	.125	.138	12501625	8802810
1.750	2.000	.125	.138	12501750	8803010
1.875	2.125	.125	.138	12501875	8803210
2.000	2.250	.125	.138	12502000	8803410
2.250	2.500	.125	.138	12502250	8803810
2.375	2.625	.125	.138	12502375	8815610
2.500	2.750	.125	.138	12502500	8800310
2.750	3.000	.125	.138	12502750	8817910
2.875	3.125	.125	.138	12502875	8814210
3.000	3.250	.125	.138	12503000	8804510
3.250	3.500	.125	.138	12503250	8819610
3.500	3.750	.125	.138	12503500	8815810
3.750	4.000	.125	.138	12503750	8818710
3.875	4.125	.125	.138	12503875	8816510
4.000	4.250	.125	.138	12504000	8805210
4.250	4.500	.125	.138	12504250	8819710
4.750	5.000	.125	.138	12504750	8818110
4.875	5.125	.125	.138	12504875	8816710

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
5/32 CROSS SECTION					
1.000	1.313	.156	.172	15601000	8810110
1.188	1.500	.156	.172	15601187	8811010
1.250	1.563	.156	.172	15601250	8813810
1.375	1.688	.156	.172	15601375	8813910
3/16 CROSS SECTION					
.375	.750	.188	.207	18700375	8902910
.500	.875	.188	.207	18700500	8800710
.625	1.000	.188	.207	18700625	8800910
.750	1.125	.188	.207	18700750	8801210
.875	1.250	.188	.207	18700875	8801510
1.000	1.375	.188	.207	18701000	8801710
1.125	1.500	.188	.207	18701125	8802010
1.188	1.563	.188	.207	18701187	8851710
1.250	1.625	.188	.207	18701250	8802310
1.375	1.750	.188	.207	18701375	8802510
1.500	1.875	.188	.207	18701500	8802710
1.625	2.000	.188	.207	18701625	8802910
1.750	2.125	.188	.207	18701750	8803110
1.875	2.250	.188	.207	18701875	8803310
2.000	2.375	.188	.207	18702000	8803510
2.125	2.500	.188	.207	18702125	8803710
2.250	2.625	.188	.207	18702250	8803910
2.375	2.750	.188	.207	18702375	8804010
2.500	2.875	.188	.207	18702500	8804110
2.625	3.000	.188	.207	18702625	8804210
2.750	3.125	.188	.207	18702750	8804410
2.875	3.250	.188	.207	18702875	8851010
3.000	3.375	.188	.207	18703000	8804610
3.125	3.500	.188	.207	18703125	8804710
3.250	3.625	.188	.207	18703250	8804810
3.375	3.750	.188	.207	18703375	8854210
3.500	3.875	.188	.207	18703500	8805010
3.625	4.000	.188	.207	18703625	8805110
3.750	4.125	.188	.207	18703750	8879410
3.875	4.250	.188	.207	18703875	8823510
4.000	4.375	.188	.207	18704000	8805310
4.125	4.500	.188	.207	18704125	8805410



Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
4.250	4.625	.188	.207	18704250	8805510
4.375	4.750	.188	.207	18704375	8854310
4.500	4.875	.188	.207	18704500	8805710
4.625	5.000	.188	.207	18704625	8879510
4.875	5.250	.188	.207	18704875	8823610
5.125	5.500	.188	.207	18705125	8908510

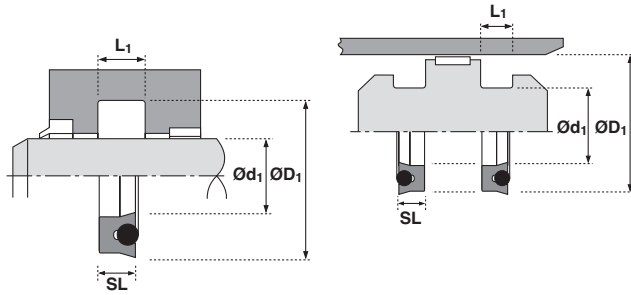
1/4 CROSS SECTION

.313	.812	.250	.275	25000312	8824710
.375	.875	.250	.275	25000375	8865810
.500	1.000	.250	.275	25000500	8806310
.625	1.125	.250	.275	25000625	8806410
.750	1.250	.250	.275	25000750	8806510
.875	1.375	.250	.275	25000875	8806610
1.000	1.500	.250	.275	25001000	8806810
1.125	1.625	.250	.275	25001125	8807010
1.250	1.750	.250	.275	25001250	8807210
1.375	1.875	.250	.275	25001375	8807310
1.500	2.000	.203	.223	25001500-203	8801310
1.500	2.000	.250	.275	25001500	8807510
1.625	2.125	.250	.275	25001625	8807710
1.750	2.250	.250	.275	25001750	8807810
1.875	2.375	.250	.275	25001875	8808010
2.000	2.500	.250	.275	25002000	8808210
2.125	2.625	.250	.275	25002125	8808410
2.250	2.750	.250	.275	25002250	8808610
2.375	2.875	.250	.275	25002375	8808810
2.500	3.000	.203	.223	25002500-203	8803610
2.500	3.000	.250	.275	25002500	8809010
2.625	3.125	.250	.275	25002625	8809110
2.750	3.250	.250	.275	25002750	8809210
2.875	3.375	.250	.275	25002875	8809410
3.000	3.500	.203	.223	25003000-203	8816110
3.000	3.500	.250	.275	25003000	8809610
3.250	3.750	.250	.275	25003250	8810010
3.375	3.875	.250	.275	25003375	8850710
3.500	4.000	.203	.223	25003500-203	8817210
3.500	4.000	.250	.275	25003500	8810310
3.625	4.125	.250	.275	25003625	8810510

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
3.750	4.250	.250	.275	25003750	8810610
3.875	4.375	.250	.275	25003875	8810710
4.000	4.500	.250	.275	25004000	8810810
4.250	4.750	.250	.275	25004250	8811210
4.375	4.875	.250	.275	25004375	8811410
4.500	5.000	.203	.223	25004500-203	8804310
4.500	5.000	.250	.275	25004500	8811610
4.625	5.125	.250	.275	25004625	8811810
4.750	5.250	.250	.275	25004750	8811910
4.875	5.375	.250	.275	25004875	8856510
5.000	5.500	.250	.275	25005000	8812010
5.250	5.750	.250	.275	25005250	8812210
5.500	6.000	.250	.275	25005500	8812410
5.750	6.250	.250	.275	25005750	8812610
6.000	6.500	.250	.275	25006000	8812810
6.250	6.750	.250	.275	25006250	8856610
6.500	7.000	.250	.275	25006500	8813110
6.750	7.250	.250	.275	25006750	8813210
7.000	7.500	.250	.275	25007000	8813310
7.250	7.750	.250	.275	25007250	8856710
7.500	8.000	.250	.275	25007500	8813410
8.000	8.500	.250	.275	25008000	8813610
8.250	8.750	.250	.275	25008250	8856810
8.500	9.000	.250	.275	25008500	8813710

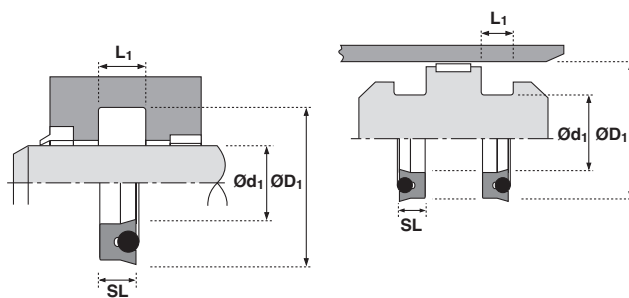
5/16 CROSS SECTION

.250	.875	.313	.344	31200250	8899710
.375	1.000	.313	.344	31200375	8824910
.687	1.312	.312	.344	31200687	8906710
1.000	1.625	.313	.344	31201000	8806910
1.125	1.750	.313	.344	31201125	8807110
1.250	1.875	.313	.344	31201250	8870010
1.375	2.000	.313	.344	31201375	8807410
1.500	2.125	.313	.344	31201500	8807610
1.625	2.250	.313	.344	31201625	8850910
1.750	2.375	.313	.344	31201750	8807910
1.875	2.500	.313	.344	31201875	8808110
2.000	2.625	.313	.344	31202000	8808310
2.125	2.750	.313	.344	31202125	8808510



Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
2.250	2.875	.313	.344	31202250	8808710
2.375	3.000	.313	.344	31202375	8808910
2.500	3.125	.313	.344	31202500	8870110
2.625	3.250	.313	.344	31202625	8851110
2.750	3.375	.313	.344	31202750	8809310
2.875	3.500	.313	.344	31202875	8809510
3.000	3.625	.313	.344	31203000	8809710
3.125	3.750	.313	.344	31203125	8809910
3.250	3.875	.313	.344	31203250	8879610
3.375	4.000	.313	.344	31203375	8810210
3.500	4.125	.313	.344	31203500	8810410
3.550	4.175	.250	.275	31203550-250	8899510
3.625	4.250	.313	.344	31203625	8851210
3.750	4.375	.313	.344	31203750	8870210
3.875	4.500	.313	.344	31203875	8870310
4.000	4.625	.313	.344	31204000	8810910
4.125	4.750	.313	.344	31204125	8811110
4.250	4.875	.313	.344	31204250	8811310
4.375	5.000	.313	.344	31204375	8811510
4.500	5.125	.313	.344	31204500	8811710
4.750	5.375	.313	.344	31204750	8879710
5.000	5.625	.313	.344	31205000	8812110
5.250	5.875	.313	.344	31205250	8856910
5.375	6.000	.313	.344	31205375	8812310
5.500	6.125	.313	.344	31205500	8812510
5.750	6.375	.313	.344	31205750	8857010
6.000	6.625	.313	.344	31206000	8812910
6.250	6.875	.313	.344	31206250	8857110
6.375	7.000	.313	.344	31206375	8813010
6.500	7.125	.313	.344	31206500	8876610
6.750	7.375	.313	.344	31206750	8857210
7.000	7.625	.313	.344	31207000	8879310
7.250	7.875	.313	.344	31207250	8857310
7.375	8.000	.313	.344	31207375	8876710
7.500	8.125	.313	.344	31207500	8813510
7.750	8.375	.313	.344	31207750	8857410
8.000	8.625	.313	.344	31208000	8876910
8.250	8.875	.313	.344	31208250	8857510
8.500	9.125	.313	.344	31208500	8857610

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
3/8 CROSS SECTION					
1.000	1.750	.375	.413	37501000	8819110
1.250	2.000	.375	.413	37501250	8814310
1.375	2.125	.375	.413	37501375	8814410
1.500	2.250	.375	.413	37501500	8814510
1.625	2.375	.375	.413	37501625	8814710
1.750	2.500	.375	.413	37501750	8814810
2.000	2.750	.375	.413	37502000	8814910
2.125	2.875	.375	.413	37502125	8815110
2.250	3.000	.375	.413	37502250	8869910
2.500	3.250	.375	.413	37502500	8815410
2.750	3.500	.375	.413	37502750	8815710
3.000	3.750	.375	.413	37503000	8815910
3.250	4.000	.375	.413	37503250	8816210
3.375	4.125	.375	.413	37503375	8857710
3.500	4.250	.375	.413	37503500	8816410
3.625	4.375	.375	.413	37503625	8824610
3.750	4.500	.375	.413	37503750	8816610
3.875	4.625	.375	.413	37503875	8819210
4.000	4.750	.375	.413	37504000	8816810
4.125	4.875	.375	.413	37504125	8853210
4.250	5.000	.375	.413	37504250	8817010
4.500	5.250	.375	.413	37504500	8817310
4.750	5.500	.375	.413	37504750	8817510
5.000	5.750	.375	.413	37505000	8817610
5.250	6.000	.375	.413	37505250	8817810
5.500	6.250	.375	.413	37505500	8818010
5.625	6.375	.375	.413	37505625	8814110
5.750	6.500	.375	.413	37505750	8818210
6.000	6.750	.375	.413	37506000	8818310
6.250	7.000	.375	.413	37506250	8818510
6.500	7.250	.375	.413	37506500	8818610
6.750	7.500	.375	.413	37506750	8818810
7.000	7.750	.375	.413	37507000	8877010
7.250	8.000	.375	.413	37507250	8818910
7.500	8.250	.375	.413	37507500	8877110
7.625	8.375	.375	.413	37507625	8814010
7.750	8.500	.375	.413	37507750	8853910
8.000	8.750	.375	.413	37508000	8869210
8.250	9.000	.375	.413	37508250	8851410



Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
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1/2 CROSS SECTION

1.500	2.500	.500	.550	50001500	8814610
1.875	2.875	.500	.550	50001875	8825510
2.000	3.000	.500	.550	50002000	8815010
2.125	3.125	.500	.550	50002125	8853110
2.500	3.500	.500	.550	50002500	8815510
2.750	3.750	.500	.550	50002750	8900010
3.000	4.000	.500	.550	50003000	8816010
3.375	4.375	.500	.550	50003375	8866910
4.000	5.000	.500	.550	50004000	8816910
4.250	5.250	.500	.550	50004250	8858910
4.500	5.500	.500	.550	50004500	8817410
5.000	6.000	.500	.550	50005000	8817710
5.125	6.125	.500	.550	50005125	8851810
5.250	6.250	.500	.550	50005250	8900110
5.375	6.375	.500	.550	50005375	8863610
6.000	7.000	.500	.550	50006000	8818410
6.250	7.250	.500	.550	50006250	8857810
6.500	7.500	.500	.550	50006500	8815210
7.000	8.000	.500	.550	50007000	8851310
7.250	8.250	.500	.550	50007250	8857910
7.375	8.375	.500	.550	50007375	8863910
7.500	8.500	.500	.550	50007500	8851610
8.000	9.000	.500	.550	50008000	8819010
8.125	9.125	.500	.550	50008125	8853810
9.000	10.000	.500	.550	50001000	8905410

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
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5/8 CROSS SECTION

2.750	4.000	.625	.688	62502750	8819310
3.250	4.500	.625	.688	62503250	8822410
4.250	5.500	.625	.688	62504250	8819810
4.750	6.000	.625	.688	62504750	8819410
6.500	7.750	.625	.688	62506500	8819910
6.750	8.000	.625	.688	62506750	8819510

Design

The Hallite 512 is a standard profile loaded U cup utilising a polyurethane or polyester shell energised by a high specification O ring.

At zero or low pressure, the O ring helps to increase the sealing force, preventing any by-pass. As pressure rises, so the sealing force increases, with the O ring ensuring complete lip actuation under most conditions.

The deep profile of this seal provides extra stability needed to resist rolling in the groove and together with the knife trimmed precision sealing lips, the results are improved life and sealing. The 512 can be used for single acting applications or fitted back to back for double acting applications. Although it can also be used as a rod seal, Other profiles like 513, 605 or 621 are a better option.

Features

- Flexible for easy installation
- Excellent resistance to abrasion
- Positive lip actuation
- Deep profile for stability
- Wide range of size and material options

Material

Face Material - O Ring
Standard material
Polyurethane – NBR

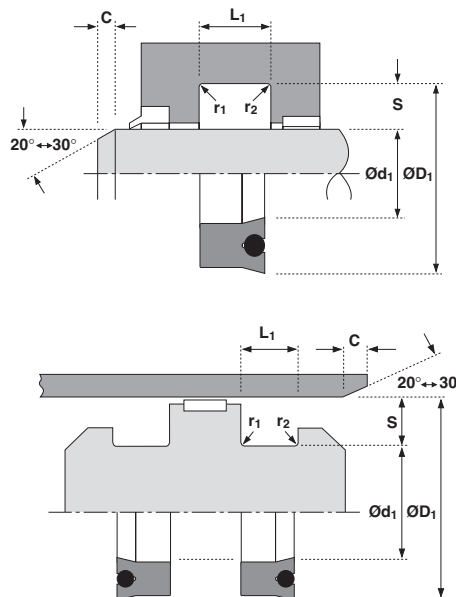
----- 10

Material options:
Polyester – NBR

----- 11

Hallite 361 – NBR

----- 16



Technical details

Operating conditions

Maximum Speed

Temperature Range

Maximum Pressure

Metric

0.5 m/sec

-40°C + 110°C

350 bar

Inch

1.5 ft/sec

-40°F + 230°F

5000 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side, for rod seals using minimum rod $\varnothing$ and maximum clearance $\varnothing$ and for piston seals using the minimum clearance $\varnothing$ and maximum bore $\varnothing$. Refer to Housing Design section.

(1/4" section and above)

Pressure bar

Pressure p.s.i.

Maximum Gap in

160	250	350
2400	3750	5000
0.024	0.020	0.016

Surface roughness

Dynamic Sealing Face $\varnothing d_1$

Static Sealing Face $\varnothing D_1$

Static Housing Faces L_1

μmRa	μmRt	$\mu inCLA$	$\mu inRMS$
0.1 < > 0.4	4 max	4 < > 16	5 < > 18
1.6 max	10 max	63 max	70 max
3.2 max	16 max	125 max	140 max

Chamfers & Radii

Groove Section $\leq S$ in

Min Chamfer C in

Max Fillet Rad r_1 in

Max Fillet Rad r_2 in

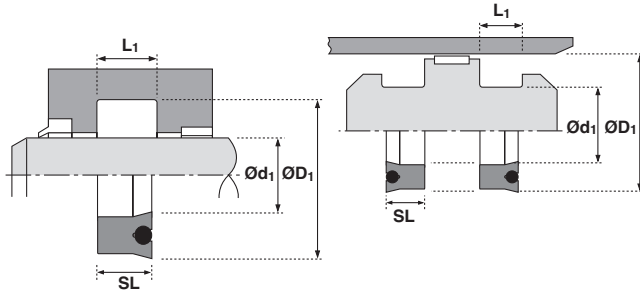
0.125	0.187	0.250	0.312	0.375	0.500
0.093	0.093	0.125	0.156	0.187	0.187
0.008	0.008	0.016	0.032	0.032	0.032
0.016	0.016	0.032	0.047	0.047	0.047

Tolerances

Please refer to specified tolerances in the introduction page - Hallite 500 Series



rod/piston seals



Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
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1/8 CROSS SECTION

.250	.500	.250	.275	12500250-250	8820210
.500	.750	.250	.275	12500500-250	8870510
.625	.875	.250	.275	12500625-250	8820510
.750	1.000	.250	.275	12500750-250	8820710
1.000	1.250	.250	.275	12501000-250	8821210
1.125	1.375	.250	.275	12501125-250	8854910
1.188	1.438	.188	.207	12501187-187	8858010
1.250	1.500	.250	.275	12501250-250	8821810
1.375	1.625	.250	.275	12501375-250	8822110
1.500	1.750	.250	.275	12501500-250	8822310
1.625	1.875	.250	.275	12501625-250	8870610
1.750	2.000	.250	.275	12501750-250	8822810
2.000	2.250	.250	.275	12502000-250	8823110

3/16 CROSS SECTION

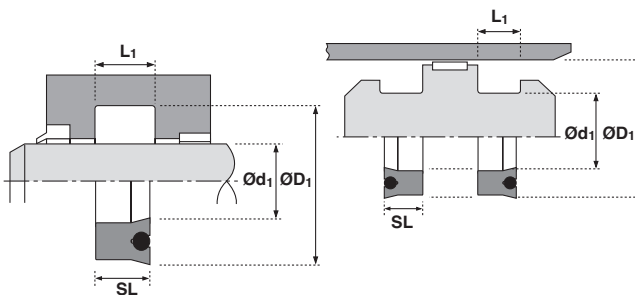
.750	1.125	.313	.344	18700750-312	8820810
1.000	1.375	.313	.344	18701000-312	8821310
1.125	1.500	.250	.275	18701125-250	8820610
1.125	1.500	.313	.344	18701125-312	8821710
1.250	1.625	.313	.344	18701250-312	8821910
1.375	1.750	.313	.344	18701375-312	8822210
1.375	1.750	.375	.413	18701375-375	8870710
1.500	1.875	.375	.413	18701500-375	8822510
1.625	2.000	.250	.275	18701625-250	8908210
1.625	2.000	.313	.344	18701625-312	8858110
1.625	2.000	.375	.413	18701625-375	8822710
1.750	2.125	.375	.413	18701750-375	8822910
1.875	2.250	.375	.413	18701875-375	8870810
2.000	2.375	.375	.413	18702000-375	8823210
2.125	2.500	.250	.275	18702125-250	8865510
2.125	2.500	.375	.413	18702125-375	8870910
2.188	2.563	.375	.413	18702187-375	8858210
2.250	2.625	.313	.344	18702250-312	8858310
2.250	2.625	.375	.413	18702250-375	8823410
2.375	2.750	.375	.413	18702375-375	8858410
2.500	2.875	.375	.413	18702500-375	8871010
2.625	3.000	.313	.344	18702625-312	8858510
2.625	3.000	.375	.413	18702625-375	8823710
2.750	3.125	.375	.413	18702750-375	8871110

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
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2.875	3.250	.250	.275	18702825-250	8865610
3.000	3.375	.375	.413	18703000-375	8823910
3.125	3.500	.250	.275	18703125-250	8867310
3.125	3.500	.375	.413	18703125-375	8871210
3.188	3.563	.375	.413	18703187-375	8858610
3.250	3.625	.313	.344	18703250-312	8858710
3.250	3.625	.375	.413	18703250-375	8824010
3.375	3.750	.375	.413	18703375-375	8858810
3.500	3.875	.375	.413	18703500-375	8824110
3.625	4.000	.313	.344	18703625-312	8864010
3.625	4.000	.375	.413	18703625-375	8824210
3.750	4.125	.375	.413	18703750-375	8855010
3.875	4.250	.250	.275	18703875-250	8820910
4.000	4.375	.375	.413	18704000-375	8824310
4.125	4.500	.313	.344	18704125-312	8867210
4.125	4.500	.375	.413	18704125-375	8871310
4.188	4.563	.375	.413	18704187-375	8859010
4.250	4.625	.313	.344	18704250-312	8859110
4.250	4.625	.375	.413	18704250-375	8824410
4.375	4.750	.375	.413	18704375-375	8859210
4.500	4.875	.375	.413	18704500-375	8824510
4.625	5.000	.313	.344	18704625-312	8859310
4.625	5.000	.375	.413	18704625-375	8855410
4.875	5.250	.250	.275	18704875-250	8821510

1/4 CROSS SECTION

.687	1.187	.375	.413	25000687-375	8906110
.750	1.250	.375	.413	25000750-375	8825010
.875	1.375	.312	.344	25000875-312	8906810
1.000	1.500	.312	.344	25001000-312	8906910
1.000	1.500	.375	.413	25001000-375	8825210
1.000	1.500	.437	.480	25001000-437	8907210
1.125	1.625	.375	.413	25001125-375	8847610
1.250	1.750	.375	.413	25001250-375	8825410
1.375	1.875	.375	.413	25001375-375	8825610
1.500	2.000	.313	.344	25001500-312	8821010
1.500	2.000	.375	.413	25001500-375	8825710
1.750	2.250	.375	.413	25001750-375	8825910
2.000	2.500	.375	.413	25002000-375	8826210
2.125	2.625	.375	.413	25002125-375	8826410



Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
2.250	2.750	.375	.413	25002250-375	8826510
2.250	2.750	.563	.619	25002250-562	8864110
2.375	2.875	.375	.413	25002375-375	8826610
2.500	3.000	.313	.344	25002500-312	8821110
2.500	3.000	.375	.413	25002500-375	8826810
2.750	3.250	.375	.413	25002750-375	8826910
3.000	3.500	.375	.413	25003000-375	8827010
3.000	3.500	.563	.619	25003000-562	8850610
3.125	3.625	.375	.413	25003125-375	8859510
3.250	3.750	.375	.413	25003250-375	8827310
3.500	4.000	.313	.344	25003500-312	8865710
3.500	4.000	.375	.413	25003500-375	8827510
3.750	4.250	.375	.413	25003750-375	8827810
4.000	4.500	.375	.413	25004000-375	8827910
4.000	4.500	.563	.619	25004000-562	8828010
4.125	4.625	.375	.413	25004125-375	8859610
4.250	4.750	.375	.413	25004250-375	8828210
4.250	4.750	.563	.619	25004250-562	8833710
4.500	5.000	.313	.344	25004500-312	8821410
4.500	5.000	.375	.413	25004500-375	8828610
4.500	5.000	.563	.619	25004500-562	8828710
5.000	5.500	.375	.413	25005000-375	8871510
5.000	5.500	.563	.619	25005000-562	8828810
5.500	6.000	.375	.413	25005500-375	8829110
5.500	6.000	.563	.619	25005500-562	8829210
5.750	6.250	.563	.619	25005750-563	8905510
6.000	6.500	.563	.619	25006000-562	8829310
6.500	7.000	.375	.413	25006500-375	8829510
6.500	7.000	.563	.619	25006500-562	8829710
7.000	7.500	.375	.413	25007000-375	8822610
7.000	7.500	.563	.619	25007000-562	8877210
7.500	8.000	.375	.413	25007500-375	8829610
7.500	8.000	.563	.619	25007500-562	8877310
8.500	9.000	.375	.413	25008500-375	8829810
8.500	9.000	.563	.619	25008500-562	8855110

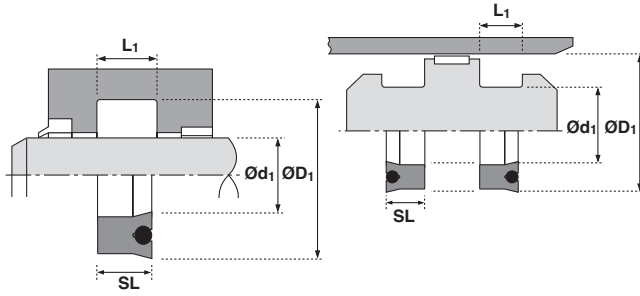
5/16 CROSS SECTION

1.000	1.625	.500	.550	31201000-500	88225310
1.375	2.000	.500	.550	31201375-500	8871610
1.500	2.125	.500	.550	31201500-500	8825810

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
1.750	2.375	.500	.550	31201750-500	8826010
1.875	2.500	.500	.550	31201875-500	8826110
2.000	2.625	.500	.550	31202000-500	8826310
2.375	3.000	.500	.550	31202375-500	8826710
2.500	3.125	.500	.550	31202500-500	8871810
2.750	3.375	.500	.550	31202750-500	8871910
2.875	3.500	.500	.550	31202875-500	8872010
3.000	3.625	.500	.550	31203000-500	8827110
3.375	4.000	.500	.550	31203375-500	8872110
3.500	4.125	.500	.550	31203500-500	8827710
3.750	4.375	.500	.550	31203750-500	8872210
3.875	4.500	.500	.550	31203875-500	8872310
4.375	5.000	.500	.550	31204375-500	8828410
4.375	5.000	.625	.688	31204375-625	8872410
4.500	5.125	.625	.688	31204500-625	8872510
5.375	6.000	.625	.688	31205375-625	8872610
6.375	7.000	.625	.688	31206375-625	8829410
7.000	7.625	.625	.688	31207000-625	8859710
7.375	8.000	.625	.688	31207375-625	8855310

3/8 CROSS SECTION

1.500	2.250	.500	.550	37501500-500	8872710
1.500	2.250	.625	.688	37501500-625	8872810
1.750	2.500	.500	.550	37501750-500	8830010
2.000	2.750	.500	.550	37502000-500	8830310
2.000	2.750	.625	.688	37502000-625	8830410
2.250	3.000	.500	.550	37502250-500	8872910
2.250	3.000	.625	.688	37502250-625	8873010
2.500	3.250	.500	.550	37502500-500	8879210
2.500	3.250	.625	.688	37502500-625	8830510
2.750	3.500	.500	.550	37502750-500	8830710
2.750	3.500	.625	.688	37502750-625	8830810
3.000	3.750	.500	.550	37503000-500	8831010
3.000	3.750	.625	.688	37503000-625	8878710
3.250	4.000	.500	.550	37503250-500	8831110
3.250	4.000	.625	.688	37503250-625	8831210
3.375	4.125	.625	.688	37503375-625	8855910
3.500	4.250	.500	.550	37503500-500	8878810
3.500	4.250	.625	.688	37503500-625	8831310
3.750	4.500	.500	.550	37503750-500	8831410



Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
4.000	4.750	.500	.550	37504000-500	8878910
4.000	4.750	.625	.688	37504000-625	8831610
4.250	5.000	.500	.550	37504250-500	8831810
4.250	5.000	.625	.688	37504250-625	8831910
4.500	5.250	.500	.550	37504500-500	8832010
4.500	5.250	.625	.688	37504500-625	8832110
4.750	5.500	.625	.688	37504750-625	8832210
5.000	5.750	.500	.550	37505000-500	8879110
5.000	5.750	.625	.688	37505000-625	8832310
5.250	6.000	.500	.550	37505250-500	8905910
5.250	6.000	.625	.688	37505250-625	8832610
5.750	6.500	.500	.550	37505750-500	8829010
5.750	6.500	.625	.688	37505750-625	8832810
6.000	6.750	.625	.688	37506000-625	8833010
6.250	7.000	.500	.550	37506250-500	8833210
6.250	7.000	.625	.688	37506250-625	8833310
6.500	7.250	.625	.688	37506500-625	8833410
6.750	7.500	.625	.688	37506750-625	8850810
7.000	7.750	.500	.550	37507000-500	8859810
7.000	7.750	.625	.688	37507000-625	8877610
7.250	8.000	.625	.688	37507250-625	8833510
7.750	8.500	.625	.688	37507750-625	8859910
8.250	9.000	.500	.550	37508250-500	8860010
8.250	9.000	.625	.688	37508250-625	8853710

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
1/2 CROSS SECTION					
1.500	2.500	.750	.825	50001500-750	8820310
2.000	3.000	.750	.825	50002000-750	8853410
3.000	4.000	.750	.825	50003000-750	8850510
3.500	4.500	.625	.688	50003500-625	8907810
3.500	4.500	.750	.825	50003500-750	8823010
4.000	5.000	.750	.825	50004000-750	8853510
5.000	6.000	.750	.825	50005000-750	8832410
5.500	6.500	.750	.825	50005500-750	8823310
6.000	7.000	.750	.825	50006000-750	8833110
7.000	8.000	.750	.825	50007000-750	8851910
7.500	8.500	.750	.825	50007500-750	8820410
8.000	9.000	.750	.825	50008000-750	8855210
8.250	9.250	.750	.825	50008250-750	8904710

Design

The Hallite 513 is a standard profile loaded U cup utilising a polyurethane or polyester shell energised by a high specification resilient O ring.

At zero or low pressure the O ring helps to increase the sealing force preventing any bypass. As pressure rises the sealing force increases and the O ring provides complete lip actuation under most conditions.

The precision trimmed sealing lips ensure optimum sealing action.

Features

- Flexible for easy installation
- Excellent resistance to abrasion
- Positive lip actuation
- Knife trimmed precision sealing lips
- Compact housing
- Wide range of sizes

Material

Face Material - O Ring
Standard material
Polyurethane – NBR

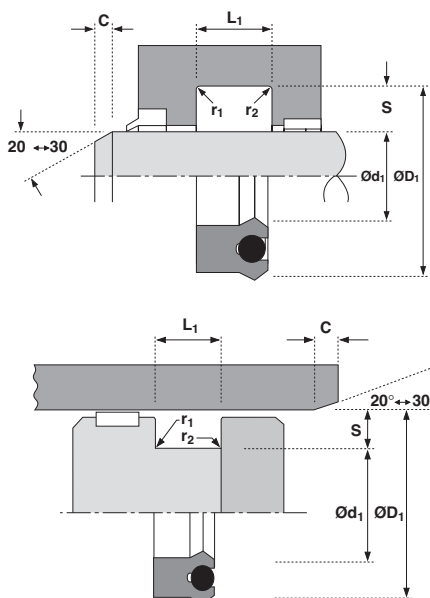
----- 10

Material options:
Polyester – NBR

----- 11

Hallite 361 – NBR

----- 16



Technical details

Operating conditions

Maximum Speed
Temperature Range
Maximum Pressure

Metric

0.5 m/sec
-40°C +110°C
350 bar

Inch

1.5 ft/sec
-40°F +230°F
5000 p.s.i.

Maximum extrusion gap

(1/4" section and above)

Pressure bar
Pressure p.s.i.
Maximum Gap in

Figures show the maximum permissible gap all on one side, for rod seals using minimum rod Ø and maximum clearance Ø and for piston seals using the minimum clearance Ø and maximum bore Ø. Refer to Housing Design section.

160	250	350
2400	3750	5000
0.024	0.020	0.016

Surface roughness

Dynamic Sealing Face Ød₁
Static Sealing Face ØD₁
Static Housing Faces L₁

µmRa	µmRt	µinCLA	µinRMS
0.1 < > 0.4	4 max	4 < > 16	5 < > 18
1.6 max	10 max	63 max	70 max
3.2 max	16 max	125 max	140 max

Chamfers & Radii

Groove Section ≤ S in
Min Chamfer C in
Max Fillet Rad r₁ in
Max Fillet Rad r₂ in

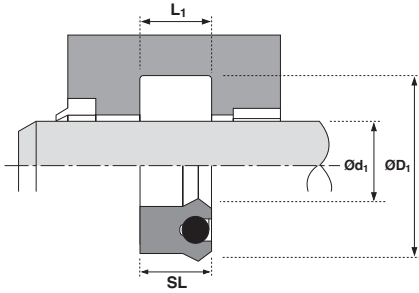
0.125	0.187	0.250	0.312	0.375	0.500
0.093	0.093	0.125	0.156	0.187	0.187
0.008	0.008	0.016	0.032	0.032	0.032
0.016	0.016	0.032	0.047	0.047	0.047

Tolerances

Please refer to specified tolerances in the introduction page - Hallite 500 Series

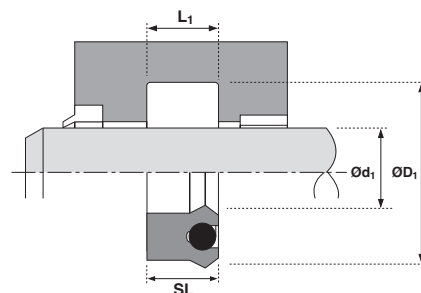


rod/piston seals



$\odot d_1$	$\odot D_1$	SL	L_1	STD. REF.	PART No.
1/8 CROSS SECTION					
.250	.500	.187	.207	12500250-187B	8845910
.250	.500	.250	.275	12500250-250B	8878510
.375	.625	.125	.138	12500375-125B	8908610
.375	.625	.250	.275	12500375-250B	8823810
.437	.687	.125	.138	12500437-250B	8902510
.437	.687	.250	.275	12500437-250B	8846910
.500	.750	.125	.138	12500500-125B	8907910
.500	.750	.250	.275	12500500-250B	8834010
.625	.875	.125	.138	12500625-125B	8906210
.625	.875	.188	.207	12500625-187B	8848710
.625	.875	.250	.275	12500625-250B	8834110
.750	1.000	.125	.139	12500750-125B	8905310
.750	1.000	.250	.275	12500750-250B	8834210
.875	1.125	.250	.275	12500875-250B	8845310
.937	1.187	.250	.275	12500937-250B	8900910
1.000	1.250	.187	.207	12501000-187B	8860110
1.000	1.250	.250	.275	12501000-250B	8834410
1.063	1.313	.250	.275	12501062-250B	8845710
1.125	1.375	.125	.138	12501125-125B	8899910
1.125	1.375	.187	.207	12501125-187B	8855510
1.125	1.375	.250	.275	12501125-250B	8855610
1.125	1.375	.313	.344	12501125-312B	8848810
1.187	1.437	.250	.275	12501187-250B	8848910
1.250	1.500	.188	.207	12501250-187B	8860210
1.250	1.500	.250	.275	12501250-250B	8834710
1.375	1.625	.188	.207	12501375-187B	8860310
1.375	1.625	.250	.275	12501375-250B	8834910
1.437	1.687	.250	.275	12501437-250B	8849010
1.500	1.750	.250	.275	12501500-250B	8835210
1.625	1.875	.188	.207	12501625-187B	8849110
1.625	1.875	.250	.275	12501625-250B	8873110
1.750	2.000	.250	.275	12501750-250B	8835610
1.875	2.125	.188	.207	12501875-187B	8845810
1.875	2.125	.250	.275	12501875-250B	8845410
2.000	2.250	.188	.207	12502000-187B	8860410
2.000	2.250	.250	.275	12502000-250B	8873210
2.125	2.375	.250	.275	12502125-250B	8908910
2.250	2.500	.250	.275	12502250-250B	8908810
2.500	2.750	.250	.275	12502500-250B	8902210

$\odot d_1$	$\odot D_1$	SL	L_1	STD. REF.	PART No.
2.875	3.125	.250	.275	12502875-250B	8847410
3.875	4.125	.250	.275	12503875-250B	8845510
4.875	5.125	.250	.275	12504875-250B	8845610
3/16 CROSS SECTION					
.375	.750	.156	.172	18700375-156B	8901410
.500	.875	.250	.275	18700500-250B	8848010
.500	.875	.313	.344	18700500-312B	8852910
.625	1.000	.313	.344	18700625-312B	8902710
.750	1.125	.188	.207	18700750-187B	8849810
.750	1.125	.250	.275	18700750-250B	8846010
.750	1.125	.313	.344	18700750-312B	8834310
.750	1.125	.375	.413	18700750-375B	8855810
.875	1.250	.313	.344	18700875-312B	8900210
1.000	1.375	.188	.207	18701000-187B	8806110
1.000	1.375	.250	.275	18701000-250B	8860510
1.000	1.375	.313	.344	18701000-312B	8834510
1.062	1.437	.313	.344	18701062-312B	8850010
1.125	1.500	.188	.207	18701125-187B	8907710
1.125	1.500	.250	.275	18701125-250B	8844910
1.125	1.500	.312	.344	18701125-312B	8834610
1.188	1.563	.313	.344	18701187-312B	8902310
1.250	1.625	.250	.275	18701250-250B	8860610
1.250	1.625	.312	.344	18701250-312B	8834810
1.250	1.625	.375	.413	18701250-375B	8860710
1.375	1.750	.250	.275	18701375-250B	8844710
1.375	1.750	.312	.344	18701375-312B	8835010
1.375	1.750	.375	.413	18701375-375B	8835110
1.500	1.875	.188	.207	18701500-187B	8851510
1.500	1.875	.250	.275	18701500-250B	8835310
1.500	1.875	.313	.344	18701500-312B	8849710
1.500	1.875	.375	.413	18701500-375B	8835410
1.500	1.875	.406	.447	18701500-406B	8848110
1.625	2.000	.250	.275	18701625-250B	8868410
1.625	2.000	.313	.344	18701625-312B	8864210
1.625	2.000	.375	.413	18701625-375B	8835510
1.750	2.125	.230	.250	18701750-230B	8852010
1.750	2.125	.313	.344	18701750-312B	8865410
1.750	2.125	.375	.413	18701750-375B	8835710
1.875	2.250	.375	.413	18701875-375B	8835810

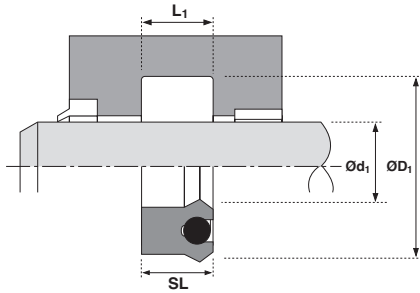


Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
2.000	2.375	.230	.250	18702000-230B	8806210
2.000	2.375	.250	.275	18702000-250B	8868110
2.000	2.375	.313	.344	18702000-312B	8860810
2.000	2.375	.375	.413	18702000-375B	8835910
2.125	2.500	.188	.207	18702125-187B	8908110
2.125	2.500	.250	.275	18702125-250B	8845010
2.125	2.500	.375	.413	18702125-375B	8836010
2.250	2.625	.313	.344	18702250-312B	8860910
2.250	2.625	.375	.413	18702250-375B	8873310
2.375	2.750	.280	.308	18702375-280B	8903010
2.375	2.750	.375	.413	18702375-375B	8861010
2.500	2.875	.250	.275	18702500-250B	8908310
2.500	2.875	.375	.413	18702500-375B	8836210
2.625	3.000	.250	.275	18702625-250B	8868510
2.625	3.000	.313	.344	18702625-312B	8864310
2.625	3.000	.375	.413	18702625-375B	8836310
2.750	3.125	.188	.207	18702750-187B	8849910
2.750	3.125	.313	.344	18702750-312B	8846110
2.750	3.125	.375	.413	18702750-375B	8836410
2.875	3.250	.280	.308	18702875-280B	8903110
2.875	3.250	.375	.413	18702875-375B	8861110
3.000	3.375	.188	.207	18703000-187B	8806710
3.000	3.375	.250	.275	18703000-250B	8868210
3.000	3.375	.313	.344	18703000-312B	8861210
3.000	3.375	.375	.413	18703000-375B	8836510
3.125	3.500	.188	.207	18703125-187B	8908710
3.125	3.500	.250	.275	18703125-250B	8845110
3.125	3.500	.375	.413	18703125-375B	8836610
3.250	3.625	.313	.344	18703250-312B	8861310
3.250	3.625	.375	.413	18703250-375B	8873410
3.375	3.750	.280	.308	18703375-280B	8903210
3.375	3.750	.375	.413	18703375-375B	8836710
3.500	3.875	.375	.413	18703500-375B	8836810
3.625	4.000	.250	.275	18703625-250B	8868610
3.625	4.000	.313	.344	18703625-312B	8864410
3.625	4.000	.375	.413	18703625-375B	8836910
3.750	4.125	.188	.207	18703750-187B	8850210
3.750	4.125	.313	.344	18703750-312B	8846210
3.750	4.125	.375	.413	18703750-375B	8837010
3.875	4.250	.280	.308	18703875-280B	8903310

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
3.875	4.250	.375	.413	18703875-375B	8861410
4.000	4.375	.188	.207	18704000-187B	8820010
4.000	4.375	.250	.275	18704000-250B	8868310
4.000	4.375	.313	.344	18704000-312B	8861510
4.000	4.375	.375	.413	18704000-375B	8837110
4.125	4.500	.250	.275	18704125-250B	8845210
4.125	4.500	.375	.413	18704125-375B	8837210
4.250	4.625	.313	.344	18704250-312B	8861610
4.250	4.625	.375	.413	18704250-375B	8837310
4.375	4.750	.280	.308	18704375-280B	8903410
4.375	4.750	.375	.413	18704375-375B	8861710
4.500	4.875	.375	.413	18704500-375B	8837510
4.625	5.000	.250	.275	18704625-250B	8868710
4.625	5.000	.313	.344	18704625-312B	8864510
4.625	5.000	.375	.413	18704625-375B	8837610
4.750	5.125	.750	.413	18704750-375B	8846610
4.875	5.250	.280	.308	18704875-280B	8903510
4.875	5.250	.375	.413	18704875-375B	8861810
5.000	5.375	.375	.413	18705000-375B	8842510
5.500	5.875	.375	.413	18705500-375B	8905710

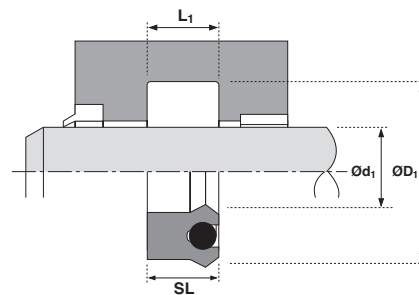
1/4 CROSS SECTION

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
.438	.938	.375	.413	25000437-375B	8863110
.500	1.000	.375	.413	25000500-375B	8837710
.625	1.125	.313	.344	25000625-312B	8849210
.750	1.250	.375	.413	25000750-375B	8837810
.875	1.375	.313	.344	25000875-312B	8830210
.875	1.375	.375	.413	25000875-375B	8864610
1.000	1.500	.375	.413	25001000-375B	8837910
1.125	1.625	.250	.275	25001125-250B	8804910
1.125	1.625	.375	.413	25001125-375B	8856110
1.250	1.750	.375	.413	25001250-375B	8838110
1.313	1.813	.375	.413	25001312-375B	8902610
1.375	1.875	.375	.413	25001375-375B	8878610
1.500	2.000	.250	.275	25001500-250B	8908410
1.500	2.000	.313	.344	25001500-312B	8867710
1.500	2.000	.375	.413	25001500-375B	8838310
1.625	2.125	.375	.413	25001625-375B	8849610
1.750	2.250	.250	.275	25001750-250B	8805610
1.750	2.250	.375	.413	25001750-375B	8838510



Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
1.875	2.375	.375	.413	25001875-375B	8859410
2.000	2.500	.250	.275	25002000-250B	8856010
2.000	2.500	.375	.413	25002000-375B	8838610
2.125	2.625	.250	.275	25002125-250B	8805810
2.125	2.625	.375	.413	25002125-375B	8856310
2.250	2.750	.375	.413	25002250-375B	8838710
2.375	2.875	.375	.413	25002375-375B	8850110
2.375	2.875	.563	.619	25002375-562B	8900610
2.500	3.000	.313	.344	25002500-312B	8867810
2.500	3.000	.375	.413	25002500-375B	8839010
2.625	3.125	.375	.413	25002625-375B	8849310
2.750	3.250	.250	.275	25002750-250B	8805910
2.750	3.250	.375	.413	25002750-375B	8839110
2.875	3.375	.375	.413	25002875-375B	8830910
3.000	3.500	.375	.413	25003000-375B	8839310
3.000	3.500	.500	.550	25003000-500B	8842110
3.000	3.500	.563	.619	25003000-562B	8852210
3.125	3.625	.250	.275	25003125-250B	8848510
3.125	3.625	.375	.413	25003125-375B	8856210
3.250	3.750	.375	.413	25003250-375B	8839410
3.375	3.875	.375	.413	25003375-375B	8849410
3.375	3.875	.563	.619	25003375-562B	8900710
3.500	4.000	.313	.344	25003500-312B	8867910
3.500	4.000	.375	.413	25003500-375B	8839510
3.625	4.125	.375	.413	25003625-375B	8849510
3.750	4.250	.250	.275	25003750-250B	8848610
3.750	4.250	.375	.413	25003750-375B	8839710
3.750	4.250	.563	.619	25003750-562B	8839810
3.875	4.375	.375	.413	25003875-375B	8832510
4.000	4.500	.375	.413	25004000-375B	8840010
4.000	4.500	.500	.550	25004000-500B	8867510
4.000	4.500	.562	.619	25004000-562B	8840110
4.125	4.625	.250	.275	25004125-250B	8806010
4.125	4.625	.375	.413	25004125-375B	8856410
4.250	4.750	.375	.413	25004250-375B	8840210
4.250	4.750	.563	.619	25004250-562B	8905810
4.375	4.875	.250	.275	25004375-250B	8848310
4.375	4.875	.563	.619	25004375-562B	8900510
4.500	5.000	.250	.275	25004500-250B	8817110
4.500	5.000	.313	.344	25004500-312B	8868010

Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
4.500	5.000	.375	.413	25004500-375B	8840510
4.500	5.000	.500	.550	25004500-500B	8864710
4.500	5.000	.563	.619	25004500-562B	8840610
4.625	5.125	.250	.275	25004500-250B	8848410
4.750	5.250	.375	.413	25004750-375B	8861910
4.750	5.250	.500	.550	25004750-500B	8846310
4.750	5.250	.562	.619	25004750-562B	8840910
4.875	5.375	.375	.413	25004875-375B	8832910
5.000	5.500	.375	.413	25005000-375B	8841010
5.000	5.500	.500	.550	25005000-500B	8866810
5.000	5.500	.562	.619	25005000-562B	8841110
5.250	5.750	.562	.619	25005250-562B	8862010
5.500	6.000	.375	.413	25005500-375B	8841310
5.500	6.000	.500	.550	25005500-500B	8833610
5.500	6.000	.562	.619	25005500-562B	8841410
5.625	6.125	.563	.619	25005625-562B	8903610
5.750	6.250	.375	.413	25005750-375B	8866410
5.750	6.250	.563	.619	25005750-562B	8841610
6.000	6.500	.375	.413	25006000-375B	8852310
6.000	6.500	.500	.550	25006000-500B	8867610
6.000	6.500	.562	.619	25006000-562B	8841710
6.250	6.750	.563	.619	25006250-562B	8905610
6.500	7.000	.250	.275	25006500-250B	8899410
6.500	7.000	.375	.413	25006500-375B	8852610
6.500	7.000	.500	.550	25006500-500B	8846410
6.500	7.000	.562	.619	25006500-562B	8841910
6.750	7.250	.375	.413	25006750-375B	8865910
6.750	7.250	.500	.550	25006750-500B	8866010
6.750	7.250	.563	.619	25006750-562B	8866310
7.000	7.500	.375	.413	25007000-375B	8852410
7.000	7.500	.500	.550	25007000-500B	8842410
7.000	7.500	.563	.619	25007000-562B	8877910
7.250	7.750	.563	.619	25007250-562B	8862110
7.500	8.000	.375	.413	25007500-375B	8852510
7.500	8.000	.500	.550	25007500-500B	8833810
7.500	8.000	.563	.619	25007500-562B	8852810
8.000	8.500	.250	.275	25008000-250B	8904610
8.000	8.500	.375	.413	25008000-375B	8848210
8.000	8.500	.563	.619	25008000-562B	8842310
8.500	9.000	.375	.413	25008500-375B	8852710



Ød ₁	ØD ₁	SL	L ₁	STD. REF.	PART No.
8.500	9.000	.500	.550	25008500-500B	8833910
8.500	9.000	.563	.619	25008500-562B	8853010

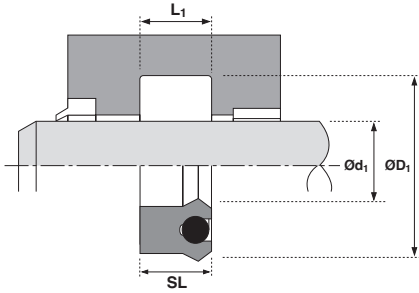
5/16 CROSS SECTION

1.000	1.625	.375	.413	31201000-375B	8828310
1.000	1.625	.500	.550	31201000-500B	8838010
1.125	1.750	.500	.550	31201125-500B	8879810
1.250	1.875	.313	.344	31201250-312B	8809810
1.250	1.875	.500	.550	31201250-500B	8838210
1.375	2.000	.313	.344	31201375-312B	8825110
1.375	2.000	.500	.550	31201375-500B	8873510
1.500	2.125	.375	.413	31201500-375B	8846510
1.500	2.125	.500	.550	31201500-500B	8838410
1.750	2.375	.375	.413	31201750-375B	8868810
1.750	2.375	.500	.550	31201750-500B	8873610
1.875	2.500	.500	.550	31201875-500B	8873710
2.000	2.625	.500	.550	31202000-500B	8873810
2.000	2.625	.563	.619	31202000-562B	8862210
2.125	2.750	.500	.550	31202125-500B	8879910
2.125	2.750	.625	.688	31202125-625B	8864810
2.250	2.875	.313	.344	31202250-312B	8816310
2.250	2.875	.500	.550	31202250-500B	8838810
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2.500	3.125	.375	.413	31202500-375B	8836110
2.500	3.125	.500	.550	31202500-500B	8873910
2.750	3.375	.375	.413	31202750-375B	8868910
2.750	3.375	.500	.550	31202750-500B	8839210
2.875	3.500	.500	.550	31202875-500B	8874010
3.000	3.625	.375	.413	31203000-375B	8828510
3.000	3.625	.500	.550	31203000-500B	8874110
3.125	3.750	.500	.550	31203125-500B	8869810
3.250	3.875	.313	.344	31203250-312B	8820110
3.250	3.875	.500	.550	31203250-500B	8869710
3.375	4.000	.313	.344	31203375-312B	8827410
3.375	4.000	.500	.550	31203375-500B	8874210
3.500	4.125	.375	.413	31203500-375B	8837410
3.500	4.125	.500	.550	31203500-500B	8874310
3.750	4.375	.375	.413	31203750-375B	8869010
3.750	4.375	.500	.550	31203750-500B	8874410

3.875	4.500	.500	.550	31203875-500B	8839910
4.000	4.625	.500	.550	31204000-500B	8874510
4.000	4.625	.562	.619	31204000-562B	8862310
4.125	4.750	.500	.550	31204125-500B	8869610
4.125	4.750	.625	.688	31204125-625B	8869510
4.250	4.875	.313	.344	31204250-312B	8821610
4.250	4.875	.500	.550	31204250-500B	8869410
4.375	5.000	.313	.344	31204375-312B	8827610
4.375	5.000	.500	.550	31204375-500B	8874610
4.375	5.000	.625	.688	31204375-625B	8840410
4.500	5.125	.375	.413	31204500-375B	8840710
4.500	5.125	.625	.688	31204500-625B	8840810
4.750	5.375	.500	.550	31204750-500B	8869310
4.750	5.375	.625	.688	31204750-625B	8862410
5.000	5.625	.625	.688	31205000-625B	8874710
5.250	5.875	.625	.688	31205250-625B	8862510
5.375	6.000	.625	.688	31205375-625B	8841210
6.000	6.625	.625	.688	31206000-625B	8862610
6.375	7.000	.625	.688	31206375-625B	8841810
6.500	7.125	.625	.688	31206500-625B	8869110
6.750	7.375	.625	.688	31206750-625B	8862710
7.000	7.625	.625	.688	31207000-625B	8854810
7.250	7.875	.625	.688	31207250-625B	8862810
7.375	8.000	.500	.550	31207375-500B	8842610
7.375	8.000	.625	.688	31207375-625B	8864910
8.000	8.625	.500	.550	31208000-500B	8866610
8.000	8.625	.625	.668	31208000-625B	8904810
8.500	9.125	.625	.688	31208500-625B	8862910

3/8 CROSS SECTION

1.250	2.000	.500	.550	37501250-500B	8842010
1.500	2.250	.500	.550	37501500-500B	8874810
1.500	2.250	.625	.688	37501500-625B	8842710
1.625	2.375	.375	.413	37501625-375B	8901010
1.750	2.500	.500	.550	37501750-500B	8874910
1.750	2.500	.625	.688	37501750-625B	8875010
2.000	2.750	.500	.550	37502000-500B	8875110
2.000	2.750	.625	.688	37502000-625B	8842810
2.250	3.000	.500	.550	37502250-500B	8875210
2.250	3.000	.625	.688	37502250-625B	8842910



OD_1	OD_2	SL	L_1	STD. REF.	PART No.
2.375	3.125	.625	.688	37502375-625B	8846810
2.500	3.250	.500	.550	37502500-500B	8875310
2.500	3.250	.625	.688	37502500-625B	8843010
2.625	3.375	.625	.688	37502625-625B	8863710
2.750	3.500	.500	.550	37502750-500B	8875410
2.750	3.500	.625	.688	37502750-625B	8843110
3.000	3.750	.500	.550	37503000-500B	8875510
3.000	3.750	.625	.688	37503000-625B	8843210
3.125	3.875	.625	.688	37503125-625B	8900310
3.250	4.000	.500	.550	37503250-500B	8875610
3.250	4.000	.625	.688	37503250-625B	8843310
3.375	4.125	.625	.688	37503375-625B	8852110
3.500	4.250	.500	.550	37503500-500B	8875710
3.500	4.250	.625	.688	37503500-625B	8843410
3.625	4.375	.625	.688	37503625-625B	8865310
3.750	4.500	.500	.550	37503750-500B	8875810
3.750	4.500	.625	.688	37503750-625B	8875910
4.000	4.750	.500	.550	37504000-500B	8876010
4.000	4.750	.625	.688	37504000-625B	8843510
4.250	5.000	.375	.413	37504250-375B	8867410
4.250	5.000	.500	.550	37504250-500B	8876110
4.250	5.000	.625	.688	37504250-625B	8843610
4.500	5.250	.500	.550	37504500-500B	8876210
4.500	5.250	.625	.688	37504500-625B	8843710
4.750	5.500	.500	.550	37504750-500B	8876310
4.750	5.500	.625	.688	37504750-625B	8876410
5.000	5.750	.500	.550	37505000-500B	8876510
5.000	5.750	.625	.688	37505000-625B	8843810
5.250	6.000	.500	.550	37505250-500B	8865010
5.250	6.000	.625	.688	37505250-625B	8843910
5.250	6.000	.750	.825	37505250-750B	8854410
5.500	6.250	.500	.550	37505500-500B	8863010
5.500	6.250	.625	.688	37505500-625B	8844010
5.750	6.500	.500	.550	37505750-500B	8866110
5.750	6.500	.625	.688	37505750-625B	8878010
5.875	6.625	.625	.688	37505875-625B	8900410
6.000	6.750	.500	.550	37506000-500B	8866210
6.000	6.750	.625	.688	37506000-625B	8844110
6.250	7.000	.500	.550	37506250-500B	8902410
6.250	7.000	.625	.688	37506250-625B	8844210

OD_1	OD_2	SL	L_1	STD. REF.	PART No.
6.500	7.250	.500	.550	37506500-500B	8853310
6.500	7.250	.625	.688	37506500-625B	8844310
6.750	7.500	.500	.550	37506750-500B	8854610
6.750	7.500	.625	.688	37506750-625B	8854710
7.000	7.750	.500	.550	37507000-500B	8854010
7.000	7.750	.625	.688	37507000-625B	8844410
7.250	8.000	.500	.550	37507250-500B	8865110
7.250	8.000	.625	.688	37507250-625B	8844510
7.250	8.000	.750	.825	37507250-750B	8854510
7.500	8.250	.500	.550	37507500-500B	8863210
7.500	8.250	.625	.688	37507500-625B	8878110
7.750	8.500	.500	.550	37507750-500B	8865210
7.750	8.500	.625	.688	37507750-625B	8853610
8.000	8.750	.625	.688	37508000-625B	8878210
8.250	9.000	.625	.688	37508250-625B	8854110

1/2 CROSS SECTION

1.750	2.750	.750	.825	50001750-750B	8847010
2.000	3.000	.750	.825	50002000-750B	8876810
2.500	3.500	.750	.825	50002500-750B	8847110
3.000	4.000	.750	.825	50003000-750B	8863310
4.000	5.000	.750	.825	50004000-750B	8877410
4.250	5.250	.750	.825	50004250-750B	8847210
4.500	5.500	.750	.825	50004500-750B	8847310
5.000	6.000	.750	.825	50005000-750B	8907610
5.250	6.250	.750	.825	50005250-750B	8847510
6.000	7.000	.750	.825	50006000-750B	8863410
6.250	7.250	.750	.825	50006250-750B	8847710
7.000	8.000	.750	.825	50007000-750B	8870410
7.250	8.250	.750	.825	50007250-750B	8847810
7.750	8.750	.750	.825	50007750-750B	8847910
8.000	9.000	.750	.825	50008000-750B	8863510

Design

The Hallite 520 snap-in rod wiper has been designed to fit "Universal" style housings. The proportions of the wiping lip ensure that contact is maintained with the surface of the rod to remove heavily deposited mud, ice, etc. The outside diameter contacts the housing diameter and has a sealing lip to prevent moisture entering the groove. The moulded ribs on the internal diameter provides extra stability to the seal and help prevent pressure trapping.

The Hallite 520 is available in two polyurethane or a polyester based compound and can be used with a split housing, however the majority can be installed in a blind housing with care.

Material option

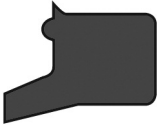
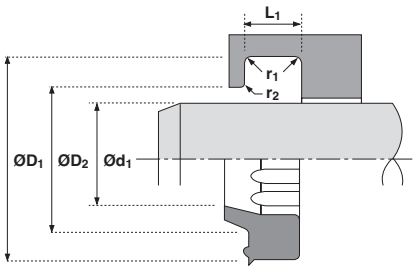
The part numbers shown are for 93 IRHD polyurethane. If you require this product in 55D polyester or 96 IRHD Hallite 361 polyurethane, please change the last digit of the part number when ordering.

Features

- ‘Crush Lip’ and ‘Face Bead’ provide effective seal on housing
- Low wear and long life
- Cost effective
- Pressure relief ribs
- Polyester material for heavy duty applications

Material

Polyurethane	---	0
Polyester	---	1
Hallite® 361	---	6



Technical details

Operating conditions

Maximum Speed	4.0 m/sec
Temperature Range	-45°C +110°C

Surface roughness

Dynamic Sealing Face Ød_1	0.1 < > 0.4	4 max
Static Sealing Face ØD_1 ØD_2	1.6 max	10 max
Static Housing Faces L_1	3.2 max	16 max

Radii

Max Fillet Rad r_1 in	0.016
Max Fillet Rad r_2 in	0.016

Tolerances

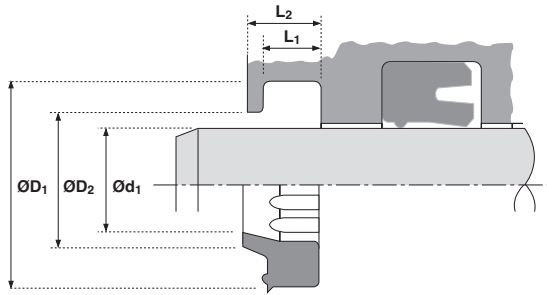
Ød_1	ØD_1	ØD_2	L_1
f9	±0.003	±0.005	+0.004 -0

Inch

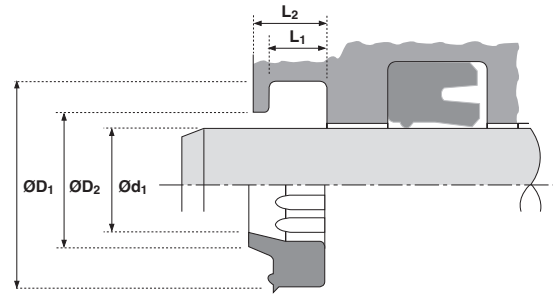
12.0 ft/sec
-50°F +230°F

μinCLA	μinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

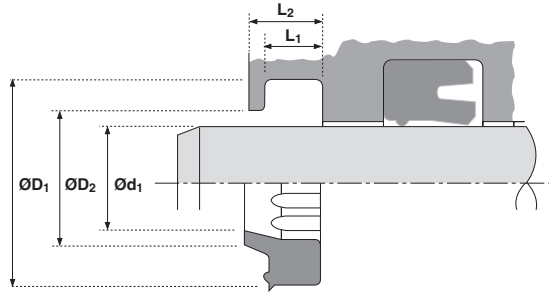




Ød ₁	TOL f9	ØD ₁	TOL	ØD ₂	TOL	L ₁ +0.004 -0	L ₂	PART No.
0.375	-0.0005 -0.0019	0.625	+0.003 -0.003	0.540	+0.005 -0.005	0.125	0.187	8889010
0.500	-0.0005 -0.0019	0.750	+0.003 -0.003	0.665	+0.005 -0.005	0.125	0.187	8880210
0.563	-0.0006 -0.0023	0.844	+0.003 -0.003	0.736	+0.005 -0.005	0.125	0.187	8888910
0.625	-0.0006 -0.0023	0.875	+0.003 -0.003	0.790	+0.005 -0.005	0.125	0.187	8880310
0.750	-0.0008 -0.0028	1.125	+0.003 -0.003	1.000	+0.005 -0.005	0.187	0.281	8880410
0.875	-0.0008 -0.0028	1.250	+0.003 -0.003	1.125	+0.005 -0.005	0.187	0.281	8880510
1.000	-0.0008 -0.0028	1.375	+0.003 -0.003	1.250	+0.005 -0.005	0.187	0.281	8880610
1.125	-0.0008 -0.0028	1.500	+0.003 -0.003	1.375	+0.005 -0.005	0.187	0.281	8880710
1.187	-0.0008 -0.0028	1.562	+0.003 -0.003	1.437	+0.005 -0.005	0.187	0.281	8880810
1.250	-0.0010 -0.0034	1.625	+0.003 -0.003	1.500	+0.005 -0.005	0.187	0.281	8880910
1.375	-0.0010 -0.0034	1.750	+0.003 -0.003	1.625	+0.005 -0.005	0.187	0.281	8881110
1.500	-0.0010 -0.0034	1.875	+0.003 -0.003	1.750	+0.005 -0.005	0.187	0.281	8881210
1.625	-0.0010 -0.0034	2.000	+0.003 -0.003	1.875	+0.005 -0.005	0.187	0.281	8881310
1.750	-0.0010 -0.0034	2.125	+0.003 -0.003	2.000	+0.005 -0.005	0.187	0.281	8881410
1.875	-0.0010 -0.0034	2.250	+0.003 -0.003	2.125	+0.005 -0.005	0.187	0.281	8887410
2.000	-0.0012 -0.0041	2.500	+0.003 -0.003	2.332	+0.005 -0.005	0.250	0.375	8881510
2.250	-0.0012 -0.0041	2.750	+0.003 -0.003	2.582	+0.005 -0.005	0.250	0.375	8881610
2.375	-0.0012 -0.0041	2.875	+0.003 -0.003	2.707	+0.005 -0.005	0.250	0.375	8887210
2.500	-0.0012 -0.0041	3.000	+0.003 -0.003	2.832	+0.005 -0.005	0.250	0.375	8881710
2.750	-0.0012 -0.0041	3.250	+0.003 -0.003	3.082	+0.005 -0.005	0.250	0.375	8881810
3.000	-0.0012 -0.0041	3.500	+0.003 -0.003	3.332	+0.005 -0.005	0.250	0.375	8881910
3.250	-0.0014 -0.0048	3.750	+0.003 -0.003	3.582	+0.005 -0.005	0.250	0.375	8882010
3.500	-0.0014 -0.0048	4.000	+0.003 -0.003	3.832	+0.005 -0.005	0.250	0.375	8882110



Ød ₁	TOL f ₉	ØD ₁	TOL	ØD ₂	TOL	L ₁ +0.004 -0	L ₂	PART No.
3.750	-0.0014 -0.0048	4.250	+0.003 -0.003	4.082	+0.005 -0.005	0.250	0.375	8882210
3.875	-0.0014 -0.0048	4.375	+0.003 -0.003	4.207	+0.005 -0.005	0.250	0.375	8888810
4.000	-0.0014 -0.0048	4.500	+0.003 -0.003	4.332	+0.005 -0.005	0.250	0.375	8882310
4.250	-0.0014 -0.0048	4.750	+0.003 -0.003	4.582	+0.005 -0.005	0.250	0.375	8882410
4.500	-0.0014 -0.0048	5.000	+0.003 -0.003	4.832	+0.005 -0.005	0.250	0.375	8887510
4.500	-0.0014 -0.0048	5.250	+0.003 -0.003	4.998	+0.005 -0.005	0.375	0.562	8882510
4.750	-0.0014 -0.0048	5.500	+0.003 -0.003	5.248	+0.005 -0.005	0.375	0.562	8887310
4.875	-0.0014 -0.0048	5.625	+0.003 -0.003	5.373	+0.005 -0.005	0.375	0.562	8881010
5.000	-0.0017 -0.0056	5.500	+0.003 -0.003	5.332	+0.005 -0.005	0.250	0.375	8887910
5.000	-0.0017 -0.0056	5.750	+0.003 -0.003	5.498	+0.005 -0.005	0.375	0.562	8882610
5.250	-0.0017 -0.0056	6.000	+0.003 -0.003	5.748	+0.005 -0.005	0.375	0.562	8882710
5.500	-0.0017 -0.0056	6.250	+0.003 -0.003	5.998	+0.005 -0.005	0.375	0.562	8882810
5.750	-0.0017 -0.0056	6.500	+0.003 -0.003	6.248	+0.005 -0.005	0.375	0.562	8889210
5.875	-0.0016 -0.0056	6.625	+0.003 -0.003	6.373	+0.005 -0.005	0.375	0.562	8887010
6.000	-0.0017 -0.0056	6.500	+0.003 -0.003	6.332	+0.005 -0.005	0.250	0.375	8888010
6.000	-0.0017 -0.0056	6.750	+0.003 -0.003	6.498	+0.005 -0.005	0.375	0.562	8882910
6.500	-0.0016 -0.0056	7.250	+0.003 -0.003	6.998	+0.005 -0.005	0.375	0.562	8892510
7.000	-0.0017 -0.0056	7.500	+0.003 -0.003	7.332	+0.005 -0.005	0.250	0.375	8888310
7.000	-0.0017 -0.0056	7.750	+0.003 -0.003	7.498	+0.005 -0.005	0.375	0.562	8883210
7.500	-0.0020 -0.0065	8.250	+0.003 -0.003	7.998	+0.005 -0.005	0.375	0.562	8883110
8.000	-0.0020 -0.0065	8.750	+0.003 -0.003	8.498	+0.005 -0.005	0.375	0.562	8883310
8.125	-0.0020 -0.0065	8.625	+0.003 -0.003	8.457	+0.005 -0.005	0.250	0.375	8888410
8.250	-0.0020 -0.0065	9.000	+0.003 -0.003	8.748	+0.005 -0.005	0.375	0.562	8892410



Ød ₁	TOL f9	ØD ₁	TOL	ØD ₂	TOL	L ₁ +0.004 -0	L ₂	PART No.
8.500	-0.0020 -0.0065	9.250	+0.003 -0.003	8.998	+0.005 -0.005	0.375	0.562	8888510
9.000	-0.0020 -0.0065	9.750	+0.003 -0.003	9.498	+0.005 -0.005	0.375	0.562	8884510
9.375	-0.0020 -0.0065	9.875	+0.003 -0.003	8.707	+0.005 -0.005	0.250	0.375	8889110
9.500	-0.0022 -0.0073	10.250	+0.003 -0.003	9.998	+0.005 -0.005	0.375	0.562	8885210
10.000	-0.0022 -0.0073	11.000	+0.003 -0.003	10.664	+0.005 -0.005	0.500	0.750	8889610
11.000	-0.0022 -0.0073	11.750	+0.003 -0.003	11.498	+0.005 -0.005	0.375	0.562	8891310
11.000	-0.0022 -0.0073	12.000	+0.003 -0.003	11.664	+0.005 -0.005	0.500	0.750	8909010
12.000	-0.0022 -0.0073	13.000	+0.003 -0.003	12.664	+0.005 -0.005	0.500	0.750	8888610
14.000	-0.0025 -0.0080	15.000	+0.003 -0.003	14.664	+0.005 -0.005	0.500	0.750	8888710
15.000	-0.0025 -0.0080	16.000	+0.003 -0.003	15.664	+0.005 -0.005	0.500	0.750	8889810

Design

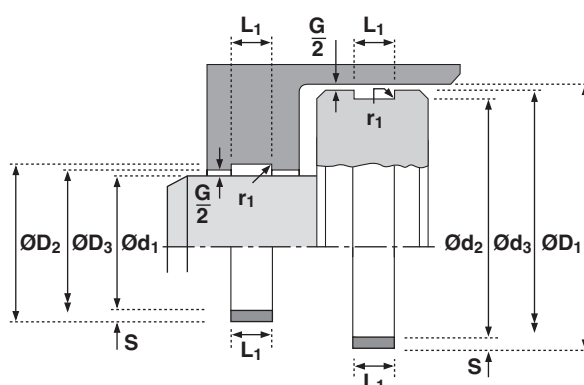
Hallite 533 glass filled nylon wear rings are designed for reciprocating piston and rod bearing applications.

The material is heat stabilised 33% glass reinforced nylon 66, which offers excellent bearing properties. The material is compatible with hydraulic and lubricating oils. The material is not recommended for use in water based fluids (HFA) or where significant water is present, due to the swell of the nylon. For these applications the use of Hallite 506 or Hallite 63 bearings are recommended.

Note: Metric sizes are also available upon request. For further information about these and any other sizes that you are looking for, please contact your local Hallite sales office.

Features

- Moulded to size
- Easy Installation
- Robust
- Long life
- Economical



Technical details

Operating conditions

Maximum Speed 5.0 m/sec
Temperature Range -40°C + 120°C

Inch

15.0 ft/sec
-40°F + 250°F

Surface roughness

Dynamic Sealing Face – Rod Ød₁
Static Sealing Face – Rod ØD₂ L₁
Dynamic Sealing Face – Piston Ød₁
Static Sealing Face – Piston ØD₂ L₁

µmRa

0.4
3.2 max
0.4
3.2 max

µmRt

4 max
16 max
4 max
16 max

µinCLA

16
125 max
16
125 max

µinRMS

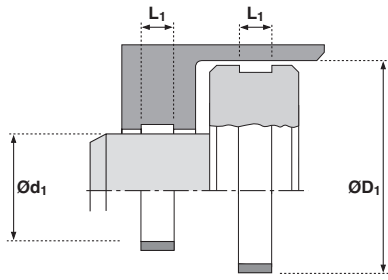
18
140 max
18
140 max

Housing Details & Tolerances

L₁ in
r₁ in
Rod Ød₁ in
ØD₂ in
ØD₃ in
Piston ØD₁ in
Ød₂ in
Ød₃ in
1/8 nominal cross sections - in
3/32 nominal cross sections - in

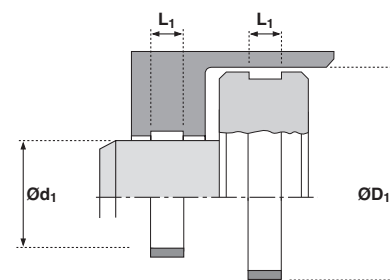
+0.015 +0.010
0.016 max
f9
Ød₁ + 2S +0.004 -0.000
Ød₁ + G
H11
ØD₁ -2S +0.000 -0.004
ØD₁ - G
S = 0.126 G max 0.080 G min 0.031
S = 0.093 G max 0.060 G min 0.031





ØD ₁	Ød ₁	L ₁	PART No.
1.250	1.000	1.000	F30220
1.500	1.250	0.250	F30005
1.500	1.250	0.375	F30006
1.500	1.250	0.500	F30305
1.500	1.312	0.187	F30004
1.500	1.312	0.375	F30352
1.750	1.500	0.190	F30234
1.750	1.500	0.375	F30201
1.750	1.500	0.500	F30013
1.875	1.625	0.190	F30179
1.875	1.625	0.375	F30235
1.875	1.625	0.500	F30306
2.000	1.750	0.187	F40001
2.000	1.750	0.250	F30018
2.000	1.750	0.312	F30020
2.000	1.750	0.375	F30022
2.000	1.750	0.500	F30024
2.000	1.750	0.750	F30025
2.000	1.812	0.375	F30325
2.125	1.875	0.375	F20026
2.250	2.000	0.187	F40029
2.250	2.000	0.250	F30196
2.250	2.000	0.312	F30032
2.250	2.000	0.375	F30033
2.250	2.000	0.500	F30035
2.250	2.000	0.625	F30036
2.250	2.000	0.750	F30037
2.375	2.125	0.500	F30038
2.500	2.250	0.187	F30040
2.500	2.250	0.250	F30041
2.500	2.250	0.312	F30043
2.500	2.250	0.375	F30044
2.500	2.250	0.500	F30045
2.500	2.250	0.625	F30047
2.500	2.250	0.750	F30048
2.500	2.250	1.000	F30286
2.500	2.312	0.375	F30326
2.625	2.375	0.375	F20179
2.625	2.375	0.625	F30285
2.750	2.500	0.250	F30209

ØD ₁	Ød ₁	L ₁	PART No.
2.750	2.500	0.375	F30051
2.750	2.500	0.500	F30052
2.750	2.500	0.625	F30054
2.750	2.500	0.750	F30055
2.750	2.500	1.000	F30056
3.000	2.750	0.250	F30061
3.000	2.750	0.312	F30062
3.000	2.750	0.375	F30063
3.000	2.750	0.500	F30064
3.000	2.750	0.625	F30191
3.000	2.750	0.750	F30066
3.000	2.750	1.000	F30067
3.000	2.812	0.375	F30327
3.250	3.000	0.250	F30207
3.250	3.000	0.312	F30259
3.250	3.000	0.375	F30069
3.250	3.000	0.500	F30070
3.250	3.000	0.625	F30287
3.250	3.000	0.750	F30072
3.250	3.000	1.000	F30074
3.250	3.062	0.375	F30353
3.500	3.250	0.250	F30079
3.500	3.250	0.312	F30255
3.500	3.250	0.375	F30080
3.500	3.250	0.500	F30083
3.500	3.250	0.625	F30085
3.500	3.250	0.750	F30087
3.500	3.250	1.000	F30275
3.500	3.312	0.375	F30328
3.625	3.375	0.500	F30090
3.625	3.375	1.000	F30091
3.750	3.500	0.250	F40027
3.750	3.500	0.312	F30260
3.750	3.500	0.375	F30092
3.750	3.500	0.500	F30093
3.750	3.500	0.625	F30094
3.750	3.500	0.750	F30095
4.000	3.750	0.250	F30100
4.000	3.750	0.312	F30256
4.000	3.750	0.375	F30101



ØD ₁	Ød ₁	L ₁	PART No.
4.000	3.750	0.500	F30102
4.000	3.750	0.625	F30104
4.000	3.750	0.750	F30105
4.000	3.750	1.000	F30219
4.250	4.000	0.312	F30261
4.250	4.000	0.375	F30107
4.250	4.000	0.500	F30108
4.250	4.000	0.625	F30109
4.250	4.000	0.750	F30110
4.250	4.000	1.000	F30112
4.500	4.250	0.312	F30262
4.500	4.250	0.375	F30114
4.500	4.250	0.500	F30115
4.500	4.250	0.625	F30118
4.500	4.250	0.750	F30120
4.500	4.250	1.000	F30278
4.750	4.500	0.375	F30194
4.750	4.500	0.500	F30121
4.750	4.500	0.750	F30123
4.750	4.500	1.000	F30124
5.000	4.750	0.375	F30126
5.000	4.750	0.500	F30127
5.000	4.750	0.625	F30128
5.000	4.750	0.750	F30129
5.000	4.750	1.000	F30169
5.250	5.000	0.500	F30131
5.250	5.000	0.625	F30132
5.250	5.000	0.750	F30133
5.250	5.000	1.000	F30269
5.500	5.250	0.375	F30135
5.500	5.250	0.500	F30136
5.500	5.250	0.625	F30138
5.500	5.250	0.750	F30140
5.500	5.250	1.000	F30141
5.750	5.500	0.750	F30143
5.750	5.500	1.000	F30144
6.000	5.750	0.500	F30145
6.000	5.750	0.625	F30147
6.000	5.750	0.750	F30208

ØD ₁	Ød ₁	L ₁	PART No.
6.000	5.750	1.000	F30149
6.250	6.000	0.500	F30279
6.250	6.000	0.625	F30151
6.250	6.000	0.750	F30152
6.250	6.000	1.000	F30153
6.500	6.250	0.500	F30154
6.500	6.250	0.750	F30199
6.500	6.250	1.000	F30157
6.750	6.500	1.000	F30276
7.000	6.750	0.500	F30158
7.000	6.750	0.625	F30159
7.000	6.750	0.750	F30277
7.000	6.750	1.000	F30160
7.250	7.000	0.500	F30281
7.250	7.000	0.750	F30284
7.250	7.000	1.000	F30289
7.500	7.250	0.500	F30162
7.500	7.250	0.750	F30165
7.500	7.250	1.000	F30166
7.750	7.500	0.500	F20160
7.750	7.500	1.000	F30247
8.000	7.750	1.000	F30231
8.250	8.000	1.000	F30248
8.500	8.250	0.500	F30168
8.500	8.250	1.000	F30246
8.750	8.500	1.000	F30249
9.000	8.750	1.000	F30230
9.250	9.000	1.000	F30253
9.500	9.250	1.000	F30254
9.750	9.500	1.000	F30250
10.000	9.750	1.000	F30221
10.250	10.000	1.000	F30258
10.500	10.250	1.000	F30257
11.000	10.750	1.000	F30222
11.250	11.000	1.000	F30251
11.500	11.250	1.000	F30252
12.000	11.750	1.000	F30223
13.000	12.750	1.000	F30224

Design

The Hallite 601 is a high performance general purpose seal suitable for rod and piston use.

Manufactured in Hythane[®] 181 – Hallite's 601 is engineered to effect a good seal in most industrial cylinder applications.

The sealing lips are accurately machine trimmed to ensure good low pressure sealing while the material resists extrusion at high pressures.

NB: Hallite 606 is a preferred option for back to back piston applications.

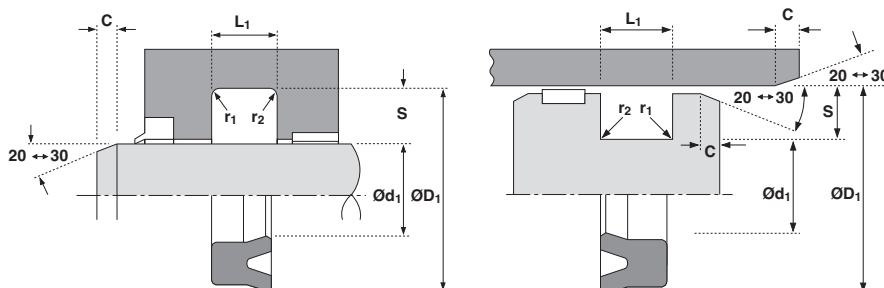
Part numbers commencing 46 are designed to suit popular Asian housings.

Part numbers suffixed by “†” indicate housing sizes to meet ISO5597.

Size lists give “on line” tolerances for rod applications.

Features

- General purpose seal
- Excellent temperature resistance
- Easy to install



Technical details

Operating conditions

Maximum Speed

1.0 m/sec

3.0 ft/sec

Temperature Range

-45°C +110°C

-50°F +230°F

Maximum Pressure

400 bar*

6,000 p.s.i.*

Maximum extrusion gap

Figures show the maximum permissible gap all on one side, for rod seals using minimum rod $\varnothing$ and maximum clearance $\varnothing$ and for piston seals using the minimum clearance $\varnothing$ and maximum bore $\varnothing$. Refer to Housing Design section.

Pressure bar	160	250	400
Maximum Gap mm	0.6	0.5	0.4
Pressure p.s.i.	2400	3750	6000
Maximum Gap in	0.024	0.020	0.016

Surface roughness

	μmRa	μmRt	μinCLA	μinRMS
Dynamic Sealing Face – Rod $\varnothing d_1$	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face – Rod $\varnothing D_1$	1.6 max	10 max	63 max	70 max
Dynamic Sealing Face – Piston $\varnothing D_1$	0.1 < > 0.4	4 max	4 ÷ 16	5 < > 18
Static Sealing Face – Piston $\varnothing d_1$	1.6 max	10 max	63 max	70 max
Static Housing Faces L_1	3.2 max	16 max	125 max	140 max

Chamfers & Radii

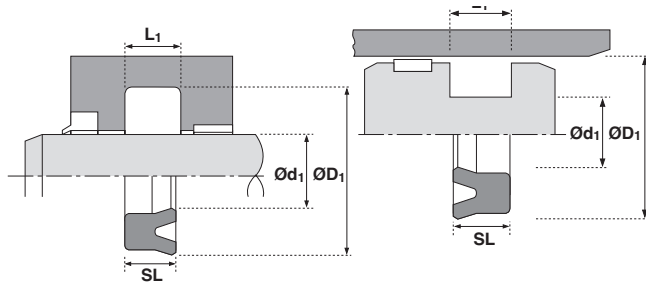
Groove Section $\leq S$ mm	4.0	5.0	7.5	10.0	12.5	15.0	20.0
Min Chamfer C mm	3.0	3.5	5.0	6.5	7.0	8.0	10.0
Max Fillet Rad r_1 mm	0.2	0.4	0.8	0.8	1.2	1.6	1.6
Max Fillet Rad r_2 mm	0.4	0.8	1.2	1.2	1.6	2.4	2.4
Groove Section $\leq S$ in	0.125	0.187	0.250	0.312	0.375	0.500	
Min Chamfer C in	0.093	0.093	0.125	0.156	0.187	0.217	
Max Fillet Rad r_1 in	0.008	0.008	0.016	0.032	0.032	0.032	
Max Fillet Rad r_2 in	0.016	0.016	0.032	0.047	0.047	0.047	

Tolerances

	$\varnothing d_1$	$\varnothing D_1$	L_1 mm	L_1 in
Rod	f9	Js11	+0.25 -0	+0.010 -0
Piston	js11	H9	+0.25 -0	+0.010 -0

* Pressure rating of seal can be extended to 700 bar /10,000p.s.i. with the use of a back up ring.
If this option is required seek advice from your local Hallite Seals sales office.

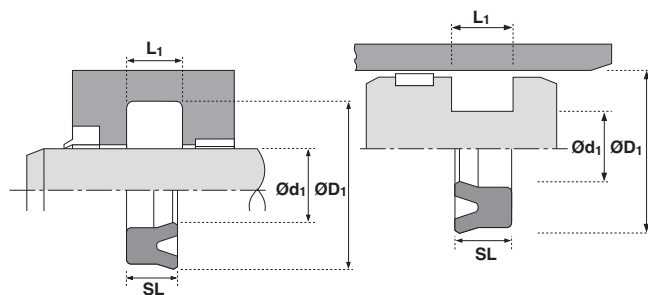




For piston sealing tolerances refer to technical details

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
4.5	-0.010 -0.040	12.5	+0.06 -0.06	4.4	5.0	4506701
5	-0.010 -0.040	12	+0.06 -0.06	5.5	6.5	4508601
6	-0.010 -0.040	13	+0.06 -0.06	8.0	9.0	4460300
10	-0.013 -0.049	18	+0.06 -0.06	6.0	6.6	4299900
10	-0.013 -0.049	20	+0.07 -0.07	8.0	9.0	4600000
12	-0.016 -0.059	18	+0.06 -0.06	6.0	7.0	4621300
12	-0.016 -0.059	20	+0.07 -0.07	4.4	5.0	4182501‡
12	-0.016 -0.059	25	+0.07 -0.07	8.0	9.0	4600100
14	-0.016 -0.059	22	+0.07 -0.07	4.4	5.0	4182601‡
14	-0.016 -0.059	22	+0.07 -0.07	5.0	5.7	4604000
14	-0.016 -0.059	24	+0.07 -0.07	8.0	9.0	4600200
15	-0.016 -0.059	25	+0.07 -0.07	8.0	9.0	4600300
16	-0.016 -0.059	24	+0.07 -0.07	4.4	5.0	4182701‡
16	-0.016 -0.059	24	+0.07 -0.07	5.0	5.7	4604100
16	-0.016 -0.059	26	+0.07 -0.07	8.0	9.0	4600400
18	-0.016 -0.059	26	+0.07 -0.07	4.4	5.0	4182901‡
18	-0.016 -0.059	26	+0.07 -0.07	5.0	5.7	4604200
18	-0.016 -0.059	28	+0.07 -0.07	7.3	8.0	4547900
18	-0.016 -0.059	28	+0.07 -0.07	8.0	9.0	4600500
20	-0.020 -0.072	28	+0.07 -0.07	4.4	5.0	4183001‡
20	-0.020 -0.072	28	+0.07 -0.07	5.0	5.7	4604300
20	-0.020 -0.072	30	+0.07 -0.07	8.0	9.0	4600600
20	-0.020 -0.072	40	+0.08 -0.08	12.0	13.0	4621900

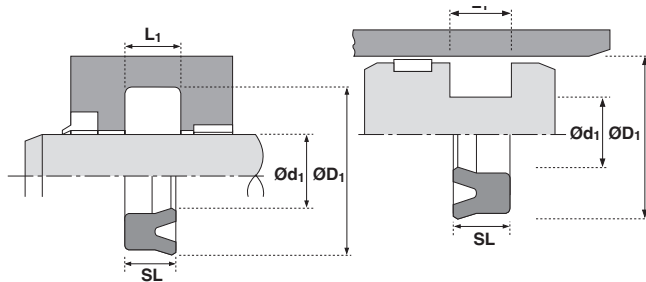
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
22	-0.020 -0.072	30	+0.07 -0.07	4.4	5.0	4183101‡
22	-0.020 -0.072	35	+0.08 -0.08	10.0	11.0	4600700
22	-0.020 -0.072	40	+0.08 -0.08	10.0	11.0	4572900
22.4	-0.020 -0.072	30	+0.07 -0.07	5.0	5.7	4604400
22.4	-0.020 -0.072	32.4	+0.08 -0.08	8.0	9.0	4600800
23.5	-0.020 -0.072	31.5	+0.08 -0.08	5.0	5.7	4621500
25	-0.020 -0.072	33	+0.08 -0.08	4.4	5.0	4183301‡
25	-0.020 -0.072	33	+0.08 -0.08	5.0	5.7	4604500
25	-0.020 -0.072	35	+0.08 -0.08	8.0	9.0	4600900
25	-0.020 -0.072	35	+0.08 -0.08	10.0	11.0	4362600
25	-0.020 -0.072	38	+0.08 -0.08	8.0	9.0	4601000
25	-0.020 -0.072	38	+0.08 -0.08	10.0	11.0	4621400
25	-0.020 -0.072	40	+0.08 -0.08	10.0	11.0	4601100
26	-0.020 -0.072	40	+0.08 -0.08	9.0	10.0	4584900
28	-0.020 -0.072	35.5	+0.08 -0.08	5.0	5.7	4604600
28	-0.020 -0.072	36	+0.08 -0.08	6.5	7.1	4506201
28	-0.020 -0.072	38	+0.08 -0.08	5.6	6.3	4183401‡
28	-0.020 -0.072	38	+0.08 -0.08	8.0	9.0	4867600
28	-0.020 -0.072	40	+0.08 -0.08	10.0	11.0	4601200
28	-0.020 -0.072	43	+0.08 -0.08	10.0	11.0	4601300
30	-0.020 -0.072	37	+0.08 -0.08	6.0	7.0	4596800
30	-0.020 -0.072	40	+0.08 -0.08	5.6	6.3	4183501
30	-0.020 -0.072	40	+0.08 -0.08	6.0	7.0	4604700



For piston sealing tolerances refer to technical details

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
30	-0.020 -0.072	40	+0.08 -0.08	8.0	9.0	4596900
30	-0.020 -0.072	40	+0.08 -0.08	10.0	11.0	4362700
30	-0.020 -0.072	45	+0.08 -0.08	10.0	11.0	4601400
31.5	-0.025 -0.087	41.5	+0.08 -0.08	6.0	7.0	4604800
32	-0.025 -0.087	40	+0.08 -0.08	8.0	9.0	4867700
32	-0.025 -0.087	42	+0.08 -0.08	5.6	6.3	4183601‡
32	-0.025 -0.087	42	+0.08 -0.08	6.0	7.0	4604900
32	-0.025 -0.087	42	+0.08 -0.08	10.0	11.0	4362800
32	-0.025 -0.087	47	+0.08 -0.08	10.0	11.0	4621200
35	-0.025 -0.087	45	+0.08 -0.08	6.0	7.0	4605000
35	-0.025 -0.087	45	+0.08 -0.08	7.0	8.0	4496000
35	-0.025 -0.087	48	+0.08 -0.08	10.0	11.0	4360300
35	-0.025 -0.087	50	+0.08 -0.08	10.0	11.0	4601500
35.5	-0.025 -0.087	45	+0.08 -0.08	6.0	7.0	4605100
35.5	-0.025 -0.087	50.5	+0.08 -0.08	10.0	11.0	4621100
36	-0.025 -0.087	46	+0.08 -0.08	5.6	6.3	4183701‡
38	-0.025 -0.087	48	+0.08 -0.08	6.0	7.0	4605200
38	-0.025 -0.087	50	+0.08 -0.08	9.0	10.0	4709400
38	-0.025 -0.087	55	+0.10 -0.10	9.7	11.0	4366000
38	-0.025 -0.087	58	+0.10 -0.10	9.7	11.0	4560100
40	-0.025 -0.087	50	+0.08 -0.08	5.6	6.3	4183801‡
40	-0.025 -0.087	50	+0.08 -0.08	6.0	7.0	4605300
40	-0.025 -0.087	50	+0.08 -0.08	10.0	11.0	4362900

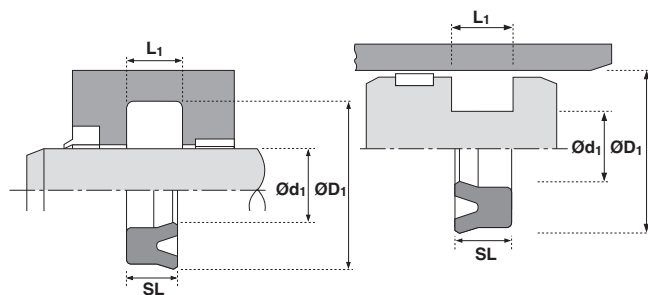
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
40	-0.025 -0.087	55	+0.10 -0.10	9.9	11.0	4388500
40	-0.025 -0.087	55	+0.10 -0.10	10.0	11.0	4601600
40	-0.025 -0.087	60	+0.10 -0.10	12.0	13.0	4601700
45	-0.025 -0.087	53	+0.10 -0.10	10.0	11.0	4867800
45	-0.025 -0.087	55	+0.10 -0.10	5.6	6.3	4183901‡
45	-0.025 -0.087	55	+0.10 -0.10	6.0	7.0	4605400
45	-0.025 -0.087	55	+0.10 -0.10	10.0	11.0	4363000
45	-0.025 -0.087	56	+0.10 -0.10	7.0	8.0	4605500
45	-0.025 -0.087	60	+0.10 -0.10	10.0	11.0	4601800
45	-0.025 -0.087	65	+0.10 -0.10	10.0	11.0	4575000
46	-0.025 -0.087	56	+0.10 -0.10	6.0	7.0	4543900
48	-0.025 -0.087	63	+0.10 -0.10	10.0	11.0	4601900
50	-0.025 -0.087	60	+0.10 -0.10	5.6	6.3	4184001‡
50	-0.025 -0.087	60	+0.10 -0.10	6.0	7.0	4605600
50	-0.025 -0.087	60	+0.10 -0.10	10.0	11.0	4363100
50	-0.025 -0.087	65	+0.10 -0.10	10.0	11.0	4602000
50	-0.025 -0.087	70	+0.10 -0.10	12.0	13.0	4602100
52	-0.030 -0.104	62	+0.10 -0.10	10.0	11.0	4559000
53	-0.030 -0.104	63	+0.10 -0.10	6.0	7.0	4605700
55	-0.030 -0.104	65	+0.10 -0.10	6.0	7.0	4605800
55	-0.030 -0.104	75	+0.10 -0.10	12.0	13.0	4602200
56	-0.030 -0.104	66	+0.10 -0.10	6.0	7.0	4605900
56	-0.030 -0.104	71	+0.10 -0.10	8.4	9.5	4184201‡



For piston sealing tolerances refer to technical details

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
56	-0.030 -0.104	76	+0.10 -0.10	12.0	13.0	4622000
60	-0.030 -0.104	70	+0.10 -0.10	6.0	7.0	4606000
60	-0.030 -0.104	70	+0.10 -0.10	10.0	11.0	4363200
60	-0.030 -0.104	71	+0.10 -0.10	7.0	8.0	4606100
60	-0.030 -0.104	76	+0.10 -0.10	12.0	13.0	4608000
60	-0.030 -0.104	80	+0.10 -0.10	12.0	13.0	4602300
63	-0.030 -0.104	73	+0.10 -0.10	6.0	7.0	4606200
63	-0.030 -0.104	73	+0.10 -0.10	11.8	13.0	4363300
63	-0.030 -0.104	78	+0.10 -0.10	8.4	9.5	4184301‡
65	-0.030 -0.104	75	+0.10 -0.10	6.0	7.0	4606300
65	-0.030 -0.104	80	+0.10 -0.10	8.4	9.5	4184401‡
65	-0.030 -0.104	80	+0.10 -0.10	12.0	13.0	4867900
65	-0.030 -0.104	85	+0.11 -0.11	12.0	13.0	4602400
70	-0.030 -0.104	80	+0.10 -0.10	6.0	7.0	4606400
70	-0.030 -0.104	80	+0.10 -0.10	11.8	13.0	4363400
70	-0.030 -0.104	85	+0.11 -0.11	8.4	9.5	4184501‡
70	-0.030 -0.104	85	+0.11 -0.11	12.0	13.0	4868000
70	-0.030 -0.104	90	+0.11 -0.11	12.0	13.0	4602500
70	-0.030 -0.104	92	+0.11 -0.11	12.0	13.0	4602600
71	-0.030 -0.104	80	+0.10 -0.10	6.0	7.0	4606500
75	-0.030 -0.104	85	+0.11 -0.11	6.0	7.0	4606600
75	-0.030 -0.104	85	+0.11 -0.11	11.8	13.0	4363500
75	-0.030 -0.104	90	+0.11 -0.11	12.0	13.0	4868100

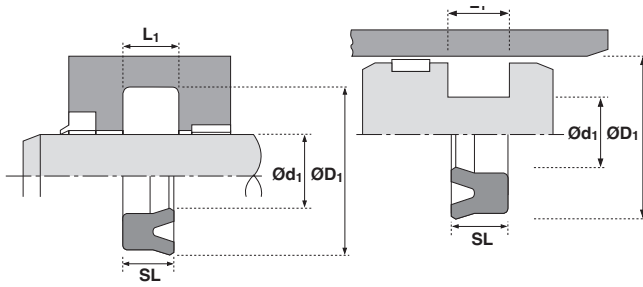
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
75	-0.030 -0.104	95	+0.11 -0.11	12.0	13.0	4602700
75	-0.030 -0.104	100	+0.11 -0.11	22.0	24.0	4584700
80	-0.030 -0.104	90	+0.11 -0.11	6.0	7.0	4606700
80	-0.030 -0.104	90	+0.11 -0.11	8.0	8.7	4159001
80	-0.030 -0.104	90	+0.11 -0.11	11.8	13.0	4363600
80	-0.030 -0.104	95	+0.11 -0.11	8.4	9.5	4184601‡
80	-0.030 -0.104	100	+0.11 -0.11	12.0	13.0	4602800
80	-0.030 -0.104	100	+0.11 -0.11	13.2	14.5	4857100
85	-0.036 -0.123	100	+0.11 -0.11	8.4	9.5	4184701‡
85	-0.036 -0.123	100	+0.11 -0.11	8.9	10.0	4606800
85	-0.036 -0.123	100	+0.11 -0.11	12.0	13.0	4868200
85	-0.036 -0.123	105	+0.11 -0.11	12.0	13.0	4602900
90	-0.036 -0.123	100	+0.11 -0.11	11.8	13.0	4363700
90	-0.036 -0.123	105	+0.11 -0.11	8.4	9.5	4184801‡
90	-0.036 -0.123	105	+0.11 -0.11	8.9	10.0	4606900
90	-0.036 -0.123	110	+0.11 -0.11	12.0	13.0	4603000
95	-0.036 -0.123	110	+0.11 -0.11	8.9	10.0	4607000
95	-0.036 -0.123	110	+0.11 -0.11	12.0	13.0	4868300
95	-0.036 -0.123	115	+0.11 -0.11	12.0	13.0	4603100
100	-0.036 -0.123	115	+0.11 -0.11	8.9	10.0	4607100
100	-0.036 -0.123	115	+0.11 -0.11	12.0	13.0	4868400
100	-0.036 -0.123	120	+0.11 -0.11	11.0	12.5	4184901‡
100	-0.036 -0.123	120	+0.11 -0.11	12.0	13.0	4603200



For piston sealing tolerances refer to technical details

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
105	-0.036 -0.123	125	+0.13 -0.13	11.4	12.5	4185001‡
105	-0.036 -0.123	125	+0.13 -0.13	15.0	17.0	4603300
110	-0.036 -0.123	130	+0.13 -0.13	11.0	12.5	4185101‡
110	-0.036 -0.123	130	+0.13 -0.13	15.0	17.0	4603400
112	-0.036 -0.123	125	+0.13 -0.13	8.9	10.0	4607200
115	-0.036 -0.123	130	+0.13 -0.13	8.9	10.0	4621600
115	-0.036 -0.123	135	+0.13 -0.13	15.0	17.0	4608100
120	-0.036 -0.123	140	+0.13 -0.13	14.5	16.0	4319600
120	-0.036 -0.123	140	+0.13 -0.13	15.0	17.0	4603500
125	-0.043 -0.143	140	+0.13 -0.13	8.9	10.0	4607300
125	-0.043 -0.143	145	+0.13 -0.13	11.4	12.5	4185201‡
125	-0.043 -0.143	145	+0.13 -0.13	15.0	17.0	4603600
130	-0.043 -0.143	150	+0.13 -0.13	15.0	17.0	4603700
136	-0.043 -0.143	150	+0.13 -0.13	8.5	9.5	4607400
140	-0.043 -0.143	154	+0.13 -0.13	9.0	10.0	4607900
140	-0.043 -0.143	155	+0.13 -0.13	8.9	10.0	4607500
140	-0.043 -0.143	160	+0.13 -0.13	15.0	17.0	4603800
145	-0.043 -0.143	160	+0.13 -0.13	8.9	10.0	4607600
145	-0.043 -0.143	165	+0.13 -0.13	15.0	17.0	4608200
150	-0.043 -0.143	165	+0.13 -0.13	8.9	10.0	4607700
150	-0.043 -0.143	170	+0.13 -0.13	15.0	17.0	4603900
155	-0.043 -0.143	170	+0.13 -0.13	8.9	10.0	4621700
155	-0.043 -0.143	180	+0.13 -0.13	15.0	17.0	4608300

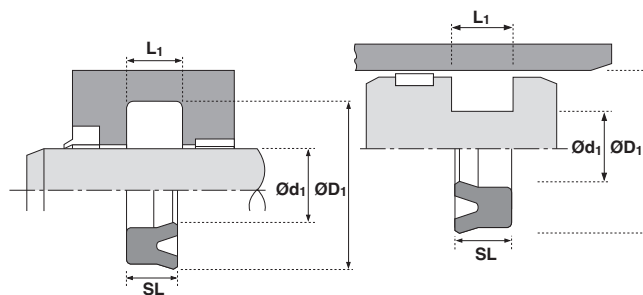
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
160	-0.043 -0.143	175	+0.13 -0.13	9.0	10.0	4608400
160	-0.043 -0.143	180	+0.13 -0.13	15.0	16.0	4868500
160	-0.043 -0.143	185	+0.15 -0.15	15.0	17.0	4608500
165	-0.043 -0.143	180	+0.13 -0.13	9.0	10.0	4608600
165	-0.043 -0.143	183	+0.15 -0.15	10.0	11.0	4607800
165	-0.043 -0.143	190	+0.15 -0.15	15.0	17.0	4608700
170	-0.043 -0.143	195	+0.15 -0.15	15.0	17.0	4608800
175	-0.043 -0.143	190	+0.15 -0.15	8.9	10.0	4621800
175	-0.043 -0.143	200	+0.15 -0.15	15.0	17.0	4608900
180	-0.043 -0.143	200	+0.15 -0.15	12.0	13.0	4609000
180	-0.043 -0.143	205	+0.15 -0.15	15.0	17.0	4609100
190	-0.050 -0.165	210	+0.15 -0.15	12.0	13.0	4609200
190	-0.050 -0.165	215	+0.15 -0.15	15.0	17.0	4609300
200	-0.050 -0.165	220	+0.15 -0.15	12.0	13.0	4609400
200	-0.050 -0.165	225	+0.15 -0.15	15.0	17.0	4609500
210	-0.050 -0.165	235	+0.15 -0.15	18.0	20.0	4609600
220	-0.050 -0.165	240	+0.15 -0.15	12.0	13.0	4609700
220	-0.050 -0.165	250	+0.15 -0.15	17.0	19.2	4426600
230	-0.050 -0.165	250	+0.15 -0.15	12.0	13.0	4609800
240	-0.050 -0.165	260	+0.16 -0.16	12.0	13.0	4621000
240	-0.050 -0.165	265	+0.16 -0.16	18.0	20.0	4609900
250	-0.050 -0.165	275	+0.15 -0.15	18.0	20.0	4610000
260	-0.056 -0.186	290	+0.16 -0.16	18.0	20.0	4620100



For piston sealing tolerances refer to technical details

$\varnothing d_1$	TOL f9	$\varnothing D_1$	TOL Js11	SL	L_1 +0.25-0	PART No.
265	-0.056 -0.186	295	+0.16 -0.16	18.0	20.0	4620200
270	-0.056 -0.186	300	+0.16 -0.16	18.0	20.0	4620300
280	-0.056 -0.186	310	+0.16 -0.16	18.0	20.0	4620400
290	-0.056 -0.186	320	+0.18 -0.18	18.0	20.0	4620500

$\varnothing d_1$	TOL f9	$\varnothing D_1$	TOL Js11	SL	L_1 +0.25-0	PART No.
300	-0.056 -0.186	330	+0.18 -0.18	18.0	20.0	4620600
375	-0.062 -0.202	405	+0.20 -0.20	22.0	24.0	4620700
400	-0.062 -0.202	425	+0.20 -0.20	25.0	27.0	4620800



For piston sealing tolerances refer to technical details

Ød1	TOL f9	ØD1	TOL Js11	SL	L1 +0.010-0	PART No.
0.500	-0.0006 -0.0023	0.750	+0.003 -0.003	0.250	0.275	4566500
0.500	-0.0006 -0.0023	0.875	+0.003 -0.003	0.197	0.218	4300000
0.500	-0.0006 -0.0023	1.000	+0.003 -0.003	0.250	0.275	4110201
0.625	-0.0006 -0.0023	1.000	+0.003 -0.003	0.190	0.218	4298300
0.625	-0.0006 -0.0023	1.125	+0.003 -0.003	0.250	0.275	4509101
0.750	-0.0008 -0.0028	1.250	+0.003 -0.003	0.250	0.275	4102901
0.875	-0.0008 -0.0028	1.375	+0.003 -0.003	0.250	0.275	4507101
1.000	-0.0008 -0.0028	1.500	+0.003 -0.003	0.250	0.275	4111101
1.250	-0.0010 -0.0034	1.750	+0.003 -0.003	0.250	0.275	4502701
1.250	-0.0010 -0.0034	1.750	+0.003 -0.003	0.375	0.413	4107001
1.375	-0.0010 -0.0034	1.750	+0.003 -0.003	0.375	0.413	4353400
1.375	-0.0010 -0.0034	2.000	+0.004 -0.004	0.266	0.312	4236201
1.500	-0.0010 -0.0034	2.000	+0.004 -0.004	0.250	0.275	4111001
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.250	0.275	4502601
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.375	0.413	4140901
1.750	-0.0010 -0.0034	2.375	+0.004 -0.004	0.266	0.312	4236301
1.750	-0.0010 -0.0034	2.375	+0.004 -0.004	0.562	0.619	4250901
2.000	-0.0012 -0.0041	2.375	+0.004 -0.004	0.250	0.275	4508301
2.000	-0.0012 -0.0041	2.375	+0.004 -0.004	0.312	0.344	4509201
2.000	-0.0012 -0.0041	2.500	+0.004 -0.004	0.375	0.413	4353500
2.000	-0.0012 -0.0041	2.625	+0.004 -0.004	0.500	0.550	4225101
2.000	-0.0012 -0.0041	2.625	+0.004 -0.004	0.562	0.619	4159801

Ød1	TOL f9	ØD1	TOL Js11	SL	L1 +0.010-0	PART No.
2.125	-0.0012 -0.0041	2.500	+0.004 -0.004	0.250	0.275	4508201
2.125	-0.0012 -0.0041	2.625	+0.004 -0.004	0.375	0.413	4156101
2.250	-0.0012 -0.0041	2.750	+0.004 -0.004	0.375	0.413	4128701
2.375	-0.0012 -0.0041	3.000	+0.004 -0.004	0.312	0.344	4107201
2.500	-0.0012 -0.0041	3.000	+0.004 -0.004	0.375	0.413	4119501
2.500	-0.0012 -0.0041	3.125	+0.004 -0.004	0.312	0.344	4124401
2.625	-0.0012 -0.0041	3.125	+0.004 -0.004	0.375	0.413	4224701
2.750	-0.0012 -0.0041	3.375	+0.004 -0.004	0.562	0.619	4250701
2.875	-0.0012 -0.0041	3.500	+0.004 -0.004	0.325	0.360	4129701
3.000	-0.0012 -0.0041	3.625	+0.004 -0.004	0.562	0.619	4160001
3.750	-0.0014 -0.0048	4.500	+0.004 -0.004	0.375	0.413	4119201
4.000	-0.0014 -0.0048	4.500	+0.004 -0.004	0.511	0.562	4373400
4.000	-0.0014 -0.0048	4.750	+0.004 -0.004	0.375	0.413	4120501
4.000	-0.0014 -0.0048	4.750	+0.005 -0.005	0.536	0.600	4422500
4.500	-0.0014 -0.0048	5.000	+0.005 -0.005	0.375	0.413	4129801
4.750	-0.0017 -0.0056	5.500	+0.005 -0.005	0.360	0.437	4154701
5.000	-0.0017 -0.0056	5.750	+0.005 -0.005	0.482	0.539	4224801
5.000	-0.0017 -0.0056	6.000	+0.005 -0.005	0.750	0.825	8901300
5.500	-0.0017 -0.0056	6.250	+0.005 -0.005	0.375	0.413	4119301
5.750	-0.0017 -0.0056	6.500	+0.005 -0.005	0.375	0.413	4135301
7.000	-0.0017 -0.0056	7.500	+0.005 -0.005	0.250	0.275	4806200
7.750	-0.0017 -0.0056	8.750	+0.005 -0.005	0.500	0.550	4806100

Design

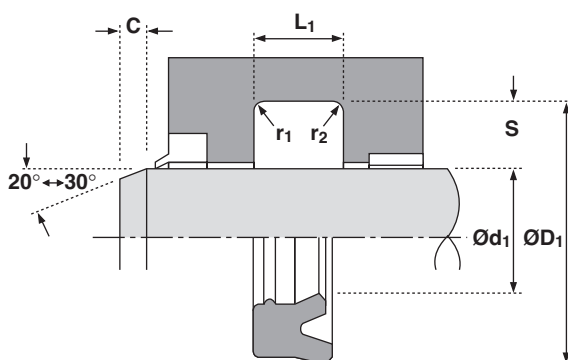
The Hallite 605 is an asymmetric seal offering superlative dry rod sealing for light and medium duty applications. The 605 has become an industry standard seal worldwide owing to its twin lip profile and consistent performance. Manufactured in Hythane® – 181, the Hallite 605 is an extremely flexible seal making installation very easy. The ranges cover most standard housings used in Europe, North America and Asia.

