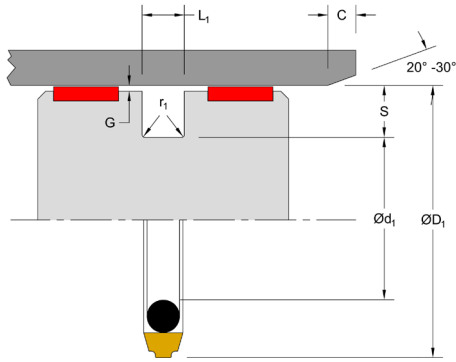




P94

PISTON SEAL

Double-Acting

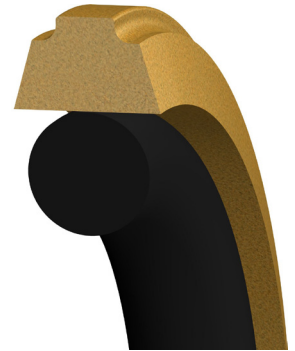
TECHNICAL DETAILS

The Hallite P94 is a compact high-performance double-acting piston seal with a proven design performance.

The product is a class-leading sealing solution for use in the most demanding applications. The standard P94 seal face employs a trapezoidal cross-section allowing optimal compression and load transfer to the seal face via the rubber energizer whilst being highly responsive to changes in pressure and/or direction of travel.

Uses include demanding, performance-critical applications such as injection moulding machines, machine tools, material handling, and hydraulic cylinders in a wide range of other industries.

The seal face is available in a range of materials from the high-performing Armorlene® series including HLX, a proprietary Hallite PTFE formulation which offers outstanding wear and extrusion-resistance properties and suitability for a wide range of operating conditions and fluid media.



FEATURES

- No stick-slip
- Low breakout and running friction
- Superior static and dynamic sealing performance
- Compact piston seal design
- Seal ring component can be machined to any size up to 2700mm diameter
- Design enables larger extrusion gap without loss of seal performance

Part Number Structure

P94MR00900NHLX_

P94	M	R	00900	N	HLX	—
PROFILE DESIGNATION	UNIT OF MEASUREMENT M = Metric E = Inch	APPLICATION Refer to <i>Installation Recommendations</i> and use designator for desired application	BORE DIAMETER Metric = mm X 10 Inch = inches X 1000	ENERGIZER MATERIAL Refer to <i>Energizer Table</i> for desired energizer material	PTFE MATERIAL Refer to <i>Material Table</i> for desired PTFE (face) material	SPECIAL FEATURE Blank = Std profile No notches



OPERATING CONDITIONS

	METRIC	INCH
Maximum Speed	Up to 15m/sec	Up to 50ft/sec
Temperature Range*	-45 to 200°C	-49 to 392°F
Maximum Dynamic Pressure**	600 bar	8700 psi

*Dependent upon energizer used (NBR, FKM, etc.). **For pressures above 400 bar (5800 psi), contact Hallite Engineering

NOTE

Data given are maximum values and can apply depending on specific application. Maximum ratings of temperature, pressure, or operating speeds are dependent on fluid medium, surface, gap value, and other variables such as dynamic or static service. Maximum values are not intended for use together at the same time, e.g. max temperature and max pressure. Please contact your Hallite technical representative for application support.

SURFACE FINISH RECOMMENDATIONS

SURFACE ROUGHNESS	METRIC			INCH			Rmr*
	µmRa	µmRz	µmRt	µinRa	µinRz	µinRt	
Dynamic Sealing Face ØD ₁	0.05 - 0.2	1.6 max	2 max	2 - 8	63 max	157 max	60% - 90%
Static Sealing Face Ød ₁	1.6 max	6.3 max	10 max	63 max	250 max	394 max	
Static Housing Faces L ₁	3.2 max	10 max	16 max	125 max	394 max	630 max	

*Rmr is measured at a depth of 25% of the Rz value based upon a reference level (zero line) at 5% material/bearing area.

