

# HALLITE

## ARMORLENE® PTFE PRODUCT CATALOG

Including an Introduction to Spring Energized OptiSeal®

THIRD EDITION



TABLE OF CONTENTS



INTRODUCTION

|                                   |   |
|-----------------------------------|---|
| Select It & Forget It             | 4 |
| Major Industries                  | 5 |
| Tried & Trusted                   | 6 |
| Hallite Armorlene® PTFE Portfolio | 7 |
| Global Quality Certifications     | 8 |
| Manufacturing Locations           | 9 |

MATERIALS

|                                   |    |
|-----------------------------------|----|
| Materials                         | 10 |
| Filled PTFE                       | 11 |
| Hallite High-Performance          | 12 |
| Aarmorlene® Materials             |    |
| Hallite High-Performance Hythane® | 14 |
| Materials                         |    |
| Master Energizer Materials        | 15 |
| Materials & Fluid Compatibility   | 16 |

OVERVIEW

|                                       |    |
|---------------------------------------|----|
| Hallite Seal Design & Selection Index | 18 |
| Other Hallite Products Index          | 22 |
| Cylinder Operating Conditions         | 24 |
| Use & Fitting of Seals                | 25 |
| Face Ring & Optiseal® Installation    | 26 |
| Specified Tolerance Tables            | 27 |
| Housing Designs and Extrusion Gaps    | 29 |
| Storage of Seals                      | 31 |
| Surface Finish                        | 33 |

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All descriptions, design and performance information, and recommended uses for the products described herein are based generally on our design and manufacturing experience, product testing in specific conditions, and industry standards. The catalog is for general guidance only, does not constitute professional advice or a guarantee or warranty of design or warranty of performance and should not be relied upon or treated as a substitute for specific consideration and advice relevant to particular circumstances. The information provided herein is provided “as is,” and we reserve the right to make product changes from time to time, without prior notification, which may change some of the information provided herein. Hallite and its affiliated companies disclaim all express and implied warranties with regard to the information, materials, and opinions contained in this brochure, including without limitation implied warranties of merchantability, fitness for a particular purpose, compatibility, and non-infringement. All warranties applicable to Hallite products are found exclusively in the terms and conditions of sale, as stated in sales contracts related to the sale of such products. Each purchaser of such products must decide if the products are suitable to the intended use of such purchaser.

This edition supersedes all previous brochures.

## TABLE OF CONTENTS



### ROD SEALS

|        |    |
|--------|----|
| R16    | 39 |
| 716SPN | 51 |
| RDA    | 55 |
| RDS    | 65 |
| RCG    | 73 |
| SRS    | 81 |
| SRB    | 87 |

### PISTON SEALS

|     |     |
|-----|-----|
| CT  | 95  |
| P54 | 105 |
| P16 | 115 |
| GPS | 127 |
| GP2 | 137 |
| PFR | 145 |
| G54 | 149 |
| PDS | 157 |
| PCG | 165 |
| PCA | 173 |

### WIPER SEALS

|     |     |
|-----|-----|
| E2W | 181 |
| E5W | 189 |
| ELA | 197 |
| EXF | 203 |
| EXG | 209 |

### SWIVEL SEALS

|     |     |
|-----|-----|
| SSP | 215 |
| SSR | 223 |

### OPTISEAL®

|                                              |     |
|----------------------------------------------|-----|
| OptiSeal® Hallite<br>Spring-Energized System | 233 |
|----------------------------------------------|-----|

### BACK-UP RINGS

|                     |     |
|---------------------|-----|
| PME                 | 257 |
| Other Back-Up Rings | 259 |

### BEARINGS & GUIDE ELEMENTS

|          |     |
|----------|-----|
| T87      | 263 |
| 506      | 269 |
| 533      | 275 |
| G-Series | 279 |

### RELATED PRODUCTS

|                                             |     |
|---------------------------------------------|-----|
| Other Related Hallite<br>Products Available | 285 |
|---------------------------------------------|-----|



SELECT IT  
& FORGET IT

At Hallite, we want to help you forget about your seals. It's not that we don't understand the critical role they play in the performance and productivity of your equipment — quite the contrary. After all, as a leading manufacturer of high-performance sealing solutions, we've been developing and delivering high-quality seals for a wide variety of markets for over a century.

Now, with our new PTFE fluid seals offering, we've expanded our portfolio again, continuing to offer our customers around the world the reliable products and services they depend upon from Hallite.