NB: Part numbers commencing 46 or suffixed by “†” are designed to suit popular Asian housings.

Part numbers suffixed by “‡” indicate housing sizes to meet ISO5597.

Features

- Twin lip design offering:
 - Lower friction
 - improved sealing
 - primary lip protection
 - increased seal stability
- Easy installation



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-45°C +110°C
Maximum Pressure	400 bar*

Inch

3.0 ft/sec
-50°F +230°F
6000 p.s.i.*

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø.

	160	250	400
Pressure bar	160	250	400
Maximum Gap mm	0.6	0.5	0.4
Pressure p.s.i.	2400	3750	6000
Maximum Gap in	0.024	0.020	0.016

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

Chamfers & Radii

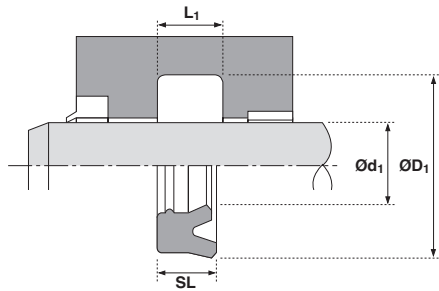
	4.0	5.0	7.5	10.0	12.5	15.0
Groove Section ≤ S mm	4.0	5.0	7.5	10.0	12.5	15.0
Min Chamfer C mm	3.0	3.5	5.0	6.5	7.0	8.0
Max Fillet Rad r ₁ mm	0.2	0.4	0.8	0.8	1.2	1.6
Max Fillet Rad r ₂ mm	0.4	0.8	1.2	1.2	1.6	2.4
Groove Section ≤ S in	0.125	0.187	0.250	0.312	0.375	0.500
Min Chamfer C in	0.093	0.093	0.125	0.156	0.187	0.217
Max Fillet Rad r ₁ in	0.008	0.008	0.016	0.032	0.032	0.032
Max Fillet Rad r ₂ in	0.016	0.016	0.032	0.047	0.047	0.047

Tolerances

Ød ₁	ØD ₁	L ₁ mm	L ₁ in
f9	Js11	+0.25 -0	+0.010 -0

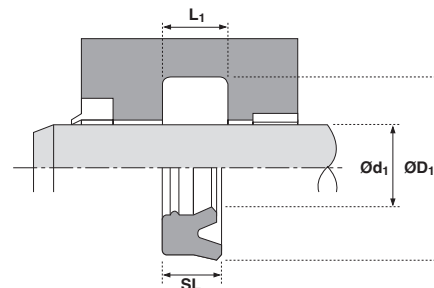
* Pressure rating of seal can be extended to 700 bar /10,000p.s.i. with the use of a back up ring. If this option is required seek advice from your local Hallite Seals sales office.





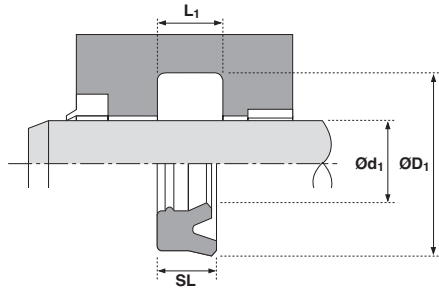
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
6	-0.010 -0.040	15	+0.055 -0.055	7.3	8.0	4790600
6	-0.010 -0.040	16	+0.055 -0.055	7.0	8.0	4580600
8	-0.013 -0.049	18	+0.055 -0.055	7.0	8.0	4580500
10	-0.013 -0.049	15	+0.055 -0.055	3.6	4.0	4402300
12	-0.016 -0.059	18	+0.055 -0.055	4.0	4.5	4578000
12	-0.016 -0.059	18	+0.055 -0.055	5.7	6.3	4314900
12	-0.016 -0.059	19	+0.065 -0.065	4.5	5.0	4341600
12	-0.016 -0.059	19	+0.065 -0.065	5.1	5.6	4710000‡
12	-0.016 -0.059	20	+0.065 -0.065	5.7	6.3	4310900‡
12	-0.016 -0.059	22	+0.065 -0.065	7.3	8.0	4857200
12	-0.016 -0.059	22	+0.065 -0.065	7.7	9.0	4315000
12.7	-0.016 -0.059	18	+0.055 -0.055	5.5	6.0	4370400
13	-0.016 -0.059	20	+0.065 -0.065	4.5	5.0	4351600
14	-0.016 -0.059	21	+0.065 -0.065	5.1	5.6	4710100‡
14	-0.016 -0.059	22	+0.065 -0.065	5.7	6.3	4311000‡
14	-0.016 -0.059	24	+0.065 -0.065	7.3	8.0	4310000‡
15	-0.016 -0.059	22	+0.065 -0.065	5.7	6.3	4762200
15.37	-0.016 -0.059	25.5	+0.065 -0.065	6.35	7.4	4333800
16	-0.016 -0.059	22	+0.065 -0.065	4.5	5.0	4341700
16	-0.016 -0.059	22	+0.065 -0.065	5.0	6.0	4314100
16	-0.016 -0.059	24	+0.065 -0.065	5.8	6.3	4295200‡
16	-0.016 -0.059	26	+0.065 -0.065	7.7	9.0	4311100
18	-0.016 -0.059	24	+0.065 -0.065	4.5	5.0	4712000

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
18	-0.016 -0.059	25	+0.065 -0.065	5.0	6.0	4314200
18	-0.016 -0.059	26	+0.065 -0.065	5.0	5.7	4611000
18	-0.016 -0.059	26	+0.065 -0.065	5.7	6.3	4311200‡
18	-0.016 -0.059	26	+0.065 -0.065	6.0	7.0	4333900
18	-0.016 -0.059	26	+0.065 -0.065	8.2	9.0	4863000
18	-0.016 -0.059	28	+0.065 -0.065	7.7	9.0	4305100
20	-0.020 -0.072	25	+0.065 -0.065	3.2	3.5	4332100
20	-0.020 -0.072	26	+0.065 -0.065	5.0	5.5	4315100
20	-0.020 -0.072	26	+0.065 -0.065	6.5	7.6	4826000
20	-0.020 -0.072	27	+0.065 -0.065	6.1	6.7	4702900
20	-0.020 -0.072	28	+0.065 -0.065	5.0	5.7	4611100
20	-0.020 -0.072	28	+0.065 -0.065	5.7	6.3	4362100‡
20	-0.020 -0.072	30	+0.065 -0.065	6.0	7.0	4611200
20	-0.020 -0.072	30	+0.065 -0.065	7.3	8.0	4857300
20	-0.020 -0.072	30	+0.065 -0.065	7.7	9.0	4305200
20	-0.020 -0.072	30	+0.065 -0.065	10.0	11.0	4310300
22	-0.020 -0.072	30	+0.065 -0.065	5	5.7	4617500
22	-0.020 -0.072	30	+0.065 -0.065	5.7	6.3	4305300‡
22	-0.020 -0.072	30	+0.065 -0.065	7.3	8.0	4356800
22	-0.020 -0.072	32	+0.080 -0.080	7.3	8.0	4310800‡
22	-0.020 -0.059	32	+0.080 -0.080	8.2	9.0	4863300
22	-0.020 -0.072	32	+0.080 -0.080	10.0	11.0	4311300
22.4	-0.020 -0.072	30	+0.080 -0.080	5.0	5.7	4611300



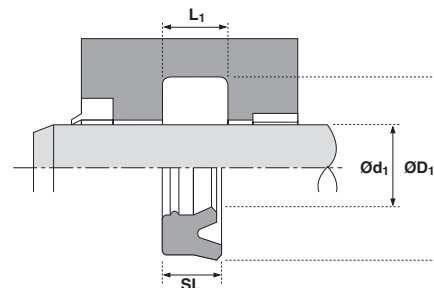
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
22.4	-0.020 -0.072	30	+0.080 -0.080	8.0	9.0	4616600
24	-0.020 -0.072	30	+0.080 -0.080	4.5	5.0	4773500
25	-0.020 -0.072	33	+0.080 -0.080	5.0	5.7	4610100
25	-0.020 -0.072	33	+0.080 -0.080	5.7	6.3	4305400‡
25	-0.020 -0.072	33	+0.080 -0.080	6.8	7.5	4333500
25	-0.020 -0.072	33	+0.080 -0.080	8.0	9.0	4807800
25	-0.020 -0.072	33	+0.080 -0.080	10.0	11.0	4315200
25	-0.020 -0.072	35	+0.080 -0.080	7.3	8.0	4512000‡
25	-0.020 -0.072	35	+0.080 -0.080	7.7	9.0	4311400
25	-0.020 -0.072	35	+0.080 -0.080	10.0	11.0	4310500
25	-0.020 -0.072	37	+0.080 -0.080	10.0	11.0	4379900
25	-0.020 -0.072	40	+0.080 -0.080	10.0	11.0	4322900
26	-0.020 -0.072	36	+0.080 -0.080	7.0	8.0	4459400
28	-0.020 -0.072	35.5	+0.080 -0.080	5.0	5.7	4611400
28	-0.020 -0.072	36	+0.080 -0.080	5.7	6.3	4703000‡
28	-0.020 -0.072	38	+0.080 -0.080	7.3	8.0	4305500‡
28	-0.020 -0.072	43	+0.080 -0.080	11.4	12.5	4399000‡
30	-0.020 -0.072	38	+0.080 -0.080	5.7	6.3	4704500
30	-0.020 -0.072	38	+0.080 -0.080	6.3	7.0	4402700
30	-0.020 -0.072	40	+0.080 -0.080	6.0	7.0	4610200
30	-0.020 -0.072	40	+0.080 -0.080	7.0	7.7	4703100
30	-0.020 -0.072	40	+0.080 -0.080	7.3	8.0	4857400
30	-0.020 -0.072	40	+0.080 -0.080	8.5	9.5	4826100

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
30	-0.020 -0.072	40	+0.080 -0.080	10.0	11.0	4304600
30	-0.020 -0.072	42	+0.080 -0.080	10.9	12.0	4383100
30	-0.020 -0.072	45	+0.080 -0.080	9.0	10.0	4618900
30	-0.020 -0.072	45	+0.080 -0.080	10.0	11.0	4857500
30	-0.020 -0.072	50	+0.080 -0.080	10.0	11.0	4328500
32	-0.025 -0.087	40	+0.080 -0.080	6.0	7.0	4310700
32	-0.025 -0.087	40	+0.080 -0.080	6.7	7.7	4334000
32	-0.025 -0.087	40	+0.080 -0.080	7.7	9.0	4315300
32	-0.025 -0.087	41.5	+0.080 -0.080	7.9	8.9	4334100
32	-0.025 -0.087	42	+0.080 -0.080	5.7	6.3	4360100‡
32	-0.025 -0.087	42	+0.080 -0.080	6.0	7.0	4616100
32	-0.025 -0.087	42	+0.080 -0.080	7.3	8.0	4374200‡
32	-0.025 -0.087	42	+0.080 -0.080	10.0	11.0	4305600
32	-0.025 -0.087	45	+0.080 -0.080	10.0	11.0	4597700
32	-0.025 -0.087	47	+0.080 -0.080	9.1	10.0	4329600
32	-0.025 -0.087	47	+0.080 -0.080	10.0	11.0	4338900
32	-0.025 -0.087	48	+0.080 -0.080	10.0	11.0	4492500
35	-0.025 -0.087	43	+0.080 -0.080	5.7	6.3	4703200
35	-0.025 -0.087	43	+0.080 -0.080	6.3	7.0	4402800
35	-0.025 -0.087	43	+0.080 -0.080	8.2	9.0	4309000
35	-0.025 -0.087	45	+0.080 -0.080	6.0	7.0	4611500
35	-0.025 -0.087	45	+0.080 -0.080	7.0	8.0	4619200
35	-0.025 -0.087	45	+0.080 -0.080	7.7	9.0	4314300



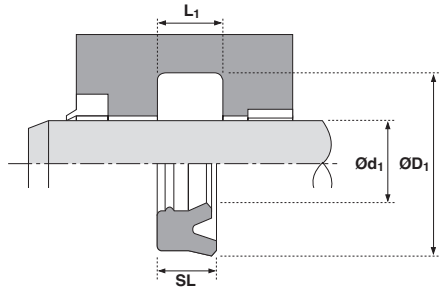
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
35	-0.025 -0.087	45	+0.080 -0.080	10.0	11.0	4305700
35	-0.025 -0.087	50	+0.080 -0.080	9.0	10.0	4611600
35	-0.025 -0.087	50	+0.080 -0.080	10.0	11.0	4322500
35.5	-0.025 -0.087	45	+0.080 -0.080	6.0	7.0	4616700
35.5	-0.025 -0.087	50.5	+0.095 -0.095	10.0	11.0	4616900
36	-0.025 -0.087	44	+0.080 -0.080	6.4	7.5	4373900
36	-0.025 -0.087	44	+0.080 -0.080	8.2	9.0	4395000
36	-0.025 -0.087	46	+0.080 -0.080	5.7	6.3	4372100‡
36	-0.025 -0.087	46	+0.080 -0.080	7.3	8.0	4304900‡
36	-0.025 -0.087	46	+0.080 -0.080	10.0	11.0	4305000
36	-0.025 -0.087	51	+0.095 -0.095	10.0	11.0	4771600
37	-0.025 -0.087	47	+0.080 -0.080	10.0	11.0	4862900
38	-0.025 -0.087	48	+0.080 -0.080	8.0	9.0	4619100
38	-0.025 -0.087	48	+0.080 -0.080	10.0	11.0	4515500
38	-0.025 -0.087	50	+0.080 -0.080	10.0	11.0	4586300
38	-0.025 -0.087	53	+0.095 -0.095	10.0	11.0	4480900
40	-0.025 -0.087	48	+0.080 -0.080	5.7	6.3	4703300
40	-0.025 -0.087	48	+0.080 -0.080	8.2	9.0	4396800
40	-0.025 -0.087	49.52	+0.080 -0.080	9.5	10.5	4334200
40	-0.025 -0.087	50	+0.080 -0.080	6.0	7.0	4610300
40	-0.025 -0.087	50	+0.080 -0.080	7.3	8.0	4311600‡
40	-0.025 -0.087	50	+0.080 -0.080	9.0	10.0	4866800
40	-0.025 -0.087	50	+0.080 -0.080	10.0	11.0	4293800

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
40	-0.025 -0.087	52	+0.095 -0.095	10.9	12.0	4381800
40	-0.025 -0.087	55	+0.095 -0.095	7.3	8.0	4703400
40	-0.025 -0.087	55	+0.095 -0.095	9.0	10.0	4611700
40	-0.025 -0.087	55	+0.095 -0.095	10.0	11.0	4328300
40	-0.025 -0.087	55	+0.095 -0.095	11.4	12.5	4857600
42	-0.025 -0.087	50	+0.080 -0.080	7.5	8.0	4373800
42	-0.025 -0.087	50	+0.080 -0.080	5.7	6.3	4744400
42	-0.025 -0.087	52	+0.095 -0.095	6.0	7.0	4618100
42	-0.025 -0.087	52	+0.095 -0.095	10.0	11.0	4338200
43	-0.025 -0.087	53	+0.095 -0.095	6.0	7.0	4619700
45	-0.025 -0.087	53	+0.095 -0.095	7.3	8.0	4619800
45	-0.025 -0.087	53	+0.095 -0.095	8.1	9.0	4402900
45	-0.025 -0.087	53	+0.095 -0.095	11.8	13.0	4315600
45	-0.025 -0.087	55	+0.095 -0.095	5.6	6.3	4479700‡
45	-0.025 -0.087	55	+0.095 -0.095	6.0	7.0	4610400
45	-0.025 -0.087	55	+0.095 -0.095	7.3	8.0	4305900‡
45	-0.025 -0.087	55	+0.095 -0.095	8.0	9.0	4845700
45	-0.025 -0.087	55	+0.095 -0.095	10.0	11.0	4302600
45	-0.025 -0.087	57.7	+0.095 -0.095	9.5	10.5	4322800
45	-0.025 -0.087	60	+0.095 -0.095	10.0	11.0	4315400
45	-0.025 -0.087	60	+0.095 -0.095	11.4	12.5	4619900
45	-0.025 -0.087	65	+0.095 -0.095	10.0	11.0	4315500
47	-0.025 -0.087	56.33	+0.095 -0.095	9.0	10.0	4778000



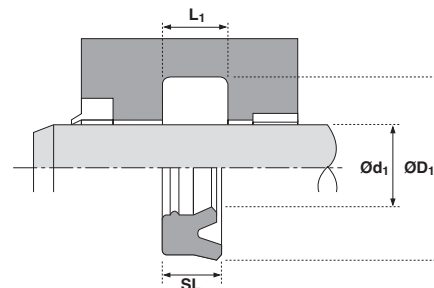
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
48	-0.025 -0.087	60	+0.095 -0.095	10.0	11.0	4432600
50	-0.025 -0.087	57	+0.095 -0.095	9.0	10.0	4538600
50	-0.025 -0.087	60	+0.095 -0.095	6.0	7.0	4611800
50	-0.025 -0.087	60	+0.095 -0.095	7.3	8.0	4306000‡
50	-0.025 -0.087	60	+0.095 -0.095	8.2	9.0	4845800
50	-0.025 -0.087	60	+0.095 -0.095	10.0	11.0	4304500
50	-0.025 -0.087	60	+0.095 -0.095	11.8	13.0	4314400
50	-0.025 -0.087	62.7	+0.095 -0.095	9.5	10.5	4334400
50	-0.025 -0.087	63	+0.095 -0.095	10.0	11.0	4804400
50	-0.025 -0.087	65	+0.095 -0.095	9.0	10.0	4611900
50	-0.025 -0.087	65	+0.095 -0.095	9.5	10.5	4344000
50	-0.025 -0.087	65	+0.095 -0.095	10.0	11.0	4617000
50	-0.025 -0.087	65	+0.095 -0.095	10.9	12.0	4291700
50	-0.025 -0.087	65	+0.095 -0.095	14.5	16.0	4381900
50	-0.025 -0.087	70	+0.095 -0.095	12.0	13.0	4612000
53	-0.030 -0.104	63	+0.095 -0.095	6.0	7.0	4617700
53	-0.030 -0.104	65	+0.095 -0.095	9.0	10.0	4371700
55	-0.030 -0.104	63	+0.095 -0.095	8.2	9.0	4863400
55	-0.030 -0.104	65	+0.095 -0.095	6.0	7.0	4615600
55	-0.030 -0.104	65	+0.095 -0.095	7.3	8.0	4703500
55	-0.030 -0.104	65	+0.095 -0.095	8.2	9.0	4360400
55	-0.030 -0.104	65	+0.095 -0.095	10.0	11.0	4306100
55	-0.030 -0.104	65	+0.095 -0.095	11.8	13.0	4323400

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
55	-0.030 -0.104	68	+0.095 -0.095	10.0	11.0	4593800
55	-0.030 -0.104	70	+0.095 -0.095	9.0	10.0	4612100
55	-0.030 -0.104	70	+0.095 -0.095	11.8	13.0	4319200
55	-0.030 -0.104	71	+0.095 -0.095	12.0	13.0	4625000
55	-0.030 -0.104	75	+0.095 -0.095	12.0	13.0	4612200
56	-0.030 -0.104	66	+0.095 -0.095	10.0	11.0	4311800
56	-0.030 -0.104	71	+0.095 -0.095	10.0	11.0	4311900
56	-0.030 -0.104	71	+0.095 -0.095	11.4	12.5	4306200‡
60	-0.030 -0.104	68	+0.095 -0.095	11.4	12.5	4538000
60	-0.030 -0.104	70	+0.095 -0.095	6.0	7.0	4610500
60	-0.030 -0.104	70	+0.095 -0.095	7.3	8.0	4703600
60	-0.030 -0.104	70	+0.095 -0.095	10.0	11.0	4310600
60	-0.030 -0.104	70	+0.095 -0.095	11.8	13.0	4306300
60	-0.030 -0.104	71	+0.095 -0.095	7.0	8.0	4615700
60	-0.030 -0.104	72	+0.095 -0.095	10.0	11.0	4323500
60	-0.030 -0.104	73	+0.095 -0.095	10.0	11.0	4593900
60	-0.030 -0.104	75	+0.095 -0.095	9.0	10.0	4612300
60	-0.030 -0.104	75	+0.095 -0.095	10.0	11.0	4378700
60	-0.030 -0.104	75	+0.095 -0.095	11.4	12.5	4857700
60	-0.030 -0.104	75	+0.095 -0.095	11.8	13.0	4306400
60	-0.030 -0.104	75	+0.095 -0.095	20.5	22.5	4391800
60	-0.030 -0.104	76	+0.095 -0.095	10.0	11.0	4625100
60	-0.030 -0.104	80	+0.095 -0.095	11.4	12.5	4514300



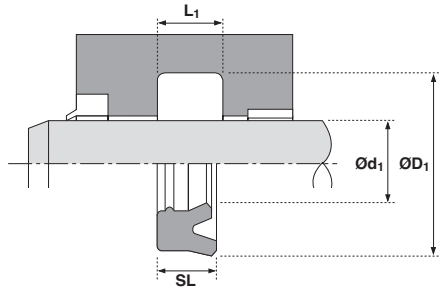
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
60	-0.030 -0.104	80	+0.095 -0.095	12.0	13.0	4612400
63	-0.030 -0.104	73	+0.095 -0.095	6.0	7.0	4612500
63	-0.030 -0.104	73	+0.095 -0.095	11.8	13.0	4312000
63	-0.030 -0.104	78	+0.095 -0.095	10.0	11.0	4312100
63	-0.030 -0.104	78	+0.095 -0.095	11.4	12.5	4306500‡
63	-0.030 -0.104	83	+0.110 -0.110	11.8	13.0	4857800
65	-0.030 -0.104	75	+0.095 -0.095	6.0	7.0	4615900
65	-0.030 -0.104	75	+0.095 -0.095	7.7	9.0	4314500
65	-0.030 -0.104	75	+0.095 -0.095	11.8	13.0	4306600
65	-0.030 -0.104	77	+0.095 -0.095	9.0	10.0	4703700
65	-0.030 -0.104	77.7	+0.095 -0.095	9.5	10.5	4334500
65	-0.030 -0.104	78	+0.095 -0.095	10.0	11.0	4616200
65	-0.030 -0.104	80	+0.095 -0.095	9.0	10.0	4612600
65	-0.030 -0.104	80	+0.095 -0.095	11.8	13.0	4312200
65	-0.030 -0.104	85	+0.110 -0.110	12.0	13.0	4612700
67	-0.030 -0.104	77	+0.095 -0.095	6.0	7.0	4612800
68.5	-0.030 -0.104	76.5	+0.095 -0.095	8.0	9.0	4855200
70	-0.030 -0.104	78	+0.095 -0.095	11.4	12.5	4863500
70	-0.030 -0.104	80	+0.095 -0.095	6.0	7.0	4615800
70	-0.030 -0.104	80	+0.095 -0.095	11.4	12.5	4857900
70	-0.030 -0.104	80	+0.095 -0.095	11.8	13.0	4312300
70	-0.030 -0.104	82	+0.110 -0.110	8.7	9.6	4494700
70	-0.030 -0.104	82	+0.110 -0.110	10.0	11.0	4323600

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
70	-0.030 -0.104	83	+0.110 -0.110	10.0	11.0	4616400
70	-0.030 -0.104	85	+0.110 -0.110	9.0	10.0	4612900
70	-0.030 -0.104	85	+0.110 -0.110	10.0	11.0	4302700
70	-0.030 -0.104	85	+0.110 -0.110	11.4	12.5	4301200‡
70	-0.030 -0.104	85	+0.110 -0.110	20.5	22.5	4401400
70	-0.030 -0.104	90	+0.110 -0.110	12.0	13.0	4613000
75	-0.030 -0.104	83	+0.110 -0.110	11.4	12.5	4706300
75	-0.030 -0.104	85	+0.110 -0.110	6.0	7.0	4616800
75	-0.030 -0.104	85	+0.110 -0.110	11.4	12.5	4858000
75	-0.030 -0.104	85	+0.110 -0.110	11.8	13	4312400
75	-0.030 -0.104	88	+0.110 -0.110	10.0	11.0	4616300
75	-0.030 -0.104	90	+0.110 -0.110	9.0	10.0	4613100
75	-0.030 -0.104	90	+0.110 -0.110	10.0	11.0	4862800
75	-0.030 -0.104	90	+0.110 -0.110	11.4	12.5	4858100
75	-0.030 -0.104	95	+0.110 -0.110	12.0	13.0	4613200
77	-0.030 -0.104	87	+0.110 -0.110	11.8	13.0	4863100
78	-0.030 -0.104	86	+0.110 -0.110	9.0	10.0	4538700
78	-0.030 -0.104	86	+0.110 -0.110	11.4	12.5	4863600
80	-0.030 -0.104	88	+0.110 -0.110	10.9	12.0	4766600
80	-0.030 -0.104	90	+0.110 -0.110	6.0	7.0	4616000
80	-0.030 -0.104	90	+0.110 -0.110	10.0	11.0	4390400
80	-0.030 -0.104	90	+0.110 -0.110	11.8	13.0	4312500
80	-0.030 -0.104	92	+0.110 -0.110	8.7	9.6	4494800



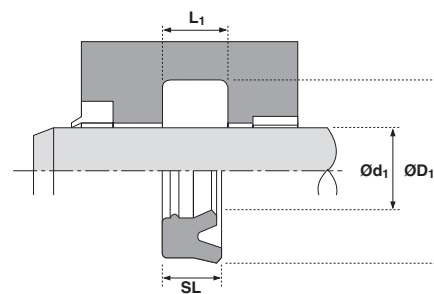
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
80	-0.030 -0.104	93	+0.110 -0.110	10.0	11.0	4615200
80	-0.030 -0.104	95	+0.110 -0.110	9.0	10.0	4613300
80	-0.030 -0.104	95	+0.110 -0.110	10.0	11.0	4383500
80	-0.030 -0.104	95	+0.110 -0.110	11.4	12.5	4620000
80	-0.030 -0.104	95	+0.110 -0.110	11.8	13.0	4306700
80	-0.030 -0.104	100	+0.110 -0.110	12.0	13.0	4613400
80	-0.030 -0.104	100	+0.110 -0.110	14.5	16.0	4382800‡
80	-0.030 -0.104	110	+0.110 -0.110	16.4	18.0	4342900
85	-0.036 -0.123	93	+0.110 -0.110	8.2	9.0	4839100
85	-0.036 -0.123	93	+0.110 -0.110	10.0	11.0	4392700
85	-0.036 -0.123	93	+0.110 -0.110	11.4	12.5	4537900
85	-0.036 -0.123	95	+0.110 -0.110	11.8	13.0	4863700
85	-0.036 -0.123	100	+0.110 -0.110	9.0	10.0	4610600
85	-0.036 -0.123	100	+0.110 -0.110	10.0	11.0	4615300
85	-0.036 -0.123	100	+0.110 -0.110	11.8	13.0	4306800
85	-0.036 -0.123	105	+0.110 -0.110	12.0	13.0	4613500
90	-0.036 -0.123	98	+0.110 -0.110	11.4	12.5	4706400
90	-0.036 -0.123	100	+0.110 -0.110	6.8	7.5	4493500‡
90	-0.036 -0.123	100	+0.110 -0.110	9.0	10.0	4366900
90	-0.036 -0.123	100	+0.110 -0.110	11.4	12.5	4858200
90	-0.036 -0.123	100	+0.110 -0.110	11.8	13.0	4314600
90	-0.036 -0.123	102	+0.110 -0.110	8.7	9.6	4333000
90	-0.036 -0.123	105	+0.110 -0.110	9.0	10.0	4613600

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
90	-0.036 -0.123	105	+0.110 -0.110	10.0	11.0	4615400
90	-0.036 -0.123	105	+0.110 -0.110	11.4	12.5	4306900‡
90	-0.036 -0.123	110	+0.110 -0.110	12.0	13.0	4613700
95	-0.036 -0.123	103	+0.110 -0.110	11.4	12.5	4863200
95	-0.036 -0.123	110	+0.110 -0.110	9.0	10.0	4610700
95	-0.036 -0.123	110	+0.110 -0.110	10.0	11.0	4615500
95	-0.036 -0.123	110	+0.110 -0.110	11.8	13.0	4617600
95	-0.036 -0.123	115	+0.110 -0.110	12.0	13.0	4613800
96	-0.036 -0.123	104	+0.110 -0.110	10.9	12.0	4380300
98	-0.036 -0.123	112	+0.110 -0.110	8.5	9.5	4618200
100	-0.036 -0.123	108	+0.110 -0.110	10.9	12.0	4766700
100	-0.036 -0.123	110	+0.110 -0.110	10.9	12.0	4461700
100	-0.036 -0.123	115	+0.110 -0.110	9.0	10.0	4610800
100	-0.036 -0.123	115	+0.110 -0.110	11.8	13.0	4312600
100	-0.036 -0.123	115	+0.110 -0.110	10.0	11.0	4617100
100	-0.036 -0.123	120	+0.110 -0.110	11.8	13.0	4312700†
100	-0.036 -0.123	120	+0.110 -0.110	14.5	16.0	4307000‡
105	-0.036 -0.123	113	+0.110 -0.110	10.0	11.0	4392800
105	-0.036 -0.123	115	+0.110 -0.110	13.2	14.5	4390500
105	-0.036 -0.123	120	+0.110 -0.110	9.0	10	4617300
105	-0.036 -0.123	120	+0.110 -0.110	10.0	11.0	4617200
105	-0.036 -0.123	120	+0.110 -0.110	14.5	16.0	4379500
105	-0.036 -0.123	125	+0.125 -0.125	14.5	16.0	4617400



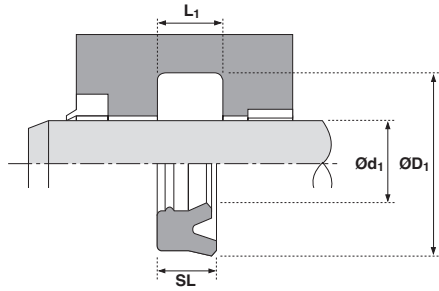
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
108	-0.036 -0.123	123	+0.125 -0.125	10.9	12.0	4329100
110	-0.036 -0.123	125	+0.125 -0.125	9.0	10.0	4459700†
110	-0.036 -0.123	125	+0.125 -0.125	11.0	12.0	4537800
110	-0.036 -0.123	125	+0.125 -0.125	14.5	16.0	4481600
110	-0.036 -0.123	130	+0.125 -0.125	11.8	13.0	4312800†
110	-0.036 -0.123	130	+0.125 -0.125	14.5	16.0	4307100‡
110	-0.036 -0.123	135	+0.125 -0.125	14.5	16.0	4343000
112	-0.036 -0.123	125	+0.125 -0.125	9.0	10.0	4610900
115	-0.036 -0.123	125	+0.125 -0.125	11.0	12.0	4619300
115	-0.036 -0.123	130	+0.125 -0.125	9.0	10.0	4459800
115	-0.036 -0.123	130	+0.125 -0.125	10.9	12.0	4434600
115	-0.036 -0.123	130	+0.125 -0.125	14.5	16.0	4342600
120	-0.036 -0.123	128	+0.125 -0.125	11.4	12.5	4706500
120	-0.036 -0.123	130	+0.125 -0.125	10.9	12.0	4461800
120	-0.036 -0.123	135	+0.125 -0.125	9.0	10.0	4614000
120	-0.036 -0.123	140	+0.125 -0.125	12.0	13.0	4614100
120	-0.036 -0.123	140	+0.125 -0.125	14.5	16.0	4312900
124	-0.043 -0.143	134	+0.125 -0.125	6.0	7.0	4618300
125	-0.043 -0.143	133	+0.125 -0.125	10.0	11.0	4392900
125	-0.043 -0.143	133	+0.125 -0.125	11.4	12.5	4748500
125	-0.043 -0.143	140	+0.125 -0.125	9.0	10.0	4614200
125	-0.043 -0.143	140	+0.125 -0.125	10.0	11.0	4618400
125	-0.043 -0.143	140	+0.125 -0.125	10.9	12.0	4766500

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
125	-0.043 -0.143	145	+0.125 -0.125	12.0	13.0	4614300
125	-0.043 -0.143	145	+0.125 -0.125	14.5	16.0	4307300‡
125	-0.043 -0.143	150	+0.125 -0.125	12.5	14.0	4367000
130	-0.043 -0.143	140	+0.125 -0.125	14.5	16.0	4390600
130	-0.043 -0.143	145	+0.125 -0.125	9.0	10.0	4614400
130	-0.043 -0.143	145	+0.125 -0.125	10.0	11.0	4619000
130	-0.043 -0.143	150	+0.125 -0.125	12.0	13.0	4614500
130	-0.043 -0.143	150	+0.125 -0.125	14.5	16.0	4313000
132.5	-0.043 -0.143	157.5	+0.125 -0.125	13.2	14.5	4329400
135	-0.043 -0.143	145	+0.125 -0.125	11.0	12.0	4619400
135	-0.043 -0.143	150	+0.125 -0.125	9.0	10.0	4618500
135	-0.043 -0.143	150	+0.125 -0.125	11.4	12.5	4537700
140	-0.043 -0.143	150	+0.125 -0.125	6.0	7.0	4617900
140	-0.043 -0.143	150	+0.125 -0.125	10.9	12.0	4461900
140	-0.043 -0.143	155	+0.125 -0.125	9.0	10.0	4614600
140	-0.043 -0.143	155	+0.125 -0.125	11.8	13.0	4555300
140	-0.043 -0.143	160	+0.125 -0.125	11.8	13.0	4313100†
140	-0.043 -0.143	160	+0.125 -0.125	14.5	16.0	4307400‡
150	-0.043 -0.143	160	+0.125 -0.125	11.0	12.0	4595200
150	-0.043 -0.143	165	+0.125 -0.125	9.0	10.0	4614700
150	-0.043 -0.143	170	+0.125 -0.125	12.0	13.0	4614800
150	-0.043 -0.143	170	+0.125 -0.125	13.2	14.5	4367100
150	-0.043 -0.143	170	+0.125 -0.125	14.5	16.0	4342800



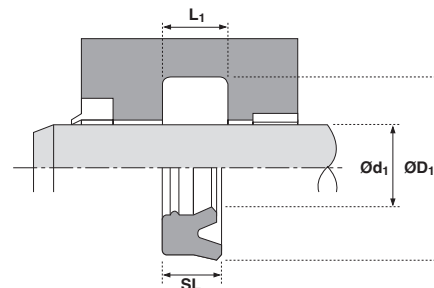
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
151	-0.043 -0.143	159	+0.125 -0.125	9.0	10.0	4538800
155	-0.043 -0.143	165	+0.125 -0.125	6.0	7.0	4618600
155	-0.043 -0.143	165	+0.125 -0.125	11.0	12.0	4619500
155	-0.043 -0.143	170	+0.125 -0.125	9.0	10.0	4618700
155	-0.043 -0.143	170	+0.125 -0.125	14.5	16.0	4342700
160	-0.043 -0.143	175	+0.125 -0.125	9.0	10.0	4614900
160	-0.043 -0.143	175	+0.125 -0.125	10.9	12.0	4462000
160	-0.043 -0.143	180	+0.125 -0.125	12.0	13.0	4615000
160	-0.043 -0.143	180	+0.125 -0.125	14.5	16.0	4345000
165	-0.043 -0.143	180	+0.125 -0.125	9.0	10.0	4616500
170	-0.043 -0.143	180	+0.125 -0.125	6.0	7.0	4618800
170	-0.043 -0.143	185	+0.145 -0.145	9.0	10.0	4618000
170	-0.043 -0.143	190	+0.145 -0.145	14.5	16.0	4398800

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
180	-0.043 -0.143	190	+0.145 -0.145	11.0	12.0	4617800
180	-0.043 -0.143	192	+0.145 -0.145	12.5	14.0	4619600
180	-0.043 -0.143	200	+0.145 -0.145	11.8	13.0	4314700‡
180	-0.043 -0.143	200	+0.145 -0.145	14.5	16.0	4560900
185	-0.050 -0.165	200	+0.145 -0.145	10.9	12.0	4462100
190	-0.050 -0.165	215	+0.145 -0.145	18.5	20.0	4749400
200	-0.050 -0.165	220	+0.145 -0.145	12.0	13.0	4615100
200	-0.050 -0.165	220	+0.145 -0.145	14.5	16.0	4380200
205	-0.050 -0.143	220	+0.145 -0.125	12.2	13.5	4522400
220	-0.050 -0.165	240	+0.145 -0.145	14.5	16.0	4555400
260	-0.056 -0.186	280	+0.160 -0.160	14.5	16.0	4859300
330	-0.062 -0.202	350	+0.180 -0.180	18.0	20.0	4587400



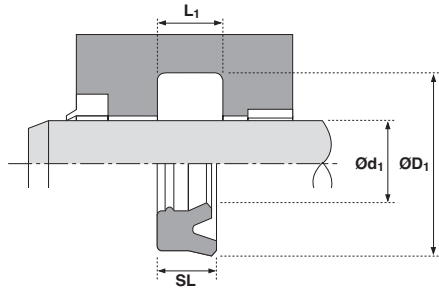
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
0.375	-0.0005 -0.0019	0.625	+0.002 -0.002	0.198	0.218	4544300
0.375	-0.0005 -0.0019	0.750	+0.003 -0.003	0.312	0.343	4710500
0.500	-0.0006 -0.0023	0.750	+0.003 -0.003	0.187	0.207	4576100
0.562	-0.0006 -0.0023	0.813	+0.003 -0.003	0.187	0.207	4576200
0.625	-0.0006 -0.0023	0.875	+0.003 -0.003	0.187	0.207	4493700
0.625	-0.0006 -0.0023	0.875	+0.003 -0.003	0.241	0.265	4329000
0.625	-0.0006 -0.0023	1.000	+0.003 -0.003	0.281	0.312	4447200
0.687	-0.0006 -0.0023	0.937	+0.003 -0.003	0.187	0.207	4572000
0.750	-0.0008 -0.0028	1.000	+0.003 -0.003	0.125	0.138	4552900
0.750	-0.0008 -0.0028	1.000	+0.003 -0.003	0.187	0.207	4571000
0.750	-0.0008 -0.0028	1.000	+0.003 -0.003	0.250	0.275	4345100
0.750	-0.0008 -0.0028	1.125	+0.003 -0.003	0.312	0.344	4512200
0.812	-0.0008 -0.0028	1.062	+0.003 -0.003	0.187	0.207	4576300
0.812	-0.0008 -0.0028	1.062	+0.003 -0.003	0.250	0.275	4558700
0.875	-0.0008 -0.0028	1.125	+0.003 -0.003	0.187	0.207	4576400
0.875	-0.0008 -0.0028	1.125	+0.003 -0.003	0.250	0.275	4442500
0.875	-0.0008 -0.0028	1.250	+0.003 -0.003	0.324	0.356	4794500
0.875	-0.0008 -0.0028	1.375	+0.003 -0.003	0.341	0.375	4373100
1.000	-0.0008 -0.0028	1.240	+0.003 -0.003	0.192	0.211	4371800
1.000	-0.0008 -0.0028	1.250	+0.003 -0.003	0.187	0.207	4442600
1.000	-0.0008 -0.0028	1.250	+0.003 -0.003	0.250	0.275	4345200
1.000	-0.0008 -0.0028	1.312	+0.003 -0.003	0.219	0.241	4493800
1.000	-0.0008 -0.0028	1.375	+0.003 -0.003	0.187	0.207	4801700
1.000	-0.0008 -0.0028	1.375	+0.003 -0.003	0.250	0.275	4456800

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
1.000	-0.0008 -0.0028	1.375	+0.003 -0.003	0.312	0.344	4345900
1.000	-0.0008 -0.0028	1.500	+0.003 -0.003	0.255	0.275	4430200
1.000	-0.0008 -0.0028	1.500	+0.003 -0.003	0.341	0.375	4330100
1.000	-0.0008 -0.0028	1.500	+0.003 -0.003	0.375	0.413	4308400
1.062	-0.0008 -0.0028	1.302	+0.003 -0.003	0.187	0.207	4410300
1.062	-0.0008 -0.0028	1.312	+0.003 -0.003	0.250	0.275	4394500
1.125	-0.0008 -0.0028	1.365	+0.003 -0.003	0.192	0.211	4384500
1.125	-0.0008 -0.0028	1.375	+0.003 -0.003	0.187	0.207	4442700
1.125	-0.0008 -0.0028	1.375	+0.003 -0.003	0.250	0.275	4388000
1.125	-0.0008 -0.0028	1.399	+0.003 -0.003	0.192	0.211	4371900
1.125	-0.0008 -0.0028	1.500	+0.003 -0.003	0.312	0.344	4392600
1.125	-0.0008 -0.0028	1.562	+0.003 -0.003	0.325	0.360	4568800
1.125	-0.0008 -0.0028	1.625	+0.003 -0.003	0.250	0.275	4370900
1.125	-0.0008 -0.0028	1.750	+0.003 -0.003	0.397	0.437	4373000
1.187	-0.0008 -0.0028	1.562	+0.003 -0.003	0.250	0.275	4458600
1.250	-0.0010 -0.0034	1.500	+0.003 -0.003	0.187	0.207	4359600
1.250	-0.0010 -0.0034	1.500	+0.003 -0.003	0.250	0.275	4345300
1.250	-0.0010 -0.0034	1.625	+0.003 -0.003	0.187	0.207	4552600
1.250	-0.0010 -0.0034	1.625	+0.003 -0.003	0.227	0.250	4330200
1.250	-0.0010 -0.0034	1.625	+0.003 -0.003	0.250	0.275	4460600
1.250	-0.0010 -0.0034	1.625	+0.003 -0.003	0.312	0.344	4346000
1.250	-0.0010 -0.0034	1.750	+0.003 -0.003	0.250	0.275	4513500
1.250	-0.0010 -0.0034	1.750	+0.003 -0.003	0.375	0.413	4335800
1.250	-0.0010 -0.0034	1.875	+0.003 -0.003	0.397	0.437	4330300



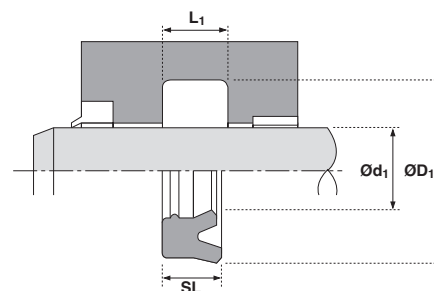
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
1.375	-0.0010 -0.0034	1.625	+0.003 -0.003	0.187	0.207	4392200
1.375	-0.0010 -0.0034	1.625	+0.003 -0.003	0.250	0.275	4345400
1.375	-0.0010 -0.0034	1.687	+0.003 -0.003	0.219	0.241	4493900
1.375	-0.0010 -0.0034	1.750	+0.003 -0.003	0.187	0.207	4552800
1.375	-0.0010 -0.0034	1.750	+0.003 -0.003	0.312	0.344	4346100
1.375	-0.0010 -0.0034	1.875	+0.003 -0.003	0.375	0.413	4403100
1.375	-0.0010 -0.0034	2.000	+0.004 -0.004	0.397	0.437	4330400
1.437	-0.0010 -0.0034	1.812	+0.003 -0.003	0.312	0.344	4442800
1.500	-0.0010 -0.0034	1.750	+0.003 -0.003	0.250	0.275	4345500
1.500	-0.0010 -0.0034	1.875	+0.003 -0.003	0.187	0.207	4576600
1.500	-0.0010 -0.0034	1.875	+0.003 -0.003	0.250	0.275	4322100
1.500	-0.0010 -0.0034	1.875	+0.003 -0.003	0.312	0.344	4346200
1.500	-0.0010 -0.0034	1.875	+0.003 -0.003	0.375	0.413	4385400
1.500	-0.0010 -0.0034	2.000	+0.004 -0.004	0.250	0.275	4394400
1.500	-0.0010 -0.0034	2.000	+0.004 -0.004	0.341	0.375	4330500
1.500	-0.0010 -0.0034	2.000	+0.004 -0.004	0.375	0.413	4322200
1.500	-0.0010 -0.0034	2.125	+0.004 -0.004	0.375	0.413	4442900
1.500	-0.0010 -0.0034	2.125	+0.004 -0.004	0.397	0.437	4330600
1.625	-0.0010 -0.0034	1.875	+0.003 -0.003	0.250	0.275	4345600
1.625	-0.0010 -0.0034	2.000	+0.004 -0.004	0.281	0.312	4542800
1.625	-0.0010 -0.0034	2.000	+0.004 -0.004	0.312	0.344	4443000
1.625	-0.0010 -0.0034	2.000	+0.004 -0.004	0.375	0.413	4443100
1.625	-0.0010 -0.0034	2.125	+0.004 -0.004	0.375	0.413	4512100
1.750	-0.0010 -0.0034	2.000	+0.004 -0.004	0.250	0.275	4345700

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
1.750	-0.0010 -0.0034	2.125	+0.004 -0.004	0.250	0.275	4357200
1.750	-0.0010 -0.0034	2.125	+0.004 -0.004	0.312	0.344	4346300
1.750	-0.0010 -0.0034	2.125	+0.004 -0.004	0.375	0.413	4366800
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.250	0.275	4552700
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.341	0.375	4330700
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.375	0.413	4337000
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.500	0.550	4376800
1.750	-0.0010 -0.0034	2.375	+0.004 -0.004	0.437	0.481	4443200
1.875	-0.0010 -0.0034	2.250	+0.004 -0.004	0.312	0.344	4834600
1.875	-0.0010 -0.0034	2.250	+0.004 -0.004	0.375	0.413	4476200
1.875	-0.0010 -0.0034	2.375	+0.004 -0.004	0.375	0.413	4391200
1.875	-0.0010 -0.0034	2.500	+0.004 -0.004	0.397	0.437	4331500
2.000	-0.0012 -0.0041	2.250	+0.004 -0.004	0.250	0.275	4345800
2.000	-0.0012 -0.0041	2.375	+0.004 -0.004	0.250	0.275	4458700
2.000	-0.0012 -0.0041	2.375	+0.004 -0.004	0.312	0.344	4346400
2.000	-0.0012 -0.0041	2.375	+0.004 -0.004	0.375	0.413	4380100
2.000	-0.0012 -0.0041	2.500	+0.004 -0.004	0.250	0.275	4496900
2.000	-0.0012 -0.0041	2.500	+0.004 -0.004	0.312	0.344	4382900
2.000	-0.0012 -0.0041	2.500	+0.004 -0.004	0.341	0.375	4330900
2.000	-0.0012 -0.0041	2.500	+0.004 -0.004	0.375	0.413	4337100
2.000	-0.0012 -0.0041	2.500	+0.004 -0.004	0.781	0.859	4491400
2.000	-0.0012 -0.0041	2.625	+0.004 -0.004	0.312	0.344	4333100
2.000	-0.0012 -0.0041	2.625	+0.004 -0.004	0.397	0.437	4331000
2.000	-0.0012 -0.0041	2.625	+0.004 -0.004	0.500	0.550	4346500



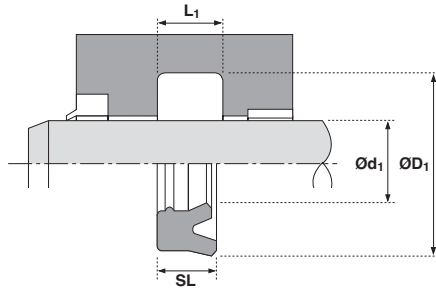
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
2.000	-0.0012 -0.0041	2.750	+0.004 -0.004	0.625	0.688	4347300
2.125	-0.0012 -0.0041	2.500	+0.004 -0.004	0.375	0.413	4443300
2.250	-0.0012 -0.0041	2.625	+0.004 -0.004	0.335	0.375	4372200
2.250	-0.0012 -0.0041	2.750	+0.004 -0.004	0.341	0.375	4331100
2.250	-0.0012 -0.0041	2.750	+0.004 -0.004	0.375	0.413	4337200
2.250	-0.0012 -0.0041	2.875	+0.004 -0.004	0.5	0.55	4750200
2.250	-0.0012 -0.0041	3.000	+0.004 -0.004	0.511	0.562	4331200
2.375	-0.0012 -0.0041	2.750	+0.004 -0.004	0.375	0.413	4443400
2.375	-0.0012 -0.0041	2.875	+0.004 -0.004	0.375	0.413	4443500
2.500	-0.0012 -0.0041	2.875	+0.004 -0.004	0.312	0.344	4443600
2.500	-0.0012 -0.0041	2.875	+0.004 -0.004	0.375	0.413	4458500
2.500	-0.0012 -0.0041	2.937	+0.004 -0.004	0.284	0.312	4535900
2.500	-0.0012 -0.0041	3.000	+0.004 -0.004	0.250	0.275	4553000
2.500	-0.0012 -0.0041	3.000	+0.004 -0.004	0.284	0.312	4331300
2.500	-0.0012 -0.0041	3.000	+0.004 -0.004	0.375	0.413	4335900
2.500	-0.0012 -0.0041	3.125	+0.004 -0.004	0.500	0.550	4346600
2.500	-0.0012 -0.0041	3.250	+0.004 -0.004	0.625	0.688	4347400
2.625	-0.0012 -0.0041	3.000	+0.004 -0.004	0.375	0.413	4443700
2.625	-0.0012 -0.0041	3.125	+0.004 -0.004	0.500	0.550	4514900
2.625	-0.0012 -0.0041	3.250	+0.004 -0.004	0.625	0.688	4376900
2.735	-0.0012 -0.0041	3.250	+0.004 -0.004	0.312	0.344	4746400
2.750	-0.0012 -0.0041	3.125	+0.004 -0.004	0.375	0.413	4379100
2.750	-0.0012 -0.0041	3.250	+0.004 -0.004	0.375	0.413	4336000
2.750	-0.0012 -0.0041	3.375	+0.004 -0.004	0.375	0.413	4456900

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
2.750	-0.0012 -0.0041	3.375	+0.004 -0.004	0.500	0.550	4346700
2.750	-0.0012 -0.0041	3.375	+0.004 -0.004	0.805	0.885	4467400
2.750	-0.0012 -0.0041	3.500	+0.004 -0.004	0.625	0.688	4347500
2.875	-0.0012 -0.0041	3.250	+0.004 -0.004	0.375	0.413	4443800
2.875	-0.0012 -0.0041	3.375	+0.004 -0.004	0.375	0.413	4760200
3.000	-0.0012 -0.0041	3.375	+0.004 -0.004	0.375	0.413	4468300
3.000	-0.0012 -0.0041	3.438	+0.004 -0.004	0.281	0.310	4539900
3.000	-0.0012 -0.0041	3.500	+0.004 -0.004	0.375	0.413	4336100
3.000	-0.0012 -0.0041	3.500	+0.004 -0.004	0.625	0.688	4399600
3.000	-0.0012 -0.0041	3.500	+0.004 -0.004	0.781	0.859	4476900
3.000	-0.0012 -0.0041	3.625	+0.004 -0.004	0.500	0.550	4346800
3.000	-0.0012 -0.0041	3.750	+0.004 -0.004	0.625	0.688	4347600
3.125	-0.0012 -0.0041	3.500	+0.004 -0.004	0.625	0.688	4399700
3.250	-0.0014 -0.0048	3.625	+0.004 -0.004	0.375	0.413	4714100
3.250	-0.0014 -0.0048	3.625	+0.004 -0.004	0.562	0.619	4476800
3.250	-0.0014 -0.0048	3.750	+0.004 -0.004	0.375	0.413	4336200
3.250	-0.0014 -0.0048	3.875	+0.004 -0.004	0.500	0.550	4415400
3.375	-0.0014 -0.0048	3.875	+0.004 -0.004	0.375	0.413	4760300
3.375	-0.0014 -0.0048	4.000	+0.004 -0.004	0.594	0.653	4377000
3.500	-0.0014 -0.0048	3.875	+0.004 -0.004	0.375	0.413	4468400
3.500	-0.0014 -0.0048	4.000	+0.004 -0.004	0.312	0.344	4540000
3.500	-0.0014 -0.0048	4.000	+0.004 -0.004	0.375	0.413	4336300
3.500	-0.0014 -0.0048	4.125	+0.004 -0.004	0.500	0.550	4346900
3.500	-0.0014 -0.0048	4.250	+0.004 -0.004	0.625	0.688	4347700



Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
3.625	-0.0014 -0.0048	4.125	+0.004 -0.004	0.375	0.413	4436200
3.750	-0.0014 -0.0048	4.125	+0.004 -0.004	0.375	0.413	4702500
3.750	-0.0014 -0.0048	4.250	+0.004 -0.004	0.375	0.413	4443900
3.750	-0.0014 -0.0048	4.250	+0.004 -0.004	0.500	0.550	4456500
3.750	-0.0014 -0.0048	4.250	+0.004 -0.004	0.562	0.625	4436100
3.875	-0.0014 -0.0048	4.375	+0.004 -0.004	0.375	0.413	4760400
4.000	-0.0014 -0.0048	4.375	+0.004 -0.004	0.375	0.413	4468500
4.000	-0.0014 -0.0048	4.500	+0.004 -0.004	0.312	0.344	4586700
4.000	-0.0014 -0.0048	4.500	+0.004 -0.004	0.375	0.413	4336400
4.000	-0.0014 -0.0048	4.500	+0.004 -0.004	0.562	0.619	4385700
4.000	-0.0014 -0.0048	4.500	+0.004 -0.004	0.781	0.859	4399800
4.000	-0.0014 -0.0048	4.625	+0.004 -0.004	0.375	0.413	4520100
4.000	-0.0014 -0.0048	4.625	+0.004 -0.004	0.500	0.550	4347000
4.000	-0.0014 -0.0048	4.750	+0.004 -0.004	0.500	0.550	4444000
4.000	-0.0014 -0.0048	4.750	+0.005 -0.005	0.625	0.688	4347800
4.250	-0.0014 -0.0048	5.000	+0.005 -0.005	0.625	0.688	4347900
4.375	-0.0014 -0.0048	4.875	+0.005 -0.005	0.375	0.413	4760500
4.500	-0.0014 -0.0048	5.000	+0.005 -0.005	0.375	0.413	4379200
4.500	-0.0014 -0.0048	5.125	+0.005 -0.005	0.500	0.550	4347100
4.500	-0.0014 -0.0048	5.125	+0.005 -0.005	0.625	0.688	4444100
4.500	-0.0014 -0.0048	5.250	+0.005 -0.005	0.625	0.688	4348000
4.625	-0.0014 -0.0048	5.250	+0.005 -0.005	0.625	0.688	4377100
4.750	-0.0014 -0.0048	5.125	+0.005 -0.005	0.375	0.413	4714200
4.750	-0.0014 -0.0048	5.250	+0.005 -0.005	0.625	0.688	4451100

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
4.875	-0.0017 -0.0056	5.375	+0.005 -0.005	0.375	0.413	4760600
5.000	-0.0017 -0.0056	5.500	+0.005 -0.005	0.375	0.413	4495000
5.000	-0.0017 -0.0056	5.500	+0.005 -0.005	0.562	0.619	4386100
5.000	-0.0017 -0.0056	5.500	+0.005 -0.005	0.781	0.859	4399900
5.000	-0.0017 -0.0056	5.531	+0.005 -0.005	0.557	0.619	4391400
5.000	-0.0017 -0.0056	5.625	+0.005 -0.005	0.500	0.550	4347200
5.000	-0.0017 -0.0056	5.750	+0.005 -0.005	0.625	0.688	4348100
5.125	-0.0017 -0.0056	5.625	+0.005 -0.005	0.562	0.619	4436000
5.125	-0.0017 -0.0056	6.000	+0.005 -0.005	0.500	0.550	4444200
5.375	-0.0017 -0.0056	5.875	+0.005 -0.005	0.625	0.688	4475800
5.375	-0.0017 -0.0056	6.000	+0.005 -0.005	0.625	0.688	4448300
5.500	-0.0017 -0.0056	6.000	+0.005 -0.005	0.375	0.413	4379300
5.500	-0.0017 -0.0056	6.000	+0.005 -0.005	0.562	0.619	4468600
5.500	-0.0017 -0.0056	6.125	+0.005 -0.005	0.312	0.344	4540100
5.500	-0.0017 -0.0056	6.250	+0.005 -0.005	0.625	0.688	4348200
5.625	-0.0017 -0.0056	6.125	+0.005 -0.005	0.375	0.413	4714300
6.000	-0.0017 -0.0056	6.500	+0.005 -0.005	0.562	0.619	4436500
6.000	-0.0017 -0.0056	6.500	+0.005 -0.005	0.781	0.859	4400000
6.000	-0.0017 -0.0056	6.531	+0.005 -0.005	0.562	0.619	4391000
6.000	-0.0017 -0.0056	6.750	+0.005 -0.005	0.625	0.688	4348300
6.500	-0.0017 -0.0056	7.250	+0.006 -0.006	0.625	0.688	4348400
7.000	-0.0017 -0.0056	7.500	+0.006 -0.006	0.562	0.619	4436600
7.000	-0.0017 -0.0056	7.500	+0.006 -0.006	0.780	0.859	4456600
7.000	-0.0017 -0.0056	7.531	+0.006 -0.006	0.562	0.619	4391100



Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
7.000	-0.0017 -0.0056	7.750	+0.006 -0.006	0.625	0.688	4348500
7.500	-0.0017 -0.0056	8.000	+0.006 -0.006	0.375	0.413	4714400
7.750	-0.0020 -0.0065	8.500	+0.006 -0.006	0.625	0.688	4353900
8.000	-0.0020 -0.0065	8.500	+0.006 -0.006	0.375	0.413	4733400
8.000	-0.0020 -0.0065	8.500	+0.006 -0.006	0.562	0.619	4468700
8.000	-0.0020 -0.0065	8.750	+0.006 -0.006	0.625	0.688	4510500
8.125	-0.0020 -0.0065	8.625	+0.006 -0.006	0.781	0.859	4477000

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
8.500	-0.0020 -0.0065	9.000	+0.006 -0.006	0.375	0.413	4733500
9.000	-0.0020 -0.0065	9.500	+0.006 -0.006	0.562	0.619	4468800
9.250	-0.0020 -0.0065	10.000	+0.006 -0.006	0.625	0.688	4499300
9.375	-0.0020 -0.0065	9.875	+0.006 -0.006	0.781	0.859	4477100
9.750	-0.0020 -0.0065	10.250	+0.006 -0.006	0.375	0.413	4733600
10.000	-0.0022 -0.0073	10.500	+0.006 -0.006	0.562	0.619	4468900

Design

The Hallite 606 is an asymmetric piston seal designed to offer effective bore sealing in a wide variety of applications.

The outer *dynamic* lip is shorter and more robust to provide improved sealing and compression set characteristics over conventional U rings.

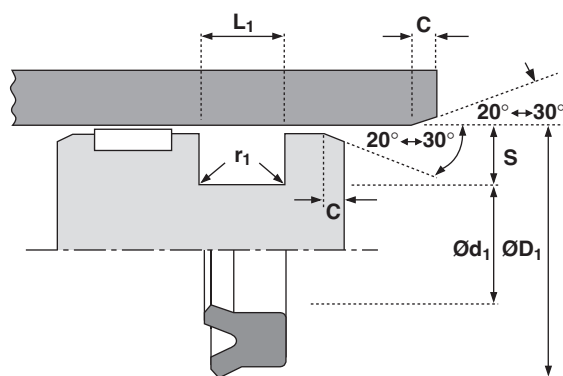
The seal can be used by itself as a single acting seal or fitted back to back in separate grooves for double acting applications.

Manufactured in Hallite's high performance polyurethane Hythane® 181, The Hallite 606 provides the following benefits:

NB: Part numbers suffixed by “±” indicate housing sizes to meet ISO5597.

Features

- Flexible for easy installation
- Excellent wear resistance
- Robust design
- Wide temperature range



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-45°C +110°C
Maximum Pressure	400 bar*

Inch

3.0 ft/sec
-50°F +230°F
6,000 p.s.i.*

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	160	250	400
Maximum Gap mm	0.6	0.5	0.4
Pressure p.s.i.	2400	3750	6000
Maximum Gap in	0.024	0.020	0.016

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

Chamfers & Radii

Groove Section ≤ S mm	4.0	5.0	7.5	10.0
Min Chamfer C mm	3.0	3.5	5.0	6.5
Max Fillet Rad r ₁ mm	0.2	0.4	0.8	0.8
Groove Section ≤ S in	0.125	0.187	0.250	0.312
Min Chamfer C in	0.093	0.093	0.125	0.156
Max Fillet Rad r ₁ in	0.008	0.008	0.016	0.032

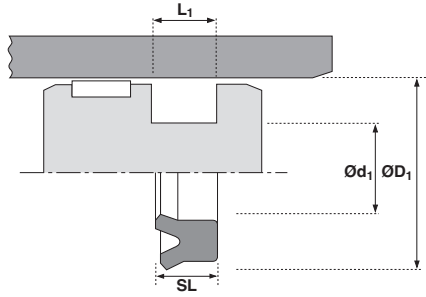
Tolerances

ØD ₁	Ød ₁	L ₁ mm	L ₁ in
H9	js11	+0.25 -0	+0.010 -0

* Pressure rating of seal can be extended to 700 bar /10,000p.s.i. with the use of a back up ring. If this option is required seek advice from your local Hallite Seals sales office.

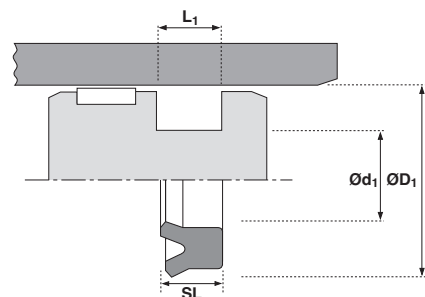


single acting piston seals



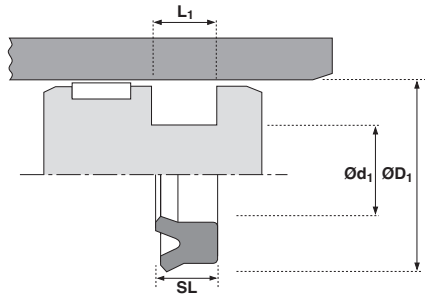
ØD ₁	TOL H9	Ød ₁	TOL js11	SL	L ₁ +0.25-0	PART No.
16	+0.05 +0.00	10	+0.06 -0.06	5.7	6.3	4830500
25	+0.05 +0.00	15	+0.06 -0.06	8.2	9.0	4390100
25	+0.05 +0.00	17	+0.06 -0.06	5.7	6.3	4418000‡
30	+0.05 +0.00	20	+0.07 -0.07	8.0	9.0	4354200
32	+0.06 +0.00	24	+0.07 -0.07	5.7	6.3	4351900‡
35	+0.06 +0.00	25	+0.07 -0.07	7.3	8.0	4365700
37	+0.06 +0.00	21	+0.07 -0.07	11.8	13.0	4354100
38	+0.06 +0.00	31	+0.08 -0.08	5.2	6.0	4728000
40	+0.06 +0.00	28	+0.07 -0.07	9.0	10.0	4826200
40	+0.06 +0.00	30	+0.07 -0.07	7.3	8.0	4299500‡
40	+0.06 +0.00	30	+0.07 -0.07	10.0	11.0	4400900
45	+0.06 +0.00	35	+0.08 -0.08	7.3	8.0	4315700
50	+0.06 +0.00	39	+0.08 -0.08	3.8	4.2	4460700
50	+0.06 +0.00	40	+0.08 -0.08	7.8	8.0	4319500‡
55	+0.07 +0.00	45	+0.08 -0.08	7.3	8.0	4380000
60	+0.07 +0.00	44.9	+0.08 -0.08	5.7	6.3	4739800
60	+0.07 +0.00	45	+0.08 -0.08	10.0	11.0	4407000
60	+0.07 +0.00	50	+0.08 -0.08	9.0	10.0	4762000
63	+0.07 +0.00	48	+0.08 -0.08	11.4	12.5	4383200
63	+0.07 +0.00	53	+0.10 -0.10	7.3	8.0	4341500‡
63	+0.07 +0.00	53	+0.10 -0.10	11.8	13.0	4318800
65	+0.07 +0.00	55	+0.10 -0.10	7.3	8.0	4424100
70	+0.07 +0.00	55	+0.10 -0.10	10.0	11.0	4448000

ØD ₁	TOL H9	Ød ₁	TOL js11	SL	L ₁ +0.25-0	PART No.
70	+0.07 +0.00	60	+0.10 -0.10	8.1	9.0	4709500
71	+0.07 +0.00	61	+0.10 -0.10	6.0	7.0	4492600
75	+0.07 +0.00	67	+0.10 -0.10	5.7	6.3	4844100
75	+0.07 +0.00	67	+0.10 -0.10	8.8	9.7	4322300
80	+0.07 +0.00	65	+0.10 -0.10	11.4	12.5	4363800‡
80	+0.07 +0.00	70	+0.10 -0.10	6.8	7.5	4370300
80	+0.07 +0.00	70	+0.10 -0.10	8.0	9.0	4709600
85	+0.09 +0.00	75	+0.10 -0.10	8.1	9.0	4709700
85.7	+0.09 +0.00	70.7	+0.10 -0.10	10.3	11.4	4493400
90.0	+0.09 +0.00	80.0	+0.10 -0.10	11.0	12.0	4798800
100	+0.09 +0.00	85	+0.11 -0.11	11.4	12.5	4363900‡
100	+0.09 +0.00	90	+0.11 -0.11	6.8	7.5	4375900
110	+0.09 +0.00	100	+0.11 -0.11	8.0	9.0	4533100
125	+0.10 +0.00	105	+0.11 -0.11	14.5	16.0	4364000‡
150	+0.10 +0.00	130	+0.13 -0.13	14.5	16.0	4390200
150	+0.10 +0.00	140	+0.13 -0.13	13.6	15.0	4390300
160	+0.10 +0.00	140	+0.13 -0.13	14.5	16.0	4642700
160	+0.10 +0.00	140	+0.13 -0.13	18.2	20.0	4364100
170	+0.10 +0.00	150	+0.13 -0.13	15.0	16.5	4642800
180	+0.10 +0.00	160	+0.13 -0.13	15.0	16.5	4643100
190	+0.10 +0.00	170	+0.13 -0.13	15.0	16.5	4642900
200	+0.12 +0.00	180	+0.13 -0.13	14.5	16.0	4392300
280	+0.12 +0.00	260	+0.13 -0.13	15.5	17.0	4643000



ØD ₁	TOL H9	Ød ₁	TOL js11	SL	L ₁ +0.010-0	PART No.
0.750	+0.002 +0.000	0.375	+0.002 -0.002	0.312	0.344	4707100
1.125	+0.003 +0.000	0.750	+0.003 -0.003	0.312	0.344	4565600
1.250	+0.003 +0.000	0.875	+0.003 -0.003	0.250	0.275	4800300
1.500	+0.003 +0.000	1.125	+0.003 -0.003	0.250	0.275	4426700
1.500	+0.003 +0.000	1.250	+0.003 -0.003	0.250	0.275	4426800
1.750	+0.003 +0.000	1.500	+0.003 -0.003	0.250	0.275	4769800
2.000	+0.003 +0.000	1.375	+0.003 -0.003	0.500	0.550	4364200
2.000	+0.003 +0.000	1.500	+0.003 -0.003	0.375	0.413	4376000
2.000	+0.003 +0.000	1.625	+0.003 -0.003	0.187	0.207	4426900
2.000	+0.003 +0.000	1.625	+0.003 -0.003	0.312	0.344	4444300
2.000	+0.003 +0.000	1.625	+0.003 -0.003	0.375	0.413	4364400
2.250	+0.003 +0.000	1.750	+0.003 -0.003	0.375	0.413	4476500
2.250	+0.003 +0.000	1.875	+0.003 -0.003	0.375	0.413	4479600
2.500	+0.003 +0.000	1.625	+0.003 -0.003	0.500	0.550	4364500
2.500	+0.003 +0.000	1.875	+0.003 -0.003	0.500	0.550	4376100
2.500	+0.003 +0.000	2.000	+0.004 -0.004	0.250	0.275	4516500
2.500	+0.003 +0.000	2.000	+0.004 -0.004	0.375	0.413	4391900
2.500	+0.003 +0.000	2.125	+0.004 -0.004	0.250	0.275	4427000
2.500	+0.003 +0.000	2.125	+0.004 -0.004	0.312	0.344	4444400
2.500	+0.003 +0.000	2.125	+0.004 -0.004	0.375	0.413	4451300
3.000	+0.003 +0.000	2.250	+0.004 -0.004	0.455	0.500	4375000
3.000	+0.003 +0.000	2.375	+0.004 -0.004	0.500	0.550	4364600
3.000	+0.003 +0.000	2.500	+0.004 -0.004	0.250	0.275	4516600

ØD ₁	TOL H9	Ød ₁	TOL js11	SL	L ₁ +0.010-0	PART No.
3.000	+0.003 +0.000	2.500	+0.004 -0.004	0.375	0.413	4364700
3.000	+0.003 +0.000	2.625	+0.004 -0.004	0.187	0.208	4792800
3.000	+0.003 +0.000	2.625	+0.004 -0.004	0.375	0.413	4458400
3.250	+0.003 +0.000	2.625	+0.004 -0.004	0.500	0.550	4376200
3.250	+0.003 +0.000	2.750	+0.004 -0.004	0.250	0.275	4516700
3.250	+0.003 +0.000	2.750	+0.004 -0.004	0.375	0.413	4474400
3.250	+0.003 +0.000	2.875	+0.004 -0.004	0.250	0.275	4427100
3.500	+0.003 +0.000	2.750	+0.004 -0.004	0.500	0.550	4444600
3.500	+0.003 +0.000	2.750	+0.004 -0.004	0.625	0.688	4376300
3.500	+0.003 +0.000	2.875	+0.004 -0.004	0.312	0.344	4571100
3.500	+0.003 +0.000	2.875	+0.004 -0.004	0.500	0.550	4364800
3.500	+0.003 +0.000	3.000	+0.004 -0.004	0.250	0.275	4516800
3.500	+0.003 +0.000	3.000	+0.004 -0.004	0.375	0.413	4364900
3.500	+0.003 +0.000	3.125	+0.004 -0.004	0.275	0.302	4572200
3.500	+0.003 +0.000	3.125	+0.004 -0.004	0.375	0.413	4444500
3.750	+0.003 +0.000	3.250	+0.004 -0.004	0.375	0.413	4444700
4.000	+0.003 +0.000	3.250	+0.004 -0.004	0.375	0.413	4517400
4.000	+0.003 +0.000	3.250	+0.004 -0.004	0.500	0.550	4444900
4.000	+0.003 +0.000	3.250	+0.004 -0.004	0.625	0.688	4376400
4.000	+0.003 +0.000	3.375	+0.004 -0.004	0.500	0.550	4365000
4.000	+0.003 +0.000	3.500	+0.004 -0.004	0.250	0.275	4516900
4.000	+0.003 +0.000	3.500	+0.004 -0.004	0.312	0.344	4427200
4.000	+0.003 +0.000	3.500	+0.004 -0.004	0.375	0.413	4365100



ØD ₁	TOL H9	Ød ₁	TOL js11	SL	L ₁ +0.010-0	PART No.
4.000	+0.003 +0.000	3.625	+0.004 -0.004	0.375	0.413	4444800
4.250	+0.003 +0.000	3.750	+0.004 -0.004	0.375	0.413	4445000
4.500	+0.003 +0.000	3.750	+0.004 -0.004	0.625	0.688	4371000
4.500	+0.003 +0.000	4.000	+0.004 -0.004	0.375	0.413	4448100
4.750	+0.003 +0.000	4.379	+0.004 -0.004	0.275	0.302	4493600
5.000	+0.004 +0.000	4.250	+0.004 -0.004	0.375	0.413	4517500
5.000	+0.004 +0.000	4.250	+0.004 -0.004	0.500	0.550	4445100
5.000	+0.004 +0.000	4.250	+0.004 -0.004	0.625	0.688	4371100
5.000	+0.004 +0.000	4.500	+0.004 -0.004	0.250	0.275	4517000
5.000	+0.004 +0.000	4.500	+0.004 -0.004	0.375	0.413	4365200
5.000	+0.004 +0.000	4.500	+0.004 -0.004	0.562	0.619	4495900
5.250	+0.004 +0.000	4.500	+0.004 -0.004	0.500	0.550	4445200
5.500	+0.004 +0.000	4.750	+0.005 -0.005	0.625	0.688	4371200
6.000	+0.004 +0.000	5.250	+0.005 -0.005	0.375	0.413	4517600
6.000	+0.004 +0.000	5.250	+0.005 -0.005	0.500	0.550	4445300
6.000	+0.004 +0.000	5.250	+0.005 -0.005	0.625	0.688	4371300

ØD ₁	TOL H9	Ød ₁	TOL js11	SL	L ₁ +0.010-0	PART No.
6.000	+0.004 +0.000	5.500	+0.005 -0.005	0.250	0.275	4517100
6.000	+0.004 +0.000	5.500	+0.005 -0.005	0.375	0.413	4365300
6.000	+0.004 +0.000	5.500	+0.005 -0.005	0.562	0.619	4393400
6.250	+0.004 +0.000	5.750	+0.005 -0.005	0.562	0.619	4458300
6.500	+0.004 +0.000	5.750	+0.005 -0.005	0.625	0.688	4743900
7.000	+0.004 +0.000	6.250	+0.005 -0.005	0.375	0.413	4517700
7.000	+0.004 +0.000	6.250	+0.005 -0.005	0.500	0.550	4445500
7.000	+0.004 +0.000	6.250	+0.005 -0.005	0.625	0.688	4371400
7.000	+0.004 +0.000	6.500	+0.005 -0.005	0.250	0.275	4517200
7.000	+0.004 +0.000	6.500	+0.005 -0.005	0.375	0.413	4445400
8.000	+0.005 +0.000	7.250	+0.006 -0.006	0.625	0.688	4371500
8.000	+0.005 +0.000	7.500	+0.006 -0.006	0.250	0.275	4517300
9.000	+0.005 +0.000	8.000	+0.006 -0.006	0.750	0.825	4371600
10.000	+0.005 +0.000	9.000	+0.006 -0.006	0.750	0.825	4536200
10.000	+0.005 +0.000	9.250	+0.006 -0.006	0.375	0.413	4575100

Design

The Hallite 610 is an asymmetric “solid” seal offering excellent dry rod sealing for light and medium duty applications.

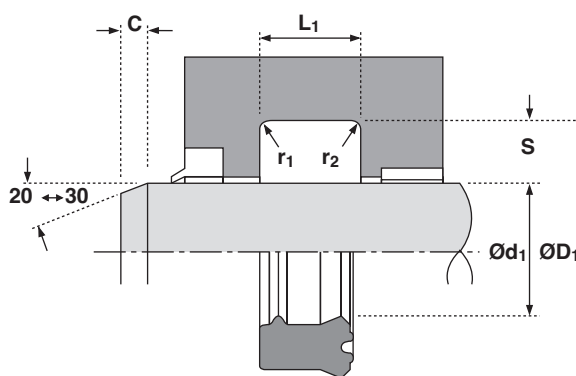
It is designed to be less sensitive to pressure fluctuations than Hallite 605 ‘U’ ring design.

Manufactured in Hallite’s high performance polyurethane – Hythane[®] 181 – the type 610 is an extremely flexible seal making installation very easy.

NB: Part numbers suffixed by “†” indicate housing sizes to meet ISO5597.

Features

- Insensitive to pressure fluctuations
- Twin lip design offering:
 - lower friction
 - improved sealing
 - primary lip protection
 - increased seal stability



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-45°C +110°C
Maximum Pressure	400 bar

Inch

3.0 ft/sec
-50°F +230°F
6000 p.s.i.

Maximum extrusion gap

Pressure bar	160	250	400
Maximum Gap mm	0.6	0.5	0.4
Pressure p.s.i.	2400	3750	6000

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

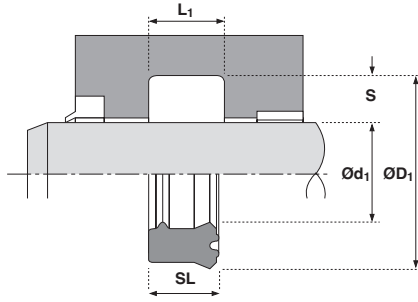
Chamfers & Radii

Groove Section ≤ S mm	4.0	5.0	7.5
Min Chamfer C mm	3.0	3.5	5.0
Max Fillet Rad r ₁ mm	0.2	0.4	0.8
Max Fillet Rad r ₂ mm	0.4	0.8	1.2

Tolerances

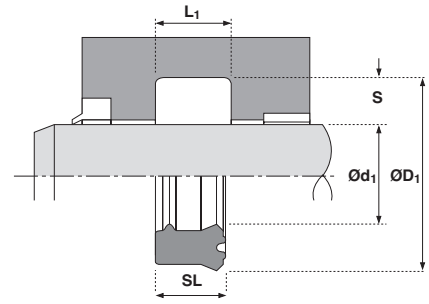
Ød ₁	ØD ₁	L ₁ mm
f9	Js11	+0.25 -0





Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
8	-0.013 -0.049	16	+0.06 -0.06	5.3	6.0	4581000
14	-0.016 -0.059	22	+0.07 -0.07	5.3	6.0	4580900
18	-0.016 -0.059	25	+0.07 -0.07	4.6	5.6	4334600‡
20	-0.020 -0.072	26	+0.07 -0.07	4.5	5.5	4319400
20	-0.020 -0.072	28	+0.07 -0.07	6.0	7.0	4307500
22	-0.020 -0.072	28	+0.07 -0.07	4.5	5.5	4356000
22	-0.020 -0.072	29	+0.07 -0.07	4.6	5.6	4324200‡
22	-0.020 -0.072	30	+0.07 -0.07	6.0	7.0	4316100
25	-0.020 -0.072	33	+0.08 -0.08	6.0	7.0	4316200
25	-0.020 -0.072	33	+0.08 -0.08	8.0	9.0	4299000
28	-0.020 -0.072	36	+0.08 -0.08	5.3	6.3	4334700‡
28	-0.020 -0.072	36	+0.08 -0.08	6.0	7.0	4323200
28	-0.020 -0.072	36	+0.08 -0.08	8.0	9.0	4307700
30	-0.020 -0.072	38	+0.08 -0.08	6.0	7.0	4308900
30	-0.020 -0.072	38	+0.08 -0.08	8.0	9.0	4362400
30	-0.020 -0.072	40	+0.08 -0.08	7.0	8.0	4558300
32	-0.025 -0.087	40	+0.08 -0.08	6.0	7.0	4316300
35	-0.025 -0.087	43	+0.08 -0.08	6.0	7.0	4301700
35	-0.025 -0.087	43	+0.08 -0.08	8.0	9.0	4592800
35	-0.025 -0.087	45	+0.08 -0.08	10.0	11.0	4299300
36	-0.025 -0.087	44	+0.08 -0.08	5.3	6.3	4324300‡
36	-0.025 -0.087	44	+0.08 -0.08	8.0	9.0	4308000
36	-0.025 -0.087	46	+0.08 -0.08	10.0	11.0	4299400

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
40	-0.025 -0.087	48	+0.08 -0.08	5.4	6.4	4329200
40	-0.025 -0.087	48	+0.08 -0.08	6.5	7.5	4323300
40	-0.025 -0.087	48	+0.08 -0.08	8.0	9.0	4301800
45	-0.025 -0.087	52	+0.10 -0.10	10.0	11.0	4330000
45	-0.025 -0.087	53	+0.10 -0.10	5.3	6.3	4334800‡
45	-0.025 -0.087	53	+0.10 -0.10	6.0	7.0	4711000
45	-0.025 -0.087	53	+0.10 -0.10	8.0	9.0	4308100
45	-0.025 -0.087	55	+0.10 -0.10	10.0	11.0	4389400
50	-0.025 -0.087	58	+0.10 -0.10	5.3	6.3	4356900
50	-0.025 -0.087	58	+0.10 -0.10	8.0	9.0	4299100
50	-0.025 -0.087	60	+0.10 -0.10	10.0	11.0	4389500
55	0.030 -0.104	63	+0.10 -0.10	8.0	9.0	4323000
55	-0.030 -0.104	65	+0.10 -0.10	7.0	8.0	4385500
55	-0.030 -0.104	65	+0.10 -0.10	10.0	11.0	4389600
55	-0.030 -0.104	65	+0.10 -0.10	11.8	13.0	4389700
56	-0.030 -0.104	64	+0.10 -0.10	8.0	9.0	4316400
56	-0.030 -0.104	66	+0.10 -0.10	6.8	7.5	4334900‡
60	-0.030 -0.104	68	+0.10 -0.10	7.0	8.0	4732400
60	-0.030 -0.104	68	+0.10 -0.10	8.0	9.0	4299200
60	-0.030 -0.104	68	+0.10 -0.10	11.4	12.5	4329900
60	-0.030 -0.104	70	+0.10 -0.10	7.0	8.0	4303200
60	-0.030 -0.104	70	+0.10 -0.10	11.8	13.0	4389800
63	-0.030 -0.104	71	+0.10 -0.10	8.0	9.0	4316500



Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
63	-0.030 -0.104	75	+0.10 -0.10	8.6	9.6	4360500
65	-0.030 -0.104	73	+0.10 -0.10	8.0	9.0	4362500
65	-0.030 -0.104	75	+0.10 -0.10	11.8	13.0	4389900
70	-0.030 -0.104	78	+0.10 -0.10	8.0	9.0	4316600
70	-0.030 -0.104	80	+0.10 -0.10	6.5	7.5	4335000‡
70	-0.030 -0.104	80	+0.10 -0.10	11.8	13.0	4390000
75	-0.030 -0.104	83	+0.10 -0.10	8.0	9.0	4539400

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
80	-0.030 -0.104	88	+0.11 -0.10	8.0	9.0	4316700
85	-0.036 -0.123	97	+0.11 -0.11	9.0	10.0	4328100
87	-0.036 -0.123	95	+0.11 -0.11	8.0	9.0	4323700
90	-0.036 -0.123	98	+0.11 -0.11	8.0	9.0	4316800
100	-0.036 -0.123	108	+0.11 -0.11	8.0	9.0	4316900
134	-0.043 -0.143	147	+0.13 -0.13	12.0	13.3	4588100

Design

The Hallite 616 is a revolutionary seal from Hallite, incorporating the sealing efficiency of the Hallite 605 with the compact grooves used by PTFE rod seals.

Hallite's 616 is an asymmetric twin lip seal, designed for light and medium duty applications where space and friction are at a premium.

Manufactured in Hallite's high performance polyurethane Hythane® 181, the Hallite 616 is an extremely flexible seal making installation very easy.

NB: Part numbers suffixed by "±" indicate housing sizes to meet ISO7425-2.

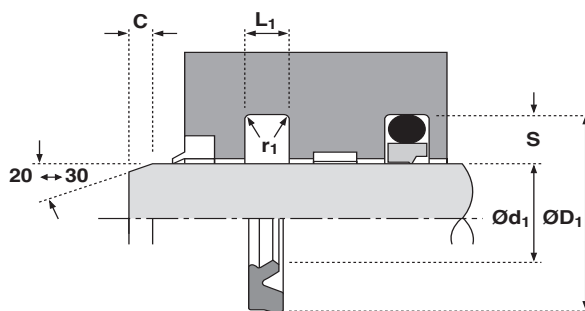
NOTE

Hallite 616 is used either as a single seal or in a combination with Hallite 16. The latter arrangement is recommended when pressure peaks can occur, as in cylinders with cushioning, in this case the Hallite 16 is fitted into the pressure side of the housing while the Hallite 616 ensures minimal leakage sealing.

It is recommended that Hallite Seals be consulted when considering this arrangement.