ENERGIZER TABLE

ENERGIZER MATERIAL (SHORE A)	ENERGIZER TYPE	ENERGIZER DESIGNATION	ENERGIZER OPERATING TEMPERATURE°C	ENERGIZER OPERATING TEMPERATURE°F
NBR - 70A	O-ring	N	-30 to 100°C	-22 to 212°F
NBR - 70A Low temp.	O-ring	L	-45 to 80°C	-49 to 176°F
FKM - 75A	O-ring	F	-10 to 200°C	14 to 392°F
EPDM - 70A	O-ring	E	-45 to 145°C	-49 to 293°F
HNBR - 70A	O-ring	H	-25 to 150°C	-13 to 302°F
NBR - 90A	O-ring	Q	-30 to 100°C	-22 to 212°F
HNBR - 90A	O-ring	U	-25 to 150°C	-13 to 302°F
No Energizer*	None	X	-	-

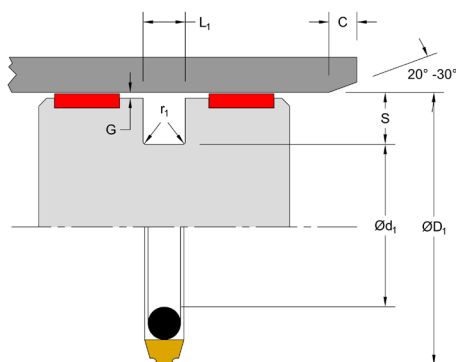
*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

MATERIAL FEATURES AND APPLICATIONS	FILLER	MATERIAL DESIGNATOR	COLOR	TEMPERATURE RANGE °C	TEMPERATURE RANGE °F	MAXIMUM DYNAMIC PRESSURE - BAR	MAXIMUM DYNAMIC PRESSURE - PSI
ARMORLENE® HLX - Standard material for hydraulic applications - High compressive strength - Excellent extrusion resistance - Extended wear resistance	Special Bronze Compound	HLX	Gold	-73 to 288°C	-100 to 550°F	500 bar	7250 psi
ARMORLENE® HLA - Excellent in all hydraulic fluids - Excellent wear resistance - Excellent low-friction properties - Good extrusion resistance	Special Mineral Compound	HLA	Gray	-73 to 260°C	-100 to 500°F	500 bar	7250 psi
ARMORLENE® 702 - Excellent in lubricating and non-lubricating hydraulic fluids - Good low-friction properties - Excellent extrusion resistance - Good chemical resistance	Glass Molybdenum Disulfide	702	Gray	-73 to 260°C	-100 to 500°F	300 bar	4350 psi
ARMORLENE® HCF - Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content - Not recommended for gas sealing applications - Not recommended for electrically conductive fluids	Carbon Fiber Filled	HCF	Gray/Black	-73 to 260°C	-100 to 500°F	250 bar	3600 psi
ARMORLENE® 713 - High compressive strength - Excellent extrusion resistance - Excellent wear properties	60% Bronze Content	713	Bronze	-73 to 288°C	-100 to 550°F	600 bar	8700 psi
HU9 - POLYURETHANE, 95A - Positive position load holding - Excellent extrusion resistance - Excellent wear resistance	Standard	HU9	Red	-20 to 115°C	-4 to 240°F	500 bar	7250 psi
HU5 - POLYURETHANE, 55D - Positive position load holding - Excellent extrusion resistance - Excellent wear resistance	Standard	HU5	Yellow	-20 to 115°C	-4 to 240°F	500 bar	7250 psi
HE5 - POLYESTER, 55D - Positive position load holding - Excellent extrusion resistance - Excellent wear resistance	Standard	HE5	Gray/Black	-20 to 115°C	-40 to 240°F	500 bar	7250 psi
748 - UHMWPE - Excellent impact resistance - Good di-electrical properties - Excellent abrasion resistance - Low coefficient of friction	Standard	748	Translucent	-184 to 82°C	-300 to 180°F	350 bar	5000 psi

For other material options consult the Master Materials Index at the front of the catalog. If you do not find the material that you require, please contact your local Hallite sales office.





