

Transeals Pty Ltd

A.B.N. 29 008 902 163

Power Transmission Equipment
Hydraulic Seals Specialists



Hallite Seals

2003 Edition



A Culture of Excellence...

For optimum seal life and performance, seal selection is critical. There are many factors to consider, including the cylinder itself. Although the introductory section, pages 4 - 26, provides technical data to help you with selection, we strongly suggest you contact our sales engineers to confirm your choice.

Making world class products for safety critical and high specification applications goes beyond excellence in design, engineering and manufacturing; it means a total commitment to quality, in every aspect of the business, as a way of life.

To continuously maintain the highest standards in all areas of our business requires a genuine commitment to progressive advancement and a dedication to outstanding products for today's markets.

Delivering high quality, high performance sealing solutions, cost effectively and on time to our customers world-wide. 100 years of knowledge and expertise unrivalled in the hydraulic seals industry.

A long-standing reputation as a provider of high quality sealing solutions and outstanding service that has put us amongst the very best worldwide.



All our activities conform to the highest quality assurance systems. Hallite Seals International is accredited to ISO 9001 and are approved by many of the worlds foremost O.E.M.s
Hallite Seals Australia is accredited to ISO 9002.



www.hallite.com.au

Hallite Seals Australia has been servicing Australian industry for nearly forty years, and is a fully owned subsidiary of Hallite Seals International.

With unrivalled knowledge and expertise in the hydraulic seals industry, and fully trained staff, we can provide our customers with high class engineering solutions to fluid sealing applications that are among the very best.

A CULTURE OF EXCELLENCE

Excelling in every aspect of design, engineering and manufacturing, Hallite's internal culture is one which stimulates and challenges, develops employee skills and shares knowledge and information.

Quality

Hallite manufactures world-class products for safety critical and high specification applications. Our products have been developed and tested to exceed customer expectations in all markets of the world, often tolerating temperatures as low as -60 OC in Canada to over 40oC in the remote outback of Australia. Our ISO certification recognises the group's commitment to the highest quality standards.

SERVICE

Hallite Australia holds the most comprehensive and extensive range of reciprocation fluid sealing products in Australia and, in most cases, can supply either the same day, or overnight.

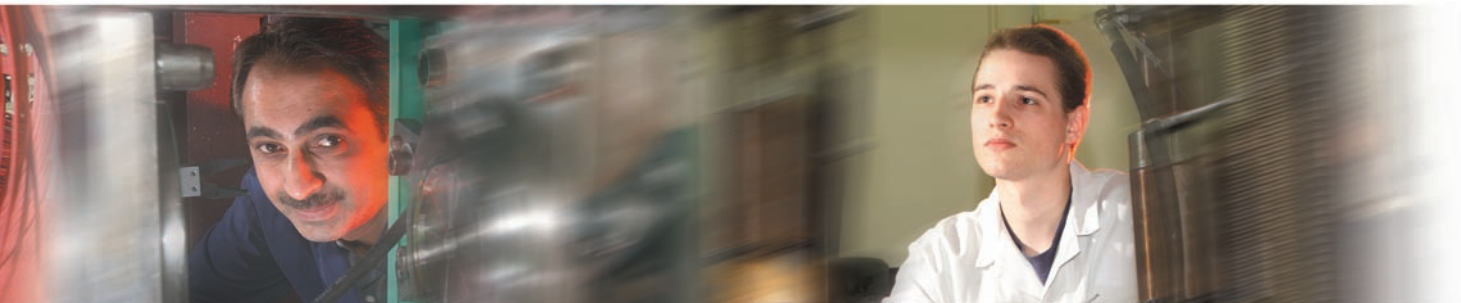
We provide a flexible and responsive service that continually evolves to meet the progressive business environment in which we operate.

CONTINUOUS IMPROVEMENT

To continuously maintain the highest standards in all areas of business requires a genuine commitment to progressive advancement and a dedication to outstanding products for today's markets.

Through assessment, employee training, evaluation of production methods and ongoing investment in the best technologies, and by continual and critical self-appraisal, Hallite is always improving it's business practices.

Hallite Seals aims to deliver world-class products to all our customers in terms of quality, performance, cost and time.



Hallite Seals Australia Pty Ltd

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Contents

Any technical advice, recommendation, measurement or identification of seals including the content of this catalogue is rendered gratis by Hallite Seals. It is based on technical data and many years of fluid sealing experience, which Hallite Seals believes reliable. Any such technical advice, recommendation or offer to supply product(s) is intended for use by persons having the skill and knowledge to decide the suitability of product(s) for their application. Considering all the criteria for seal selection cannot be analysed, the users, through their own analysis and testing, are solely responsible for making the final selection of the seal. Our recommendations cannot be guaranteed as the conditions of use are beyond our control.

Selecting a seal

The selection of the correct seal for the application is vital to the operation and performance of both the equipment and the seal. Seals sometimes get a bad name simply because they were selected to do a job they were not designed for.

Considering this and the many factors used in seal selection, some technical, some commercial, it is wise to always **OVER SPECIFY**.

We strongly recommend Hallite's technical department be consulted if there is any doubt in this extremely important aspect.

<u>FACTOR</u>	<u>CONSIDERATIONS</u>
Pressure	Is it known ? Are there pressure spikes ?
Temperature	Where will the equipment be used ?
Speed	Is it constant ? If very slow is 'Stick Slip' a problem ?
Media	What is the fluid ? - Oil, Water, etc.
Design	Bearings?, Extrusion Gaps?, Split Housing?
Bore surface	How is the cylinder made?, what is the surface finish?
Rod surface	How is the rod made?, what is the surface finish?
Contamination	Where will the equipment be used? What contamination will there be, water, dust?
Application	Where is the equipment to be used? What does it do?
Customer	What does he prefer? Rubber? P.U.?
Friction	Good position control required. ?

IF IN DOUBT, ASK HALLITE.

ISO reference list

ISO reference	Scope	Hallite product group codes
5597	Single acting seals	21, 601, 605, 606, 610, 621
6195 A	Wipers A	33, 38
6195 B	Wipers B	860
6195 C	Wipers C	839
6547	Piston seals with integral bearings	50, 68
7425-1	Piston seals	54, 754
7425-2	Rod seals	16, 616
10766	Rod / piston bearings	87, 506

Relevant International and British Standards

Standard	HFP: Hydraulic fluid power FP: Fluid power
ISO 3601-1	FP Systems - O-rings - Part 1: Inside diameters, cross sections, tolerances and size identification code.
ISO 3601-3	FP Systems - O-rings - Part 3: Quality acceptance criteria.
ISO 3939	FP Systems and components - Multiple lip packing sets - Method for measuring stack height.
ISO 5597	HFP - Cylinders - Housings for piston and rod seals in reciprocating applications - Dimensions and tolerances.
ISO 6072	HFP Compatibility between elastomeric materials and fluids.
ISO 6195	FP systems and components - Single rod cylinders - Housings for rod wiper rings in reciprocating applications - Dimensions and tolerances.
ISO 6547	HFP - Cylinders - Piston seal housings incorporating bearing rings - Dimensions and tolerances.
ISO 6743-4	Lubricants, industrial oils and related products (class L) - Classification - Family H (Hydraulic systems).
ISO 7425-1	HFP - Housings for elastomer-energised plastic -faced seals - Dimensions and tolerances - Part 1: Piston seal housings.
ISO 7425-2	HFP - Housings for elastomer-energised plastic -faced seals - Dimensions and tolerances - Part 2: Rod seal housings
ISO 7986	HFP - Sealing devices - Standard test methods to assess the performance of seals used in oil hydraulic reciprocating applications.
ISO 10766	HFP - Cylinders - Housing dimensions for rectangular-section cut bearings for pistons and rods.
BS 1806: 1989	Dimensions of toroidal sealing rings (O-rings) and housings
BS 4518: 1982	Specification for metric dimensions of O-rings and their housings
BS 5016: 1988	Dimensions of anti-extrusion back-up rings and their housings
BS 7714: 1993	Guide for the care and handling of seals for fluid power applications

Use and fitting of seals

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.
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.

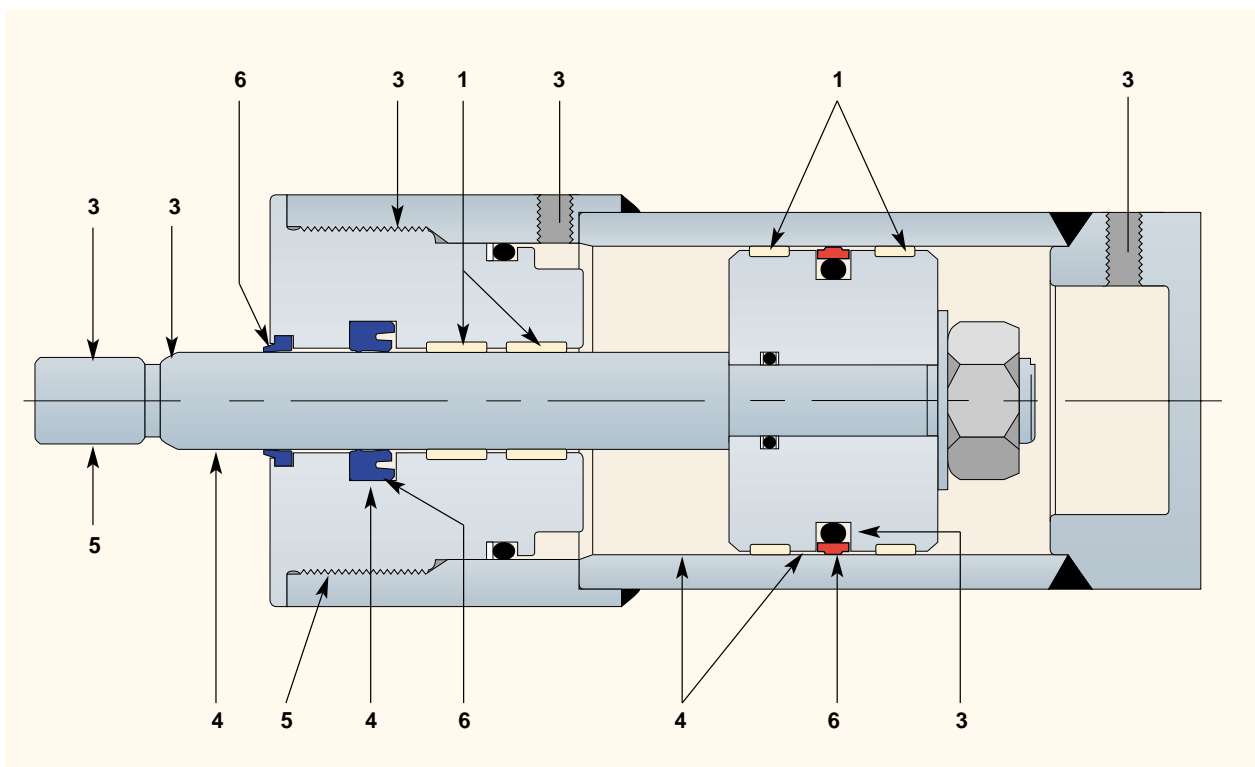
7. Lubricate all seals and metal components liberally with clean operating fluid or a compatible grease prior to assembly. **N.B.** Silicone grease should not be used in normal hydraulic applications.

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.



Operating conditions

Cylinder Specification	Light Duty	Medium Duty	Heavy Duty
Pressure Max. Normal Working	350 bar 5000 psi 160 bar 2300 psi No Pressure Peaks	500 bar 7500 psi 250 bar 3600 psi Intermittent Pressure Peaks	700 bar 10000 psi 400 bar 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 & outdoors but some protection from the weather.	Outdoors all the time or a dirty indoor area. Wide variations in temperature, both ambient & 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 & 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 & 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.

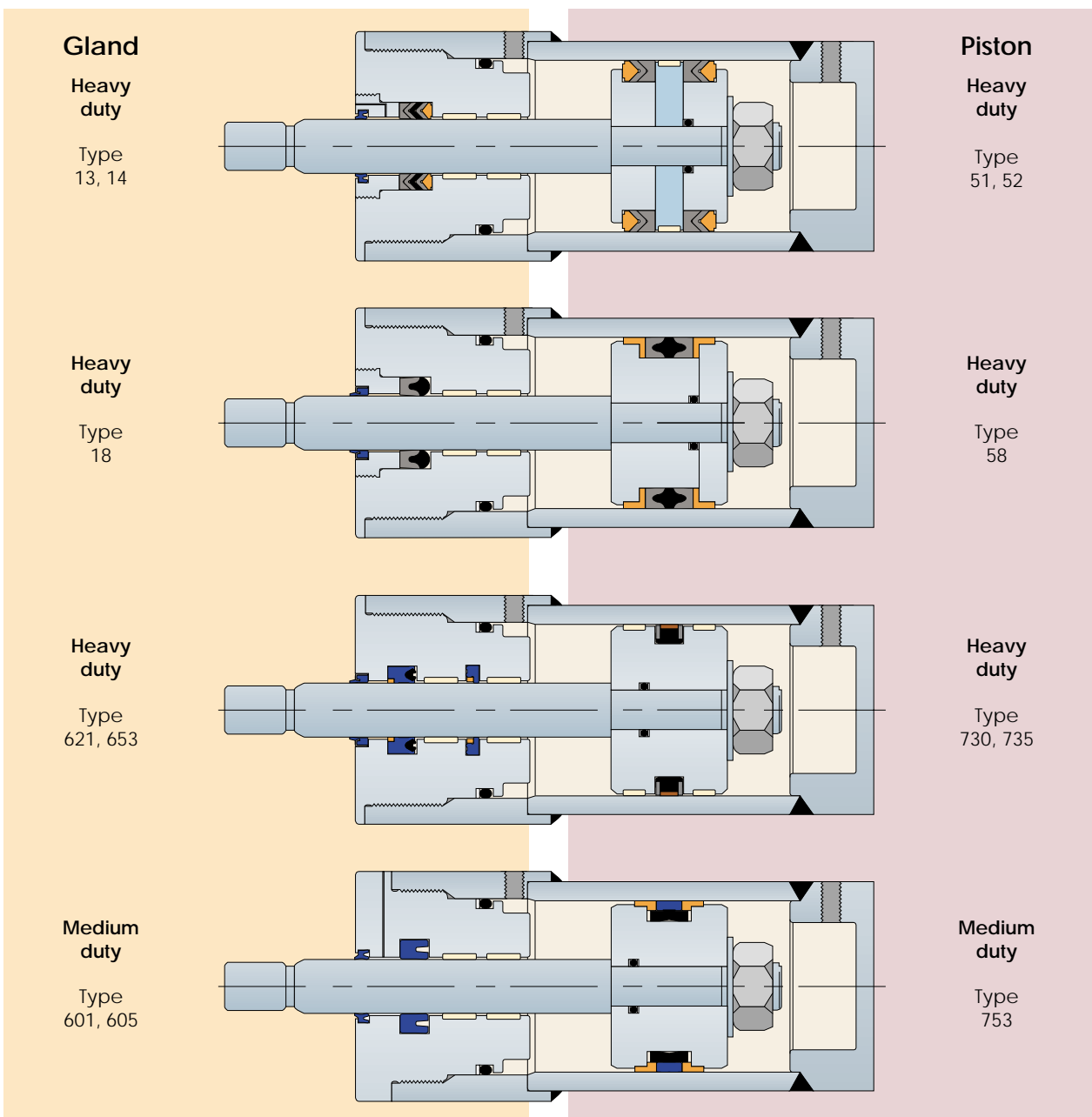
Housing design & seal options

Cylinder housings and seal options

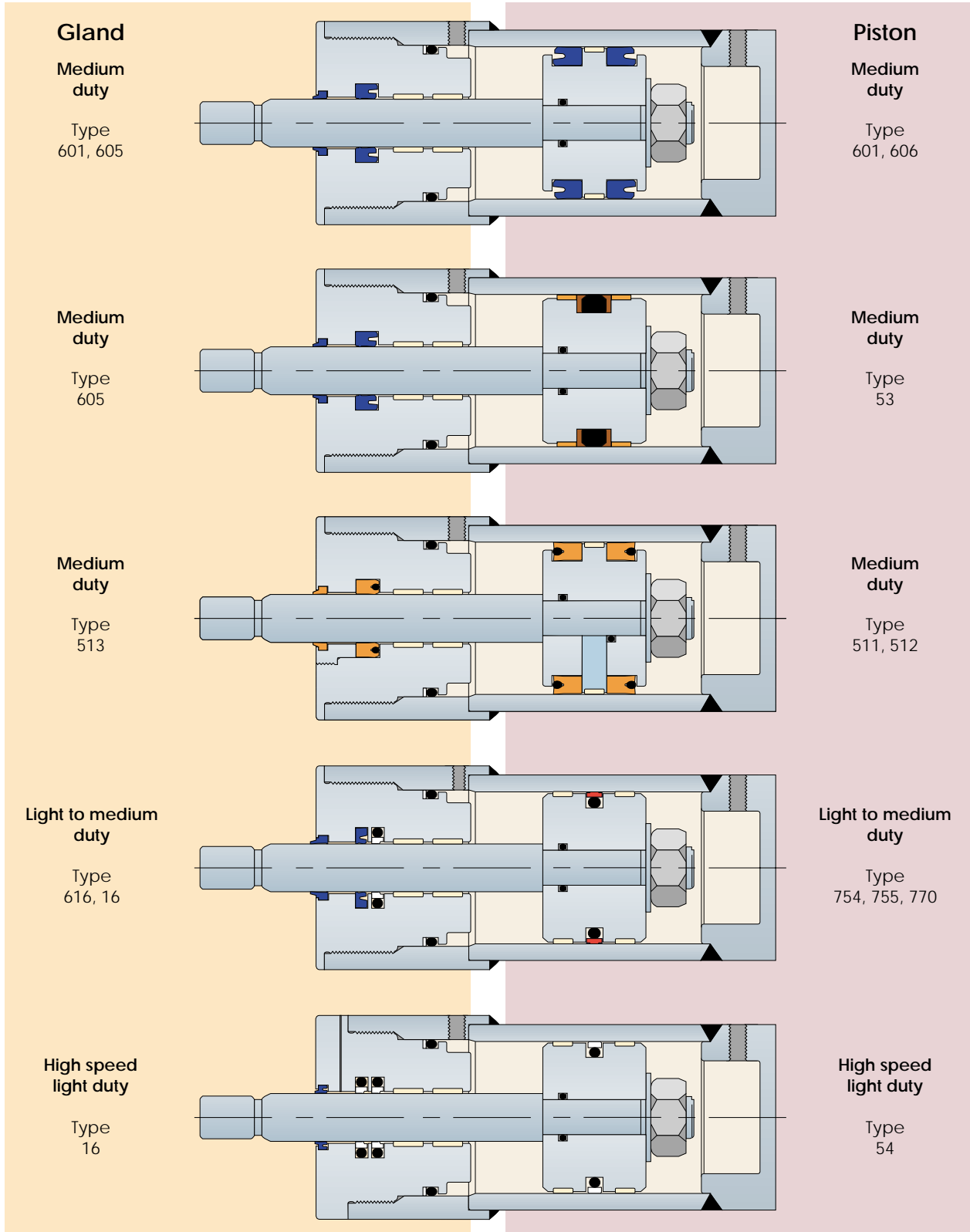
The following diagrams illustrate how Hallite's wide range of products can be applied to a selection of some of the most popular cylinder designs servicing the world's fluid power industry.

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.



Housing design & seal options



Materials and fluid compatibility

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

			SERVICE FLUIDS								
			Fluids based on mineral oils				Greases		Fuels		
Material	Continuous material service temperature range °C	Intermittent material service temperature range °C	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
Temperature range for fluid °C			+ 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	*	*	*
IIR Butyl	+ 120 - 40	+ 140 - 40	NS	NS	NS	NS	NS	120	NS	NS	NS
FFKM Perfluoro-elastomer	+300 +200 -40 -20		150	150	160	100	100	200	150	150	150
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 - 45	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 values vary greatly for individual elastomers within this group NS Denotes that the elastomer is not suitable
The work of the BFP technical working group 'TC16/WG8' in the compilation of this table is acknowledged.

Materials and fluid compatibility

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 water based)	ISO 6743-4 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 (incl.))	ISO 6743-4 HETG fluids (Vegetable oil based)	ISO 6743-4 HEES fluids (Synthetic ester based)	ISO 6743-4 HEPG fluids (Synthetic glycol based)	ISO 6743-4 HEPR fluids (Synthetic hydrocarbons)	Water	Air	Brake fluids
+ 60 + 5	+ 60 + 5	+ 60 - 30	+ 100 - 50	+ 150 - 0	+ 60 - 10	+ 100 - 40	+ 100 - 50	+ 150 - 50	+ 60 (1) + 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	150	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
NS	NS	60	100	120	NS	NS	NS	NS	120	120	80
60	60	60	100	150	60	100	100	150	150	200	130
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.

Materials

Material Name	Material Group	Designation	Temperature		Hardness	Colour	Rod	Piston	Wiper	Bearing
			°C	°F						
Nitrile - medium	Synthetic rubber	NBR	-30 +120	-22 +250	93 IRHD	Black	H			
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	P	P	
Nitrile - low	Synthetic rubber	NBR	-45 +100	-45 +212	80 IRHD	Black			H	
Nitrile - medium	Synthetic rubber	NBR	-30 +120	-22 +250	78 IRHD	Black		H		M(1)
Nitrile - medium	Synthetic rubber	NBR	-30 +120	-22 +250	75 IRHD	Black	H	H		
Nitrile - medium	Synthetic rubber	NBR	-30 +120	-22 +250	73 IRHD	Black	H	H		
Nitrile - medium	Synthetic rubber	NBR	-30 +120	-22 +250	70 IRHD	Black	H	H		
Nitrile - low	Synthetic rubber	NBR	-45 +100	-45 +212	70 IRHD	Black	H	H		
Nitrile - medium 407	Synthetic rubber	NBR	-30 +120	-22 +250	70 IRHD	Black		H		
Nitrile - low 407 LT	Synthetic rubber	NBR	-56 +100	-70 +212	70 IRHD	Black		H		
Nitrile - medium	Synthetic rubber	NBR	-30 +120	-22 +250	65 IRHD	Black		H		
Hallprene - rubber/fabric	Composite	Cotton/NBR	-30 +120	-22 +250		Black	H	H		
Fluoroelastomer rubber/fabric	Composite	Cotton/FKM	-20 +150	-4 +302		Black	H	H		
Fluoroelastomer	Synthetic rubber	FKM	-20 +200	-4 +392	75 IRHD	Black	HP	HP	HP	
Hythane 181	TPE	EU	-45 +110	-50 +230	93 IRHD	Blue	HP	HP	HP	M
Hythane 282	TPE		-30 +125	-22 +255	93 IRHD	Purple	H	H	H	
Polyurethane	TPE	AU	-40 +100	-40 +212	94 IRHD	Dark blue			H	
Polyurethane	TPE	AU	-30 +100	-22 +212	93 IRHD	Dark blue		H	H	
Standard polyester elastomer	TPE		-40 +120	-40 +250	55 D	Red		H	H	
Hydrolysis stabilised polyester elastomer	TPE		-40 +120	-40 +250	55 D	Grey	H	H		M
Hydrolysis stabilised polyester elastomer	TPE		-40 +140	-40 +284	72 D	Red		H		M
Lubricated stabilised polyester elastomer	TPE		-40 +120	-40 +250	55 D	Dark brown		HP		
Acetal	Eng. plastic	POM	-45 +120	-50 +250	R 115	Orange	H	H		HP M
PTFE glass filled	Eng. plastic	PTFE	-50 +200	-58 +392	60 D	White	HP	HP		
PTFE Glass / MoS2 filled	Eng. plastic	PTFE	-50 +200	-58 +392	62 D	Grey	H	H		H
PTFE Bronze filled	Eng. plastic	PTFE	-50 +200	-58 +392	72 D	Bronze	HP	HP		HP
Hallite 506 polyester / polyester	Composite		-40 +120	-40 +250		Red				HP M
Nylon 12	Eng. plastic	PA	-40 +120	-40 +250	72 D	Brown		H		
Nylon 6 / MoS2	Eng. plastic	PA	-40 +120	-40 +250	R 115	Black	H	H		
Glass filled Nylon	Eng. plastic	PA	-40 +120	-40 +250	R 124	Black	H	H		H

H - Hydraulic P - Pneumatic
M - Suitable for water based fluids
(1) Static applications only

Housing and installation data

Specified tolerances

Nominal sizes mm		Shafts (outside diameter) Units 0.001 mm								Bores (outside 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 in.		Shafts (outside diameter) Units 0.001 in.								Bores (outside diameter) Units 0.001 in.				
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 -3.0	+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 -8.0	0 -12.0	+4.0 -4.0	+6.0 -6.0	+3.0 0	+5.0 0	+8.0 0	+12.0 0	+6.0 -6.0
12.41	15.75	-2.5 -6.0	-2.5 -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

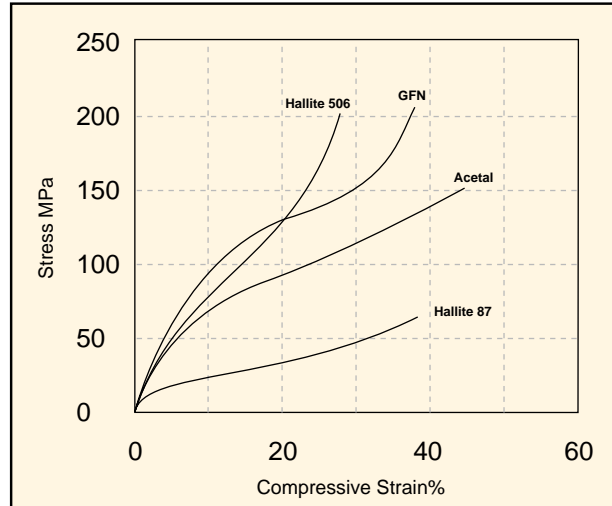
Housing and installation data

Hallite 87 & 506 bearing strip

Hallite 87 strip is a low friction PTFE & Bronze 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. Hallite506 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



Compressive bearing stress versus strain for non metallic materials

Bearing strip housing tolerances

As tolerances are not specified "on line" for types 87 & 506, please refer to the information below for tolerances as indicated on the product's data sheet.

Hallite 506 specified tolerances		
	Bearing length L ₁	Bearing cross section S
Tolerances (mm)	-0.1 to -0.6	-0.02 to -0.1

Hallite 506 specified tolerances		
	Bearing length L ₁	Bearing cross section S
Tolerances (in.)	-0.005 to -0.015	-0.001 to -0.004

Type 506 & 87 specified tolerances					
Nominal dimension range (mm)		Tolerances (units 0.001 mm)			
over	to	f9	H9	H10	H11
10	18	-16 -59	+43 0	+70 0	+110 0
18	30	-20 -72	+52 0	+84 0	+130 0
30	50	-25 -87	+62 0	+100 0	+160 0
50	80	-30 -104	+74 0	+120 0	+190 0
80	120	-36 -123	+87 0	+140 0	+220 0
120	180	-43 -143	+100 0	+160 0	+250 0
180	250	-50 -165	+115 0	+185 0	+290 0
250	315	-56 -186	+130 0	+210 0	+320 0
315	400	-62 -202	+140 0	+230 0	+360 0
400	500	-68 -223	+155 0	+250 0	+400 0
500	630	-76 -251	+175 0	+280 0	+440 0
630	800	-80 -280	+200 0	+320 0	+500 0
800	1000	-86 -316	+230 0	+360 0	+560 0

Type 506 & 87 specified tolerances					
Nominal dimension range (in.)		Tolerances (units 0.001 in.)			
over	to	f9	H9	H10	H11
0.40	0.71	-0.6 -2.3	+1.6 0	+2.8 0	+4.0 0
0.71	1.19	-0.8 -2.8	+2.0 0	+3.5 0	+5.0 0
1.19	1.97	-1.0 -3.4	+2.5 0	+4.0 0	+6.0 0
1.97	3.15	-1.2 -4.1	+3.0 0	+4.5 0	+7.0 0
3.15	4.73	-1.4 -4.8	+3.5 0	+5.0 0	+9.0 0
4.73	7.09	-1.6 -5.6	+4.0 0	+6.0 0	+10.0 0
7.09	9.85	-2.0 -6.5	+4.5 0	+7.0 0	+12.0 0
9.85	12.41	-2.2 -7.3	+5.0 0	+8.0 0	+12.0 0
12.41	15.75	-2.5 -8.0	+6.0 0	+9.0 0	+14.0 0
15.75	19.69	-2.8 -8.8	+6.0 0	+10.0 0	+16.0 0
19.69	24.80	-3.0 -9.9	+6.9 0	+11.0 0	+17.3 0
24.80	31.49	-3.1 -11.0	+7.9 0	+12.6 0	+19.7 0
31.49	39.37	-3.4 -12.4	+9.1 0	+14.2 0	+22.0 0

Housing design

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 up 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 > 0.004" (0.1mm).

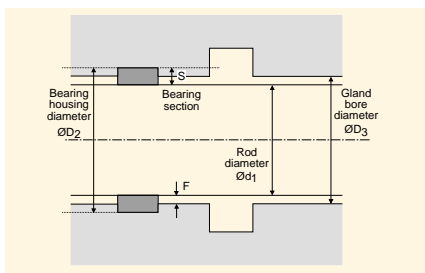
Rods

Maximum extrusion gap

$$F \text{ max} = \frac{(\text{ØD}_3 \text{ max} + \text{ØD}_2 \text{ max}) - S \text{ min} - \text{Ød}_1 \text{ min}}{2}$$

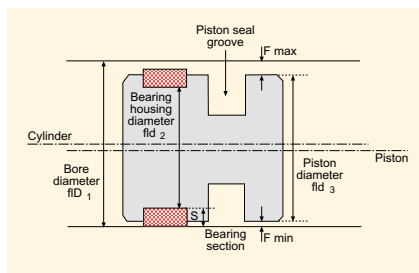
Minimum metal to metal clearance (extrusion gap)

$$F \text{ min} = S \text{ min} - \frac{(\text{ØD}_2 \text{ max} - \text{ØD}_3 \text{ min})}{2}$$



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

$$F \text{ max} = \text{ØD}_1 \text{ max} - S \text{ min} - \frac{(\text{Ød}_3 \text{ min} + \text{Ød}_2 \text{ min})}{2} + \text{dilation}$$

Minimum metal to metal clearance (extrusion gap)

$$F \text{ min} = S \text{ min} - \frac{(\text{Ød}_3 \text{ max} - \text{Ød}_2 \text{ min})}{2}$$

Calculate both F max and F min.

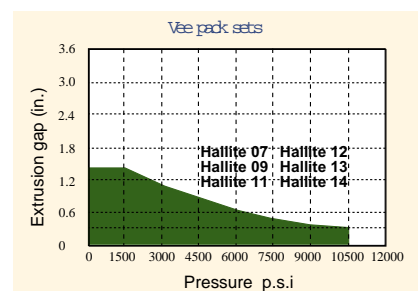
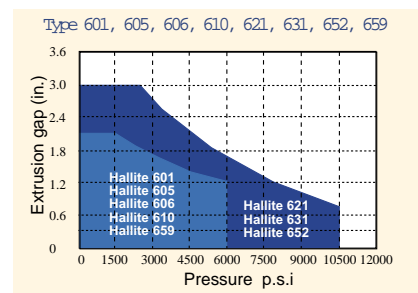
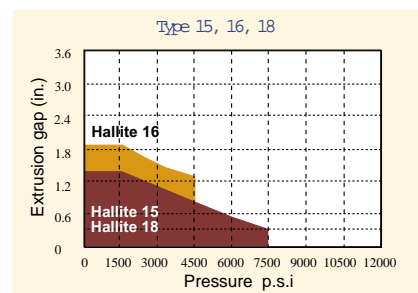
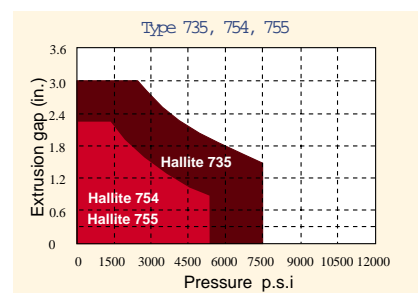
Ensure the F min is greater than 0.1mm (0.004") and F max is less than the maximum extrusion gap stated on the seal data sheet at the application's working pressure.

For built-in metal bearings, the extrusion gap calculation is simpler.

$$F \text{ max For Rod} = \text{ØD}_3 \text{ max} - \text{Ød}_1 \text{ min}$$

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.



Storage of 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 75° F. 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 85°F 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

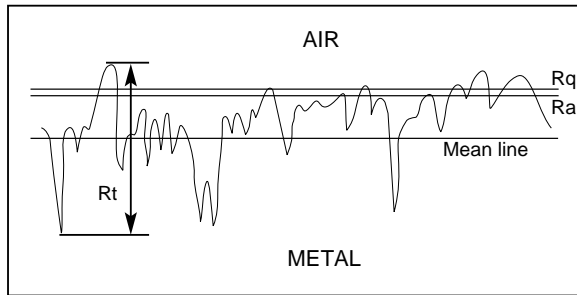
The appearance of 'bloom' is relatively unimportant, except in certain non-toxic applications.

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

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 THERMO PLASTICS: ACETAL (POM) POLYAMIDE (PA) GLASSFILLED NYLON (PA) PIFE POLYPHENYLENE SULFIDE (PPS)	UNLIMITED	
ENGINEERING THERMOSETS: TYPE 506 BEARING STRIP	UNLIMITED	

Surface roughness

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 $16 \mu\text{in CLA}$.
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

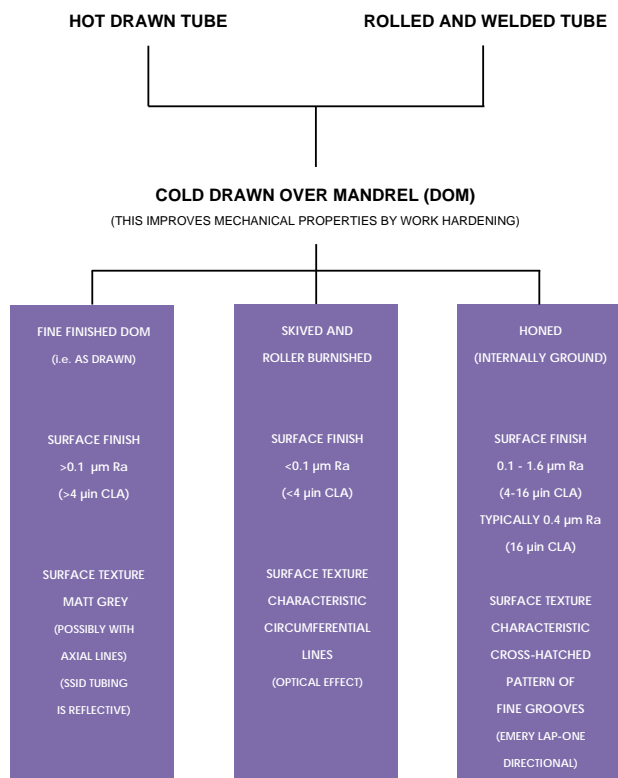
Piston rods are generally hard chrome plated. The hardness should be at least 67 Rockwell C. This gives an excellent tribological surface and provided the rods are produced by an established supplier within a surface finish range of 0.1 to $0.3 \mu\text{m Ra}$ (4 - $12 \mu\text{in CLA}$) no major problem 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 ($<0.1 \mu\text{m Ra}$) ($4 \mu\text{in CLA}$) 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.



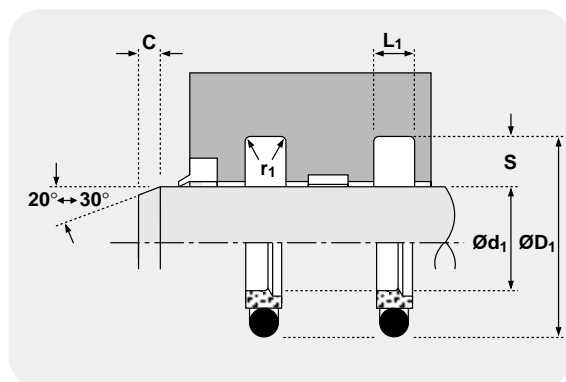
Methods of manufacturing of tubes for hydraulic cylinders and resulting surface textures.

Notes



Rod seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	4.0 m/sec	12.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F	
MAXIMUM PRESSURE	300 bar	4500 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	100	150	250
MAXIMUM GAP mm	0.6	0.5	0.45
PRESSURE p.s.i.	1500	2400	3750
			4500
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	$0.1 \div 0.4$	4 max	$4 \div 16$
STATIC SEALING FACE $\varnothing D_1$	1.6 max	10 max	63 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ 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
			1.6
TOLERANCES			
$\varnothing d_1$	$\varnothing D_1$	L_1 mm	
f9	H11	+0.2 -0	



FEATURES

- ULTRA LOW FRICTION
- COMPACT HOUSING
- INCH SIZES AVAILABLE ON REQUEST
- THE SEAL RING COMPONENT IS MACHINED BY HALLITE, THEREFORE ANY SIZE CAN BE CATERED FOR

MATERIALS

Face material - O-Ring	last two digits of part number
Standard material	
15% Glass/PTFE - NBR	10
Material options:	
15% Glass/PTFE - FKM	11
Bronze/PTFE - NBR	20
Bronze/PTFE - FKM	21

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

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.

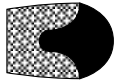
For the best results it is recommended two seals are fitted. The PTFE ring should always be mounted with the sealing lip on the pressure side. Sizes above 30mm are easily installed by deforming the PTFE ring into a kidney shape, sizes under 30mm are best installed using a tool, details of which can be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

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

Rod/Piston seals



8

1

TECHNICAL DETAILS

METRIC

INCH

OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 500 bar

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 \varnothing and maximum clearance \varnothing and for piston seals using the minimum clearance \varnothing and maximum bore \varnothing

	160	250	400	500
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

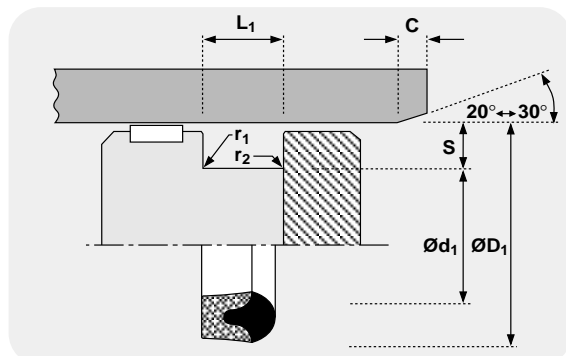
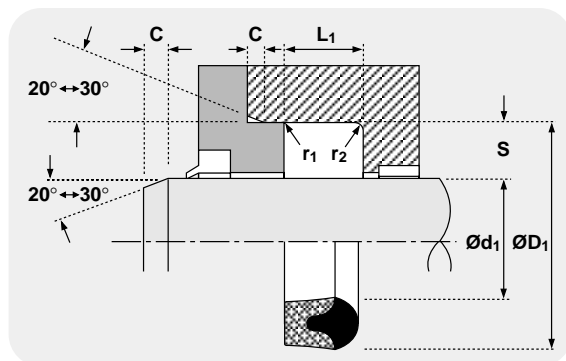
	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE - ROD $\varnothing d_1$	0.1 \leftrightarrow 0.4	4 max	4 \leftrightarrow 16	5 \leftrightarrow 18
STATIC SEALING FACE - ROD $\varnothing D_1$	1.6 max	10 max	63 max	70 max
DYNAMIC SEALING FACE - PISTON $\varnothing d_1$	0.1 \leftrightarrow 0.4	4 max	4 \leftrightarrow 16	5 \leftrightarrow 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

	4.0	5.0	7.5	10.0	12.5	15.0	20.0
GROOVE SECTION $\leq S$ 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 $\leq S$ 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

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



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.

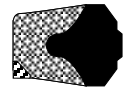
The seal section is pre-loaded by the housing when installed to ensure effective sealing at low pressure. When the pressure increases the rubber energises the U form to increase the sealing area and hence the efficiency of the seal. The strength and durability of the rubberised fabric combines with its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

FEATURES

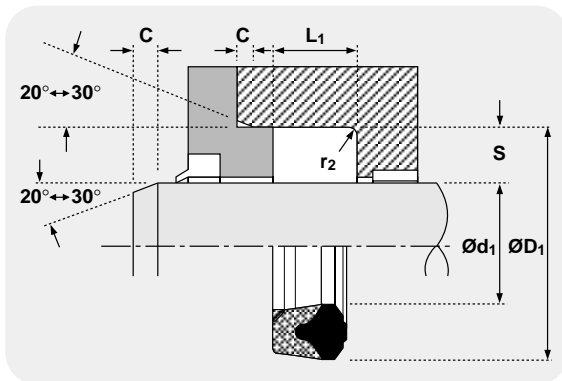
- THE ORIGINAL HALLITE FLUID SEAL
- GENERAL PURPOSE SEAL
- LONG LIFE

Rod seals

TECHNICAL DETAILS		METRIC		INCH		
OPERATING CONDITIONS						
MAXIMUM SPEED	0.5 m/sec			1.5 ft/sec		
MAXIMUM TEMPERATURE	-30°C + 100°C			-22°F + 212°F		
MAXIMUM PRESSURE	400 bar			6000 p.s.i.		
MAXIMUM EXTRUSION GAP						
PRESSURE bar	100	160	250	400		
MAXIMUM GAP mm	1.0	0.9	0.8	0.6		
PRESSURE p.s.i.	1500	2400	3750	6000		
MAXIMUM GAP in	0.040	0.036	0.032	0.024		
SURFACE ROUGHNESS						
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	4.0	5.0	7.5	10.0	12.5	15.0
MIN CHAMFER C mm	2.0	2.5	4.0	5.0	6.5	7.5
MAX FILLET RAD r_2 mm	0.2	0.4	0.8	0.8	1.2	1.6
GROOVE SECTION $\leq S$ in	0.187	0.250	0.312	0.375		
MIN CHAMFER C in	0.093	0.125	0.156	0.187		
MAX FILLET RAD r_2 in	0.008	0.016	0.032	0.032		
TOLERANCES						
$\varnothing d_1$	$\varnothing D_1$	L_1 mm		L_1 in		
f9	Js11	+0.25 -0		+0.010 -0		



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



FEATURES

- HIGH PRESSURE CAPABILITY
- CONTAMINATION RESISTANT
- GENERAL PURPOSE SEAL
- LONG LIFE

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

DESIGN

The Hallite 21 is a compact, low friction seal with the advantage of an internal anti-extrusion ring.

A rubberised fabric U ring, which gives strength and durability, and a rubber header are moulded together forming the seal. 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 range has a reinforced plastic anti-extrusion ring at the internal heel of the seal, to protect it against damage by extrusion, which enables the designer to use a large clearance. Where possible, triangular anti-extrusion rings are used, but in some cases a rectangular section may be supplied. Certain sizes are designed to suit housing requirements of ISO 5597.

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, please contact your local Hallite sales office for additional information.

Rod/Piston seals

26

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec	
MAXIMUM TEMPERATURE	-30°C +100°C	-22°F +212°F	
MAXIMUM PRESSURE	30 bar	500 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	10	30	
PRESSURE p.s.i.	150	500	
MAXIMUM GAP in	0.028	0.024	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE - ROD $\varnothing d_1$	μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16
STATIC SEALING FACE - ROD $\varnothing d_1$	1.6 max	10 max	μinRMS 5 ↔ 18
DYNAMIC SEALING FACE - PISTON $\varnothing D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16
STATIC SEALING FACE - PISTON $\varnothing d_1$	1.6 max	10 max	63 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ in	0.187	0.250	0.312
MIN CHAMFER C in	0.093	0.125	0.156
MAX FILLET RAD r_1 in	0.008	0.016	0.016
TOLERANCES			
ROD	$\varnothing d_1$	$\varnothing D_1$	L_1 mm
PISTON	f9	Js11	+0.25 -0
	js11	H9	+0.25 -0
			L_1 in
			+0.010 -0

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

0.187	0.250	0.312	0.375	0.500
0.093	0.125	0.156	0.187	0.217
0.008	0.016	0.016	0.032	0.032

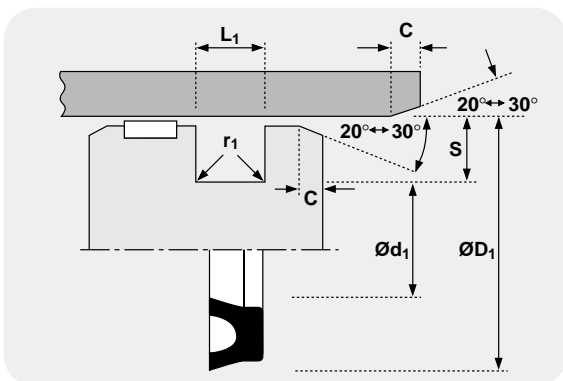
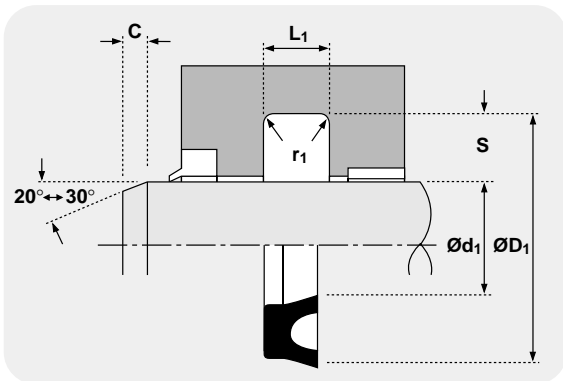
DESIGN

Hallite 26 U rings are normally supplied in an 80 durometer nitrile material.

The AN style U ring is designed for use in low pressure pneumatic applications. The Block U ring style can be used for light pressure applications in pneumatic or hydraulic cylinders.

The pressure rating can be extended by the use of back-up rings.

*Hallite also manufacture a full range of rectangular nitrile U rings, please contact your nearest Hallite sales office or Hallite distributor for the sizes available.



Rod seals

TECHNICAL DETAILS

METRIC

INCH

OPERATING CONDITIONS

MAXIMUM SPEED 4.0 m/sec
 TEMPERATURE RANGE -30°C + 100°C
 MAXIMUM PRESSURE 300 bar

12.0 ft/sec
 -22°F + 212°F
 4500 p.s.i.

MAXIMUM EXTRUSION GAP

PRESSURE bar	100	150	250	300
PRESSURE p.s.i.	1500	2400	3750	4500
MAXIMUM GAP in	0.024	0.020	0.018	0.016

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

SURFACE ROUGHNESS

	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE $\varnothing d_1$	0.1 \leftrightarrow 0.4	4 max	4 \leftrightarrow 16	5 \leftrightarrow 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 & RADI

GROOVE SECTION $\leq S$ in	0.148	0.216	0.305	0.413	0.482
MIN CHAMFER C in	0.079	0.118	0.197	0.295	0.315
MAX FILLET RAD r_1 in	0.016	0.031	0.047	0.059	0.059

TOLERANCES

$\varnothing d_1$	$\varnothing D_1$	L_1 in
f9	H11	+0.008 -0

DESIGN

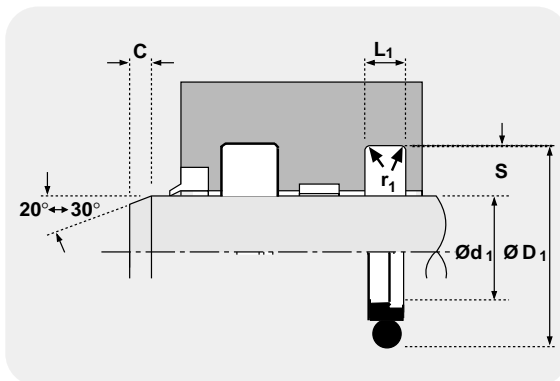
The Hallite 416 is a buffer seal developed to work in conjunction with high performance rod seals, such as the Hallite 605 and 621.

It has a bronze filled PTFE ring with a pre-loaded lip energised by an O ring. The seal is designed to protect the primary rod seal from pressure spikes in the cylinder. It has a self relieving design in order to prevent excessive pressure build up in the cavity between the buffer seal and the rod 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.

The PTFE ring should always be mounted with the internal step 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.



FEATURES

- SELF RELIEVING DESIGN PREVENTS PRESSURE TRAPPING
- LOW FRICTION - NO STICK SLIP
- HIGH STRENGTH PRECISION MACHINED PTFE CAP RING
- WIDE RANGE OF MATERIALS AVAILABLE FOR SPECIAL APPLICATIONS
- SIMPLE GROOVE DESIGN AND INSTALLATION

MATERIALS

Face material - O-Ring	last two digits of part number
Standard material	
Bronze/PTFE - NBR	--- 00
Material options:	
15% Glass/PTFE - NBR	--- 01
15% Glass/PTFE - FKM	--- 11
Bronze/PTFE - FKM	--- 10

500 series

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. 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 world-wide. 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.

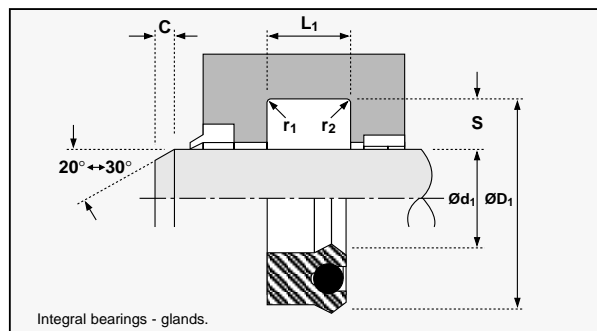
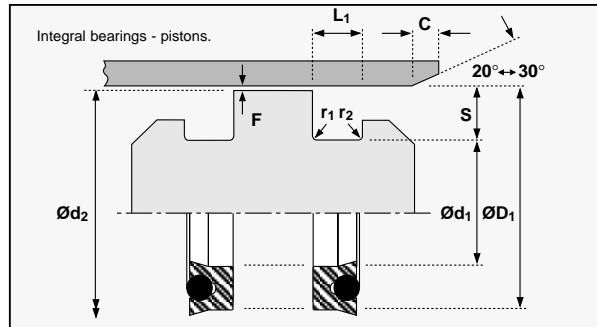
Media

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)	Piston Diameter Tolerance (Ød ₂)	Groove Width Tolerance (L ₁)
1/8" (.125)	+0.002 -0.000	+0.000 -0.002	+0.001 -0.002	+0.015 -0.000
3/16" (.187)	+0.002 -0.000	+0.000 -0.002	+0.001 -0.003	+0.015 -0.000
1/4" (.250)	+0.003 -0.000	+0.000 -0.003	+0.001 -0.003	+0.015 -0.000
5/16" (.312)	+0.003 -0.000	+0.000 -0.004	+0.002 -0.004	+0.015 -0.000
3/8" (.375)	+0.002 -0.000	+0.000 -0.005	+0.002 -0.004	+0.015 -0.000
1/2" (.500)	+0.004 -0.000	+0.000 -0.007	+0.002 -0.004	+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)	Gland Diameter Tolerance (Ød ₂)	Groove Width Tolerance (L ₁)
1/8" (.125)	+0.000 -0.001	+0.002 -0.000	+0.001 +0.003	+0.015 -0.000
3/16" (.187)	+0.000 -0.002	+0.002 -0.000	+0.001 +0.003	+0.015 -0.000
1/4" (.250)	+0.000 -0.002	+0.003 -0.000	+0.001 +0.004	+0.015 -0.000
5/16" (.312)	+0.000 -0.002	+0.004 -0.000	+0.002 +0.005	+0.015 -0.000
3/8" (.375)	+0.000 -0.002	+0.005 -0.000	+0.002 +0.006	+0.015 -0.000
1/2" (.500)	+0.000 -0.003	+0.007 -0.000	+0.002 +0.006	+0.015 -0.000

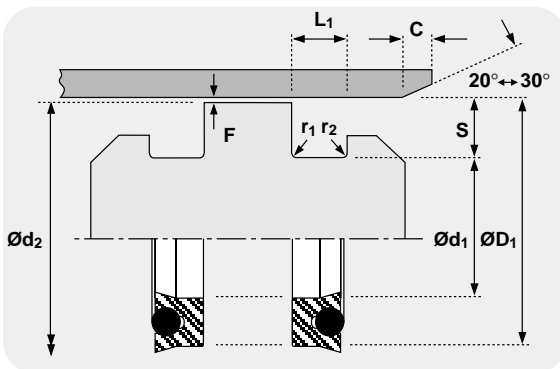
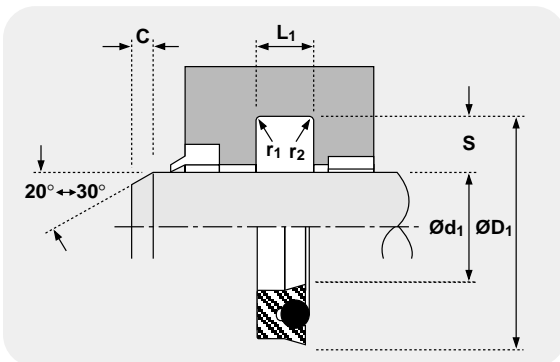
Rod/Piston seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec	
MAXIMUM TEMPERATURE	-40°C + 110°C	-40°F + 230°F	
MAXIMUM PRESSURE	350 bar	5000 p.s.i.	
MAXIMUM EXTRUSION GAP			
(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			
DYNAMIC SEALING FACE - ROD $\varnothing d_1$	μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16
STATIC SEALING FACE - ROD $\varnothing D_1$	1.6 max	10 max	μinRMS 5 ↔ 18
DYNAMIC SEALING FACE - PISTON $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16
STATIC SEALING FACE - PISTON $\varnothing d_1$	1.6 max	10 max	5 ↔ 18
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ in	0.125	0.187	0.250
MIN CHAMFER C in	0.093	0.093	0.125
MAX FILLET RAD r_1 in	0.008	0.008	0.016
MAX FILLET RAD r_2 in	0.016	0.016	0.032
TOLERANCES			
500			

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

0.125	0.187	0.250	0.312	0.375	0.500	0.625
0.093	0.093	0.125	0.156	0.187	0.187	0.217
0.008	0.008	0.016	0.032	0.032	0.032	0.047
0.016	0.016	0.032	0.047	0.047	0.047	0.062

Please refer to specified tolerances on the Hallite Series details.



Technical details shown are for standard material option.

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

MATERIALS

Seal material - O-Ring	last digit of part number
Standard material:	
Polyurethane - NBR	10
Material options:	
Polyester - NBR	11
Polyester - FKM	12

Rod seals



513

TECHNICAL DETAILS

OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -40°C + 110°C
 MAXIMUM PRESSURE 350 bar

1.5 ft/sec
 -40°F + 230°F
 5000 p.s.i.

MAXIMUM EXTRUSION GAP

(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

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

SURFACE ROUGHNESS

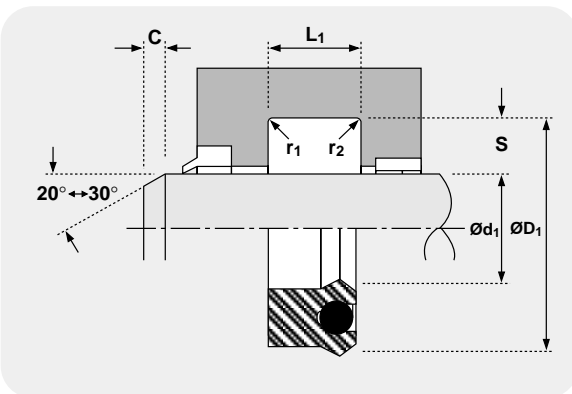
	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE $\varnothing d_1$	0.1 \leftrightarrow 0.4	4 max	4 \leftrightarrow 16	5 \leftrightarrow 18
STATIC SEALING FACE $\varnothing D_1$	1.6 max	10 max	63 max	70 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max	140 max

CHAMFERS & RADII

GROOVE SECTION $\leq S$ 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	0.187
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

Please refer to specified tolerances in the introduction
 - Housing & installation data - Hallite 500 Series



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 OPTIONS

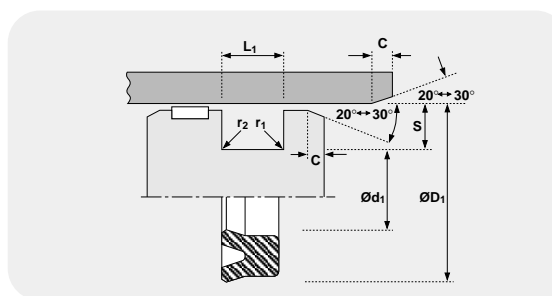
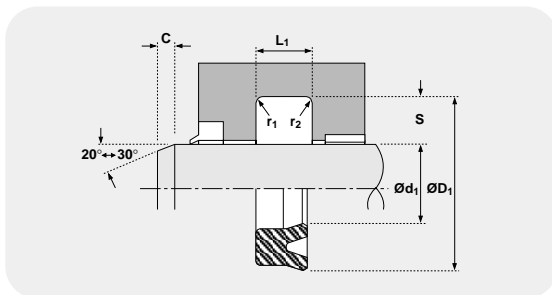
MATERIALS

Seal material - O-Ring	last digit of part number
Standard material:	
Polyurethane - NBR	10
Material options:	
Polyester - NBR	11
Polyester - FKM	12

Rod/Piston seals

TECHNICAL DETAILS		METRIC	INCH				
OPERATING CONDITIONS							
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec					
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F					
MAXIMUM PRESSURE	400 bar*	6,000 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				
MAXIMUM GAP in	0.024	0.020	0.016				
SURFACE ROUGHNESS							
DYNAMIC SEALING FACE - ROD $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16				
STATIC SEALING FACE - ROD $\varnothing d_1$	1.6 max	10 max	63 max				
DYNAMIC SEALING FACE - PISTON $\varnothing D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16				
STATIC SEALING FACE - PISTON $\varnothing D_1$	1.6 max	10 max	63 max				
STATIC HOUSING FACES L_1	3.2 max	16 max	125 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							
ROD	$\varnothing d_1$	f9	Js11	L_1 mm	+0.25 -0	L_1 in	+0.010 -0
PISTON	$\varnothing D_1$	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.



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.

FEATURES

- GENERAL PURPOSE SEAL
- EXCELLENT TEMPERATURE RESISTANCE
- EASE OF INSTALLATION

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.

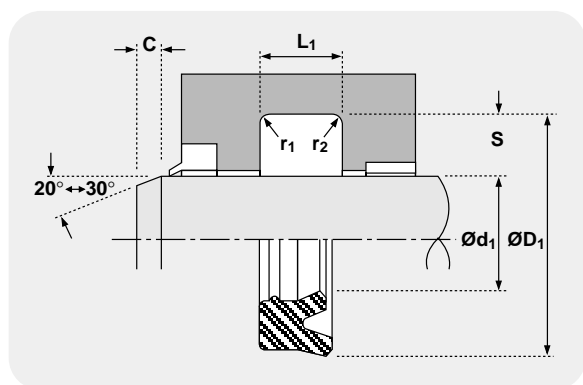
Rod seals

605



TECHNICAL DETAILS		METRIC	INCH				
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	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			
MAXIMUM GAP in		0.024	0.020	0.016			
SURFACE ROUGHNESS							
DYNAMIC SEALING FACE $\varnothing d_1$		μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16	μinRMS 5 \leftrightarrow 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		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 $\leq S$ 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			
f9		Js11	+0.25 -0	+0.010 -0			

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



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.

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.

FEATURES

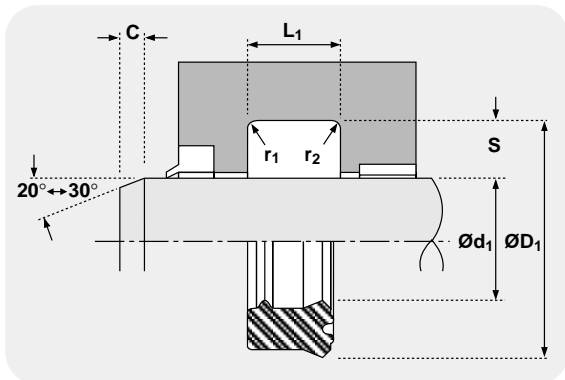
- TWIN LIP DESIGN OFFERING:
 - LOWER FRICTION,
 - IMPROVED SEALING,
 - PRIMARY LIP PROTECTION,
 - INCREASED SEAL STABILITY.
- EASY INSTALLATION

Rod seals

TECHNICAL DETAILS		METRIC	INCH
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	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
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16
STATIC SEALING FACE $\varnothing D_1$	1.6 max	10 max	63 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ 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			
$\varnothing d_1$	$\varnothing D_1$	L_1 mm	
f9	Js11	+0.25 -0	



610



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

FEATURES:

- INSENSITIVE TO PRESSURE FLUCTUATION.
- TWIN LIP DESIGN OFFERING: LOWER FRICTION, IMPROVED SEALING, PRIMARY LIP PROTECTION, INCREASED SEAL STABILITY.

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

Rod/Piston seals

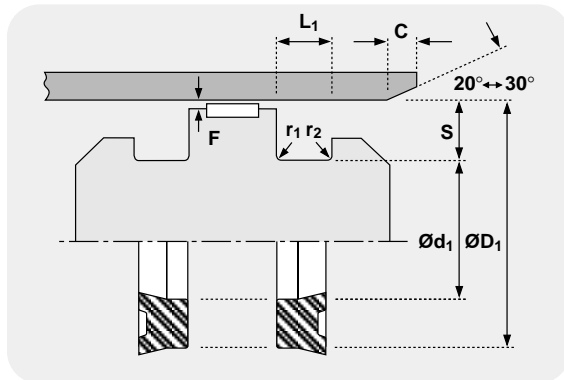
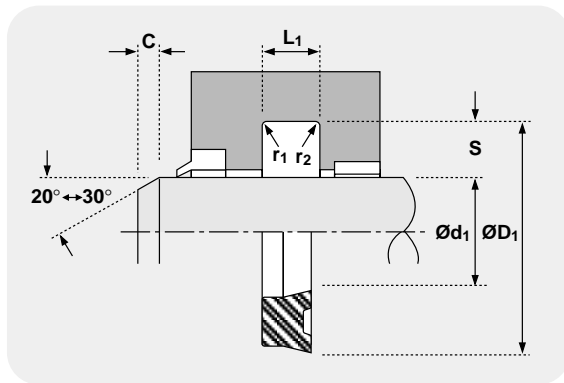
611



TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F	
MAXIMUM PRESSURE	240 bar	3500 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	100	170	240
PRESSURE p.s.i.	1500	2500	3500
MAXIMUM GAP in	0.020	0.012	0.008
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	
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			
$\varnothing d_1$	± 0.002		

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

For all other tolerances please use specified tolerances as indicated in Housing & installation data - Hallite 500 Series



DESIGN

The Hallite 611 is a one piece symmetrical seal suitable for rod and piston use. It is a compact seal for "square" type housings, for light duty applications.

It is manufactured from Hallite's high performance polyurethane- HYTHANE 181, which is an extremely flexible material and makes installation very easy.

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

FEATURES

- EASY INSTALLATION
- EXCELLENT TEMPERATURE RANGE
- LIGHT DUTY SEAL FOR "SQUARE" NORTH AMERICAN HOUSINGS

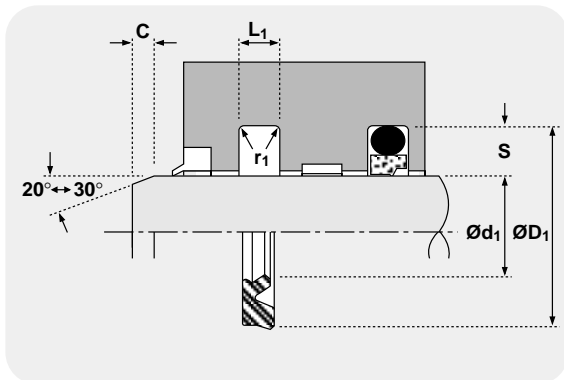
NB:

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

Rod seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F	
MAXIMUM PRESSURE	240 bar	3500 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	160	240	
MAXIMUM GAP mm	0.6	0.5	
PRESSURE p.s.i.	2400	3750	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16
STATIC SEALING FACE $\varnothing D_1$	1.6 max	10 max	63 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ 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			
$\varnothing d_1$	$\varnothing D_1$	L_1 mm	
f9	H11	+0.25 -0	

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



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 the Hallite technical department be consulted when considering this arrangement.

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.

FEATURES:

- EASY ASSEMBLY
- TWIN LIP PERFORMANCE
- ISO 7425 HOUSINGS

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

Rod seals

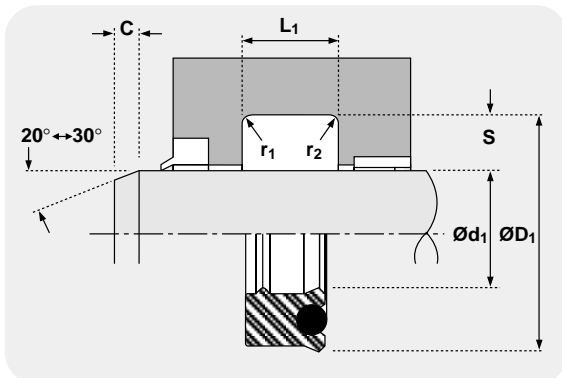


620

TECHNICAL DETAILS		METRIC	INCH			
OPERATING CONDITIONS						
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec				
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F				
MAXIMUM PRESSURE	400 bar	6000 p.s.i.				
MAXIMUM EXTRUSION GAP						
PRESSURE bar	160	250	400			
PRESSURE p.s.i.	2400	3750	6000			
MAXIMUM GAP in	0.020	0.016	0.012			
SURFACE ROUGHNESS						
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 $\leq S$ 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	0.016	0.032	0.032
MAX FILLET RAD r_2 in	0.016	0.016	0.032	0.032	0.047	0.047
TOLERANCES						
$\varnothing d_1$	$\varnothing D_1$	L_1 in				
f9	Js11	+0.010 -0				

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

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



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:

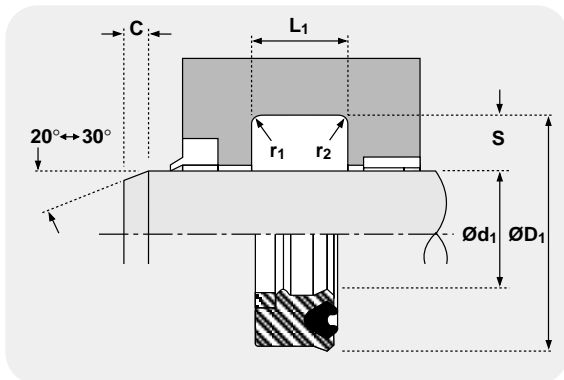
- TWIN LIP DESIGN OFFERING:
 - LOWER FRICTION
 - IMPROVED SEALING
 - PRIMARY LIP PROTECTION
 - INCREASED SEAL STABILITY
- IMPROVED SHOCK HANDLING
- COMPLETE LIP ACTUATION

Rod seals

TECHNICAL DETAILS		METRIC	INCH				
OPERATING CONDITIONS							
MAXIMUM SPEED		1.0 m/sec	3.0 ft/sec				
MAXIMUM TEMPERATURE		-45°C + 110°C	-50°F + 230°F				
MAXIMUM PRESSURE		700 bar	10,000 p.s.i.				
MAXIMUM EXTRUSION GAP							
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	
MAXIMUM GAP in		0.040	0.032	0.024	0.016	0.010	
SURFACE ROUGHNESS							
DYNAMIC SEALING FACE $\varnothing d_1$		$0.1 \leftrightarrow 0.4$	4 max	$4 \leftrightarrow 16$	$5 \leftrightarrow 18$		
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		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 $\leq S$ 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	0.016	0.032	0.032
MAX FILLET RAD r_2 in		0.016	0.016	0.032	0.032	0.047	0.047
TOLERANCES							
$\varnothing d_1$		$\varnothing D_1$	L_1 mm	L_1 in			
f9		Js11	+0.25 -0	+0.010 -0			



621



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.

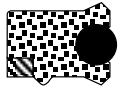
FEATURES

- HIGH PRESSURE/SHOCK LOAD CAPABILITY
- TWIN LIP DESIGN OFFERING:
 - LOWER FRICTION
 - IMPROVED SEALING
 - PRIMARY LIP PROTECTION
 - INCREASED SEAL STABILITY
- POLYACETAL ANTI-EXTRUSION RING.

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

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

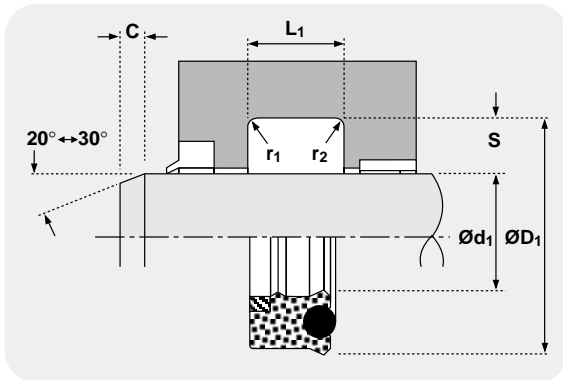
Rod seals



631

TECHNICAL DETAILS		METRIC	INCH					
OPERATING CONDITIONS								
MAXIMUM SPEED		0.5 m/sec	1.5 ft/sec					
MAXIMUM TEMPERATURE		-45°C + 110°C	-50°F + 230°F					
MAXIMUM PRESSURE		700 bar	10,000 p.s.i.					
MAXIMUM EXTRUSION GAP								
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								
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		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	
TOLERANCES								
$\varnothing d_1$		f9	$\varnothing D_1$		Js11	L_1 mm		+0.25 -0

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



DESIGN

The Hallite 631 is a high pressure rod seal. The thermoplastic polyester elastomer seal generally has an O ring energiser to ensure complete lip actuation under all pressure conditions and to cushion the seal against shock loadings. The Hallite 631 is also available without an anti extrusion ring (Hallite 630). The operating conditions given are for general use with hydraulic mineral oil.

FEATURES:

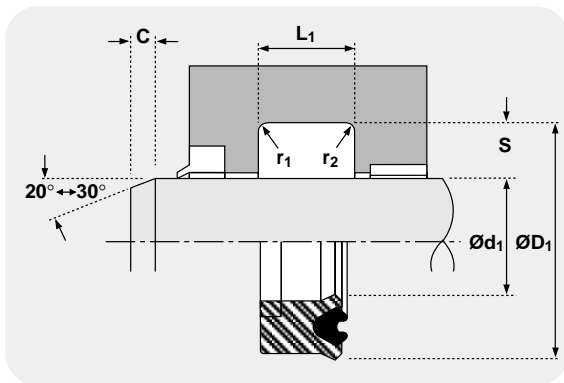
- HIGH PRESSURE/SHOCK LOAD CAPABILITY
- POLYACETAL ANTI-EXTRUSION RING

Rod seals

TECHNICAL DETAILS		METRIC	INCH			
OPERATING CONDITIONS						
MAXIMUM SPEED	1.0 m/sec		3.0 ft/sec			
MAXIMUM TEMPERATURE	-45°C + 110°C		-50°F + 230°F			
MAXIMUM PRESSURE	700 bar		10,000 p.s.i.			
MAXIMUM EXTRUSION GAP						
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						
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	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
TOLERANCES						
$\varnothing d_1$	$\varnothing D_1$	L_1 mm				
f9	Js11	+0.25 -0				



652



DESIGN

The Hallite 652 is a high pressure rod seal designed specifically for longwall mining applications. The seal design comprises three elements; a unique profiled NBR 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 an O ring energiser is used

FEATURES

- HIGH PRESSURE/SHOCK LOAD CAPABILITY
- POLYACETAL ANTI-EXTRUSION RING.
- RESPONSIVE SEALING

Rod buffer seals



653

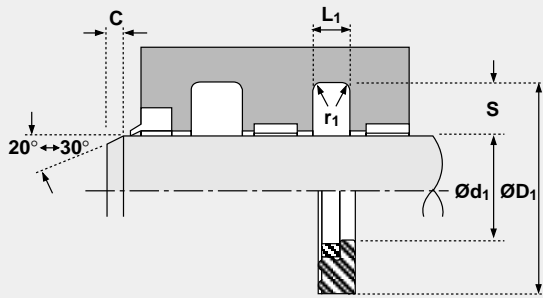
TECHNICAL DETAILS		METRIC	INCH			
OPERATING CONDITIONS						
MAXIMUM SPEED		1.0 m/sec	3.0 ft/sec			
MAXIMUM TEMPERATURE		-45°C + 110°C	-50°F + 230°F			
MAXIMUM PRESSURE		700 bar	10,000 p.s.i.			
MAXIMUM EXTRUSION GAP						
PRESSURE bar		160	250	400	500	700
MAXIMUM GAP (S ≤ 6) mm		0.6	0.5	0.4	0.3	0.2
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 Ød ₁		0.1 ↔ 0.4	4 max	µinCLA	4 ↔ 16	
STATIC SEALING FACE ØD ₁		1.6 max	10 max	µinRMS	5 ↔ 18	
STATIC HOUSING FACES L ₁		3.2 max	16 max		63 max	
					70 max	
					125 max	
					140 max	
CHAMFERS & RADII						
GROOVE SECTION ≤ S mm		3.75	5.50	7.75		
MIN CHAMFER C mm		3.00	3.50	5.00		
MAX FILLET RAD r ₁ mm		0.50	0.70	1.20		
GROOVE SECTION ≤ S in		0.150	0.215	0.306		
MIN CHAMFER C in		0.093	0.125	0.156		
MAX FILLET RAD r ₁ in		0.020	0.028	0.047		
TOLERANCES						
	mm	Ød ₁	ØD ₁	L ₁		
	in	f9	H11	+0.25 -0		
		f9	Js11	+0.010 -0		

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

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

GROOVE SECTION ≤ S in	MIN CHAMFER C in	MAX FILLET RAD r ₁ in
0.150	0.215	0.306
0.093	0.125	0.156
0.020	0.028	0.047

mm	in	Ød ₁	ØD ₁	L ₁
f9	H11	+0.25	-0	
f9	Js11	+0.010	-0	



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. An 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. 0427554BI.

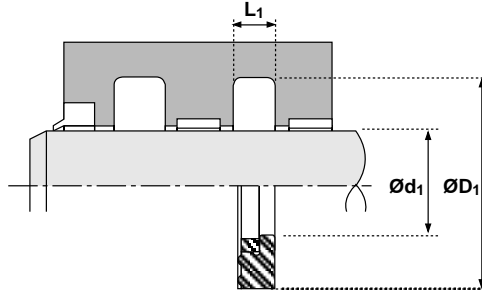
U.S.A. patent no. 5088747.

FEATURES

- PREVENTS INTER-SEAL PRESSURE BUILD UP
- INTERCHANGEABLE WITH COMMON PTFE BUFFER SEAL HOUSINGS
- EASY INSTALLATION
- LONG LIFE
- EXCELLENT TEMPERATURE RANGE

Rod buffer seals

Hallite[™] 653



metric

Ød ₁	TOL f ₉	ØD ₁	TOL H11	L ₁ +0.25 -0	PART No.
45.0	-0.025 -0.087	56.0	+0.19 +0.00	4.2	4575510
50.0	-0.025 -0.087	65.5	+0.19 +0.00	6.3	4403210
55.0	-0.030 -0.104	70.5	+0.19 +0.00	6.3	4403310
60.0	-0.030 -0.104	75.5	+0.19 +0.00	6.3	4403410
65.0	-0.030 -0.104	80.5	+0.22 +0.00	6.3	4742110
70.0	-0.030 -0.104	85.5	+0.22 +0.00	6.3	4742310
75.0	-0.030 -0.104	90.5	+0.22 +0.00	6.3	4742410

Ød ₁	TOL f ₉	ØD ₁	TOL H11	L ₁ +0.25 -0	PART No.
80.0	-0.030 -0.104	95.5	+0.22 +0.00	6.3	4742510
85.0	-0.036 -0.123	100.5	+0.22 +0.00	6.3	4742610
90.0	-0.036 -0.123	105.5	+0.22 +0.00	6.3	4523710
95.0	-0.036 -0.123	110.0	+0.22 +0.00	6.3	4742810
100.5	-0.036 -0.123	115.5	+0.22 +0.00	6.3	4742910
110.0	-0.036 -0.123	125.5	+0.25 +0.00	6.3	4743010
215.0	-0.050 -0.165	236.0	+0.29 +0.00	8.1	4705710

inch

Ød ₁	TOL f ₉	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

Ød ₁	TOL f ₉	ØD ₁	TOL Js11	L ₁ +0.010 -0	PART No.
3.500	-0.0014 -0.0048	4.116	+0.004 -0.004	0.247	4514810
4.000	-0.0014 -0.0048	4.616	+0.004 -0.004	0.247	4524610
7.000	-0.0016 -0.0056	7.610	+0.006 -0.006	0.247	4588310

Rod seals



658

TECHNICAL DETAILS		METRIC	INCH	
OPERATING CONDITIONS				
MAXIMUM SPEED	1.0 m/sec		3.0 ft/sec	
MAXIMUM TEMPERATURE	-45°C + 110°C		-50°F + 230°F	
MAXIMUM PRESSURE	400 bar		6000 p.s.i.	
MAXIMUM EXTRUSION GAP				
PRESSURE bar	160	250	400	
PRESSURE p.s.i.	2400	3750	6000	
MAXIMUM GAP in	0.024	0.020	0.016	
SURFACE ROUGHNESS				
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 $\leq S$ in	0.125	0.187	0.250	
MIN CHAMFER C in	0.093	0.093	0.125	
MAX FILLET RAD r_1 in	0.008	0.008	0.016	
MAX FILLET RAD r_2 in	0.016	0.016	0.032	
TOLERANCES				
$\varnothing d_1$	$\varnothing D_1$		L_1 in	
f9	Js11		+0.010 -0	

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

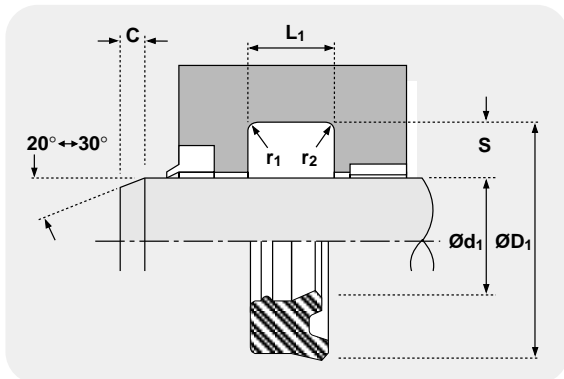
DESIGN

The Hallite 658 is an asymmetric seal designed specifically to replace an O ring and one back up sealing arrangement.

Manufactured in Hallite's high performance polyurethane - Hythane 181, the Hallite 658 is an extremely flexible seal making installation very easy. See Hallite 605 for more details.

FEATURES

- TWIN LIP DESIGN OFFERING: LOWER FRICTION, IMPROVED SEALING, PRIMARY LIP PROTECTION, INCREASED SEAL STABILITY.
- EASY INSTALLATION



Rod seals

TECHNICAL DETAILS

METRIC

INCH



OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -35°C + 100°C
 MAXIMUM PRESSURE 350 bar

1.5 ft/sec
 -30°F + 212°F
 5000 p.s.i.

MAXIMUM EXTRUSION GAP

PRESSURE bar	160	250	350
MAXIMUM GAP mm	0.6	0.5	0.4
PRESSURE p.s.i.	2400	3750	5000

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

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

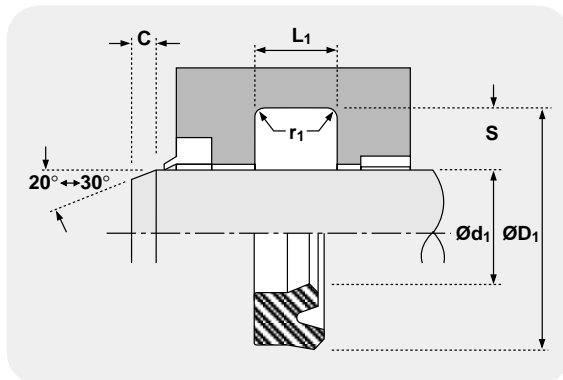
CHAMFERS & RADII

GROOVE SECTION $\leq S$ mm	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3

TOLERANCES

$\varnothing d_1$	$\varnothing D_1$	L_1 mm
f8	H10	+0.3 0

902



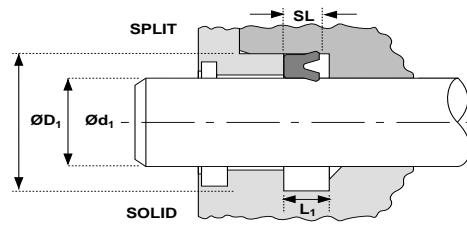
DESIGN

Suitable for standard Asian housings, Hallite 902 is a general purpose polyurethane rod seal. As a possible indent item, minimum quantities may apply when ordering this product.