Features

- Easy assembly
- Twin-lip performance
- ISO 7425 housing



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-45°C +110°C
Maximum Pressure	240 bar

Inch

3.0 ft/sec
-50°F +230°F
3500 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	160	240
Maximum Gap mm	0.6	0.5
Pressure p.s.i.	2400	3500

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70
maxStatic Housing Faces L ₁	3.2 max	16 max	125 max	140 max

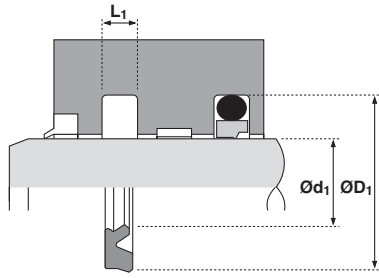
Chamfers & Radii

Groove Section ≤ S mm	3.75	5.50	7.75
Min Chamfer C mm	2.0	3.0	5.0
Max Fillet Rad r ₁ mm	0.4	0.8	1.2

Tolerances

Ød ₁	ØD ₁	L ₁ mm
f9	H11	+0.25 -0





Ød1	TOL f9	ØD1	TOL H11	SL	L1 +0.25 -0	PART No.
14	-0.016 -0.059	21.5	+0.13 +0.00	2.8	3.2	4577700‡
18	-0.016 -0.059	25.5	+0.13 +0.00	2.8	3.2	4341800‡
20	-0.020 -0.072	27.5	+0.13 +0.00	2.8	3.2	4721700‡
20	-0.020 -0.072	31.0	+0.16 +0.00	3.9	4.2	4367400‡
22	-0.020 -0.072	33.0	+0.16 +0.00	3.9	4.2	4341900‡
25	-0.020 -0.072	32.5	+0.16 +0.00	2.8	3.2	4721800‡
25	-0.020 -0.072	36.0	+0.16 +0.00	3.9	4.2	4367500‡
25.4	-0.020 -0.072	32.9	+0.16 +0.00	2.8	3.2	4469000
28	-0.020 -0.072	39.0	+0.16 +0.00	3.9	4.2	4367600‡
30	-0.020 -0.072	41.0	+0.16 +0.00	3.9	4.2	4404500
32	-0.025 -0.087	39.5	+0.16 +0.00	2.8	3.2	4714800
32	-0.025 -0.087	43.0	+0.16 +0.00	3.9	4.2	4367700‡
36	-0.025 -0.087	47.0	+0.16 +0.00	3.9	4.2	4353100‡
40	-0.025 -0.087	51.0	+0.19 +0.00	3.9	4.2	4722900‡
40	-0.025 -0.087	55.5	+0.19 +0.00	6.0	6.3	4367800
45	-0.025 -0.087	56.0	+0.19 +0.00	3.9	4.2	4556300‡
45	-0.025 -0.087	60.5	+0.19 +0.00	6.0	6.3	4367900
50	-0.025 -0.087	61.0	+0.19 +0.00	3.9	4.2	4723000‡
50	-0.025 -0.087	65.5	+0.19 +0.00	6.0	6.3	4368000

Ød1	TOL f9	ØD1	TOL H11	SL	L1 +0.25 -0	PART No.
56	-0.030 -0.104	71.5	+0.19 +0.00	6.0	6.3	4368100‡
60	-0.030 -0.104	70.6	+0.19 +0.00	3.9	4.2	4410800
60	-0.030 -0.104	75.5	+0.19 +0.00	6.0	6.3	4727100
63	-0.030 -0.104	78.5	+0.19 +0.00	6.0	6.3	4368200‡
65	-0.030 -0.104	76.0	+0.19 +0.00	3.9	4.2	4853300
65	-0.030 -0.104	80.5	+0.22 +0.00	6.0	6.3	4548000
70	-0.030 -0.104	85.5	+0.22 +0.00	6.0	6.3	4368300‡
75	-0.030 -0.104	90.5	+0.22 +0.00	6.0	6.3	4728200
80	-0.030 -0.104	95.5	+0.22 +0.00	6.0	6.3	4368400‡
85	-0.036 -0.123	100.5	+0.22 +0.00	6.0	6.3	4538400
90	-0.036 -0.123	105.5	+0.22 +0.00	6.0	6.3	4368500‡
95	-0.036 -0.123	110.5	+0.22 +0.00	6.0	6.3	4538500
100	-0.036 -0.123	115.5	+0.22 +0.00	6.0	6.3	4368600‡
110	-0.036 -0.123	125.5	+0.25 +0.00	6.0	6.3	4545400‡
125	-0.043 -0.143	140.5	+0.25 +0.00	6.0	6.3	4545500‡
130	-0.043 -0.143	145.5	+0.25 +0.00	6.0	6.3	4793900
140	-0.043 -0.143	155.5	+0.25 +0.00	6.0	6.3	4545600‡
160	-0.043 -0.143	175.5	+0.25 +0.00	6.0	6.3	4548100‡

Design

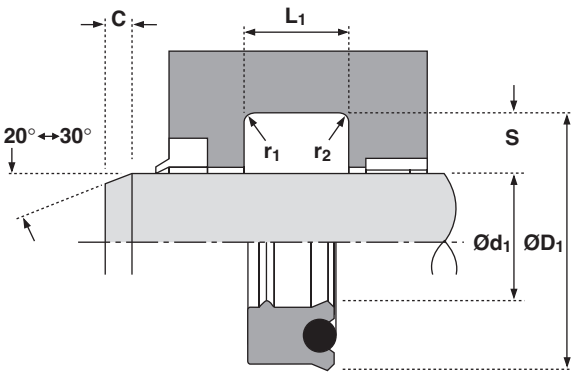
Hallite’s 620 design incorporates features from the Hallite 621 to provide a twin lip alternative to Hallite’s 500 series products.

The shell is moulded in Hallite’s high performance polyurethane - Hythane® 181 - ensuring flexibility for easy installation and performance at low temperatures.

The 620 benefits from the Hallite’s twin lip profile for dry rod sealing.

Features

- Easy installation
- Improved shock handling
- Twin-lip design offering
Lower friction
Primary lip protection
Increased seal stability
- Complete lip actuation



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-45°C +110°C
Maximum Pressure	400 bar*

Inch

3.0 ft/sec
-50°F +230°F
6000 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	160	250	400
Maximum Gap mm	0.6	0.5	0.4
Pressure p.s.i.	2400	3750	6000
Maximum Gap in	0.024	0.020	0.016

Surface roughness

Dynamic Sealing Face ØD ₁	µmRa 0.1 < > 0.4	µmRt 4 max	µinCLA 4 < > 16	µinRMS 5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

Chamfers & Radii

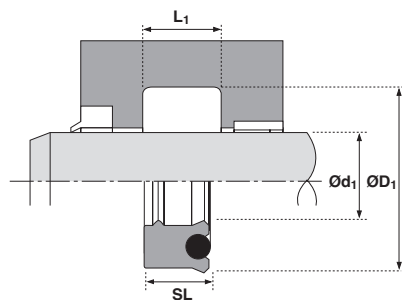
Groove Section ≤ S in	0.125	0.187
Min Chamfer C in	0.093	0.093
Max Fillet Rad r ₁ in	0.008	0.008
Max Fillet Rad r ₂ in	0.016	0.016

Tolerances

Ød ₁	ØD ₁	L ₁ in
f9	Js11	+0.010 -0



rod seals



Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
0.625	-0.0006 -0.0023	0.875	+0.003 -0.003	0.160	0.176	4498600
0.625	-0.0006 -0.0023	0.875	+0.003 -0.003	0.175	0.190	4528700
0.625	-0.0006 -0.0023	0.875	+0.003 -0.003	0.250	0.275	4459900
0.750	-0.0008 -0.0028	1.000	+0.003 -0.003	0.187	0.207	4583900
0.750	-0.0008 -0.0028	1.000	+0.003 -0.003	0.250	0.275	4498500
0.875	-0.0008 -0.0028	1.125	+0.003 -0.003	0.187	0.207	4709100
1.000	-0.0008 -0.0028	1.240	+0.003 -0.003	0.187	0.217	4477200
1.000	-0.0008 -0.0028	1.250	+0.003 -0.003	0.187	0.207	4457500
1.000	-0.0008 -0.0028	1.250	+0.003 -0.003	0.250	0.275	4498400
1.000	-0.0008 -0.0028	1.375	+0.003 -0.003	0.250	0.275	4410400

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
1.000	-0.0008 -0.0028	1.375	+0.003 -0.003	0.312	0.344	4584000
1.125	-0.0010 -0.0034	1.375	+0.003 -0.003	0.250	0.275	4461100
1.125	-0.0010 -0.0034	1.500	+0.003 -0.003	0.250	0.275	4410500
1.250	-0.0010 -0.0034	1.500	+0.003 -0.003	0.187	0.207	4398900
1.250	-0.0010 -0.0034	1.500	+0.003 -0.003	0.250	0.275	4461000
1.250	-0.0010 -0.0034	1.625	+0.003 -0.003	0.312	0.344	4410600
1.375	-0.0010 -0.0034	1.750	+0.003 -0.003	0.312	0.344	4410700
1.500	-0.0010 -0.0034	1.875	+0.003 -0.003	0.375	0.413	4750600
1.750	-0.0010 -0.0034	2.125	+0.004 -0.004	0.375	0.413	4460000

Design

The Hallite 621 is a top of the range high pressure rod seal. The design of the seal incorporates a unique profiled NBR energiser to ensure complete lip actuation under all pressure conditions and to cushion the seal against shock loadings.

The shell is moulded in Hallite's high performance polyurethane Hythane[®] 181, ensuring flexibility for installation and performance at low temperatures.

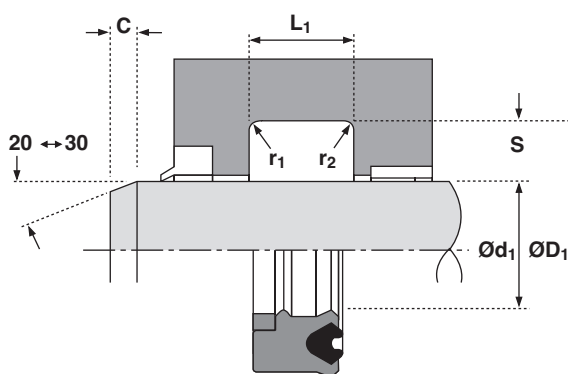
The Hallite 621 also benefits from Hallite's twin lip profile for dry rod sealing.

NB: Part numbers suffixed by "†" are designed to suit popular Asian housings.

Part numbers suffixed by "‡" indicate housing sizes to meet ISO 5597.

Features

- High pressure/shock load capability
- Twin-lip design offering lower friction improved sealing primary lip protection increased seal stability
- Polyacetal anti-extrusion ring



Technical details

Operating conditions

Maximum Speed

Temperature Range

Maximum Pressure

Metric

1.0 m/sec
-45°C +110°C
700 bar

Inch

3.0 ft/sec
-50°F +230°F
10,000 p.s.i.

Maximum extrusion gap

Pressure bar

Maximum Gap mm

Pressure p.s.i.

Maximum Gap in

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

160	250	400	500	700
1.0	0.8	0.6	0.4	0.25
2400	3750	6000	7500	10,000
0.040	0.032	0.024	0.016	0.010

Surface roughness

Dynamic Sealing Face Ød₁

Static Sealing Face ØD₁

Static Housing Faces L₁

µmRa

0.1 < > 0.4

1.6 max

3.2 max

µmRt

4 max

10 max

16 max

µinCLA

4 < > 16

63 max

125 max

µinRMS

5 < > 18

70 max

140 max

Chamfers & Radii

Groove Section ≤ S mm

Min Chamfer C mm

Max Fillet Rad r₁ mm

Max Fillet Rad r₂ mm

Groove Section ≤ S in

Min Chamfer C in

Max Fillet Rad r₁ in

Max Fillet Rad r₂ in

4.0	5.0	7.5	10.0	12.5	15.0
3.0	3.5	5.0	6.5	7.0	8.0
0.2	0.4	0.8	0.8	1.2	1.6
0.4	0.8	1.2	1.2	1.6	2.4
0.125	0.187	0.250	0.312	0.375	0.500
0.093	0.093	0.125	0.156	0.187	0.217
0.008	0.008	0.016	0.016	0.032	0.032
0.016	0.016	0.032	0.032	0.047	0.047

Tolerances

Ød₁
f9

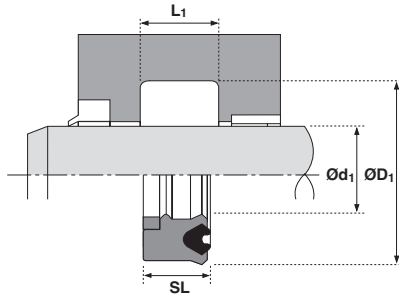
ØD₁
Js11

L₁ mm
+0.25 -0

L₁ in
+0.010 -0

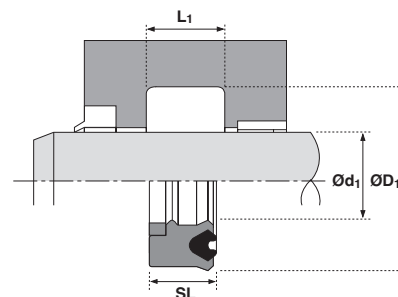


rod seals



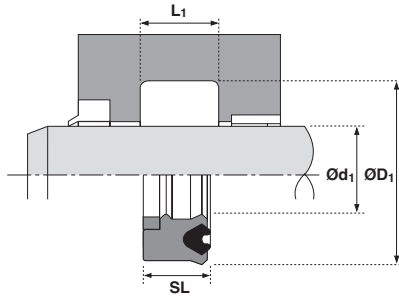
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
30	-0.020 -0.072	40	+0.08 -0.08	7.3	8.0	4577110
30	-0.020 -0.072	40	+0.08 -0.08	10.0	11.0	4831310
30	-0.020 -0.072	45	+0.08 -0.08	10.0	11.0	4831410
35	-0.025 -0.087	50	+0.08 -0.08	9.5	10.5	4335310
36	-0.025 -0.087	46	+0.08 -0.08	7.3	8.0	4317010‡
40	-0.025 -0.087	50	+0.08 -0.08	7.3	8.0	4317110‡
40	-0.025 -0.087	50	+0.08 -0.08	10.0	11.0	4755010
45	-0.025 -0.087	55	+0.08 -0.08	10.0	11.0	4831510
45	-0.025 -0.087	55	+0.10 -0.10	7.3	8.0	4317210‡
45	-0.025 -0.087	60	+0.10 -0.10	11.4	12.5	4295510‡
50	-0.025 -0.087	60	+0.10 -0.10	7.3	8.0	4317310‡
50	-0.025 -0.087	60	+0.10 -0.10	10.0	11.0	4802310†
50	-0.025 -0.087	65	+0.10 -0.10	10.0	11.0	4752910
50	-0.025 -0.087	65	+0.10 -0.10	11.4	12.5	4293410‡
55	-0.025 -0.087	65	+0.10 -0.10	10.0	11.0	4831210
55	-0.030 -0.104	70	+0.10 -0.10	9.0	10.0	4810210†
55	-0.030 -0.104	70	+0.10 -0.10	11.4	12.5	4403610
56	-0.030 -0.104	71	+0.10 -0.10	11.4	12.5	4317410‡
60	-0.030 -0.104	73	+0.10 -0.10	13.0	14.0	4526010†
60	-0.030 -0.104	75	+0.10 -0.10	11.4	12.5	4298410
63	-0.030 -0.104	78	+0.10 -0.10	11.4	12.5	4317510‡
63	-0.030 -0.104	83	+0.11 -0.11	11.8	13.0	4520510†
65	-0.030 -0.104	75	+0.10 -0.10	10.0	11.0	4755110

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
65	-0.030 -0.104	80	+0.10 -0.10	10.0	11.0	4761810
65	-0.030 -0.104	80	+0.10 -0.10	11.4	12.5	4783710
65	-0.030 -0.104	80	+0.10 -0.10	13.0	14.0	4810310
70	-0.030 -0.104	83	+0.11 -0.11	13.0	14.0	4810410†
70	-0.030 -0.104	85	+0.11 -0.11	11.4	12.5	4317610‡
75	-0.030 -0.104	88	+0.11 -0.11	13.0	14.0	4526110†
75	-0.030 -0.104	90	+0.11 -0.11	12.0	13.0	4810510
75	-0.030 -0.104	90	+0.11 -0.11	13.0	14.0	4784710
75	-0.030 -0.104	95	+0.11 -0.11	11.4	12.5	4810610
75	-0.030 -0.104	95	+0.11 -0.11	14.6	16.0	4801510†
80	-0.030 -0.104	93	+0.11 -0.11	13.0	14.0	4810710†
80	-0.030 -0.104	95	+0.11 -0.11	11.4	12.5	4317710‡
80	-0.030 -0.104	95	+0.11 -0.11	13.0	14.0	4540610†
85	-0.036 -0.123	100	+0.11 -0.11	11.8	13.0	4766410
85	-0.036 -0.123	100	+0.11 -0.11	13.0	14.0	4540710†
85	-0.036 -0.123	105	+0.11 -0.11	14.6	16.0	4810810†
90	-0.036 -0.123	105	+0.11 -0.11	11.4	12.5	4317810‡
90	-0.036 -0.123	105	+0.11 -0.11	13.0	14.0	4526310†
90	-0.036 -0.123	110	+0.11 -0.11	14.6	16.0	4810910†
95	-0.036 -0.123	110	+0.11 -0.11	12.0	13.0	4811010†
95	-0.036 -0.123	110	+0.11 -0.11	13.0	14.0	4540810†
95	-0.036 -0.123	115	+0.11 -0.11	14.6	16.0	4811110†
100	-0.036 -0.123	115	+0.11 -0.11	13.0	14.0	4540910†



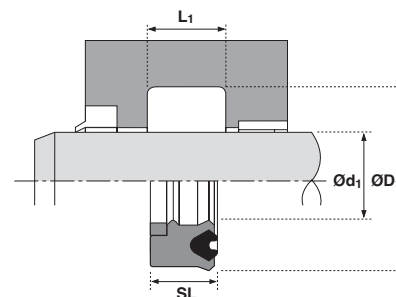
Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
100	-0.036 -0.123	120	+0.11 -0.11	14.6	16.0	4317910‡
105	-0.036 -0.123	120	+0.11 -0.11	12.0	13.0	4811210†
105	-0.036 -0.123	120	+0.11 -0.11	13.0	14.0	4811310†
105	-0.036 -0.123	125	+0.13 -0.13	14.6	16.0	4811410†
110	-0.036 -0.123	125	+0.13 -0.13	13.0	14.0	4811510†
110	-0.036 -0.123	130	+0.13 -0.13	13.0	14.0	4541010†
110	-0.036 -0.123	130	+0.13 -0.13	14.6	16.0	4318010‡
115	-0.036 -0.123	135	+0.13 -0.13	14.6	16.0	4783810
120	-0.036 -0.123	135	+0.13 -0.13	14.6	16.0	4318110
120	-0.036 -0.123	140	+0.13 -0.13	13.0	14.0	4541110†
120	-0.036 -0.123	140	+0.13 -0.13	14.6	16.0	4783910†
125	-0.043 -0.143	145	+0.13 -0.13	14.6	16.0	4318210‡

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25-0	PART No.
130	-0.043 -0.143	145	+0.13 -0.13	13.0	14.0	4811610†
130	-0.043 -0.143	150	+0.13 -0.13	14.6	16.0	4709810†
140	-0.043 -0.143	155	+0.13 -0.13	13.0	14.0	4811710†
140	-0.043 -0.143	160	+0.13 -0.13	13.0	14.0	4541210†
140	-0.043 -0.143	160	+0.13 -0.13	14.6	16.0	4318310‡
150	-0.043 -0.143	170	+0.13 -0.13	14.6	16.0	4784010
160	-0.043 -0.143	180	+0.13 -0.13	14.6	16.0	4454810
160	-0.043 -0.143	185	+0.15 -0.15	14.5	16.0	4723410
180	-0.043 -0.143	200	+0.15 -0.15	14.6	16.0	4454910
200	-0.050 -0.165	220	+0.15 -0.15	14.6	16.0	4455110
215	-0.050 -0.165	235	+0.15 -0.15	14.6	16.0	4705610



Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
1.250	-0.0010 -0.0034	1.625	+0.003 -0.003	0.250	0.275	4794110
1.250	-0.0010 -0.0034	1.625	+0.003 -0.003	0.313	0.344	4809910
1.375	-0.0010 -0.0034	1.875	+0.003 -0.003	0.375	0.413	4707710
1.500	-0.0010 -0.0034	1.875	+0.003 -0.003	0.250	0.275	4484410
1.500	-0.0010 -0.0034	1.875	+0.003 -0.003	0.312	0.344	4484510
1.500	-0.0010 -0.0034	2.000	+0.004 -0.004	0.375	0.413	4484910
1.750	-0.0010 -0.0034	2.125	+0.004 -0.004	0.250	0.275	4484610
1.750	-0.0010 -0.0034	2.125	+0.004 -0.004	0.375	0.413	4484710
1.750	-0.0010 -0.0034	2.250	+0.004 -0.004	0.375	0.413	4485010
2.000	-0.0012 -0.0041	2.375	+0.004 -0.004	0.375	0.413	4484810
2.000	-0.0012 -0.0041	2.500	+0.004 -0.004	0.375	0.413	4485110
2.125	-0.0012 -0.0041	2.625	+0.004 -0.004	0.375	0.413	4592510
2.250	-0.0012 -0.0041	2.750	+0.004 -0.004	0.375	0.413	4485210
2.375	-0.0012 -0.0041	2.875	+0.004 -0.004	0.375	0.413	4485310
2.500	-0.0012 -0.0041	3.000	+0.004 -0.004	0.375	0.413	4485410
2.500	-0.0012 -0.0041	3.125	+0.004 -0.004	0.500	0.550	4794310
2.750	-0.0012 -0.0041	3.250	+0.004 -0.004	0.375	0.413	4485510
3.000	-0.0012 -0.0041	3.500	+0.004 -0.004	0.375	0.413	4485610
3.000	-0.0012 -0.0041	3.625	+0.004 -0.004	0.500	0.550	4486810
3.000	-0.0012 -0.0041	3.750	+0.004 -0.004	0.625	0.688	4489310
3.250	-0.0014 -0.0048	3.750	+0.004 -0.004	0.375	0.413	4485710
3.250	-0.0014 -0.0048	4.000	+0.004 -0.004	0.625	0.688	4790710
3.500	-0.0014 -0.0048	4.000	+0.004 -0.004	0.375	0.413	4485810

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
3.500	-0.0014 -0.0048	4.125	+0.004 -0.004	0.500	0.550	4486910
3.500	-0.0014 -0.0048	4.250	+0.004 -0.004	0.625	0.688	4573610
3.750	-0.0014 -0.0048	4.125	+0.004 -0.004	0.375	0.413	4709310
3.750	-0.0014 -0.0048	4.250	+0.004 -0.004	0.375	0.413	4790810
4.000	-0.0014 -0.0048	4.500	+0.004 -0.004	0.375	0.413	4486010
4.000	-0.0014 -0.0048	4.500	+0.004 -0.004	0.562	0.619	4486110
4.000	-0.0014 -0.0048	4.625	+0.004 -0.004	0.375	0.413	4778610
4.000	-0.0014 -0.0048	4.625	+0.004 -0.004	0.500	0.550	4792610
4.000	-0.0014 -0.0048	4.625	+0.004 -0.004	0.562	0.619	4487010
4.000	-0.0014 -0.0048	4.750	+0.005 -0.005	0.625	0.688	4483310
4.250	-0.0014 -0.0048	5.000	+0.005 -0.005	0.625	0.688	4790910
4.500	-0.0014 -0.0048	5.000	+0.005 -0.005	0.375	0.413	4486210
4.500	-0.0014 -0.0048	5.000	+0.005 -0.005	0.562	0.619	4486310
4.500	-0.0014 -0.0048	5.125	+0.005 -0.005	0.375	0.413	4791010
4.500	-0.0014 -0.0048	5.125	+0.005 -0.005	0.625	0.688	4486410
4.500	-0.0014 -0.0048	5.250	+0.005 -0.005	0.625	0.688	4483410
4.750	-0.0017 -0.0056	5.500	+0.005 -0.005	0.375	0.413	4791210
4.750	-0.0017 -0.0056	5.500	+0.005 -0.005	0.625	0.688	4791110
5.000	-0.0017 -0.0056	5.500	+0.005 -0.005	0.562	0.619	4486510
5.000	-0.0017 -0.0056	5.625	+0.005 -0.005	0.625	0.688	4487110
5.000	-0.0017 -0.0056	5.750	+0.005 -0.005	0.625	0.688	4483510
5.250	-0.0017 -0.0056	6.000	+0.005 -0.005	0.625	0.688	4791310
5.500	-0.0017 -0.0056	6.000	+0.005 -0.005	0.562	0.619	4486610



Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
5.500	-0.0017 -0.0056	6.125	+0.005 -0.005	0.375	0.413	4791410
5.750	-0.0017 -0.0056	6.500	+0.005 -0.005	0.625	0.688	4791510
6.000	-0.0017 -0.0056	6.500	+0.005 -0.005	0.562	0.619	4486710
6.000	-0.0017 -0.0056	6.750	+0.005 -0.005	0.625	0.688	4487210
6.250	-0.0017 -0.0056	7.000	+0.005 -0.005	0.625	0.688	4791610
6.500	-0.0017 -0.0056	7.250	+0.005 -0.005	0.500	0.550	4791710
6.750	-0.0017 -0.0056	7.250	+0.005 -0.005	0.562	0.619	4791810
7.000	-0.0017 -0.0056	7.500	+0.005 -0.005	0.500	0.550	4791910
7.000	-0.0017 -0.0056	7.625	+0.005 -0.005	0.562	0.619	4792310
7.000	-0.0017 -0.0056	7.750	+0.006 -0.006	0.562	0.619	4792710
7.000	-0.0017 -0.0056	7.750	+0.006 -0.006	0.625	0.688	4588210
8.000	-0.0020 -0.0065	8.500	+0.006 -0.006	0.562	0.619	4792110
8.000	-0.0020 -0.0065	8.750	+0.006 -0.006	0.625	0.688	4573210

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.010 -0	PART No.
8.500	-0.0020 -0.0065	9.250	+0.006 -0.006	0.625	0.688	4745010
9.000	-0.0020 -0.0065	9.750	+0.006 -0.006	0.625	0.688	4808810
9.000	-0.0020 -0.0065	10.000	+0.006 -0.006	0.750	0.825	4809810
10.000	-0.0022 -0.0073	10.500	+0.006 -0.006	0.562	0.619	4792210
10.000	-0.0022 -0.0073	10.750	+0.006 -0.006	0.625	0.688	4808910
10.000	-0.0022 -0.0073	11.000	+0.006 -0.006	0.750	0.825	4809410
10.500	-0.0022 -0.0073	11.125	+0.006 -0.006	0.562	0.619	4792410
11.000	-0.0022 -0.0073	11.750	+0.006 -0.006	0.625	0.688	4809210
12.000	-0.0022 -0.0073	12.750	+0.006 -0.006	0.625	0.688	4809310
12.000	-0.0022 -0.0073	13.000	+0.006 -0.006	0.750	0.825	4809510
13.000	-0.0025 -0.0080	13.625	+0.007 -0.007	0.562	0.619	4792510
14.000	-0.0025 -0.0080	15.000	+0.007 -0.007	0.750	0.825	4809610
15.000	-0.0025 -0.0080	16.000	+0.008 -0.008	0.750	0.825	4809710

Design

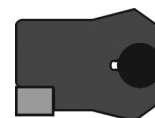
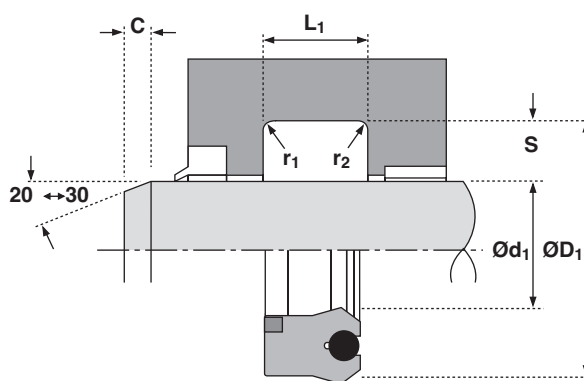
The Hallite 652 is a high pressure rod seal designed specifically for longwall mining applications. The seal design comprises three elements; an O ring energiser*, a polyurethane shell and a polyacetal anti-extrusion ring.

The shell is manufactured in Hythane® 181 to provide flexibility for installation and responsiveness to the sealing lip. The rubber energiser ensures complete lip actuation under all pressure conditions and cushions the seal against shock loadings. The anti-extrusion ring enables the seal to withstand side loads and extreme pressure peaks during operation, even with the extrusion gaps which are the result of using remote plastic bearing strips such as Hallite 506.

*In some cases a profiled energiser (as T621) is used.

Features

- High pressure/shock load capability
- Responsive sealing
- Polyacetal anti-extrusion ring



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-45°C + 110°C
Maximum Pressure	700 bar

Inch

3.0 ft/sec
-50°F + 230°F
10,000 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	160	250	400	500	700
Maximum Gap mm	1.0	0.8	0.6	0.4	0.25
Pressure p.s.i.	2400	3750	6000	7500	10,000

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød1	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face ØD1	1.6 max	10 max	63 max	70 max
Static Housing Faces L1	3.2 max	16 max	125 max	140 max

Chamfers & Radii

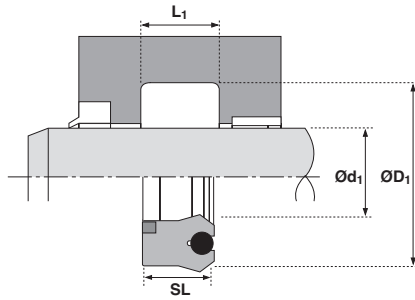
Groove Section ≤ S mm	4.0	5.0	7.5	10.0	12.5	15.0
Min Chamfer C mm	3.0	3.5	5.0	6.5	7.0	8.0
Max Fillet Rad r1 mm	0.2	0.4	0.8	0.8	1.2	1.6
Max Fillet Rad r2 mm	0.4	0.8	1.2	1.2	1.6	2.4

Tolerances

Ød1	ØD1	L1 mm
f9	Js11	+0.25 -0

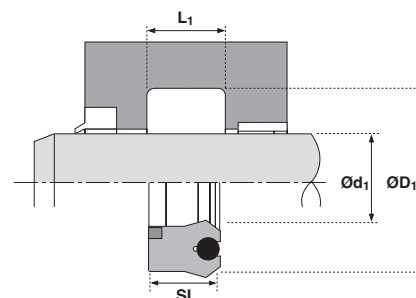


rod seals



Ød ₁	TOL f ₉	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
32	-0.025 -0.087	44.0	+0.080 -0.080	8.7	9.6	4344111
40	-0.025 -0.087	52.0	+0.095 -0.095	8.7	9.6	4326311
50	-0.025 -0.087	62.0	+0.095 -0.095	8.7	9.6	4326411
60	-0.030 -0.104	69.8	+0.095 -0.095	11.4	12.5	4534910*
60	-0.030 -0.104	72.0	+0.095 -0.095	8.7	9.6	4344211*
60	-0.030 -0.104	75.0	+0.095 -0.095	11.9	13.0	4451211
63	-0.030 -0.104	75.0	+0.095 -0.095	8.7	9.6	4326511*
70	-0.030 -0.104	82.0	+0.110 -0.110	8.7	9.6	4344311*
75	-0.030 -0.104	95.0	+0.110 -0.110	12.5	14.0	4547810*
80	-0.030 -0.104	95.0	+0.110 -0.110	14.5	16.0	4446511
80	-0.030 -0.104	95.0	+0.110 -0.110	11.8	13.0	4797410
85	-0.036 -0.123	97.0	+0.110 -0.110	8.7	9.6	4344511
90	-0.036 -0.123	105.0	+0.110 -0.110	14.5	16.0	4428011
100	-0.036 -0.123	115.0	+0.110 -0.110	11.0	12.0	4528010*
100	-0.036 -0.123	115.0	+0.110 -0.110	14.5	16.0	4397611*
105	-0.036 -0.123	120.0	+0.110 -0.110	11.8	13.0	4406711*
105	-0.036 -0.123	120.0	+0.110 -0.110	14.5	16.0	4781810
110	-0.036 -0.123	125.0	+0.125 -0.125	14.5	16.0	4445611
115	-0.036 -0.123	130.0	+0.125 -0.125	14.5	16.0	4455411
120	-0.036 -0.123	135.0	+0.125 -0.125	14.5	16.0	4452011
125	-0.043 -0.143	140.0	+0.125 -0.125	14.5	16.0	4446911
128	-0.043 -0.143	143.0	+0.125 -0.125	14.5	16.0	4581611
130	-0.043 -0.143	145.0	+0.125 -0.125	14.5	16.0	4782410

Ød ₁	TOL f ₉	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
135	-0.043 -0.143	155.0	+0.125 -0.125	13.6	15.0	4475410*
140	-0.043 -0.143	155.0	+0.125 -0.125	14.5	16.0	4753210
150	-0.043 -0.143	165.0	+0.125 -0.125	14.5	16.0	4389111*
160	-0.043 -0.143	175.0	+0.125 -0.125	11.7	12.8	4484010*
160	-0.043 -0.143	175.0	+0.125 -0.125	14.5	16.0	4405011*
160	-0.043 -0.143	177.0	+0.125 -0.125	14.5	16.0	4767610
160	-0.043 -0.143	185.0	+0.145 -0.145	18.8	20.0	4401711*
165	-0.043 -0.143	182.0	+0.145 -0.145	14.5	16.0	4537411
170	-0.043 -0.143	185.0	+0.145 -0.145	14.5	16.0	4745610
177	-0.043 -0.143	192.0	+0.145 -0.145	14.5	16.0	4445711
180	-0.043 -0.143	195.0	+0.145 -0.145	14.5	16.0	4734610
185	-0.050 -0.165	200.0	+0.145 -0.145	14.5	16.0	4777210
185	-0.050 -0.165	210.0	+0.145 -0.145	18.0	20.0	4546611
190	-0.050 -0.165	205.0	+0.145 -0.145	14.5	16.0	4430811
195	-0.050 -0.165	210.0	+0.145 -0.145	14.5	16.0	4459311
195	-0.050 -0.165	215.0	+0.145 -0.145	14.5	16.0	4550511
200	-0.050 -0.165	220.0	+0.145 -0.145	14.5	16.0	4387611*
205	-0.050 -0.165	220.0	+0.145 -0.145	14.5	16.0	4762110
210	-0.050 -0.165	230.0	+0.145 -0.145	14.5	16.0	4472911
220	-0.050 -0.165	235.0	+0.145 -0.145	14.5	16.0	4759610
220	-0.050 -0.165	240.0	+0.145 -0.145	14.5	16.0	4544510*
225	-0.050 -0.165	240.0	+0.145 -0.145	14.5	16.0	4445811
225	-0.050 -0.165	250.0	+0.145 -0.145	18.0	20.0	4537511



Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
230	-0.050 -0.165	247.0	+0.160 -0.160	14.5	16.0	4767710
230	-0.050 -0.165	249.3	+0.160 -0.160	14.5	16.0	4439411
230	-0.050 -0.165	250.0	+0.160 -0.160	14.5	16.0	4707210
230	-0.050 -0.165	255.0	+0.160 -0.160	22.8	25.0	4555511
235	-0.050 -0.165	255.0	+0.160 -0.160	14.5	16.0	4771410
240	-0.050 -0.165	260.0	+0.160 -0.160	14.5	16.0	4496511
245	-0.050 -0.165	270.0	+0.160 -0.160	18.0	20.0	4546711
250	-0.050 -0.165	270.0	+0.160 -0.160	14.5	16.0	4728810
255	-0.056 -0.186	275.0	+0.160 -0.160	14.5	16.0	4578611
260	-0.056 -0.186	280	+0.160 -0.160	16.4	18.0	4499011
265	-0.056 -0.186	285	+0.160 -0.160	14.5	16.0	4722110
275	-0.056 -0.186	295	+0.160 -0.160	14.5	16.0	4807310
280	-0.056 -0.186	300	+0.160 -0.160	14.5	16.0	4713910
285	-0.056 -0.186	305	+0.160 -0.160	16.4	18.0	4767810
285	-0.056 -0.186	310	+0.160 -0.160	18.0	20.0	4537611
290	-0.056 -0.186	310	+0.160 -0.160	16.4	18.0	4475111
290	-0.056 -0.186	315	+0.160 -0.160	18.0	20.0	4759410
295	-0.056 -0.186	315	+0.160 -0.160	16.4	18.0	4598211
300	-0.056 -0.186	320	+0.180 -0.180	14.5	16.0	4525110*
305	-0.056 -0.186	325	+0.180 -0.180	16.4	18.0	4473011
305	-0.056 -0.186	330	+0.180 -0.180	18.0	20.0	4546811

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
305	-0.056 -0.186	335	+0.180 -0.180	16.4	18.0	4721910
320	-0.062 -0.202	340	+0.180 -0.180	14.5	16.0	4544410*
320	-0.062 -0.202	340	+0.180 -0.180	16.4	18.0	4707310
325	-0.062 -0.202	355	+0.180 -0.180	18.0	20.0	4555711
330	-0.062 -0.202	350	+0.180 -0.180	16.4	18.0	4796710
335	-0.062 -0.202	355	+0.180 -0.180	16.4	18.0	4496611
335	-0.062 -0.202	360	+0.180 -0.180	18.0	20.0	4831710
340	-0.062 -0.202	360	+0.180 -0.180	18.5	20.5	4788110
340	-0.062 -0.202	365	+0.180 -0.180	18.0	20.0	4732810
350	-0.062 -0.202	375	+0.180 -0.180	18.0	20.0	4718010
355	-0.062 -0.202	380	+0.180 -0.180	18.0	20.0	4578411
360	-0.062 -0.202	385	+0.180 -0.180	18.0	20.0	4781110
370	-0.062 -0.202	395	+0.180 -0.180	18.0	20.0	4579710
380	-0.062 -0.202	405	+0.200 -0.200	18.0	20.0	4752010
390	-0.062 -0.202	415	-0.200 -0.200	18.0	20.0	4730010
395	-0.062 -0.202	420	-0.200 -0.200	18.0	20.0	4807110
400	-0.062 -0.202	425	-0.200 -0.200	18.0	20.0	4797210
410	-0.068 -0.223	435	-0.200 -0.200	18.0	20.0	4785110*
415	-0.068 -0.223	445	-0.200 -0.200	20.5	22.5	4820510
445	-0.068 -0.223	475	-0.200 -0.200	20.5	22.5	4838010
470	-0.068 -0.223	495	-0.200 -0.200	18.0	20.0	4814610

Design

The Hallite 653 is a buffer seal developed to work in conjunction with high performance rod seals, such as the Hallite 605 and 621. It is also interchangeable with common PTFE buffer seal housings.

The seal, which is manufactured in Hythane® 181, is designed to provide a valve action to prevent excessive pressure build up in the cavity between the buffer seal and the rod seal. A polyacetal anti-extrusion ring is fitted to provide maximum extrusion resistance against shock pressure loads.

The Hallite 653 is a patented product :

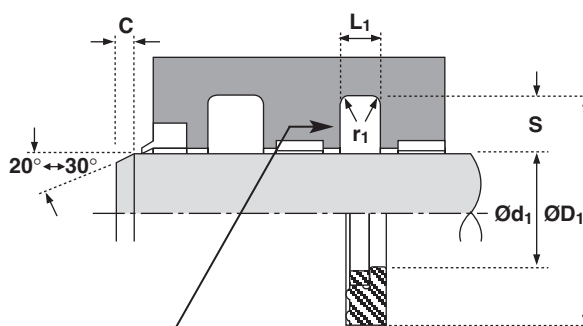
European patent no. 0427554Bl.

U.S.A. patent no. 5088747.

NB: Part numbers suffixed by “±” indicate housing sizes to meet ISO 7425-2

Features

- Prevents inter-seal pressure build up
- Interchangeable with common PTFE buffer seal housings
- Easy installation
- Long life
- Excellent temperature range



NB: This is a sealing surface



Technical details

Operating conditions

Maximum Speed

Temperature Range

Maximum Pressure

Metric

1.0 m/sec

-45°C + 110°C

700 bar

Inch

3.0 ft/sec

-50°F + 230°F

10,000 p.s.i.

Maximum extrusion gap

Pressure bar

Maximum Gap (S ≤ 6) mm

Maximum Gap (S > 6) mm

Pressure p.s.i.

Maximum Gap (S ≤ 0.250) in

Maximum Gap (S > 0.250) in

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	160	250	400	500	700
Maximum Gap (S ≤ 6) mm	0.6	0.5	0.4	0.3	0.2
Maximum Gap (S > 6) mm	1.0	0.8	0.6	0.4	0.25
Pressure p.s.i.	2400	3750	6000	7500	10,000
Maximum Gap (S ≤ 0.250) in	0.024	0.020	0.016	0.012	0.008
Maximum Gap (S > 0.250) in	0.040	0.032	0.024	0.016	0.010

Surface roughness

Dynamic Sealing Face Ød₁

Static Sealing Face L₁

Static Housing Faces ØD₁, L₁

µmRa

0.1 < > 0.4

1.6 max

3.2 max

µmRt

4 max

10 max

16 max

µinCLA

4 < > 16

63 max

125 max

µinRMS

5 < > 18

70 max

140 max

Chamfers & Radii

Groove Section ≤ S mm

Min Chamfer C mm

Max Fillet Rad r₁ mm

Groove Section ≤ S in

Min Chamfer C in

Max Fillet Rad r₁ in

3.75

3.00

0.50

0.150

0.125

0.020

5.50

3.50

0.70

0.215

0.140

0.028

7.75

5.00

1.20

0.306

0.200

0.047

10.50

7.50

1.60

0.413

0.300

0.062

Tolerances

mm

in

Ød₁

f9

f9

ØD₁

H10

Js11

L₁

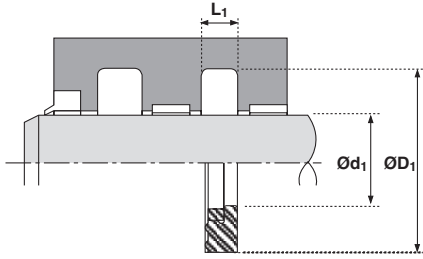
+0.25 -0

+0.010 -0



rod buffer seals

metric



Ød ₁	TOL f9	ØD ₁	TOL H10	L ₁ +0.25 -0	PART No.
40	-0.025 -0.087	55.5	+0.120 -0.000	6.3	4772710
45	-0.025 -0.087	56.0	+0.120 -0.000	4.2	4575510‡
45	-0.025 -0.087	60.5	+0.120 -0.000	6.3	4772810
50	-0.025 -0.087	65.5	+0.120 -0.000	6.3	4403210
55	-0.030 -0.104	70.5	+0.120 -0.000	6.3	4403310
60	-0.030 -0.104	75.5	+0.120 -0.000	6.3	4403410
63	-0.030 -0.104	78.5	+0.120 -0.000	6.3	4751110‡
65	-0.030 -0.104	80.5	+0.140 -0.000	6.3	4742110
70	-0.030 -0.104	85.5	+0.140 -0.000	6.3	4742310‡
75	-0.030 -0.104	90.5	+0.140 -0.000	6.3	4742410
80	-0.030 -0.104	95.5	+0.140 -0.000	6.3	4742510‡
85	-0.036 -0.123	100.5	+0.140 -0.000	6.3	4742610
90	-0.036 -0.123	105.5	+0.140 -0.000	6.3	4523710‡
95	-0.036 -0.123	110.5	+0.140 -0.000	6.3	4742810

inch

Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.010 -0	PART No.
2.000	-0.0012 -0.0041	2.424	+0.004 -0.004	0.166	4521310
2.500	-0.0012 -0.0041	2.924	+0.004 -0.004	0.166	4514610
2.750	-0.0012 -0.0041	3.174	+0.004 -0.004	0.166	4533510
3.000	-0.0012 -0.0041	3.616	+0.004 -0.004	0.247	4515910
3.500	-0.0014 -0.0048	4.116	+0.004 -0.004	0.247	4514810

Ød ₁	TOL f9	ØD ₁	TOL H10	L ₁ +0.25 -0	PART No.
100	-0.036 -0.123	115.5	+0.140 -0.000	6.3	4742910‡
110	-0.036 -0.123	125.5	+0.160 -0.000	6.3	4743010‡
124	-0.036 -0.123	139.5	+0.160 -0.000	6.3	4824710
125	-0.036 -0.123	140.5	+0.160 -0.000	6.3	4824810‡
130	-0.036 -0.123	145.5	+0.160 -0.000	6.3	4830210
135	-0.036 -0.123	150.5	+0.160 -0.000	6.3	4824910
140	-0.043 -0.143	155.5	+0.160 -0.000	6.3	4770810‡
150	-0.043 -0.143	165.5	+0.160 -0.000	6.3	4825010
150	-0.043 -0.143	170.0	+0.160 -0.000	10.0	4804110
155	-0.043 -0.143	170.5	+0.160 -0.000	6.3	4825110
160	-0.043 -0.143	175.5	+0.160 -0.000	6.3	4825210‡
170	-0.043 -0.143	185.5	+0.185 -0.000	6.3	4820210
180	-0.050 -0.165	195.5	+0.185 -0.000	6.3	4804010‡
215	-0.050 -0.165	236.0	+0.185 -0.000	8.1	4705710

Ød ₁	TOL f9	ØD ₁	TOL Js11	L ₁ +0.010 -0	PART No.
4.000	-0.0014 -0.0048	4.616	+0.004 -0.004	0.247	4524610
7.000	-0.0016 -0.0056	7.616	+0.006 -0.006	0.247	4588310
8.000	-0.0020 -0.0065	8.610	+0.006 0.006	0.247	4753410
8.500	-0.0020 -0.0065	9.116	+0.006 -0.006	0.247	4744810
12.000	-0.0020 -0.0065	12.950	+0.007 -0.007	0.319	4764910

Design

The Hallite 657 has been designed especially to fit SAE J518 flanges.

High pressure and pumping are common problems which prevent reliable sealing in applications where O rings are fitted. Hallite's 657 overcomes these.

Manufactured as standard in Hallite's high quality Hythane® 181, the material provides excellent extrusion resistance and is able to perform at both low and high temperatures. The seal's profile is designed to ensure that pumping is prevented and to provide reliable sealing of the flange.

In addition to the high specification material, the Hallite 657 is also manufactured in an industrial standard polyurethane.

Please ensure that the correct part number is specified for the material option that is required. See left for details.

NB: Also listed, two non-SAE seal sizes for metric flanges.

Features

- High specification material
- Industrial grade material option
- SAE flange sizes

Material

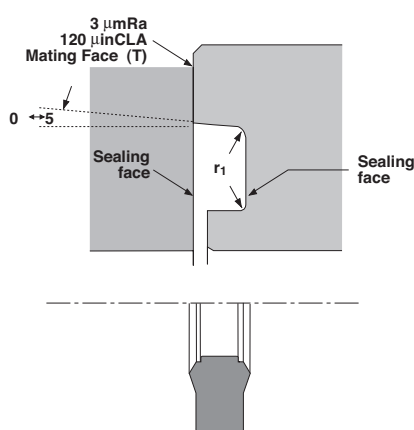
Standard material

Hythane® _ _ _ _ 00

Material options:

93IRHD Polyurethane (AU)
_ _ _ _ 01

NB: Temperature rating for 93IRHD Polyurethane (AU) changes to:
-30°C +100°C (-22°F +212°F)



Technical details

Operating conditions

Maximum Speed
Temperature Range
Maximum Pressure

Metric

Static
-45°C +110°C
600 bar

Inch

Static
-50°F +230°F
8500 p.s.i.

Surface roughness

Sealing Faces
Mating Face

µmRa	µmRt
0.8	6.3
3	20 ÷ 30

µinCLA	µinRMS
32	35
120	120

Radii

Max Fillet Rad r_1 mm
Max Fillet Rad r_1 in

0.80
0.03

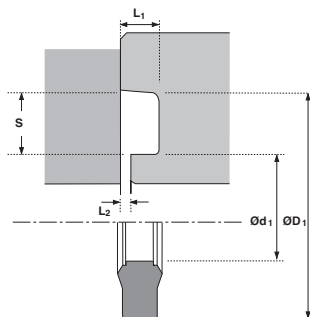
Tolerances

mm
in

$\varnothing D_1$	S	L_1	L_2
±0.100	±0.25	±0.050	+0 -0.25
+0.005 -0	±0.015	+0.005 -0	+0 -0.010



flange seals

**metric**

ØD ₁	TOL	Ød ₁	S	TOL	L ₁	TOL	L ₂	TOL	PART No.
33.5	+0.100 -0.100	26.3	3.6	+0.25 -0.25	2.200	+0.050 -0.050	0.25	+0.000 -0.250	44328_ _
45.0	+0.100 -0.100	36.2	4.4	+0.25 -0.25	3.300	+0.050 -0.050	0.25	+0.000 -0.250	44912_ _

inch - SAE J518

NOMINAL (SAE J518)	ØD ₁	TOL	Ød ₁	S	TOL	L ₁	TOL	L ₂	TOL	PART No.
½	1.000	+0.005 -0.000	0.670	0.165	+0.010 -0.010	0.110	+0.005 -0.000	0.010	+0.000 -0.010	44909_ _
¾	1.250	+0.005 -0.000	0.920	0.165	+0.010 -0.010	0.110	+0.005 -0.000	0.010	+0.000 -0.010	44910_ _
1	1.560	+0.005 -0.000	1.230	0.165	+0.010 -0.010	0.110	+0.005 -0.000	0.010	+0.000 -0.010	44911_ _
1¼	1.750	+0.005 -0.000	1.420	0.165	+0.010 -0.010	0.110	+0.005 -0.000	0.010	+0.000 -0.010	44220_ _
1½	2.125	+0.010 -0.000	1.785	0.165	+0.010 -0.010	0.110	+0.005 -0.000	0.010	+0.000 -0.010	44221_ _
2	2.500	+0.010 -0.000	2.160	0.165	+0.010 -0.010	0.110	+0.005 -0.000	0.010	+0.000 -0.010	44222_ _

Design

The Hallite 659 is an asymmetric piston seal designed to offer effective bore sealing in a wide variety of applications.

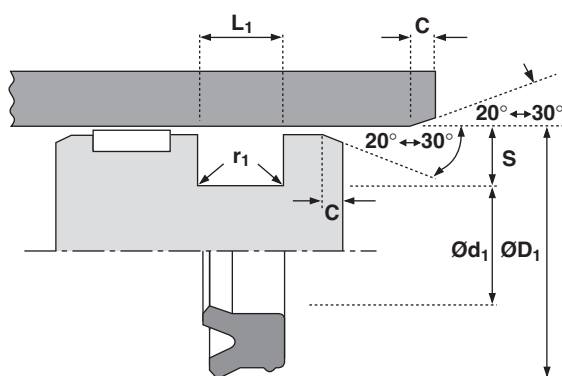
The outer dynamic lip is shorter and more robust to provide improved sealing and compression set characteristics over conventional U rings. The seal also features a secondary lip that provides a pocket for lubrication as well as the benefits listed below.

For use in single acting applications only, the seal is manufactured in Hallite's high performance polyurethane Hythane[®] 181. The Hallite 659 provides the following benefits:

Note: Variations of this seal are available in other sizes, please contact your local Hallite sales office for additional information and technical details.

Features

- Flexible for easy installation
- Excellent wear resistance
- High resistance to extrusion
- Wide temperature range
- Twin lip design for:
improved sealing
lower friction
increased seal stability
primary lip protection



Technical details

Operating conditions

Maximum Speed
-45°C +110°C
Maximum Pressure
400 bar

Inch

3.0 ft/sec
-50°F +230°F
6000 p.s.i.

Maximum extrusion gap

	160	250	400
Pressure bar	160	250	400
Maximum Gap mm	0.6	0.5	0.4
Pressure p.s.i.	2400	3750	6000
Maximum Gap in	0.024	0.020	0.016

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section

Surface roughness

Dynamic Sealing Face ØD₁
Static Sealing Face Ød₁
Static Housing Faces L₁

µmRa	µmRt	µinCLA	µinRMS
0.1 < > 0.4	4 max	4 < > 16	5 < > 18
1.6 max	10 max	63 max	70 max
3.2 max	16 max	125 max	140 max

Chamfers & Radii

Groove Section ≤ S mm
Min Chamfer C mm
Max Fillet Rad r₁ mm
Groove Section ≤ S in
Min Chamfer C in
Max Fillet Rad r₁ in

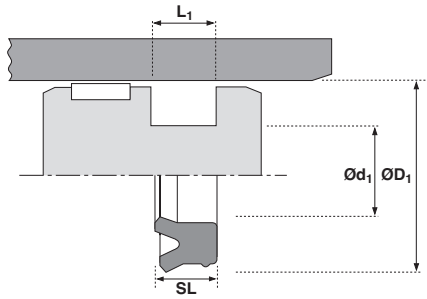
4.0	5.0	7.5	10.0
3.0	3.5	5.0	6.5
0.2	0.4	0.8	0.8
0.125	0.187	0.250	0.500
0.093	0.093	0.125	0.217
0.008	0.008	0.016	0.032

Tolerances

	ØD ₁	Ød ₁	L ₁
mm	H9	js11	+0.25 -0
in	+0.004 -0	0 -0.002	+0.010 -0



single acting piston seals



metric

ØD ₁	TOL H9	Ød ₁	TOL js11	SL	L ₁ +0.25 -0	PART No.
75.0	+0.08 +0.00	65.0	+0.10 -0.10	7.30	8.00	4775500
90.0	+0.09 +0.00	75.0	+0.11 -0.11	11.50	12.50	4775500
90.0	+0.09 +0.00	80.0	+0.11 -0.11	8.00	9.00	4834000
100.0	+0.09 +0.00	80.0	+0.11 -0.11	14.50	16.00	4580300

ØD ₁	TOL H9	Ød ₁	TOL js11	SL	L ₁ +0.25 -0	PART No.
100.0	+0.09 +0.00	85.0	+0.11 -0.11	11.50	12.50	4775600
110.0	+0.09 +0.00	90.0	+0.11 -0.11	14.50	16.00	4580400
110.0	+0.09 +0.00	95.0	+0.11 -0.11	11.50	12.50	4775700
130.0	+0.09 +0.00	115.0	+0.11 -0.11	11.50	12.50	4813000

inch

ØD ₁	TOL	Ød ₁	TOL	SL	L ₁ +0.010 -0	PART No.
1.250	+0.004 -0.000	1.000	+0.000 -0.002	0.171	0.187	4416600
1.500	+0.004 -0.000	1.250	+0.000 -0.002	0.187	0.207	4372400
1.750	+0.004 -0.000	1.250	+0.000 -0.002	0.375	0.413	4528600
2.000	+0.004 -0.000	1.630	+0.000 -0.002	0.250	0.281	4563300 Δ
2.375	+0.004 -0.000	1.750	+0.000 -0.002	0.437	0.481	4528500
2.500	+0.004 -0.000	2.130	+0.000 -0.002	0.250	0.281	4563400 Δ
3.000	+0.004 -0.000	2.250	+0.000 -0.002	0.500	0.550	4528400
3.000	+0.004 -0.000	2.630	+0.000 -0.002	0.250	0.281	4563500 Δ

ØD ₁	TOL	Ød ₁	TOL	SL	L ₁ +0.010 -0	PART No.
3.500	+0.004 -0.000	3.130	+0.000 -0.002	0.250	0.281	4563600 Δ
3.625	+0.004 -0.000	2.875	+0.000 -0.002	0.562	0.619	4528300
4.000	+0.004 -0.000	3.630	+0.000 -0.002	0.250	0.281	4563700 Δ
4.250	+0.004 -0.000	3.500	+0.000 -0.002	0.562	0.619	4528200
5.000	+0.004 -0.000	4.000	+0.000 -0.002	0.731	0.804	4528100
6.000	+0.004 -0.000	5.000	+0.000 -0.002	0.731	0.804	4530200
7.000	+0.004 -0.000	6.000	+0.000 -0.002	0.731	0.804	4529700

Δ Denotes parts designed to fit inch standard O ring grooves.

Design

The Hallite 663 is an asymmetric seal offering superlative dry rod sealing for light and medium duty applications.

The seal is a single lip modification of the well established Hallite 605 profile and is ideal for applications which require a double lip wiper such as the Hallite 839, Hallite 844 or Hallite 846.

Manufactured in Hythane[®] – 181, the Hallite 663 is an extremely flexible seal making installation very easy. The Hallite 663 is also available in Hallite 361 material.

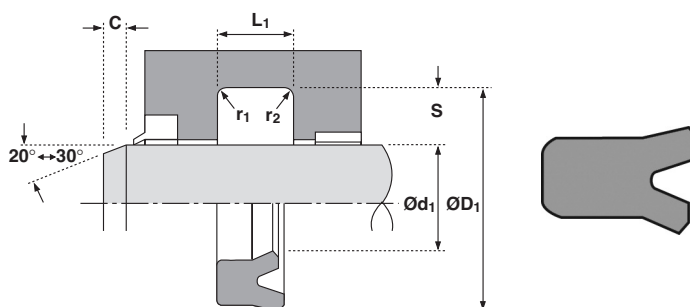
Features

- Easy installation
- Dry rod sealing performance when used with Hallite 839, 844 or 846 wipers

Material

Material options:

Hythane [®] 181	0
Hallite [®] 361	6



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-45°C +110°C
Maximum Pressure	400 bar

Inch

3.0 ft/sec
-50°F +230°F
6000 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	160	250	400
Maximum Gap mm	0.6	0.5	0.4
Pressure p.s.i.	2400	3750	6000

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

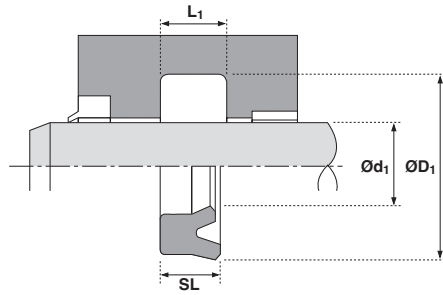
Chamfers & Radii

Groove Section ≤ S mm	4.0	5.0	7.5	10
Min Chamfer C mm	3.0	3.5	5.0	6.5
Max Fillet Rad r ₁ mm	0.2	0.4	0.8	0.8
Max Fillet Rad r ₂ mm	0.4	0.8	1.2	1.2

Tolerances

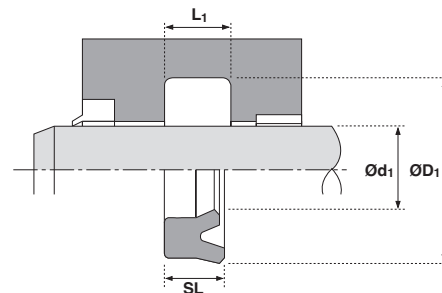
Ød ₁	ØD ₁	L ₁ mm
f9	Js11	+0.25 -0





Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
12.0	-0.016 -0.059	22.0	+0.06 -0.06	7.3	8.0	486510_
14.0	-0.016 -0.059	24.0	+0.06 -0.06	8.2	9.0	486520_
16.0	-0.016 -0.059	24.0	+0.06 -0.06	5.7	6.3	478930_
16.0	-0.016 -0.059	26.0	+0.06 -0.06	7.3	8.0	486530_
18.0	-0.016 -0.059	26.0	+0.06 -0.06	5.7	6.3	478940_
20.0	-0.020 -0.072	28.0	+0.06 -0.06	5.7	6.3	482740_
20.0	-0.020 -0.072	30.0	+0.06 -0.06	7.3	8.0	486540_
22.0	-0.020 -0.072	32.0	+0.08 -0.08	7.3	8.0	486550_
24.0	-0.020 -0.072	34.0	+0.08 -0.08	7.8	8.5	476450_
25.0	-0.020 -0.072	33.0	+0.08 -0.08	5.7	6.3	478950_
25.0	-0.020 -0.072	35.0	+0.08 -0.08	7.3	8.0	486560_
25.0	-0.020 -0.072	40.0	+0.08 -0.08	10.0	11.0	486570_
26.0	-0.020 -0.072	36.0	+0.08 -0.08	10.0	11.0	472600_
28.0	-0.020 -0.072	36.0	+0.08 -0.08	5.7	6.3	478960_
30.0	-0.020 -0.072	38.0	+0.08 -0.08	5.7	6.3	483040_
30.0	-0.020 -0.072	38.0	+0.08 -0.08	8.2	9.0	478970_
30.0	-0.020 -0.072	40.0	+0.08 -0.08	7.3	8.0	481670_
30.0	-0.020 -0.072	40.0	+0.08 -0.08	10.0	11.0	481180_
30.0	-0.010 -0.072	45.0	+0.08 -0.08	10.0	11.0	486580_
32.0	-0.020 -0.072	40.0	+0.08 -0.08	5.7	6.3	482750_
32.0	-0.020 -0.072	42.0	+0.08 -0.08	7.3	8.0	486590_
35.0	-0.025 -0.087	43.0	+0.08 -0.08	5.7	6.3	478980_
35.0	-0.025 -0.087	45.0	+0.08 -0.08	7.3	8.0	481680_

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
35.0	-0.025 -0.087	45.0	+0.08 -0.08	10.0	11.0	481610_
36.0	-0.025 -0.087	44.0	+0.08 -0.08	5.8	6.3	485960_
36.0	-0.025 -0.087	44.0	+0.08 -0.08	8.0	9.0	472620_
36.0	-0.025 -0.087	46.0	+0.08 -0.08	7.3	8.0	486600_
40.0	-0.025 -0.087	48.0	+0.08 -0.08	5.7	6.3	478990_
40.0	-0.025 -0.087	48.0	+0.08 -0.08	8.2	9.0	479000_
40.0	-0.025 -0.087	50.0	+0.08 -0.08	7.3	8.0	480630_
40.0	-0.025 -0.087	50.0	+0.08 -0.08	8.2	9.0	479010_
40.0	-0.025 -0.087	50.0	+0.08 -0.08	10.0	11.0	455340_
45.0	-0.025 -0.087	53.0	+0.08 -0.08	8.2	9.0	483890_
45.0	-0.025 -0.087	55.0	+0.09 -0.09	7.3	8.0	479020_
45.0	-0.025 -0.087	55.0	+0.09 -0.09	10.3	11.0	472630_
50.0	-0.025 -0.087	57.0	+0.09 -0.09	9.0	10.0	478740_
50.0	-0.025 -0.087	58.0	+0.09 -0.09	8.2	9.0	479030_
50.0	-0.025 -0.087	60.0	+0.09 -0.09	7.3	8.0	472640_
50.0	-0.025 -0.087	60.0	+0.09 -0.09	10.0	11.0	481440_
50.0	-0.025 -0.087	65.0	+0.09 -0.09	11.4	12.5	480640_
54.0	-0.030 -0.104	64.0	+0.09 -0.09	10.0	11.0	486870_
55.0	-0.030 -0.104	65.0	+0.09 -0.09	10.0	11.0	479890_
55.0	-0.030 -0.104	67.0	+0.09 -0.09	10.0	11.0	479380_
56.0	-0.030 -0.104	66.0	+0.09 -0.09	10.0	11.0	472650_
60.0	-0.030 -0.104	68.0	+0.09 -0.09	8.0	9.0	481690_
60.0	-0.030 -0.104	70.0	+0.09 -0.09	7.3	8.0	482260_



Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
60.0	-0.030 -0.104	70.0	+0.09 -0.09	10.0	11.0	472660_
60.0	-0.030 -0.104	75.0	+0.09 -0.09	11.4	12.5	480650_
65.0	-0.030 -0.104	75.0	+0.09 -0.09	11.8	13.0	479040_
65.0	-0.030 -0.104	80.0	+0.11 -0.11	11.4	13.0	472670_
70.0	-0.030 -0.104	85.0	+0.11 -0.11	11.4	13.0	479050_
75.0	-0.030 -0.104	95.0	+0.11 -0.11	14.5	16.0	480900_

Ød ₁	TOL f9	ØD ₁	TOL Js11	SL	L ₁ +0.25 -0	PART No.
80.0	-0.030 -0.104	90.0	+0.11 -0.11	11.8	13.0	476140_
80.0	-0.030 -0.104	100.0	+0.11 -0.11	14.5	16.0	480660_
85.0	-0.036 -0.123	97.0	+0.11 -0.11	8.7	9.6	487010_
85.0	-0.036 -0.123	100.0	+0.11 -0.11	11.8	13.0	480670_
100.0	-0.036 -0.123	115.0	+0.11 -0.11	11.8	13.0	483740_

Design

The Hallite 714 is a double acting seal capable of passing over ports. The reinforced, heat stabilised, thermoplastic sealing face, expands and contracts to fill the gap between the piston and the cylinder wall and has a step-cut joint for ease of installation.

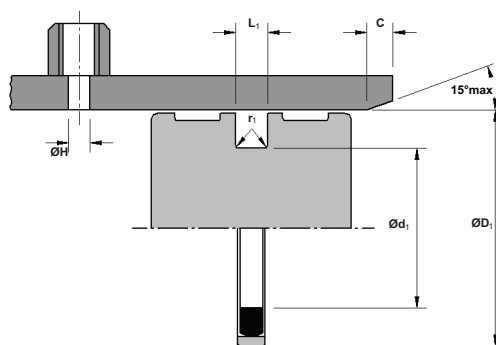
It will tolerate a considerable extrusion gap, thus reducing the possibility of piston-to-bore contact, and it offers excellent static load holding capability.

The special profile nitrile rubber energiser responds quickly to pressure changes, providing excellent sealing characteristics under all pressure conditions. Additionally, the profiled energizer allows for easier installation when compared with a traditional square cut energizer while providing better stability in the groove.

NB: Part numbers suffixed by “±” indicate housing sizes to meet ISO 7425-1.

Features

- Face expands for easy installation
- Passes over ports
- Excellent wear and abrasion resistance
- Runs on SSID tube
- Static load holding capability
- Replaces multiple piston rings
- Increases cylinder effectiveness
- Compact housing
- Ideal for re-phasing cylinders



Technical details

Operating conditions

Maximum Speed	2.0 m/sec
Temperature Range	-40°C + 110°C
Maximum Pressure	500 bar

6.0 ft/sec
-40°F + 230°F
7500 p.s.i.

Maximum extrusion gap

Pressure bar	500			
Groove Section S mm	5.5	7.75	10.5	12.25
Maximum Gap mm	0.6	0.8	1.1	1.2
Pressure p.s.i.	7,500			

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

Chamfers & Radii

Groove Section S mm	5.5	7.75	10.5	12.25
Min Chamfer C mm	4	6	8	10
Max Fillet Rad r ₁ mm	0.4	0.8	0.8	0.8

Port Diameter

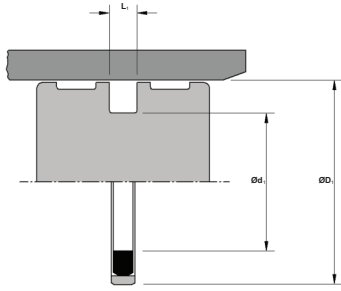
Max ØH mm

If the seal is to pass over the port
L₁ × 1.167

Tolerances

	ØD ₁	Ød ₁	L ₁
mm	H9	h9	+0.2 -0





ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
40	+0.06 +0.00	29.0	+0.000 -0.052	4.2	7270510‡
50	+0.06 +0.00	34.5	+0.000 -0.062	6.3	7272310‡
50	+0.06 +0.00	39.0	+0.000 -0.062	4.2	7270810‡
60	+0.07 +0.00	49.0	+0.000 -0.062	4.2	7270910
63	+0.07 +0.00	47.5	+0.000 -0.062	6.3	7272410‡
70	+0.07 +0.00	54.5	+0.000 -0.074	6.3	7273710
70	+0.07 +0.00	59.0	+0.000 -0.074	4.2	7271310
75	+0.07 +0.00	54.0	+0.000 -0.074	8.1	7273010
75	+0.07 +0.00	59.5	+0.000 -0.074	6.3	7271410
80	+0.07 +0.00	59.0	+0.000 -0.074	8.1	7273310‡
80	+0.07 +0.00	64.5	+0.000 -0.074	6.3	7270010‡
85	+0.09 +0.00	64.0	+0.000 -0.074	8.1	7273110
90	+0.09 +0.00	69.0	+0.000 -0.074	8.1	7273210
90	+0.09 +0.00	74.5	+0.000 -0.074	6.3	7271610
95	+0.09 +0.00	74.0	+0.000 -0.074	8.1	7273510
100	+0.09 +0.00	79.0	+0.000 -0.074	8.1	7273810
100	+0.09 +0.00	84.5	+0.000 -0.087	6.3	7271810‡

ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
105	+0.09 +0.00	84.0	+0.000 -0.087	8.1	7272910
110	+0.09 +0.00	89.0	+0.000 -0.087	8.1	7273410
115	+0.09 +0.00	94.0	+0.000 -0.087	8.1	7273910
120	+0.09 +0.00	99.0	+0.000 -0.087	8.1	7272010
125	+0.10 +0.00	104.0	+0.000 -0.087	8.1	7272110‡
125	+0.10 +0.00	109.5	+0.000 -0.087	6.3	7272810‡
130	+0.10 +0.00	109.0	+0.000 -0.087	8.1	7274010
140	+0.10 +0.00	119.0	+0.000 -0.087	8.1	7272210
150	+0.10 +0.00	129.0	+0.000 -0.100	8.1	7274110
160	+0.10 +0.00	139.0	+0.000 -0.100	8.1	7272510‡
180	+0.10 +0.00	159.0	+0.000 -0.100	8.1	7272610
190	+0.12 +0.00	169.0	+0.000 -0.100	8.1	7274210
200	+0.12 +0.00	179.0	+0.000 -0.100	8.1	7272710‡
220	+0.12 +0.00	199.0	+0.000 -0.115	8.1	7274310
250	+0.12 +0.00	229.0	+0.000 -0.115	8.1	7273610‡
280	+0.13 +0.00	255.5	+0.000 -0.130	8.1	7274410

Design

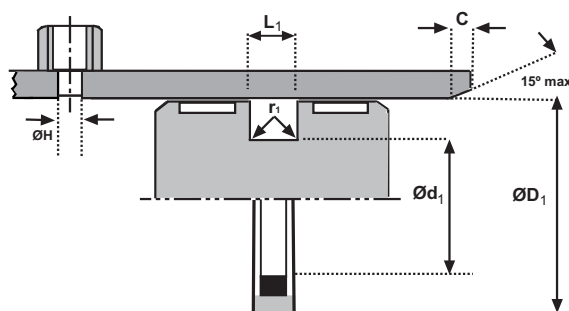
The Hallite 714 is a double acting seal capable of passing over ports. The reinforced, heat stabilised, thermoplastic sealing face, expands and contracts to fill the gap between the piston and the cylinder wall and has a step-cut joint for ease of installation.

It will tolerate a considerable extrusion gap, thus reducing the possibility of piston-to-bore contact, and it offers excellent static load holding capability.

The square section nitrile rubber energiser responds quickly to pressure changes, providing excellent sealing characteristics under all pressure conditions.

Features

- Face expands for easy installation
- Passes over ports
- Excellent wear and abrasion resistance
- Runs on SSID tube
- Static load holding capability
- Replaces multiple piston rings
- Increases cylinder effectiveness
- Compact housing
- Ideal for re-phasing cylinders



Technical details

Operating conditions

Maximum Speed	2.0 m/sec
Temperature Range	-40°C + 110°C
Maximum Pressure	500 bar

Inch

6.0 ft/sec
-40°F + 230°F
7500 p.s.i.

Maximum extrusion gap

Pressure bar	500
Maximum Gap ØD ₁ ≤ 5.000 in	0.032
Maximum Gap ØD ₁ > 5.000 in	0.040
Pressure p.s.i.	7500

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

Dynamic Sealing Face ØD ₁
Static Sealing Face Ød ₁
Static Housing Faces L ₁

µmRa	µmRt	µinCLA	µinRMS
0.1 < > 0.4	4 max	4 < > 16	5 < > 18
1.6 max	10 max	63 max	70 max
3.2 max	16 max	125 max	140 max

Chamfers & Radii

Min Chamfer C in	0.250
Max Fillet Rad r ₁ in	0.016

Port Diameter

Max ØH in	If the seal is to pass over the port
-----------	--------------------------------------

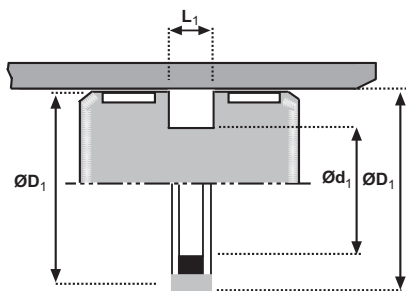
L₁ × 1.167

Tolerances

in	ØD ₁	Ød ₁	L ₁
	+0.005 -0	+0 -0.005	+0.005 -0



piston seals



ØD_1 +0.005 -0	Ød_1 +0 -0.005	L_1 +0.005 -0	PART No.
2.000	1.462	0.282	7260510
2.250	1.712	0.282	7260710
2.500	1.962	0.282	7261010
2.750	2.212	0.282	7261510
3.000	2.442	0.282	7262010
3.250	2.692	0.282	7262510
3.500	2.942	0.282	7263010
3.750	3.192	0.282	7263510

ØD_1 +0.005 -0	Ød_1 +0 -0.005	L_1 +0.005 -0	PART No.
4.000	3.442	0.282	7264010
4.250	3.692	0.282	7264510
4.500	3.942	0.282	7265010
4.750	4.192	0.282	7265510
5.000	4.442	0.282	7266010
5.250	4.490	0.377	7266510
5.500	4.740	0.377	7267010
6.000	5.240	0.377	7267510

Design

The Hallite 720 is a complete, self-contained piston, bearing and seal in one assembly that can solve difficult assembly problems or be used as a cost effective alternative to the traditional piston assembly with a separately fitted seal and bearing.

The Hallite 720 provides improved stability and has smaller extrusion gaps that extend the life of the piston seal. Moulding the bearing material over the outer diameter gives an extremely tight fit between the piston and the cylinder inner diameter. The piston diameter is tightly controlled, reducing the number of critical tolerance variables resulting in increased performance.

Material Option

The materials used for the Standard Unitised Piston are selected to handle a broad range of application parameters.

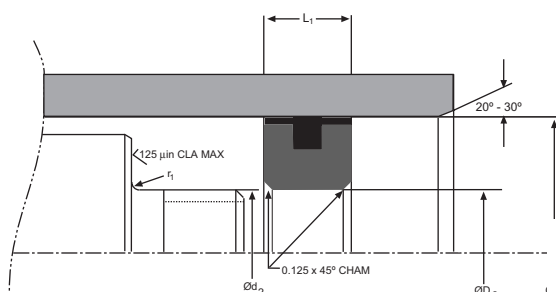
It is constructed using four components:

- High strength steel body
- Non-metallic bearing
- Rubber loading ring
- Filled PTFE seal ring (inch sizes)
- Polyurethane seal ring (metric sizes)

The piston body is machined to exact dimensions. The non-metallic bearing material is moulded to the piston using a special proprietary process. It is then machined to the final precise OD dimension and the seal is installed. It is supplied ready for use in a cylinder.

Features

- Maximum bearing surface area for the piston length
- Side load Capacity increase
- Improves supply chain management
- Less affected by fluid contamination
- Product improvement
- Extended seal life
- Helps increase manufacturing capacity
- Eliminates metal-to-metal contact
- Reduces warranty claims
- Works on a variety of cylinder bore finishes
- Reduces inventory
- Compact design enables increase in stroke or reduction in overall cylinder length



Technical details

Operating conditions

Maximum Speed	1 m/sec
Temperature Range	-30°C + 100°C
Maximum Pressure	350 bar

Inch

3.0 ft/sec
-22°F + 212°F
5000 p.s.i.

Surface roughness

	µmRa	µmRt
Dynamic Sealing Face ØD ₁	0.1-0.4	4max
Static Housing (Rod end)	3.2 max	16 max

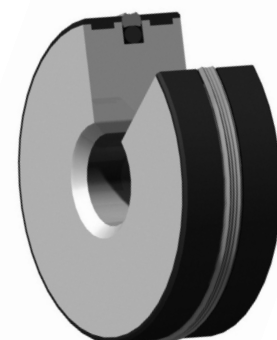
µinCLA	µinRMS
4-16	5-18
125	137

Radii

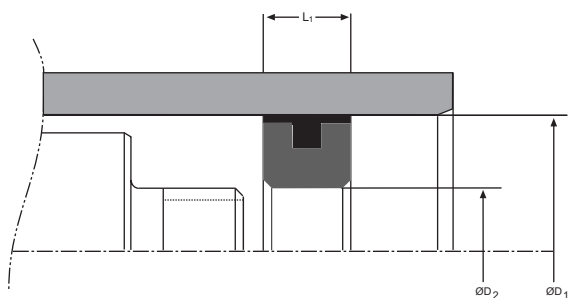
Max Fillet Rad r ₁ mm	3
Max Fillet Rad r ₁ in	0.125

Tolerances

	ØD ₁	ØD ₂	Ød ₂
mm	H9	+0.05 -0	f9
in	H9	+0.002 -0	f9



unitised piston



metric

ØD ₁	TOL H9	ØD ₂	TOL	L ₁ +0.2 -0	PART No.
32	+0.06 +0.00	12.0	+0.05 -0.0	25.0	7240510
40	+0.06 +0.00	16.0	+0.05 -0.0	25.0	7241010
50	+0.06 +0.00	20.0	+0.05 -0.0	25.0	7241510
60	+0.07 +0.00	25.0	+0.05 -0.0	25.0	7242010

ØD ₁	TOL H9	ØD ₂	TOL	L ₁ +0.2 -0	PART No.
63	+0.07 +0.00	25.0	+0.05 -0	25.0	7242510
70	+0.07 +0.00	25.0	+0.05 -0.	29.0	7243010
80	+0.07 +0.00	25.0	+0.05 -0	29.0	7243510
100	+0.09 +0.00	32.0	+0.05 -0	40.0	7244010

inch

ØD ₁	TOL H9	ØD ₂	TOL	L ₁ +0.2 -0	PART No.
1.500	+0.003 -0.000	0.500	+0.002 -0.000	1.000	H1380*
2.000	+0.003 -0.000	0.750	+0.002 -0.000	1.000	H1381*
2.250	+0.003 -0.000	1.000	+0.002 -0.000	1.000	H1443*
2.500	+0.003 -0.000	1.000	+0.002 -0.000	1.000	H1382*
3.000	+0.003 -0.000	1.000	+0.002 -0.000	1.000	H1383
3.500	+0.004 -0.000	1.000	+0.002 -0.000	1.000	H1384

ØD ₁	TOL H9	ØD ₂	TOL	L ₁ +0.2 -0	PART No.
3.500	+0.004 -0.000	1.000	+0.002 -0.000	1.500	H1385
4.000	+0.004 -0.000	1.000	+0.002 -0.000	1.000	H1386
4.000	+0.004 -0.000	1.000	+0.002 -0.000	1.500	H1387
4.500	+0.004 -0.000	1.000	+0.002 -0.000	1.500	H1388
5.000	+0.004 -0.000	1.500	+0.002 -0.000	1.250	H1389
5.000	+0.004 -0.000	1.500	+0.002 -0.000	1.750	H1390

* Not fitted with an internal static sealing O-Ring.

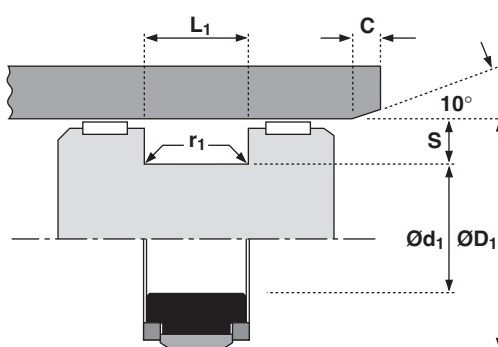
Design

The Hallite 730 is a top of the range double acting piston seal. It is constructed with a tough wear resistant thermoplastic polyester elastomer (TPE) face, which is loaded by a profiled nitrile energiser. Material options can be provided for the sealing face, including lubricated polyester and PTFE. All designs have rectangular polyacetal anti-extrusion rings. The TPE face material is suitable for both roller-burnished and honed tubing.

N.B. For installation of the Hallite 730 refer to guide following the size list.

Features

- High shock load capability
- High pressure capability
- Proven on both roller-burnished and honed tubing



Technical details

Operating conditions

Maximum Speed	0.3 m/sec
Temperature Range	-40°C +110°C
Maximum Pressure	700 bar

Inch

1.0 ft/sec
-40°F + 230°F
10,000 p.s.i.

Maximum extrusion gap

Pressure bar	160	250	500	700
Maximum Gap mm	1.00	0.80	0.40	0.25
Pressure p.s.i.	2400	3750	7500	10,000

Figures show the maximum permissible gap all on one side using minimum rod $\varnothing$ and maximum clearance $\varnothing$. Refer to Housing Design section.

Surface roughness

	μmRa	μmRt	μinCLA	μinRMS
Dynamic Sealing Face $\varnothing D_1$	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face $\varnothing d_1$ $\varnothing d_2$	1.6 max	10 max	63 max	70 max
Static Housing Faces L_1	3.2 max	16 max	125 max	140 max

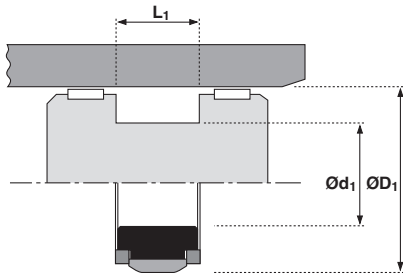
Chamfers & Radii

Groove Section $\leq S$ mm	7.5	10.0	12.5	15.0
Min Chamfer C mm	8.0	10.0	13.0	15.0
Max Fillet Rad r_1 mm	0.2	0.4	0.8	0.8

Tolerances

	$\varnothing D_1$	$\varnothing d_1$	L_1
mm	H10	h9	+0.2 -0

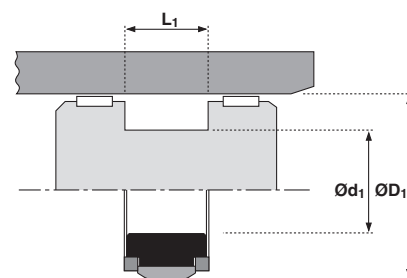




$\varnothing D_1$	TOL H10	$\varnothing d_1$	TOL h9	L_1 +0.2 -0	PART No.
40	+0.10 +0.00	28	+0.00 -0.06	11.5	2390810
50	+0.10 +0.00	38	+0.00 -0.06	11.5	2335410
60	+0.10 +0.00	44	+0.00 -0.06	13.0	2390710
60	+0.12 +0.00	44	+0.00 -0.06	20.5	2356710
63	+0.12 +0.00	50	+0.00 -0.06	14.5	2331210
75	+0.12 +0.00	55	+0.00 -0.07	23.0	2346420
80	+0.12 +0.00	66	+0.00 -0.07	17.0	2330310
90	+0.14 +0.00	75	+0.00 -0.07	13.5	2331310
90	+0.14 +0.00	76	+0.00 -0.07	16.0	2364810
100	+0.14 +0.00	82	+0.00 -0.09	22.5	2331410
100	+0.14 +0.00	85	+0.00 -0.09	12.5	2342910*
100	+0.14 +0.00	85	+0.00 -0.09	13.5	2335010
100	+0.14 +0.00	86	+0.00 -0.09	22.5	2359710
105	+0.14 +0.00	80	+0.00 -0.09	22.5	2346710
105	+0.14 +0.00	91	+0.00 -0.09	16.5	2348210
110	+0.14 +0.00	95	+0.00 -0.09	12.5	2343010*
110	+0.14 +0.00	95	+0.00 -0.09	16.0	2331610
115	+0.14 +0.00	90	+0.00 -0.09	21.0	2329110
115	+0.14 +0.00	97	+0.00 -0.09	22.5	2356110
115	+0.14 +0.00	100	+0.00 -0.09	16.0	2329210
120	+0.14 +0.00	105	+0.00 -0.09	16.0	2337410
125	+0.16 +0.00	110	+0.00 -0.09	15.8	2331510
130	+0.16 +0.00	113	+0.00 -0.09	12.5	2339110*

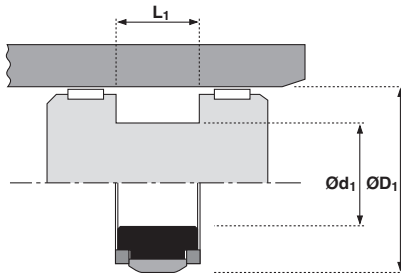
$\varnothing D_1$	TOL H10	$\varnothing d_1$	TOL h9	L_1 +0.2 -0	PART No.
130	+0.16 +0.00	113	+0.00 -0.09	20.5	2369010
135	+0.16 +0.00	118	+0.00 -0.09	20.5	2348110
135	+0.16 +0.00	120	+0.00 -0.09	16.0	2334010
140	+0.16 +0.00	123	+0.00 -0.10	16.0	2357910
140	+0.16 +0.00	125	+0.00 -0.10	16.0	2329410
150	+0.16 +0.00	130	+0.00 -0.10	16.0	2339010
150	+0.16 +0.00	133	+0.00 -0.10	20.0	2360510
150	+0.16 +0.00	135	+0.00 -0.10	16.0	2338210
160	+0.16 +0.00	143	+0.00 -0.10	20.0	2365510
160	+0.16 +0.00	145	+0.00 -0.10	16.0	2331910
165	+0.16 +0.00	145	+0.00 -0.10	20.0	2348910
165	+0.16 +0.00	150	+0.00 -0.10	16.0	2332010
170	+0.16 +0.00	145	+0.00 -0.10	25.0	2345510
170	+0.16 +0.00	150	+0.00 -0.10	16.0	2331110
175	+0.16 +0.00	155	+0.00 -0.10	16.0	2335110
180	+0.16 +0.00	160	+0.00 -0.10	16.0	2328510
180	+0.16 +0.00	163	+0.00 -0.10	20.0	2365210
185	+0.19 +0.00	165	+0.00 -0.10	16.0	2328410
185	+0.19 +0.00	165	+0.00 -0.10	20.0	2364010
190	+0.19 +0.00	170	+0.00 -0.10	16.0	2332210
195	+0.19 +0.00	175	+0.00 -0.10	16.0	2334710
200	+0.19 +0.00	180	+0.00 -0.10	16.0	2329310
200	+0.19 +0.00	180	+0.00 -0.10	20.0	2348810

* Uses type 754 face



ØD ₁	TOL H10	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
200	+0.19 +0.00	183	+0.00 -0.12	20.0	2365010
210	+0.19 +0.00	190	+0.00 -0.12	16.0	2332410
210	+0.19 +0.00	190	+0.00 -0.12	20.0	2364710
215	+0.19 +0.00	195	+0.00 -0.12	16.0	2332510
215	+0.19 +0.00	195	+0.00 -0.12	20.0	2345110
220	+0.19 +0.00	195	+0.00 -0.12	16.0	2345810
220	+0.19 +0.00	195	+0.00 -0.12	22.0	2333920
220	+0.19 +0.00	195	+0.00 -0.12	25.0	2333910
220	+0.19 +0.00	200	+0.00 -0.12	20.5	2356510
224	+0.19 +0.00	204	+0.00 -0.12	20.5	2348510
225	+0.19 +0.00	205	+0.00 -0.12	16.0	2332610
225	+0.19 +0.00	205	+0.00 -0.12	20.0	2346810
230	+0.19 +0.00	210	+0.00 -0.12	16.0	2332710
230	+0.19 +0.00	210	+0.00 -0.12	20.0	2344510
240	+0.19 +0.00	215	+0.00 -0.12	25.0	2333010
240	+0.19 +0.00	220	+0.00 -0.12	25.0	2364310
245	+0.19 +0.00	220	+0.00 -0.12	25.0	2328810
250	+0.19 +0.00	225	+0.00 -0.12	25.0	2348310
255	+0.19 +0.00	230	+0.00 -0.12	25.0	2348320
260	+0.21 +0.00	230	+0.00 -0.12	30.0	2347810
260	+0.21 +0.00	235	+0.00 -0.12	25.0	2347910
275	+0.21 +0.00	250	+0.00 -0.12	25.0	2362210
280	+0.21 +0.00	255	+0.00 -0.13	25.0	2333510

ØD ₁	TOL H10	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
285	+0.21 +0.00	260	+0.00 -0.13	25.0	2362410
290	+0.21 +0.00	265	+0.00 -0.13	27.0	2364410
300	+0.21 +0.00	275	+0.00 -0.13	25.0	2333610
305	+0.21 +0.00	280	+0.00 -0.13	25.0	2333630
310	+0.21 +0.00	285	+0.00 -0.13	25.0	2333710
320	+0.23 +0.00	290	+0.00 -0.13	30.0	2348010
340	+0.23 +0.00	310	+0.00 -0.13	30.0	2366010
340	+0.23 +0.00	310	+0.00 -0.13	32.0	2390910
345	+0.23 +0.00	315	+0.00 -0.13	30.0	2363610
350	+0.23 +0.00	320	+0.00 -0.14	30.0	2345410
360	+0.23 +0.00	330	+0.00 -0.14	30.0	2345430
360	+0.23 +0.00	330	+0.00 -0.14	31.5	2365410
370	+0.23 +0.00	340	+0.00 -0.14	30.0	2362710
380	+0.23 +0.00	350	+0.00 -0.14	32.0	2362110
390	+0.23 +0.00	360	+0.00 -0.14	32.0	2362120
400	+0.23 +0.00	370	+0.00 -0.14	32.0	2359810
410	+0.25 +0.00	380	+0.00 -0.14	32.0	2359820
420	+0.25 +0.00	390	+0.00 -0.14	32.0	2366410
440	+0.25 +0.00	410	+0.00 -0.16	32.0	2365910
450	+0.25 +0.00	410	+0.00 -0.16	32.0	2390510
480	+0.25 +0.00	440	+0.00 -0.16	32.0	2391010
500	+0.25 +0.00	470	+0.00 -0.16	32.0	2369410



PLEASE NOTE!

Before installation of the seals onto the piston check that the piston is free of dirt and sharp edges. Sharp edged tools which could damage the seal during installation must not be used.

INSTALLATION

The rubber energiser must be installed first. It can be pulled over the piston with a circling movement, using a plastic strip for the stretching. The energiser should then be positioned in the centre of the groove, with a clearance either side. The first AE-ring is fitted next. It must be positioned opposite the installation side for the TPE face. This is fitted over the NBR energiser using the plastic installation strip. Please note that the TPE face ring needs to be installed directly against the AE ring. This can easily be achieved by circling movements with the fitting strap. The second AE ring can now be snapped on.

To provide the necessary seal interference, the seal will be considerably larger than the piston diameter. The assembly chamfer on the cylinder tube should be as long and flat as possible. Ensure that all edges are deburred and that the intersection points of the assembly chamfers with the bore are smoothly rounded.

Before the cylinders are assembled, the seal surface should be well greased. The grease also helps the seal to slip into the tube easily. For tubes longer than 800 mm the bore needs to be greased as well.

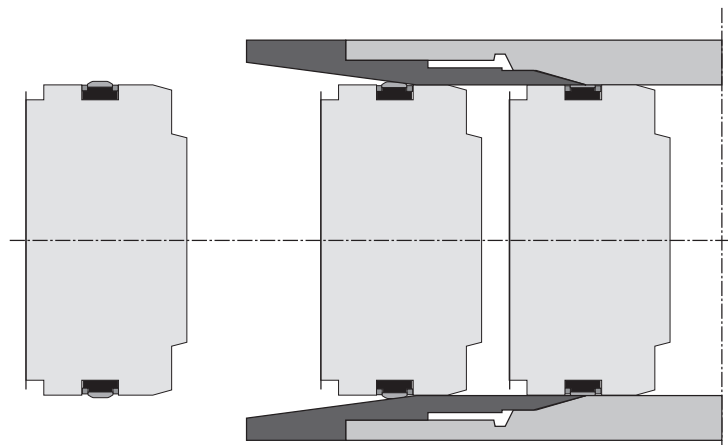
PLEASE NOTE!

The surface between energiser and face-ring must be kept free of grease.

For T730 with nominal groove lengths above 16 mm an installation sleeve is required (this can also be helpful for groove lengths up to 16 mm). This sleeve is needed to extend the assembly chamfer. A slope angle between 7° and 10° is required to prevent the face ring taking up a conical shape that will allow the rear AE-ring to slip under the TPE face ring.

The installation sleeve should be machined from a suitable plastic (such as polyacetal or polyamide). It can be made as a one piece design or as two half shells.

When automatic screwing equipment is used for the installation of the associated gland the maximum surface speed of the seal with respect to the bore must not exceed 0.1 m/s.



Design

Hallite 735 is a compact double acting piston seal assembly designed for one piece pistons and is suitable for low to high pressure, medium to heavy duty applications. The assembly comprises as standard a self lubricating wear resistant bronze filled or glass / MoS2 filled PTFE cap ring, which is loaded by a NBR energiser. Thermoplastic split anti-extrusion rings support the seal on both sides and prevent contamination of the the energiser and cap ring.

Hallite's 735 piston seal is designed to be used in a variety of equipment and is particularly suited to use in earthmoving and other off-highway equipment.

The range consists of seals to suit popular North American and Asian housings.

For information about other material options available, please contact your local Hallite Seals office.