NOTE

Applications with maximum radial clearance that are using nylon, phenolic, or PTFE bearings must ensure proper clearance in accordance with the bearing recommendations to avoid metal-to-metal contact. Please refer to Hallite Type 87, Type 506, and Type 533 specification sheets for this information.

INSTALLATION RECOMMENDATIONS

METRIC

BORE DIAMETER ØD ₁ H9			GROOVE DIAMETER	GROOVE WIDTH	RADIUS	CHAMFER	GROOVE SECTION	RADIAL CLEARANCE G max*			O-RING CROSS SECTION
DIAMETER RANGE			Ød ₁ h9	L ₁ + 0.2	r ₁	C	S	Up to 100 bar	Up to 200 bar	Up to 400 bar	O-ring
Standard Duty Application - R	Light Duty Application - L	Heavy Duty Application - H									
8 - 14.9	15 - 39.9	-	D1 - 4.9	2.2	0.4	2.0	2.45	0.40	0.30	0.20	1.78
15 - 39.9	40 - 79.9	-	D1 - 7.5	3.2	0.6	3.0	3.75	0.60	0.50	0.30	2.62
40 - 79.9	80 - 132.9	15 - 39.9	D1 - 11.0	4.2	1.0	4.0	5.50	0.70	0.50	0.30	3.53
80 - 132.9	133 - 329.9	40 - 79.9	D1 - 15.5	6.3	1.3	6.0	7.75	0.80	0.60	0.40	5.33
133 - 329.9	330 - 669.9	80 - 132.9	D1 - 21.0	8.1	1.8	8.0	10.50	0.80	0.60	0.40	6.99
330 - 669.9	670 - 999.9	133 - 329.9	D1 - 24.5	8.1	1.8	8.0	12.25	0.90	0.70	0.50	6.99
670 - 999.9	1000 - 1200	330 - 669.9	D1 - 28.0	9.5	2.5	9.0	14.00	1.00	0.80	0.60	8.40
1000 - 2700	-	670 - 999.9	D1 - 38.0	13.8	3.0	10.0	19.00	1.20	0.90	0.70	12.00

At pressure >400 bar use diameter tolerance H8/f7

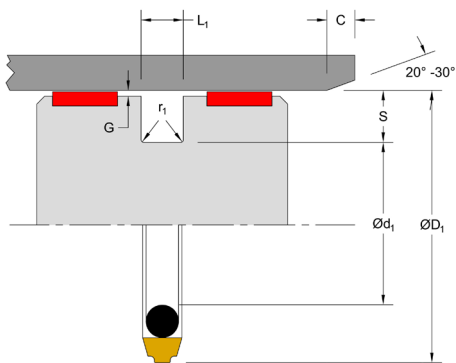
*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

INCH

BORE DIAMETER ØD ₁ H9			GROOVE DIAMETER	GROOVE WIDTH	RADIUS	CHAMFER	GROOVE SECTION	RADIAL CLEARANCE G max*			O-RING CROSS SECTION
DIAMETER RANGE			Ød ₁ h9	L ₁ + 0.008	r ₁	C	S	Up to 1200 PSI	Up to 3000 PSI	Up to 5000 PSI	O-ring
Standard Duty Application - R											
0.375 - 0.563			D1 - 0.193	0.087	0.015	0.079	0.097	0.020	0.012	0.008	0.070
0.562 - 1.563			D1 - 0.295	0.126	0.025	0.118	0.148	0.024	0.016	0.008	0.103
1.563 - 3.125			D1 - 0.433	0.165	0.025	0.157	0.217	0.024	0.016	0.008	0.139
3.126 - 5.250			D1 - 0.610	0.248	0.035	0.236	0.305	0.031	0.020	0.012	0.210
5.250 - 12.500			D1 - 0.827	0.319	0.035	0.315	0.414	0.031	0.020	0.012	0.275
12.501 - 26.000			D1 - 0.965	0.319	0.035	0.354	0.483	0.035	0.020	0.016	0.275

At pressure >5800 psi use diameter tolerance H8/f7

*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.