Notes



Rod seals
metric

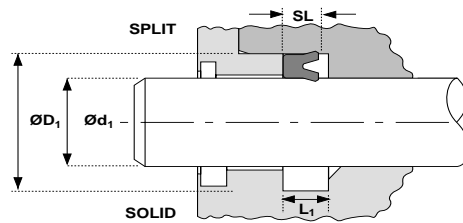


Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
601	4.500	12.500	4.400	5.000	4506701
601	5.000	12.000	5.500	6.500	4508601
601	6.000	13.000	8.000	9.000	4460300
18	6.000	14.000	6.000	6.000	0202200
605	6.000	16.000	7.000	8.000	4580600
610	8.000	16.000	5.300	6.000	4581000
18	8.000	16.000	6.000	6.000	0202400
605	8.000	18.000	7.000	8.000	4580500
605	10.000	15.000	3.600	4.000	4402300
16	10.000	17.500	3.000	3.200	8639510
18	10.000	18.000	6.000	6.000	0202500
601	10.000	18.000	6.000	6.600	4299900
601	10.000	20.000	8.000	9.000	4600000
605	12.000	18.000	4.000	4.500	4578000
605	12.000	18.000	5.700	6.300	4314900
601	12.000	18.000	6.000	7.000	4621300
605	12.000	19.000	4.500	5.000	4341600
605	12.000	19.000	5.000	5.600	4710000
16	12.000	19.500	3.000	3.200	86106_ ‡
601	12.000	20.000	4.400	5.000	4182501 ‡
605	12.000	20.000	5.700	6.300	4310900 ‡
18	12.000	20.000	6.000	6.000	0202600
605	12.000	22.000	7.700	9.000	4315000
601	12.000	25.000	8.000	9.000	4600100
18	12.000	25.000	10.000	10.500	0615800
605	12.700	18.000	5.500	6.000	4370400
605	13.000	20.000	4.500	5.000	4351600
605	14.000	21.000	5.000	5.600	4710100
16	14.000	21.500	2.800	3.200	86098_ ‡
616	14.000	21.500	2.800	3.200	4577700 ‡
601	14.000	22.000	4.400	5.000	4182601 ‡
601	14.000	22.000	5.000	5.700	4604000
610	14.000	22.000	5.300	6.000	4580900
605	14.000	22.000	5.700	6.300	4311000 ‡
605	14.000	24.000	7.300	8.000	4310000 ‡

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
18	14.000	24.000	7.500	7.500	0202700
601	14.000	24.000	8.000	9.000	4600200
16	15.000	22.500	2.800	3.200	86179_ _
18	15.000	25.000	7.500	8.000	0202800
601	15.000	25.000	8.000	9.000	4600300
605	15.370	25.500	6.350	7.400	4333800
605	16.000	22.000	4.500	5.000	4341700
605	16.000	22.000	5.000	6.000	4314100
16	16.000	23.500	2.800	3.200	66225_ _ ‡
601	16.000	24.000	4.400	5.000	4182701 ‡
601	16.000	24.000	5.000	5.700	4604100
605	16.000	24.000	5.800	6.300	4295200 ‡
610	16.000	24.000	6.000	7.000	4319300
18	16.000	26.000	7.500	8.000	0615900
605	16.000	26.000	7.700	9.000	4311100
601	16.000	26.000	8.000	9.000	4600400
605	18.000	24.000	4.500	5.000	4712000
610	18.000	25.000	4.600	5.600	4334600 ‡
605	18.000	25.000	5.000	6.000	4314200
16	18.000	25.500	2.800	3.200	66226_ _ ‡
616	18.000	25.500	2.800	3.200	4341800 ‡
601	18.000	26.000	4.400	5.000	4182901 ‡
601	18.000	26.000	5.000	5.700	4604200
605	18.000	26.000	5.000	5.700	4611000
605	18.000	26.000	5.700	6.300	4311200 ‡
605	18.000	26.000	6.000	7.000	4333900
601	18.000	28.000	7.300	8.000	4547900
18	18.000	28.000	7.500	8.000	0202900
605	18.000	28.000	7.700	9.000	4305100
601	18.000	28.000	8.000	9.000	4600500
605	20.000	25.000	3.200	3.500	4332100
610	20.000	26.000	4.500	5.500	4319400
605	20.000	26.000	5.000	5.500	4315100
605	20.000	27.000	6.000	6.700	4702900
616	20.000	27.500	2.800	3.200	4721700



Rod seals
metric

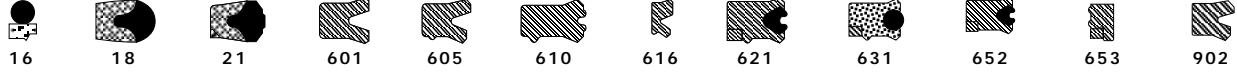
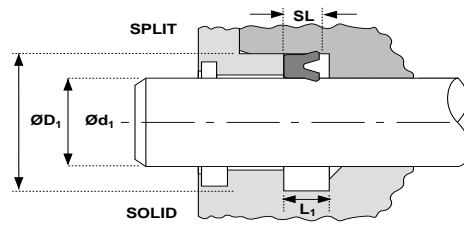


Type	Ød ₁	NOMINALS ØD ₁	SL	L ₁	PART No.
601	20.000	28.000	4.400	5.000	4183001‡
601	20.000	28.000	5.000	5.700	4604300
605	20.000	28.000	5.000	5.700	4611100
605	20.000	28.000	5.700	6.300	4362100‡
610	20.000	28.000	6.000	7.000	4307500
605	20.000	30.000	6.000	7.000	4611200
18	20.000	30.000	7.500	8.000	0200500
605	20.000	30.000	7.700	9.000	4305200
21	20.000	30.000	8.000	8.500	2176120‡
601	20.000	30.000	8.000	9.000	4600600
605	20.000	30.000	10.000	11.000	4310300
16	20.000	31.000	3.900	4.200	65948_‡
616	20.000	31.000	3.900	4.200	4367400‡
610	22.000	28.000	4.500	5.500	4356000
610	22.000	29.000	4.600	5.600	4324200‡
16	22.000	29.500	2.800	3.200	8624310
601	22.000	30.000	4.400	5.000	4183101‡
605	22.000	30.000	5.700	6.300	4305300‡
605	22.000	30.000	5.700	6.300	4305300
18	22.000	30.000	6.000	6.500	0817600
610	22.000	30.000	6.000	7.000	4316100
610	22.000	30.000	7.000	8.000	4389300
605	22.000	30.000	7.300	8.000	4356800
605	22.000	32.000	7.300	8.000	4310800‡
18	22.000	32.000	7.500	8.000	0203300
605	22.000	32.000	10.000	11.000	4311300
16	22.000	33.000	3.900	4.200	6594910
616	22.000	33.000	3.900	4.200	4341900‡
601	22.000	35.000	10.000	11.000	4600700
601	22.000	40.000	10.000	11.000	4572900
601	22.400	30.000	5.000	5.700	4604400
605	22.400	30.000	5.000	5.700	4611300
601	22.400	32.400	8.000	9.000	4600800
605	22.400	32.400	8.000	9.000	4616600
601	23.500	31.500	5.000	5.700	4621500

Type	Ød ₁	NOMINALS ØD ₁	SL	L ₁	PART No.
616	25.000	32.500	2.800	3.200	4721800
601	25.000	33.000	4.400	5.000	4183301‡
601	25.000	33.000	5.000	5.700	4604500
605	25.000	33.000	5.000	5.700	4610100
605	25.000	33.000	5.700	6.300	4305400‡
610	25.000	33.000	6.000	7.000	4316200
605	25.000	33.000	6.800	7.500	4333500
610	25.000	33.000	8.000	9.000	4299000
605	25.000	33.000	10.000	11.000	4315200
605	25.000	35.000	7.300	8.000	4512000‡
605	25.000	35.000	7.700	9.000	4311400
601	25.000	35.000	8.000	9.000	4600900
601	25.000	35.000	10.000	11.000	4362600
605	25.000	35.000	10.000	11.000	4310500
16	25.000	36.000	3.900	4.200	65950_‡
616	25.000	36.000	3.900	4.200	4367500‡
605	25.000	37.000	10.000	11.000	4379900
601	25.000	38.000	8.000	9.000	4601000
601	25.000	38.000	10.000	11.000	4621400
601	25.000	40.000	10.000	11.000	4601100
605	25.000	40.000	10.000	11.000	4322900
18	25.000	40.000	11.000	11.500	0472800
616	25.400	32.900	2.800	3.200	4469000
605	26.000	36.000	7.000	8.000	4459400
601	26.000	40.000	9.200	10.000	4584900
601	28.000	35.500	5.000	5.700	4604600
605	28.000	35.500	5.000	5.700	4611400
610	28.000	36.000	5.300	6.300	4334700‡
605	28.000	36.000	5.700	6.300	4703000
610	28.000	36.000	6.000	7.000	4323200
601	28.000	36.000	6.500	7.100	4506201
610	28.000	36.000	8.000	9.000	4307700
601	28.000	38.000	5.600	6.300	4183401‡
605	28.000	38.000	7.300	8.000	4305500‡
21	28.000	38.000	8.000	8.500	6583220‡



Rod seals
metric

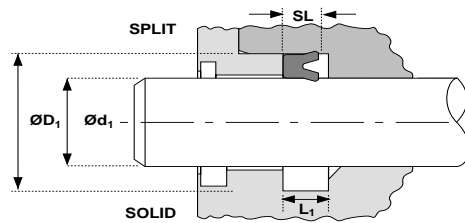


Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
16	28.000	39.000	3.900	4.200	66227_ _ ‡
616	28.000	39.000	3.900	4.200	4367600 ‡
601	28.000	40.000	10.000	11.000	4601200
601	28.000	43.000	10.000	11.000	4601300
18	28.000	43.000	11.000	11.500	0204300
605	28.000	43.000	11.400	12.500	4399000 ‡
601	30.000	37.000	6.000	7.000	4596800
605	30.000	38.000	5.700	6.300	4704500
610	30.000	38.000	6.000	7.000	4308900
605	30.000	38.000	6.300	7.000	4402700
610	30.000	38.000	8.000	9.000	4362400
601	30.000	40.000	5.600	6.300	4183501
601	30.000	40.000	6.000	7.000	4604700
605	30.000	40.000	6.000	7.000	4610200
605	30.000	40.000	7.000	7.700	4703100
610	30.000	40.000	7.000	8.000	4558300
621	30.000	40.000	7.300	8.000	4577110
601	30.000	40.000	8.000	9.000	4596900
601	30.000	40.000	10.000	11.000	4362700
605	30.000	40.000	10.000	11.000	4304600
16	30.000	41.000	3.900	4.200	65951_ _
616	30.000	41.000	3.900	4.200	4404500
605	30.000	42.000	10.900	12.000	4383100
21	30.000	45.000	9.000	9.500	2176420
601	30.000	45.000	10.000	11.000	4601400
18	30.000	45.000	11.000	11.500	0204400
605	30.000	50.000	10.000	11.000	4328500
18	30.000	50.000	14.000	14.500	0282100
601	31.500	41.500	6.000	7.000	4604800
616	32.000	39.500	2.800	3.200	4714800
605	32.000	40.000	6.000	7.000	4310700
610	32.000	40.000	6.000	7.000	4316300
605	32.000	40.000	6.700	7.700	4334000
605	32.000	40.000	7.700	9.000	4315300
605	32.000	41.500	7.900	8.900	4334100

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
601	32.000	42.000	5.600	6.300	4183601à
605	32.000	42.000	5.700	6.300	4360100à
601	32.000	42.000	6.000	7.000	4604900
605	32.000	42.000	6.000	7.000	4616100
605	32.000	42.000	7.300	8.000	4374200à
21	32.000	42.000	8.000	8.500	6583320à
601	32.000	42.000	10.000	11.000	4362800
605	32.000	42.000	10.000	11.000	4305600
16	32.000	43.000	3.900	4.200	65952_ _ à
616	32.000	43.000	3.900	4.200	4367700à
631	32.000	44.000	8.700	9.600	4344110
18	32.000	45.000	10.000	11.000	4597700
605	32.000	47.000	9.100	10.000	4329600
601	32.000	47.000	10.000	11.000	4621200
605	32.000	47.000	10.000	11.000	4338900
18	32.000	47.000	11.000	11.500	0204600
605	32.000	48.000	10.000	11.000	4492500
902	34.000	50.000	12.000	13.000	9034006*
605	35.000	43.000	5.700	6.300	4703200
610	35.000	43.000	6.000	7.000	4301700
605	35.000	43.000	6.300	7.000	4402800
610	35.000	43.000	8.000	9.000	4592800
605	35.000	43.000	8.200	9.000	4309000
601	35.000	45.000	6.000	7.000	4605000
605	35.000	45.000	6.000	7.000	4611500
601	35.000	45.000	7.000	8.000	4496000
18	35.000	45.000	7.500	8.000	0052300
605	35.000	45.000	7.700	9.000	4314300
605	35.000	45.000	10.000	11.000	4305700
610	35.000	45.000	10.000	11.000	4299300
16	35.000	46.000	3.900	4.200	66228_ _
601	35.000	48.000	10.000	11.000	4360300
605	35.000	50.000	9.000	10.000	4611600
621	35.000	50.000	9.500	10.500	4335310
601	35.000	50.000	10.000	11.000	4601500



Rod seals
metric

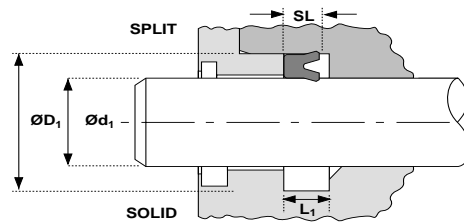


Type	Ød ₁	NOMINALS ØD ₁	SL	L ₁	PART No.
605	35.000	50.000	10.000	11.000	4322500
18	35.000	50.000	11.000	11.500	0474600
902	35.000	50.000	12.000	13.000	9035036*
601	35.500	45.000	6.000	7.000	4605100
605	35.500	45.000	6.000	7.000	4616700
605	35.500	50.500	10.000	11.000	4616900
601	35.500	50.500	10.000	11.000	4621100
610	36.000	44.000	5.300	6.300	4324300‡
18	36.000	44.000	6.000	6.500	1204900
605	36.000	44.000	6.400	7.500	4373900
610	36.000	44.000	8.000	9.000	4308000
605	36.000	44.000	8.200	9.000	4395000
601	36.000	46.000	5.600	6.300	4183701‡
605	36.000	46.000	5.700	6.300	4372100‡
605	36.000	46.000	7.300	8.000	4304900‡
621	36.000	46.000	7.300	8.000	4317010‡
21	36.000	46.000	8.000	8.500	6583420‡
605	36.000	46.000	10.000	11.000	4305000
610	36.000	46.000	10.000	11.000	4299400
16	36.000	47.000	3.900	4.200	65953_‡
616	36.000	47.000	3.900	4.200	4353100‡
18	36.000	51.000	11.000	11.500	0978800
601	38.000	48.000	6.000	7.000	4605200
605	38.000	48.000	10.000	11.000	4515500
601	38.000	50.000	9.000	10.000	4709400
605	38.000	50.000	10.000	11.000	4586300
605	38.000	53.000	10.000	11.000	4480900
601	38.000	55.000	9.700	11.000	4366000
601	38.000	58.000	9.700	11.000	4560100
610	40.000	48.000	5.400	6.400	4329200
605	40.000	48.000	5.700	6.300	4703300
610	40.000	48.000	6.500	7.500	4323300
610	40.000	48.000	8.000	9.000	4301800
605	40.000	48.000	8.200	9.000	4396800
605	40.000	49.500	9.500	10.500	4334200

Type	Ød ₁	NOMINALS ØD ₁	SL	L ₁	PART No.
601	40.000	50.000	5.600	6.300	4183801‡
601	40.000	50.000	6.000	7.000	4605300
605	40.000	50.000	6.000	7.000	4610300
605	40.000	50.000	7.300	8.000	4311600‡
621	40.000	50.000	7.300	8.000	4317110‡
21	40.000	50.000	8.000	8.500	6583520‡
601	40.000	50.000	10.000	11.000	4362900
605	40.000	50.000	10.000	11.000	4293800
18	40.000	50.000	10.500	11.000	0202000
616	40.000	51.000	3.900	4.200	4722900
652	40.000	52.000	8.700	9.600	4326311
631	40.000	52.000	8.700	9.600	4326310
605	40.000	52.000	10.900	12.000	4381800
605	40.000	55.000	7.300	8.000	4703400
605	40.000	55.000	9.000	10.000	4611700
601	40.000	55.000	9.900	11.000	4388500
601	40.000	55.000	10.000	11.000	4601600
605	40.000	55.000	10.000	11.000	4328300
21	40.000	55.000	10.500	11.000	2176920
18	40.000	55.000	11.000	11.500	0475000
16	40.000	55.500	6.000	6.300	6595410
616	40.000	55.500	6.000	6.300	4367800
902	40.000	56.000	12.000	13.000	9040036*
601	40.000	60.000	12.000	13.000	4601700
605	42.000	50.000	7.500	8.000	4373800
605	42.000	52.000	10.000	11.000	4338200
18	42.000	73.000	23.000	24.000	6502900*
16	43.000	58.500	6.000	6.300	86193_
610	45.000	52.000	10.000	11.000	4330000
610	45.000	53.000	5.300	6.300	4334800‡
610	45.000	53.000	6.000	7.000	4711000
610	45.000	53.000	8.000	9.000	4308100
605	45.000	53.000	8.100	9.000	4402900
605	45.000	53.000	11.800	13.000	4315600
601	45.000	55.000	5.600	6.300	4183901‡



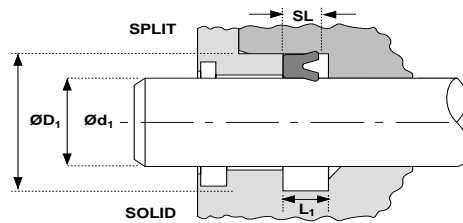
Rod seals
metric



Type	NOMINALS		NOMINALS		PART No.
	Ød ₁	ØD ₁	SL	L ₁	
605	45.000	55.000	5.600	6.300	4479700‡
601	45.000	55.000	6.000	7.000	4605400
605	45.000	55.000	6.000	7.000	4610400
605	45.000	55.000	7.300	8.000	4305900‡
621	45.000	55.000	7.300	8.000	4317210‡
21	45.000	55.000	8.000	8.500	6583620‡
601	45.000	55.000	10.000	11.000	4363000
605	45.000	55.000	10.000	11.000	4302600
610	45.000	55.000	10.000	11.000	4389400‡
16	45.000	56.000	3.900	4.200	8616910
616	45.000	56.000	3.900	4.200	4556300‡
653	45.000	56.000	3.900	4.200	4575510
601	45.000	56.000	7.000	8.000	4605500
605	45.000	57.700	9.500	10.500	4322800
601	45.000	60.000	10.000	11.000	4601800
605	45.000	60.000	10.000	11.000	4315400
18	45.000	60.000	11.000	11.500	0979400
621	45.000	60.000	11.400	12.500	4295510‡
16	45.000	60.500	6.000	6.300	65955__
616	45.000	60.500	6.000	6.300	4367900
601	45.000	65.000	10.000	11.000	4575000
605	45.000	65.000	10.000	11.000	4315500
902	45.000	65.000	12.000	13.000	9045046*
18	45.000	65.000	14.000	14.500	0281700
601	46.000	56.000	6.000	7.000	4543900
605	48.000	60.000	10.000	11.000	4432600
601	48.000	63.000	10.000	11.000	4601900
605	50.000	57.000	9.000	10.000	4538600
610	50.000	58.000	5.300	6.300	4356900
610	50.000	58.000	8.000	9.000	4299100
601	50.000	60.000	5.600	6.300	4184001‡
601	50.000	60.000	6.000	7.000	4605600
605	50.000	60.000	6.000	7.000	4611800
605	50.000	60.000	7.300	8.000	4306000‡
621	50.000	60.000	7.300	8.000	4317310‡

Type	NOMINALS		NOMINALS		PART No.
	Ød ₁	ØD ₁	SL	L ₁	
18	50.000	60.000	7.500	8.000	0179300
21	50.000	60.000	8.000	8.500	2192722‡
601	50.000	60.000	10.000	11.000	4363100‡
605	50.000	60.000	10.000	11.000	4304500
610	50.000	60.000	10.000	11.000	4389500
605	50.000	60.000	11.800	13.000	4314400‡
16	50.000	61.000	3.900	4.200	8619510
616	50.000	61.000	3.900	4.200	4723000
631	50.000	62.000	8.700	9.600	4326410
652	50.000	62.000	8.700	9.600	4326411
605	50.000	62.700	9.500	10.500	4334400
605	50.000	65.000	9.000	10.000	4611900
605	50.000	65.000	9.500	10.500	4344000
18	50.000	65.000	10.000	10.500	0208400
601	50.000	65.000	10.000	11.000	4602000
605	50.000	65.000	10.000	11.000	4617000
605	50.000	65.000	10.900	12.000	4291700‡
18	50.000	65.000	11.000	11.500	0383800
621	50.000	65.000	11.400	12.500	4293410‡
605	50.000	65.000	14.500	16.000	4381900
653	50.000	65.500	5.900	6.300	4403210
16	50.000	65.500	6.000	6.300	65956__
616	50.000	65.500	6.000	6.300	4368000
902	50.000	66.000	12.000	13.000	9050036*
601	50.000	70.000	12.000	13.000	4602100
605	50.000	70.000	12.000	13.000	4612000
18	50.000	70.000	14.000	14.500	0294600
601	52.000	62.000	10.000	11.000	4559000
601	53.000	63.000	6.000	7.000	4605700
605	53.000	65.000	9.000	10.000	4371700
610	55.000	63.000	8.000	9.000	4323000
601	55.000	65.000	6.000	7.000	4605800
605	55.000	65.000	6.000	7.000	4615600
610	55.000	65.000	7.000	8.000	4385500
605	55.000	65.000	7.300	8.000	4703500

Rod seals
metric

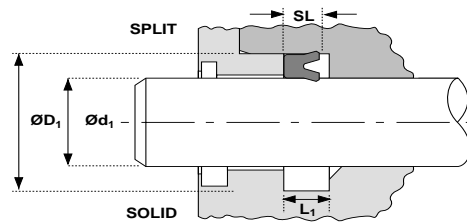


Type	Ød ₁	NOMINALS ØD ₁	SL	L ₁	PART No.
18	55.000	65.000	8.000	8.500	0242600
605	55.000	65.000	8.200	9.000	4360400
605	55.000	65.000	10.000	11.000	4306100
610	55.000	65.000	10.000	11.000	4389600
21	55.000	65.000	10.500	11.000	2177320
605	55.000	65.000	11.800	13.000	4323400
610	55.000	65.000	11.800	13.000	4389700
605	55.000	68.000	10.000	11.000	4593800
605	55.000	70.000	9.000	10.000	4612100
621	55.000	70.000	11.400	12.500	4403610
605	55.000	70.000	11.800	13.000	4319200
653	55.000	70.500	5.900	6.300	4403310
16	55.000	70.500	6.000	6.300	86193_
601	55.000	75.000	12.000	13.000	4602200
605	55.000	75.000	12.000	13.000	4612200
610	56.000	64.000	8.000	9.000	4316400
601	56.000	66.000	6.000	7.000	4605900
610	56.000	66.000	6.800	7.500	4334900‡
605	56.000	66.000	10.000	11.000	4311800
601	56.000	71.000	8.400	9.500	4184201‡
605	56.000	71.000	10.000	11.000	4311900
605	56.000	71.000	11.400	12.500	4306200‡
621	56.000	71.000	11.400	12.500	4317410‡
652	56.000	71.000	11.400	12.500	4557110
21	56.000	71.000	12.500	13.000	6583720‡
16	56.000	71.500	6.000	6.300	65957_
616	56.000	71.500	6.000	6.300	4368100‡
902	56.000	76.000	12.000	13.000	9056026*
18	56.000	76.000	14.000	14.500	0646100
610	60.000	68.000	7.000	8.000	4732400
610	60.000	68.000	8.000	9.000	4299200
605	60.000	68.000	11.000	12.500	4538000
610	60.000	68.000	11.400	12.500	4329900
652	60.000	69.800	11.400	12.500	4534910
601	60.000	70.000	6.000	7.000	4606000

Type	Ød ₁	NOMINALS ØD ₁	SL	L ₁	PART No.
605	60.000	70.000	6.000	7.000	4610500
610	60.000	70.000	7.000	8.000	4303200
605	60.000	70.000	7.300	8.000	4703600
601	60.000	70.000	10.000	11.000	4363200
605	60.000	70.000	10.000	11.000	4310600
605	60.000	70.000	11.800	13.000	4306300
610	60.000	70.000	11.800	13.000	4389800
902	60.000	70.000	12.000	13.000	9060036*
616	60.000	70.600	3.900	4.200	4410800
601	60.000	71.000	7.000	8.000	4606100
605	60.000	71.000	7.000	8.000	4615700
652	60.000	72.000	8.700	9.600	4344211
631	60.000	72.000	8.700	9.600	4344210
18	60.000	72.000	9.500	10.000	1397700
605	60.000	72.000	10.000	11.000	4323500
605	60.000	73.000	10.000	11.000	4593900
621	60.000	73.000	13.000	14.000	4526010
605	60.000	75.000	9.000	10.000	4612300
605	60.000	75.000	10.000	11.000	4378700
621	60.000	75.000	11.400	12.500	4298410
605	60.000	75.000	11.800	13.000	4306400
652	60.000	75.000	11.800	13.000	4451211
631	60.000	75.000	11.800	13.000	4451210
605	60.000	75.000	20.500	22.500	4391800
616	60.000	75.500	5.900	6.300	4727100
653	60.000	75.500	5.900	6.300	4403410
16	60.000	75.500	6.000	6.300	65958_
601	60.000	76.000	12.000	13.000	4608000
902	60.000	76.000	12.000	13.000	9060046*
605	60.000	80.000	11.400	12.500	4514300
601	60.000	80.000	12.000	13.000	4602300
605	60.000	80.000	12.000	13.000	4612400
18	60.000	80.000	14.000	14.500	0294900
610	63.000	71.000	8.000	9.000	4316500
601	63.000	73.000	6.000	7.000	4606200



Rod seals
metric

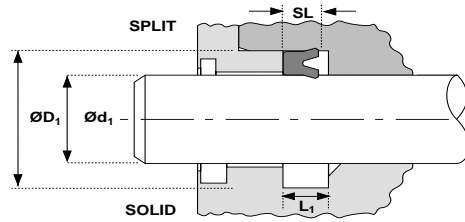


Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
605	63.000	73.000	6.000	7.000	4612500
601	63.000	73.000	11.800	13.000	4363300
605	63.000	73.000	11.800	13.000	4312000
610	63.000	75.000	8.600	9.600	4360500
652	63.000	75.000	8.700	9.600	4326511
631	63.000	75.000	8.700	9.600	4326510
601	63.000	78.000	8.400	9.500	4184301‡
605	63.000	78.000	10.000	11.000	4312100
605	63.000	78.000	11.400	12.500	4306500‡
621	63.000	78.000	11.400	12.500	4317510‡
21	63.000	78.000	12.500	13.000	2192822‡
16	63.000	78.500	6.000	6.300	65959_‡
616	63.000	78.500	6.000	6.300	4368200‡
902	63.000	79.000	12.000	13.000	9063016*
621	63.000	83.000	11.800	13.000	4520510
902	63.000	83.000	12.000	13.000	9063026
18	63.000	83.000	14.000	14.500	0646300
610	65.000	73.000	8.000	9.000	4362500
601	65.000	75.000	6.000	7.000	4606300
605	65.000	75.000	6.000	7.000	4615900
605	65.000	75.000	7.700	9.000	4314500
605	65.000	75.000	11.800	13.000	4306600
610	65.000	75.000	11.800	13.000	4389900
605	65.000	77.000	9.000	10.000	4703700
605	65.000	77.700	9.500	10.500	4334500
605	65.000	78.000	10.000	11.000	4616200
601	65.000	80.000	8.400	9.500	4184401‡
605	65.000	80.000	9.000	10.000	4612600
605	65.000	80.000	11.800	13.000	4312200
902	65.000	80.000	12.000	13.000	9065026*
16	65.000	80.500	6.000	6.300	65960_‡
616	65.000	80.500	6.000	6.300	4548000
601	65.000	85.000	12.000	13.000	4602400
605	65.000	85.000	12.000	13.000	4612700
605	67.000	77.000	6.000	7.000	4612800

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
902	67.000	87.000	15.000	16.000	9067006*
610	70.000	78.000	8.000	9.000	4316600
601	70.000	80.000	6.000	7.000	4606400
605	70.000	80.000	6.000	7.000	4615800
610	70.000	80.000	6.500	7.500	4335000‡
601	70.000	80.000	11.800	13.000	4363400
605	70.000	80.000	11.800	13.000	4312300
610	70.000	80.000	11.800	13.000	4390000
605	70.000	82.000	8.700	9.600	4494700
652	70.000	82.000	8.700	9.600	4344311
631	70.000	82.000	8.700	9.600	4344310
605	70.000	82.000	10.000	11.000	4323600
605	70.000	83.000	10.000	11.000	4616400
601	70.000	85.000	8.400	9.500	4184501‡
605	70.000	85.000	9.000	10.000	4612900
605	70.000	85.000	10.000	11.000	4302700
605	70.000	85.000	11.400	12.500	4301200‡
621	70.000	85.000	11.400	12.500	4317610‡
21	70.000	85.000	12.500	13.000	6583820‡
605	70.000	85.000	20.500	22.500	4401400
16	70.000	85.500	6.000	6.300	65961_‡
616	70.000	85.500	6.000	6.300	4368300‡
601	70.000	90.000	12.000	13.000	4602500
605	70.000	90.000	12.000	13.000	4613000
18	70.000	90.000	14.000	14.500	0296000
902	70.000	90.000	15.000	16.000	9070046*
601	70.000	92.000	12.000	13.000	4602600
601	71.000	80.000	6.000	7.000	4606500
902	71.000	91.000	12.000	13.000	9071016*
902	71.000	91.000	15.000	16.000	9071026*
610	75.000	83.000	8.000	9.000	4539400
605	75.000	83.000	11.400	12.500	4706300
601	75.000	85.000	6.000	7.000	4606600
605	75.000	85.000	6.000	7.000	4616800
601	75.000	85.000	11.800	13.000	4363500



Rod seals
metric

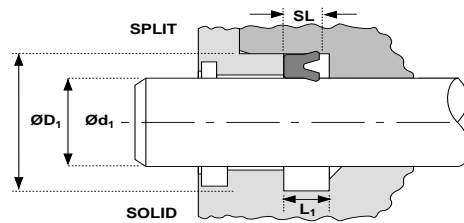


Type	Ød ₁	NOMINALS ØD ₁	SL	L ₁	PART No.
605	75.000	85.000	11.800	13.000	4312400
605	75.000	88.000	10.000	11.000	4616300
621	75.000	88.000	13.000	14.000	4526110
605	75.000	90.000	9.000	10.000	4613100
18	75.000	90.000	12.000	12.500	0740600
616	75.000	90.500	5.900	6.300	4728200
16	75.000	90.500	6.000	6.300	65962_ _
601	75.000	95.000	12.000	13.000	4602700
605	75.000	95.000	12.000	13.000	4613200
652	75.000	95.000	12.500	14.000	4547810
18	75.000	95.000	14.000	14.500	0412700
21	75.000	95.000	14.000	14.500	0896220
902	75.000	95.000	15.000	16.000	9075036*
601	75.000	100.000	22.000	24.000	4584700l
605	78.000	86.000	9.000	10.000	4538700
16	78.000	93.500	6.000	6.300	86112_ _
610	80.000	88.000	8.000	9.000	4316700
601	80.000	90.000	6.000	7.000	4606700
605	80.000	90.000	6.000	7.000	4616000
601	80.000	90.000	8.000	8.700	4159001
605	80.000	90.000	10.000	11.000	4390400
601	80.000	90.000	11.800	13.000	4363600
605	80.000	90.000	11.800	13.000	4312500
605	80.000	92.000	8.700	9.600	4494800
605	80.000	93.000	10.000	11.000	4615200
601	80.000	95.000	8.400	9.500	4184601‡
605	80.000	95.000	9.000	10.000	4613300
605	80.000	95.000	10.000	11.000	4383500
621	80.000	95.000	11.400	12.500	4317710‡
605	80.000	95.000	11.800	13.000	4306700
18	80.000	95.000	12.000	12.500	0732700
21	80.000	95.000	12.500	13.000	2192922‡
621	80.000	95.000	13.000	14.000	4540610
631	80.000	95.000	14.500	16.000	4446510
652	80.000	95.000	14.500	16.000	4446511

Type	Ød ₁	NOMINALS ØD ₁	SL	L ₁	PART No.
16	80.000	95.500	6.000	6.300	65963_ _‡
616	80.000	95.500	6.000	6.300	4368400‡
601	80.000	100.000	12.000	13.000	4602800
605	80.000	100.000	12.000	13.000	4613400
18	80.000	100.000	14.000	14.500	0295100
605	80.000	100.000	14.500	16.000	4382800‡
902	80.000	100.000	15.000	16.000	9080036*
605	80.000	110.000	16.400	18.000	4342900
605	85.000	93.000	10.000	11.000	4392700
605	85.000	93.000	11.000	12.500	4537900
631	85.000	97.000	8.700	9.600	4344510
610	85.000	97.000	9.000	10.000	4328100
601	85.000	100.000	8.400	9.500	4184701‡
601	85.000	100.000	8.900	10.000	4606800
605	85.000	100.000	9.000	10.000	4610600
605	85.000	100.000	10.000	11.000	4615300
605	85.000	100.000	11.800	13.000	4306800
621	85.000	100.000	13.000	14.000	4540710
616	85.000	100.500	5.600	6.300	4538400
16	85.000	100.500	6.000	6.300	65964_ _
601	85.000	105.000	12.000	13.000	4602900
605	85.000	105.000	12.000	13.000	4613500
610	87.000	95.000	8.000	9.000	4323700
610	90.000	98.000	8.000	9.000	4316800
605	90.000	98.000	11.400	12.500	4706400
605	90.000	100.000	6.800	7.500	4493500‡
605	90.000	100.000	9.000	10.000	4366900
601	90.000	100.000	11.800	13.000	4363700
605	90.000	100.000	11.800	13.000	4314600
605	90.000	102.000	8.700	9.600	4333000
601	90.000	105.000	8.400	9.500	4184801‡
601	90.000	105.000	8.900	10.000	4606900
605	90.000	105.000	9.000	10.000	4613600
605	90.000	105.000	10.000	11.000	4615400
605	90.000	105.000	11.400	12.500	4306900‡



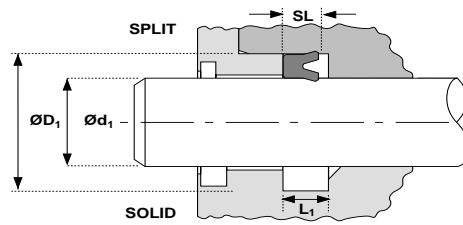
Rod seals
metric



Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
621	90.000	105.000	11.400	12.500	4317810‡
21	90.000	105.000	12.500	13.000	6583920‡
621	90.000	105.000	13.000	14.000	4526310
652	90.000	105.000	14.500	16.000	4428011
631	90.000	105.000	14.500	16.000	4428010
653	90.000	105.500	5.900	6.300	4523710
16	90.000	105.500	6.000	6.300	65965_‡
616	90.000	105.500	6.000	6.300	4368500‡
18	90.000	110.000	10.000	10.500	0306700
601	90.000	110.000	12.000	13.000	4603000
605	90.000	110.000	12.000	13.000	4613700
18	90.000	110.000	14.000	14.500	0071700
18	90.000	110.000	15.000	15.500	0712400
902	90.000	110.000	15.000	16.000	9090036*
601	95.000	110.000	8.900	10.000	4607000
605	95.000	110.000	9.000	10.000	4610700
605	95.000	110.000	10.000	11.000	4615500
621	95.000	110.000	13.000	14.000	4540810
616	95.000	110.500	5.900	6.300	4538500
16	95.000	110.500	6.000	6.300	65966_
601	95.000	115.000	12.000	13.000	4603100
605	95.000	115.000	12.000	13.000	4613800
902	95.000	115.000	15.000	16.000	9095036*
605	96.000	104.000	10.900	12.000	4380300
16	97.000	112.500	6.000	6.300	86113_
610	100.000	108.000	8.000	9.000	4316900
605	100.000	110.000	10.900	12.000	4461700
601	100.000	115.000	8.900	10.000	4607100
605	100.000	115.000	9.000	10.000	4610800
605	100.000	115.000	10.000	11.000	4617100
652	100.000	115.000	11.000	12.000	4528010
605	100.000	115.000	11.800	13.000	4312600
18	100.000	115.000	12.000	12.500	0740500
621	100.000	115.000	13.000	14.000	4540910
652	100.000	115.000	14.500	16.000	4397611

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
631	100.000	115.000	14.500	16.000	4397610
16	100.000	115.500	6.000	6.300	65967_‡
616	100.000	115.500	6.000	6.300	4368600‡
601	100.000	120.000	11.000	12.500	4184901‡
605	100.000	120.000	11.800	13.000	4312700
601	100.000	120.000	12.000	13.000	4603200
18	100.000	120.000	14.000	14.500	0296100
21	100.000	120.000	14.000	14.500	2178720
605	100.000	120.000	14.500	16.000	4307000‡
621	100.000	120.000	14.600	16.000	4317910‡
902	100.000	120.000	15.000	16.000	9100036*
21	100.000	120.000	16.000	17.000	6581720‡
18	100.000	125.000	19.000	20.000	0418600
605	105.000	113.000	10.000	11.000	4392800
605	105.000	115.000	13.200	14.500	4390500
605	105.000	120.000	14.500	16.000	4379500‡
16	105.000	120.500	5.900	6.300	86478_
601	105.000	125.000	11.400	12.500	4185001‡
601	105.000	125.000	15.000	17.000	4603300
902	105.000	125.000	16.000	17.000	9105026*
652	105.220	120.000	11.800	12.950	4406711
605	108.000	123.000	10.900	12.000	4329100
605	110.000	125.000	9.000	10.000	4459700
18	110.000	125.000	11.000	11.500	0558300
605	110.000	125.000	11.000	12.000	4537800
605	110.000	125.000	14.500	16.000	4481600
652	110.000	125.000	14.500	16.000	4445611
631	110.000	125.000	14.500	16.000	4445610
16	110.000	125.500	6.000	6.300	66229_‡
616	110.000	125.500	6.000	6.300	4545400‡
601	110.000	130.000	11.000	12.500	4185101‡
605	110.000	130.000	11.800	13.000	4312800
621	110.000	130.000	13.000	14.000	4541010
605	110.000	130.000	14.500	16.000	4307100‡
621	110.000	130.000	14.600	16.000	4318010‡

Rod seals
metric

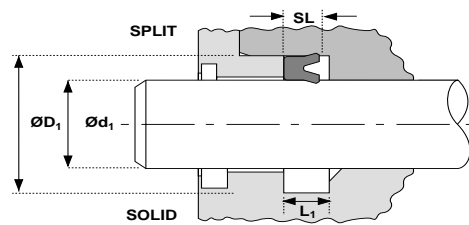


Type	NOMINALS				PART No.
	Ød ₁	ØD ₁	SL	L ₁	
601	110.000	130.000	15.000	17.000	4603400
21	110.000	130.000	16.000	17.000	2193022‡
902	110.000	130.000	16.000	17.000	9110026*
605	110.000	135.000	14.500	16.000	4343000
18	110.000	135.000	19.000	20.000	0304300
601	112.000	125.000	8.900	10.000	4607200
605	112.000	125.000	9.000	10.000	4610900
902	112.000	132.000	15.000	16.000	9112016
601	115.000	130.000	9.000	10.000	4621600
605	115.000	130.000	9.000	10.000	4459800
605	115.000	130.000	10.900	12.000	4434600
605	115.000	130.000	14.500	16.000	4342600
652	115.000	130.000	14.500	16.000	4455411
631	115.000	130.000	14.500	16.000	4455410
16	115.000	130.500	6.000	6.300	66391_ _
902	115.000	135.000	12.000	13.000	9115006
18	115.000	135.000	14.000	14.500	0639900
601	115.000	135.000	15.000	17.000	4608100
902	118.000	133.000	9.000	10.000	9118026
605	120.000	128.000	11.400	12.500	4706500
605	120.000	130.000	10.900	12.000	4461800
605	120.000	135.000	9.000	10.000	4614000
631	120.000	135.000	14.500	16.000	4452010
621	120.000	135.000	14.600	16.000	4318110
16	120.000	135.500	5.900	6.300	86099_ _
605	120.000	140.000	12.000	13.000	4614100
621	120.000	140.000	13.000	14.000	4541110
601	120.000	140.000	14.500	16.000	4319600
605	120.000	140.000	14.500	16.000	4312900
601	120.000	140.000	15.000	17.000	4603500
902	120.000	140.000	16.000	17.000	9120036*
18	120.000	145.000	19.000	20.000	0070400
605	125.000	133.000	10.000	11.000	4392900
601	125.000	140.000	8.900	10.000	4607300
605	125.000	140.000	9.000	10.000	4614200

Type	NOMINALS				PART No.
	Ød ₁	ØD ₁	SL	L ₁	
652	125.000	140.000	14.500	16.000	4446911
631	125.000	140.000	14.500	16.000	4446910
16	125.000	140.500	6.000	6.300	66392_ _‡
616	125.000	140.500	6.000	6.300	4545500‡
601	125.000	145.000	11.000	12.500	4185201‡
605	125.000	145.000	12.000	13.000	4614300
605	125.000	145.000	14.500	16.000	4307300‡
621	125.000	145.000	14.600	16.000	4318210‡
601	125.000	145.000	15.000	17.000	4603600
21	125.000	145.000	16.000	17.000	6581820‡
902	125.000	145.000	16.000	17.000	9125036*
605	125.000	150.000	12.500	14.000	4367000
18	125.000	150.000	19.000	20.000	0070500
902	125.000	150.000	19.000	20.000	9125046*
631	128.000	143.000	14.500	16.000	4581610
605	130.000	140.000	14.500	16.000	4390600
605	130.000	145.000	9.000	10.000	4614400
18	130.000	145.000	11.300	11.800	0634500*
16	130.000	145.500	6.000	6.300	86102_ _
605	130.000	150.000	12.000	13.000	4614500
605	130.000	150.000	14.500	16.000	4313000
621	130.000	150.000	14.500	16.000	4709810
601	130.000	150.000	15.000	17.000	4603700
605	132.500	157.500	13.200	14.500	4329400
610	134.000	147.000	12.000	13.300	4588100*
605	135.000	150.000	11.000	12.500	4537700
16	135.000	150.500	6.000	6.300	86103_ _
652	135.000	155.000	13.650	15.000	4475410
18	135.000	160.000	19.000	20.000	0080400
902	135.000	160.000	19.000	20.000	9135006*
601	136.000	150.000	8.500	9.500	4607400
605	140.000	150.000	10.900	12.000	4461900
601	140.000	154.000	9.000	10.000	4607900
601	140.000	155.000	8.900	10.000	4607500
605	140.000	155.000	9.000	10.000	4614600



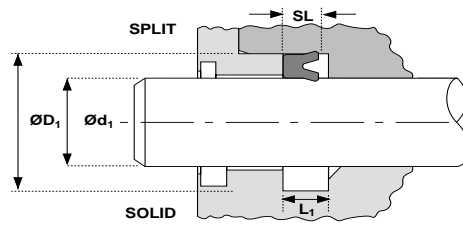
Rod seals
metric



Type	NOMINALS				PART No.
	Ød ₁	ØD ₁	SL	L ₁	
605	140.000	155.000	11.800	13.000	4555300
16	140.000	155.500	6.000	6.300	66393_ _ ‡
616	140.000	155.500	6.000	6.300	4545600‡
605	140.000	160.000	11.800	13.000	4313100
621	140.000	160.000	13.000	14.000	4541210
605	140.000	160.000	14.500	16.000	4307400‡
621	140.000	160.000	14.600	16.000	4318310‡
601	140.000	160.000	15.000	17.000	4603800
21	140.000	160.000	16.000	17.000	2193122‡
902	140.000	165.000	12.000	13.000	9140046*
18	140.000	165.000	19.000	20.000	0080500
902	140.000	165.000	19.000	20.000	9140056*
601	145.000	160.000	8.900	10.000	4607600
16	145.000	160.500	6.000	6.300	86156_ _
601	145.000	165.000	15.000	17.000	4608200
605	150.000	160.000	11.000	12.000	4595200‡
601	150.000	165.000	8.900	10.000	4607700
605	150.000	165.000	9.000	10.000	4614700
652	150.000	165.000	14.500	16.000	4389111
631	150.000	165.000	14.500	16.000	4389110
16	150.000	165.500	6.000	6.300	86157_ _
605	150.000	170.000	12.000	13.000	4614800
605	150.000	170.000	13.200	14.500	4367100
18	150.000	170.000	14.000	14.500	0303300
605	150.000	170.000	14.500	16.500	4342800
601	150.000	170.000	15.000	17.000	4603900
902	150.000	175.000	16.000	17.000	9150046*
605	151.000	159.000	9.000	10.000	4538800
601	155.000	170.000	9.000	10.000	4621700
605	155.000	170.000	14.500	16.000	4342700
601	155.000	180.000	15.000	17.000	4608300
601	160.000	175.000	9.000	10.000	4608400
605	160.000	175.000	9.000	10.000	4614900
605	160.000	175.000	10.900	12.000	4462000
652	160.000	175.000	11.700	12.800	4484010

Type	NOMINALS				PART No.
	Ød ₁	ØD ₁	SL	L ₁	
652	160.000	175.000	14.500	16.000	4405011
631	160.000	175.000	14.500	16.000	4405010
16	160.000	175.500	6.000	6.300	66394_ _ ‡
616	160.000	175.500	6.000	6.300	4548100‡
21	160.000	176.000	12.000	12.500	2120120*
652	160.000	177.000	12.300	13.500	4483110
605	160.000	180.000	12.000	13.000	4615000
605	160.000	180.000	14.500	16.000	4345000
621	160.000	180.000	14.600	16.000	4454810
18	160.000	180.000	15.000	15.500	1283100
621	160.000	185.000	14.500	16.000	4723410
601	160.000	185.000	15.000	17.000	4608500
631	160.000	185.000	18.800	20.000	4401710
21	160.000	185.000	20.000	21.000	6581920‡
18	160.000	190.000	24.000	25.000	0136100
601	165.000	180.000	9.000	10.000	4608600
605	165.000	180.000	9.000	10.000	4616500
911	165.000	180.500	5.900	6.300	9165016
631	165.000	182.000	14.500	16.000	4537410
652	165.000	182.000	14.500	16.000	4537411
601	165.000	183.000	10.000	11.000	4607800
601	165.000	190.000	15.000	17.000	4608700
16	170.000	185.500	6.000	6.300	86083_ _
902	170.000	190.000	12.000	13.000	9170006
605	170.000	190.000	14.500	16.000	4398800
902	170.000	190.000	16.000	17.000	9170016*
601	170.000	195.000	15.000	17.000	4608800
601	175.000	190.000	9.000	10.000	4621800
902	175.000	200.000	12.000	13.000	9175006*
601	175.000	200.000	15.000	17.000	4608900
18	175.000	200.000	19.000	20.000	0838800
652	177.000	192.000	14.500	16.000	4445711
631	177.000	192.000	14.500	16.000	4445710
652	180.000	195.000	14.500	16.000	4734610
16	180.000	195.500	6.000	6.300	66395_ _ ‡

Rod seals
metric

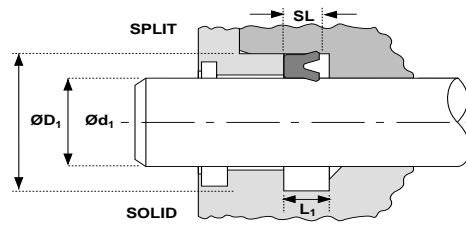


Type	NOMINALS				PART No.
	Ød ₁	ØD ₁	SL	L ₁	
605	180.000	200.000	11.800	13.000	4314700
601	180.000	200.000	12.000	13.000	4609000
605	180.000	200.000	14.500	16.000	4560900
621	180.000	200.000	14.600	16.000	4454910
601	180.000	205.000	15.000	17.000	4609100
21	180.000	205.000	20.000	21.000	6582020‡
18	180.000	210.000	24.000	25.000	0087200
605	185.000	200.000	10.900	12.000	4462100
631	185.000	210.000	18.200	20.000	4546610
631	190.000	205.000	14.500	16.000	4430810
16	190.000	205.500	6.000	6.300	86074__
601	190.000	210.000	12.000	13.000	4609200
902	190.000	210.000	16.000	17.000	9190016*
601	190.000	215.000	15.000	17.000	4609300
652	195.000	210.000	14.500	16.000	4459311
631	195.000	210.000	14.500	16.000	4459310
652	195.000	215.000	14.500	16.000	4550511
631	195.000	215.000	14.500	16.000	4550510
601	200.000	220.000	12.000	13.000	4609400
605	200.000	220.000	12.000	13.000	4615100
605	200.000	220.000	14.500	16.000	4380200
652	200.000	220.000	14.500	16.000	4387611
631	200.000	220.000	14.500	16.000	4387610
621	200.000	220.000	14.600	16.000	4455110
18	200.000	220.000	15.000	15.500	1284100
16	200.000	221.000	7.800	8.100	66396_‡
601	200.000	225.000	15.000	17.000	4609500
21	200.000	225.000	20.000	21.000	6582220‡
18	200.000	230.000	24.000	25.000	2010000*
902	204.000	224.000	12.000	13.000	9204006*
605	205.000	220.000	12.200	13.500	4522400
902	210.000	230.000	12.000	13.000	9210006
652	210.000	230.000	14.500	16.000	4472911
631	210.000	230.000	14.500	16.000	4472910
902	210.000	230.000	16.000	17.000	9210016*

Type	NOMINALS				PART No.
	Ød ₁	ØD ₁	SL	L ₁	
16	210.000	231.000	7.800	8.100	86094__
902	210.000	235.000	16.000	17.000	9210026*
601	210.000	235.000	18.000	20.000	4609600
621	215.000	235.000	14.500	16.000	4705610
653	215.000	236.000	8.100	8.100	4705710
601	220.000	240.000	12.000	13.000	4609700
605	220.000	240.000	14.500	16.000	4555400
652	220.000	240.000	14.500	16.000	4544510
902	220.000	240.000	16.000	17.000	9220016*
16	220.000	241.000	7.800	8.100	66397_‡
902	220.000	245.000	16.000	17.000	9220026*
601	220.000	250.000	17.000	19.200	4426600
18	220.000	250.000	22.000	23.000	0958900
21	220.000	250.000		25.000	6592120
631	225.000	240.000	14.500	16.000	4445810
652	225.000	240.000	14.500	16.000	4445811
902	225.000	245.000	12.000	13.000	9225006*
902	225.000	245.000	16.000	17.000	9225016*
16	225.000	246.000	7.800	8.100	8337510
902	225.000	250.000	16.000	17.000	9225026*
652	225.000	250.000	18.000	20.000	4537511
631	225.000	250.000	18.200	20.000	4537510
902	225.000	250.000	19.000	20.000	9225036*
902	225.000	250.000	20.000	21.000	9225046*
652	230.000	249.000	14.500	16.000	4439411
631	230.000	249.300	14.500	16.000	4439410
601	230.000	250.000	12.000	13.000	4609800
652	230.000	250.000	14.500	16.000	4707210
902	230.000	255.000	16.000	17.000	9230026*
652	230.000	255.000	22.000	25.000	4555511
631	230.000	255.000	22.500	25.000	4555510
601	240.000	260.000	12.000	13.000	4621000
652	240.000	260.000	14.500	16.000	4496511
631	240.000	260.000	14.500	16.000	4496510
16	240.000	261.000	7.800	8.100	86159__



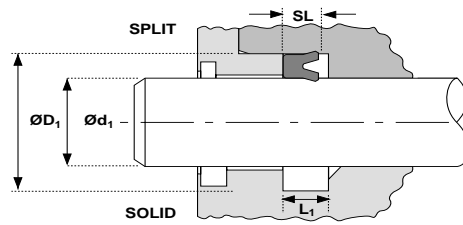
Rod seals
metric



Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
902	240.000	265.000	15.000	16.000	9240026*
601	240.000	265.000	18.000	20.000	4609900
652	245.000	270.000	18.000	20.000	4546711
631	245.000	270.000	18.200	20.000	4546710
652	250.000	270.000	14.500	16.000	4728810
902	250.000	270.000	16.000	17.000	9250016
16	250.000	271.000	7.800	8.100	66398_ _ ‡
902	250.000	275.000	16.000	17.000	9250026*
601	250.000	275.000	18.000	20.000	4610000
18	250.000	280.000	24.000	25.000	1055500
652	255.000	275.000	14.500	16.000	4578611
652	260.000	280.000	16.400	18.000	4499011
631	260.000	280.000	16.400	18.000	4499010
902	260.000	285.000	16.000	17.000	9260006*
902	260.000	285.000	19.000	20.000	9260016
601	260.000	290.000	18.000	20.000	4620100
652	265.000	285.000	14.500	16.000	4722110
601	265.000	295.000	18.000	20.000	4620200
16	270.000	294.500	7.800	8.100	86069_ _
902	270.000	295.000	16.000	17.000	9270006*
902	270.000	295.000	19.000	20.000	9270016*
601	270.000	300.000	18.000	20.000	4620300
902	270.000	300.000	19.000	20.000	9270026*
18	270.000	300.000	24.000	25.000	0094800
902	270.000	300.000	24.000	25.000	9270036*
652	280.000	300.000	14.600	16.000	4713910
16	280.000	304.500	7.800	8.100	66399_ _ ‡
02	280.000	305.000	16.000	17.000	9280006*
902	280.000	305.000	19.000	20.000	9280016*
601	280.000	310.000	18.000	20.000	4620400
902	280.000	310.000	19.000	20.000	9280026*
18	280.000	310.000	24.000	25.000	0094900*
652	285.000	310.000	18.000	20.000	4537611
631	285.000	310.000	18.000	20.000	4537610
631	290.000	310.000	16.400	18.000	4475110

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
652	290.000	310.000	16.400	18.000	4475111
16	290.000	314.500	7.800	8.100	86173_ _
902	290.000	315.000	16.000	17.000	9290006*
902	290.000	315.000	19.000	20.000	9290016*
601	290.000	320.000	18.000	20.000	4620500
902	290.000	320.000	19.000	20.000	9290026*
652	295.000	315.000	16.400	18.000	4598211
652	300.000	320.000	14.500	16.000	4525110
16	300.000	324.500	7.800	8.100	66400_ _
902	300.000	325.000	16.000	17.000	9300006*
902	300.000	325.000	19.000	20.000	9300016*
601	300.000	330.000	18.000	20.000	4620600
902	300.000	330.000	22.000	23.000	9300036*
18	300.000	330.000	24.000	25.000	0095000
631	305.000	325.000	16.400	18.000	4473010
652	305.000	325.000	16.400	18.000	4473011
652	305.000	330.000	18.000	20.000	4546811
631	305.000	330.000	18.000	20.000	4546810
652	305.000	335.000	16.400	18.000	4721910
652	320.000	340.000	14.500	16.000	4544410
652	320.000	340.000	16.000	18.000	4707310
16	320.000	344.500	7.800	8.100	86082_ _ ‡
18	320.000	360.000	30.000	31.000	1054000*
631	325.000	355.000	18.000	20.000	4555710
652	325.000	355.000	18.200	20.000	4555711
605	330.000	350.000	18.200	20.000	4587400
16	330.000	354.500	7.800	8.100	86196_ _
652	335.000	355.000	16.400	18.000	4496611
631	335.000	355.000	16.400	18.000	4496610
902	335.000	385.000	22.000	23.000	9335006*
16	340.000	364.500	7.800	8.100	86197_ _
652	340.000	365.000	18.500	20.000	4732810
16	350.000	374.500	7.800	8.100	86198_ _
652	350.000	375.000	18.000	20.000	4718010
652	355.000	380.000	18.000	20.000	4578411

Rod seals
metric



Hallite



16



18



21



601



605



610



616



621



631



652



653



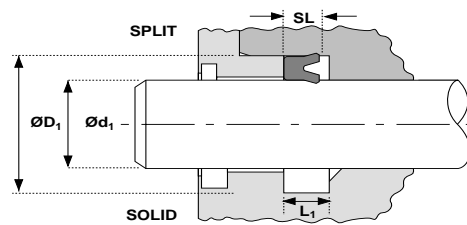
902

Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
16	360.000	384.500	7.800	8.100	86199_ _ ‡
18	360.000	400.000	30.000	31.000	1054300
16	370.000	394.500	7.800	8.100	86200_ _
652	370.000	395.000	18.000	20.000	4579710
601	375.000	405.000	22.000	24.000	4620700
16	380.000	404.500	7.800	8.100	86201_ _
18	380.000	420.000	30.000	31.000	0095100*
16	390.000	414.500	7.800	8.100	86202_ _
652	390.000	415.000	18.000	20.000	4730010
16	400.000	424.500	7.800	8.100	86203_ _
601	400.000	425.000	25.000	27.000	4620800
902	400.000	430.000	22.000	23.000	9400006*

Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	

Rod seals

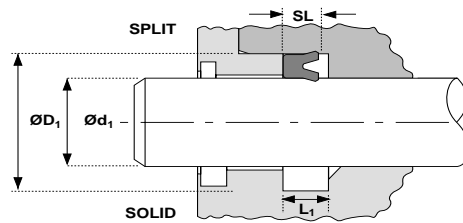
inch



Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
26	0.125	0.375	0.125	0.138	28-41
511	0.125	0.375	0.125	0.138	8900810
26	0.125	0.500	0.187	0.207	28-01
26	0.187	0.437	0.125	0.138	28-42
511	0.187	0.438	0.125	0.138	8800110
26	0.187	0.562	0.187	0.207	28-02
26	0.250	0.500	0.125	0.138	28-43
511	0.250	0.500	0.125	0.138	8800210
513	0.250	0.500	0.187	0.207	8845910
513	0.250	0.500	0.250	0.275	8878510
26	0.250	0.625	0.187	0.207	28-03
26	0.250	0.750	0.250	0.275	28-08
26	0.312	0.562	0.125	0.138	28-44
26	0.312	0.687	0.187	0.207	28-04
26	0.312	0.812	0.250	0.275	28-09
26	0.375	0.625	0.125	0.138	28-45
511	0.375	0.625	0.125	0.138	8800410
605	0.375	0.625	0.198	0.218	4544300
513	0.375	0.625	0.250	0.275	8823810
26	0.375	0.750	0.187	0.207	28-05
18	0.375	0.750	0.281	0.300	1379300
605	0.375	0.750	0.312	0.343	4710500
26	0.375	0.875	0.250	0.275	28-10
511	0.375	0.875	0.250	0.275	8865810
511	0.375	1.000	0.312	0.344	8824910
26	0.437	0.687	0.125	0.138	28-46
513	0.437	0.687	0.250	0.275	8846910
26	0.437	0.812	0.187	0.207	28-06
26	0.437	0.937	0.250	0.275	28-11
26	0.500	0.750	0.125	0.138	28-47
511	0.500	0.750	0.125	0.138	8800610
611	0.500	0.750	0.125	0.138	4418100
605	0.500	0.750	0.187	0.207	4576100
513	0.500	0.750	0.250	0.275	8834010
601	0.500	0.750	0.250	0.275	4566500

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
26	0.500	0.875	0.187	0.207	28-07
511	0.500	0.875	0.187	0.207	8800710
601	0.500	0.875	0.197	0.218	4300000
513	0.500	0.875	0.250	0.275	8848010
18	0.500	0.875	0.281	0.300	0406700
513	0.500	0.875	0.312	0.344	8852910
26	0.500	1.000	0.250	0.275	28-12
511	0.500	1.000	0.250	0.275	8806310
601	0.500	1.000	0.250	0.275	4110201
513	0.500	1.000	0.375	0.413	8837710
511	0.562	0.812	0.125	0.138	8844610
611	0.562	0.812	0.125	0.138	4466600
605	0.562	0.813	0.187	0.207	4576200
26	0.562	1.062	0.250	0.275	28-13
511	0.625	0.875	0.125	0.138	8800810
611	0.625	0.875	0.125	0.138	4399500
620	0.625	0.875	0.160	0.176	4498600
620	0.625	0.875	0.175	0.190	4528700
18	0.625	0.875	0.187	0.203	1435600
513	0.625	0.875	0.187	0.207	8848710
605	0.625	0.875	0.187	0.207	4493700
605	0.625	0.875	0.241	0.265	4329000
513	0.625	0.875	0.250	0.275	8834110
620	0.625	0.875	0.250	0.275	4459900
16	0.625	0.921	0.116	0.125	6623010
26	0.625	1.000	0.187	0.207	28-48
511	0.625	1.000	0.187	0.207	8800910
601	0.625	1.000	0.190	0.218	4298300
18	0.625	1.000	0.281	0.300	1247600
605	0.625	1.000	0.281	0.312	4447200
26	0.625	1.125	0.250	0.275	28-14
511	0.625	1.125	0.250	0.275	8806410
601	0.625	1.125	0.250	0.275	4509101
513	0.625	1.125	0.312	0.344	8849210
511	0.687	0.937	0.125	0.138	8801010

Rod seals
inch

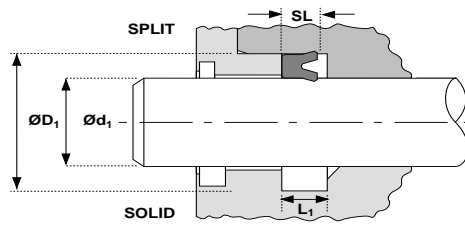


Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
611	0.687	0.937	0.125	0.138	4410100
605	0.687	0.937	0.187	0.207	4572000
26	0.687	1.187	0.250	0.275	28-15
658	0.750	0.937	0.156	0.172	4472400
511	0.750	1.000	0.125	0.138	8801110
605	0.750	1.000	0.125	0.138	4552900
611	0.750	1.000	0.125	0.138	4410000
621	0.750	1.000	0.187	0.207	4583900
605	0.750	1.000	0.187	0.207	4571000
513	0.750	1.000	0.250	0.275	8834210
605	0.750	1.000	0.250	0.275	4345100
620	0.750	1.000	0.250	0.275	4498500
416	0.750	1.037	0.120	0.126	7200500
18	0.750	1.093	0.281	0.300	1364200
26	0.750	1.125	0.187	0.207	28-49
511	0.750	1.125	0.187	0.207	8801210
513	0.750	1.125	0.187	0.207	8849810
513	0.750	1.125	0.250	0.275	8846010
513	0.750	1.125	0.312	0.344	8834310
605	0.750	1.125	0.312	0.344	4512200
513	0.750	1.125	0.375	0.413	8855810
16	0.750	1.183	0.150	0.165	6623110
26	0.750	1.250	0.250	0.275	28-16
511	0.750	1.250	0.250	0.275	8806510
601	0.750	1.250	0.250	0.275	4102901
18	0.750	1.250	0.375	0.395	0403700
513	0.750	1.250	0.375	0.413	8837810
511	0.812	1.062	0.125	0.138	8815310
611	0.812	1.062	0.125	0.138	4521200
605	0.812	1.062	0.187	0.207	4576300
605	0.812	1.062	0.250	0.275	4558700
26	0.812	1.312	0.250	0.275	28-17
18	0.812	1.375	0.500	0.520	0413800
511	0.875	1.125	0.125	0.138	8801410
611	0.875	1.125	0.125	0.138	4416700

Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
605	0.875	1.125	0.187	0.207	4576400
658	0.875	1.125	0.187	0.207	4527500
620	0.875	1.125	0.187	0.207	4709100
513	0.875	1.125	0.250	0.275	8845310
605	0.875	1.125	0.250	0.275	4442500
611	0.875	1.250	0.187	0.206	4415700
26	0.875	1.250	0.187	0.207	28-50
511	0.875	1.250	0.187	0.207	8801510
513	0.875	1.250	0.312	0.344	8900210
26	0.875	1.375	0.250	0.275	28-18
511	0.875	1.375	0.250	0.275	8806610
601	0.875	1.375	0.250	0.275	4507101
513	0.875	1.375	0.312	0.344	8830210
605	0.875	1.375	0.341	0.375	4373100
18	0.875	1.375		0.375	0401300
18	0.875	1.375	0.375	0.395	0401300
513	0.875	1.375	0.375	0.413	8864610
511	0.937	1.187	0.125	0.138	8844810
26	0.937	1.437	0.250	0.275	28-19
611	1.000	1.125	0.125	0.139	4455200
605	1.000	1.240	0.187	0.211	4371800
511	1.000	1.250	0.125	0.138	8801610
611	1.000	1.250	0.125	0.138	4457300
513	1.000	1.250	0.187	0.207	8860110
605	1.000	1.250	0.187	0.207	4442600
620	1.000	1.250	0.187	0.207	4457500
658	1.000	1.250	0.187	0.207	4569000
513	1.000	1.250	0.250	0.275	8834410
605	1.000	1.250	0.250	0.275	4345200
620	1.000	1.250	0.250	0.275	4498400
416	1.000	1.287	0.120	0.126	7201000
511	1.000	1.312	0.156	0.172	8810110
605	1.000	1.312	0.219	0.241	4493800
26	1.000	1.375	0.187	0.207	28-51
511	1.000	1.375	0.187	0.207	8801710



Rod seals
inch



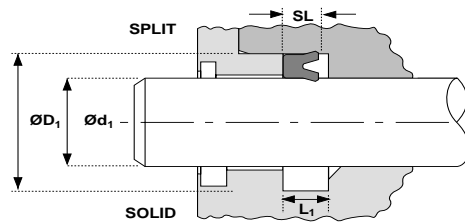
Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
513	1.000	1.375	0.187	0.207	8806110
18	1.000	1.375		0.250	0282600
18	1.000	1.375	0.250	0.270	0282600
513	1.000	1.375	0.250	0.275	8860510
605	1.000	1.375	0.250	0.275	4456800
620	1.000	1.375	0.250	0.275	4410400
513	1.000	1.375	0.312	0.344	8834510
605	1.000	1.375	0.312	0.344	4345900
620	1.000	1.375	0.312	0.344	4584000
16	1.000	1.433	0.150	0.165	6623210
26	1.000	1.500	0.250	0.275	28-20
511	1.000	1.500	0.250	0.275	8806810
601	1.000	1.500	0.250	0.275	4111101
605	1.000	1.500	0.255	0.275	4430200
605	1.000	1.500	0.341	0.375	4330100
18	1.000	1.500	0.375	0.395	0422400
513	1.000	1.500	0.375	0.413	8837910
605	1.000	1.500	0.375	0.413	4308400
511	1.000	1.625	0.312	0.344	8806910
513	1.000	1.625	0.375	0.413	8828310
513	1.000	1.625	0.500	0.550	8838010
511	1.000	1.750	0.375	0.413	8819110
605	1.062	1.302	0.187	0.203	4410300
658	1.062	1.302	0.187	0.207	4549400
511	1.062	1.312	0.125	0.138	8801810
611	1.062	1.312	0.125	0.138	4597800
513	1.062	1.312	0.250	0.275	8845710
605	1.062	1.312	0.250	0.275	4394500
513	1.062	1.437	0.312	0.344	8850010
26	1.062	1.562	0.250	0.275	28-21
605	1.125	1.365	0.192	0.211	4384500
658	1.125	1.368	0.187	0.207	4466200
511	1.125	1.375	0.125	0.138	8801910
605	1.125	1.375	0.187	0.207	4442700
513	1.125	1.375	0.250	0.275	8855610

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
605	1.125	1.375	0.250	0.275	4388000
620	1.125	1.375	0.250	0.275	4461100
513	1.125	1.375	0.312	0.344	8848810
605	1.125	1.399	0.187	0.211	4371900
611	1.125	1.500	0.187	0.206	4455300
26	1.125	1.500	0.187	0.207	28-52
511	1.125	1.500	0.187	0.207	8802010
513	1.125	1.500	0.250	0.275	8844910
620	1.125	1.500	0.250	0.275	4410500
18	1.125	1.500		0.281	0525100
513	1.125	1.500	0.312	0.344	8834610
605	1.125	1.500	0.312	0.344	4392600
605	1.125	1.562	0.325	0.360	4568800
26	1.125	1.625	0.250	0.275	28-22
511	1.125	1.625	0.250	0.275	8807010
605	1.125	1.625	0.250	0.275	4370900
18	1.125	1.625	0.375	0.395	0287000
513	1.125	1.625	0.375	0.413	8856110
511	1.125	1.750	0.312	0.344	8807110
605	1.125	1.750	0.397	0.437	4373000
18	1.125	1.750	0.437	0.457	0778200
513	1.125	1.750	0.500	0.550	8879810
513	1.187	1.437	0.250	0.275	8848910
511	1.187	1.500	0.156	0.172	8811010
611	1.187	1.562	0.187	0.206	4536400
511	1.187	1.562	0.187	0.207	8851710
605	1.187	1.562	0.250	0.275	4458600
26	1.187	1.687	0.250	0.275	28-23
658	1.250	1.491	0.197	0.217	4359610
511	1.250	1.500	0.125	0.138	8802210
513	1.250	1.500	0.187	0.207	8860210
620	1.250	1.500	0.187	0.207	4398900
513	1.250	1.500	0.250	0.275	8834710
605	1.250	1.500	0.250	0.275	4345300
620	1.250	1.500	0.250	0.275	4461000



Rod seals

inch

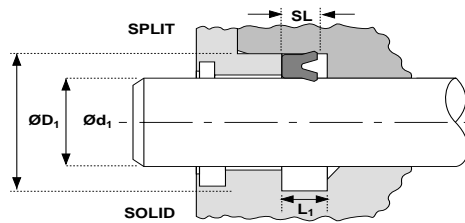


Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
416	1.250	1.537	0.120	0.126	7201200
511	1.250	1.562	0.156	0.172	8813810
611	1.250	1.625	0.187	0.206	4535600
26	1.250	1.625	0.187	0.207	28-53
511	1.250	1.625	0.187	0.207	8802310
605	1.250	1.625	0.187	0.207	4552600
605	1.250	1.625	0.227	0.250	4330200
513	1.250	1.625	0.250	0.275	8860610
605	1.250	1.625	0.250	0.275	4460600
18	1.250	1.625	0.281	0.300	0282400
513	1.250	1.625	0.312	0.344	8834810
605	1.250	1.625	0.312	0.344	4346000
620	1.250	1.625	0.312	0.344	4410600
513	1.250	1.625	0.375	0.413	8860710
26	1.250	1.750	0.250	0.275	28-24
511	1.250	1.750	0.250	0.275	8807210
601	1.250	1.750	0.250	0.275	4502701
605	1.250	1.750	0.250	0.275	4513500
513	1.250	1.750	0.375	0.413	8838110
601	1.250	1.750	0.375	0.413	4107001
605	1.250	1.750	0.375	0.413	4335800
26	1.250	1.875	0.312	0.344	28-25
511	1.250	1.875	0.312	0.344	8870010
605	1.250	1.875	0.397	0.437	4330300
18	1.250	1.875	0.437	0.457	0404100
513	1.250	1.875	0.500	0.550	8838210
511	1.250	2.000	0.375	0.413	8814310
513	1.250	2.000	0.500	0.550	8842010
658	1.375	1.616	0.197	0.217	4392210
511	1.375	1.625	0.125	0.138	8802410
513	1.375	1.625	0.187	0.207	8860310
513	1.375	1.625	0.250	0.275	8834910
605	1.375	1.625	0.250	0.275	4345400
511	1.375	1.687	0.156	0.172	8813910
605	1.375	1.687	0.219	0.241	4493900

Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
611	1.375	1.750	0.187	0.206	4491500
511	1.375	1.750	0.187	0.207	8802510
605	1.375	1.750	0.187	0.207	4552800
513	1.375	1.750	0.250	0.275	8844710
513	1.375	1.750	0.312	0.344	8835010
605	1.375	1.750	0.312	0.344	4346100
620	1.375	1.750	0.312	0.344	4410700
513	1.375	1.750	0.375	0.413	8835110
601	1.375	1.750	0.375	0.413	4353400
511	1.375	1.875	0.250	0.275	8807310
513	1.375	1.875	0.375	0.413	8878610
605	1.375	1.875	0.375	0.413	4403100
621	1.375	1.875	0.375	0.413	4707710
601	1.375	2.000	0.266	0.312	4236201
26	1.375	2.000	0.312	0.344	28-26
511	1.375	2.000	0.312	0.344	8807410
605	1.375	2.000	0.397	0.437	4330400
18	1.375	2.000	0.437	0.457	0778400
513	1.375	2.000	0.500	0.550	8873510
511	1.375	2.125	0.375	0.413	8814410
513	1.437	1.687	0.250	0.275	8849010
605	1.437	1.812	0.312	0.344	4442800
658	1.500	1.743	0.187	0.207	4480600
511	1.500	1.750	0.125	0.138	8802610
513	1.500	1.750	0.250	0.275	8835210
605	1.500	1.750	0.250	0.275	4345500
416	1.500	1.787	0.120	0.126	7201500
658	1.500	1.872	0.295	0.324	4386020
611	1.500	1.875	0.187	0.206	4466700
511	1.500	1.875	0.187	0.207	8802710
605	1.500	1.875	0.187	0.207	4576600
513	1.500	1.875	0.250	0.275	8835310
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	0.312	0.344	8849710



Rod seals
inch

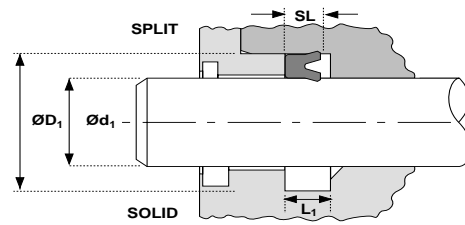


Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
605	1.500	1.875	0.312	0.344	4346200
621	1.500	1.875	0.312	0.344	4484510
513	1.500	1.875	0.375	0.413	8835410
605	1.500	1.875	0.375	0.413	4385400
513	1.500	1.875	0.406	0.447	8848110
416	1.500	1.921	0.159	0.165	7202500
511	1.500	2.000	0.250	0.275	8807510
601	1.500	2.000	0.250	0.275	4111001
605	1.500	2.000	0.250	0.275	4394400
18	1.500	2.000	0.281	0.300	1447800
513	1.500	2.000	0.312	0.344	8867710
605	1.500	2.000	0.341	0.375	4330500
513	1.500	2.000	0.375	0.413	8838310
605	1.500	2.000	0.375	0.413	4322200
621	1.500	2.000	0.375	0.413	4484910
16	1.500	2.110	0.235	0.250	8619410
26	1.500	2.125	0.312	0.344	28-27
511	1.500	2.125	0.312	0.344	8807610
513	1.500	2.125	0.375	0.413	8846510
605	1.500	2.125	0.375	0.413	4442900
605	1.500	2.125	0.397	0.437	4330600
18	1.500	2.125	0.437	0.457	0967600
513	1.500	2.125	0.500	0.550	8838410
511	1.500	2.250	0.375	0.413	8814510
513	1.500	2.250	0.500	0.550	8874810
513	1.500	2.250	0.625	0.688	8842710
18	1.500	2.375	0.687	0.727	0403100*
511	1.500	2.500	0.500	0.550	8814610
511	1.625	1.875	0.125	0.138	8802810
513	1.625	1.875	0.187	0.207	8849110
513	1.625	1.875	0.250	0.275	8873110
605	1.625	1.875	0.250	0.275	4345600
611	1.625	2.000	0.187	0.206	4469700
511	1.625	2.000	0.187	0.207	8802910
513	1.625	2.000	0.250	0.275	8868410

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
605	1.625	2.000	0.281	0.312	4542800
513	1.625	2.000	0.312	0.344	8864210
605	1.625	2.000	0.312	0.344	4443000
513	1.625	2.000	0.375	0.413	8835510
605	1.625	2.000	0.375	0.413	4443100
511	1.625	2.125	0.250	0.275	8807710
513	1.625	2.125	0.375	0.413	8849610
605	1.625	2.125	0.375	0.413	4512100
26	1.625	2.250	0.312	0.344	28-28
511	1.625	2.250	0.312	0.344	8850910
18	1.625	2.250	0.437	0.457	1432600
511	1.625	2.375	0.375	0.413	8814710
18	1.687	2.500	0.625	0.665	1382600*
511	1.750	2.000	0.125	0.138	8803010
513	1.750	2.000	0.250	0.275	8835610
605	1.750	2.000	0.250	0.275	4345700
416	1.750	2.037	0.120	0.126	7202000
658	1.750	2.119	0.281	0.311	4456200
611	1.750	2.125	0.187	0.206	4490400
511	1.750	2.125	0.187	0.207	8803110
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	0.312	0.344	8865410
605	1.750	2.125	0.312	0.344	4346300
513	1.750	2.125	0.375	0.413	8835710
605	1.750	2.125	0.375	0.413	4366800
620	1.750	2.125	0.375	0.413	4460000
621	1.750	2.125	0.375	0.413	4484710
416	1.750	2.171	0.159	0.165	7203000
511	1.750	2.250	0.250	0.275	8807810
601	1.750	2.250	0.250	0.275	4502601
605	1.750	2.250	0.250	0.275	4552700
18	1.750	2.250	0.312	0.332	1404300*
605	1.750	2.250	0.341	0.375	4330700



Rod seals
inch



Hallite

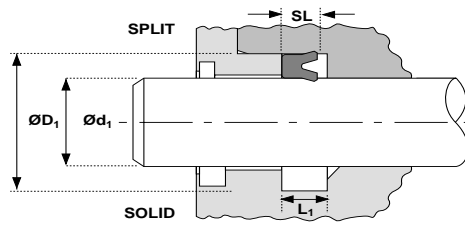


Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
513	1.750	2.250	0.375	0.413	8838510
601	1.750	2.250	0.375	0.413	4140901
605	1.750	2.250	0.375	0.413	4337000
621	1.750	2.250	0.375	0.413	4485010
605	1.750	2.250	0.500	0.550	4376800
16	1.750	2.360	0.235	0.250	6623310
601	1.750	2.375	0.266	0.312	4236301
26	1.750	2.375	0.312	0.344	28-29
511	1.750	2.375	0.312	0.344	8807910
513	1.750	2.375	0.375	0.413	8868810
18	1.750	2.375	0.437	0.457	0939800
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
511	1.750	2.500	0.375	0.413	8814810
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
511	1.875	2.125	0.125	0.138	8803210
513	1.875	2.125	0.187	0.207	8845810
513	1.875	2.125	0.250	0.275	8845410
658	1.875	2.246	0.281	0.311	4576700
511	1.875	2.250	0.187	0.207	8803310
513	1.875	2.250	0.375	0.413	8835810
605	1.875	2.250	0.375	0.413	4476200
511	1.875	2.375	0.250	0.275	8808010
513	1.875	2.375	0.375	0.413	8859410
605	1.875	2.375	0.375	0.413	4391200
26	1.875	2.500	0.312	0.344	28-30
511	1.875	2.500	0.312	0.344	8808110
605	1.875	2.500	0.397	0.437	4331500
18	1.875	2.500	0.437	0.457	0867200
513	1.875	2.500	0.500	0.550	8873710
511	2.000	2.250	0.125	0.138	8803410
513	2.000	2.250	0.187	0.207	8860410

Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
513	2.000	2.250	0.250	0.275	8873210
605	2.000	2.250	0.250	0.275	4345800
658	2.000	2.371	0.281	0.311	4466300
511	2.000	2.375	0.187	0.207	8803510
513	2.000	2.375	0.230	0.250	8806210
513	2.000	2.375	0.250	0.275	8868110
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	0.312	0.344	8860810
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	0.375	0.413	8835910
605	2.000	2.375	0.375	0.413	4380100
621	2.000	2.375	0.375	0.413	4484810
416	2.000	2.421	0.159	0.165	7203500
653	2.000	2.424	0.154	0.166	4521310
511	2.000	2.500	0.250	0.275	8808210
605	2.000	2.500	0.250	0.275	4496900
605	2.000	2.500	0.312	0.344	4382900
605	2.000	2.500	0.341	0.375	4330900
513	2.000	2.500	0.375	0.413	8838610
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
605	2.000	2.500	0.781	0.859	4491400
16	2.000	2.610	0.235	0.250	6623410
26	2.000	2.625	0.312	0.344	28-31
511	2.000	2.625	0.312	0.344	8808310
605	2.000	2.625	0.312	0.344	4333100
605	2.000	2.625	0.397	0.437	4331000
18	2.000	2.625	0.437	0.457	1371000
513	2.000	2.625	0.500	0.550	8873810
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	0.562	0.619	8862210



Rod seals
inch

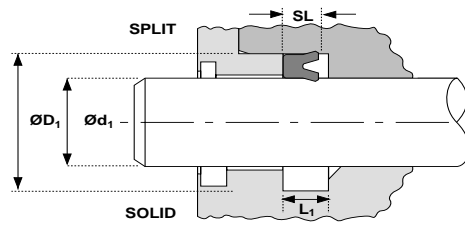


Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
601	2.000	2.625	0.562	0.619	4159801
511	2.000	2.750	0.375	0.413	8814910
513	2.000	2.750	0.500	0.550	8875110
18	2.000	2.750	0.562	0.582	1369100
513	2.000	2.750	0.625	0.688	8842810
605	2.000	2.750	0.625	0.688	4347300
511	2.000	3.000	0.500	0.550	8815010
513	2.000	3.000	0.750	0.825	8876810
511	2.125	2.500	0.187	0.207	8803710
513	2.125	2.500	0.250	0.275	8845010
601	2.125	2.500	0.250	0.275	4508201
513	2.125	2.500	0.375	0.413	8836010
605	2.125	2.500	0.375	0.413	4443300
511	2.125	2.625	0.250	0.275	8808410
513	2.125	2.625	0.375	0.413	8856310
601	2.125	2.625	0.375	0.413	4156101
621	2.125	2.625	0.375	0.413	4592510
26	2.125	2.750	0.312	0.344	28-32
511	2.125	2.750	0.312	0.344	8808510
513	2.125	2.750	0.500	0.550	8879910
513	2.125	2.750	0.625	0.688	8864810
511	2.125	2.875	0.375	0.413	8815110
511	2.125	3.125	0.500	0.550	8853110
511	2.250	2.500	0.125	0.138	8803810
511	2.250	2.625	0.187	0.207	8803910
513	2.250	2.625	0.312	0.344	8860910
605	2.250	2.625	0.335	0.375	4372200
513	2.250	2.625	0.375	0.413	8873310
511	2.250	2.750	0.250	0.275	8808610
605	2.250	2.750	0.341	0.375	4331100
513	2.250	2.750	0.375	0.413	8838710
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
26	2.250	2.875	0.312	0.344	28-33

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
511	2.250	2.875	0.312	0.344	8808710
18	2.250	2.875	0.437	0.457	0424300
513	2.250	2.875	0.500	0.550	8838810
511	2.250	3.000	0.375	0.413	8869910
513	2.250	3.000	0.500	0.550	8875210
605	2.250	3.000	0.511	0.562	4331200
18	2.250	3.000	0.562	0.582	1098400
513	2.250	3.000	0.625	0.688	8842910
511	2.375	2.625	0.125	0.138	8815610
511	2.375	2.750	0.187	0.207	8804010
513	2.375	2.750	0.375	0.413	8861010
605	2.375	2.750	0.375	0.413	4443400
511	2.375	2.875	0.250	0.275	8808810
513	2.375	2.875	0.375	0.413	8850110
605	2.375	2.875	0.375	0.413	4443500
621	2.375	2.875	0.375	0.413	4485310
26	2.375	3.000	0.312	0.344	28-34
511	2.375	3.000	0.312	0.344	8808910
601	2.375	3.000	0.312	0.344	4107201
18	2.375	3.000	0.469	0.489	0716600
513	2.375	3.000	0.500	0.550	8838910
513	2.375	3.125	0.625	0.688	8846810
658	2.500	2.871	0.281	0.311	4576800
511	2.500	2.875	0.187	0.207	8804110
605	2.500	2.875	0.312	0.344	4443600
513	2.500	2.875	0.375	0.413	8836210
605	2.500	2.875	0.375	0.413	4458500
416	2.500	2.921	0.159	0.165	7204000
653	2.500	2.924	0.154	0.166	4514610
605	2.500	2.937	0.284	0.312	4535900
511	2.500	3.000	0.250	0.275	8809010
605	2.500	3.000	0.250	0.275	4553000
605	2.500	3.000	0.284	0.312	4331300
18	2.500	3.000	0.312	0.332	0641200
513	2.500	3.000	0.312	0.344	8867810