Developed from material and compound production expertise within Hallite and our sister companies, CDI Energy Products and EGC Critical Components, our PTFE seals come in a complete range of product profiles, forming one of the most comprehensive collections of its kind in the industry. Plus, as with all of our seals, they come with the technical services to help provide the advice necessary in developing tailored product solutions.

And that's precisely the point: when you partner with Hallite, you CAN forget about your seals. Because you're purchasing more than our proven products; You're buying into a relationship that you can trust will deliver the peace of mind you deserve.

## MAJOR INDUSTRIES



- Agriculture
- Chemical Processing
- Construction & Forestry
- Food & Beverage
- General Industry
- Hydro-Power
- Injection Molding
- Machine Tools
- Marine
- Material Handling
- Mining & Mineral Extraction
- Mobile Hydraulics/Off-Highway
- Oil & Gas
- Steel & Aluminum Processing
- Transportation



TRIED & TRUSTED

For over 100 years, Hallite Seals has been a leading supplier and pioneer of high-quality fluid sealing technologies and engineered sealing solutions. As a global organization with a keen focus on worldwide delivery through regional manufacturing sites and fabrication centers, we are able to leverage our expertise in engineering design, superior quality, and advanced manufacturing and production processes to meet your supply needs when and where you need them the most. From high-volume production runs to bespoke sealing solutions, the longevity of our success in meeting the demands of OEMs, distributors and aftermarket specialists can be attributed to doing things the “Hallite Way.”

We bring to market a blend of cataloged and fit-for-purpose, quality products that offer cost-performance. Over the years, we have refined our business approach to provide services to our customers that are searching for both engineered solutions and off-the-shelf products from a single-source supplier.

We are constantly adding to our range of profiles and sizes for ISO standard and Asian housing. Please review the product catalog for a complete list of products or contact your nearest Hallite sales office or official Hallite distributor for further information.

## THE HALLITE WAY

### Whatever You Need, We Can Help

A robust portfolio of cataloged products and value-added engineering and manufacturing services that meet and exceed customer needs and expectations.

### One High Standard, Everywhere

A commitment to global quality and production standards that ensure consistency everywhere in the world.

### Service As Reliable As Our Seals

A dedication to getting it done right and on time — the first time. Ensuring products and value-added services are delivered on time and to exact specifications.

## HALLITE ARMORLENE® PTFE PORTFOLIO

PTFE is the most chemical-resistant thermoplastic polymer available. PTFE offers low friction, exceptional chemical resistance, and sealability not found in most plastic materials.

The Hallite PTFE material and product portfolio is a fit-for-purpose solution designed for dynamic and static sealing applications, where high speeds up to 15 m/s (50 ft/s), low friction, temperatures ranging from -200 to 260°C (-328 to 500°F), strong wear performance,