P94

PISTON SEAL

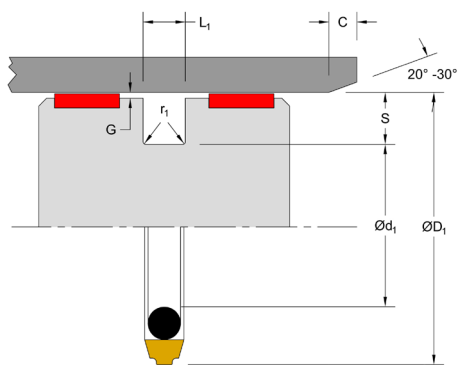
Double-Acting

PART NUMBER RANGE (METRIC)*

METRIC			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +0.2	
8.00	3.10	2.20	P94MR00080****
10.00	5.10	2.20	P94MR00100****
12.00	7.10	2.20	P94MR00120****
14.00	9.10	2.20	P94MR00140****
15.00	7.50	3.20	P94MR00150****
16.00	11.10	2.20	P94ML00160****
16.00	8.50	3.20	P94MR00160****
18.00	13.10	2.20	P94ML00180****
18.00	10.50	3.20	P94MR00180****
19.05	11.55	3.20	P94MR00190****
20.00	15.10	2.20	P94ML00200****
20.00	12.50	3.20	P94MR00200****
21.00	13.50	3.20	P94MR00210****
22.00	17.10	2.20	P94ML00220****
22.00	14.50	3.20	P94MR00220****
24.00	16.50	3.20	P94MR00240****
25.00	20.10	2.20	P94ML00250****
25.00	17.50	3.20	P94MR00250****
25.00	14.00	4.20	P94MH00250****
25.40	20.50	2.20	P94ML00254****
28.00	20.50	3.20	P94MR00280****
30.00	22.50	3.20	P94MR00300****
32.00	27.10	2.20	P94ML00320****
32.00	24.50	3.20	P94MR00320****
32.00	21.00	4.20	P94MH00320****
35.00	27.50	3.20	P94MR00350****
35.00	24.00	4.20	P94MH00350****
36.00	28.50	3.20	P94MR00360****

METRIC			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +0.2	
38.00	30.50	3.20	P94MR00380****
40.00	32.50	3.20	P94ML00400****
40.00	29.00	4.20	P94MR00400****
42.00	31.00	4.20	P94MR00420****
44.45	36.95	3.20	P94ML00445****
45.00	34.00	4.20	P94MR00450****
48.00	37.00	4.20	P94MR00480****
50.00	42.50	3.20	P94ML00500****
50.00	39.00	4.20	P94MR00500****
50.00	34.50	6.30	P94MH00500****
50.80	43.30	3.20	P94ML00508****
50.80	39.80	4.20	P94MR00508****
52.00	41.00	4.20	P94MR00520****
53.00	42.00	4.20	P94MR00530****
55.00	44.00	4.20	P94MR00550****
57.00	46.00	4.20	P94MR00570****
58.00	47.00	4.20	P94MR00580****
60.00	49.00	4.20	P94MR00600****
62.00	51.00	4.20	P94MR00620****
63.00	52.00	4.20	P94MR00630****
63.00	47.50	6.30	P94MH00630****
65.00	54.00	4.20	P94MR00650****
68.00	57.00	4.20	P94MR00680****
70.00	59.00	4.20	P94MR00700****
70.00	54.50	6.30	P94MH00700****
75.00	64.00	4.20	P94MR00750****
75.00	59.50	6.30	P94MH00750****
80.00	69.00	4.20	P94ML00800****