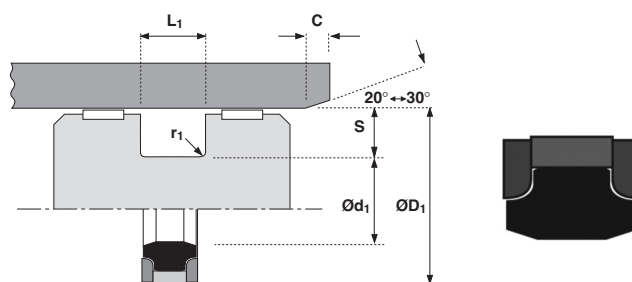
Features

- Heavy duty
- High pressure capability
- PTFE cap ring
- Compact design
- Low friction
- Long life
- Range of material options to extend service temperature range

Material

Material options (cap ring):
PTFE, 40% Bronze

PTFE, 15% Glass 5% MoS2



Technical details

Operating conditions

Maximum Speed	1.5 m/sec
Temperature Range	-40°C +120°C
Maximum Pressure	500 bar

Inch

4.5 ft/sec
-40°F +250°F
7500 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Pressure bar	160	250	400	500
Maximum Gap mm	1.0	0.8	0.6	0.5
Pressure p.s.i.	2400	3750	6000	7500
Maximum Gap in	0.040	0.030	0.024	0.020

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

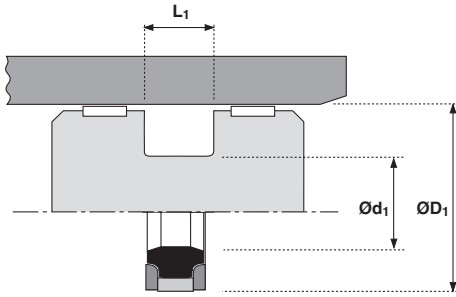
Chamfers & Radii

Groove Section ≤ S mm	7.0	7.5	11.5	14.0
Min Chamfer C mm	4.0	5.0	7.0	8.0
Max Fillet Rad r ₁ mm	0.8	0.8	0.8	0.8
Groove Section ≤ S in	0.187	0.240	0.365	0.470
Min Chamfer C in	0.160	0.200	0.250	0.280
Max Fillet Rad r ₁ in	0.016	0.016	0.032	0.032

Tolerances

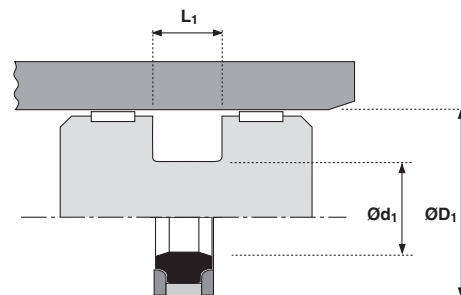
	ØD ₁	Ød ₁	L ₁
mm	H9	+0 -0.2	+0.2 -0
in	H9	*see below	+0.01 -0
ØD ₁ in	≤ 3.000	≤ 4.500	> 4.500
Ød ₁ Tol	+0 - 0.002	+0 - 0.003	+0 - 0.004





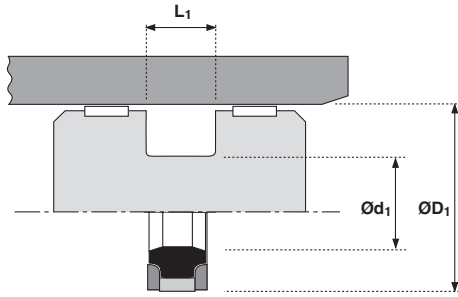
ØD ₁ H9	TOL +0.0 -0.2	Ød ₁	L ₁ +0.2 -0.0	PART No.
50	+0.06 +0.00	36	9.0	715100_†
60	+0.07 +0.00	46	9.0	715150_†
63	+0.07 +0.00	48	11.0	715200_†
65	+0.07 +0.00	50	11.0	715250_†
70	+0.07 +0.00	55	11.0	715300_†
75	+0.07 +0.00	60	11.0	715350_†
80	+0.07 +0.00	65	11.0	715400_†
85	+0.09 +0.00	70	11.0	715450_†
90	+0.09 +0.00	75	11.0	715500_†
95	+0.09 +0.00	80	11.0	715550_†
100	+0.09 +0.00	85	12.5	715600_†
105	+0.09 +0.00	90	12.5	715650_†
110	+0.09 +0.00	95	12.5	715700_†
115	+0.09 +0.00	100	12.5	715750_†
120	+0.09 +0.00	105	12.5	715800_†
125	+0.10 +0.00	102	16.0	715850_†
130	+0.10 +0.00	107	16.0	715900_†
135	+0.10 +0.00	112	16.0	715950_†
140	+0.10 +0.00	117	16.0	716000_†
145	+0.10 +0.00	122	16.0	716050_†
150	+0.10 +0.00	127	16.0	716100_†
160	+0.10 +0.00	137	16.0	716150_†
165	+0.10 +0.00	142	16.0	716200_†

ØD ₁ H9	TOL +0.0 -0.2	Ød ₁	L ₁ +0.2 -0.0	PART No.
170	+0.10 +0.00	147	16.0	716250_†
175	+0.10 +0.00	152	16.0	716280_†
180	+0.10 +0.00	157	16.0	716300_†
185	+0.12 +0.00	162	16.0	716350_†
190	+0.12 +0.00	167	16.0	716400_†
200	+0.12 +0.00	177	16.0	716450_†
210	+0.12 +0.00	187	16.0	716500_†
215	+0.12 +0.00	192	16.0	716530_†
220	+0.12 +0.00	197	16.0	716550_†
225	+0.12 +0.00	202	16.0	716600_†
230	+0.12 +0.00	207	16.0	716650_†
240	+0.12 +0.00	217	16.0	716700_†
250	+0.12 +0.00	222	17.5	716750_†
260	+0.13 +0.00	232	17.5	716800_†
270	+0.13 +0.00	242	17.5	716820_†
280	+0.13 +0.00	252	17.5	716840_†
290	+0.13 +0.00	262	17.5	716850_
300	+0.13 +0.00	272	17.5	716870_†
320	+0.13 +0.00	292	17.5	716890_†
330	+0.13 +0.00	302	17.5	716910_
350	+0.14 +0.00	322	17.5	716950_
400	+0.14 +0.00	372	17.5	716990_



ØD ₁ H9	TOL	Ød ₁	TOL	L ₁ +0.010 -0	PART No.
1.500	+0.002 -0.000	1.127	+0.000 -0.002	0.424	710020_
1.750	+0.002 -0.000	1.377	+0.000 -0.002	0.424	710030_
2.000	+0.002 -0.000	1.627	+0.000 -0.002	0.424	710050_
2.250	+0.002 -0.000	1.877	+0.000 -0.002	0.424	710060_
2.500	+0.002 -0.000	2.127	+0.000 -0.002	0.424	710070_
2.750	+0.002 -0.000	2.377	+0.000 -0.002	0.424	710080_
3.000	+0.003 -0.000	2.522	+0.000 -0.002	0.579	710100_
3.250	+0.003 -0.000	2.772	+0.000 -0.003	0.579	710150_
3.500	+0.003 -0.000	3.022	+0.000 -0.003	0.579	710200_
3.750	+0.003 -0.000	3.272	+0.000 -0.003	0.579	710250_
4.000	+0.003 -0.000	3.522	+0.000 -0.003	0.579	710300_
4.250	+0.003 -0.000	3.772	+0.000 -0.003	0.579	710350_
4.500	+0.003 -0.000	3.909	+0.000 -0.003	0.492	710390_
4.500	+0.003 -0.000	4.022	+0.000 -0.003	0.579	710400_
4.750	+0.004 -0.000	4.159	+0.000 -0.004	0.492	710420_
4.750	+0.004 -0.000	4.272	+0.000 -0.004	0.579	710430_
5.000	+0.004 -0.000	4.094	+0.000 -0.004	0.630	710440_
5.000	+0.004 -0.000	4.274	+0.000 -0.004	0.750	710450_
5.250	+0.004 -0.000	4.524	+0.000 -0.004	0.750	710500_
5.500	+0.004 -0.000	4.594	+0.000 -0.004	0.630	710540_
5.500	+0.004 -0.000	4.774	+0.000 -0.004	0.750	710550_
5.500	+0.004 -0.000	5.022	+0.000 -0.004	0.579	710600_
6.000	+0.004 -0.000	5.094	+0.000 -0.004	0.630	710640_

ØD ₁ H9	TOL	Ød ₁	TOL	L ₁ +0.010 -0	PART No.
6.000	+0.004 -0.000	5.274	+0.000 -0.004	0.750	710650_
6.250	+0.004 -0.000	5.344	+0.000 -0.004	0.630	710680_
6.250	+0.004 -0.000	5.772	+0.000 -0.004	0.579	710690_
6.250	+0.004 -0.000	5.524	+0.000 -0.004	0.750	710700_
6.500	+0.004 -0.000	5.594	+0.000 -0.004	0.630	710740_
6.500	+0.004 -0.000	5.774	+0.000 -0.004	0.750	710750_
6.500	+0.004 -0.000	6.022	+0.000 -0.004	0.579	710800_
7.000	+0.004 -0.000	6.094	+0.000 -0.004	0.630	710840_
7.000	+0.004 -0.000	6.274	+0.000 -0.004	0.750	710850_
7.250	+0.005 -0.000	6.344	+0.000 -0.004	0.630	710860_
7.500	+0.005 -0.000	6.594	+0.000 -0.004	0.630	710890_
7.500	+0.005 -0.000	6.774	+0.000 -0.004	0.750	710900_
7.750	+0.005 -0.000	6.844	+0.000 -0.004	0.630	710920_
8.000	+0.005 -0.000	7.274	+0.000 -0.004	0.750	710950_
8.250	+0.005 -0.000	7.524	+0.000 -0.004	0.750	710980_
8.250	+0.005 -0.000	7.344	+0.000 -0.004	0.630	710970_
8.500	+0.005 -0.000	7.594	+0.000 -0.004	0.630	710990_
8.500	+0.005 -0.000	7.774	+0.000 -0.004	0.750	711000_
9.000	+0.005 -0.000	8.274	+0.000 -0.004	0.750	711050_
10.000	+0.005 -0.000	8.898	+0.000 -0.004	0.687	711090_
10.000	+0.005 -0.000	9.275	+0.000 -0.004	0.750	711100_
10.500	+0.005 -0.000	9.398	+0.000 -0.004	0.687	711120_
11.000	+0.005 -0.000	10.275	+0.000 -0.004	0.750	711150_



ØD_1 H9	TOL	Ød_1	TOL	L_1 +0.010 -0	PART No.
11.500	+0.005 -0.000	10.398	+0.000 -0.004	0.687	711170_
12.000	+0.005 -0.000	11.275	+0.000 -0.004	0.750	711200_
12.500	+0.005 -0.000	11.775	+0.000 -0.004	0.750	711220_
13.000	+0.005 -0.000	12.275	+0.000 -0.004	0.750	711240_
14.000	+0.006 -0.000	12.898	+0.000 -0.004	0.687	711270_

ØD_1 H9	TOL	Ød_1	TOL	L_1 +0.010 -0	PART No.
14.000	+0.005 -0.000	13.275	+0.000 -0.004	0.750	711400_
14.500	+0.006 -0.000	13.775	+0.000 -0.004	0.750	711280_
15.000	+0.006 -0.000	14.275	+0.000 -0.004	0.750	711300_
16.000	+0.006 -0.000	15.275	+0.000 -0.004	0.750	711320_
18.000	+0.006 -0.000	17.060	+0.000 -0.004	0.750	711380_

Design

The Hallite 754 double acting piston seal is a compact low friction seal for light to medium duty hydraulic cylinders. As standard, it comprises a tough, wear resistant thermoplastic elastomer face, (see below for face material options) which is pre-loaded by an O ring. The housing width allows a narrow width piston to be used, but it is recommended that an adequate bearing is mounted on one or both sides of the seal.

Housing dimensions for use with Hallite 87 and 506 bearing strip are given in the installation details. For further details of bearing strip grooves, please refer to the appropriate data sheets.

NB: Part numbers suffixed by “±” indicate housing sizes to meet ISO 7425-1.

Features

- Low breakout and operating friction levels
- Rapid recovery of face after assembly
- More tolerant to contamination
- Excellent position holding characteristics under load
- Compatible with most hydraulic fluids
- Excellent wear resistance
- Operates on wide range of surface finishes
- Ideal for use with Hallite 506 or 87 bearing
- ISO 7425 housing

Material

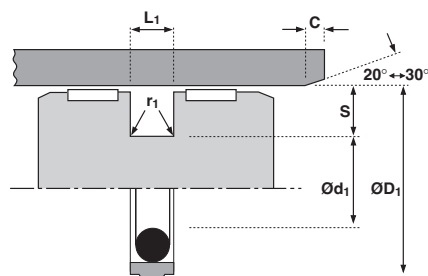
Face Material options:

Polyester elastomer - standard 55D

----- 0

Hydrolysis stabilised polyester elastomer Dark Red 72D

----- 3



Technical details

Metric

Inch

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-40°C +110°C
Maximum Pressure	350 bar- standard 55D material 500 bar- 72D material

3ft/sec
40°C+230°F
5000 p.s.i
7500 p.s.i

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Polyester elastomer - standard (red 55D) material 9270061

Pressure bar	100	160	250	350
Maximum Gap (S>7) mm	1.0	0.8	0.6	0.4
Maximum Gap (S<7) mm	0.8	0.6	0.5	0.3
Pressure p.s.i	1500	2400	3750	5000

Hydrolysis stabilised polyester elastomer (dark red 72D) material 9270051

Pressure bar	160	250	400	500
Maximum Gap (S>7) mm	1.0	0.8	0.6	0.4
Maximum Gap (S<7) mm	0.8	0.6	0.4	0.2
Pressure p.s.i	2400	3750	6000	7500

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

Chamfers & Radii

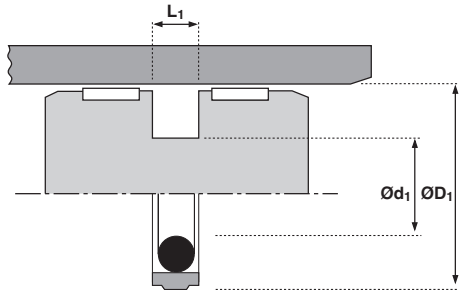
Groove Section ≤ S mm	3.75	5.50	7.75	10.50
Min Chamfer C mm	2.00	2.50	5.00	5.00
Max Fillet Rad r ₁ mm	0.40	0.80	1.20	1.60
Groove Section ≤ S in	0.150	0.220	0.310	0.410
Min Chamfer C in	0.080	0.100	0.200	0.200
Max Fillet Rad r ₁ in	0.016	0.032	0.047	0.063

Tolerances

Ød ₁	Ød ₁	L ₁ mm	L ₁ in
H9	h9	+0.2 -0	+0.008-0

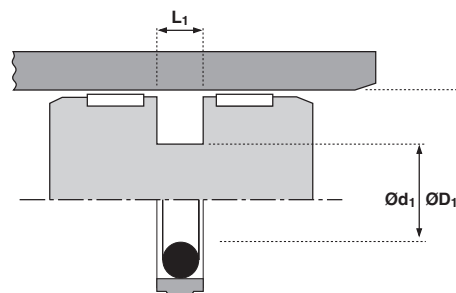


piston seals



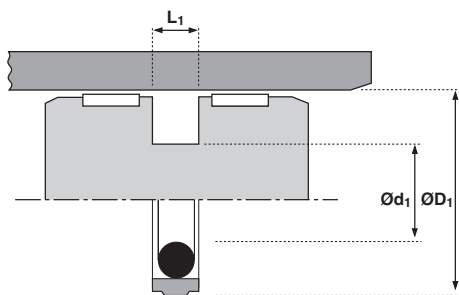
$\varnothing D_1$	TOL H9	$\varnothing d_1$	TOL h9	L_1 +0.2 -0	PART No.
15	+0.04 +0.00	7.5	+0.000 -0.036	3.2	444641_
16	+0.04 +0.00	8.5	+0.000 -0.036	3.2	440061_‡
20	+0.05 +0.00	12.5	+0.000 -0.043	3.2	436231_‡
25	+0.05 +0.00	17.5	+0.000 -0.052	3.2	433961_‡
28	+0.05 +0.00	20.5	+0.000 -0.052	3.2	476591_
30	+0.05 +0.00	22.5	+0.000 -0.052	3.2	433971_
32	+0.06 +0.00	24.5	+0.000 -0.052	3.2	433981_‡
35	+0.06 +0.00	27.5	+0.000 -0.052	3.2	435241_
36	+0.06 +0.00	28.5	+0.000 -0.052	3.2	4787510
40	+0.06 +0.00	29.0	+0.000 -0.052	4.2	433921_‡
40	+0.06 +0.00	32.5	+0.000 -0.062	3.2	474001_‡
42	+0.06 +0.00	31.0	+0.000 -0.062	4.2	4787610
45	+0.06 +0.00	34.0	+0.000 -0.062	4.2	434231_
50	+0.06 +0.00	34.5	+0.000 -0.062	6.3	442741_‡
50	+0.06 +0.00	39.0	+0.000 -0.062	4.2	432711_‡
55	+0.07 +0.00	39.5	+0.000 -0.062	6.3	435561_
55	+0.07 +0.00	44.0	+0.000 -0.062	4.2	446551_
60	+0.07 +0.00	44.5	+0.000 -0.062	6.3	439071_
60	+0.07 +0.00	49.0	+0.000 -0.062	4.2	432701_
63	+0.07 +0.00	47.5	+0.000 -0.062	6.3	443111_‡
63	+0.07 +0.00	50.0	+0.000 -0.062	6.3	447231_
63	+0.07 +0.00	52.0	+0.000 -0.074	4.2	432691_‡
65	+0.07 +0.00	49.5	+0.000 -0.062	6.3	436201_

$\varnothing D_1$	TOL H9	$\varnothing d_1$	TOL h9	L_1 +0.2 -0	PART No.
65	+0.07 +0.00	52.0	+0.000 -0.074	6.3	438491_
65	+0.07 +0.00	54.0	+0.000 -0.074	4.2	435301_
70	+0.07 +0.00	54.5	+0.000 -0.074	6.3	476341_
70	+0.07 +0.00	57.0	+0.000 -0.074	6.3	439081_
70	+0.07 +0.00	59.0	+0.000 -0.074	4.2	432681_
75	+0.07 +0.00	59.5	+0.000 -0.074	6.3	470491_
75	+0.07 +0.00	64.0	+0.000 -0.074	4.2	433991_
80	+0.07 +0.00	64.5	+0.000 -0.074	6.3	427091_‡
80	+0.07 +0.00	69.0	+0.000 -0.074	4.2	476851_‡
85	+0.09 +0.00	69.5	+0.000 -0.074	6.3	456401_
90	+0.09 +0.00	74.5	+0.000 -0.074	6.3	437271_
95	+0.09 +0.00	84.0	+0.000 -0.074	4.2	483161_
95	+0.09 +0.00	79.5	+0.000 -0.074	6.3	456951_
100	+0.09 +0.00	84.5	+0.000 -0.087	6.3	433931_‡
105	+0.09 +0.00	89.5	+0.000 -0.087	6.3	437251_
110	+0.09 +0.00	94.5	+0.000 -0.087	6.3	441931_
115	+0.09 +0.00	94.0	+0.000 -0.087	8.1	478851_
115	+0.09 +0.00	99.5	+0.000 -0.087	6.3	435581_
120	+0.09 +0.00	99.0	+0.000 -0.087	8.1	453501_
120	+0.09 +0.00	104.5	+0.000 -0.087	6.3	446541_
125	+0.10 +0.00	104.0	+0.000 -0.087	8.1	437651_‡
125	+0.10 +0.00	109.5	+0.000 -0.087	6.3	434001_‡
130	+0.10 +0.00	109.0	+0.000 -0.087	8.1	440241_



ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
130	+0.10 +0.00	114.5	+0.000 -0.087	6.3	434221_
135	+0.10 +0.00	114.0	+0.000 -0.087	8.1	453511_
140	+0.10 +0.00	119.0	+0.000 -0.087	8.1	434011_
140	+0.10 +0.00	124.5	+0.000 -0.100	6.3	449941_
150	+0.10 +0.00	129.0	+0.000 -0.100	8.1	439691_
160	+0.10 +0.00	139.0	+0.000 -0.100	8.1	434021_‡
165	+0.10 +0.00	144.0	+0.000 -0.100	8.1	445221_
170	+0.10 +0.00	149.0	+0.000 -0.100	8.1	434031_
180	+0.10 +0.00	159.0	+0.000 -0.100	8.1	434041_

ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
190	+0.12 +0.00	169.0	+0.000 -0.100	8.1	434241_
200	+0.12 +0.00	179.0	+0.000 -0.100	8.1	434051_‡
210	+0.12 +0.00	189.0	+0.000 -0.115	8.1	435151_
220	+0.12 +0.00	199.0	+0.000 -0.115	8.1	4735710
225	+0.12 +0.00	204.0	+0.000 -0.115	8.1	451281_
230	+0.12 +0.00	209.0	+0.000 -0.115	8.1	476401_
240	+0.12 +0.00	219.0	+0.000 -0.115	8.1	455361_
250	+0.12 +0.00	229.0	+0.000 -0.115	8.1	439371_‡
300	+0.13 +0.00	279.0	+0.000 -0.130	8.1	457281_



$\varnothing D_1$	TOL H9	$\varnothing d_1$	TOL h9	L_1 +0.008 -0	PART No.
1.250	+0.003 +0.000	0.974	+0.000 -0.002	0.126	433981_
1.375	+0.003 +0.000	1.079	+0.000 -0.002	0.126	435241_
1.500	+0.003 +0.000	1.067	+0.000 -0.002	0.165	443231_
1.500	+0.003 +0.000	1.204	+0.000 -0.003	0.125	442871_
2.000	+0.003 +0.000	1.567	+0.000 -0.003	0.165	432711_
2.500	+0.003 +0.000	2.067	+0.000 -0.003	0.165	432691_

$\varnothing D_1$	TOL H9	$\varnothing d_1$	TOL h9	L_1 +0.008 -0	PART No.
2.750	+0.003 +0.000	2.318	+0.000 -0.003	0.165	432681_
2.750	+0.003 +0.000	2.140	+0.000 -0.003	0.248	476341_
3.250	+0.003 +0.000	2.640	+0.000 -0.003	0.248	442881_
4.000	+0.003 +0.000	3.390	+0.000 -0.004	0.248	442891_
5.000	+0.004 +0.000	4.390	+0.000 -0.004	0.248	442901_

Design

The Hallite 755 seal is a compact, low friction seal for light to medium duty hydraulic cylinders. Designed originally to the North American housing standards, the 755 is an inch version of Hallite's 754. It comprises a very tough elastomeric face (see material options) which is pre-loaded by a square section ring (as North American convention). Please note part numbers marked * are supplied with an O ring energiser.

It is recommended that an adequate bearing is mounted on both sides of the seal. See Hallite 506 bearing strip.

For full details and availability please contact your local Hallite sales office.

Features

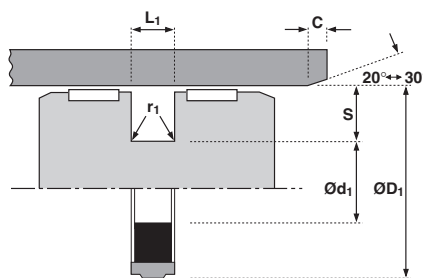
- Low breakout and operating friction levels
- Rapid recovery of face after assembly
- More tolerant to contamination
- Excellent position holding characteristics under load
- Compatible with most hydraulic fluids
- Excellent wear resistance
- Operates on wide range of surface finishes
- Ideal for use with Hallite 506 or 87 bearing

Material

Face Material options:

- Polyester elastomer standard Red 55D ----- 0
- Hydrolysis stabilised polyester elastomer Grey 55D ----- 1
- Lubricated polyester elastomer ----- 2
- Hydrolysis stabilised polyester elastomer Dark Red 72D ----- 3
- Hythane® 181 (limited sizes available) ----- 4

Technical details shown are for standard Red 55D polyester elastomer



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-40°C +110°C
Maximum Pressure	350 bar

Inch

3.0 ft/sec
-40°F +230°F
5000 p.s.i.

Maximum extrusion gap

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

	100	160	250	350
Pressure bar	1500	2400	3750	5000
Pressure p.s.i.	0.030	0.025	0.020	0.010
Maximum Gap (S>0.280) in	0.025	0.020	0.015	0.005
Maximum Gap (S<0.280) in				

Surface roughness

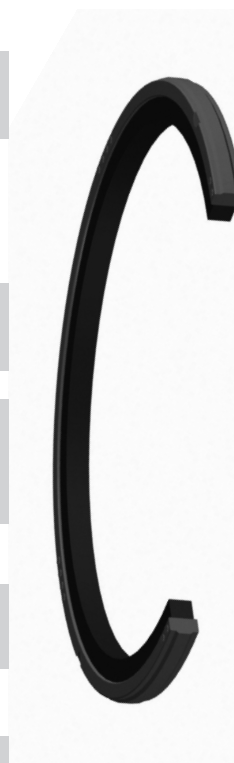
	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD1	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød1	1.6 max	10 max	63 max	70 max
Static Housing Faces L1	3.2 max	16 max	125 max	140 max

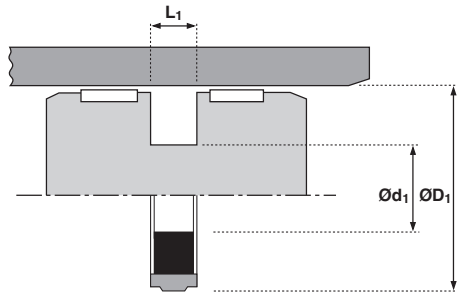
Chamfers & Radii

Groove Section ≤ S in	0.154	0.269	0.373	0.431
Min Chamfer C in	0.100	0.150	0.200	0.200
Max Fillet Rad r1 in	0.016	0.016	0.016	0.016

Tolerances

	ØD1	Ød1
in	H9	js10
ØD1* ≥ in	1.000	3.000
L1	± 0.002	±0.003
NB	Part numbers 449002_ and 455352_ L1 tol ±0.003	





ØD ₁	TOL H9	Ød ₁	TOL js10	L ₁	TOL	PART No.
1.000	+0.002 +0.000	0.691	+0.001 -0.001	0.129	+0.002 -0.002	891000_
1.250	+0.002 +0.000	0.941	+0.002 -0.002	0.129	+0.002 -0.002	891010_
1.500	+0.002 +0.000	1.191	+0.002 -0.002	0.129	+0.002 -0.002	891020_
1.750	+0.002 +0.000	1.441	+0.002 -0.002	0.129	+0.002 -0.002	891030_
2.000	+0.003 +0.000	1.462	+0.002 -0.002	0.283	+0.003 -0.003	455352_
2.000	+0.003 +0.000	1.606	+0.002 -0.002	0.129	+0.002 -0.002	891310_*
2.000	+0.003 +0.000	1.691	+0.002 -0.002	0.129	+0.002 -0.002	891040_
2.250	+0.003 +0.000	1.941	+0.002 -0.002	0.129	+0.002 -0.002	891050_
2.500	+0.003 +0.000	1.962	+0.002 -0.002	0.283	+0.003 -0.003	449002_
2.500	+0.003 +0.000	2.106	+0.002 -0.002	0.129	+0.002 -0.002	443931_*
2.500	+0.003 +0.000	2.191	+0.002 -0.002	0.129	+0.002 -0.002	891060_
2.750	+0.003 +0.000	2.441	+0.002 -0.002	0.129	+0.002 -0.002	891070_
3.000	+0.003 +0.000	2.462	+0.002 -0.002	0.283	+0.003 -0.003	891080_
3.250	+0.003 +0.000	2.712	+0.002 -0.002	0.283	+0.003 -0.003	891090_
3.500	+0.003 +0.000	2.962	+0.002 -0.002	0.283	+0.003 -0.003	891100_
3.750	+0.003 +0.000	3.212	+0.002 -0.002	0.283	+0.003 -0.003	891110_
4.000	+0.003 +0.000	3.462	+0.002 -0.002	0.283	+0.003 -0.003	891120_
4.250	+0.003 +0.000	3.712	+0.002 -0.002	0.283	+0.003 -0.003	891130_
4.500	+0.003 +0.000	3.962	+0.002 -0.002	0.283	+0.003 -0.003	891140_

ØD ₁	TOL H9	Ød ₁	TOL js10	L ₁	TOL	PART No.
4.750	+0.004 +0.000	4.212	+0.002 -0.002	0.283	+0.003 -0.003	891150_
5.000	+0.004 +0.000	4.462	+0.002 -0.002	0.283	+0.003 -0.003	891160_
5.250	+0.004 +0.000	4.504	+0.002 -0.002	0.378	+0.004 -0.004	891170_
5.500	+0.004 +0.000	4.754	+0.003 -0.003	0.378	+0.004 -0.004	891180_
5.750	+0.004 +0.000	5.004	+0.003 -0.003	0.378	+0.004 -0.004	891320_
6.000	+0.004 +0.000	5.254	+0.003 -0.003	0.378	+0.004 -0.004	891190_
6.250	+0.004 +0.000	5.504	+0.003 -0.003	0.378	+0.004 -0.004	891200_
6.500	+0.004 +0.000	5.754	+0.003 -0.003	0.378	+0.004 -0.004	891210_
7.000	+0.004 +0.000	6.250	+0.003 -0.003	0.312	+0.004 -0.004	439481_*
7.000	+0.004 +0.000	6.254	+0.003 -0.003	0.378	+0.004 -0.004	891220_
7.250	+0.005 +0.000	6.504	+0.003 -0.003	0.378	+0.004 -0.004	891230_
7.500	+0.005 +0.000	6.754	+0.003 -0.003	0.378	+0.004 -0.004	891240_
8.000	+0.005 +0.000	7.254	+0.003 -0.003	0.378	+0.004 -0.004	891250_
8.437	+0.005 +0.000	7.691	+0.003 -0.003	0.378	+0.004 -0.004	891300_
8.500	+0.005 +0.000	7.754	+0.003 -0.003	0.378	+0.004 -0.004	891260_
9.000	+0.005 +0.000	8.137	+0.003 -0.003	0.378	+0.004 -0.004	891270_
9.500	+0.005 +0.000	8.637	+0.003 -0.003	0.378	+0.004 -0.004	891280_
10.000	+0.005 +0.000	9.137	+0.003 -0.003	0.378	+0.004 -0.004	891290_

Design

The Hallite 764 is a compact seal for light to medium duty hydraulic cylinders. It is a double acting piston seal with single acting capabilities. This makes it an excellent choice for double acting applications where minimal dynamic leakage is required.

The Hallite 764 comprises of a tough elastomeric face that is pre-loaded by an O ring. The housing width allows a narrow width piston to be used, but it is recommended that an adequate bearing is mounted on one or both sides of the seal.

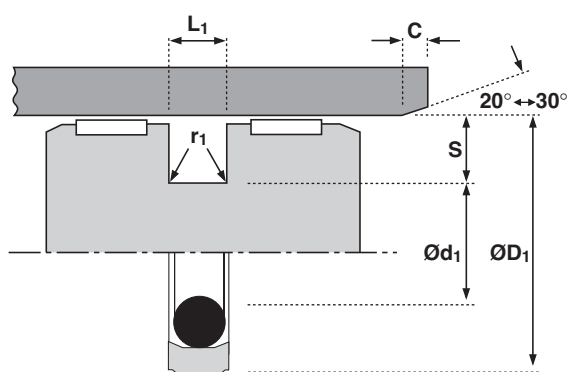
Housing dimensions for use with Hallite 87 and 506 bearing strip are given in the installation details. For further details on bearing strip grooves, please refer to the appropriate data sheets.

NB: Part numbers suffixed by "±" indicate housing sizes to meet ISO 7425-1.

For full details and availability please contact your local Hallite Sales office.

Features

- Double acting seal with single acting capabilities
- Excellent wear resistance
- High extrusion resistance, ideal for use with Hallite 506 or 87
- More tolerant to contamination
- Rapid recovery of face after assembly
- Advanced face geometry provides enhanced dynamic and static sealing
- ISO 7425 housing



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-30°C + 110°C
Maximum Pressure	250 bar

Inch

3.0 ft/sec
-22°F + 230°F
3600 p.s.i.

Maximum extrusion gap

Pressure bar	100	160	250
Maximum Gap mm	0.6	0.5	0.4

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

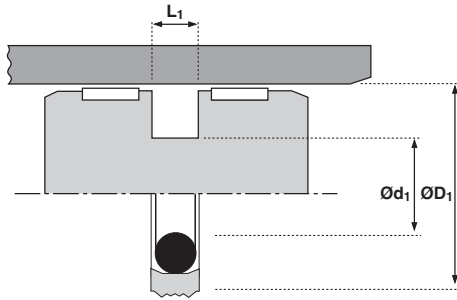
Chamfers & Radii

Groove Section ≤ S mm	3.75	5.50	7.75	10.50
Min Chamfer C mm	2.0	2.5	5.0	5.0
Max Fillet Rad r ₁ mm	0.4	0.8	1.2	1.6
Groove Section ≤ S in	0.150	0.220	0.310	0.410
Min Chamfer C in	0.080	0.100	0.200	0.200
Max Fillet Rad r ₁ in	0.016	0.032	0.047	0.063

Tolerances

ØD ₁	Ød ₁	L ₁ mm	L ₁ in
H9	h9	+0.2 -0	+0.008-0



**metric**

ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
22	+0.05 +0.00	14.5	-0.000 -0.043	3.20	4763610
32	+0.06 +0.00	24.5	-0.000 -0.052	3.20	4741010‡
32	+0.06 +0.00	21.0	-0.000 -0.052	4.20	4751210‡
35	+0.06 +0.00	24.0	-0.000 -0.052	4.20	4764110
40	+0.06 +0.00	29.0	-0.000 -0.052	4.20	4741110‡
45	+0.06 +0.00	34.0	-0.000 -0.062	4.20	4744510
50	+0.06 +0.00	39.0	-0.000 -0.062	4.20	4741210‡
50	+0.06 +0.00	34.5	-0.000 -0.062	6.30	4775810‡
55	+0.06 +0.00	44.0	-0.000 -0.062	4.20	4845310
60	+0.07 +0.00	49.0	-0.000 -0.062	4.20	4741310
60	+0.07 +0.00	44.5	-0.000 -0.062	6.30	4739910
63	+0.07 +0.00	47.5	-0.000 -0.062	6.30	4766810‡
63	+0.07 +0.00	52.0	-0.000 -0.074	4.20	4740810

inch

ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.008 -0	PART No.
1.250	+0.002 +0.000	0.817	-0.000 -0.002	0.165	4751210
1.375	+0.002 +0.000	0.942	-0.000 -0.002	0.165	4764110
1.500	+0.002 +0.000	1.067	-0.000 -0.002	0.165	4764210
2.000	+0.003 +0.000	1.390	-0.000 -0.003	0.248	4764810
2.125	+0.003 +0.000	1.515	-0.000 -0.003	0.248	4765410

ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
65	+0.07 +0.00	54.0	-0.000 -0.074	4.20	4845410
70	+0.07 +0.00	59.0	-0.000 -0.074	4.20	4741410
70	+0.07 +0.00	54.5	-0.000 -0.074	6.30	4759710
75	+0.07 +0.00	64.0	-0.000 -0.074	4.20	4845510
80	+0.07 +0.00	64.5	-0.000 -0.074	6.30	4722210‡
80	+0.07 +0.00	69.0	-0.000 -0.074	4.20	4845610
90	+0.09 +0.00	74.5	-0.000 -0.074	6.30	4741510
100	+0.09 +0.00	84.5	-0.000 -0.087	6.30	4741610‡
115	+0.09 +0.00	99.5	-0.000 -0.087	6.30	4761610
115	+0.09 +0.00	94.0	-0.000 -0.087	8.10	4829910
120	+0.09 +0.00	99.0	-0.000 -0.087	8.10	4812010
125	+0.09 +0.00	109.5	-0.000 -0.087	6.30	4771710‡

ØD ₁	TOL H9	Ød ₁	TOL h9	L ₁ +0.2 -0	PART No.
2.500	+0.003 +0.000	1.890	-0.000 -0.003	0.248	4766810
2.750	+0.003	2.318 +0.000	-0.000 -0.003	0.165	4741410
2.750	+0.003	2.140 +0.000	-0.000 -0.003	0.248	4759710
3.000	+0.003	2.390 +0.000	-0.000 -0.003	0.248	4767110

Design

The Hallite 770 seal is a double acting compact, low friction seal for light to medium duty hydraulic cylinders. It has been designed to fit standard inch O ring housings. It comprises a tough self lubricated elastomeric face which is pre-loaded by a rectangular cross-section expander. It can be used on SG iron pistons or on a piston where there is an adequate remote bearing (see Hallite 506 and 533 bearings).

The standard material is only suitable for hydraulic mineral oil applications. Other material options are available for water based (HFA and HFB) fluids and synthetic esters (HEES). In certain sizes a Hythane face material option is available, particularly for intermittent single acting applications.

For full details and availability please contact your local Hallite Sales office.

Features

- Low breakout and operating friction level
- Excellent wear resistance
- Ideal for use with Hallite 506 or 533 GFN wear rings
- More tolerant to contamination
- Rapid recovery after assembly
- Operates on a wide range of surface finishes

Material

Standard material

Lubricated polyester elastomer (Cream 55D)

Material options:

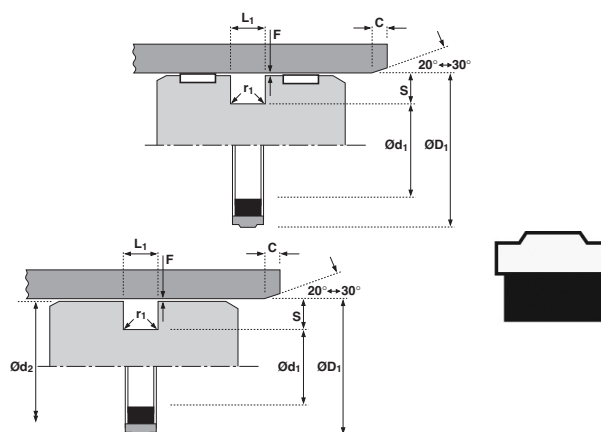
Polyester elastomer (Red 55D)

Hydrolysis stabilised polyester elastomer (Grey 55D)

Hydrolysis stabilised polyester elastomer (Red 72D)

Hythane® 181
limited sizes available

Technical details shown are for standard Cream 55D lubricated polyester elastomer



Technical details

Operating conditions

Maximum Speed
Temperature Range
Maximum Pressure

Metric

1.0 m/sec
-40°C +110°C
350 bar

Inch

3.0 ft/sec
-40°F +230°F
5000 p.s.i.

Maximum extrusion gap

Pressure bar
Pressure p.s.i.
Maximum Gap in

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

100	160	250	350
1500	2400	3750	5000
0.030	0.025	0.020	0.010

Surface roughness

Dynamic Sealing Face ØD₁
Static Sealing Face Ød₁
Static Housing Faces L₁

µmRa	µmRt	µinCLA	µinRMS
0.1 < > 0.4	4 max	4 < > 16	5 < > 18
1.6 max	10 max	63 max	70 max
3.2 max	16 max	125 max	140 max

Chamfers & Radii

Groove Section ≤ S mm
Min Chamfer C in
Max Fillet Rad r₁ in

0.125	0.187	0.250
0.100	0.150	0.200
0.016	0.016	0.016

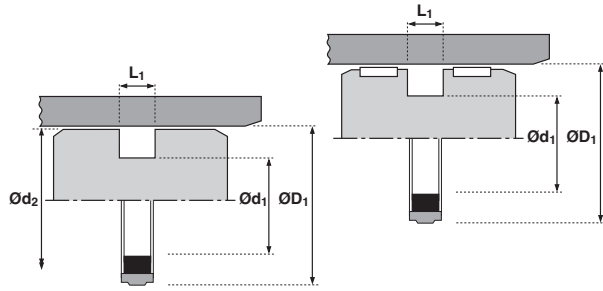
Tolerances

in

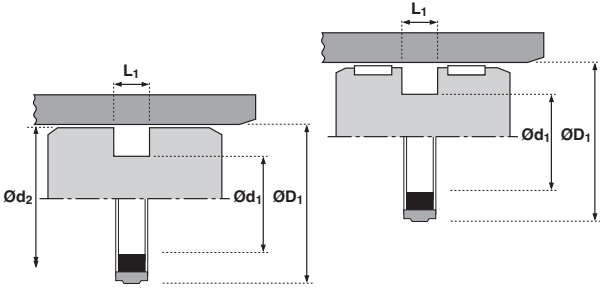
ØD ₁	Ød ₁	Ød ₂	L ₁
+0.002 -0	+0 -0.002	+0 -0.001	+0.005 -0



piston seals



ØD ₁	TOL	Ød ₁	TOL	Ød ₂	TOL	L ₁	TOL	PART No.
0.750	+0.002 -0.000	0.508	+0.000 -0.002	0.747	+0.000 -0.001	0.187	+0.005 -0.000	481771_
0.875	+0.002 -0.000	0.633	+0.000 -0.002	0.872	+0.000 -0.001	0.187	+0.005 -0.000	481781_
1.000	+0.002 -0.000	0.758	+0.000 -0.002	0.997	+0.000 -0.001	0.187	+0.005 -0.000	481791_
1.125	+0.002 -0.000	0.883	+0.000 -0.002	1.122	+0.000 -0.001	0.187	+0.005 -0.000	481801_
1.250	+0.002 -0.000	1.008	+0.000 -0.002	1.247	+0.000 -0.001	0.187	+0.005 -0.000	455441_
1.375	+0.002 -0.000	1.133	+0.000 -0.002	1.372	+0.000 -0.001	0.187	+0.005 -0.000	471691_
1.500	+0.002 -0.000	1.258	+0.000 -0.002	1.497	+0.000 -0.001	0.187	+0.005 -0.000	471701_
1.625	+0.002 -0.000	1.383	+0.000 -0.002	1.622	+0.000 -0.001	0.187	+0.005 -0.000	471711_
1.750	+0.002 -0.000	1.508	+0.000 -0.002	1.747	+0.000 -0.001	0.187	+0.005 -0.000	471721_
2.000	+0.002 -0.000	1.630	+0.000 -0.002	1.997	+0.000 -0.001	0.281	+0.005 -0.000	455351_
2.125	+0.002 -0.000	1.755	+0.000 -0.002	2.122	+0.000 -0.001	0.281	+0.005 -0.000	471731_
2.250	+0.002 -0.000	1.880	+0.000 -0.002	2.247	+0.000 -0.001	0.281	+0.005 -0.000	471741_
2.500	+0.002 -0.000	2.130	+0.000 -0.002	2.497	+0.000 -0.001	0.281	+0.005 -0.000	449001_
2.750	+0.002 -0.000	2.380	+0.000 -0.002	2.747	+0.000 -0.001	0.281	+0.005 -0.000	481751_
2.875	+0.002 -0.000	2.505	+0.000 -0.002	2.872	+0.000 -0.001	0.281	+0.005 -0.000	481761_
3.000	+0.002 -0.000	2.630	+0.000 -0.002	2.997	+0.000 -0.001	0.281	+0.005 -0.000	434941_
3.250	+0.002 -0.000	2.880	+0.000 -0.002	3.247	+0.000 -0.001	0.281	+0.005 -0.000	434951_
3.500	+0.002 -0.000	3.130	+0.000 -0.002	3.497	+0.000 -0.001	0.281	+0.005 -0.000	434961_
3.750	+0.002 -0.000	3.380	+0.000 -0.002	3.747	+0.000 -0.001	0.281	+0.005 -0.000	434971_
4.000	+0.002 -0.000	3.630	+0.000 -0.002	3.997	+0.000 -0.001	0.281	+0.005 -0.000	434981_
4.250	+0.002 -0.000	3.880	+0.000 -0.002	4.247	+0.000 -0.001	0.281	+0.005 -0.000	434991_
4.500	+0.002 -0.000	4.130	+0.000 -0.002	4.497	+0.000 -0.001	0.281	+0.005 -0.000	435001_
4.750	+0.002 -0.000	4.380	+0.000 -0.002	4.747	+0.000 -0.001	0.281	+0.005 -0.000	435011_



ØD ₁	TOL	Ød ₁	TOL	Ød ₂	TOL	L ₁	TOL	PART No.
5.000	+0.004 -0.000	4.630	+0.000 -0.002	4.997	+0.000 -0.001	0.281	+0.005 -0.000	435021_
5.250	+0.004 -0.000	4.778	+0.000 -0.002	5.247	+0.000 -0.001	0.375	+0.005 -0.000	435032_
5.500	+0.004 -0.000	5.028	+0.000 -0.002	5.497	+0.000 -0.001	0.375	+0.005 -0.000	435042_
6.000	+0.004 -0.000	5.528	+0.000 -0.002	5.997	+0.000 -0.001	0.375	+0.005 -0.000	435052_
6.250	+0.004 -0.000	5.778	+0.000 -0.002	6.247	+0.000 -0.001	0.375	+0.005 -0.000	435062_
6.500	+0.004 -0.000	6.028	+0.000 -0.002	6.497	+0.000 -0.001	0.375	+0.005 -0.000	435072_
7.000	+0.004 -0.000	6.528	+0.000 -0.002	6.997	+0.000 -0.001	0.375	+0.005 -0.000	435082_
8.000	+0.004 -0.000	7.528	+0.000 -0.002	7.997	+0.000 -0.001	0.375	+0.005 -0.000	435112_

Design

The Hallite 775 is a compact seal for light to medium duty hydraulic cylinders. It is a double acting piston seal with single acting capabilities. This makes it an excellent choice for double acting applications where minimal dynamic leakage is required.

The Hallite 775 is manufactured for two housing standards; to fit standard O-ring grooves and for O-ring and two back-up grooves. It comprises a tough elastomeric face that is pre-loaded by a rectangular cross section expander.

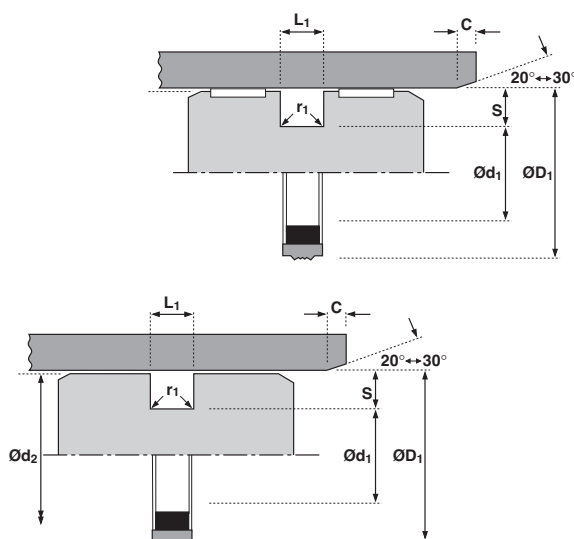
The Hallite 775 seal can be used on SG iron pistons or on pistons with adequate remote bearing (see Hallite 506 or 533 bearings).

The standard material is suitable for hydraulic mineral oil applications.

For full details and availability please contact your local Hallite Sales office.

Features

- Double acting seal with single acting capabilities
- Excellent wear resistance
- High extrusion resistance ideal for use with Hallite 506 or 533
- More tolerant to contamination
- Rapid recovery after assembly
- Advanced face geometry provides enhanced dynamic and static sealing



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-30°C +110°C
Maximum Pressure	350 bar

Inch

3.0 ft/sec
-22°F +230°F
5000 p.s.i.

Maximum extrusion gap

Pressure bar	100	160	250	350
Pressure p.s.i.	1500	2400	3750	5000
Maximum Gap in	0.025	0.020	0.016	0.008

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max	4 < > 16	5 < > 18
Static Sealing Face Ød ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

Chamfers & Radii

Groove Section ≤ S in	0.125	0.187	0.250
Min Chamfer C in	0.100	0.150	0.200
Max Fillet Rad r ₁ in	0.016	0.016	0.016

Tolerances

	ØD ₁	Ød ₁	Ød ₂	L ₁
in ØD ₁ ≤ 2.500	+0.002 -0	+0 -0.002	+0 -0.001	+0.005 -0
ØD ₁ > 2.500	+0.004 -0	+0 -0.004	+0 -0.001	+0.005 -0



Housings suit standard O-ring

ØD_1	TOL	Ød_1	TOL	Ød_2	TOL	L_1	TOL	O RING	PART NO.
1.375	+0.003 -0.000	1.133	+0.000 -0.003	1.372	+0.000 -0.001	0.187	+0.005 -0.000	216	4763516
1.500	+0.003 -0.000	1.258	+0.000 -0.003	1.497	+0.000 -0.001	0.187	+0.005 -0.000	218	4731816
1.750	+0.003 -0.000	1.508	+0.000 -0.003	1.747	+0.000 -0.001	0.187	+0.005 -0.000	222	4750716
2.000	+0.003 -0.000	1.630	+0.000 -0.003	1.997	+0.000 -0.001	0.281	+0.005 -0.000	326	4731016
2.500	+0.003 -0.000	2.130	+0.000 -0.003	2.497	+0.000 -0.001	0.281	+0.005 -0.000	330	4731116
3.000	+0.004 -0.000	2.630	+0.000 -0.004	2.997	+0.000 -0.001	0.281	+0.005 -0.000	334	4731216
3.500	+0.004 -0.000	3.130	+0.000 -0.004	3.497	+0.000 -0.001	0.281	+0.005 -0.000	338	4731316
4.000	+0.004 -0.000	3.630	+0.000 -0.004	3.997	+0.000 -0.001	0.281	+0.005 -0.000	342	4731416

Housings suit standard O-ring with two back-up rings

ØD_1	TOL	Ød_1	TOL	Ød_2	TOL	L_1	TOL	O RING	PART NO.
1.500	+0.003 -0.000	1.258	+0.000 -0.003	1.497	+0.000 -0.001	0.275	+0.005 -0.000	218	4730516
2.000	+0.003 -0.000	1.630	+0.000 -0.003	1.997	+0.000 -0.001	0.410	+0.005 -0.000	326	4733716
2.500	+0.003 -0.000	2.130	+0.000 -0.003	2.497	+0.000 -0.001	0.410	+0.005 -0.000	330	4726916
3.000	+0.004 -0.000	2.630	+0.000 -0.004	2.997	+0.000 -0.001	0.410	+0.005 -0.000	334	4733816
3.500	+0.004 -0.000	3.130	+0.000 -0.004	3.497	+0.000 -0.001	0.410	+0.005 -0.000	338	4733916
4.000	+0.004 -0.000	3.630	+0.000 -0.004	3.997	+0.000 -0.001	0.410	+0.005 -0.000	342	4734016
5.000	+0.004 -0.000	4.528	+0.000 -0.004	4.997	+0.000 -0.001	0.538	+0.005 -0.000	425	4730616
6.000	+0.004 -0.000	5.528	+0.000 -0.004	5.997	+0.000 -0.001	0.538	+0.005 -0.000	433	4734116

Design

A robust assembly designed specifically for one piece pistons, the Hallite 780 double acting seal uses a rubber sealing element that has proved itself in service to be extremely wear resistant and capable of working most effectively in a wide range of medium duty applications. The seal is also suitable for two piece pistons.

The assembly comprises a rubber sealing element, two split support rings and two split L-shaped bearings, one of each located either side of the seal.

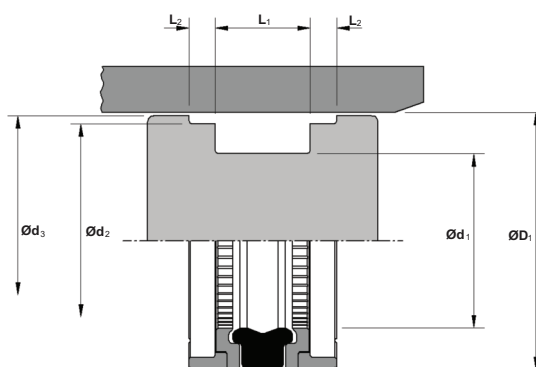
The nitrile rubber sealing element is designed with multi-lips for efficient dynamic sealing with minimal low pressure friction and, when pressurised, be protected from extrusion damage by the extending lips of the support ring. The support ring is manufactured from a tough, flexible polymer and scarf cut for assembly.

Both the L-shaped bearings and support rings are grooved to ensure that the fluid pressure properly energises the sealing element and to prevent the possibility of any pressure trapping within the seal assembly.

NB: Part numbers suffixed by “±” indicate housing sizes to meet ISO 6547.

Features

- Well proven design
- Long life
- Extremely wear resistant



Technical details

Operating conditions

Maximum Speed	0.5 m/sec
Temperature Range	-30°C +100°C
Maximum Pressure	400 bar

Inch

1.5 ft/sec
-22°F +212°F
6000 p.s.i.

Surface roughness

	µmRa	µmRt
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max
Static Sealing Face Ød ₁ Ød ₂	1.6 max	10 max
Static Housing Faces Ød ₃ L ₁ L ₂	3.2 max	16 max

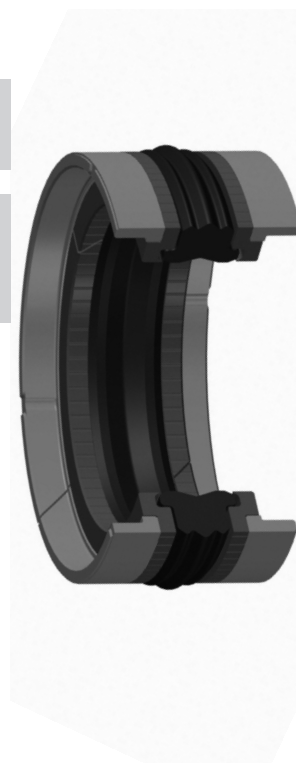
µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

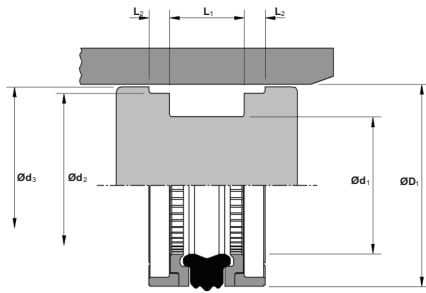
Chamfers & Radii

Groove Section ≤ S mm	5.0	7.5	8.0	10.0	12.5	15.0
Min Chamfer C mm	2.4	4.0	5.0	5.0	6.5	7.5
Max Fillet Rad r ₁ mm	0.4	0.4	0.4	0.4	0.8	0.8
Max Fillet Rad r ₂ mm	0.4	0.4	0.4	0.4	0.8	0.8

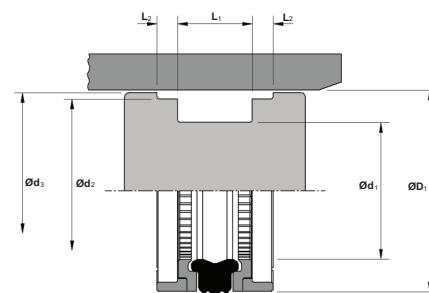
Tolerances

	ØD ₁	Ød ₁	Ød ₂	Ød ₃	L ₁	L ₂
mm	H9	h9	h9	h11	+0.2 -0	+0.1 -0

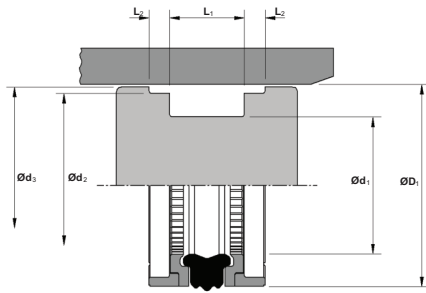




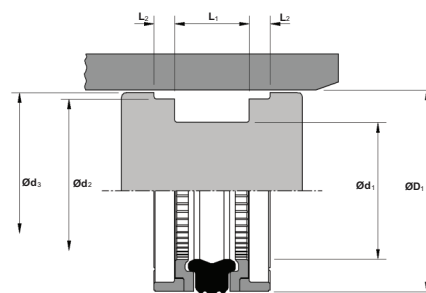
ØD ₁	TOL H9	Ød ₁	TOL h9	ØD ₂	TOL h9	ØD ₃	TOL h11	L ₁ +0.2 -0	L ₂ +0.1 -0	PART No.
20	+0.05 +0.00	11	+0.00 -0.04	17.00	+0.00 -0.04	19.0	+0.00 -0.13	13.5	2.10	5006710
25	+0.05 +0.00	15	+0.00 -0.04	21.00	+0.00 -0.05	24.0	+0.00 -0.13	12.0	4.00	5003710
25	+0.05 +0.00	16	+0.00 -0.04	22.00	+0.00 -0.05	24.0	+0.00 -0.13	13.5	2.10	5003810
30	+0.05 +0.00	17	+0.00 -0.04	27.00	+0.00 -0.05	29.0	+0.00 -0.13	15.4	6.35	5006410
30	+0.05 +0.00	21	+0.00 -0.05	27.00	+0.00 -0.05	29.0	+0.00 -0.13	13.5	2.10	5003910
32	+0.06 +0.00	22	+0.00 -0.05	28.00	+0.00 -0.07	31.0	+0.00 -0.16	15.5	2.60	5001420
32	+0.06 +0.00	22	+0.00 -0.05	28.50	+0.00 -0.05	30.5	+0.00 -0.16	16.4	6.35	5001410
35	+0.06 +0.00	25	+0.00 -0.05	31.00	+0.00 -0.06	34.0	+0.00 -0.16	15.5	2.60	5001520
35	+0.06 +0.00	25	+0.00 -0.05	31.40	+0.00 -0.06	33.5	+0.00 -0.16	16.4	6.35	5001510
40	+0.06 +0.00	24	+0.00 -0.05	35.40	+0.00 -0.06	38.5	+0.00 -0.16	18.4	6.35	5001310
40	+0.06 +0.00	26	+0.00 -0.05	36.00	+0.00 -0.06	39.0	+0.00 -0.16	15.5	2.60	5008010
40	+0.06 +0.00	30	+0.00 -0.05	37.00	+0.00 -0.06	39.0	+0.00 -0.16	12.5	4.00	5005810
40	+0.06 +0.00	30	+0.00 -0.05	35.40	+0.00 -0.06	38.5	+0.00 -0.16	16.4	6.35	5004010
40	+0.06 +0.00	32	+0.00 -0.05	36.00	+0.00 -0.06	39.4	+0.00 -0.16	15.5	3.20	5008110
45	+0.06 +0.00	29	+0.00 -0.05	40.40	+0.00 -0.06	43.5	+0.00 -0.16	18.4	6.35	5000710
45	+0.06 +0.00	31	+0.00 -0.06	41.00	+0.00 -0.06	44.0	+0.00 -0.16	15.5	2.60	5004110
45	+0.06 +0.00	35	+0.00 -0.06	40.40	+0.00 -0.06	43.5	+0.00 -0.16	16.4	6.35	5001610
50	+0.06 +0.00	34	+0.00 -0.06	45.40	+0.00 -0.06	48.5	+0.00 -0.16	18.4	6.35	5000810
50	+0.06 +0.00	34	+0.00 -0.06	46.00	+0.00 -0.06	49.0	+0.00 -0.16	20.5	3.10	5000820
50	+0.06 +0.00	38	+0.00 -0.06	46.00	+0.00 -0.06	49.4	+0.00 -0.16	20.5	4.20	5004810
50	+0.06 +0.00	40	+0.00 -0.06	47.00	+0.00 -0.06	49.0	+0.00 -0.16	12.5	4.00	5005910†
55	+0.07 +0.00	39	+0.00 -0.06	50.36	+0.00 -0.07	53.5	+0.00 -0.19	18.4	6.35	5000910
55	+0.07 +0.00	39	+0.00 -0.06	51.00	+0.00 -0.07	54.0	+0.00 -0.19	20.5	3.10	5000920



ØD ₁	TOL H9	Ød ₁	TOL h9	Ød ₂	TOL h9	Ød ₃	TOL h11	L ₁ +0.2 -0	L ₂ +0.1 -0	PART No.
60	+0.07 +0.00	44	+0.00 -0.06	55.40	+0.00 -0.07	58.5	+0.00 -0.19	18.4	6.35	5001010
60	+0.07 +0.00	44	+0.00 -0.06	56.00	+0.00 -0.07	59.0	+0.00 -0.19	20.5	3.10	5001020
60	+0.07 +0.00	48	+0.00 -0.06	56.00	+0.00 -0.07	59.4	+0.00 -0.19	20.5	4.20	5004910
63	+0.07 +0.00	47	+0.00 -0.06	58.40	+0.00 -0.07	61.5	+0.00 -0.19	18.4	6.35	5001110
63	+0.07 +0.00	47	+0.00 -0.06	58.40	+0.00 -0.07	61.5	+0.00 -0.19	19.4	6.35	5001120
63	+0.07 +0.00	47	+0.00 -0.06	59.00	+0.00 -0.07	62.0	+0.00 -0.19	20.5	3.10	5001130
63	+0.07 +0.00	51	+0.00 -0.07	59.00	+0.00 -0.07	62.4	+0.00 -0.19	20.5	4.20	5005010
63	+0.07 +0.00	53	+0.00 -0.07	60.00	+0.00 -0.07	62.0	+0.00 -0.19	12.5	4.00	5006010‡
65	+0.07 +0.00	49	+0.00 -0.06	61.00	+0.00 -0.07	64.0	+0.00 -0.19	20.5	3.10	5005510
65	+0.07 +0.00	50	+0.00 -0.06	60.40	+0.00 -0.07	63.5	+0.00 -0.19	18.4	6.35	5001210
65	+0.07 +0.00	53	+0.00 -0.07	61.00	+0.00 -0.07	64.4	+0.00 -0.19	20.5	4.20	5010710
70	+0.07 +0.00	50	+0.00 -0.06	64.20	+0.00 -0.07	68.3	+0.00 -0.19	22.4	6.35	5000210
70	+0.07 +0.00	54	+0.00 -0.07	66.00	+0.00 -0.07	69.0	+0.00 -0.19	20.5	3.10	5004210
70	+0.07 +0.00	58	+0.00 -0.07	66.00	+0.00 -0.07	69.4	+0.00 -0.19	20.5	4.20	5005110
75	+0.07 +0.00	55	+0.00 -0.07	69.20	+0.00 -0.07	73.3	+0.00 -0.19	22.4	6.35	5000310
75	+0.07 +0.00	59	+0.00 -0.07	71.00	+0.00 -0.07	74.0	+0.00 -0.19	20.5	3.10	5004310
75	+0.07 +0.00	63	+0.00 -0.07	71.00	+0.00 -0.07	74.4	+0.00 -0.19	20.5	4.20	5010810
80	+0.07 +0.00	60	+0.00 -0.07	74.15	+0.00 -0.07	78.3	+0.00 -0.19	22.4	6.35	5000110
80	+0.07 +0.00	60	+0.00 -0.07	75.00	+0.00 -0.07	78.0	+0.00 -0.19	25.0	6.30	5000120
80	+0.07 +0.00	62	+0.00 -0.07	76.00	+0.00 -0.07	79.0	+0.00 -0.19	22.5	3.60	5004410
80	+0.07 +0.00	65	+0.00 -0.07	76.00	+0.00 -0.07	78.5	+0.00 -0.19	20.0	5.00	5008710‡
80	+0.07 +0.00	66	+0.00 -0.07	76.00	+0.00 -0.07	79.4	+0.00 -0.19	22.5	5.20	5005210
85	+0.09 +0.00	65	+0.00 -0.07	79.15	+0.00 -0.07	83.3	+0.00 -0.22	22.4	6.35	5000410



ØD ₁	TOL H9	Ød ₁	TOL h9	Ød ₂	TOL h9	Ød ₃	TOL h11	L ₁ +0.2 -0	L ₂ +0.1 -0	PART No.
90	+0.09 +0.00	70	+0.00 -0.07	84.15	+0.00 -0.09	88.3	+0.00 -0.22	22.4	6.35	5000510
90	+0.09 +0.00	72	+0.00 -0.07	86.00	+0.00 -0.09	89.0	+0.00 -0.22	22.5	3.60	5007910
90	+0.09 +0.00	76	+0.00 -0.07	86.00	+0.00 -0.09	89.4	+0.00 -0.22	22.5	5.20	5005310
95	+0.09 +0.00	75	+0.00 -0.07	89.15	+0.00 -0.09	93.3	+0.00 -0.22	22.4	6.35	5000610
100	+0.09 +0.00	75	+0.00 -0.07	93.15	+0.00 -0.09	98.0	+0.00 -0.22	22.4	6.35	5001710
100	+0.09 +0.00	80	+0.00 -0.07	95.00	+0.00 -0.09	98.0	+0.00 -0.22	25.0	6.30	5004710‡
100	+0.09 +0.00	82	+0.00 -0.09	96.00	+0.00 -0.09	99.0	+0.00 -0.22	22.5	3.60	5004510
100	+0.09 +0.00	85	+0.00 -0.09	96.00	+0.00 -0.09	98.5	+0.00 -0.22	20.0	5.00	5006110‡
100	+0.09 +0.00	86	+0.00 -0.09	96.00	+0.00 -0.09	99.4	+0.00 -0.22	22.5	5.20	5005410
105	+0.09 +0.00	80	+0.00 -0.07	98.10	+0.00 -0.09	103.0	+0.00 -0.22	22.4	6.35	5001810
110	+0.09 +0.00	85	+0.00 -0.09	103.10	+0.00 -0.09	108.0	+0.00 -0.22	22.4	6.35	5001910
110	+0.09 +0.00	92	+0.00 -0.09	106.00	+0.00 -0.09	109.0	+0.00 -0.22	22.5	3.60	5007810
115	+0.09 +0.00	90	+0.00 -0.09	108.10	+0.00 -0.09	113.0	+0.00 -0.22	22.4	6.35	5002010
120	+0.09 +0.00	95	+0.00 -0.09	113.10	+0.00 -0.09	118.0	+0.00 -0.22	22.4	6.35	5002110
120	+0.09 +0.00	106	+0.00 -0.09	116.00	+0.00 -0.09	119.4	+0.00 -0.22	22.5	5.20	5008810
125	+0.10 +0.00	100	+0.00 -0.09	118.10	+0.00 -0.09	123.0	+0.00 -0.25	25.4	6.35	5002310
125	+0.10 +0.00	103	+0.00 -0.09	121.0	+0.00 -0.09	124.0	+0.00 -0.25	26.5	5.10	5007710
125	+0.10 +0.00	105	+0.00 -0.09	120.00	+0.00 -0.09	123.0	+0.00 -0.25	25.0	6.30	5006210‡
130	+0.10 +0.00	105	+0.00 -0.09	123.10	+0.00 -0.10	128.0	+0.00 -0.25	25.4	6.35	5002420
130	+0.10 +0.00	105	+0.00 -0.09	122.60	+0.00 -0.10	128.0	+0.00 -0.25	25.4	9.50	5002410
135	+0.10 +0.00	110	+0.00 -0.09	127.60	+0.00 -0.10	133.0	+0.00 -0.25	25.4	9.50	5002510
140	+0.10 +0.00	115	+0.00 -0.09	133.00	+0.00 -0.10	138.0	+0.00 -0.25	25.4	6.35	5002220
140	+0.10 +0.00	115	+0.00 -0.09	132.60	+0.00 -0.10	138.0	+0.00 -0.25	25.4	9.50	5002210



ØD ₁	TOL H9	Ød ₁	TOL h9	Ød ₂	TOL h9	Ød ₃	TOL h11	L ₁ +0.2 -0	L ₂ +0.1 -0	PART No.
145	+0.10 +0.00	120	+0.00 -0.09	137.60	+0.00 -0.10	143.0	+0.00 -0.25	25.4	9.50	5002610
150	+0.10 +0.00	125	+0.00 -0.10	142.60	+0.00 -0.10	148.0	+0.00 -0.25	25.4	9.50	5002710
150	+0.10 +0.00	125	+0.00 -0.10	143.00	+0.00 -0.10	148.0	+0.00 -0.25	25.4	6.35	5002720
155	+0.10 +0.00	130	+0.00 -0.10	147.60	+0.00 -0.10	153.0	+0.00 -0.25	25.4	9.50	5002810
160	+0.10 +0.00	130	+0.00 -0.10	152.60	+0.00 -0.10	158.0	+0.00 -0.25	25.4	9.50	5004610
160	+0.10 +0.00	130	+0.00 -0.10	153.00	+0.00 -0.10	158.0	+0.00 -0.25	25.4	6.35	5004620
160	+0.10 +0.00	135	+0.00 -0.10	152.60	+0.00 -0.10	158.0	+0.00 -0.25	25.4	9.50	5005610
160	+0.10 +0.00	143	+0.00 -0.10	156.00	+0.00 -0.10	159.4	+0.00 -0.25	26.5	7.20	5008910
165	+0.10 +0.00	140	+0.00 -0.10	157.60	+0.00 -0.10	163.0	+0.00 -0.25	25.4	9.50	5002910
170	+0.10 +0.00	145	+0.00 -0.10	161.70	+0.00 -0.10	168.0	+0.00 -0.25	25.4	12.70	5003010
175	+0.10 +0.00	150	+0.00 -0.10	166.70	+0.00 -0.10	173.0	+0.00 -0.25	25.4	12.70	5003110
180	+0.10 +0.00	150	+0.00 -0.10	172.95	+0.00 -0.10	178.0	+0.00 -0.25	35.4	6.35	5006310
180	+0.10 +0.00	155	+0.00 -0.10	171.70	+0.00 -0.10	178.0	+0.00 -0.25	25.4	12.70	5003210
185	+0.12 +0.00	160	+0.00 -0.10	176.70	+0.00 -0.10	183.0	+0.00 -0.25	25.4	12.70	5003310
190	+0.12 +0.00	165	+0.00 -0.10	181.70	+0.00 -0.12	188.0	+0.00 -0.29	25.4	12.70	5003410
195	+0.12 +0.00	170	+0.00 -0.10	186.70	+0.00 -0.12	193.0	+0.00 -0.29	25.4	12.70	5003510
200	+0.12 +0.00	175	+0.00 -0.10	191.60	+0.00 -0.12	198.0	+0.00 -0.29	25.4	12.70	5003610
210	+0.12 +0.00	185	+0.00 -0.10	201.60	+0.00 -0.12	208.0	+0.00 -0.29	25.4	12.70	5008210
220	+0.12 +0.00	195	+0.00 -0.10	311.60	+0.00 -0.12	218.0	+0.00 -0.29	25.4	12.70	5008310
230	+0.12 +0.00	205	+0.00 -0.10	221.60	+0.00 -0.12	227.0	+0.00 -0.29	25.4	12.70	5006510
240	+0.12 +0.00	215	+0.00 -0.10	231.60	+0.00 -0.12	238.0	+0.00 -0.29	25.4	12.70	5008410
250	+0.12 +0.00	225	+0.00 -0.10	241.60	+0.00 -0.12	247.0	+0.00 -0.29	25.4	12.70	5006610

Design

A patented seal designed specifically for hydraulic swivels. Manufactured in the high grade Hythane® 181, Hallite's Ro800 is engineered as a one piece seal. No relative motion between the seal and the energiser can effect the lifetime of this seal, which is often mainly the problem of two piece swivel seals.

The special design of the Ro800 is minimizing the friction.

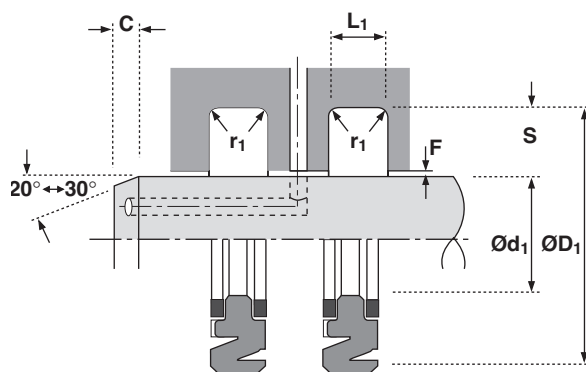
Optional anti-extrusion rings made from acetal are allowing larger extrusion gaps. The seal without anti-extrusion rings are made for applications with a very good guidance or low working pressure. Therefore please contact our technical service.

Ro800 is designed for double acting conditions. Designs are available for piston or rod applications.

The seal is easy to install in one piece housings.

Features

- One piece seal
- No rotation within the groove
- Available for both Rod and Piston
- Very low friction
- Easy to install
- Low abrasion and good wear resistance
- Simple and small seal grooves



Technical details

Operating conditions

Maximum Rotational Speed	0.2 m/sec
Temperature Range	-30°C + 80°C
Maximum Pressure	350 bar
Limiting PV Value Lubricated	25 bar m/sec

Inch

0.6 ft/sec
-22°F + 176°F
5000 p.s.i.
1200 p.s.i ft/sec

Maximum extrusion gap

Pressure bar	100	200	350
Housing Length L ₁ 4.2 mm	0.20	0.10	H7/f7 fit
Housing Length L ₁ 6.3 mm	0.30	0.25	H7/f7 fit
Pressure p.s.i	1500	3000	5000

Figures show the maximum permissible gap all on one side using minimum rod Ø and maximum clearance Ø. Refer to Housing Design section.

Surface roughness

	µmRa	µmRt	µinCLA	µinRMS
Dynamic Sealing Face Ød ₁	0.1 < > 0.3	2.5 max	4 < > 12	5 < > 13
Static Sealing Face ØD ₁	1.6 max	10 max	63 max	70 max
Static Housing Faces L ₁	3.2 max	16 max	125 max	140 max

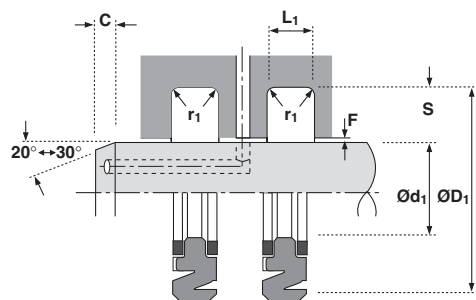
Chamfers & Radii

Groove Section ≤ S mm	5.5	7.75
Min Chamfer C mm	3.0	5.0
Max Fillet Rad r ₁ mm	0.8	1.2

Tolerances

	Ød ₁	ØD ₁	L ₁
Rod mm	f9	H11	+0.2 -0
Piston mm	h9	H9	+0.2 -0





Rod Sealing

Ød ₁	ØD ₁	L ₁	PART No.
25.0	32.5	3.2	4763300*
32.0	39.5	3.2	4761300*
36.0	43.5	3.2	4770600*
40.0	51.0	4.2	4754400*
45.0	56.0	4.2	4743400*
70.0	80.0	5.0	4727800*
100.0	111.0	4.2	4777810
100.0	115.5	6.3	4762810
130.0	145.5	6.3	4720610

Bore Sealing

Ød ₁	ØD ₁	L ₁	PART No.
80.0	69.3	4.2	4748100*
90.0	79.3	4.2	4771300*
145.0	129.5	6.3	4712710
160.0	144.5	6.3	4712810
180.0	164.5	6.3	4720710

* without anti-extrusion rings

Design

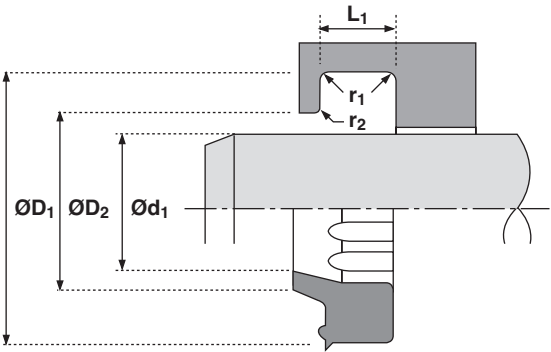
The Hallite 831 wiper is designed to snap into a standard housing and provide reliable medium duty dirt exclusion. The proportions of the precision trimmed wiping lip ensure that it remains in contact with the rod surface to remove all deposits of mud and other forms of contamination except for those found in heavy duty industrial applications.

The outside diameter of the seal incorporates a 'crush lip' to provide interference fit with the housing and a 'face bead' to ensure that the crush lip is not trapped in the corner of the housing. The inside diameter of the seal is provided with ribs to prevent the possibility of blow-out due to pressure trapping of the main rod seal.

The Hallite 831 is precision moulded in polyurethane for maximum wear resistance and is interchangeable with many common European wiper styles.

Features

- Precision trimmed sealing lip
- 'Crush Lip' and 'Face Bead' provide effective seal on housing
- Low wear
- Long life
- Cost effective
- Pressure relief ribs



Technical details

Operating conditions

Maximum Speed	4.0 m/sec
Temperature Range	-45°C +110°C

Surface roughness

	µmRa	µmRt
Dynamic Sealing Face ØD ₁	0.1 < > 0.4	4 max
Static Sealing Face Ød ₁	1.6 max	10 max
Static Housing Faces L ₁	3.2 max	16 max

Radii

Rod Diameter Ød ₁	≤ 90	> 90
Max Fillet Rad r ₁ mm	0.2	0.4
Max Fillet Rad r ₂ mm	0.4	0.4

Tolerances

	Ød ₁	ØD ₁	ØD ₂	L ₁
mm	f9	H11	H11	+0.2 -0

Metric

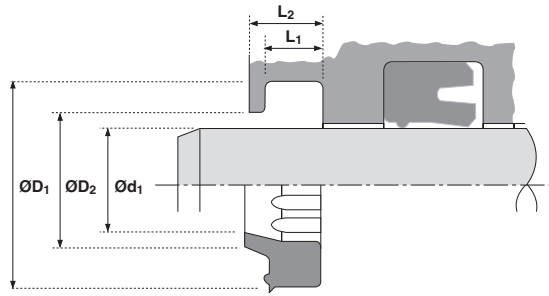
Inch

12.0 ft/sec
-50°F +230°F

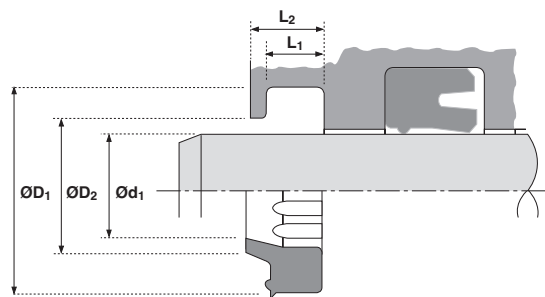
µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max



wipers



Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 - 0	L ₂	PART No.
12	-0.016 -0.059	18.6	+0.13 +0.00	15.0	+0.11 +0.00	3.8	5.3	4565800
14	-0.016 -0.059	20.6	+0.13 +0.00	17.0	+0.11 +0.00	3.8	5.3	4580000
16	-0.016 -0.059	22.6	+0.13 +0.00	19.0	+0.13 +0.00	3.8	5.3	4830600
16	-0.016 -0.059	24.6	+0.13 +0.00	19.0	+0.13 +0.00	5.3	7.0	4703800
18	-0.016 -0.059	24.6	+0.13 +0.00	21.0	+0.13 +0.00	3.8	5.3	4580100
18	-0.016 -0.059	26.6	+0.13 +0.00	21.0	+0.13 +0.00	5.3	7.0	4703900
20	-0.020 -0.072	28.6	+0.13 +0.00	23.0	+0.13 +0.00	5.3	7.0	4530600
22	-0.020 -0.072	30.6	+0.16 +0.00	25.0	+0.13 +0.00	5.3	7.0	4530700
25	-0.020 -0.072	33.6	+0.16 +0.00	28.0	+0.13 +0.00	5.3	7.0	4530800
28	-0.020 -0.072	36.6	+0.16 +0.00	31.0	+0.16 +0.00	5.3	7.0	4565900
30	-0.020 -0.072	38.6	+0.16 +0.00	33.0	+0.16 +0.00	5.3	7.0	4530900
32	-0.025 -0.087	40.6	+0.16 +0.00	35.0	+0.16 +0.00	5.3	7.0	4534500
35	-0.025 -0.087	43.6	+0.16 +0.00	38.0	+0.16 +0.00	5.3	7.0	4531000
36	-0.025 -0.087	44.6	+0.16 +0.00	39.0	+0.16 +0.00	5.3	7.0	4580200
38	-0.025 -0.087	46.6	+0.16 +0.00	41.0	+0.16 +0.00	5.3	7.0	4788300
40	-0.025 -0.087	48.6	+0.16 +0.00	43.0	+0.16 +0.00	5.3	7.0	4531100
42	-0.025 -0.087	50.6	+0.16 +0.00	45.0	+0.16 +0.00	5.3	7.0	4788400
45	-0.025 -0.087	53.6	+0.19 +0.00	48.0	+0.16 +0.00	5.3	7.0	4533800
45	-0.025 -0.087	55.6	+0.19 +0.00	48.0	+0.16 +0.00	5.3	7.0	4531200
47	-0.025 -0.087	55.6	+0.19 +0.00	50.0	+0.16 +0.00	5.3	7.0	4778100
50	-0.025 -0.087	58.6	+0.19 +0.00	53.0	+0.19 +0.00	5.3	7.0	4533900
50	-0.025 -0.087	60.6	+0.19 +0.00	53.0	+0.19 +0.00	5.3	7.0	4531300
55	-0.030 -0.104	63.6	+0.19 +0.00	58.0	+0.19 +0.00	5.3	7.0	4534000



Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 - 0	L ₂	PART No.
55	-0.030 -0.104	65.6	+0.19 +0.00	58.0	+0.19 +0.00	5.3	7.0	4531400
56	-0.030 -0.104	64.6	+0.19 +0.00	59.0	+0.19 +0.00	5.3	7.0	4566000
56	-0.030 -0.104	66.6	+0.19 +0.00	59.0	+0.19 +0.00	5.3	7.0	4704000
60	-0.030 -0.104	68.6	+0.19 +0.00	63.0	+0.19 +0.00	5.3	7.0	4534100
60	-0.030 -0.104	70.6	+0.19 +0.00	63.0	+0.19 +0.00	5.3	7.0	4531500
63	-0.030 -0.104	73.6	+0.19 +0.00	66.0	+0.19 +0.00	5.3	7.0	4824400
70	-0.030 -0.104	78.6	+0.19 +0.00	73.0	+0.19 +0.00	5.3	7.0	4534200
70	-0.030 -0.104	80.6	+0.22 +0.00	73.0	+0.19 +0.00	5.3	7.0	4531600
80	-0.030 -0.104	88.6	+0.22 +0.00	83.0	+0.22 +0.00	5.3	7.0	4534300
80	-0.030 -0.104	92.2	+0.22 +0.00	86.0	+0.22 +0.00	7.1	12.0	4531700
85	-0.036 -0.123	93.6	+0.22 +0.00	88.0	+0.22 +0.00	5.3	7.0	4534400
85	-0.036 -0.123	97.2	+0.22 +0.00	91.0	+0.22 +0.00	7.1	12.0	4531800
90	-0.036 -0.123	102.2	+0.22 +0.00	96.0	+0.22 +0.00	7.1	12.0	4531900
100	-0.036 -0.123	112.2	+0.22 +0.00	106.0	+0.22 +0.00	7.1	12.0	4532000
110	-0.036 -0.123	122.2	+0.25 +0.00	116.0	+0.22 +0.00	7.1	12.0	4538200
135	-0.043 -0.143	147.2	+0.25 +0.00	141.0	+0.25 +0.00	7.1	12.0	4538100

Design

The Hallite 834 wiper is designed to snap into a standard housing and provide reliable medium duty dirt exclusion. The proportions of the wiping lip ensure that it remains in contact with the rod surface to remove all deposits of mud and other forms of contamination except for those found in the heavy duty environment such as steel works and cement factories.

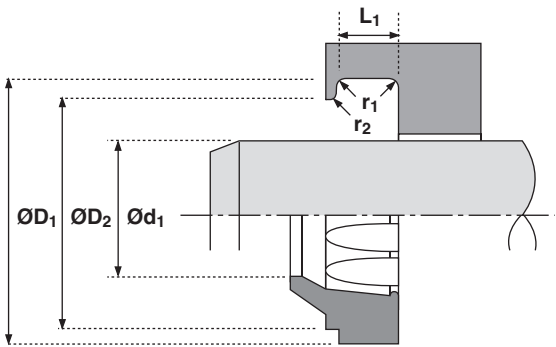
The inside diameter of the seal is provided with ribs to prevent the possibility of blow out due to pressure trapping of the main rod seal.

The Hallite® 834 is precision moulded in Hythane® 181 for maximum wear resistance.

Part numbers suffixed by † indicate housing sizes to meet ISO 6195E.

Features

- Snug fit provides effective sealing
- Long life
- Low wear
- Easy installation
- Pressure relief ribs



Technical details

Operating conditions

Maximum Speed	4.0 m/sec
Temperature Range	-45°C +110°C

Inch

12.0 ft/sec
-50°F +230°F

Surface roughness

	µmRa	µmRt
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max
Static Sealing Face ØD ₁ ØD ₂	1.6 max	10 max
Static Housing Faces L ₁	3.2 max	16 max

µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

Radii

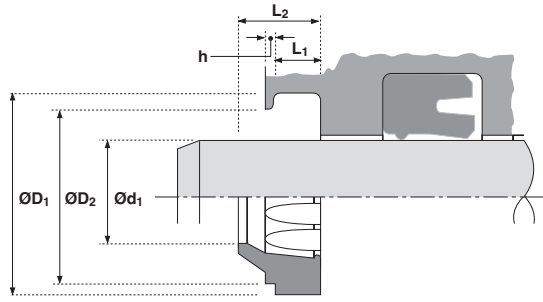
Max Fillet Rad r ₁ mm	0.4
Max Fillet Rad r ₂ mm	0.2

Tolerances

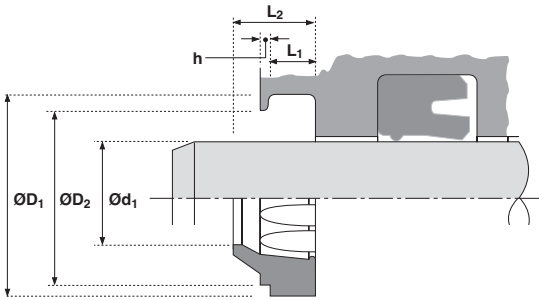
	Ød ₁	ØD ₁	ØD ₂	L ₁
mm	f9	H11	H11	+0.2 -0



wipers



Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 -0	L ₂	h	PART No.
18	-0.016 -0.059	26.0	+0.13 +0.00	24.0	+0.13 +0.00	4.0	7.0	1.0	4367200†
20	-0.020 -0.072	28.0	+0.13 +0.00	26.0	+0.13 +0.00	4.0	7.0	1.0	4391300†
22	-0.020 -0.072	30.0	+0.13 +0.00	28.0	+0.13 +0.00	4.0	7.0	1.0	4370600†
24	-0.020 -0.072	32.0	+0.13 +0.00	30.0	+0.13 +0.00	4.0	7.0	1.0	4829300
25	-0.020 -0.072	33.0	+0.16 +0.00	31.0	+0.16 +0.00	4.0	7.0	1.0	4343900†
26	-0.020 -0.072	34.0	+0.16 +0.00	32.0	+0.16 +0.00	4.0	7.0	1.0	4514400
28	-0.020 -0.072	36.0	+0.16 +0.00	34.0	+0.16 +0.00	4.0	7.0	1.0	4373500†
30	-0.020 -0.072	38.0	+0.16 +0.00	36.0	+0.16 +0.00	4.0	7.0	1.0	4378800
32	-0.025 -0.087	40.0	+0.16 +0.00	38.0	+0.16 +0.00	4.0	7.0	1.0	4373600†
35	-0.025 -0.087	43.0	+0.16 +0.00	41.0	+0.16 +0.00	4.0	7.0	1.0	4398400
36	-0.025 -0.087	44.0	+0.16 +0.00	42.0	+0.16 +0.00	4.0	7.0	1.0	4370700†
37	-0.025 -0.087	45.0	+0.16 +0.00	43.0	+0.16 +0.00	4.0	7.0	1.0	4514500
38	-0.025 -0.087	46.0	+0.16 +0.00	44.0	+0.16 +0.00	4.0	7.0	1.0	4515400
40	-0.025 -0.087	48.0	+0.16 +0.00	46.0	+0.16 +0.00	4.0	7.0	1.0	4378900†
45	-0.025 -0.087	53.0	+0.19 +0.00	51.0	+0.19 +0.00	4.0	7.0	1.0	4370800†
46	-0.025 -0.087	54.0	+0.19 +0.00	52.0	+0.19 +0.00	4.0	7.0	1.0	4515200
48	-0.025 -0.087	56.0	+0.19 +0.00	54.0	+0.19 +0.00	4.0	7.0	1.0	4432700
50	-0.025 -0.087	58.0	+0.19 +0.00	56.0	+0.19 +0.00	4.0	7.0	1.0	4379000†
55	-0.030 -0.104	63.0	+0.19 +0.00	61.0	+0.19 +0.00	4.0	7.0	1.0	4515100
56	-0.030 -0.104	64.0	+0.19 +0.00	62.0	+0.19 +0.00	4.0	7.0	1.0	4385100†
60	-0.030 -0.104	68.0	+0.19 +0.00	66.0	+0.19 +0.00	4.0	7.0	1.0	4385200
63	-0.030 -0.104	71.0	+0.19 +0.00	69.0	+0.19 +0.00	4.0	7.0	1.0	4385300†
65	-0.030 -0.104	73.0	+0.19 +0.00	71.0	+0.19 +0.00	4.0	7.0	1.0	4394200



Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 -0	L ₂	h	PART No.
70	-0.030 -0.104	78.0	+0.19 +0.00	76.0	+0.19 +0.00	4.0	7.0	1.0	4373700†
75	-0.030 -0.104	83.0	+0.22 +0.00	81.0	+0.22 +0.00	4.0	7.0	1.0	4711900
80	-0.030 -0.104	88.0	+0.22 +0.00	86.0	+0.22 +0.00	4.0	7.0	1.0	4398500†
85	-0.036 -0.123	93.0	+0.22 +0.00	91.0	+0.22 +0.00	4.0	7.0	1.0	4839000
90	-0.036 -0.123	98.0	+0.22 +0.00	96.0	+0.22 +0.00	4.0	7.0	1.0	4398600
100	-0.036 -0.123	108.0	+0.22 +0.00	106.0	+0.22 +0.00	4.0	7.0	1.0	4394300
110	-0.036 -0.123	118.0	+0.22 +0.00	116.0	+0.22 +0.00	4.0	7.0	1.0	4448200
140	-0.043 -0.143	152.0	+0.25 +0.00	149.0	+0.25 +0.00	5.5	10.0	1.5	4456100†

Design

The Hallite 839 wiper is precision moulded in Hallite's high performance polyurethane – Hythane[®] 181 for maximum wear resistance, and is designed to exclude dirt and moisture from entering the cylinder and to collect traces of fluid passing the rod seal.

Opposite the wiper lip are two sealing lips accurately produced and proportioned to collect fluid passing the rod seal. To obtain stability and improve the seal the outside diameter is in interference with the housing.

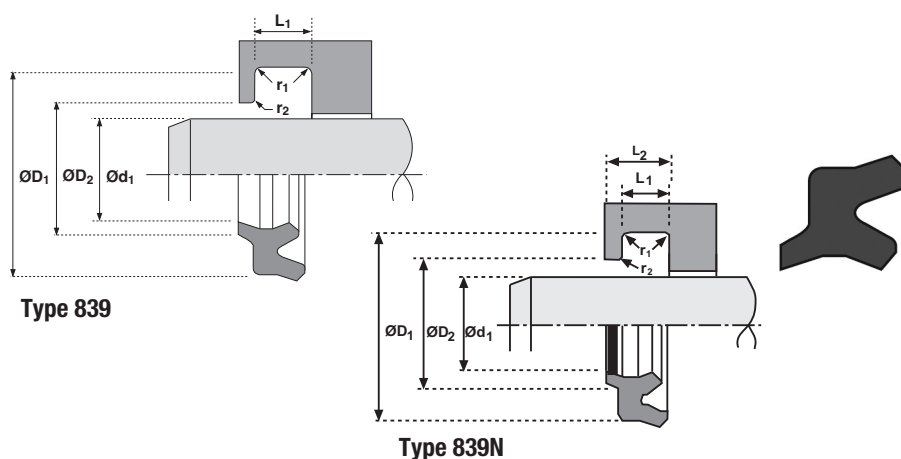
The Hallite 839N wiper is designed to suit popular Asian housing and has a textured wiping lip for improved performance.

NB: Part numbers suffixed by “†” indicate housing sizes to meet ISO 6195C.

A vent between the seal and the wiper is recommended to avoid a pressure trap.

Features

- Twin lips ensures drier sealing system
- Hard wearing material for long life
- ISO housing range (839)



Technical details

Operating conditions

Maximum Speed	4.0 m/sec
Temperature Range	-45°C +110°C

Surface roughness

	µmRa	µmRt
Dynamic Sealing Face $\varnothing d_1$	0.1 < > 0.4	4 max
Static Sealing Face $\varnothing D_1$ $\varnothing D_2$	1.6 max	10 max
Static Housing Faces L_1	3.2 max	16 max

Chamfers & Radii

Rod Diameter $\varnothing d_1$ mm	≤ 90	> 90
Max Fillet Rad r_1 mm	0.2	0.4
Max Fillet Rad r_2 mm	0.4	0.4

Tolerances

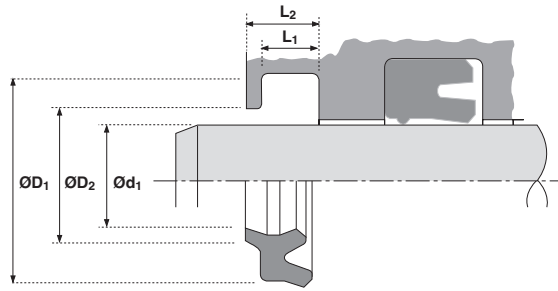
	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1
839 mm	f9	H11	H11	+0.2 -0
839N mm	f9	+0-0.2	+0.1	+0.4 -0

Inch

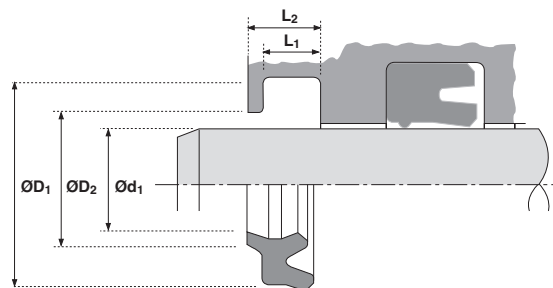
12.0 ft/sec
-50°F +230°F

µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

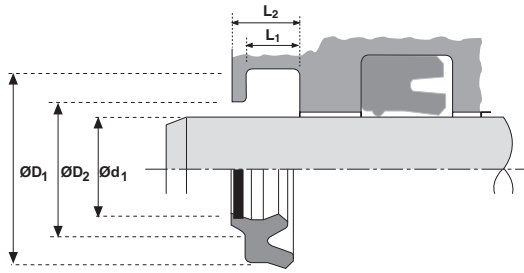




Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 - 0	L ₂	PART No.
12	-0.016 -0.059	18.0	+0.11 +0.00	14.5	+0.11 +0.00	4.0	7.0	4436800‡
14	-0.016 -0.059	20.0	+0.13 +0.00	16.5	+0.11 +0.00	4.0	7.0	4436900‡
15	-0.016 -0.059	22.0	+0.11 +0.00	18.0	+0.11 +0.00	3.8	6.0	4762300
18	-0.016 -0.059	24.0	+0.13 +0.00	20.5	+0.13 +0.00	4.0	7.0	4437000‡
20	-0.020 -0.072	26.0	+0.13 +0.00	22.5	+0.13 +0.00	4.0	7.0	4415000‡
22	-0.020 -0.072	28.0	+0.13 +0.00	24.5	+0.13 +0.00	4.0	7.0	4437100‡
25	-0.016 -0.059	31.0	+0.11 +0.00	27.5	+0.11 +0.00	4.0	7.0	4799700‡
28	-0.020 -0.072	36.0	+0.16 +0.00	31.0	+0.16 +0.00	5.0	8.0	4437200‡
30	-0.020 -0.072	38.0	+0.16 +0.00	33.0	+0.16 +0.00	5.0	8.0	4519200
32	-0.025 -0.087	40.0	+0.16 +0.00	35.0	+0.16 +0.00	5.0	8.0	4594000‡
36	-0.025 -0.087	44.0	+0.16 +0.00	39.0	+0.16 +0.00	5.0	8.0	4437300‡
40	-0.025 -0.087	48.0	+0.16 +0.00	43.0	+0.16 +0.00	5.0	8.0	4591600‡
45	-0.025 -0.087	53.0	+0.19 +0.00	48.0	+0.16 +0.00	5.0	8.0	4437400‡
50	-0.025 -0.087	58.0	+0.19 +0.00	53.0	+0.19 +0.00	5.0	8.0	4584400‡
55	-0.030 -0.104	65.0	+0.19 +0.00	58.0	+0.19 +0.00	6.0	9.7	4575200
56	-0.030 -0.104	66.0	+0.19 +0.00	59.0	+0.19 +0.00	6.0	9.7	4437500‡
60	-0.030 -0.104	70.0	+0.19 +0.00	63.0	+0.19 +0.00	6.0	9.7	4802400
65	-0.030 -0.104	75.0	+0.19 +0.00	68.0	+0.19 +0.00	6.0	9.7	4575300
70	-0.030 -0.104	80.0	+0.19 +0.00	73.0	+0.19 +0.00	6.0	9.7	4437600‡
90	-0.036 -0.123	100.0	+0.22 +0.00	93.0	+0.22 +0.00	6.0	9.7	4437700‡
110	-0.036 -0.123	125.0	+0.25 +0.00	114.0	+0.22 +0.00	8.5	13.0	4437800‡
130	-0.043 -0.143	142.0	+0.25 +0.00	135.0	+0.25 +0.00	8.2	11.0	4786300
140	-0.043 -0.143	155.0	+0.25 +0.00	144.0	+0.25 +0.00	8.5	13.0	4437900‡
150	-0.043 -0.143	165.0	+0.25 +0.00	154.0	+0.25 +0.00	8.5	13.0	4804200
180	-0.043 -0.143	196.0	+0.29 +0.00	184.0	+0.29 +0.00	9.5	14.0	4595600



Ød ₁	TOL f9	ØD ₁ +0 -0.2	ØD ₂ +0.1 -0.1	L ₁ +0.4 -0	L ₂	PART No
14	-0.016 -0.059	22.0	18.3	4.8	7.0	4632000
16	-0.016 -0.059	24.0	20.3	4.8	7.0	4632100
18	-0.016 -0.059	26.0	22.3	4.8	7.0	4630800
20	-0.020 -0.072	28.0	24.3	4.8	7.0	4630900
22.4	-0.020 -0.072	30.4	26.7	4.8	7.0	4630100
25	-0.020 -0.072	33.0	29.3	4.8	7.0	4631000
28	-0.020 -0.072	36.0	32.3	4.8	7.0	4631100
30	-0.020 -0.072	38.0	34.0	5.8	8.0	4630200
31.5	-0.025 -0.072	39.5	35.5	5.8	8.0	4632200
32	-0.025 -0.072	40.0	36.0	5.8	8.0	4632300
35	-0.025 -0.087	43.0	39.0	5.8	8.0	4630300
35.5	-0.025 -0.087	43.5	39.5	5.8	8.0	4630400
38	-0.025 -0.087	46.0	42.0	5.8	8.0	4632400
40	-0.025 -0.087	48.0	44.0	5.8	8.0	4630500
43	-0.025 -0.087	51.0	47.0	5.8	8.0	4634200
45	-0.025 -0.087	53.0	49.0	5.8	8.0	4630600
50	-0.025 -0.087	58.0	54.0	5.8	8.0	4630000
53	-0.030 -0.104	61.0	57.0	5.8	8.0	4632500
55	-0.030 -0.104	63.0	59.0	5.8	8.0	4630700
56	-0.030 -0.104	64.0	60.0	5.8	8.0	4632600
60	-0.030 -0.104	68.0	64.0	5.8	8.0	4631200
63	-0.030 -0.104	71.0	67.0	5.8	8.0	4632700
65	-0.030 -0.104	73.0	69.0	5.8	8.0	4631300
70	-0.030 -0.104	80.0	75.0	6.8	10.0	4631400
75	-0.030 -0.104	85.0	80.0	6.8	10.0	4631500



Ød ₁	TOL f9	ØD ₁ +0 -0.2	ØD ₂ +0.1 -0.1	L ₁ +0.4 -0	L ₂	PART No
80	-0.030 -0.104	90.0	85.0	6.8	10.0	4631600
85	-0.036 -0.123	95.0	90.0	6.8	10.0	4632900
90	-0.036 -0.123	100.0	95.0	6.8	10.0	4631700
95	-0.036 -0.123	105.0	100.0	6.8	10.0	4631900
100	-0.036 -0.123	110.0	105.0	6.8	10.0	4631800
110	-0.036 -0.123	120.0	115.0	6.8	10.0	4633000
112	-0.036 -0.123	122.0	117.0	6.8	10.0	4633100
120	-0.036 -0.123	130.0	125.0	6.8	10.0	4633700
125	-0.043 -0.143	138.0	132.0	7.8	11.0	4633200
130	-0.043 -0.143	143.0	137.0	7.8	11.0	4633800
136	-0.043 -0.143	149.0	143.0	7.8	11.0	4633300
140	-0.043 -0.143	153.0	147.0	7.8	11.0	4633400
145	-0.043 -0.143	158.0	152.0	7.8	11.0	4633500
150	-0.043 -0.143	163.0	157.0	7.8	11.0	4633900
160	-0.043 -0.143	174.0	167.0	7.8	11.0	4633600

Design

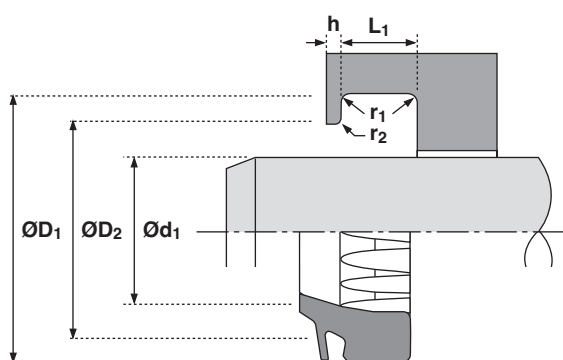
The Hallite 842 rod wiper is designed to prevent the ingress of foreign particles and moisture into the cylinder. The profile has been specially developed for harsh environments, in particular the longwall mining industry.

The special feature is the flap on the wiping lip which covers the gland housing, preventing the water/slurry trap so common with conventional wipers and thus ingress of contamination around the outside of the wiper. The internal ribs on the inside diameter prevent the possibility of pressure trapping between the gland seal and the wiper and ensure correct support and guidance of the wiping lip, even in cases of high eccentricity as can occur between the outer stage gland and the inner cylinder of a roof support leg.

The Hallite 842 is manufactured in Hallite's high performance polyurethane, Hythane[®] 181. The material has excellent compression set characteristics, excellent wear and abrasive resistance, proven compatibility with HFA (95/5) fluids, as used in longwall mining equipment, and with mineral oil.

A number of sizes, indicated by *, do not have an interference fit between the outside diameter of the wiper and the wiper housing bore $\varnothing D_1$. They float on the retaining lip.