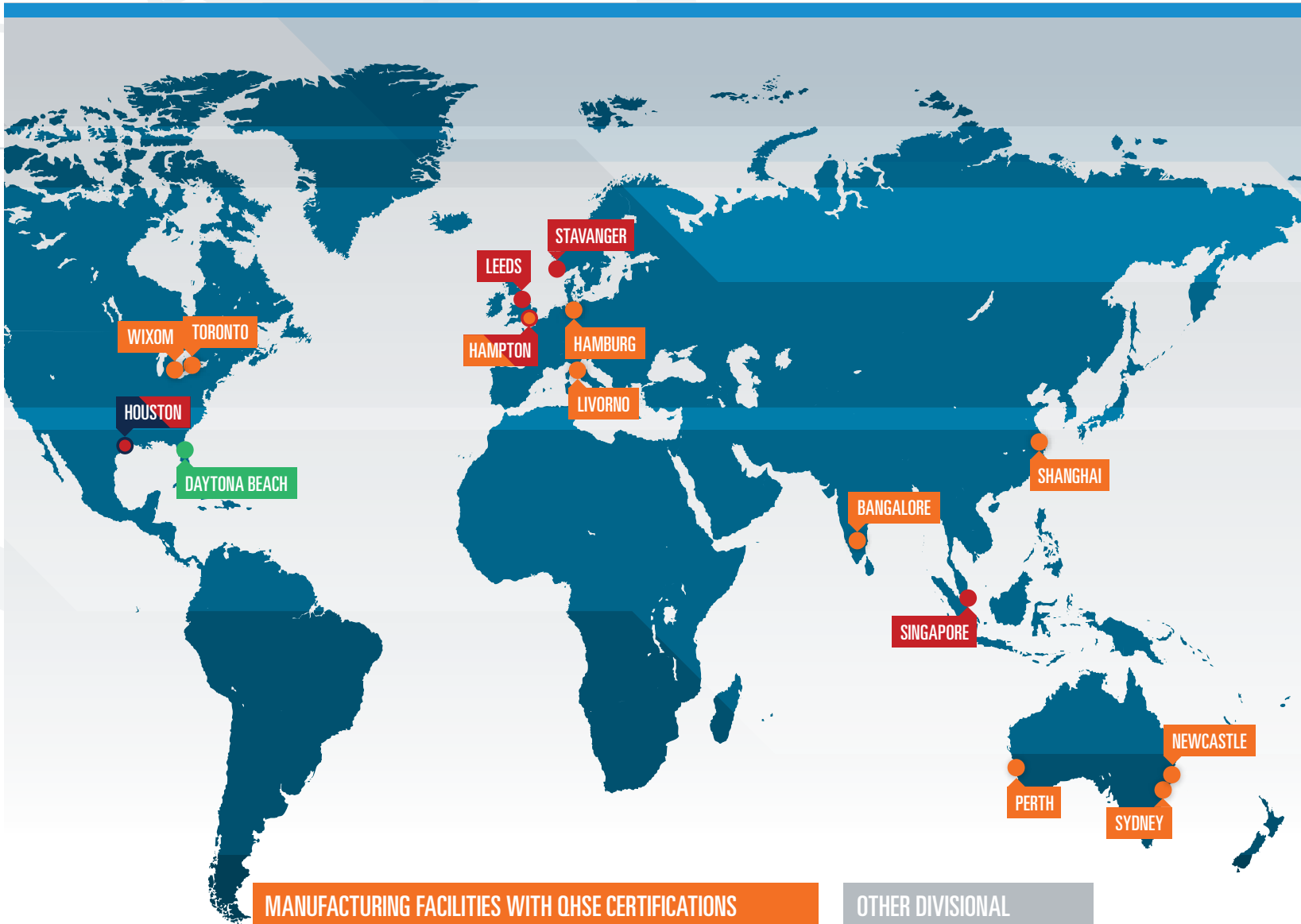
broad fluid compatibility and high pressure capabilities up to 600 bar (8700 psi) are required. Our material technology, enhanced by the company's deep technical and testing expertise, enables Hallite to engineer unique, custom sealing solutions. Hallite engineers can help you select which high-performance compounds made from filler combinations of glass, bronze or other metals, PPS, graphite, MoS<sub>2</sub>, carbon, mineral, carbon fiber, and other fillers will optimize performance in your application.

# GLOBAL QUALITY CERTIFICATIONS

It's more than simply what we do, it's who we are.

At Hallite, quality, health, safety, and environmental concerns are more than checklist items. Our focus on QHSE is ingrained into our company culture and is an integral component of corporate responsibility. A safe, healthy work environment positions our global team to provide the highest quality, on-time delivery, and service excellence. Industry standards such as the ISO 14001, ISO 9001:2010, and the OHSAS 18001 management systems help us continually improve on all elements of QHSE while ensuring regulatory compliance.

Our commitment to QHSE comes from genuine concern about our people, our customers, the environment, and corporate responsibility. The health and safety culture at Hallite is based on personal empowerment, encouraging each employee to take personal responsibility in following the protocols and procedures that ensure QHSE compliance.



## MANUFACTURING FACILITIES WITH QHSE CERTIFICATIONS

|                     |                                                                                                                                                                                  |                          |                                                                                                                                              |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| WIXOM, MI, USA      | <ul style="list-style-type: none"><li>• ISO 9001 Quality</li><li>• ISO 14001 Environmental</li><li>• OHSAS 18001 Health and Safety</li></ul>                                     | HAMBURG, GERMANY         | <ul style="list-style-type: none"><li>• ISO 9001 Quality</li><li>• ISO 14001 Environmental</li><li>• OHSAS 18001 Health and Safety</li></ul> |
| TORONTO, ON, CANADA | <ul style="list-style-type: none"><li>• ISO 9001 Quality</li></ul>                                                                                                               | BANGALORE, INDIA         | <ul style="list-style-type: none"><li>• ISO 9001 Quality</li><li>• ISO 14001 Environmental</li></ul>                                         |
| HAMPTON, UK         | <ul style="list-style-type: none"><li>• ISO 9001 Quality</li><li>• AS 9100 Aerospace Quality</li><li>• ISO 14001 Environmental</li><li>• OHSAS 18001 Health and Safety</li></ul> | JIADING, SHANGHAI, CHINA | <ul style="list-style-type: none"><li>• ISO 9001 Quality</li><li>• OHSAS 18001 Health and Safety</li></ul>                                   |
| LIVORNO, ITALY      | <ul style="list-style-type: none"><li>• ISO 9001 Quality</li></ul>                                                                                                               | AUSTRALIA                | <ul style="list-style-type: none"><li>• ISO 9001 Quality</li></ul>                                                                           |