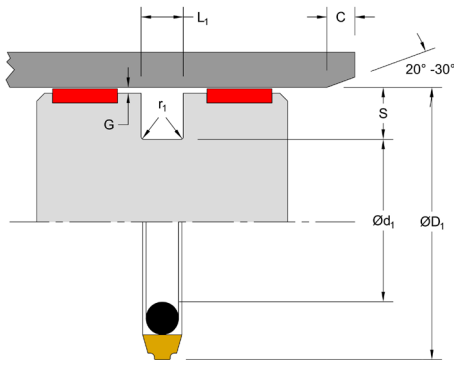




PART NUMBER RANGE (METRIC)*

METRIC			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +0.2	
80.00	64.50	6.30	P94MR00800****
80.00	59.00	8.10	P94MH00800****
82.50	67.00	6.30	P94MR00825****
85.00	69.50	6.30	P94MR00850****
85.00	64.00	8.10	P94MH00850****
90.00	79.00	4.20	P94ML00900****
90.00	74.50	6.30	P94MR00900****
90.00	69.00	8.10	P94MH00900****
95.00	84.00	4.20	P94ML00950****
95.00	79.50	6.30	P94MR00950****
95.00	74.00	8.10	P94MH00950****
100.00	89.00	4.20	P94ML01000****
100.00	84.50	6.30	P94MR01000****
100.00	79.00	8.10	P94MH01000****
101.60	86.10	6.30	P94MR01016****
105.00	94.00	4.20	P94ML01050****
105.00	89.50	6.30	P94MR01050****
108.00	92.50	6.30	P94MR01080****
110.00	99.00	4.20	P94ML01100****
110.00	94.50	6.30	P94MR01100****
110.00	89.00	8.10	P94MH01100****
115.00	99.50	6.30	P94MR01150****
120.00	109.00	4.20	P94ML01200****
120.00	104.50	6.30	P94MR01200****
120.00	99.00	8.10	P94MH01200****
125.00	114.00	4.20	P94ML01250****
125.00	109.50	6.30	P94MR01250****
125.00	104.00	8.10	P94MH01250****

METRIC			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +0.2	
127.00	111.50	6.30	P94MR01270****
130.00	114.50	6.30	P94MR01300****
130.00	109.00	8.10	P94MH01300****
132.00	121.00	4.20	P94ML01320****
135.00	114.00	8.10	P94MR01350****
140.00	124.50	6.30	P94ML01400****
140.00	119.00	8.10	P94MR01400****
145.00	129.50	6.30	P94ML01450****
145.00	124.00	8.10	P94MR01450****
150.00	134.50	6.30	P94ML01500****
150.00	129.00	8.10	P94MR01500****
155.00	134.00	8.10	P94MR01550****
160.00	144.50	6.30	P94ML01600****
160.00	139.00	8.10	P94MR01600****
165.00	144.00	8.10	P94MR01650****
170.00	149.00	8.10	P94MR01700****
175.00	154.00	8.10	P94MR01750****
180.00	164.50	6.30	P94ML01800****
180.00	159.00	8.10	P94MR01800****
190.00	169.00	8.10	P94MR01900****
194.00	178.50	6.30	P94ML01940****
200.00	184.50	6.30	P94ML02000****
200.00	179.00	8.10	P94MR02000****
205.00	184.00	8.10	P94MR02050****
210.00	189.00	8.10	P94MR02100****
215.00	194.00	8.10	P94MR02150****
220.00	199.00	8.10	P94MR02200****
230.00	214.50	6.30	P94ML02300****