NB: Part numbers suffixed by '±' indicate housing sizes to meet ISO6195A



Technical details

Operating conditions

Maximum Speed	4.0 m/sec
Temperature Range	-45°C +110°C

Inch

12.0 ft/sec
-50°F +230°F

Surface roughness

	μmRa	μmRt
Dynamic Sealing Face $\varnothing d_1$	0.1 < > 0.4	4 max
Static Sealing Face $\varnothing D_1$ $\varnothing D_2$ h	1.6 max	10 max
Static Housing Faces L_1	3.2 max	16 max

$\mu inCLA$	$\mu inRMS$
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

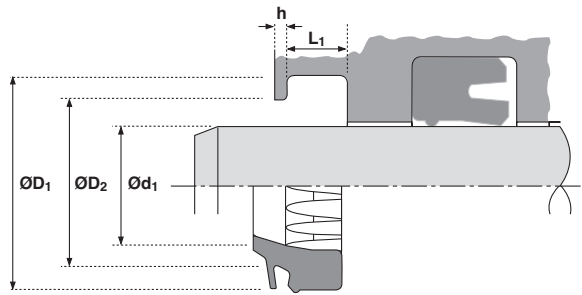
Radii

Rod Diameter $\varnothing d_1$	≤ 50	≤ 90	≤ 200	> 200
Max Fillet Rad r_1 mm	0.4	0.4	0.4	0.8
Max Fillet Rad r_2 mm	0.2	0.4	0.6	0.8
Rod Diameter $\varnothing d_1$	≤ 2.000	≤ 3.500	≤ 7.875	> 7.875
Max Fillet Rad r_1 in	0.016	0.016	0.016	0.032
Max Fillet Rad r_2 in	0.008	0.016	0.024	0.032

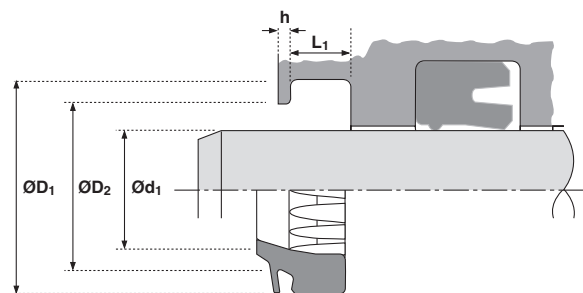
Tolerances

	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1	h
mm	f9	H11	H11	+0.2 -0	+0.10 +0
in	f9	H11	H11	+0.008 -0	+0.004 +0

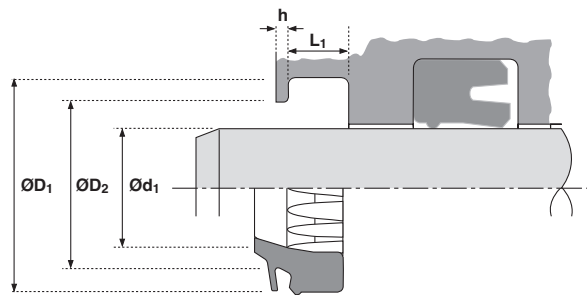




Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 -0	L ₂	h +0.1 -0	PART No.
20	-0.025 -0.087	26.0	+0.16 +0.00	24.0	+0.16 +0.00	4.0	6.0	1.00	4787000
32	-0.025 -0.087	40.0	+0.16 +0.00	37.5	+0.16 +0.00	5.0	8.0	1.50	4714900‡
35	-0.025 -0.087	45.0	+0.16 +0.00	42.0	+0.16 +0.00	6.3	10.0	1.50	4515300
36	-0.025 -0.087	44.0	+0.16 +0.00	41.5	+0.16 +0.00	5.0	8.0	1.50	4715000‡
38	-0.025 -0.087	46.0	+0.16 +0.00	43.0	+0.16 +0.00	5.3	8.0	1.50	4568700
40	-0.025 -0.087	48.0	+0.16 +0.00	45.5	+0.16 +0.00	5.0	8.0	1.50	4536500‡
45	-0.025 -0.087	53.0	+0.19 +0.00	50.5	+0.19 +0.00	5.0	8.0	1.50	4715100‡
50	-0.025 -0.087	58.0	+0.19 +0.00	55.5	+0.19 +0.00	5.0	8.0	1.50	4533600‡
55	-0.030 -0.104	65.0	+0.19 +0.00	62.0	+0.19 +0.00	6.3	10.0	1.50	4764600
56	-0.030 -0.104	66.0	+0.19 +0.00	63.0	+0.19 +0.00	6.3	10.0	1.50	4715200‡
60	-0.030 -0.104	70.0	+0.19 +0.00	67.0	+0.19 +0.00	6.3	10.0	1.50	4557800
60	-0.030 -0.104	72.0	+0.19 +0.00	67.0	+0.19 +0.00	4.1	10.0	2.50	4739300*
63	-0.030 -0.104	73.0	+0.19 +0.00	70.0	+0.19 +0.00	6.3	10.0	1.50	4536600‡
70	-0.030 -0.104	82.6	+0.22 +0.00	78.4	+0.19 +0.00	8.0	12.0	2.00	4480800
70	-0.030 -0.104	85.0	+0.22 +0.00	78.0	+0.19 +0.00	5.1	12.0	3.00	4739400*
75	-0.030 -0.104	90.0	+0.22 +0.00	83.0	+0.22 +0.00	5.1	12.0	3.00	4744000*
80	-0.030 -0.104	90.0	+0.22 +0.00	87.0	+0.22 +0.00	6.3	10.0	1.50	4715300‡
80	-0.030 -0.104	95.0	+0.22 +0.00	88.0	+0.22 +0.00	5.1	12.0	3.00	4739500*
85	-0.036 -0.123	97.6	+0.22 +0.00	93.4	+0.22 +0.00	8.0	12.0	2.00	4521800
85	-0.036 -0.123	100.0	+0.22 +0.00	93.0	+0.22 +0.00	5.1	10.0	3.00	4744100*
90	-0.036 -0.123	102.2	+0.22 +0.00	96.0	+0.22 +0.00	7.1	12.4	2.80	4727300
90	-0.036 -0.123	102.6	+0.22 +0.00	98.4	+0.22 +0.00	8.0	12.0	2.00	4512500
90	-0.036 -0.123	105.0	+0.22 +0.00	98.0	+0.22 +0.00	5.1	10.0	3.00	4744600*

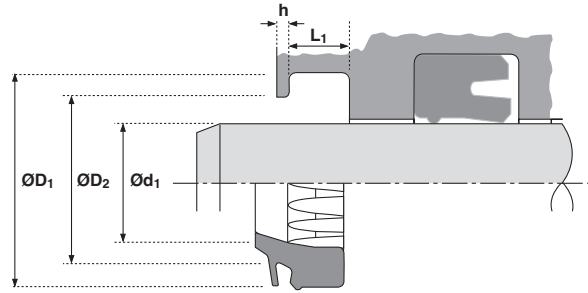


Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 -0	L ₂	h +0.1 -0	PART No.
95	-0.036 -0.123	110.0	+0.22 +0.00	105.0	+0.22 +0.00	9.5	14.0	2.80	4536900
100	-0.036 -0.123	112.2	+0.22 +0.00	106.0	+0.22 +0.00	7.1	12.4	2.80	4727400
100	-0.036 -0.123	114.0	+0.22 +0.00	109.9	+0.22 +0.00	8.0	12.0	1.50	4536000
100	-0.036 -0.123	115.0	+0.22 +0.00	108.0	+0.22 +0.00	5.1	12.0	3.00	4584800*
100	-0.036 -0.123	115.0	+0.22 +0.00	110.0	+0.22 +0.00	9.5	14.0	2.00	4589500‡
105	-0.036 -0.123	120.0	+0.22 +0.00	115.0	+0.22 +0.00	9.5	14.0	2.50	4532100
110	-0.036 -0.123	125.0	+0.25 +0.00	118.0	+0.22 +0.00	5.1	12.0	3.00	4739600*
110	-0.036 -0.123	125.0	+0.25 +0.00	120.0	+0.22 +0.00	9.5	14.0	2.00	4715400‡
120	-0.036 -0.123	135.0	+0.25 +0.00	130.0	+0.25 +0.00	9.5	14.0	2.00	4580800
125	-0.043 -0.123	137.2	+0.25 +0.00	131.0	+0.25 +0.00	7.6	12.9	2.80	4727500
125	-0.043 -0.143	140.0	+0.25 +0.00	133.0	+0.25 +0.00	5.1	12.0	3.00	4748300*
125	-0.043 -0.143	140.0	+0.25 +0.00	135.0	+0.25 +0.00	9.5	14.0	2.00	4715500‡
130	-0.043 -0.143	145.0	+0.25 +0.00	140.0	+0.25 +0.00	9.5	14.0	2.25	4491700
140	-0.043 -0.143	152.2	+0.25 +0.00	146.0	+0.25 +0.00	7.6	12.9	2.80	4727600
140	-0.043 -0.143	155.0	+0.25 +0.00	150.0	+0.25 +0.00	9.5	14.0	2.00	4555900‡
145	-0.043 -0.143	160.0	+0.25 +0.00	155.0	+0.25 +0.00	9.5	14.0	2.25	4570200
150	-0.043 -0.143	169.0	+0.25 +0.00	159.0	+0.25 +0.00	6.1	14.0	4.00	4748400*
155	-0.043 -0.143	170.0	+0.25 +0.00	165.0	+0.25 +0.00	9.5	12.0	2.25	4535200
170	-0.043 -0.143	189.0	+0.29 +0.00	179.0	+0.25 +0.00	6.1	14.0	4.00	4749200*
175	-0.043 -0.143	190.0	+0.29 +0.00	185.0	+0.29 +0.00	9.5	14.0	2.25	4552100
180	-0.043 -0.143	195.0	+0.29 +0.00	190.0	+0.29 +0.00	9.5	14.0	2.25	4491300‡
190	-0.050 -0.165	209.0	+0.29 +0.00	199.0	+0.29 +0.00	6.1	14.0	4.00	4749300*
200	-0.050 -0.165	223.0	+0.29 +0.00	211.0	+0.29 +0.00	8.3	20.0	4.80	4748700*

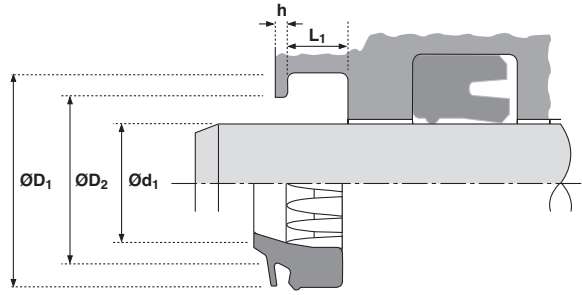


Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 -0	L ₂	h +0.1 -0	PART No.
215	-0.050 -0.165	230.0	+0.29 +0.00	225.0	+0.29 +0.00	9.5	14.0	2.00	4705500
220	-0.050 -0.165	240.0	+0.29 +0.00	230.0	+0.29 +0.00	10.2	18.0	3.80	4859800
230	-0.050 -0.165	250.0	+0.29 +0.00	240.0	+0.29 +0.00	10.2	18.0	3.80	4750500
235	-0.050 0.165	255.0	+0.32 +0.00	245.0	+0.29 +0.00	10.2	18.0	3.80	4773300
250	-0.050 -0.165	270.0	+0.32 +0.00	260.0	+0.32 +0.00	10.2	18.0	3.80	4725100
295	-0.050 -0.165	315.0	+0.32 +0.00	305.0	+0.32 +0.00	10.2	18.0	3.80	4851900
320	-0.062 -0.202	340.0	+0.36 +0.00	330.0	+0.36 +0.00	10.2	18.0	3.80	4750400
335	-0.062 -0.202	355.0	+0.36 +0.00	345.0	+0.36 +0.00	10.2	18.0	3.80	4773400
350	-0.062 -0.202	370.0	+0.36 +0.00	360.0	+0.36 +0.00	10.2	18.0	3.80	4725200
415	-0.068 -0.223	435.0	+0.40 +0.00	425.0	+0.40 +0.00	10.2	18.0	3.80	4851800

*These wipers do not have an interference fit between the outside diameter of the wiper and the wiper housing bore ØD1, they float on the retaining lip.



Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.008 -0	L ₂	h +0.004 -0	PART No.
1.750	-0.0010 -0.0034	2.125	+0.007 +0.000	1.995	+0.007 +0.000	0.220	0.362	0.079	4543300
2.000	-0.0012 -0.0041	2.375	+0.007 +0.000	2.245	+0.007 +0.000	0.220	0.362	0.079	4543200
2.500	-0.0012 -0.0041	2.875	+0.007 +0.000	2.745	+0.007 +0.000	0.220	0.362	0.079	4708200
2.750	-0.0012 -0.0041	3.125	+0.007 +0.000	2.995	+0.007 +0.000	0.220	0.362	0.079	4554600
3.000	-0.0012 -0.0041	3.375	+0.009 +0.000	3.245	+0.009 +0.000	0.220	0.362	0.079	4543400
3.125	-0.0012 -0.0041	3.500	+0.009 +0.000	3.370	+0.009 +0.000	0.220	0.362	0.079	4543100
3.250	-0.0014 -0.0048	3.625	+0.009 +0.000	3.495	+0.009 +0.000	0.220	0.362	0.079	4721400
3.375	-0.0014 -0.0048	3.750	+0.009 +0.000	3.620	+0.009 +0.000	0.220	0.362	0.079	4554700
3.500	-0.0014 -0.0048	3.875	+0.009 +0.000	3.745	+0.009 +0.000	0.220	0.362	0.079	4818700
3.625	-0.0014 -0.0048	4.000	+0.009 +0.000	3.870	+0.009 +0.000	0.220	0.362	0.079	4543000
3.750	-0.0014 -0.0048	4.125	+0.009 +0.000	3.995	+0.009 +0.000	0.220	0.362	0.079	4708300
3.875	-0.0014 -0.0048	4.250	+0.009 +0.000	4.120	+0.009 +0.000	0.220	0.362	0.079	4523600
4.000	-0.0014 -0.0048	4.375	+0.009 +0.000	4.245	+0.009 +0.000	0.220	0.362	0.079	4708400
4.375	-0.0014 -0.0048	4.875	+0.010 +0.000	4.715	+0.009 +0.000	0.312	0.472	0.080	4707800
4.750	-0.0016 -0.0056	5.250	+0.010 +0.000	5.090	+0.010 +0.000	0.312	0.472	0.080	4547300
5.000	-0.0016 -0.0056	5.500	+0.010 +0.000	5.340	+0.010 +0.000	0.312	0.472	0.080	4708500
5.250	-0.0016 -0.0056	5.750	+0.010 +0.000	5.590	+0.010 +0.000	0.312	0.472	0.080	4707900
5.750	-0.0016 -0.0056	6.250	+0.010 +0.000	6.090	+0.010 +0.000	0.312	0.472	0.080	4547400
6.000	-0.0016 -0.0056	6.500	+0.010 +0.000	6.340	+0.010 +0.000	0.312	0.472	0.080	4708600
6.250	-0.0016 -0.0056	7.000	+0.010 +0.000	6.745	+0.010 +0.000	0.500	0.740	0.100	4708000
6.750	-0.0016 -0.0056	7.250	+0.012 +0.000	7.090	+0.010 +0.000	0.312	0.472	0.080	4547500
7.000	-0.0016 -0.0056	7.500	+0.012 +0.000	7.340	+0.012 +0.000	0.312	0.472	0.080	4708700
7.000	-0.0016 -0.0056	7.750	+0.012 +0.000	7.495	+0.012 +0.000	0.500	0.740	0.100	4588400



$\varnothing d_1$	TOL f9	$\varnothing D_1$	TOL H11	$\varnothing D_2$	TOL H11	L_1 +0.008 -0	L_2	h +0.004 -0	PART No.
7.000	-0.0016 -0.0056	8.000	+0.012 +0.000	7.625	+0.012 +0.000	0.500	0.740	0.125	4774100
7.750	-0.0020 -0.0065	8.250	+0.012 +0.000	8.090	+0.012 +0.000	0.312	0.472	0.080	4547600
8.000	-0.0020 -0.0065	8.500	+0.012 +0.000	8.340	+0.012 +0.000	0.312	0.472	0.080	4708800
8.750	-0.0020 -0.0065	9.250	+0.012 +0.000	9.090	+0.012 +0.000	0.312	0.472	0.080	4536700

Design

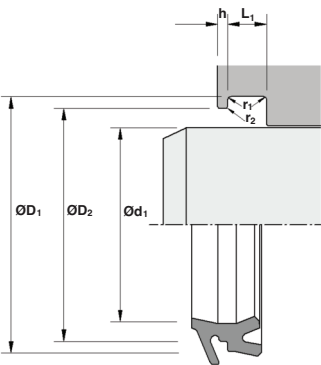
The Hallite 844 wiper has been specifically developed for cylinders used in demanding off-highway applications. It is a double lip wiper designed for use with venting U-rings such as the Hallite 663 rod seal. The special feature is the flap on the wiping lip which covers the gland housing, preventing the water/slurry trap so common with conventional wipers and thus ingress of contamination around the outside of the wiper. The design minimises the oil transfer out of the ram on the cylinder rod and prevents dirt, contamination and moisture entering the cylinder through the rod gland. The design is also particularly tolerant to rod deflection.

The standard range is made from the high-performance Hallite® 361 polyurethane. The wiper is also available in other Hallite polyurethane grades, if required.

Some sizes, indicated by * have a textured wiping lip as the Type 846 for long stroking cylinder applications.

Features

- Contamination resistant
- Tolerant to rod deflection
- Water/slurry trap prevention
- Textured wiping lip option
- Range of materials



Technical details

Operating conditions

Maximum Speed	4.0 m/sec
Temperature Range	-45°C +110°C

Surface roughness

Dynamic Sealing Face $\text{Ø}d_1$	μmRa 0.1 < > 0.4	μmRt 4 max
Static Sealing Face $\text{Ø}D_1$ $\text{Ø}D_2$	1.6 max	10 max
Static Housing Faces L_1	3.2 max	16 max

Radii

Max Fillet Rad r_1 mm	0.4
Max Fillet Rad r_2 mm	0.4

Tolerances

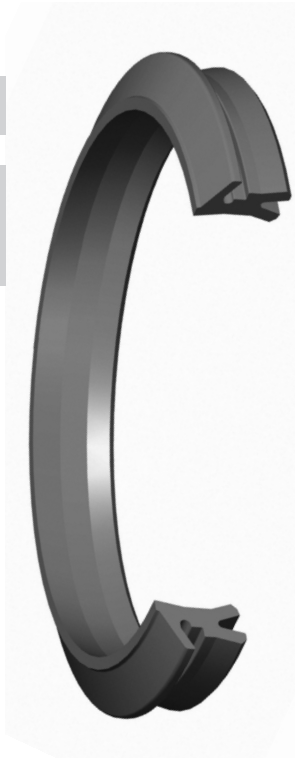
	$\text{Ø}d_1$	$\text{Ø}D_1$	$\text{Ø}D_2$	L_1	h
mm	f9	H11	H11	+0.2 -0	+0.2 -0

Metric

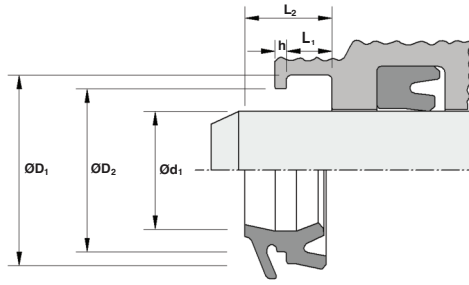
Inch

12.0 ft/sec
-50°F +230°F

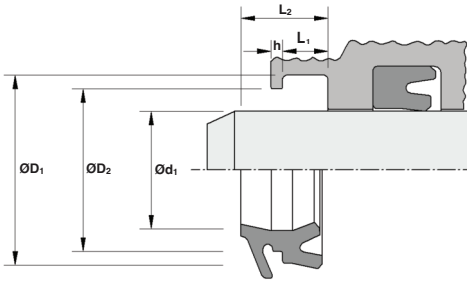
μinCLA	μinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max



wipers



Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 -0	L ₂	h +0.2 -0	PART No.
16	-0.020 -0.072	22.0	+0.16 +0.00	19.0	+0.13 +0.00	4.0	7.0	1.00	4826406
18	-0.020 -0.072	24.0	+0.16 +0.00	21.0	+0.13 +0.00	4.0	7.0	1.00	4848606
20	-0.020 -0.072	26.0	+0.16 +0.00	23.0	+0.13 +0.00	4.0	7.0	1.00	4827606
25	-0.020 -0.072	31.0	+0.16 +0.00	28.8	+0.13 +0.00	4.0	7.0	1.00	4805206
28	-0.020 -0.072	36.0	+0.16 +0.00	33.0	+0.16 +0.00	5.0	9.0	1.20	4833106
30	-0.020 -0.072	38.0	+0.16 +0.00	35.0	+0.16 +0.00	5.0	9.0	1.20	4803706
32	-0.020 -0.087	40.0	+0.16 +0.00	37.0	+0.16 +0.00	5.0	9.0	1.20	4827706
35	-0.020 -0.087	43.0	+0.16 +0.00	40.0	+0.16 +0.00	5.0	9.0	1.20	4805306
36	-0.020 -0.087	44.0	+0.16 +0.00	41.0	+0.16 +0.00	5.0	9.0	1.20	4833206
40	-0.020 -0.087	48.0	+0.16 +0.00	45.0	+0.16 +0.00	5.0	9.0	1.20	4794006
45	-0.020 -0.087	53.0	+0.19 +0.00	50.0	+0.16 +0.00	5.0	9.0	1.20	4800006
50	-0.020 -0.087	58.0	+0.19 +0.00	55.0	+0.19 +0.00	5.0	8.0	1.20	4869606
50	-0.020 -0.087	58.0	+0.19 +0.00	55.0	+0.19 +0.00	5.0	9.0	1.20	4803606
50.8	-0.030 -0.104	60.8	+0.19 +0.00	57.8	+0.19 +0.00	6.0	10.0	1.20	4781500*
55	-0.030 -0.104	65.0	+0.19 +0.00	60.0	+0.19 +0.00	6.0	11.5	1.60	4805406
60	-0.030 -0.104	70.0	+0.19 +0.00	67.0	+0.19 +0.00	6.0	9.5	1.60	4869706
60	-0.030 -0.104	70.0	+0.19 +0.00	67.0	+0.19 +0.00	6.0	11.5	1.60	4799506
63	-0.030 -0.104	73.0	+0.19 +0.00	70.0	+0.19 +0.00	6.0	11.5	1.60	4833306
65	-0.030 -0.104	75.0	+0.19 +0.00	72.0	+0.19 +0.00	6.0	11.5	1.60	4805506
70	-0.030 -0.104	80.0	+0.19 +0.00	77.0	+0.19 +0.00	6.0	11.5	1.60	4805606
75	-0.030 -0.104	85.0	+0.22 +0.00	82.0	+0.22 +0.00	6.0	11.5	1.60	4805706
80	-0.030 -0.104	90.0	+0.22 +0.00	87.0	+0.22 +0.00	6.0	11.5	1.60	4805806
85	-0.036 -0.123	95.0	+0.22 +0.00	92.0	+0.22 +0.00	6.0	11.5	1.60	4805906



Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 -0	L ₂	h +0.2 -0	PART No.
90	-0.036 -0.123	100.0	+0.22 +0.00	97.0	+0.22 +0.00	6.0	11.5	1.60	4806006
105	-0.036 -0.123	120.0	+0.22 +0.00	115.0	+0.22 +0.00	9.5	17.0	2.50	4800400*
110	-0.036 -0.123	125.0	+0.25 +0.00	120.0	+0.22 +0.00	9.5	17.0	2.50	4853106
125	-0.043 -0.143	140.0	+0.25 +0.00	135.0	+0.25 +0.00	9.5	17.0	2.50	4853206

* These parts are made in Hythane® 181 and have a textured wiping lip for long stroking cylinder applications.

Design

The Hallite 846 wiper is designed to exclude dirt and moisture from entering the cylinder and to collect traces of fluid passing the rod seal.

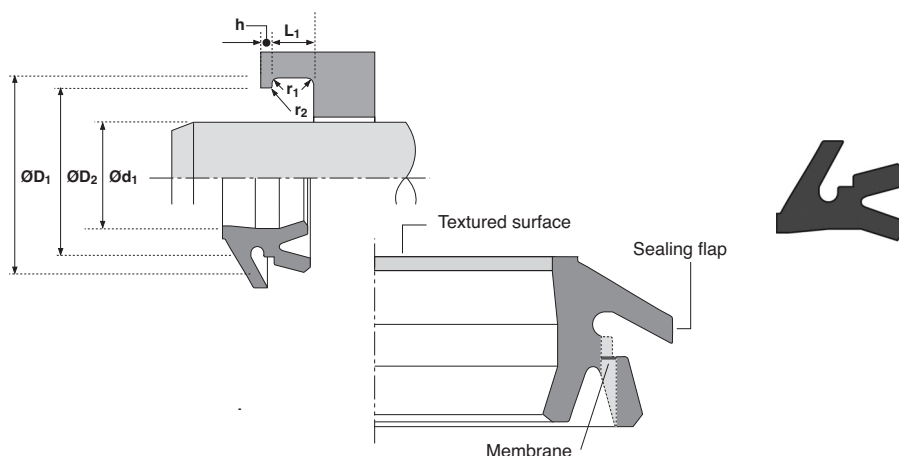
One special feature of the wiper design are the thin membranes which burst when excessive fluid pressure is trapped between the wiper and the rod seal and prevent the wiper being forced out of its housing. After release of this pressure, the membranes close to protect against contamination from the outside. This feature removes the requirement for an expensive vent hole in the gland.

A second feature is the sealing flap on the wiping lip that completely seals the metal housing groove, preventing the ingress of dirt and moisture around the outside diameter of the wiper.

Precision moulded in Hallite's high performance polyurethane, Hythane® 181, for maximum wear resistance and temperature range, the wiper is designed to remove lightly adhered dirt, dust and moisture from the rod.

Features

- Twin lip - no leakage
- Trapped pressure automatically released through bursting membranes
- No push out of wiper through build up of pressure
- No gland vent hole necessary
- Sealing flap protects against ingress of dirt and moisture around the outside diameter



Technical details

Operating conditions

Maximum Speed

Temperature Range

Metric

4.0 m/sec

-45°C +110°C

Surface roughness

Dynamic Sealing Face Ød_1

Static Sealing Face ØD_1 h

Static Housing Faces L_1

μmRa

0.1 < > 0.4

1.6 max

3.2 max

μmRt

4 max

10 max

16 max

Inch

12.0 ft/sec

-50°F +230°F

μinCLA

4 < > 16

63 max

125 max

μinRMS

5 < > 18

70 max

140 max

Radii

Rod Diameter Ød_1 mm

Max Fillet Rad r_1 mm

Max Fillet Rad r_2 mm

≤90

0.4

0.2

>90

0.4

0.4

Tolerances

mm

Ød_1

f9

ØD_1

H11

ØD_2

H11

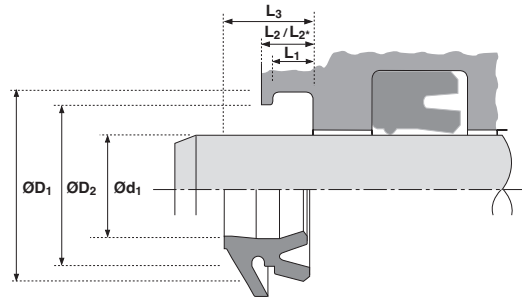
L_1

+0.2 -0

L_2

+0.2 -0





Ød ₁	TOL f9	ØD ₁	TOL H11	ØD ₂	TOL H11	L ₁ +0.2 - 0	L ₂ +0.2 - 0	L ₂ * +0.2 - 0	L ₃	PART No.
24	-0.020 -0.072	32.0	+0.16 +0.00	30.0	+0.16 +0.00	4.0	5.0	6.0	8.7	4764400
25	-0.020 -0.072	33.0	+0.16 +0.00	31.0	+0.16 +0.00	4.0	5.0	6.0	8.7	4556600
26	-0.020 -0.072	34.0	+0.16 +0.00	32.0	+0.16 +0.00	4.0	5.0	6.0	8.7	4588700
28	-0.020 -0.072	36.0	+0.16 +0.00	34.0	+0.16 +0.00	4.0	5.0	6.0	8.7	4556700
30	-0.020 -0.072	38.0	+0.16 +0.00	36.0	+0.16 +0.00	4.0	5.0	6.0	8.7	4584500
32	-0.025 -0.087	40.0	+0.16 +0.00	38.0	+0.16 +0.00	4.0	5.0	6.0	8.7	4568900
36	-0.025 -0.087	44.0	+0.16 +0.00	42.0	+0.16 +0.00	4.0	5.0	6.0	8.7	4588800
40	-0.025 -0.087	48.0	+0.16 +0.00	46.0	+0.16 +0.00	4.0	5.0	6.0	8.7	4549200
45	-0.025 -0.087	53.0	+0.19 +0.00	51.0	+0.19 +0.00	4.0	5.0	6.0	8.7	4589900
50	-0.025 -0.087	58.0	+0.19 +0.00	56.0	+0.19 +0.00	4.0	5.0	6.0	8.7	4597200
54	-0.030 -0.104	62.0	+0.19 +0.00	60.0	+0.19 +0.00	4.0	5.0	6.0	8.7	4803300
56	-0.030 -0.104	64.0	+0.19 +0.00	62.0	+0.19 +0.00	4.0	5.0	6.0	8.7	4588900
60	-0.030 -0.104	68.0	+0.19 +0.00	66.0	+0.19 +0.00	4.0	5.0	6.0	8.7	4596600
63	-0.030 -0.104	71.0	+0.19 +0.00	69.0	+0.19 +0.00	4.0	5.0	6.0	8.7	4749600
65	-0.030 -0.104	73.0	+0.19 +0.00	71.0	+0.19 +0.00	4.0	5.0	6.0	8.7	4597500
70	-0.030 -0.104	78.0	+0.19 +0.00	76.0	+0.19 +0.00	4.0	5.0	6.0	8.7	4556800
75	-0.030 -0.104	83.0	+0.22 +0.00	81.0	+0.22 +0.00	4.0	5.0	6.0	8.7	4597600
80	-0.030 -0.104	88.0	+0.22 +0.00	86.0	+0.22 +0.00	4.0	5.0	6.0	8.7	4590000
90	-0.036 -0.123	98.0	+0.22 +0.00	96.0	+0.22 +0.00	4.0	5.0	6.0	8.7	4557700
100	-0.036 -0.123	110.0	+0.22 -0.00	107.0	+0.22 -0.00	6.3	8.1		11.7	4723600

NB - The housing length shows options for L₂ and L₂* .
L₂ is the preferred dimension but either can be used.

Design

The Hallite 860 is a metal cased wiper, designed to press-fit into open groove housings. Hallite's 860 wiper comprises a precisely trimmed polyurethane wiping element which is securely bonded to a metal case treated with a rust inhibitor. Capable of operating in dirty conditions, the proportions of the polyurethane wiping lip allow it to follow the side movement of the rod and to clear away heavily deposited dirt.

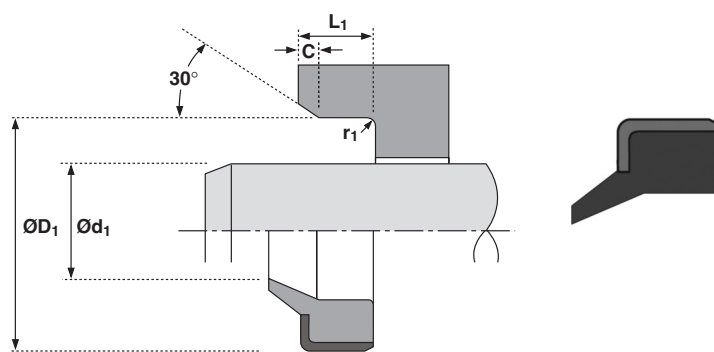
Suitable for light, medium and heavy duty applications, the wiper has been designed to provide ease of installation and offers excellent durability in service. The Hallite 860 offers a range of sizes suitable for ISO 6195 type B housings and a range for standard Asian housings.

NB: Part numbers suffixed by “†” are designed for Asian housings.

Part numbers suffixed by “‡” indicate housing sizes to meet ISO 6195 type B.

Features

- Ease of assembly
- Long life
- Precision trimmed wiping lip
- Metal case treated with a rust inhibitor
- Wide range of application uses
- Range includes ISO & standard Asian housings



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-40°C +100°C

Inch

3.0 ft/sec
-40°F +212°F

Surface roughness

	µmRa	µmRt
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max
Static Sealing Face ØD ₁	1.6 max	10 max
Static Housing Faces L ₁	3.2 max	16 max

µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max

Chamfers & Radii

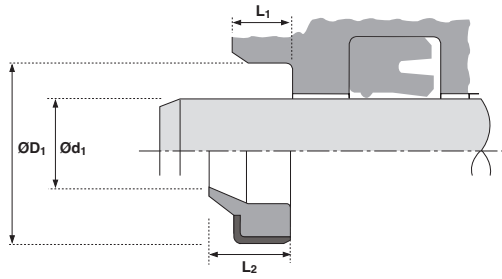
Rod Diameter Ød ₁ mm	≤ 19	≥ 19
Min Chamfer C mm	0.5	1.0
Max Fillet Rad r ₁ mm	0.4	0.4
Rod Diameter Ød ₁ in	< 0.75	≥ 0.75
Min Chamfer C in	0.020	0.040
Max Fillet Rad r ₁ in	0.016	0.016

Tolerances

Ød ₁	ØD ₁	L ₁ mm	L ₁ in
f9	H8	+0.5 -0	+0.020 -0

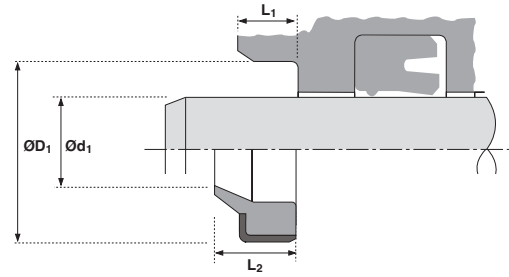


wipers



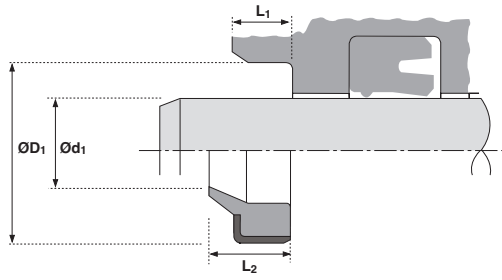
Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁ +0.5 -0	L ₂	PART No.
8	-0.013 -0.049	14	+0.033 +0.000	3.5	5.0	6950520
12	-0.016 -0.059	20	+0.033 +0.000	4.0	6.0	6950530
15	-0.016 -0.059	25	+0.033 +0.000	5.0	7.0	6950000
16	-0.016 -0.059	22	+0.033 +0.000	3.0	4.0	6950010
18	-0.016 -0.059	28	+0.033 +0.000	5.0	7.0	6950020
18	-0.016 -0.059	28	+0.033 +0.000	7.0	10.0	6950540
20	-0.020 -0.072	30	+0.033 +0.000	4.0	6.0	6950550
20	-0.020 -0.072	30	+0.033 +0.000	5.0	8.0	6950030
20	-0.020 -0.072	30	+0.033 +0.000	7.0	10.0	6950560
22	-0.020 -0.072	32	+0.033 +0.000	5.0	8.0	6950570
25	-0.020 -0.072	35	+0.039 +0.000	5.0	8.0	6950040
25	-0.020 -0.072	35	+0.039 +0.000	7.0	10.0	6950580
25	-0.020 -0.072	37	+0.039 +0.000	6.0	9.0	6950050†
28	-0.020 -0.072	38	+0.039 +0.000	5.0	8.0	6950060
28	-0.020 -0.072	38	+0.039 +0.000	7.0	10.0	6950590
30	-0.020 -0.072	40	+0.039 +0.000	5.0	8.0	6950070
30	-0.020 -0.072	40	+0.039 +0.000	7.0	10.0	6950600
30	-0.020 -0.072	42	+0.039 +0.000	6.0	9.0	6950080†
32	-0.025 -0.087	42	+0.039 +0.000	5.0	8.0	6950090
32	-0.025 -0.087	42	+0.039 +0.000	7.0	10.0	6950610
32	-0.025 -0.087	45	+0.039 +0.000	5.0	8.0	6950620
32	-0.025 -0.087	45	+0.039 +0.000	7.0	10.0	6950630
35	-0.025 -0.087	45	+0.039 +0.000	4.0	6.0	6950640

Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁ +0.5 -0	L ₂	PART No.
35	-0.025 -0.087	45	+0.039 +0.000	7.0	10.0	6950100
35	-0.025 -0.087	47	+0.039 +0.000	7.0	10.0	6950110†
36	-0.025 -0.087	45	+0.039 +0.000	7.0	10.0	6950650
36	-0.025 -0.087	46	+0.039 +0.000	7.0	10.0	6950660
38	-0.025 -0.087	48	+0.039 +0.000	7.0	10.0	6950470
40	-0.025 -0.087	50	+0.039 +0.000	7.0	10.0	6950120‡
40	-0.025 -0.087	52	+0.046 +0.000	7.0	10.0	6950130†
42	-0.025 -0.087	52	+0.046 +0.000	7.0	10.0	6950670
45	-0.025 -0.087	55	+0.046 +0.000	5.0	8.0	6950680
45	-0.025 -0.087	55	+0.046 +0.000	7.0	10.0	6950140‡
45	-0.025 -0.087	57	+0.046 +0.000	7.0	10.0	6950150†
50	-0.025 -0.087	60	+0.046 +0.000	5.0	8.0	6950690
50	-0.025 -0.087	60	+0.046 +0.000	7.0	10.0	6950160‡
50	-0.025 -0.087	62	+0.046 +0.000	7.0	10.0	6950170†
55	-0.030 -0.104	65	+0.046 +0.000	7.0	10.0	6950180
55	-0.030 -0.104	69	+0.046 +0.000	8.0	11.0	6950190†
55	-0.030 -0.104	70	+0.046 +0.000	5.0	8.0	6950700
55	-0.030 -0.104	70	+0.046 +0.000	7.0	10.0	6667689
60	-0.030 -0.104	70	+0.046 +0.000	5.0	8.0	6950710
60	-0.030 -0.104	70	+0.046 +0.000	7.0	10.0	6950200
60	-0.030 -0.104	74	+0.046 +0.000	8.0	11.0	6950210†
60	-0.030 -0.104	75	+0.046 +0.000	5.0	8.0	6950720
60	-0.030 -0.104	75	+0.046 +0.000	7.0	10.0	6950730



Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁ +0.5 -0	L ₂	PART No.
63	-0.030 -0.104	73	+0.046 +0.000	7.0	10.0	6667690‡
63	-0.030 -0.104	75	+0.046 +0.000	7.0	10.0	6950750
65	-0.030 -0.104	75	+0.046 +0.000	7.0	10.0	6950220
65	-0.030 -0.104	79	+0.046 +0.000	8.0	11.0	6950230†
70	-0.030 -0.104	80	+0.046 +0.000	7.0	10.0	6950240‡
70	-0.030 -0.104	84	+0.054 +0.000	8.0	11.0	6950250†
75	-0.030 -0.104	85	+0.054 +0.000	7.0	10.0	6950260
75	-0.030 -0.104	89	+0.054 +0.000	8.0	11.0	6950270†
80	-0.030 -0.104	90	+0.054 +0.000	7.0	10.0	6950280‡
80	-0.030 -0.104	94	+0.054 +0.000	8.0	11.0	6950290†
85	-0.036 -0.123	95	+0.054 +0.000	7.0	10.0	6950300
85	-0.036 -0.123	95	+0.054 +0.000	5.0	8.0	6950760
85	-0.036 -0.123	99	+0.054 +0.000	8.0	11.0	6950310†
90	-0.036 -0.123	100	+0.054 +0.000	7.0	10.0	6950320‡
90	-0.036 -0.123	104	+0.054 +0.000	8.0	11.0	6950330†
95	-0.036 -0.123	109	+0.054 +0.000	8.0	11.0	6950340†
100	-0.036 -0.123	110	+0.054 +0.000	7.0	10.0	6950350

Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁ +0.5 -0	L ₂	PART No.
100	-0.036 -0.123	114	+0.054 +0.000	8.0	11.0	6950360†
105	-0.036 -0.123	115	+0.063 +0.000	7.0	10.0	6950770
105	-0.036 -0.123	121	+0.063 +0.000	9.0	12.0	6950370†
110	-0.036 -0.123	120	+0.054 +0.000	7.0	10.0	6950380
110	-0.036 -0.123	126	+0.063 +0.000	9.0	12.0	6950390†
115	-0.036 -0.123	131	+0.063 +0.000	9.0	12.0	6950400†
120	-0.036 -0.123	130	+0.063 +0.000	7.0	10.0	6950410
120	-0.036 -0.123	136	+0.063 +0.000	9.0	12.0	6950420†
125	-0.043 -0.143	140	+0.063 +0.000	9.0	12.0	6950780
125	-0.043 -0.143	141	+0.063 +0.000	9.0	12.0	6950790
130	-0.043 -0.143	146	+0.063 +0.000	9.0	12.0	6950430†
135	-0.043 -0.143	155	+0.063 +0.000	10.0	14.0	6950800
140	-0.043 -0.143	155	+0.063 +0.000	9.0	12.0	6950810
140	-0.043 -0.143	160	+0.063 +0.000	10.0	14.0	6950440†
150	-0.043 -0.143	170	+0.063 +0.000	10.0	14.0	6950450†
160	-0.043 -0.143	180	+0.063 +0.000	10.0	14.0	6950460†
180	-0.043 -0.143	195	+0.063 +0.000	10.0	14.0	6950820



Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁ +0.020 -0	L ₂	PART No.
0.750	-0.0008 -0.0028	1.125	+0.0013 +0.0000	0.187	0.281	6955100
1.000	-0.0008 -0.0028	1.375	+0.0015 +0.0000	0.187	0.281	6955120
1.250	-0.0010 -0.0034	1.625	+0.0015 +0.0000	0.187	0.281	6955140
1.500	-0.0010 -0.0034	1.875	+0.0015 +0.0000	0.187	0.281	6955160
1.750	-0.0010 -0.0034	2.125	+0.0018 +0.0000	0.187	0.281	6955180

Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁ +0.020 -0	L ₂	PART No.
2.000	-0.0012 -0.0041	2.375	+0.0018 +0.0000	0.187	0.281	6955200
2.250	-0.0012 -0.0041	2.625	+0.0018 +0.0000	0.187	0.281	6955220
2.500	-0.0012 -0.0041	2.875	+0.0018 +0.0000	0.187	0.281	6955240
2.750	-0.0012 -0.0041	3.125	+0.0018 +0.0000	0.187	0.281	6955260
3.000	-0.0012 -0.0041	3.375	+0.0021 +0.0000	0.187	0.281	6955280

Design

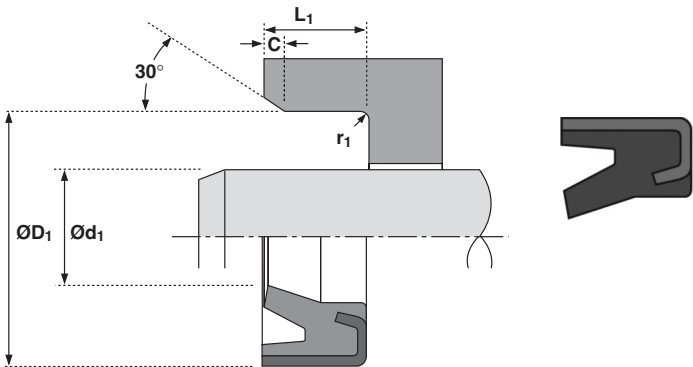
The Hallite 862 is a metal cased wiper, designed to press-fit into open groove housings. Hallite’s 862 comprises a precisely trimmed polyurethane wiping element which is securely bonded to a metal case treated with a rust inhibitor. Capable of operating in dirty conditions, the proportions of the polyurethane wiping lip allow it to follow the side movement of the rod and to clear away heavily deposited dirt.

Suitable for light, medium and heavy duty applications, the wiper has been designed to provide ease of installation and offers excellent durability in service.

The Hallite 862 offers a range of sizes suitable for standard American inch housings.

Features

- Ease of assembly
- Long life
- Precision trimmed wiping lip
- Metal case treated with rust inhibitor
- Wide range of application uses



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-40°C +100°C

Surface roughness

Dynamic Sealing Face $\varnothing d_1$	μmRa 0.1 > 0.4	μmRt 4 max
Static Sealing Face $\varnothing D_1$	1.6 max	10 max
Static Housing Faces L_1	3.2 max	16 max

Chamfers & Radii

Min Chamfer C in	0.040
Max Fillet Rad r_1 in	0.016

Tolerances

$\varnothing d_1$	$\varnothing D_1$	L_1
f9	H8	+0.020 -0

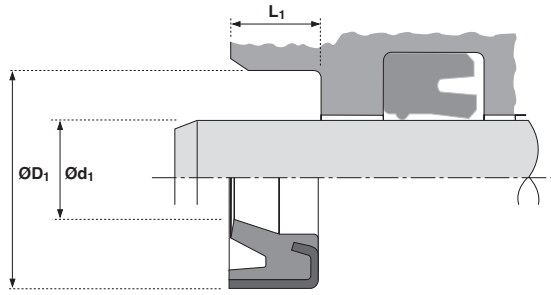
Inch

3.0 ft/sec
-40°F +212°F

$\mu inCLA$	$\mu inRMS$
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max



wipers



Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁	TOL	PART No.
0.625	-0.0006 -0.0023	1.125	+0.0012 +0.0000	0.313	+0.020 -0.000	6960000
0.750	-0.0008 -0.0028	1.250	+0.0016 +0.0000	0.313	+0.020 -0.000	6960010
1.000	-0.0008 -0.0028	1.500	+0.0016 +0.0000	0.313	+0.020 -0.000	6960020
1.125	-0.0008 -0.0028	1.625	+0.0016 +0.0000	0.313	+0.020 -0.000	6960030
1.250	-0.0010 -0.0034	1.750	+0.0016 +0.0000	0.25	+0.020 -0.000	6960260
1.250	-0.0010 -0.0034	1.750	+0.0016 +0.0000	0.313	+0.020 -0.000	6960040
1.375	-0.0010 -0.0034	1.875	+0.0016 +0.0000	0.313	+0.020 -0.000	6960050
1.500	-0.0010 -0.0034	2.000	+0.0018 +0.0000	0.25	+0.020 -0.000	6960270
1.500	-0.0010 -0.0034	2.000	+0.0018 +0.0000	0.313	+0.020 -0.000	6960060
1.625	-0.0010 -0.0034	2.125	+0.0018 +0.0000	0.313	+0.020 -0.000	6960070
1.750	-0.0010 -0.0034	2.250	+0.0018 +0.0000	0.313	+0.020 -0.000	6960080
2.000	-0.0012 -0.0041	2.500	+0.0018 +0.0000	0.313	+0.020 -0.000	6960090
2.250	-0.0012 -0.0041	2.750	+0.0018 +0.0000	0.313	+0.020 -0.000	6960100
2.500	-0.0012 -0.0041	3.000	+0.0018 +0.0000	0.313	+0.020 -0.000	6960110

Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁	TOL	PART No.
2.750	-0.0012 -0.0041	3.250	+0.0022 +0.0000	0.313	+0.020 -0.000	6960120
3.000	-0.0012 -0.0041	3.500	+0.0022 +0.0000	0.313	+0.020 -0.000	6960130
3.250	-0.0014 -0.0048	3.750	+0.0022 +0.0000	0.313	+0.020 -0.000	6960140
3.250	-0.0014 -0.0048	3.875	+0.0022 +0.0000	0.313	+0.020 -0.000	6960150
3.500	-0.0014 -0.0048	4.000	+0.0022 +0.0000	0.313	+0.020 -0.000	6960160
3.500	-0.0014 -0.0048	4.125	+0.0022 +0.0000	0.313	+0.020 -0.000	6960170
3.750	-0.0014 -0.0048	4.375	+0.0022 +0.0000	0.313	+0.020 -0.000	6960180
4.000	-0.0014 -0.0048	4.625	+0.0022 +0.0000	0.313	+0.020 -0.000	6960190
4.000	-0.0014 -0.0048	4.750	+0.0025 +0.0000	0.313	+0.020 -0.000	6960200
4.000	-0.0014 -0.0048	5.000	+0.0025 +0.0000	0.500	+0.020 -0.000	6960210
4.500	-0.0014 -0.0048	5.125	+0.0025 +0.0000	0.313	+0.020 -0.000	6960220
4.500	-0.0014 -0.0048	5.500	+0.0025 +0.0000	0.500	+0.020 -0.000	6960230
5.000	-0.0016 -0.0056	5.625	+0.0025 +0.0000	0.313	+0.020 -0.000	6960240
5.000	-0.0016 -0.0056	6.000	+0.0025 +0.0000	0.500	+0.020 -0.000	6960250

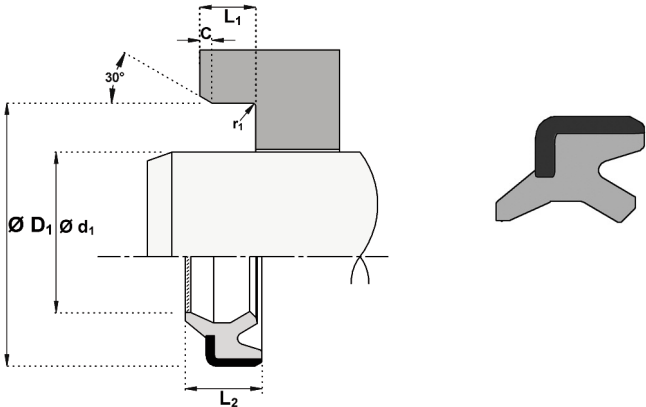
Design

The Hallite 864 is a double lipped metal cased wiper, designed to press-fit into open groove housings. Hallite’s 864 wiper comprises a specially textured polyurethane wiping lip which is securely bonded to a nitrided metal case, eliminating the potential for rust. Opposite the wiping lip are two sealing lips accurately produced and proportioned to collect the fluid passing the rod seal. Capable of operating in dirty conditions, the proportions of the polyurethane wiping lip allow it to follow the side movement of the rod and to clear away heavily deposited dirt. The Hallite 864 wiper is designed for use with venting U-rings such as the Hallite 663 rod seal.

Suitable for light, medium and heavy duty applications, the wiper has been designed to provide ease of installation and offers excellent durability in service.

Features

- Ease of assembly
- Long life
- Textured wiping lip minimising oil transfer
- Nitrided metal case
- Wide range of application uses



Technical details

Operating conditions

Maximum Speed	1.0 m/sec
Temperature Range	-45°C +110°C

Surface roughness

	µmRa	µmRt
Dynamic Sealing Face Ød ₁	0.1 < > 0.4	4 max
Static Sealing Face ØD ₁	1.6 max	10 max
Static Housing Faces L ₁	3.2 max	16 max

Chamfers & Radii

Rod Diameter Ød ₁ mm	≤ 19	≥ 19
Min Chamfer C mm	0.5	1.0
Max Fillet Rad r ₁ mm	0.4	0.4

Tolerances

Ød ₁	ØD ₁	L ₁ mm
f9	H8	+0.5 -0

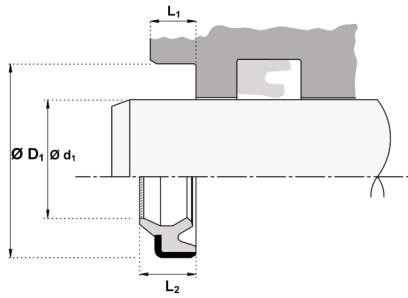
Inch

3.0 ft/sec
-50°F +230°F

µinCLA	µinRMS
4 < > 16	5 < > 18
63 max	70 max
125 max	140 max



wipers

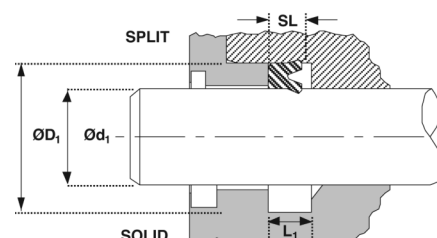
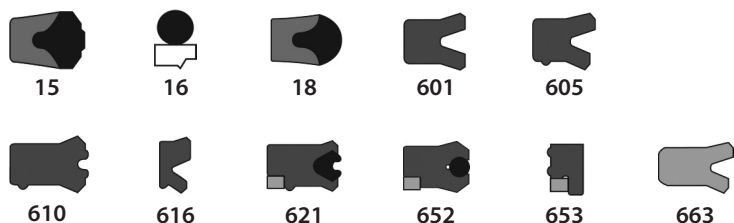


Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁ +0.5 -0	L ₂	PART No.
25	-0.020 -0.072	35	+0.039 +0.000	5.0	8.0	4680506
30	-0.020 -0.072	40	+0.039 +0.000	5.0	8.0	4680606
30	-0.020 -0.072	42	+0.039 +0.000	6.0	9.0	4680706
35	-0.025 -0.087	45	+0.039 +0.000	7.0	10.0	4680806
35	-0.025 -0.087	47	+0.039 +0.000	7.0	10.0	4680906
36	-0.025 -0.087	48	+0.039 +0.000	7.0	10.0	4683206
40	-0.025 -0.087	50	+0.039 +0.000	5.0	8.0	4681006
40	-0.025 -0.087	52	+0.046 +0.000	7.0	10.0	4681106
45	-0.025 -0.087	55	+0.046 +0.000	7.0	10.0	4681206
45	-0.025 -0.087	57	+0.046 +0.000	7.0	10.0	4681306
50	-0.025 -0.087	62	+0.046 +0.000	7.0	10.0	4680206
55	-0.030 -0.104	69	+0.046 +0.000	8.0	11.0	4681406
60	-0.030 -0.104	74	+0.046 +0.000	8.0	11.0	4681506
65	-0.030 -0.104	79	+0.046 +0.000	8.0	11.0	4681606

Ød ₁	TOL f9	ØD ₁	TOL H8	L ₁ +0.5 -0	L ₂	PART No.
70	-0.030 -0.104	84	+0.054 +0.000	8.0	11.0	4681706
75	-0.030 -0.104	89	+0.054 +0.000	8.0	11.0	4681806
80	-0.030 -0.104	94	+0.054 +0.000	8.0	11.0	4681906
85	-0.036 -0.123	99	+0.054 +0.000	8.0	11.0	4682006
90	-0.036 -0.123	104	+0.054 +0.000	8.0	11.0	4682106
95	-0.036 -0.123	109	+0.054 +0.000	8.0	11.0	4682206
100	-0.036 -0.123	114	+0.054 +0.000	8.0	11.0	4682306
110	-0.036 -0.123	126	+0.063 +0.000	9.0	12.0	4682406
120	-0.036 -0.123	136	+0.063 +0.000	9.0	12.0	4682506
130	-0.043 -0.143	146	+0.063 +0.000	9.0	12.0	4682606
135	-0.043 -0.143	155	+0.063 +0.000	10.0	14.0	4683506
140	-0.043 -0.143	160	+0.063 +0.000	10.0	14.0	4682706
150	-0.043 -0.143	170	+0.063 +0.000	10.0	14.0	4682806
160	-0.043 -0.143	180	+0.063 +0.000	10.0	14.0	4682906

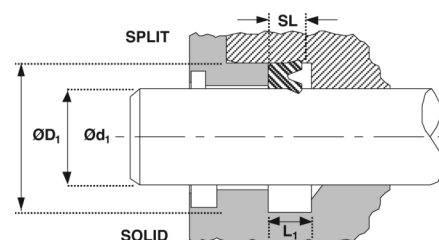
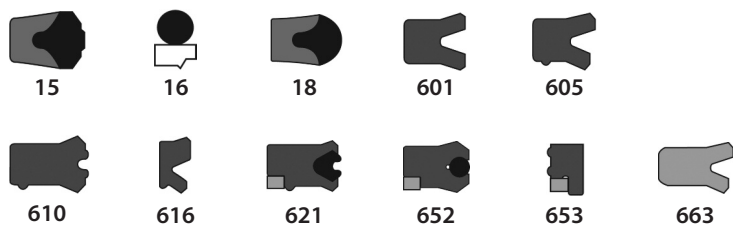
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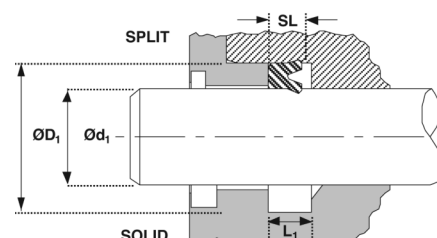
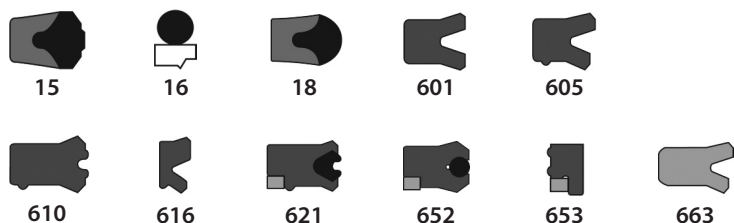
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601	4.50	12.50	4.40	5.00	4506701
601	5.00	12.00	5.50	6.50	4508601
601	6.00	13.00	8.00	9.00	4460300
018	6.00	14.00		6.00	0202200
605	6.00	15.00	7.30	8.00	4790600
605	6.00	16.00	7.00	8.00	4580600
018	8.00	16.00		6.00	0202400
610	8.00	16.00	5.30	6.00	4581000
605	8.00	18.00	7.00	8.00	4580500
605	10.00	15.00	3.60	4.00	4402300
018	10.00	18.00		6.00	0202500
601	10.00	18.00	6.00	6.60	4299900
601	10.00	20.00	8.00	9.00	4600000
605	12.00	18.00	4.00	4.50	4578000
605	12.00	18.00	5.70	6.30	4314900
601	12.00	18.00	6.00	7.00	4621300
605	12.00	19.00	4.50	5.00	4341600
605	12.00	19.00	5.00	5.60	4710000
016	12.00	19.50		3.20	8610610
018	12.00	20.00		6.00	0202600
601	12.00	20.00	4.40	5.00	4182501
605	12.00	20.00	5.70	6.30	4310900
605	12.00	22.00	7.30	8.00	4857200
663	12.00	22.00	7.30	8.00	4865100
605	12.00	22.00	7.70	9.00	4315000
601	12.00	25.00	8.00	9.00	4600100
605	12.70	18.00	5.50	6.00	4370400
605	13.00	20.00	4.50	5.00	4351600
605	14.00	21.00	5.00	5.60	4710100
016	14.00	21.50		3.20	8609810
616	14.00	21.50	2.80	3.20	4577700
601	14.00	22.00	4.40	5.00	4182601
601	14.00	22.00	5.00	5.70	4604000
610	14.00	22.00	5.30	6.00	4580900
605	14.00	22.00	5.70	6.30	4311000
018	14.00	24.00		7.50	0202700
605	14.00	24.00	7.30	8.00	4310000
601	14.00	24.00	8.00	9.00	4600200
663	14.00	24.00	8.20	9.00	4865200

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	15.00	22.00	5.70	6.30	4762200
016	15.00	22.50		3.20	8617910
018	15.00	25.00		7.50	0202800
601	15.00	25.00	8.00	9.00	4600300
605	15.37	25.48	6.35	7.40	4333800
605	16.00	22.00	4.50	5.00	4341700
605	16.00	22.00	5.00	6.00	4314100
016	16.00	23.50		3.20	6622510
601	16.00	24.00	4.40	5.00	4182701
601	16.00	24.00	5.00	5.70	4604100
663	16.00	24.00	5.70	6.30	4789300
605	16.00	24.00	5.80	6.30	4295200
605	16.00	24.00	5.80	6.30	4295206
018	16.00	26.00		7.50	0615900
015	16.00	26.00		8.00	0754300
663	16.00	26.00	7.30	8.00	4865300
605	16.00	26.00	7.70	9.00	4311100
601	16.00	26.00	8.00	9.00	4600400
605	18.00	24.00	4.50	5.00	4712000
610	18.00	25.00	4.60	5.60	4334600
605	18.00	25.00	5.00	6.00	4314200
016	18.00	25.50		3.20	6622610
616	18.00	25.50	2.80	3.20	4341800
601	18.00	26.00	4.40	5.00	4182901
601	18.00	26.00	5.00	5.70	4604200
605	18.00	26.00	5.00	5.70	4611000
605	18.00	26.00	5.70	6.30	4311200
663	18.00	26.00	5.70	6.30	4789400
605	18.00	26.00	6.00	7.00	4333900
605	18.00	26.00	8.20	9.00	4863000
018	18.00	28.00		7.50	0202900
601	18.00	28.00	7.30	8.00	4547900
605	18.00	28.00	7.70	9.00	4305100
601	18.00	28.00	8.00	9.00	4600500
605	20.00	25.00	3.20	3.50	4332100
610	20.00	26.00	4.50	5.50	4319400
605	20.00	26.00	5.00	5.50	4315100
605	20.00	26.00	6.50	7.60	4826000
605	20.00	27.00	6.00	6.70	4702900



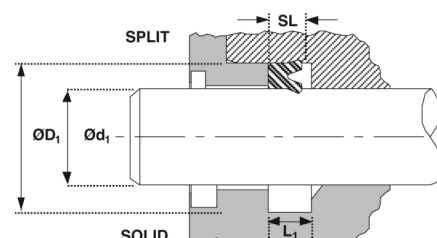
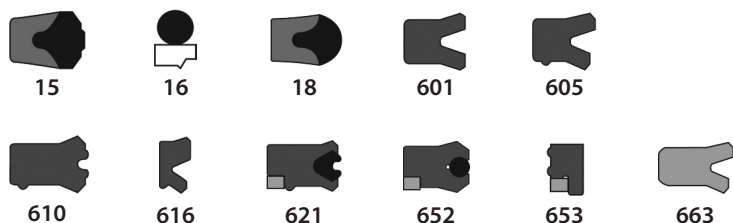
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616	20.00	27.50	2.80	3.20	4721700
015	20.00	28.00		6.40	2137000
601	20.00	28.00	4.40	5.00	4183001
601	20.00	28.00	5.00	5.70	4604300
605	20.00	28.00	5.00	5.70	4611100
605	20.00	28.00	5.70	6.30	4362100
663	20.00	28.00	5.70	6.30	4827400
610	20.00	28.00	6.00	7.00	4307500
018	20.00	30.00		7.50	0200500
605	20.00	30.00	6.00	7.00	4611200
605	20.00	30.00	7.30	8.00	4857300
663	20.00	30.00	7.30	8.00	4865400
605	20.00	30.00	7.70	9.00	4305200
601	20.00	30.00	8.00	9.00	4600600
605	20.00	30.00	10.00	11.00	4310300
016	20.00	31.00		4.20	6594810
616	20.00	31.00	3.90	4.20	4367400
601	20.00	40.00	12.00	13.00	4621900
610	22.00	28.00	4.50	5.50	4356000
610	22.00	29.00	4.60	5.60	4324200
018	22.00	30.00		6.00	0817600
015	22.00	30.00		6.40	2137100
601	22.00	30.00	4.50	5.00	4183101
601	22.00	30.00	4.50	5.00	4183106
605	22.00	30.00	5.00	5.70	4617500
605	22.00	30.00	5.70	6.30	4305300
610	22.00	30.00	6.00	7.00	4316100
605	22.00	30.00	7.30	8.00	4356800
018	22.00	32.00		7.50	0203300
015	22.00	32.00		9.00	0377300
605	22.00	32.00	7.30	8.00	4310800
663	22.00	32.00	7.30	8.00	4865500
605	22.00	32.00	8.20	9.00	4863300
605	22.00	32.00	10.00	11.00	4311300
016	22.00	33.00		4.20	6594910
616	22.00	33.00	3.90	4.20	4341900
601	22.00	35.00	10.00	11.00	4600700
601	22.00	40.00	10.00	11.00	4572900
601	22.40	30.00	5.00	5.70	4604400

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	22.40	30.00	5.00	5.70	4611300
601	22.40	32.40	8.00	9.00	4600800
605	22.40	32.40	8.00	9.00	4616600
601	23.50	31.50	5.00	5.70	4621500
605	24.00	30.00	4.50	5.00	4773500
663	24.00	34.00	7.80	8.50	4764500
663	25.00	31.00		5.35	4799600
616	25.00	32.50	2.80	3.20	4721800
015	25.00	33.00		6.40	2137200
601	25.00	33.00	4.40	5.00	4183301
601	25.00	33.00	5.00	5.70	4604500
605	25.00	33.00	5.00	5.70	4610100
605	25.00	33.00	5.70	6.30	4305400
663	25.00	33.00	5.70	6.30	4789500
610	25.00	33.00	6.00	7.00	4316200
605	25.00	33.00	6.80	7.50	4333500
605	25.00	33.00	8.00	9.00	4807800
610	25.00	33.00	8.00	9.00	4299000
605	25.00	33.00	10.00	11.00	4315200
605	25.00	35.00	7.30	8.00	4512000
663	25.00	35.00	7.30	8.00	4865600
605	25.00	35.00	7.70	9.00	4311400
601	25.00	35.00	8.00	9.00	4600900
601	25.00	35.00	10.00	11.00	4362600
605	25.00	35.00	10.00	11.00	4310500
016	25.00	36.00		4.20	6595010
616	25.00	36.00	3.90	4.20	4367500
605	25.00	37.00	10.00	11.00	4379900
601	25.00	38.00	8.00	9.00	4601000
601	25.00	38.00	10.00	11.00	4621400
018	25.00	40.00		11.00	0472800
601	25.00	40.00	10.00	11.00	4601100
605	25.00	40.00	10.00	11.00	4322900
663	25.00	40.00	10.00	11.00	4865700
616	25.40	32.90	2.80	3.20	4469000
605	26.00	36.00	7.00	8.00	4459400
663	26.00	36.00	10.00	11.00	4726000
601	26.00	40.00	9.00	10.00	4584900
601	28.00	35.50	5.00	5.70	4604600



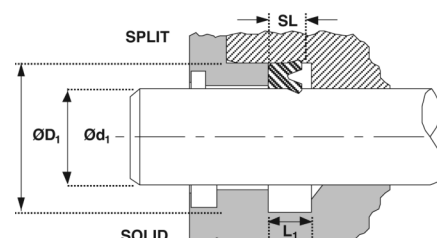
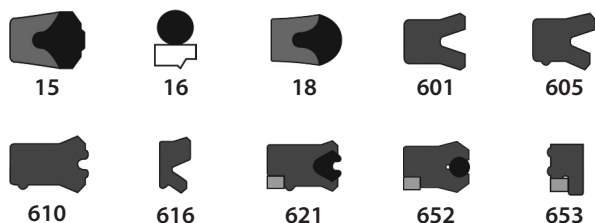
TYPE	Ød ₁	NOMINAL		L ₁	PART No.
ØD ₁	SL				
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015	28.00	36.00		6.40	2137300
610	28.00	36.00	5.30	6.30	4334700
605	28.00	36.00	5.70	6.30	4703000
663	28.00	36.00	5.70	6.30	4789600
610	28.00	36.00	6.00	7.00	4323200
601	28.00	36.00	6.45	7.10	4506201
610	28.00	36.00	8.00	9.00	4307700
601	28.00	38.00	5.60	6.30	4183401
605	28.00	38.00	7.30	8.00	4305500
663	28.00	38.00	7.30	8.00	4726100
601	28.00	38.00	8.00	9.00	4867600
016	28.00	39.00		4.20	6622710
616	28.00	39.00	3.90	4.20	4367600
015	28.00	40.00		9.00	0690700
601	28.00	40.00	10.00	11.00	4601200
018	28.00	43.00		11.00	0204300
601	28.00	43.00	10.00	11.00	4601300
605	28.00	43.00	11.40	12.50	4399000
601	30.00	37.00	6.00	7.00	4596800
015	30.00	38.00		6.40	2137400
605	30.00	38.00	5.70	6.30	4704500
663	30.00	38.00	5.70	6.30	4830400
610	30.00	38.00	6.00	7.00	4308900
605	30.00	38.00	6.30	7.00	4402700
610	30.00	38.00	8.00	9.00	4362400
663	30.00	38.00	8.20	9.00	4789700
015	30.00	40.00		7.50	0032400
601	30.00	40.00	5.60	6.30	4183501
601	30.00	40.00	6.00	7.00	4604700
605	30.00	40.00	6.00	7.00	4610200
605	30.00	40.00	7.00	7.70	4703100
610	30.00	40.00	7.00	8.00	4558300
605	30.00	40.00	7.30	8.00	4857400
621	30.00	40.00	7.30	8.00	4577110
663	30.00	40.00	7.30	8.00	4816700
601	30.00	40.00	8.00	9.00	4596900
605	30.00	40.00	8.50	9.50	4826100
601	30.00	40.00	10.00	11.00	4362700

TYPE	Ød ₁	NOMINAL		L ₁	PART No.
ØD ₁	SL				
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621	30.00	40.00	10.00	11.00	4831310
663	30.00	40.00	10.00	11.00	4811800
016	30.00	41.00		4.20	6595110
616	30.00	41.00	3.80	4.20	4404500
605	30.00	42.00	10.90	12.00	4383100
018	30.00	45.00		11.00	0204400
605	30.00	45.00	9.00	10.00	4618900
601	30.00	45.00	10.00	11.00	4601400
605	30.00	45.00	10.00	11.00	4857500
663	30.00	45.00	10.00	11.00	4865800
018	30.00	50.00		14.00	0282100
605	30.00	50.00	10.00	11.00	4328500
601	31.50	41.50	6.00	7.00	4604800
616	32.00	39.50	2.80	3.20	4714800
015	32.00	40.00		6.40	2137500
663	32.00	40.00	5.70	6.30	4827500
605	32.00	40.00	6.00	7.00	4310700
610	32.00	40.00	6.00	7.00	4316300
605	32.00	40.00	6.70	7.70	4334000
605	32.00	40.00	7.70	9.00	4315300
601	32.00	40.00	8.00	9.00	4867700
605	32.00	41.53	7.90	8.90	4334100
601	32.00	42.00	5.60	6.30	4183601
605	32.00	42.00	5.70	6.30	4360100
601	32.00	42.00	6.00	7.00	4604900
605	32.00	42.00	6.00	7.00	4616100
605	32.00	42.00	7.30	8.00	4374200
663	32.00	42.00	7.30	8.00	4865900
601	32.00	42.00	10.00	11.00	4362800
605	32.00	42.00	10.00	11.00	4305600
016	32.00	43.00		4.20	6595210
616	32.00	43.00	3.90	4.20	4367700
652	32.00	44.00	8.10	9.60	4344111
605	32.00	45.00	10.00	11.00	4597700
018	32.00	47.00		11.00	0204600
605	32.00	47.00	9.10	10.00	4329600
601	32.00	47.00	10.00	11.00	4621200
605	32.00	47.00	10.00	11.00	4338900



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	32.00	48.00	10.00	11.00	4492500
015	35.00	43.00		6.40	2137600
605	35.00	43.00	5.70	6.30	4703200
663	35.00	43.00	5.70	6.30	4789800
610	35.00	43.00	6.00	7.00	4301700
605	35.00	43.00	6.30	7.00	4402800
610	35.00	43.00	8.00	9.00	4592800
605	35.00	43.00	8.20	9.00	4309000
018	35.00	45.00		7.50	0052300
601	35.00	45.00	6.00	7.00	4605000
605	35.00	45.00	6.00	7.00	4611500
601	35.00	45.00	7.00	8.00	4496000
605	35.00	45.00	7.00	8.00	4619200
663	35.00	45.00	7.30	8.00	4816800
605	35.00	45.00	7.70	9.00	4314300
605	35.00	45.00	10.00	11.00	4305700
610	35.00	45.00	10.00	11.00	4299300
621	35.00	45.00	10.00	11.00	4831410
663	35.00	45.00	10.00	11.00	4816100
016	35.00	46.00		4.20	6622810
601	35.00	48.00	10.00	11.00	4360300
015	35.00	50.00		11.00	0874400
018	35.00	50.00		11.00	0474600
605	35.00	50.00	9.00	10.00	4611600
621	35.00	50.00	9.50	10.50	4335310
601	35.00	50.00	10.00	11.00	4601500
605	35.00	50.00	10.00	11.00	4322500
601	35.50	45.00	6.00	7.00	4605100
605	35.50	45.00	6.00	7.00	4616700
601	35.50	50.50	10.00	11.00	4621100
605	35.50	50.50	10.00	11.00	4616900
018	36.00	44.00		6.00	1204900
015	36.00	44.00		6.40	2137700
610	36.00	44.00	5.30	6.30	4324300
663	36.00	44.00	5.80	6.30	4859600
605	36.00	44.00	6.40	7.50	4373900
610	36.00	44.00	8.00	9.00	4308000
605	36.00	44.00	8.20	9.00	4395000
663	36.00	44.00	8.20	9.00	4726200

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
601	36.00	46.00	5.60	6.30	4183701
605	36.00	46.00	5.70	6.30	4372100
605	36.00	46.00	7.30	8.00	4304900
621	36.00	46.00	7.30	8.00	4317010
663	36.00	46.00	7.30	8.00	4866000
605	36.00	46.00	10.00	11.00	4305000
610	36.00	46.00	10.00	11.00	4299400
016	36.00	47.00		4.20	6595310
616	36.00	47.00	3.90	4.20	4353100
015	36.00	48.00		9.00	0690600
018	36.00	51.00		11.00	0978800
605	36.00	51.00	10.00	11.00	4771600
605	37.00	47.00	10.00	11.00	4862900
601	38.00	48.00	6.00	7.00	4605200
605	38.00	48.00	8.00	9.00	4619100
605	38.00	48.00	10.00	11.00	4515500
601	38.00	50.00	9.00	10.00	4709400
605	38.00	50.00	10.00	11.00	4586300
605	38.00	53.00	10.00	11.00	4480900
601	38.00	55.00	9.70	11.00	4366000
601	38.00	58.00	9.70	11.00	4560100
015	40.00	48.00		6.40	2137800
610	40.00	48.00	5.40	6.40	4329200
605	40.00	48.00	5.70	6.30	4703300
663	40.00	48.00	5.70	6.30	4789900
610	40.00	48.00	6.50	7.50	4323300
610	40.00	48.00	8.00	9.00	4301800
605	40.00	48.00	8.20	9.00	4396800
663	40.00	48.00	8.20	9.00	4790000
605	40.00	49.52	9.50	10.50	4334200
015	40.00	50.00		7.50	0188600
015	40.00	50.00		10.50	1252100
018	40.00	50.00		10.50	0202000
601	40.00	50.00	5.60	6.30	4183801
601	40.00	50.00	6.00	7.00	4605300
605	40.00	50.00	6.00	7.00	4610300
605	40.00	50.00	7.30	8.00	4311600
621	40.00	50.00	7.30	8.00	4317110
663	40.00	50.00	7.30	8.00	4806300



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
663	40.00	50.00	8.20	9.00	4790100
605	40.00	50.00	9.00	10.00	4866800
601	40.00	50.00	10.00	11.00	4362900
605	40.00	50.00	10.00	11.00	4293800
621	40.00	50.00	10.00	11.00	4755010
663	40.00	50.00	10.00	11.00	4553400
616	40.00	51.00	3.90	4.20	4722900
652	40.00	52.00	8.70	9.60	4326311
605	40.00	52.00	10.90	12.00	4381800
018	40.00	55.00		11.00	0475000
605	40.00	55.00	7.30	8.00	4703400
605	40.00	55.00	9.00	10.00	4611700
601	40.00	55.00	9.90	11.00	4388500
601	40.00	55.00	10.00	11.00	4601600
605	40.00	55.00	10.00	11.00	4328300
605	40.00	55.00	11.40	12.50	4857600
016	40.00	55.50		6.30	6595410
653	40.00	55.50		6.30	4772710
616	40.00	55.50	6.00	6.30	4367800
601	40.00	60.00	12.00	13.00	4601700
605	42.00	50.00	5.70	6.30	4744400
605	42.00	50.00	7.50	8.00	4373800
605	42.00	52.00	6.00	7.00	4618100
605	42.00	52.00	10.00	11.00	4338200
605	43.00	53.00	6.00	7.00	4619700
016	43.00	58.50		6.30	8607510
610	45.00	52.00	10.00	11.00	4330000
610	45.00	53.00	5.30	6.30	4334800
610	45.00	53.00	6.00	7.00	4711000
605	45.00	53.00	7.30	8.00	4619800
610	45.00	53.00	8.00	9.00	4308100
605	45.00	53.00	8.10	9.00	4402900
663	45.00	53.00	8.20	9.00	4838900
601	45.00	53.00	10.00	11.00	4867800
605	45.00	53.00	11.80	13.00	4315600
015	45.00	55.00		8.00	2137900
601	45.00	55.00	5.60	6.30	4183901
605	45.00	55.00	5.60	6.30	4479700
601	45.00	55.00	6.00	7.00	4605400

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	45.00	55.00	6.00	7.00	4610400
605	45.00	55.00	7.30	8.00	4305900
621	45.00	55.00	7.30	8.00	4317210
663	45.00	55.00	7.30	8.00	4790200
605	45.00	55.00	8.20	9.00	4845700
601	45.00	55.00	10.00	11.00	4363000
605	45.00	55.00	10.00	11.00	4302600
610	45.00	55.00	10.00	11.00	4389400
621	45.00	55.00	10.00	11.00	4831510
663	45.00	55.00	10.00	11.00	4726300
653	45.00	56.00		4.20	4575510
616	45.00	56.00	3.90	4.20	4556300
601	45.00	56.00	7.00	8.00	4605500
605	45.00	57.70	9.50	10.50	4322800
015	45.00	60.00		10.00	1022800
018	45.00	60.00		11.00	0979400
601	45.00	60.00	10.00	11.00	4601800
605	45.00	60.00	10.00	11.00	4315400
605	45.00	60.00	11.40	12.50	4619900
621	45.00	60.00	11.40	12.50	4295510
016	45.00	60.50		6.30	6595510
653	45.00	60.50		6.30	4772810
616	45.00	60.50	6.00	6.30	4367900
018	45.00	65.00		14.00	0281700
601	45.00	65.00	10.00	11.00	4575000
605	45.00	65.00	10.00	11.00	4315500
601	46.00	56.00	6.00	7.00	4543900
605	47.00	56.33	9.00	10.00	4778000
605	48.00	60.00	10.00	11.00	4432600
601	48.00	63.00	10.00	11.00	4601900
605	50.00	57.00	9.00	10.00	4538600
663	50.00	57.00	9.00	10.00	4787400
610	50.00	58.00	5.30	6.30	4356900
610	50.00	58.00	8.00	9.00	4299100
663	50.00	58.00	8.20	9.00	4790300
018	50.00	60.00		7.50	0179300
015	50.00	60.00		8.00	1204400
601	50.00	60.00	5.60	6.30	4184001
601	50.00	60.00	6.00	7.00	4605600



15



16



18



601



605



610



616



621



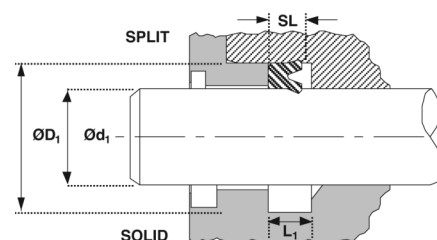
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653

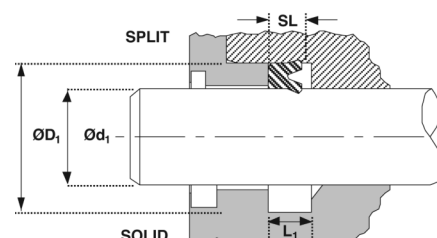
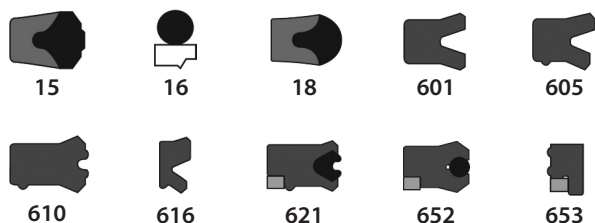


663



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	50.00	60.00	6.00	7.00	4611800
605	50.00	60.00	7.30	8.00	4306000
621	50.00	60.00	7.30	8.00	4317310
663	50.00	60.00	7.30	8.00	4726400
605	50.00	60.00	8.20	9.00	4845800
601	50.00	60.00	10.00	11.00	4363100
605	50.00	60.00	10.00	11.00	4304500
610	50.00	60.00	10.00	11.00	4389500
621	50.00	60.00	10.00	11.00	4802310
663	50.00	60.00	10.00	11.00	4814400
605	50.00	60.00	11.80	13.00	4314400
616	50.00	61.00	3.90	4.20	4723000
652	50.00	62.00	8.70	9.60	4326411
605	50.00	62.70	9.50	10.50	4334400
605	50.00	63.00	10.00	11.00	4804400
018	50.00	65.00		10.00	0208400
018	50.00	65.00		11.00	0383800
605	50.00	65.00		12.50	4625400
605	50.00	65.00	9.00	10.00	4611900
605	50.00	65.00	9.50	10.50	4344000
601	50.00	65.00	10.00	11.00	4602000
605	50.00	65.00	10.00	11.00	4617000
621	50.00	65.00	10.00	11.00	4752910
605	50.00	65.00	10.90	12.00	4291700
621	50.00	65.00	11.40	12.50	4293410
663	50.00	65.00	11.40	12.50	4806400
605	50.00	65.00	14.50	16.00	4381900
016	50.00	65.50		6.30	6595610
653	50.00	65.50		6.30	4403210
616	50.00	65.50	6.00	6.30	4368000
018	50.00	70.00		14.00	0294600
601	50.00	70.00	12.00	13.00	4602100
605	50.00	70.00	12.00	13.00	4612000
601	52.00	62.00	10.00	11.00	4559000
601	53.00	63.00	6.00	7.00	4605700
605	53.00	63.00	6.00	7.00	4617700
605	53.00	65.00	9.00	10.00	4371700
663	54.00	64.00	10.00	11.00	4868700
610	55.00	63.00	8.00	9.00	4323000

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	55.00	63.00	8.20	9.00	4863400
015	55.00	65.00		8.00	0208700
018	55.00	65.00		8.00	0242600
601	55.00	65.00	6.00	7.00	4605800
605	55.00	65.00	6.00	7.00	4615600
610	55.00	65.00	7.00	8.00	4385500
605	55.00	65.00	7.30	8.00	4703500
605	55.00	65.00	8.20	9.00	4360400
605	55.00	65.00	10.00	11.00	4306100
610	55.00	65.00	10.00	11.00	4389600
621	55.00	65.00	10.00	11.00	4831210
663	55.00	65.00	10.00	11.00	4798900
605	55.00	65.00	11.80	13.00	4323400
610	55.00	65.00	11.80	13.00	4389700
663	55.00	67.00	10.00	11.00	4793800
605	55.00	68.00	10.00	11.00	4593800
605	55.00	70.00	9.00	10.00	4612100
621	55.00	70.00	9.00	10.00	4810210
621	55.00	70.00	11.40	12.50	4403610
605	55.00	70.00	11.80	13.00	4319200
653	55.00	70.50		6.30	4403310
605	55.00	71.00	12.00	13.00	4625000
601	55.00	75.00	12.00	13.00	4602200
605	55.00	75.00	12.00	13.00	4612200
610	56.00	64.00	8.00	9.00	4316400
015	56.00	66.00		8.00	2138000
601	56.00	66.00	6.00	7.00	4605900
610	56.00	66.00	6.80	7.50	4334900
605	56.00	66.00	10.00	11.00	4311800
663	56.00	66.00	10.00	11.00	4726500
015	56.00	71.00		12.00	0332600
601	56.00	71.00	8.40	9.50	4184201
605	56.00	71.00	10.00	11.00	4311900
605	56.00	71.00	11.40	12.50	4306200
621	56.00	71.00	11.40	12.50	4317410
016	56.00	71.50		6.30	6595710
616	56.00	71.50	6.00	6.30	4368100
601	56.00	76.00		13.00	4622000
018	56.00	76.00		14.00	0646100



TYPE	Ød ₁	NOMINAL		L ₁	PART No.
ØD ₁	SL				
610	60.00	68.00	7.00	8.00	4732400
610	60.00	68.00	8.00	9.00	4299200
663	60.00	68.00	8.20	9.00	4816900
605	60.00	68.00	11.40	12.50	4538000
610	60.00	68.00	11.40	12.50	4329900
652	60.00	69.80	11.40	12.50	4534910
015	60.00	70.00		8.00	0208500
601	60.00	70.00	6.00	7.00	4606000
605	60.00	70.00	6.00	7.00	4610500
610	60.00	70.00	7.00	8.00	4303200
605	60.00	70.00	7.30	8.00	4703600
663	60.00	70.00	7.30	8.00	4822600
601	60.00	70.00	10.00	11.00	4363200
605	60.00	70.00	10.00	11.00	4310600
663	60.00	70.00	10.00	11.00	4726600
605	60.00	70.00	11.80	13.00	4306300
610	60.00	70.00	11.80	13.00	4389800
616	60.00	70.60	3.90	4.20	4410800
601	60.00	71.00	7.00	8.00	4606100
605	60.00	71.00	7.00	8.00	4615700
018	60.00	72.00		9.50	1397700
652	60.00	72.00	8.70	9.60	4344211
605	60.00	72.00	10.00	11.00	4323500
605	60.00	73.00	10.00	11.00	4593900
621	60.00	73.00	13.00	14.00	4526010
605	60.00	75.00	9.00	10.00	4612300
605	60.00	75.00	10.00	11.00	4378700
605	60.00	75.00	11.40	12.50	4857700
621	60.00	75.00	11.40	12.50	4298410
663	60.00	75.00	11.40	12.50	4806500
605	60.00	75.00	11.80	13.00	4306400
652	60.00	75.00	11.90	13.00	4451211
605	60.00	75.00	20.50	22.50	4391800
016	60.00	75.50		6.30	6595810
653	60.00	75.50		6.30	4403410
616	60.00	75.50	6.00	6.30	4727100
605	60.00	76.00	10.00	11.00	4625100
601	60.00	76.00	12.00	13.00	4608000
015	60.00	80.00		14.00	0391400

TYPE	Ød ₁	NOMINAL		L ₁	PART No.
ØD ₁	SL				
018	60.00	80.00		14.00	0294900
605	60.00	80.00	11.40	12.50	4514300
601	60.00	80.00	12.00	13.00	4602300
605	60.00	80.00	12.00	13.00	4612400
610	63.00	71.00	8.00	9.00	4316500
601	63.00	73.00	6.00	7.00	4606200
605	63.00	73.00	6.00	7.00	4612500
601	63.00	73.00	11.80	13.00	4363300
605	63.00	73.00	11.80	13.00	4312000
015	63.00	75.00		9.60	2138100
610	63.00	75.00	8.60	9.60	4360500
652	63.00	75.00	8.60	9.60	4326511
601	63.00	78.00	8.40	9.50	4184301
605	63.00	78.00	10.00	11.00	4312100
605	63.00	78.00	11.40	12.50	4306500
621	63.00	78.00	11.40	12.50	4317510
016	63.00	78.50		6.30	6595910
653	63.00	78.50		6.30	4751110
616	63.00	78.50	6.00	6.30	4368200
018	63.00	83.00		14.00	0646300
605	63.00	83.00	11.80	13.00	4857800
621	63.00	83.00	11.80	13.00	4520510
610	65.00	73.00	8.00	9.00	4362500
601	65.00	75.00	6.00	7.00	4606300
601	65.00	75.00	6.00	7.00	4606306
605	65.00	75.00	6.00	7.00	4615900
605	65.00	75.00	7.70	9.00	4314500
621	65.00	75.00	10.00	11.00	4755110
605	65.00	75.00	11.80	13.00	4306600
610	65.00	75.00	11.80	13.00	4389900
663	65.00	75.00	11.80	13.00	4790400
616	65.00	76.00	3.90	4.20	4853300
015	65.00	77.00		9.60	2138200
605	65.00	77.00	9.00	10.00	4703700
605	65.00	77.70	9.50	10.50	4334500
605	65.00	78.00	10.00	11.00	4616200
018	65.00	80.00		11.00	0740700
601	65.00	80.00	8.50	9.50	4184401
605	65.00	80.00	9.00	10.00	4612600



15



16



18



601



605



610



616



621



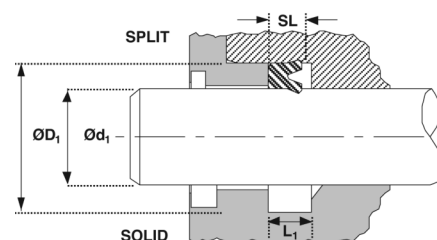
652



653

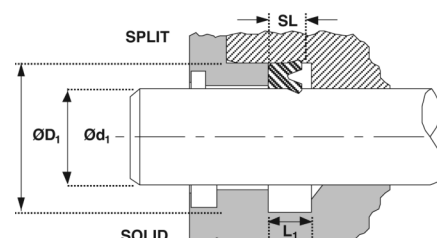
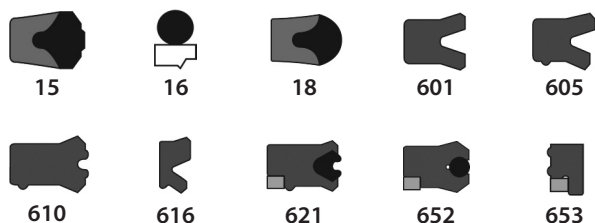


663



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
621	65.00	80.00	10.00	11.00	4761810
621	65.00	80.00	11.40	12.50	4783710
663	65.00	80.00	11.40	13.00	4726700
605	65.00	80.00	11.80	13.00	4312200
601	65.00	80.00	12.00	13.00	4867900
621	65.00	80.00	13.00	14.00	4810310
016	65.00	80.50		6.30	6596010
653	65.00	80.50		6.30	4742110
616	65.00	80.50	6.00	6.30	4548000
601	65.00	85.00	12.00	13.00	4602400
605	65.00	85.00	12.00	13.00	4612700
605	67.00	77.00	6.00	7.00	4612800
605	68.50	76.50	8.00	9.00	4855200
610	70.00	78.00	8.00	9.00	4316600
605	70.00	78.00	11.40	12.50	4863500
015	70.00	80.00		7.50	0057700
601	70.00	80.00	6.00	7.00	4606400
605	70.00	80.00	6.00	7.00	4615800
610	70.00	80.00	6.50	7.50	4335000
605	70.00	80.00	11.40	12.50	4857900
601	70.00	80.00	11.80	13.00	4363400
605	70.00	80.00	11.80	13.00	4312300
610	70.00	80.00	11.80	13.00	4390000
015	70.00	82.00		9.60	2146800
605	70.00	82.00	8.70	9.60	4494700
652	70.00	82.00	8.70	9.60	4344311
605	70.00	82.00	10.00	11.00	4323600
605	70.00	83.00	10.00	11.00	4616400
621	70.00	83.00	13.00	14.00	4810410
015	70.00	85.00		12.00	0384500
601	70.00	85.00	8.40	9.50	4184501
605	70.00	85.00	9.00	10.00	4612900
605	70.00	85.00	10.00	11.00	4302700
605	70.00	85.00	11.40	12.50	4301200
621	70.00	85.00	11.40	12.50	4317610
663	70.00	85.00	11.40	13.00	4790500
601	70.00	85.00	12.00	13.00	4868000
605	70.00	85.00	20.50	22.50	4401400
016	70.00	85.50		6.30	6596110

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
653	70.00	85.50		6.30	4742310
616	70.00	85.50	6.00	6.30	4368300
018	70.00	90.00		14.00	0296000
601	70.00	90.00	12.00	13.00	4602500
605	70.00	90.00	12.00	13.00	4613000
601	70.00	92.00	12.00	13.00	4602600
601	71.00	80.00	6.00	7.00	4606500
610	75.00	83.00	8.00	9.00	4539400
605	75.00	83.00	11.40	12.50	4706300
601	75.00	85.00	6.00	7.00	4606600
605	75.00	85.00	6.00	7.00	4616800
605	75.00	85.00	11.40	12.50	4858000
601	75.00	85.00	11.80	13.00	4363500
605	75.00	85.00	11.80	13.00	4312400
663	75.00	85.00	11.80	13.00	4726800
605	75.00	88.00	10.00	11.00	4616300
621	75.00	88.00	13.00	14.00	4526110
018	75.00	90.00		12.00	0740600
605	75.00	90.00	9.00	10.00	4613100
605	75.00	90.00	10.00	11.00	4862800
605	75.00	90.00	11.40	12.50	4858100
601	75.00	90.00	12.00	13.00	4868100
621	75.00	90.00	12.00	13.00	4810510
621	75.00	90.00	13.00	14.00	4784710
016	75.00	90.50		6.30	6596210
653	75.00	90.50		6.30	4742410
616	75.00	90.50	6.00	6.30	4728200
018	75.00	95.00		14.00	0412700
621	75.00	95.00	11.40	12.50	4810610
601	75.00	95.00	12.00	13.00	4602700
605	75.00	95.00	12.00	13.00	4613200
652	75.00	95.00	12.50	14.00	4547810
663	75.00	95.00	14.50	16.00	4809000
621	75.00	95.00	14.60	16.00	4801510
601	75.00	100.00	22.00	24.00	4584700
605	77.00	87.00	11.80	13.00	4863100
605	78.00	86.00	9.00	10.00	4538700
605	78.00	86.00	11.40	12.50	4863600
016	78.00	93.50		6.30	8611210



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
610	80.00	88.00	8.00	9.00	4316700
605	80.00	88.00	10.90	12.00	4766600
601	80.00	90.00	6.00	7.00	4606700
605	80.00	90.00	6.00	7.00	4616000
601	80.00	90.00	8.00	8.75	4159001
605	80.00	90.00	10.00	11.00	4390400
601	80.00	90.00	11.80	13.00	4363600
605	80.00	90.00	11.80	13.00	4312500
663	80.00	90.00	11.80	13.00	4761400
015	80.00	92.00		9.60	2138300
605	80.00	92.00	8.70	9.60	4494800
605	80.00	93.00	10.00	11.00	4615200
621	80.00	93.00	13.00	14.00	4810710
018	80.00	95.00		12.00	0732700
601	80.00	95.00	8.40	9.50	4184601
605	80.00	95.00	9.00	10.00	4613300
605	80.00	95.00	10.00	11.00	4383500
605	80.00	95.00	11.40	12.50	4620000
621	80.00	95.00	11.40	12.50	4317710
605	80.00	95.00	11.80	13.00	4306700
652	80.00	95.00	11.80	13.00	4797410
621	80.00	95.00	13.00	14.00	4540610
652	80.00	95.00	14.50	16.00	4446511
016	80.00	95.50		6.30	6596310
653	80.00	95.50		6.30	4742510
653	80.00	95.50		6.30	4742513
616	80.00	95.50	6.00	6.30	4368400
018	80.00	100.00		14.00	0295100
601	80.00	100.00	12.00	13.00	4602800
605	80.00	100.00	12.00	13.00	4613400
601	80.00	100.00	13.20	14.50	4857100
605	80.00	100.00	14.50	16.00	4382800
663	80.00	100.00	14.50	16.00	4806600
605	80.00	110.00	16.40	18.00	4342900
605	85.00	93.00	8.00	9.00	4839100
605	85.00	93.00	10.00	11.00	4392700
605	85.00	93.00	11.40	12.50	4537900
605	85.00	95.00	11.80	13.00	4863700
652	85.00	97.00	8.60	9.60	4344511

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
663	85.00	97.00	8.70	9.60	4870100
610	85.00	97.00	9.00	10.00	4328100
601	85.00	100.00	8.40	9.50	4184701
601	85.00	100.00	8.90	10.00	4606800
605	85.00	100.00	9.00	10.00	4610600
605	85.00	100.00	10.00	11.00	4615300
605	85.00	100.00	11.80	13.00	4306800
621	85.00	100.00	11.80	13.00	4766410
663	85.00	100.00	11.80	13.00	4806700
601	85.00	100.00	12.00	13.00	4868200
621	85.00	100.00	13.00	14.00	4540710
016	85.00	100.50		6.30	6596410
653	85.00	100.50		6.30	4742610
616	85.00	100.50	6.00	6.30	4538400
601	85.00	105.00	12.00	13.00	4602900
605	85.00	105.00	12.00	13.00	4613500
621	85.00	105.00	14.60	16.00	4810810
610	87.00	95.00	8.00	9.00	4323700
610	90.00	98.00	8.00	9.00	4316800
605	90.00	98.00	11.40	12.50	4706400
605	90.00	100.00	6.80	7.50	4493500
605	90.00	100.00	9.00	10.00	4366900
605	90.00	100.00	11.40	12.50	4858200
601	90.00	100.00	11.80	13.00	4363700
605	90.00	100.00	11.80	13.00	4314600
015	90.00	102.00		9.60	2138400
605	90.00	102.00	8.70	9.60	4333000
015	90.00	105.00		9.50	2174600
601	90.00	105.00	8.40	9.50	4184801
601	90.00	105.00	8.90	10.00	4606900
605	90.00	105.00	9.00	10.00	4613600
605	90.00	105.00	10.00	11.00	4615400
605	90.00	105.00	11.40	12.50	4306900
621	90.00	105.00	11.40	12.50	4317810
621	90.00	105.00	13.00	14.00	4526310
652	90.00	105.00	14.50	16.00	4428011
016	90.00	105.50		6.30	6596510
653	90.00	105.50		6.30	4523710
616	90.00	105.50	6.00	6.30	4368500