Rod seals
inch



Hallite 

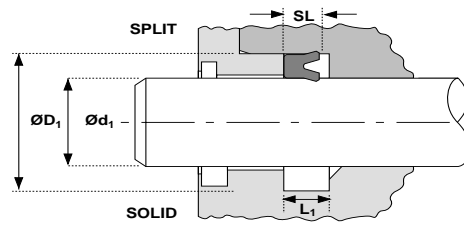


Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
513	2.500	3.000	0.375	0.413	8839010
601	2.500	3.000	0.375	0.413	4119501
605	2.500	3.000	0.375	0.413	4335900
621	2.500	3.000	0.375	0.413	4485410
16	2.500	3.110	0.235	0.250	6623510
26	2.500	3.125	0.312	0.344	28-35
511	2.500	3.125	0.312	0.344	8870110
601	2.500	3.125	0.312	0.344	4124401
513	2.500	3.125	0.375	0.413	8836110
513	2.500	3.125	0.500	0.550	8873910
605	2.500	3.125	0.500	0.550	4346600
26	2.500	3.250	0.375	0.413	28-36
511	2.500	3.250	0.375	0.413	8815410
513	2.500	3.250	0.500	0.550	8875310
18	2.500	3.250	0.562	0.582	0782400
513	2.500	3.250	0.625	0.688	8843010
605	2.500	3.250	0.625	0.688	4347400
511	2.500	3.500	0.500	0.550	8815510
513	2.500	3.500	0.750	0.825	8847110
511	2.625	3.000	0.187	0.207	8804210
513	2.625	3.000	0.250	0.275	8868510
513	2.625	3.000	0.312	0.344	8864310
513	2.625	3.000	0.375	0.413	8836310
605	2.625	3.000	0.375	0.413	4443700
511	2.625	3.125	0.250	0.275	8809110
513	2.625	3.125	0.375	0.413	8849310
601	2.625	3.125	0.375	0.413	4224701
605	2.625	3.125	0.500	0.550	4514900
511	2.625	3.250	0.312	0.344	8851110
605	2.625	3.250	0.625	0.688	4376900
26	2.625	3.375	0.375	0.413	28-37
513	2.625	3.375	0.625	0.688	8863710
511	2.750	3.000	0.125	0.138	8817910
511	2.750	3.125	0.187	0.207	8804410
513	2.750	3.125	0.187	0.207	8849910

Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
513	2.750	3.125	0.312	0.344	8846110
513	2.750	3.125	0.375	0.413	8836410
605	2.750	3.125	0.375	0.413	4379100
416	2.750	3.171	0.159	0.165	7204500
653	2.750	3.174	0.154	0.166	4533510
511	2.750	3.250	0.250	0.275	8809210
513	2.750	3.250	0.375	0.413	8839110
605	2.750	3.250	0.375	0.413	4336000
621	2.750	3.250	0.375	0.413	4485510
416	2.750	3.344	0.240	0.248	7205400
511	2.750	3.375	0.312	0.344	8809310
513	2.750	3.375	0.375	0.413	8868910
605	2.750	3.375	0.375	0.413	4456900
513	2.750	3.375	0.500	0.550	8839210
605	2.750	3.375	0.500	0.550	4346700
601	2.750	3.375	0.562	0.619	4250701
605	2.750	3.375	0.805	0.885	4467400
26	2.750	3.500	0.375	0.413	28-38
511	2.750	3.500	0.375	0.413	8815710
513	2.750	3.500	0.500	0.550	8875410
18	2.750	3.500	0.562	0.582	0437800*
513	2.750	3.500	0.625	0.688	8843110
605	2.750	3.500	0.625	0.688	4347500
511	2.750	3.750	0.500	0.550	8900010
511	2.750	4.000	0.625	0.688	8819310
511	2.875	3.125	0.125	0.138	8814210
513	2.875	3.125	0.250	0.275	8847410
511	2.875	3.250	0.187	0.207	8851010
513	2.875	3.250	0.375	0.413	8861110
605	2.875	3.250	0.375	0.413	4443800
511	2.875	3.375	0.250	0.275	8809410
513	2.875	3.375	0.562	0.619	8900610
511	2.875	3.500	0.312	0.344	8809510
601	2.875	3.500	0.325	0.360	4129701
513	2.875	3.500	0.500	0.550	8874010



Rod seals
inch

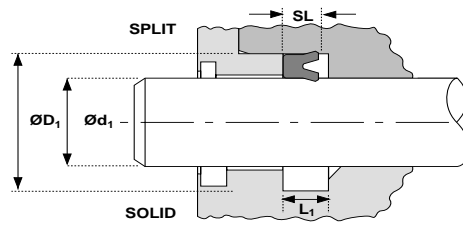


Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L ₁	
26	2.875	3.625	0.375	0.413	28-39
511	3.000	3.250	0.125	0.138	8804510
511	3.000	3.375	0.187	0.207	8804610
513	3.000	3.375	0.187	0.207	8806710
513	3.000	3.375	0.250	0.275	8868210
513	3.000	3.375	0.312	0.344	8861210
513	3.000	3.375	0.375	0.413	8836510
605	3.000	3.375	0.375	0.413	4468300
416	3.000	3.421	0.159	0.165	7205000
605	3.000	3.438	0.281	0.310	4539900
511	3.000	3.500	0.250	0.275	8809610
513	3.000	3.500	0.375	0.413	8839310
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	0.500	0.550	8842110
513	3.000	3.500	0.562	0.619	8852210
605	3.000	3.500	0.625	0.688	4399600
605	3.000	3.500	0.781	0.859	4476900
416	3.000	3.594	0.240	0.248	7205500
16	3.000	3.610	0.235	0.250	6623610
653	3.000	3.616	0.236	0.247	4515910
511	3.000	3.625	0.312	0.344	8809710
513	3.000	3.625	0.375	0.413	8828510
513	3.000	3.625	0.500	0.550	8874110
605	3.000	3.625	0.500	0.550	4346800
621	3.000	3.625	0.500	0.550	4486810
601	3.000	3.625	0.562	0.619	4160001
26	3.000	3.750	0.375	0.413	28-40
511	3.000	3.750	0.375	0.413	8815910
513	3.000	3.750	0.500	0.550	8875510
18	3.000	3.750	0.562	0.582	0410500
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
511	3.000	4.000	0.500	0.550	8816010

Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L ₁	
513	3.000	4.000	0.750	0.825	8863310
511	3.125	3.500	0.187	0.207	8804710
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	0.375	0.413	8856210
511	3.125	3.750	0.312	0.344	8809910
513	3.125	3.750	0.500	0.550	8869810
513	3.125	3.875	0.625	0.688	8900310
511	3.250	3.500	0.125	0.138	8819610
511	3.250	3.625	0.187	0.207	8804810
513	3.250	3.625	0.312	0.344	8861310
513	3.250	3.625	0.375	0.413	8873410
605	3.250	3.625	0.375	0.413	4714100
605	3.250	3.625	0.562	0.619	4476800
511	3.250	3.750	0.250	0.275	8810010
513	3.250	3.750	0.375	0.413	8839410
605	3.250	3.750	0.375	0.413	4336200
621	3.250	3.750	0.375	0.413	4485710
511	3.250	3.875	0.312	0.344	8879610
513	3.250	3.875	0.500	0.550	8869710
605	3.250	3.875	0.500	0.550	4415400
26	3.250	4.000	0.375	0.413	28-60
511	3.250	4.000	0.375	0.413	8816210
513	3.250	4.000	0.500	0.550	8875610
18	3.250	4.000	0.562	0.582	1407700
513	3.250	4.000	0.625	0.688	8843310
511	3.250	4.500	0.625	0.688	8822410
511	3.375	3.750	0.187	0.207	8854210
513	3.375	3.750	0.375	0.413	8836710
511	3.375	3.875	0.250	0.275	8850710
513	3.375	3.875	0.375	0.413	8849410
513	3.375	3.875	0.562	0.619	8900710
511	3.375	4.000	0.312	0.344	8810210
513	3.375	4.000	0.500	0.550	8874210



Rod seals
inch

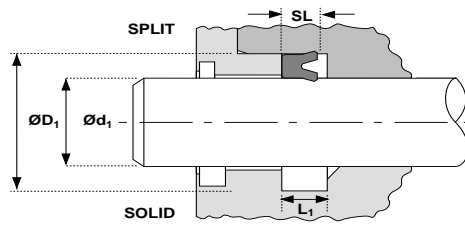


Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
605	3.375	4.000	0.594	0.653	4377000
511	3.375	4.125	0.375	0.413	8857710
513	3.375	4.125	0.625	0.688	8852110
511	3.375	4.375	0.500	0.550	8866910
511	3.500	3.750	0.125	0.138	8815810
511	3.500	3.875	0.187	0.207	8805010
513	3.500	3.875	0.375	0.413	8836810
605	3.500	3.875	0.375	0.413	4468400
511	3.500	4.000	0.250	0.275	8810310
513	3.500	4.000	0.312	0.344	8867910
605	3.500	4.000	0.312	0.344	4540000
18	3.500	4.000	0.375	0.395	1468200
513	3.500	4.000	0.375	0.413	8839510
605	3.500	4.000	0.375	0.413	4336300
621	3.500	4.000	0.375	0.413	4485810
416	3.500	4.094	0.240	0.248	7206000
16	3.500	4.110	0.235	0.250	6623710
653	3.500	4.116	0.236	0.247	4514810
511	3.500	4.125	0.312	0.344	8810410
513	3.500	4.125	0.375	0.413	8837410
513	3.500	4.125	0.500	0.550	8874310
605	3.500	4.125	0.500	0.550	4346900
621	3.500	4.125	0.500	0.550	4486910
511	3.500	4.250	0.375	0.413	8816410
513	3.500	4.250	0.500	0.550	8875710
18	3.500	4.250	0.562	0.582	1128800
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
511	3.625	4.000	0.187	0.207	8805110
513	3.625	4.000	0.250	0.275	8868610
513	3.625	4.000	0.312	0.344	8864410
513	3.625	4.000	0.375	0.413	8836910
511	3.625	4.125	0.250	0.275	8810510
513	3.625	4.125	0.375	0.413	8849510

Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
605	3.625	4.125	0.375	0.413	4436200
416	3.625	4.219	0.240	0.248	7206500
511	3.625	4.250	0.312	0.344	8851210
511	3.625	4.375	0.375	0.413	8824610
513	3.625	4.375	0.625	0.688	8865310
511	3.750	4.000	0.125	0.138	8818710
511	3.750	4.125	0.187	0.207	8879410
513	3.750	4.125	0.187	0.207	8850210
513	3.750	4.125	0.312	0.344	8846210
513	3.750	4.125	0.375	0.413	8837010
605	3.750	4.125	0.375	0.413	4702500
621	3.750	4.125	0.375	0.413	4709310
511	3.750	4.250	0.250	0.275	8810610
513	3.750	4.250	0.375	0.413	8839710
605	3.750	4.250	0.375	0.413	4443900
605	3.750	4.250	0.500	0.550	4456500
513	3.750	4.250	0.562	0.619	8839810
605	3.750	4.250	0.562	0.625	4436100
416	3.750	4.344	0.240	0.248	7207000
511	3.750	4.375	0.312	0.344	8870210
513	3.750	4.375	0.375	0.413	8869010
513	3.750	4.375	0.500	0.550	8874410
511	3.750	4.500	0.375	0.413	8816610
601	3.750	4.500	0.375	0.413	4119201
18	3.750	4.500	0.500	0.520	1414800
513	3.750	4.500	0.500	0.550	8875810
513	3.750	4.500	0.625	0.688	8875910
511	3.875	4.125	0.125	0.138	8816510
513	3.875	4.125	0.250	0.275	8845510
511	3.875	4.250	0.187	0.207	8823510
513	3.875	4.250	0.375	0.413	8861410
511	3.875	4.375	0.250	0.275	8810710
513	3.875	4.375	0.375	0.413	8832510
511	3.875	4.500	0.312	0.344	8870310
513	3.875	4.500	0.500	0.550	8839910



Rod seals
inch

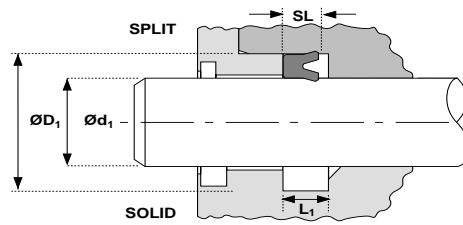


Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
511	3.875	4.625	0.375	0.413	8819210
511	4.000	4.250	0.125	0.138	8805210
511	4.000	4.375	0.187	0.207	8805310
513	4.000	4.375	0.187	0.207	8820010
513	4.000	4.375	0.250	0.275	8868310
513	4.000	4.375	0.312	0.344	8861510
513	4.000	4.375	0.375	0.413	8837110
605	4.000	4.375	0.375	0.413	4468500
511	4.000	4.500	0.250	0.275	8810810
605	4.000	4.500	0.312	0.355	4586700
513	4.000	4.500	0.375	0.413	8840010
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	0.500	0.550	8867510
601	4.000	4.500	0.511	0.562	4373400
513	4.000	4.500	0.562	0.619	8840110
605	4.000	4.500	0.562	0.619	4385700
621	4.000	4.500	0.562	0.619	4486110
605	4.000	4.500	0.781	0.859	4399800
416	4.000	4.594	0.240	0.248	7207500
16	4.000	4.610	0.235	0.250	6623810
653	4.000	4.616	0.236	0.247	4524610
511	4.000	4.625	0.312	0.344	8810910
605	4.000	4.625	0.375	0.413	4520100
513	4.000	4.625	0.500	0.550	8874510
605	4.000	4.625	0.500	0.550	4347000
513	4.000	4.625	0.562	0.619	8862310
621	4.000	4.625	0.562	0.619	4487010
511	4.000	4.750	0.375	0.413	8816810
601	4.000	4.750	0.375	0.413	4120501
513	4.000	4.750	0.500	0.550	8876010
605	4.000	4.750	0.500	0.550	4444000
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

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
621	4.000	4.750	0.625	0.688	4483310
18	4.000	4.875	0.656	0.676	1424100
511	4.000	5.000	0.500	0.550	8816910
18	4.000	5.000	0.750	0.790	0443000
513	4.000	5.000	0.750	0.825	8877410
511	4.125	4.500	0.187	0.207	8805410
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	0.375	0.413	8856410
511	4.125	4.750	0.312	0.344	8811110
513	4.125	4.750	0.500	0.550	8869610
513	4.125	4.750	0.625	0.688	8869510
511	4.125	4.875	0.375	0.413	8853210
511	4.250	4.500	0.125	0.138	8819710
511	4.250	4.625	0.187	0.207	8805510
513	4.250	4.625	0.312	0.344	8861610
513	4.250	4.625	0.375	0.413	8837310
511	4.250	4.750	0.250	0.275	8811210
513	4.250	4.750	0.375	0.413	8840210
511	4.250	4.875	0.312	0.344	8811310
513	4.250	4.875	0.500	0.550	8869410
511	4.250	5.000	0.375	0.413	8817010
513	4.250	5.000	0.500	0.550	8876110
513	4.250	5.000	0.625	0.688	8843610
605	4.250	5.000	0.625	0.688	4347900
511	4.250	5.250	0.500	0.550	8858910
18	4.250	5.250	0.750	0.790	0892200
513	4.250	5.250	0.750	0.825	8847210
511	4.250	5.500	0.625	0.688	8819810
511	4.375	4.750	0.187	0.207	8854310
513	4.375	4.750	0.375	0.413	8861710
511	4.375	4.875	0.250	0.275	8811410
513	4.375	4.875	0.562	0.616	8900510
511	4.375	5.000	0.312	0.344	8811510
513	4.375	5.000	0.500	0.550	8874610



Rod seals
inch



Hallite 

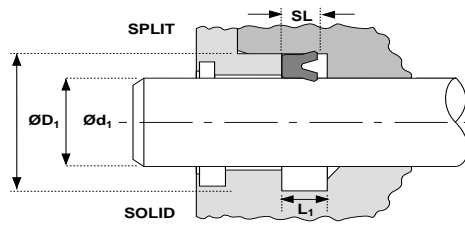


Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
513	4.375	5.000	0.625	0.688	8840410
511	4.500	4.875	0.187	0.207	8805710
513	4.500	4.875	0.375	0.413	8837510
511	4.500	5.000	0.250	0.275	8811610
513	4.500	5.000	0.312	0.344	8868010
513	4.500	5.000	0.375	0.413	8840510
601	4.500	5.000	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	0.500	0.550	8864710
513	4.500	5.000	0.562	0.619	8840610
621	4.500	5.000	0.562	0.619	4486310
416	4.500	5.094	0.240	0.248	7207900
16	4.500	5.110	0.235	0.250	8620910
511	4.500	5.125	0.312	0.344	8811710
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
511	4.500	5.250	0.375	0.413	8817310
18	4.500	5.250	0.469	0.489	0447800
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
416	4.500	5.307	0.310	0.319	7210000
511	4.500	5.500	0.500	0.550	8817410
18	4.500	5.500	0.750	0.790	0133200
513	4.500	5.500	0.750	0.825	8847310
511	4.625	5.000	0.187	0.207	8879510
513	4.625	5.000	0.250	0.275	8868710
513	4.625	5.000	0.312	0.344	8864510
513	4.625	5.000	0.375	0.413	8837610
511	4.625	5.125	0.250	0.275	8811810

Type	NOMINALS				PART No.
	$\varnothing d_1$	$\varnothing D_1$	SL	L_1	
605	4.625	5.250	0.625	0.688	4377100
511	4.750	5.000	0.125	0.138	8818110
513	4.750	5.125	0.375	0.413	8846610
605	4.750	5.125	0.375	0.413	4714200
511	4.750	5.250	0.250	0.275	8811910
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	0.562	0.619	8840910
605	4.750	5.250	0.625	0.688	4451100
416	4.750	5.344	0.240	0.248	7208000
511	4.750	5.375	0.312	0.344	8879710
513	4.750	5.375	0.500	0.550	8869310
513	4.750	5.375	0.625	0.688	8862410
511	4.750	5.500	0.375	0.413	8817510
601	4.750	5.500	0.360	0.437	4154701
513	4.750	5.500	0.500	0.550	8876310
513	4.750	5.500	0.625	0.688	8876410
511	4.750	6.000	0.625	0.688	8819410
511	4.875	5.125	0.125	0.138	8816710
513	4.875	5.125	0.250	0.275	8845610
511	4.875	5.250	0.187	0.207	8823610
513	4.875	5.250	0.375	0.413	8861810
511	4.875	5.375	0.250	0.275	8856510
513	4.875	5.375	0.375	0.413	8832910
513	5.000	5.375	0.375	0.413	8842510
511	5.000	5.500	0.250	0.275	8812010
513	5.000	5.500	0.375	0.413	8841010
605	5.000	5.500	0.375	0.413	4495000
513	5.000	5.500	0.500	0.550	8866810
513	5.000	5.500	0.562	0.619	8841110
605	5.000	5.500	0.562	0.619	4386100
621	5.000	5.500	0.562	0.619	4486510
605	5.000	5.500	0.781	0.859	4399900
605	5.000	5.531	0.557	0.619	4391400
416	5.000	5.594	0.240	0.248	7208500



Rod seals
inch



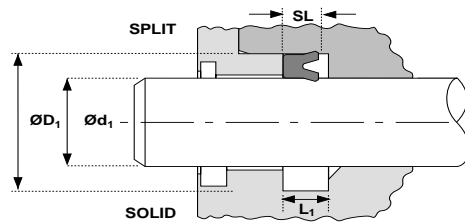
Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
16	5.000	5.610	0.235	0.250	8621010*
511	5.000	5.625	0.312	0.344	8812110
605	5.000	5.625	0.500	0.550	4347200
513	5.000	5.625	0.625	0.688	8874710
621	5.000	5.625	0.625	0.688	4487110
511	5.000	5.750	0.375	0.413	8817610
601	5.000	5.750	0.482	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
511	5.000	6.000	0.500	0.550	8817710
18	5.000	6.000	0.750	0.790	1367000
605	5.125	5.625	0.562	0.619	4436000
416	5.125	5.719	0.240	0.248	7209000
605	5.125	6.000	0.500	0.550	4444200
511	5.125	6.125	0.500	0.550	8851810
511	5.250	5.750	0.250	0.275	8812210
513	5.250	5.750	0.562	0.619	8862010
511	5.250	5.875	0.312	0.344	8856910
513	5.250	5.875	0.625	0.688	8862510
511	5.250	6.000	0.375	0.413	8817810
513	5.250	6.000	0.500	0.550	8865010
18	5.250	6.000	0.562	0.582	0487700
513	5.250	6.000	0.625	0.688	8843910
513	5.250	6.000	0.750	0.825	8854410
511	5.250	6.250	0.500	0.550	8900110
513	5.250	6.250	0.750	0.825	8847510
605	5.375	5.875	0.625	0.688	4475800
416	5.375	5.969	0.240	0.248	7209500
511	5.375	6.000	0.312	0.344	8812310
513	5.375	6.000	0.625	0.688	8841210
605	5.375	6.000	0.625	0.688	4448300
511	5.375	6.375	0.500	0.550	8863610
511	5.500	6.000	0.250	0.275	8812410

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
513	5.500	6.000	0.375	0.413	8841310
605	5.500	6.000	0.375	0.413	4379300
513	5.500	6.000	0.562	0.619	8841410
605	5.500	6.000	0.562	0.619	4468600
621	5.500	6.000	0.562	0.619	4486610
16	5.500	6.110	0.235	0.250	8621110
511	5.500	6.125	0.312	0.344	8812510
605	5.500	6.125	0.312	0.344	4540100
511	5.500	6.250	0.375	0.413	8818010
601	5.500	6.250	0.375	0.413	4119301
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
416	5.500	6.307	0.310	0.319	7210500
18	5.500	6.500	0.750	0.790	1164100
605	5.625	6.125	0.375	0.413	4714300
511	5.625	6.375	0.375	0.413	8814110
511	5.750	6.250	0.250	0.275	8812610
513	5.750	6.250	0.375	0.413	8866410
513	5.750	6.250	0.562	0.619	8841610
511	5.750	6.375	0.312	0.344	8857010
511	5.750	6.500	0.375	0.413	8818210
601	5.750	6.500	0.375	0.413	4135301
513	5.750	6.500	0.500	0.550	8866110
513	5.750	6.500	0.625	0.688	8878010
513	5.875	6.500	0.625	0.688	8900410
511	6.000	6.500	0.250	0.275	8812810
513	6.000	6.500	0.375	0.413	8852310
513	6.000	6.500	0.500	0.550	8867610
513	6.000	6.500	0.562	0.619	8841710
605	6.000	6.500	0.562	0.619	4436500
621	6.000	6.500	0.562	0.619	4486710
605	6.000	6.500	0.781	0.859	4400000
605	6.000	6.531	0.562	0.619	4391000
16	6.000	6.610	0.235	0.250	8618010



Rod seals

inch

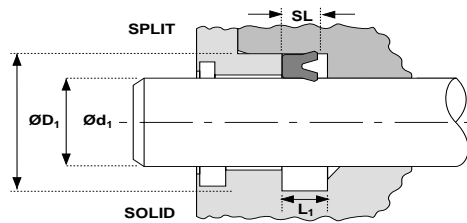


Type	NOMINALS				PART No.
	Ød ₁	ØD ₁	SL	L ₁	
511	6.000	6.625	0.312	0.344	8812910
513	6.000	6.625	0.625	0.688	8862610
511	6.000	6.750	0.375	0.413	8818310
513	6.000	6.750	0.500	0.550	8866210
513	6.000	6.750	0.625	0.688	8844110
605	6.000	6.750	0.625	0.688	4348300
621	6.000	6.750	0.625	0.688	4487210
416	6.000	6.807	0.310	0.319	7211000
511	6.000	7.000	0.500	0.550	8818410
18	6.000	7.000	0.750	0.790	1188800
513	6.000	7.000	0.750	0.825	8863410
511	6.250	6.750	0.250	0.275	8856610
511	6.250	6.875	0.312	0.344	8857110
511	6.250	7.000	0.375	0.413	8818510
513	6.250	7.000	0.625	0.688	8844210
511	6.250	7.250	0.500	0.550	8857810
513	6.250	7.250	0.750	0.825	8847710
511	6.375	7.000	0.312	0.344	8813010
513	6.375	7.000	0.625	0.688	8841810
511	6.500	7.000	0.250	0.275	8813110
513	6.500	7.000	0.250	0.275	8899410
18	6.500	7.000	0.375	0.395	1431600
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	0.562	0.619	8841910
511	6.500	7.125	0.312	0.344	8876610
513	6.500	7.125	0.625	0.688	8869110
511	6.500	7.250	0.375	0.413	8818610
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
511	6.500	7.500	0.500	0.550	8815210
18	6.500	7.750	1.000	1.040	1192700
511	6.500	8.000	0.625	0.688	8819910
511	6.750	7.250	0.250	0.275	8813210

Type	NOMINALS				PART No.
	Ød ₁	ØD ₁	SL	L ₁	
513	6.750	7.250	0.375	0.413	8865910
513	6.750	7.250	0.500	0.550	8866010
513	6.750	7.250	0.562	0.619	8866310
511	6.750	7.375	0.312	0.344	8857210
513	6.750	7.375	0.625	0.688	8862710
511	6.750	7.500	0.375	0.413	8818810
513	6.750	7.500	0.500	0.550	8854610
513	6.750	7.500	0.625	0.688	8854710
511	6.750	8.000	0.625	0.688	8819510
511	7.000	7.500	0.250	0.275	8813310
513	7.000	7.500	0.375	0.413	8852410
513	7.000	7.500	0.500	0.550	8842410
513	7.000	7.500	0.562	0.619	8877910
605	7.000	7.500	0.562	0.619	4436600
605	7.000	7.500	0.780	0.859	4456600
605	7.000	7.531	0.562	0.619	4391100
653	7.000	7.610	0.235	0.247	4588310
16	7.000	7.610	0.235	0.250	8621210
511	7.000	7.625	0.312	0.344	8879310
513	7.000	7.625	0.625	0.688	8854810
511	7.000	7.750	0.375	0.413	8877010
513	7.000	7.750	0.500	0.550	8854010
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
416	7.000	7.807	0.310	0.319	7211500
511	7.000	8.000	0.500	0.550	8851310
601	7.000	8.000	0.500	0.550	4124901
513	7.000	8.000	0.750	0.825	8870410
18	7.000	8.000	0.875	0.915	6501200
18	7.000	8.125		0.750	1054100
18	7.000	8.250	1.000	1.040	1219200
511	7.250	7.750	0.250	0.275	8856710
513	7.250	7.750	0.562	0.619	8862110
511	7.250	7.875	0.312	0.344	8857310



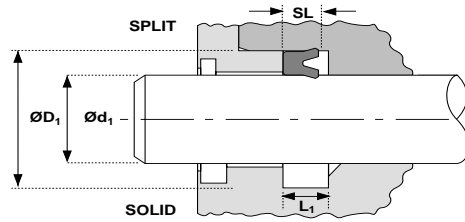
Rod seals
inch



Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
513	7.250	7.875	0.625	0.688	8862810
511	7.250	8.000	0.375	0.413	8818910
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
511	7.250	8.250	0.500	0.550	8857910
513	7.250	8.250	0.750	0.825	8847810
511	7.375	8.000	0.312	0.344	8876710
513	7.375	8.000	0.500	0.550	8842610
513	7.375	8.000	0.625	0.688	8864910
511	7.375	8.375	0.500	0.550	8863910
511	7.500	8.000	0.250	0.275	8813410
513	7.500	8.000	0.375	0.413	8852510
605	7.500	8.000	0.375	0.413	4714400
513	7.500	8.000	0.500	0.550	8833810
513	7.500	8.000	0.562	0.619	8852810
511	7.500	8.125	0.312	0.344	8813510
511	7.500	8.250	0.375	0.413	8877110
513	7.500	8.250	0.500	0.550	8863210
513	7.500	8.250	0.625	0.688	8878110
511	7.500	8.500	0.500	0.550	8851610
18	7.500	8.750	1.000	1.040	0418100
511	7.625	8.375	0.375	0.413	8814010
511	7.750	8.375	0.312	0.344	8857410
511	7.750	8.500	0.375	0.413	8853910
513	7.750	8.500	0.500	0.550	8865210
513	7.750	8.500	0.625	0.688	8853610
605	7.750	8.500	0.625	0.688	4353900
513	7.750	8.750	0.750	0.825	8847910
511	8.000	8.500	0.250	0.275	8813610
513	8.000	8.500	0.250	0.275	8899710
605	8.000	8.500	0.375	0.413	4733400
513	8.000	8.500	0.562	0.619	8842310
605	8.000	8.500	0.562	0.619	4468700
511	8.000	8.625	0.312	0.344	8876910

Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
513	8.000	8.625	0.500	0.550	8866610
511	8.000	8.750	0.375	0.413	8869210
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
416	8.000	8.807	0.310	0.319	7212000
16	8.000	8.827	0.305	0.320	8621310
511	8.000	9.000	0.500	0.550	8819010
18	8.000	9.000	0.750	0.790	1269400
513	8.000	9.000	0.750	0.825	8863510
18	8.000	9.250	1.000	1.040	0455700
605	8.125	8.625	0.781	0.859	4477000
511	8.125	9.125	0.500	0.550	8853810
511	8.250	8.750	0.250	0.275	8856810
511	8.250	8.875	0.312	0.344	8857510
511	8.250	9.000	0.375	0.413	8851410
513	8.250	9.000	0.625	0.688	8854110
511	8.500	9.000	0.250	0.275	8813710
513	8.500	9.000	0.375	0.413	8852710
605	8.500	9.000	0.375	0.413	4733500
513	8.500	9.000	0.500	0.550	8833910
513	8.500	9.000	0.562	0.619	8853010
511	8.500	9.125	0.312	0.344	8857610
513	8.500	9.125	0.625	0.688	8862910
18	8.500	9.750	1.000	1.040	1332300
605	9.000	9.500	0.562	0.619	4468800
18	9.000	10.250	1.000	1.040	0437500
605	9.250	10.000	0.625	0.688	4499300
605	9.375	9.875	0.781	0.859	4477100
16	9.500	10.316		0.319	8618110
18	9.500	10.750	1.000	1.040	1320400
605	9.750	10.250	0.375	0.413	4733600
605	10.000	10.500	0.562	0.619	4468900
16	10.000	10.816		0.319	8618510
18	10.000	11.250	1.000	1.040	0452200

Rod seals
inch



Hallite 




Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
18	10.500	11.750	1.000	1.040	1331300
16	11.000	11.965		0.319	8618110
18	11.000	12.250	1.000	1.040	1331000*
18	11.500	12.750	1.000	1.040	1331800
18	12.000	13.250	1.000	1.040	1329100
16	12.500	13.464		0.319	8618310
18	13.000	14.250	1.000	1.040	0864800
18	14.000	15.250	1.208	1.270	0174900
18	14.500	16.000	1.500	1.562	1345000*
16	15.000	15.965		0.319	8618410
18	15.000	17.000	1.500	1.562	1345300*
18	16.500	17.750	1.000	1.040	1318800*
18	17.000	17.750	0.625	0.665	1345900
18	18.000	19.250	1.250	1.312	1314500*
18	19.000	20.750	1.312	1.375	1342200*
18	20.000	21.500	1.750	1.812	0093600*
18	21.500	23.500	1.750	1.812	0150500*
18	23.000	25.000	1.500	1.562	0158700
18	27.000	29.000	1.500	1.562	2003500*
18	30.000	32.000	1.500	1.562	2109700*
18	38.000	39.500	1.125	1.187	0159200*

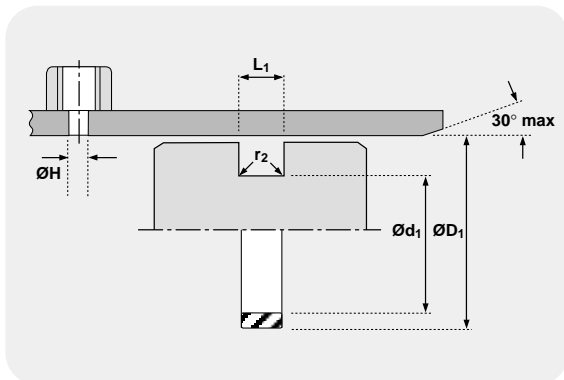
Type	$\varnothing d_1$	NOMINALS $\varnothing D_1$	SL	L_1	PART No.
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Piston seals

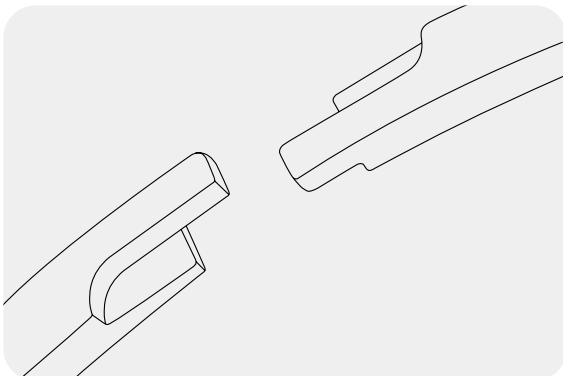
TECHNICAL DETAILS		METRIC	INCH	
OPERATING CONDITIONS				
MAXIMUM SPEED	} See below			
MAXIMUM TEMPERATURE				
MAXIMUM PRESSURE				
MAXIMUM EXTRUSION GAP				
PRESSURE bar	} See below			
MAXIMUM GAP $\varnothing D_1$ in				
PRESSURE psi				
SURFACE ROUGHNESS				
DYNAMIC SEALING FACE $\varnothing D_1$	μmRa	μmRt	μinCLA	μinRMS
STATIC SEALING FACE $\varnothing d_1$	3.2 max	16 max	125 max	16 ↔ 40
STATIC HOUSING FACES L_1				140 max
				43 max
CHAMFERS & RADII				
GROOVE SECTION $\leq S$ in	Not applicable			
MIN CHAMFER C in	0.125			
MAX FILLET RAD r_2 in	0.005			
PORT DIAMETER				
MAX $\varnothing H$ in	If the ring is to pass over the port			
	$L_1 \times 4$			
TOLERANCES				
	$\varnothing D_1$	$\varnothing d_1$	L_1	
	H10	+0 -0.006	+0.003 -0	

43



FEATURES

- COMPACT GROOVE DESIGN
- NO 'GAPPING' REQUIRED
- LARGE PORT PASSING CAPABILITY
- CONTAMINATION TOLERANT
- UNIQUE JOINT DESIGN



DESIGN

The Hallite 43 cast iron piston ring is designed for heavy duty, high speed, or port passing applications where elastomeric seals are not suitable..

The joint design has become the industry standard, ensuring ring 'gapping' is not required on assembly and that fewer rings are required in double acting applications. Generally, a maximum of three rings are recommended.

As the ring presses against the cylinder wall an initial seal is established. The effect of fluid pressure causes the side face of the ring to seal against the side face of the groove. These surfaces and the joint design ensure that fluid bypass is maintained at or below acceptable levels in the majority of applications.

Pressure, temperature and speed ratings have little effect on the piston ring. Thermal expansion is allowed for in the joint design.

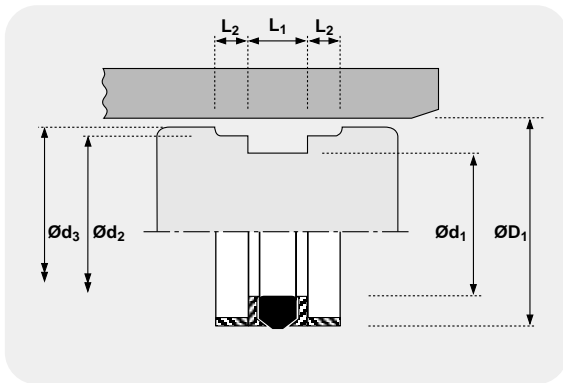
The extrusion gap (or piston diameter) can vary with each individual ring size.

To maintain concentricity and alignment however, it is recommended the piston be a close fit in the cylinder bore.

If in doubt, please consult Hallite Seals for this dimension.

Piston seals

TECHNICAL DETAILS		METRIC	INCH			
OPERATING CONDITIONS						
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec				
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F				
MAXIMUM PRESSURE	350 bar	5000 p.s.i.				
SURFACE ROUGHNESS						
DYNAMIC SEALING FACE $\varnothing D_1$	μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16	μinRMS 5 ↔ 18		
STATIC SEALING FACE $\varnothing d_1$ $\varnothing d_2$	1.6 max	10 max	63 max	70 max		
STATIC HOUSING FACES $\varnothing d_3$ L_1 L_2	3.2 max	16 max	125 max	140 max		
CHAMFERS & RADII						
GROOVE SECTION $\leq S$ 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						
	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	$\varnothing d_3$	L_1	L_2
mm	H10	h9	h9	h11	+0.35 +0.1	+0.1 -0



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 of 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.

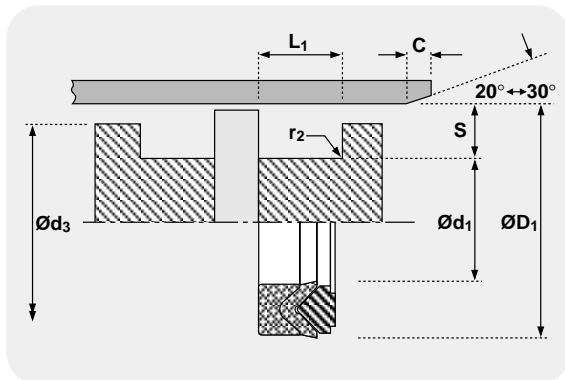
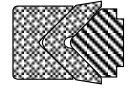
FEATURES

- COMPACT GROOVE DESIGN
- EASY ASSEMBLY
- POSITIVE NO DRIFT SEAL

NB: Part numbers suffixed by "†" indicate housing sizes to meet ISO 6547.

Piston seals

TECHNICAL DETAILS		METRIC	INCH	
OPERATING CONDITIONS				
MAXIMUM SPEED	0.5 m/sec		1.5 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C		-22°F + 212°F	
MAXIMUM PRESSURE	700 bar		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	10,000
SURFACE ROUGHNESS				
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_2 mm	0.8	1.2	1.6	1.6
TOLERANCES				
	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_3$	L_1
mm	H9	h11	+0 -0.3	+0.25 -0



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

Piston seals



52

TECHNICAL DETAILS

METRIC ○ ○ INCH

OPERATING CONDITIONS

MAXIMUM SPEED 0.8 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 600 bar

2.4 ft/sec
 -22°F + 212°F
 9000 p.s.i.

MAXIMUM EXTRUSION GAP

Figures show the maximum permissible gap all on one side using the minimum clearance \emptyset and maximum bore \emptyset

	160	250	400	600
PRESSURE bar	160	250	400	600
MAXIMUM GAP mm	0.35	0.3	0.2	0.1
PRESSURE p.s.i.	2400	3750	6000	9000

SURFACE ROUGHNESS

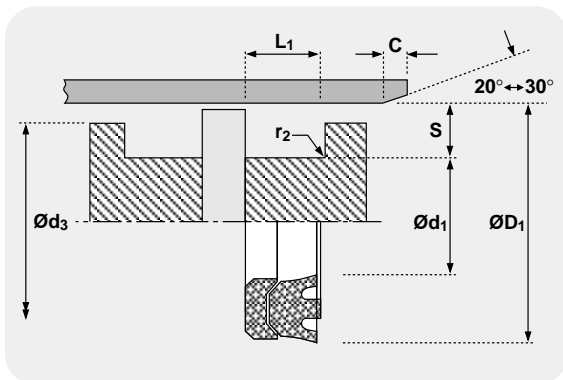
	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE $\emptyset D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC SEALING FACE $\emptyset d_1$	1.6 max	10 max	63 max	70 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max	140 max

CHAMFERS & RADII

GROOVE SECTION $\leq S$ mm	5.0	7.5	10.0	12.5	15.0
MIN CHAMFER C mm	2.5	4.0	5.0	6.5	7.5
MAX FILLET RAD r_2 mm	0.8	0.8	0.8	1.2	1.6

TOLERANCES

	$\emptyset D_1$	$\emptyset d_1$	$\emptyset d_3$	L_1
mm	H9	h11	+0 -0.3	+0.3 -0



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.

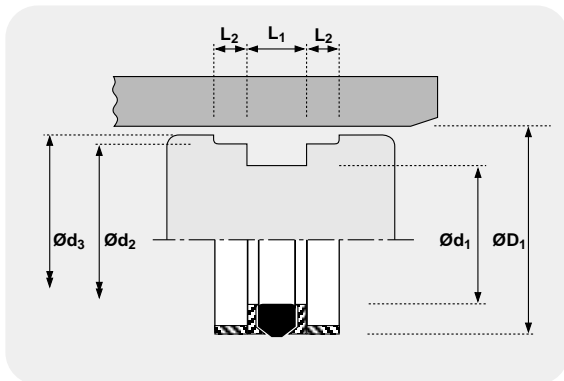
NB: Part numbers suffixed by "+" indicate housing sizes to meet ISO 5597.

FEATURES

- EFFECTIVE SEAL FOR EXTREME APPLICATIONS
- PRECISION MOULDED VEE PACKS
- HIGH LOAD CAPABILITY
- PRESSURE ACTIVATING GROOVES

Piston seals

TECHNICAL DETAILS		METRIC		INCH		
OPERATING CONDITIONS						
MAXIMUM SPEED	0.5 m/sec			1.5 ft/sec		
MAXIMUM TEMPERATURE	-30°C + 100°C			-22°F + 212°F		
MAXIMUM PRESSURE	500 bar			7500 p.s.i.		
SURFACE ROUGHNESS						
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 $\varnothing d_3$ L_1 L_2	3.2 max	16 max		125 max	140 max	
CHAMFERS & RADII						
GROOVE SECTION $\leq S$ 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 $\leq S$ in	0.312	0.375	0.500			
MIN CHAMFER C in	0.156	0.187	0.217			
MAX FILLET RAD r_1 in	0.16	0.16	0.32			
MAX FILLET RAD r_2 in	0.16	0.16	0.32			
TOLERANCES						
	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	$\varnothing d_3$	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



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

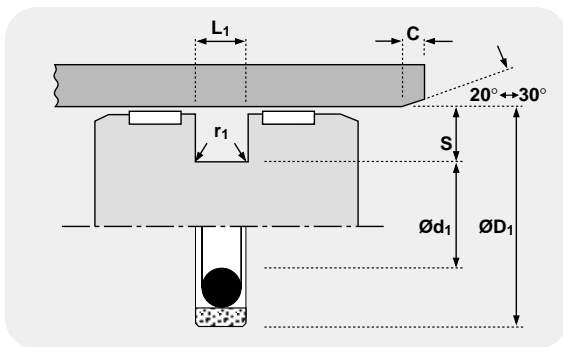
- WELL PROVEN DESIGN
- LONG LIFE

Piston seals



TECHNICAL DETAILS		METRIC	INCH	
OPERATING CONDITIONS				
MAXIMUM SPEED	4.0 m/sec		12.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C		-22°F + 212°F	
MAXIMUM PRESSURE	350 bar		5000 p.s.i.	
MAXIMUM EXTRUSION GAP				
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				
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	3.75	5.50	7.75	10.50
MIN CHAMFER C mm	2.00	2.50	5.00	7.50
MAX FILLET RAD r_1 mm	0.40	0.80	1.20	1.60
GROOVE SECTION $\leq S$ in	0.147	0.216	0.305	0.413
MIN CHAMFER C in	0.093	0.125	0.156	0.187
MAX FILLET RAD r_1 in	0.016	0.016	0.032	0.032
TOLERANCES				
	$\varnothing D_1$	$\varnothing d_1$	L_1	
mm	H9	f8	+0.2 -0	
in	H9	f8	+0.008 -0	

Figures show the maximum permissible gap all on one side using the minimum clearance \varnothing and maximum bore \varnothing



FEATURES

- LOW STICK/SLIP
- LOW BREAKOUT & RUNNING FRICTION
- HIGH MAXIMUM SPEED
- COMPACT PISTON DESIGN
- THE SEAL RING COMPONENT CAN BE MACHINED TO ANY SIZE

MATERIALS

Face material - O-Ring	last two digits of part number
Standard material	
15% Glass/PTFE - NBR	10
Material options:	
15% Glass/PTFE - FKM	11
Bronze/PTFE - NBR	20
Bronze/PTFE - FKM	21

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.

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

Piston seals

TECHNICAL DETAILS

METRIC

INCH



OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 500 bar

1.5 ft/sec
 -22°F + 212°F
 7500 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 the minimum clearance \emptyset and maximum bore \emptyset

160	250	400	500
0.35	0.3	0.2	0.1
2400	3750	6000	7500
0.016	0.012	0.008	0.004

SURFACE ROUGHNESS

DYNAMIC SEALING FACE $\emptyset D_1$
 STATIC SEALING FACE $\emptyset d_1$
 STATIC HOUSING FACES L_1

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

CHAMFERS & RADII

GROOVE SECTION $\leq S$ mm
 MIN CHAMFER C mm
 MAX FILLET RAD r_1 mm
 GROOVE SECTION $\leq S$ in
 MIN CHAMFER C in
 MAX FILLET RAD r_1 in

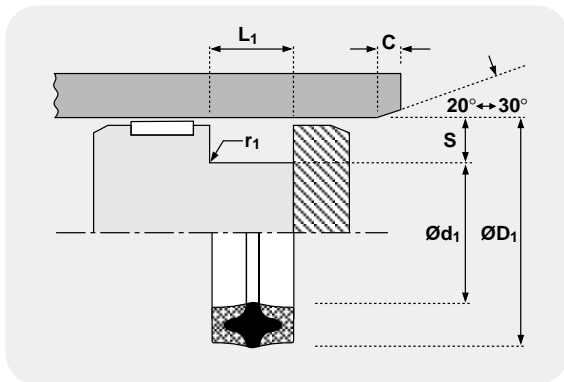
5.0	7.5	8.0	10.0	12.5
2.4	4.0	5.0	5.0	6.5
0.4	0.8	0.8	1.2	1.6

0.250	0.312	0.375	0.500	0.625
0.125	0.156	0.187	0.217	0.250
0.016	0.016	0.032	0.032	0.046

TOLERANCES

mm
 in

$\emptyset D_1$	$\emptyset d_1$	L_1
H11	js11	+0.25 +0
H11	js11	+0.030 +0.020



FEATURES

- WELL PROVEN DESIGN
- TOLERANT TO CONTAMINATION
- WIDE RANGE OF NON STANDARD SIZES

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.

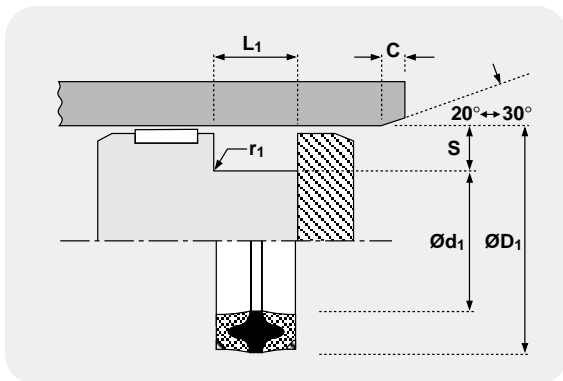
Piston seals



57

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F	
MAXIMUM PRESSURE	700 bar	10,000 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	160	250	400
MAXIMUM GAP mm	0.7	0.6	0.5
PRESSURE p.s.i.	2400	3750	6000
MAXIMUM GAP in	0.028	0.024	0.020
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16
STATIC SEALING FACE $\varnothing d_1$	1.6 max	10 max	63 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ mm	7.5	10.0	12.5
MIN CHAMFER C mm	4.0	5.0	6.5
MAX FILLET RAD r_1 mm	0.8	0.8	1.2
GROOVE SECTION $\leq S$ in	0.250	0.312	0.375
MIN CHAMFER C in	0.125	0.156	0.187
MAX FILLET RAD r_1 in	0.016	0.016	0.032
TOLERANCES			
mm	$\varnothing D_1$	$\varnothing d_1$	L_1
in	H11	js11	+0.25 +0
	H11	js11	+0.030 +0.020

Figures show the maximum permissible gap all on one side using the minimum clearance \varnothing and maximum bore \varnothing



FEATURES

- WELL PROVEN DESIGN
- TOLERANT TO CONTAMINATION
- ANTI-EXTRUSION RINGS

DESIGN

The Hallite 57 piston seal, designed for split pistons, is a medium to heavy duty double acting seal. It has the advantage of external anti-extrusion rings which enable the designer to use larger clearances.

The anti-extrusion rings are usually triangular section glass filled nylon but some seals use rectangular section polyacetal rings.

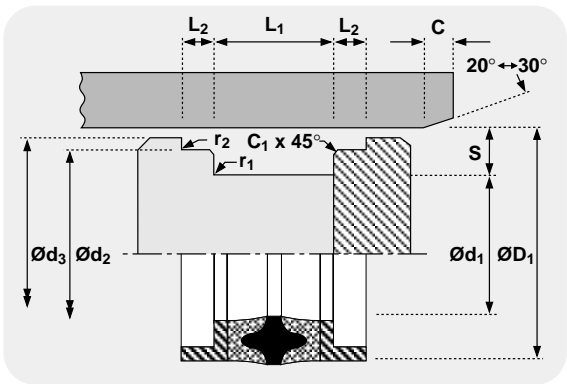
The centre of the seal is rubber which is bonded to two 'U' section bases of rubberised fabric and is compressed by the housing to obtain an effective low pressure seal. When the pressure increases the rubber energises the 'U' section and deforms it to the housing, increasing the sealing area and improving the seal. The movement of the base expands the diameter of the anti-extrusion ring to close the gap and protect the seal from damage.

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.

Piston seals

TECHNICAL DETAILS		METRIC		INCH		
OPERATING CONDITIONS						
MAXIMUM SPEED	0.5 m/sec			1.5 ft/sec		
MAXIMUM TEMPERATURE	-30°C + 100°C			-22°F + 212°F		
MAXIMUM PRESSURE	700 bar			10,000 p.s.i.		
SURFACE ROUGHNESS						
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 $\varnothing d_3$ L_1 L_2	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	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 $\leq S$ in	0.187	0.250	0.312	0.375	0.500	
MIN CHAMFER C in	0.093	0.125	0.156	0.187	0.217	
MIN CHAMFER C_1 in	0.032	0.032	0.032	0.062	0.062	
MAX FILLET RAD r_1 in	0.008	0.008	0.008	0.008	0.016	
MAX FILLET RAD r_2 in	0.008	0.008	0.008	0.008	0.016	
TOLERANCES						
	$\varnothing d_1$	$\varnothing d_1$	$\varnothing d_2$	$\varnothing d_3$	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



FEATURES

- WELL PROVEN DESIGN
- TOLERANT TO CONTAMINATION
- HIGH PRESSURE CAPABILITY

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.

Piston seals



64

TECHNICAL DETAILS

METRIC

INCH

OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 400 bar

1.5 ft/sec
 -22°F + 212°F
 6000 p.s.i.

SURFACE ROUGHNESS

DYNAMIC SEALING FACE Ød_1 0.1 ↔ 0.4 μmRa 4 max μmRt
 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

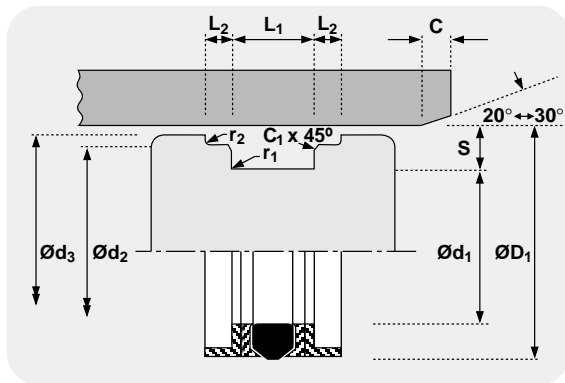
CHAMFERS & RADII

	5.0	7.0	8.0	9.0	11.0	12.5
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 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

mm

Ød_1	Ød_1	Ød_2	Ød_3	L_1	L_2
H10	h9	h9	h11	+0.2 -0	+0.1 -0



FEATURES

- COMPACT SEAL DESIGN
- EASY ASSEMBLY
- POSITIVE NO DRIFT SEAL

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 Ød_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.

Piston seals

TECHNICAL DETAILS

METRIC

INCH



OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 200 bar

1.5 ft/sec
 -22°F + 212°F
 3000 p.s.i.

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 $\text{Ø}d_3$ 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 $\leq S$ 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 $\leq S$ 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

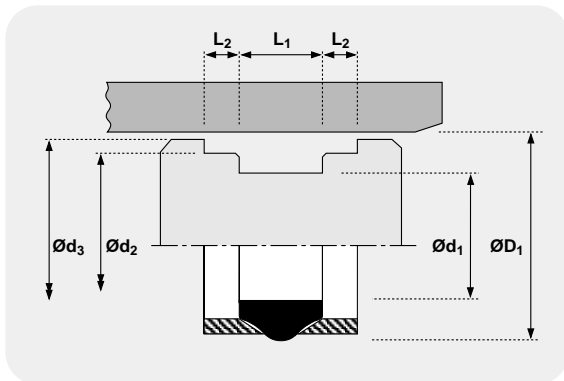
mm

$\text{Ø}D_1$ $\text{Ø}d_1$ $\text{Ø}d_2$ $\text{Ø}d_3$ 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

65



DESIGN

Ideal for light to medium duty one piece piston applications, the Hallite 65 double acting seal is a simple, effective and economical design for pressures up to 200 bar/3000 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

Piston seals



86

TECHNICAL DETAILS

METRIC

INCH

OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 500 bar

1.5 ft/sec
 -22°F + 212°F
 7500 p.s.i.

SURFACE ROUGHNESS

DYNAMIC SEALING FACE $\varnothing d_1$ 0.1 ↔ 0.4 μmRa 4 max μmRt
 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

μinCLA μinRMS
 4 ↔ 16 5 ↔ 18
 63 max 70 max
 125 max 140 max

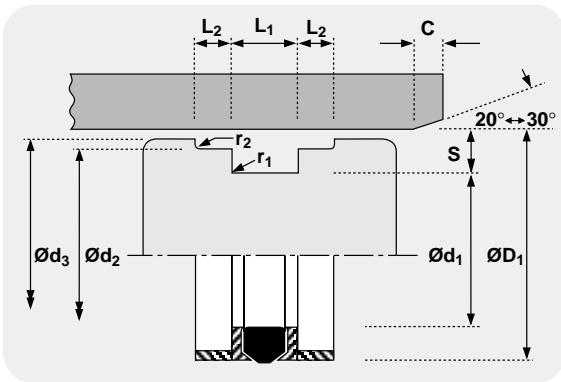
CHAMFERS & RADII

	5.0	7.5	10.0	12.5	15.0
GROOVE SECTION $\leq S$ 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

mm

$\varnothing d_1$	$\varnothing d_1$	$\varnothing d_2$	$\varnothing d_3$	L_1	L_2
H10	h9	h9	h11	+0.35 +0.1	+0.1 -0



FEATURES

- ISO 6547 HOUSING
- COMPACT GROOVE DESIGN
- POSITIVE NO DRIFT SEAL

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 †

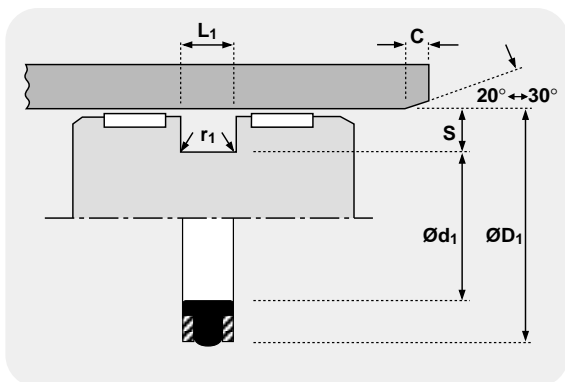
Other sizes of this design of seal are shown under Hallite 50, 53 and 64.

Piston seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec	
MAXIMUM TEMPERATURE	-40°C + 100°C	-40°F + 212°F	
MAXIMUM PRESSURE	200 bar	3000 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	70	140	200
PRESSURE p.s.i.	1000	2000	3000
MAXIMUM GAP in	0.018	0.010	0.005
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing D_1$	$0.1 \leftrightarrow 0.4$	4 max	$4 \leftrightarrow 16$ $5 \leftrightarrow 18$
STATIC SEALING FACE $\varnothing d_1$	0.8 max	5 max	32 max 35 max
STATIC HOUSING FACES L_1	1.6 max	10 max	63 max 70 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ in	0.125	0.187	0.250
MIN CHAMFER C in	0.093	0.125	0.187
MAX FILLET RAD r_1 in	0.016	0.016	0.016
TOLERANCES			
$\varnothing D_1 \leq 2.625$ in	± 0.001	$+0.002$ -0.000	$+0.005$ -0.000
$\varnothing D_1 \leq 6.250$ in	± 0.002	$+0.003$ -0.001	$+0.005$ -0.000
$\varnothing D_1 > 6.250$ in	± 0.003	$+0.004$ -0.002	$+0.005$ -0.000



76



DESIGN

The Hallite 76, also known as a T seal, is an extremely compact seal comprising a T shaped nitrile rubber sealing element and two split nylon anti-extrusion rings. Originally designed to replace a standard O ring, this seal offers lower friction and vastly improved resistance to extrusion.

Its compact size allows the designer to keep the length of the piston to a minimum. A one piece aluminium, cast iron or bronze piston can be used, or a steel piston with remote bearing rings can also house this seal.

The rubber element is simply stretched over the piston and snapped into the groove. Then the anti-extrusion rings are clipped into position on each side of the element.


FEATURES

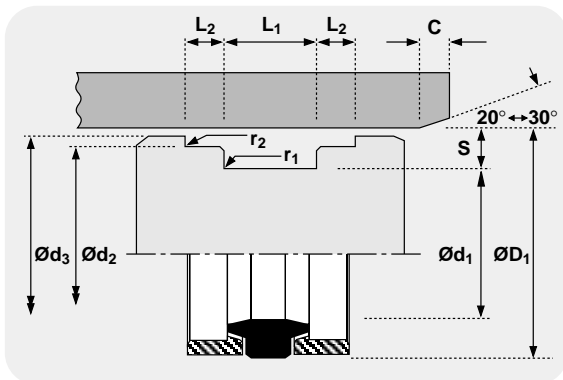
- COMPACT GROOVE DESIGN
- WELL PROVEN DESIGN
- LOW FRICTION SEAL TO REPLACE O-RINGS

Please contact your local Hallite sales office for availability.

NOTE: Also see Hallite 770

Piston seals

		METRIC		INCH			
	TECHNICAL DETAILS						
	OPERATING CONDITIONS	MAXIMUM SPEED 0.5 m/sec MAXIMUM TEMPERATURE -30°C + 100°C MAXIMUM PRESSURE 350 bar		1.5 ft/sec -22°F + 212°F 6000 p.s.i.			
	SURFACE ROUGHNESS	DYNAMIC SEALING FACE $\text{Ø}d_1$ 0.1 ↔ 0.4 STATIC SEALING FACE $\text{Ø}d_1$ $\text{Ø}d_2$ 1.6 max STATIC HOUSING FACES $\text{Ø}d_3$ L_1 L_2 3.2 max	μmRa μmRt 4 max 10 max 16 max	μinCLA μinRMS 4 ↔ 16 5 ↔ 18 63 max 70 max 125 max 140 max			
	CHAMFERS & RADII	GROOVE SECTION $\leq S$ mm 3.75 MIN CHAMFER C mm 2.00 MAX FILLET RAD r_1 mm 0.40 MAX FILLET RAD r_2 mm 0.20 GROOVE SECTION $\leq S$ in 0.156 MIN CHAMFER C in 0.078 MAX FILLET RAD r_1 in 0.016 MAX FILLET RAD r_2 in 0.008	5.00 6.50 2.50 4.00 0.40 0.40 0.20 0.20 0.187 0.250 0.093 0.125 0.016 0.016 0.008 0.008				
	TOLERANCES	$\text{Ø}d_1$ H10	$\text{Ø}d_1$ h9	$\text{Ø}d_2$ h9	$\text{Ø}d_3$ h11	L_1 +0.4 +0.13	L_2 0 -0.13
		H10	h9	h9	h11	+0.015 +0.005	0 -0.005



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

Piston seals

TECHNICAL DETAILS

METRIC

INCH



OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 400 bar

1.5 ft/sec
 -22°F + 212°F
 6000 p.s.i.

MAXIMUM EXTRUSION GAP

PRESSURE bar	160	250	400
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 the minimum clearance \emptyset and maximum bore \emptyset

SURFACE ROUGHNESS

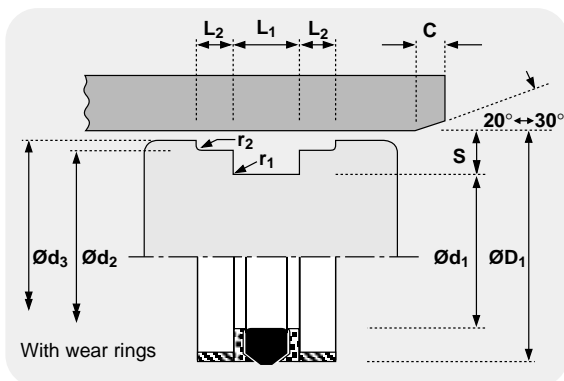
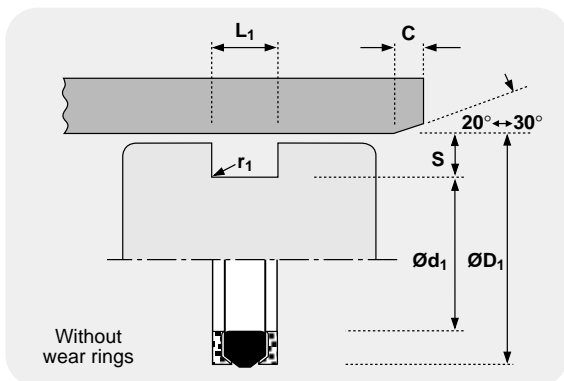
	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE $\emptyset d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC SEALING FACE $\emptyset d_1$ $\emptyset d_2$	1.6 max	10 max	63 max	70 max
STATIC HOUSING FACES $\emptyset d_3$ L_1 L_2	3.2 max	16 max	125 max	140 max

CHAMFERS & RADII

GROOVE SECTION $\leq S$ in	0.187	0.250	0.375
MIN CHAMFER C in	0.156	0.187	0.250
MAX FILLET RAD r_1 in	0.010	0.016	0.016
MAX FILLET RAD r_2 in	0.010	0.016	0.016

TOLERANCES

	$\emptyset d_1$	$\emptyset d_1$	$\emptyset d_3$	L_1	L_2
in	±0.005	±0.005	±0.005	±0.005	+0.004 -0
$\emptyset d_2$ in \geq	1.5	2.5	3.5		
	-0.001	-0.003	-0.001	-0.004	-0.001 -0.005



DESIGN-

The Hallite 83 Tri-Seal assembly offers the engineer many advantages when considering the design of cast iron, bronze, alloy etc. one-piece pistons in double-acting hydraulic cylinders, not the least being cost effectiveness with long and efficient seal life.

The Tri-Seal consists of two split plastic anti-extrusion rings and a nitrile synthetic rubber sealing member. Under pressure, the seal exerts a wedging action on the anti-extrusion ring, reducing the clearance between the cylinder bore and the piston, thus minimising the possibility of extrusion of the seal.

Wear rings are also available for this assembly, allowing the designer to benefit from the following advantages :

- Eliminate metal to metal contact in the bore
- One piece steel piston
- Improved alignment for optimum seal life
- Smoother operation

Note : For availability of sizes not listed please consult your local Hallite sales department.

When ordering Hallite 83 with wear rings please replace the last digit of the part number as indicated:

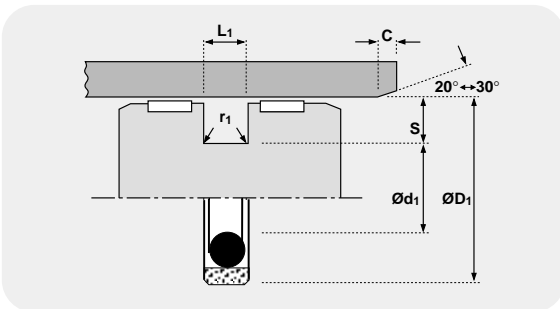
Without wear rings	
Last digit of part no.	_____ 0
With wear rings	
Last digit of part no.	_____ 9

Piston seals

454

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	4.0 m/sec	12.0 ft/sec	
TEMPERATURE RANGE	-30°C + 100°C	-22°F + 212°F	
MAXIMUM PRESSURE	350 bar	5000 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE p.s.i.	1500	2400	3750 5250
MAXIMUM GAP in	0.024	0.020	0.018 0.014
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing D_1$	μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16 μinRMS 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 $\leq S$ 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			
$\varnothing D_1$	H9	$\varnothing d_1$	f8
L_1	+0.008		-0

Figures show the maximum permissible gap all on one side using the minimum clearance \varnothing and maximum bore \varnothing



FEATURES

- LOW FRICTION - NO STICK SLIP
- LOW COST
- HIGH STRENGTH PRECISION MACHINED PTFE CAP RING
- WIDE RANGE OF MATERIALS AVAILABLE FOR SPECIAL APPLICATIONS

MATERIALS

Face material - O-Ring	last two digits of part number
Standard material	
Bronze/PTFE - NBR	----- 20
Material options:	
15% Glass/PTFE - NBR	----- 10
15% Glass/PTFE - FKM	----- 11
Bronze/PTFE - FKM	----- 21

DESIGN

The Hallite 454 double acting piston seal provides the designer with a compact, low friction seal for light to medium duty hydraulic cylinders.

It comprises a bronze filled PTFE ring, 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 454 seal is not recommended for applications where it is necessary for the pressurised cylinder to maintain the load in a set position.

Piston seals

TECHNICAL DETAILS

METRIC

INCH



OPERATING CONDITIONS

MAXIMUM SPEED
MAXIMUM TEMPERATURE
MAXIMUM PRESSURE

0.5 m/sec
-30°C + 100°C
250 bar

1.5 ft/sec
-22°F + 212°F
3500 p.s.i.

SURFACE ROUGHNESS

DYNAMIC SEALING FACE $\varnothing D_1$
STATIC SEALING FACE $\varnothing d_1$ $\varnothing d_2$
STATIC HOUSING FACES $\varnothing d_3$ L_1 L_2

μmRa μmRt
0.1 ↔ 0.4 4 max
1.6 max 10 max
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
MIN CHAMFER C mm
MAX FILLET RAD r_1 mm
MAX FILLET RAD r_2 mm

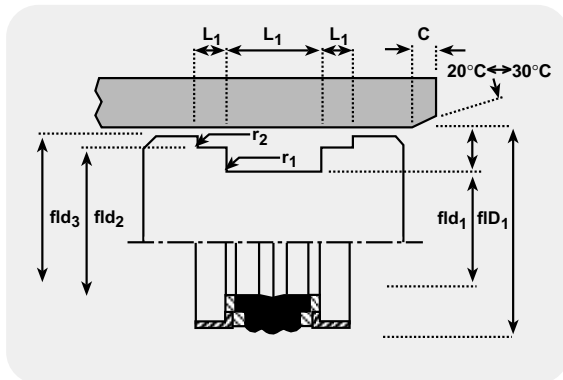
5.0	7.5	8.0	10.0	12.5	15.0
2.4	4.0	5.0	5.0	6.5	7.5
0.4	0.4	0.4	0.4	0.8	0.8
0.4	0.4	0.4	0.4	0.8	0.8

TOLERANCES

mm

$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	$\varnothing d_3$	L_1	L_2
H10	-0 +0.1	+0 -0.05	± 0.2	-0 +0.2	± 0.1

707



DESIGN

The Hallite 707 is a compact double acting seal assembly for one piece pistons.

The assembly comprises a rubber sealing element, two split support rings and two split wear rings.

The nitrile rubber seal is designed to have its section compressed by the housing to ensure a good low pressure seal. When pressurised, it is protected from extrusion damage by the profiled support rings which are manufactured from a tough flexible polymer and scarf-cut for assembly.

The wear rings are fitted into a recess in the support ring; being pressure activated, they help to guide and support the piston, eliminating any metal to metal contact.

FEATURES

- COMPACT DESIGN
- EASY INSTALLATION
- WIDE RANGE OF APPLICATIONS

Piston seals



714

TECHNICAL DETAILS

METRIC INCH

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
 7,300 p.s.i.

MAXIMUM EXTRUSION GAP

PRESSURE bar
 MAXIMUM GAP $\text{ØD}_1 \leq 5.000$ in
 MAXIMUM GAP $\text{ØD}_1 > 5.000$ in
 PRESSURE psi

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

500

0.032

0.040

7,500

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
 MAX FILLET RAD r_1 in
 MAX FILLET RAD r_2 in

0.250

0.016

0.005

PORT DIAMETER

MAX ØH in

IF THE SEAL IS TO PASS OVER THE PORT

$L_1 \times 1.167$

TOLERANCES

in

ØD_1

Ød_1

L_1

+0.005 -0

+0 -0.005

+0.005 -0

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.

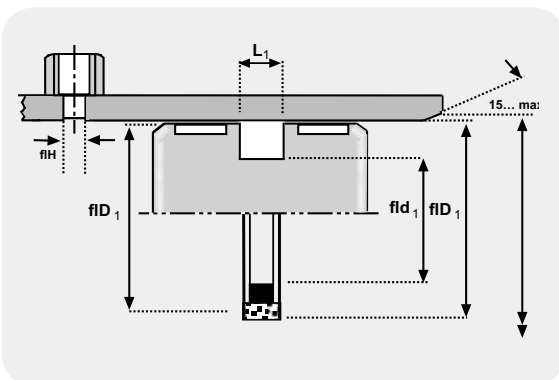
The square section nitrile rubber energiser responds quickly to pressure changes, providing excellent sealing characteristics under all pressure conditions.

FEATURES

- FACE EXPANDS FOR EASY INSTALLATION
- PASSES OVER PORTS
- EXCELLENT WEAR & ABRASION RESISTANCE
- STATIC LOAD HOLDING CAPABILITY
- REPLACES MULTIPLE PISTON RINGS
- INCREASES CYLINDER EFFECTIVENESS
- IDEAL FOR RE-PHASING CYLINDERS
- INGESTS CONTAMINATION
- COMPACT HOUSING

MATERIAL OPTIONS

Please contact your local Hallite sales office for additional information.



Piston seals

TECHNICAL DETAILS

METRIC

INCH



OPERATING CONDITIONS

MAXIMUM SPEED 1.0 m/sec
 MAXIMUM TEMPERATURE -40°C +110°C
 MAXIMUM PRESSURE 700 bar

3.0 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 the minimum clearance \emptyset and maximum bore \emptyset

SURFACE ROUGHNESS

	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE $\emptyset D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC SEALING FACE $\emptyset d_1$ $\emptyset d_2$	1.6 max	10 max	63 max	70 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max	140 max

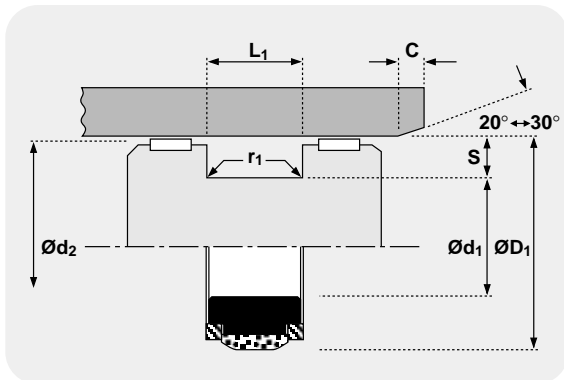
CHAMFERS & RADII

GROOVE SECTION $\leq S$ mm	7.5	10.0	12.5
MIN CHAMFER C mm	4.0	5.0	6.5
MAX FILLET RAD r_1 mm	0.2	0.4	0.8

TOLERANCES

	$\emptyset D_1$	$\emptyset d_1$	L_1
mm	H10	h9	+0.2 -0

730



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.

FEATURES

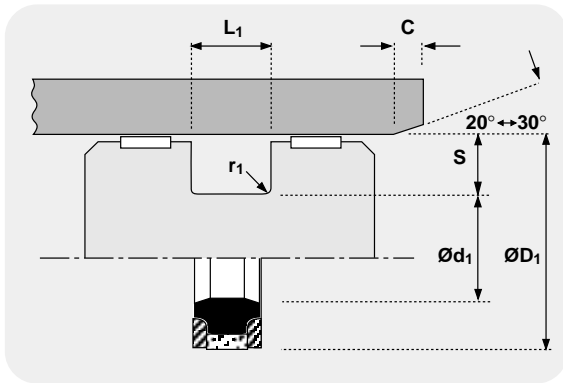
- HIGH SHOCK LOAD CAPABILITY
- HIGH PRESSURE CAPABILITY
- PROVEN ON BOTH ROLLER-BURNISHED AND HONED TUBING

Piston seals



735

TECHNICAL DETAILS		METRIC	INCH		
OPERATING CONDITIONS					
MAXIMUM SPEED		1.5 m/sec	4.5 ft/sec		
MAXIMUM TEMPERATURE		-40°C +120°C	-40°F + 250°F		
MAXIMUM PRESSURE		500 bar	7500 p.s.i.		
MAXIMUM EXTRUSION GAP					
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					
DYNAMIC SEALING FACE $\varnothing D_1$		μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16	μinRMS 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		7.0	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 $\leq S$ 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	0.035	0.035
TOLERANCES					
	mm	$\varnothing D_1$	$\varnothing d_1$	L_1	
	in	H9	+0 -0.2	+0.2 -0	
	$\varnothing D_1$ in	H9	*see below	+0.01 -0	
	* $\varnothing d_1$ Tol =	≤ 3.000	≤ 4.500	≥ 4.500	
	*NB	+0 - 0.002	+0 - 0.003	+0 - 0.004	
		Part numbers 710600_ and 710800_ Tol = ± 0.003			



MATERIALS

Please ensure the correct part number is used for the required cap ring.

PTFE, 40% bronze
Last digit of part no. _____ 0

or

PTFE, 15% glass 5% MoS₂
Last digit of part no. _____ 1

Products suffixed † are designed to suit popular Asian housings

For information about other material options available, please contact your local Hallite Seals office.

DESIGN

Hallite's 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 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.

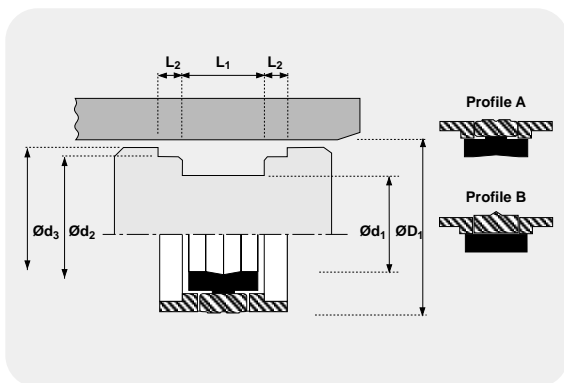
FEATURES

- HIGH PRESSURE
- HEAVY DUTY
- PTFE CAP RING
- COMPACT DESIGN
- LOW FRICTION
- LONG LIFE
- RANGE OF MATERIAL OPTIONS TO EXTEND SERVICE TEMPERATURE RANGE

Piston seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F	
MAXIMUM PRESSURE	350 bar	5000 p.s.i.	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing D_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16 μinRMS 5 \leftrightarrow 18
STATIC SEALING FACE $\varnothing d_1$ $\varnothing d_2$	1.6 max	10 max	63 max 70 max
STATIC HOUSING FACES $\varnothing d_3$ L_1 L_2	3.2 max	16 max	125 max 140 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ mm	5.0	7.5	8.0 10.0 12.5 15.0
MIN CHAMFER C mm	4.0	4.0	5.0 5.0 6.5 7.5
MAX FILLET RAD r_1 mm	0.2	0.2	0.4 0.4 0.4 0.8
MAX FILLET RAD r_2 mm	0.2	0.2	0.2 0.2 0.2 0.4
TOLERANCES			
	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$ $\varnothing d_3$ L_1 L_2
mm	H11	h10	f9 h11 +0.4 +0.1 -0

753



Hallite 753 is manufactured using two different profiles as illustrated above. The parts list clearly indicates which profile is used for each size.

DESIGN

The Hallite 753 is a compact assembly designed and developed specifically for one piece pistons.

The assembly comprises a wear-resistant polyurethane slip ring which is loaded by an NBR ring. There are split 'L' shaped anti-extrusion bearings made from polyacetal resin on both sides of the seal.

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

FEATURES

- LONG LIFE - DUE TO THE WEAR-RESISTANT POLYURETHANE SLIP RINGS
- EASY INSTALLATION

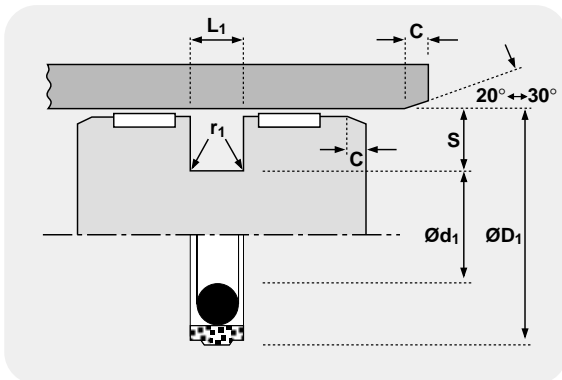
Piston seals

754



TECHNICAL DETAILS		METRIC	INCH		
OPERATING CONDITIONS					
MAXIMUM SPEED		1.0 m/sec		3.0 ft/sec	
MAXIMUM TEMPERATURE		-40°C + 110°C		-40°F + 230°F	
MAXIMUM PRESSURE		350 bar		5000 p.s.i.	
MAXIMUM EXTRUSION GAP					
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
SURFACE ROUGHNESS					
DYNAMIC SEALING FACE $\varnothing D_1$		μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16	μinRMS 5 \leftrightarrow 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		3.75	5.50	7.50	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
TOLERANCES					
	mm	$\varnothing D_1$	$\varnothing d_1$	L_1	
		H9	f8	+0.2 -0	

Figures show the maximum permissible gap all on one side using the minimum clearance \varnothing and maximum bore \varnothing



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 left 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.

MATERIAL OPTIONS

Face material

Polyester elastomer - standard (Red 55D)	
Last digit of part no.	----- 0
Lubricated polyester elastomer	
Last digit of part no.	----- 2
Hydrolysis stabilised polyester elastomer (Red 72D)	
Last digit of part no.	----- 3
Hythane 181 - <i>A limited number of sizes are available in this material option</i>	
Last digit of part no.	----- 4

For full details and availability please contact your local Hallite sales office. Technical details shown are for standard Red 55D polyester elastomer.

FEATURES

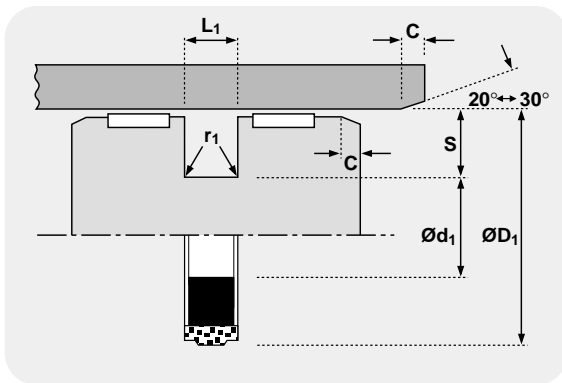
- LOW BREAK-OUT AND OPERATING FRICTION LEVELS.
- RAPID RECOVERY OF FACE AFTER ASSEMBLY. UNLIKE COMMON PTFE FACES, NO RE-SIZING IS REQUIRED.
- MORE TOLERANT TO CONTAMINATION THAN COMMON PTFE EQUIVALENTS.
- EXCELLENT POSITION HOLDING CHARACTERISTICS UNDER LOAD
- COMPATIBLE WITH MOST HYDRAULIC FLUIDS.
- EXCELLENT WEAR RESISTANCE.
- OPERATES ON A WIDE RANGE OF SURFACE FINISHES.
- IDEAL FOR USE WITH HALLITE 506 OR 87 BEARING STRIP.
- ISO 7425 HOUSINGS.

Piston seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-40°C + 110°C	-40°F + 230°F	
MAXIMUM PRESSURE	350 bar	5000 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	100	160	250
PRESSURE p.s.i.	1500	2400	3750
MAXIMUM GAP (S>0.280) in	0.030	0.025	0.020
MAXIMUM GAP (S<0.280) in	0.025	0.020	0.015
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing D_1$	μmRa	μmRt	μinCLA
STATIC SEALING FACE $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16
STATIC HOUSING FACES L_1	1.6 max	10 max	63 max
	3.2 max	16 max	125 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ in	0.154	0.269	0.373
MIN CHAMFER C in	0.100	0.150	0.200
MAX FILLET RAD r_1 in	0.016	0.016	0.016
TOLERANCES			
$\varnothing D_1^*$ in	H9	$js10$	
L_1 in	1.000	3.000	5.250
NB	± 0.002	± 0.003	± 0.004
	Part numbers 449002_ and 443931_ $L_1 = \pm 0.003$		



755



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 BREAK-OUT AND OPERATING FRICTION LEVELS.
- RAPID RECOVERY OF FACE AFTER ASSEMBLY. UNLIKE COMMON PTFE FACES, NO RE-SIZING IS REQUIRED.
- MORE TOLERANT TO DIRT AND CONTAMINATION THAN COMMON PTFE EQUIVALENTS.
- EXCELLENT POSITION HOLDING CHARACTERISTICS UNDER LOAD
- COMPATIBLE WITH MOST HYDRAULIC FLUIDS.
- EXCELLENT WEAR RESISTANCE.
- OPERATES ON A WIDE RANGE OF SURFACE FINISHES.
- IDEAL FOR USE WITH HALLITE'S 506 BEARING STRIP

MATERIALS

Standard face material:
Polyester elastomer - (red 55D)
Last digit of part no. ----- 0

Face material options:
Hydrolysis stabilised polyester elastomer (Grey 55D)
Last digit of part no. ----- 1

Lubricated polyester elastomer
Last digit of part no. ----- 2

Hydrolysis stabilised polyester elastomer (Red 72D)
Last digit of part no. ----- 3

Hythane 181 - *A limited number of sizes are available in this material option*
Last digit of part no. ----- 4

Technical details shown are for standard Red 55D polyester elastomer.