P94

PISTON SEAL

Double-Acting

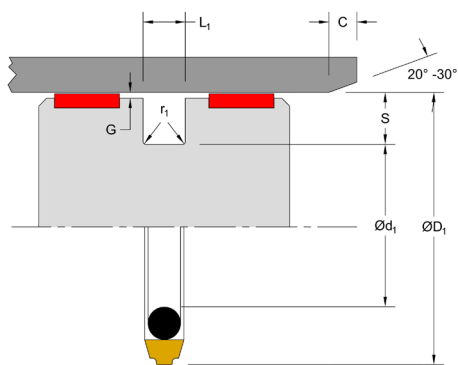
PART NUMBER RANGE (METRIC)*

METRIC			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +0.2	
230.00	209.00	8.10	P94MR02300****
240.00	219.00	8.10	P94MR02400****
250.00	229.00	8.10	P94MR02500****
250.00	225.50	8.10	P94MH02500****
250.00	234.50	6.30	P94ML02500****
254.00	233.00	8.10	P94MR02540****
260.00	239.00	8.10	P94MR02600****
265.00	244.00	8.10	P94MR02650****
268.00	247.00	8.10	P94MR02680****
270.00	249.00	8.10	P94MR02700****
280.00	259.00	8.10	P94MR02800****
290.00	269.00	8.10	P94MR02900****
300.00	279.00	8.10	P94MR03000****
300.00	275.50	8.10	P94MH03000****
304.80	283.80	8.10	P94MR03048****
310.00	289.00	8.10	P94MR03100****
320.00	299.00	8.10	P94MR03200****
320.00	295.50	8.10	P94MH03200****
330.00	305.50	8.10	P94MR03300****
340.00	315.50	8.10	P94MR03400****
350.00	325.50	8.10	P94MR03500****
360.00	335.50	8.10	P94MR03600****
370.00	345.50	8.10	P94MR03700****
380.00	355.50	8.10	P94MR03800****
400.00	375.50	8.10	P94MR04000****
420.00	395.50	8.10	P94MR04200****
430.00	405.50	8.10	P94MR04300****
440.00	415.50	8.10	P94MR04400****

METRIC			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +0.2	
450.00	425.50	8.10	P94MR04500****
460.00	435.50	8.10	P94MR04600****
480.00	455.50	8.10	P94MR04800****
500.00	475.50	8.10	P94MR05000****
555.00	530.50	8.10	P94MR05550****
600.00	575.50	8.10	P94MR06000****
640.00	615.50	8.10	P94MR06400****
660.00	635.50	8.10	P94MR06600****
700.00	672.00	9.50	P94MR07000****
710.00	682.00	9.50	P94MR07100****
740.00	712.00	9.50	P94MR07400****
780.00	752.00	9.50	P94MR07800****
800.00	772.00	9.50	P94MR08000****
900.00	872.00	9.50	P94MR09000****
1000.00	972.00	9.50	P94ML10000****
1000.00	962.00	13.80	P94MH10000****
1050.00	1022.00	9.50	P94ML10500****
1065.00	1027.00	13.80	P94MR10650****
1070.00	1032.00	13.80	P94MR10700****
1200.00	1172.00	9.50	P94ML12000****
1200.00	1162.00	13.80	P94MR12000****
1225.00	1187.00	13.80	P94MR12250****
1500.00	1462.00	13.80	P94MR15000****
2000.00	1962.00	13.80	P94MR20000****
2700.00	2662.00	13.80	P94MR27000****

*Please contact Hallite for custom sizes, material selection, or seal design.

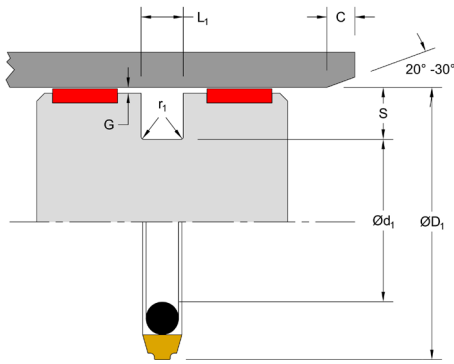




PART NUMBER RANGE (INCH)*

INCH			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +.010	
0.500	0.307	0.087	P94ER00500****
0.563	0.370	0.087	P94ER00563****
0.625	0.330	0.126	P94ER00625****
0.688	0.393	0.126	P94ER00688****
0.750	0.455	0.126	P94ER00750****
0.813	0.518	0.126	P94ER00813****
0.875	0.580	0.126	P94ER00875****
0.938	0.643	0.126	P94ER00938****
1.000	0.705	0.126	P94ER01000****
1.063	0.768	0.126	P94ER01063****
1.125	0.830	0.126	P94ER01125****
1.188	0.893	0.126	P94ER01188****
1.250	0.955	0.126	P94ER01250****
1.313	1.018	0.126	P94ER01313****
1.375	1.080	0.126	P94ER01375****
1.438	1.143	0.126	P94ER01438****
1.500	1.205	0.126	P94ER01500****
1.563	1.268	0.126	P94ER01563****
1.625	1.192	0.165	P94ER01625****
1.688	1.255	0.165	P94ER01688****
1.750	1.317	0.165	P94ER01750****
1.813	1.380	0.165	P94ER01813****
1.875	1.442	0.165	P94ER01875****
1.938	1.505	0.165	P94ER01938****
2.000	1.567	0.165	P94ER02000****
2.125	1.692	0.165	P94ER02125****
2.250	1.817	0.165	P94ER02250****
2.375	1.942	0.165	P94ER02375****