15



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601



605



610



616



621



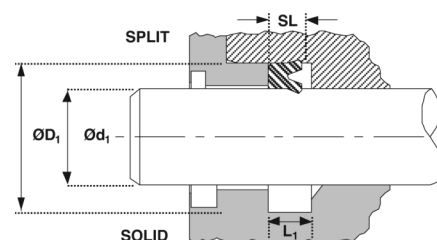
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653

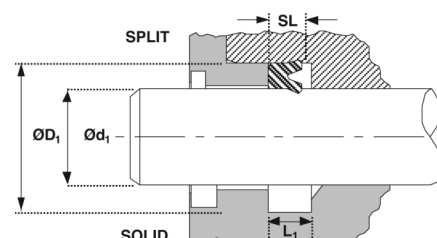
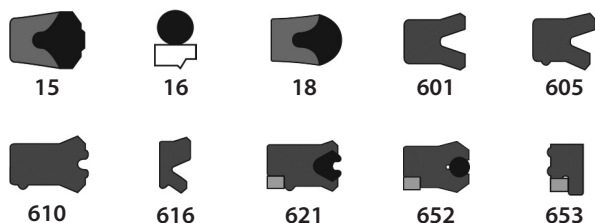


663



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
018	90.00	110.00		10.00	0306700
018	90.00	110.00		14.00	0071700
018	90.00	110.00		15.00	0712400
601	90.00	110.00	12.00	13.00	4603000
605	90.00	110.00	12.00	13.00	4613700
621	90.00	110.00	14.60	16.00	4810910
605	95.00	103.00	11.40	12.50	4863200
601	95.00	110.00	8.90	10.00	4607000
605	95.00	110.00	9.00	10.00	4610700
605	95.00	110.00	10.00	11.00	4615500
605	95.00	110.00	11.80	13.00	4617600
601	95.00	110.00	12.00	13.00	4868300
621	95.00	110.00	12.00	13.00	4811010
621	95.00	110.00	13.00	14.00	4540810
016	95.00	110.50		6.30	6596610
653	95.00	110.50		6.30	4742810
616	95.00	110.50	6.00	6.30	4538500
601	95.00	115.00	12.00	13.00	4603100
605	95.00	115.00	12.00	13.00	4613800
621	95.00	115.00	14.60	16.00	4811110
605	96.00	104.00	10.90	12.00	4380300
016	97.00	112.50		6.30	8611310
605	98.00	112.00	8.50	9.50	4618200
610	100.00	108.00	8.00	9.00	4316900
605	100.00	108.00	10.90	12.00	4766700
605	100.00	110.00	10.90	12.00	4461700
015	100.00	115.00		12.00	2138500
018	100.00	115.00		12.00	0740500
601	100.00	115.00	8.90	10.00	4607100
605	100.00	115.00	9.00	10.00	4610800
605	100.00	115.00	10.00	11.00	4617100
652	100.00	115.00	11.00	12.00	4528010
605	100.00	115.00	11.80	13.00	4312600
663	100.00	115.00	11.80	13.00	4837400
601	100.00	115.00	12.00	13.00	4868400
621	100.00	115.00	13.00	14.00	4540910
652	100.00	115.00	14.50	16.00	4397611
016	100.00	115.50		6.30	6596710
653	100.00	115.50		6.30	4742910

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
616	100.00	115.50	6.00	6.30	4368600
018	100.00	120.00		14.00	0296100
015	100.00	120.00		15.00	0466100
601	100.00	120.00	11.00	12.50	4184901
605	100.00	120.00	11.80	13.00	4312700
601	100.00	120.00	12.00	13.00	4603200
605	100.00	120.00	14.50	16.00	4307000
621	100.00	120.00	14.60	16.00	4317910
018	100.00	125.00		19.00	0418600
605	105.00	113.00	10.00	11.00	4392800
605	105.00	115.00	13.20	14.50	4390500
605	105.00	120.00	9.00	10.00	4617300
605	105.00	120.00	10.00	11.00	4617200
652	105.00	120.00	11.80	13.00	4406711
621	105.00	120.00	12.00	13.00	4811210
621	105.00	120.00	13.00	14.00	4811310
605	105.00	120.00	14.50	16.00	4379500
652	105.00	120.00	14.50	16.00	4781810
016	105.00	120.50		6.30	8647810
601	105.00	125.00	11.36	12.50	4185001
605	105.00	125.00	14.50	16.00	4617400
621	105.00	125.00	14.60	16.00	4811410
601	105.00	125.00	15.00	17.00	4603300
605	108.00	123.00	10.90	12.00	4329100
018	110.00	125.00		11.00	0558300
015	110.00	125.00		12.00	0749300
605	110.00	125.00	9.00	10.00	4459700
605	110.00	125.00	11.00	12.00	4537800
621	110.00	125.00	13.00	14.00	4811510
605	110.00	125.00	14.50	16.00	4481600
652	110.00	125.00	14.50	16.00	4445611
016	110.00	125.50		6.30	6622910
653	110.00	125.50		6.30	4743010
616	110.00	125.50	6.00	6.30	4545400
601	110.00	130.00	11.00	12.50	4185101
605	110.00	130.00	11.80	13.00	4312800
621	110.00	130.00	13.00	14.00	4541010
605	110.00	130.00	14.50	16.00	4307100
621	110.00	130.00	14.60	16.00	4318010



TYPE	Ød ₁	NOMINAL			PART
		ØD ₁	SL	L ₁	No.
601	110.00	130.00	15.00	17.00	4603400
018	110.00	135.00		19.00	0304300
605	110.00	135.00	14.50	16.00	4343000
601	112.00	125.00	8.90	10.00	4607200
605	112.00	125.00	9.00	10.00	4610900
605	115.00	125.00	10.90	12.00	4619300
015	115.00	130.00		12.00	2136900
601	115.00	130.00	9.00	10.00	4621600
605	115.00	130.00	9.00	10.00	4459800
605	115.00	130.00	10.90	12.00	4434600
605	115.00	130.00	14.50	16.00	4342600
652	115.00	130.00	14.50	16.00	4455411
016	115.00	130.50		6.30	6639110
018	115.00	135.00		14.00	0639900
621	115.00	135.00	14.60	16.00	4783810
601	115.00	135.00	15.00	17.00	4608100
605	120.00	128.00	11.40	12.50	4706500
605	120.00	130.00	10.90	12.00	4461800
605	120.00	135.00	9.00	10.00	4614000
652	120.00	135.00	14.50	16.00	4452011
621	120.00	135.00	14.60	16.00	4318110
016	120.00	135.50		6.30	8609910
018	120.00	140.00		12.00	0250500
605	120.00	140.00	12.00	13.00	4614100
621	120.00	140.00	13.00	14.00	4541110
601	120.00	140.00	14.50	16.00	4319600
605	120.00	140.00	14.50	16.00	4312900
621	120.00	140.00	14.60	16.00	4783910
601	120.00	140.00	15.00	17.00	4603500
018	120.00	145.00		19.00	0070400
605	124.00	134.00	6.00	7.00	4618300
653	124.00	139.50		6.30	4824710
605	125.00	133.00	10.00	11.00	4392900
605	125.00	133.00	11.40	12.50	4748500
601	125.00	140.00	8.90	10.00	4607300
605	125.00	140.00	9.00	10.00	4614200
605	125.00	140.00	10.00	11.00	4618400
605	125.00	140.00	10.90	12.00	4766500
652	125.00	140.00	14.50	16.00	4446911

TYPE	Ød ₁	NOMINAL			PART
		ØD ₁	SL	L ₁	No.
016	125.00	140.50		6.30	6639210
653	125.00	140.50		6.30	4824810
616	125.00	140.50	6.00	6.30	4545500
601	125.00	145.00	11.40	12.50	4185201
605	125.00	145.00	12.00	13.00	4614300
605	125.00	145.00	14.50	16.00	4307300
621	125.00	145.00	14.60	16.00	4318210
601	125.00	145.00	15.00	17.00	4603600
018	125.00	150.00		19.00	0070500
605	125.00	150.00	12.50	14.00	4367000
652	128.00	143.00	14.50	16.00	4581611
605	130.00	140.00	14.50	16.00	4390600
018	130.00	145.00		11.30	0634500
605	130.00	145.00	9.00	10.00	4614400
605	130.00	145.00	10.00	11.00	4619000
621	130.00	145.00	13.00	14.00	4811610
652	130.00	145.00	14.50	16.00	4782410
016	130.00	145.50		6.30	8610210
653	130.00	145.50		6.30	4830210
616	130.00	145.50	6.00	6.30	4793900
605	130.00	150.00	12.00	13.00	4614500
605	130.00	150.00	14.50	16.00	4313000
621	130.00	150.00	14.60	16.00	4709810
601	130.00	150.00	15.00	17.00	4603700
605	132.50	157.50	13.20	14.50	4329400
610	134.00	147.00	12.00	13.30	4588100
605	135.00	145.00	11.00	12.00	4619400
605	135.00	150.00	9.00	10.00	4618500
605	135.00	150.00	11.40	12.50	4537700
016	135.00	150.50		6.30	8610310
653	135.00	150.50		6.30	4824910
652	135.00	155.00	13.60	15.00	4475410
018	135.00	160.00		19.00	0080400
601	136.00	150.00	8.50	9.50	4607400
605	140.00	150.00	6.00	7.00	4617900
605	140.00	150.00	10.90	12.00	4461900
601	140.00	154.00	9.00	10.00	4607900
601	140.00	155.00	8.90	10.00	4607500
605	140.00	155.00	9.00	10.00	4614600



15



16



18



601



605



610



616



621



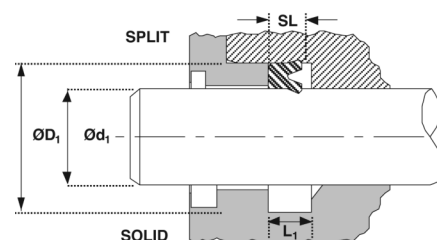
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653

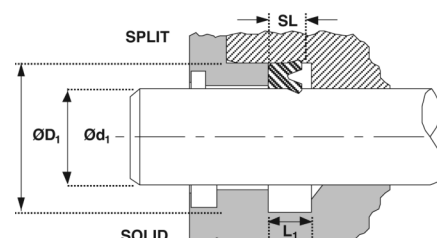
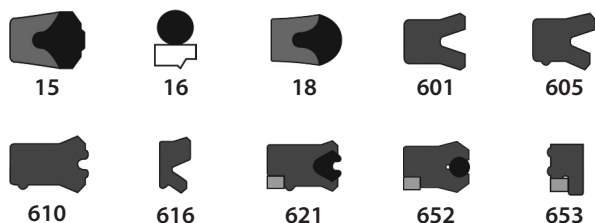


663



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	140.00	155.00	11.80	13.00	4555300
605	140.00	155.00	11.80	13.00	4555306
621	140.00	155.00	13.00	14.00	4811710
652	140.00	155.00	14.50	16.00	4753210
016	140.00	155.50		6.30	6639310
653	140.00	155.50		6.30	4770810
616	140.00	155.50	6.00	6.30	4545600
018	140.00	160.00		14.00	0304600
605	140.00	160.00	11.80	13.00	4313100
621	140.00	160.00	13.00	14.00	4541210
605	140.00	160.00	14.50	16.00	4307400
621	140.00	160.00	14.60	16.00	4318310
601	140.00	160.00	15.00	17.00	4603800
018	140.00	165.00		19.00	0080500
601	145.00	160.00	8.90	10.00	4607600
016	145.00	160.50		6.30	8615610
601	145.00	165.00	15.00	17.00	4608200
605	150.00	160.00	11.00	12.00	4595200
601	150.00	165.00	8.90	10.00	4607700
605	150.00	165.00	9.00	10.00	4614700
652	150.00	165.00	14.50	16.00	4389111
016	150.00	165.50		6.30	8615710
653	150.00	165.50		6.30	4825010
653	150.00	170.00		10.00	4804110
018	150.00	170.00		14.00	0303300
605	150.00	170.00	12.00	13.00	4614800
605	150.00	170.00	13.20	14.50	4367100
605	150.00	170.00	14.50	16.00	4342800
621	150.00	170.00	14.60	16.00	4784010
601	150.00	170.00	15.00	17.00	4603900
605	151.00	159.00	9.00	10.00	4538800
605	155.00	165.00	6.00	7.00	4618600
605	155.00	165.00	11.00	12.00	4619500
601	155.00	170.00	9.00	10.00	4621700
605	155.00	170.00	9.00	10.00	4618700
605	155.00	170.00	14.50	16.00	4342700
653	155.00	170.50		6.30	4825110
601	155.00	180.00	15.00	17.00	4608300
601	160.00	175.00	9.00	10.00	4608400

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	160.00	175.00	9.00	10.00	4614900
605	160.00	175.00	10.90	12.00	4462000
652	160.00	175.00	11.70	12.80	4484010
652	160.00	175.00	14.50	16.00	4405011
016	160.00	175.50		6.30	6639410
653	160.00	175.50		6.30	4825210
616	160.00	175.50	6.00	6.30	4548100
652	160.00	177.00	14.50	16.00	4767610
018	160.00	180.00		15.00	1283100
605	160.00	180.00	12.00	13.00	4615000
605	160.00	180.00	14.50	16.00	4345000
621	160.00	180.00	14.60	16.00	4454810
601	160.00	180.00	15.00	16.00	4868500
621	160.00	185.00	14.60	16.00	4723410
601	160.00	185.00	15.00	17.00	4608500
652	160.00	185.00	18.80	20.00	4401711
018	160.00	190.00		24.00	0136100
601	165.00	180.00	9.00	10.00	4608600
605	165.00	180.00	9.00	10.00	4616500
652	165.00	182.00	14.50	16.00	4537411
601	165.00	183.00	10.00	11.00	4607800
601	165.00	190.00	15.00	17.00	4608700
605	170.00	180.00	6.00	7.00	4618800
605	170.00	185.00	9.00	10.00	4618000
652	170.00	185.00	14.50	16.00	4745610
016	170.00	185.50		6.30	8608310
653	170.00	185.50		6.30	4820210
605	170.00	190.00	14.50	16.00	4398800
601	170.00	195.00	15.00	17.00	4608800
601	175.00	190.00	9.00	10.00	4621800
018	175.00	200.00		19.00	0838800
601	175.00	200.00	15.00	17.00	4608900
652	177.00	192.00	14.50	16.00	4445711
605	180.00	190.00	11.00	12.00	4617800
605	180.00	192.00	12.50	14.00	4619600
652	180.00	195.00	14.50	16.00	4734610
016	180.00	195.50		6.30	6639510
653	180.00	195.50		6.30	4804010
605	180.00	200.00	11.80	13.00	4314700



TYPE	Ød ₁	NOMINAL		PART
		ØD ₁	SL	No.
601	180.00	200.00	12.00	4609000
605	180.00	200.00	14.50	4560900
621	180.00	200.00	14.60	4454910
601	180.00	205.00	15.00	4609100
018	180.00	210.00		0087200
605	185.00	200.00	10.90	4462100
652	185.00	200.00	14.50	4777210
652	185.00	210.00	18.00	4546611
652	190.00	205.00	14.50	4430811
016	190.00	205.50		8607410
601	190.00	210.00	12.00	4609200
601	190.00	215.00	15.00	4609300
605	190.00	215.00	18.50	4749400
652	195.00	210.00	14.50	4459311
652	195.00	215.00	14.50	4550511
018	200.00	220.00		1284100
601	200.00	220.00	12.00	4609400
605	200.00	220.00	12.00	4615100
605	200.00	220.00	14.50	4380200
652	200.00	220.00	14.50	4387611
621	200.00	220.00	14.60	4455110
016	200.00	221.00		6639610
601	200.00	225.00	15.00	4609500
018	200.00	230.00		2010000
605	205.00	220.00	12.20	4522400
652	205.00	220.00	14.50	4762110
652	210.00	230.00	14.50	4472911
016	210.00	231.00		8609410
601	210.00	235.00	18.00	4609600
621	215.00	235.00	14.60	4705610
653	215.00	236.00		4705710
652	220.00	235.00	14.50	4759610
601	220.00	240.00	12.00	4609700
605	220.00	240.00	14.50	4555400
652	220.00	240.00	14.50	4544510
016	220.00	241.00		6639710
018	220.00	250.00		0958900
601	220.00	250.00	17.00	4426600
652	225.00	240.00	14.50	4445811

TYPE	Ød ₁	NOMINAL		PART
		ØD ₁	SL	No.
652	225.00	250.00	18.00	4537511
652	230.00	247.00	14.50	4767710
652	230.00	249.30	14.50	4439411
601	230.00	250.00	12.00	4609800
652	230.00	250.00	14.50	4707210
652	230.00	255.00	22.00	4555511
652	235.00	255.00	14.50	4771410
601	240.00	260.00	12.00	4621000
652	240.00	260.00	14.50	4496511
016	240.00	261.00		8615910
601	240.00	265.00	18.00	4609900
652	245.00	270.00	18.00	4546711
652	250.00	270.00	14.50	4728810
016	250.00	271.00		6639810
601	250.00	275.00	18.00	4610000
018	250.00	280.00		1055500
652	255.00	275.00	14.50	4578611
605	260.00	280.00	14.50	4859300
652	260.00	280.00	16.40	4499011
601	260.00	290.00	18.00	4620100
652	265.00	285.00	14.50	4722110
601	265.00	295.00	18.00	4620200
016	270.00	294.50		8606910
018	270.00	300.00		0094800
601	270.00	300.00	18.00	4620300
652	275.00	295.00	14.50	4807310
652	280.00	300.00	14.60	4713910
016	280.00	304.50		6639910
018	280.00	310.00		0094900
601	280.00	310.00	18.00	4620400
652	285.00	305.00	16.40	4767810
652	285.00	310.00	18.00	4537611
652	290.00	310.00	16.40	4475111
016	290.00	314.50		8617310
652	290.00	315.00	18.00	4759410
601	290.00	320.00	18.00	4620500
652	295.00	315.00	16.50	4598211
652	300.00	320.00	14.50	4525110
016	300.00	324.50		6640010



15



16



18



601



605



610



616



621



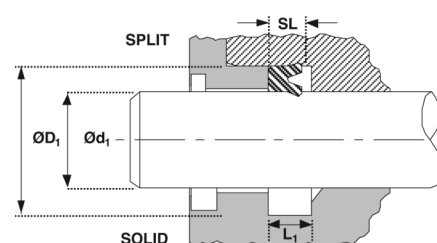
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653

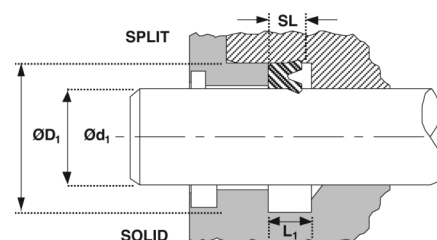
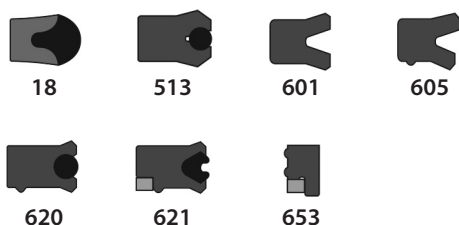


663



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
018	300.00	330.00		24.00	0095000
601	300.00	330.00	18.00	20.00	4620600
652	305.00	325.00	16.40	18.00	4473011
652	305.00	330.00	18.00	20.00	4546811
652	305.00	335.00	16.40	18.00	4721910
652	320.00	340.00	14.50	16.00	4544410
652	320.00	340.00	16.00	18.00	4707310
016	320.00	344.50		8.10	8608210
018	320.00	360.00		30.00	1054000
652	325.00	355.00	18.00	20.00	4555711
652	330.00	350.00	16.40	18.00	4796710
605	330.00	350.00	18.00	20.00	4587400
016	330.00	354.50		8.10	8619610
652	335.00	355.00	16.50	18.00	4496611
652	335.00	360.00	18.00	20.00	4831710
652	340.00	360.00	18.50	20.50	4788110
016	340.00	364.50		8.10	8619710
652	340.00	365.00	18.50	20.00	4732810
016	350.00	374.50		8.10	8619810
652	350.00	375.00	18.00	20.00	4718010
652	355.00	380.00	18.00	20.00	4578411

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
016	360.00	384.50		8.10	8619910
652	360.00	385.00	18.00	20.00	4781110
018	360.00	400.00		30.00	1054300
016	370.00	394.50		8.10	8620010
652	370.00	395.00	18.00	20.00	4579710
601	375.00	405.00	22.00	24.00	4620700
016	380.00	404.50		8.10	8620110
652	380.00	405.00	18.00	20.00	4752010
018	380.00	420.00		30.00	0095100
016	390.00	414.50		8.10	8620210
652	390.00	415.00	18.00	20.00	4730010
652	395.00	420.00	18.00	20.00	4807110
016	400.00	424.50		8.10	8620310
652	400.00	425.00	18.00	20.00	4797210
601	400.00	425.00	25.00	27.00	4620800
018	400.00	440.00		30.00	0095200
652	410.00	435.00	18.00	20.00	4785110
652	415.00	445.00	20.50	22.50	4820510
652	445.00	475.00	20.50	22.50	4838010
652	470.00	495.00	18.00	20.00	4814610



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	0.125	0.375	0.250	0.275	8922910
513	0.187	0.437	0.250	0.275	8923010
513	0.187	0.562	0.187	0.207	8923110
513	0.250	0.500	0.125	0.138	8933610
513	0.250	0.500	0.187	0.207	8845910
513	0.250	0.500	0.250	0.275	8878510
513	0.250	0.625	0.187	0.207	8923210
513	0.312	0.562	0.125	0.139	8923310
513	0.312	0.562	0.250	0.275	8923510
513	0.312	0.687	0.187	0.207	8923410
513	0.375	0.625	0.125	0.138	8908610
513	0.375	0.625	0.187	0.207	8923610
605	0.375	0.625	0.198	0.218	4544300
513	0.375	0.625	0.250	0.275	8823810
018	0.375	0.750		0.281	1379300
513	0.375	0.750	0.156	0.172	8901410
605	0.375	0.750	0.312	0.344	4710500
513	0.437	0.687	0.125	0.138	8902510
513	0.437	0.687	0.250	0.275	8846910
513	0.437	0.937	0.375	0.413	8863110
513	0.500	0.750	0.125	0.138	8907910
605	0.500	0.750	0.187	0.207	4576100
601	0.500	0.750	0.250	0.275	4566500
513	0.500	0.750	0.250	0.275	8834010
018	0.500	0.875		0.281	0406700
601	0.500	0.875	0.197	0.218	4300000
513	0.500	0.875	0.250	0.275	8848010
513	0.500	0.875	0.313	0.344	8852910
601	0.500	1.000	0.250	0.275	4110201
513	0.500	1.000	0.375	0.413	8837710
513	0.562	0.812	0.125	0.138	8923710
605	0.562	0.813	0.187	0.207	4576200
018	0.625	0.875		0.187	1435600
513	0.625	0.875	0.125	0.138	8906210
620	0.625	0.875	0.160	0.176	4498600
620	0.625	0.875	0.175	0.190	4528700
605	0.625	0.875	0.187	0.207	4493700
513	0.625	0.875	0.187	0.207	8848710
605	0.625	0.875	0.241	0.265	4329000

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	0.625	0.875	0.250	0.275	8834110
620	0.625	0.875	0.250	0.275	4459900
018	0.625	1.000		0.281	1247600
513	0.625	1.000	0.187	0.207	8923810
601	0.625	1.000	0.190	0.218	4298300
605	0.625	1.000	0.281	0.312	4447200
513	0.625	1.000	0.313	0.344	8902710
601	0.625	1.125	0.250	0.275	4509101
513	0.625	1.125	0.313	0.344	8849210
513	0.625	1.125	0.375	0.413	8923910
605	0.687	0.937	0.187	0.207	4572000
605	0.750	1.000	0.125	0.138	4552900
513	0.750	1.000	0.125	0.139	8905310
605	0.750	1.000	0.187	0.207	4571000
620	0.750	1.000	0.187	0.207	4583900
605	0.750	1.000	0.250	0.275	4345100
513	0.750	1.000	0.250	0.275	8834210
620	0.750	1.000	0.250	0.275	4498500
018	0.750	1.093		0.281	1364200
513	0.750	1.125	0.187	0.207	8849810
513	0.750	1.125	0.250	0.275	8846010
605	0.750	1.125	0.312	0.344	4512200
513	0.750	1.125	0.313	0.344	8834310
513	0.750	1.125	0.375	0.413	8855810
018	0.750	1.250		0.375	0403700
601	0.750	1.250	0.250	0.275	4102901
513	0.750	1.250	0.250	0.275	8924010
513	0.750	1.250	0.375	0.413	8837810
513	0.812	1.062	0.125	0.138	8924110
605	0.812	1.062	0.187	0.207	4576300
605	0.812	1.062	0.250	0.275	4558700
513	0.812	1.062	0.250	0.275	8924210
513	0.875	1.125	0.125	0.138	8924310
605	0.875	1.125	0.187	0.207	4576400
620	0.875	1.125	0.187	0.207	4709100
605	0.875	1.125	0.250	0.275	4442500
513	0.875	1.125	0.250	0.275	8845310
513	0.875	1.250	0.187	0.207	8924410
513	0.875	1.250	0.313	0.344	8900210



18



513



601



605



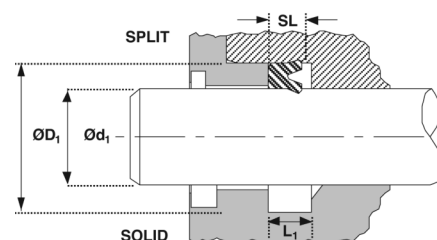
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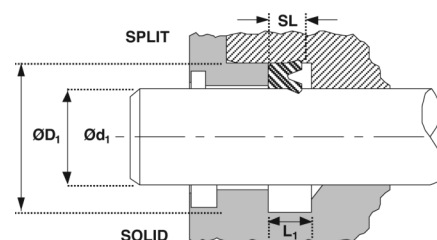
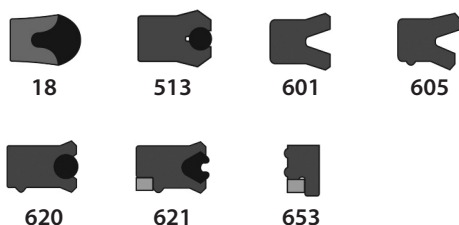


653



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	0.875	1.250	0.324	0.356	4794500
018	0.875	1.375		0.375	0401300
601	0.875	1.375	0.238	0.275	4507101
513	0.875	1.375	0.250	0.275	8924510
513	0.875	1.375	0.313	0.344	8830210
605	0.875	1.375	0.341	0.375	4373100
513	0.875	1.375	0.375	0.413	8864610
513	0.937	1.187	0.125	0.138	8924610
513	0.937	1.187	0.250	0.275	8900910
513	0.937	1.312	0.312	0.344	8924710
620	1.000	1.240	0.187	0.217	4477200
605	1.000	1.240	0.192	0.211	4371800
513	1.000	1.250	0.125	0.138	8924810
620	1.000	1.250	0.187	0.197	4457500
605	1.000	1.250	0.187	0.207	4442600
513	1.000	1.250	0.187	0.207	8860110
605	1.000	1.250	0.250	0.275	4345200
513	1.000	1.250	0.250	0.275	8834410
620	1.000	1.250	0.250	0.275	4498400
513	1.000	1.312	0.156	0.182	8925010
605	1.000	1.312	0.219	0.241	4493800
018	1.000	1.375		0.250	0282600
605	1.000	1.375	0.187	0.207	4801700
513	1.000	1.375	0.187	0.207	8806110
605	1.000	1.375	0.250	0.275	4456800
513	1.000	1.375	0.250	0.275	8860510
620	1.000	1.375	0.250	0.275	4410400
513	1.000	1.375	0.281	0.310	8925110
605	1.000	1.375	0.312	0.344	4345900
620	1.000	1.375	0.312	0.344	4584000
513	1.000	1.375	0.313	0.344	8834510
018	1.000	1.500		0.375	0422400
513	1.000	1.500	0.250	0.275	8924910
601	1.000	1.500	0.253	0.275	4111101
605	1.000	1.500	0.255	0.275	4430200
605	1.000	1.500	0.341	0.375	4330100
605	1.000	1.500	0.375	0.413	4308400
513	1.000	1.500	0.375	0.413	8837910
513	1.000	1.625	0.375	0.413	8828310

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	1.000	1.625	0.500	0.550	8838010
605	1.062	1.302	0.187	0.207	4410300
513	1.062	1.312	0.125	0.138	8925210
605	1.062	1.312	0.250	0.275	4394500
513	1.062	1.437	0.313	0.344	8850010
513	1.063	1.313	0.250	0.275	8845710
605	1.125	1.365	0.192	0.210	4384500
513	1.125	1.375	0.125	0.138	8899910
605	1.125	1.375	0.187	0.207	4442700
513	1.125	1.375	0.187	0.207	8855510
605	1.125	1.375	0.250	0.275	4388000
513	1.125	1.375	0.250	0.275	8855610
620	1.125	1.375	0.250	0.275	4461100
513	1.125	1.375	0.313	0.344	8848810
605	1.125	1.400	0.192	0.211	4371900
513	1.125	1.500	0.188	0.207	8907710
513	1.125	1.500	0.250	0.275	8844910
620	1.125	1.500	0.250	0.275	4410500
605	1.125	1.500	0.312	0.344	4392600
513	1.125	1.500	0.313	0.344	8834610
605	1.125	1.562	0.325	0.360	4568800
018	1.125	1.625		0.375	0287000
605	1.125	1.625	0.250	0.275	4370900
513	1.125	1.625	0.250	0.275	8804910
513	1.125	1.625	0.375	0.413	8856110
018	1.125	1.750		0.437	0778200
513	1.125	1.750	0.312	0.344	8925310
605	1.125	1.750	0.397	0.437	4373000
513	1.125	1.750	0.500	0.550	8879810
513	1.187	1.437	0.250	0.275	8848910
513	1.187	1.562	0.187	0.207	8925410
605	1.187	1.562	0.250	0.275	4458600
513	1.188	1.563	0.313	0.344	8902310
513	1.250	1.500	0.125	0.138	8925510
605	1.250	1.500	0.187	0.207	4359600
513	1.250	1.500	0.187	0.207	8860210
620	1.250	1.500	0.187	0.207	4398900
605	1.250	1.500	0.250	0.275	4345300
513	1.250	1.500	0.250	0.275	8834710



TYPE	$\varnothing d_1$	NOMINAL $\varnothing D_1$	SL	L_1	PART No.
620	1.250	1.500	0.250	0.275	4461000
018	1.250	1.625		0.281	0282400
605	1.250	1.625	0.187	0.207	4552600
513	1.250	1.625	0.187	0.207	8925610
605	1.250	1.625	0.227	0.250	4330200
605	1.250	1.625	0.250	0.275	4460600
621	1.250	1.625	0.250	0.275	4794110
513	1.250	1.625	0.250	0.275	8860610
605	1.250	1.625	0.312	0.344	4346000
620	1.250	1.625	0.312	0.344	4410600
621	1.250	1.625	0.313	0.344	4809910
513	1.250	1.625	0.313	0.344	8834810
513	1.250	1.625	0.375	0.413	8860710
605	1.250	1.750	0.250	0.275	4513500
513	1.250	1.750	0.250	0.275	8925710
601	1.250	1.750	0.253	0.275	4502701
601	1.250	1.750	0.375	0.413	4107001
605	1.250	1.750	0.375	0.413	4335800
513	1.250	1.750	0.375	0.413	8838110
018	1.250	1.875		0.437	0404100
513	1.250	1.875	0.313	0.344	8809810
605	1.250	1.875	0.397	0.437	4330300
513	1.250	1.875	0.500	0.550	8838210
513	1.250	2.000	0.375	0.413	8925810
513	1.250	2.000	0.500	0.550	8842010
513	1.312	1.562	0.125	0.138	8926010
513	1.312	1.687	0.312	0.344	8925910
513	1.313	1.813	0.375	0.413	8902610
513	1.375	1.625	0.125	0.138	8926210
605	1.375	1.625	0.187	0.207	4392200
513	1.375	1.625	0.187	0.207	8860310
605	1.375	1.625	0.250	0.275	4345400
513	1.375	1.625	0.250	0.275	8834910
513	1.375	1.688	0.156	0.182	8926410
605	1.375	1.688	0.219	0.241	4493900
605	1.375	1.750	0.187	0.207	4552800
513	1.375	1.750	0.187	0.207	8926110
513	1.375	1.750	0.250	0.275	8844710
605	1.375	1.750	0.312	0.344	4346100

TYPE	$\varnothing d_1$	NOMINAL $\varnothing D_1$	SL	L_1	PART No.
620	1.375	1.750	0.312	0.344	4410700
513	1.375	1.750	0.313	0.344	8835010
601	1.375	1.750	0.375	0.413	4353400
513	1.375	1.750	0.375	0.413	8835110
513	1.375	1.875	0.250	0.275	8926310
605	1.375	1.875	0.375	0.413	4403100
621	1.375	1.875	0.375	0.413	4707710
513	1.375	1.875	0.375	0.413	8878610
018	1.375	2.000		0.437	0778400
601	1.375	2.000	0.265	0.312	4236201
513	1.375	2.000	0.313	0.344	8825110
605	1.375	2.000	0.397	0.437	4330400
513	1.375	2.000	0.500	0.550	8873510
513	1.375	2.125	0.625	0.688	8933510
513	1.437	1.687	0.125	0.138	8926510
513	1.437	1.687	0.250	0.275	8849010
605	1.437	1.812	0.312	0.344	4442800
513	1.500	1.750	0.125	0.138	8926610
605	1.500	1.750	0.250	0.275	4345500
513	1.500	1.750	0.250	0.275	8835210
605	1.500	1.875	0.187	0.207	4576600
513	1.500	1.875	0.187	0.207	8851510
605	1.500	1.875	0.250	0.275	4322100
621	1.500	1.875	0.250	0.275	4484410
513	1.500	1.875	0.250	0.275	8835310
605	1.500	1.875	0.312	0.344	4346200
621	1.500	1.875	0.312	0.344	4484510
513	1.500	1.875	0.313	0.344	8849710
605	1.500	1.875	0.375	0.413	4385400
513	1.500	1.875	0.375	0.413	8835410
620	1.500	1.875	0.375	0.413	4750600
513	1.500	1.875	0.406	0.447	8848110
018	1.500	2.000		0.281	1447800
601	1.500	2.000	0.250	0.275	4111001
605	1.500	2.000	0.250	0.275	4394400
513	1.500	2.000	0.250	0.275	8908410
513	1.500	2.000	0.313	0.344	8867710
605	1.500	2.000	0.341	0.375	4330500
605	1.500	2.000	0.375	0.413	4322200



18



513



601



605



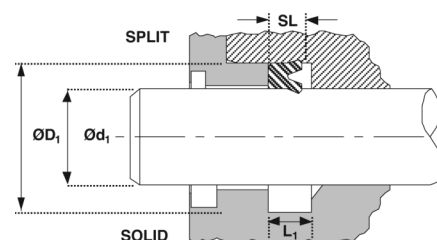
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621



653



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
621	1.500	2.000	0.375	0.413	4484910
513	1.500	2.000	0.375	0.413	8838310
018	1.500	2.125		0.437	0967600
513	1.500	2.125	0.312	0.344	8926710
605	1.500	2.125	0.375	0.413	4442900
513	1.500	2.125	0.375	0.413	8846510
605	1.500	2.125	0.397	0.437	4330600
513	1.500	2.125	0.500	0.550	8838410
513	1.500	2.250	0.500	0.550	8874810
513	1.500	2.250	0.625	0.688	8842710
513	1.625	1.875	0.125	0.139	8926910
513	1.625	1.875	0.187	0.207	8849110
605	1.625	1.875	0.250	0.275	4345600
513	1.625	1.875	0.250	0.275	8873110
513	1.625	2.000	0.187	0.207	8926810
513	1.625	2.000	0.250	0.275	8868410
605	1.625	2.000	0.281	0.312	4542800
605	1.625	2.000	0.312	0.344	4443000
513	1.625	2.000	0.313	0.344	8864210
605	1.625	2.000	0.375	0.413	4443100
513	1.625	2.000	0.375	0.413	8835510
605	1.625	2.125	0.375	0.413	4512100
513	1.625	2.125	0.375	0.413	8849610
018	1.625	2.250		0.437	1432600
513	1.625	2.375	0.375	0.413	8901010
513	1.750	2.000	0.125	0.138	8927210
605	1.750	2.000	0.250	0.275	4345700
513	1.750	2.000	0.250	0.275	8835610
513	1.750	2.125	0.187	0.207	8927010
513	1.750	2.125	0.230	0.250	8852010
605	1.750	2.125	0.250	0.275	4357200
621	1.750	2.125	0.250	0.275	4484610
513	1.750	2.125	0.250	0.275	8927110
605	1.750	2.125	0.312	0.344	4346300
513	1.750	2.125	0.313	0.344	8865410
605	1.750	2.125	0.375	0.413	4366800
621	1.750	2.125	0.375	0.413	4484710
513	1.750	2.125	0.375	0.413	8835710
620	1.750	2.125	0.375	0.413	4460000

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
018	1.750	2.250		0.312	1404300
601	1.750	2.250	0.250	0.275	4502601
605	1.750	2.250	0.250	0.275	4552700
513	1.750	2.250	0.250	0.275	8805610
605	1.750	2.250	0.341	0.375	4330700
601	1.750	2.250	0.375	0.413	4140901
605	1.750	2.250	0.375	0.413	4337000
621	1.750	2.250	0.375	0.413	4485010
513	1.750	2.250	0.375	0.413	8838510
605	1.750	2.250	0.500	0.550	4376800
018	1.750	2.375		0.437	0939800
601	1.750	2.375	0.250	0.312	4236301
513	1.750	2.375	0.375	0.413	8868810
605	1.750	2.375	0.437	0.481	4443200
513	1.750	2.375	0.500	0.550	8873610
601	1.750	2.375	0.562	0.619	4250901
513	1.750	2.500	0.500	0.550	8874910
513	1.750	2.500	0.625	0.688	8875010
513	1.750	2.750	0.750	0.825	8847010
513	1.875	2.125	0.187	0.207	8845810
513	1.875	2.125	0.250	0.275	8845410
513	1.875	2.250	0.187	0.207	8927310
605	1.875	2.250	0.313	0.344	4834600
605	1.875	2.250	0.375	0.413	4476200
513	1.875	2.250	0.375	0.413	8835810
605	1.875	2.375	0.375	0.413	4391200
513	1.875	2.375	0.375	0.413	8859410
018	1.875	2.500		0.437	0867200
605	1.875	2.500	0.397	0.437	4331500
513	1.875	2.500	0.500	0.550	8873710
513	2.000	2.250	0.187	0.207	8860410
605	2.000	2.250	0.250	0.275	4345800
513	2.000	2.250	0.250	0.275	8873210
513	2.000	2.375	0.187	0.207	8927410
513	2.000	2.375	0.230	0.250	8806210
601	2.000	2.375	0.250	0.275	4508301
605	2.000	2.375	0.250	0.275	4458700
513	2.000	2.375	0.250	0.275	8868110
513	2.000	2.375	0.266	0.292	8927710



18



513



601



605



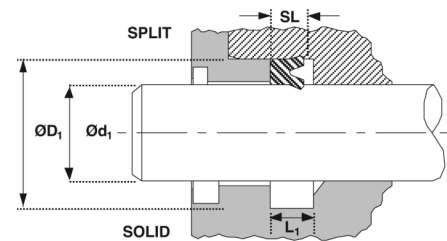
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621



653



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
601	2.000	2.375	0.312	0.344	4509201
605	2.000	2.375	0.312	0.344	4346400
513	2.000	2.375	0.313	0.344	8860810
605	2.000	2.375	0.375	0.413	4380100
621	2.000	2.375	0.375	0.413	4484810
513	2.000	2.375	0.375	0.413	8835910
653	2.000	2.424		0.166	4521310
605	2.000	2.500	0.250	0.275	4496900
513	2.000	2.500	0.250	0.275	8856010
620	2.000	2.500	0.250	0.275	8907600
605	2.000	2.500	0.312	0.344	4382900
605	2.000	2.500	0.341	0.375	4330900
601	2.000	2.500	0.375	0.413	4353500
605	2.000	2.500	0.375	0.413	4337100
621	2.000	2.500	0.375	0.413	4485110
513	2.000	2.500	0.375	0.413	8838610
605	2.000	2.500	0.781	0.859	4491400
018	2.000	2.625		0.437	1371000
605	2.000	2.625	0.312	0.344	4333100
605	2.000	2.625	0.397	0.437	4331000
601	2.000	2.625	0.500	0.550	4225101
605	2.000	2.625	0.500	0.550	4346500
513	2.000	2.625	0.500	0.550	8873810
601	2.000	2.625	0.562	0.619	4159801
513	2.000	2.625	0.563	0.619	8862210
018	2.000	2.750		0.562	1369100
513	2.000	2.750	0.375	0.413	8927610
513	2.000	2.750	0.500	0.550	8875110
513	2.000	2.750	0.625	0.688	8842810
605	2.000	2.750	0.625	0.688	4347300
513	2.000	3.000	0.500	0.550	8927510
513	2.000	3.000	0.750	0.825	8876810
513	2.125	2.375	0.250	0.275	8908910
513	2.125	2.500	0.188	0.207	8908110
601	2.125	2.500	0.250	0.275	4508201
513	2.125	2.500	0.250	0.275	8845010
605	2.125	2.500	0.375	0.413	4443300
513	2.125	2.500	0.375	0.413	8836010
513	2.125	2.625	0.250	0.275	8805810

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
601	2.125	2.625	0.375	0.413	4156101
621	2.125	2.625	0.375	0.413	4592510
513	2.125	2.625	0.375	0.413	8856310
513	2.125	2.750	0.312	0.344	8927810
513	2.125	2.750	0.500	0.550	8879910
513	2.125	2.750	0.625	0.688	8864810
513	2.250	2.500	0.250	0.275	8908810
513	2.250	2.625	0.187	0.207	8927910
513	2.250	2.625	0.313	0.344	8860910
605	2.250	2.625	0.335	0.375	4372200
513	2.250	2.625	0.375	0.413	8873310
605	2.250	2.750	0.341	0.375	4331100
601	2.250	2.750	0.375	0.413	4128701
605	2.250	2.750	0.375	0.413	4337200
621	2.250	2.750	0.375	0.413	4485210
513	2.250	2.750	0.375	0.413	8838710
018	2.250	2.875		0.437	0424300
513	2.250	2.875	0.313	0.344	8816310
605	2.250	2.875	0.500	0.550	4750200
513	2.250	2.875	0.500	0.550	8838810
018	2.250	3.000		0.562	1098400
513	2.250	3.000	0.375	0.413	8928010
513	2.250	3.000	0.500	0.550	8875210
605	2.250	3.000	0.511	0.562	4331200
513	2.250	3.000	0.625	0.688	8842910
513	2.375	2.750	0.187	0.207	8928110
513	2.375	2.750	0.280	0.308	8903010
605	2.375	2.750	0.375	0.413	4443400
513	2.375	2.750	0.375	0.413	8861010
605	2.375	2.875	0.375	0.413	4443500
621	2.375	2.875	0.375	0.413	4485310
513	2.375	2.875	0.375	0.413	8850110
513	2.375	2.875	0.563	0.619	8900610
601	2.375	3.000	0.312	0.344	4107201
513	2.375	3.000	0.313	0.344	8827210
513	2.375	3.000	0.500	0.550	8838910
513	2.375	3.125	0.625	0.688	8846810
513	2.375	3.375	0.500	0.550	8928210
513	2.500	2.750	0.125	0.138	8928610



18



513



601



605



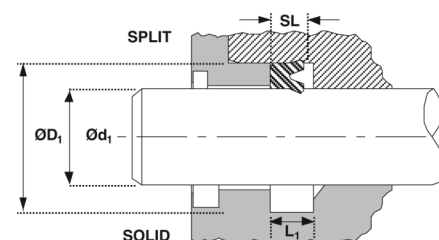
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621

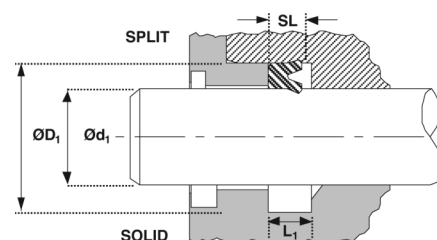
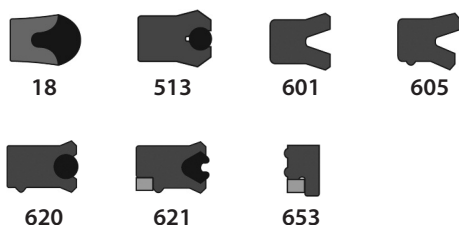


653



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	2.500	2.750	0.250	0.275	8902210
513	2.500	2.875	0.187	0.207	8928410
513	2.500	2.875	0.250	0.275	8908310
605	2.500	2.875	0.312	0.344	4443600
605	2.500	2.875	0.375	0.413	4458500
513	2.500	2.875	0.375	0.413	8836210
653	2.500	2.924		0.166	4514610
605	2.500	2.937	0.284	0.312	4535900
018	2.500	3.000		0.312	0641200
605	2.500	3.000	0.250	0.275	4553000
513	2.500	3.000	0.250	0.275	8928310
605	2.500	3.000	0.284	0.312	4331300
513	2.500	3.000	0.313	0.344	8867810
601	2.500	3.000	0.375	0.413	4119501
605	2.500	3.000	0.375	0.413	4335900
621	2.500	3.000	0.375	0.413	4485410
513	2.500	3.000	0.375	0.413	8839010
601	2.500	3.125	0.312	0.344	4124401
513	2.500	3.125	0.375	0.413	8836110
605	2.500	3.125	0.500	0.550	4346600
621	2.500	3.125	0.500	0.550	4794310
513	2.500	3.125	0.500	0.550	8873910
018	2.500	3.250		0.562	0782400
513	2.500	3.250	0.375	0.413	8928510
513	2.500	3.250	0.500	0.550	8875310
513	2.500	3.250	0.625	0.688	8843010
605	2.500	3.250	0.625	0.688	4347400
513	2.500	3.500	0.750	0.825	8847110
513	2.625	3.000	0.187	0.207	8928710
513	2.625	3.000	0.250	0.275	8868510
513	2.625	3.000	0.313	0.344	8864310
605	2.625	3.000	0.375	0.413	4443700
513	2.625	3.000	0.375	0.413	8836310
601	2.625	3.125	0.375	0.413	4224701
513	2.625	3.125	0.375	0.413	8849310
605	2.625	3.125	0.500	0.550	4514900
513	2.625	3.250	0.500	0.550	8933310
605	2.625	3.250	0.625	0.688	4376900
513	2.625	3.375	0.625	0.688	8863710

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
605	2.735	3.250	0.312	0.344	4746400
513	2.750	3.125	0.187	0.207	8849910
513	2.750	3.125	0.313	0.344	8846110
605	2.750	3.125	0.375	0.413	4379100
513	2.750	3.125	0.375	0.413	8836410
653	2.750	3.174		0.166	4533510
513	2.750	3.250	0.250	0.275	8805910
605	2.750	3.250	0.375	0.413	4336000
621	2.750	3.250	0.375	0.413	4485510
513	2.750	3.250	0.375	0.413	8839110
605	2.750	3.375	0.375	0.413	4456900
513	2.750	3.375	0.375	0.413	8868910
605	2.750	3.375	0.500	0.550	4346700
513	2.750	3.375	0.500	0.550	8839210
601	2.750	3.375	0.562	0.619	4250701
605	2.750	3.375	0.805	0.885	4467400
018	2.750	3.500		0.562	0437800
513	2.750	3.500	0.500	0.550	8875410
513	2.750	3.500	0.625	0.688	8843110
605	2.750	3.500	0.625	0.688	4347500
513	2.875	3.125	0.250	0.275	8847410
513	2.875	3.250	0.280	0.308	8903110
605	2.875	3.250	0.375	0.413	4443800
513	2.875	3.250	0.375	0.413	8861110
605	2.875	3.375	0.375	0.413	4760200
513	2.875	3.375	0.375	0.413	8830910
601	2.875	3.500	0.325	0.360	4129701
513	2.875	3.500	0.500	0.550	8874010
513	3.000	3.375	0.187	0.207	8806710
513	3.000	3.375	0.250	0.275	8868210
513	3.000	3.375	0.313	0.344	8861210
605	3.000	3.375	0.375	0.413	4468300
513	3.000	3.375	0.375	0.413	8836510
605	3.000	3.438	0.281	0.310	4539900
513	3.000	3.500	0.250	0.275	8928810
605	3.000	3.500	0.375	0.413	4336100
621	3.000	3.500	0.375	0.413	4485610
513	3.000	3.500	0.375	0.413	8839310
513	3.000	3.500	0.500	0.550	8842110



TYPE	Ød ₁	NOMINAL			PART
		ØD ₁	SL	L ₁	No.
513	3.000	3.500	0.563	0.619	8852210
605	3.000	3.500	0.625	0.688	4399600
605	3.000	3.500	0.781	0.859	4476900
653	3.000	3.616		0.247	4515910
513	3.000	3.625	0.312	0.344	8929010
513	3.000	3.625	0.375	0.413	8828510
605	3.000	3.625	0.500	0.550	4346800
621	3.000	3.625	0.500	0.550	4486810
513	3.000	3.625	0.500	0.550	8874110
601	3.000	3.625	0.562	0.619	4160001
018	3.000	3.750		0.562	0410500
513	3.000	3.750	0.375	0.413	8928910
513	3.000	3.750	0.500	0.550	8875510
513	3.000	3.750	0.625	0.688	8843210
605	3.000	3.750	0.625	0.688	4347600
621	3.000	3.750	0.625	0.688	4489310
513	3.000	4.000	0.750	0.825	8863310
513	3.125	3.500	0.188	0.207	8908710
513	3.125	3.500	0.250	0.275	8845110
513	3.125	3.500	0.375	0.413	8836610
605	3.125	3.500	0.625	0.688	4399700
513	3.125	3.625	0.250	0.275	8848510
513	3.125	3.625	0.375	0.413	8856210
513	3.125	3.750	0.312	0.344	8929210
513	3.125	3.750	0.500	0.550	8869810
513	3.125	3.875	0.375	0.413	8929110
513	3.125	3.875	0.625	0.688	8900310
513	3.250	3.625	0.313	0.344	8861310
605	3.250	3.625	0.375	0.413	4714100
513	3.250	3.625	0.375	0.413	8873410
605	3.250	3.625	0.562	0.619	4476800
605	3.250	3.750	0.375	0.413	4336200
621	3.250	3.750	0.375	0.413	4485710
513	3.250	3.750	0.375	0.413	8839410
513	3.250	3.875	0.313	0.344	8820110
605	3.250	3.875	0.500	0.550	4415400
513	3.250	3.875	0.500	0.550	8869710
018	3.250	4.000		0.562	1407700
513	3.250	4.000	0.500	0.550	8875610

TYPE	Ød ₁	NOMINAL			PART
		ØD ₁	SL	L ₁	No.
621	3.250	4.000	0.625	0.688	4790710
513	3.250	4.000	0.625	0.688	8843310
513	3.375	3.750	0.187	0.207	8932910
513	3.375	3.750	0.280	0.308	8903210
513	3.375	3.750	0.375	0.413	8836710
513	3.375	3.875	0.250	0.275	8929310
605	3.375	3.875	0.375	0.413	4760300
513	3.375	3.875	0.375	0.413	8849410
513	3.375	3.875	0.563	0.619	8900710
513	3.375	4.000	0.313	0.344	8827410
513	3.375	4.000	0.500	0.550	8874210
605	3.375	4.000	0.594	0.653	4377000
513	3.375	4.125	0.625	0.688	8852110
513	3.500	3.875	0.187	0.207	8929510
605	3.500	3.875	0.375	0.413	4468400
513	3.500	3.875	0.375	0.413	8836810
018	3.500	4.000		0.375	1468200
513	3.500	4.000	0.250	0.275	8929410
605	3.500	4.000	0.312	0.344	4540000
513	3.500	4.000	0.313	0.344	8867910
605	3.500	4.000	0.375	0.413	4336300
621	3.500	4.000	0.375	0.413	4485810
513	3.500	4.000	0.375	0.413	8839510
653	3.500	4.116		0.247	4514810
513	3.500	4.125	0.375	0.413	8837410
605	3.500	4.125	0.500	0.550	4346900
621	3.500	4.125	0.500	0.550	4486910
513	3.500	4.125	0.500	0.550	8874310
018	3.500	4.250		0.562	1128800
513	3.500	4.250	0.500	0.550	8875710
513	3.500	4.250	0.625	0.688	8843410
605	3.500	4.250	0.625	0.688	4347700
621	3.500	4.250	0.625	0.688	4573610
513	3.500	5.000	0.750	0.825	8929610
513	3.625	4.000	0.187	0.207	8929710
513	3.625	4.000	0.250	0.275	8868610
513	3.625	4.000	0.313	0.344	8864410
513	3.625	4.000	0.375	0.413	8836910
605	3.625	4.125	0.375	0.413	4436200



18



513



601



605



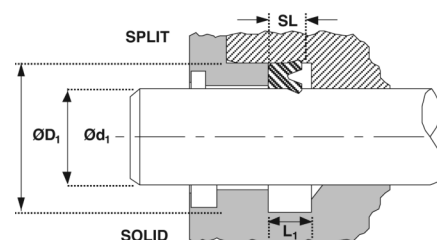
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621

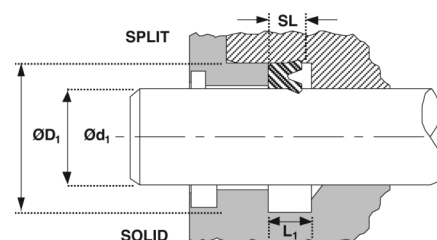
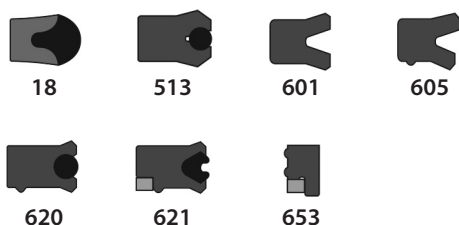


653



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	3.625	4.125	0.375	0.413	8849510
513	3.625	4.250	0.375	0.413	8933910
513	3.625	4.375	0.625	0.688	8865310
513	3.750	4.125	0.187	0.207	8850210
513	3.750	4.125	0.313	0.344	8846210
605	3.750	4.125	0.375	0.413	4702500
621	3.750	4.125	0.375	0.413	4709310
513	3.750	4.125	0.375	0.413	8837010
513	3.750	4.250	0.250	0.275	8848610
605	3.750	4.250	0.375	0.413	4443900
621	3.750	4.250	0.375	0.413	4790810
513	3.750	4.250	0.375	0.413	8839710
605	3.750	4.250	0.500	0.550	4456500
605	3.750	4.250	0.562	0.625	4436100
513	3.750	4.250	0.563	0.619	8839810
513	3.750	4.375	0.375	0.413	8869010
513	3.750	4.375	0.500	0.550	8874410
018	3.750	4.500		0.500	1414800
601	3.750	4.500	0.375	0.413	4119201
513	3.750	4.500	0.375	0.413	8929810
513	3.750	4.500	0.500	0.550	8875810
513	3.750	4.500	0.625	0.688	8875910
513	3.875	4.125	0.250	0.275	8845510
513	3.875	4.250	0.280	0.308	8903310
513	3.875	4.250	0.375	0.413	8861410
605	3.875	4.375	0.375	0.413	4760400
513	3.875	4.375	0.375	0.413	8832510
513	3.875	4.500	0.500	0.550	8839910
513	4.000	4.250	0.125	0.138	8930010
513	4.000	4.375	0.187	0.207	8820010
513	4.000	4.375	0.250	0.275	8868310
513	4.000	4.375	0.313	0.344	8861510
605	4.000	4.375	0.375	0.413	4468500
513	4.000	4.375	0.375	0.413	8837110
513	4.000	4.500	0.250	0.275	8929910
605	4.000	4.500	0.312	0.344	4586700
605	4.000	4.500	0.375	0.413	4336400
621	4.000	4.500	0.375	0.413	4486010
513	4.000	4.500	0.375	0.413	8840010

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	4.000	4.500	0.500	0.550	8867510
601	4.000	4.500	0.511	0.562	4373400
605	4.000	4.500	0.562	0.619	4385700
621	4.000	4.500	0.562	0.619	4486110
513	4.000	4.500	0.563	0.619	8840110
605	4.000	4.500	0.781	0.859	4399800
653	4.000	4.616		0.247	4524610
605	4.000	4.625	0.375	0.413	4520100
621	4.000	4.625	0.375	0.413	4778610
605	4.000	4.625	0.500	0.550	4347000
621	4.000	4.625	0.500	0.550	4792610
513	4.000	4.625	0.500	0.550	8874510
621	4.000	4.625	0.562	0.619	4487010
513	4.000	4.625	0.563	0.619	8862310
601	4.000	4.750	0.375	0.413	4120501
605	4.000	4.750	0.500	0.550	4444000
513	4.000	4.750	0.500	0.550	8876010
601	4.000	4.750	0.536	0.600	4422500
513	4.000	4.750	0.625	0.688	8843510
605	4.000	4.750	0.625	0.688	4347800
621	4.000	4.750	0.625	0.688	4483310
018	4.000	4.875		0.656	1424100
018	4.000	5.000		0.750	0443000
513	4.000	5.000	0.500	0.550	8930110
513	4.000	5.000	0.750	0.825	8877410
513	4.125	4.500	0.250	0.275	8845210
513	4.125	4.500	0.375	0.413	8837210
513	4.125	4.625	0.250	0.275	8806010
513	4.125	4.625	0.375	0.413	8856410
513	4.125	4.750	0.500	0.550	8869610
513	4.125	4.750	0.625	0.688	8869510
513	4.250	4.625	0.313	0.344	8861610
513	4.250	4.625	0.375	0.413	8837310
513	4.250	4.750	0.250	0.275	8930310
513	4.250	4.750	0.375	0.413	8840210
513	4.250	4.750	0.563	0.619	8905810
513	4.250	4.875	0.313	0.344	8821610
513	4.250	4.875	0.500	0.550	8869410
513	4.250	4.875	0.562	0.619	8930210



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	4.250	5.000	0.375	0.413	8867410
513	4.250	5.000	0.500	0.550	8876110
621	4.250	5.000	0.625	0.688	4790910
513	4.250	5.000	0.625	0.688	8843610
605	4.250	5.000	0.625	0.688	4347900
018	4.250	5.250		0.750	0892200
513	4.250	5.250	0.750	0.825	8847210
513	4.375	4.750	0.280	0.308	8903410
513	4.375	4.750	0.375	0.413	8861710
513	4.375	4.875	0.250	0.275	8848310
605	4.375	4.875	0.375	0.413	4760500
513	4.375	4.875	0.563	0.619	8900510
513	4.375	5.000	0.313	0.344	8827610
513	4.375	5.000	0.500	0.550	8874610
513	4.375	5.000	0.625	0.688	8840410
513	4.500	4.875	0.375	0.413	8837510
513	4.500	5.000	0.250	0.275	8817110
513	4.500	5.000	0.313	0.344	8868010
601	4.500	5.000	0.375	0.413	4129801
605	4.500	5.000	0.375	0.413	4379200
621	4.500	5.000	0.375	0.413	4486210
513	4.500	5.000	0.375	0.413	8840510
513	4.500	5.000	0.500	0.550	8864710
621	4.500	5.000	0.562	0.619	4486310
513	4.500	5.000	0.563	0.619	8840610
621	4.500	5.125	0.375	0.413	4791010
513	4.500	5.125	0.375	0.413	8840710
605	4.500	5.125	0.500	0.550	4347100
513	4.500	5.125	0.625	0.688	8840810
605	4.500	5.125	0.625	0.688	4444100
621	4.500	5.125	0.625	0.688	4486410
018	4.500	5.250		0.469	0447800
513	4.500	5.250	0.375	0.413	8930410
513	4.500	5.250	0.500	0.550	8876210
513	4.500	5.250	0.625	0.688	8843710
605	4.500	5.250	0.625	0.688	4348000
621	4.500	5.250	0.625	0.688	4483410
018	4.500	5.500		0.750	0133200
513	4.500	5.500	0.500	0.550	8930510

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	4.500	5.500	0.750	0.825	8847310
513	4.625	5.000	0.250	0.275	8868710
513	4.625	5.000	0.313	0.344	8864510
513	4.625	5.000	0.375	0.413	8837610
513	4.625	5.125	0.250	0.275	8848410
605	4.625	5.250	0.625	0.688	4377100
605	4.750	5.125	0.375	0.413	4714200
513	4.750	5.125	0.375	0.413	8846610
513	4.750	5.250	0.250	0.275	8930810
513	4.750	5.250	0.375	0.413	8861910
513	4.750	5.250	0.500	0.550	8846310
513	4.750	5.250	0.563	0.619	8840910
605	4.750	5.250	0.625	0.688	4451100
513	4.750	5.375	0.500	0.550	8869310
513	4.750	5.375	0.625	0.688	8862410
601	4.750	5.500	0.360	0.437	4154701
621	4.750	5.500	0.375	0.413	4791210
513	4.750	5.500	0.375	0.413	8930610
513	4.750	5.500	0.500	0.550	8876310
621	4.750	5.500	0.625	0.688	4791110
513	4.750	5.500	0.625	0.688	8876410
513	4.750	5.750	0.750	0.825	8930710
513	4.875	5.125	0.250	0.275	8845610
513	4.875	5.250	0.280	0.308	8903510
513	4.875	5.250	0.375	0.413	8861810
605	4.875	5.375	0.375	0.413	4760600
513	4.875	5.375	0.375	0.413	8832910
513	4.875	5.375	0.562	0.619	8930910
513	5.000	5.375	0.375	0.413	8842510
513	5.000	5.500	0.250	0.275	8931210
605	5.000	5.500	0.375	0.413	4495000
513	5.000	5.500	0.375	0.413	8841010
513	5.000	5.500	0.500	0.550	8866810
605	5.000	5.500	0.562	0.619	4386100
621	5.000	5.500	0.562	0.619	4486510
513	5.000	5.500	0.563	0.619	8841110
605	5.000	5.500	0.781	0.859	4399900
605	5.000	5.531	0.557	0.619	4391400
605	5.000	5.625	0.500	0.550	4347200



18



513



601



605



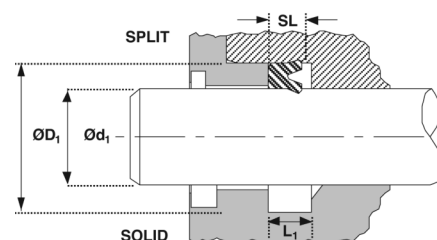
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621



653



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	5.000	5.625	0.625	0.688	8874710
621	5.000	5.625	0.625	0.688	4487110
513	5.000	5.750	0.375	0.413	8931010
601	5.000	5.750	0.482	0.539	4224801
513	5.000	5.750	0.500	0.550	8876510
513	5.000	5.750	0.625	0.688	8843810
605	5.000	5.750	0.625	0.688	4348100
621	5.000	5.750	0.625	0.688	4483510
018	5.000	6.000		0.750	1367000
601	5.000	6.000	0.750	0.825	8901300
513	5.000	6.000	0.750	0.825	8907610
513	5.000	6.000	0.750	0.825	8931110
605	5.125	5.625	0.562	0.619	4436000
605	5.125	6.000	0.500	0.550	4444200
513	5.250	5.750	0.563	0.619	8862010
513	5.250	5.875	0.625	0.688	8862510
018	5.250	6.000		0.562	0487700
513	5.250	6.000	0.375	0.413	8931310
513	5.250	6.000	0.500	0.550	8865010
621	5.250	6.000	0.625	0.688	4791310
513	5.250	6.000	0.625	0.688	8843910
513	5.250	6.000	0.750	0.825	8854410
513	5.250	6.250	0.500	0.550	8931410
513	5.250	6.250	0.750	0.825	8847510
605	5.375	5.875	0.625	0.688	4475800
513	5.375	6.000	0.312	0.344	8931510
513	5.375	6.000	0.375	0.413	8931610
513	5.375	6.000	0.625	0.688	8841210
605	5.375	6.000	0.625	0.688	4448300
513	5.500	5.875	0.375	0.413	8905710
605	5.500	6.000	0.375	0.413	4379300
513	5.500	6.000	0.375	0.413	8841310
513	5.500	6.000	0.500	0.550	8833610
605	5.500	6.000	0.562	0.619	4468600
621	5.500	6.000	0.562	0.619	4486610
513	5.500	6.000	0.563	0.619	8841410
605	5.500	6.125	0.312	0.344	4540100
513	5.500	6.125	0.312	0.344	8931810
621	5.500	6.125	0.375	0.413	4791410

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	5.500	6.125	0.625	0.688	8933810
601	5.500	6.250	0.375	0.413	4119301
513	5.500	6.250	0.375	0.413	8931710
513	5.500	6.250	0.500	0.550	8863010
513	5.500	6.250	0.625	0.688	8844010
605	5.500	6.250	0.625	0.688	4348200
018	5.500	6.500		0.750	1164100
605	5.625	6.125	0.375	0.413	4714300
513	5.625	6.125	0.563	0.619	8903610
513	5.750	6.250	0.375	0.413	8866410
513	5.750	6.250	0.563	0.619	8841610
601	5.750	6.500	0.375	0.413	4135301
513	5.750	6.500	0.500	0.550	8866110
621	5.750	6.500	0.625	0.688	4791510
513	5.750	6.500	0.625	0.688	8878010
513	5.875	6.625	0.625	0.688	8900410
513	6.000	6.500	0.375	0.413	8852310
513	6.000	6.500	0.500	0.550	8867610
605	6.000	6.500	0.562	0.619	4436500
621	6.000	6.500	0.562	0.619	4486710
513	6.000	6.500	0.563	0.619	8841710
605	6.000	6.500	0.781	0.859	4400000
605	6.000	6.531	0.562	0.619	4391000
513	6.000	6.625	0.625	0.688	8862610
513	6.000	6.750	0.375	0.413	8931910
513	6.000	6.750	0.500	0.550	8866210
513	6.000	6.750	0.625	0.688	8844110
605	6.000	6.750	0.625	0.688	4348300
621	6.000	6.750	0.625	0.688	4487210
018	6.000	7.000		0.750	1188800
513	6.000	7.000	0.750	0.825	8863410
513	6.000	7.000	0.750	0.825	8932010
513	6.250	6.750	0.563	0.619	8905610
513	6.250	7.000	0.500	0.550	8902410
621	6.250	7.000	0.625	0.688	4791610
513	6.250	7.000	0.625	0.688	8844210
513	6.250	7.250	0.750	0.825	8847710
513	6.375	7.000	0.625	0.688	8841810
513	6.500	7.000	0.250	0.275	8899410



18



513



601



605



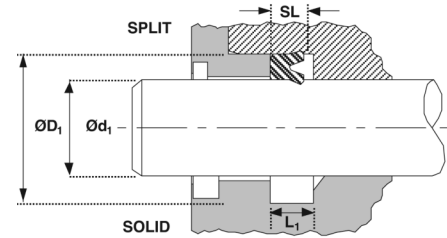
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621



653



TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	6.500	7.000	0.375	0.413	8852610
513	6.500	7.000	0.500	0.550	8846410
513	6.500	7.000	0.563	0.619	8841910
513	6.500	7.125	0.625	0.688	8869110
513	6.500	7.250	0.375	0.413	8932110
621	6.500	7.250	0.500	0.550	4791710
513	6.500	7.250	0.500	0.550	8853310
513	6.500	7.250	0.625	0.688	8844310
605	6.500	7.250	0.625	0.688	4348400
018	6.500	7.750		1.000	1192700
513	6.750	7.250	0.375	0.413	8865910
513	6.750	7.250	0.500	0.550	8866010
621	6.750	7.250	0.562	0.619	4791810
513	6.750	7.250	0.563	0.619	8866310
513	6.750	7.375	0.625	0.688	8862710
513	6.750	7.500	0.375	0.413	8932210
513	6.750	7.500	0.500	0.550	8854610
513	6.750	7.500	0.625	0.688	8854710
601	7.000	7.500	0.250	0.275	4806200
513	7.000	7.500	0.375	0.413	8852410
621	7.000	7.500	0.500	0.550	4791910
513	7.000	7.500	0.500	0.550	8842410
605	7.000	7.500	0.562	0.619	4436600
513	7.000	7.500	0.563	0.619	8877910
605	7.000	7.500	0.780	0.859	4456600
605	7.000	7.531	0.562	0.619	4391100
653	7.000	7.616		0.247	4588310
621	7.000	7.625	0.562	0.619	4792310
513	7.000	7.625	0.625	0.688	8854810
513	7.000	7.750	0.500	0.550	8854010
621	7.000	7.750	0.562	0.619	4792710
513	7.000	7.750	0.625	0.688	8844410
605	7.000	7.750	0.625	0.688	4348500
621	7.000	7.750	0.625	0.688	4588210
018	7.000	8.000		0.875	6501200
513	7.000	8.000	0.750	0.825	8870410
018	7.000	8.250		1.000	1219200
513	7.250	7.750	0.563	0.619	8862110
513	7.250	7.875	0.625	0.688	8862810

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	7.250	8.000	0.375	0.413	8932310
513	7.250	8.000	0.500	0.550	8865110
513	7.250	8.000	0.625	0.688	8844510
513	7.250	8.000	0.750	0.825	8854510
513	7.250	8.250	0.750	0.825	8847810
513	7.375	8.000	0.500	0.550	8842610
513	7.375	8.000	0.625	0.688	8864910
513	7.500	8.000	0.250	0.275	8932410
605	7.500	8.000	0.375	0.413	4714400
513	7.500	8.000	0.375	0.413	8852510
513	7.500	8.000	0.500	0.550	8833810
513	7.500	8.000	0.563	0.619	8852810
513	7.500	8.250	0.500	0.550	8863210
513	7.500	8.250	0.625	0.688	8878110
018	7.500	8.750		1.000	0418100
513	7.750	8.500	0.500	0.550	8865210
605	7.750	8.500	0.625	0.688	4353900
513	7.750	8.500	0.625	0.688	8853610
601	7.750	8.750	0.500	0.550	4806100
513	7.750	8.750	0.750	0.825	8847910
513	8.000	8.500	0.250	0.275	8904610
605	8.000	8.500	0.375	0.413	4733400
513	8.000	8.500	0.375	0.413	8848210
605	8.000	8.500	0.562	0.619	4468700
621	8.000	8.500	0.562	0.619	4792110
513	8.000	8.500	0.563	0.619	8842310
653	8.000	8.610		0.247	4753410
513	8.000	8.625	0.500	0.550	8866610
513	8.000	8.625	0.625	0.688	8904810
513	8.000	8.750	0.625	0.688	8878210
605	8.000	8.750	0.625	0.688	4510500
621	8.000	8.750	0.625	0.688	4573210
018	8.000	9.000		0.750	1269400
513	8.000	9.000	0.750	0.825	8863510
018	8.000	9.250		1.000	0455700
605	8.125	8.625	0.781	0.859	4477000
513	8.250	9.000	0.625	0.688	8854110
605	8.500	9.000	0.375	0.413	4733500
513	8.500	9.000	0.375	0.413	8852710



18



513



601



605



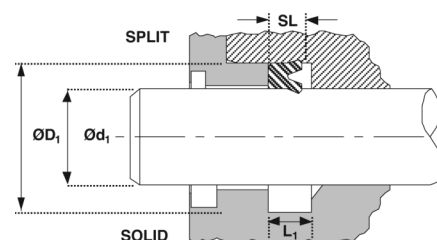
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621

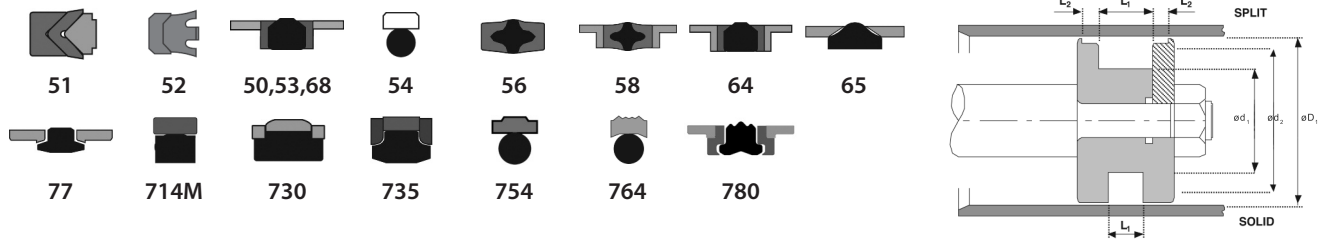


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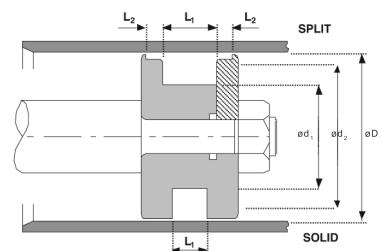
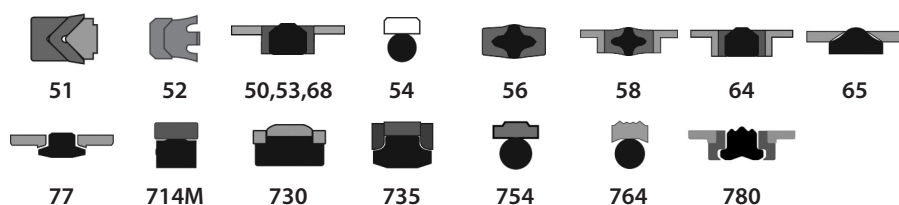
TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	8.500	9.000	0.500	0.550	8833910
513	8.500	9.000	0.563	0.619	8853010
653	8.500	9.116		0.247	4744810
513	8.500	9.125	0.625	0.688	8862910
621	8.500	9.250	0.625	0.688	4745010
018	8.500	9.750		1.000	1332300
513	8.750	9.500	0.500	0.550	8934810
605	9.000	9.500	0.562	0.619	4468800
513	9.000	9.750	0.375	0.413	8932510
621	9.000	9.750	0.625	0.688	4808810
621	9.000	10.000	0.750	0.825	4809810
018	9.000	10.250		1.000	0437500
605	9.250	10.000	0.625	0.688	4499300
605	9.375	9.875	0.781	0.859	4477100
513	9.500	10.000	0.562	0.619	8932610
513	9.500	10.250	0.625	0.688	8933710
018	9.500	10.750		1.000	1320400
605	9.750	10.250	0.375	0.413	4733600
605	10.000	10.500	0.562	0.619	4468900
621	10.000	10.500	0.562	0.619	4792210
513	10.000	10.500	0.562	0.619	8932710
621	10.000	10.750	0.625	0.688	4808910
621	10.000	11.000	0.750	0.825	4809410
018	10.000	11.250		1.000	0452200

TYPE	Ød ₁	NOMINAL ØD ₁	SL	L ₁	PART No.
513	10.250	11.000	0.500	0.550	8934710
621	10.500	11.125	0.562	0.619	4792410
018	10.500	11.750		1.000	1331300
621	11.000	11.750	0.625	0.688	4809210
018	11.000	12.250		1.000	1331000
621	12.000	12.750	0.625	0.688	4809310
653	12.000	12.950		0.319	4764910
621	12.000	13.000	0.750	0.825	4809510
018	12.000	13.250		1.000	1329100
621	13.000	13.625	0.562	0.619	4792510
018	13.000	14.250		1.000	0864800
621	14.000	15.000	0.750	0.825	4809610
018	14.000	15.250		1.208	0174900
018	14.500	16.000		1.500	1345000
621	15.000	16.000	0.750	0.825	4809710
018	15.000	17.000		1.500	1345300
018	16.500	17.750		1.000	1318800
018	17.000	17.750		0.625	1345900
018	18.000	19.250		1.250	1314500
018	19.000	20.750		1.312	1342200
018	20.000	21.500		1.750	0093600
018	30.000	31.500		1.125	1337900
018	30.000	32.000		1.500	2109700
018	38.000	39.500		1.125	0159200



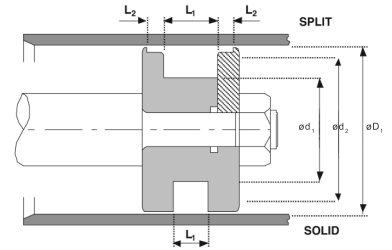
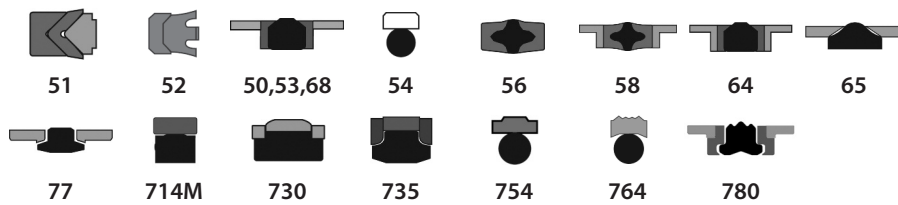
TYPE	ØD ₁	Ød ₁	NOMINAL Ød ₂	L ₁	L ₂	PART No.
054	12.00	7.10		2.20		6623910
754	15.00	7.50		3.20		4446410
054	15.00	7.50		3.20		8616310
754	16.00	8.50		3.20		4400610
054	16.00	8.50		3.20		6624010
780	20.00	11.00	17.00	13.50	2.10	5006710
754	20.00	12.50		3.20		4362310
054	20.00	12.50		3.20		6624110
764	22.00	14.50		3.20		4763610
054	24.00	16.50		3.20		6615410
052	25.00	15.00		6.30		6619810
780	25.00	15.00	21.00	12.00	4.00	5003710
068	25.00	15.00	22.00	12.50	4.00	6594610
780	25.00	16.00	22.00	13.50	2.10	5003810
050	25.00	17.00	22.00	10.00	4.00	6607810
053	25.00	17.00	22.10	8.00	4.00	2249212
754	25.00	17.50		3.20		4339610
054	25.00	17.50		3.20		6624210
065	25.00	17.50	21.30	8.50	3.25	2218210
077	25.00	17.50	21.30	8.50	3.25	6111410
754	28.00	20.50		3.20		4765910
780	30.00	17.00	27.00	15.40	6.35	5006410
051	30.00	20.00		9.30		4208310
056	30.00	20.00		12.50		0200540
780	30.00	21.00	27.00	13.50	2.10	5003910
754	30.00	22.50		3.20		4339710
054	30.00	22.50		3.20		6596810
052	32.00	20.00		7.80		1791610
764	32.00	21.00		4.20		4751210
052	32.00	22.00		6.30		6619910
065	32.00	22.00	27.50	11.00	4.00	2218110
064	32.00	22.00	28.00	15.50	2.60	6600100
780	32.00	22.00	28.00	15.50	2.60	5001420
053	32.00	22.00	28.50	10.00	5.00	2249312
780	32.00	22.00	28.50	16.40	6.35	5001410
068	32.00	22.00	29.00	12.50	4.00	2249320
050	32.00	24.00	29.00	10.00	4.00	6607910
754	32.00	24.50		3.20		4339810
054	32.00	24.50		3.20		6596910

TYPE	ØD ₁	Ød ₁	NOMINAL Ød ₂	L ₁	L ₂	PART No.
764	32.00	24.50		3.20		4741010
764	35.00	24.00		4.20		4764110
780	35.00	25.00	31.00	15.50	2.60	5001520
780	35.00	25.00	31.40	16.40	6.35	5001510
754	35.00	27.50		3.20		4352410
054	35.00	27.50		3.20		6597010
754	36.00	28.50		3.20		4787510
054	38.00	30.50		3.20		6647510
780	40.00	24.00	35.40	18.40	6.35	5001310
052	40.00	25.00		10.00		2149810
051	40.00	25.00		11.50		4208010
056	40.00	25.00		19.00		0472840
058	40.00	25.00	34.85	24.00	6.00	0472850
064	40.00	26.00	36.00	15.50	2.60	6600200
780	40.00	26.00	36.00	15.50	2.60	5008010
730	40.00	28.00		11.50		2390810
054	40.00	29.00		4.20		6597110
714	40.00	29.00		4.20		7270510
754	40.00	29.00		4.20		4339210
764	40.00	29.00		4.20		4741110
052	40.00	30.00		6.30		6620010
780	40.00	30.00	35.40	16.40	6.35	5004010
065	40.00	30.00	35.50	11.00	4.00	2218010
077	40.00	30.00	35.50	11.00	4.00	6111210
053	40.00	30.00	36.50	10.00	5.00	2249412
068	40.00	30.00	37.00	12.50	4.00	2249420
780	40.00	30.00	37.00	12.50	4.00	5005810
780	40.00	32.00		15.50	3.20	5008110
050	40.00	32.00	37.00	10.00	4.00	6608010
754	40.00	32.50		3.20		4740010
054	42.00	31.00		4.20		6597210
754	42.00	31.00		4.20		4787610
058	45.00	26.00	38.85	31.00	6.50	0474050
780	45.00	29.00	40.40	18.40	6.35	5000710
052	45.00	30.00		10.00		2150010
780	45.00	31.00	41.00	15.50	2.60	5004110
054	45.00	34.00		4.20		6597310
754	45.00	34.00		4.20		4342310
764	45.00	34.00		4.20		4744510



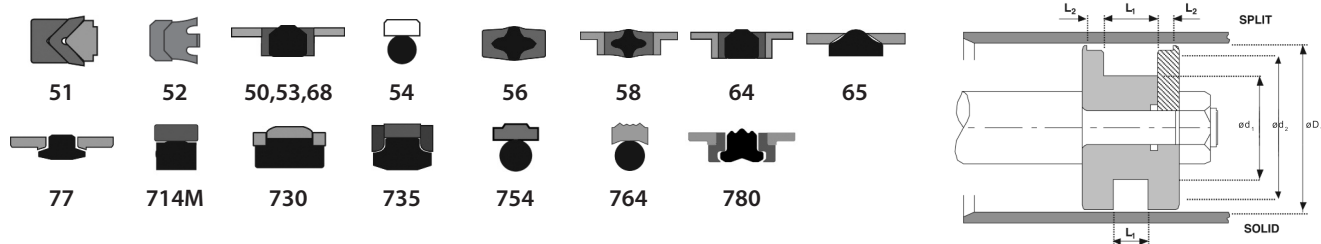
TYPE	ØD ₁	Ød ₁	NOMINAL			PART No.
			Ød ₂	L ₁	L ₂	
053	45.00	35.00	40.40	16.40	6.35	2199411
780	45.00	35.00	40.40	16.40	6.35	5001610
053	50.00	34.00	45.40	18.00	6.35	0209912
780	50.00	34.00	45.40	18.40	6.35	5000810
058	50.00	34.00	45.54	18.02	6.45	0814850
064	50.00	34.00	46.00	20.50	3.10	6600300
780	50.00	34.00	46.00	20.50	3.10	5000820
714	50.00	34.50		6.30		7272310
754	50.00	34.50		6.30		4427410
764	50.00	34.50		6.30		4775810
052	50.00	35.00		9.50		2150210
051	50.00	35.00		11.50		4207610
056	50.00	35.00		19.00		0474640
058	50.00	35.00	44.85	24.00	6.00	0474650
053	50.00	35.00	46.00	15.00	7.50	0074012
068	50.00	35.00	46.00	20.00	5.00	0074020
735	50.00	36.00		9.00		7151000
780	50.00	38.00	46.00	20.50	4.20	5004810
054	50.00	39.00		4.20		6597410
054	50.00	39.00		4.20		6597412
714	50.00	39.00		4.20		7270810
754	50.00	39.00		4.20		4327110
764	50.00	39.00		4.20		4741210
065	50.00	40.00	45.50	11.00	4.00	2217910
077	50.00	40.00	45.50	11.00	4.00	2326110
050	50.00	40.00	47.00	12.50	4.00	6608110
780	50.00	40.00	47.00	12.50	4.00	5005910
780	55.00	39.00	50.36	18.40	6.35	5000910
053	55.00	39.00	50.40	18.00	6.35	1352212
064	55.00	39.00	51.00	20.50	3.10	6600400
780	55.00	39.00	51.00	20.50	3.10	5000920
754	55.00	39.50		6.30		4355610
052	55.00	40.00		10.00		2150410
051	55.00	40.00		11.50		4207110
056	55.00	40.00		19.00		0475040
058	55.00	40.00	49.85	24.00	6.00	0475050
054	55.00	44.00		4.20		6597510
754	55.00	44.00		4.20		4465510
764	55.00	44.00		4.20		4845310

TYPE	ØD ₁	Ød ₁	NOMINAL			PART No.
			Ød ₂	L ₁	L ₂	
056	60.00	40.00		25.00		0282040
058	60.00	40.00	53.85	31.00	7.00	0282050
730	60.00	44.00		13.00		2390710
053	60.00	44.00	55.40	18.00	6.35	1361412
780	60.00	44.00	55.40	18.40	6.35	5001010
064	60.00	44.00	56.00	20.50	3.10	6600500
780	60.00	44.00	56.00	20.50	3.10	5001020
754	60.00	44.50		6.30		4390710
764	60.00	44.50		6.30		4739910
052	60.00	45.00		10.00		2150610
051	60.00	45.00		11.50		4207210
056	60.00	45.00		19.00		0979440
735	60.00	46.00		9.00		7151500
077	60.00	48.00	55.90	20.50	4.20	2326210
780	60.00	48.00	56.00	20.50	4.20	5004910
054	60.00	49.00		4.20		6597610
714	60.00	49.00		4.20		7270910
754	60.00	49.00		4.20		4327010
764	60.00	49.00		4.20		4741310
056	63.00	43.00		25.00		0646740
058	63.00	43.00	56.85	31.00	7.00	0646750
780	63.00	47.00	58.40	18.40	6.35	5001110
053	63.00	47.00	58.40	19.00	6.35	0209712
780	63.00	47.00	58.40	19.40	6.35	5001120
064	63.00	47.00	59.00	20.50	3.10	6600600
780	63.00	47.00	59.00	20.50	3.10	5001130
714	63.00	47.50		6.30		7272410
754	63.00	47.50		6.30		4431110
764	63.00	47.50		6.30		4766810
052	63.00	48.00		9.50		2150810
735	63.00	48.00		11.00		7152000
051	63.00	48.00		13.00		4207410
058	63.00	48.00	57.85	24.00	6.00	0205250
068	63.00	48.00	59.00	20.00	5.00	6594710
754	63.00	50.00		6.30		4472310
780	63.00	51.00	59.00	20.50	4.20	5005010
054	63.00	52.00		4.20		6624310
754	63.00	52.00		4.20		4326910
764	63.00	52.00		4.20		4740810



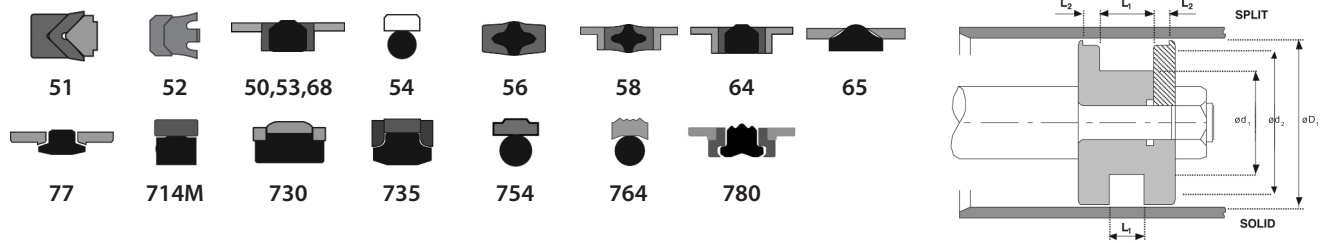
TYPE	ØD ₁	Ød ₁	NOMINAL Ød ₂	L ₁	L ₂	PART No.
065	63.00	53.00	58.50	11.00	4.00	2217810
077	63.00	53.00	58.50	11.00	4.00	2325810
050	63.00	53.00	60.00	12.50	4.00	2199513
780	63.00	53.00	60.00	12.50	4.00	5006010
064	65.00	49.00	61.00	20.50	3.10	1705210
780	65.00	49.00	61.00	20.50	3.10	5005510
754	65.00	49.50		6.30		4362010
735	65.00	50.00		11.00		7152500
056	65.00	50.00		19.00		0383840
058	65.00	50.00	59.85	24.00	6.00	0383850
053	65.00	50.00	60.40	18.00	6.35	1350512
780	65.00	50.00	60.40	18.40	6.35	5001210
754	65.00	52.00		6.30		4384910
054	65.00	54.00		4.20		8611810
754	65.00	54.00		4.20		4353010
764	65.00	54.00		4.20		4845410
052	70.00	50.00		13.00		2151010
051	70.00	50.00		15.20		4208210
056	70.00	50.00		25.00		0294640
058	70.00	50.00	63.85	31.00	7.00	0294650
053	70.00	50.00	64.00	22.00	10.00	0075112
053	70.00	50.00	64.20	22.00	6.35	0075122
780	70.00	50.00	64.20	22.40	6.35	5000210
064	70.00	54.00	66.00	20.50	3.10	6600700
780	70.00	54.00	66.00	20.50	3.10	5004210
714	70.00	54.50		6.30		7273710
754	70.00	54.50		6.30		4763410
764	70.00	54.50		6.30		4759710
735	70.00	55.00		11.00		7153000
754	70.00	57.00		6.30		4390810
780	70.00	58.00	66.00	20.50	4.20	5005110
054	70.00	59.00		4.20		6597710
714	70.00	59.00		4.20		7271310
754	70.00	59.00		4.20		4326810
764	70.00	59.00		4.20		4741410
714	75.00	54.00		8.10		7273010
056	75.00	55.00		25.00		0818640
058	75.00	55.00	68.85	31.00	7.00	0818650
053	75.00	55.00	69.00	22.00	10.00	0075612

TYPE	ØD ₁	Ød ₁	NOMINAL Ød ₂	L ₁	L ₂	PART No.
053	75.00	55.00	69.20	22.00	6.35	0075622
780	75.00	55.00	69.20	22.40	6.35	5000310
780	75.00	59.00	71.00	20.50	3.10	5004310
714	75.00	59.50		6.30		7271410
754	75.00	59.50		6.30		4704910
735	75.00	60.00		11.00		7153500
054	75.00	64.00		4.20		6624410
754	75.00	64.00		4.20		4339910
764	75.00	64.00		4.20		4845510
714	80.00	59.00		8.10		7273310
052	80.00	60.00		12.50		2151210
051	80.00	60.00		15.20		4208110
056	80.00	60.00		25.00		0294940
780	80.00	60.00		25.00	6.30	5000120
058	80.00	60.00	73.85	31.00	7.00	0294950
053	80.00	60.00	74.00	22.00	10.00	0073812
780	80.00	60.00	74.15	22.40	6.35	5000110
053	80.00	60.00	74.20	22.00	6.35	0073822
068	80.00	60.00	75.00	25.00	6.30	0073830
064	80.00	62.00	76.00	22.50	3.60	1705110
780	80.00	62.00	76.00	22.50	3.60	5004410
054	80.00	64.50		6.30		6597810
714	80.00	64.50		6.30		7270010
754	80.00	64.50		6.30		4270910
764	80.00	64.50		6.30		4722210
735	80.00	65.00		11.00		7154000
050	80.00	65.00	76.00	20.00	5.00	6608210
780	80.00	66.00	76.00	22.50	5.20	5005210
754	80.00	69.00		4.20		4768510
764	80.00	69.00		4.20		4845610
065	80.00	70.00	75.50	11.00	4.00	2217610
077	80.00	70.00	75.50	11.00	4.00	2325710
714	85.00	64.00		8.10		7273110
056	85.00	65.00		25.00		0388640
058	85.00	65.00	78.85	31.00	7.00	0388650
780	85.00	65.00	79.15	22.40	6.35	5000410
058	85.00	65.00	79.16	22.00	6.45	0314550
053	85.00	65.00	79.20	22.00	6.35	0075722
754	85.00	69.50		6.30		4564010



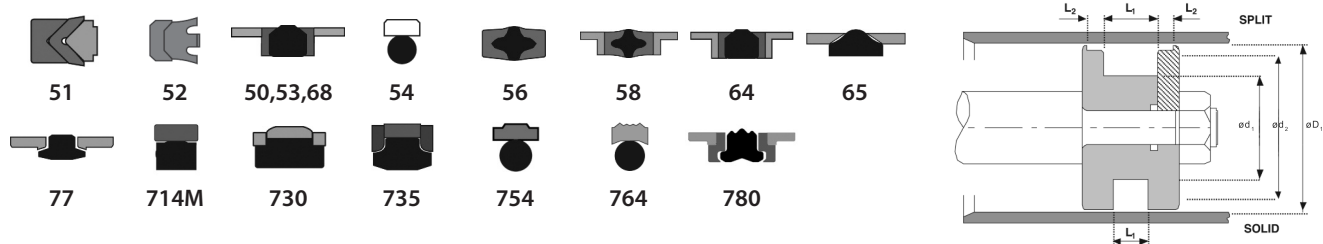
TYPE	ØD ₁	Ød ₁	NOMINAL			PART No.
			Ød ₂	L ₁	L ₂	
735	85.00	70.00		11.00		7154500
714	90.00	69.00		8.10		7273210
052	90.00	70.00		13.00		2151410
051	90.00	70.00		21.20		4207710
056	90.00	70.00		25.00		0296040
058	90.00	70.00	83.85	31.00	7.00	0296050
053	90.00	70.00	84.00	22.00	10.00	0075812
780	90.00	70.00	84.15	22.40	6.35	5000510
053	90.00	70.00	84.20	22.00	6.35	0075822
064	90.00	72.00	86.00	22.50	3.60	6600800
780	90.00	72.00	86.00	22.50	3.60	5007910
054	90.00	74.50		6.30		6597910
714	90.00	74.50		6.30		7271610
754	90.00	74.50		6.30		4372710
764	90.00	74.50		6.30		4741510
735	90.00	75.00		11.00		7155000
780	90.00	76.00	86.00	22.50	5.20	5005310
065	92.00	82.00	87.50	11.00	4.00	2240410
714	95.00	74.00		8.10		7273510
058	95.00	75.00	88.85	31.00	7.00	0412750
780	95.00	75.00	89.15	22.40	6.35	5000610
053	95.00	75.00	89.20	22.00	6.35	1352512
054	95.00	79.50		6.30		8608410
754	95.00	79.50		6.30		4569510
735	95.00	80.00		11.00		7155500
754	95.00	84.00		4.20		4831610
780	100.00	75.00	93.15	22.40	6.35	5001710
053	100.00	75.00	93.20	22.00	6.35	0073712
058	100.00	75.00	93.24	22.00	6.45	0034950
058	100.00	75.00	93.85	26.00	9.50	0891650
714	100.00	79.00		8.10		7273810
052	100.00	80.00		12.50		2151610
051	100.00	80.00		21.20		4207510
056	100.00	80.00		25.00		0295140
058	100.00	80.00	93.85	31.00	7.00	0295150
053	100.00	80.00	94.00	22.00	10.00	0083612
068	100.00	80.00	95.00	25.00	6.30	0083620
780	100.00	80.00	95.00	25.00	6.30	5004710
064	100.00	82.00	96.00	22.50	3.60	6600900

TYPE	ØD ₁	Ød ₁	NOMINAL			PART No.
			Ød ₂	L ₁	L ₂	
780	100.00	82.00	96.00	22.50	3.60	5004510
054	100.00	84.50		6.30		6598010
714	100.00	84.50		6.30		7271810
754	100.00	84.50		6.30		4339310
764	100.00	84.50		6.30		4741610
730	100.00	85.00		12.50		2342910
735	100.00	85.00		12.50		7156000
050	100.00	85.00	96.00	20.00	5.00	6608310
780	100.00	85.00	96.00	20.00	5.00	5006110
780	100.00	86.00	96.00	22.50	5.20	5005410
065	100.00	87.00	93.80	14.00	6.00	0352510
077	100.00	87.00	93.80	14.00	6.00	2326010
780	105.00	80.00	98.10	22.40	6.35	5001810
053	105.00	80.00	98.10	22.00	6.35	1352812
714	105.00	84.00		8.10		7272910
754	105.00	89.50		6.30		4372510
735	105.00	90.00		12.50		7156500
780	110.00	85.00	103.10	22.40	6.35	5001910
053	110.00	85.00	103.10	22.00	6.35	0091113
058	110.00	85.00	103.50	22.00	6.45	1188250
714	110.00	89.00		8.10		7273410
052	110.00	90.00		13.00		2151810
051	110.00	90.00		21.20		4207910
056	110.00	90.00		25.00		0712440
058	110.00	90.00	103.85	31.00	7.00	0712450
064	110.00	92.00	106.00	22.50	3.60	6601000
780	110.00	92.00	106.00	22.50	3.60	5007810
054	110.00	94.50		6.30		6598110
714	110.00	94.50		6.30		7271910
754	110.00	94.50		6.30		4419310
730	110.00	95.00		12.50		2343010
735	110.00	95.00		12.50		7157000
780	115.00	90.00	108.10	22.40	6.35	5002010
053	115.00	90.00	108.10	22.00	6.35	0084222
714	115.00	94.00		8.10		7273910
754	115.00	94.00		8.10		4788510
764	115.00	94.00		8.10		4829910
058	115.00	95.00	108.85	31.00	7.00	0796450
054	115.00	99.50		6.30		6598210