Piston seals

770

TECHNICAL DETAILS		METRIC	INCH		
OPERATING CONDITIONS					
MAXIMUM SPEED		1.0 m/sec	3.0 ft/sec		
MAXIMUM TEMPERATURE		-40°C + 110°C	-40°F + 230°F		
MAXIMUM PRESSURE		350 bar	5000 p.s.i.		
MAXIMUM EXTRUSION GAP					
PRESSURE bar		100	160	250	350
PRESSURE p.s.i.		1500	2400	3750	5000
MAXIMUM GAP in		0.030	0.025	0.020	0.010
SURFACE ROUGHNESS					
DYNAMIC SEALING FACE $\varnothing D_1$		μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16	μinRMS 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 $\leq S$ 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	
TOLERANCE					
		$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	L_1
	in	+0.002 -0	+0 -0.002	+0 -0.001	+0.005 -0

Figures show the maximum permissible gap all on one side using the minimum clearance \varnothing and maximum bore \varnothing

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 BREAK-OUT AND OPERATING FRICTION LEVELS.
- RAPID RECOVERY OF FACE AFTER ASSEMBLY. UNLIKE COMMON PTFE FACES, NO RE-SIZING IS REQUIRED.
- MORE TOLERANT TO DIRT AND CONTAMINATION THAN COMMON PTFE EQUIVALENTS.
- EXCELLENT WEAR RESISTANCE.
- OPERATES ON A WIDE RANGE OF SURFACE FINISHES.
- IDEAL FOR USE WITH HALLITE HALLITE 506 OR 533 GFN WEAR RINGS

MATERIAL OPTIONS

Standard face material: (Brown 55D)
Lubricated polyester elastomer
Last digit of part no. ----- 2

Face material options:
Polyester elastomer (Red 55D)
Last digit of part no. ----- 0

Hydrolysis stabilised polyester elastomer (Grey 55D)
Last digit of part no. ----- 1

Hydrolysis stabilised polyester elastomer (Red 72D)
Last digit of part no. ----- 3

Hythane 181 - A limited number of sizes are available in this material option
Last digit of part no. ----- 4

Technical details shown are for standard Brown 55D lubricated polyester elastomer.

Piston seals

TECHNICAL DETAILS

METRIC INCH



OPERATING CONDITIONS

MAXIMUM SPEED 1.0 m/sec
 TEMPERATURE RANGE -40°C + 110°C
 MAXIMUM PRESSURE 350 bar

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 the minimum clearance \emptyset and maximum bore \emptyset

	100	160	250	350
PRESSURE bar	1500	2400	3750	5000
PRESSURE p.s.i.	0.025	0.020	0.016	0.008
MAXIMUM GAP in				

SURFACE ROUGHNESS

	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE $\emptyset d_1$	0.1 \leftrightarrow 0.4	4 max	4 \leftrightarrow 16	5 \leftrightarrow 18
STATIC SEALING FACE $\emptyset d_1$	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

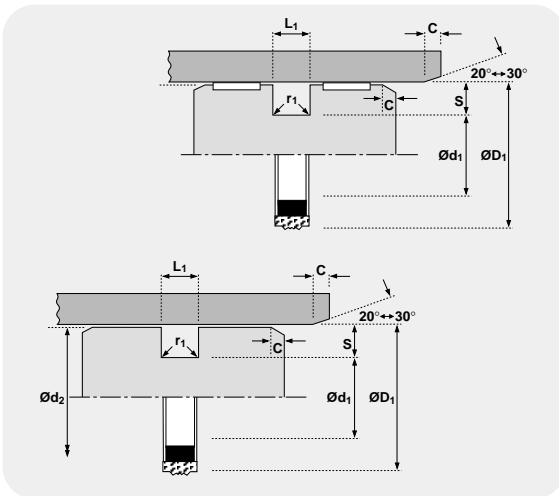
GROOVE SECTION $\leq S$ in	0.125	0.187	0.250
MIN CHAMFER C in	0.100	0.150	0.200
MAX FILLET RAD r_1 in	0.016	0.016	0.016

TOLERANCE

$\emptyset d_1$	$\emptyset d_1$	$\emptyset d_2$	L_1
+0.002 -0	+0 -0.002	+0 -0.001	+0.005 -0

in

775



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.

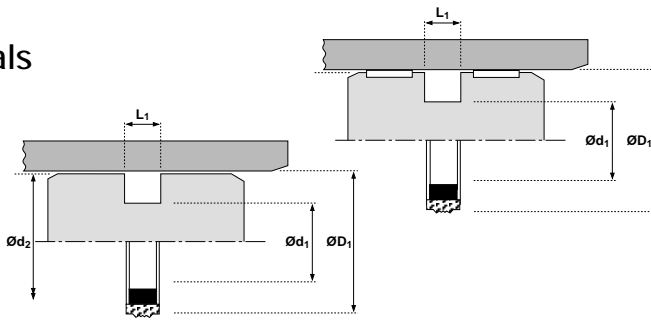
For full details and availability please contact your local Hallite Sales office.

FEATURES

- DOUBLE ACTING SEAL WITH SINGLE ACTING CAPABILITIES
- EXCELLENT WEAR RESISTANCE
- HIGH EXTRUSION RESISTANCE MAKES IT IDEAL FOR USE WITH REMOTE WEAR RINGS SUCH AS THE HALLITE 506 OR 533
- ADVANCED FACE GEOMETRY PROVIDES ENHANCED DYNAMIC AND STATIC SEALING
- MORE TOLERANT TO DIRT AND CONTAMINATION THAN COMMON PTFE FACES
- RAPID RECOVERY AFTER ASSEMBLY, NO RESIZING REQUIRED

Piston seals

775



inch - Housings suit standard O-rings

$\varnothing D_1$	TOL	$\varnothing d_1$	TOL	$\varnothing d_2$	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	0.187	+0.005 -0.000	218	4731816
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
5.000	+0.004 -0.000	4.630	+0.000 -0.004	4.997	+0.000 -0.001	0.281	+0.005 -0.000	350	4731516

inch - Housings suit standard O-ring with two backup rings

$\varnothing D_1$	TOL	$\varnothing d_1$	TOL	$\varnothing d_2$	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



Piston seals

TECHNICAL DETAILS

OPERATING CONDITIONS

MAXIMUM SPEED 1.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 350 bar

4.5 ft/sec
 -22°F + 212°F
 5000 p.s.i.

MAXIMUM EXTRUSION GAP

PRESSURE bar	100	160	250	350
MAXIMUM GAP mm	0.6	0.5	0.4	0.3
PRESSURE p.s.i.	1500	2400	3750	5000

Figures show the maximum permissible gap all on one side using the minimum clearance \emptyset and maximum bore \emptyset

SURFACE ROUGHNESS

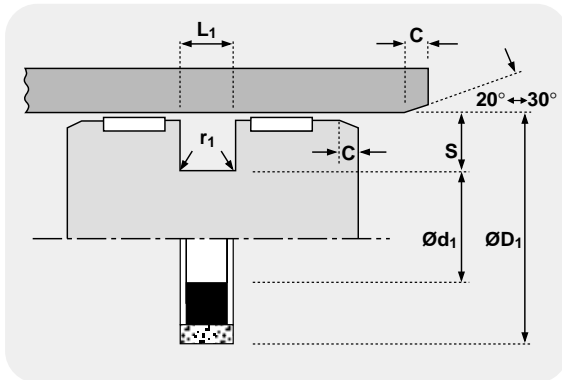
	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE $\emptyset D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC SEALING FACE $\emptyset d_1$	1.6 max	10 max	63 max	70 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max	140 max

CHAMFERS & RADII

GROOVE SECTION $\leq S$ mm	3.75	5.50	7.50	10.50	12.25
MIN CHAMFER C mm	2.00	2.50	5.00	5.00	7.50
MAX FILLET RAD r_1 mm	0.50	0.50	0.50	0.50	0.50

TOLERANCES

mm $\emptyset D_1$ $\emptyset d_1$ L_1
 H9 +0 -0.2 +0.2 -0



FEATURES

- LOW STICK/SLIP
- LOW BREAKOUT & RUNNING FRICTION
- HIGH MAXIMUM SPEED
- COMPACT PISTON DESIGN

DESIGN

The Hallite 917 double acting piston seal provides the designer with a compact, low friction seal for light duty hydraulic cylinders.

It comprises a PTFE ring which is pre-loaded by an square section energiser to be effective for the operating pressure range recommended. As the pressure rises the energiser 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 Hallite 917 range is suitable for popular Asian sizes.

Piston seals

8
916

TECHNICAL DETAILS

OPERATING CONDITIONS

MAXIMUM SPEED 4.0 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 350 bar

12.0 ft/sec
 -22°F + 212°F
 5000 p.s.i.

MAXIMUM EXTRUSION GAP

	100	160	250	350
PRESSURE bar	100	160	250	350
MAXIMUM GAP mm	0.6	0.5	0.45	0.35
PRESSURE p.s.i.	1500	2400	3750	5000

Figures show the maximum permissible gap all on one side using the minimum clearance \emptyset and maximum bore \emptyset

SURFACE ROUGHNESS

	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE $\emptyset D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC SEALING FACE $\emptyset d_1$	1.6 max	10 max	63 max	70 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max	140 max

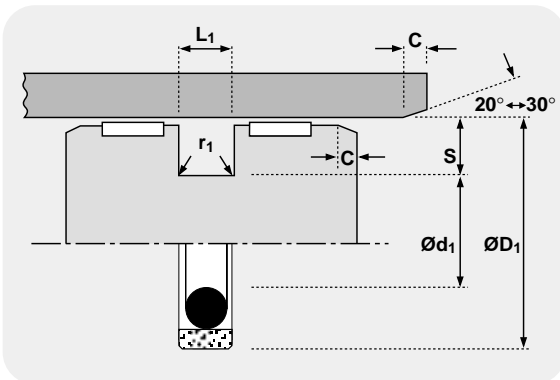
CHAMFERS & RADII

GROOVE SECTION $\leq S$ mm	3.75	5.50	7.50	10.5	12.25
MIN CHAMFER C mm	2.00	2.50	5.00	5.00	7.50
MAX FILLET RAD r_1 mm	0.50	0.50	0.50	0.5	0.50

TOLERANCES

mm $\emptyset D_1$ $\emptyset d_1$ L_1
 H9 +0 -0.2 +0.2 -0

METRIC INCH



DESIGN

The Hallite 918 double acting piston seal is a very compact, extremely low friction seal for medium to heavy duty applications.

The bronze filled PTFE face is pre-loaded by a nitrile rubber O ring. As the pressure rises, the O ring energiser deforms to force the PTFE face against the cylinder wall, increasing the sealing force and the effectiveness of the seal.

The ultra low friction of the PTFE allows this seal to operate at speeds up to 4m/sec - 12.0 ft/sec.

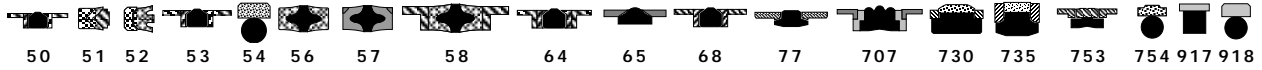
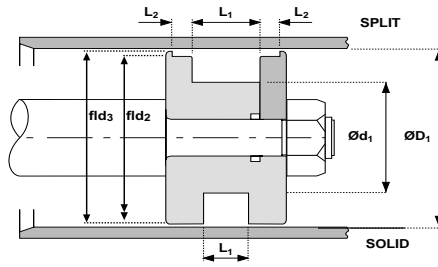
Also see Hallite 54.

FEATURES

- TOUGH, SELF LUBRICATING BRONZE PTFE FACE
- ULTRA LOW FRICTION
- ELIMINATES STICK SLIP EFFECT
- EXCELLENT WEAR RESISTANCE
- ROBUST CONSTRUCTION
- LONG LIFE
- BROAD FLUID COMPATIBILITY BY CHANGING COMPOUND OF O RING

Hallite 918 are designed to suitable for popular Asian housings.

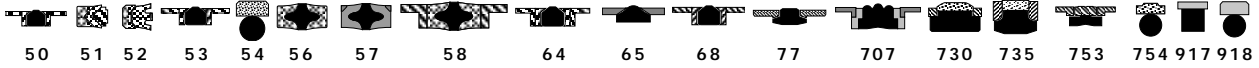
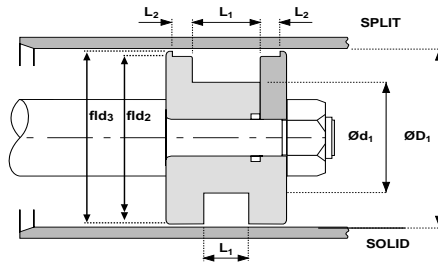
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
54	9.000	4.100			2.200		8611710
54	10.000	5.100			2.200		8616810
54	12.000	7.100			2.200		66239_ _
54	14.000	9.100			2.200		8639110
54	15.000	7.500			3.200		86163_ _I
754	15.000	7.500			3.200		444641_
54	16.000	8.500			3.200		66240_ _ ‡
754	16.000	8.500			3.200		440061_ ‡
54	20.000	12.500			3.200		66241_ _ ‡
754	20.000	12.500			3.200		436231_ ‡
54	24.000	16.500			3.200		66154_ _
52	25.000	15.000		24.000	6.600		6619810‡
68	25.000	15.000	22.000	24.000	12.500	4.000	6594610à*
53	25.000	17.000	22.100	24.000	8.000	4.000	2249212
50	25.000	17.000	22.000	24.000	10.000	4.000	6607810à*
54	25.000	17.500			3.200		66242_ _ ‡
754	25.000	17.500			3.200		433961_ ‡
65	25.000	17.500	21.300	24.000	8.500	3.250	2218210
77	25.000	17.500	21.300	24.000	8.500	3.250	6111410
51	30.000	20.000		29.000	9.600		4208310*
56	30.000	20.000			12.500		0200540
917	30.000	20.500			4.300		9030017*
707	30.000	21.000	27.000	29.000	13.500	2.100	DA030021
54	30.000	22.500			3.200		65968_ _
754	30.000	22.500			3.200		433971_
52	32.000	20.000	31.000		7.800		1791610
52	32.000	22.000	31.000		6.600		6619910‡
53	32.000	22.000	28.500	31.000	10.000	5.000	2249312
65	32.000	22.000	27.500	31.000	11.000	4.000	2218110
68	32.000	22.000	29.000	31.000	12.500	4.000	2249320‡*
64	32.000	22.000	28.000	31.000	15.500	2.600	6600100
917	32.000	22.500			4.300		9032027*
50	32.000	24.000	29.000	31.000	10.000	4.000	6607910‡
54	32.000	24.500			3.200		65969_ _ ‡
754	32.000	24.500			3.200		433981_ ‡



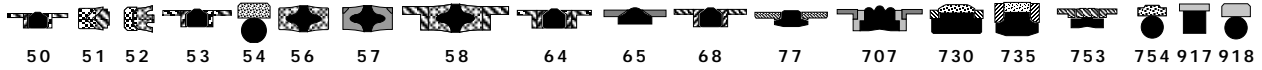
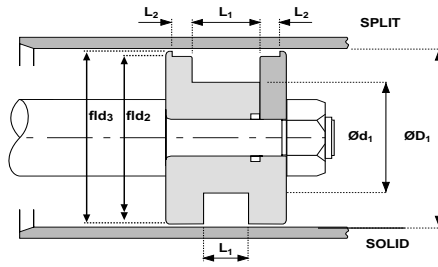
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS		L ₁	L ₂	PART No.
			Ød ₂	Ød ₃			
917	35.000	22.500			4.300		9035027*
707	35.000	25.000	31.000	34.000	15.500	2.600	DA035025/1
707	35.000	25.000	31.400	33.500	16.400	6.350	DA035025
54	35.000	27.500			3.200		65970_ _
754	35.000	27.500			3.200		435241_ _
54	38.000	30.500			3.200		66475_ _
707	40.000	24.000	35.400	38.500	18.400	6.350	DA040024
52	40.000	25.000		39.000	10.000		2149810
51	40.000	25.000		39.000	11.800		4208010
56	40.000	25.000			19.000		0472840
58	40.000	25.000	34.850	39.000	24.000	6.000	0472850
64	40.000	26.000	36.000	39.000	15.500	2.600	6600200
753B	40.000	26.000	36.000	39.000	15.500	2.600	6916500
54	40.000	29.000			4.200		65971_ _ ‡
754	40.000	29.000			4.200		433921_ ‡
917	40.000	30.000			4.300		9040057
52	40.000	30.000		39.000	6.600		6620010‡
53	40.000	30.000	36.500	39.000	10.000	5.000	2249412
753A	40.000	30.000	36.500	39.000	10.000	5.000	6915100
65	40.000	30.000	35.500	39.000	11.000	4.000	2218010
77	40.000	30.000	35.500	39.000	11.000	4.000	6111210
68	40.000	30.000	37.000	39.000	12.500	4.000	2249420‡*
707	40.000	30.000	36.000	38.000	12.500	4.000	DA040030/1
707	40.000	30.000	37.000	39.000	12.500	4.000	DA040030/2
707	40.000	30.000	35.400	38.500	16.400	6.350	DA040030
50	40.000	32.000	37.000	39.000	10.000	4.000	6608010‡
707	40.000	32.000	36.000	39.400	15.500	3.200	DA040032
754	40.000	32.500			3.200		4740010
54	42.000	31.000			4.200		65972_ _
707	45.000	29.000	40.400	43.700	18.400	6.350	DA045029
52	45.000	30.000		44.000	10.300		2150010
707	45.000	31.000	41.000	44.000	15.500	2.600	DA045031
753	45.000	31.000	41.000	44.000	15.500	2.600	6914500
54	45.000	34.000			4.200		65973_ _
754	45.000	34.000			4.200		434231_ _



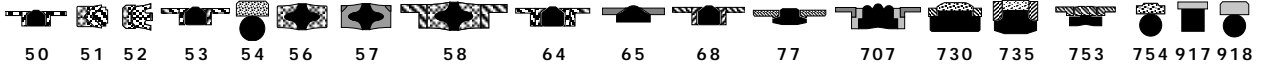
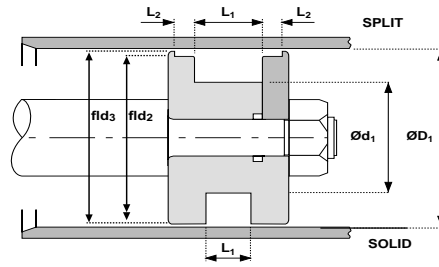
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
917	45.000	35.000			4.300		9045037*
53	45.000	35.000	40.400	44.000	16.400	6.350	2199411
707	45.000	35.000	40.400	43.500	16.400	6.350	DA045035
53	50.000	34.000	45.400	49.000	18.000	6.350	0209912
753A	50.000	34.000	45.400	49.000	18.400	6.350	6915200
64	50.000	34.000	46.000	49.000	20.500	3.100	6600300
753B	50.000	34.000	46.000	49.000	20.500	3.100	6916600
754	50.000	34.500			6.300		442741_‡
52	50.000	35.000		49.000	9.800		2150210‡
51	50.000	35.000		49.000	11.800		4207610
53	50.000	35.000	46.000	49.000	15.000	7.500	0074012
56	50.000	35.000			19.000		0474640
68	50.000	35.000	46.000	48.500	20.000	5.000	0074020‡
58	50.000	35.000	44.850	48.500	24.000	6.000	0474650
735	50.000	36.000			9.000		715100_
54	50.000	37.000			6.300		6680120
730	50.000	38.000			11.500		2335410
707	50.000	38.000	46.000	49.400	20.500	4.200	DA050038
54	50.000	39.000			4.200		65974_ _ ‡
754	50.000	39.000			4.200		432711_ ‡
917	50.000	40.000			4.300		9050047
65	50.000	40.000	45.500	49.000	11.000	4.000	2217910
77	50.000	40.000	45.500	49.000	11.000	4.000	2326110
50	50.000	40.000	47.000	49.000	12.500	4.000	6608110‡
53	55.000	39.000	50.400	54.000	18.000	6.350	1352212
64	55.000	39.000	51.000	54.000	20.500	3.100	6600400
753	55.000	39.000	51.000	54.000	20.500	3.100	6914600
754	55.000	39.500			6.300		435561_
52	55.000	40.000		54.000	10.300		2150410
51	55.000	40.000		54.000	11.800		4207110
56	55.000	40.000			19.000		0475040
58	55.000	40.000	49.850	53.500	24.000	6.000	0475050
54	55.000	44.000			4.200		65975_ _
754	55.000	44.000			4.200		446551_
917	55.000	45.000			4.300		9055027



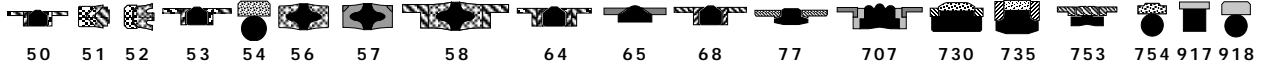
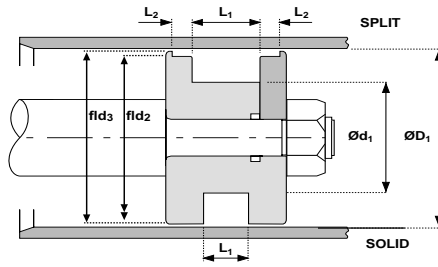
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
56	60.000	40.000			25.000		0282040
58	60.000	40.000	53.850	58.500	31.000	7.000	0282050
53	60.000	44.000	55.400	58.500	18.000	6.350	1361412
753A	60.000	44.000	55.400	58.500	18.400	6.350	2341410
64	60.000	44.000	56.000	59.000	20.500	3.100	6600500
730	60.000	44.000			20.500		2356710
753A	60.000	44.000	56.000	58.500	20.500	3.100	6916300
754	60.000	44.500			6.300		439071_
52	60.000	45.000		59.000	10.300		2150610
51	60.000	45.000		59.000	11.800		4207210
56	60.000	45.000			19.000		0979440
735	60.000	46.000			9.000		715150_
77	60.000	48.000	55.900	59.200	20.500	4.300	2326210*
707	60.000	48.000	56.000	59.400	20.500	4.200	DA060048
54	60.000	49.000			4.200		65976_
754	60.000	49.000			4.200		432701_
917	60.000	50.000			4.300		9060047
56	63.000	43.000			25.000		0646740
58	63.000	43.000	56.850	61.500	31.000	7.000	0646750
753A	63.000	47.000	58.400	61.500	18.400	6.350	6915300
53	63.000	47.000	58.400	61.500	19.000	6.350	0209712
64	63.000	47.000	59.000	62.000	20.500	3.100	6600600
753A	63.000	47.000	59.000	62.000	20.500	3.100	6916100
754	63.000	47.500			6.300		443111_ ‡
917	63.000	48.000			7.300		9063047
52	63.000	48.000		62.000	9.800		2150810 ‡
735	63.000	48.000			11.000		715200_
51	63.000	48.000		62.000	13.300		4207410
68	63.000	48.000	59.000	61.500	20.000	5.000	6594710 ‡
58	63.000	48.000	57.850	61.500	24.000	6.000	0205250
754	63.000	50.000			6.300		447231_
730	63.000	50.000			14.500		2331210
707	63.000	51.000	59.000	62.400	20.500	4.200	DA063051
54	63.000	52.000			4.200		66243_ _ ‡
754	63.000	52.000			4.200		432691_ ‡



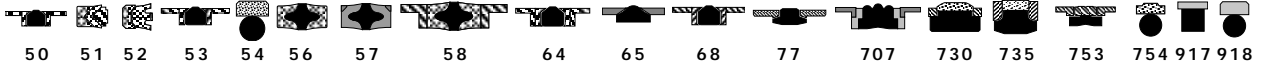
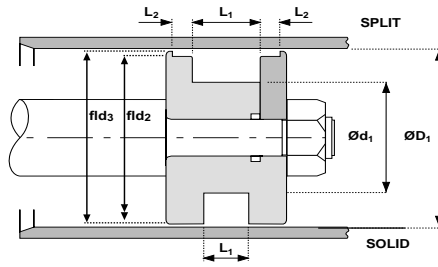
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
65	63.000	53.000	58.500	61.500	11.000	4.000	2217810
77	63.000	53.000	58.500	61.500	11.000	4.000	2325810
50	63.000	53.000	60.000	62.000	12.500	4.000	2199513†
64	65.000	49.000	61.000	64.000	20.500	3.100	1705210
753B	65.000	49.000	61.000	64.000	20.500	3.100	6916700
754	65.000	49.500			6.300		436201_
917	65.000	50.000			7.300		9065037*
735	65.000	50.000			11.000		715250_
53	65.000	50.000	60.400	63.500	18.000	6.350	1350512
56	65.000	50.000			19.000		0383840
58	65.000	50.000	59.850	63.500	24.000	6.000	0383850
754	65.000	52.000			6.300		438491_
54	65.000	54.000			4.200		86118_
754	65.000	54.000			4.200		435301_
917	69.000	54.000			7.300		9069007*
52	70.000	50.000		68.500	13.300		2151010
51	70.000	50.000		68.500	15.300		4208210
53	70.000	50.000	64.200	68.000	22.000	6.350	0075122
53	70.000	50.000	64.000	68.000	22.000	10.000	0075112
753A	70.000	50.000	64.200	68.300	22.400	6.350	6915400
56	70.000	50.000			25.000		0294640
58	70.000	50.000	63.850	68.000	31.000	7.000	0294650
64	70.000	54.000	66.000	69.000	20.500	3.100	6600700
753B	70.000	54.000	66.000	69.000	20.500	3.100	6916800
917	70.000	55.000			7.300		9070067
735	70.000	55.000			11.000		715300_
754	70.000	57.000			6.300		439081_
707	70.000	58.000	66.000	69.400	20.500	4.200	DA070058
54	70.000	59.000			4.200		65977_
754	70.000	59.000			4.200		432681_
53	75.000	55.000	69.200	73.000	22.000	6.350	0075622
53	75.000	55.000	69.000	73.000	22.000	10.000	0075612
730	75.000	55.000			23.000		2346420
56	75.000	55.000			25.000		0818640
58	75.000	55.000	68.850	73.000	31.000	7.000	0818650



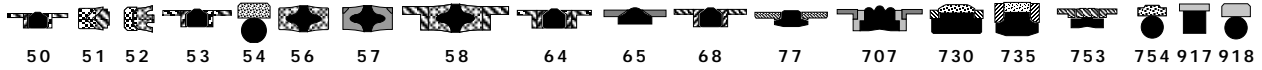
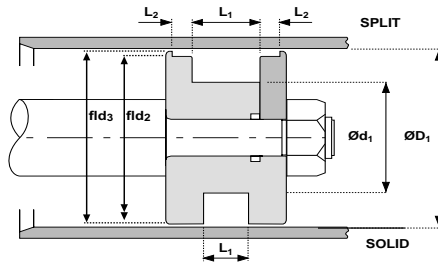
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
753B	75.000	59.000	71.000	74.000	20.500	3.100	6918650
754	75.000	59.500			6.300		4704910
917	75.000	60.000			7.300		9075017
735	75.000	60.000			11.000		715350_
54	75.000	64.000			4.200		66244_ _
754	75.000	64.000			4.200		433991_
54	80.000	59.000			8.100		8612220
52	80.000	60.000		78.500	12.800		2151210‡
51	80.000	60.000		78.500	15.300		4208110
53	80.000	60.000	74.200	78.000	22.000	6.350	0073822
53	80.000	60.000	74.000	78.000	22.000	10.000	0073812
753A	80.000	60.000	74.150	78.300	22.400	6.350	6915500
56	80.000	60.000			25.000		0294940
68	80.000	60.000	75.000	78.000	25.000	6.300	0073830‡
58	80.000	60.000	73.850	78.000	31.000	7.000	0294950
753B	80.000	62.000	76.000	79.000	22.400	3.600	6916400
64	80.000	62.000	76.000	79.000	22.500	3.600	1705110
54	80.000	64.500			6.300		65978_ _ ‡
754	80.000	64.500			6.300		427091_ ‡
917	80.000	65.000			7.300		9080067
735	80.000	65.000			11.000		715400_
50	80.000	65.000	76.000	78.500	20.000	5.000	6608210‡
730	80.000	66.000			17.000		2330310
707	80.000	66.000	76.000	79.400	22.500	5.200	DA080066
65	80.000	70.000	75.500	78.500	11.000	4.000	2217610
77	80.000	70.000	75.500	78.500	11.000	4.000	2325710
918	85.000	64.000			8.100		9085027
53	85.000	65.000	79.200	83.000	22.000	6.350	0075722
56	85.000	65.000			25.000		0388640
58	85.000	65.000	78.850	83.000	31.000	7.000	0388650
54	85.000	69.500			6.300		8625210
754	85.000	69.500			6.300		456401_
917	85.000	70.000			7.300		9085017
735	85.000	70.000			11.000		715450_
54	90.000	69.000			8.100		8614420



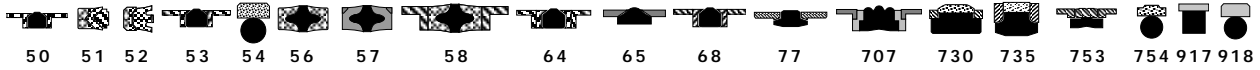
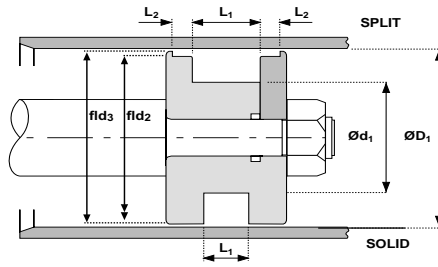
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
52	90.000	70.000		88.500	13.300		2151410
51	90.000	70.000		88.500	21.500		4207710
53	90.000	70.000	84.200	88.000	22.000	6.350	0075822
53	90.000	70.000	84.000	88.000	22.000	10.000	0075812
753A	90.000	70.000	84.150	88.300	22.400	6.350	6915600
56	90.000	70.000			25.000		0296040
58	90.000	70.000	83.850	88.000	31.000	7.000	0296050
64	90.000	72.000	86.000	89.000	22.500	3.600	6600800
753B	90.000	72.000	86.000	89.000	22.500	3.600	6916900
54	90.000	74.500			6.300		65979_ _
754	90.000	74.500			6.300		437271_
917	90.000	75.000			7.300		9090067
735	90.000	75.000			11.000		715500_
730	90.000	75.000			13.500		2331310
707	90.000	76.000	86.000	89.400	22.500	5.200	DA090076
65	92.000	82.000	87.500	90.500	11.000	4.000	2240410
918	95.000	74.000			8.100		9095027
53	95.000	75.000	89.200	93.000	22.000	6.350	1352512
58	95.000	75.000	88.850	93.000	31.000	7.000	0412750
54	95.000	79.500			6.300		86084_ _
754	95.000	79.500			6.300		456951_
917	95.000	80.000			7.300		9095017
735	95.000	80.000			11.000		715550_
53	100.000	75.000	93.200	98.000	22.000	6.350	0073712
58	100.000	75.000	93.240	98.000	22.000	6.450	0034950*
753A	100.000	75.000	93.150	98.000	22.400	6.350	6915700
58	100.000	75.000	93.850	98.000	26.000	9.500	0891650
54	100.000	79.000			8.100		8609320
52	100.000	80.000		98.500	12.800		2151610‡
51	100.000	80.000		98.500	21.500		4207510
53	100.000	80.000	94.000	98.000	22.000	10.000	0083612
56	100.000	80.000			25.000		0295140
68	100.000	80.000	95.000	98.000	25.000	6.300	0083620‡
58	100.000	80.000	93.850	98.000	31.000	7.000	0295150
64	100.000	82.000	96.000	99.000	22.500	3.600	6600900



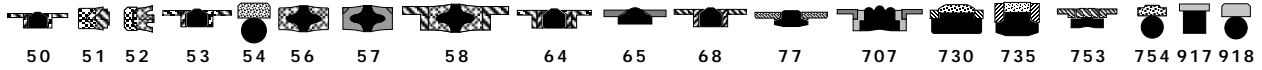
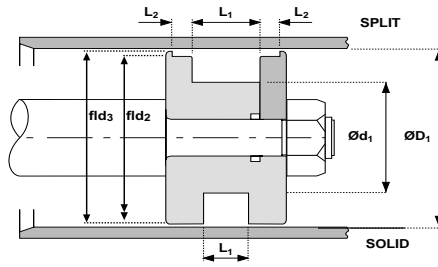
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS		L ₁	L ₂	PART No.
			Ød ₂	Ød ₃			
730	100.000	82.000			22.500		2331410
753	100.000	82.000	96.000	99.000	22.500	3.600	6918660
54	100.000	84.500			6.300		65980_ _ ‡
754	100.000	84.500			6.300		433931_ ‡
917	100.000	85.000			7.300		9100067
735	100.000	85.000			12.500		715600_
730	100.000	85.000			13.500		2335010
50	100.000	85.000	96.000	98.500	20.000	5.000	6608310‡
707	100.000	86.000	96.000	99.400	22.500	5.200	DA100086
730	100.000	86.000			22.500		2359710
65	100.000	87.000	93.800	98.500	14.000	6.000	0352510
77	100.000	87.000	93.800	98.500	14.000	6.000	2326010
53	105.000	80.000	98.100	103.000	22.000	6.350	1352812
730	105.000	80.000			22.500		2346710
58	105.000	80.000	98.850	103.000	38.000	9.500	0413150*
918	105.000	84.000			8.100		9105017
754	105.000	89.500			6.300		437251_
735	105.000	90.000			12.500		715650_
730	105.000	91.000			16.500		2348210
917	108.000	92.000			7.300		9108017*
53	110.000	85.000	103.100	108.000	22.000	6.350	0091113
58	110.000	85.000	103.500	108.000	22.000	6.450	1188250
753A	110.000	85.000	103.100	108.000	22.400	6.350	6915800
58	110.000	85.000	103.500	108.000	25.000	6.450	0820650*
52	110.000	90.000		108.500	13.300		2151810
51	110.000	90.000		108.500	21.500		4207910
56	110.000	90.000			25.000		0712440
58	110.000	90.000	103.850	108.000	31.000	7.000	0712450
64	110.000	92.000	106.000	109.000	22.500	3.600	6601000
753	110.000	92.000	106.000	109.000	22.500	3.600	6914700
917	110.000	94.000			7.300		
54	110.000	94.500			6.300		65981_ _
754	110.000	94.500			6.300		4419310
735	110.000	95.000			12.500		715700_
730	110.000	95.000			16.000		2331610



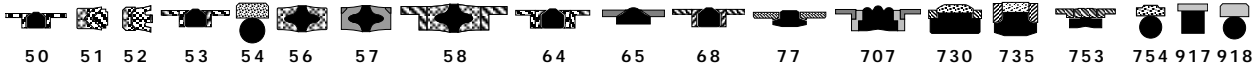
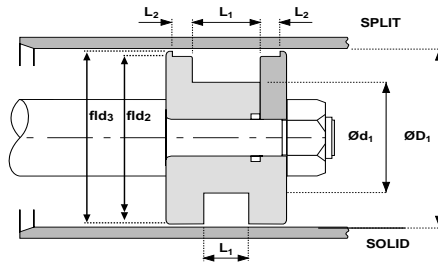
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
707	110.000	96.000	106.000	109.400	22.500	5.200	DA115096
730	115.000	90.000			21.000		2329110
53	115.000	90.000	108.100	113.000	22.000	6.350	0084222
54	115.000	94.000			8.100		6680020
58	115.000	95.000	108.850	113.000	31.000	7.000	0796450
707	115.000	97.000	111.000	114.000	22.500	3.600	DA115097
730	115.000	97.000			22.500		2356110
54	115.000	99.500			6.300		65982_
754	115.000	99.500			6.300		435581_
735	115.000	100.000			12.500		715750_
730	115.000	100.000			16.000		2329210
53	120.000	95.000	113.100	118.000	22.000	6.350	0090012
754	120.000	99.000			8.100		453501_
54	120.000	99.000			8.100		8616720
56	120.000	100.000			25.000		0296140
58	120.000	100.000	113.850	118.000	31.000	7.000	0296150
54	120.000	104.500			6.300		66361_
754	120.000	104.500			6.300		446541_
735	120.000	105.000			12.500		715800_
730	120.000	105.000			16.000		2337410
707	120.000	106.000	116.000	119.400	22.500	5.200	DA120106
52	125.000	100.000		123.500	16.300		2152010†
56	125.000	100.000			19.000		1007440
53	125.000	100.000	118.100	123.000	25.000	6.350	0087522
58	125.000	100.000	118.500	123.000	25.000	6.450	1007450
753A	125.000	100.000	118.100	123.000	25.400	6.350	6915900
51	125.000	100.000		123.500	26.100		4207810
56	125.000	100.000			32.000		0418640
68	125.000	100.000	119.000	123.000	32.000	10.000	0087540†
58	125.000	100.000	118.850	123.000	38.000	9.500	0418650
735	125.000	102.000			16.000		715850_
64	125.000	103.000	121.000	124.000	26.500	5.100	6601100
753	125.000	103.000	121.000	124.000	26.500	5.100	6919800
753B	125.000	103.000	121.000	124.000	26.500	5.100	6917000
54	125.000	104.000			8.100		8625120



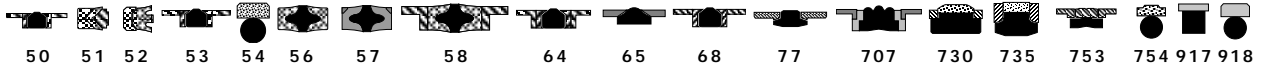
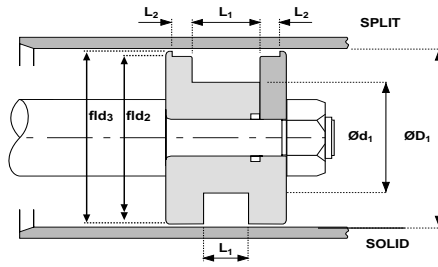
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS		L ₁	L ₂	PART No.
			Ød ₂	Ød ₃			
754	125.000	104.000			8.100		437651_‡
50	125.000	105.000	120.000	123.000	25.000	6.300	6608410‡
707	125.000	108.000	121.000	124.400	26.500	7.200	DA125108
54	125.000	109.500			6.300		65983_ _ ‡
754	125.000	109.500			6.300		434001_ ‡
730	125.000	110.000			15.800		2331510
65	125.000	112.000	118.800	123.500	14.000	6.000	0315810
77	125.000	112.000	118.800	123.500	14.000	6.000	2325910
58	130.000	104.000	123.850	128.000	38.000	9.500	0244350
53	130.000	105.000	122.600	128.000	25.000	9.520	0089622
58	130.000	105.000	123.500	128.000	25.000	6.450	0044850
707	130.000	105.000	123.100	128.000	25.400	6.350	DA130105/1
735	130.000	107.000			16.000		715900_
754	130.000	109.000			8.100		440241_
54	130.000	109.000			8.100		8647620
54	130.000	114.500			6.300		66476_ _
754	130.000	114.500			6.300		434221_
53	135.000	110.000	127.600	133.000	25.000	9.520	0091222
53	135.000	110.000	128.000	133.000	25.000	12.700	0091212
707	135.000	110.000	128.100	133.000	25.400	6.350	DA135110/1
58	135.000	110.000	128.350	133.000	38.000	9.500	0304350
735	135.000	112.000			16.000		715950_
54	135.000	114.000			8.100		66477_ _
754	135.000	114.000			8.100		453511_
730	135.000	118.000			20.500		2348110
730	135.000	120.000			16.000		2334010
52	140.000	115.000		138.500	16.500		2152210
53	140.000	115.000	132.600	138.000	25.000	6.350	0091032
53	140.000	115.000	132.600	138.000	25.000	9.520	0091022
58	140.000	115.000	133.500	138.000	25.000	6.450	1008450
51	140.000	115.000		138.500	26.100		4208410
735	140.000	117.000			16.000		716000_
64	140.000	118.000	136.000	139.000	26.500	5.100	6601200
753A	140.000	118.000	136.000	139.000	26.500	5.100	2356010
54	140.000	119.000			8.100		65984_ _



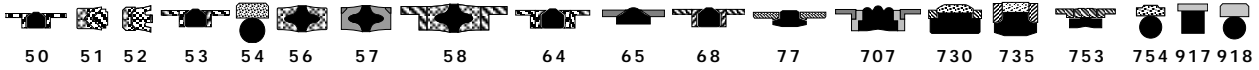
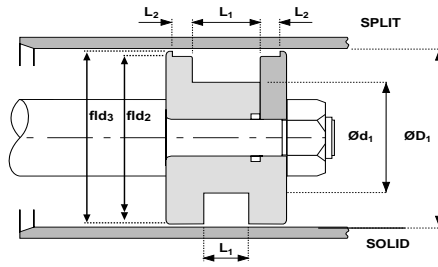
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
754	140.000	119.000			8.100		434011_
50	140.000	120.000	135.000	138.000	25.000	6.300	2317030
56	140.000	120.000			25.000		0250540
58	140.000	120.000	133.850	138.000	31.000	7.000	0250550
730	140.000	123.000			16.000		2357910
707	140.000	123.000	136.000	139.400	26.500	7.200	DA140123
917	140.000	124.000			7.300		9140077*
65	140.000	124.000	132.000	138.500	17.500	8.750	0317710
754	140.000	124.500			6.300		449941_
730	140.000	125.000			16.000		2329410
53	145.000	120.000	137.600	143.000	25.000	9.520	0091422
707	145.000	120.000	138.300	142.950	25.400	6.350	DA145120/1
735	145.000	122.000			16.000		716050_
54	145.000	124.000			8.100		86080_ _
58	145.000	125.000	138.850	143.000	31.000	7.000	0640150
51	150.000	120.000		148.000	29.300		4208510
56	150.000	120.000			38.000		1289540
58	150.000	120.000	143.850	148.000	44.000	9.500	1289550
53	150.000	125.000	142.600	148.000	25.000	9.520	0091522
53	150.000	125.000	143.000	148.000	25.000	12.700	0091512
707	150.000	125.000	143.000	148.000	25.400	6.350	DA150125/1
735	150.000	127.000			16.000		716100_
707	150.000	128.000	146.000	149.000	26.500	5.100	DA150128
753A	150.000	128.000	146.000	149.000	26.500	5.100	2349910
54	150.000	129.000			8.100		65985_ _
754	150.000	129.000			8.100		439691_
730	150.000	130.000			16.000		2339010
730	150.000	133.000			20.000		2360510
707	150.000	133.000	146.000	149.400	26.500	7.200	DA150133
730	150.000	135.000			16.000		2338210
53	155.000	130.000	147.600	153.000	25.000	9.520	0091622*
707	155.000	130.000	147.600	152.500	25.400	9.500	DA155130
54	155.000	134.000			8.100		86177_ _
52	160.000	130.000		158.000	20.100		2152410
58	160.000	130.000	153.500	158.000	25.000	6.450	1008250



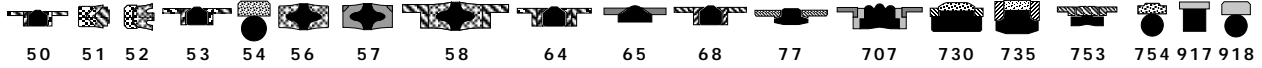
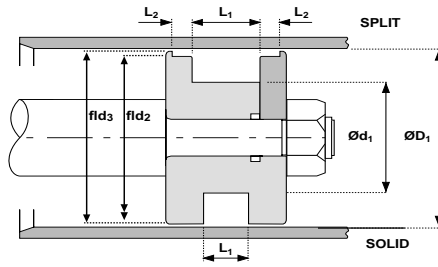
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
707	160.000	130.000	153.000	157.500	25.400	6.350	DA160130
51	160.000	130.000		158.000	29.300		4208710
52	160.000	135.000		158.000	16.300		6620110‡
53	160.000	135.000	152.600	158.000	25.000	9.520	0089922
56	160.000	135.000			32.000		0080440
68	160.000	135.000	154.000	158.000	32.000	10.000	0089930‡
58	160.000	135.000	153.850	158.000	38.000	9.500	0080450
735	160.000	137.000			16.000		716150_
64	160.000	138.000	156.000	159.000	26.500	5.100	6601300
753A	160.000	138.000	156.000	159.000	26.500	5.100	2349810
54	160.000	139.000			8.100		65986_ _ ‡
754	160.000	139.000			8.100		434021_ ‡
50	160.000	140.000	155.000	158.000	25.000	6.300	6608510‡
65	160.000	140.000	151.400	158.500	25.000	12.500	0315910
58	160.000	140.000	153.850	158.000	31.000	7.000	0304650
707	160.000	143.000	156.000	159.400	26.500	7.200	DA160143
730	160.000	145.000			16.000		2331910
53	165.000	140.000	158.000	163.000	25.000	12.700	1257612
735	165.000	142.000			16.000		716200_
753	165.000	143.000	161.000	164.000	26.500	5.100	2362310
54	165.000	144.000			8.100		66491_ _
754	165.000	144.000			8.100		445221_
730	165.000	145.000			20.000		2348910
730	165.000	150.000			16.000		2332010
58	170.000	140.000	162.540	168.000	25.000	6.450	1222250*
53	170.000	145.000	161.700	168.000	25.000	12.700	0088012
730	170.000	145.000			25.000		2345510
735	170.000	147.000			16.000		716250_
707	170.000	148.000	166.000	169.000	25.500	5.100	DA170148
54	170.000	149.000			8.100		65987_ _
754	170.000	149.000			8.100		434031_
730	170.000	150.000			16.000		2331110
56	170.000	150.000			25.000		0303340
58	170.000	150.000	163.850	168.000	31.000	7.000	0303350
53	175.000	150.000	166.700	173.000	25.000	12.700	1260712*



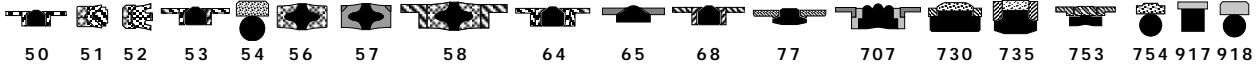
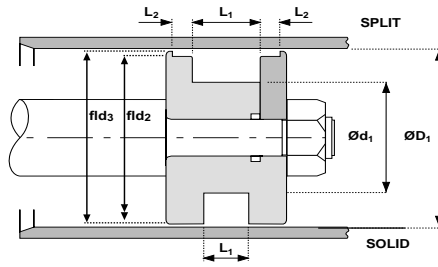
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
735	175.000	152.000			16.000		716280_
730	175.000	155.000			16.000		2335110
52	180.000	150.000		178.000	20.100		2152610
51	180.000	150.000		178.000	31.800		4208610
58	180.000	150.000	173.000	178.000	35.000	6.450	0679850
707	180.000	150.000	172.950	177.870	35.400	6.350	DA180150
53	180.000	155.000	171.700	178.000	25.000	12.700	0091712
735	180.000	157.000			16.000		716300_
753A	180.000	158.000	176.000	179.000	26.500	5.100	2349510
54	180.000	159.000			8.100		65988_ _
754	180.000	159.000			8.100		434041_
730	180.000	160.000			16.000		2328510
56	180.000	160.000			25.000		1283140
65	180.000	160.000	171.400	178.500	25.000	12.500	0316010
58	180.000	160.000	173.850	178.000	31.000	7.000	1283150
735	185.000	162.000			16.000		716350_
54	185.000	164.000			8.100		66478_ _
730	185.000	165.000			16.000		2328410
56	190.000	160.000			38.000		0838440
58	190.000	160.000	183.850	188.000	44.000	9.500	0838450
53	190.000	165.000	181.700	188.000	25.000	12.700	1270012
735	190.000	167.000			16.000		716400_
54	190.000	169.000			8.100		65989_ _
754	190.000	169.000			8.100		434241_
730	190.000	170.000			16.000		2332210
53	195.000	170.000	186.700	193.000	25.000	12.700	1265412
707	195.000	170.000	186.700	192.000	25.400	12.700	DA195170
730	195.000	175.000			16.000		2334710
52	200.000	170.000		198.000	20.300		2152810†
53	200.000	170.000	192.000	197.000	30.000	15.000	1270112
51	200.000	170.000		198.000	31.800		4209010
68	200.000	170.000	192.000	197.000	36.000	12.500	1270120†
56	200.000	170.000			38.000		0087140
58	200.000	170.000	193.850	198.000	44.000	12.000	0087150
53	200.000	175.000	191.600	198.000	25.000	12.700	0089712



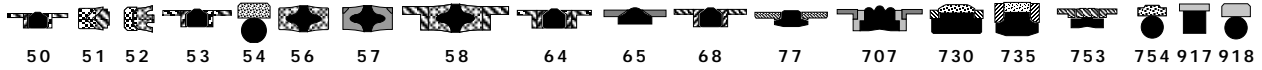
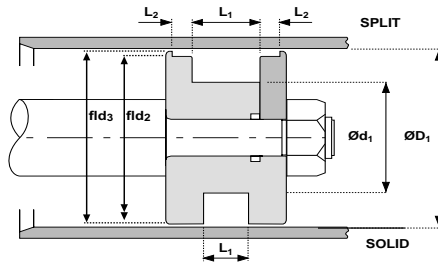
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS		L ₁	L ₂	PART No.
			Ød ₂	Ød ₃			
753A	200.000	175.000	196.000	199.000	31.500	6.600	2347010
58	200.000	175.000	193.850	198.000	38.000	9.500	0838850
735	200.000	177.000			16.000		716450_
54	200.000	179.000			8.100		65990_ _ ‡
754	200.000	179.000			8.100		434051_ ‡
730	200.000	180.000			16.000		2329310
730	200.000	180.000			20.000		2348810
65	200.000	180.000	191.400	198.500	25.000	12.500	0316910
58	210.000	180.000	203.130	208.000	31.700	6.450	1198450
707	210.000	185.000	201.600	207.000	25.400	12.700	DA210185
735	210.000	187.000			16.000		716500_
54	210.000	189.000			8.100		86146_ _
754	210.000	189.000			8.100		435151_
730	210.000	190.000			16.000		2332410
735	215.000	192.000			16.000		716280_
735	215.000	192.000			16.000		7165300
730	215.000	195.000			16.000		2332510
730	215.000	195.000			20.000		2345110
53	220.000	190.000	212.000	217.000	30.000	15.000	1714810
707	220.000	190.000	212.700	217.900	35.400	6.350	DA220190
56	220.000	190.000			38.000		0087340
730	220.000	195.000			16.000		2345810
730	220.000	195.000			25.000		2333910
707	220.000	195.000	211.600	217.000	25.400	12.700	DA220195
735	220.000	197.000			16.000		716550_
54	220.000	199.000			8.100		66245_ _
754	220.000	199.000			8.100		4735710
730	220.000	200.000			20.500		2356510
58	220.000	200.000	213.850	218.000	31.000	7.000	1056450
730	224.000	204.000			20.500		2348510
52	225.000	195.000		223.000	20.100		2197010
51	225.000	195.000		223.000	31.800		6582110*
735	225.000	202.000			16.000		716600_
54	225.000	204.000			8.100		66246_ _
754	225.000	204.000			8.100		451281_



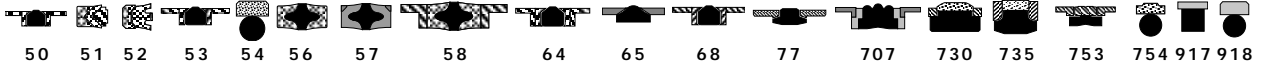
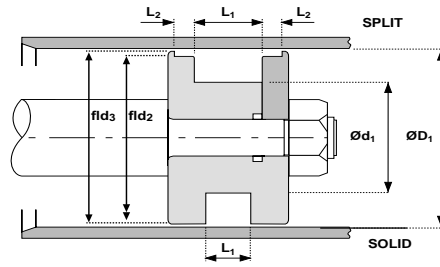
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂		Ød ₃	L ₁	L ₂	PART No.
730	225.000	205.000				16.000		2332610
730	225.000	205.000				20.000		2346810
56	230.000	200.000				38.000		2010040*
707	230.000	205.000	221.600	227.000		25.400	12.700	DA230205
735	230.000	207.000				16.000		716650_
54	230.000	209.000				8.100		66247_ _
730	230.000	210.000				16.000		2332710
730	230.000	210.000				20.000		2344510
56	240.000	210.000				38.000		0094340*
730	240.000	215.000				25.000		2333010
707	240.000	215.000	231.600	237.000		25.400	12.700	DA240215
735	240.000	217.000				16.000		716700_
54	240.000	219.000				8.100		86154_ _
754	240.000	219.000				8.100		455361_
730	245.000	220.000				25.000		2328810
52	250.000	220.000			248.000	20.300		2197210‡
53	250.000	220.000	242.000	247.000		30.000	15.000	1264312
51	250.000	220.000			248.000	31.800		6582310
707	250.000	220.000	242.900	247.850		35.400	6.350	DA250220
753A	250.000	220.000	242.900	247.850		35.400	6.350	2340710
68	250.000	220.000	242.000	247.000		36.000	12.500	1264320‡
56	250.000	220.000				38.000		1056340
58	250.000	220.000	243.850	248.000		44.000	12.000	1056350
735	250.000	222.000				17.500		716750_
730	250.000	225.000				25.000		2348310
64	250.000	225.000	246.000	249.000		31.500	6.600	6601400
54	250.000	229.000				8.100		66401_ _ ‡
754	250.000	229.000				8.100		439371_ ‡
730	260.000	230.000				30.000		2347810
56	260.000	230.000				38.000		0094540*
735	260.000	232.000				17.500		716800_
730	260.000	235.000				25.000		2347910
54	260.000	239.000				8.100		66479_ _
54	270.000	249.000				8.100		8625310
52	275.000	245.000			273.000	20.100		2197410



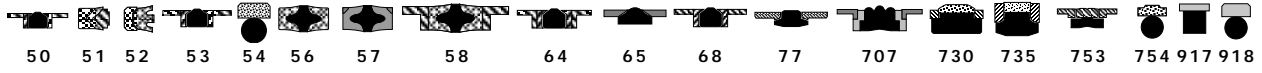
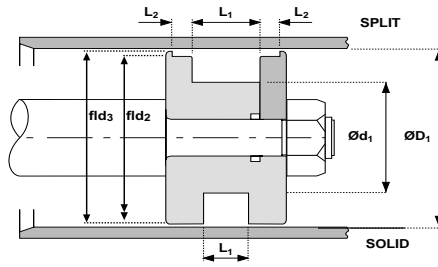
Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS		L ₁	L ₂	PART No.
			Ød ₂	Ød ₃			
51	275.000	245.000		273.000	31.800		6582410*
730	275.000	250.000			25.000		2362210
53	280.000	250.000	272.000	277.000	30.000	15.000	1261712
58	280.000	250.000	273.850	278.000	44.000	12.000	1055550
735	280.000	252.000			17.500		7169000
730	280.000	255.000			25.000		2333510
54	280.000	259.000			8.100		66402_ _
730	285.000	260.000			25.000		2362410
52	300.000	270.000		298.000	20.100		2188310
51	300.000	270.000		298.000	31.800		6582510*
56	300.000	270.000			38.000		0094840
730	300.000	275.000			25.000		2333610
54	300.000	279.000			8.100		66403_ _
754	300.000	279.000			8.100		457281_
56	310.000	280.000			38.000		0094940*
730	310.000	285.000			25.000		2333710
54	310.000	289.000			8.100		66480_ _
730	320.000	290.000			30.000		2348010
51	320.000	290.000		318.000	31.800		6582610
54	320.000	299.000			8.100		86086_ _ ‡
56	330.000	300.000			38.000		0095040*
54	330.000	305.500			8.100		86081_ _
54	340.000	315.500			8.100		66481_ _
730	345.000	315.000			30.000		2363610
730	350.000	320.000			30.000		2345410
735	350.000	322.000			17.500		716950_
54	350.000	325.500			8.100		86155_ _
56	360.000	320.000			45.000		1054040
54	360.000	335.500			8.100		86218_ _
730	370.000	340.000			30.000		2362710
54	370.000	345.5000			8.100		86219_ _
730	380.000	350.000			32.000		2362110
54	380.000	355.500			8.100		86220_ _
54	390.000	365.500			8.100		86221_ _
56	400.000	360.000			45.000		1054340



Piston seals
metric - double acting



Type	ØD ₁	Ød ₁	NOMINALS Ød ₂	Ød ₃	L ₁	L ₂	PART No.
730	400.000	370.000			32.000		2359810
54	400.000	375.500			8.100		66482_ _ ‡
56	420.000	380.000			45.000		
56	420.000				45.000		0095340*
56	480.000	440.000			45.000		0095440*
56	500.000	460.000			45.000		0134740*
56	540.000	500.000			45.000		2018240*I
56	580.000	540.000			50.000		2020940*

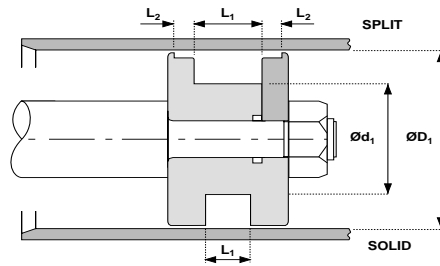


Notes

Hallite 



Piston seals
inch - double acting



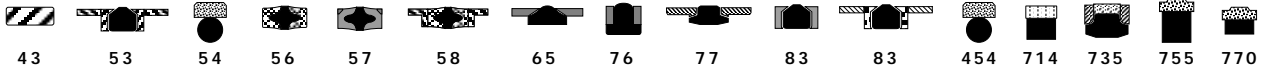
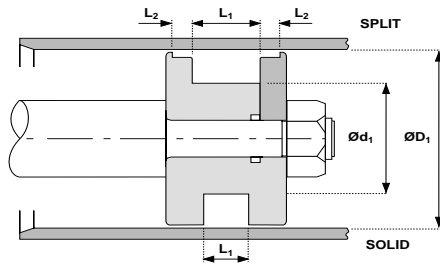
Hallite



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
58	1.000	0.500	0.864	0.960	0.625	0.188	0723850
56	1.000	0.625			0.469		1247640
58	1.000	0.625	0.868	0.968	0.594	0.187	1247650
65	1.000	0.687	0.829	0.937	0.343	0.125	2221210
54	1.000	0.690			0.128		PR1000RG
755	1.000	0.691			0.129		891000_
54	1.000	0.704			0.125		66248_
54	1.000	0.741			0.083		PR1000GFT
58	1.125	0.625	0.990	1.093	0.750	0.250	0855050
76	1.187	0.943			0.187		MPT014
56	1.250	0.750			0.625		0403740
58	1.250	0.750	1.118	1.218	0.750	0.250	0403750
65	1.250	0.937	1.079	1.187	0.343	0.125	2221310
77	1.250	0.937	1.079	1.187	0.343	0.125	6567790
54	1.250	0.940			0.128		PR1250RG
755	1.250	0.941			0.129		891010_
54	1.250	0.991			0.083		PR1250GFT
770	1.250	1.008	1.247		0.187		455441_
58	1.375	0.875	1.234	1.343	0.625	0.254	6503550*
58	1.375	0.875	1.241	1.343	0.750	0.250	0401350
76	1.375	1.132			0.187		MPT017
56	1.500	1.000			0.625		0422440
58	1.500	1.000	1.362	1.460	0.625	0.254	1441150
58	1.500	1.000	1.362	1.460	0.625	0.188	6504850
58	1.500	1.000	1.371	1.468	0.750	0.250	0422450
754	1.500	1.068			0.165		443231_
65	1.500	1.125	1.324	1.437	0.437	0.150	2219610
83	1.500	1.125	1.321	1.450	0.452	0.250	611191_
54	1.500	1.190			0.128		PR1500RG
755	1.500	1.191			0.129		891020_
54	1.500	1.204			0.125		66249_
754	1.500	1.204			0.125		442871_
54	1.500	1.204			0.083		PR1500GFT
76	1.500	1.256			0.187		MPT019
775	1.500	1.258			0.187		473181_



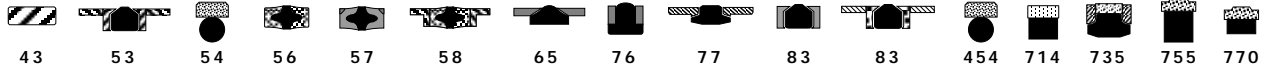
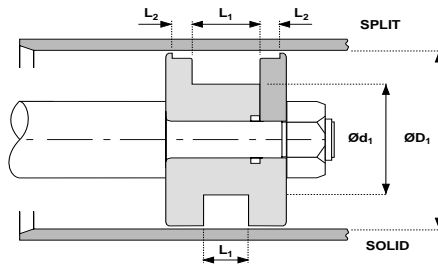
Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
775	1.500	1.258			0.275		473051_
43	1.500	1.286			0.125		P1001
43	1.500	1.286			0.187		P1001-06
58	1.625	1.000	1.428	1.562	0.937	0.250	0540650
56	1.750	1.125			0.750		0778240
58	1.750	1.125	1.572	1.710	0.750	0.254	6504450
58	1.750	1.125	1.555	1.687	0.937	0.250	0778250
54	1.750	1.360			0.122		PR1750GFT
65	1.750	1.375	1.574	1.687	0.437	0.150	2220910
735	1.750	1.377			0.424		710030_
54	1.750	1.440			0.128		PR1750RG
755	1.750	1.441			0.129		891030_
43	1.750	1.510			0.125		P1003
58	1.875	1.250	1.678	1.812	0.937	0.250	0404150
53	2.000	1.375	1.821	1.950	0.750	0.250	6593410
56	2.000	1.375			0.750		0778440
58	2.000	1.375	1.822	1.962	0.750	0.254	0639150
58	2.000	1.375	1.805	1.937	0.937	0.250	0778450
714	2.000	1.462			0.282		7260510
755	2.000	1.462			0.283		455352_
83	2.000	1.500	1.821	1.950	0.587	0.250	232631_
54	2.000	1.568			0.165		66250_
454	2.000	1.576			0.168		7230500
755	2.000	1.606			0.129		891310_*
54	2.000	1.606			0.130		PR2000GFT
54	2.000	1.625			0.192		PR2000KCN
76	2.000	1.625			0.281		MPT024
65	2.000	1.625	1.824	1.937	0.437	0.150	2224010
735	2.000	1.627			0.424		710050_
770	2.000	1.630			0.281		455351_
775	2.000	1.630			0.281		473101_
775	2.000	1.630			0.410		473371_
54	2.000	1.690			0.128		PR2000RG
755	2.000	1.691			0.129		891040_
43	2.000	1.750			0.125		P1005



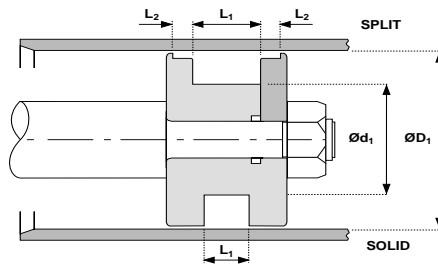
Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
43	2.000	1.750			0.187		P1005-06
58	2.125	1.500	1.928	2.062	0.937	0.250	0967650
714	2.125	1.587			0.282		CC2125*
53	2.250	1.625	2.071	2.200	0.750	0.250	6593510
56	2.250	1.625			0.750		1432640
58	2.250	1.625	2.071	2.211	0.750	0.254	0640450
58	2.250	1.625	2.055	2.187	0.937	0.250	1432650
714	2.250	1.712			0.282		CC2250
54	2.250	1.856			0.130		PR2250GFT
65	2.250	1.875	2.075	2.187	0.437	0.150	2221110
76	2.250	1.877			0.187		MPT026
54	2.250	1.940			0.128		PR2250RG
755	2.250	1.941			0.129		891050_
43	2.250	1.980			0.125		P1007-04
43	2.250	1.980			0.188		P1007
56	2.375	1.750			0.750		0939840
58	2.375	1.750	2.180	2.312	0.750	0.250	0890850
58	2.375	1.750	2.180	2.312	0.937	0.250	0939850
714	2.375	1.837			0.282		CC2375*
77	2.375	2.000	2.200	2.312	0.437	0.150	6918060
53	2.500	1.875	2.321	2.450	0.750	0.250	6593610
56	2.500	1.875			0.750		0867240
58	2.500	1.875	2.321	2.460	0.750	0.254	6502250
58	2.500	1.875	2.305	2.437	0.937	0.250	0867250
714	2.500	1.962			0.282		7261010
755	2.500	1.962			0.283		449002_
83	2.500	2.000	2.321	2.450	0.587	0.250	212201_
54	2.500	2.068			0.165		66251_
454	2.500	2.076			0.165		7231000
755	2.500	2.106			0.129		443931_*
54	2.500	2.106			0.130		PR2500GFT
54	2.500	2.125			0.192		PR2500KCN
65	2.500	2.125	2.325	2.437	0.437	0.150	2224110
77	2.500	2.125	2.325	2.437	0.437	0.150	2360210
735	2.500	2.127			0.424		710070_



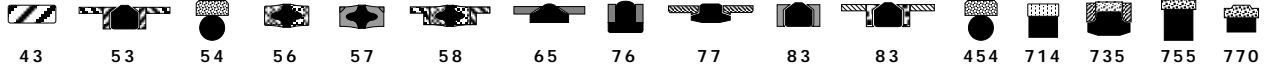
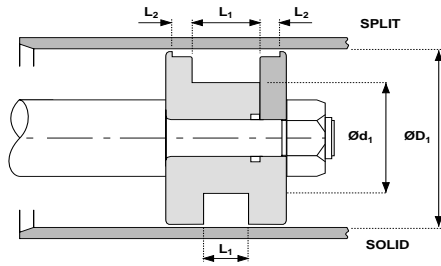
Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
76	2.500	2.130			0.281		MPT028
770	2.500	2.130			0.281		449001_
775	2.500	2.130			0.281		473111_
775	2.500	2.130			0.410		472691_
54	2.500	2.190			0.128		PR2500RG
755	2.500	2.191			0.129		891060_
43	2.500	2.206			0.125		P1009-04
43	2.500	2.206			0.188		P1009
58	2.625	2.000	2.428	2.562	0.937	0.250	1371050
714	2.625	2.087			0.282		CC2625*
53	2.750	2.000	2.524	2.690	0.937	0.250	6593710
56	2.750	2.000			0.937		1369140
58	2.750	2.000	2.524	2.710	0.937	0.254	0783250
58	2.750	2.000	2.485	2.687	1.187	0.250	1369150
714	2.750	2.212			0.282		7261510
454	2.750	2.326			0.165		7231500
54	2.750	2.356			0.130		PR2750GFT
54	2.750	2.375			0.192		PR2750KCN
65	2.750	2.375	2.575	2.687	0.437	0.150	2219510
43	2.750	2.437			0.125		P1011-04
43	2.750	2.437			0.188		P1011
54	2.750	2.440			0.128		PR2750RG
755	2.750	2.441			0.129		891070_
56	2.875	2.125			0.937		0779640
58	2.875	2.125	2.610	2.812	1.187	0.250	0779650
714	2.875	2.337			0.282		CC2875*
65	2.875	2.500	2.700	2.812	0.437	0.150	2225210
53	3.000	2.250	2.774	2.940	0.937	0.250	1377612
56	3.000	2.250			0.937		1098440
58	3.000	2.250	2.774	2.960	0.937	0.254	6502450
58	3.000	2.250	2.735	2.937	1.187	0.250	1098450
54	3.000	2.442				0.280	PR3000RG
714	3.000	2.442			0.282		7262010
54	3.000	2.460			0.192		PR3000KCN
755	3.000	2.462			0.283		891080_

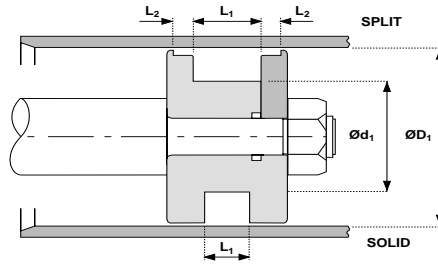


Piston seals
inch - double acting

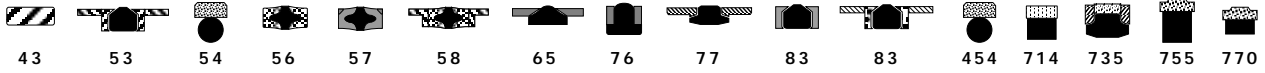


Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
83	3.000	2.500	2.774	2.940	0.587	0.250	212211_
735	3.000	2.522			0.579		710100_
54	3.000	2.568			0.165		66252_
454	3.000	2.576			0.165		7232000
54	3.000	2.606			0.130		PR3000GFT
65	3.000	2.625	2.825	2.937	0.437	0.150	2224210
76	3.000	2.630			0.281		MPT032
770	3.000	2.630			0.281		434941_
775	3.000	2.630			0.281		473121_
775	3.000	2.630			0.410		473381_
43	3.000	2.680			0.125		P1013-04
43	3.000	2.680			0.188		P1013
43	3.00	2.680			0.250		P1013-08
58	3.125	2.375	2.858	3.062	1.187	0.250	1024850
714	3.125	2.567			0.282		CC3125*
53	3.250	2.500	3.023	3.190	0.937	0.250	6593910
56	3.250	2.500			0.937		0782440
58	3.250	2.500	3.024	3.210	0.937	0.254	1154150
58	3.250	2.500	2.985	3.187	1.187	0.250	0782450
454	3.250	2.634			0.246		7232500
54	3.250	2.640			0.250		66253_
754	3.250	2.640			0.250		442881_
54	3.250	2.692			0.280		PR3250RG
714	3.250	2.692			0.282		7262510
54	3.250	2.710			0.192		PR3250KCN
755	3.250	2.712			0.283		891090_
83	3.250	2.750	3.023	3.190	0.587	0.250	232761_
735	3.250	2.772			0.579		710150_
54	3.250	2.856			0.130		PR3250GFT
65	3.250	2.875	3.075	3.187	0.437	0.150	2219710
77	3.250	2.875	3.075	3.187	0.437	0.150	2360310
76	3.250	2.877			0.281		MPT034
770	3.250	2.880			0.281		434951_
43	3.250	2.914			0.188		P1015
43	3.250	2.914			0.250		P1015-08

Piston seals
inch - double acting



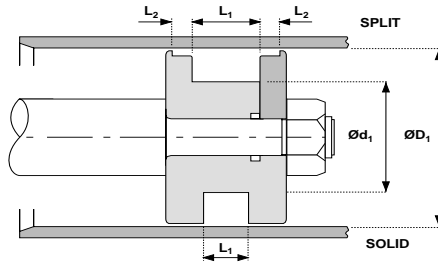
Hallite



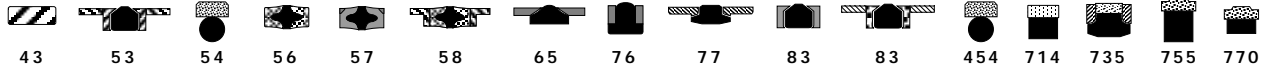
Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
56	3.375	2.625			0.937		0773840
58	3.375	2.625	3.110	3.312	1.000	0.250	2199650
58	3.375	2.625	3.108	3.312	1.187	0.250	0773850
714	3.375	2.817			0.282		CC3375*
53	3.500	2.750	3.274	3.440	0.937	0.250	0082412
56	3.500	2.750			0.937		0437840
58	3.500	2.750	3.273	3.460	0.937	0.254	6500550
58	3.500	2.750	3.235	3.437	1.187	0.250	0437850
454	3.500	2.884			0.246		7233000
54	3.500	2.890			0.250		66254_
54	3.500	2.942			0.280		PR3500RG
714	3.500	2.942			0.282		7263010
54	3.500	2.960			0.192		PR3500KCN
755	3.500	2.962			0.283		891100_
65	3.500	3.500	3.270	3.437	0.562	0.210	0177610
83	3.500	3.500	3.274	3.440	0.587	0.250	212221_
735	3.500	3.022			0.579		710200_
54	3.500	3.106			0.130		PR3500GFT
76	3.500	3.128			0.281		MPT035
770	3.500	3.130			0.281		434961_
775	3.500	3.130			0.281		473131_
775	3.500	3.130			0.410		473391_
43	3.500	3.148			0.188		P1017
43	3.500	3.148			0.250		P1017-08
43	3.500	3.148			0.312		P1017-10
58	3.625	2.875	3.360	3.562	1.187	0.250	1474550
53	3.750	3.000	3.524	3.690	0.937	0.250	2361010
56	3.750	3.000			0.937		0410540
58	3.750	3.000	3.485	3.687	1.187	0.250	0410550
54	3.750	3.192			0.280		PR3750RG
714	3.750	3.192			0.282		7263510
54	3.750	3.210			0.192		PR3750KCN
755	3.750	3.212			0.283		891110_
65	3.750	3.250	3.520	3.687	0.562	0.210	0178810
735	3.750	3.272			0.579		710250_



Piston seals
inch - double acting



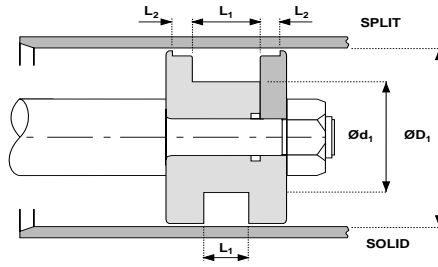
Hallite 



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
54	3.750	3.356			0.130		PR3750GFT
43	3.750	3.380			0.250		P1019
770	3.750	3.380			0.281		434971_
58	3.875	3.125	3.610	3.812	1.187	0.250	0295850
714	3.875	3.317			0.282		CC3875*
56	4.000	3.250			0.716		6504740
83	4.000	3.250	3.773	3.940	0.780	0.250	232641_
53	4.000	3.250	3.773	3.940	0.937	0.250	0082313
56	4.000	3.250			0.937		1407740
58	4.000	3.250	3.772	3.958	0.937	0.254	6504750
58	4.000	3.250	3.735	3.937	1.187	0.250	1407750
54	4.000	3.335			0.255		PR4000KCN
454	4.000	3.384			0.246		7233500
54	4.000	3.390			0.250		66255_ _
754	4.000	3.390			0.250		442891_
54	4.000	3.442			0.280		PR4000RG
714	4.000	3.442			0.282		7264010
755	4.000	3.462			0.283		891120_
65	4.000	3.500	3.770	3.937	0.562	0.210	1172310
735	4.000	3.522			0.579		710300_
54	4.000	3.606			0.130		PR4000GFT
43	4.000	3.612			0.250		P1021
43	4.000	3.612			0.312		P1021-10
76	4.000	3.628			0.281		MPT039
770	4.000	3.630			0.281		434981_
775	4.000	3.630			0.281		473141_
775	4.000	3.630			0.410		473401_
714	4.125	3.567			0.282		CC4125*
53	4.250	3500	4.024	4.187	0.937	0.250	0082211
56	4.250	3.500			0.937		1128840
58	4.250	3.500	4.022	4.210	0.937	0.254	6504550
58	4.250	3.500	3.985	4.187	1.187	0.250	1128850
54	4.250	3.585			0.255		PR4250KCN
454	4.250	3.634			0.246		7234000
54	4.250	3.692			0.280		PR4250RG



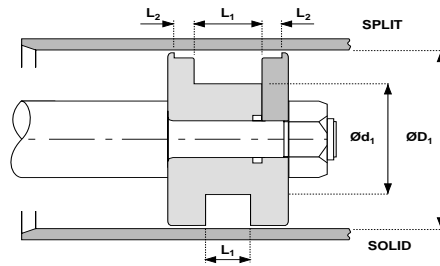
Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
714	4.250	3.692			0.282		7264510
755	4.250	3.712			0.283		891130_
65	4.250	3.750	4.020	4.187	0.562	0.210	0309210
735	4.250	3.772			0.579		710350_
43	4.250	3.844			0.250		P1022
54	4.250	3.856			0.130		PR4250GFT
770	4.250	3.880			0.281		434991_
53	4.500	3.500	4.232	4.428	1.250	0.250	6594210
56	4.500	3.500			1.250		0448840
58	4.500	3.500	4.234	4.437	1.500	0.375	0448850
58	4.500	3.500	4.232	4.450	1.250	0.254	6504250
83	4.500	3.750	4.232	4.440	0.780	0.250	236041_
54	4.500	3.835			0.255		PR4500KCN
454	4.500	3.884			0.246		7234500
54	4.500	3.890			0.250		66256_
735	4.500	3.909			0.492		7103900
54	4.500	3.942			0.280		PR4500RG
714	4.500	3.942			0.282		7265010
755	4.500	3.962			0.283		891140_
65	4.500	4.000	4.270	4.437	0.562	0.210	0418910
735	4.500	4.022			0.579		710400_
43	4.500	4.074			0.250		P1023
43	4.500	4.074			0.312		P1023-10
54	4.500	4.106			0.130		PR4500GFT
76	4.500	4.130			0.281		MPT043
770	4.500	4.130			0.281		435001_
56	4.625	3.625			1.250		0449040
58	4.625	3.625	4.355	4.582	1.250	0.254	6504350*
53	4.750	3.750	4.463	4.660	1.250	0.375	2360910
56	4.750	3.750			1.250		1007040
58	4.750	3.750	4.483	4.700	1.250	0.254	0038250
58	4.750	3.750	4.485	4.687	1.500	0.375	1007050
54	4.750	4.085			0.255		PR4750KCN
735	4.750	4.159			0.492		7104200
54	4.500	4.192			0.282		PR4750RG

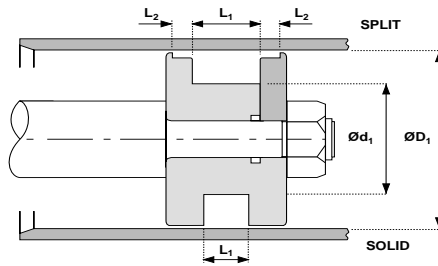


Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
714	4.750	4.192			0.282		7265510
755	4.750	4.212			0.283		891150_
65	4.750	4.250	4.520	4.687	0.562	0.210	1155810
43	4.750	4.4308			0.250		P1024
54	4.750	4.356			0.130		PR4750GFT
770	4.750	4.380			0.281		435011_
53	5.000	4.000	4.712	4.910	1.250	0.375	6594310
56	5.000	4.000			1.250		0443040
58	5.000	4.000	4.730	4.956	1.250	0.254	6500650
58	5.000	4.000	4.735	4.937	1.500	0.375	0443050
735	5.000	4.094			0.630		7104400
54	5.000	4.225			0.380		PR5000KCN
83	5.000	4.250	4.713	4.910	0.780	0.375	232651_
735	5.000	4.274			0.750		710450_
65	5.000	4.375	4.689	4.937	0.687	0.344	1175410
454	5.000	4.384			0.246		7235000
54	5.000	4.390			0.250		66257_ _
754	5.000	4.390			0.250		442901_
54	5.000	4.442			0.282		PR5000RG
714	5.000	4.442			0.282		7266010
755	5.000	4.462			0.283		891160_
76	5.000	4.525			0.366		MPT047/1
775	5.000	4.528			0.538		473061_
43	5.000	4.540			0.250		P1025
43	5.000	4.540			0.312		P1025-10
54	5.000	4.606			0.130		PR5000GFT
76	5.000	4.628			0.281		MPT047
770	5.000	4.630			0.281		435021_
775	5.000	4.630			0.281		473151_
56	5.000	4.250			1.250		0892240
58	5.250	4.250	4.980	5.187	1.500	0.375	0892250
54	5.250	4.475			0.380		PR5250KCN
54	5.250	4.490			0.377		PR5250RG
714	5.250	4.490			0.377		7266510
755	5.250	4.504			0.378		891170_

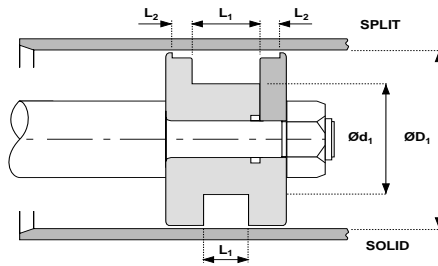
Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
735	5.250	4.524			0.750		710500_
65	5.250	4.625	4.938	5.187	0.687	0.344	1173710
43	5.250	4.782			0.250		P1026
54	5.250	4.856			0.130		PR5250GFT
53	5.500	4.500	5.213	5.410	1.250	0.375	6594410
56	5.500	4.500			1.250		0133240
58	5.500	4.500	5.235	5.456	1.250	0.254	6504150
58	5.500	4.500	5.236	5.437	1.500	0.375	0133250
735	5.500	4.594			0.630		7105400
454	5.500	4.670			0.319		7235500
54	5.500	4.725			0.380		PR5500KCN
54	5.500	4.740			0.377		PR5500RG
714	5.500	4.740			0.377		7267010
755	5.500	4.754			0.378		891180_
735	5.500	4.774			0.750		710550_
65	5.500	4.875	5.188	5.487	0.687	0.344	1173610
43	5.500	5.020			0.250		P1027
43	5.500	5.020			0.312		P1027-10
735	5.500	5.022			0.579		710600_
54	5.500	5.106			0.130		PR5500GFT
58	5.750	4.750	5.484	5.687	1.500	0.375	1366950
54	5.750	4.990			0.377		PR5750RG
714	5.750	4.990			0.377		CC5750
755	5.750	5.004			0.378		891320_
54	5.750	5.232			0.160		PR5750GFT
53	6.000	5.000	5.713	5.910	1.250	0.375	6594510
56	6.000	5.000			1.250		1367040
58	6.000	5.000	5.728	5.954	1.250	0.254	0557950
58	6.000	5.000	5.736	5.937	1.500	0.375	1367050
735	6.000	5.094			0.630		7106400
54	6.000	5.095			0.380		PR6000KCN
454	6.000	5.170			0.319		7236000
54	6.000	5.174			0.320		66258_ _
54	6.000	5.240			0.377		PR6000RG
714	6.000	5.240			0.377		0726751