INCH			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +.010	
2.500	2.067	0.165	P94ER02500****
2.625	2.193	0.165	P94ER02625****
2.750	2.317	0.165	P94ER02750****
2.875	2.442	0.165	P94ER02875****
3.000	2.567	0.165	P94ER03000****
3.125	2.692	0.165	P94ER03125****
3.250	2.640	0.248	P94ER03250****
3.375	2.765	0.248	P94ER03375****
3.500	2.890	0.248	P94ER03500****
3.625	3.015	0.248	P94ER03625****
3.750	3.140	0.248	P94ER03750****
3.875	3.265	0.248	P94ER03875****
4.000	3.390	0.248	P94ER04000****
4.125	3.515	0.248	P94ER04125****
4.250	3.640	0.248	P94ER04250****
4.375	3.765	0.248	P94ER04375****
4.500	3.890	0.248	P94ER04500****
4.625	4.015	0.248	P94ER04625****
4.750	4.140	0.248	P94ER04750****
4.875	4.265	0.248	P94ER04875****
5.000	4.390	0.248	P94ER05000****
5.125	4.515	0.248	P94ER05125****
5.250	4.640	0.248	P94ER05250****
5.375	4.548	0.319	P94ER05375****
5.500	4.673	0.319	P94ER05500****
5.625	4.798	0.319	P94ER05625****
5.750	4.923	0.319	P94ER05750****
6.000	5.173	0.319	P94ER06000****



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PISTON SEAL

Double-Acting

PART NUMBER RANGE (INCH)*

INCH			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +.010	
6.250	5.423	0.319	P94ER06250****
6.500	5.673	0.319	P94ER06500****
6.750	5.923	0.319	P94ER06750****
7.000	6.173	0.319	P94ER07000****
7.250	6.423	0.319	P94ER07250****
7.500	6.673	0.319	P94ER07500****
7.750	6.923	0.319	P94ER07750****
8.000	7.173	0.319	P94ER08000****
8.250	7.423	0.319	P94ER08250****
8.500	7.673	0.319	P94ER08500****
8.750	7.923	0.319	P94ER08750****
9.000	8.173	0.319	P94ER09000****
9.250	8.423	0.319	P94ER09250****
9.500	8.673	0.319	P94ER09500****
9.750	8.923	0.319	P94ER09750****
10.000	9.173	0.319	P94ER10000****
10.500	9.673	0.319	P94ER10500****
11.000	10.173	0.319	P94ER11000****
11.500	10.673	0.319	P94ER11500****
12.000	11.173	0.319	P94ER12000****
12.500	11.673	0.319	P94ER12500****
13.000	12.035	0.319	P94ER13000****
13.500	12.535	0.319	P94ER13500****
14.000	13.035	0.319	P94ER14000****
14.500	13.535	0.319	P94ER14500****
15.000	14.035	0.319	P94ER15000****
15.500	14.535	0.319	P94ER15500****
16.000	15.035	0.319	P94ER16000****

INCH			PART NUMBER
ØD ₁	Ød ₁	L ₁	
Tol. H9	Tol. h9	Tol. +.010	
16.500	15.535	0.319	P94ER16500****
17.000	16.035	0.319	P94ER17000****
17.500	16.535	0.319	P94ER17500****
18.000	17.035	0.319	P94ER18000****
18.500	17.535	0.319	P94ER18500****
19.000	18.035	0.319	P94ER19000****
19.500	18.535	0.319	P94ER19500****
20.000	19.035	0.319	P94ER20000****

*Please contact Hallite for custom sizes, material selection, or seal design.