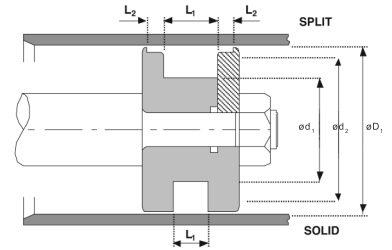
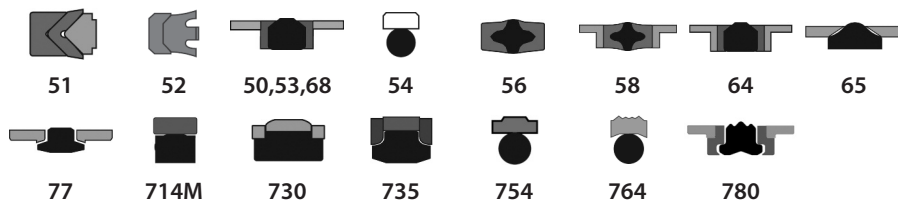
TYPE	ØD ₁	Ød ₁	NOMINAL Ød ₂	L ₁	L ₂	PART No.
754	115.00	99.50		6.30		4355810
764	115.00	99.50		6.30		4761610
735	115.00	100.00		12.50		7157500
780	120.00	95.00	113.10	22.40	6.35	5002110
053	120.00	95.00	113.10	22.00	6.35	0090012
714	120.00	99.00		8.10		7272010
754	120.00	99.00		8.10		4535010
764	120.00	99.00		8.10		4812010
056	120.00	100.00		25.00		0296140
058	120.00	100.00	113.85	31.00	7.00	0296150
054	120.00	104.50		6.30		6636110
754	120.00	104.50		6.30		4465410
735	120.00	105.00		12.50		7158000
052	125.00	100.00		16.00		2152010
056	125.00	100.00		19.00		1007440
051	125.00	100.00		25.80		4207810
056	125.00	100.00		32.00		0418640
780	125.00	100.00	118.10	25.40	6.35	5002310
053	125.00	100.00	118.10	25.00	6.35	0087522
058	125.00	100.00	118.50	25.00	6.45	1007450
058	125.00	100.00	118.85	38.00	9.50	0418650
068	125.00	100.00	119.00	32.00	10.00	0087540
735	125.00	102.00		16.00		7158500
064	125.00	103.00	121.00	26.50	5.10	6601100
780	125.00	103.00	121.00	26.50	5.10	5007710
714	125.00	104.00		8.10		7272110
754	125.00	104.00		8.10		4376510
050	125.00	105.00	120.00	25.00	6.30	6608410
780	125.00	105.00	120.00	25.00	6.30	5006210
054	125.00	109.50		6.30		6598310
714	125.00	109.50		6.30		7272810
754	125.00	109.50		6.30		4340010
764	125.00	109.50		6.30		4771710
065	125.00	112.00	118.80	14.00	6.00	0315810
077	125.00	112.00	118.80	14.00	6.00	2325910
058	130.00	104.00	123.85	38.00	9.50	0244350
780	130.00	105.00	122.60	25.40	9.50	5002410
053	130.00	105.00	122.60	25.00	9.52	0089622
780	130.00	105.00	123.10	25.40	6.35	5002420

TYPE	ØD ₁	Ød ₁	NOMINAL Ød ₂	L ₁	L ₂	PART No.
058	130.00	105.00	123.50	25.00	6.45	0044850
735	130.00	107.00		16.00		7159000
714	130.00	109.00		8.10		7274010
754	130.00	109.00		8.10		4402410
730	130.00	113.00		12.50		2339110
730	130.00	113.00		20.50		2369010
054	130.00	114.50		6.30		6647610
754	130.00	114.50		6.30		4342210
780	135.00	110.00	127.60	25.40	9.50	5002510
053	135.00	110.00	127.60	25.00	9.52	0091222
053	135.00	110.00	128.00	25.00	12.70	0091212
058	135.00	110.00	128.35	38.00	9.50	0304350
735	135.00	112.00		16.00		7159500
054	135.00	114.00		8.10		6647710
754	135.00	114.00		8.10		4535110
052	140.00	115.00		16.20		2152210
051	140.00	115.00		25.80		4208410
053	140.00	115.00	132.60	25.00	9.52	0091022
053	140.00	115.00	132.60	25.00	6.35	0091032
780	140.00	115.00	132.60	25.40	9.50	5002210
780	140.00	115.00	133.00	25.40	6.35	5002220
058	140.00	115.00	133.50	25.00	6.45	1008450
735	140.00	117.00		16.00		7160000
064	140.00	118.00	136.00	26.50	5.10	6601200
054	140.00	119.00		8.10		6598410
714	140.00	119.00		8.10		7272210
754	140.00	119.00		8.10		4340110
056	140.00	120.00		25.00		0250540
058	140.00	120.00	133.85	31.00	7.00	0250550
050	140.00	120.00	135.00	25.00	6.30	2317030
065	140.00	124.00	132.00	17.50	8.75	0317710
754	140.00	124.50		6.30		4499410
053	145.00	120.00	137.60	25.00	9.52	0091422
780	145.00	120.00	137.60	25.40	9.50	5002610
735	145.00	122.00		16.00		7160500
054	145.00	124.00		8.10		8608010
058	145.00	125.00	138.85	31.00	7.00	0640150
051	150.00	120.00		29.00		4208510
056	150.00	120.00		38.00		1289540



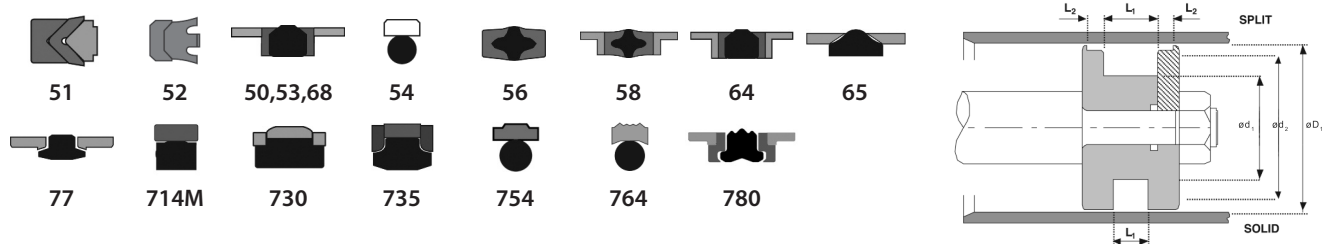
TYPE	ØD_1	Ød_1	NOMINAL Ød_2	L_1	L_2	PART No.
058	150.00	120.00	143.85	44.00	9.50	1289550
780	150.00	125.00		25.40	6.35	5002720
053	150.00	125.00	142.60	25.00	9.52	0091522
780	150.00	125.00	142.60	25.40	9.50	5002710
053	150.00	125.00	143.00	25.00	12.70	0091512
058	150.00	125.00	143.50	25.00	6.45	1008050
735	150.00	127.00		16.00		7161000
054	150.00	129.00		8.10		6598510
714	150.00	129.00		8.10		7274110
754	150.00	129.00		8.10		4396910
053	155.00	130.00	147.60	25.00	9.52	0091622
780	155.00	130.00	147.60	25.40	9.50	5002810
054	155.00	134.00		8.10		8617710
052	160.00	130.00		19.80		2152410
051	160.00	130.00		29.00		4208710
780	160.00	130.00	152.60	25.40	9.50	5004610
780	160.00	130.00	153.00	25.40	6.35	5004620
058	160.00	130.00	153.50	25.00	6.45	1008250
052	160.00	135.00		16.00		6620110
056	160.00	135.00		32.00		0080440
053	160.00	135.00	152.60	25.00	9.52	0089922
780	160.00	135.00	152.60	25.40	9.50	5005610
058	160.00	135.00	153.85	38.00	9.50	0080450
068	160.00	135.00	154.00	32.00	10.00	0089930
735	160.00	137.00		16.00		7161500
064	160.00	138.00	156.00	26.50	5.10	6601300
054	160.00	139.00		8.10		6598610
714	160.00	139.00		8.10		7272510
754	160.00	139.00		8.10		4340210
065	160.00	140.00	151.40	25.00	12.50	0315910
058	160.00	140.00	153.85	31.00	7.00	0304650
050	160.00	140.00	155.00	25.00	6.30	6608510
780	165.00	140.00	157.60	25.40	9.50	5002910
053	165.00	140.00	158.00	25.00	12.70	1257612
735	165.00	142.00		16.00		7162000
054	165.00	144.00		8.10		6649110
754	165.00	144.00		8.10		4452210
058	170.00	140.00	162.54	25.00	6.45	1222250
780	170.00	145.00	161.70	25.40	12.50	5003010

TYPE	ØD_1	Ød_1	NOMINAL Ød_2	L_1	L_2	PART No.
053	170.00	145.00	161.70	25.00	12.70	0088012
735	170.00	147.00		16.00		7162500
054	170.00	149.00		8.10		6598710
754	170.00	149.00		8.10		4340310
056	170.00	150.00		25.00		0303340
058	170.00	150.00	163.85	31.00	7.00	0303350
780	175.00	150.00	166.70	25.40	12.50	5003110
053	175.00	150.00	166.70	25.00	12.70	1260712
735	175.00	152.00		16.00		7162800
052	180.00	150.00		19.80		2152610
051	180.00	150.00		31.50		4208610
780	180.00	150.00	172.95	35.40	6.35	5006310
058	180.00	150.00	173.00	35.00	6.45	0679850
780	180.00	155.00	171.70	25.40	12.50	5003210
053	180.00	155.00	171.70	25.00	12.70	0091712
735	180.00	157.00		16.00		7163000
054	180.00	159.00		8.10		6598810
714	180.00	159.00		8.10		7272610
754	180.00	159.00		8.10		4340410
056	180.00	160.00		25.00		1283140
065	180.00	160.00	171.40	25.00	12.50	0316010
058	180.00	160.00	173.85	31.00	7.00	1283150
780	185.00	160.00	176.70	25.40	12.50	5003310
735	185.00	162.00		16.00		7163500
054	185.00	164.00		8.10		6647810
056	190.00	160.00		38.00		0838440
058	190.00	160.00	183.85	44.00	9.50	0838450
780	190.00	165.00	181.70	25.40	12.50	5003410
053	190.00	165.00	181.70	25.00	12.70	1270012
735	190.00	167.00		16.00		7164000
054	190.00	169.00		8.10		6598910
714	190.00	169.00		8.10		7274210
754	190.00	169.00		8.10		4342410
780	195.00	170.00	186.70	25.40	12.50	5003510
053	195.00	170.00	186.70	25.00	12.70	1265412
052	200.00	170.00		20.00		2152810
051	200.00	170.00		33.50		4209010
056	200.00	170.00		38.00		0087140
053	200.00	170.00	192.00	30.00	15.00	1270112



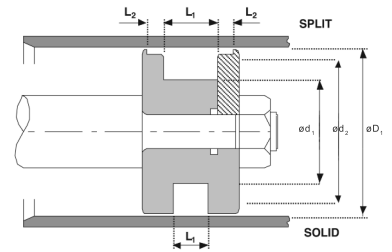
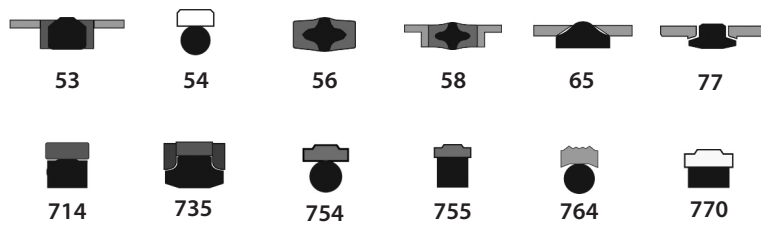
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068	200.00	170.00	192.00	36.00	12.50	1270120
058	200.00	170.00	193.85	44.00	12.00	0087150
053	200.00	175.00	191.60	25.00	12.70	0089712
780	200.00	175.00	191.60	25.40	12.50	5003610
058	200.00	175.00	193.85	38.00	9.50	0838850
735	200.00	177.00		16.00		7164500
054	200.00	179.00		8.10		6599010
714	200.00	179.00		8.10		7272710
754	200.00	179.00		8.10		4340510
065	200.00	180.00	191.40	25.00	12.50	0316910
058	210.00	180.00	203.13	31.70	6.45	1198450
780	210.00	185.00		25.40	12.70	5008210
735	210.00	187.00		16.00		7165000
054	210.00	189.00		8.10		8614610
754	210.00	189.00		8.10		4351510
735	215.00	192.00		16.00		7165300
056	220.00	190.00		38.00		0087340
053	220.00	190.00	212.00	30.00	15.00	1714810
780	220.00	195.00		25.40	12.70	5008310
735	220.00	197.00		16.00		7165500
054	220.00	199.00		8.10		6624510
714	220.00	199.00		8.10		7274310
754	220.00	199.00		8.10		4735710
058	220.00	200.00	213.85	31.00	7.00	1056450
052	225.00	195.00		19.80		2197010
051	225.00	195.00		33.50		6582110
735	225.00	202.00		16.00		7166000
054	225.00	204.00		8.10		6624610
754	225.00	204.00		8.10		4512810
056	230.00	200.00		38.00		2010040
780	230.00	205.00	221.60	25.40	12.70	5006510
735	230.00	207.00		16.00		7166500
054	230.00	209.00		8.10		6624710
754	230.00	209.00		8.10		4764010
056	240.00	210.00		38.00		0094340
780	240.00	215.00		25.40	12.70	5008410
735	240.00	217.00		16.00		7167000
054	240.00	219.00		8.10		8615410
754	240.00	219.00		8.10		4553610

TYPE	ØD ₁	Ød ₁	NOMINAL Ød ₂	L ₁	L ₂	PART No.
052	250.00	220.00		20.00		2197210
051	250.00	220.00		33.50		6582310
056	250.00	220.00		38.00		1056340
053	250.00	220.00	242.00	30.00	15.00	1264312
068	250.00	220.00	242.00	36.00	12.50	1264320
058	250.00	220.00	243.85	44.00	12.00	1056350
735	250.00	222.00		17.50		7167500
780	250.00	225.00	241.60	25.40	12.70	5006610
064	250.00	225.00	246.00	31.50	6.60	6601400
054	250.00	229.00		8.10		6640110
714	250.00	229.00		8.10		7273610
754	250.00	229.00		8.10		4393710
056	260.00	230.00		38.00		0094540
735	260.00	232.00		17.50		7168000
054	260.00	239.00		8.10		6647910
735	270.00	242.00		17.50		7168200
052	275.00	245.00		19.80		2197410
051	275.00	245.00		33.50		6582410
053	280.00	250.00	272.00	30.00	15.00	1261712
058	280.00	250.00	273.85	44.00	12.00	1055550
735	280.00	252.00		17.50		7168400
714	280.00	255.50		8.10		7274410
054	280.00	259.00		8.10		6640210
735	290.00	262.00		17.50		7168500
052	300.00	270.00		19.80		2188310
051	300.00	270.00		33.50		6582510
056	300.00	270.00		38.00		0094840
735	300.00	272.00		17.50		7168700
054	300.00	279.00		8.10		6640310
754	300.00	279.00		8.10		4572810
054	310.00	289.00		8.10		6648010
051	320.00	290.00		33.50		6582610
735	320.00	292.00		17.50		7168900
054	320.00	299.00		8.10		8608610
056	330.00	300.00		38.00		0095040
735	330.00	302.00		17.50		7169100
054	330.00	305.50		8.10		8608110
054	340.00	315.50		8.10		6648110
735	350.00	322.00		17.50		7169500



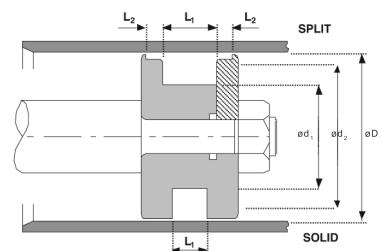
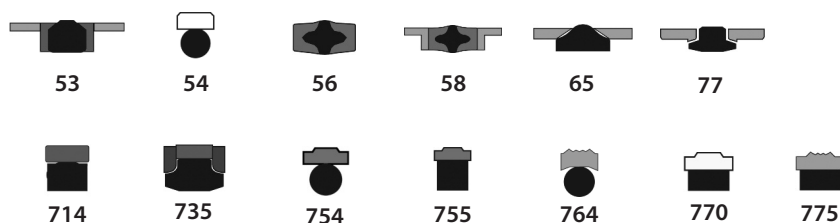
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			Ød ₂	L ₁		
054	350.00	325.50		8.10		8615510
056	360.00	320.00		45.00		1054040
054	360.00	335.50		8.10		8621810
054	370.00	345.50		8.10		8621910
054	380.00	355.50		8.10		8622010
054	390.00	365.50		8.10		8622110
056	400.00	360.00		45.00		1054340
735	400.00	372.00		17.50		7169900

TYPE	ØD ₁	Ød ₁	NOMINAL		L ₂	PART No.
			Ød ₂	L ₁		
054	400.00	375.50		8.10		6648210
056	420.00	380.00		45.00		0095140
056	460.00	420.00		45.00		0095340
056	480.00	440.00		45.00		0095440
056	500.00	460.00		45.00		0134740
056	540.00	500.00		45.00		2018240
056	580.00	540.00		50.00		2020940



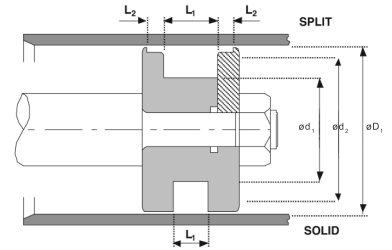
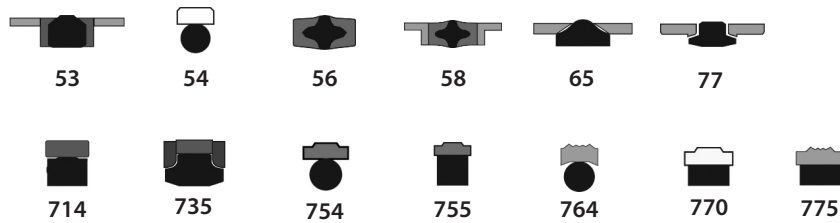
TYPE	ØD ₁	Ød ₁	Ød ₂	L ₁	L ₂	PART No.
770	0.750	0.508		0.187		4817712
770	0.875	0.633		0.187		4817812
058	1.000	0.625	0.868	0.594	0.187	1247650
065	1.000	0.687	0.829	0.343	0.125	2221210
755	1.000	0.691		0.129		8910000
054	1.000	0.704		0.125		6624810
770	1.000	0.758		0.187		4817912
770	1.125	0.883		0.187		4818012
056	1.250	0.750		0.625		0403740
058	1.250	0.750	1.118	0.750	0.250	0403750
065	1.250	0.937	1.079	0.343	0.125	2221310
077	1.250	0.937	1.079	0.343	0.125	6567790
755	1.250	0.941		0.129		8910100
770	1.250	1.008	1.247	0.187		4554412
770	1.375	1.133		0.187		4716912
775	1.375	1.133		0.187		4763516
056	1.500	1.000		0.625		0422440
058	1.500	1.000	1.362	0.625	0.254	1441150
058	1.500	1.000	1.362	0.625	0.188	6504850
058	1.500	1.000	1.371	0.750	0.250	0422450
754	1.500	1.067		0.165		4432310
764	1.500	1.067		0.165		4764210
065	1.500	1.125	1.324	0.437	0.150	2219610
735	1.500	1.127		0.424		7100200
755	1.500	1.191		0.129		8910200
054	1.500	1.204		0.125		6624910
754	1.500	1.204		0.125		4428710
770	1.500	1.258		0.187		4717012
775	1.500	1.258		0.187		4731816
775	1.500	1.258		0.275		4730516
058	1.625	1.000	1.428	0.937	0.250	0540650
770	1.625	1.383		0.187		4717112
056	1.750	1.125		0.750		0778240
058	1.750	1.125	1.555	0.937	0.250	0778250
058	1.750	1.125	1.572	0.750	0.254	6504450
065	1.750	1.375	1.574	0.437	0.150	2220910
735	1.750	1.377		0.424		7100300
755	1.750	1.441		0.129		8910300
770	1.750	1.508		0.187		4717212

TYPE	ØD ₁	Ød ₁	Ød ₂	L ₁	L ₂	PART No.
775	1.750	1.508		0.187		4750716
056	2.000	1.375		0.750		0778440
058	2.000	1.375	1.805	0.937	0.250	0778450
053	2.000	1.375	1.821	0.750	0.250	6593410
058	2.000	1.375	1.822	0.750	0.254	0639150
764	2.000	1.390		0.250		4764810
714	2.000	1.462		0.282		7260510
755	2.000	1.462		0.283		4553520
054	2.000	1.568		0.165		6625010
755	2.000	1.606		0.129		8913100
065	2.000	1.625	1.824	0.437	0.150	2224010
735	2.000	1.627		0.424		7100500
775	2.000	1.630		0.281		4731016
775	2.000	1.630		0.410		4733716
770	2.000	1.630	1.997	0.281		4553512
755	2.000	1.691		0.129		8910400
058	2.125	1.500	1.928	0.937	0.250	0967650
764	2.125	1.515		0.250		4765410
770	2.125	1.755		0.281		4717312
056	2.250	1.625		0.750		1432640
058	2.250	1.625	2.055	0.937	0.250	1432650
053	2.250	1.625	2.071	0.750	0.250	6593510
058	2.250	1.625	2.071	0.750	0.254	0640450
714	2.250	1.712		0.282		7260710
065	2.250	1.875	2.075	0.437	0.150	2221110
735	2.250	1.877		0.424		7100600
770	2.250	1.880		0.281		4717412
755	2.250	1.941		0.129		8910500
056	2.375	1.750		0.750		0939840
058	2.375	1.750	2.180	0.750	0.250	0890850
058	2.375	1.750	2.180	0.937	0.250	0939850
077	2.375	2.000	2.200	0.437	0.150	6918060
056	2.500	1.875		0.750		0867240
058	2.500	1.875	2.305	0.937	0.250	0867250
053	2.500	1.875	2.321	0.750	0.250	6593610
058	2.500	1.875	2.321	0.750	0.254	6502250
714	2.500	1.962		0.282		7261010
755	2.500	1.962		0.283		4490020
054	2.500	2.068		0.165		6625110



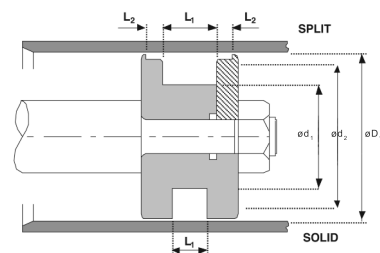
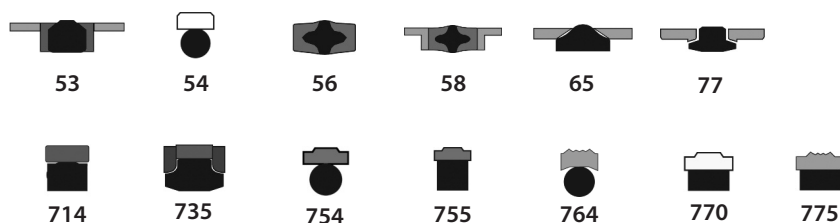
TYPE	ØD ₁	Ød ₁	NOMINAL			PART No.
			Ød ₂	L ₁	L ₂	
755	2.500	2.106		0.129		4439310
065	2.500	2.125	2.325	0.437	0.150	2224110
077	2.500	2.125	2.325	0.437	0.150	2360210
735	2.500	2.127		0.424		7100700
775	2.500	2.130		0.281		4731116
775	2.500	2.130		0.410		4726916
770	2.500	2.130	2.497	0.281		4490012
755	2.500	2.191		0.129		8910600
058	2.625	2.000	2.428	0.937	0.250	1371050
056	2.750	2.000		0.937		1369140
058	2.750	2.000	2.485	1.187	0.250	1369150
053	2.750	2.000	2.524	0.937	0.250	6593710
058	2.750	2.000	2.524	0.937	0.254	0783250
714	2.750	2.212		0.282		7261510
065	2.750	2.375	2.575	0.437	0.150	2219510
735	2.750	2.377		0.424		7100800
770	2.750	2.380		0.281		4817512
755	2.750	2.441		0.129		8910700
056	2.875	2.125		0.937		0779640
058	2.875	2.125	2.610	1.187	0.250	0779650
065	2.875	2.500	2.700	0.437	0.150	2225210
770	2.875	2.505		0.281		4817612
056	3.000	2.250		0.937		1098440
058	3.000	2.250	2.735	1.187	0.250	1098450
053	3.000	2.250	2.774	0.937	0.250	1377612
058	3.000	2.250	2.774	0.937	0.254	6502450
764	3.000	2.390		0.250		4767110
714	3.000	2.442		0.282		7262010
755	3.000	2.462		0.283		8910800
735	3.000	2.522		0.579		7101000
054	3.000	2.568		0.165		6625210
065	3.000	2.625	2.825	0.437	0.150	2224210
775	3.000	2.630		0.281		4731216
775	3.000	2.630		0.410		4733816
770	3.000	2.630	2.997	0.281		4349412
058	3.125	2.375	2.858	1.187	0.250	1024850
056	3.250	2.500		0.937		0782440
058	3.250	2.500	2.985	1.187	0.250	0782450
053	3.250	2.500	3.023	0.937	0.250	6593910

TYPE	ØD ₁	Ød ₁	NOMINAL			PART No.
			Ød ₂	L ₁	L ₂	
058	3.250	2.500	3.024	0.937	0.254	1154150
054	3.250	2.640		0.250		6625310
754	3.250	2.640		0.250		4428810
714	3.250	2.692		0.282		7262510
755	3.250	2.712		0.283		8910900
735	3.250	2.772		0.579		7101500
065	3.250	2.875	3.075	0.437	0.150	2219710
077	3.250	2.875	3.270	0.437	0.150	2360310
770	3.250	2.880	3.247	0.281		4349512
056	3.500	2.750		0.937		0437840
058	3.500	2.750	3.235	1.187	0.250	0437850
058	3.500	2.750	3.273	0.937	0.254	6500550
053	3.500	2.750	3.274	0.937	0.250	0082412
054	3.500	2.890		0.250		6625410
714	3.500	2.942		0.282		7263010
755	3.500	2.962		0.283		8911000
065	3.500	3.000	3.270	0.562	0.210	0177610
735	3.500	3.022		0.579		7102000
775	3.500	3.130		0.281		4731316
775	3.500	3.130		0.410		4733916
770	3.500	3.130	3.497	0.281		4349612
058	3.625	2.875	3.360	1.187	0.250	1474550
056	3.750	3.000		0.937		0410540
058	3.750	3.000	3.485	1.187	0.250	0410550
053	3.750	3.000	3.524	0.937	0.250	2361010
714	3.750	3.192		0.282		7263510
755	3.750	3.212		0.283		8911100
065	3.750	3.250	3.520	0.562	0.210	0178810
735	3.750	3.272		0.579		7102500
770	3.750	3.380	3.747	0.281		4349712
058	3.875	3.125	3.610	1.187	0.250	0295850
056	4.000	3.250		0.719		6504740
056	4.000	3.250		0.937		1407740
058	4.000	3.250	3.735	1.187	0.250	1407750
058	4.000	3.250	3.772	0.937	0.254	6504750
053	4.000	3.250	3.773	0.937	0.250	0082313
054	4.000	3.390		0.250		6625510
754	4.000	3.390		0.250		4428910
714	4.000	3.442		0.282		7264010



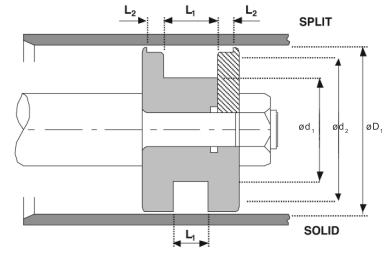
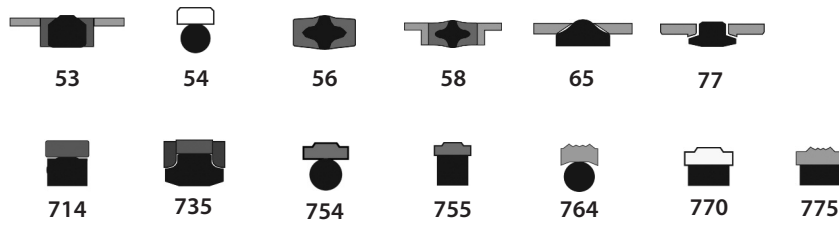
TYPE	ØD ₁	Ød ₁	Ød ₂	L ₁	L ₂	PART No.
755	4.000	3.462		0.283		8911200
065	4.000	3.500	3.770	0.562	0.210	1172310
735	4.000	3.522		0.579		7103000
775	4.000	3.630		0.281		4731416
775	4.000	3.630		0.410		4734016
770	4.000	3.630	3.747	0.281		4349812
056	4.250	3.500		0.937		1128840
058	4.250	3.500	3.985	1.187	0.250	1128850
058	4.250	3.500	4.022	0.937	0.254	6504550
053	4.250	3.500	4.024	0.937	0.250	0082211
714	4.250	3.692		0.282		7264510
755	4.250	3.712		0.283		8911300
065	4.250	3.750	4.020	0.562	0.210	0309210
735	4.250	3.772		0.579		7103500
770	4.250	3.880	4.247	0.281		4349912
056	4.500	3.500		1.250		0448840
058	4.500	3.500	4.231	1.250	0.254	6504250
053	4.500	3.500	4.232	1.250	0.250	6594210
058	4.500	3.500	4.234	1.500	0.375	0448850
054	4.500	3.890		0.250		6625610
735	4.500	3.909		0.492		7103900
714	4.500	3.942		0.282		7265010
755	4.500	3.962		0.283		8911400
065	4.500	4.000	4.270	0.562	0.210	0418910
735	4.500	4.022		0.579		7104000
770	4.500	4.130	4.497	0.281		4350012
056	4.625	3.625		1.250		0449040
056	4.750	3.750		1.250		1007040
053	4.750	3.750	4.463	1.250	0.375	2360910
058	4.750	3.750	4.483	1.250	0.254	0038250
058	4.750	3.750	4.485	1.500	0.375	1007050
735	4.750	4.159		0.492		7104200
714	4.750	4.192		0.282		7265510
755	4.750	4.212		0.283		8911500
065	4.750	4.250	4.520	0.562	0.210	1155810
735	4.750	4.272		0.579		7104300
770	4.750	4.380	4.747	0.281		4350112
056	5.000	4.000		1.250		0443040
053	5.000	4.000	4.712	1.250	0.375	6594310

TYPE	ØD ₁	Ød ₁	Ød ₂	L ₁	L ₂	PART No.
058	5.000	4.000	4.730	1.250	0.254	6500650
058	5.000	4.000	4.735	1.500	0.375	0443050
735	5.000	4.094		0.630		7104400
735	5.000	4.274		0.750		7104500
065	5.000	4.375	4.689	0.687	0.344	1175410
054	5.000	4.390		0.250		6625710
754	5.000	4.390		0.250		4429010
714	5.000	4.442		0.282		7266010
755	5.000	4.462		0.283		8911600
775	5.000	4.528		0.538		4730616
775	5.000	4.630		0.281		4731516
770	5.000	4.630	4.997	0.281		4350212
056	5.250	4.250		1.250		0892240
058	5.250	4.250	4.980	1.500	0.375	0892250
714	5.250	4.490		0.377		7266510
755	5.250	4.504		0.378		8911700
735	5.250	4.524		0.750		7105000
065	5.250	4.625	4.938	0.687	0.344	1173710
770	5.250	4.778		0.375		4350322
056	5.500	4.500		1.250		0133240
053	5.500	4.500	5.213	1.250	0.375	6594410
058	5.500	4.500	5.235	1.250	0.254	6504150
058	5.500	4.500	5.236	1.500	0.375	0133250
735	5.500	4.594		0.630		7105400
714	5.500	4.740		0.377		7267010
755	5.500	4.754		0.378		8911800
735	5.500	4.774		0.750		7105500
065	5.500	4.875	5.188	0.687	0.344	1173610
735	5.500	5.022		0.579		7106000
770	5.500	5.028		0.375		4350422
058	5.750	4.750	5.484	1.500	0.375	1366950
755	5.750	5.004		0.378		8913200
056	6.000	5.000		1.250		1367040
053	6.000	5.000	5.713	1.250	0.375	6594510
058	6.000	5.000	5.728	1.250	0.254	0557950
058	6.000	5.000	5.736	1.500	0.375	1367050
735	6.000	5.094		0.630		7106400
054	6.000	5.174		0.319		6625810
714	6.000	5.240		0.377		7267510



TYPE	NOMINAL					PART No.
	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	L_1	L_2	
065	6.000	5.250	5.712	1.000	0.500	0300110
755	6.000	5.254		0.378		8911900
735	6.000	5.274		0.750		7106500
770	6.000	5.528		0.375		4350522
775	6.000	5.528		0.538		4734116
058	6.250	5.250	5.984	1.500	0.375	0083350
735	6.250	5.344		0.630		7106800
755	6.250	5.504		0.378		8912000
735	6.250	5.524		0.750		7107000
735	6.250	5.772		0.579		7106900
770	6.250	5.778		0.375		4350622
056	6.500	5.500		1.250		1164140
058	6.500	5.500	6.236	1.500	0.375	1164150
735	6.500	5.594		0.630		7107400
065	6.500	5.750	6.212	1.000	0.500	0047010
755	6.500	5.754		0.378		8912100
735	6.500	5.774		0.750		7107500
735	6.500	6.022		0.579		7108000
770	6.500	6.028		0.375		4350722
058	6.750	5.750	6.484	1.500	0.375	1286150
056	7.000	6.000		1.250		1188840
058	7.000	6.000	6.736	1.500	0.375	1188850
735	7.000	6.094		0.630		7108400
054	7.000	6.174		0.319		6625910
755	7.000	6.250		0.312		4394810
065	7.000	6.250	6.712	1.000	0.500	0314110
755	7.000	6.254		0.378		8912200
735	7.000	6.274		0.750		7108500
770	7.000	6.528		0.375		4350822
056	7.250	6.000		1.625		0424140
735	7.250	6.344		0.630		7108600
755	7.250	6.504		0.378		8912300
056	7.500	6.250		1.625		1255240
058	7.500	6.250	7.240	1.875	0.375	1255250
735	7.500	6.594		0.630		7108900
755	7.500	6.754		0.378		8912400
735	7.500	6.774		0.750		7109000
735	7.750	6.844		0.630		7109200
056	8.000	6.750		1.625		0426540

TYPE	NOMINAL					PART No.
	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	L_1	L_2	
056	8.000	7.000		1.000		0224340
058	8.000	7.000	7.740	1.250	0.375	0224350
054	8.000	7.174		0.319		6626010
065	8.000	7.250	7.712	1.000	0.500	0045110
755	8.000	7.254		0.378		8912500
735	8.000	7.274		0.750		7109500
770	8.000	7.528		0.375		4351122
056	8.250	7.000		1.625		1219240
735	8.250	7.344		0.630		7109700
735	8.250	7.524		0.750		7109800
755	8.437	7.691		0.378		8913000
056	8.500	7.250		1.625		1286440
735	8.500	7.594		0.630		7109900
755	8.500	7.754		0.378		8912600
735	8.500	7.774		0.750		7110000
056	9.000	7.750		1.625		1266640
058	9.000	7.750	8.740	1.875	0.375	1266650
058	9.000	8.000	8.736	1.250	0.375	1273750
755	9.000	8.137		0.378		8912700
755	9.000	8.137		0.378		8912702
065	9.000	8.250	8.712	1.000	0.500	0045510
735	9.000	8.274		0.750		7110500
056	9.250	8.000		1.625		0455740
056	9.500	8.250		1.625		1332240
755	9.500	8.637		0.378		8912800
056	9.750	8.500		1.625		1332340
056	10.000	8.750		1.625		0436140
735	10.000	8.898		0.687		7110900
058	10.000	9.000	9.740	1.250	0.375	0697650
755	10.000	9.137		0.378		8912900
735	10.000	9.275		0.750		7111000
056	10.500	9.250		1.625		1331940
735	10.500	9.398		0.687		7111200
056	10.750	9.500		1.625		1320440
056	11.000	9.750		1.625		0433940
735	11.000	10.275		0.750		7111500
056	11.500	10.250		1.625		1331640
735	11.500	10.398		0.687		7111700
056	12.000	10.750		1.625		1331440



	NOMINAL					PART
TYPE	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	L_1	L_2	No.
735	12.000	11.275		0.750		7112000
735	12.500	11.775		0.750		7112200
735	13.000	12.275		0.750		7112400
056	13.250	12.000		1.625		1329140
735	14.000	12.898		0.687		7112700
735	14.000	13.275		0.750		7114000
056	14.500	13.000		1.500		0270940
735	14.500	13.775		0.750		7112800

	NOMINAL					PART
TYPE	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	L_1	L_2	No.
056	15.000	13.750		1.500		0787040
735	15.000	14.275		0.750		7113000
056	16.000	14.750		1.800		2117440
735	16.000	15.275		0.750		7113200
735	18.000	17.060		0.750		7113800
056	19.500	18.000		2.500		2108240
056	20.000	18.500		1.750		2111240



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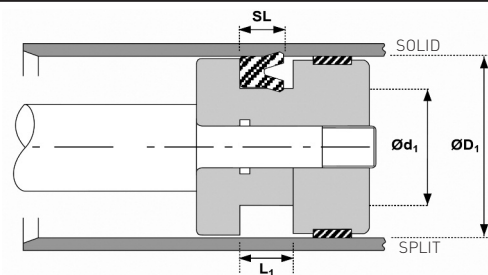
601



606



659



TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
TYPE	OD1	Od1	SL	L1	PART NO
601	12.00	5.00	5.50	6.50	4508601
601	12.50	4.50	4.40	5.00	4506701
601	13.00	6.00	8.00	9.00	4460300
018	14.00	6.00		6.00	0202200
018	16.00	8.00		6.00	0202400
606	16.00	10.00	5.70	6.30	4830500
018	18.00	10.00		6.00	0202500
601	18.00	10.00	6.00	6.60	4299900
601	18.00	12.00	6.00	7.00	4621300
601	20.00	10.00	8.00	9.00	4600000
601	20.00	12.00	4.40	5.00	4182501
018	20.00	12.00		6.00	0202600
601	22.00	14.00	4.40	5.00	4182601
601	22.00	14.00	5.00	5.70	4604000
018	24.00	14.00		7.50	0202700
601	24.00	14.00	8.00	9.00	4600200
601	24.00	16.00	4.40	5.00	4182701
601	24.00	16.00	5.00	5.70	4604100
601	25.00	12.00	8.00	9.00	4600100
018	25.00	15.00		7.50	0202800
601	25.00	15.00	8.00	9.00	4600300
606	25.00	15.00	8.20	9.00	4390100
606	25.00	17.00	5.70	6.30	4418000
018	26.00	16.00		7.50	0615900
015	26.00	16.00		8.00	0754300
601	26.00	16.00	8.00	9.00	4600400
601	26.00	18.00	4.40	5.00	4182901
601	26.00	18.00	5.00	5.70	4604200
018	28.00	18.00		7.50	0202900
601	28.00	18.00	7.30	8.00	4547900
601	28.00	18.00	8.00	9.00	4600500
601	28.00	20.00	4.40	5.00	4183001
601	28.00	20.00	5.00	5.70	4604300
015	28.00	20.00		6.40	2137000
018	30.00	20.00		7.50	0200500
601	30.00	20.00	8.00	9.00	4600600
606	30.00	20.00	8.00	9.00	4354200
601	30.00	22.00	4.50	5.00	4183101

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
601	30.00	22.00	4.50	5.00	4183106
018	30.00	22.00		6.00	0817600
015	30.00	22.00		6.40	2137100
601	30.00	22.40	5.00	5.70	4604400
601	31.50	23.50	5.00	5.70	4621500
018	32.00	22.00		7.50	0203300
015	32.00	22.00		9.00	0377300
606	32.00	24.00	5.70	6.30	4351900
601	32.40	22.40	8.00	9.00	4600800
601	33.00	25.00	4.40	5.00	4183301
601	33.00	25.00	5.00	5.70	4604500
015	33.00	25.00		6.40	2137200
601	35.00	22.00	10.00	11.00	4600700
606	35.00	25.00	7.30	8.00	4365700
601	35.00	25.00	8.00	9.00	4600900
601	35.00	25.00	10.00	11.00	4362600
601	35.50	28.00	5.00	5.70	4604600
015	36.00	28.00		6.40	2137300
601	36.00	28.00	6.45	7.10	4506201
606	37.00	21.00	11.80	13.00	4354100
601	37.00	30.00	6.00	7.00	4596800
601	38.00	25.00	8.00	9.00	4601000
601	38.00	25.00	10.00	11.00	4621400
601	38.00	28.00	5.60	6.30	4183401
601	38.00	28.00	8.00	9.00	4867600
015	38.00	30.00		6.40	2137400
606	38.00	31.00	5.20	6.00	4728000
601	40.00	20.00	12.00	13.00	4621900
601	40.00	22.00	10.00	11.00	4572900
018	40.00	25.00		11.00	0472800
601	40.00	25.00	10.00	11.00	4601100
601	40.00	26.00	9.00	10.00	4584900
015	40.00	28.00		9.00	0690700
606	40.00	28.00	9.00	10.00	4826200
601	40.00	28.00	10.00	11.00	4601200
601	40.00	30.00	5.60	6.30	4183501
601	40.00	30.00	6.00	7.00	4604700
015	40.00	30.00		7.50	0032400
606	40.00	30.00	7.30	8.00	4299500



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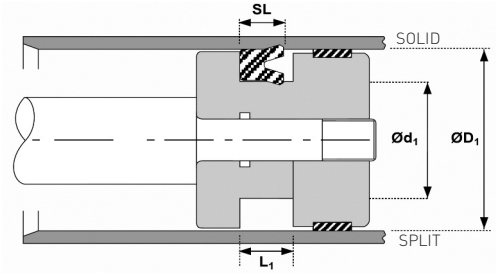
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606



659



TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
601	40.00	30.00	8.00	9.00	4596900
601	40.00	30.00	10.00	11.00	4362700
606	40.00	30.00	10.00	11.00	4400900
015	40.00	32.00		6.40	2137500
601	40.00	32.00	8.00	9.00	4867700
601	41.50	31.50	6.00	7.00	4604800
601	42.00	32.00	5.60	6.30	4183601
601	42.00	32.00	6.00	7.00	4604900
601	42.00	32.00	10.00	11.00	4362800
018	43.00	28.00		11.00	0204300
601	43.00	28.00	10.00	11.00	4601300
015	43.00	35.00		6.40	2137600
018	44.00	36.00		6.00	1204900
015	44.00	36.00		6.40	2137700
018	45.00	30.00		11.00	0204400
601	45.00	30.00	10.00	11.00	4601400
601	45.00	35.00	6.00	7.00	4605000
018	45.00	35.00		7.50	0052300
601	45.00	35.00	7.00	8.00	4496000
606	45.00	35.00	7.30	8.00	4315700
601	45.00	35.50	6.00	7.00	4605100
601	46.00	36.00	5.60	6.30	4183701
018	47.00	32.00		11.00	0204600
601	47.00	32.00	10.00	11.00	4621200
601	48.00	35.00	10.00	11.00	4360300
015	48.00	36.00		9.00	0690600
601	48.00	38.00	6.00	7.00	4605200
015	48.00	40.00		6.40	2137800
018	50.00	30.00		14.00	0282100
015	50.00	35.00		11.00	0874400
018	50.00	35.00		11.00	0474600
601	50.00	35.00	10.00	11.00	4601500
601	50.00	38.00	9.00	10.00	4709400
606	50.00	39.00	3.80	4.20	4460700
601	50.00	40.00	5.60	6.30	4183801
601	50.00	40.00	6.00	7.00	4605300
015	50.00	40.00		7.50	0188600
606	50.00	40.00	7.80	8.00	4319500
015	50.00	40.00		10.50	1252100

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
018	50.00	40.00		10.50	0202000
601	50.00	40.00	10.00	11.00	4362900
601	50.50	35.50	10.00	11.00	4621100
018	51.00	36.00		11.00	0978800
601	53.00	45.00	10.00	11.00	4867800
601	55.00	38.00	9.70	11.00	4366000
018	55.00	40.00		11.00	0475000
601	55.00	40.00	9.90	11.00	4388500
601	55.00	40.00	10.00	11.00	4601600
601	55.00	45.00	5.60	6.30	4183901
601	55.00	45.00	6.00	7.00	4605400
015	55.00	45.00		8.00	2137900
606	55.00	45.00	7.30	8.00	4380000
601	55.00	45.00	10.00	11.00	4363000
601	56.00	45.00	7.00	8.00	4605500
601	56.00	46.00	6.00	7.00	4543900
601	58.00	38.00	9.70	11.00	4560100
601	60.00	40.00	12.00	13.00	4601700
606	60.00	44.90	5.70	6.30	4739800
015	60.00	45.00		10.00	1022800
018	60.00	45.00		11.00	0979400
601	60.00	45.00	10.00	11.00	4601800
606	60.00	45.00	10.00	11.00	4407000
601	60.00	50.00	5.60	6.30	4184001
601	60.00	50.00	6.00	7.00	4605600
018	60.00	50.00		7.50	0179300
015	60.00	50.00		8.00	1204400
606	60.00	50.00	9.00	10.00	4762000
601	60.00	50.00	10.00	11.00	4363100
601	62.00	52.00	10.00	11.00	4559000
601	63.00	48.00	10.00	11.00	4601900
606	63.00	48.00	11.40	12.50	4383200
601	63.00	53.00	6.00	7.00	4605700
606	63.00	53.00	7.30	8.00	4341500
606	63.00	53.00	11.80	13.00	4318800
601	65.00	45.00	10.00	11.00	4575000
018	65.00	45.00		14.00	0281700
018	65.00	50.00		10.00	0208400
018	65.00	50.00		11.00	0383800



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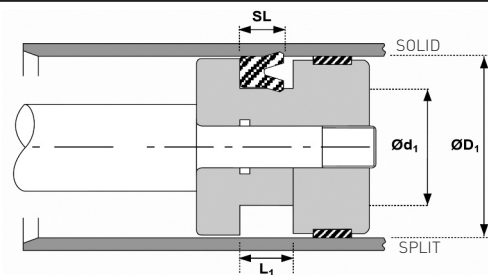
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606



659



TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
601	65.00	50.00	10.00	11.00	4602000
601	65.00	55.00	6.00	7.00	4605800
015	65.00	55.00		8.00	0208700
018	65.00	55.00		8.00	0242600
606	65.00	55.00	7.30	8.00	4424100
601	66.00	56.00	6.00	7.00	4605900
015	66.00	56.00		8.00	2138000
601	70.00	50.00	12.00	13.00	4602100
018	70.00	50.00		14.00	0294600
606	70.00	55.00	10.00	11.00	4448000
601	70.00	60.00	6.00	7.00	4606000
015	70.00	60.00		8.00	0208500
606	70.00	60.00	8.00	9.00	4709500
601	70.00	60.00	10.00	11.00	4363200
601	71.00	56.00	8.40	9.50	4184201
015	71.00	56.00		12.00	0332600
601	71.00	60.00	7.00	8.00	4606100
606	71.00	61.00	6.00	7.00	4492600
018	72.00	60.00		9.50	1397700
601	73.00	63.00	6.00	7.00	4606200
601	73.00	63.00	11.80	13.00	4363300
601	75.00	55.00	12.00	13.00	4602200
015	75.00	63.00		9.60	2138100
601	75.00	65.00	6.00	7.00	4606300
601	75.00	65.00	6.00	7.00	4606306
659	75.00	65.00	7.30	8.00	4870700
606	75.00	67.00	5.70	6.30	4844100
606	75.00	67.00	8.80	9.70	4322300
601	76.00	56.00		13.00	4622000
018	76.00	56.00		14.00	0646100
601	76.00	60.00	12.00	13.00	4608000
015	77.00	65.00		9.60	2138200
601	78.00	63.00	8.40	9.50	4184301
601	80.00	60.00	12.00	13.00	4602300
015	80.00	60.00		14.00	0391400
018	80.00	60.00		14.00	0294900
601	80.00	65.00	8.50	9.50	4184401
018	80.00	65.00		11.00	0740700
606	80.00	65.00	11.40	12.50	4363800

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
601	80.00	65.00	12.00	13.00	4867900
601	80.00	70.00	6.00	7.00	4606400
015	80.00	70.00		7.50	0057700
606	80.00	70.00	6.80	7.50	4370300
606	80.00	70.00	8.00	9.00	4709600
601	80.00	70.00	11.80	13.00	4363400
601	80.00	71.00	6.00	7.00	4606500
015	82.00	70.00		9.60	2146800
018	83.00	63.00		14.00	0646300
601	85.00	65.00	12.00	13.00	4602400
601	85.00	70.00	8.40	9.50	4184501
015	85.00	70.00		12.00	0384500
601	85.00	70.00	12.00	13.00	4868000
601	85.00	75.00	6.00	7.00	4606600
606	85.00	75.00	8.00	9.00	4709700
601	85.00	75.00	11.80	13.00	4363500
606	85.70	70.70	10.30	11.40	4493400
601	90.00	70.00	12.00	13.00	4602500
018	90.00	70.00		14.00	0296000
018	90.00	75.00		12.00	0740600
659	90.00	75.00	11.50	12.50	4775500
601	90.00	75.00	12.00	13.00	4868100
601	90.00	80.00	6.00	7.00	4606700
601	90.00	80.00	8.00	8.75	4159001
659	90.00	80.00	8.00	9.00	4834000
606	90.00	80.00	11.00	12.00	4798800
601	90.00	80.00	11.80	13.00	4363600
601	92.00	70.00	12.00	13.00	4602600
015	92.00	80.00		9.60	2138300
601	95.00	75.00	12.00	13.00	4602700
018	95.00	75.00		14.00	0412700
601	95.00	80.00	8.40	9.50	4184601
018	95.00	80.00		12.00	0732700
601	100.00	75.00	22.00	24.00	4584700
606	100.00	80.00	10.50	11.60	4874000
601	100.00	80.00	12.00	13.00	4602800
018	100.00	80.00		14.00	0295100
601	100.00	80.00	13.20	14.50	4857100
659	100.00	80.00	14.50	16.00	4580300



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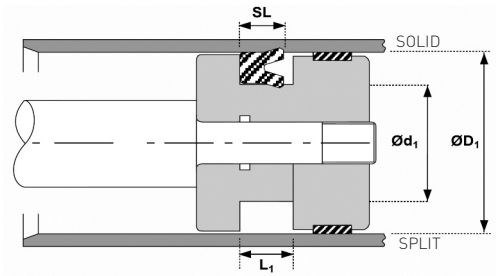
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606



659



TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
601	100.00	85.00	8.40	9.50	4184701
601	100.00	85.00	8.90	10.00	4606800
606	100.00	85.00	11.40	12.50	4363900
659	100.00	85.00	11.50	12.50	4775600
601	100.00	85.00	12.00	13.00	4868200
606	100.00	90.00	6.80	7.50	4375900
601	100.00	90.00	11.80	13.00	4363700
015	102.00	90.00		9.60	2138400
601	105.00	85.00	12.00	13.00	4602900
015	105.00	90.00		9.50	2174600
601	105.00	90.00	8.40	9.50	4184801
601	105.00	90.00	8.90	10.00	4606900
018	110.00	90.00		10.00	0306700
601	110.00	90.00	12.00	13.00	4603000
018	110.00	90.00		14.00	0071700
018	110.00	90.00		15.00	0712400
659	110.00	90.00	14.50	16.00	4580400
601	110.00	95.00	8.90	10.00	4607000
659	110.00	95.00	11.50	12.50	4775700
601	110.00	95.00	12.00	13.00	4868300
606	110.00	100.00	8.00	9.00	4533100
601	115.00	95.00	12.00	13.00	4603100
601	115.00	100.00	8.90	10.00	4607100
015	115.00	100.00		12.00	2138500
018	115.00	100.00		12.00	0740500
601	115.00	100.00	12.00	13.00	4868400
601	120.00	100.00	11.00	12.50	4184901
601	120.00	100.00	12.00	13.00	4603200
018	120.00	100.00		14.00	0296100
015	120.00	100.00		15.00	0466100
018	125.00	100.00		19.00	0418600
601	125.00	105.00	11.36	12.50	4185001
606	125.00	105.00	14.50	16.00	4364000
601	125.00	105.00	15.00	17.00	4603300
018	125.00	110.00		11.00	0558300
015	125.00	110.00		12.00	0749300
601	125.00	112.00	8.90	10.00	4607200
601	130.00	110.00	11.00	12.50	4185101
601	130.00	110.00	15.00	17.00	4603400

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
601	130.00	115.00	9.00	10.00	4621600
015	130.00	115.00		12.00	2136900
659	130.00	115.00	11.50	12.50	4813000
018	135.00	110.00		19.00	0304300
018	135.00	115.00		14.00	0639900
601	135.00	115.00	15.00	17.00	4608100
018	140.00	120.00		12.00	0250500
601	140.00	120.00	14.50	16.00	4319600
601	140.00	120.00	15.00	17.00	4603500
601	140.00	125.00	8.90	10.00	4607300
018	145.00	120.00		19.00	0070400
601	145.00	125.00	11.40	12.50	4185201
601	145.00	125.00	15.00	17.00	4603600
018	145.00	130.00		11.30	0634500
018	150.00	125.00		19.00	0070500
606	150.00	130.00	14.50	16.00	4390200
601	150.00	130.00	15.00	17.00	4603700
601	150.00	136.00	8.50	9.50	4607400
606	150.00	140.00	13.60	15.00	4390300
601	154.00	140.00	9.00	10.00	4607900
601	155.00	140.00	8.90	10.00	4607500
018	160.00	135.00		19.00	0080400
018	160.00	140.00		14.00	0304600
606	160.00	140.00	14.50	16.00	4642700
601	160.00	140.00	15.00	17.00	4603800
606	160.00	140.00	18.20	20.00	4364100
601	160.00	145.00	8.90	10.00	4607600
018	165.00	140.00		19.00	0080500
601	165.00	145.00	15.00	17.00	4608200
601	165.00	150.00	8.90	10.00	4607700
018	170.00	150.00		14.00	0303300
606	170.00	150.00	15.00	16.50	4642800
601	170.00	150.00	15.00	17.00	4603900
601	170.00	155.00	9.00	10.00	4621700
601	175.00	160.00	9.00	10.00	4608400
601	180.00	155.00	15.00	17.00	4608300
018	180.00	160.00		15.00	1283100
601	180.00	160.00	15.00	16.00	4868500
606	180.00	160.00	15.00	16.50	4643100



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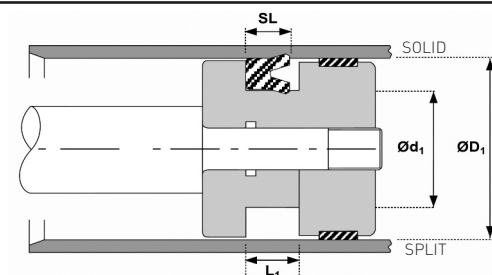
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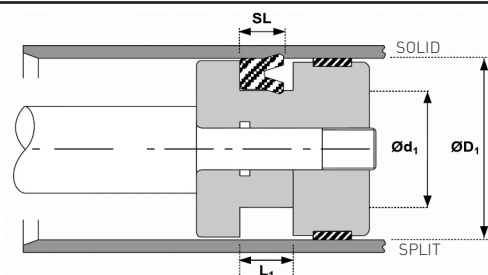
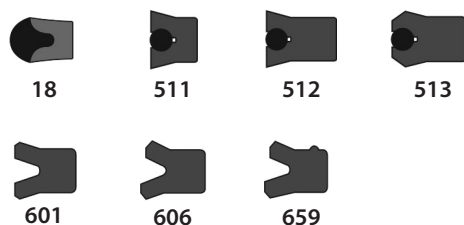


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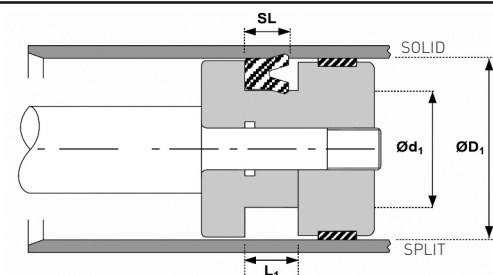
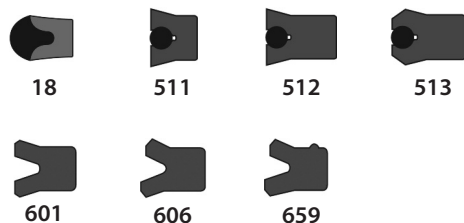
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
601	180.00	165.00	9.00	10.00	4608600
601	183.00	165.00	10.00	11.00	4607800
601	185.00	160.00	15.00	17.00	4608500
018	190.00	160.00		24.00	0136100
601	190.00	165.00	15.00	17.00	4608700
606	190.00	170.00	15.00	16.50	4642900
601	190.00	175.00	9.00	10.00	4621800
601	195.00	170.00	15.00	17.00	4608800
601	200.00	175.00	15.00	17.00	4608900
018	200.00	175.00		19.00	0838800
601	200.00	180.00	12.00	13.00	4609000
606	200.00	180.00	14.50	16.00	4392300
601	205.00	180.00	15.00	17.00	4609100
018	210.00	180.00		24.00	0087200
601	210.00	190.00	12.00	13.00	4609200
601	215.00	190.00	15.00	17.00	4609300
601	220.00	200.00	12.00	13.00	4609400
018	220.00	200.00		15.00	1284100
601	225.00	200.00	15.00	17.00	4609500
018	230.00	200.00		24.00	2010000
601	235.00	210.00	18.00	20.00	4609600
601	240.00	220.00	12.00	13.00	4609700
601	250.00	220.00	17.00	19.20	4426600

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
018	250.00	220.00		22.00	0958900
601	250.00	230.00	12.00	13.00	4609800
601	260.00	240.00	12.00	13.00	4621000
601	265.00	240.00	18.00	20.00	4609900
601	275.00	250.00	18.00	20.00	4610000
018	280.00	250.00		24.00	1055500
606	280.00	260.00	15.50	17.00	4643000
601	290.00	260.00	18.00	20.00	4620100
601	295.00	265.00	18.00	20.00	4620200
601	300.00	270.00	18.00	20.00	4620300
018	300.00	270.00		24.00	0094800
601	310.00	280.00	18.00	20.00	4620400
018	310.00	280.00		24.00	0094900
601	320.00	290.00	18.00	20.00	4620500
601	330.00	300.00	18.00	20.00	4620600
018	330.00	300.00		24.00	0095000
018	360.00	320.00		30.00	1054000
018	400.00	360.00		30.00	1054300
601	405.00	375.00	22.00	24.00	4620700
018	420.00	380.00		30.00	0095100
601	425.00	400.00	25.00	27.00	4620800
018	440.00	400.00		30.00	0095200



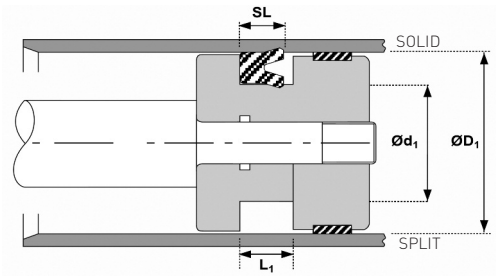
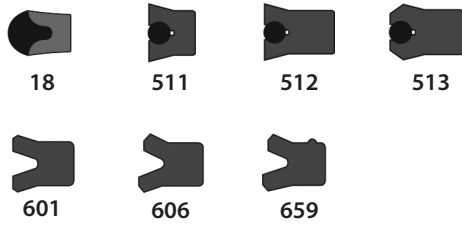
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	0.312	0.062	0.125	0.138	8920810
511	0.375	0.125	0.125	0.138	8900810
513	0.375	0.125	0.250	0.275	8922910
513	0.437	0.187	0.250	0.275	8923010
511	0.438	0.188	0.125	0.138	8800110
511	0.500	0.250	0.125	0.138	8800210
513	0.500	0.250	0.125	0.138	8933610
513	0.500	0.250	0.187	0.207	8845910
512	0.500	0.250	0.250	0.275	8820210
513	0.500	0.250	0.250	0.275	8878510
513	0.562	0.187	0.187	0.207	8923110
513	0.562	0.312	0.125	0.139	8923310
513	0.562	0.312	0.250	0.275	8923510
511	0.563	0.313	0.125	0.138	8902810
513	0.625	0.250	0.187	0.207	8923210
511	0.625	0.375	0.125	0.138	8800410
513	0.625	0.375	0.125	0.138	8908610
513	0.625	0.375	0.187	0.207	8923610
513	0.625	0.375	0.250	0.275	8823810
513	0.687	0.312	0.187	0.207	8923410
511	0.687	0.437	0.125	0.138	8905110
513	0.687	0.437	0.125	0.138	8902510
513	0.687	0.437	0.250	0.275	8846910
513	0.750	0.375	0.156	0.172	8901410
511	0.750	0.375	0.188	0.207	8902910
018	0.750	0.375		0.281	1379300
606	0.750	0.375	0.313	0.344	4707100
511	0.750	0.500	0.125	0.138	8800610
513	0.750	0.500	0.125	0.138	8907910
601	0.750	0.500	0.250	0.275	4566500
512	0.750	0.500	0.250	0.275	8870510
513	0.750	0.500	0.250	0.275	8834010
511	0.812	0.313	0.250	0.275	8824710
513	0.812	0.562	0.125	0.138	8923710
511	0.813	0.563	0.125	0.138	8844610
511	0.875	0.250	0.312	0.344	8899710
511	0.875	0.375	0.250	0.275	8865810
511	0.875	0.500	0.188	0.207	8800710
601	0.875	0.500	0.197	0.218	4300000

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	0.875	0.500	0.250	0.275	8848010
018	0.875	0.500		0.281	0406700
513	0.875	0.500	0.313	0.344	8852910
511	0.875	0.625	0.125	0.138	8800810
513	0.875	0.625	0.125	0.138	8906210
018	0.875	0.625		0.187	1435600
513	0.875	0.625	0.187	0.207	8848710
512	0.875	0.625	0.250	0.275	8820510
513	0.875	0.625	0.250	0.275	8834110
513	0.937	0.437	0.375	0.413	8863110
511	0.938	0.563	0.188	0.207	8932810
511	0.938	0.688	0.125	0.138	8801010
511	1.000	0.375	0.313	0.344	8824910
601	1.000	0.500	0.250	0.275	4110201
511	1.000	0.500	0.250	0.275	8806310
512	1.000	0.500	0.375	0.413	8922310
513	1.000	0.500	0.375	0.413	8837710
513	1.000	0.625	0.187	0.207	8923810
511	1.000	0.625	0.188	0.207	8800910
601	1.000	0.625	0.190	0.218	4298300
018	1.000	0.625		0.281	1247600
513	1.000	0.625	0.313	0.344	8902710
511	1.000	0.750	0.125	0.138	8801110
513	1.000	0.750	0.125	0.139	8905310
512	1.000	0.750	0.250	0.275	8820710
513	1.000	0.750	0.250	0.275	8834210
511	1.062	0.812	0.125	0.138	8815310
513	1.062	0.812	0.125	0.138	8924110
513	1.062	0.812	0.250	0.275	8924210
018	1.093	0.750		0.281	1364200
601	1.125	0.625	0.250	0.275	4509101
511	1.125	0.625	0.250	0.275	8806410
513	1.125	0.625	0.313	0.344	8849210
513	1.125	0.625	0.375	0.413	8923910
513	1.125	0.750	0.187	0.207	8849810
511	1.125	0.750	0.188	0.207	8801210
513	1.125	0.750	0.250	0.275	8846010
606	1.125	0.750	0.313	0.344	4565600
512	1.125	0.750	0.313	0.344	8820810



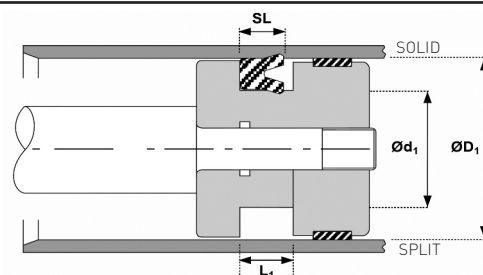
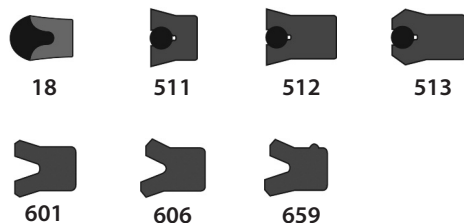
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	1.125	0.750	0.313	0.344	8834310
513	1.125	0.750	0.375	0.413	8855810
511	1.125	0.875	0.125	0.138	8801410
513	1.125	0.875	0.125	0.138	8924310
513	1.125	0.875	0.250	0.275	8845310
512	1.187	0.687	0.375	0.413	8906110
511	1.187	0.937	0.125	0.138	8844810
513	1.187	0.937	0.125	0.138	8924610
513	1.187	0.937	0.250	0.275	8900910
601	1.250	0.750	0.250	0.275	4102901
511	1.250	0.750	0.250	0.275	8806510
513	1.250	0.750	0.250	0.275	8924010
018	1.250	0.750		0.375	0403700
512	1.250	0.750	0.375	0.413	8825010
513	1.250	0.750	0.375	0.413	8837810
513	1.250	0.875	0.187	0.207	8924410
511	1.250	0.875	0.188	0.207	8801510
606	1.250	0.875	0.250	0.275	4800300
513	1.250	0.875	0.313	0.344	8900210
512	1.250	0.875	0.375	0.413	8933110
511	1.250	1.000	0.125	0.138	8801610
513	1.250	1.000	0.125	0.138	8924810
659	1.250	1.000	0.171	0.187	4416600
513	1.250	1.000	0.187	0.207	8860110
512	1.250	1.000	0.250	0.275	8821210
513	1.250	1.000	0.250	0.275	8834410
511	1.312	0.687	0.312	0.344	8906710
513	1.312	0.937	0.312	0.344	8924710
511	1.312	1.000	0.156	0.172	8810110
513	1.312	1.000	0.156	0.182	8925010
511	1.312	1.062	0.125	0.138	8801810
513	1.312	1.062	0.125	0.138	8925210
513	1.313	1.063	0.250	0.275	8845710
601	1.375	0.875	0.238	0.275	4507101
511	1.375	0.875	0.250	0.275	8806610
513	1.375	0.875	0.250	0.275	8924510
512	1.375	0.875	0.312	0.344	8906810
513	1.375	0.875	0.313	0.344	8830210
018	1.375	0.875		0.375	0401300

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	1.375	0.875	0.375	0.413	8864610
513	1.375	1.000	0.187	0.207	8806110
511	1.375	1.000	0.188	0.207	8801710
018	1.375	1.000		0.250	0282600
513	1.375	1.000	0.250	0.275	8860510
513	1.375	1.000	0.281	0.310	8925110
512	1.375	1.000	0.313	0.344	8821310
513	1.375	1.000	0.313	0.344	8834510
511	1.375	1.125	0.125	0.138	8801910
513	1.375	1.125	0.125	0.138	8899910
513	1.375	1.125	0.187	0.207	8855510
512	1.375	1.125	0.250	0.275	8854910
513	1.375	1.125	0.250	0.275	8855610
513	1.375	1.125	0.313	0.344	8848810
513	1.437	1.062	0.313	0.344	8850010
513	1.437	1.187	0.250	0.275	8848910
511	1.438	0.938	0.250	0.275	8921010
511	1.438	1.188	0.125	0.139	8921310
512	1.438	1.188	0.188	0.207	8858010
511	1.500	0.875	0.313	0.344	8920910
511	1.500	1.000	0.250	0.275	8806810
513	1.500	1.000	0.250	0.275	8924910
601	1.500	1.000	0.253	0.275	4111101
512	1.500	1.000	0.312	0.344	8906910
018	1.500	1.000		0.375	0422400
512	1.500	1.000	0.375	0.413	8825210
513	1.500	1.000	0.375	0.413	8837910
512	1.500	1.000	0.437	0.480	8907210
511	1.500	1.125	0.188	0.207	8802010
513	1.500	1.125	0.188	0.207	8907710
606	1.500	1.125	0.250	0.275	4426700
512	1.500	1.125	0.250	0.275	8820610
513	1.500	1.125	0.250	0.275	8844910
512	1.500	1.125	0.313	0.344	8821710
513	1.500	1.125	0.313	0.344	8834610
511	1.500	1.187	0.156	0.172	8811010
511	1.500	1.250	0.125	0.138	8802210
513	1.500	1.250	0.125	0.138	8925510
659	1.500	1.250	0.187	0.207	4372400



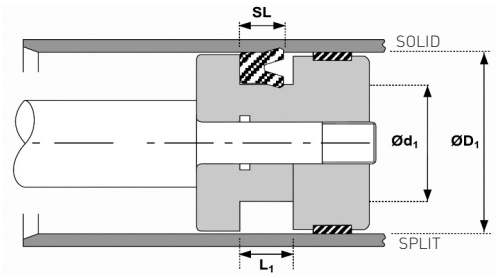
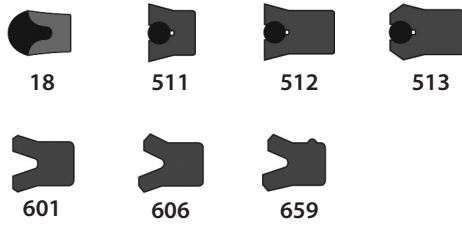
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	1.500	1.250	0.187	0.207	8860210
606	1.500	1.250	0.250	0.275	4426800
512	1.500	1.250	0.250	0.275	8821810
513	1.500	1.250	0.250	0.275	8834710
513	1.562	1.187	0.187	0.207	8925410
511	1.562	1.187	0.188	0.207	8851710
511	1.562	1.250	0.156	0.172	8813810
513	1.562	1.312	0.125	0.138	8926010
513	1.563	1.188	0.313	0.344	8902310
511	1.625	0.875	0.375	0.413	8933210
511	1.625	1.000	0.313	0.344	8806910
513	1.625	1.000	0.375	0.413	8828310
512	1.625	1.000	0.500	0.550	8825310
513	1.625	1.000	0.500	0.550	8838010
511	1.625	1.125	0.250	0.275	8807010
513	1.625	1.125	0.250	0.275	8804910
018	1.625	1.125		0.375	0287000
512	1.625	1.125	0.375	0.413	8847610
513	1.625	1.125	0.375	0.413	8856110
513	1.625	1.250	0.187	0.207	8925610
511	1.625	1.250	0.188	0.207	8802310
513	1.625	1.250	0.250	0.275	8860610
018	1.625	1.250		0.281	0282400
512	1.625	1.250	0.313	0.344	8821910
513	1.625	1.250	0.313	0.344	8834810
513	1.625	1.250	0.375	0.413	8860710
511	1.625	1.375	0.125	0.138	8802410
513	1.625	1.375	0.125	0.138	8926210
513	1.625	1.375	0.187	0.207	8860310
512	1.625	1.375	0.250	0.275	8822110
513	1.625	1.375	0.250	0.275	8834910
511	1.687	1.187	0.250	0.275	8921210
513	1.687	1.312	0.312	0.344	8925910
513	1.687	1.437	0.125	0.138	8926510
513	1.687	1.437	0.250	0.275	8849010
513	1.688	1.375	0.156	0.182	8926410
511	1.688	1.375	0.156	0.172	8813910
511	1.750	1.000	0.375	0.413	8819110
513	1.750	1.125	0.312	0.344	8925310

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	1.750	1.125	0.313	0.344	8807110
018	1.750	1.125		0.437	0778200
513	1.750	1.125	0.500	0.550	8879810
511	1.750	1.250	0.250	0.275	8807210
513	1.750	1.250	0.250	0.275	8925710
601	1.750	1.250	0.253	0.275	4502701
601	1.750	1.250	0.375	0.413	4107001
659	1.750	1.250	0.375	0.413	4528600
512	1.750	1.250	0.375	0.413	8825410
513	1.750	1.250	0.375	0.413	8838110
513	1.750	1.375	0.187	0.207	8926110
511	1.750	1.375	0.188	0.207	8802510
513	1.750	1.375	0.250	0.275	8844710
512	1.750	1.375	0.313	0.344	8822210
513	1.750	1.375	0.313	0.344	8835010
601	1.750	1.375	0.375	0.413	4353400
512	1.750	1.375	0.375	0.413	8870710
513	1.750	1.375	0.375	0.413	8835110
511	1.750	1.500	0.125	0.138	8802610
513	1.750	1.500	0.125	0.138	8926610
606	1.750	1.500	0.250	0.275	4769800
512	1.750	1.500	0.250	0.275	8822310
513	1.750	1.500	0.250	0.275	8835210
511	1.813	1.188	0.313	0.344	8933010
513	1.813	1.313	0.375	0.413	8902610
511	1.875	1.125	0.375	0.413	8921110
511	1.875	1.250	0.313	0.344	8870010
513	1.875	1.250	0.313	0.344	8809810
018	1.875	1.250		0.437	0404100
513	1.875	1.250	0.500	0.550	8838210
511	1.875	1.375	0.250	0.275	8807310
513	1.875	1.375	0.250	0.275	8926310
512	1.875	1.375	0.375	0.413	8825610
513	1.875	1.375	0.375	0.413	8878610
513	1.875	1.500	0.187	0.207	8851510
511	1.875	1.500	0.188	0.207	8802710
513	1.875	1.500	0.250	0.275	8835310
513	1.875	1.500	0.313	0.344	8849710
512	1.875	1.500	0.375	0.413	8822510



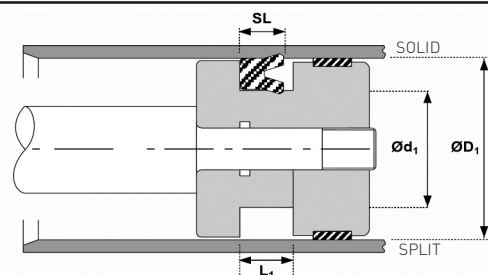
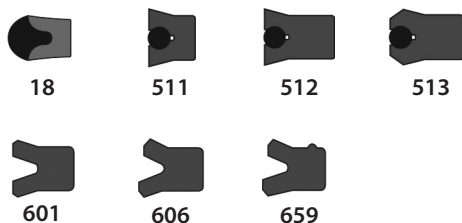
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	1.875	1.500	0.375	0.413	8835410
513	1.875	1.500	0.406	0.447	8848110
511	1.875	1.625	0.125	0.138	8802810
513	1.875	1.625	0.125	0.139	8926910
513	1.875	1.625	0.187	0.207	8849110
512	1.875	1.625	0.250	0.275	8870610
513	1.875	1.625	0.250	0.275	8873110
511	2.000	1.250	0.375	0.413	8814310
513	2.000	1.250	0.375	0.413	8925810
513	2.000	1.250	0.500	0.550	8842010
601	2.000	1.375	0.265	0.312	4236201
511	2.000	1.375	0.313	0.344	8807410
513	2.000	1.375	0.313	0.344	8825110
018	2.000	1.375		0.437	0778400
606	2.000	1.375	0.500	0.550	4364200
512	2.000	1.375	0.500	0.550	8871610
513	2.000	1.375	0.500	0.550	8873510
511	2.000	1.500	0.203	0.223	8801310
601	2.000	1.500	0.250	0.275	4111001
511	2.000	1.500	0.250	0.275	8807510
513	2.000	1.500	0.250	0.275	8908410
018	2.000	1.500		0.281	1447800
512	2.000	1.500	0.313	0.344	8821010
513	2.000	1.500	0.313	0.344	8867710
606	2.000	1.500	0.375	0.413	4376000
512	2.000	1.500	0.375	0.413	8825710
513	2.000	1.500	0.375	0.413	8838310
606	2.000	1.625	0.187	0.207	4426900
513	2.000	1.625	0.187	0.207	8926810
511	2.000	1.625	0.188	0.207	8802910
512	2.000	1.625	0.250	0.275	8908210
513	2.000	1.625	0.250	0.275	8868410
606	2.000	1.625	0.312	0.344	4444300
512	2.000	1.625	0.313	0.344	8858110
513	2.000	1.625	0.313	0.344	8864210
606	2.000	1.625	0.375	0.413	4364400
512	2.000	1.625	0.375	0.413	8822710
513	2.000	1.625	0.375	0.413	8835510
659	2.000	1.630	0.250	0.281	4563300

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	2.000	1.750	0.125	0.138	8803010
513	2.000	1.750	0.125	0.138	8927210
512	2.000	1.750	0.250	0.275	8822810
513	2.000	1.750	0.250	0.275	8835610
511	2.125	1.375	0.375	0.413	8814410
513	2.125	1.375	0.625	0.688	8933510
513	2.125	1.500	0.312	0.344	8926710
511	2.125	1.500	0.313	0.344	8807610
513	2.125	1.500	0.375	0.413	8846510
018	2.125	1.500		0.437	0967600
512	2.125	1.500	0.500	0.550	8825810
513	2.125	1.500	0.500	0.550	8838410
511	2.125	1.625	0.250	0.275	8807710
513	2.125	1.625	0.375	0.413	8849610
513	2.125	1.750	0.187	0.207	8927010
511	2.125	1.750	0.188	0.207	8803110
513	2.125	1.750	0.230	0.250	8852010
513	2.125	1.750	0.250	0.275	8927110
513	2.125	1.750	0.313	0.344	8865410
512	2.125	1.750	0.375	0.413	8822910
513	2.125	1.750	0.375	0.413	8835710
511	2.125	1.875	0.125	0.138	8803210
513	2.125	1.875	0.187	0.207	8845810
513	2.125	1.875	0.250	0.275	8845410
511	2.250	1.500	0.375	0.413	8814510
512	2.250	1.500	0.500	0.550	8872710
513	2.250	1.500	0.500	0.550	8874810
512	2.250	1.500	0.625	0.688	8872810
513	2.250	1.500	0.625	0.688	8842710
511	2.250	1.625	0.313	0.344	8850910
018	2.250	1.625		0.437	1432600
601	2.250	1.750	0.250	0.275	4502601
511	2.250	1.750	0.250	0.275	8807810
513	2.250	1.750	0.250	0.275	8805610
018	2.250	1.750		0.312	1404300
601	2.250	1.750	0.375	0.413	4140901
606	2.250	1.750	0.375	0.413	4476500
512	2.250	1.750	0.375	0.413	8825910
513	2.250	1.750	0.375	0.413	8838510



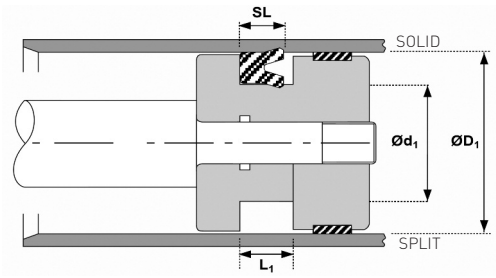
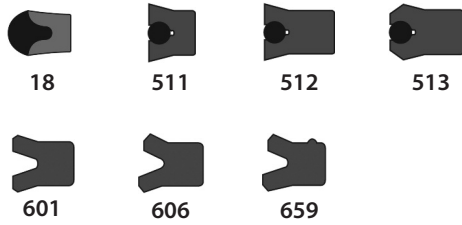
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	2.250	1.875	0.187	0.207	8927310
511	2.250	1.875	0.188	0.207	8803310
606	2.250	1.875	0.375	0.413	4479600
512	2.250	1.875	0.375	0.413	8870810
513	2.250	1.875	0.375	0.413	8835810
511	2.250	2.000	0.125	0.138	8803410
513	2.250	2.000	0.187	0.207	8860410
512	2.250	2.000	0.250	0.275	8823110
513	2.250	2.000	0.250	0.275	8873210
511	2.375	1.625	0.375	0.413	8814710
513	2.375	1.625	0.375	0.413	8901010
601	2.375	1.750	0.250	0.312	4236301
511	2.375	1.750	0.313	0.344	8807910
513	2.375	1.750	0.375	0.413	8868810
018	2.375	1.750		0.437	0939800
659	2.375	1.750	0.437	0.481	4528500
512	2.375	1.750	0.500	0.550	8826010
513	2.375	1.750	0.500	0.550	8873610
601	2.375	1.750	0.562	0.619	4250901
511	2.375	1.875	0.250	0.275	8808010
513	2.375	1.875	0.375	0.413	8859410
513	2.375	2.000	0.187	0.207	8927410
511	2.375	2.000	0.188	0.207	8803510
513	2.375	2.000	0.230	0.250	8806210
601	2.375	2.000	0.250	0.275	4508301
513	2.375	2.000	0.250	0.275	8868110
513	2.375	2.000	0.266	0.292	8927710
601	2.375	2.000	0.312	0.344	4509201
513	2.375	2.000	0.313	0.344	8860810
512	2.375	2.000	0.375	0.413	8823210
513	2.375	2.000	0.375	0.413	8835910
513	2.375	2.125	0.250	0.275	8908910
511	2.500	1.500	0.500	0.550	8814610
512	2.500	1.500	0.750	0.825	8820310
606	2.500	1.625	0.500	0.550	4364500
511	2.500	1.750	0.375	0.413	8814810
512	2.500	1.750	0.500	0.550	8830010
513	2.500	1.750	0.500	0.550	8874910
513	2.500	1.750	0.625	0.688	8875010

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	2.500	1.875	0.313	0.344	8808110
018	2.500	1.875		0.437	0867200
606	2.500	1.875	0.500	0.550	4376100
512	2.500	1.875	0.500	0.550	8826110
513	2.500	1.875	0.500	0.550	8873710
606	2.500	2.000	0.250	0.275	4516500
511	2.500	2.000	0.250	0.275	8808210
513	2.500	2.000	0.250	0.275	8856010
601	2.500	2.000	0.375	0.413	4353500
606	2.500	2.000	0.375	0.413	4391900
512	2.500	2.000	0.375	0.413	8826210
513	2.500	2.000	0.375	0.413	8838610
513	2.500	2.125	0.188	0.207	8908110
511	2.500	2.125	0.188	0.207	8803710
601	2.500	2.125	0.250	0.275	4508201
606	2.500	2.125	0.250	0.275	4427000
512	2.500	2.125	0.250	0.275	8865510
513	2.500	2.125	0.250	0.275	8845010
606	2.500	2.125	0.312	0.344	4444400
606	2.500	2.125	0.375	0.413	4451300
512	2.500	2.125	0.375	0.413	8870910
513	2.500	2.125	0.375	0.413	8836010
659	2.500	2.130	0.250	0.281	4563400
511	2.500	2.250	0.125	0.138	8803810
513	2.500	2.250	0.250	0.275	8908810
512	2.563	2.188	0.375	0.413	8858210
511	2.625	2.000	0.313	0.344	8808310
018	2.625	2.000		0.437	1371000
601	2.625	2.000	0.500	0.550	4225101
512	2.625	2.000	0.500	0.550	8826310
513	2.625	2.000	0.500	0.550	8873810
601	2.625	2.000	0.562	0.619	4159801
513	2.625	2.000	0.563	0.619	8862210
511	2.625	2.125	0.250	0.275	8808410
513	2.625	2.125	0.250	0.275	8805810
601	2.625	2.125	0.375	0.413	4156101
512	2.625	2.125	0.375	0.413	8826410
513	2.625	2.125	0.375	0.413	8856310
513	2.625	2.250	0.187	0.207	8927910



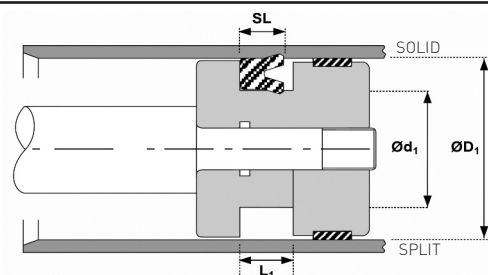
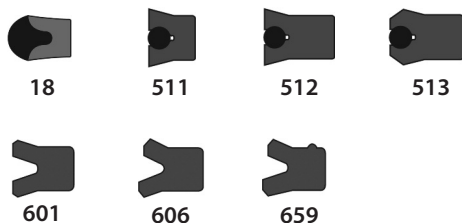
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	2.625	2.250	0.188	0.207	8803910
512	2.625	2.250	0.313	0.344	8858310
513	2.625	2.250	0.313	0.344	8860910
512	2.625	2.250	0.375	0.413	8823410
513	2.625	2.250	0.375	0.413	8873310
511	2.625	2.375	0.125	0.138	8815610
513	2.750	1.750	0.750	0.825	8847010
511	2.750	2.000	0.375	0.413	8814910
513	2.750	2.000	0.375	0.413	8927610
512	2.750	2.000	0.500	0.550	8830310
513	2.750	2.000	0.500	0.550	8875110
018	2.750	2.000		0.562	1369100
512	2.750	2.000	0.625	0.688	8830410
513	2.750	2.000	0.625	0.688	8842810
513	2.750	2.125	0.312	0.344	8927810
511	2.750	2.125	0.313	0.344	8808510
513	2.750	2.125	0.500	0.550	8879910
513	2.750	2.125	0.625	0.688	8864810
511	2.750	2.250	0.250	0.275	8808610
601	2.750	2.250	0.375	0.413	4128701
512	2.750	2.250	0.375	0.413	8826510
513	2.750	2.250	0.375	0.413	8838710
512	2.750	2.250	0.563	0.619	8864110
513	2.750	2.375	0.187	0.207	8928110
511	2.750	2.375	0.188	0.207	8804010
513	2.750	2.375	0.280	0.308	8903010
512	2.750	2.375	0.375	0.413	8858410
513	2.750	2.375	0.375	0.413	8861010
511	2.750	2.500	0.125	0.138	8800310
513	2.750	2.500	0.125	0.138	8928610
513	2.750	2.500	0.250	0.275	8902210
511	2.875	1.875	0.500	0.550	8825510
511	2.875	2.125	0.375	0.413	8815110
511	2.875	2.250	0.313	0.344	8808710
513	2.875	2.250	0.313	0.344	8816310
018	2.875	2.250		0.437	0424300
513	2.875	2.250	0.500	0.550	8838810
511	2.875	2.375	0.250	0.275	8808810
512	2.875	2.375	0.375	0.413	8826610

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	2.875	2.375	0.375	0.413	8850110
513	2.875	2.375	0.563	0.619	8900610
513	2.875	2.500	0.187	0.207	8928410
511	2.875	2.500	0.188	0.207	8804110
513	2.875	2.500	0.250	0.275	8908310
512	2.875	2.500	0.375	0.413	8871010
513	2.875	2.500	0.375	0.413	8836210
511	2.937	2.500	0.218	0.240	8921410
511	3.000	2.000	0.500	0.550	8815010
513	3.000	2.000	0.500	0.550	8927510
512	3.000	2.000	0.750	0.825	8853410
513	3.000	2.000	0.750	0.825	8876810
511	3.000	2.250	0.375	0.413	8869910
513	3.000	2.250	0.375	0.413	8928010
606	3.000	2.250	0.455	0.500	4375000
659	3.000	2.250	0.500	0.550	4528400
512	3.000	2.250	0.500	0.550	8872910
513	3.000	2.250	0.500	0.550	8875210
018	3.000	2.250		0.562	1098400
512	3.000	2.250	0.625	0.688	8873010
513	3.000	2.250	0.625	0.688	8842910
601	3.000	2.375	0.312	0.344	4107201
511	3.000	2.375	0.313	0.344	8808910
513	3.000	2.375	0.313	0.344	8827210
606	3.000	2.375	0.500	0.550	4364600
512	3.000	2.375	0.500	0.550	8826710
513	3.000	2.375	0.500	0.550	8838910
511	3.000	2.500	0.203	0.223	8803610
606	3.000	2.500	0.250	0.275	4516600
511	3.000	2.500	0.250	0.275	8809010
513	3.000	2.500	0.250	0.275	8928310
018	3.000	2.500		0.312	0641200
512	3.000	2.500	0.313	0.344	8821110
513	3.000	2.500	0.313	0.344	8867810
601	3.000	2.500	0.375	0.413	4119501
606	3.000	2.500	0.375	0.413	4364700
512	3.000	2.500	0.375	0.413	8826810
513	3.000	2.500	0.375	0.413	8839010
511	3.000	2.562	0.218	0.240	8921510



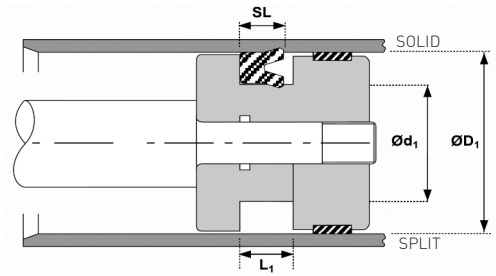
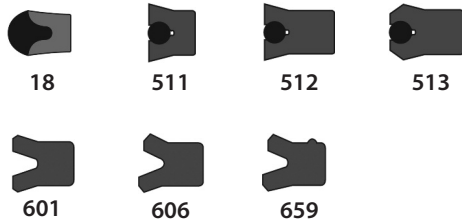
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
606	3.000	2.625	0.187	0.207	4792800
513	3.000	2.625	0.187	0.207	8928710
511	3.000	2.625	0.188	0.207	8804210
513	3.000	2.625	0.250	0.275	8868510
512	3.000	2.625	0.313	0.344	8858510
513	3.000	2.625	0.313	0.344	8864310
606	3.000	2.625	0.375	0.413	4458400
512	3.000	2.625	0.375	0.413	8823710
513	3.000	2.625	0.375	0.413	8836310
659	3.000	2.630	0.250	0.281	4563500
511	3.000	2.750	0.125	0.138	8817910
511	3.125	2.125	0.500	0.550	8853110
513	3.125	2.375	0.625	0.688	8846810
601	3.125	2.500	0.312	0.344	4124401
511	3.125	2.500	0.313	0.344	8870110
513	3.125	2.500	0.375	0.413	8836110
512	3.125	2.500	0.500	0.550	8871810
513	3.125	2.500	0.500	0.550	8873910
511	3.125	2.625	0.250	0.275	8809110
601	3.125	2.625	0.375	0.413	4224701
513	3.125	2.625	0.375	0.413	8849310
513	3.125	2.750	0.187	0.207	8849910
511	3.125	2.750	0.188	0.207	8804410
513	3.125	2.750	0.313	0.344	8846110
512	3.125	2.750	0.375	0.413	8871110
513	3.125	2.750	0.375	0.413	8836410
511	3.125	2.875	0.125	0.138	8814210
513	3.125	2.875	0.250	0.275	8847410
511	3.250	2.500	0.375	0.413	8815410
513	3.250	2.500	0.375	0.413	8928510
512	3.250	2.500	0.500	0.550	8879210
513	3.250	2.500	0.500	0.550	8875310
018	3.250	2.500		0.562	0782400
512	3.250	2.500	0.625	0.688	8830510
513	3.250	2.500	0.625	0.688	8843010
511	3.250	2.625	0.313	0.344	8851110
606	3.250	2.625	0.500	0.550	4376200
513	3.250	2.625	0.500	0.550	8933310
606	3.250	2.750	0.250	0.275	4516700

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	3.250	2.750	0.250	0.275	8809210
513	3.250	2.750	0.250	0.275	8805910
606	3.250	2.750	0.375	0.413	4474400
512	3.250	2.750	0.375	0.413	8826910
513	3.250	2.750	0.375	0.413	8839110
511	3.250	2.875	0.188	0.207	8851010
606	3.250	2.875	0.250	0.275	4427100
512	3.250	2.875	0.250	0.275	8865610
513	3.250	2.875	0.280	0.308	8903110
513	3.250	2.875	0.375	0.413	8861110
511	3.250	3.000	0.125	0.138	8804510
513	3.375	2.375	0.500	0.550	8928210
513	3.375	2.625	0.625	0.688	8863710
511	3.375	2.750	0.313	0.344	8809310
513	3.375	2.750	0.375	0.413	8868910
512	3.375	2.750	0.500	0.550	8871910
513	3.375	2.750	0.500	0.550	8839210
601	3.375	2.750	0.562	0.619	4250701
511	3.375	2.875	0.250	0.275	8809410
513	3.375	2.875	0.375	0.413	8830910
513	3.375	3.000	0.187	0.207	8806710
511	3.375	3.000	0.188	0.207	8804610
513	3.375	3.000	0.250	0.275	8868210
513	3.375	3.000	0.313	0.344	8861210
512	3.375	3.000	0.375	0.413	8823910
513	3.375	3.000	0.375	0.413	8836510
511	3.500	2.500	0.500	0.550	8815510
513	3.500	2.500	0.750	0.825	8847110
511	3.500	2.750	0.375	0.413	8815710
606	3.500	2.750	0.500	0.550	4444600
512	3.500	2.750	0.500	0.550	8830710
513	3.500	2.750	0.500	0.550	8875410
018	3.500	2.750		0.562	0437800
606	3.500	2.750	0.625	0.688	4376300
512	3.500	2.750	0.625	0.688	8830810
513	3.500	2.750	0.625	0.688	8843110
606	3.500	2.875	0.312	0.344	4571100
511	3.500	2.875	0.313	0.344	8809510
601	3.500	2.875	0.325	0.360	4129701



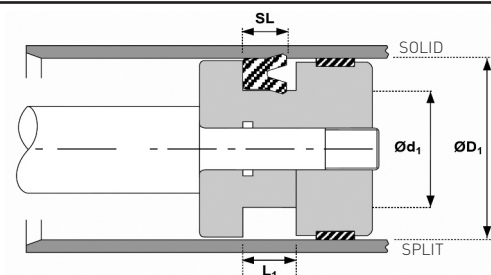
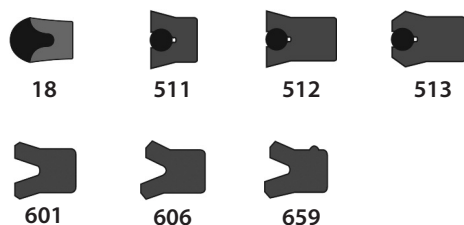
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
606	3.500	2.875	0.500	0.550	4364800
512	3.500	2.875	0.500	0.550	8872010
513	3.500	2.875	0.500	0.550	8874010
511	3.500	3.000	0.203	0.223	8816110
606	3.500	3.000	0.250	0.275	4516800
511	3.500	3.000	0.250	0.275	8809610
513	3.500	3.000	0.250	0.275	8928810
606	3.500	3.000	0.375	0.413	4364900
512	3.500	3.000	0.375	0.413	8827010
513	3.500	3.000	0.375	0.413	8839310
513	3.500	3.000	0.500	0.550	8842110
512	3.500	3.000	0.563	0.619	8850610
513	3.500	3.000	0.563	0.619	8852210
511	3.500	3.125	0.188	0.207	8804710
513	3.500	3.125	0.188	0.207	8908710
512	3.500	3.125	0.250	0.275	8867310
513	3.500	3.125	0.250	0.275	8845110
606	3.500	3.125	0.275	0.302	4572200
606	3.500	3.125	0.375	0.413	4444500
512	3.500	3.125	0.375	0.413	8871210
513	3.500	3.125	0.375	0.413	8836610
659	3.500	3.130	0.250	0.281	4563600
511	3.500	3.250	0.125	0.138	8819610
512	3.563	3.188	0.375	0.413	8858610
659	3.625	2.875	0.562	0.619	4528300
513	3.625	3.000	0.312	0.344	8929010
511	3.625	3.000	0.313	0.344	8809710
513	3.625	3.000	0.375	0.413	8828510
512	3.625	3.000	0.500	0.550	8827110
513	3.625	3.000	0.500	0.550	8874110
601	3.625	3.000	0.562	0.619	4160001
513	3.625	3.125	0.250	0.275	8848510
512	3.625	3.125	0.375	0.413	8859510
513	3.625	3.125	0.375	0.413	8856210
511	3.625	3.250	0.188	0.207	8804810
512	3.625	3.250	0.313	0.344	8858710
513	3.625	3.250	0.313	0.344	8861310
512	3.625	3.250	0.375	0.413	8824010
513	3.625	3.250	0.375	0.413	8873410

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	3.750	2.750	0.500	0.550	8900010
511	3.750	3.000	0.375	0.413	8815910
513	3.750	3.000	0.375	0.413	8928910
512	3.750	3.000	0.500	0.550	8831010
513	3.750	3.000	0.500	0.550	8875510
018	3.750	3.000		0.562	0410500
512	3.750	3.000	0.625	0.688	8878710
513	3.750	3.000	0.625	0.688	8843210
513	3.750	3.125	0.312	0.344	8929210
511	3.750	3.125	0.313	0.344	8809910
513	3.750	3.125	0.500	0.550	8869810
511	3.750	3.250	0.250	0.275	8810010
606	3.750	3.250	0.375	0.413	4444700
512	3.750	3.250	0.375	0.413	8827310
513	3.750	3.250	0.375	0.413	8839410
513	3.750	3.375	0.187	0.207	8932910
511	3.750	3.375	0.188	0.207	8854210
513	3.750	3.375	0.280	0.308	8903210
512	3.750	3.375	0.375	0.413	8858810
513	3.750	3.375	0.375	0.413	8836710
511	3.750	3.500	0.125	0.138	8815810
513	3.875	3.125	0.375	0.413	8929110
513	3.875	3.125	0.625	0.688	8900310
511	3.875	3.250	0.313	0.344	8879610
513	3.875	3.250	0.313	0.344	8820110
513	3.875	3.250	0.500	0.550	8869710
511	3.875	3.375	0.250	0.275	8850710
513	3.875	3.375	0.250	0.275	8929310
513	3.875	3.375	0.375	0.413	8849410
513	3.875	3.375	0.563	0.619	8900710
513	3.875	3.500	0.187	0.207	8929510
511	3.875	3.500	0.188	0.207	8805010
512	3.875	3.500	0.375	0.413	8824110
513	3.875	3.500	0.375	0.413	8836810
511	4.000	2.750	0.625	0.688	8819310
511	4.000	3.000	0.500	0.550	8816010
512	4.000	3.000	0.750	0.825	8850510
513	4.000	3.000	0.750	0.825	8863310
606	4.000	3.250	0.375	0.413	4517400