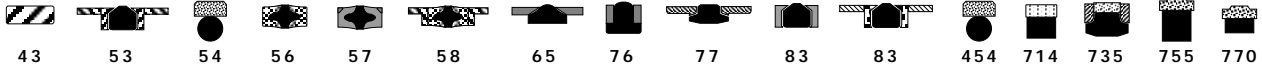
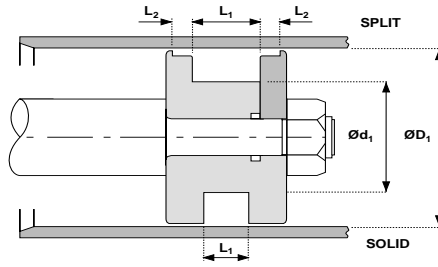


Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
83	6.000	5.250	5.713	5.910	0.780	0.375	232661_
65	6.000	5.250	5.712	5.937	1.000	0.500	0300110
755	6.000	5.254			0.378		891190_
735	6.000	5.274			0.750		710650_
54	6.000	5.482			0.160		PR6000GFT
43	6.000	5.488			0.250		P1029-08
43	6.000	5.488			0.313		P1029
76	6.000	5.524			0.366		MPT055
775	6.000	5.528			0.538		473411_
58	6.250	5.250	5.984	6.187	1.500	0.375	0083350
735	6.250	5.344			0.630		710680_
54	6.250	5.345			0.380		PR6250KCN
54	6.250	5.490			0.377		PR6250RG
714	6.250	5.490			0.377		CC6250
755	6.250	5.504			0.378		891200_
735	6.250	5.524			0.750		710700_
54	6.250	5.732			0.160		PR6250GFT
735	6.250	5.772			0.579		710690_
56	6.500	5.500			1.250		1164140
58	6.500	5.500	6.227	6.454	1.250	0.254	6504650
58	6.500	5.500	6.236	6.437	1.500	0.375	1164150
735	6.500	5.594			0.630		7107400
54	6.500	5.595			0.380		PR6500KCN
454	6.500	5.670			0.319		7236500
54	6.500	5.740			0.377		PR6500RG
714	6.500	5.740			0.377		CC6500
65	6.500	5.750	6.212	6.437	1.000	0.500	0047010
755	6.500	5.754			0.378		891210_
735	6.500	5.774			0.750		710750_
54	6.500	5.982			0.160		PR6500GFT
43	6.500	5.984			0.313		P1031
735	6.500	6.022			0.579		710800_
58	6.750	5.750	6.484	6.687	1.500	0.375	1286150
54	6.750	6.232			0.160		PR6750GFT
56	7.000	6.000			1.250		1188840

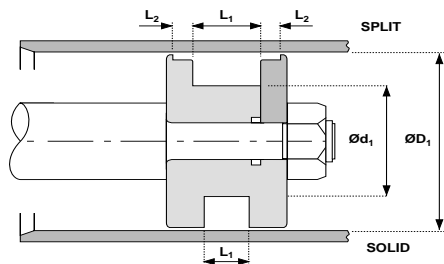
Piston seals
inch - double acting



Type	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$	NOMINALS $\varnothing d_3$	L_1	L_2	PART No.
58	7.000	6.000	6.736	6.937	1.500	0.375	1188850
735	6.094	6.094			0.630		7108400
54	7.000	6.095			0.380		PR700KCN
454	7.000	6.170			0.319		7237000
54	7.000	6.174			0.320		66259_ _
54	7.000	6.240			0.377		PR7000RG
714	7.000	6.240			0.377		CC7000
755	7.000	6.250			0.312		439481_ *
83	7.000	6.250			0.750		23619_ _
65	7.000	6.250	6.712	6.937	1.000	0.500	0314110
755	7.000	6.254			0.378		891220_
735	7.000	6.274			0.750		710850_
43	7.000	6.414			0.313		P1033
54	7.000	6.482			0.160		PR7000GFT
76	7.000	6.524			0.366		MPT060
735	7.250	6.344			0.630		7108600
54	7.250	6.345			0.380		PR7250KCN
54	7.250	6.490			0.377		PR7250RG
56	7.250	6.500			1.625		0424140*
755	7.250	6.504			0.378		891230_
43	7.250	6.646			0.312		P1034
54	7.250	6.732			0.160		PR7250GFT
56	7.250	6.250			1.625		1255240
58	7.500	6.250	7.240	7.437	1.875	0.375	1255250
735	7.500	6.594			0.630		7108900
54	7.500	6.595			0.380		PR7500KCN
454	7.500	6.670			0.319		7237500
54	7.500	6.740			0.377		PR7500RG
714	7.500	6.740			0.377		CC7500
65	7.500	6.750	7.212	7.437	1.000	0.500	0363410
755	7.500	6.754			0.378		891240_
735	7.500	6.774			0.750		710900_
43	7.500	6.882			0.312		P1035
54	7.500	9.982			0.160		PR7500GFT
76	7.500	7.024			0.366		MPT062I



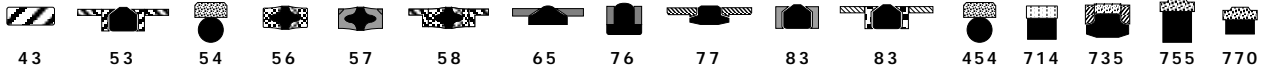
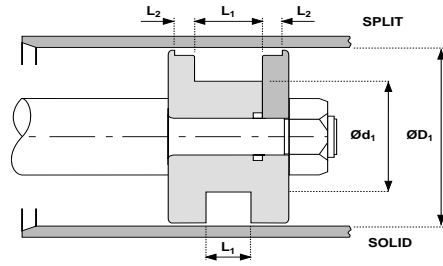
Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
735	7.750	4.159			0.492		7104200
56	7.750	6.500			1.625		1192740*
735	7.750	6.844			0.630		7109200
54	7.750	6.845			0.380		PR7750KCN
54	7.750	7.232			0.160		PR7750GFT
56	8.000	6.750			1.625		0426540
56	8.000	7.000			1.000		0224340
58	8.000	7.000	7.740	7.937	1.250	0.375	0224350
454	8.000	7.170			0.319		7238000
54	8.000	7.174			0.320		66260_ _
54	8.000	7.240			0.377		PR8000RG
714	8.000	7.240			0.377		CC8000
65	8.000	7.250	7.712	7.937	1.000	0.500	0045110
83	8.000	7.250			0.780		23617_ _
755	8.000	7.254			0.378		891250_
735	8.000	7.274			0.750		710950_
43	8.000	7.350			0.312		P1037-10
43	8.000	7.350			0.375		P1037
54	8.000	7.482			0.160		PR8000GFT
76	8.000	7.524			0.366		MPT064
56	8.250	7.000			1.625		1219240*
54	8.250	7.255			0.380		PR8250KCN
735	8.250	7.344			0.630		7109700
54	8.250	7.732			0.160		PR8250GFT
714	8.437	7.677			0.377		CC8437
755	8.437	7.691			0.378		891300_
56	8.500	7.250			1.625		1286440*
54	8.500	7.255			0.380		PR8500KCN
735	8.500	7.594			0.630		7109900
54	8.500	7.740			0.377		PR8500RG
714	8.500	7.740			0.377		CC8500
755	8.500	7.754			0.378		891260_
735	8.500	7.774			0.750		711000_
43	8.500	7.820			0.312		P1039-10



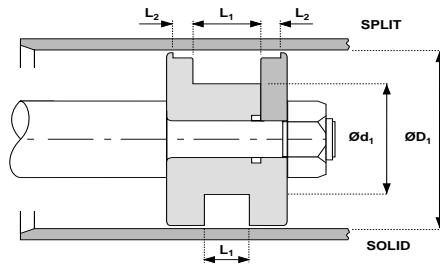
Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
54	8.500	7.982			0.160		PR8500GFT
714	8.531	7.771			0.377		CC8531
56	8.750	7.500			1.625		0418140*
56	9.000	7.750			1.625		1266640
58	9.000	7.750	8.740	8.937	1.875	0.375	1266650
58	9.000	8.000	8.736	8.937	1.250	0.375	1273750
54	9.000	8.124			0.377		PR9000RG
755	9.000	8.137			0.378		891270_
65	9.000	8.250	8.712	8.937	1.000	0.500	0045510
735	9.000	8.274			0.750		711050_
54	9.000	8.482			0.160		PR9000GFT
56	9.250	8.000			1.625		0455740*
56	9.500	8.250			1.625		1332240*
54	9.500	8.624			0.377		PR9500RG
755	9.500	8.637			0.378		891280_
454	9.500	8.670			0.319		7238500
54	9.500	8.982			0.160		PR9500GFT
56	9.750	8.500			1.625		1332340*
714	9.875	9.000			0.377		CC9875
56	10.000	8.750			1.625		0436140
735	10.000	8.898			0.687		7110900
58	10.000	9.000	9.740	9.937	1.250	0.375	0697650
54	10.000	9.124			0.377		PR10000RG
714	10.000	9.129			0.377		CC10000
755	10.000	9.137			0.378		891290_
454	10.000	9.170			0.319		7239000
43	10.000	9.236			0.312		P1044-10
735	10.000	9.275			0.750		711100_
54	10.000	9.482			0.160		PR10000GFT
56	10.250	9.000			1.625		0437540*
56	10.500	9.250			1.625		1331940*
735	10.500	9.398			0.687		7111200
56	10.750	9.500			1.625		1320440*
56	11.000	9.750			1.625		0433940*



Piston seals
inch - double acting



Type	ØD ₁	Ød ₁	Ød ₂	NOMINALS Ød ₃	L ₁	L ₂	PART No.
56	11.250	10.250				1.625	1331640*
735	11.500	10.398				0.687	7111700
56	12.000	10.750				1.625	1331440
54	12.000	11.124				0.377	PR12000RG
714	12.000	11.129				0.377	CC12000
735	12.000	11.275				0.750	711200_
735	12.500	11.775				0.750	711220_
56	12.500	11.250				1.625	0436340*
56	13.000	11.750				1.625	0436540*
54	13.000	12.124				0.377	PR13000RG
735	14.000	12.898				0.687	7112700
54	14.000	13.124				0.377	PR14000RGI
56	14.500	13.000				1.500	0270940*
56	15.000	13.750				1.500	0787040*
714	15.000	14.275				0.750	711300_
56	16.000	14.750				1.800	2117440
56	17.000	15.000				2.250	1345340
56	18.000	16.000				2.062	2002040
56	19.500	18.000				2.500	2108240*
56	20.000	18.500				1.750	2111240*

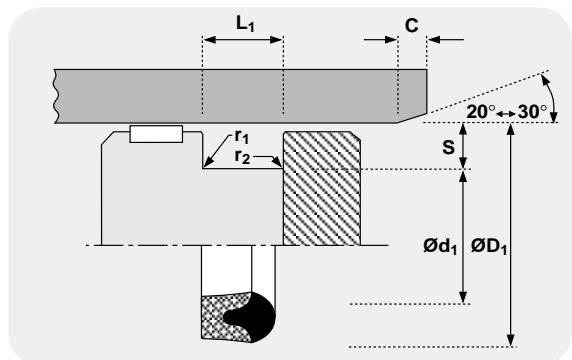
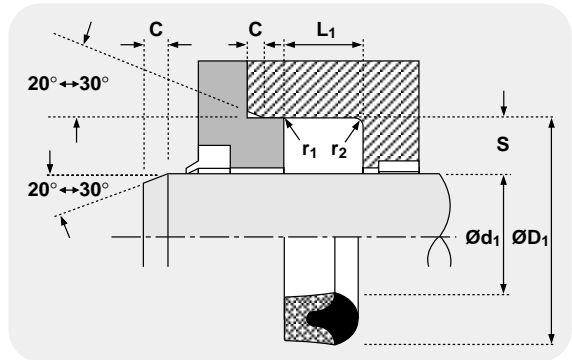
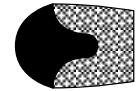


Notes



Piston/Rod seals

TECHNICAL DETAILS		METRIC	INCH				
OPERATING CONDITIONS							
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec					
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F					
MAXIMUM PRESSURE	500 bar	7500 p.s.i.					
MAXIMUM EXTRUSION GAP							
PRESSURE bar	160	250	400				
MAXIMUM GAP mm	0.4	0.3	0.2				
PRESSURE p.s.i.	2400	3750	6000				
MAXIMUM GAP in	0.016	0.012	0.008				
SURFACE ROUGHNESS							
DYNAMIC SEALING FACE - ROD $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16				
STATIC SEALING FACE - ROD $\varnothing D_1$	1.6 max	10 max	63 max				
DYNAMIC SEALING FACE - PISTON $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16				
STATIC SEALING FACE - PISTON $\varnothing d_1$	1.6 max	10 max	63 max				
STATIC HOUSING FACES L_1	3.2 max	16 max	125 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	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 $\leq S$ 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							
ROD	$\varnothing d_1$	$\varnothing D_1$	L_1 mm	L_1 in			
PISTON	f9	Js11	+0.25 -0	+0.010 -0			
	js11	H9	+0.25 -0	+0.010 -0			



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.

FEATURES

- THE ORIGINAL HALLITE FLUID SEAL
- GENERAL PURPOSE SEAL
- LONG LIFE

NB:

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



Piston/Rod seals

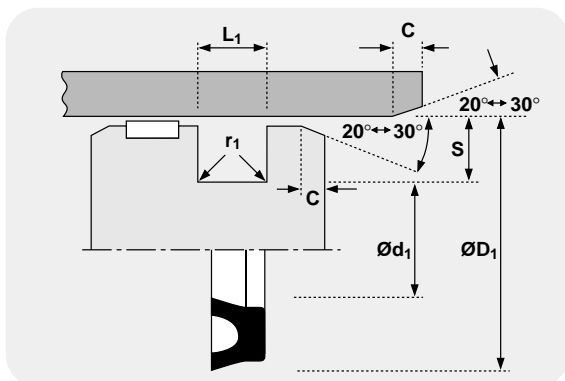
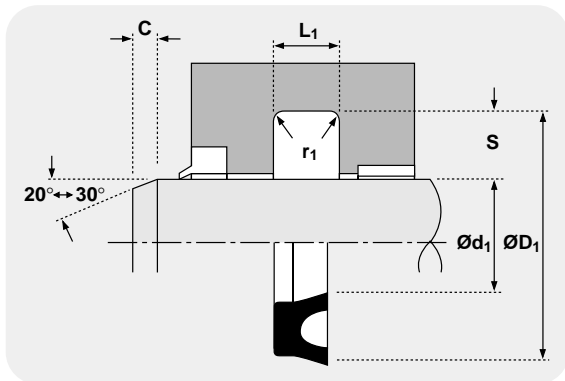
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TECHNICAL DETAILS		METRIC	INCH		
OPERATING CONDITIONS					
MAXIMUM SPEED	0.5 m/sec		1.5 ft/sec		
MAXIMUM TEMPERATURE	-30°C +100°C		-22°F +212°F		
MAXIMUM PRESSURE	30 bar		500 p.s.i.		
MAXIMUM EXTRUSION GAP					
PRESSURE bar	10	30			
PRESSURE p.s.i.	150	500			
MAXIMUM GAP in	0.028	0.024			
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	0.187	0.250	0.312	0.375	0.500
MIN CHAMFER C in	0.093	0.125	0.156	0.187	0.217
MAX FILLET RAD r_1 in	0.008	0.016	0.016	0.032	0.032
TOLERANCES					
ROD	\varnothing_{d_1}	\varnothing_{D_1}	L_1 mm	L_1 in	
PISTON	f9	Js11	+0.25 -0	+0.010 -0	
	js11	H9	+0.25 -0	+0.010 -0	

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

0.187 0.250 0.312 0.375 0.500
0.093 0.125 0.156 0.187 0.217
0.008 0.016 0.016 0.032 0.032

\varnothing_{d_1} \varnothing_{D_1} L_1 mm L_1 in
f9 Js11 +0.25 -0 +0.010 -0
js11 H9 +0.25 -0 +0.010 -0



DESIGN

Hallite 26 U rings are normally supplied in an 80 durometer nitrile material.

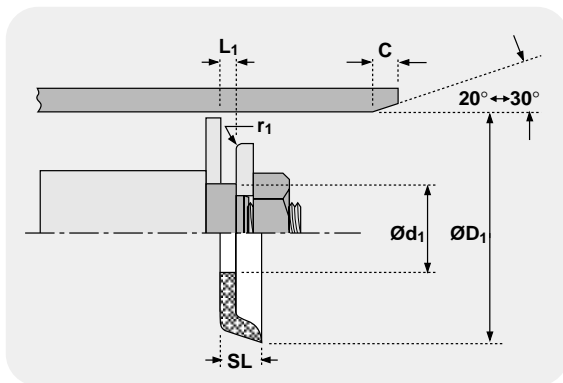
The AN style U ring is designed for use in low pressure pneumatic applications. The Block U ring style can be used for pneumatic or light pressure applications in hydraulic cylinders.

The pressure rating can be extended by the use of back-up rings.

Hallite also manufacture a full range of rectangular nitrile U rings, please contact your nearest Hallite sales office or Hallite distributor for the sizes available.

Piston seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F	
MAXIMUM PRESSURE	170 bar	2500 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	50	100	140
PRESSURE p.s.i.	750	1500	2000
MAXIMUM GAP mm	0.020	0.018	0.017
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing D_1$	μmRa	μmRt	μinCLA
STATIC SEALING FACE $\varnothing d_1$	0.8 max	5 max	32 max
STATIC HOUSING FACES L_1	1.6 max	10 max	63 max
	3.2 max	16 max	125 max
CHAMFERS & RADII			
SEAL DIAMETER $\leq \varnothing D_1$ in	2.000	3.000	6.500
MIN CHAMFER C in	0.187	0.217	0.250
MAX FILLET RAD r_1 in	0.062	0.093	0.125
TOLERANCES			
	$\varnothing D_1$	$\varnothing d_1$	$\varnothing d_2$
	See overleaf	h11	max
			L_1
			0 -0.005



DESIGN

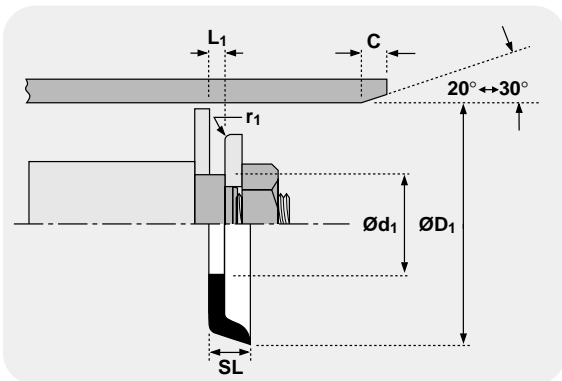
Hallite 66 fabric cup seal is designed for pistons in either single or double acting medium duty applications. Manufactured from rubberised fabric, this provides the seal with a lip which has strength and durability, capable of operating in wide tolerance tube with a generous surface finish. Wear and friction are kept to a minimum because of the ability of the rubberised fabric to retain lubricant in the seal area. The standard range is designed to give a satisfactory performance when used with the recommended operating conditions and installation details. Each size in the standard range can be supplied with different diameter centre holes, $\varnothing d_1$, by specifying the appropriate number for the sixth digit in the part number. Many other sizes are available so if your requirements are not met by the standard range please contact your Hallite representative.

FEATURES

- PRECISION MOULDED
- LONG LIFE
- WIDE SIZE RANGE
- TOLERATES CONTAMINATION

Piston seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	0.55 m/sec	1.5 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 90°C	-22°F + 194°F	
MAXIMUM PRESSURE	17 bar	250 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	17		
PRESSURE p.s.i.	250		
MAXIMUM GAP mm	0.030		
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing D_1$	μmRa 0.8 max	μmRt 5 max	μinCLA 32 max μinRMS 35 max
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			
SEAL DIAMETER $\leq \varnothing D_1$ in	2.000	3.000	6.500
MIN CHAMFER C in	0.187	0.217	0.250
MAX FILLET RAD r_1 in	0.062	0.093	0.125
TOLERANCES			
Please refer to local Hallite sales office			



DESIGN

The Hallite 67 cup seal is designed for use in either single or double acting light duty applications.

Manufactured from nitrile rubber, the seal is responsive to low pressure fluctuations and has very low friction. Ideal for use in pneumatic applications, the Hallite 67 is also suitable for use in mineral oil based fluids and water.

The range is supplied without a centre hole $\varnothing d_1$, however the centre is marked for your convenience.

FEATURES

- FLEXIBLE FOR EASY INSTALLATION
- LONG LIFE
- WIDE RANGE OF SIZES

Piston/Rod seals

TECHNICAL DETAILS

METRIC ○

INCH ○

OPERATING CONDITIONS

MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec
MAXIMUM TEMPERATURE	-40°C + 110°C	-40°F + 230°F
MAXIMUM PRESSURE	350 bar	5000 p.s.i.

MAXIMUM EXTRUSION GAP

(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

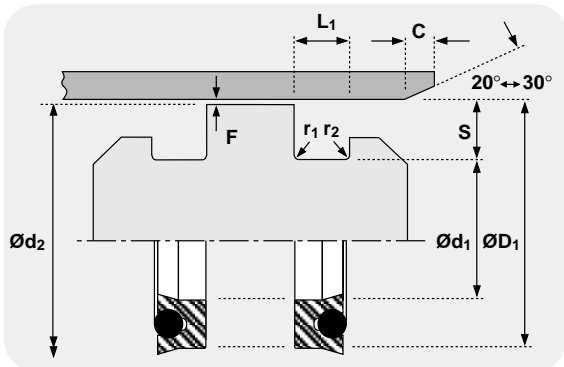
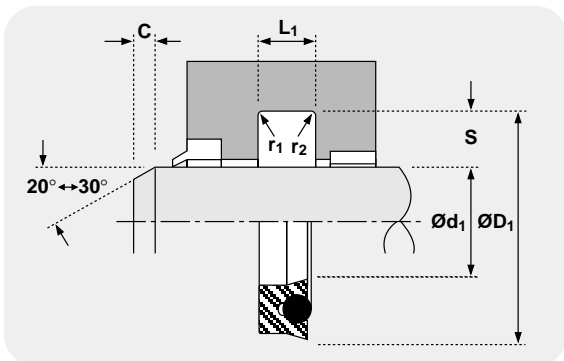
	µmRa	µmRt	µinCLA	µinRMS
DYNAMIC SEALING FACE - ROD Ød ₁	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC SEALING FACE - ROD ØD ₁	1.6 max	10 max	63 max	70 max
DYNAMIC SEALING FACE - PISTON ØD ₁	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC SEALING FACE - PISTON Ød ₁	1.6 max	10 max	63 max	70 max
STATIC HOUSING FACES L ₁	3.2 max	16 max	125 max	140 max

CHAMFERS & RADII

GROOVE SECTION ≤ S 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
- Housing & installation data - Hallite 500 Series



DESIGN

The Hallite 511 is a standard profile loaded U cup utilizing 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. Although used as a rod seal, other profiles such as 513, 605 or 621 are a better option.

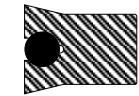
FEATURES

- FLEXIBLE FOR EASY INSTALLATION
- EXCELLENT RESISTANCE TO ABRASION
- POSITIVE LIP ACTUATION
- KNIFE TRIMMED PRECISION SEALING LIPS
- COMPACT HOUSING
- WIDE RANGE OF SIZES
- MATERIAL OPTIONS

MATERIALS

Seal material - O-Ring	last digit of part number
Standard material:	
Polyurethane - NBR	----- 10
Material options:	
Polyester - NBR	----- 11
Polyester - FKM	----- 12

Piston/Rod seals



512

TECHNICAL DETAILS

OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -40°C + 110°C
 MAXIMUM PRESSURE 350 bar

1.5 ft/sec
 -40°F + 230°F
 5000 p.s.i.

MAXIMUM EXTRUSION GAP

(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 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

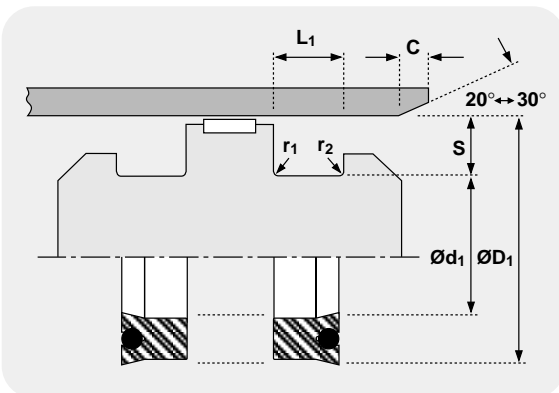
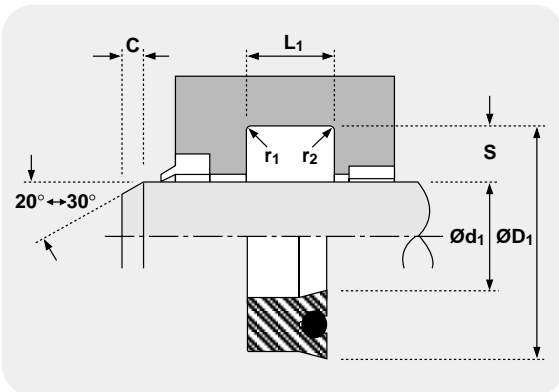
CHAMFERS & RADII

GROOVE SECTION ≤ S in	0.125	0.187	0.250	0.312	0.375	0.500
MIN CHAMFER C in	0.093	0.093	0.125	0.156	0.187	0.187
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

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

Please refer to specified tolerances in the introduction
 - Housing & installation data - Hallite 500 Series



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. Technical details shown are for standard material option.

FEATURES

- FLEXIBLE FOR EASY INSTALLATION
- EXCELLENT RESISTANCE TO ABRASION
- POSITIVE LIP ACTUATION
- DEEP PROFILE FOR STABILITY
- WIDE RANGE OF SIZES AND MATERIAL OPTIONS

MATERIALS

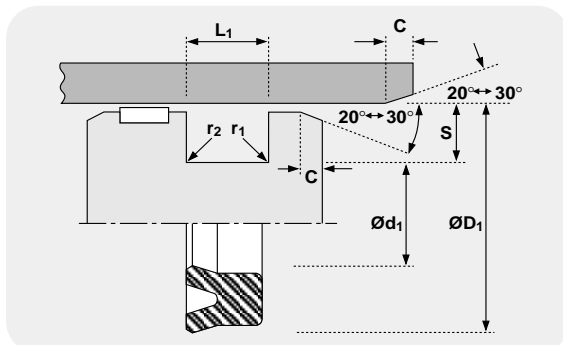
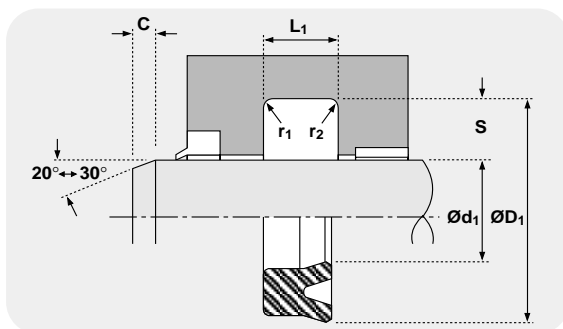
Seal material - O-Ring	last digit of part number
Standard material:	
Polyurethane - NBR	----- 10
Material options:	
Polyester - NBR	----- 11
Polyester - FKM	----- 12

Piston/Rod seals

TECHNICAL DETAILS		METRIC	INCH				
OPERATING CONDITIONS							
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec					
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F					
MAXIMUM PRESSURE	400 bar*	6,000 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				
MAXIMUM GAP in	0.024	0.020	0.016				
SURFACE ROUGHNESS							
DYNAMIC SEALING FACE - ROD $\varnothing d_1$	μmRa	μmRt	μinCLA μinRMS				
STATIC SEALING FACE - ROD $\varnothing D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16 5 ↔ 18				
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	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 $\leq S$ 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							
ROD	$\varnothing d_1$	$\varnothing D_1$	L_1 mm	L_1 in			
PISTON	f9	Js11	+0.25 -0	+0.010 -0			
	js11	H9	+0.25 -0	+0.010 -0			

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

* 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.



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.

FEATURES

- GENERAL PURPOSE SEAL
- EXCELLENT TEMPERATURE RESISTANCE
- EASE OF INSTALLATION

NB:

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

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

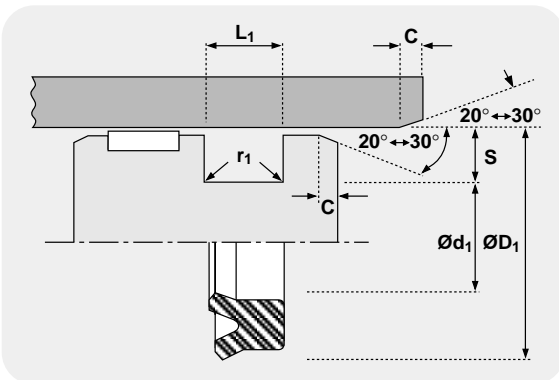
Size lists give "on line" tolerances for rod applications.

Piston seals

606

TECHNICAL DETAILS		METRIC	INCH				
OPERATING CONDITIONS							
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec					
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F					
MAXIMUM PRESSURE	400 bar*	6,000 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				
MAXIMUM GAP in	0.024	0.020	0.016				
SURFACE ROUGHNESS							
DYNAMIC SEALING FACE $\varnothing D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16				
STATIC SEALING FACE $\varnothing d_1$	1.6 max	10 max	63 max				
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max				
CHAMFERS & RADII							
GROOVE SECTION $\leq S$ 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 $\leq S$ 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	
TOLERANCES							
$\varnothing D_1$	H9	$\varnothing d_1$	js11	L_1 mm	+0.25 -0	L_1 in	+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.



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:

FEATURES

- FLEXIBLE FOR EASY INSTALLATION
- EXCELLENT WEAR RESISTANCE
- HIGH RESISTANCE TO EXTRUSION
- ROBUST DESIGN
- WIDE TEMPERATURE RANGE

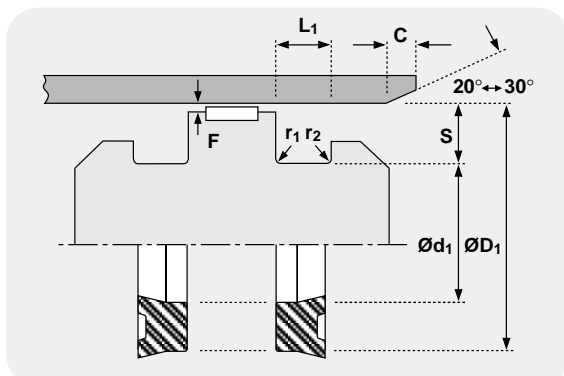
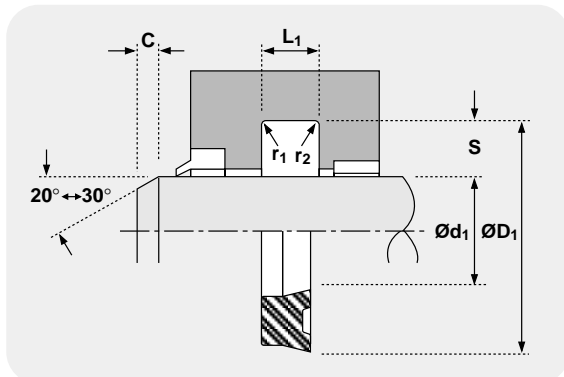
NB: Part numbers suffixed by “†” indicate housing sizes to meet ISO5597.

Piston/Rod seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F	
MAXIMUM PRESSURE	240 bar	3500 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	100	170	240
PRESSURE p.s.i.	1500	2500	3500
MAXIMUM GAP in	0.020	0.012	0.008
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	
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			
Please use specified tolerances in the introduction - Housing & installation data - Hallite 500 Series			



611



DESIGN

The Hallite 611 is a one piece symmetrical seal suitable for rod and piston use. It is a compact seal for "square" type housings, for light duty applications.

It is manufactured from Hallite's high performance polyurethane- HYTHANE 181, which is an extremely flexible material and makes installation very easy.

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

FEATURES

- EASY INSTALLATION
- EXCELLENT TEMPERATURE RANGE
- LIGHT DUTY SEAL FOR "SQUARE" NORTH AMERICAN HOUSINGS

NB:

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

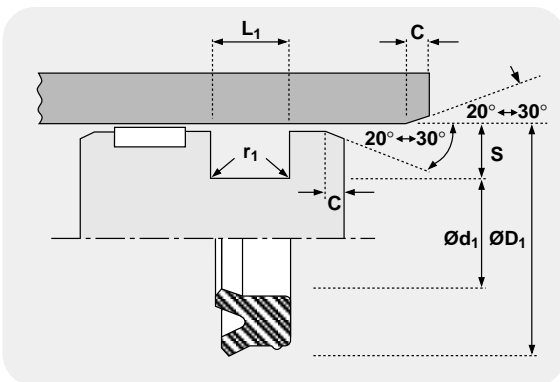
Piston seals



659

TECHNICAL DETAILS		METRIC	INCH	
OPERATING CONDITIONS				
MAXIMUM SPEED		1.0 m/sec		3.0 ft/sec
MAXIMUM TEMPERATURE		-45°C + 110°C		-50°F + 230°F
MAXIMUM PRESSURE		400 bar		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
MAXIMUM GAP in		0.024	0.020	0.016
SURFACE ROUGHNESS				
DYNAMIC SEALING FACE $\varnothing d_1$		μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16
STATIC SEALING FACE $\varnothing d_1$		1.6 max	10 max	63 max
STATIC HOUSING FACES L_1		3.2 max	16 max	125 max
CHAMFERS & RADII				
GROOVE SECTION $\leq S$ 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
GROOVE SECTION $\leq S$ in		0.125	0.187	0.250
MIN CHAMFER C in		0.093	0.093	0.125
MAX FILLET RAD r_1 in		0.008	0.008	0.016
TOLERANCES				
		$\varnothing d_1$	$\varnothing d_1$	L_1
	mm	H9	js11	+0.25 -0
	in	+0.004 -0	0 -0.002	+0.010 -0

Figures show the maximum permissible gap all on one side using the minimum clearance \varnothing and maximum bore \varnothing



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

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:

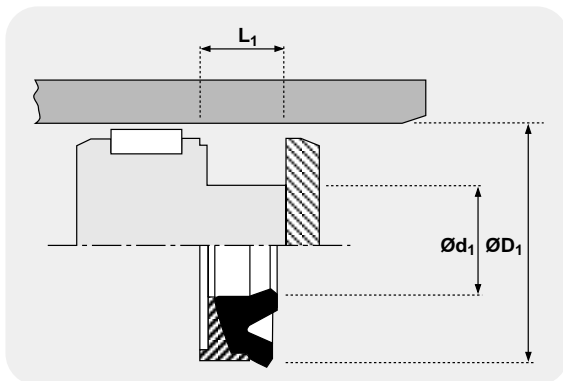
Note: Variations of this seal are available in other sizes, please contact your local Hallite sales office for additional information and technical details.

Piston seals

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec	
MAXIMUM TEMPERATURE	-40°C + 100°C	-40°F + 212°F	
MAXIMUM PRESSURE	350 bar	5000 p.s.i.	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing D_1$	μmRa μmRt	μinCLA	μinRMS
STATIC SEALING FACE $\varnothing d_1$	0.1 ↔ 0.4 4 max	4 ↔ 16	5 ↔ 18
STATIC HOUSING FACES L_1	1.6 max 10 max	63 max	70 max
	3.2 max 16 max	125 max	140 max
TOLERANCES			
$\varnothing D_1$	$\varnothing d_1$	L_1 mm	
H9	0 -0.2	+0.2 -0	



906



DESIGN

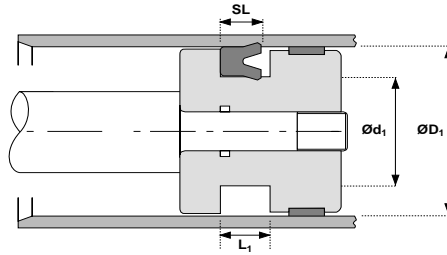
The Hallite 906 is a single acting seal assembly comprising of a nitrile rubber seal and a contoured nylon back-up.

Usually fitted back to back on double acting pistons found in Japanese and Asian construction equipment, this product is stocked as a replacement part only, not recommended for new designs.

Notes



Piston Seals
metric - single acting



18



601



606



655



659



906

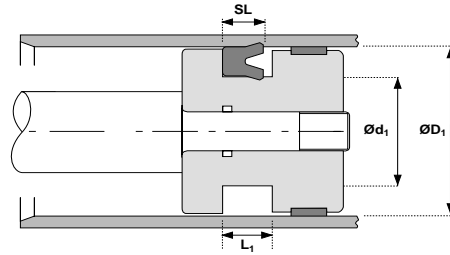
Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
601	12.000	5.000	5.500	6.500	4508601
601	12.500	4.500	4.400	5.000	4506701
601	13.000	6.000	8.000	9.000	4460300
18	14.000	6.000	6.000	6.000	0202200
18	16.000	8.000	6.000	6.000	0202400
18	18.000	10.000	6.000	6.000	0202500
601	18.000	10.000	6.000	6.600	4299900
601	20.000	10.000	8.000	9.000	4600000
601	20.000	12.000	4.400	5.000	4182501‡
18	20.000	12.000	6.000	6.000	0202600
601	22.000	14.000	4.400	5.000	4182601‡
601	22.000	14.000	5.000	5.700	4604000
18	24.000	14.000	7.500	7.500	0202700
601	24.000	14.000	8.000	9.000	4600200
601	24.000	16.000	4.400	5.000	4182701‡
601	24.000	16.000	5.000	5.700	4604100
601	25.000	12.000	8.000	9.000	4600100
18	25.000	12.000	10.000	10.000	0615800
18	25.000	15.000	7.500	7.500	0202800
601	25.000	15.000	8.000	9.000	4600300
655	25.000	15.000	8.000	9.000	4581310
606	25.000	15.000	8.200	9.000	4390100
606	25.000	17.000	5.700	6.300	4418000
18	26.000	16.000	7.500	7.500	0615900
601	26.000	16.000	8.000	9.000	4600400
601	26.000	18.000	4.400	5.000	4182901‡
601	26.000	18.000	5.000	5.700	4604200
18	28.000	18.000	7.500	7.500	0202900
601	28.000	18.000	7.300	8.000	4547900
601	28.000	18.000	8.000	9.000	4600500
601	28.000	20.000	4.400	5.000	4183001‡
601	28.000	20.000	5.000	5.700	4604300
18	30.000	20.000	7.500	7.500	0200500
601	30.000	20.000	8.000	9.000	4600600
606	30.000	20.000	8.000	9.000	4354200

Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
655	30.000	20.000	9.000	10.000	4581410
601	30.000	22.000	4.400	5.000	4183101‡
18	30.000	22.000	6.000	6.000	0817600
601	30.000	22.400	5.000	5.700	4604400
655	32.000	20.000	10.000	11.000	4581510
18	32.000	22.000	7.500	7.500	0203300
606	32.000	24.000	5.700	6.300	4351900‡
601	32.400	22.400	8.000	9.000	4600800
601	33.000	25.000	4.400	5.000	4183301‡
601	33.000	25.000	5.000	5.700	4604500
659	33.000	28.800	4.300	4.700	4581200
601	35.000	22.000	10.000	11.000	4600700
606	35.000	25.000	7.300	8.000	4365700
601	35.000	25.000	8.000	9.000	4600900
601	35.000	25.000	10.000	11.000	4362600
601	35.500	28.000	5.000	5.700	4604600
601	36.000	28.000	6.500	7.100	4506201
606	37.000	21.000	11.800	13.000	4354100
601	37.000	30.000	6.000	7.000	4596800
601	38.000	25.000	8.000	9.000	4601000
601	38.000	28.000	5.600	6.300	4183401‡
606	38.000	31.000	5.200	6.000	4728000
601	40.000	22.000	10.000	11.000	4572900
601	40.000	25.000	10.000	11.000	4601100
18	40.000	25.000	11.000	11.000	0472800
601	40.000	26.000	9.200	10.000	4584900
601	40.000	28.000	10.000	11.000	4601200
601	40.000	30.000	5.600	6.300	4183501
601	40.000	30.000	6.000	7.000	4604700
606	40.000	30.000	7.300	8.000	4299500‡
601	40.000	30.000	8.000	9.000	4596900
601	40.000	30.000	10.000	11.000	4362700
606	40.000	30.000	10.000	11.000	4400900
601	41.500	31.500	6.000	7.000	4604800
601	42.000	32.000	5.600	6.300	4183601‡



Piston Seals

metric - single acting



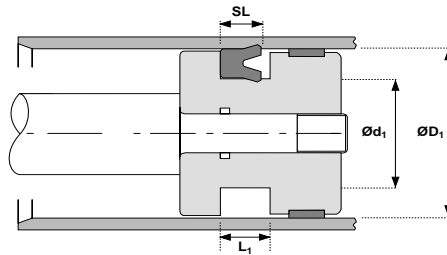
Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
601	42.000	32.000	6.000	7.000	4604900
601	42.000	32.000	10.000	11.000	4362800
601	43.000	28.000	10.000	11.000	4601300
18	43.000	28.000	11.000	11.000	0204300
18	44.000	36.000	6.000	6.000	1204900
601	45.000	30.000	10.000	11.000	4601400
18	45.000	30.000	11.000	11.500	0204400
601	45.000	35.000	6.000	7.000	4605000
18	45.000	35.000	7.500	8.000	0052300
601	45.000	35.000	7.000	8.000	4496000
606	45.000	35.000	7.300	8.000	4315700
601	45.000	35.500	6.000	7.000	4605100
601	46.000	36.000	5.600	6.300	4183701‡
601	47.000	32.000	10.000	11.000	4621200
18	47.000	32.000	11.000	11.500	0204600
601	48.000	35.000	10.000	11.000	4360300
601	48.000	38.000	6.000	7.000	4605200
18	50.000	30.000	14.000	14.500	0282100
906	50.000	32.000	12.100	12.500	9050057
601	50.000	35.000	10.000	11.000	4601500
18	50.000	35.000	11.000	11.500	0474600
601	50.000	38.000	9.000	10.000	4709400
601	50.000	40.000	5.600	6.300	4183801‡
601	50.000	40.000	6.000	7.000	4605300
606	50.000	40.000	7.300	8.000	4319500‡
18	50.000	40.000	10.500	10.500	0202000
601	50.000	40.000	10.000	11.000	4362900
601	50.500	35.500	10.000	11.000	46221100
18	51.000	36.000	11.000	11.000	0978800
906	55.000	37.000	12.100	12.500	9055037
601	55.000	38.000	9.700	11.000	4366000
601	55.000	40.000	9.900	11.000	4388500
601	55.000	40.000	10.000	11.000	4601600
18	55.000	40.000	11.000	11.000	0475000
601	55.000	45.000	5.600	6.300	4183901‡

Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
601	55.000	45.000	6.000	7.000	4605400
606	55.000	45.000	7.300	8.000	4380000
601	55.000	45.000	10.000	11.000	4363000
601	56.000	45.000	7.000	8.000	4605500
601	56.000	46.000	6.000	7.000	4543900
601	58.000	38.000	9.700	11.000	4560100
601	60.000	40.000	12.000	13.000	4601700
906	60.000	42.000	12.100	12.500	9060057
606	60.000	44.900	5.700	6.300	4739800
601	60.000	45.000	10.000	11.000	4601800
606	60.000	45.000	10.000	11.000	4407000
18	60.000	45.000	11.000	11.500	0979400
601	60.000	50.000	5.600	6.300	4184001‡
601	60.000	50.000	6.000	7.000	4605600
18	60.000	50.000	7.500	8.000	0179300
601	60.000	50.000	10.000	11.000	4363100
601	62.000	52.000	10.000	11.000	4559000
601	63.000	48.000	10.000	11.000	4601900
606	63.000	48.000	11.400	12.500	4383200
601	63.000	53.000	6.000	7.000	4605700
606	63.000	53.000	7.300	8.000	4341500‡
606	63.000	53.000	11.800	13.000	4318800
601	65.000	45.000	10.000	11.000	4575000
18	65.000	45.000	14.000	14.500	0281700
906	65.000	47.000	12.100	12.500	9065007
18	65.000	50.000	10.000	10.500	0208400
601	65.000	50.000	10.000	11.000	4602000
18	65.000	50.000	11.000	11.500	0383800
601	65.000	55.000	6.000	7.000	4605800
606	65.000	55.000	7.300	8.000	4424100
18	65.000	55.000	8.000	8.500	0242600
601	66.000	56.000	6.000	7.000	4605900
906	70.000	48.000	14.500	15.000	9070007
601	70.000	50.000	12.000	13.000	4602100
18	70.000	50.000	14.000	14.500	0294600



Piston Seals

metric - single acting



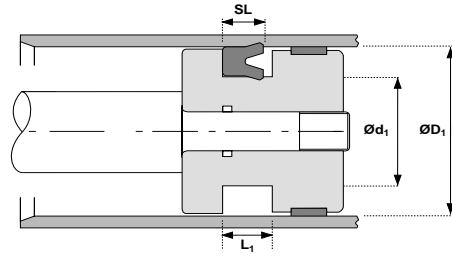
Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
606	70.000	55.000	10.000	11.000	4448000
601	70.000	60.000	6.000	7.000	4606000
606	70.000	60.000	8.000	9.000	4709500
601	70.000	60.000	10.000	11.000	4363200
601	71.000	56.000	8.400	9.500	4184201‡
601	71.000	60.000	7.000	8.000	4606100
606	71.000	61.000	6.000	7.000	4492600
18	72.000	60.000	9.500	10.000	1397700
601	73.000	63.000	6.000	7.000	4606200
601	73.000	63.000	11.800	13.000	4363300
601	75.000	55.000	12.000	13.000	4602200
601	75.000	65.000	6.000	7.000	4606300
606	75.000	67.000	8.800	9.700	4322300
18	76.000	56.000	14.000	14.000	0646100
601	76.000	60.000	12.000	13.000	4608000
601	78.000	63.000	8.400	9.500	4184301‡
906	80.000	58.000	14.500	15.000	9080007
655	80.000	60.000	10.000	11.000	4525510
601	80.000	60.000	12.000	13.000	4602300
18	80.000	60.000	14.000	14.500	0294900
601	80.000	65.000	8.400	9.500	4184401‡
18	80.000	65.000	11.000	11.500	0740700
606	80.000	65.000	11.400	12.500	4363800‡
601	80.000	70.000	6.000	7.000	4606400
606	80.000	70.000	6.800	7.500	4370300
606	80.000	70.000	8.000	9.000	4709600
601	80.000	70.000	11.800	13.000	4363400
601	80.000	71.000	6.000	7.000	4606500
18	83.000	63.000	14.000	14.000	0646300
601	85.000	65.000	12.000	13.000	4602400
601	85.000	70.000	8.400	9.500	4184501‡
601	85.000	75.000	6.000	7.000	4606600
606	85.000	75.000	8.000	9.000	4709700
601	85.000	75.000	11.800	13.000	4363500
606	85.700	70.700	10.300	11.400	4493400

Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
906	90.000	68.000	14.500	15.000	9090007
655	90.000	70.000	10.000	11.000	4525410
601	90.000	70.000	12.000	13.000	4602500
18	90.000	70.000	14.000	14.500	0296000
923	90.000	75.000	9.000	10.000	9090087
18	90.000	75.000	12.000	12.500	0740600
655	90.000	75.000	11.800	13.000	4527810
601	90.000	80.000	6.000	7.000	4606700
601	90.000	80.000	8.000	8.700	4159001
601	90.000	80.000	11.800	13.000	4363600
601	92.000	70.000	12.000	13.000	4602600
601	95.000	75.000	12.000	13.000	4602700
18	95.000	75.000	14.000	14.500	0412700
601	95.000	80.000	8.400	9.500	4184601‡
18	95.000	80.000	12.000	12.500	0732700
601	100.000	75.000	22.000	24.000	4584700
906	100.000	78.000	14.500	15.000	9100007
601	100.000	80.000	12.000	13.000	4602800
18	100.000	80.000	14.000	14.500	0295100
659	100.000	80.000	14.500	16.000	4580300
601	100.000	85.000	8.400	9.500	4184701‡
601	100.000	85.000	8.900	10.000	4606800
606	100.000	85.000	11.400	12.500	4363900‡
655	100.000	85.000	11.400	12.500	4521910
606	100.000	90.000	6.800	7.500	4375900
601	100.000	90.000	11.800	13.000	4363700
601	105.000	85.000	12.000	13.000	4602900
655	105.000	85.000	11.800	13.000	4415210
655	105.000	85.000	12.000	13.000	4549810
601	105.000	90.000	8.400	9.500	4184801‡
601	105.000	90.000	8.900	10.000	4606900
906	110.000	88.000	14.500	15.000	9110007
18	110.000	90.000	10.000	10.500	0306700
601	110.000	90.000	12.000	13.000	4603000
18	110.000	90.000	14.000	14.500	0071700



Piston Seals

metric - single acting



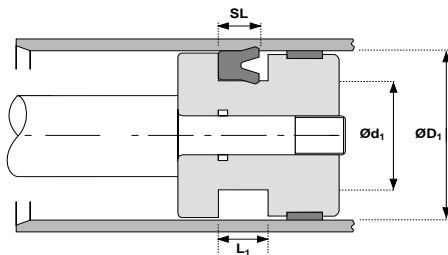
Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
18	110.000	90.000	15.000	15.500	0712400
659	110.000	90.000	14.500	16.000	4580400
601	110.000	95.000	8.900	10.000	4607000
606	110.000	100.000	8.000	9.000	4533100
906	115.000	93.000	14.500	15.000	9115007
601	115.000	95.000	12.000	13.000	4603100
655	115.000	95.000	11.800	13.000	4378210
655	115.000	95.000	12.000	13.000	4549910
601	115.000	100.000	8.900	10.000	4607100
18	115.000	100.000	12.000	12.500	0740500
906	120.000	98.000	14.500	15.000	9120087
601	120.000	100.000	11.000	12.500	4184901‡
601	120.000	100.000	12.000	13.000	4603200
18	120.000	100.000	14.000	14.500	0296100
18	125.000	100.000	19.000	20.000	0418600
906	125.000	103.000	14.500	15.000	9125007
601	125.000	105.000	11.400	12.500	4185001‡
606	125.000	105.000	14.500	16.000	4364000‡
601	125.000	105.000	15.000	17.000	4603300
18	125.000	110.000	11.000	11.500	0558300
601	125.000	112.000	8.900	10.000	4607200
906	130.000	108.000	14.500	15.000	9130007
601	130.000	110.000	11.000	12.500	4185101‡
601	130.000	110.000	15.000	17.000	4603400
18	135.000	110.000	19.000	20.000	0304300
18	135.000	115.000	14.000	14.500	0639900
601	135.000	115.000	15.000	17.000	4608100
906	140.000	118.000	14.500	15.000	9140007
18	140.000	120.000	12.000	12.500	0250500
601	140.000	120.000	14.500	16.000	4319600
601	140.000	120.000	15.000	17.000	4603500
601	140.000	125.000	8.900	10.000	4607300
18	145.000	120.000	19.000	20.000	0070400
601	145.000	125.000	11.000	12.500	4185201‡
18	145.000	125.000	14.000	14.500	0640100

Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
601	145.000	125.000	15.000	17.000	4603600
18	145.000	130.000	11.300	11.800	0634500*
18	150.000	120.000	24.000	25.000	1289500
18	150.000	125.000	19.000	20.000	0070500
906	150.000	128.000	14.500	15.000	9150007
606	150.000	130.000	14.500	16.000	4390200
601	150.000	130.000	15.000	17.000	4603700
601	150.000	136.000	8.500	9.500	4607400
606	150.000	140.000	13.600	15.000	4390300
601	154.000	140.000	9.000	10.000	4607900
601	155.000	140.000	8.900	10.000	4607500
18	160.000	135.000	19.000	20.000	0080400
906	160.000	138.000	14.500	15.000	9160007
18	160.000	140.000	14.000	14.500	0304600
601	160.000	140.000	15.000	17.000	4603800
606	160.000	140.000	18.200	20.000	4364100
601	160.000	145.000	8.900	10.000	4607600
18	165.000	140.000	19.000	20.000	0080500
601	165.000	145.000	15.000	17.000	4608200
601	165.000	150.000	8.900	10.000	4607700
906	170.000	148.000	14.500	15.000	9170007
18	170.000	150.000	14.000	14.500	0303300
601	170.000	150.000	15.000	17.000	4603900
601	175.000	160.000	9.000	10.000	4608400
601	180.000	155.000	15.000	17.000	4608300
906	180.000	158.000	14.500	15.000	9180007
18	180.000	160.000	15.000	15.500	1283100
601	180.000	165.000	9.000	10.000	4608600
601	183.000	165.000	10.000	11.000	4607800
601	185.000	160.000	15.000	17.000	4608500
18	190.000	160.000	24.000	25.000	0136100
601	190.000	165.000	15.000	17.000	4608700
906	190.000	168.000	14.500	15.000	9190007
601	195.000	170.000	15.000	17.000	4608800
601	200.000	175.000	15.000	17.000	4608900



Piston Seals

metric - single acting



18



601



606



655



659



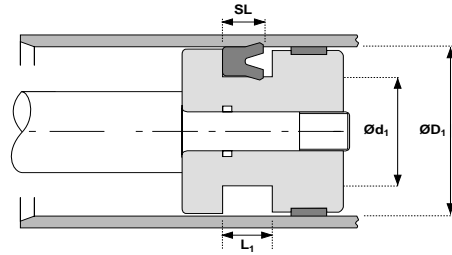
906

Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
18	200.000	175.000	19.000	20.000	0838800
906	200.000	178.000	14.500	15.000	9200007
601	200.000	180.000	12.000	13.000	4609000
606	200.000	180.000	14.500	16.000	4392300
601	205.000	180.000	15.000	17.000	4609100
18	210.000	180.000	24.000	25.000	0087200
601	210.000	190.000	12.000	13.000	4609200
601	215.000	190.000	15.000	17.000	4609300
601	220.000	200.000	12.000	13.000	4609400
18	220.000	200.000	15.000	15.500	1284100
601	225.000	200.000	15.000	17.000	4609500
906	225.000	203.000	14.500	15.000	9225007
18	230.000	200.000	24.000	25.000	2010000*
906	230.000	225.000	14.500	15.000	9230007*
601	235.000	210.000	18.000	20.000	4609600
601	240.000	220.000	12.000	13.000	4609700
601	250.000	220.000	17.000	19.200	4426600
18	250.000	220.000	22.000	23.000	0958900
601	250.000	230.000	12.000	13.000	4609800
601	260.000	240.000	12.000	13.000	4621000
601	265.000	240.000	18.000	20.000	4609900
601	275.000	250.000	18.000	20.000	4610000
18	280.000	250.000	24.000	25.000	1055500
601	290.000	260.000	18.000	20.000	4620100
601	295.000	265.000	18.000	20.000	4620200
601	300.000	270.000	18.000	20.000	4620300
18	300.000	270.000	24.000	25.000	0094800
601	310.000	280.000	18.000	20.000	4620400
18	310.000	280.000	24.000	25.000	0094900*
601	320.000	290.000	18.000	20.000	4620500
601	330.000	300.000	18.000	20.000	4620600
18	330.000	330.000	24.000	25.000	0095000
18	360.000	320.000	30.000	31.000	1054000*
18	400.000	360.000	30.000	31.000	1054300
601	405.000	375.000	22.000	24.000	4620700

Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
601	425.000	400.000	25.000	27.000	4620800
18	440.000	400.000	30.000	31.000	0095200
18	460.000	420.000	30.000	31.000	0095300*
601	485.000	450.000	25.000	27.000	4620900



Piston Seals
inch - single acting



18

26

66

67

511

512

601

606

611

655

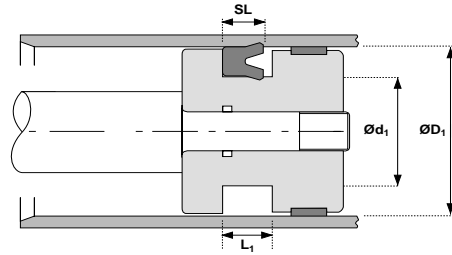
659

Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
26	0.375	0.125	0.125	0.138	28-41
511	0.375	0.125	0.125	0.138	8900810
26	0.437	0.187	0.125	0.138	28-42
511	0.438	0.187	0.125	0.138	8800110
26	0.500	0.125	0.187	0.207	28-01
26	0.500	0.250	0.125	0.138	28-43
511	0.500	0.250	0.125	0.138	8800210
512	0.500	0.250	0.250	0.275	8820210
67	0.500		0.500	0.062	67-0500
26	0.562	0.187	0.187	0.207	28-02
26	0.562	0.312	0.125	0.138	28-44
67	0.562		0.250	0.094	67-0562
26	0.625	0.250	0.187	0.207	28-03
26	0.625	0.375	0.125	0.138	28-45
511	0.625	0.375	0.125	0.138	8800410
67	0.625		0.500	0.094	67-0625
26	0.687	0.312	0.187	0.207	28-04
26	0.687	0.437	0.125	0.138	28-46
26	0.750	0.250	0.250	0.275	28-08
26	0.750	0.375	0.187	0.207	28-05
18	0.750	0.375	0.281	0.300	1379300
606	0.750	0.375	6.312	0.344	0470710
26	0.750	0.500	0.125	0.138	28-47
511	0.750	0.500	0.125	0.138	8800610
611	0.750	0.500	0.125	0.138	4418100
512	0.750	0.500	0.250	0.275	8870510
601	0.750	0.500	0.250	0.275	4566500
67	0.750		0.250	0.094	67-0750
26	0.812	0.312	0.250	0.275	28-09
26	0.812	0.437	0.187	0.207	28-06
511	0.812	0.562	0.125	0.138	8844610
611	0.812	0.562	0.125	0.138	4466600
67	0.875	0.375	0.250	0.125	67-0875
26	0.875	0.375	0.250	0.275	28-10
511	0.875	0.375	0.250	0.275	8865810

Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
26	0.875	0.500	0.187	0.207	28-07
511	0.875	0.500	0.187	0.207	8800710
601	0.875	0.500	0.197	0.218	4300000
18	0.875	0.500	0.281	0.300	0406700
511	0.875	0.625	0.125	0.138	8800810
611	0.875	0.625	0.125	0.138	4399500
18	0.875	0.625	0.187	0.203	1435600
512	0.875	0.625	0.250	0.275	8820510
26	0.937	0.437	0.250	0.275	28-11
511	0.937	0.687	0.125	0.138	8801010
611	0.937	0.687	0.125	0.138	4410100
66	1.000	0.250	0.375	0.115	1106600
511	1.000	0.375	0.312	0.344	8824910
26	1.000	0.500	0.250	0.275	28-12
511	1.000	0.500	0.250	0.275	8806310
601	1.000	0.500	0.250	0.275	4110201
26	1.000	0.625	0.187	0.207	28-48
511	1.000	0.625	0.187	0.207	8800910
601	1.000	0.625	0.190	0.218	4298300
18	1.000	0.625	0.281	0.300	1247600
511	1.000	0.750	0.125	0.138	8801110
611	1.000	0.750	0.125	0.138	4410000
512	1.000	0.750	0.250	0.275	8820710
67	1.000		0.500	0.125	67-1000
26	1.062	0.562	0.250	0.275	28-13
511	1.000	0.812	0.125	0.138	8815310
611	1.062	0.812	0.125	0.138	4521200
18	1.093	0.750	0.281	0.300	1364200
66	1.125	0.250	0.375	0.085	0341200
26	1.125	0.625	0.250	0.275	28-14
511	1.125	0.625	0.250	0.275	8806410
601	1.125	0.625	0.250	0.275	4509101
26	1.125	0.750	0.187	0.207	28-49
511	1.125	0.750	0.187	0.207	8801210
512	1.125	0.750	0.312	0.344	8820810



Piston Seals
inch - single acting

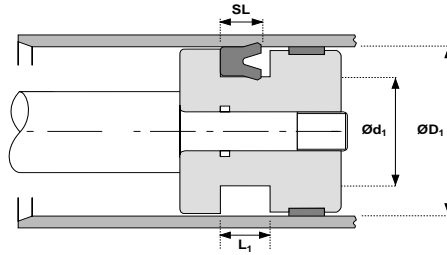


Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
606	1.125	0.750	0.312	0.344	4565600
511	1.125	0.875	0.125	0.138	8801410
611	1.125	0.875	0.125	0.138	4416700
67	1.125		0.500	0.125	67-1125
26	1.187	0.687	0.250	0.275	28-15
511	1.187	0.937	0.125	0.138	8844810
66	1.250	0.250	0.375	0.085	0343000
26	1.250	0.750	0.250	0.275	28-16
511	1.250	0.750	0.250	0.275	8806510
601	1.250	0.750	0.250	0.275	4102901
18	1.250	0.750	0.375	0.395	0403700
512	1.250	0.750	0.375	0.413	8825010
611	1.250	0.875	0.187	0.206	4415700
26	1.250	0.875	0.187	0.207	28-50
511	1.250	0.875	0.187	0.207	8801510
511	1.250	1.000	0.125	0.138	8801610
611	1.250	1.000	0.125	0.138	4457300
659	1.250	1.000	0.171	0.187	4416600
512	1.250	1.000	0.250	0.275	8821210
67	1.250		0.500	0.125	67-1250
26	1.312	0.812	0.250	0.275	28-17
511	1.312	1.000	0.156	0.172	8810110
511	1.312	1.062	0.125	0.138	8801810
66	1.375	1.250	0.437	0.115	0273300
18	1.375	0.812	0.500	0.520	0413800
26	1.375	0.875	0.250	0.275	28-18
511	1.375	0.875	0.250	0.275	8806610
601	1.375	0.875	0.250	0.275	4507101
18	1.375	0.875	0.375	0.395	0401300
26	1.375	1.000	0.187	0.207	28-51
511	1.375	1.000	0.187	0.207	8801710
18	1.375	1.000	0.250	0.270	0282600
512	1.375	1.000	0.312	0.344	8821310
511	1.375	1.125	0.125	0.138	8801910
512	1.375	1.125	0.250	0.275	8854910

Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
67	1.375		0.437	0.094	67-1375
26	1.437	0.937	0.250	0.275	28-19
512	1.437	1.187	0.187	0.207	8858010
66	1.500	0.250	0.500	0.115	0217400
659	1.500	1.000	0.187	0.205	4372400
26	1.500	1.000	0.250	0.275	28-20
511	1.500	1.000	0.250	0.275	8806810
601	1.500	1.000	0.250	0.275	4111101
18	1.500	1.000	0.375	0.395	0422400
512	1.500	1.000	0.375	0.413	8825210
611	1.500	1.125	0.187	0.206	4455300
26	1.500	1.125	0.187	0.207	28-52
511	1.500	1.125	0.187	0.207	8802010
512	1.500	1.125	0.250	0.275	8820610
606	1.500	1.125	0.250	0.275	4426700
18	1.500	1.125		0.281	0525100
512	1.500	1.125	0.312	0.344	8821710
511	1.500	1.187	0.156	0.172	8811010
511	1.500	1.250	0.125	0.138	8802210
512	1.500	1.250	0.250	0.275	8821810
606	1.500	1.250	0.250	0.275	4426800
67	1.500		0.500	0.125	67-1500
26	1.562	1.062	0.250	0.275	28-21
611	1.562	1.187	0.187	0.206	4536400
511	1.562	1.187	0.187	0.207	8851710
511	1.562	1.250	0.156	0.172	8813810
66	1.625	0.250	0.500	0.115	0384600
511	1.625	1.000	0.312	0.344	8806910
512	1.625	1.000	0.500	0.550	8825310
26	1.625	1.125	0.250	0.275	28-22
511	1.625	1.125	0.250	0.275	8807010
18	1.625	1.125	0.375	0.395	0287000
512	1.625	1.125	0.375	0.413	8847610
611	1.625	1.250	0.187	0.206	4535600
26	1.625	1.250	0.187	0.207	28-53



Piston Seals
inch - single acting



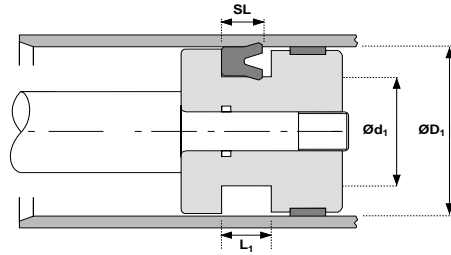
Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
511	1.625	1.250	0.187	0.207	8802310
18	1.625	1.250	0.281	0.300	0282400
512	1.625	1.250	0.312	0.344	8821910
511	1.625	1.375	0.125	0.138	8802410
512	1.625	1.375	0.250	0.275	8822110
67	1.625		0.500	0.125	67-1625
26	1.687	1.187	0.250	0.275	28-23
511	1.687	1.375	0.156	0.172	8813910
66	1.750	0.250	0.500	0.115	0596700
511	1.750	1.000	0.375	0.413	8819110
511	1.750	1.125	0.312	0.344	8807110
18	1.750	1.125	0.437	0.457	0778200
26	1.750	1.250	0.250	0.275	28-24
511	1.750	1.250	0.250	0.275	8807210
601	1.750	1.250	0.250	0.275	4502701
512	1.750	1.250	0.375	0.413	8825410
601	1.750	1.250	0.375	0.413	4107001
659	1.750	1.250	0.375	0.413	4528600
611	1.750	1.375	0.187	0.206	4491500
511	1.750	1.375	0.187	0.207	8802510
512	1.750	1.375	0.312	0.344	8822210
512	1.750	1.375	0.375	0.413	8870710
601	1.750	1.375	0.375	0.413	4353400
511	1.750	1.500	0.125	0.138	8802610
512	1.750	1.500	0.250	0.275	8822310
67	1.750		0.500	0.125	67-1750
66	1.875	0.375	0.500	0.140	0787300
26	1.875	1.250	0.312	0.344	28-25
511	1.875	1.250	0.312	0.344	8870010
18	1.875	1.250	0.437	0.457	0404100
511	1.875	1.375	0.250	0.275	8807310
512	1.875	1.375	0.375	0.413	8825610
611	1.875	1.500	0.187	0.206	4466700
511	1.875	1.500	0.187	0.207	8802710
512	1.875	1.500	0.375	0.413	8822510

Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
511	1.875	1.625	0.125	0.138	8802810
512	1.875	1.625	0.250	0.275	8870610
67	1.875		0.500	0.125	67-1875
66	2.000	0.375	0.500	0.115	0218700
511	2.000	1.250	0.375	0.413	8814310
601	2.000	1.375	0.266	0.312	4236201
26	2.000	1.375	0.312	0.344	28-26
511	2.000	1.375	0.312	0.344	8807410
18	2.000	1.375	0.437	0.457	0778400
512	2.000	1.375	0.500	0.550	8871610
606	2.000	1.375	0.500	0.550	4364200
511	2.000	1.500	0.250	0.275	8807510
601	2.000	1.500	0.250	0.275	4111001
18	2.000	1.500	0.281	0.300	1447800
512	2.000	1.500	0.312	0.344	8821010
512	2.000	1.500	0.375	0.413	8825710
606	2.000	1.500	0.375	0.413	4376000
606	2.000	1.625	0.187	0.206	4426900
611	2.000	1.625	0.187	0.206	4469700
511	2.000	1.625	0.187	0.207	8802910
512	2.000	1.625	0.312	0.344	8858110
606	2.000	1.625	0.312	0.344	4444300
512	2.000	1.625	0.375	0.413	8822710
606	2.000	1.625	0.375	0.413	4364400
659	2.000	1.630	0.250	0.281	4563300?
511	2.000	1.750	0.125	0.138	8803010
512	2.000	1.750	0.250	0.275	8822810
67	2.000		0.500	0.125	67-2000
66	2.125	0.250	0.625	0.140	0273100
511	2.125	1.375	0.375	0.413	8814410
26	2.125	1.500	0.312	0.344	28-27
511	2.125	1.500	0.312	0.344	8807610
18	2.125	1.500	0.437	0.457	0967600
512	2.125	1.500	0.500	0.550	8825810
511	2.125	1.625	0.250	0.275	8807710



Piston Seals

inch - single acting

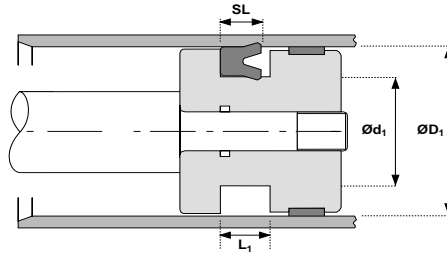


Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
611	2.125	1.750	0.187	0.206	4490400
511	2.125	1.750	0.187	0.207	8803110
512	2.125	1.750	0.375	0.413	8822910
511	2.125	1.875	0.125	0.138	8803210
66	2.250	0.250	0.750	0.170	0860600
511	2.250	1.500	0.375	0.413	8814510
512	2.250	1.500	0.500	0.550	8872710
512	2.250	1.500	0.625	0.688	8872810
26	2.250	1.625	0.312	0.344	28-28
511	2.250	1.625	0.312	0.344	8850910
18	2.250	1.625	0.437	0.457	1432600
511	2.250	1.750	0.250	0.275	8807810
601	2.250	1.750	0.250	0.275	4502601
18	2.250	1.750	0.312	0.332	1404300
512	2.250	1.750	0.375	0.413	8825910
601	2.250	1.750	0.375	0.413	4140901
606	2.250	1.750	0.375	0.413	4476500
511	2.250	1.875	0.187	0.207	8803310
512	2.250	1.875	0.375	0.413	8870810
606	2.250	1.875	0.375	0.413	4479600
511	2.250	2.000	0.125	0.138	8803410
512	2.250	2.000	0.250	0.275	8823110
67	2.250		0.500	0.125	67-2250
66	2.375	0.500	0.750	0.170	0271900
18	2.375	1.500	0.687	0.727	0403100*
511	2.375	1.625	0.375	0.413	8814710
601	2.375	1.750	0.266	0.312	4236301
26	2.375	1.750	0.312	0.344	28-29
511	2.375	1.750	0.312	0.344	8807910
18	2.375	1.750	0.437	0.457	0939800
659	2.375	1.750	0.437	0.481	4528500
512	2.375	1.750	0.500	0.550	8826010
601	2.375	1.750	0.562	0.619	4250901
511	2.375	1.875	0.250	0.275	8808010
511	2.375	2.000	0.187	0.207	8803510

Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
601	2.375	2.000	0.250	0.275	4508301
601	2.375	2.000	0.312	0.344	4509201
512	2.375	2.000	0.375	0.413	8823210
66	2.500	0.500	0.625	0.140	1446100
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
18	2.500	1.687	0.625	0.665	1382600*
511	2.500	1.750	0.375	0.413	8814810
512	2.500	1.750	0.500	0.550	8830010
26	2.500	1.875	0.312	0.344	28-30
511	2.500	1.875	0.312	0.344	8808110
18	2.500	1.875	0.437	0.457	0867200
512	2.500	1.875	0.500	0.550	8826110
606	2.500	1.875	0.500	0.550	4376100
511	2.500	2.000	0.250	0.275	8808210
606	2.500	2.000	0.250	0.275	4516500
512	2.500	2.000	0.375	0.413	8826210
601	2.500	2.000	0.375	0.413	4353500
606	2.500	2.000	0.375	0.413	4391900
655	2.500	2.000	0.375	0.413	4588010
511	2.500	2.125	0.187	0.207	8803710
512	2.500	2.125	0.250	0.275	8865510
601	2.500	2.125	0.250	0.275	4508201
606	2.500	2.125	0.250	0.275	4427000
606	2.500	2.125	0.312	0.344	4444400
512	2.500	2.125	0.375	0.413	8870910
606	2.500	2.125	0.375	0.413	4451300
659	2.500	2.130	0.250	0.281	4563400?
511	2.500	2.250	0.125	0.138	8803810
67	2.500		0.500	0.125	67-2500
512	2.562	2.187	0.375	0.413	8858210
66	2.625	0.250	0.750	0.170	0271000
26	2.625	2.000	0.312	0.344	28-31
511	2.625	2.000	0.312	0.344	8808310



Piston Seals
inch - single acting

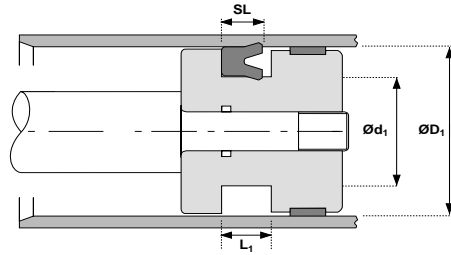


Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
18	2.625	2.000	0.437	0.457	1371000
512	2.625	2.000	0.500	0.550	8826310
601	2.625	2.000	0.500	0.550	4225101
601	2.625	2.000	0.562	0.619	4159801
511	2.625	2.125	0.250	0.275	8808410
512	2.625	2.125	0.375	0.413	8826410
601	2.625	2.125	0.375	0.413	4156101
511	2.625	2.250	0.187	0.207	8803910
512	2.625	2.250	0.312	0.344	8858310
512	2.625	2.250	0.375	0.413	8823410
511	2.625	2.375	0.125	0.138	8815610
66	2.750	0.500	0.750	0.170	0863500
511	2.750	2.000	0.375	0.413	8814910
512	2.750	2.000	0.500	0.550	8830310
18	2.750	2.000	0.562	0.582	1369100
512	2.750	2.000	0.625	0.688	8830410
26	2.750	2.125	0.312	0.344	28-32
511	2.750	2.125	0.312	0.344	8808510
511	2.750	2.250	0.250	0.275	8808610
512	2.750	2.250	0.375	0.413	8826510
601	2.750	2.250	0.375	0.413	4128701
512	2.750	2.250	0.562	0.619	8864110
511	2.750	2.375	0.187	0.207	8804010
512	2.750	2.375	0.375	0.413	8858410
67	2.750		0.500	0.125	67-2750A
66	2.875	0.500	0.750	0.170	0861500
511	2.875	2.125	0.375	0.413	8815110
26	2.875	2.250	0.312	0.344	28-33
511	2.875	2.250	0.312	0.344	8808710
18	2.875	2.250	0.437	0.457	0424300
512	2.875	2.250	0.500	0.550	8871710
511	2.875	2.375	0.250	0.275	8808810
511	2.875	2.500	0.187	0.207	8804110
512	2.875	2.500	0.375	0.413	8871010
66	3.000	0.500	0.625	0.140	1446200

Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
511	3.000	2.000	0.500	0.550	8815010
512	3.000	2.000	0.750	0.825	8853410
511	3.000	2.250	0.375	0.413	8869910
606	3.000	2.250	0.455	0.500	4375000
512	3.000	2.250	0.500	0.550	8872910
659	3.000	2.250	0.500	0.550	4528400
18	3.000	2.250	0.562	0.582	1098400
512	3.000	2.250	0.625	0.688	8873010
26	3.000	2.375	0.312	0.344	28-34
511	3.000	2.375	0.312	0.344	8808910
601	3.000	2.375	0.312	0.344	4107201
18	3.000	2.375	0.469	0.489	0716600
512	3.000	2.375	0.500	0.550	8826710
606	3.000	2.375	0.500	0.550	4364600
511	3.000	2.500	0.250	0.275	8809010
606	3.000	2.500	0.250	0.275	4516600
18	3.000	2.500	0.312	0.332	0641200
512	3.000	2.500	0.312	0.344	8821110
512	3.000	2.500	0.375	0.413	8826810
601	3.000	2.500	0.375	0.413	4119501
606	3.000	2.500	0.375	0.413	4364700
655	3.000	2.500	0.375	0.413	4525610
511	3.000	2.625	0.187	0.207	8804210
512	3.000	2.625	0.312	0.344	8858510
512	3.000	2.625	0.375	0.413	8823710
606	3.000	2.625	0.375	0.413	4458400
659	3.000	2.630	0.250	0.281	4563500
511	3.000	2.750	0.125	0.138	8817910
67	3.000		0.500	0.125	67-3000
66	3.125	0.500	0.750	0.170	1310600
511	3.125	2.125	0.500	0.550	8853110
26	3.125	2.500	0.312	0.344	28-35
511	3.125	2.500	0.312	0.344	8870110
601	3.125	2.500	0.312	0.344	4124401
512	3.125	2.500	0.500	0.550	8871810



Piston Seals
inch - single acting



Hallite



18



26



66



67



511



512



601



606



611



655



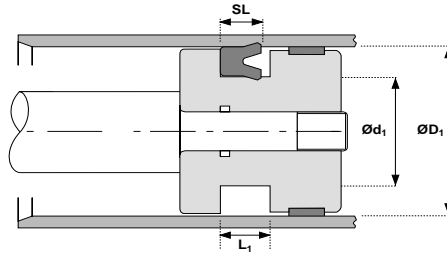
659

Type	NOMINALS				PART No.
	ØD ₁	Ød ₁	SL	L ₁	
511	3.125	2.625	0.250	0.275	8809110
601	3.125	2.625	0.375	0.413	4224701
511	3.125	2.750	0.187	0.207	8804410
512	3.125	2.750	0.375	0.413	8871110
511	3.125	2.875	0.125	0.138	8814210
66	3.250	0.500	0.750	0.170	0271100
26	3.250	2.500	0.375	0.413	28-36
511	3.250	2.500	0.375	0.413	8815410
512	3.250	2.500	0.500	0.550	8879210
18	3.250	2.500	0.562	0.582	0782400
512	3.250	2.500	0.625	0.688	8830510
511	3.250	2.625	0.312	0.344	8851110
606	3.250	2.625	0.500	0.550	4376200
511	3.250	2.750	0.250	0.275	8809210
606	3.250	2.750	0.250	0.275	4516700
512	3.250	2.750	0.375	0.413	8826910
606	3.250	2.750	0.375	0.413	4474400
511	3.250	2.875	0.187	0.207	8851010
512	3.250	2.875	0.250	0.275	8865610
606	3.250	2.875	0.250	0.275	4427100
511	3.250	3.000	0.125	0.138	8804510
67	3.250		0.625	0.156	67-3250
26	3.375	2.625	0.375	0.413	28-37
511	3.375	2.750	0.312	0.344	8809310
512	3.375	2.750	0.500	0.550	8871910
601	3.375	2.750	0.562	0.619	4250701
511	3.375	2.875	0.250	0.275	8809410
511	3.375	3.000	0.187	0.207	8804610
512	3.375	3.000	0.375	0.413	8823910
66	3.500	0.250	0.750	0.170	1446300
511	3.500	2.500	0.500	0.550	8815510
26	3.500	2.750	0.375	0.413	28-38
511	3.500	2.750	0.375	0.413	8815710
512	3.500	2.750	0.500	0.550	8830710
606	3.500	2.750	0.500	0.550	4444600

Type	NOMINALS				PART No.
	ØD ₁	Ød ₁	SL	L ₁	
18	3.500	2.750	0.562	0.582	0437800*
512	3.500	2.750	0.625	0.688	8830810
606	3.500	2.750	0.625	0.688	4376300
511	3.500	2.875	0.312	0.344	8809510
606	3.500	2.875	0.312	0.344	4571100
601	3.500	2.875	0.325	0.360	4129701
512	3.500	2.875	0.500	0.550	8872010
606	3.500	2.875	0.500	0.550	4364800
511	3.500	3.000	0.250	0.275	8809610
606	3.500	3.000	0.250	0.275	4516800
512	3.500	3.000	0.375	0.413	8827010
606	3.500	3.000	0.375	0.413	4364900
655	3.500	3.000	0.375	0.413	4525710
512	3.500	3.000	0.562	0.619	8850610
511	3.500	3.125	0.187	0.207	8804710
512	3.500	3.125	0.250	0.275	8867310
606	3.500	3.125	0.275	0.302	4572200
512	3.500	3.125	0.375	0.413	8871210
606	3.500	3.125	0.375	0.413	4444500
659	3.500	3.130	0.250	0.281	4563600?
511	3.500	3.250	0.125	0.138	8819610
67	3.500		0.625	0.156	67-3500
512	3.562	3.187	0.375	0.413	8858610*
26	3.625	2.875	0.375	0.413	28-39
659	3.625	2.875	0.562	0.618	4528300
511	3.625	3.000	0.312	0.344	8809710
512	3.625	3.000	0.500	0.550	8827110
601	3.625	3.000	0.562	0.618	4160001
512	3.625	3.125	0.375	0.413	8859510
511	3.625	3.250	0.187	0.207	8804810
512	3.625	3.250	0.312	0.344	8858710
512	3.625	3.250	0.375	0.413	8824010
66	3.750	0.500	0.750	0.170	0863600
511	3.750	2.750	0.500	0.550	8900010
26	3.750	3.000	0.375	0.413	28-40



Piston Seals
inch - single acting

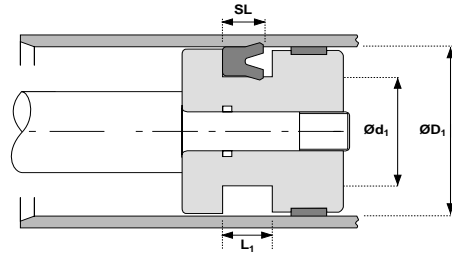


Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
511	3.750	3.000	0.375	0.413	8815910
512	3.750	3.000	0.500	0.550	8831010
18	3.750	3.000	0.562	0.582	0410500
512	3.750	3.000	0.625	0.688	8878710
511	3.750	3.125	0.312	0.344	8809910
511	3.750	3.250	0.250	0.275	8810010
512	3.750	3.250	0.375	0.413	8827310
606	3.750	3.250	0.375	0.413	4444700
511	3.750	3.375	0.187	0.207	8854210
512	3.750	3.375	0.375	0.413	8858810
511	3.750	3.500	0.125	0.138	8815810
67	3.750		0.500	0.125	67-3750
511	3.875	3.250	0.312	0.344	8879610
511	3.875	3.375	0.250	0.275	8850710
511	3.875	3.500	0.187	0.207	8805010
512	3.875	3.500	0.375	0.413	8824110
66	4.000	0.500	0.750	0.170	0271800
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
26	4.000	3.250	0.375	0.413	28-60
511	4.000	3.250	0.375	0.413	8816210
606	4.000	3.250	0.375	0.413	4517400
512	4.000	3.250	0.500	0.550	8831110
606	4.000	3.250	0.500	0.550	4444900
18	4.000	3.250	0.562	0.582	1407700
512	4.000	3.250	0.625	0.688	8831210
606	4.000	3.250	0.625	0.688	4376400
511	4.000	3.375	0.312	0.344	8810210
512	4.000	3.375	0.500	0.550	8872110
606	4.000	3.375	0.500	0.550	4365000
511	4.000	3.500	0.250	0.275	8810310
606	4.000	3.500	0.250	0.275	4516900
512	4.000	3.500	0.312	0.344	8865710
606	4.000	3.500	0.312	0.344	4427200

Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
18	4.000	3.500	0.375	0.395	1468200
512	4.000	3.500	0.375	0.413	8827510
606	4.000	3.500	0.375	0.413	4365100
655	4.000	3.500	0.625	0.688	4525810
511	4.000	3.625	0.187	0.207	8805110
512	4.000	3.625	0.312	0.344	8864010
512	4.000	3.625	0.375	0.413	8824210
606	4.000	3.625	0.375	0.413	4444800
659	4.000	3.630	0.250	0.281	4563700?
511	4.000	3.750	0.125	0.138	8818710
67	4.000		0.500	0.125	67-4000A
67	4.000		0.625	0.156	67-4000
511	4.125	3.375	0.375	0.413	8857710
512	4.125	3.375	0.625	0.688	8855910
511	4.125	3.500	0.312	0.344	8810410
512	4.125	3.500	0.500	0.550	8827710
511	4.125	3.625	0.250	0.275	8810510
511	4.125	3.750	0.187	0.207	8879410
512	4.125	3.750	0.375	0.413	8855010
511	4.125	3.875	0.125	0.138	8816510
66	4.250	0.500	0.750	0.170	0863400
511	4.250	3.500	0.375	0.413	8816410
512	4.250	3.500	0.500	0.550	8878810
18	4.250	3.500	0.562	0.582	1128800
659	4.250	3.500	0.562	0.618	4528200
512	4.250	3.500	0.625	0.688	8831310
511	4.250	3.625	0.312	0.344	8851210
511	4.250	3.750	0.250	0.275	8810610
512	4.250	3.750	0.375	0.413	8827810
606	4.250	3.750	0.375	0.413	4445000
511	4.250	3.875	0.187	0.207	8823510
512	4.250	3.875	0.250	0.275	8820910
511	4.250	4.000	0.125	0.138	8805210
511	4.375	3.375	0.500	0.550	8866910*
511	4.375	3.625	0.375	0.413	8824610



Piston Seals
inch - single acting

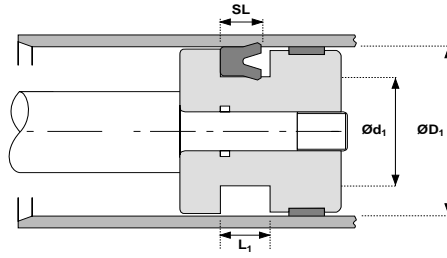


Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
511	4.375	3.750	0.312	0.344	8870210
512	4.375	3.750	0.500	0.550	8872210
511	4.375	3.875	0.250	0.275	8810710
511	4.375	4.000	0.187	0.207	8805310
512	4.375	4.000	0.375	0.413	8824310
66	4.500	0.500	0.750	0.170	1446500
511	4.500	3.250	0.625	0.688	8822410
512	4.500	3.500	0.750	0.825	8823010
511	4.500	3.750	0.375	0.413	8816610
601	4.500	3.750	0.375	0.413	4119201
18	4.500	3.750	0.500	0.520	1414800
512	4.500	3.750	0.500	0.550	8831410
606	4.500	3.750	0.625	0.688	4371000
511	4.500	3.875	0.312	0.344	8870310
512	4.500	3.875	0.500	0.550	8872310
511	4.500	4.000	0.250	0.275	8810810
512	4.500	4.000	0.375	0.413	8827910
606	4.500	4.000	0.375	0.413	4448100
601	4.500	4.000	0.511	0.562	4373400
512	4.500	4.000	0.562	0.619	8828010
511	4.500	4.125	0.187	0.207	8805410
512	4.500	4.125	0.250	0.275	8867210
512	4.500	4.125	0.375	0.413	8871310
511	4.500	4.250	0.125	0.138	8819710*
67	4.500		0.625	0.156	67-4500
512	4.562	4.187	0.375	0.413	8859010*
511	4.625	3.875	0.375	0.413	8819210
511	4.625	4.000	0.312	0.344	8810910
512	4.625	4.125	0.375	0.413	8859610
511	4.625	4.250	0.187	0.207	8805510
512	4.625	4.250	0.312	0.344	8859110
512	4.625	4.250	0.375	0.413	8824410
66	4.750	0.500	0.750	0.170	0271300
511	4.750	4.000	0.375	0.413	8816810
601	4.750	4.000	0.375	0.413	4120501

Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
512	4.750	4.000	0.500	0.550	8878910
601	4.750	4.000	0.536	0.600	4422500
512	4.750	4.000	0.625	0.688	8831610
511	4.750	4.125	0.312	0.344	8811110
511	4.750	4.250	0.250	0.275	8811210
512	4.750	4.250	0.375	0.413	8828210
512	4.750	4.250	0.562	0.619	8833710
511	4.750	4.375	0.187	0.207	8854310
512	4.750	4.375	0.375	0.413	8859210
606	4.750	4.379	0.275	0.302	4493600
18	4.875	4.000	0.656	0.676	1424100
511	4.875	4.125	0.375	0.413	8853210
511	4.875	4.250	0.312	0.344	8811310
511	4.875	4.375	0.250	0.275	8811410
511	4.875	4.500	0.187	0.207	8805710
512	4.875	4.500	0.375	0.413	8824510
66	5.000	0.500	0.750	0.170	0253100
511	5.000	4.000	0.500	0.550	8816910
659	5.000	4.000	0.731	0.804	4528100
18	5.000	4.000	0.750	0.790	0443000
512	5.000	4.000	0.750	0.825	8853510
511	5.000	4.250	0.375	0.413	8817010
606	5.000	4.250	0.375	0.413	4517500
512	5.000	4.250	0.500	0.550	8831810
606	5.000	4.250	0.500	0.550	4445100
512	5.000	4.250	0.625	0.688	8831910
606	5.000	4.250	0.625	0.688	4371100
511	5.000	4.375	0.312	0.344	8811510
512	5.000	4.375	0.500	0.550	8828410
512	5.000	4.375	0.625	0.688	8872410
511	5.000	4.500	0.250	0.275	8811610
606	5.000	4.500	0.250	0.275	4517000
512	5.000	4.500	0.312	0.344	8821410
512	5.000	4.500	0.375	0.413	8828610
601	5.000	4.500	0.375	0.413	4129801



Piston Seals
inch - single acting

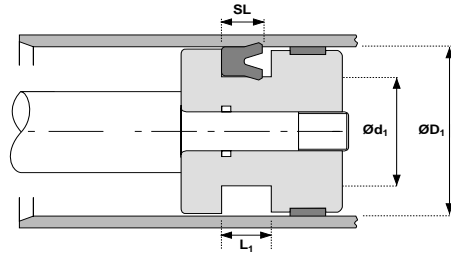


Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
606	5.000	4.500	0.375	0.413	4365200
512	5.000	4.500	0.562	0.619	8828710
606	5.000	4.500	0.562	0.619	4495900
511	5.000	4.625	0.187	0.207	8879510
512	5.000	4.625	0.312	0.344	8859310
512	5.000	4.625	0.375	0.413	8855410
511	5.000	4.750	0.125	0.138	8818110
67	5.000		0.625	0.187	67-5000
511	5.125	4.500	0.312	0.344	8811710
512	5.125	4.500	0.625	0.688	8872510
511	5.125	4.625	0.250	0.275	8811810
511	5.125	4.875	0.125	0.138	8816710
66	5.250	0.500	0.750	0.170	0257700
511	5.250	4.250	0.500	0.550	8858910
18	5.250	4.250	0.750	0.790	0892200
511	5.250	4.500	0.375	0.413	8817310
18	5.250	4.500	0.469	0.489	0447800
512	5.250	4.500	0.500	0.550	8832010
606	5.250	4.500	0.500	0.550	4445200
512	5.250	4.500	0.625	0.688	8832110
511	5.250	4.750	0.250	0.275	8811910
511	5.250	4.875	0.187	0.207	8823610
512	5.250	4.875	0.250	0.275	8821510
511	4.750	5.375	0.312	0.344	8879710
511	5.375	4.875	0.250	0.275	8856510
66	5.500	0.500	0.750	0.170	0253000
511	5.500	4.250	0.625	0.688	8819810
511	5.500	4.500	0.500	0.550	8817410
18	5.500	4.500	0.750	0.790	0133200
511	5.500	4.750	0.375	0.413	8817510
601	5.500	4.750	0.360	0.437	4154701
512	5.500	4.750	0.625	0.688	8832210
606	5.500	4.750	0.625	0.688	4371200
511	5.500	5.000	0.250	0.275	8812010
512	5.500	5.000	0.375	0.413	8871510

Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
512	5.500	5.000	0.562	0.619	8828810
67	5.500		0.750	0.187	67-5500
511	5.625	5.000	0.312	0.344	8812110
66	5.750	0.500	0.750	0.170	0848000
511	5.750	5.000	0.375	0.413	8817610
601	5.750	5.000	0.482	0.539	4224801
512	5.750	5.000	0.500	0.550	8879110
512	5.750	5.000	0.625	0.688	8832310
511	5.750	5.250	0.250	0.275	8812210
511	5.875	5.250	0.312	0.344	8856910
66	6.000	0.500	0.750	0.170	0316100
511	6.000	4.750	0.625	0.688	8819410
511	6.000	5.000	0.500	0.550	8817710
18	6.000	5.000	0.750	0.790	1367000
659	6.000	5.000	0.731	0.804	4530200
512	6.000	5.000	0.750	0.825	8832410
511	6.000	5.250	0.375	0.413	8817810
606	6.000	5.250	0.375	0.413	4517600
606	6.000	5.250	0.500	0.550	4445300
18	6.000	5.250	0.562	0.582	0487700
512	6.000	5.250	0.625	0.688	8832610
606	6.000	5.250	0.625	0.688	4371300
511	6.000	5.375	0.312	0.344	8812310
512	6.000	5.375	0.625	0.688	8872610
511	6.000	5.500	0.250	0.275	8812410
606	6.000	5.500	0.250	0.275	4517100
512	6.000	5.500	0.375	0.413	8829110
606	6.000	5.500	0.375	0.413	4365300
512	6.000	5.500	0.562	0.619	8829210
606	6.000	5.500	0.562	0.619	4393400
67	6.000		0.750	0.187	67-6000
511	6.125	5.125	0.500	0.550	8851810
511	6.125	5.500	0.312	0.344	8812510
511	6.250	5.250	0.500	0.550	8900110
511	6.250	5.500	0.375	0.413	8818010



Piston Seals
inch - single acting

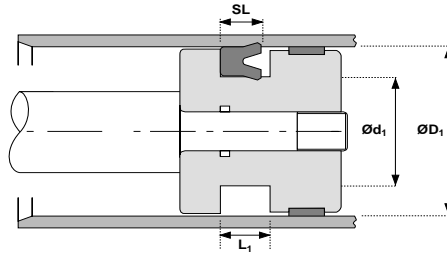


Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
601	6.250	5.500	0.375	0.413	4119301
511	6.250	5.750	0.250	0.275	8812610
606	6.250	5.750	0.562	0.619	4458300
511	6.375	5.375	0.500	0.550	8863610
511	6.375	5.625	0.375	0.413	8814110
511	6.375	5.750	0.312	0.344	8857010
66	6.500	0.500	0.875	0.225	0853500
18	6.500	5.500	0.750	0.790	1164100
512	6.500	5.500	0.750	0.825	8823310
511	6.500	5.750	0.375	0.413	8818210
601	6.500	5.750	0.375	0.413	4135301
512	6.500	5.750	0.500	0.550	8829010
512	6.500	5.750	0.625	0.688	8832810
511	6.500	6.000	0.250	0.275	8812810
512	6.500	6.000	0.562	0.619	8829310
511	6.625	6.000	0.312	0.344	8812910
511	6.750	6.000	0.375	0.413	8818310
512	6.750	6.000	0.625	0.688	8833010
511	6.750	6.250	0.250	0.275	8856610
511	6.875	6.250	0.312	0.344	8857110
511	7.000	6.000	0.500	0.550	8818410
18	7.000	6.000	0.750	0.790	1188800
659	7.000	6.000	0.731	0.804	4529700
512	7.000	6.000	0.750	0.825	8833110
511	7.000	6.250	0.375	0.413	8818510
606	7.000	6.250	0.375	0.413	4517700
512	7.000	6.250	0.500	0.550	8833210
606	7.000	6.250	0.500	0.550	4445500
512	7.000	6.250	0.625	0.688	8833310
606	7.000	6.250	0.625	0.688	4371400
511	7.000	6.375	0.312	0.344	8813010
512	7.000	6.375	0.625	0.688	8829410
511	7.000	6.500	0.250	0.275	8813110
606	7.000	6.500	0.250	0.275	4517200
18	7.000	6.500	0.375	0.395	1431600

Type	ØD ₁	Ød ₁	NOMINALS SL	L ₁	PART No.
512	7.000	6.500	0.375	0.413	8829510
606	7.000	6.500	0.375	0.413	4445400
512	7.000	6.500	0.562	0.619	8829710
67	7.000		0.750	0.187	67-7000
511	7.125	6.500	0.312	0.344	8876610
511	7.250	6.250	0.500	0.550	8857810
511	7.250	6.500	0.375	0.413	8818610
512	7.250	6.500	0.625	0.688	8833410
511	7.250	6.750	0.250	0.275	8813210
511	7.375	6.750	0.312	0.344	8857210
511	7.500	6.500	0.500	0.550	8815210
511	7.500	6.750	0.375	0.413	8818810
512	7.500	6.750	0.625	0.688	8850810
511	7.500	7.000	0.250	0.275	8813310
512	7.500	7.000	0.375	0.413	8822610
512	7.500	7.000	0.562	0.619	8877210
511	7.625	7.000	0.312	0.344	8879310
512	7.625	7.000	0.625	0.688	8859710
18	7.750	6.500	1.000	1.040	1192700
511	7.750	7.000	0.375	0.413	8877010
512	7.750	7.000	0.500	0.550	8859810
512	7.750	7.000	0.625	0.688	8877610
511	7.750	7.250	0.250	0.275	8856710
511	7.875	7.250	0.312	0.344	8857310
511	8.000	6.500	0.625	0.688	8819910
511	8.000	6.750	0.625	0.688	8819510
511	8.000	7.000	0.500	0.550	8851310
601	8.000	7.000	0.500	0.550	4124901
512	8.000	7.000	0.750	0.825	8851910
18	8.000	7.000	0.875	0.915	6501200
511	8.000	7.250	0.375	0.413	8818910
512	8.000	7.250	0.625	0.688	8833510
606	8.000	7.250	0.625	0.688	4371500
511	8.000	7.375	0.312	0.344	8876710
512	8.000	7.375	0.625	0.688	8855310



Piston Seals
inch - single acting



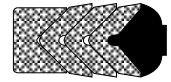
Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
511	8.000	7.500	0.250	0.275	8813410
606	8.000	7.500	0.250	0.275	4517300
512	8.000	7.500	0.375	0.413	8829610
512	8.000	7.500	0.562	0.619	8877310
67	8.000		0.750	0.187	67-8000
18	8.125	7.000		0.750	1054100
511	8.125	7.500	0.312	0.344	8813510
18	8.250	7.000	1.000	1.040	1219200
511	8.250	7.250	0.500	0.550	8857910
511	8.250	7.500	0.375	0.413	8877110
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	0.312	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
512	7.750	8.500	0.625	0.688	8859910
511	8.500	8.000	0.250	0.275	8813610
511	8.625	8.000	0.312	0.344	8876910
18	8.750	7.500	1.000	1.040	0418100
511	8.750	8.000	0.375	0.413	8869210
511	8.750	8.250	0.250	0.275	8856810
511	8.875	8.250	0.312	0.344	8857510
511	9.000	8.000	0.500	0.550	8819010
18	9.000	8.000	0.750	0.790	1269400
512	9.000	8.000	0.750	0.825	8855210
606	9.000	8.000	0.750	0.825	4371600
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
511	9.000	8.500	0.250	0.275	8813710
512	9.000	8.500	0.375	0.413	8829810
512	9.000	8.500	0.562	0.619	8855110
511	9.125	8.125	0.500	0.550	8853810
511	9.125	8.500	0.312	0.344	8857610

Type	ØD ₁	NOMINALS Ød ₁	SL	L ₁	PART No.
18	9.250	8.000	1.000	1.040	0455700
18	9.750	8.500	1.000	1.040	1332300
606	10.000	9.000	0.750	0.825	4536200
606	10.000	9.250	0.375	0.413	4575100
18	10.250	9.000	1.000	1.040	0437500
18	10.750	9.500	1.000	1.040	1320400
18	11.250	10.000	1.000	1.040	0452200
18	11.750	10.500	1.000	1.040	1331300
18	12.250	11.000	1.000	1.040	1331000
18	12.750	11.500	1.000	1.040	1331800
18	13.250	12.000	1.000	1.040	1329100
18	14.250	13.000	1.000	1.040	0864800
18	15.250	14.000	1.208	1.270	0174900
18	16.000	14.500	1.500	1.562	1345000*
18	17.000	15.000	1.500	1.562	1345300*
18	17.750	16.500	1.000	1.040	1318800*
18	17.750	17.000	0.625	0.665	1345900
18	19.250	18.000	1.250	1.312	1314500*
18	20.750	19.000	1.312	1.375	1342200*
18	21.500	20.000	1.750	1.812	0093600*
18	23.500	21.500	1.750	1.812	0150500*
18	25.000	23.000	1.500	1.562	0158700
18	29.000	27.000	1.500	1.562	2003500*
18	32.000	30.000	1.500	1.562	2109700*
18	39.500	38.000	1.125	1.187	0159200*

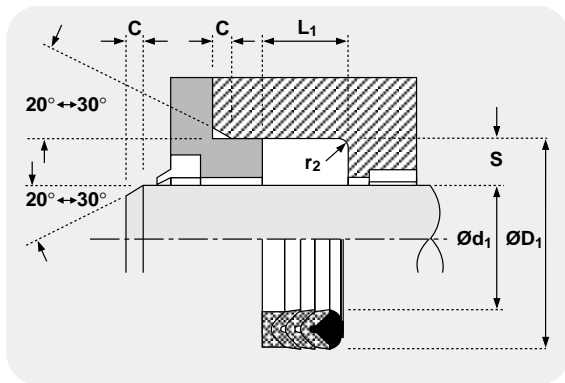


Vee pack sets

TECHNICAL DETAILS		METRIC	INCH		
OPERATING CONDITIONS					
MAXIMUM SPEED		0.5 m/sec	1.5 ft/sec		
MAXIMUM TEMPERATURE		-30°C + 100°C	-22°F + 212°F		
MAXIMUM PRESSURE		700 bar	10,000 p.s.i.		
MAXIMUM EXTRUSION GAP					
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
SURFACE ROUGHNESS					
DYNAMIC SEALING FACE $\varnothing d_1$		μmRa 0.1 ↔ 0.4	μmRt 4 max	$\mu\text{in CLA}$ 4 ↔ 16	μinRMS 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_2 mm		0.8	0.8	0.8	1.6
GROOVE SECTION $\leq S$ 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_2 in		0.031	0.031	0.031	0.031
TOLERANCES					
$\varnothing d_1$	$\varnothing D_1$	L_1 mm	L_1 in		
f9	Js11	+0.25 -0	+0.010 -0		



07



FEATURES

- EFFECTIVE DRI-ROD SEAL UNDER BOTH LOW AND HIGH PRESSURE CONDITIONS
- PRECISION MOULDED VEE RINGS
- PRESSURE ACTIVATED
- NO ADJUSTMENT NECESSARY

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.

Vee pack components



TECHNICAL DETAILS

OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 400 bar

1.5 ft/sec
 -22°F + 212°F
 6000 p.s.i.

MAXIMUM EXTRUSION GAP

PRESSURE bar	100	150	240	400
PRESSURE p.s.i.	1500	2250	3500	6000
MAXIMUM GAP in	0.018	0.015	0.010	0.007

SURFACE ROUGHNESS

	µmRa	µmRt	µin CLA	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	0.187	0.250	0.312	0.375	0.437	0.500
MIN CHAMFER C in	0.093	0.125	0.156	0.187	0.250	0.250
MAX FILLET RAD r_1 in	0.020	0.031	0.031	0.031	0.031	0.031

TOLERANCES

ROD	$h10$	$H10$	L_1 in	± 0.1000
PISTON	$H10$	$h10$		± 0.1000

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

DESIGN

The Hallite O8 vee pack components are manufactured from fabric reinforced high grade synthetic rubber, homogeneous rubber, nylon and polyester. These are normally used in multiples of vee rings with a male and female adaptor.

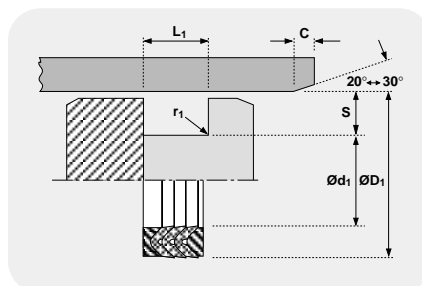
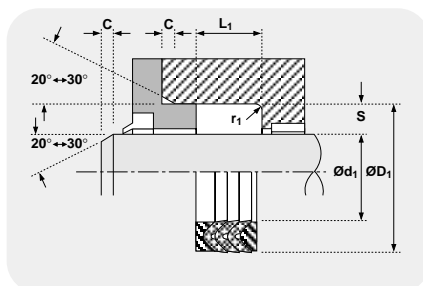
Vees are "stacked" together and must be lubricated liberally with the operating fluid prior to assembly.

The male adaptor fits into the vee ring on the pressure side and when pre-loaded, exerts a hinging action on the vee, forcing the sealing lips apart and ensuring a low pressure seal. As the pressure increases, so this hinging action increases, improving the effectiveness of the seal even where severe vibration, shock loading and knuckling may occur.

For any sizes not listed or for any special requirements, please consult your local Hallite sales department.

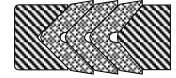
STANDARD STACK HEIGHT (L_1)
 INCLUDES M & F ADAPTORS AND INDICATES NUMBER OF VEE'S USED

3/16 CROSS SECTION	1/4 CROSS SECTION	5/16 CROSS SECTION	3/8 CROSS SECTION	7/16 CROSS SECTION	1/2 CROSS SECTION
0.410 1 RING	0.500 1 RING	0.562 1 RING	0.625 1 RING	0.645 1 RING	0.750 1 RING
0.520 2 RING	0.625 2 RING	0.719 2 RING	0.812 2 RING	0.863 2 RING	1.000 2 RING
0.630 3 RING	0.750 3 RING	0.875 3 RING	1.000 3 RING	1.081 3 RING	1.250 3 RING
0.740 4 RING	0.875 4 RING	1.031 4 RING	1.187 4 RING	1.300 4 RING	1.500 4 RING
0.850 5 RING	1.000 5 RING	1.187 5 RING	1.375 5 RING	1.517 5 RING	1.750 5 RING
0.960 6 RING	1.125 6 RING	1.344 6 RING	1.562 6 RING	1.735 6 RING	2.000 6 RING



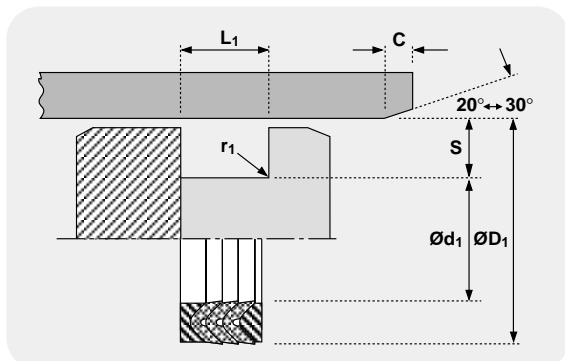
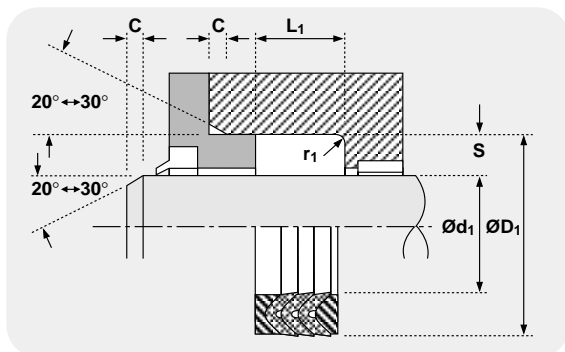
Vee pack sets

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	0.5 m/sec	1.5 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F	
MAXIMUM PRESSURE	400 bar	6000 p.s.i.	
MAXIMUM EXTRUSION GAP			
PRESSURE bar	100	175	250
MAXIMUM GAP mm	0.45	0.4	0.3
PRESSURE p.s.i.	1500	2250	3500
MAXIMUM GAP in	0.018	0.015	0.010
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE - ROD $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16
STATIC SEALING FACE - ROD $\varnothing D_1$	1.6 max	10 max	63 max
DYNAMIC SEALING FACE - PISTON $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16
STATIC SEALING FACE - PISTON $\varnothing D_1$	1.6 max	10 max	63 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max
CHAMFERS & RADII			
GROOVE SECTION $\leq S$ mm	5.0	7.5	10.0
MIN CHAMFER C mm	3.0	5.0	6.5
MAX FILLET RAD r_1 mm	0.5	0.8	0.8
GROOVE SECTION $\leq S$ in	0.187	0.250	0.312
MIN CHAMFER C in	0.093	0.125	0.156
MAX FILLET RAD r_1 in	0.020	0.031	0.031
TOLERANCES			
ROD	f9	Js11	+0.75 -0.0
PISTON	js11	H9	+0.75 -0.0



09

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



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 knocking 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.

Vee pack sets



TECHNICAL DETAILS

METRIC

INCH

OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 400 bar

1.5 ft/sec
 -22°F + 212°F
 6,000 p.s.i.

MAXIMUM EXTRUSION GAP

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

	100	160	250	400
PRESSURE bar	100	160	250	400
MAXIMUM GAP mm	0.45	0.4	0.3	0.2
PRESSURE p.s.i.	1500	2400	3750	6000

SURFACE ROUGHNESS

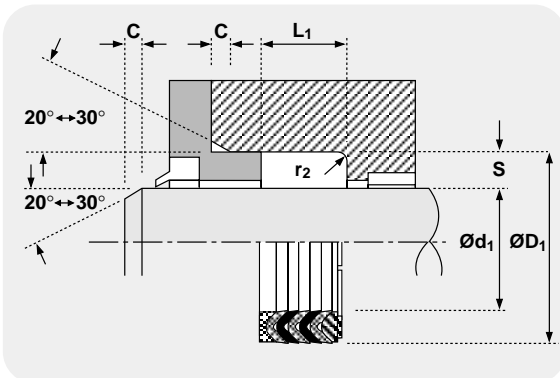
	μmRa	μmRt	$\mu\text{in CLA}$	$\mu\text{in RMS}$
DYNAMIC SEALING FACE $\varnothing d_1$	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC SEALING FACE $\varnothing D_1$	1.6 max	10 max	63 max	70 max
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max	140 max

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_2 mm	0.4	1.2	1.6	1.6

TOLERANCES

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



FEATURES

- PRECISION MOULDED VEE RINGS
- PRESSURE DISTRIBUTION ADAPTORS
- RELIABLE SEALING

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.

Vee pack sets

TECHNICAL DETAILS

METRIC

INCH



OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 400 bar

1.5 ft/sec
 -22°F + 212°F
 6,000 p.s.i.

MAXIMUM EXTRUSION GAP

PRESSURE bar
 MAXIMUM GAP mm
 PRESSURE p.s.i.

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

100	160	250	400
0.45	0.4	0.3	0.2
1500	2400	3750	6000

SURFACE ROUGHNESS

DYNAMIC SEALING FACE $\varnothing d_1$
 STATIC SEALING FACE $\varnothing D_1$
 STATIC HOUSING FACES L_1

μmRa	μmRt	$\mu\text{in CLA}$	$\mu\text{in RMS}$
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

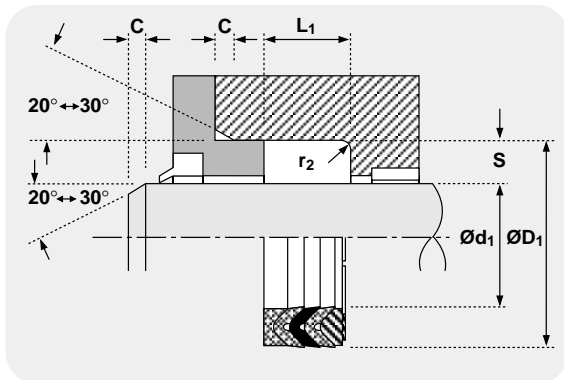
CHAMFERS & RADII

GROOVE SECTION $\leq S$ mm
 MIN CHAMFER C mm
 MAX FILLET RAD r_2 mm

7.5	10.0
4.0	5.0
0.8	1.2

TOLERANCES

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



FEATURES

- PRECISION MOULDED VEE RINGS
- PRESSURE DISTRIBUTION ADAPTORS
- RELIABLE SEALING

DESIGN

The Hallite 12 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 3 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 the sizes have two 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. A rubber vee ring is 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 pressures the lips of the adaptor act as a secondary seal.

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

Vee pack sets



TECHNICAL DETAILS

METRIC

INCH

OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 700 bar

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

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

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

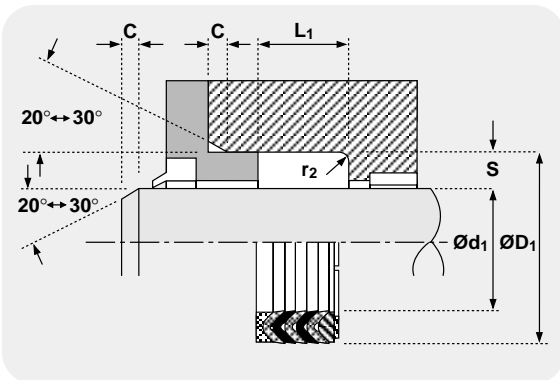
CHAMFERS & RADII

	6.0	7.5	10.0	12.5	15.0	20.0
GROOVE SECTION $\leq S$ 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_2 mm	0.4	0.4	1.2	1.6	1.6	1.6

TOLERANCES

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

13



FEATURES

- PRECISION MOULDED VEE RINGS
- PRESSURE DISTRIBUTION ADAPTORS
- RELIABLE SEALING

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.

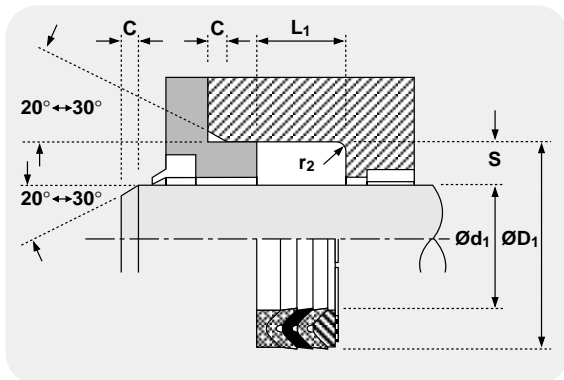
All sizes have vee rings manufactured from rubberised fabric because this has strength and durability and permits an oil film to lubricate the other parts of the seal. Some sizes are supplied with rubber vee rings between the rubberised fabric vee rings. The number and type of vee rings used are :

	Up to 89 mm \varnothing	90 mm \varnothing to 139mm \varnothing	Above 139mm \varnothing
Rubberised Fabric vee's	3	4	5
Rubber vee's	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.

Vee pack sets

TECHNICAL DETAILS		METRIC	INCH			
OPERATING CONDITIONS						
MAXIMUM SPEED	0.5 m/sec		1.5 ft/sec			
MAXIMUM TEMPERATURE	-30°C + 100°C		-22°F + 212°F			
MAXIMUM PRESSURE	700 bar		10,000 p.s.i.			
MAXIMUM EXTRUSION GAP						
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						
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	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						
$\varnothing d_1$	$\varnothing D_1$	L_1 mm				
f9	H11	+0.2 -0				



FEATURES

- PRECISION MOULDED VEE RINGS
- PRESSURE DISTRIBUTION ADAPTORS
- RELIABLE SEALING

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

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.

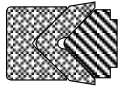
The male adaptor is usually manufactured from polyacetal but some of the larger sizes use rubberised fabric. It has grooves across one face to ensure equal pressure to the sealing edges of the vee ring.

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 139mm \varnothing	Above 140mm \varnothing
Rubberised fabric vee ring	2	3
Rubber vee ring	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.

Vee pack sets



TECHNICAL DETAILS

METRIC

INCH

OPERATING CONDITIONS

MAXIMUM SPEED 0.5 m/sec
 MAXIMUM TEMPERATURE -30°C + 100°C
 MAXIMUM PRESSURE 700 bar

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	0.35	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 the minimum clearance \emptyset and maximum bore \emptyset

SURFACE ROUGHNESS

	μmRa	μmRt	μinCLA	μinRMS
DYNAMIC SEALING FACE $\emptyset D_1$	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC SEALING FACE $\emptyset d_1$	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

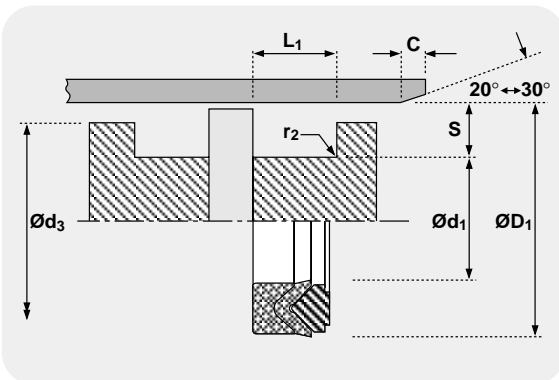
	7.5	10.0	12.5	15.0
GROOVE SECTION $\leq S$ mm	7.5	10.0	12.5	15.0
MIN CHAMFER C mm	4.0	5.0	6.5	7.5
MAX FILLET RAD r_2 mm	0.8	1.2	1.6	1.6

TOLERANCES

mm

$\emptyset D_1$	$\emptyset d_1$	$\emptyset d_3$	L_1
H9	h11	+0 -0.3	+0.25 -0

51



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.

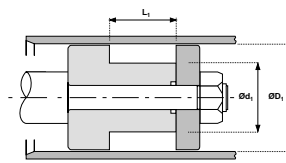
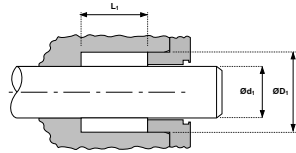
The seal is an assembly of three parts, a male adaptor, a V ring and a female adaptor. Both the V ring and the female adaptor are made from rubberised fabric which has durability and strength, it also retains lubricant at the sliding surfaces so friction and wear are kept to a minimum. The V ring being 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

Vee pack sets metric



07



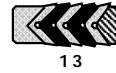
09



11



12



13



14

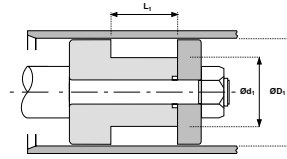
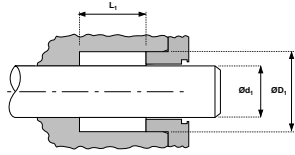


51

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
09	12.000	22.000	16.000	0188730*
09	14.000	24.000	16.000	0189030*
09	15.000	25.000	16.000	0189530
09	16.000	26.000	16.000	0190130*
09	18.000	28.000	16.000	0190530*
51	20.000	30.000	9.600	4208310
12	20.000	30.000	13.500	4201730
09	20.000	30.000	16.000	0190930*
11	20.000	30.000	18.500	4201750
14	20.000	32.000	16.500	4204930*
13	20.000	32.000	22.500	4204950
09	22.000	32.000	16.000	0191730
12	25.000	37.000	16.500	4198930
11	25.000	37.000	22.500	4198950
51	25.000	40.000	11.800	4208010
14	25.000	40.000	16.500	4205030*
09	25.000	40.000	22.500	0192630*
13	25.000	40.000	22.500	4205050
07	25.000	40.000	22.500	6630720
12	28.000	40.000	16.500	4202030
11	28.000	40.000	22.500	4202050
09	28.000	43.000	22.500	0193430*
12	30.000	42.000	16.500	4202130
11	30.000	42.000	22.500	4202150
14	30.000	45.000	16.500	4205130*
09	30.000	45.000	22.500	0193930*
07	30.000	45.000	22.500	0400820
13	30.000	45.000	22.500	4205150
12	32.000	44.000	16.500	4202230
11	32.000	44.000	22.500	4202250
09	32.000	47.000	22.500	0194330*
07	32.000	47.000	22.500	6630820*
12	35.000	47.000	16.500	4202330
11	35.000	47.000	22.500	4202350
51	35.000	50.000	11.80	04207610

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
14	35.000	50.000	16.500	4205230*
09	35.000	50.000	22.500	0195130*
07	35.000	50.000	22.500	0339520
13	35.000	50.000	22.500	4205250
12	36.000	48.000	16.500	4202430
11	36.000	48.000	22.500	4202450
07	36.000	51.000	19.000	1251120
09	36.000	51.000	22.500	0196030*
11	40.000	52.000	22.500	4202550
51	40.000	55.000	11.800	4207110
14	40.000	55.000	16.500	4205330*
09	40.000	55.000	22.500	0196530*
13	40.000	55.000	22.500	4205350
07	40.000	55.000	22.500	0968920
12	42.000	54.000	16.500	4202630*
11	42.000	54.000	22.500	4202650
09	42.000	57.000	22.500	0196830*
51	45.000	60.000	11.800	4207210
12	45.000	60.000	16.500	4202730
09	45.000	60.000	22.500	0197430*
07	45.000	60.000	22.500	0385020
11	45.000	60.000	22.500	4202750
14	45.000	65.000	20.500	4205430*
13	45.000	65.000	27.500	4205450
51	48.000	63.000	13.300	4207410
09	48.000	63.000	22.500	0197730
12	50.000	65.000	16.500	4199030
11	50.000	65.000	22.500	4199050
51	50.000	70.000	15.500	4208210
14	50.000	70.000	22.000	4205530*
09	50.000	70.000	30.000	1208430*
13	50.000	70.000	30.000	4205550
07	50.000	70.000	30.000	0889820
12	55.000	70.000	16.500	4202930

Vee pack sets metric



07



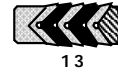
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14

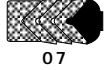
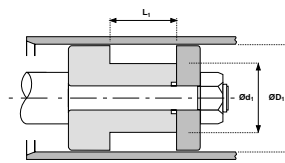
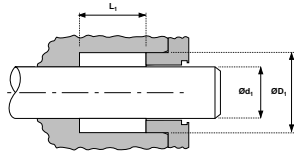


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Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
11	55.000	70.000	22.500	4202950
14	55.000	75.000	22.000	4205630*
09	55.000	75.000	30.000	1208230*
13	55.000	75.000	30.000	4205650
07	55.000	75.000	30.000	6631120*
12	56.000	71.000	16.500	4203030
11	56.000	71.000	22.500	4203050
07	56.000	76.000	30.000	0338220
09	56.000	76.000	32.000	1208630*
12	60.000	75.000	16.500	4203130
11	60.000	75.000	22.500	4203150
51	60.000	80.000	15.500	4208110
14	60.000	80.000	27.000	4205730*
07	60.000	80.000	30.000	0892520
09	60.000	80.000	32.000	1208930*
13	60.000	80.000	37.000	4205750
12	63.000	78.000	16.500	4203230
11	63.000	78.000	22.500	4203250
07	63.000	83.000	30.000	0467120
09	63.000	83.000	32.000	1209130*
12	65.000	80.000	16.500	4203330
11	65.000	80.000	22.500	4203350
07	65.000	85.000	30.000	0467720
09	65.000	85.000	30.000	1209230*
14	65.000	85.000	30.000	4205830*
13	65.000	85.000	40.000	4205850
12	70.000	85.000	16.500	4203430
11	70.000	85.000	22.500	4203450
51	70.000	90.000	21.500	4207710
09	70.000	90.000	30.000	1209330*
14	70.000	90.000	30.000	4205930*
07	70.000	90.000	30.000	0620420
13	70.000	90.000	40.000	4205950
12	75.000	90.000	16.500	4203530
11	75.000	90.000	22.500	4203550

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
07	75.000	95.000	30.000	0446620
09	75.000	95.000	30.000	1209530*
14	75.000	95.000	30.000	4206030
13	75.000	95.000	40.000	4206050
12	80.000	95.000	16.500	4203630
11	80.000	95.000	22.500	4203650
51	80.000	100.000	21.500	4207510
09	80.000	100.000	30.000	1209630*
14	80.000	100.000	30.000	4206130*
07	80.000	100.000	30.000	0892820
13	80.000	100.000	40.000	4206150
09	80.000	105.000	44.000	0984230*
12	85.000	100.000	16.500	4203730
11	85.000	100.000	22.500	4203750
09	85.000	105.000	30.000	1209830*
07	85.000	105.000	30.000	6631420*
12	90.000	105.000	16.500	4203830
11	90.000	105.000	22.500	4203850
51	90.000	110.000	21.500	4207910
09	90.000	110.000	30.000	1210630*
14	90.000	110.000	30.000	4206230*
07	90.000	110.000	30.000	0890120
13	90.000	110.000	40.000	4206250
12	100.000	115.000	22.000	4203930
11	100.000	115.000	30.000	4203950
09	100.000	120.000	30.000	1210730*
14	100.000	120.000	30.000	4199130*
07	100.000	120.000	30.000	0892620
13	100.000	120.000	40.000	4199150
51	100.000	125.000	26.100	4207810
09	104.000	130.000	36.000	4121230*
09	105.000	125.000	30.000	1203130*
12	110.000	125.000	22.000	4204030
11	110.000	125.000	30.000	4204050
07	110.000	130.000	30.000	0308420

Vee pack sets metric



07



09



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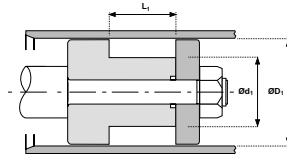
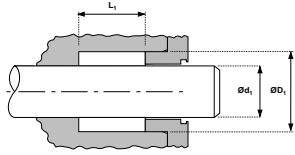


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Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
09	110.000	130.000	30.000	1195030*
14	110.000	130.000	30.000	4206330
13	110.000	130.000	40.000	4206350
51	115.000	140.000	26.100	4208410
09	115.000	140.000	34.000	1215030*
14	115.000	140.000	34.000	4206430*
13	115.000	140.000	46.000	4206450
09	120.000	140.000	30.000	4137830
51	120.000	150.000	29.300	4208510
07	125.000	140.000	22.500	1362820*
12	125.000	140.000	26.000	4204230
11	125.000	140.000	34.000	4204250
07	125.000	145.000	30.000	2179620
09	125.000	150.000	34.000	1215330*
14	125.000	150.000	34.000	4206530*
07	125.000	150.000	37.000	1365620
13	125.000	150.000	46.000	4206550
51	130.000	160.000	29.300	4208710
09	135.000	160.000	34.000	1197630*
12	140.000	155.000	26.000	4199230*
11	140.000	155.000	34.000	4199250
07	140.000	160.000	30.000	1272320*
09	140.000	160.000	33.000	0677130*
14	140.000	165.000	34.000	4206630*
09	140.000	165.000	35.000	1219930*
13	140.000	165.000	46.000	4206650
07	150.000	170.000	30.000	0044920*
12	150.000	170.000	30.000	2196630*
11	150.000	170.000	40.000	2196650
51	150.000	180.000	31.800	4208610
09	150.000	180.000	45.000	1220130*
14	150.000	180.000	45.000	4206730
13	150.000	180.000	60.000	4206750
12	160.000	180.000	30.000	2196730
11	160.000	180.000	40.000	2196750

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
09	160.000	190.000	45.000	1221230*
14	160.000	190.000	45.000	4206830
13	160.000	190.000	60.000	4206850
51	170.000	200.000	33.800	4209010
09	170.000	200.000	45.000	1224930*
12	180.000	200.000	30.000	2196830
11	180.000	200.000	40.000	2196850
09	180.000	210.000	45.000	1225230*
14	180.000	210.000	45.000	4206930
07	180.000	210.000	47.000	0090320
13	180.000	210.000	60.000	4206950
09	190.000	220.000	45.000	1225530*
51	195.000	225.000	33.800	6582110
14	195.000	225.000	47.500	6582130*
13	195.000	225.000	62.500	6582150
12	200.000	220.000	30.000	2196930
11	200.000	220.000	40.000	2196950
09	200.000	230.000	45.000	1225830*
07	200.000	230.000	45.000	1282720
14	200.000	230.000	45.000	4207030*
13	200.000	230.000	60.000	4207050
51	220.000	250.000	33.800	6582310
14	220.000	250.000	47.500	6582330*
13	220.000	250.000	62.500	6582350
07	230.000	260.000	45.000	1220620
51	245.000	275.000	33.800	6582410
14	245.000	275.000	47.500	6582430*
13	245.000	275.000	62.500	6582450
07	255.000	285.000	45.000	0137220
51	270.000	300.000	33.800	6582510
14	270.000	300.000	47.500	6582530*
13	270.000	300.000	62.500	6582550
07	280.000	310.000	45.000	1342820
51	290.000	320.000	33.800	6582610
14	290.000	320.000	49.000	6582630*

Vee pack sets metric



07



09



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12



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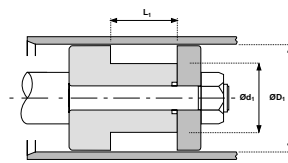
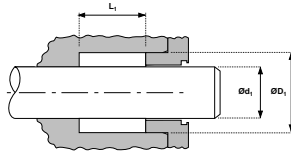


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Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
13	290.000	320.000	64.000	6582650
14	320.000	360.000	58.000	6582730*
13	320.000	360.000	78.000	6582750*
07	330.000	370.000	60.000	2018920*
07	380.000	420.000	60.000	2017920*
14	380.000	420.000	60.000	6584030*

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
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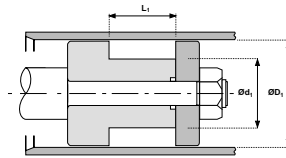
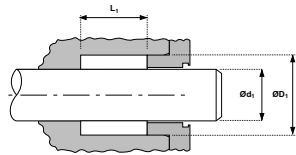
Vee pack sets
inch



Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
09	0.500	1.000	0.715	6530830
08	0.750	1.250	0.125	0634200
09	0.750	1.250	0.875	1735140
08	0.875	1.375	0.125	0723000
09	0.875	1.375	0.825	4135930
08	1.000	1.375	0.093	1136500
09	1.00	1.375	0.675	4138630
08	1.000	1.500	0.125	0820000
09	1.000	1.500	0.710	0183330
07	1.000	1.500	0.750	0820120
08	1.000	1.625	0.156	V100162
09	1.000	1.625	0.860	VP100162
08	1.125	1.625	0.125	0977300
07	1.125	1.625	0.750	0379320
09	1.125	1.625	0.755	4136030
08	1.125	1.750	0.156	0816900
09	1.125	1.750	1.065	4115330
08	1.250	1.750	0.125	0821300
08	1.250	1.750	0.125	2228600Δ
07	1.250	1.750	0.750	0821420
09	1.250	1.750	0.785	4102530
08	1.250	2.000	0.187	V125200
09	1.250	2.000	0.982	VP125200
08	1.375	1.875	0.125	V137187
09	1.375	1.875	0.750	VP137187
08	1.375	2.000	0.156	V137200
09	1.375	2.000	0.875	VP137200
08	1.500	2.000	0.125	0636500
09	1.500	2.000	0.710	4007630
07	1.500	2.000	0.750	0618620
08	1.500	2.125	0.156	0331600
09	1.500	2.125	1.000	4002130
08	1.500	2.250	0.187	V150225
09	1.500	2.250	1.000	VP150225
07	1.625	2.125	0.750	0206420

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
08	1.750	2.250	0.125	0821500
07	1.750	2.250	0.750	0889320
09	1.750	2.250	0.825	1461530
08	1.750	2.375	0.156	1435900
09	1.750	2.375	1.000	4135130
08	1.750	2.500	0.187	V175250
09	1.750	2.500	0.972	VP175250
08	1.875	2.500	0.156	0471200
09	1.875	2.500	0.950	4136230
08	2.000	2.500	0.125	0610800
08	2.000	2.500	0.125	0979500Δ
09	2.000	2.500	0.715	4007430
07	2.000	2.500	0.750	0617220
08	2.000	2.625	0.156	0299600
08	2.000	2.625	0.156	0532800Δ
09	2.000	2.625	0.898	6557940
08	2.000	2.750	0.187	0639300
08	2.000	2.750	0.187	0753300Δ
09	2.000	2.750	0.986	6575730
08	2.000	3.000	0.250	V200300
09	2.000	3.000	1.340	VP200300
08	2.125	2.750	0.156	0299400
09	2.125	2.750	0.875	VP212275
08	2.250	2.750	0.125	0610900
09	2.250	2.750	0.705	6555230
07	2.250	2.750	0.750	6630620
08	2.250	2.875	0.156	0889700
08	2.250	2.875	0.156	2244400Δ
09	2.250	2.875	0.937	6530730
08	2.250	3.000	0.187	0636400
09	2.250	3.000	0.960	4008030
08	2.375	3.000	0.156	0753000
07	2.375	3.000	0.937	0207220
09	2.375	3.000	0.990	4129530
09	2.400	3.000	0.875	VP240300+

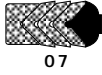
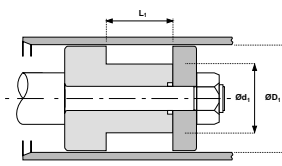
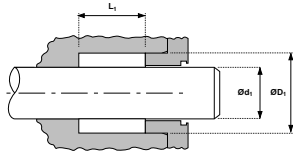
Vee pack sets inch



Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
08	2.500	3.000	0.125	0334400
09	2.500	3.000	0.777	0334330
08	2.500	3.125	0.156	0819100
08	2.500	3.125	0.156	0979600Δ
09	2.500	3.125	0.961	4122230
07	2.500	3.125	1.000	0819220
08	2.500	3.250	0.156	0535600Δ
08	2.500	3.250	0.187	0297500
09	2.500	3.250	1.222	4002530
08	2.750	3.250	0.125	0900700
09	2.750	3.250	0.795	4182430
08	2.750	3.375	0.156	V275337
09	2.750	3.375	0.875	VP275337
07	2.750	3.375	1.000	0819920
08	2.750	3.500	0.187	0638800
09	2.750	3.500	0.978	4008430
08	3.000	3.500	0.125	0539200
08	3.000	3.500	0.125	2230100Δ
09	3.000	3.500	0.725	4130730
08	3.000	3.625	0.156	0893100
09	3.000	3.625	0.918	4001530
07	3.000	3.625	1.000	0893020
09	3.000	3.625	1.437	362300JVP
08	3.000	3.750	0.187	0636800
09	3.000	3.750	1.125	0636930
08	3.000	4.000	0.250	V300400
09	3.000	4.000	1.250	VP300400
08	3.250	4.000	0.156	0620900Δ
08	3.250	4.000	0.187	0634300
09	3.250	4.000	0.960	4008330
07	3.250	4.000	1.125	0207320
08	3.375	4.000	0.156	0756000
09	3.375	4.000	0.833	4002730
08	3.375	4.125	0.187	0892000
09	3.375	4.125	1.236	4134030

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
09	3.400	4.000	0.875	VP340400+
08	3.500	4.000	0.125	1461200
09	3.500	4.000	0.825	1461130
08	3.500	4.250	0.187	0818300
08	3.500	4.250	0.187	0990300Δ
09	3.500	4.250	1.086	4115830
07	3.500	4.250	1.125	0818420
08	3.750	4.375	0.156	1364400
09	3.750	4.375	0.900	1365330
09	3.750	4.375	1.312	437375JVP
08	3.750	4.500	0.187	0755900
09	3.750	4.500	1.090	0755731
07	3.750	4.500	1.125	1014420
08	3.875	4.500	0.156	0602600
09	3.875	4.500	0.878	4001930
08	4.000	4.500	0.125	0525000
09	4.000	4.500	0.775	6565930
08	4.000	4.750	0.187	0986100
09	4.000	4.750	1.000	6573130
07	4.000	4.750	1.125	1356620
08	4.000	5.000	0.250	0563700
09	4.000	5.000	1.440	0563630
09	4.000	5.000	1.750	VP400500
08	4.250	4.750	0.125	V425475
09	4.250	4.750	0.750	VP425475
08	4.250	5.000	0.187	0641500
09	4.250	5.000	0.880	500425JVP
09	4.250	5.000	1.090	0299330
09	4.250	5.250	1.750	VP425525
08	4.375	5.000	0.156	V437500
09	4.375	5.000	0.860	VP437500
09	4.400	5.000	0.875	VP440500+
08	4.500	5.000	0.125	V450500
09	4.500	5.000	0.750	VP450500
08	4.500	5.250	0.187	0355700

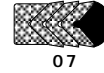
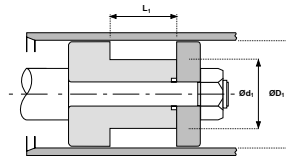
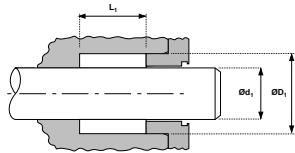
Vee pack sets inch



Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
09	4.500	5.250	0.562	525450JVP
09	4.500	5.250	0.718	525450JVP1
09	4.500	5.250	0.970	VP450525
07	4.500	5.250	1.125	0354120
08	4.500	5.500	0.250	0563100
09	4.500	5.500	1.750	VP450550
08	4.750	5.375	0.156	V475537
09	4.750	5.375	0.948	VP475537
09	4.750	5.375	1.250	537475JVP
08	4.750	5.500	0.187	0641700
09	4.750	5.500	1.375	550475JVP
09	4.750	5.750	1.750	VP475575
08	5.000	5.500	0.125	V500550
09	5.000	5.500	0.750	VP500550
08	5.000	5.750	0.187	V500575
09	5.000	5.750	0.972	VP500575
08	5.000	6.000	0.250	0307600
09	5.000	6.000	1.750	VP500600
09	5.000	6.000	1.765	0307530
08	5.250	6.000	0.187	0641800
09	5.250	6.000	1.055	0411130
09	5.375	6.375	1.750	VP537637
09	5.400	6.000	0.875	VP540600+
08	5.500	6.000	0.125	V550600
09	5.500	6.000	0.750	VP550600
08	5.500	6.500	0.250	0048500
09	5.500	6.500	1.172	0048430
09	5.500	6.500	1.750	VP550650
08	5.750	6.375	0.156	V575637
09	5.750	6.375	0.905	VP575637
09	5.750	6.375	0.948	637575A
09	5.750	6.375	1.250	637575JVP
09	5.750	6.750	1.750	VP575675
08	6.000	6.500	0.125	1207100
09	6.000	6.500	0.675	1207030

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
08	6.000	6.750	0.187	V600675
09	6.000	6.750	0.972	VP600675
08	6.000	7.000	0.250	V600700
09	6.000	7.000	1.480	VP600700
09	6.000	7.250	2.000	VP600725
09	6.250	7.500	2.000	VP625750
09	6.400	7.000	0.875	VP640700+
08	6.500	7.000	0.125	V650700
09	6.500	7.000	0.750	VP650700
09	6.500	7.750	2.000	VP650775
08	6.750	7.250	0.125	V675725
09	6.750	7.250	0.750	VP675725
08	6.750	7.375	0.156	V675737
09	6.750	7.375	0.948	VP675737
09	6.750	7.375	1.187	737675JVP
09	6.750	8.000	2.000	VP675800
08	7.000	7.500	0.125	V700750
09	7.000	7.500	0.750	VP700750
09	7.000	8.000	1.500	VP700800
09	7.000	8.250	2.000	VP700825
09	7.250	8.500	2.000	VP725850
08	7.500	8.000	0.125	V750800
09	7.500	8.000	0.750	VP750800
09	7.500	8.125	1.000	VP750812+
09	7.500	8.750	2.000	VP750875
09	7.750	9.000	2.000	VP775900
08	8.000	8.500	0.125	V800850
09	8.000	8.500	0.750	VP800850
09	8.000	9.000	1.500	VP800900
09	8.000	9.250	2.000	VP800925
09	8.250	9.500	2.000	VP825950
09	8.500	9.750	2.000	VP850975
09	8.750	10.000	2.000	VP8751000
09	9.000	10.000	2.000	VP9001000
09	9.000	10.250	1.410	VP9001025

Vee pack sets inch



Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
09	9.250	10.500	2.000	VP9251050
09	9.500	10.750	2.000	VP9501075
09	9.750	11.000	2.000	VP9751100
09	10.000	11.250	2.000	VP10001125
09	10.250	11.500	2.000	VP10251150
09	10.500	11.750	2.000	VP10501175
09	10.750	12.000	2.000	VP10751200
09	11.000	12.250	2.000	VP11001225
09	11.250	12.500	2.000	VP11251250
09	11.500	12.750	2.000	VP11501275
09	11.750	13.000	2.000	VP11751300
09	12.000	13.250	2.000	VP12001325
09	12.250	13.500	2.000	VP12251350
09	12.500	13.750	2.000	VP12501375
09	12.750	14.000	2.000	VP12751400
09	13.000	14.250	2.000	VP13001425
09	13.250	14.500	2.000	VP13251450
09	13.500	14.750	2.000	VP13501475
09	13.750	15.000	2.000	VP13751500
09	14.000	15.250	2.000	VP14001525
09	14.250	15.500	2.000	VP14251550
09	14.500	15.750	2.000	VP14501575
09	14.750	16.000	2.000	VP14751600
09	15.000	16.250	2.000	VP15001625
09	15.250	16.500	2.000	VP15251650
09	15.500	16.750	2.000	VP15501675
09	15.750	17.000	2.000	VP15751700
09	16.000	17.250	2.000	VP16001725
09	16.000	17.500	2.875	VP16001750
09	16.500	18.000	2.875	VP16501800
09	17.000	18.500	2.875	VP17001850
09	17.500	19.000	2.875	VP17501900
09	18.000	19.500	2.875	VP18001950
09	18.500	20.000	2.875	VP18502000
09	19.000	20.500	2.875	VP19002050

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
09	19.500	21.000	2.875	VP19502100
09	20.000	21.500	2.875	VP20002150

* Possible indent item - minimum quantity may apply.

‡ Housing sizes to meet ISO7425-2.)

† Designed to suite popular Asian housings.

Note: Hallite 51 vee packs are for double acting piston applications only - see Hallite 51 data sheet.

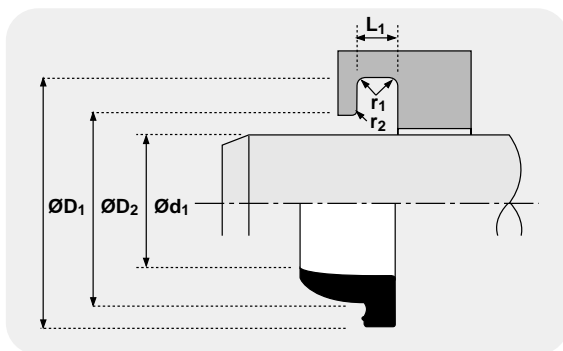
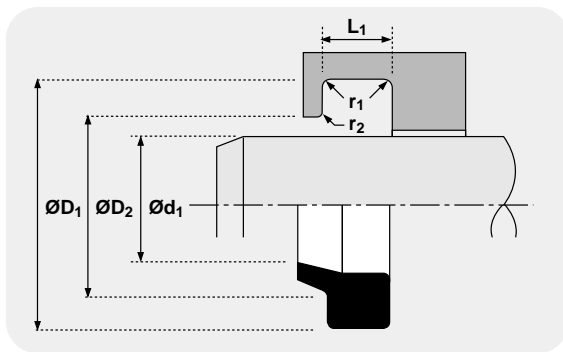
Δ indicates a nitrile only vee ring. This part has no fabric#

Denotes special set for Terex cylinders

+ Consists of 4 vees, male adaptor and rod wiper"

Wipers

TECHNICAL DETAILS		METRIC	INCH	
OPERATING CONDITIONS				
MAXIMUM SPEED		4.0 m/sec	12.0 ft/sec	
MAXIMUM TEMPERATURE		-30°C + 100°C	-22°F + 212°F	
SURFACE ROUGHNESS				
DYNAMIC SEALING FACE $\varnothing d_1$		μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1 \varnothing D_2$		2.5 max	16 max	μinRMS 5 \leftrightarrow 18
STATIC HOUSING FACES L_1		2.5 max	16 max	100 max 111 max
RADI				
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



METRIC

INCH

Hallite 33: the metric and inch profiles differ as illustrated above.

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, and is also available in Hythane 181 - see Hallite 840.

FEATURES

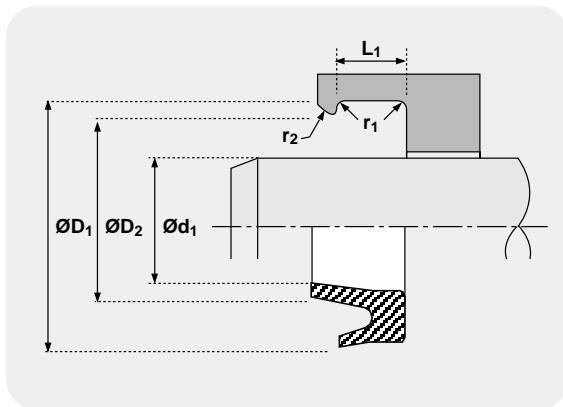
- GENERAL PURPOSE SEAL
- PRECISION TRIMMED SEALING LIP
- WIDE SIZE RANGES
- EFFECTIVE SEAL ON HOUSING AS WELL AS ROD

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.

Wipers

35

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 90°C	-22°F + 194°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
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
RADI			
MAX FILLET RAD r_1 in	0.015		
MAX FILLET RAD r_2 in	0.062		
TOLERANCES			
$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1
f9	+0.005 +0	+0.005 +0	+0.010 +0



DESIGN

The Hallite 35 nylon rod scraper is designed to provide reliable dirt exclusion for heavy duty applications. The tough wiping lip will scrape away baked on mud and residue from grain crop harvesting, yet remains flexible enough to stay in contact with the rod even under severe side loads.

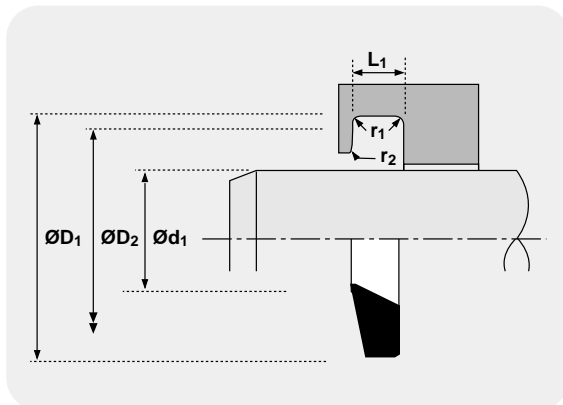
The sealing lip on the outside diameter prevents the ingress of contamination and helps retain the scraper in its snap-fit housing.

FEATURES

- ROBUST DESIGN
- SIMPLE SNAP-IN INSTALLATION
- RESISTANCE TO ABRASION

Wipers

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16 μinRMS 5 ↔ 8
STATIC SEALING FACE $\varnothing D_1 \varnothing D_2$	1.6 max	10 max	63 max 70 max
STATIC HOUSING FACES L_1	2.5 max	16 max	100 max 111 max
RADII			
MAX FILLET RAD r_1 in	0.020		
MAX FILLET RAD r_2 in	0.030		
TOLERANCES			
	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$ L_1
in	f9	+0.010 -0	+0.010 -0 ±0.010



DESIGN


The Hallite 36 light duty nitrile rod wiper is designed for the effective removal of dust, moisture and very lightly adhered contaminants.

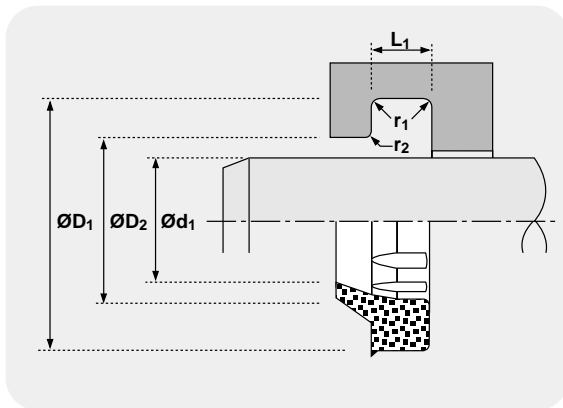
The material is renowned for its flexibility and good resistance to abrasion, and its extremely compact size range requires only a simple groove for easy installation.

FEATURES

- COMPACT
- EASY INSTALLATION
- EXTREMELY FLEXIBLE

Wipers

		METRIC		INCH		
	TECHNICAL DETAILS					
	OPERATING CONDITIONS	MAXIMUM SPEED		12.0 ft/sec		
		MAXIMUM TEMPERATURE		-40°F + 250°F		
	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	100 max	70 max		
STATIC HOUSING FACES L_1	3.2 max	16 max	125 max	140 max		
RADI	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
TOLERANCES	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1		
mm	f9	H11	H11	+0.5 -0		



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.

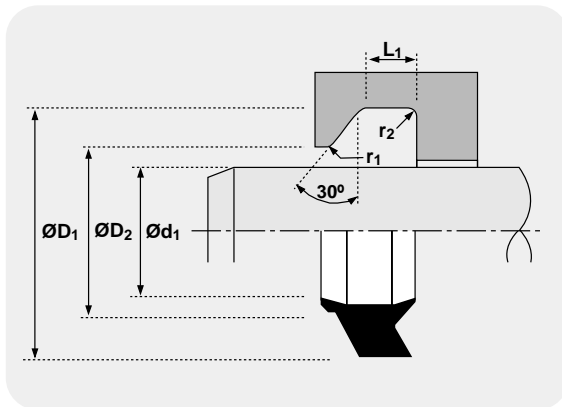
FEATURES

- OUTSIDE LIP FOR EFFECTIVE HOUSING SEAL
- PRESSURE RELIEF RIBS
- EFFECTIVE SCRAPING LIP
- PRECISION TRIMMED WIPING LIP

NB: Part numbers suffixed by "‡" indicate housing sizes to meet ISO 6195A.

Wipers

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED		1.0 m/sec	3.0 ft/sec
MAXIMUM TEMPERATURE		-30°C + 100°C	-22°F + 212°F
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$		μmRa 0.1 ↔ 0.4	μinCLA 4 ↔ 16
STATIC SEALING FACE $\varnothing D_1 \varnothing D_2$		μmRt 4 max	μinRMS 5 ↔ 18
STATIC HOUSING FACES L_1		1.6 max	63 max
		2.5 max	100 max
RADII			
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
	in	f9	+0.005 -0



DESIGN

The Hallite 41 light to medium duty nitrile rod wiper prevents contaminants like dust, moisture and dirt from entering the gland. Its twin lip design helps retain small amounts of fluid that may by-pass the rod seal, ensuring a dry sealing system.

FEATURES

- FLEXIBLE FOR EASY INSTALLATION
- INTERCHANGEABLE WITH COMMON W, K AND NK RANGES
- ALSO AVAILABLE IN HYTHANE 181 - SEE HALLITE 841

Wipers

420



TECHNICAL DETAILS

OPERATING CONDITIONS

MAXIMUM SPEED
MAXIMUM TEMPERATURE

SURFACE ROUGHNESS

DYNAMIC SEALING FACE $\varnothing d_1$
STATIC SEALING FACE $\varnothing D_1$, $\varnothing D_2$
STATIC HOUSING FACES L_1

RADI

MAX FILLET RAD r_1 in
MAX FILLET RAD r_2 in

TOLERANCES

in

METRIC

INCH

1.0 m/sec
-40°C + 110°C

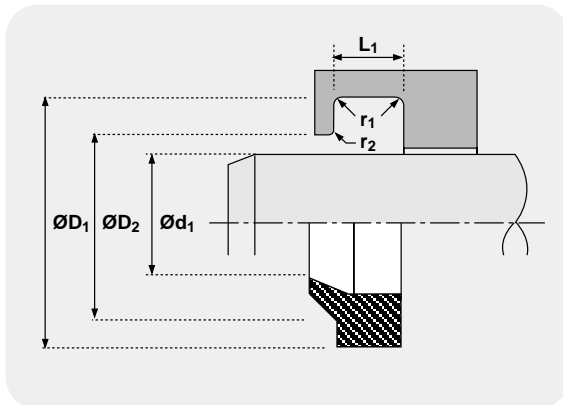
3.0 ft/sec
-40°F + 230°F

μmRa	μmRt
0.1 ↔ 0.4	4 max
1.6 max	10 max
3.2 max	16 max

μinCLA	μinRMS
4 ↔ 16	5 ↔ 18
63 max	70 max
125 max	140 max

0.010
0.020

$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1
f9	±0.003	±0.005	+0.004 -0



DESIGN

Designed for medium to heavy duty applications, the Hallite 420 snap-in urethane rod wipers offer excellent resistance to abrasion, toughness, high tensile strength and impact resistance to withstand shock, yet they retain the flexibility to remain effective throughout their entire life even where some side movement of the rod is evident.

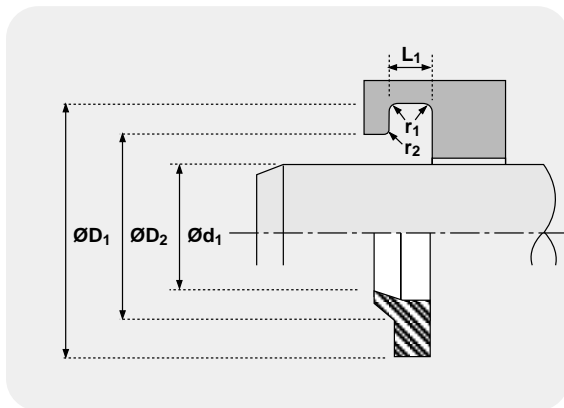
With the ability to wipe ice, dried mud and other heavily deposited contaminants from the rod, and to be interchangeable with common wipers in the spare parts market ensures the versatility of this wiper.

Wipers

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-40°C + 110°C	-40°F + 230°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16 μinRMS 5 \leftrightarrow 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
RADI			
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
in	f9	+0.004 -0	+0.005 -0 +0.003 -0



421



DESIGN

Designed for medium duty applications, the Hallite 421 snap-in urethane rod wipers offer excellent resistance to abrasion, toughness, high tensile strength and are impact resistant to withstand shock, yet they retain the flexibility to remain effective throughout their entire life, even where some side movement of the rod is evident.

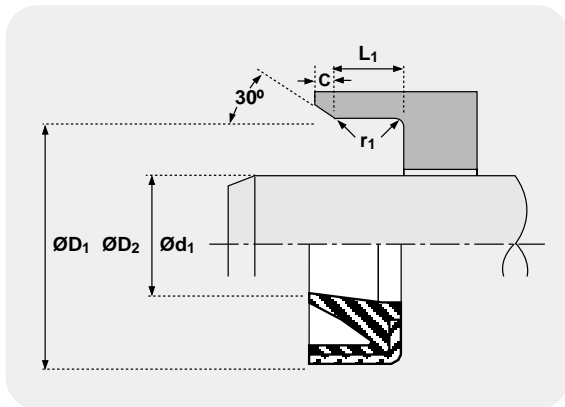
Capable of removing mud and other contaminants from the rod, and to interchange with AN6231 & MS28776 corresponding wipers, the Hallite 421 is extremely compact, versatile and cost effective.

Wipers

424



TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 90°C	-22°F + 194°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16 μinRMS 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			
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	+0.02 -0	



DESIGN

The Hallite 424 press fit wiper is designed for medium to heavy duty applications.

The moulded polyurethane lip is capable of removing ice, mud and dirt, yet sensitive enough to exclude dust and moisture.

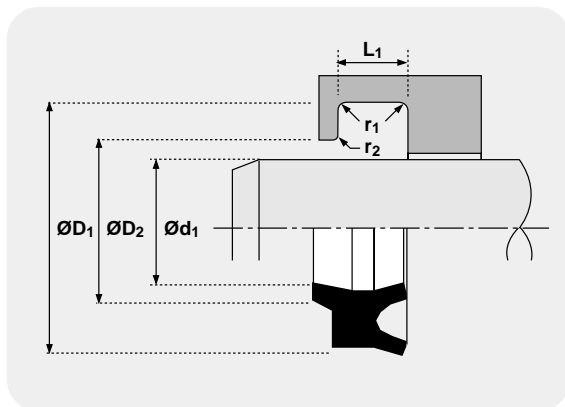
FEATURES

- SUITABLE FOR HEAVY DUTY SERVICE
- LONG LIFE
- EXCELLENT RESISTANCE TO ABRASION
- SIMPLE HOUSING MACHINING

Wipers

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16 μinRMS 5 \leftrightarrow 18
STATIC SEALING FACE $\varnothing D_1$ $\varnothing D_2$	2.5 max	16 max	100 max 111 max
STATIC HOUSING FACES L_1	2.5 max	16 max	100 max 111 max
RADII			
MAX FILLET RAD r_1 in	0.010		
MAX FILLET RAD r_2 in	0.020		
TOLERANCES			
$\varnothing d_1 \leq 0.937$ in	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$ L_1
$\varnothing d_1 < 3.000$ in	+0 -0.001	+0.002 -0	+0.002 -0 +0.005 -0
$\varnothing d_1 \geq 3.000$ in	+0 -0.001	+0.003 -0	+0.003 -0 +0.005 -0
	+0 -0.002	+0.003 -0	+0.003 -0 +0.005 -0

425



DESIGN

The Hallite 425 H style wiper offers superior wiping and low pressure sealing in one component. When used in conjunction with single lip rod seals, the combination provides effective cylinder sealing.

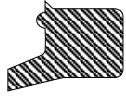
The Hallite 425 is manufactured in nitrile rubber and is also available in fluoroelastomer material.

FEATURES

- VARIETY OF MATERIALS AVAILABLE
- TWIN LIP DESIGN ENSURES DRIER SEALING SYSTEM
- FLEXIBILITY

Wipers

520



TECHNICAL DETAILS

METRIC

INCH

OPERATING CONDITIONS

MAXIMUM SPEED
MAXIMUM TEMPERATURE

4.0 m/sec
-40°C + 110°C

12.0 ft/sec
-40°F + 230°F

SURFACE ROUGHNESS

DYNAMIC SEALING FACE $\varnothing d_1$
STATIC SEALING FACE $\varnothing D_1$ $\varnothing D_2$
STATIC HOUSING FACES L_1

μmRa μmRt
0.1 ↔ 0.4 4 max
1.6 max 10 max
3.2 max 16 max

μinCLA μinRMS
4 ↔ 16 5 ↔ 18
63 max 70 max
125 max 140 max

RADI

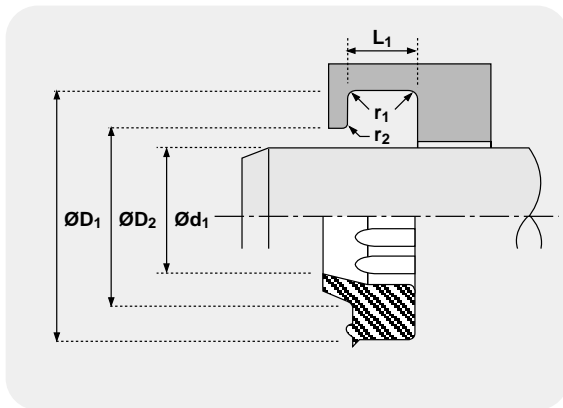
MAX FILLET RAD r_1 in
MAX FILLET RAD r_2 in

0.016
0.016

TOLERANCES

in

$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1
f9	±0.003	±0.005	+0.004 -0



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 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.

FEATURES

- PRECISION TRIMMED SEALING LIP
- 'CRUSH LIP' AND 'FACE BEAD'
PROVIDE EFFECTIVE SEAL ON HOUSING
- LOW WEAR LONG LIFE
- COST EFFECTIVE
- PRESSURE RELIEF RIBS
- POLYESTER MATERIAL FOR
HEAVY DUTY APPLICATIONS

MATERIAL OPTION

The part numbers shown are for polyurethane. If you require this product in polyester, please add a 'P' after the part number when ordering.

For example:

8880910 = polyurethane

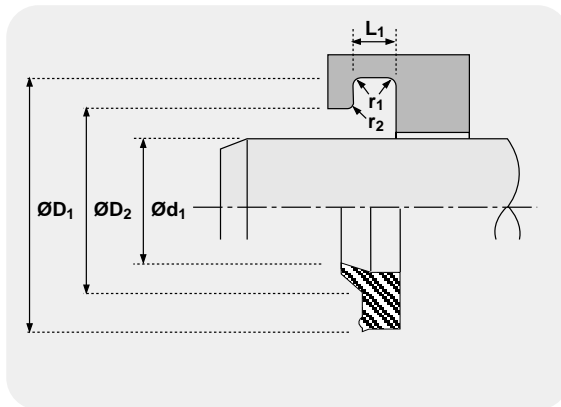
8880911 = polyester.

Wipers

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	4.0 m/sec	12.0 ft/sec	
MAXIMUM TEMPERATURE	-40°C + 110°C	-50°F + 230°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16 μinRMS 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
RADII			
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
in	f9	+0.004 -0	+0.005 -0 +0.003 -0



521



DESIGN

The Hallite 521 snap-in rod wiper has been designed for light to medium duty applications. The proportions of the wiping lip ensure that contact is maintained with the surface of the rod to remove contaminants. The moulded ribs on the internal diameter provides extra stability to the seal and help prevent pressure trapping. The outside diameter contacts the housing diameter and has a sealing lip to prevent moisture entering the groove.

The Hallite 521 is available in polyurethane or a polyester based compound.

FEATURES

- PRECISION TRIMMED SEALING LIP
- 'CRUSH LIP' AND 'FACE BEAD' PROVIDE EFFECTIVE SEAL ON HOUSING
- LOW WEAR LONG LIFE
- PRESSURE RELIEF RIBS
- POLYESTER MATERIAL OPTION

MATERIAL OPTION

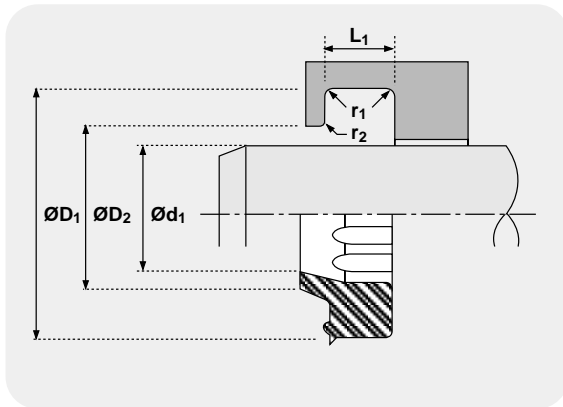
The part numbers shown are for polyurethane. If you require this product in polyester, please contact your local Hallite sales office.

Wipers



831

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	4.0 m/sec	12.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16 μinRMS 5 \leftrightarrow 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
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
mm	f9	H11	H11 +0.2 -0



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

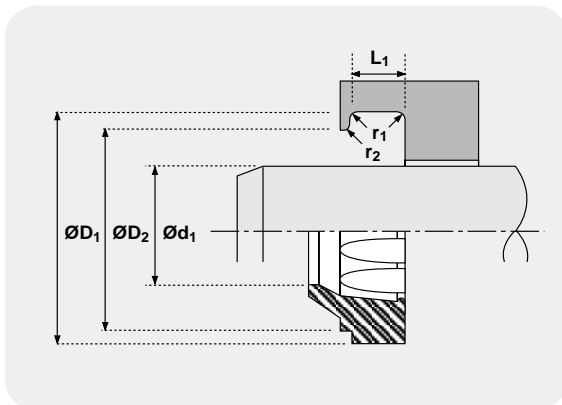
- PRECISION TRIMMED SEALING LIP
- 'CRUSH LIP' AND 'FACE BEAD' PROVIDE EFFECTIVE SEAL ON HOUSING
- LOW WEAR LONG LIFE
- COST EFFECTIVE
- PRESSURE RELIEF RIBS

Wipers

TECHNICAL DETAILS		METRIC		INCH	
OPERATING CONDITIONS					
MAXIMUM SPEED	4.0 m/sec			12.0 ft/sec	
MAXIMUM TEMPERATURE	-45°C + 110°C			-50°F + 230°F	
SURFACE ROUGHNESS					
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max		μinCLA 4 \leftrightarrow 16	μinRMS 5 \leftrightarrow 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
RADII					
MAX FILLET RAD r_1 mm	0.4				
MAX FILLET RAD r_2 mm	0.2				
TOLERANCES					
	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1	
mm	f9	H11	H11	+0.2 -0	



4
3
8



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.

FEATURES

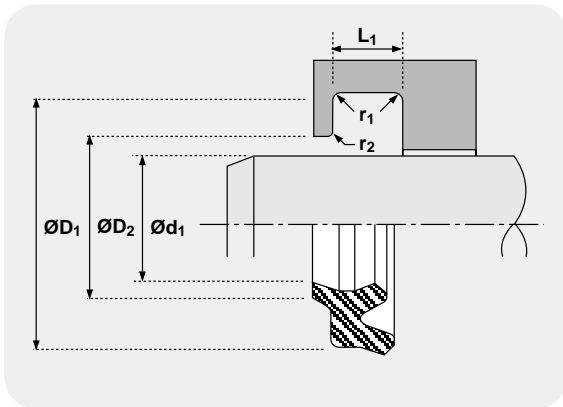
- SNUG FIT PROVIDES EFFECTIVE SEALING
- LOW WEAR - LONG LIFE
- EASY INSTALLATION
- PRESSURE RELIEF RIBS
- PRECISION TRIMMED WIPING LIP

Wipers

839



TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	4.0 m/sec	12.0 ft/sec	
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1$ $\varnothing D_2$	1.6 max	10 max	5 \leftrightarrow 18
STATIC HOUSING FACES L_1	3.2 max	16 max	63 max 70 max 125 max 140 max
RADI			
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
mm	f9	H11	H11 +0.2 -0



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 standard range is designed to satisfy the requirements of ISO 6195 type C housing.

FEATURES

- TWIN LIP ENSURES DRIER SEALING SYSTEM.
- HARD WEARING MATERIAL FOR LONG LIFE
- ISO HOUSING RANGE

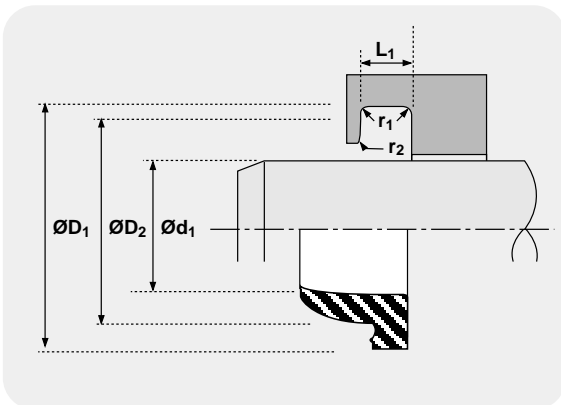
NB: Part numbers suffixed by "‡" indicate housing sizes to meet ISO 6195C.

Wipers

TECHNICAL DETAILS		METRIC	INCH	
OPERATING CONDITIONS				
MAXIMUM SPEED		4.0 m/sec	12.0 ft/sec	
MAXIMUM TEMPERATURE		-45°C + 110°C	-50°F + 230°F	
SURFACE ROUGHNESS				
DYNAMIC SEALING FACE $\varnothing d_1$		μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1$ $\varnothing D_2$		1.6 max	16 max	5 \leftrightarrow 18
STATIC HOUSING FACES L_1		3.2 max	16 max	63 max 70 max
CHAMFERS & RADII				
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		
	in	f9	+0.020 +0.010	± 0.005 +0.020 +0.010



840



DESIGN

The Hallite 840 medium to heavy duty rod wiper is designed to remove heavy deposits of mud, ice and similar contaminants from the rod.

The proportions of the knife trimmed wiping lip ensure it remains in contact with the rod at all times, even where severe side loads exist. The main body features a rib to prevent moisture and other contaminants from passing over the outside diameter.

This product is manufactured from Hallite's high performance polyurethane - Hythane 181- to provide a flexible responsive wiper with excellent resistance to abrasion.

FEATURES

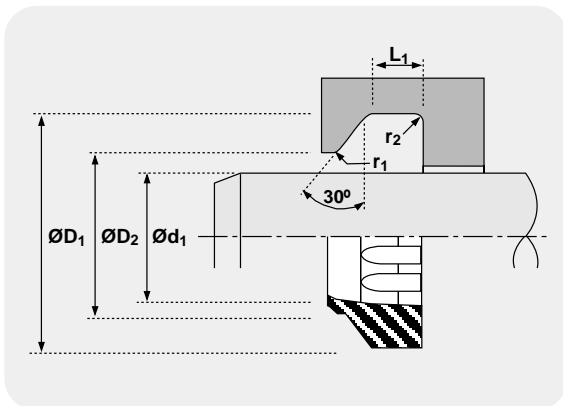
- PRECISION TRIMMED WIPING LIP
- BUILT-IN RIB TO EFFECTIVELY SEAL THE HOUSING.
- EXTREMELY FLEXIBLE
- EASY INSTALLATION.

Also see Hallite 33 inch rod wipers.

Wipers

841

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	4.0 m/sec	12.0 ft/sec	
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1$	1.6 max	16 max	5 \leftrightarrow 18
STATIC HOUSING FACES L_1	3.2 max	16 max	63 max 70 max
RADI			
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
f9	+0.005 -0	+0.010 -0	+0.005 +0.



DESIGN

The Hallite 841 is a medium duty wiper and incorporates a knife trimmed wiping lip to prevent contaminants like dust, dirt and moisture from entering the gland.

Manufactured in Hallite's high performance polyurethane - Hythane 181- this wiper provides superior performance to traditional products like Hallite 41, W, K, NK and RWK wipers.

The main body features internal ribs designed to keep the wiper stable, ensuring lip contact with the rod at all times, and to allow fluid by-pass if the rod seal weeps.

FEATURES

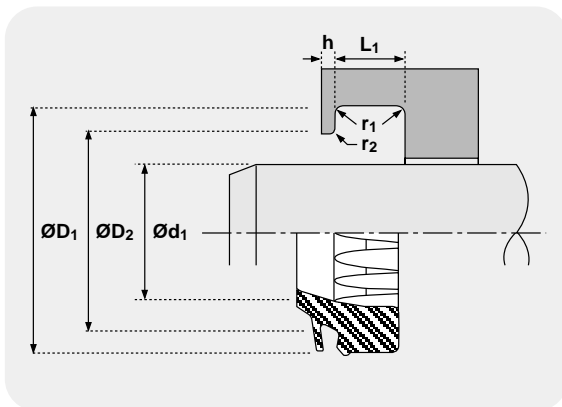
- PRECISION TRIMMED WIPING LIP
- EXTREMELY FLEXIBLE
- EASY INSTALLATION
- EXCELLENT RESISTANCE TO ABRASION
- INTERCHANGEABLE WITH OTHER COMMON STYLES

Wipers

TECHNICAL DETAILS		METRIC		INCH		
OPERATING CONDITIONS						
MAXIMUM SPEED		4.0 m/sec		12.0 ft/sec		
MAXIMUM TEMPERATURE		-45°C + 110°C		-50°F + 230°F		
SURFACE ROUGHNESS						
DYNAMIC SEALING FACE $\varnothing d_1$		μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16	μinRMS 5 \leftrightarrow 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	
RADI						
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



842



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.

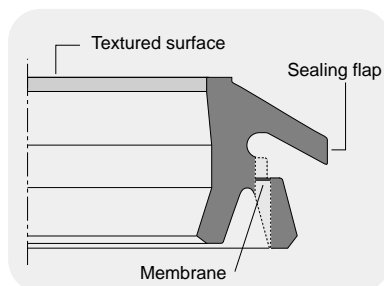
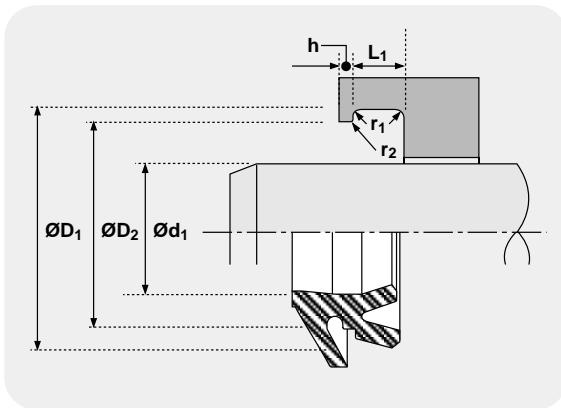
The special feature is the flap on the wiping lip which covers the gland housing, preventing the water/slurry trap so common with conventional wipers and thus ingress of contamination around the outside of the wiper. The internal ribs on the inside diameter prevent the possibility of pressure trapping 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.

Wipers

846

TECHNICAL DETAILS		METRIC	INCH		
OPERATING CONDITIONS					
MAXIMUM SPEED	4.0 m/sec	12.0 ft/sec			
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F			
SURFACE ROUGHNESS					
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16		
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		
RADII					
ROD DIAMETER $\varnothing d_1$ mm	≤ 90	> 90			
MAX FILLET RAD r_1 mm	0.4	0.4			
MAX FILLET RAD r_2 mm	0.2	0.4			
TOLERANCES					
	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1	h
mm	f9	H11	H11	+0.2 -0	+0.1 -0



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.

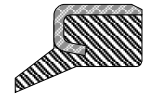
Precision moulded in Hallite's high performance polyurethane, Hythane 181, for maximum wear resistance and temperature range, the wiper is designed to remove lightly adhered dirt, dust and moisture from the rod.

FEATURES

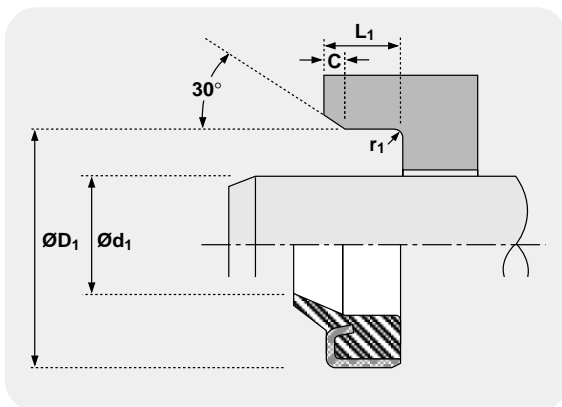
- TWIN LIP - NO LEAKAGE
- TRAPPED PRESSURE AUTOMATICALLY RELEASED THROUGH BURSTING MEMBRANES
- NO PUSH OUT OF THE WIPER THROUGH BUILD UP OF PRESSURE
- NO GLAND VENT HOLE NECESSARY
- SEALING FLAP PROTECTS AGAINST INGRESS OF DIRT AND MOISTURE AROUND THE OUTSIDE DIAMETER

Wipers

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-40°C +100°C	-40°F +212°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1$	1.6 max	10 max	μinRMS 5 \leftrightarrow 18
STATIC HOUSING FACES L_1	3.2 max	16 max	63 max 70 max 125 max 140 max
CHAMFERS & RADII			
ROD DIAMETER $\varnothing d_1$ mm	≤ 19	> 19	
MIN CHAMFER C mm	0.5	1.0	
MAX FILLET RAD r_1 mm	0.4	0.4	
ROD DIAMETER $\varnothing d_1$ in	< 0.75	≥ 0.75	
MIN CHAMFER C in	0.020	0.040	
MAX FILLET RAD r_1 in	0.016	0.016	
TOLERANCES			
$\varnothing d_1$	$\varnothing D_1$	L_1 mm	L_1 in
f9	H8	+0.5 -0	+0.020 -0



860



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.

FEATURES

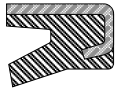
- EASE OF ASSEMBLY
- LONG LIFE
- PRECISION TRIMMED WIPING LIP
- METAL CASE TREATED WITH A RUST INHIBITOR
- WIDE RANGE OF APPLICATION USES
- RANGE INCLUDES ISO & STANDARD ASIAN HOUSINGS.

NB: Part numbers suffixed by "+" are designed for Asian housings.

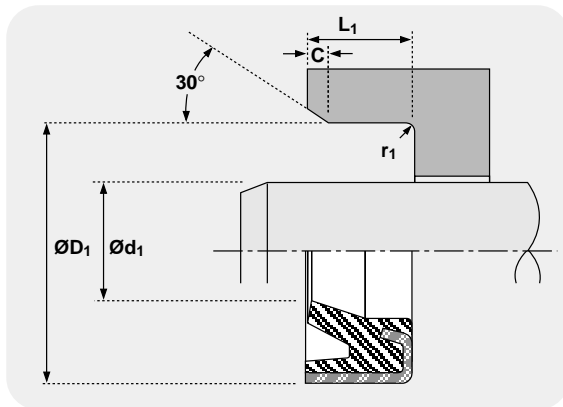
Part numbers suffixed by "‡" indicate housing sizes to meet ISO 6195 type B.

Wipers

862



TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-40°C +100°C	-40°F +212°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1$	1.6 max	10 max	5 \leftrightarrow 18
STATIC HOUSING FACES L_1	3.2 max	16 max	63 max 70 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	



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

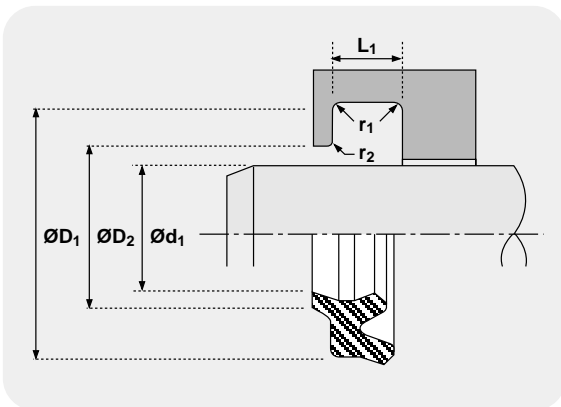
- EASE OF ASSEMBLY
- LONG LIFE
- PRECISION TRIMMED WIPING LIP
- METAL CASE TREATED WITH A RUST INHIBITOR
- WIDE RANGE OF APPLICATION USES

Wipers

TECHNICAL DETAILS		METRIC	INCH	
OPERATING CONDITIONS				
MAXIMUM SPEED	4.0 m/sec		12.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C		-22°F + 212°F	
SURFACE ROUGHNESS				
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa	μmRt	μinCLA	μinRMS
STATIC SEALING FACE $\varnothing D_1$ $\varnothing D_2$	0.1 ↔ 0.4	4 max	4 ↔ 16	5 ↔ 18
STATIC HOUSING FACES L_1	1.6 max	10 max	63 max	70 max
	3.2 max	16 max	125 max	140 max
RADII				
MAX FILLET RAD r_1 mm	0.3			
TOLERANCES				
	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1
mm	f8	H10	±0.10	+0.3 -0



904



DESIGN

The Hallite 904 double lip rod wiper is designed to scrape dirt and moisture from the rod and to collect any traces of fluid passing the rod seal.

The polyurethane material provides a very good scraping action and has excellent resistance to abrasion. This product fits popular Asian housings and is suitable for light to medium duty use typically found in the materials handling industry.

FEATURES

- PRECISION TRIMMED WIPING LIP
- EXTREMELY FLEXIBLE
- EASY INSTALLATION
- EXCELLENT RESISTANCE TO ABRASION
- INTERCHANGEABLE WITH POPULAR STYLES

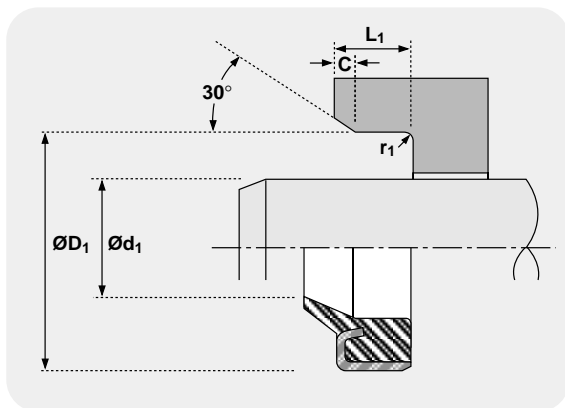
Also see Hallite 839.

Wipers



905

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C +100°C	-22°F +212°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1$	1.6 max	10 max	μinRMS 5 \leftrightarrow 18
STATIC HOUSING FACES L_1	3.2 max	16 max	63 max 70 max 125 max 140 max
CHAMFERS & RADII			
MIN CHAMFER C mm	1.0		
MAX FILLET RAD r_1 mm	0.3		
TOLERANCES			
	$\varnothing d_1$	$\varnothing D_1$	L_1
mm	f8	H10	+0.5 -0



DESIGN

The Hallite 905 is a metal cased wiper, designed to press-fit into a simple counter-bore.

Suitable for medium and heavy duty applications, typically found in Asian earthmoving equipment, the polyurethane wiping lip has a very good resistance to abrasion and provides excellent scraping of ice, baked on mud and other heavy contaminants.

FEATURES

- SIMPLE HOUSING MACHINING
- ROBUST DESIGN
- RANGE SUITS STANDARD ASIAN HOUSINGS

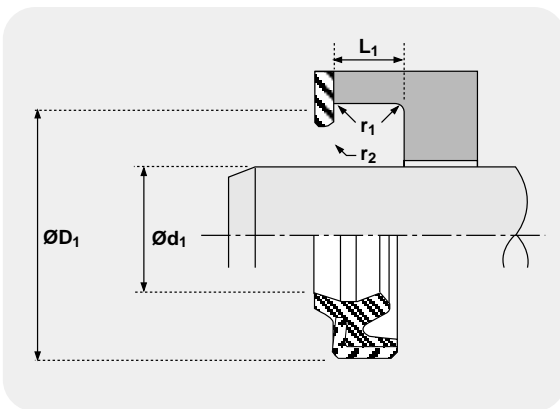
Also see Hallite 860.

Wipers

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	4.0 m/sec	12.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 100°C	-22°F + 212°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1$	1.6 max	10 max	μinRMS 5 \leftrightarrow 18
STATIC HOUSING FACES L_1	3.2 max	16 max	63 max 70 max 125 max 140 max
RADII			
MAX FILLET RAD r_1 mm	0.3		
TOLERANCES			
	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$
	f8	H10	± 0.10



913



DESIGN

The Hallite 913 metal cased double lip wiper is designed to press fit into a simple counter-bore.

Suitable for medium duty applications, the polyurethane wiping lip prevents the ingress of contaminants and has very good resistance to abrasion. The internal second lip ensures a dry sealing system by collecting traces of fluid that may by-pass the rod seal.

FEATURES

- TOUGH POLYURETHANE MATERIAL
- EASY INSTALLATION
- EXCELLENT RESISTANCE TO ABRASION
- DOUBLE LIP DESIGNED FOR DRY SEALING SYSTEM

NOTE

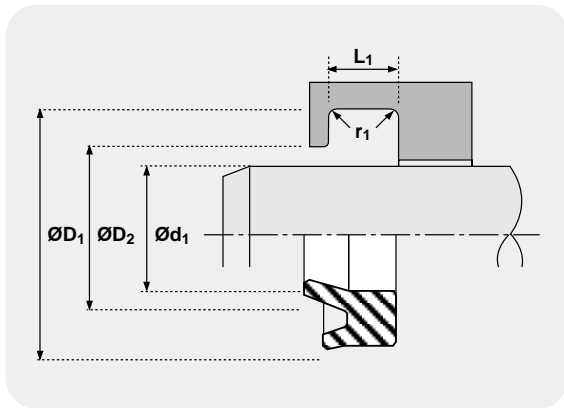
Many sizes are interchangeable with Hallite 860 and 905.

Wipers

915



TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C + 90°C	-22°F + 194°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1$ $\varnothing D_2$	1.6 max	10 max	μinRMS 5 \leftrightarrow 18
STATIC HOUSING FACES L_1	3.2 max	16 max	63 max 70 max
RADII			
MAX FILLET RAD r_1 mm	0.3		
TOLERANCES			
	$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$
mm	f8	H10	± 0.1
			L_1
			+0.3 -0



DESIGN

The Hallite 915 medium to heavy duty polyurethane rod wiper prevents ice, baked on mud and other contaminants from entering the gland.

The proportions of the wiping lip ensure it remains in constant contact with the rod, even with considerable side load.

The tough material has very good resistance to abrasion yet remains flexible enough for easy installation.

FEATURES

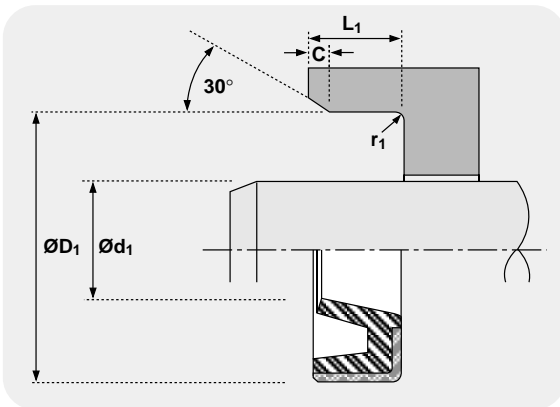
- PRECISION TRIMMED WIPING LIP
- TOUGH POLYURETHANE MATERIAL
- EASY INSTALLATION
- EXCELLENT RESISTANCE TO ABRASION.

Wipers

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED		1.0 m/sec	3.0 ft/sec
MAXIMUM TEMPERATURE		-30°C +100°C	-22°F +212°F
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$		μmRa 0.1 \leftrightarrow 0.4	μinCLA 4 \leftrightarrow 16
STATIC SEALING FACE $\varnothing D_1$		μmRt 4 max	μinRMS 5 \leftrightarrow 18
STATIC HOUSING FACES L_1		1.6 max	63 max
		3.2 max	125 max
CHAMFERS & RADII			
MIN CHAMFER C mm		1.0	
MAX FILLET RAD r_1 mm		0.3	
TOLERANCES			
	$\varnothing d_1$	$\varnothing D_1$	
mm	f8	H10	



919



DESIGN

The Hallite 919 metal cased rod wiper is designed to press fit into a simple counter-bore.

Suitable for medium to heavy duty applications, the polyurethane wiping lip prevents ingress of contaminants and has very good abrasion resistance.

The wiper is also suitable for the retention of grease when fitted to pivot pins.

Also see hallite 921

FEATURES

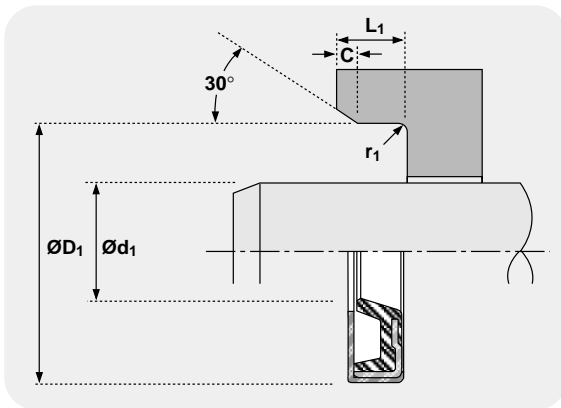
- TOUGH POLYURETHANE MATERIAL
- EASY INSTALLATION
- COMPACT HOUSINGS
- VERY GOOD RESISTANCE TO ABRASION
- EXCELLENT DURABILITY IN SERVICE

Wipers



921

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-30°C +100°C	-22°F +212°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16 μinRMS 5 \leftrightarrow 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			
MIN CHAMFER C mm	1.0		
MAX. RADIUS r_1 mm	0.3		
TOLERANCES			
	$\varnothing d_1$	$\varnothing D_1$	
	mm h9	mm H8	



DESIGN

The Hallite 921 metal cased wiper is designed to press fit into a simple counter-bore.

Suitable for medium duty applications, the polyurethane wiping lip prevents ingress of contaminants and has good resistance to abrasion.

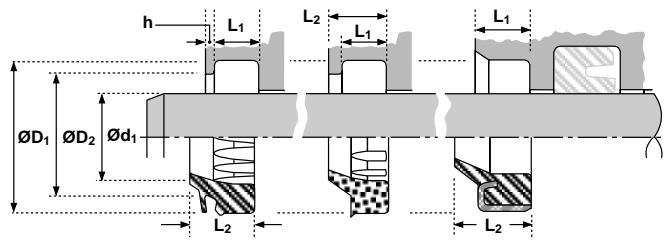
The wiper is also suitable for the retention of grease when fitted to pivot pins.

Also see Hallite 919

FEATURES

- TOUGH POLYURETHANE MATERIAL
- ENCLOSED METAL CASE
- EASY INSTALLATION
- COMPACT HOUSINGS
- VERY GOOD RESISTANCE TO ABRASION
- EXCELLENT DURABILITY IN SERVICE

Wiper seals
metric

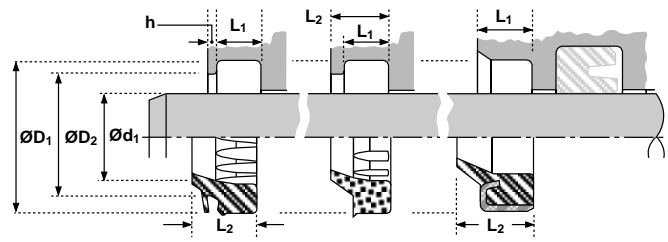


Type	NOMINALS			PART No.		
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h
839	12.000	18.000	14.500	4.000	7.000	4436800‡
831	12.000	18.600	15.000	3.800	5.300	4565800
33	12.000	20.000	16.000	4.000	6.000	2232500
839	14.000	20.000	16.500	4.000	7.000	4436900‡
831	14.000	20.600	17.000	3.800	5.300	4580000
33	14.000	22.000	18.000	4.000	6.000	2232600
839	14.000	22.000	18.300	4.800	7.000	4632000
905	14.000	24.000		5.000	7.000	9014008*
913	14.000	24.000		5.000	7.000	9014018*
860	15.000	25.000		5.000	7.000	6950000
860	16.000	22.000		3.000	4.000	6950010
33	16.000	24.000	20.000	4.000	6.000	2232800
839	16.000	24.000	20.300	4.800	7.000	4632100
831	16.000	24.600	19.000	5.000	7.000	4703800
905	16.000	26.000		5.000	7.000	9016018*
839	18.000	24.000	20.500	4.000	7.000	4437000‡
38	18.000	24.000	21.000	5.000	7.000	4392000
831	18.000	24.600	21.000	3.800	5.300	4580100
33	18.000	26.000	22.000	4.000	6.000	2232900
834	18.000	26.000	24.000	4.000	7.000	1.000 4367200
839	18.000	26.000	22.300	4.800	7.000	4630800
831	18.000	26.600	21.000	5.000	7.000	4703900
860	18.000	28.000		5.000	7.000	6950020
904	20.000	25.000	25.500	5.000	6.000	9020008
839	20.000	26.000	22.500	4.000	6.000	4415000‡
33	20.000	28.000	24.000	4.000	6.000	2233000
834	20.000	28.000	26.000	4.000	7.000	1.000 4391300
839	20.000	28.000	24.300	4.800	7.000	4630900
38	20.000	28.000	25.500	5.000	8.000	4321900‡
831	20.000	28.600	23.000	5.300	7.000	4530600
860	20.000	30.000		5.000	8.000	6950030
913	20.000	32.000		6.000	9.000	9020038
905	20.000	32.000		6.000	9.000	9020028*
839	22.000	28.000	24.500	4.000	7.000	4437100‡
33	22.000	30.000	26.000	4.000	6.000	2233100

Type	NOMINALS			PART No.		
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h
834	22.000	30.000	28.000	4.000	7.000	1.000 4370600
904	22.000	30.000	26.300	5.000	6.000	9022008
38	22.000	30.000	27.500	5.000	8.000	4322000‡
831	22.000	30.600	25.000	5.300	7.000	4530700
913	22.000	34.000		6.000	9.000	9022038
839	22.400	30.400	26.700	4.800	7.000	4630100
33	25.000	33.000	29.000	4.000	6.000	2233200
834	25.000	33.000	31.000	4.000	7.000	1.000 4343900
846	25.000	33.000	31.000	4.000	8.700	1.000 4556600
839	25.000	33.000	29.300	4.800	7.000	4631000
38	25.000	33.000	30.500	5.000	8.000	6617700‡
831	25.000	33.600	28.000	5.300	7.000	4530800
919	25.000	35.000		4.000		9025088
860	25.000	35.000		5.000	8.000	6950040
860	25.000	37.000		6.000	9.000	6950050
834	26.000	34.000	32.000	4.000	7.000	1.000 4514400
846	26.000	34.000	32.000	4.000	8.700	1.000 4588700
33	28.000	36.000	32.000	4.000	6.000	2233300
834	28.000	36.000	34.000	4.000	7.000	1.000 4373500
846	28.000	36.000	34.000	4.000	8.700	4556700
839	28.000	36.000	32.300	4.800	7.000	4631100
839	28.000	36.000	31.000	5.000	8.000	4437200‡
38	28.000	36.000	33.500	5.000	8.000	6617800‡
831	28.000	36.600	31.000	5.300	7.000	4565900
860	28.000	38.000		5.000	8.000	6950060
905	28.000	40.000		6.000	9.000	9028018*
834	30.000	38.000	36.000	4.000	7.000	1.000 4378800
846	30.000	38.000	36.000	4.000	8.700	1.000 4584500
38	30.000	38.000	35.500	5.000	8.000	4419200
839	30.000	38.000	33.000	5.000	8.000	4519200
839	30.000	38.000	34.000	5.800	8.000	4630200
831	30.000	38.600	33.000	5.300	7.000	4530900
919	30.000	40.000		4.000		9030088
860	30.000	40.000	5.000	8.000		6950070
38	30.000	41.200	37.000	7.500	10.000	4528900



Wiper seals
metric

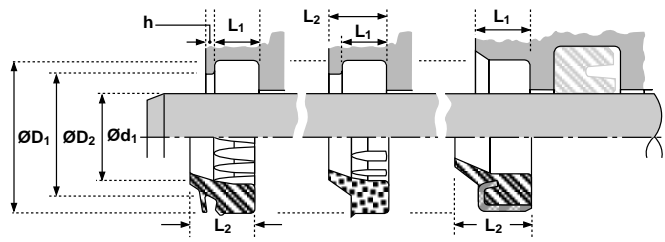


Type	Ød1	ØD1	NOMINALS				PART No.
			ØD2	L1	L2	h	
33	30.000	42.000	36.000	6.000	9.000		2233400
860	30.000	42.000		6.000	9.000		6950080
905	30.000	45.000		7.000	10.000		9030038*
839	31.500	39.500	35.500	5.800	8.000		4632200
834	32.000	40.000	38.000	4.000	7.000	1.000	4373600
846	32.000	40.000	38.000	4.000	8.700	1.000	4568900
839	32.000	40.000	35.000	5.000	8.000		4594000‡
842	32.000	40.000	37.500	5.000	8.000	1.500	4714900
38	32.000	40.000	37.500	5.000	8.000		6617900‡
839	32.000	40.000	36.000	5.800	8.000		4632300
831	32.000	40.600	35.000	5.300	7.000		4534500
860	32.000	42.000		5.000	8.000		6950090
33	32.000	44.000	38.000	6.000	9.000		2233500
905	32.000	44.000		7.000	10.000		9032018*
834	35.000	43.000	41.000	4.000	7.000	1.000	4398400
38	35.000	43.000	40.500	5.000	8.000		4724800
839	35.000	43.000	39.000	5.800	8.000		4630300
831	35.000	43.600	38.000	5.300	7.000		4531000
919	35.000	45.000		4.000			9035088
842	35.000	45.000	42.000	6.300	10.000	1.500	4515300
860	35.000	45.000		7.000	10.000		6950100
33	35.000	47.000	41.000	6.000	9.000		2233600
860	35.000	47.000		7.000	10.000		6950110
839	35.500	43.500	39.500	5.800	8.000		4630400
834	36.000	44.000	42.000	4.000	7.000	1.000	4370700
846	36.000	44.000	42.000	4.000	8.700	1.000	4588800
839	36.000	44.000	39.000	5.000	8.000		4437300‡
842	36.000	44.000	41.500	5.000	8.000	1.500	4715000
38	36.000	44.000	41.500	5.000	8.000		6618000‡
904	36.000	44.000	40.000	6.000	6.500		9036008*
831	36.000	44.600	39.000	5.300	7.000		4580200
33	36.000	48.000	42.000	6.000	9.000		2233700
834	37.000	45.000	43.000	4.000	7.000	1.000	4514500
834	38.000	46.000	44.000	4.000	7.000	1.000	4515400
842	38.000	46.000	43.000	5.300	8.000	1.500	4568700

Type	Ød1	ØD1	NOMINALS				PART No.
			ØD2	L1	L2	h	
839	38.000	46.000	42.000	5.800	8.000		4632400
860	38.000	48.000		7.000	10.000		6950470
834	40.000	48.000	46.000	4.000	7.000	1.000	4378900
846	40.000	48.000	46.000	4.000	8.700	1.000	4549200
842	40.000	48.000	45.000	5.000	8.000	1.500	4536500
839	40.000	48.000	43.000	5.000	8.000		4591600‡
38	40.000	48.000	45.500	5.000	8.000		6618100‡
839	40.000	48.000	44.000	5.800	8.000		4630500
831	40.000	48.600	43.000	5.300	7.000		4531100
919	40.000	50.000		4.000			9040058
919	40.000	50.000		5.000			9040068
904	40.000	50.000	46.000	6.000	6.500		9040018
860	40.000	50.000		7.000	10.000		6950120‡
33	40.000	52.000	46.000	6.000	9.000		2233800
860	40.000	52.000		7.000	10.000		6950130
919	40.000	55.000		5.000			9040088
38	41.300	49.300	46.800	5.000	8.000		4599900
33	42.000	54.000	48.000	6.000	9.000		2233900
834	45.000	53.000	51.000	4.000	7.000	1.000	4370800
846	45.000	53.000	51.000	4.000	8.700	1.000	4589900
839	45.000	53.000	48.000	5.000	8.000		4437400‡
842	45.000	53.000	50.500	5.000	8.000	1.500	4715100
38	45.000	53.000	50.500	5.000	8.000		6618200‡
839	45.000	53.000	49.000	5.800	8.000		4630600
831	45.000	53.600	48.000	5.300	7.000		4533800
919	45.000	55.000		4.000			9045068
904	45.000	55.000	51.000	6.000	6.500		9045018*
915	45.000	55.000	50.000	7.000	8.000		9045058
860	45.000	55.000		7.000	10.000		6950140‡
831	45.000	55.600	48.000	5.300	7.000		4531200
33	45.000	57.000	51.000	6.000	9.000		2234000
860	45.000	57.000		7.000	10.000		6950150
919	45.000	60.000		5.000			9045088
834	46.000	54.000	52.000	4.000	7.000	1.000	4515200
834	48.000	56.000	54.000	4.000	7.000	1.000	4432700



Wiper seals
metric



33



38



831



834



839



842



846



860



904



905



913



915



919



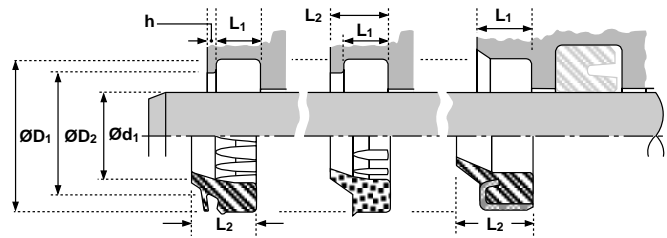
921

Type	NOMINALS			PART			
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h	No.
834	50.000	58.000	56.000	4.000	7.000	1.000	4379000
846	50.000	58.000	56.000	4.000	8.700	1.000	4597200
842	50.000	58.000	55.000	5.000	8.000	1.500	4533600
839	50.000	58.000	53.000	5.000	8.000		4584400†
38	50.000	58.000	55.500	5.000	8.000		6618300†
839	50.000	58.000	54.000	5.800	8.000		4630000
38	50.000	58.600	53.000	5.300	7.000		4300400
831	50.000	58.600	53.000	5.300	7.000		4533900
919	50.000	60.000		4.500			9050078
904	50.000	60.000	56.000	6.000	6.500		9050018*
915	50.000	60.000	55.000	7.000	8.000		9050058
860	50.000	60.000		7.000	10.000		6950160†
38	50.000	60.600	53.000	5.300	7.000		4458000
831	50.000	60.600	53.000	5.300	7.000		4531300
33	50.000	62.000	55.000	6.000	9.000		2234200
860	50.000	62.000		7.000	10.000		6950170
915	50.000	63.000	56.500	8.000	9.500		9050068
919	50.000	65.000		5.000			9050108
921	50.000	65.000		6.000			9050088
839	53.000	61.000	57.000	5.800	8.000		4632500
834	55.000	63.000	61.000	4.000	7.000	1.000	4515100
839	55.000	63.000	58.000	5.800	8.000		4630700
831	55.000	63.600	58.000	5.300	7.000		4534000
839	55.000	65.000	58.000	6.000	9.700		4575200
860	55.000	65.000		7.000	10.000		6950180
915	55.000	65.000	60.000	7.000	8.500		9055048
831	55.000	65.600	58.000	5.300	7.000		4531400
38	55.000	65.600		5.300	7.000		4531401
33	55.000	67.000	61.000	6.000	9.000		2234300
915	55.000	68.000	61.500	8.000	9.500		9055058
860	55.000	69.000		8.000	11.000		6950190
919	55.000	70.000		5.000			9055088
834	56.000	64.000	62.000	4.000	7.000	1.000	4385100
846	56.000	64.000	62.000	4.000	8.700	1.000	4588900
839	56.000	64.000	60.000	5.800	8.000		4632600

Type	NOMINALS			PART			
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h	No.
831	56.000	64.600	59.000	5.300	7.000		4566000
839	56.000	66.000	59.000	6.000	9.700		4437500†
842	56.000	66.000	63.000	6.300	10.000	1.500	4715200
38	56.000	66.000	63.000	6.300	10.000		6618400†
38	56.000	66.600	59.000	5.300	7.000		4458100
831	56.000	66.600	59.000	5.300	7.000		4704000
33	56.000	68.000	62.000	6.000	9.000		2234400
919	56.000	70.000		7.500			9056088
905	56.000	70.000		8.000	11.000		9056018*
834	60.000	68.000	66.000	4.000	7.000	1.000	4385200
846	60.000	68.000	66.000	4.000	8.700	1.000	4596600
839	60.000	68.000	64.000	5.800	8.000		4631200
831	60.000	68.600	63.000	5.300	7.000		4534100
38	60.000	70.000	66.000	5.300	7.000		4386200
38	60.000	70.000	67.000	6.300	10.000		4270200
842	60.000	70.000	67.000	6.300	10.000	1.500	4557800
860	60.000	70.000		7.000	10.000		6950200
38	60.000	70.600	63.000	5.300	7.000		4456400
831	60.000	70.600	63.000	5.300	7.000		4531500
33	60.000	72.000	66.000	6.000	9.000		2234500
919	60.000	73.000		8.000			9060078
915	60.000	73.000	66.500	8.000	9.500		9060048
860	60.000	74.000		8.000	11.000		6950210
919	60.000	75.000		5.000			9060088
834	63.000	71.000	69.000	4.000	7.000	1.000	4385300
839	63.000	71.000	67.000	5.800	8.000		4632700
842	63.000	73.000	70.000	6.300	10.000	1.500	4536600
38	63.000	73.000	70.000	6.300	10.000		6618500†
38	63.000	73.600	66.000	5.300	7.000		4283600
33	63.000	75.000	69.000	6.000	9.000		2234600
905	63.000	77.000		8.000	11.000		9063018
834	65.000	73.000	71.000	4.000	7.000	1.000	4394200
846	65.000	73.000	71.000	4.000	8.700	1.000	4597500
839	65.000	73.000	69.000	5.800	8.000		4631300
839	65.000	75.000	68.000	6.000	9.700		4575300



Wiper seals
metric

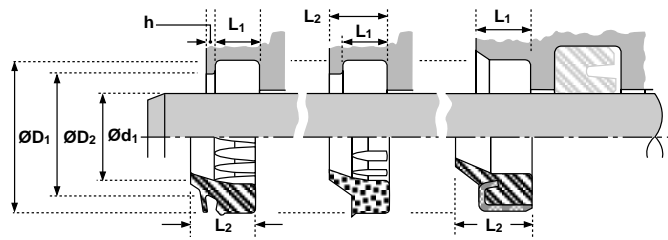


Type	Ød ₁	ØD ₁	NOMINALS			PART No.	
			ØD ₂	L ₁	L ₂	h	
38	65.000	75.000	72.000	6.300	10.000		4343800
860	65.000	75.000		7.000	10.000		6950220
33	65.000	77.000	71.000	6.000	9.000		2234700
915	65.000	78.000	71.500	8.000	9.500		9065048
860	65.000	79.000		8.000	11.000		6950230
919	65.000	80.000		5.000			9065088
904	67.000	75.000	71.000	6.000	6.500		9067008*
834	70.000	78.000	76.000	4.000	7.000	1.000	4373700
846	70.000	78.000	76.000	4.000	8.700	1.000	4556800
831	70.000	78.600	73.000	5.300	7.000		4534200
839	70.000	80.000	73.000	6.000	9.700		4437600‡
38	70.000	80.000	77.000	6.300	10.000		6618600‡
839	70.000	80.000	75.000	6.800	10.000		4631400
860	70.000	80.000		7.000	10.000		6950240‡
38	70.000	80.600	73.000	5.300	7.000		4454000
831	70.000	80.600	73.000	5.300	7.000		4531600
33	70.000	82.000	76.000	6.000	9.000		2234800
38	70.000	82.200	76.000	7.200	12.000		4243900
842	70.000	82.600	78.400	8.000	12.000	2.000	4480800
919	70.000	83.000		8.000			9070078
915	70.000	83.000	76.500	8.000	9.500		9070048
860	70.000	84.000		8.000	11.000		6950250
919	70.000	85.000		5.000			9070088
834	75.000	83.000		4.000	7.000	1.000	4711900
846	75.000	83.000	81.000	4.000	8.700	1.000	4597600
38	75.000	83.600	78.000	5.300	7.000		4539500
38	75.000	85.000	82.000	6.300	10.000		4532500
839	75.000	85.000	80.000	6.800	10.000		4631500
860	75.000	85.000		7.000	10.000		6950260
38	75.000	87.200	81.000	7.200	12.000		4384400
915	75.000	88.000	81.500	8.000	9.500		9075048
860	75.000	89.000		8.000	11.000		6950270
919	75.000	90.000		6.000			9075088
834	80.000	88.000	86.000	4.000	7.000	1.000	4398500
846	80.000	88.000	86.000	4.000	8.700	1.000	4590000

Type	Ød ₁	ØD ₁	NOMINALS			PART No.	
			ØD ₂	L ₁	L ₂	h	
831	80.000	88.600	83.000	5.300	7.000		4534300
842	80.000	90.000	87.000	6.300	10.000	1.500	4715300
38	80.000	90.000	87.000	6.300	10.000		6618700‡
839	80.000	90.000	85.000	6.800	10.000		4631600
860	80.000	90.000		7.000	10.000		6950280‡
38	80.000	91.000	85.000	7.500	11.000		4493200
831	80.000	92.200	86.000	7.100	12.000		4531700
38	80.000	92.200	86.000	7.200	12.000		4242800
919	80.000	93.000		8.000			9080078
915	80.000	93.000	86.500	8.000	9.500		9080048
860	80.000	94.000		8.000	11.000		6950290
919	80.000	95.000		5.000			9080088
919	80.000	100.000		10.000			9080098
38	82.600	92.200	85.700	5.300	7.100		4415500
846	85.000	93.000	88.000	4.000	8.700	1.000	4701800
38	85.000	93.600	88.000	5.300	7.000		4292100
831	85.000	93.600	88.000	5.300	7.000		4534400
860	85.000	95.000		7.000	10.000		6950300
831	85.000	97.200	91.000	7.100	12.000		4531800
842	85.000	97.600	93.400	8.000	12.000	2.000	4521800
38	85.000	98.000	92.000	7.500	11.500		4332800
915	85.000	98.000	91.500	8.000	9.500		9085048
860	85.000	99.000		8.000	11.000		6950310
919	85.000	100.000		6.000			9085088
38	88.000	100.200	94.000	7.200	12.000		4269400
834	90.000	98.000	96.000	4.000	7.000	1.000	4398600
846	90.000	98.000	96.000	4.000	8.700	1.000	4557700
839	90.000	100.000	93.000	6.000	9.700		4437700‡
38	90.000	100.000	97.000	6.300	10.000		6618800‡
839	90.000	100.000	95.000	6.800	10.000		4631700
860	90.000	100.000		7.000	10.000		6950320‡
831	90.000	102.200	96.000	7.100	12.000		4531900
842	90.000	102.200	96.000	7.100	12.000	2.000	4727300
38	90.000	102.200	96.000	7.200	12.000		4324500
842	90.000	102.600	98.400	8.000	12.000		4512500



Wiper seals metric



33



38



831



834



839



842



846



860



904



905



913



915



919



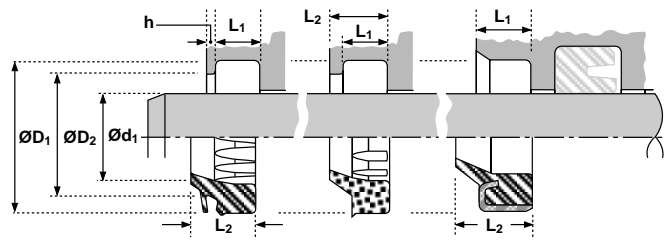
921

Type	NOMINALS			PART No.			
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h	
915	90.000	103.000	96.500	8.000	9.500	9090048	
860	90.000	104.000		8.000	11.000	6950330	
919	90.000	105.000		6.000		9090058	
921	90.000	105.000		6.000		9090068	
33	90.000	106.000	98.000	8.000	12.000	2235200	
919	90.000	110.000		10.000		9090088	
839	95.000	105.000	100.000	6.800	10.000	4631900	
38	95.000	107.200	101.000	7.200	12.000	6667600	
915	95.000	108.000	101.500	8.000	9.500	9095048	
860	95.000	109.000		8.000	11.000	6950340	
842	95.000	110.000	105.000	9.500	14.000	2.800	4536900
834	100.000	108.000	106.000	4.000	7.000	1.000	4394300
846	100.000	110.000	107.000	6.300	11.500	2.000	4723600
839	100.000	110.000	105.000	6.800	10.000		4631800
860	100.000	110.000		7.000	10.000		6950350
38	100.000	110.600	104.000	5.300	7.000		4300200
831	100.000	112.200	106.000	7.100	12.000		4532000
842	100.000	112.200	106.000	7.100	12.000	1.500	4727400
38	100.000	112.200	106.000	7.200	12.000		4324600
915	100.000	113.000	106.500	8.000	9.500		9100048
842	100.000	114.000	109.900	8.000	12.000	1.500	4536000
860	100.000	114.000		8.000	11.000		6950360
919	100.000	115.000		6.000			9100078
842	100.000	115.000	110.000	9.500	14.000		4589500
38	100.000	115.000	110.000	9.500	14.000		6618900‡
33	100.000	116.000	108.000	8.000	12.000		2235300
919	100.000	120.000		10.000			9100088
38	101.600	116.600	111.600	9.500	14.000		6619010
38	105.000	113.000	110.500	5.000	8.000		4290300
904	105.000	115.000	110.000	7.000	8.000		9105008*
38	105.000	120.000	112.000	7.200	12.000		4539100
842	105.000	120.000	115.000	9.500	14.000		4532100
33	105.000	121.000	113.000	8.000	12.000		2235400
860	105.000	121.000		9.000	12.000		6950370
834	110.000	118.000	116.000	4.000	7.000	1.000	4448200

Type	NOMINALS			PART No.			
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h	
839	110.000	120.000	115.000	6.800	10.000		4633000
860	110.000	120.000		7.000	10.000		6950380
831	110.000	122.200	116.000	7.100	12.000		4538200
38	110.000	122.200	116.000	7.200	12.000		4459200
839	110.000	125.000	114.000	8.500	13.000		4437800‡
919	110.000	125.000		9.000			9110088
842	110.000	125.000	120.000	9.500	14.000	2.500	4715400
38	110.000	125.000	120.000	9.500	14.000		6619000‡
860	110.000	126.000		9.000	12.000		6950390
839	112.000	122.000	117.000	6.800	10.000		4633100
904	115.000	125.000	120.000	7.000	8.000		9115008*
38	115.000	127.200	121.000	7.200	12.000		4324800
860	115.000	131.000		9.000	12.000		6950400
904	118.000	128.000	123.000	7.000	8.000		9118008*
860	120.000	130.000		7.000	10.000		6950410
839	120.000	130.000	125.000	6.000	8.000		4633700
904	120.000	130.000	125.000	7.000	8.000		9120008*
38	120.000	132.200	126.000	7.200	12.000		4454300
38	120.000	135.000	130.000	9.500	14.000		4385600
842	120.000	135.000	130.000	9.500	14.000	2.000	4580800
860	120.000	136.000		9.000	12.000		6950420
38	125.000	133.000	130.800	5.300	7.000		4393000
842	125.000	137.200	131.000	7.600	12.500	2.000	4727500
38	125.000	137.200	131.000	7.700	12.000		4233500
839	125.000	138.000	132.000	7.800	11.000		4633200
842	125.000	140.000	135.000	9.500	14.000		4715500
38	125.000	140.000	135.000	9.500	14.000		6619100‡
905	125.000	141.000		9.000	12.000		9125018
38	128.000	143.000	138.000	9.500	14.000		4581800
38	130.000	142.200	136.000	7.200	12.000		4304300
904	130.000	143.000	138.000	8.000	9.500		9130008*
839	130.000	143.000	137.000	7.000	9.500		4633800
842	130.000	145.000	140.000	9.500	14.000	2.250	4491700
860	130.000	146.000		9.000	12.000		6950430
38	132.000	144.200	138.000	7.200	12.000		4269500



Wiper seals
metric

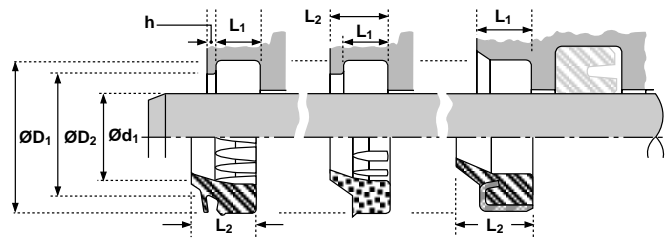


Type	NOMINALS			PART No.			
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h	
904	132.000	145.000	139.000	8.000	9.500		9132008*
831	135.000	147.200	141.000	7.100	12.000		4538100
38	135.000	150.000	145.000	9.500	14.000		4278700
905	135.000	155.000		10.000	14.000		9135008*
839	136.000	149.000	143.000	8.000	10.000		4633300
904	136.000	149.000	143.000	8.000	9.500		9136008*
834	140.000	152.000	149.000	5.500	10.000	1.000	4456100
842	140.000	152.200	150.000	7.600	14.000	2.000	4727600
38	140.000	152.200	146.000	7.700	12.000		4324900
839	140.000	153.000	144.000	8.000	13.000		4633400
915	140.000	155.000	147.500	8.000	9.500		9140048*
839	140.000	155.000	144.000	8.500	13.000		4437900‡
842	140.000	155.000	150.000	9.500	14.000		4555900
38	140.000	155.000	150.000	9.500	14.000		6619200‡
33	140.000	156.000	148.000	8.000	12.000		1222800
860	140.000	160.000		10.000	14.000		6950440
38	145.000	153.600		5.300	7.000		4732200
839	145.000	158.000	152.000	8.000	11.000		4633500
38	145.000	160.000	155.000	9.500	14.000		4560600
842	145.000	160.000	155.000	9.500	14.000	2.250	4570200
905	145.000	165.000		10.000	14.000		9145018*
38	150.000	162.200	156.000	7.700	12.000		4278900
904	150.000	163.000	157.000	8.000	9.500		9150008
839	150.000	163.000	157.000	7.000	9.500		4633900
38	150.000	165.000	158.600	7.200	12.000		6668500
38	150.000	165.000	157.600	10.200	16.000		4342500
33	150.000	166.000	158.000	8.000	12.000		1222900
38	150.000	166.000	161.000	8.000	12.000		4336700
860	150.000	170.000		10.000	14.000		6950450
38	155.000	163.000	160.500	5.000	8.000		4290200
38	155.000	167.200	161.000	7.700	12.000		4288200
904	155.000	168.000	162.000	8.000	9.500		9155008*
842	155.000	170.000	165.000	9.500	12.000	2.250	4535200
38	155.000	175.000	165.000	10.200	18.000		4226400
38	160.000	172.200	166.000	7.700	12.000		4405700

Type	NOMINALS			PART No.			
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h	
839	160.000	174.000	167.000	8.000	11.000		4633600
38	160.000	175.000	170.000	9.500	14.000		6619300‡
38	160.000	175.000	167.000	10.200	16.000		4454100
33	160.000	176.000	168.000	8.000	12.000		1223000
860	160.000	180.000		10.000	14.000		6950460
904	165.000	178.000	172.000	8.000	9.500		9165008*
38	165.000	180.000	175.000	9.500	14.000		4537000
905	165.000	185.000		10.000	14.000		9165018*
38	170.000	180.600	174.000	5.300	7.000		4732300
38	170.000	182.200	176.000	7.700	12.000		4233600
904	170.000	183.000	176.000	8.000	9.500		9170008*
904	170.000	185.000	178.000	12.000	14.000		9170018*
905	170.000	190.000		10.000	14.000		9170028
842	175.000	190.000	185.000	9.500	14.000	2.250	4552100
905	175.000	195.000		10.000	14.000		9175018*
38	177.000	192.000	187.000	9.500	14.000		4287900
904	180.000	193.000	187.000	8.000	9.500		9180008*
842	180.000	195.000	190.000	9.500	14.000	2.250	4491300
38	180.000	195.000	190.000	9.500	14.000		6619400‡
839	180.000	196.000	184.000	9.500	14.000		4595600
38	180.000	200.000	190.000	10.200	18.000		4460900
905	180.000	205.000		12.000	17.000		9180018
904	190.000	203.000	197.000	8.000	9.500		9190008*
33	190.000	210.000	200.000	10.000	15.000		1226400
905	190.000	215.000		12.000	17.000		9190018*
38	195.000	210.000	202.500	10.200	16.000		4325100
38	200.000	208.600	203.000	5.300	7.000		4391600
904	200.000	213.000	207.000	8.000	9.500		9200008*
38	200.000	215.000	210.000	9.500	14.000		6619500‡
38	200.000	220.000	210.000	10.200	18.000		4387100
905	200.000	225.000		12.000	17.000		9200018
38	205.000	220.000	215.000	9.500	14.000		4560500
904	210.000	223.000	217.000	8.000	9.500		9210008*
38	210.000	225.000		9.500	14.000		4598000
38	210.000	226.000	221.000	8.000	12.000		4336600



Wiper seals metric



33



38



831



834



839



842



846



860



904



905



913



915



919



921

Type	NOMINALS			PART No.			
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h	
38	210.000	230.000	220.000	10.200	18.000		4325300
905	210.000	235.000		12.000	17.000		9210018*
38	212.000	232.000	225.500	12.500	18.000		4293900
842	215.000	230.000	225.000	9.500	14.000	2.000	4705500
904	220.000	233.000	227.000	8.000	9.500		9220008*
38	220.000	235.000	227.600	10.200	16.000		4325400
38	220.000	240.000	233.500	12.500	18.000		6619600‡
905	220.000	245.000		12.000	17.000		9220018*
38	225.000	240.000	235.000	9.500	14.000		4287800
38	225.000	245.000	235.000	10.200	18.000		4325500
905	225.000	250.000		12.000	17.000		9225008*
38	230.000	238.600	233.000	5.300	7.000		4514000
904	230.000	243.000	237.000	8.000	9.500		9230008*
38	230.000	246.000	240.700	7.500	12.000		4290700
38	230.000	250.000	240.000	10.200	18.000		4325600
905	230.000	255.000		12.000	17.000		9230018*
38	235.000	255.000	245.000	10.200	18.000		4325700
904	240.000	256.000	248.000	11.000	13.000		9240008*
38	240.000	260.000	250.000	10.200	18.000		4520900
905	240.000	265.000		12.000	17.000		9240018*
38	245.000	265.000	258.500	12.500	18.000		4539600
904	250.000	265.000	258.000	10.000	11.500		9250008*
38	250.000	270.000	260.000	10.200	18.000		4460100
38	250.000	270.000	263.500	12.500	18.000		6619700‡
905	250.000	275.000		12.000	17.000		9250028*
38	255.000	270.000	265.000	9.500	14.000		4578200
38	260.000	270.000	270.000	9.500	14.000		4573100
38	260.000	280.000	270.500	10.200	18.000		4325900
38	265.000	285.000	275.000	10.200	15.000		4560400
38	270.000	278.600	273.000	5.300	7.000		4391700
38	280.000	295.000	290.000	9.500	18.000		4716100
905	280.000	310.000		16.000	22.000		9280018*
38	285.000	305.000	298.500	12.500	18.000		4537100
38	288.000	308.000	301.500	10.200	18.000		4265300
38	290.000	310.000	303.500	12.500	18.000		4467300

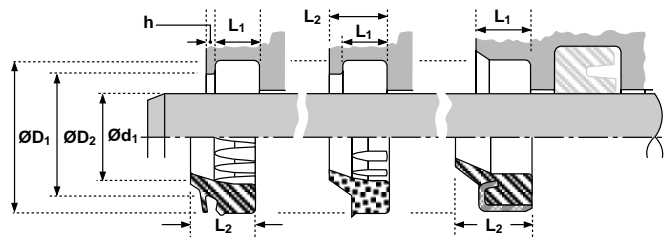
Type	NOMINALS			PART No.			
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h	
38	295.000	315.000		12.500	18.000		4598100
38	300.000	316.000	310.700	7.500	12.000		4290800
38	300.000	320.000	313.500	12.500	18.000		4525300
905	300.000	330.000		16.000	22.000		9300018*
38	305.000	325.000	318.500	12.500	18.000		4473200
38	320.000	340.000	330.000	10.200	18.000		4454200
38	330.000	346.000	340.700	7.500	12.000		4587300
38	340.000	360.000	350.000	10.200	18.000		4732500
38	350.000	370.000	365.000	10.200	18.000		4717900
38	355.000	375.000	365.000	10.200	18.000		4578300
38	370.000	390.000	383.500	12.500	18.000		4579800
839	12.00	18.00	14.50	4.00	7.00		4436800‡
831	12.00	18.60	15.00	3.80	5.30		4565800
33	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
33	14.00	22.00	18.00	4.00	6.00		2232600
839	14.00	22.00	16.50	5.00	7.00		4632000
905	14.00	24.00		5.00	7.00		9014008*
913	14.00	24.00		5.00	7.00		9014018*
33	15.00	23.00	19.00	4.00	6.00		2232700
860	15.00	25.00		5.00	7.00		6950000
839	16.00	20.30	19.00	4.60	7.00		4599800
860	16.00	22.00		3.00	4.00		6950010
33	16.00	24.00	20.00	4.00	6.00		2232800
839	16.00	24.00	20.00	5.00	7.00		4632100
905	16.00	26.00		5.00	7.00		9016018*
839	18.00	24.00	20.50	4.00	7.00		4437000‡
38	18.00	24.00	21.00	5.00	7.00		4392000



Notes



Wiper seals
inch



Hallite 

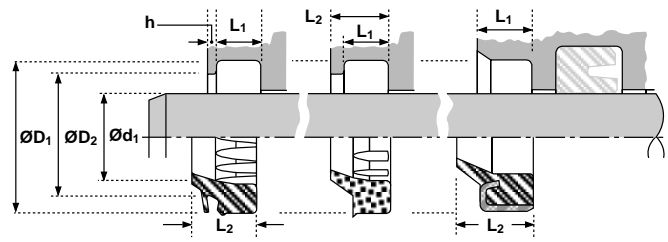


Type	NOMINALS		NOMINALS			PART No.
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	
36	0.375	0.540	0.430	0.120		2241500
420	0.375	0.625	0.535	0.125	0.196	8899300
425	0.375	0.677	0.495	0.203	0.240	6666336
36	0.500	0.680	0.560	0.130		2241600
520	0.500	0.750	0.665	0.125	0.187	8880210
41	0.500	0.750	0.625	0.176	0.275	WK0500
421	0.500	0.760	0.647	0.107	0.187	8883500
425	0.500	0.802	0.620	0.203	0.240	6666337
33	0.500	0.900	0.700	0.125	0.250	1464100
420	0.562	0.812	0.725	0.125	0.196	8887700*
421	0.562	0.822	0.710	0.107	0.187	8896300*
36	0.625	0.820	0.700	0.140		2241700
520	0.625	0.875	0.790	0.125	0.187	8880310
41	0.625	0.875	0.750	0.155	0.281	WK0626A
521	0.625	0.885	0.772	0.107	0.187	8883610
425	0.625	0.927	0.745	0.203	0.240	6666338
41	0.625	1.000	0.750	0.187	0.343	WK0625
33	0.625	1.025	0.828	0.125	0.250	1470700
35	0.625	1.125	1.062	0.234	0.312	CSW062
862	0.625	1.125		0.313		6960000
421	0.687	0.947	0.834	0.107	0.187	8896400*
424	0.687	1.000		0.187		MRW0687
424	0.750	1.000		0.125		MRW0750A
41	0.750	1.000	0.858	0.176	0.281	WK0750A
521	0.750	1.010	0.897	0.107	0.187	8883710
425	0.750	1.052	0.870	0.203	0.281	6666339
41	0.750	1.125	0.858	0.187	0.343	WK0750
520	0.750	1.125	1.000	0.187	0.281	8880410
860	0.750	1.125	0.187	0.281		6955100
33	0.750	1.150	0.950	0.125	0.250	1347700
424	0.750	1.250	0.187			MRW0750B
35	0.750	1.250	1.187	0.234	0.312	CSW075
424	0.750	1.250		0.250		MRW0750C
862	0.750	1.250		0.313		6960010
421	0.812	1.084	0.960	0.107	0.187	8896500*

Type	NOMINALS		NOMINALS			PART No.
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	
36	0.875	1.080	0.950	0.150		2241800
41	0.875	1.125	0.983	0.176	0.281	WK0875A
521	0.875	1.147	1.023	0.107	0.187	8883810
425	0.875	1.240	1.010	0.218	0.281	6666340
41	0.875	1.250	0.983	0.187	0.343	WK0875
420	0.875	1.250	1.125	0.187	0.281	8880500
520	0.875	1.250	1.125	0.187	0.281	8880510
33	0.875	1.275	1.075	0.125	0.250	1056700
35	0.875	1.375	1.312	0.234	0.312	CSW087
424	0.875	1.375		0.312		MRW0875
421	0.937	1.209	1.085	0.107	0.187	8896600*
36	1.000	1.240	1.080	0.160		2241900
424	1.000	1.250		0.125		MRW1000A
41	1.000	1.250	1.108	0.176	0.281	WK1000A
521	1.000	1.272	1.148	0.107	0.187	8883910
425	1.000	1.365	1.135	0.218	0.281	6666341
41	1.000	1.375	1.108	0.187	0.343	WK1000
520	1.000	1.375	1.250	0.187	0.281	8880610
424	1.000	1.375		0.187		MRW1000B
860	1.000	1.375		0.187	0.281	6955120
840	1.000	1.400	1.200	0.125	0.250	4405800
35	1.000	1.500	1.437	0.234	0.312	CSW100
862	1.000	1.500		0.313		6960020
36	1.125	1.360	1.210	0.160		2219300
521	1.125	1.397	1.273	0.107	0.187	8884010
425	1.125	1.490	1.260	0.218	0.281	6666342
841	1.125	1.500	1.233	0.188	0.343	4404600
520	1.125	1.500	1.375	0.187	0.281	8880710
33	1.125	1.625	1.425	0.125	0.375	1476700
35	1.125	1.625	1.562	0.234	0.312	CSW112
862	1.125	1.625		0.313		6960030
421	1.187	1.459	1.335	0.107	0.187	8896700*
520	1.187	1.562	1.437	0.187	0.281	8880810
36	1.250	1.490	1.330	0.170		2218900
424	1.250	1.500		0.125		MRW1250A



Wiper seals
inch

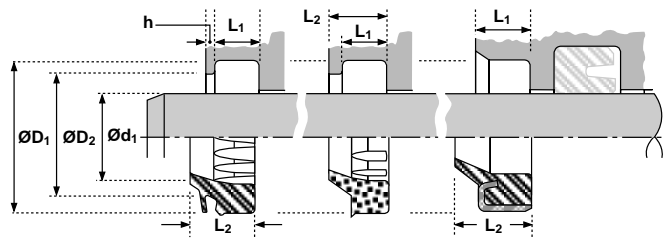


Type	Ød ₁	ØD ₁	NOMINALS		ØD ₂	L ₁	L ₂	h	PART No.
41	1.250	1.500	1.358	0.176	0.281			WK1250A	
521	1.250	1.522	1.398	0.107	0.187			8884110	
425	1.250	1.615	1.385	0.218	0.281			6666343	
841	1.250	1.625	1.358	0.188	0.343			4431300	
520	1.250	1.625	1.500	0.187	0.281			8880910	
860	1.250	1.625		0.187	0.281			6955140	
424	1.250	1.687		0.187				MRW1250B	
33	1.250	1.750	1.550	0.125	0.375			1453100*	
840	1.250	1.750	1.550	0.125	0.375			4405900	
35	1.250	1.750	1.687	0.234	0.312			CSW125	
862	1.250	1.750		0.250				6960260	
862	1.250	1.750		0.313				6960040	
424	1.250	1.875		0.250				MRW1250C	
421	1.312	1.614	1.480	0.107	0.187			8884200	
420	1.312	1.687	1.562	0.187	0.281			8881000	
36	1.375	1.620	1.460		0.170			2247400	
521	1.375	1.677	1.542	0.107	0.187			8884310	
425	1.375	1.740	1.510	0.218	0.281			6666344	
41	1.375	1.750	1.483	0.187	0.343			WK1375	
841	1.375	1.750	1.483	0.187	0.343			4553100	
520	1.375	1.750	1.625	0.187	0.281			8881110	
33	1.375	1.875	1.675	0.125	0.375			1471800	
35	1.375	1.875	1.812	0.234	0.312			CSW137	
862	1.375	1.875		0.313				6960050	
841	1.500	1.760	1.608	0.188	0.281			4574100	
36	1.500	1.770	1.590	0.180				2218600	
521	1.500	1.802	1.668	0.107	0.187			8884410	
425	1.500	1.865	1.635	0.218	0.281			6666345	
841	1.500	1.875	1.608	0.188	0.343			4399100	
520	1.500	1.875	1.750	0.187	0.281			8881210	
424	1.500	1.875		0.187				MRW1500A	
860	1.500	1.875		0.187	0.281			6955160	
424	1.500	1.875		0.250				MRW1500B	
33	1.500	2.000	1.800	0.125	0.375			0696900*	
840	1.500	2.000	1.800	0.125	0.375			4406000	

Type	Ød ₁	ØD ₁	NOMINALS		ØD ₂	L ₁	L ₂	h	PART No.
35	1.500	2.000	1.937	0.234	0.312			CSW150	
862	1.500	2.000		0.250				6960270	
862	1.500	2.000		0.313				6960060	
424	1.500	2.250		0.375				MRW1500D	
421	1.625	1.927	1.793	0.107	0.187			8884500	
425	1.625	1.990	1.760	0.218	0.281			6666346	
41	1.625	2.000	1.733	0.187	0.343			WK1625	
520	1.625	2.000	1.875	0.187	0.281			8881310	
33	1.625	2.125	1.925	0.125	0.375			0269600	
35	1.625	2.125	2.062	0.234	0.312			CSW162	
862	1.625	2.125		0.313				6960070	
36	1.750	2.030	1.850	0.190				0849400	
521	1.750	2.052	1.918	0.107	0.187			8884610	
425	1.750	2.115	1.885	0.218	0.281			6666347	
841	1.750	2.125	1.858	0.188	0.343			4399200	
520	1.750	2.125	2.000	0.187	0.281			8881410	
424	1.750	2.125		0.187				MRW1750A	
860	1.750	2.125		0.187	0.281			6955180	
842	1.750	2.125	1.995	0.220	0.362	0.079		4543300	
33	1.750	2.250	2.050	0.125	0.375			0266400*	
840	1.750	2.250	2.050	0.125	0.375			4406100	
35	1.750	2.250	2.187	0.234	0.312			CSW175	
862	1.750	2.250		0.313				6960080	
424	1.750	2.437		0.375				MRW1750B	
424	1.750	2.500		0.375				MRW1750C	
421	1.875	2.177	2.043	0.107	0.187			8884700	
425	1.875	2.240	2.010	0.218	0.281			6666348	
41	1.875	2.250	1.983	0.187	0.343			WK1875	
420	1.875	2.250	2.125	0.187	0.281			8887300	
33	1.875	2.375	2.175	0.125	0.375			0230700	
424	1.875	2.375		0.312				MRW1875	
41	2.000	2.250	2.108	0.176	0.281			WK2000A	
36	2.000	2.300	2.100	0.200				2219400	
521	2.000	2.302	2.178	0.107				8884810	
425	2.000	2.365	2.135	0.218	0.281			6666349	



Wiper seals
inch

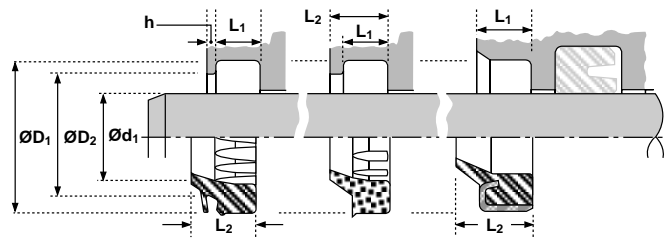


Type	Ød ₁	ØD ₁	NOMINALS		ØD ₂	L ₁	L ₂	h	PART No.
841	2.000	2.375	2.108	0.188	0.343			4431400	
424	2.000	2.375		10.187				MRW2000A	
860	2.000	2.375		0.187	0.281			6955200	
842	2.000	2.375	2.245	0.220	0.362	0.079		4543200	
33	2.000	2.500	2.300	0.125	0.375			0228100*	
840	2.000	2.500	2.300	0.125	0.375			4406200	
35	2.000	2.500	2.437	0.234	0.312			CSW200	
520	2.000	2.500	2.332	0.250	0.375			8881510	
424	2.000	2.500		0.250				MRW2000B	
862	2.000	2.500		0.313				6960090	
424	2.000	2.625		0.250				MRW2000C	
424	2.000	2.687		0.375				MRW2000D	
424	2.000	2.750		0.375				MRW2000E	
421	2.125	2.427	2.303	0.107	0.187			8884900	
425	2.125	2.490	2.260	0.218	0.281			6666350	
424	2.125	2.500		0.187				MRW2125A	
420	2.125	2.625	2.500	0.250	0.375			8888200*	
424	2.125	2.625		0.312				MRW2125	
421	2.250	2.552	2.428	0.107	0.187			8885000	
36	2.250	2.570	2.360	0.210				2283700	
424	2.250	2.625		0.187				MRW2250A*	
860	2.250	2.625		0.187	0.281			6955220	
424	2.250	2.625		0.250				MRW2250B	
425	2.250	2.745	2.385	0.281	0.360			6666351	
33	2.250	2.750	2.550	0.125	0.375			0851100	
35	2.250	2.750	2.687	0.234	0.312			CSW225	
520	2.250	2.750	2.582	0.250	0.375			8881610	
424	2.250	2.750		0.250				MRW2250C	
41	2.250	2.750	2.440	0.255	0.468			WK2250	
862	2.250	2.750		0.313				6960100	
424	2.250	2.875		0.250				MRW2250D	
424	2.250	3.000		0.375				MRW2250E	
424	2.250	3.250		0.500				MRW2250F*	
421	2.375	2.677	2.553	0.107	0.187			8896800	
36	2.375	2.700	2.490	0.220				2262500	

Type	Ød ₁	ØD ₁	NOMINALS		ØD ₂	L ₁	L ₂	h	PART No.
520	2.375	2.875	2.707	0.250	0.375			8887210	
41	2.375	2.895	2.565	0.255	0.468			WK2375	
424	2.375	3.125		0.312				MRW2375	
521	2.500	2.802	2.678	0.107				8885110	
36	2.500	2.840	2.610	0.220				2247600	
41	2.500	2.875	2.690	0.187	0.343			WK2500A	
860	2.500	2.875		0.187	0.281			6955240	
842	2.500	2.875	2.745	0.220	0.362	0.079		4708200	
425	2.500	2.995	2.635	0.281	0.360			6666352	
33	2.500	3.000	2.800	0.125	0.375			1450000	
35	2.500	3.000	2.937	0.234	0.312			CSW250	
520	2.500	3.000	2.832	0.250	0.375			8881710	
424	2.500	3.000		0.250				MRW2500A	
41	2.500	3.000	2.690	0.255	0.468			WK2500	
862	2.500	3.000		0.313				6960110	
424	2.500	3.125		0.250				MRW2500B	
424	2.500	3.187		0.375				MRW2500C	
424	2.500	3.250		0.375				MRW2500D	
36	2.625	2.970	2.740	0.230				2247300	
421	2.625	2.989	2.803	0.122	0.203			8896900*	
420	2.625	3.125	2.957	0.250	0.375			8887500	
424	2.625	3.125		0.250				MRW2625A	
36	2.750	3.110	2.870	0.230				0229600	
421	2.750	3.114	2.959	0.122	0.203			8885200	
860	2.750	3.125		0.187	0.281			6955260	
842	2.750	3.125	2.995	0.220	0.362	0.079		4554600	
425	2.750	3.245	2.885	0.281	0.360			6666353	
33	2.750	3.250	3.050	0.125	0.375			2222400	
35	2.750	3.250	3.187	0.234	0.312			CSW275	
520	2.750	3.250	3.082	0.250	0.375			8881810	
41	2.750	3.250	2.940	0.255	0.468			WK2750	
862	2.750	3.250		0.313				6960120	
424	2.750	3.500		0.375				MRW2750A	
424	2.750	3.750		0.500				MRW2750B	
421	2.875	3.239	3.084	0.122	0.203			8885300	



Wiper seals
inch

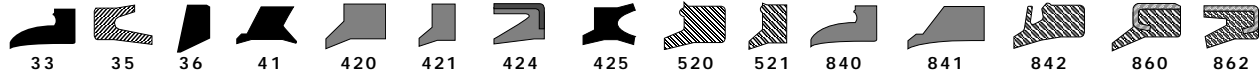
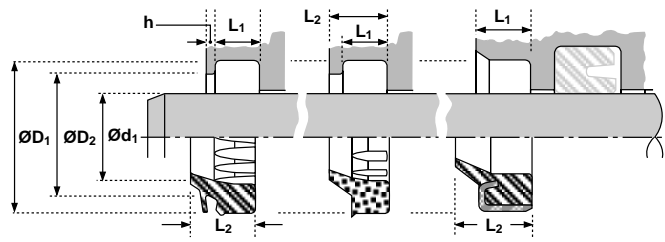


Type	Ød ₁	ØD ₁	NOMINALS			PART No.	
			ØD ₂	L ₁	L ₂	h	
420	2.875	3.375	3.207	0.250	0.375	8888300*	
521	3.000	3.364	3.209	0.122	0.187	8885410	
860	3.000	3.375		0.187	0.281	6955280	
842	3.000	3.375	3.245	0.220	0.362	0.079	4543400
36	3.000	3.380	3.130	0.240			2230000
425	3.000	3.495	3.135	0.281	0.360		6666354
33	3.000	3.500	3.300	0.125	0.375		0951300
35	3.000	3.500	3.437	0.234	0.312		CSW300
520	3.000	3.500	3.332	0.250	0.375		8881910
862	3.000	3.500		0.313			6960130
41	3.000	3.525	3.190	0.255	0.468		WK3000
424	3.000	3.750		0.375			MRW3000A
424	3.000	4.000		0.500			MRW3000B
421	3.125	3.489	3.334	0.122	0.203		8897000*
842	3.125	3.500	3.370	0.220	0.362	0.079	4543100
420	3.125	3.625	3.457	0.250	0.375		8888400*
41	3.125	3.645	3.315	0.255	0.468		WK3125
421	3.250	3.614	3.459	0.122	0.203		8885500
842	3.250	3.625	3.495	0.220	0.362	0.079	4721400
36	3.250	3.650	3.390	0.250			2283800
425	3.250	3.745	3.385	0.281	0.360		6666355
35	3.250	3.750	3.687	0.234	0.312		CSW325
520	3.250	3.750	3.582	0.250	0.375		8882010
41	3.250	3.750	3.440	0.255	0.468		WK3250
862	3.250	3.750		0.313			6960140
862	3.250	3.875		0.313			6960150
33	3.250	4.000	3.650	0.187	0.500		1472500
424	3.250	4.000		0.250			MRW3250B
424	3.250	4.250		0.500			MRW3250C
421	3.375	3.729	3.584	0.122	0.203		8885600
842	3.375	3.750	3.620	0.220	0.362	0.079	4554700
420	3.375	3.875	3.707	0.250	0.375		8887600*
33	3.375	4.125	3.775	0.187	0.500		1474200*
521	3.500	3.864	3.709	0.122	0.187		8885710
36	3.500	3.920	3.640	0.270			2247500

Type	Ød ₁	ØD ₁	NOMINALS			PART No.	
			ØD ₂	L ₁	L ₂	h	
425	3.500	3.995	3.635	0.281	0.360		6666356
35	3.500	4.000	3.937	0.234	0.312		CSW3500
520	3.500	4.000	3.832	0.250	0.375		8882110
862	3.500	4.000		0.313			6960160
41	3.500	4.025	3.690	0.255	0.468		WK3500
862	3.500	4.125		0.313			6960170
33	3.500	4.250	3.900	0.187	0.500		1445000
424	3.500	4.250		0.312			MRW3500B
424	3.500	4.500		0.500			MRW3500C
421	3.625	3.989	3.834	0.122	0.203		8885800
842	3.625	4.000	3.870	0.220	0.362	0.079	4543000
420	3.625	4.125	3.957	0.250	0.375		8888500*
421	3.750	4.114	3.959	0.122	0.203		8885900
842	3.750	4.125	3.995	0.220	0.362	0.079	4708300
425	3.750	4.245	3.885	0.281	0.360		6666357
420	3.750	4.250	4.082	0.250	0.375		8882200
520	3.750	4.250	4.082	0.250	0.375		8882210
41	3.750	4.250	3.940	0.255	0.468		WK3750
424	3.750	4.250		0.312			MRW3750A
862	3.750	4.375		0.313			6960180
424	3.750	4.500		0.312			MRW3750B
424	3.750	4.750		0.500			MRW3750C
421	3.875	4.239	4.087	0.122	0.203		8886000
842	3.875	4.250	4.120	0.220	0.362	0.079	4523600
520	3.875	4.375	4.207	0.250	0.375		8888810
842	4.000	4.375	4.245	0.220	0.362	0.079	4708400
421	4.000	4.427	4.240	0.138	0.218		8886100
521	4.000	4.427	4.240	0.138	0.218		8886110
425	4.000	4.495	4.135	0.281	0.360		6666358
35	4.000	4.500	4.437	0.234	0.312		CSW400
520	4.000	4.500	4.332	0.250	0.375		8882310
41	4.000	4.525	4.190	0.255	0.468		WK4000
862	4.000	4.625		0.313			6960190
33	4.000	4.750	4.400	0.187	0.500		1453300
862	4.000	4.750		0.313			6960200



Wiper seals
inch

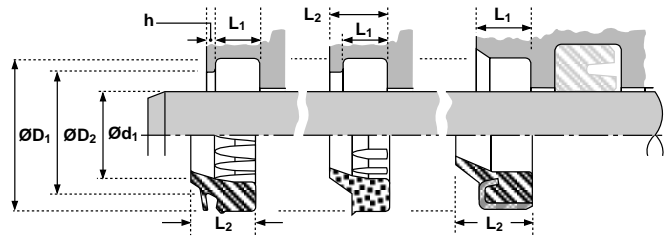


Type	Ød ₁	ØD ₁	NOMINALS		ØD ₂	L ₁	L ₂	h	PART No.
862	4.000	5.000				0.500		6960210	
421	4.125	4.552	4.365	0.138	0.218			8897100*	
420	4.125	4.625	4.457	0.250	0.375			8888600*	
421	4.250	4.677	4.490	0.138	0.218			8886200	
520	4.250	4.750	4.582	0.250	0.375			8882410	
41	4.250	4.775	4.440	0.255	0.468			WK4250	
424	4.250	4.875		0.312				MRW4250	
421	4.375	4.802	4.615	0.138	0.218			8897200*	
420	4.375	4.875	4.707	0.250	0.375			8887900*	
842	4.375	4.875		0.312				4707800	
421	4.500	4.927	4.740	0.138	0.218			8886300	
425	4.500	4.995	4.635	0.281	0.375			6666690	
41	4.500	5.025	4.690	0.255	0.468			WK4500	
862	4.500	5.125		0.313				6960220	
33	4.500	5.250	4.900	0.187	0.500			1613600	
424	4.500	5.250		0.312				MRW4500A	
520	4.500	5.250	4.998	0.375	0.562			8882510	
862	4.500	5.500		0.500				6960230	
421	4.625	5.052	4.865	0.138	0.218			8897300*	
420	4.625	5.375	5.125	0.375	0.562			8888700	
421	4.750	5.177	4.990	0.138	0.218			8886400	
842	4.750	5.250	5.090	0.312	0.472			4547300	
41	4.750	5.275	4.940	0.255	0.468			WK4750	
424	4.750	5.375		0.312				MRW4750	
520	4.750	5.500	5.248	0.375	0.562			8887310	
424	4.750	5.750		0.500				MRW4750A	
421	4.875	5.300	5.115	0.138	0.218			8897400*	
420	4.875	5.625	5.375	0.375	0.562			8888900*	
421	5.000	5.427	5.240	0.138	0.218			8886500	
425	5.000	5.495	5.135	0.281	0.375			6666691	
520	5.000	5.500	5.332	0.250	0.375			8887910	
842	5.000	5.500	5.345	0.312	0.472	0.080		4708500	
41	5.000	5.525	5.190	0.255	0.468			WK5000	
862	5.000	5.625		0.313				6960240	
33	5.000	5.750	5.400	0.187	0.500			0258600	

Type	Ød ₁	ØD ₁	NOMINALS		ØD ₂	L ₁	L ₂	h	PART No.
424	5.000	5.750				0.312		MRW5000A	
520	5.000	5.750	5.498	0.375	0.562			8882610	
862	5.000	6.000		0.500				6960250	
421	5.125	5.552	5.365	0.138	0.218			8886600	
421	5.250	5.667	5.490	0.138	0.218			8897500*	
842	5.250	5.750	5.590	0.312	0.472	0.080		4707900	
41	5.250	5.770	5.440	0.255	0.468			WK5250	
520	5.250	6.000	5.748	0.375	0.562			8882710	
421	5.375	5.802	5.615	0.138	0.218			8897600*	
421	5.500	5.927	5.740	0.138	0.218			8886700	
425	5.500	5.995	5.635	0.281	0.375			6666692	
41	5.500	6.020	5.690	0.255	0.468			WK5500	
33	5.500	6.250	5.900	0.187	0.500			0223500	
520	5.500	6.250	5.998	0.375	0.562			8882810	
421	5.625	6.114	5.897	0.154	0.250			8897700*	
421	5.750	6.239	6.022	0.154	0.250			8897800*	
842	5.750	6.250	6.090	0.312	0.472			4547400	
420	5.750	6.500	6.250	0.375	0.562			8889000*	
421	5.875	6.364	6.147	0.154	0.250			8897900*	
421	6.000	6.489	6.272	0.154	0.250			8886800	
520	6.000	6.500	6.332	0.250	0.375			8888010	
842	6.000	6.500	6.340	0.312	0.472	0.080		4708600	
41	6.000	6.520	6.190	0.255	0.468			WK6000	
424	6.000	6.625		0.375				MRW6000	
33	6.000	6.750	6.400	0.187	0.500			0222500	
520	6.000	6.750	6.498	0.375	0.562			8882910	
421	6.250	6.739	6.522	0.154	0.250			8898000*	
420	6.250	7.000	6.750	0.375	0.562			8883000	
842	6.250	7.000	6.745	0.500	0.740	0.100		4708000	
421	6.500	6.989	6.775	0.154	0.250			8886900	
420	6.500	7.250	7.000	0.375	0.562			8883100	
33	6.500	7.500	7.000	0.250	0.625			1613100	
421	6.750	7.239	7.022	0.154	0.250			8898200*	
842	6.750	7.250	7.090	0.312	0.472			4547500	
420	6.750	7.500	7.250	0.375	0.562			8888000*	



Wiper seals inch

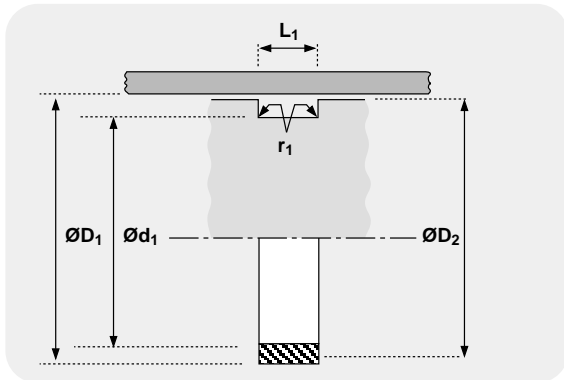


Type	NOMINALS		NOMINALS				PART No.
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂	h	
421	7.000	7.489	7.272	0.154	0.250		8887000
425	7.000	7.495	7.135	0.281	0.375		6666693
520	7.000	7.500	7.332	0.250	0.375		8888310
842	7.000	7.500	7.340	0.312	0.472	0.080	4708700
520	7.000	7.750	7.498	0.375	0.562		8883210
842	7.000	7.750	7.495	0.500	0.740	0.100	4588400
33	7.000	8.000	7.500	0.250	0.625		1614600
421	7.250	7.739	7.522	0.154	0.250		8898300*
420	7.250	8.000	7.750	0.375	0.562		8889100*
421	7.500	7.989	7.772	0.154	0.250		8898400*
420	7.500	8.250	8.000	0.375	0.562		8889200*
421	7.750	8.239	8.022	0.154	0.250		8898500*
842	7.750	8.250	8.090	0.312	0.472	0.080	4547600
420	7.750	8.500	8.250	0.375	0.562		8889300*
421	8.000	8.489	8.272	0.154	0.250		8887100
842	8.000	8.500	8.340	0.312	0.472	0.080	4708800
520	8.000	8.750	8.498	0.375	0.562		8883310
33	8.000	9.000	8.500	0.250	0.625		0786500
520	8.125	8.625	8.457	0.250	0.375		8888410
420	8.250	9.000	8.750	0.375	0.562		8888100*
421	8.500	8.989	8.772	0.154	0.250		8898600*
420	8.500	9.250	9.000	0.375	0.562		8883400*
842	8.750	9.250	9.090	0.312	0.472	0.080	4536700
420	8.750	9.500	9.250	0.375	0.562		8889400*
421	9.000	9.489	9.272	0.154	0.250		8898700*
420	9.000	9.750	9.500	0.375	0.562		8889500
421	9.500	9.989	9.772	0.154	0.250		8898800*
421	10.000	10.489	10.272	0.154	0.250		8898900*
420	10.000	11.000	10.659	0.500	0.750		8889600
421	10.500	10.989	10.772	0.154	0.250		8899000*
421	11.000	11.489	11.272	0.154	0.250		8899100*
420	11.000	12.000	11.659	0.500	0.750		8889700
421	11.500	11.989	11.772	0.169	0.250		8899200*
420	12.000	13.000	12.659	0.500	0.750		8889800*

Bearings

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	5.0 m/sec	15.0 ft/sec	
MAXIMUM TEMPERATURE	-40°C + 110°C	-40°F + 230°F	
TYPICAL PHYSICAL PROPERTIES			
SPECIFIC GRAVITY	1.41	1.41	
COEFFICIENT OF THERMAL EXPANSION	1.1×10^{-4} per °C	1.9×10^{-4} per °K	
COMPRESSION STRESS to give 1% deflection	23°C 20MN/m ²	73°F 2900 p.s.i.	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE ØD ₁	0.1 ↔ 0.4	4 max	4 ↔ 16 5 ↔ 18
STATIC SEALING FACE Ød ₁ L ₁	3.2 max 16 max	125 max 140 max	
CHAMFERS & RADII			
GROOVE SECTION ≤ S mm	2.5 3.2 3.8		
MAX FILLET RAD r ₁ mm	0.4 0.4 0.8		
GROOVE SECTION ≤ S in	0.100 0.125 0.150		
MAX FILLET RAD r ₁ in	0.016 0.016 0.032		
TOLERANCES			
	ØD ₁	Ød ₁	ØD ₂ L ₁
mm	H11	f9	see note below +0.2 +0
in	H11	f9	see note below +0.008 +0

63



DESIGN

Manufactured in polyacetal resin, the Hallite 63 bearing ring is extremely versatile, offering very low friction and excellent resistance to abrasion and wear.