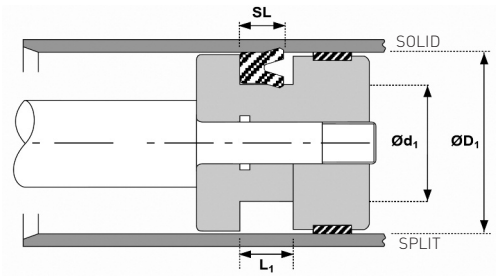
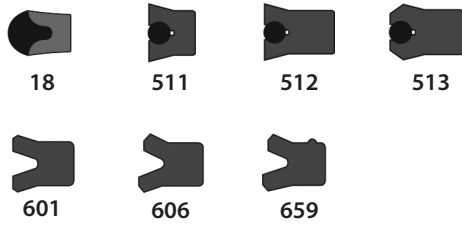
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	4.000	3.250	0.375	0.413	8816210
606	4.000	3.250	0.500	0.550	4444900
512	4.000	3.250	0.500	0.550	8831110
513	4.000	3.250	0.500	0.550	8875610
018	4.000	3.250		0.562	1407700
606	4.000	3.250	0.625	0.688	4376400
512	4.000	3.250	0.625	0.688	8831210
513	4.000	3.250	0.625	0.688	8843310
511	4.000	3.375	0.313	0.344	8810210
513	4.000	3.375	0.313	0.344	8827410
606	4.000	3.375	0.500	0.550	4365000
512	4.000	3.375	0.500	0.550	8872110
513	4.000	3.375	0.500	0.550	8874210
511	4.000	3.500	0.203	0.223	8817210
606	4.000	3.500	0.250	0.275	4516900
511	4.000	3.500	0.250	0.275	8810310
513	4.000	3.500	0.250	0.275	8929410
606	4.000	3.500	0.312	0.344	4427200
512	4.000	3.500	0.313	0.344	8865710
513	4.000	3.500	0.313	0.344	8867910
018	4.000	3.500		0.375	1468200
606	4.000	3.500	0.375	0.413	4365100
512	4.000	3.500	0.375	0.413	8827510
513	4.000	3.500	0.375	0.413	8839510
513	4.000	3.625	0.187	0.207	8929710
511	4.000	3.625	0.188	0.207	8805110
513	4.000	3.625	0.250	0.275	8868610
512	4.000	3.625	0.313	0.344	8864010
513	4.000	3.625	0.313	0.344	8864410
606	4.000	3.625	0.375	0.413	4444800
512	4.000	3.625	0.375	0.413	8824210
513	4.000	3.625	0.375	0.413	8836910
659	4.000	3.630	0.250	0.281	4563700
511	4.000	3.750	0.125	0.138	8818710
511	4.125	3.375	0.375	0.413	8857710
512	4.125	3.375	0.625	0.688	8855910
513	4.125	3.375	0.625	0.688	8852110
511	4.125	3.500	0.313	0.344	8810410
513	4.125	3.500	0.375	0.413	8837410

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
512	4.125	3.500	0.500	0.550	8827710
513	4.125	3.500	0.500	0.550	8874310
511	4.125	3.625	0.250	0.275	8810510
513	4.125	3.625	0.375	0.413	8849510
513	4.125	3.750	0.187	0.207	8850210
511	4.125	3.750	0.188	0.207	8879410
513	4.125	3.750	0.313	0.344	8846210
512	4.125	3.750	0.375	0.413	8855010
513	4.125	3.750	0.375	0.413	8837010
511	4.125	3.875	0.125	0.138	8816510
513	4.125	3.875	0.250	0.275	8845510
511	4.175	3.550	0.250	0.275	8899510
511	4.250	3.500	0.375	0.413	8816410
512	4.250	3.500	0.500	0.550	8878810
513	4.250	3.500	0.500	0.550	8875710
018	4.250	3.500		0.562	1128800
659	4.250	3.500	0.562	0.619	4528200
512	4.250	3.500	0.625	0.688	8831310
513	4.250	3.500	0.625	0.688	8843410
511	4.250	3.625	0.313	0.344	8851210
513	4.250	3.625	0.375	0.413	8933910
511	4.250	3.750	0.250	0.275	8810610
513	4.250	3.750	0.250	0.275	8848610
606	4.250	3.750	0.375	0.413	4445000
512	4.250	3.750	0.375	0.413	8827810
513	4.250	3.750	0.375	0.413	8839710
513	4.250	3.750	0.563	0.619	8839810
511	4.250	3.875	0.188	0.207	8823510
512	4.250	3.875	0.250	0.275	8820910
513	4.250	3.875	0.280	0.308	8903310
513	4.250	3.875	0.375	0.413	8861410
511	4.250	4.000	0.125	0.138	8805210
513	4.250	4.000	0.125	0.138	8930010
511	4.375	3.375	0.500	0.550	8866910
511	4.375	3.625	0.375	0.413	8824610
513	4.375	3.625	0.625	0.688	8865310
511	4.375	3.750	0.313	0.344	8870210
513	4.375	3.750	0.375	0.413	8869010
512	4.375	3.750	0.500	0.550	8872210



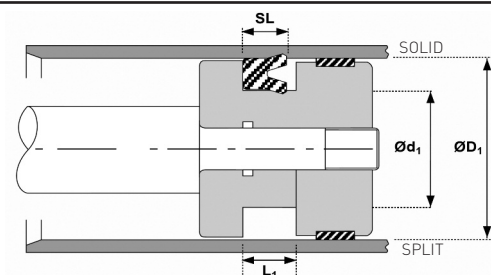
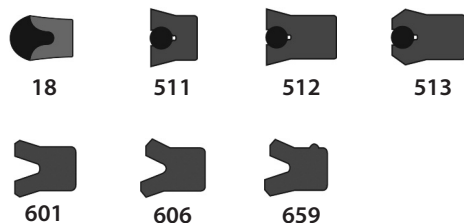
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	4.375	3.750	0.500	0.550	8874410
511	4.375	3.875	0.250	0.275	8810710
513	4.375	3.875	0.375	0.413	8832510
513	4.375	4.000	0.187	0.207	8820010
511	4.375	4.000	0.188	0.207	8805310
513	4.375	4.000	0.250	0.275	8868310
513	4.375	4.000	0.313	0.344	8861510
512	4.375	4.000	0.375	0.413	8824310
513	4.375	4.000	0.375	0.413	8837110
511	4.500	3.250	0.625	0.688	8822410
512	4.500	3.500	0.625	0.688	8907810
512	4.500	3.500	0.750	0.825	8823010
601	4.500	3.750	0.375	0.413	4119201
511	4.500	3.750	0.375	0.413	8816610
513	4.500	3.750	0.375	0.413	8929810
018	4.500	3.750		0.500	1414800
512	4.500	3.750	0.500	0.550	8831410
513	4.500	3.750	0.500	0.550	8875810
606	4.500	3.750	0.625	0.688	4371000
513	4.500	3.750	0.625	0.688	8875910
511	4.500	3.875	0.313	0.344	8870310
512	4.500	3.875	0.500	0.550	8872310
513	4.500	3.875	0.500	0.550	8839910
511	4.500	4.000	0.250	0.275	8810810
513	4.500	4.000	0.250	0.275	8929910
606	4.500	4.000	0.375	0.413	4448100
512	4.500	4.000	0.375	0.413	8827910
513	4.500	4.000	0.375	0.413	8840010
513	4.500	4.000	0.500	0.550	8867510
601	4.500	4.000	0.511	0.562	4373400
512	4.500	4.000	0.562	0.619	8828010
513	4.500	4.000	0.563	0.619	8840110
511	4.500	4.125	0.188	0.207	8805410
513	4.500	4.125	0.250	0.275	8845210
512	4.500	4.125	0.312	0.344	8867210
512	4.500	4.125	0.375	0.413	8871310
513	4.500	4.125	0.375	0.413	8837210
511	4.500	4.250	0.125	0.138	8819710
512	4.563	4.188	0.375	0.413	8859010

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	4.625	3.875	0.375	0.413	8819210
511	4.625	4.000	0.313	0.344	8810910
513	4.625	4.000	0.500	0.550	8874510
513	4.625	4.000	0.563	0.619	8862310
513	4.625	4.125	0.250	0.275	8806010
512	4.625	4.125	0.375	0.413	8859610
513	4.625	4.125	0.375	0.413	8856410
511	4.625	4.250	0.188	0.207	8805510
512	4.625	4.250	0.313	0.344	8859110
513	4.625	4.250	0.313	0.344	8861610
512	4.625	4.250	0.375	0.413	8824410
513	4.625	4.250	0.375	0.413	8837310
601	4.750	4.000	0.375	0.413	4120501
511	4.750	4.000	0.375	0.413	8816810
512	4.750	4.000	0.500	0.550	8878910
513	4.750	4.000	0.500	0.550	8876010
601	4.750	4.000	0.536	0.600	4422500
512	4.750	4.000	0.625	0.688	8831610
513	4.750	4.000	0.625	0.688	8843510
511	4.750	4.125	0.313	0.344	8811110
513	4.750	4.125	0.500	0.550	8869610
513	4.750	4.125	0.625	0.688	8869510
511	4.750	4.250	0.250	0.275	8811210
513	4.750	4.250	0.250	0.275	8930310
512	4.750	4.250	0.375	0.413	8828210
513	4.750	4.250	0.375	0.413	8840210
512	4.750	4.250	0.563	0.619	8833710
513	4.750	4.250	0.563	0.619	8905810
511	4.750	4.375	0.188	0.207	8854310
513	4.750	4.375	0.280	0.308	8903410
512	4.750	4.375	0.375	0.413	8859210
513	4.750	4.375	0.375	0.413	8861710
606	4.750	4.379	0.275	0.302	4493600
018	4.875	4.000		0.656	1424100
511	4.875	4.125	0.375	0.413	8853210
511	4.875	4.250	0.313	0.344	8811310
513	4.875	4.250	0.313	0.344	8821610
513	4.875	4.250	0.500	0.550	8869410
513	4.875	4.250	0.562	0.619	8930210



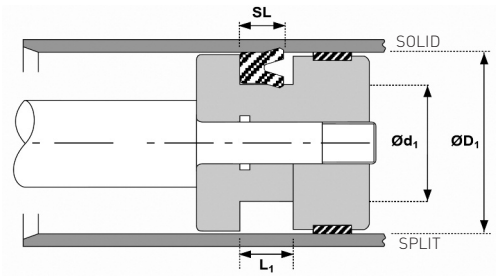
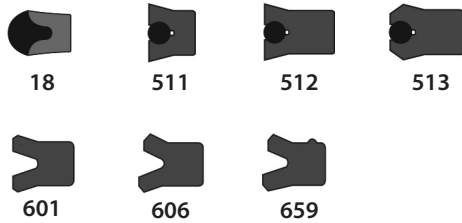
TYPE	ØD ₁	Ød ₁	NOMINAL SL	L ₁	PART No.
511	4.875	4.375	0.250	0.275	8811410
513	4.875	4.375	0.250	0.275	8848310
513	4.875	4.375	0.563	0.619	8900510
511	4.875	4.500	0.188	0.207	8805710
512	4.875	4.500	0.375	0.413	8824510
513	4.875	4.500	0.375	0.413	8837510
513	5.000	3.500	0.750	0.825	8929610
511	5.000	4.000	0.500	0.550	8816910
513	5.000	4.000	0.500	0.550	8930110
018	5.000	4.000		0.750	0443000
659	5.000	4.000	0.731	0.804	4528100
512	5.000	4.000	0.750	0.825	8853510
513	5.000	4.000	0.750	0.825	8877410
606	5.000	4.250	0.375	0.413	4517500
511	5.000	4.250	0.375	0.413	8817010
513	5.000	4.250	0.375	0.413	8867410
606	5.000	4.250	0.500	0.550	4445100
512	5.000	4.250	0.500	0.550	8831810
513	5.000	4.250	0.500	0.550	8876110
606	5.000	4.250	0.625	0.688	4371100
512	5.000	4.250	0.625	0.688	8831910
513	5.000	4.250	0.625	0.688	8843610
511	5.000	4.375	0.313	0.344	8811510
513	5.000	4.375	0.313	0.344	8827610
512	5.000	4.375	0.500	0.550	8828410
513	5.000	4.375	0.500	0.550	8874610
512	5.000	4.375	0.562	0.619	8922410
512	5.000	4.375	0.625	0.688	8872410
513	5.000	4.375	0.625	0.688	8840410
511	5.000	4.500	0.203	0.223	8804310
606	5.000	4.500	0.250	0.275	4517000
511	5.000	4.500	0.250	0.275	8811610
513	5.000	4.500	0.250	0.275	8817110
512	5.000	4.500	0.313	0.344	8821410
513	5.000	4.500	0.313	0.344	8868010
601	5.000	4.500	0.375	0.413	4129801
606	5.000	4.500	0.375	0.413	4365200
512	5.000	4.500	0.375	0.413	8828610
513	5.000	4.500	0.375	0.413	8840510

TYPE	ØD ₁	Ød ₁	NOMINAL SL	L ₁	PART No.
513	5.000	4.500	0.500	0.550	8864710
606	5.000	4.500	0.562	0.619	4495900
512	5.000	4.500	0.563	0.619	8828710
513	5.000	4.500	0.563	0.619	8840610
511	5.000	4.625	0.188	0.207	8879510
513	5.000	4.625	0.250	0.275	8868710
512	5.000	4.625	0.313	0.344	8859310
513	5.000	4.625	0.313	0.344	8864510
512	5.000	4.625	0.375	0.413	8855410
513	5.000	4.625	0.375	0.413	8837610
511	5.000	4.750	0.125	0.138	8818110
511	5.125	4.500	0.313	0.344	8811710
513	5.125	4.500	0.375	0.413	8840710
512	5.125	4.500	0.625	0.688	8872510
513	5.125	4.500	0.625	0.688	8840810
511	5.125	4.625	0.250	0.275	8811810
513	5.125	4.625	0.250	0.275	8848410
513	5.125	4.750	0.375	0.413	8846610
511	5.125	4.875	0.125	0.138	8816710
513	5.125	4.875	0.250	0.275	8845610
511	5.250	4.250	0.500	0.550	8858910
018	5.250	4.250		0.750	0892200
513	5.250	4.250	0.750	0.825	8847210
511	5.250	4.500	0.375	0.413	8817310
513	5.250	4.500	0.375	0.413	8930410
018	5.250	4.500		0.469	0447800
606	5.250	4.500	0.500	0.550	4445200
512	5.250	4.500	0.500	0.550	8832010
513	5.250	4.500	0.500	0.550	8876210
512	5.250	4.500	0.625	0.688	8832110
513	5.250	4.500	0.625	0.688	8843710
511	5.250	4.750	0.250	0.275	8811910
513	5.250	4.750	0.250	0.275	8930810
513	5.250	4.750	0.375	0.413	8861910
513	5.250	4.750	0.500	0.550	8846310
512	5.250	4.750	0.562	0.619	8933410
513	5.250	4.750	0.563	0.619	8840910
511	5.250	4.875	0.188	0.207	8823610
512	5.250	4.875	0.250	0.275	8821510



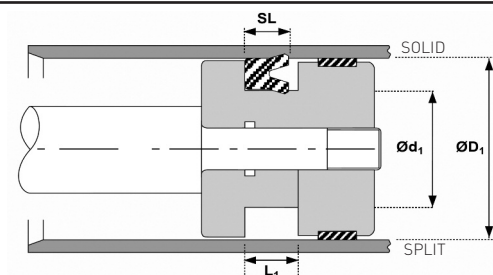
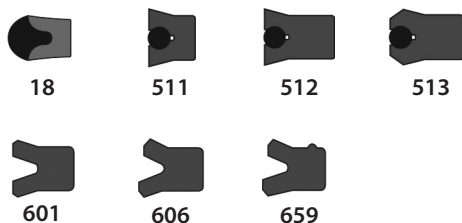
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	5.250	4.875	0.280	0.308	8903510
513	5.250	4.875	0.375	0.413	8861810
511	5.375	4.750	0.313	0.344	8879710
513	5.375	4.750	0.500	0.550	8869310
513	5.375	4.750	0.625	0.688	8862410
511	5.375	4.875	0.250	0.275	8856510
513	5.375	4.875	0.375	0.413	8832910
513	5.375	4.875	0.562	0.619	8930910
513	5.375	5.000	0.375	0.413	8842510
511	5.500	4.250	0.625	0.688	8819810
511	5.500	4.500	0.500	0.550	8817410
513	5.500	4.500	0.500	0.550	8930510
018	5.500	4.500		0.750	0133200
513	5.500	4.500	0.750	0.825	8847310
511	5.500	4.750	0.375	0.413	8817510
513	5.500	4.750	0.375	0.413	8930610
601	5.500	4.750	0.360	0.437	4154701
513	5.500	4.750	0.500	0.550	8876310
606	5.500	4.750	0.625	0.688	4371200
512	5.500	4.750	0.625	0.688	8832210
513	5.500	4.750	0.625	0.688	8876410
511	5.500	4.875	0.313	0.343	8921610
511	5.500	5.000	0.250	0.275	8812010
513	5.500	5.000	0.250	0.275	8931210
512	5.500	5.000	0.375	0.413	8871510
513	5.500	5.000	0.375	0.413	8841010
513	5.500	5.000	0.500	0.550	8866810
512	5.500	5.000	0.563	0.619	8828810
513	5.500	5.000	0.563	0.619	8841110
511	5.500	5.125	0.188	0.207	8908510
511	5.625	5.000	0.313	0.344	8812110
513	5.625	5.000	0.625	0.688	8874710
513	5.750	4.750	0.750	0.825	8930710
511	5.750	5.000	0.375	0.413	8817610
513	5.750	5.000	0.375	0.413	8931010
601	5.750	5.000	0.482	0.539	4224801
512	5.750	5.000	0.500	0.550	8879110
513	5.750	5.000	0.500	0.550	8876510
512	5.750	5.000	0.625	0.688	8832310

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	5.750	5.000	0.625	0.688	8843810
511	5.750	5.250	0.250	0.275	8812210
513	5.750	5.250	0.563	0.619	8862010
511	5.875	5.250	0.313	0.344	8856910
513	5.875	5.250	0.625	0.688	8862510
513	5.875	5.500	0.375	0.413	8905710
511	6.000	4.750	0.625	0.688	8819410
511	6.000	5.000	0.500	0.550	8817710
018	6.000	5.000		0.750	1367000
659	6.000	5.000	0.731	0.804	4530200
601	6.000	5.000	0.750	0.825	8901300
512	6.000	5.000	0.750	0.825	8832410
513	6.000	5.000	0.750	0.825	8907610
513	6.000	5.000	0.750	0.825	8931110
606	6.000	5.250	0.375	0.413	4517600
511	6.000	5.250	0.375	0.413	8817810
513	6.000	5.250	0.375	0.413	8931310
606	6.000	5.250	0.500	0.550	4445300
512	6.000	5.250	0.500	0.550	8905910
513	6.000	5.250	0.500	0.550	8865010
018	6.000	5.250		0.562	0487700
606	6.000	5.250	0.625	0.688	4371300
512	6.000	5.250	0.625	0.688	8832610
513	6.000	5.250	0.625	0.688	8843910
513	6.000	5.250	0.750	0.825	8854410
513	6.000	5.375	0.312	0.344	8931510
511	6.000	5.375	0.313	0.344	8812310
513	6.000	5.375	0.375	0.413	8931610
512	6.000	5.375	0.625	0.688	8872610
513	6.000	5.375	0.625	0.688	8841210
511	6.000	5.437	0.281	0.310	8921710
606	6.000	5.500	0.250	0.275	4517100
511	6.000	5.500	0.250	0.275	8812410
606	6.000	5.500	0.375	0.413	4365300
512	6.000	5.500	0.375	0.413	8829110
513	6.000	5.500	0.375	0.413	8841310
512	6.000	5.500	0.500	0.550	8922510
513	6.000	5.500	0.500	0.550	8833610
606	6.000	5.500	0.562	0.619	4393400



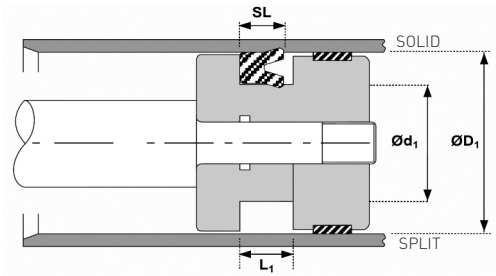
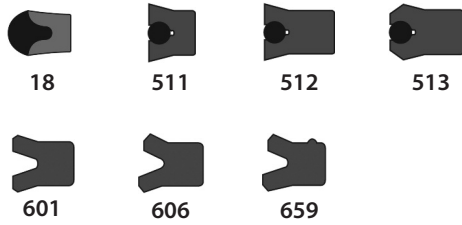
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
512	6.000	5.500	0.563	0.619	8829210
513	6.000	5.500	0.563	0.619	8841410
511	6.125	5.125	0.500	0.550	8851810
513	6.125	5.500	0.312	0.344	8931810
511	6.125	5.500	0.313	0.344	8812510
513	6.125	5.500	0.625	0.688	8933810
513	6.125	5.625	0.563	0.619	8903610
511	6.250	5.250	0.500	0.550	8900110
513	6.250	5.250	0.500	0.550	8931410
513	6.250	5.250	0.750	0.825	8847510
601	6.250	5.500	0.375	0.413	4119301
511	6.250	5.500	0.375	0.413	8818010
513	6.250	5.500	0.375	0.413	8931710
513	6.250	5.500	0.500	0.550	8863010
513	6.250	5.500	0.625	0.688	8844010
511	6.250	5.750	0.250	0.275	8812610
513	6.250	5.750	0.375	0.413	8866410
606	6.250	5.750	0.563	0.619	4458300
512	6.250	5.750	0.563	0.619	8905510
513	6.250	5.750	0.563	0.619	8841610
511	6.375	5.375	0.500	0.550	8863610
511	6.375	5.625	0.375	0.413	8814110
511	6.375	5.750	0.313	0.344	8857010
018	6.500	5.500		0.750	1164100
512	6.500	5.500	0.750	0.825	8823310
601	6.500	5.750	0.375	0.413	4135301
511	6.500	5.750	0.375	0.413	8818210
512	6.500	5.750	0.500	0.550	8829010
513	6.500	5.750	0.500	0.550	8866110
606	6.500	5.750	0.625	0.688	4743900
512	6.500	5.750	0.625	0.688	8832810
513	6.500	5.750	0.625	0.688	8878010
511	6.500	6.000	0.250	0.275	8812810
513	6.500	6.000	0.375	0.413	8852310
513	6.500	6.000	0.500	0.550	8867610
512	6.500	6.000	0.563	0.619	8829310
513	6.500	6.000	0.563	0.619	8841710
513	6.625	5.875	0.625	0.688	8900410
511	6.625	6.000	0.313	0.344	8812910

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	6.625	6.000	0.625	0.688	8862610
511	6.750	6.000	0.375	0.413	8818310
513	6.750	6.000	0.375	0.413	8931910
513	6.750	6.000	0.500	0.550	8866210
512	6.750	6.000	0.625	0.688	8833010
513	6.750	6.000	0.625	0.688	8844110
511	6.750	6.250	0.250	0.275	8856610
513	6.750	6.250	0.563	0.619	8905610
511	6.875	6.250	0.313	0.344	8857110
511	7.000	6.000	0.500	0.550	8818410
018	7.000	6.000		0.750	1188800
659	7.000	6.000	0.731	0.804	4529700
512	7.000	6.000	0.750	0.825	8833110
513	7.000	6.000	0.750	0.825	8863410
513	7.000	6.000	0.750	0.825	8932010
606	7.000	6.250	0.375	0.413	4517700
511	7.000	6.250	0.375	0.413	8818510
606	7.000	6.250	0.500	0.550	4445500
512	7.000	6.250	0.500	0.550	8833210
513	7.000	6.250	0.500	0.550	8902410
606	7.000	6.250	0.625	0.688	4371400
512	7.000	6.250	0.625	0.688	8833310
513	7.000	6.250	0.625	0.688	8844210
511	7.000	6.375	0.313	0.344	8813010
512	7.000	6.375	0.625	0.688	8829410
513	7.000	6.375	0.625	0.688	8841810
606	7.000	6.500	0.250	0.275	4517200
511	7.000	6.500	0.250	0.275	8813110
513	7.000	6.500	0.250	0.275	8899410
606	7.000	6.500	0.375	0.413	4445400
512	7.000	6.500	0.375	0.413	8829510
513	7.000	6.500	0.375	0.413	8852610
513	7.000	6.500	0.500	0.550	8846410
512	7.000	6.500	0.563	0.619	8829710
513	7.000	6.500	0.563	0.619	8841910
511	7.125	6.500	0.313	0.344	8876610
513	7.125	6.500	0.625	0.688	8869110
511	7.250	6.250	0.500	0.550	8857810
513	7.250	6.250	0.750	0.825	8847710



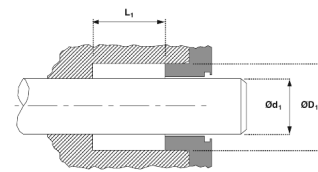
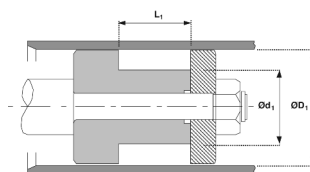
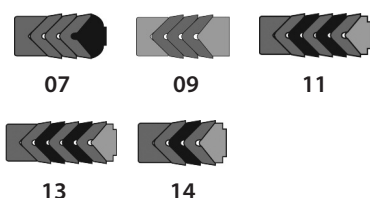
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	7.250	6.500	0.375	0.413	8818610
513	7.250	6.500	0.375	0.413	8932110
513	7.250	6.500	0.500	0.550	8853310
512	7.250	6.500	0.625	0.688	8833410
513	7.250	6.500	0.625	0.688	8844310
511	7.250	6.750	0.250	0.275	8813210
513	7.250	6.750	0.375	0.413	8865910
513	7.250	6.750	0.500	0.550	8866010
513	7.250	6.750	0.563	0.619	8866310
511	7.375	6.750	0.313	0.344	8857210
513	7.375	6.750	0.625	0.688	8862710
511	7.500	6.500	0.500	0.550	8815210
511	7.500	6.750	0.375	0.413	8818810
513	7.500	6.750	0.375	0.413	8932210
513	7.500	6.750	0.500	0.550	8854610
512	7.500	6.750	0.625	0.688	8850810
513	7.500	6.750	0.625	0.688	8854710
601	7.500	7.000	0.250	0.275	4806200
511	7.500	7.000	0.250	0.275	8813310
512	7.500	7.000	0.375	0.413	8822610
513	7.500	7.000	0.375	0.413	8852410
513	7.500	7.000	0.500	0.550	8842410
512	7.500	7.000	0.563	0.619	8877210
513	7.500	7.000	0.563	0.619	8877910
511	7.625	7.000	0.313	0.344	8879310
512	7.625	7.000	0.625	0.688	8859710
513	7.625	7.000	0.625	0.688	8854810
511	7.750	6.500	0.625	0.688	8819910
018	7.750	6.500		1.000	1192700
511	7.750	7.000	0.375	0.413	8877010
512	7.750	7.000	0.500	0.550	8859810
513	7.750	7.000	0.500	0.550	8854010
512	7.750	7.000	0.625	0.688	8877610
513	7.750	7.000	0.625	0.688	8844410
511	7.750	7.250	0.250	0.275	8856710
513	7.750	7.250	0.563	0.619	8862110
511	7.875	7.250	0.313	0.344	8857310
513	7.875	7.250	0.625	0.688	8862810
511	8.000	6.750	0.625	0.688	8819510

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	8.000	7.000	0.500	0.550	8851310
512	8.000	7.000	0.750	0.825	8851910
513	8.000	7.000	0.750	0.825	8870410
018	8.000	7.000		0.875	6501200
511	8.000	7.250	0.375	0.413	8818910
513	8.000	7.250	0.375	0.413	8932310
513	8.000	7.250	0.500	0.550	8865110
606	8.000	7.250	0.625	0.688	4371500
512	8.000	7.250	0.625	0.688	8833510
513	8.000	7.250	0.625	0.688	8844510
513	8.000	7.250	0.750	0.825	8854510
511	8.000	7.375	0.313	0.344	8876710
513	8.000	7.375	0.500	0.550	8842610
512	8.000	7.375	0.625	0.688	8855310
513	8.000	7.375	0.625	0.688	8864910
606	8.000	7.500	0.250	0.275	4517300
511	8.000	7.500	0.250	0.275	8813410
513	8.000	7.500	0.250	0.275	8932410
512	8.000	7.500	0.375	0.413	8829610
513	8.000	7.500	0.375	0.413	8852510
513	8.000	7.500	0.500	0.550	8833810
512	8.000	7.500	0.563	0.619	8877310
513	8.000	7.500	0.563	0.619	8852810
511	8.125	7.500	0.313	0.344	8813510
018	8.250	7.000		1.000	1219200
511	8.250	7.250	0.500	0.550	8857910
513	8.250	7.250	0.750	0.825	8847810
511	8.250	7.500	0.375	0.413	8877110
513	8.250	7.500	0.500	0.550	8863210
513	8.250	7.500	0.625	0.688	8878110
511	8.250	7.750	0.250	0.275	8921810
511	8.375	7.375	0.500	0.550	8863910
511	8.375	7.625	0.375	0.413	8814010
511	8.375	7.750	0.313	0.344	8857410
511	8.500	7.500	0.500	0.550	8851610
512	8.500	7.500	0.750	0.825	8820410
511	8.500	7.750	0.375	0.413	8853910
513	8.500	7.750	0.500	0.550	8865210
512	8.500	7.750	0.625	0.688	8859910



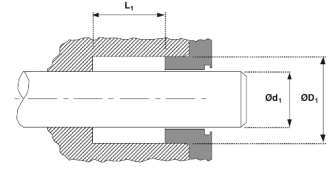
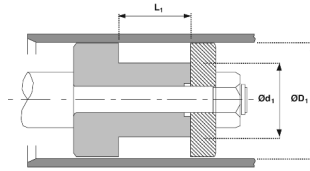
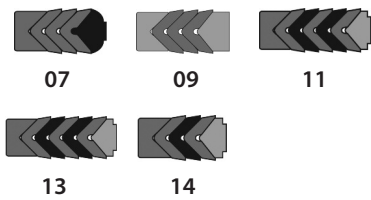
TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
513	8.500	7.750	0.625	0.688	8853610
511	8.500	8.000	0.250	0.275	8813610
513	8.500	8.000	0.250	0.275	8904610
513	8.500	8.000	0.375	0.413	8848210
513	8.500	8.000	0.563	0.619	8842310
511	8.625	8.000	0.313	0.344	8876910
513	8.625	8.000	0.500	0.550	8866610
513	8.625	8.000	0.625	0.688	8904810
018	8.750	7.500		1.000	0418100
601	8.750	7.750	0.500	0.550	4806100
513	8.750	7.750	0.750	0.825	8847910
511	8.750	8.000	0.375	0.413	8869210
513	8.750	8.000	0.625	0.688	8878210
511	8.750	8.250	0.250	0.275	8856810
511	8.875	8.250	0.313	0.344	8857510
511	9.000	8.000	0.500	0.550	8819010
018	9.000	8.000		0.750	1269400
606	9.000	8.000	0.750	0.825	4371600
512	9.000	8.000	0.750	0.825	8855210
513	9.000	8.000	0.750	0.825	8863510
511	9.000	8.250	0.375	0.413	8851410
512	9.000	8.250	0.500	0.550	8860010
512	9.000	8.250	0.625	0.688	8853710
513	9.000	8.250	0.625	0.688	8854110
511	9.000	8.500	0.250	0.275	8813710
512	9.000	8.500	0.375	0.413	8829810
513	9.000	8.500	0.375	0.413	8852710
513	9.000	8.500	0.500	0.550	8833910
512	9.000	8.500	0.563	0.619	8855110
513	9.000	8.500	0.563	0.619	8853010
511	9.125	8.125	0.500	0.550	8853810
511	9.125	8.500	0.313	0.344	8857610
513	9.125	8.500	0.625	0.688	8862910
018	9.250	8.000		1.000	0455700
512	9.250	8.250	0.750	0.825	8904710

TYPE	ØD ₁	NOMINAL Ød ₁	SL	L ₁	PART No.
511	9.500	8.750	0.375	0.413	8921910
513	9.500	8.750	0.500	0.550	8934810
018	9.750	8.500		1.000	1332300
513	9.750	9.000	0.375	0.413	8932510
511	10.000	9.000	0.500	0.550	8905410
606	10.000	9.000	0.750	0.825	4536200
512	10.000	9.000	0.750	0.825	8922610
606	10.000	9.250	0.375	0.413	4575100
513	10.000	9.500	0.562	0.619	8932610
018	10.250	9.000		1.000	0437500
513	10.250	9.500	0.625	0.688	8933710
513	10.500	10.000	0.562	0.619	8932710
018	10.750	9.500		1.000	1320400
511	10.750	10.000	0.375	0.413	8922010
512	11.000	10.000	0.750	0.825	8922710
513	11.000	10.250	0.500	0.550	8934710
018	11.250	10.000		1.000	0452200
018	11.750	10.500		1.000	1331300
511	11.750	11.000	0.375	0.413	8922110
512	12.000	11.000	0.750	0.825	8922810
511	12.000	11.500	0.250	0.275	8922210
018	12.250	11.000		1.000	1331000
018	13.250	12.000		1.000	1329100
018	14.250	13.000		1.000	0864800
018	15.250	14.000		1.208	0174900
018	16.000	14.500		1.500	1345000
018	17.000	15.000		1.500	1345300
018	17.750	16.500		1.000	1318800
018	17.750	17.000		0.625	1345900
018	19.250	18.000		1.250	1314500
018	20.750	19.000		1.312	1342200
018	21.500	20.000		1.750	0093600
018	31.500	30.000		1.125	1337900
018	32.000	30.000		1.500	2109700
018	39.500	38.000		1.125	0159200



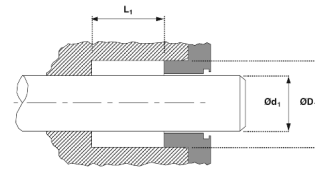
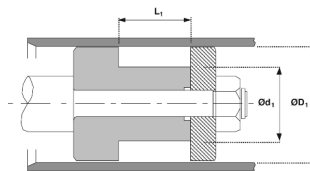
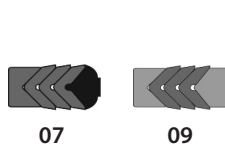
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TYPE	Od1	OD1	L1	PART NO
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009	15.00	25.00	16.00	0189530
009	16.00	26.00	16.00	0190130
009	18.00	28.00	16.00	0190530
009	20.00	30.00	16.00	0190930
011	20.00	30.00	18.50	4201750
014	20.00	32.00	16.50	4204930
013	20.00	32.00	22.50	4204950
009	22.00	32.00	16.00	0191730
011	25.00	37.00	22.50	4198950
014	25.00	40.00	16.50	4205030
007	25.00	40.00	22.50	6630720
009	25.00	40.00	22.50	0192630
013	25.00	40.00	22.50	4205050
011	28.00	40.00	22.50	4202050
009	28.00	43.00	22.50	0193430
011	30.00	42.00	22.50	4202150
014	30.00	45.00	16.50	4205130
007	30.00	45.00	22.50	0400820
009	30.00	45.00	22.50	0193930
013	30.00	45.00	22.50	4205150
011	32.00	44.00	22.50	4202250
007	32.00	47.00	22.50	6630820
009	32.00	47.00	22.50	0194330
011	35.00	47.00	22.50	4202350
014	35.00	50.00	16.50	4205230
007	35.00	50.00	22.50	0339520
009	35.00	50.00	22.50	0195130
013	35.00	50.00	22.50	4205250
011	36.00	48.00	22.50	4202450
009	36.00	51.00	22.50	0196030
011	40.00	52.00	22.50	4202550
014	40.00	55.00	16.50	4205330
007	40.00	55.00	22.50	6532620
013	40.00	55.00	22.50	4205350
011	42.00	54.00	22.50	4202650
009	42.00	57.00	22.50	0196830

TYPE	Ød ₁	NOMINAL ØD ₁	L ₁	PART No.
007	45.00	60.00	22.50	0385020
009	45.00	60.00	22.50	0197430
011	45.00	60.00	22.50	4202750
014	45.00	65.00	20.50	4205430
013	45.00	65.00	27.50	4205450
009	48.00	63.00	22.50	0197730
011	50.00	65.00	22.50	4199050
014	50.00	70.00	22.00	4205530
007	50.00	70.00	30.00	6631020
009	50.00	70.00	30.00	1208430
013	50.00	70.00	30.00	4205550
011	55.00	70.00	22.50	4202950
014	55.00	75.00	22.00	4205630
007	55.00	75.00	30.00	6631120
009	55.00	75.00	30.00	1208230
013	55.00	75.00	30.00	4205650
011	56.00	71.00	22.50	4203050
007	56.00	76.00	30.00	0338220
009	56.00	76.00	32.00	1208630
011	60.00	75.00	22.50	4203150
014	60.00	80.00	27.00	4205730
007	60.00	80.00	30.00	0892520
009	60.00	80.00	32.00	1208930
013	60.00	80.00	37.00	4205750
011	63.00	78.00	22.50	4203250
007	63.00	83.00	30.00	0467120
009	63.00	83.00	32.00	1209130
011	65.00	80.00	22.50	4203350
007	65.00	85.00	30.00	0467720
014	65.00	85.00	30.00	4205830
013	65.00	85.00	40.00	4205850
011	70.00	85.00	22.50	4203450
007	70.00	90.00	30.00	6631220
009	70.00	90.00	30.00	1209330
014	70.00	90.00	30.00	4205930
013	70.00	90.00	40.00	4205950
011	75.00	90.00	22.50	4203550
007	75.00	95.00	30.00	0446620



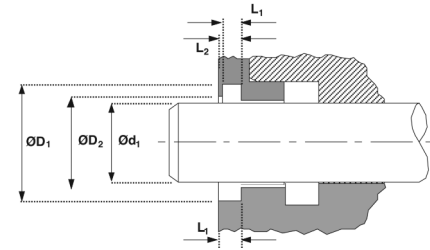
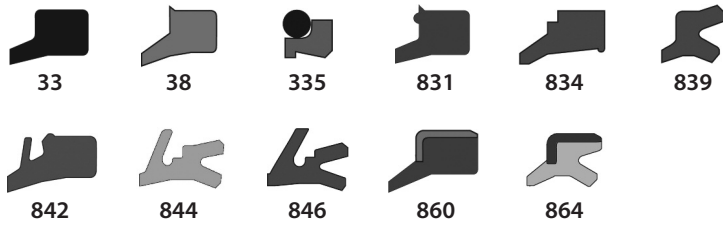
TYPE	Ød ₁	NOMINAL ØD ₁	L ₁	PART No.
009	75.00	95.00	30.00	1209530
014	75.00	95.00	30.00	4206030
013	75.00	95.00	40.00	4206050
011	80.00	95.00	22.50	4203650
007	80.00	100.00	30.00	6631320
009	80.00	100.00	30.00	1209630
014	80.00	100.00	30.00	4206130
013	80.00	100.00	40.00	4206150
009	80.00	105.00	44.00	0984230
011	85.00	100.00	22.50	4203750
007	85.00	105.00	30.00	6631420
009	85.00	105.00	30.00	1209830
011	90.00	105.00	22.50	4203850
007	90.00	110.00	30.00	6631520
009	90.00	110.00	30.00	1210630
014	90.00	110.00	30.00	4206230
013	90.00	110.00	40.00	4206250
011	100.00	115.00	30.00	4203950
007	100.00	120.00	30.00	6631620
009	100.00	120.00	30.00	1210730
014	100.00	120.00	30.00	4199130
013	100.00	120.00	40.00	4199150
009	105.00	125.00	30.00	1203130
011	110.00	125.00	30.00	4204050
007	110.00	130.00	30.00	0308420
009	110.00	130.00	30.00	1195030
014	110.00	130.00	30.00	4206330
013	110.00	130.00	40.00	4206350
014	115.00	140.00	34.00	4206430
013	115.00	140.00	46.00	4206450
009	120.00	140.00	30.00	4137830
007	125.00	140.00	22.50	1362820
011	125.00	140.00	34.00	4204250
007	125.00	145.00	30.00	2179620
009	125.00	150.00	34.00	1215330
014	125.00	150.00	34.00	4206530
007	125.00	150.00	37.00	1365620

TYPE	Ød ₁	NOMINAL ØD ₁	L ₁	PART No.
013	125.00	150.00	46.00	4206550
009	135.00	160.00	34.00	1197630
011	140.00	155.00	34.00	4199250
007	140.00	160.00	30.00	1272320
009	140.00	160.00	33.00	0677130
014	140.00	165.00	34.00	4206630
013	140.00	165.00	46.00	4206650
011	150.00	170.00	40.00	2196650
009	150.00	180.00	45.00	1220130
014	150.00	180.00	45.00	4206730
013	150.00	180.00	60.00	4206750
011	160.00	180.00	40.00	2196750
014	160.00	190.00	45.00	4206830
013	160.00	190.00	60.00	4206850
009	170.00	200.00	45.00	1224930
011	180.00	200.00	40.00	2196850
014	180.00	210.00	45.00	4206930
007	180.00	210.00	47.00	0090320
013	180.00	210.00	60.00	4206950
014	195.00	225.00	47.50	6582130
013	195.00	225.00	62.50	6582150
011	200.00	220.00	40.00	2196950
007	200.00	230.00	45.00	1282720
009	200.00	230.00	45.00	1225830
014	200.00	230.00	45.00	4207030
013	200.00	230.00	60.00	4207050
014	220.00	250.00	47.50	6582330
013	220.00	250.00	62.50	6582350
014	245.00	275.00	47.50	6582430
013	245.00	275.00	62.50	6582450
014	270.00	300.00	47.50	6582530
013	270.00	300.00	62.50	6582550
014	290.00	320.00	49.00	6582630
013	290.00	320.00	64.00	6582650
014	320.00	360.00	58.00	6582730
013	320.00	360.00	78.00	6582750
014	380.00	420.00	60.00	6584030



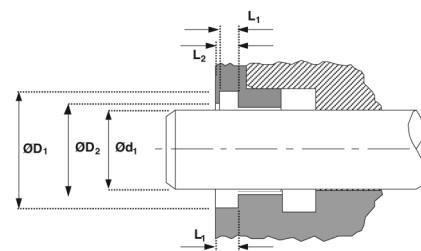
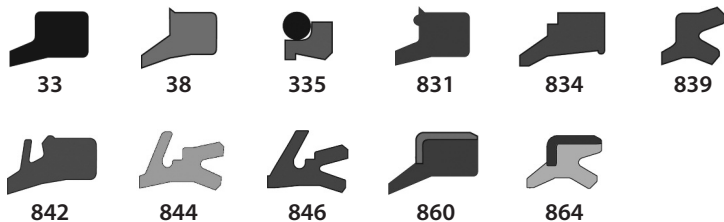
TYPE	Ød ₁	NOMINAL ØD ₁	L ₁	PART No.
009	0.500	1.000	0.715	6530830
009	0.750	1.250	0.875	1735140
009	0.875	1.375	0.825	4135930
009	1.000	1.375	0.675	4138630
009	1.000	1.500	0.710	0183330
007	1.000	1.500	0.750	0820120
007	1.125	1.625	0.750	0379320
009	1.125	1.625	0.775	4136030
009	1.125	1.750	1.065	4115330
007	1.250	1.750	0.750	0821420
009	1.250	1.750	0.785	4102530
009	1.500	2.000	0.710	4007630
007	1.500	2.000	0.750	0618620
009	1.500	2.125	1.000	4002130
007	1.625	2.125	0.750	0206420
007	1.750	2.250	0.750	0889320
009	1.750	2.250	0.825	1461530
009	1.750	2.375	1.000	4135130
009	1.875	2.500	0.950	4136230
009	2.000	2.500	0.715	4007430
007	2.000	2.500	0.750	0617220
009	2.000	2.625	0.898	6557940
009	2.000	2.750	0.986	6575730
009	2.250	2.750	0.705	6555230
007	2.250	2.750	0.750	6630620
009	2.250	2.875	0.937	6530730
009	2.250	3.000	0.960	4008030
007	2.375	3.000	0.937	0207220
009	2.375	3.000	0.990	4129530
009	2.500	3.000	0.777	0334330
009	2.500	3.125	0.961	4122230

TYPE	Ød ₁	NOMINAL ØD ₁	L ₁	PART No.
007	2.500	3.125	1.000	0819220
009	2.500	3.250	1.222	4002530
009	2.750	3.250	0.795	4182430
007	2.750	3.375	1.000	0819920
009	2.750	3.500	0.978	4008430
009	3.000	3.500	0.725	4130730
009	3.000	3.625	0.918	4001530
007	3.000	3.625	1.000	0893020
009	3.000	3.750	1.159	0636930
009	3.250	4.000	0.960	4008330
007	3.250	4.000	1.125	0207320
009	3.375	4.000	0.833	4002730
009	3.375	4.125	1.236	4134030
009	3.500	4.000	0.825	1461130
009	3.500	4.250	1.086	4115830
007	3.500	4.250	1.125	0818420
009	3.750	4.375	0.900	1365330
009	3.750	4.500	1.090	0755731
007	3.750	4.500	1.125	1014420
009	3.875	4.500	0.878	4001930
009	4.000	4.500	0.775	6565930
009	4.000	4.750	1.000	6573130
007	4.000	4.750	1.125	1356620
009	4.000	5.000	1.440	0563630
009	4.250	5.000	1.090	0299330
007	4.500	5.250	1.125	0354120
009	5.000	6.000	1.765	0307530
009	5.250	6.000	1.055	0411130
009	5.500	6.500	1.175	0048430
009	6.000	6.500	0.675	1207030



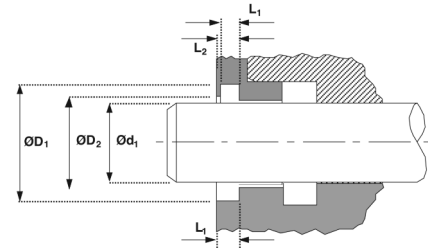
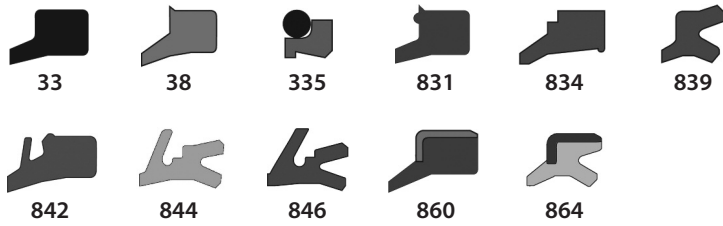
TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
860	8.00	14.00		3.50	5.00	6950520
839	12.00	18.00	14.50	4.00	7.00	4436800
831	12.00	18.60	15.00	3.80	5.30	4565800
860	12.00	20.00		4.00	6.00	6950530
033	12.00	20.00	16.00	4.00	6.00	2232500
839	14.00	20.00	16.50	4.00	7.00	4436900
831	14.00	20.60	17.00	3.80	5.30	4580000
033	14.00	22.00	18.00	4.00	6.00	2232600
839N	14.00	22.00	18.30	4.80	7.00	4632000
839	15.00	22.00	18.00	3.80	6.00	4762300
860	15.00	25.00		5.00	7.00	6950000
860	16.00	22.00		3.00	4.00	6950010
844	16.00	22.00	19.80	4.00	7.00	4826406
831	16.00	22.60	19.00	3.80	5.30	4830600
033	16.00	24.00	20.00	4.00	6.00	2232800
839N	16.00	24.00	20.30	4.80	7.00	4632100
831	16.00	24.60	19.00	5.30	7.00	4703800
839	18.00	24.00	20.50	4.00	7.00	4437000
038	18.00	24.00	21.00	5.00	7.00	4392000
844	18.00	24.00	21.80	4.00	7.00	4848606
831	18.00	24.60	21.00	3.80	5.30	4580100
033	18.00	26.00	22.00	4.00	6.00	2232900
839N	18.00	26.00	22.30	4.80	7.00	4630800
834	18.00	26.00	24.00	4.00	7.00	4367200
831	18.00	26.60	21.00	5.30	7.00	4703900
860	18.00	28.00		5.00	7.00	6950020
860	18.00	28.00		7.00	10.00	6950540
839	20.00	26.00	22.50	4.00	6.00	4415000
844	20.00	26.00	23.80	4.00	7.00	4827606
842	20.00	26.00	24.00	4.00	6.00	4787000
335	20.00	26.80	21.50	5.00	7.00	8715120
033	20.00	28.00	24.00	4.00	6.00	2233000
839N	20.00	28.00	24.30	4.80	7.00	4630900
038	20.00	28.00	25.50	5.00	8.00	4321900
834	20.00	28.00	26.00	4.00	7.00	4391300
831	20.00	28.60	23.00	5.30	7.00	4530600
860	20.00	30.00		4.00	6.00	6950550
860	20.00	30.00		5.00	8.00	6950030

TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
860	20.00	30.00		7.00	10.00	6950560
839	22.00	28.00	24.50	4.00	7.00	4437100
335	22.00	28.80	23.50	5.00	7.00	8715220
033	22.00	30.00	26.00	4.00	6.00	2233100
038	22.00	30.00	27.50	5.00	8.00	4322000
834	22.00	30.00	28.00	4.00	7.00	4370600
831	22.00	30.60	25.00	5.30	7.00	4530700
860	22.00	32.00		5.00	8.00	6950570
839N	22.40	30.40	26.70	4.80	7.00	4630100
834	24.00	32.00	30.00	4.00	7.00	4829300
846	24.00	32.00	30.00	4.00	8.70	4764400
839	25.00	31.00	27.50	4.00	7.00	4799700
844	25.00	31.00	28.80	4.00	7.00	4805206
335	25.00	31.80	26.50	5.00	7.00	8715320
033	25.00	33.00	29.00	4.00	6.00	2233200
839N	25.00	33.00	29.30	4.80	7.00	4631000
033	25.00	33.00	30.50	5.00	6.40	6586200
038	25.00	33.00	30.50	5.00	8.00	6617700
834	25.00	33.00	31.00	4.00	7.00	4343900
846	25.00	33.00	31.00	4.00	8.70	4556600
831	25.00	33.60	28.00	5.30	7.00	4530800
860	25.00	35.00		5.00	8.00	6950040
864	25.00	35.00		5.00	8.00	4680506
860	25.00	35.00		7.00	10.00	6950580
860	25.00	37.00		6.00	9.00	6950050
834	26.00	34.00	32.00	4.00	7.00	4514400
846	26.00	34.00	32.00	4.00	8.70	4588700
335	28.00	34.80	29.50	5.00	7.00	8715420
839	28.00	36.00	31.00	5.00	8.00	4437200
033	28.00	36.00	32.00	4.00	6.00	2233300
839N	28.00	36.00	32.30	4.80	7.00	4631100
844	28.00	36.00	33.00	5.00	9.00	4833106
033	28.00	36.00	33.50	5.00	6.40	6586300
038	28.00	36.00	33.50	5.00	8.00	6617800
834	28.00	36.00	34.00	4.00	7.00	4373500
846	28.00	36.00	34.00	4.00	8.70	4556700
831	28.00	36.60	31.00	5.30	7.00	4565900
860	28.00	38.00		5.00	8.00	6950060



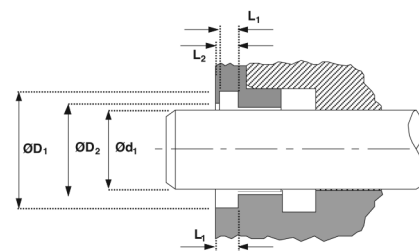
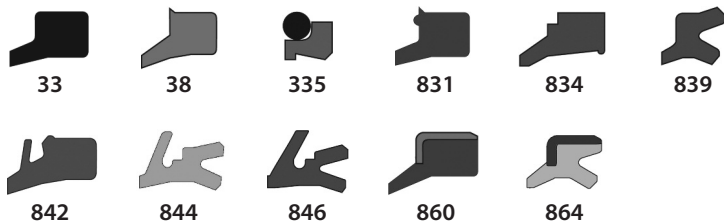
TYPE	Ød ₁	ØD ₁	NOMINAL			PART No.
			ØD ₂	L ₁	L ₂	
860	28.00	38.00		7.00	10.00	6950590
839	30.00	38.00	33.00	5.00	8.00	4519200
839N	30.00	38.00	34.00	5.80	8.00	4630200
844	30.00	38.00	35.00	5.00	9.00	4803706
038	30.00	38.00	35.50	5.00	8.00	4419200
834	30.00	38.00	36.00	4.00	7.00	4378800
846	30.00	38.00	36.00	4.00	8.70	4584500
831	30.00	38.60	33.00	5.30	7.00	4530900
860	30.00	40.00		5.00	8.00	6950070
864	30.00	40.00		5.00	8.00	4680606
860	30.00	40.00		7.00	10.00	6950600
038	30.00	41.20	37.00	7.50	10.00	4528900
860	30.00	42.00		6.00	9.00	6950080
864	30.00	42.00		6.00	9.00	4680706
033	30.00	42.00	36.00	6.00	9.00	2233400
839N	31.50	39.50	35.50	5.80	8.00	4632200
335	32.00	38.80	33.50	5.00	7.00	8715620
839	32.00	40.00	35.00	5.00	8.00	4594000
839N	32.00	40.00	36.00	5.80	8.00	4632300
844	32.00	40.00	37.00	5.00	9.00	4827706
033	32.00	40.00	37.50	5.00	6.40	6586400
038	32.00	40.00	37.50	5.00	8.00	6617900
842	32.00	40.00	37.50	5.00	8.00	4714900
834	32.00	40.00	38.00	4.00	7.00	4373600
846	32.00	40.00	38.00	4.00	8.70	4568900
831	32.00	40.60	35.00	5.30	7.00	4534500
860	32.00	42.00		5.00	8.00	6950090
860	32.00	42.00		7.00	10.00	6950610
033	32.00	44.00	38.00	6.00	9.00	2233500
860	32.00	45.00		5.00	8.00	6950620
860	32.00	45.00		7.00	10.00	6950630
839N	35.00	43.00	39.00	5.80	8.00	4630300
844	35.00	43.00	40.00	5.00	9.00	4805306
038	35.00	43.00	40.50	5.00	8.00	4724800
834	35.00	43.00	41.00	4.00	7.00	4398400
831	35.00	43.60	38.00	5.30	7.00	4531000
860	35.00	45.00		4.00	6.00	6950640
860	35.00	45.00		7.00	10.00	6950100

TYPE	Ød ₁	ØD ₁	NOMINAL			PART No.
			ØD ₂	L ₁	L ₂	
864	35.00	45.00		7.00	10.00	4680806
842	35.00	45.00	42.00	6.30	10.00	4515300
860	35.00	47.00		7.00	10.00	6950110
864	35.00	47.00		7.00	10.00	4680906
033	35.00	47.00	41.00	6.00	9.00	2233600
839N	35.50	43.50	39.50	5.80	8.00	4630400
335	36.00	42.80	37.50	5.00	7.00	8715720
839	36.00	44.00	39.00	5.00	8.00	4437300
844	36.00	44.00	41.00	5.00	9.00	4833206
033	36.00	44.00	41.50	5.00	6.40	6586500
038	36.00	44.00	41.50	5.00	8.00	6618000
842	36.00	44.00	41.50	5.00	8.00	4715000
834	36.00	44.00	42.00	4.00	7.00	4370700
846	36.00	44.00	42.00	4.00	8.70	4588800
831	36.00	44.60	39.00	5.30	7.00	4580200
860	36.00	45.00		7.00	10.00	6950650
860	36.00	46.00		7.00	10.00	6950660
864	36.00	48.00		7.00	10.00	4683206
033	36.00	48.00	42.00	6.00	9.00	2233700
834	37.00	45.00	43.00	4.00	7.00	4514500
839N	38.00	46.00	42.00	5.80	8.00	4632400
842	38.00	46.00	43.00	5.30	8.00	4568700
834	38.00	46.00	44.00	4.00	7.00	4515400
831	38.00	46.60	41.00	5.30	7.00	4788300
860	38.00	48.00		7.00	10.00	6950470
335	40.00	46.80	41.50	5.00	7.00	8715820
839	40.00	48.00	43.00	5.00	8.00	4591600
839N	40.00	48.00	44.00	5.80	8.00	4630500
844	40.00	48.00	45.00	5.00	9.00	4794006
033	40.00	48.00	45.50	5.00	6.40	6586600
038	40.00	48.00	45.50	5.00	8.00	6618100
842	40.00	48.00	45.50	5.00	8.00	4536500
834	40.00	48.00	46.00	4.00	7.00	4378900
846	40.00	48.00	46.00	4.00	8.70	4549200
831	40.00	48.60	43.00	5.30	7.00	4531100
335	40.00	48.80	41.50	6.30	9.30	8715920
864	40.00	50.00		5.00	8.00	4681006
860	40.00	50.00		7.00	10.00	6950120



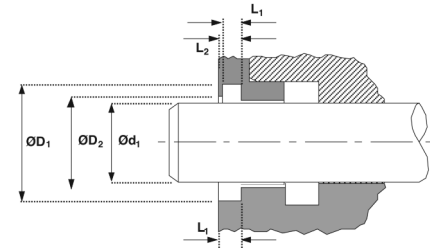
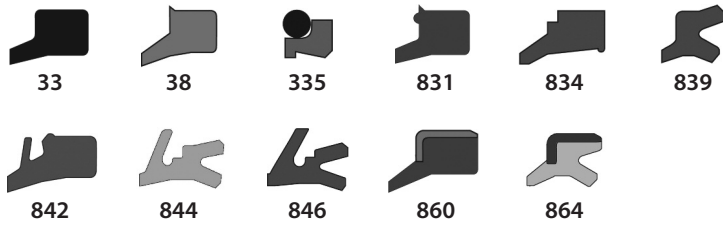
TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
038	40.00	50.60	43.00	5.30	7.00	4784100
860	40.00	52.00		7.00	10.00	6950130
864	40.00	52.00		7.00	10.00	4681106
033	40.00	52.00	46.00	6.00	9.00	2233800
038	41.28	49.28	46.80	5.00	8.00	4599900
831	42.00	50.60	45.00	5.30	7.00	4788400
860	42.00	52.00		7.00	10.00	6950670
033	42.00	54.00	48.00	6.00	9.00	2233900
839N	43.00	51.00	47.00	5.80	7.00	4634200
335	45.00	51.80	46.50	5.00	7.00	8716020
839	45.00	53.00	48.00	5.00	8.00	4437400
839N	45.00	53.00	49.00	5.80	8.00	4630600
844	45.00	53.00	50.00	5.00	9.00	4800006
033	45.00	53.00	50.50	5.00	6.40	6586700
038	45.00	53.00	50.50	5.00	8.00	6618200
842	45.00	53.00	50.50	5.00	8.00	4715100
834	45.00	53.00	51.00	4.00	7.00	4370800
846	45.00	53.00	51.00	4.00	8.70	4589900
831	45.00	53.60	48.00	5.30	7.00	4533800
335	45.00	53.80	46.50	6.30	9.30	8716120
860	45.00	55.00		5.00	8.00	6950680
860	45.00	55.00		7.00	10.00	6950140
864	45.00	55.00		7.00	10.00	4681206
038	45.00	55.60	48.00	5.30	7.00	4531201
831	45.00	55.60	48.00	5.30	7.00	4531200
860	45.00	57.00		7.00	10.00	6950150
864	45.00	57.00		7.00	10.00	4681306
033	45.00	57.00	51.00	6.00	9.00	2234000
834	46.00	54.00	52.00	4.00	7.00	4515200
831	47.00	55.60	50.00	5.30	7.00	4778100
834	48.00	56.00	54.00	4.00	7.00	4432700
335	50.00	56.80	51.50	5.00	7.00	8716220
839	50.00	58.00	53.00	5.00	8.00	4584400
839N	50.00	58.00	54.00	5.80	8.00	4630000
844	50.00	58.00	55.00	5.00	9.00	4803606
033	50.00	58.00	55.50	5.00	6.40	6586800
038	50.00	58.00	55.50	5.00	8.00	6618300
842	50.00	58.00	55.50	5.00	8.00	4533600

TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
834	50.00	58.00	56.00	4.00	7.00	4379000
846	50.00	58.00	56.00	4.00	8.70	4597200
844	50.00	58.00		5.00	8.00	4869606
038	50.00	58.60	53.00	5.30	7.00	4300400
831	50.00	58.60	53.00	5.30	7.00	4533900
335	50.00	58.80	51.50	6.30	9.30	8716320
860	50.00	60.00		5.00	8.00	6950690
860	50.00	60.00		7.00	10.00	6950160
038	50.00	60.60	53.00	5.30	7.00	4458000
831	50.00	60.60	53.00	5.30	7.00	4531300
860	50.00	62.00		7.00	10.00	6950170
864	50.00	62.00		7.00	10.00	4680206
033	50.00	62.00	55.00	6.00	9.00	2234200
844	50.80	60.80	57.80	6.00	10.00	4781500
839N	53.00	61.00	57.00	5.80	8.00	4632500
846	54.00	62.00	60.00	4.00	8.70	4803300
839N	55.00	63.00	58.00	5.80	8.00	4630700
834	55.00	63.00	61.00	4.00	7.00	4515100
831	55.00	63.60	58.00	5.30	7.00	4534000
860	55.00	65.00		7.00	10.00	6950180
839	55.00	65.00	58.00	6.00	9.70	4575200
844	55.00	65.00	62.00	6.00	11.50	4805406
842	55.00	65.00	62.00	6.30	10.00	4764600
038	55.00	65.60	58.00	5.30	7.00	4531401
831	55.00	65.60	58.00	5.30	7.00	4531400
033	55.00	67.00	61.00	6.00	9.00	2234300
860	55.00	69.00		8.00	11.00	6950190
864	55.00	69.00		8.00	11.00	4681406
860	55.00	70.00		5.00	8.00	6950700
860	55.00	70.00		7.00	10.00	6667689
335	56.00	62.80	57.50	5.00	7.00	8716420
839N	56.00	64.00	60.00	5.80	8.00	4632600
834	56.00	64.00	62.00	4.00	7.00	4385100
846	56.00	64.00	62.00	4.00	8.70	4588900
831	56.00	64.60	59.00	5.30	7.00	4566000
335	56.00	64.80	57.50	6.30	9.30	8716520
839	56.00	66.00	59.00	6.00	9.70	4437500
033	56.00	66.00	63.00	6.30	8.10	6586900



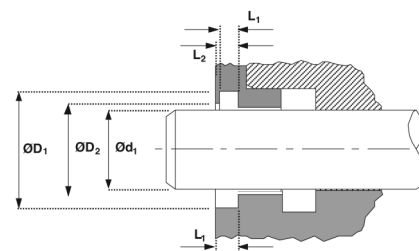
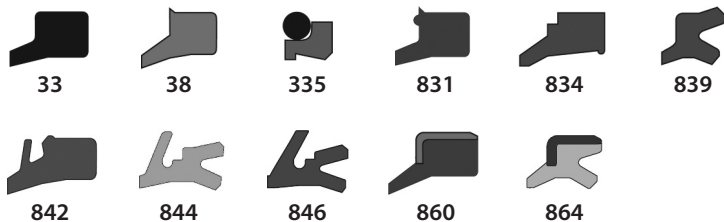
TYPE	Ød ₁	ØD ₁	NOMINAL			PART No.
			ØD ₂	L ₁	L ₂	
038	56.00	66.00	63.00	6.30	10.00	6618400
842	56.00	66.00	63.00	6.30	10.00	4715200
038	56.00	66.60	59.00	5.30	7.00	4458100
831	56.00	66.60	59.00	5.30	7.00	4704000
033	56.00	68.00	62.00	6.00	9.00	2234400
839N	60.00	68.00	64.00	5.80	8.00	4631200
834	60.00	68.00	66.00	4.00	7.00	4385200
846	60.00	68.00	66.00	4.00	8.70	4596600
831	60.00	68.60	63.00	5.30	7.00	4534100
860	60.00	70.00		5.00	8.00	6950710
860	60.00	70.00		7.00	10.00	6950200
839	60.00	70.00	63.00	6.00	9.70	4802400
038	60.00	70.00	66.00	5.30	7.00	4386200
844	60.00	70.00	67.00	6.00	11.50	4799506
038	60.00	70.00	67.00	6.30	10.00	4270200
842	60.00	70.00	67.00	6.30	10.00	4557800
844	60.00	70.00		6.00	9.50	4869706
038	60.00	70.60	63.00	5.30	7.00	4456400
831	60.00	70.60	63.00	5.30	7.00	4531500
842	60.00	72.00	66.00	4.10	9.50	4739300
033	60.00	72.00	66.00	6.00	9.00	2234500
860	60.00	74.00		8.00	11.00	6950210
864	60.00	74.00		8.00	11.00	4681506
860	60.00	75.00		5.00	8.00	6950720
860	60.00	75.00		7.00	10.00	6950730
335	63.00	69.80	64.50	5.00	7.00	8716620
839N	63.00	71.00	67.00	5.80	8.00	4632700
834	63.00	71.00	69.00	4.00	7.00	4385300
846	63.00	71.00	69.00	4.00	8.70	4749600
335	63.00	71.80	64.50	6.30	9.30	8716720
860	63.00	73.00		7.00	10.00	6667690
844	63.00	73.00	70.00	6.00	11.50	4833306
033	63.00	73.00	70.00	6.30	8.10	6587000
038	63.00	73.00	70.00	6.30	10.00	6618500
842	63.00	73.00	70.00	6.30	10.00	4536600
038	63.00	73.60	66.00	5.30	7.00	4283600
831	63.00	73.60	66.00	5.30	7.00	4824400
860	63.00	75.00		7.00	10.00	6950750

TYPE	Ød ₁	ØD ₁	NOMINAL			PART No.
			ØD ₂	L ₁	L ₂	
033	63.00	75.00	69.00	6.00	9.00	2234600
839N	65.00	73.00	69.00	5.80	8.00	4631300
834	65.00	73.00	71.00	4.00	7.00	4394200
846	65.00	73.00	71.00	4.00	8.70	4597500
860	65.00	75.00		7.00	10.00	6950220
839	65.00	75.00	68.00	6.00	9.70	4575300
844	65.00	75.00	72.00	6.00	11.50	4805506
038	65.00	75.00	72.00	6.30	10.00	4343800
038	65.00	75.60	68.00	5.30	7.00	4784200
033	65.00	77.00	71.00	6.00	9.00	2234700
860	65.00	79.00		8.00	11.00	6950230
864	65.00	79.00		8.00	11.00	4681606
834	70.00	78.00	76.00	4.00	7.00	4373700
846	70.00	78.00	76.00	4.00	8.70	4556800
831	70.00	78.60	73.00	5.30	7.00	4534200
335	70.00	78.80	71.50	6.30	9.30	8716820
860	70.00	80.00		7.00	10.00	6950240
839	70.00	80.00	73.00	6.00	9.70	4437600
839N	70.00	80.00	75.00	6.80	10.00	4631400
844	70.00	80.00	77.00	6.00	11.50	4805606
033	70.00	80.00	77.00	6.30	8.10	6587100
038	70.00	80.00	77.00	6.30	10.00	6618600
038	70.00	80.60	73.00	5.30	7.00	4454000
831	70.00	80.60	73.00	5.30	7.00	4531600
033	70.00	82.00	76.00	6.00	9.00	2234800
335	70.00	82.20	72.00	8.10	12.10	8716920
038	70.00	82.20	76.00	7.20	12.00	4243900
842	70.00	82.60	78.40	8.00	12.00	4480800
860	70.00	84.00		8.00	11.00	6950250
864	70.00	84.00		8.00	11.00	4681706
842	70.00	85.00	78.00	5.10	12.00	4739400
834	75.00	83.00	81.00	4.00	7.00	4711900
846	75.00	83.00	81.00	4.00	8.70	4597600
038	75.00	83.60	78.00	5.30	7.00	4539500
860	75.00	85.00		7.00	10.00	6950260
839N	75.00	85.00	80.00	6.80	10.00	4631500
844	75.00	85.00	82.00	6.00	11.50	4805706
038	75.00	85.00	82.00	6.30	10.00	4532500



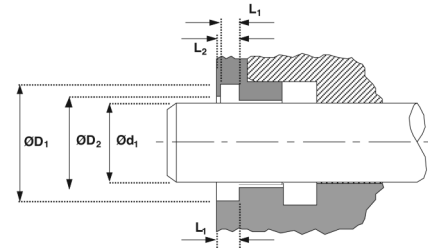
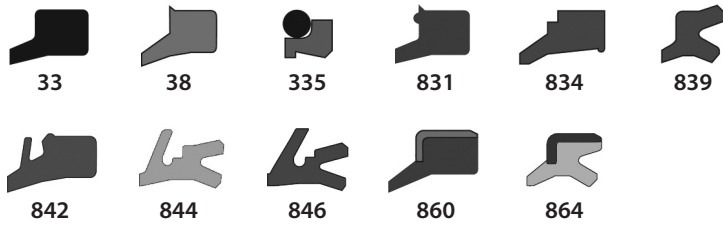
TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
038	75.00	87.20	81.00	7.20	12.00	4384400
860	75.00	89.00		8.00	11.00	6950270
864	75.00	89.00		8.00	11.00	4681806
842	75.00	90.00	83.00	5.10	12.00	4744000
834	80.00	88.00	86.00	4.00	7.00	4398500
846	80.00	88.00	86.00	4.00	8.70	4590000
831	80.00	88.60	83.00	5.30	7.00	4534300
335	80.00	88.80	81.50	6.30	9.30	8717020
860	80.00	90.00		7.00	10.00	6950280
839N	80.00	90.00	85.00	6.80	10.00	4631600
844	80.00	90.00	87.00	6.00	11.50	4805806
033	80.00	90.00	87.00	6.30	8.10	6587200
038	80.00	90.00	87.00	6.30	10.00	6618700
842	80.00	90.00	87.00	6.30	10.00	4715300
038	80.00	91.00	85.00	7.50	11.00	4493200
335	80.00	92.20	82.00	8.10	12.10	8717120
831	80.00	92.20	86.00	7.10	12.00	4531700
038	80.00	92.20	86.00	7.20	12.00	4242800
860	80.00	94.00		8.00	11.00	6950290
864	80.00	94.00		8.00	11.00	4681906
842	80.00	95.00	88.00	5.10	12.00	4739500
038	82.60	92.20	85.70	5.30	7.10	4415500
834	85.00	93.00	91.00	4.00	7.00	4839000
038	85.00	93.60	88.00	5.30	7.00	4292100
831	85.00	93.60	88.00	5.30	7.00	4534400
860	85.00	95.00		5.00	8.00	6950760
860	85.00	95.00		7.00	10.00	6950300
839N	85.00	95.00	89.90	6.80	10.00	4632900
844	85.00	95.00	92.00	6.00	11.50	4805906
831	85.00	97.20	91.00	7.10	12.00	4531800
038	85.00	97.20	91.00	7.20	12.00	4784300
842	85.00	97.60	93.40	8.00	12.00	4521800
038	85.00	98.00	92.00	7.50	11.50	4332800
860	85.00	99.00		8.00	11.00	6950310
864	85.00	99.00		8.00	11.00	4682006
842	85.00	100.00	93.00	5.10	12.00	4744100
038	88.00	100.20	94.00	7.20	12.00	4269400
834	90.00	98.00	96.00	4.00	7.00	4398600

TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
846	90.00	98.00	96.00	4.00	8.70	4557700
335	90.00	98.80	91.50	6.30	9.30	8717220
860	90.00	100.00		7.00	10.00	6950320
839	90.00	100.00	93.00	6.00	9.70	4437700
839N	90.00	100.00	95.00	6.80	10.00	4631700
844	90.00	100.00	97.00	6.00	11.50	4806006
033	90.00	100.00	97.00	6.30	8.10	6587300
038	90.00	100.00	97.00	6.30	10.00	6618800
335	90.00	102.20	92.00	8.10	12.10	8717320
831	90.00	102.20	96.00	7.10	12.00	4531900
842	90.00	102.20	96.00	7.10	12.50	4727300
038	90.00	102.20	96.00	7.20	12.00	4324500
842	90.00	102.60	98.40	8.00	12.00	4512500
860	90.00	104.00		8.00	11.00	6950330
864	90.00	104.00		8.00	11.00	4682106
842	90.00	105.00	98.00	5.10	12.00	4744600
033	90.00	106.00	98.00	8.00	12.00	2235200
839N	95.00	105.00	100.00	6.80	10.00	4631900
038	95.00	107.20	101.00	7.20	12.00	6667600
860	95.00	109.00		8.00	11.00	6950340
864	95.00	109.00		8.00	11.00	4682206
842	95.00	110.00	105.00	9.50	14.50	4536900
834	100.00	108.00	106.00	4.00	7.00	4394300
335	100.00	108.80	101.50	6.30	9.30	8717420
860	100.00	110.00		7.00	10.00	6950350
839N	100.00	110.00	105.00	6.80	10.00	4631800
846	100.00	110.00	107.00	6.30	11.70	4723600
038	100.00	110.60	104.00	5.30	7.00	4300200
335	100.00	112.20	102.00	8.10	12.10	8717520
831	100.00	112.20	106.00	7.10	12.00	4532000
842	100.00	112.20	106.00	7.10	12.50	4727400
038	100.00	112.20	106.00	7.20	12.00	4324600
860	100.00	114.00		8.00	11.00	6950360
864	100.00	114.00		8.00	11.00	4682306
842	100.00	114.00	109.90	8.00	12.00	4536000
842	100.00	115.00	108.00	5.10	12.00	4584800
842	100.00	115.00	108.40	9.50	14.00	4589500
033	100.00	115.00	110.00	9.50	12.50	6587400



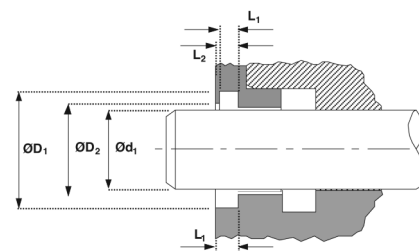
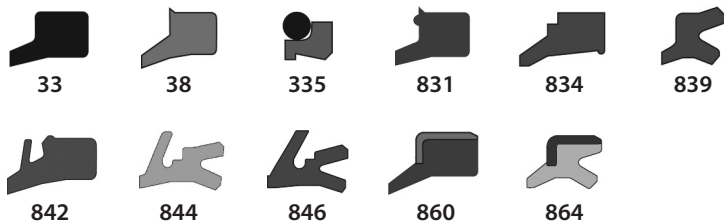
TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
038	100.00	115.00	110.00	9.50	14.00	6618900
033	100.00	116.00	108.00	8.00	12.00	2235300
038	101.60	116.60	111.60	9.50	14.00	6619010
844	104.80	119.80	114.80	9.50	17.00	4800400
038	105.00	113.00	110.50	5.00	8.00	4290300
860	105.00	115.00		7.00	10.00	6950770
038	105.00	120.00	112.00	7.20	12.00	4539100
842	105.00	120.00	115.00	9.50	14.00	4532100
860	105.00	121.00		9.00	12.00	6950370
033	105.00	121.00	113.00	8.00	12.00	2235400
834	110.00	118.00	116.00	4.00	7.00	4448200
335	110.00	118.80	111.50	6.30	9.30	8717620
860	110.00	120.00		7.00	10.00	6950380
839N	110.00	120.00	115.00	6.80	10.00	4633000
335	110.00	122.20	112.00	8.10	12.10	8717720
831	110.00	122.20	116.00	7.10	12.00	4538200
038	110.00	122.20	116.00	7.20	12.00	4459200
839	110.00	125.00	114.00	8.50	13.00	4437800
842	110.00	125.00	118.00	5.10	12.00	4739600
033	110.00	125.00	120.00	9.50	12.50	6587500
038	110.00	125.00	120.00	9.50	14.00	6619000
842	110.00	125.00	120.00	9.50	14.00	4715400
844	110.00	125.00	120.00	9.50	17.00	4853106
860	110.00	126.00		9.00	12.00	6950390
864	110.00	126.00		9.00	12.00	4682406
839N	112.00	122.00	117.00	6.80	10.00	4633100
038	115.00	127.20	121.00	7.20	12.00	4324800
860	115.00	131.00		9.00	12.00	6950400
864	115.00	131.00		9.00	12.00	4684206
860	120.00	130.00		7.00	10.00	6950410
839N	120.00	130.00	125.00	6.80	10.00	4633700
038	120.00	132.20	126.00	7.20	12.00	4454300
038	120.00	135.00	130.00	9.50	14.00	4385600
842	120.00	135.00	130.00	9.50	14.00	4580800
860	120.00	136.00		9.00	12.00	6950420
864	120.00	136.00		9.00	12.00	4682506
038	125.00	133.00	130.80	5.30	7.00	4393000
335	125.00	133.80	126.50	6.30	9.30	8717820

TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
335	125.00	137.20	127.00	8.10	12.10	8717920
842	125.00	137.20	131.00	7.60	12.90	4727500
038	125.00	137.20	131.00	7.70	12.00	4233500
839N	125.00	138.00	132.00	7.80	11.00	4633200
860	125.00	140.00		9.00	12.00	6950780
038	125.00	140.00	132.60	10.20	16.00	4784400
842	125.00	140.00	133.00	5.10	12.00	4748300
033	125.00	140.00	135.00	9.50	12.50	6587600
038	125.00	140.00	135.00	9.50	14.00	6619100
842	125.00	140.00	135.00	9.50	14.00	4715500
844	125.00	140.00	135.00	9.50	17.00	4853206
860	125.00	141.00		9.00	12.00	6950790
038	128.00	143.00	138.00	9.50	14.00	4581800
839	130.00	142.00	135.00	8.20	11.00	4786300
038	130.00	142.20	136.00	7.20	12.00	4304300
839N	130.00	143.00	137.00	7.80	11.00	4633800
038	130.00	145.00	137.60	10.20	16.00	4784500
842	130.00	145.00	140.00	9.50	14.00	4491700
860	130.00	146.00		9.00	12.00	6950430
864	130.00	146.00		9.00	12.00	4682606
038	132.00	144.20	138.00	7.20	12.00	4269500
831	135.00	147.20	141.00	7.10	12.00	4538100
038	135.00	150.00	145.00	9.50	14.00	4278700
860	135.00	155.00		10.00	14.00	6950800
864	135.00	155.00		10.00	14.00	4683506
839N	136.00	149.00	143.00	7.80	11.00	4633300
038	140.00	148.60	143.00	5.30	7.00	4763800
834	140.00	152.00	149.00	5.50	10.00	4456100
335	140.00	152.20	142.00	8.10	12.10	8718020
842	140.00	152.20	146.00	7.60	13.00	4727600
038	140.00	152.20	146.00	7.70	12.00	4324900
839N	140.00	153.00	147.00	7.80	11.00	4633400
860	140.00	155.00		9.00	12.00	6950810
839	140.00	155.00	144.00	8.50	13.00	4437900
038	140.00	155.00	147.60	10.20	16.00	4784600
033	140.00	155.00	150.00	9.50	12.50	6587700
038	140.00	155.00	150.00	9.50	14.00	6619200
842	140.00	155.00	150.00	9.50	14.00	4555900



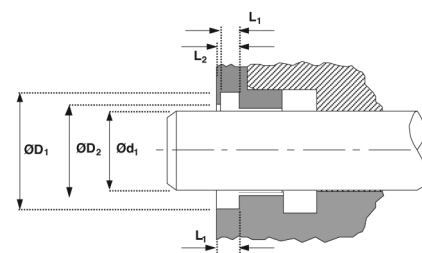
TYPE	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	PART No.
335	140.00	156.00	142.50	9.50	14.50	8718120
033	140.00	156.00	148.00	8.00	12.00	1222800
860	140.00	160.00		10.00	14.00	6950440
864	140.00	160.00		10.00	14.00	4682706
038	145.00	153.60	148.00	5.30	7.00	4732200
839N	145.00	158.00	152.00	7.80	11.00	4633500
038	145.00	160.00	155.00	9.50	14.00	4560600
842	145.00	160.00	155.00	9.50	14.00	4570200
038	150.00	162.20	156.00	7.70	12.00	4278900
839N	150.00	163.00	157.00	7.80	11.00	4633900
839	150.00	165.00	154.00	8.50	13.00	4804200
038	150.00	165.00	157.60	10.20	16.00	4342500
038	150.00	165.00	158.00	7.20	12.00	6668500
033	150.00	166.00	158.00	8.00	12.00	1222900
038	150.00	166.00	161.00	8.00	12.00	4336700
842	150.00	169.00	159.00	6.10	14.00	4748400
860	150.00	170.00		10.00	14.00	6950450
864	150.00	170.00		10.00	14.00	4682806
038	155.00	163.00	160.50	5.00	8.00	4290200
038	155.00	167.20	161.00	7.70	12.00	4288200
842	155.00	170.00	165.00	9.50	14.00	4535200
038	155.00	175.00	165.00	10.20	18.00	4226400
335	160.00	172.20	162.00	8.10	12.10	8718220
038	160.00	172.20	166.00	7.70	12.00	4405700
839N	160.00	174.00	167.00	7.80	11.00	4633600
038	160.00	175.00	167.60	10.20	16.00	4454100
033	160.00	175.00	170.00	9.50	12.50	6587800
038	160.00	175.00	170.00	9.50	14.00	6619300
335	160.00	176.00	162.50	9.50	14.50	8718320
033	160.00	176.00	168.00	8.00	12.00	1223000
860	160.00	180.00		10.00	14.00	6950460
864	160.00	180.00		10.00	14.00	4682906
038	165.00	180.00	175.00	9.50	14.00	4537000
038	170.00	180.60	174.00	5.30	7.00	4732300
038	170.00	182.20	176.00	7.70	12.00	4233600
038	170.00	185.00	180.00	9.50	14.00	4745100
842	170.00	189.00	179.00	6.10	14.00	4749200
842	175.00	190.00	185.00	9.50	14.00	4552100

TYPE	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	PART No.
038	177.00	192.00	187.00	9.50	14.00	4287900
335	180.00	192.20	182.00	8.10	12.10	8718420
860	180.00	195.00		10.00	14.00	6950820
038	180.00	195.00	190.00	9.50	14.00	6619400
842	180.00	195.00	190.00	9.50	14.00	4491300
335	180.00	196.00	182.50	9.50	14.50	8718520
839	180.00	196.00	184.00	9.50	14.00	4595600
033	180.00	200.00	190.00	10.00	15.00	1226300
038	180.00	200.00	190.00	10.20	18.00	4460900
038	185.00	200.00	192.60	10.20	16.00	4777300
038	185.00	205.00	195.00	10.20	18.00	4776100
038	190.00	198.60	193.00	5.30	7.00	4771100
038	190.00	205.00	200.00	9.50	14.00	4753100
842	190.00	209.00	199.00	6.10	14.00	4749300
033	190.00	210.00	200.00	10.00	15.00	1226400
038	190.00	210.00	200.00	10.20	18.00	4781000
038	195.00	210.00	202.50	10.20	16.00	4325100
038	200.00	208.60	203.00	5.30	7.00	4391600
335	200.00	212.20	202.00	8.10	14.50	8718620
038	200.00	215.00	210.00	9.50	14.00	6619500
335	200.00	216.00	202.50	9.50	14.50	8718720
033	200.00	220.00	210.00	10.00	15.00	1226500
038	200.00	220.00	210.00	10.20	18.00	4387100
842	200.00	223.00	211.00	8.30	20.00	4748700
038	205.00	213.60	208.00	5.30	7.00	4773800
038	205.00	220.00	215.00	9.50	14.00	4560500
038	210.00	225.00	220.00	9.50	14.00	4598000
038	210.00	226.00	221.00	8.00	12.00	4336600
038	210.00	230.00	220.00	10.20	18.00	4325300
038	212.00	232.00	225.50	12.50	18.00	4293900
842	215.00	230.00	225.00	9.50	14.00	4705500
335	220.00	232.20	222.00	8.10	12.10	8718820
038	220.00	235.00	227.60	10.20	16.00	4325400
335	220.00	236.00	222.50	9.50	14.50	8718920
038	220.00	240.00	230.00	10.20	18.00	4799000
842	220.00	240.00	230.00	10.20	18.00	4859800
033	220.00	240.00	233.50	12.50	16.60	6588100
038	220.00	240.00	233.50	12.50	18.00	6619600



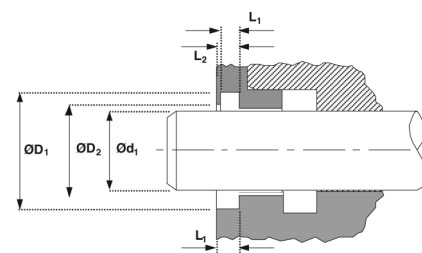
TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
038	225.00	240.00	235.00	9.50	14.00	4287800
038	225.00	245.00	235.00	10.20	18.00	4325500
038	230.00	238.60	233.00	5.30	7.00	4514000
038	230.00	245.00	240.00	9.50	14.00	4767400
038	230.00	246.00	240.70	7.50	12.00	4290700
842	230.00	250.00	240.00	10.20	18.00	4750500
038	230.00	250.00	240.00	10.20	18.00	4325600
842	235.00	255.00	245.00	10.20	18.00	4773300
038	235.00	255.00	245.00	10.20	18.00	4325700
038	240.00	255.00	250.00	9.50	14.00	4745200
038	240.00	260.00	250.00	10.20	18.00	4520900
038	240.00	260.00	253.50	12.50	18.00	4787100
038	245.00	265.00	258.50	12.50	18.00	4539600
038	250.00	270.00	260.00	10.20	18.00	4460100
842	250.00	270.00	260.00	10.20	18.00	4725100
038	250.00	270.00	263.50	12.50	18.00	6619700
038	255.00	270.00	265.00	9.50	14.00	4578200
038	260.00	275.00	270.00	9.50	14.00	4573100
038	260.00	280.00	270.00	10.20	18.00	4325900
038	265.00	280.00	272.60	10.20	16.00	4762900
038	265.00	285.00	275.00	10.20	15.00	4560400
038	270.00	278.60	273.00	5.30	7.00	4391700
038	270.00	286.00	280.70	7.50	12.00	4786400
038	275.00	295.00	285.00	10.20	18.00	4807400
038	280.00	295.00	290.00	9.50	14.00	4716100
038	280.00	300.00	290.00	10.20	18.00	4763900
038	285.00	300.00	295.00	9.50	14.00	4767300
038	285.00	305.00	298.50	12.50	18.00	4537100
038	288.00	308.00	301.50	10.20	18.00	4265300

TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
038	290.00	310.00	303.50	12.50	18.00	4467300
842	295.00	315.00	305.00	10.20	18.00	4851900
038	295.00	315.00	308.50	12.50	18.00	4598100
038	300.00	316.00	310.70	7.50	12.00	4290800
038	300.00	320.00	313.50	12.50	18.00	4525300
038	305.00	325.00	318.50	12.50	18.00	4473200
842	320.00	340.00	330.00	10.20	18.00	4750400
038	320.00	340.00	330.00	10.20	18.00	4454200
038	325.00	345.00	335.00	10.20	18.00	4801100
038	330.00	346.00	340.70	7.50	12.00	4587300
038	335.00	355.00	345.00	10.20	18.00	4776800
842	335.00	355.00	345.00	10.20	18.00	4773400
038	340.00	360.00	350.00	10.20	18.00	4732500
842	350.00	370.00	360.00	10.20	18.00	4725200
038	350.00	370.00	360.00	10.20	18.00	4717900
038	355.00	375.00	365.00	10.20	18.00	4578300
038	360.00	380.00	370.00	10.20	18.00	4781200
038	370.00	390.00	380.00	10.20	18.00	4763000
038	370.00	390.00	383.50	12.50	18.00	4579800
038	380.00	400.00	393.50	12.50	18.00	4752100
038	390.00	410.00	400.00	10.20	18.00	4851600
038	395.00	415.00	405.00	10.20	18.00	4807200
038	400.00	420.00	410.00	10.20	18.00	4769900
038	415.00	435.00	425.00	10.20	18.00	4820800
842	415.00	435.00	425.00	10.20	18.00	4851800
038	445.00	465.00	455.00	10.20	18.00	4838400
038	455.00	475.00	465.00	10.20	18.00	4777900
038	460.00	490.00	475.00	15.00	25.00	4849800
038	470.00	490.00	480.00	10.20	18.00	4814800



TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
520	0.375	0.625	0.540	0.125	0.187	8889010
520	0.500	0.750	0.665	0.125	0.187	8880210
033	0.500	0.900	0.700	0.125	0.250	1464100
520	0.563	0.844	0.736	0.125	0.187	8888910
520	0.625	0.875	0.790	0.125	0.187	8880310
033	0.625	1.025	0.825	0.125	0.250	1470700
862	0.625	1.125		0.313		6960000
860	0.750	1.125		0.187	0.281	6955100
520	0.750	1.125	1.000	0.187	0.281	8880410
033	0.750	1.150	0.950	0.125	0.250	1347700
862	0.750	1.250		0.313		6960010
520	0.875	1.250	1.125	0.187	0.281	8880510
033	0.875	1.275	1.075	0.125	0.250	1056700
860	1.000	1.375		0.187	0.281	6955120
520	1.000	1.375	1.250	0.187	0.281	8880610
033	1.000	1.400	1.200	0.125	0.250	1456300
862	1.000	1.500		0.313		6960020
520	1.125	1.500	1.375	0.187	0.281	8880710
862	1.125	1.625		0.313		6960030
033	1.125	1.625	1.425	0.125	0.375	1476700
520	1.187	1.562	1.437	0.187	0.281	8880810
860	1.250	1.625		0.187	0.281	6955140
520	1.250	1.625	1.500	0.187	0.281	8880910
862	1.250	1.750		0.250		6960260
862	1.250	1.750		0.313		6960040
033	1.250	1.750	1.550	0.125	0.375	1453100
520	1.375	1.750	1.625	0.187	0.281	8881110
862	1.375	1.875		0.313		6960050
033	1.375	1.875	1.675	0.125	0.375	1471800
860	1.500	1.875		0.187	0.281	6955160
520	1.500	1.875	1.750	0.187	0.281	8881210
862	1.500	2.000		0.250		6960270
862	1.500	2.000		0.313		6960060
033	1.500	2.000	1.800	0.125	0.375	0696900
520	1.625	2.000	1.875	0.187	0.281	8881310
862	1.625	2.125		0.313		6960070
033	1.625	2.125	1.925	0.125	0.375	0269600
860	1.750	2.125		0.187	0.281	6955180

TYPE	Ød ₁	ØD ₁	NOMINAL ØD ₂	L ₁	L ₂	PART No.
842	1.750	2.125	1.995	0.220	0.362	4543300
520	1.750	2.125	2.000	0.187	0.281	8881410
862	1.750	2.250		0.313		6960080
033	1.750	2.250	2.050	0.125	0.375	0266400
520	1.875	2.250	2.125	0.187	0.281	8887410
860	2.000	2.375		0.187	0.281	6955200
842	2.000	2.375		0.220	0.362	4543206
842	2.000	2.375	2.245	0.220	0.362	4543200
862	2.000	2.500		0.313		6960090
033	2.000	2.500	2.300	0.125	0.375	0228100
520	2.000	2.500	2.332	0.250	0.375	8881510
860	2.250	2.625		0.187	0.281	6955220
862	2.250	2.750		0.313		6960100
033	2.250	2.750	2.550	0.125	0.375	0851100
520	2.250	2.750	2.582	0.250	0.375	8881610
520	2.375	2.875	2.707	0.250	0.375	8887210
860	2.500	2.875		0.187	0.281	6955240
842	2.500	2.875	2.745	0.220	0.362	4708200
862	2.500	3.000		0.313		6960110
033	2.500	3.000	2.800	0.125	0.375	1450000
520	2.500	3.000	2.832	0.250	0.375	8881710
860	2.750	3.125		0.187	0.281	6955260
842	2.750	3.125	2.995	0.220	0.362	4554600
862	2.750	3.250		0.313		6960120
033	2.750	3.250	3.050	0.125	0.375	2222400
520	2.750	3.250	3.082	0.250	0.375	8881810
860	3.000	3.375		0.187	0.281	6955280
842	3.000	3.375	3.245	0.220	0.362	4543400
862	3.000	3.500		0.313		6960130
033	3.000	3.500	3.300	0.125	0.375	0951300
520	3.000	3.500	3.332	0.250	0.375	8881910
842	3.125	3.500	3.370	0.220	0.362	4543100
842	3.250	3.625	3.495	0.220	0.362	4721400
862	3.250	3.750		0.313		6960140
520	3.250	3.750	3.582	0.250	0.375	8882010
862	3.250	3.875		0.313		6960150
033	3.250	4.000	3.650	0.187	0.500	1472500
842	3.375	3.750	3.620	0.220	0.362	4554700



TYPE	NOMINAL					PART No.
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	
842	3.500	3.875	3.745	0.220	0.362	4818700
862	3.500	4.000		0.313		6960160
520	3.500	4.000	3.832	0.250	0.375	8882110
862	3.500	4.125		0.313		6960170
033	3.500	4.250	3.900	0.187	0.500	1445000
842	3.625	4.000	3.870	0.220	0.362	4543000
842	3.750	4.125	3.995	0.220	0.362	4708300
520	3.750	4.250	4.082	0.250	0.375	8882210
862	3.750	4.375		0.313		6960180
842	3.875	4.250	4.120	0.220	0.362	4523600
520	3.875	4.375	4.207	0.250	0.375	8888810
842	4.000	4.375	4.245	0.220	0.362	4708400
520	4.000	4.500	4.332	0.250	0.375	8882310
862	4.000	4.625		0.313		6960190
862	4.000	4.750		0.313		6960200
033	4.000	4.750	4.400	0.187	0.500	1453300
862	4.000	5.000		0.500		6960210
520	4.250	4.750	4.582	0.250	0.375	8882410
842	4.375	4.875	4.715	0.312	0.472	4707800
520	4.500	5.000	4.832	0.250	0.375	8887510
862	4.500	5.125		0.313		6960220
033	4.500	5.250	4.900	0.187	0.500	1613600
520	4.500	5.250	4.998	0.375	0.562	8882510
862	4.500	5.500		0.500		6960230
842	4.750	5.250	5.090	0.312	0.472	4547300
520	4.750	5.500	5.248	0.375	0.562	8887310
520	4.875	5.625	5.373	0.375	0.562	8881010
520	5.000	5.500	5.332	0.250	0.375	8887910
842	5.000	5.500	5.340	0.312	0.472	4708500
862	5.000	5.625		0.313		6960240
033	5.000	5.750	5.400	0.187	0.500	0258600
520	5.000	5.750	5.498	0.375	0.562	8882610
862	5.000	6.000		0.500		6960250
842	5.250	5.750	5.590	0.312	0.472	4707900
520	5.250	6.000	5.748	0.375	0.562	8882710
033	5.500	6.250	5.900	0.187	0.500	0223500

TYPE	NOMINAL					PART No.
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	
520	5.500	6.250	5.998	0.375	0.562	8882810
842	5.750	6.250	6.090	0.312	0.472	4547400
520	5.750	6.500	6.248	0.375	0.562	8889210
520	5.875	6.625	6.373	0.375	0.562	8887010
520	6.000	6.500	6.332	0.250	0.375	8888010
842	6.000	6.500	6.340	0.312	0.472	4708600
033	6.000	6.750	6.400	0.187	0.500	0222500
520	6.000	6.750	6.498	0.375	0.562	8882910
842	6.250	7.000	6.745	0.500	0.740	4708000
520	6.500	7.250	6.998	0.375	0.562	8892510
033	6.500	7.500	7.000	0.250	0.625	1613100
842	6.750	7.250	7.090	0.312	0.472	4547500
520	7.000	7.500	7.332	0.250	0.375	8888310
842	7.000	7.500	7.340	0.312	0.472	4708700
842	7.000	7.750	7.495	0.500	0.740	4588400
520	7.000	7.750	7.498	0.375	0.562	8883210
033	7.000	8.000	7.500	0.250	0.625	1614600
842	7.000	8.000	7.625	0.500	0.740	4774100
520	7.500	8.250	7.998	0.375	0.562	8883110
842	7.750	8.250	8.090	0.312	0.472	4547600
842	8.000	8.500	8.340	0.312	0.472	4708800
520	8.000	8.750	8.498	0.375	0.562	8883310
033	8.000	9.000	8.500	0.250	0.625	0786500
520	8.125	8.625	8.457	0.250	0.375	8888410
520	8.250	9.000	8.748	0.375	0.562	8892410
520	8.500	9.250	8.998	0.375	0.562	8888510
842	8.750	9.250	9.090	0.312	0.472	4536700
520	9.000	9.750	9.498	0.375	0.562	8884510
520	9.375	9.875	9.707	0.250	0.375	8889110
520	9.500	10.250	9.998	0.375	0.562	8885210
520	10.000	11.000	10.664	0.500	0.750	8889610
520	11.000	12.000	11.664	0.500	0.750	8909010
520	12.000	13.000	12.664	0.500	0.750	8888610
520	14.000	15.000	14.664	0.500	0.750	8888710
520	15.000	16.000	15.664	0.500	0.750	8889810



Hallite Seals

Hallite produces high performance hydraulic sealing solutions for the world's fluid power industry. The company enjoys an enviable reputation for high quality and reliability within the mobile hydraulics, mining, off-highway, construction, agriculture, mechanical handling and automation markets.

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