They can be used in conjunction with almost any Hallite piston seal.

FEATURES

- STEEL PISTON
- COMPACT
- EASE OF ASSEMBLY
- IMPROVED ALIGNMENT
- LONGER SEAL LIFE
- INEXPENSIVE

PISTON DIAMETER D₂

Where a seal is used, this dimension is critical and must be within specified extrusion gap relative to the seal.

Where a seal is not used:

$$\text{ØD}_2 (\text{min}) = \text{ØD}_1 - 1.00\text{mm} (0.040")$$

Note : Due to the nature of the material, these rings should not be used primarily as a bearing where severe knuckling and / or excessive side loading may occur. Under these conditions the use of a heavier duty and wider bearing, such as the Hallite 506, is recommended.

Bearings

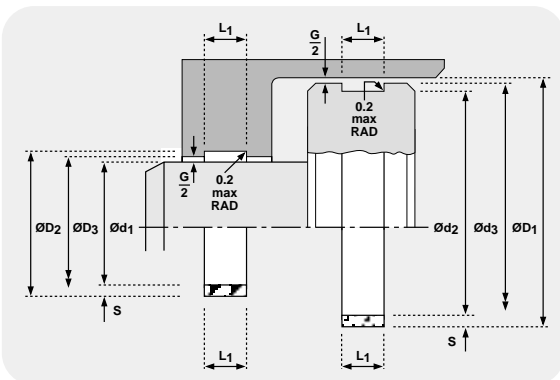


78

	METRIC	INCH
TECHNICAL DETAILS		
OPERATING CONDITIONS		
MAXIMUM SPEED	5.0 m/sec	15.0 ft/sec
MAXIMUM TEMPERATURE	-50°C + 200°C	-58°F + 390°F
TYPICAL PHYSICAL PROPERTIES		
SPECIFIC GRAVITY	3.1	3.1
COMPRESSION STRESS AT YIELD	23°C 20 MN/m ²	73°F 2900 p.s.i.
COMPRESSION STRESS AT YIELD	80°C 9 MN/m ²	176°F 1300 p.s.i.
COEFFICIENT OF THERMAL CONDUCTIVITY	2.5 W/mK	1.4Btu/hft°F
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		
DYNAMIC SEALING FACE Ød ₁ ØD ₁	µmRa 0.4	µmRt 4 max
STATIC HOUSING FACES ØD ₁ L ₁ ØD ₂	3.2 max	16 max
		µinCLA µinRMS
		16 18
		125 max 140 max
HOUSING DETAILS & TOLERANCES		

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.

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



FEATURES

- LOW FRICTION
- INFINITE LENGTH RANGE
- EASY INSTALLATION
- EXTREMELY FLEXIBLE

DESIGN

Hallite 78 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 78 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.

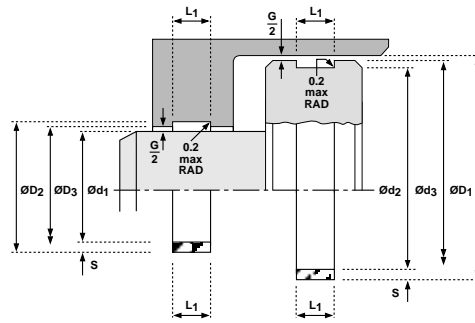
Please send us details of your application for advice on this or any other problem where the Hallite 78 may solve your bearing problem.



Bearings

87

metric - section range



L ₁	S	PART NUMBER
2.3	1.50	8611910
2.5	1.55	6663000
3.8	1.50	8624400
4.0	1.55	6663100
5.6	2.50	6663200
6.0	1.50	8616000
6.1	2.00	0610020
6.1	2.50	0610025
6.1	4.00	0610040
7.0	3.00	0700030
7.9	2.50	0790025
8.0	2.00	8616100
8.0	2.50	8640000
9.7	2.50	6658800
9.7	4.00	0970040
10.0	2.00	6663300
10.0	2.50	8642400
10.0	3.00	8644900
12.0	2.00	8638000
12.0	2.50	8638600
12.0	4.00	8657200
14.8	2.50	0148025
14.8	4.00	0148040
15.0	2.00	6663400
15.0	2.50	6658900
20.0	2.00	6663500
20.0	2.50	6663600
20.0	3.00	8639000
20.0	4.00	0200040
25.0	2.00	8635900
25.0	2.50	6663700
25.0	3.00	8610900
30.0	2.00	8636000
30.0	3.00	8646300
35.0	2.00	8637100
40.0	2.50	8637400
50.0	2.00	8635300
50.0	4.00	8637500
60.0	2.00	8637200

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 = $\pi \times (\text{CYLINDER BORE DIAMETER} - \text{STRIP SECTION}) - \text{REQUIRED SPLIT}$

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

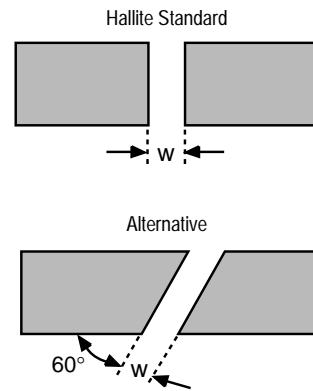
For gland mounting :

THE DEVELOPED LENGTH = $\pi \times (\text{ROD DIAMETER} + \text{STRIP SECTION}) - \text{REQUIRED SPLIT}$

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

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

Bearing strip cutting angle

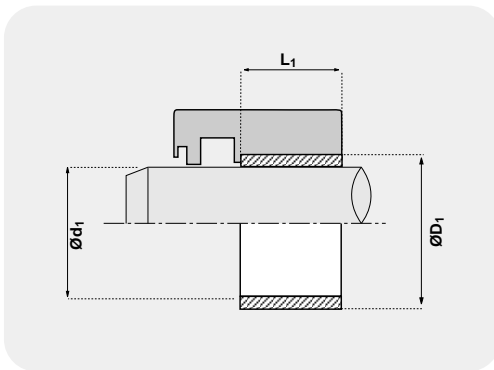


Dry Bearing (DU) Bush

406



TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	4.0 m/sec	12.0 ft/sec	
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 \leftrightarrow 0.4	μmRt 4 max	μinCLA 4 \leftrightarrow 16 μinRMS 5 \leftrightarrow 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
RADI			
MAX FILLET RAD r_1 mm	0.4		
MAX FILLET RAD r_2 mm	0.2		
TOLERANCES			
$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1
mm	f9	H11	H11 +0.2 -0



DESIGN

The DU bush is a thin-walled steel bush, axially split, with its inside diameter bronzeplated then PTFE coated. The bush can be used in dry environments and is ideal as a rod guide bearing in hydraulic cylinders. It can be fitted between the rod seal and the rod wiper, or on the pressure side of the rod seal.

The PTFE coating has a very low coefficient of friction to help eliminate stick-slip, particularly in low speed applications, and it is impervious to almost any chemical attack.

The bush is axially split to facilitate fitting, however an appropriate tool should be used on a press.

FEATURES

- Maintains a low coefficient of friction (0,04-0,18) and is usable without lubrication in high load, low speed operations.
- Excellent wear resistance.
- Wide application temperature range. (-195 °C to +270 °C)
- Satisfactory for rotating, oscillating and reciprocating motion with excellent dimensional stability.
- Excellent resistance against almost any chemical attack.
- Thin wall thickness and lightweight construction enables compact housing.
- Similar static and dynamic friction with elimination of stick-slip at very low sliding speeds.
- Various standard items are available for prompt delivery.
- Relatively inexpensive.

Bearings

TECHNICAL DETAILS

METRIC

INCH



OPERATING CONDITIONS

TEMPERATURE RANGE		-40° C + 120° C		-40° F + 250° F	
LIMITING PV VALUES LUBRICATED*		Speed m/sec	Pressure MN/m ²	Speed ft/sec	Pressure p.s.i.
		0.1	10.0	0.3	1500
		1.0	6.0	3.0	900
		5.0	0.8	16.0	120

TYPICAL PHYSICAL PROPERTIES

SPECIFIC GRAVITY		1.27	1.27
COMPRESSION STRESS AT FAILURE	(Temp 23° C)	450 MN/m ²	(Temp 73° F) 65,000 p.s.i.
COMPRESSION STRESS AT YIELD*	(Temp 23° C)	115 MN/m ²	(Temp 73° F) 16,500 p.s.i.
COMPRESSION STRESS AT YIELD*	(Temp 80° C)	58 MN/m ²	(Temp 176° F) 8,500 p.s.i.
COEFFICIENT OF THERMAL CONDUCTIVITY		0.27 W/mK	0.16 Btu/hft °F
COEFFICIENT OF THERMAL EXPANSION	Length	9 X 10 ⁻⁵ per °C	Length 5 X 10 ⁻⁵ per °F
	Thickness	13 X 10 ⁻⁵ per °C	Thickness 7.3 X 10 ⁻⁵ per °F
COEFFICIENT OF DYNAMIC FRICTION	Dry	Lubricated	Dry Lubricated
on steel surface (0.2 µm Ra) / (8 µin CLA)	0.50	0.06	0.50 0.06

SURFACE ROUGHNESS

	µm Ra	µm Rt	µin CLA	µin RMS
DYNAMIC SEALING FACE Ød ₁	0.4	4 max	16	18
STATIC SEALING FACE ØD ₁ L ₁	3.2 max	16 max	125 max	140 max

BEARING STRIP TOLERANCES

L ₁	S	L ₁	S
-0.1 to -0.6	-0.02 to -0.1	-0.005 to -0.015	-0.001 to -0.004

WIDTH OF BEARING SPLIT - W

Ød ₁ / ØD ₁	W	Ød ₁ / ØD ₁	W
Up to 50	3.00 - 1.50	Up to 2"	0.12 - 0.06
Up to 120	5.00 - 3.50	Up to 5"	0.19 - 0.14
Up to 250	9.00 - 7.25	Up to 10"	0.35 - 0.29
Up to 550	17.00 - 15.00	Up to 22"	0.67 - 0.59

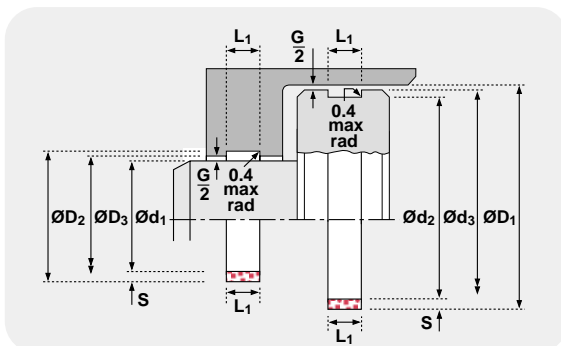
HOUSING DETAILS & TOLERANCES

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 can be 0.6 x S

ROD		PISTON	
Ød ₁	f9	ØD ₁	H11
ØD ₂ = Ød ₁ + 2S	up to : Ø80 H10 above : Ø80 H9	ØD ₂ = ØD ₁ + 2S	up to : Ø3in H10 above : Ø3in H9
ØD ₃ = Ød ₁ + G	G min / max + 0.2 - 0 mm	ØD ₃ = ØD ₁ + G	G min / max + 0.008 - 0 in
L ₁		L ₁	
ØD ₁	H11	ØD ₁	H11
Ød ₂ = ØD ₁ - 2S	f9	Ød ₂ = ØD ₁ - 2S	f9
Ød ₃ = ØD ₁ + G	G min / max + 0.2 - 0 mm	Ød ₃ = ØD ₁ + G	G min / max + 0.008 - 0 in
L ₁		L ₁	



* 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.

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.

Bearings

506



Hallite 506 bearing strip is available in three forms:

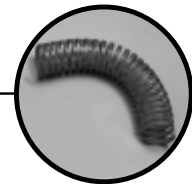
CUT RINGS

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.



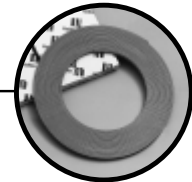
SPIRAL LENGTHS

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.

Cutting bearing strip to size

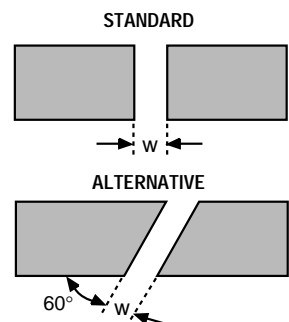
1. Select the groove width (L_1) and section (S) required.
2. In the case of a rod bearing, position the bearing strip around the rod or in the case of a piston bearing, place it in the piston groove and mark the point of overlap. Determine the correct width of bearing split (W) for the $\varnothing d$ 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.

FEATURES

- HIGH LOAD CAPABILITY
- INFINITE LENGTH RANGE
- VIRTUALLY ZERO SWELL
 - SELF LUBRICATING
 - LOW FRICTION
 - CUT TO LENGTH
- VERY LARGE RANGE OF SIZES

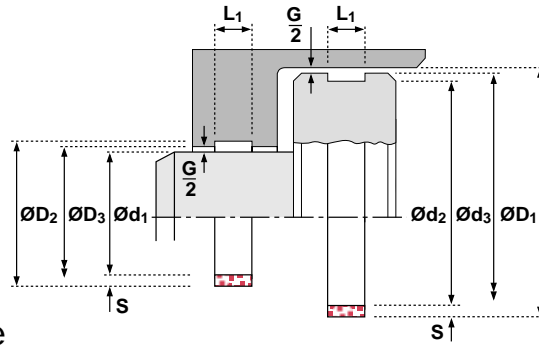
Bearing split cutting angle



Bearings

506

metric - section range



inch - section range

S	L ₁
1.50	5.60
2.00	9.70
2.00	10.00
2.00	15.00
2.50	5.60 ‡
2.50	6.30 ‡
2.50	7.00
2.50	8.00 ‡
2.50	9.70
2.50	13.00
2.50	15.00 ‡

S	L ₁
2.52	19.50
2.50	20.00
2.52	30.00
2.77	15.00 **
2.77	20.00 **
2.77	25.00 **
3.00	9.70
3.00	12.80
3.00	20.00
3.02	15.00
3.20	9.70

S	L ₁
3.20	19.70
3.50	25.00
4.00	6.10
4.00	9.70
4.00	20.00
4.00	25.00 ‡
4.00	30.00
4.00	40.10

S	L ₁
0.062	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

** Denotes non standard product.
Within the size range, items
suffixed ‡ indicate cross sections
to ISO 10766.

metric - spiral lengths

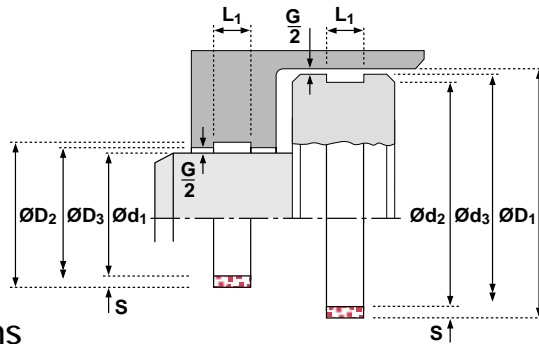
Ø RANGE		S	L ₁	G MAX	G MIN	PART No.
Ød ₁	ØD ₁					
25 - 41	45 - 90	2.0	10.0		0.7	8501310
35 - 70	74 - 160	2.0	10.0		0.7	8502610
70 - 155	159 - 310	2.0	10.0		0.7	8502252
35 - 50	54 - 110	2.0	15.0		0.7	8503357
50 - 100	104 - 210	2.0	15.0		0.7	8503175
90 - 180	184 - 370	2.0	15.0		0.7	8503358
25 - 30	35 - 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‡
		2.5	6.3			
25 - 40	45 - 90	2.5	9.7		0.7	8502100‡
35 - 70	75 - 150	2.5	9.7		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
50 - 100	106 - 210	3.0	9.7		0.8	8503370

AS REQUIRED BY THE
SEAL EXTRUSION GAP
For applications not using a seal
G MAX can be 1.6mm.

Bearings

506

metric - spiral lengths



Ø RANGE		S	L ₁	G MAX	G MIN	PART No.
Ød ₁	ØD ₁					
100 - 150	156 - 310	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	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	40.0	0.8	8503179	
200 - 300	308 - 610	4.0	40.0	0.8	8503180	

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

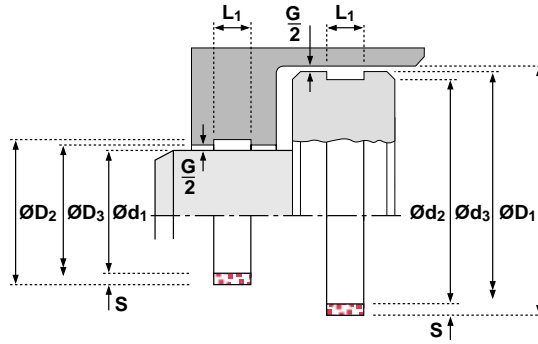
inch - spiral lengths

Ø RANGE		S	L ₁	G MAX	G MIN	PART No.
Ød ₁	ØD ₁					
1.000 - 1.375	2.625 - 3.500	0.125	0.375	AS REQUIRED BY THE SEAL EXTRUSION GAP For applications not using a seal G MAX can be 0.080in.	0.031	8502098
1.250 - 1.875	2.125 - 4.250	0.125	0.375		0.031	8502099
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	0.375		0.031	8502183
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		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
		0.125	1.500		0.031	8503768

Bearings

506

metric - flat coils



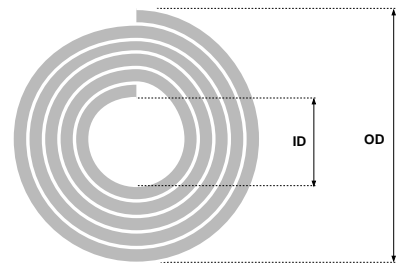
ID	Ø RANGE	OD	S	L ₁	G MAX	G MIN	PART No.
140	210		2.0	15.0	AS REQUIRED BY THE SEAL EXTRUSION GAP For applications not using a seal G MAX can be 1.6mm / 0.080in.	0.7	8581210
140	230		2.5	5.6		0.7	8580010‡
140	230		2.5	9.7		0.7	8580110‡
140	230		2.5	13.0		0.7	8581110
140	230		2.5	15.0		0.7	8580210‡
140	230		2.5	20.0		0.8	8580310
140	230		2.5	25.0		0.8	8580410‡
140	240		3.0	12.8		0.7	8581010

inch - flat coils

5.500	9.750		0.125	0.375		0.031	8580510
5.500	9.750		0.125	0.500		0.031	8580610
5.500	9.750		0.125	0.625		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.

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.

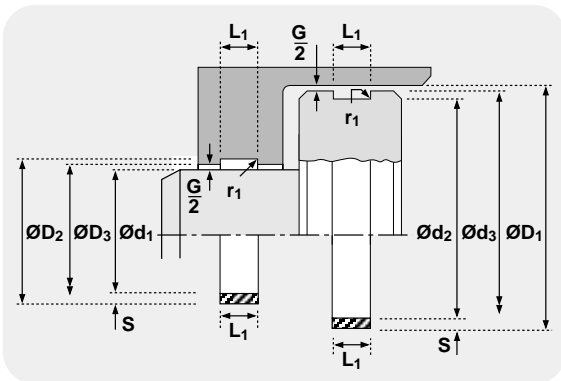


Bearings

533



TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	5.0 m/sec	15.0 ft/sec	
TEMPERATURE RANGE	-40°C + 120°C	-40°F + 250°F	
SURFACE ROUGHNESS			
ROD	DYNAMIC SEALING FACE $\varnothing d_1$	μmRa	μmRt
	STATIC SEALING FACE $\varnothing D_2$ L_1	0.4	4 max
		3.2 max	16 max
PISTON	DYNAMIC SEALING FACE $\varnothing D_1$	0.4	4 max
	STATIC SEALING FACE $\varnothing d_2$ L_1	3.2 max	16 max
			μmCLA μmRMS
			16 18
			125 max 140 max
			16 18
			125 max 140 max
HOUSING DETAILS & TOLERANCES			
	L_1 in	+0.015 +0.010	
	r_1 in	0.016 max	
	ROD $\varnothing d_1$ in	f9	
	$\varnothing D_2$ in	$\varnothing d_1 + 2S$	+0.004 -0.000
	$\varnothing D_3$ in	$\varnothing d_1 + G$	
	PISTON $\varnothing D_1$ in	H11	
	$\varnothing d_2$ in	$\varnothing D_1 - 2S$	+0.000 -0.004
	$\varnothing d_3$ in	$\varnothing D_1 - G$	
	$\frac{1}{8}$ nominal cross sections - in	S = 0.126	G max 0.080 G min 0.031
	$\frac{3}{32}$ nominal cross sections - in	S = 0.093	G max 0.060 G min 0.031



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 (H.F.A) 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.

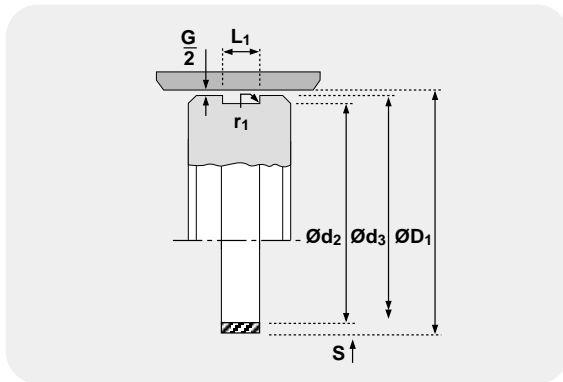
FEATURES

- MOULDED TO SIZE
- EASY INSTALLATION
- ROBUST
- LONG LIFE
- ECONOMICAL

Bearings

TECHNICAL DETAILS		METRIC		INCH	
OPERATING CONDITIONS					
MAXIMUM SPEED		5.0 m/sec		15.0 ft/sec	
TEMPERATURE RANGE		-40°C + 120°C		-40°F + 250°F	
SURFACE ROUGHNESS					
		µmRa	µmRt	µmCLA	µmRMS
ROD	DYNAMIC SEALING FACE Ød ₁	0.4	4 max	16	18
	STATIC SEALING FACE ØD ₂ L ₁	3.2 max	16 max	125 max	140 max
PISTON	DYNAMIC SEALING FACE ØD ₁	0.4	4 max	16	18
	STATIC SEALING FACE Ød ₂ L ₁	3.2 max	16 max	125 max	140 max
HOUSING DETAILS & TOLERANCES					
	L ₁ mm	+0.10 -0.00			
	r ₁ mm	0.30 max			
	PISTON ØD ₁ mm	H9			
	Ød ₂ mm	ØD ₁ max -2S		+0.00 -0.05	
	Ød ₃ mm	ØD ₁ - G			
		G min 0.80	G max 1.6		

910



DESIGN

Hallite 910 is a phenolic bearing ring moulded to size and scarf cut. The material is incredibly tough; it provides excellent support for pistons and rods, tolerates contamination and will even operate without lubrication.

Commonly fitted in reciprocating cylinders as piston bearings, Hallite 910 is capable of withstanding extreme side-loads, preventing metal-to-metal contact

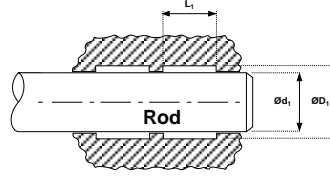
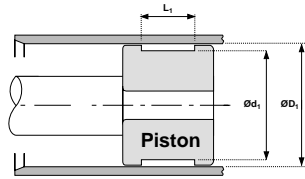
FEATURES

- INCREDIBLY TOUGH
- MACHINED TO SIZE
- EXCELLENT WEAR RESISTANCE
- CARRIES LUBRICATION
- CONTAMINATION TOLERANT

Notes



Bearings metric



533



406



910



533



406

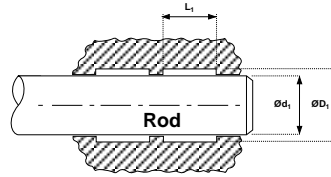
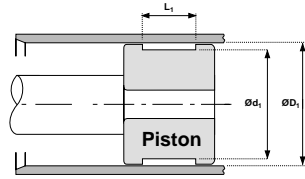


910

Type	ØD ₁	NOMINALS ød ₁	L ₁	PART No.
406	25.00	28.00	30.00	DU025030
406	30.00	34.00	30.00	DU030030
406	35.00	39.00	30.00	DU035030
533	40.00	34.92	14.90	F30333
406	40.00	44.00	30.00	DU040030
406	45.00	50.00	30.00	DU045030
406	45.00	50.00	50.00	DU045050
406	50.00	55.00	30.00	DU050030
406	50.00	55.00	35.00	DU050035
406	50.00	55.00	40.00	DU050040
406	55.00	60.00	30.00	DU055030
406	55.00	60.00	35.00	DU055035
406	55.00	60.00	40.00	DU055040
406	60.00	65.00	30.00	DU060030
406	60.00	65.00	40.00	DU060040
406	63.00	68.00	40.00	DU063040
406	65.00	70.00	30.00	DU065030
406	65.00	70.00	40.00	DU065040
406	65.00	70.00	60.00	DU065060
533	70.00	65.00	20.00	F30308
406	70.00	75.00	30.00	DU070030
406	70.00	75.00	35.00	DU070035
406	70.00	75.00	40.00	DU070040
406	75.00	80.00	30.00	DU075030
406	75.00	80.00	40.00	DU075040
406	75.00	80.00	60.00	DU075060
406	80.00	85.00	30.00	DU080030
406	80.00	85.00	40.00	DU080040
406	80.00	85.00	60.00	DU080060
406	85.00	90.00	40.00	DU085040
533	90.00	83.75	15.00	F30171
533	90.00	84.00	25.00	F30294
406	90.00	95.00	30.00	DU090030
406	95.00	95.00	35.00	DU095035
406	90.00	95.00	40.00	DU090040

Type	ØD ₁	NOMINALS ød ₁	L ₁	PART No.
910	95.00	89.00	15.00	9095005
406	95.00	100.00	35.00	DU095035
406	95.00	100.00	40.00	DU095040
406	95.00	100.00	60.00	DU095060
910	100.00	94.00	15.00	9100025
910	100.00	94.00	25.00	9100015
533	100.00	94.00	25.00	F30295
406	100.00	105.00	35.00	DU100035
406	100.00	105.00	40.00	DU100040
406	100.00	105.00	60.00	DU100060
406	105.00	110.00	40.00	DU105040
406	105.00	110.00	50.00	DU105050
533	110.00	103.75	15.00	F30173
910	110.00	104.00	15.00	9110025
910	110.00	104.00	25.00	9110015
533	110.00	104.00	25.00	F30297
533	110.00	105.00	7.90	F30312
406	110.00	115.00	40.00	DU110040
406	110.00	115.00	50.00	DU110050
406	110.00	115.00	60.00	DU110060
533	115.00	108.75	15.00	F30192
533	115.00	110.00	7.90	F30311
406	115.00	120.00	35.00	DU115035
406	115.00	120.00	60.00	DU115060
910	120.00	114.00	15.00	9120025
910	120.00	114.00	25.00	9120005
533	120.00	115.00	7.90	F30310
406	120.00	125.00	50.00	DU120050
406	120.00	125.00	60.00	DU120060
533	125.00	118.75	20.00	F30174
910	125.00	119.00	15.00	9125005
406	130.00	135.00	50.00	DU130050
406	140.00	145.00	50.00	DU140050
406	150.00	155.00	50.00	DU150050
406	160.00	165.00	50.00	DU160050

Bearings inch



63



506



533



63



506

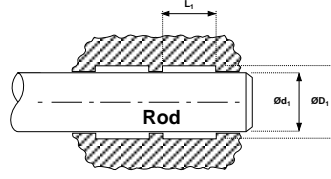
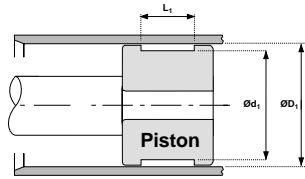


533

Type	----- $\varnothing D_1$	NOMINALS $\varnothing d_1$	----- L_1	PART No.
533	1.250	1.000	1.000	F30220
533	1.500	1.250	0.250	F30005
533	1.500	1.250	0.375	F30006
533	1.500	1.250	0.500	F30305
533	1.500	1.312	0.187	F30004
533	1.500	1.312	0.375	F30352
63	1.500	1.321	0.250	4533400
533	1.750	1.500	0.190	F30234
533	1.750	1.500	0.375	F30201
506	1.750	1.500	0.500	8502838
533	1.750	1.500	0.500	F30013
533	1.875	1.625	0.190	F30179
533	1.875	1.625	0.375	F30235
533	1.875	1.625	0.500	F30306
533	2.000	1.750	0.187	F40001
533	2.000	1.750	0.250	F30018
533	2.000	1.750	0.312	F30020
533	2.000	1.750	0.375	F30022
506	2.000	1.750	0.500	8502387
533	2.000	1.750	0.500	F30024
533	2.000	1.750	0.750	F30025
533	2.000	1.812	0.375	F30325
63	2.000	1.821	0.250	4259900
533	2.125	1.875	0.375	F20026
533	2.250	2.000	0.187	F40029
533	2.250	2.000	0.250	F30196
533	2.250	2.000	0.312	F30032
533	2.250	2.000	0.375	F30033
506	2.250	2.000	0.500	8502538
533	2.250	2.000	0.500	F30035
533	2.250	2.000	0.625	F30036
533	2.250	2.000	0.750	F30037
63	2.250	2.071	0.258	4286800
506	2.375	2.125	0.500	8502248
533	2.375	2.125	0.500	F30038

Type	----- $\varnothing D_1$	NOMINALS $\varnothing d_1$	----- L_1	PART No.
533	2.500	2.250	0.187	F30040
533	2.500	2.250	0.250	F30041
533	2.500	2.250	0.312	F30043
533	2.500	2.250	0.375	F30044
506	2.500	2.250	0.500	8502738
533	2.500	2.250	0.500	F30045
533	2.500	2.250	0.625	F30047
533	2.500	2.250	0.750	F30048
533	2.500	2.250	1.000	F30286
506	2.500	2.303	0.220	8502921
533	2.500	2.312	0.375	F30326
63	2.500	2.321	0.250	4272500
533	2.625	2.375	0.375	F20179
506	2.625	2.375	0.500	8502390
533	2.625	2.375	0.625	F30285
533	2.750	2.500	0.250	F30209
533	2.750	2.500	0.375	F30051
506	2.750	2.500	0.500	8502388
533	2.750	2.500	0.500	F30052
533	2.750	2.500	0.625	F30054
533	2.750	2.500	0.750	F30055
533	2.750	2.500	1.000	F30056
63	2.750	2.524	0.258	4287000
533	3.000	2.750	0.250	F30061
533	3.000	2.750	0.312	F30062
506	3.000	2.750	0.375	8502923
533	3.000	2.750	0.375	F30063
506	3.000	2.750	0.500	8502249
533	3.000	2.750	0.500	F30064
506	3.000	2.750	0.625	8502689
533	3.000	2.750	0.625	F30191
533	3.000	2.750	0.750	F30066
533	3.000	2.750	1.000	F30067
63	3.000	2.774	0.250	4193200
506	3.000	2.803	0.220	8502801

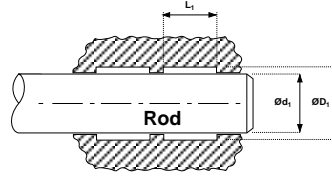
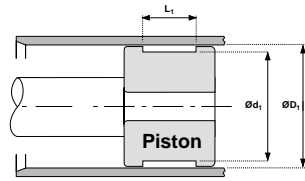
Bearings
inch



Type	ØD ₁	NOMINALS Ød ₁	L ₁	PART No.
533	3.000	2.812	0.375	F30327
506	3.125	2.875	1.000	8502885
533	3.250	3.000	0.250	F30207
533	3.250	3.000	0.312	F30259
533	3.250	3.000	0.375	F30069
506	3.250	3.000	0.500	8502391
533	3.250	3.000	0.500	F30070
533	3.250	3.000	0.625	F30287
533	3.250	3.000	0.750	F30072
533	3.250	3.000	1.000	F30074
63	3.250	3.024	0.250	4287200
506	3.250	3.053	0.220	8502802
533	3.250	3.062	0.375	F30353
506	3.437	3.187	0.625	8502135
533	3.500	3.250	0.250	F30079
533	3.500	3.250	0.312	F30255
533	3.500	3.250	0.375	F30080
506	3.500	3.250	0.500	8502389
533	3.500	3.250	0.500	F30083
533	3.500	3.250	0.625	F30085
533	3.500	3.250	0.750	F30087
533	3.500	3.250	1.000	F30275
63	3.500	3.274	0.250	4193400
506	3.500	3.303	0.220	8502803
533	3.500	3.312	0.375	F30328
533	3.625	3.375	0.500	F30090
533	3.625	3.375	1.000	F30091
533	3.750	3.500	0.250	F40027
533	3.750	3.500	0.312	F30260
533	3.750	3.500	0.375	F30092
506	3.750	3.500	0.500	8502250
533	3.750	3.500	0.500	F30093
533	3.750	3.500	0.625	F30094
533	3.750	3.500	0.750	F30095
63	3.750	3.524	0.258	4700000

Type	ØD ₁	NOMINALS Ød ₁	L ₁	PART No.
506	3.750	3.553	0.220	8502804
533	4.000	3.750	0.250	F30100
533	4.000	3.750	0.312	F30256
506	4.000	3.750	0.375	8502915
533	4.000	3.750	0.375	F30101
506	4.000	3.750	0.500	8502392
533	4.000	3.750	0.500	F30102
506	4.000	3.750	0.625	8502101
533	4.000	3.750	0.625	F30104
506	4.000	3.750	0.750	8502308
533	4.000	3.750	0.750	F30105
506	4.000	3.750	1.000	8502730
533	4.000	3.750	1.000	F30219
63	4.000	3.774	0.250	4177600
506	4.000	3.803	0.220	8502805
533	4.250	4.000	0.312	F30261
533	4.250	4.000	0.375	F30107
506	4.250	4.000	0.500	8502393
533	4.250	4.000	0.500	F30108
506	4.250	4.000	0.625	8502134
533	4.250	4.000	0.625	F30109
533	4.250	4.000	0.750	F30110
533	4.250	4.000	1.000	F30112
63	4.250	4.024	0.250	4318600
506	4.250	4.053	0.220	8502806
63	4.500	4.232	0.250	4264200
533	4.500	4.250	0.312	F30262
533	4.500	4.250	0.375	F30114
533	4.500	4.250	0.500	F30115
533	4.500	4.250	0.625	F30118
533	4.500	4.250	0.750	F30120
506	4.500	4.250	1.000	8502184
533	4.500	4.250	1.000	F30278
506	4.500	4.303	0.220	8502807
63	4.750	4.463	0.385	4700300

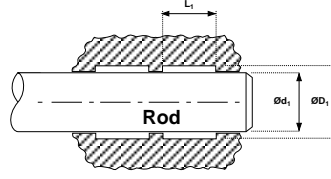
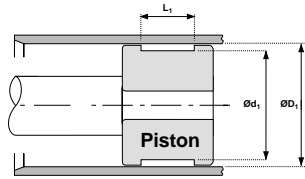
Bearings
inch



Type	$\varnothing D_1$	NOMINALS $\varnothing d_1$	L_1	PART No.
533	4.750	4.500	0.375	F30194
533	4.750	4.500	0.500	F30121
533	4.750	4.500	0.750	F30123
533	4.750	4.500	1.000	F30124
506	4.750	4.553	0.220	8502808
63	5.000	4.713	0.375	4267200
506	5.000	4.750	0.375	8502817
533	5.000	4.750	0.375	F30126
533	5.000	4.750	0.500	F30127
533	5.000	4.750	0.625	F30128
533	5.000	4.750	0.750	F30129
533	5.000	4.750	1.000	F30169
506	5.000	4.803	0.220	8502809
533	5.250	5.000	0.500	F30131
533	5.250	5.000	0.625	F30132
533	5.250	5.000	0.750	F30133
533	5.250	5.000	1.000	F30269
506	5.375	5.125	0.750	8502194
63	5.500	5.213	0.375	4260200
533	5.500	5.250	0.375	F30135
533	5.500	5.250	0.500	F30136
533	5.500	5.250	0.625	F30138
506	5.500	5.250	0.750	8502104
533	5.500	5.250	0.750	F30140
533	5.500	5.250	1.000	F30141
506	5.750	5.500	0.750	8502853
533	5.750	5.500	0.750	F30143
506	5.750	5.500	1.000	8502857
533	5.750	5.500	1.000	F30144
63	6.000	5.713	0.375	4267400
506	6.000	5.750	0.375	8502816
533	6.000	5.750	0.500	F30145
533	6.000	5.750	0.625	F30147
533	6.000	5.750	0.750	F30208
533	6.000	5.750	1.000	F30149

Type	$\varnothing D_1$	NOMINALS $\varnothing d_1$	L_1	PART No.
533	6.250	6.000	0.500	F30279
533	6.250	6.000	0.625	F30151
533	6.250	6.000	0.750	F30152
533	6.250	6.000	1.000	F30153
533	6.500	6.250	0.500	F30154
533	6.500	6.250	0.750	F30199
533	6.500	6.250	1.000	F30157
506	6.750	6.500	0.500	8502489
533	6.750	6.500	1.000	F30276
506	7.000	6.750	0.375	8502527
533	7.000	6.750	0.500	F30158
506	7.000	6.750	0.625	8502647
533	7.000	6.750	0.625	F30159
533	7.000	6.750	0.750	F30277
533	7.000	6.750	1.000	F30160
533	7.250	7.000	0.500	F30281
533	7.250	7.000	0.750	F30284
533	7.250	7.000	1.000	F30289
533	7.500	7.250	0.500	F30162
533	7.500	7.250	0.750	F30165
533	7.500	7.250	1.000	F30166
533	7.750	7.500	0.500	F20160
533	7.750	7.500	1.000	F30247
533	8.000	7.750	1.000	F30231
533	8.250	8.000	1.000	F30248
533	8.500	8.250	0.500	F30168
533	8.500	8.250	1.000	F30246
533	8.750	8.500	1.000	F30249
533	9.000	8.750	1.000	F30230
533	9.250	9.000	1.000	F30253
533	9.500	9.250	1.000	F30254
533	9.750	9.500	1.000	F30250
533	10.000	9.750	1.000	F30221
533	10.250	10.000	1.000	F30258
533	10.500	10.250	1.000	F30257

Bearings
inch



Type	NOMINALS			PART No.	
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂
533	11.000	10.750	1.000		F30222
533	11.250	11.000	1.000		F30251
533	11.500	11.250	1.000		F30252

Type	NOMINALS			PART No.	
	Ød ₁	ØD ₁	ØD ₂	L ₁	L ₂
533	12.000	11.750	1.000		F30223
533	13.000	12.750	1.000		F30224



* Possible indent item - minimum quantity may apply.
 † Designed to suite popular Asian housings.

Notes

Hallite 



O-rings

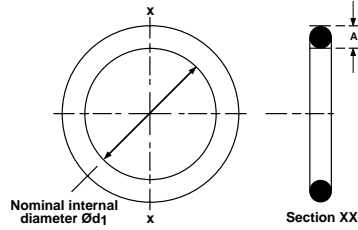
O-RINGS	
PROFILE	O-RING KITS
	01 Nitrile rubber (70 & 90 durometer Shore A) & Viton O-Rings. Full imperial range to BS1806; and American Standards AS568, AN6227 and AN6230. Comprehensive metric range to British Standard BS 4518; Japanese Standard JIS B2401 and German Standard DIN3770.
	05 Nitrile rubber (70 durometer) X seal. Large imperial range to BS1806.

DESCRIPTION	CONTENTS	PART No.
O-RING KITS		
Imperial assortment of 1/16", 3/32", 1/8" and 3/16" section 70 durometer Shore A Nitrile.	Total of 382 O-rings.	01-000/1
Imperial assortment of Boss Gasket O-Rings for tube fittings in 90 durometer Shore A Nitrile.	Total of 211 O-rings.	01-000/1B
Imperial assortment of 1/16", 3/32", 1/8" and 3/16" section 90 durometer Shore A Nitrile.	Total of 382 O-rings.	01-000/1N
Imperial assortment of 1/16", 3/32", 1/8" and 3/16" section 75 durometer Shore A Viton.	Total of 382 O-rings.	01-000/1V
Imperial assortment of 1/16" section 70 durometer Shore A Nitrile.	Total of 276 O-rings.	01-0002N7
Imperial assortment of 3/32" section 70 durometer Shore A Nitrile	Total of 218 O-rings.	01-0003N7
Metric assortment of 1, 2, 3, 4, and 5mm section 70 durometer Shore A Nitrile. (German Std.)	Total of 401 O-rings.	03-000/1
Metric assortment of 1.9, 2.4, 3.1, and 3.5mm section 70 durometer Shore A Nitrile. (Japanese Std.)	Total of 444 O-rings.	04-000/1
QUAD SEAL KIT		
Imperial assortment of 1/16", 3/32", 1/8" and 3/16" section 70 durometer Shore A Nitrile.	Total of 343 Quad seals.	05-000/1
BACK UP RING KIT		
Imperial assortment of 1/16", 3/32", 1/8" and 3/16" section 90 durometer Shore A Nitrile.	Total of 364 Back up rings.	02-000/1

O-rings

O-rings

O-rings



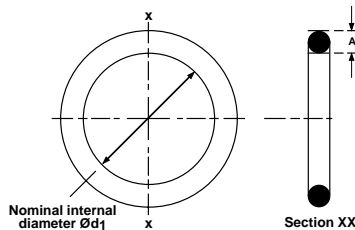
metric - Japanese standard O-rings

Nominal Ød ₁	Cross section A	Part No.	Nominal Ød ₁	Cross section A	Part No.	Nominal Ød ₁	Cross section A	Part No.	Nominal Ød ₁	Cross section A	Part No.
3	x 1.9	P003	42	x 3.5	P042	100	x 5.7	P100	185	x 8.1	P185
4	x 1.9	P004	44	x 3.5	P044	102	x 5.7	P102	190	x 5.7	G190
5	x 1.9	P005	45	x 3.1	G045	105	x 3.1	G105	190	x 8.4	P190
6	x 1.9	P006	45	x 3.5	P045	105	x 5.7	P105	195	x 5.7	G195
7	x 1.9	P007	46	x 3.5	P046	110	x 3.1	G110	195	x 8.4	P195
8	x 1.9	P008	48	x 3.5	P048	110	x 5.7	P110	200	x 5.7	G200
9	x 1.9	P009	48	x 5.7	P048A	112	x 5.7	P112	200	x 8.4	P200
10	x 1.9	P010	49	x 3.5	P049	115	x 3.1	G115	205	x 8.4	P205
10	x 2.4	P010A	50	x 3.1	G050	115	x 5.7	P115	209	x 8.1	P209
11	x 2.4	P011	50	x 3.5	P050	120	x 3.1	G120	210	x 5.7	G210
12	x 2.4	P012	50	x 5.7	P050A	120	x 5.7	P120	210	x 8.4	P210
14	x 2.4	P014	52	x 5.7	P052	125	x 3.1	G125	215	x 8.4	P215
15	x 2.4	P015	53	x 5.7	P053	125	x 5.7	P125	220	x 5.7	G220
16	x 2.4	P016	55	x 3.1	G055	130	x 3.1	G130	220	x 8.4	P220
18	x 2.4	P018	55	x 5.7	P055	130	x 5.7	P130	225	x 8.1	P225
20	x 2.4	P020	56	x 5.7	P056	132	x 5.7	P132	230	x 5.7	G230
21	x 2.4	P021	58	x 5.7	P058	135	x 3.1	G135	230	x 8.4	P230
22	x 2.4	P022	60	x 3.1	G060	135	x 5.7	P135	235	x 8.4	P235
22	x 3.5	P022A	60	x 5.7	P060	140	x 3.1	G140	240	x 5.7	G240
24	x 3.5	P024	62	x 5.7	P062	140	x 5.7	P140	240	x 8.4	P240
25	x 3.1	G025	63	x 5.7	P063	145	x 3.1	G145	245	x 8.4	P245
25	x 3.5	P025	65	x 3.1	G065	145	x 5.7	P145	250	x 5.7	G250
26	x 3.5	P026	65	x 5.7	P065	150	x 5.7	G150	250	x 8.4	P250
28	x 3.5	P028	67	x 5.7	P067	150	x 5.7	P150	255	x 8.4	P255
29	x 3.5	P029	70	x 3.1	G070	150	x 8.4	P150A	260	x 5.7	G260
30	x 3.1	G030	70	x 5.7	P070	155	x 5.7	G155	260	x 8.4	P260
30	x 3.5	P030	71	x 5.7	P071	155	x 8.4	P155	265	x 8.4	P265
31	x 3.5	P031	75	x 3.1	G075	160	x 5.7	G160	270	x 5.7	G270
32	x 3.5	P032	75	x 5.7	P075	160	x 8.4	P160	270	x 8.4	P270
34	x 3.5	P034	80	x 3.1	G080	165	x 5.7	G165	275	x 8.4	P275
35	x 3.1	G035	80	x 5.7	P080	165	x 8.4	P165	280	x 5.7	G280
35	x 3.5	P035	85	x 3.1	G085	170	x 5.7	G170	280	x 8.4	P280
36	x 3.5	P036	85	x 5.7	P085	170	x 8.4	P170	285	x 8.4	P285
38	x 3.5	P038	90	x 3.1	G090	175	x 5.7	G175	290	x 5.7	G290
39	x 3.5	P039	90	x 5.7	P090	175	x 8.4	P175	290	x 8.4	P290
40	x 3.1	G040	95	x 3.1	G095	180	x 5.7	G180	295	x 8.4	P295
40	x 3.5	P040	95	x 5.7	P095	180	x 8.4	P180	300	x 5.7	G300
41	x 3.5	P041	100	x 3.1	G100	185	x 5.7	G185	300	x 8.4	P300



O-rings

O-ring cord



Hallite

metric - Nitrile 70 durometer Shore A

Actual Section	PART No.	Actual Section	PART No.
1.5 mm	03-0000015	5.0 mm	03-0000050
2.0 mm	03-0000020	5.7 mm	03-0000057
2.4 mm	03-0000024	6.0 mm	03-0000060
2.5 mm	03-0000025	7.0 mm	03-0000070
3.0 mm	03-0000030	8.0 mm	03-0000080
3.5 mm	03-0000035	8.4 mm	03-0000084
4.0 mm	03-0000040	10.0 mm	03-0000100

inch - Nitrile 70 durometer Shore A

Actual Section	Nominal Section	PART No.
0.070	1/16	01-0000070
0.103	3/32	01-0000103
0.139	1/8	01-0000139
0.210	3/16	01-0000210
0.250		01-0000250
0.275	1/4	01-0000275
0.312		01-0000312
0.375		01-0000375
0.500		01-0000500

Note:

We also stock a very good range of German standard metric O-rings in the following cross-sections:

1.0 1.5 2.0 2.5 3.0 4.0 5.0

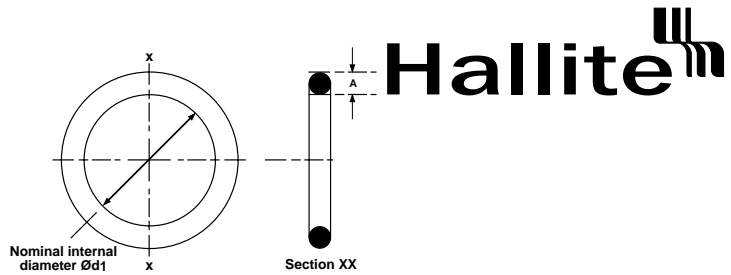
and in various compounds including 70 and 90 durometer Shore A nitrile, and 75 durometer fluorocarbon (viton®).

Section	ID Range
1.0 mm	2.0 - 22 mm
1.5 mm	3.0 - 30 mm
2.0 mm	4.0 - 100 mm
2.5 mm	5.0 - 100 mm
3.0 mm	6.0 - 250 mm
4.0 mm	8.0 - 200 mm
5.0 mm	15.0 - 200 mm



O-rings

O-rings



inch - British Standard BS 1806:1962 & American Standard AS568

Ød ₁	Cross section A				
	1/16"	3/32"	1/8"	3/16"	1/4"
0.031	001*				
0.047	002**				
0.062	003	102			
0.078	004				
0.093	005	103			
0.125	006	104			
0.156	007	105			
0.187	008	106	201		
0.218	009	107			
0.250	010	108	202		
0.312	011	109	203		
0.375	012	110	204		
0.437	013	111	205	309	
0.500	014	112	206	310	
0.562	015	113	207	311	
0.625	016	114	208	312	
0.687	017	115	209	313	
0.750	018	116	210	314	
0.812	019	117	211	315	
0.875	020	118	212	316	
0.937	021	119	213	317	
1.000	022	120	214	318	
1.062	023	121	215	319	
1.125	024	122	216	320	
1.187	025	123	217	321	
1.250	026	124	218	322	
1.312	027	125	219	323	
1.375	028	126	220	324	
1.437		127	221		
1.500	029	128	222	325	
1.562		129			
1.625	030	130	223	326	
1.687		131			
1.750	031	132	224	326	
1.812		133			
1.875	032	134	225	328	
1.937		135			
2.000	033	136	226	329	
2.062		137			
2.125	034	138	227	330	
2.187		139			
2.250	035	140	228	331	

Ød ₁	Cross section A				
	1/16"	3/32"	1/8"	3/16"	1/4"
2.312		141			
2.375	036	142	229	332	
2.437		143			
2.500	037	144	230	333	
2.562		145			
2.625	038	146	231	334	
2.687		147			
2.750	039	148	232	335	
2.812		149			
2.875	040	150	233	336	
3.000	041	151	234	337	
3.125			235	338	
3.250	042	152	236	339	
3.375			237	340	
3.500	043	153	238	341	
3.625			239	342	
3.750	044	154	240	343	
3.875			241	344	
4.000	045	155	242	345	
4.125			243	346	
4.250	046	156	244	347	
4.375			245	348	
4.500	047	157	246	349	425
4.625			247	350	426
4.750	048	158	248	351	427
4.875			249	352	428
5.000	049	159	250	353	429
5.125			251	354	430
5.250	050	160	252	355	431
5.375			253	356	432
5.500		161	254	357	433
5.625			255	358	434
5.750		162	256	359	435
5.875			257	360	436
6.000		163	258	361	437
6.250		164	259	362	438
6.500		165	260	363	439
6.750		166	261	364	440
7.000		167	262	365	441
7.250		168	263	366	442
7.500		169	264	367	443
7.750		170	265	368	444

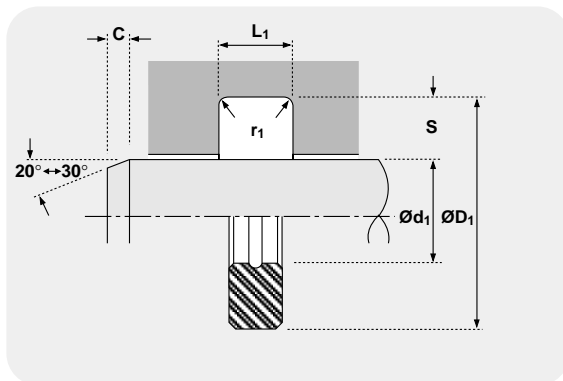
Ød ₁	Cross section A				
	1/16"	3/32"	1/8"	3/16"	1/4"
8.000		171	266	369	445
8.250		172	267	370	445A
8.500		173	268	371	446
8.750		174	269	372	446A
9.000		175	270	373	447
9.250		176	271	374	447A
9.500		177	272	375	448
9.750		178	273	376	448A
10.000			274	377	449
10.250					449A
10.500			275	378	450
10.750					450A
11.000			276	379	451
11.250					451A
11.500			277	380	452
11.750					452A
12.000			278	381	453
12.500					454
13.000			279	382	455
13.500					456
14.000			280	383	457
14.500					458
15.000			281	384	459
15.500					460
16.000			282	385	461
16.500					462
17.000			283	386	463
17.500					464
18.000			284	387	465
18.500					466
19.000				388	467
19.500					468
20.000				389	469
21.000				390	470
22.000				391	471
23.000				392	472
24.000				393	473
25.000				394	474
26.000				395	475

*1/32" section

**3/64" section

Rotary pressure seal

TECHNICAL DETAILS		METRIC	INCH
OPERATING CONDITIONS			
MAXIMUM SPEED	1.0 m/sec	3.0 ft/sec	
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F	
MAXIMUM PRESSURE	350 bar	5000 p.s.i.	
SURFACE ROUGHNESS			
DYNAMIC SEALING FACE $\varnothing d_1$	μmRa 0.1 ↔ 0.4	μmRt 4 max	μinCLA 4 ↔ 16 μinRMS 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	5.2		
MIN CHAMFER C mm	2.4		
MAX FILLET RAD r_1 mm	0.4		
TOLERANCES			
$\varnothing d_1$	$\varnothing D_1$	$\varnothing D_2$	L_1 mm
f8	H10	H8	+0.3 -0.0



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.

Please call your local Hallite sales office for further details.

metric

$\varnothing d_1$	TOL f8	$\varnothing D_1$	TOL H10	L_1 +0.3 -0.0	PART No.
80.00	-0.036 -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

Back up rings

Back up rings


BACK UP RINGS

PROFILE
BACK UP RING KITS




90

Endless PTFE back-up ring.
Large inch and metric range for Japanese, Swedish, and British Standard O-rings.



117

Endless composite nylon back-up ring for use with metric rod and piston seals.



480

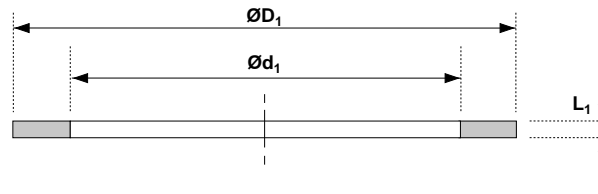
Nitrile rubber (90 durometer) contoured back up ring.
Full imperial range to suit British and American Standard O rings.

metric

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
90	25.00	30.00	1.25	G025BU
117	25.00	33.00	2.00	70-025033
117	25.00	35.00	2.00	70-025035
117	28.00	35.50	3.00	70-0280355
90	30.00	35.00	1.25	G030BU
117	30.00	40.00	3.00	70-030040
90	35.00	40.00	1.25	G035BU
117	35.00	45.00	3.00	70-035045
90	40.00	45.00	1.25	G040BU
117	40.00	50.00	3.00	70-040050
90	45.00	50.00	1.25	G045BU
117	45.00	55.00	3.00	70-045055
117	45.00	60.00	3.00	70-045060
117	48.00	63.00	3.00	70-048063
90	50.00	55.00	1.25	G050BU
90	50.00	60.00	1.80	P050ABU
117	50.00	60.00	3.00	70-050060
117	50.00	65.00	3.00	70-050065
117	50.00	70.00	3.00	70-050070
90	55.00	60.00	1.25	G055BU
90	55.00	65.00	1.80	P055BU
117	55.00	65.00	3.00	70-055065
117	55.00	70.00	3.00	70-055070
117	55.00	75.00	3.00	70-055075
90	60.00	65.00	1.25	G060BU
90	60.00	70.00	1.80	P060BU
117	60.00	70.00	3.00	70-060070
117	60.00	75.00	3.00	70-060075
117	60.00	80.00	3.00	70-060080

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
90	65.00	70.00	1.25	G065BU
90	65.00	75.00	1.80	P065BU
117	65.00	75.00	3.00	70-065075
117	65.00	78.00	3.00	70-065078
117	65.00	80.00	3.00	70-065080
117	65.00	85.00	3.00	70-065085
90	70.00	75.00	1.25	G070BU
90	70.00	80.00	1.80	P070BU
117	70.00	80.00	3.00	70-070080
117	70.00	83.00	3.00	70-070083
117	70.00	85.00	3.00	70-070085
117	70.00	90.00	3.00	70-070090
90	75.00	80.00	1.25	G075BU
90	75.00	85.00	1.80	P075BU
117	75.00	85.00	3.00	70-075085
117	75.00	90.00	3.00	70-075090
117	75.00	95.00	3.00	70-075095
90	80.00	85.00	1.25	G080BU
90	80.00	90.00	1.80	P080BU
117	80.00	90.00	3.00	70-080090
117	80.00	93.00	3.00	70-080093
117	80.00	95.00	3.00	70-080095
117	80.00	100.00	3.00	70-080100
90	85.00	90.00	1.25	G085BU
90	85.00	95.00	1.80	P085BU
117	85.00	100.00	3.00	70-085100
117	85.00	105.00	3.00	70-085105
90	90.00	95.00	1.25	G090BU
90	90.00	100.00	1.80	P090BU

Back-up rings metric



90



117



90

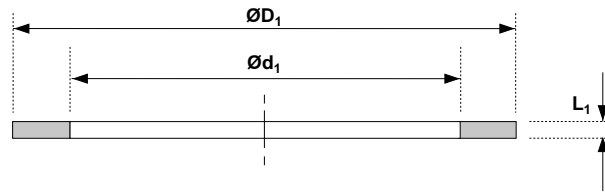


117

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
117	90.00	105.00	3.00	70-090105
117	90.00	110.00	3.00	70-090110
90	95.00	100.00	1.25	G095BU
90	95.00	105.00	1.80	P095BU
117	95.00	110.00	3.00	70-095110
117	95.00	115.00	3.00	70-95115
90	100.00	105.00	1.25	G100BU
90	100.00	110.00	1.80	P100BU
117	100.00	115.00	3.00	70-100115
117	100.00	120.00	3.00	70-100120
90	105.00	110.00	1.25	G105BU
90	105.00	115.00	1.80	P105BU
117	105.00	120.00	3.00	70-105120
117	105.00	125.00	3.00	70-105125
90	110.00	115.00	1.25	G110BU
90	110.00	120.00	1.80	P110BU
117	110.00	125.00	3.00	70-110125
117	110.00	130.00	3.00	70-110130
117	112.00	125.00	3.00	70-112125
90	115.00	120.00	1.25	G115BU
90	115.00	125.00	1.80	P115BU
117	115.00	130.00	3.00	70-115130
90	120.00	125.00	1.25	G120BU
90	120.00	130.00	1.80	P120BU
117	120.00	140.00	3.00	70-120140
90	125.00	130.00	1.25	G125BU
90	125.00	135.00	1.80	P125BU
117	125.00	140.00	3.00	70-125140
90	130.00	135.00	1.25	G130BU
90	130.00	140.00	1.80	P130BU
117	130.00	150.00	3.00	70-130150
90	135.00	140.00	1.25	G135BU

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
90	135.00	145.00	1.80	P135BU
90	140.00	145.00	1.25	G140BU
90	140.00	150.00	1.80	P140BU
117	140.00	160.00	3.00	70-140160
90	145.00	150.00	1.25	G145BU
90	150.00	160.00	1.80	G150BU
90	155.00	165.00	1.80	G155BU
90	160.00	170.00	1.80	G160BU
90	160.00	175.00	2.75	P160BU
117	160.00	180.00	4.00	70-160180
90	165.00	175.00	1.80	G165BU
90	170.00	180.00	1.80	G170BU
90	175.00	185.00	1.80	G175BU
90	180.00	190.00	1.80	G180BU
117	180.00	200.00	4.00	70-180200
90	185.00	195.00	1.80	G185BU
90	190.00	200.00	1.80	G190BU
117	190.00	210.00	4.00	70-190210
90	195.00	205.00	1.80	G195BU
90	200.00	210.00	1.80	G200BU
90	205.00	215.00	1.80	G205BU
90	210.00	220.00	1.80	G210BU
117	210.00	230.00	4.00	70-210230
90	220.00	230.00	1.80	G220BU
117	220.00	240.00	4.00	70-220240
90	230.00	240.00	1.80	G230BU
117	230.00	250.00	4.00	70-230250
90	240.00	250.00	1.80	G240BU
117	240.00	260.00	4.00	70-240260
90	250.00	260.00	1.80	G250BU
117	250.00	270.00	4.00	70-250270
90	260.00	270.00	1.80	G260BU

Back-up rings
inch



90



117



90

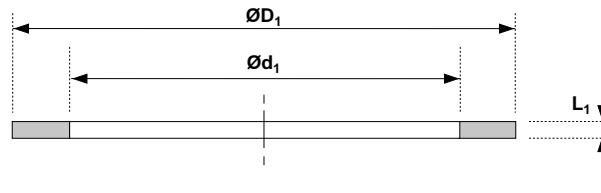


117

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
90	0.094	0.219	0.049	02-005T
90	0.125	0.250	0.049	02-006T
90	0.156	0.281	0.049	02-007T
90	0.187	0.312	0.049	02-008T
90	0.218	0.343	0.049	02-009T
90	0.250	0.375	0.049	02-010T
90	0.312	0.437	0.049	02-011T
90	0.375	0.500	0.049	02-012T
90	0.375	0.562	0.049	02-110T
90	0.375	0.625	0.049	02-204T
90	0.437	0.562	0.049	02-013T
90	0.437	0.625	0.049	02-111T
90	0.500	0.625	0.049	02-014T
90	0.500	0.687	0.049	02-112T
90	0.562	0.687	0.049	02-015T
90	0.562	0.750	0.049	02-113T
90	0.625	0.750	0.049	02-016T
90	0.625	0.812	0.049	02-114T
90	0.687	0.812	0.049	02-017T
90	0.687	0.875	0.049	02-115T
90	0.750	0.875	0.049	02-018T
90	0.750	0.937	0.049	02-116T
90	0.750	1.000	0.049	02-210T
90	0.812	0.937	0.049	02-019T
90	0.812	1.000	0.049	02-117T
90	0.812	1.062	0.049	02-211T
90	0.875	0.937	0.049	02-020T
90	0.875	1.062	0.049	02-118T
90	0.875	1.125	0.049	02-212T
90	0.937	1.125	0.049	02-119T
90	0.937	1.187	0.049	02-213T
90	1.000	1.187	0.049	02-120T
90	1.000	1.250	0.049	02-214T
90	1.062	1.250	0.049	02-121T
90	1.062	1.312	0.049	02-215T
90	1.125	1.312	0.049	02-122T
90	1.125	1.375	0.049	02-216T
90	1.187	1.375	0.049	02-123T

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
90	1.187	1.437	0.049	02-217T
90	1.250	1.437	0.049	02-124T
90	1.250	1.500	0.049	02-218T
90	1.312	1.500	0.049	02-125T
90	1.312	1.562	0.049	02-219T
90	1.375	1.562	0.049	02-126T
90	1.375	1.625	0.049	02-220T
90	1.437	1.625	0.049	02-127T
90	1.437	1.687	0.049	02-221T
90	1.500	1.687	0.049	02-128T
90	1.500	1.750	0.049	02-222T
90	1.500	1.875	0.070	02-325T
90	1.625	1.875	0.049	02-223T
90	1.625	2.000	0.070	02-326T
90	1.750	2.000	0.049	02-224T
90	1.750	2.125	0.070	02-327T
90	1.875	2.125	0.049	02-225T
90	1.875	2.250	0.070	02-328T
90	2.000	2.250	0.049	02-226T
90	2.000	2.375	0.070	02-329T
90	2.125	2.375	0.049	02-227T
90	2.125	2.500	0.070	02-330T
90	2.250	2.500	0.049	02-228T
90	2.250	2.625	0.070	02-331T
90	2.375	2.625	0.049	02-229T
90	2.375	2.750	0.070	02-332T
90	2.500	2.750	0.049	02-230T
90	2.625	2.875	0.049	02-231T
90	2.625	3.000	0.070	02-334T
90	2.750	3.000	0.049	02-232T
90	2.875	3.125	0.049	02-233T
90	2.875	3.250	0.070	02-336T
90	3.000	3.250	0.049	02-234T
90	3.125	3.375	0.049	02-235T
90	3.125	3.500	0.070	02-338T
90	3.250	3.500	0.049	02-236T
90	3.375	3.625	0.049	02-237T
90	3.500	3.750	0.049	02-238T

Back-up rings
inch



90



117



90

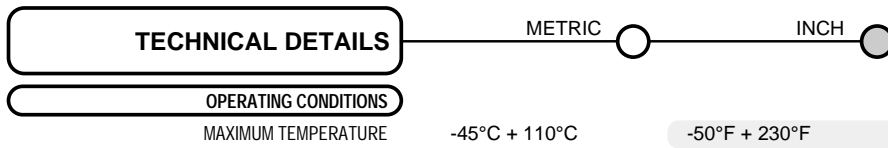
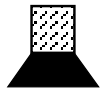


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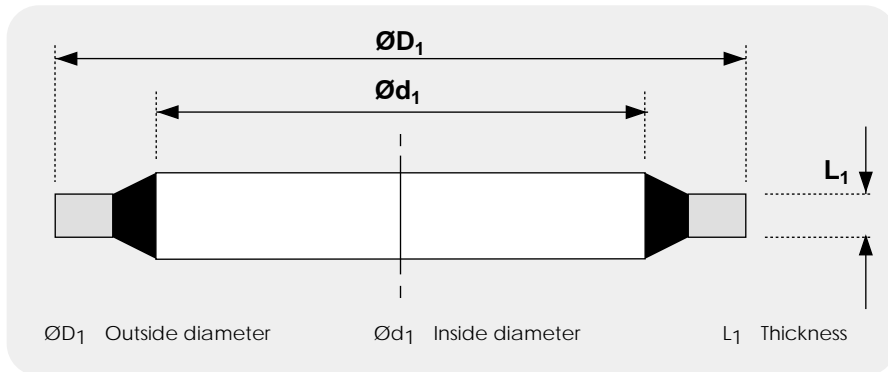
Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
90	3.625	3.875	0.049	02-239T
90	3.625	4.000	0.070	02-342T
90	3.750	4.000	0.049	02-240T
90	4.000	4.250	0.049	02-242T
90	4.125	4.500	0.070	02-346T
90	4.250	4.500	0.049	02-244T
90	4.500	4.750	0.049	02-246T
90	4.500	5.000	0.105	02-425T
90	4.625	5.000	0.070	02-350T
90	4.750	5.000	0.049	02-248T
90	4.750	5.250	0.105	02-427T
90	5.000	5.500	0.105	02-429T

Type	Ød ₁	NOMINALS ØD ₁	L ₁	PART No.
90	5.250	5.500	0.049	02-252T
90	5.250	5.750	0.105	02-431T
90	5.500	6.000	0.105	02-433T
90	5.750	6.000	0.049	02-256T
90	5.750	6.250	0.105	02-435T
90	6.000	6.500	0.105	02-437T
90	6.500	7.000	0.105	02-439T
90	6.750	7.000	0.049	02-261T
90	7.000	7.500	0.105	02-441T
90	7.500	8.000	0.105	02-443T
90	7.750	8.000	0.049	02-265T

Bonded washers



130



DESIGN

Hallite 130 offers a large range of bonded washers in metric and inch sizes to BS5750 : 1987 part 2; ISO9002 and EN29002: 1987.

Also available in a variety of different metals and rubber compounds. Please contact your local Hallite Sales office for further details.

metric

TYPE	NOMINALS			THREAD SIZE	PART NUMBER
	Ød ₁	ØD ₁	L ₁		
130	5.70	9.00	1.00	M5	40-203*
130	6.20	9.20	1.00	M5.5	40-205
130	6.70	10.00	1.00	M6	40-206
130	6.70	11.00	1.00	M6	40-207
130	8.70	13.00	1.00	M8	40-212
130	8.70	14.00	1.00	M8	40-213
130	10.70	16.00	1.50	M10	40-217
130	10.70	18.00	1.50	M10	40-218
130	11.80	19.10	1.50	M11	40-221*
130	12.70	18.00	1.50	M12	40-222
130	12.70	20.00	1.50	M12	40-223
130	13.70	22.00	1.50	M13	40-225*
130	14.70	22.00	1.50	M14	40-227
130	16.70	24.00	1.50	M16	40-229
130	17.40	24.00	1.50	M17	40-230*
130	18.00	26.00	1.50	M17.5	40-231*

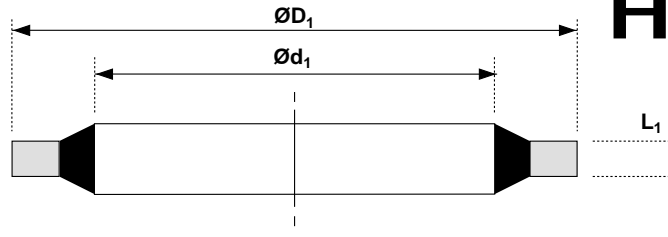
TYPE	NOMINALS			THREAD SIZE	PART NUMBER
	Ød ₁	ØD ₁	L ₁		
130	18.70	26.00	1.50	M18	40-232
130	20.70	28.00	1.50	M20	40-233
130	21.50	28.70	2.50	M21	40-234*
130	22.70	30.00	2.00	M22	40-236
130	24.70	32.00	2.00	M24	40-238
130	26.70	35.00	2.00	M26	40-239
130	27.20	36.00	2.00	M27	40-240
130	33.70	42.00	2.00	M33	40-243
130	34.30	43.00	2.00	M33	40-244
130	42.70	53.00	3.00	M42	40-247
130	48.70	59.00	3.00	M48	40-248

* Possible indent item - minimum quantity may apply.

Bonded washers

130

inch



Type	Ød ₁	ØD ₁	L ₁	Thread Size			PART No.
				BSP	BSPF	BOLT	
130	0.120	0.250	0.051			6BA	40-001
130	0.162	0.286	0.051			4BA	40-002
130	0.205	0.330	0.051			2BA	40-003
130	0.270	0.520	0.051			1/4	40-004
130	0.275	0.525	0.051			1/4	40-005
130	0.326	0.500	0.049		1/16		40-519*
130	0.327	0.525	0.051			5/16	40-006
130	0.340	0.560	0.051			5/16	40-007
130	0.408	0.625	0.083	1/8		3/8	40-020
130	0.409	0.579	0.049		1/8	3/8	40-510*
130	0.443	0.723	0.083			0.400	40-008
130	0.460	0.750	0.083			7/16	40-009
130	0.541	0.810	0.083	1/4		1/2	40-021
130	0.545	0.736	0.049		1/4	1/2	40-511
130	0.585	0.875	0.083			9/16	40-010
130	0.623	0.875	0.083			0.600	40-022
130	0.650	1.000	0.083			5/8	40-011
130	0.680	0.937	0.083	3/8			40-023
130	0.683	0.894	0.049		3/8		40-512
130	0.715	1.000	0.097			11/16	40-012
130	0.775	1.060	0.097			3/4	40-024
130	0.848	1.125	0.097	1/2		13/16	40-025
130	0.852	1.051	0.049		1/2	13/16	40-513
130	0.925	1.250	0.097	5/8		7/8	40-026
130	0.955	1.310	0.097			15/16	40-013
130	1.065	1.375	0.097	3/4		1	40-027
130	1.075	1.280	0.049		3/4	1	40-514

Type	Ød ₁	ØD ₁	L ₁	Thread Size			PART No.
				BSP	BSPF	BOLT	
130	1.095	1.520	0.097			1 1/16	40-028*
130	1.155	1.440	0.097			1 1/8	40-014
130	1.213	1.500	0.097	7/8		1 3/16	40-029
130	1.285	1.630	0.133			1 1/4	40-015
130	1.334	1.685	0.133	1		1 5/16	40-030
130	1.346	1.555	0.079		1	1 5/16	40-515
130	1.415	1.750	0.133			1 3/8	40-016
130	1.534	1.880	0.133			1 1/2	40-017
130	1.685	1.949	0.079		1 1/4		40-516
130	1.690	2.062	0.133	1 1/4		1 5/8	40-032
130	1.785	2.250	0.133			1 3/4	40-018
130	1.907	2.307	0.133	1 1/2		1 7/8	40-033
130	1.917	2.187	0.079		1 1/2	1 7/8	40-517
130	2.035	2.500	0.133			2	40-019
130	2.161	2.750	0.133	1 3/4		2 1/8	40-034
130	2.285	2.770	0.133			2 1/4	40-035
130	2.382	2.670	0.079		2		40-518
130	2.385	2.875	0.133	2			40-036
130	2.535	3.060	0.133			2 1/2	40-037
130	2.625	3.130	0.133	2 1/4			40-038
130	2.995	3.550	0.133	2 1/2			40-039
130	3.483	4.000	0.133	3			40-079

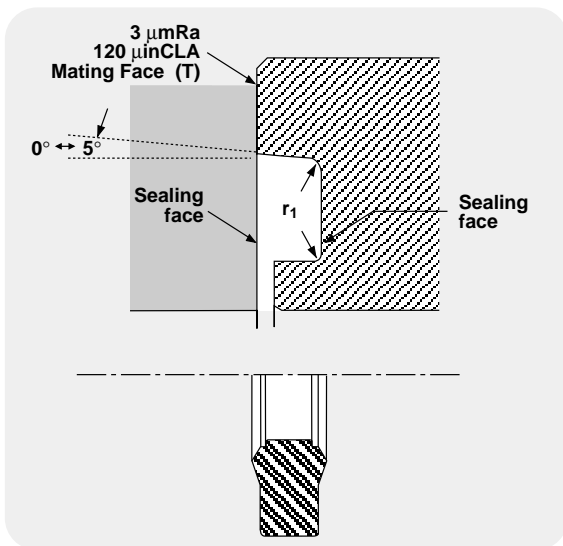
* Possible indent item - minimum quantity may apply.

Flange seals



657

TECHNICAL DETAILS		METRIC	INCH	
OPERATING CONDITIONS				
SPEED	Static	Static		
MAXIMUM TEMPERATURE	-45°C + 110°C	-50°F + 230°F		
MAXIMUM PRESSURE	600 bar	8500 p.s.i.		
SURFACE ROUGHNESS				
SEALING FACES	µmRa	µmRt	µinCLA	µinRMS
MATING FACE	0.8	6.3	32	35
	3	20 ↔ 30	120	120
RADII				
MAX FILLET RAD r ₁ mm	0.80			
MAX FILLET RAD r ₁ in	0.03			
TOLERANCES				
	mm			
	in			
	∅D ₁	S	L ₁	L ₂
	±0.100	±0.025	±0.050	+0 -0.25
	+0.005 -0	±0.015	+0.005 -0	+0 -0.010



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 over comes 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.

N.B. Also listed, two **non-SAE** seal sizes for metric flanges.

MATERIAL OPTIONS

Material of	Last two digits part number
Hythane	-----00
93 IRHD Polyester Polyurethane (AU)	-----01

NB. Temperature rating for 93 IRHD Polyester Polyurethane (AU) changes to:

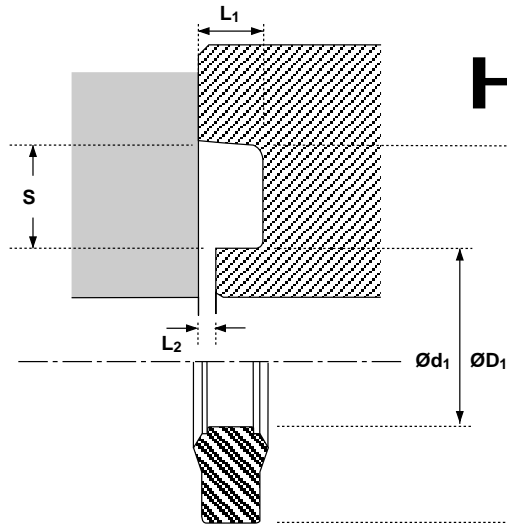
-30°C +100°C -22°F +212°F

FEATURES

- HIGH SPECIFICATION MATERIAL
- INDUSTRIAL GRADE MATERIAL OPTION
- SAE FLANGE SIZES

Flange seals

657



Hallite

metric

ØD ₁	TOL	Ød ₁	S	TOL	L ₁	TOL	L ₂	TOL	PART No.
33.5	+0.10026.3 -0.100		3.6	+0.025 -0.025	2.200	+0.050 -0.050	0.25	+0.000 -0.250	44328__
45.0	+0.10036.2 -0.100		4.4	+0.025 -0.025	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.
1/2	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__
3/4	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__
1 1/4	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__
1 1/2	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__



Notes





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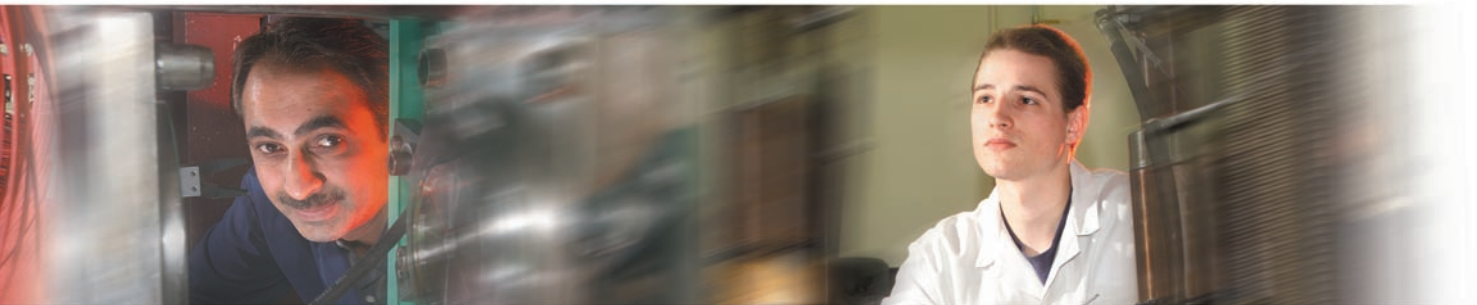
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