## OTHER DIVISIONAL MANUFACTURING SITES

|                         |                                                                                                                                                              |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CDI ENERGY PRODUCTS     | <ul style="list-style-type: none"><li>• Houston, TX, USA</li><li>• Singapore</li><li>• Leeds, UK</li><li>• Stavanger, Norway</li><li>• Hampton, UK</li></ul> |
| EGC CRITICAL COMPONENTS | <ul style="list-style-type: none"><li>• Houston, TX, USA</li></ul>                                                                                           |
| AIP PRECISION MACHINING | <ul style="list-style-type: none"><li>• Daytona Beach, FL, USA</li></ul>                                                                                     |

MATERIALS

Proper material selection and compatibility rank high among the factors that contribute to good sealability. In seal design, materials are chosen for the physical attributes, performance properties, and performance characteristics required by the application.

The application environment, including temperature, pressure, and dynamic conditions, as well as design factors such as squeeze and seal geometry and energizer selection, are essential in material selection. The materials used with Hallite seal profiles perform exceptionally well in applications with variations in temperature, pressure and media. The result is a sealing solution capable of performing in dynamic, hostile environments where standard elastomeric seals fail.

| COMMON MATERIALS |                                                                                                                                                                                                                                    |                                                                                                                                                                                                                             |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PTFE             | <ul style="list-style-type: none"><li>Thermal stability across broad temperature range</li><li>Low coefficient of friction</li><li>Inherent lubricating properties</li><li>Excellent chemical and corrosion capabilities</li></ul> | <ul style="list-style-type: none"><li>Reduced stick-slip</li><li>Unlimited shelf life</li><li>No swelling due to moisture absorption</li><li>Safe for vacuum conditions</li><li>Excellent dielectrical properties</li></ul> |
| UHMWPE           | <ul style="list-style-type: none"><li>High toughness</li><li>High abrasion resistance</li><li>Self-lubricating</li></ul>                                                                                                           | <ul style="list-style-type: none"><li>Low coefficient of friction</li><li>Broad chemical resistance</li></ul>                                                                                                               |
| ELASTOMER        | <ul style="list-style-type: none"><li>Great sealability</li><li>High toughness</li><li>Very flexible</li></ul>                                                                                                                     | <ul style="list-style-type: none"><li>Broad selection of polymer types with unique properties</li><li>Available in both thermoset and thermoplastic</li></ul>                                                               |

| FILLERS AND THEIR<br>RELATIVE EFFECTS ON PTFE | WEAR<br>RESISTANCE | FRICTION | CREEP<br>RESISTANCE | THERMAL<br>CONDUCTIVITY | MATING<br>METAL WEAR | ELECTRICAL<br>RESISTANCE |
|-----------------------------------------------|--------------------|----------|---------------------|-------------------------|----------------------|--------------------------|
| GLASS FIBERS                                  | ▲▲▲                | ▲▲       | ▲▲                  | ▲                       | ▲▲▲                  | ▲                        |
| CARBON                                        | ▲▲▲                | ▲        | ▲▲▲                 | ▲▲                      | ▲                    | ▼                        |
| GRAPHITE                                      | ▲▲                 | ◆        | ▲▲                  | ▲▲                      | ◆                    | ▼▼                       |
| MOS <sub>2</sub>                              | ▲                  | ◆        | ◆                   | ▲                       | ◆                    | ▼                        |
| BRONZE                                        | ▲▲▲                | ▲▲       | ▲▲                  | ▲▲▲                     | ▲                    | ▼▼                       |
| CARBON FIBERS                                 | ▲▲▲                | ▲        | ▲▲                  | ▲▲                      | ▲                    | ▼                        |
| MINERAL                                       | ▲▲▲                | ▲▲       | ▲▲                  | ▲▲                      | ▲▲                   | ◆                        |
| HIGH-TEMPERATURE POLYMERS                     | ▲▲▲                | ▲        | ▲▲▲                 | ◆                       | ◆                    | ◆                        |

|     |             |     |                        |     |                        |
|-----|-------------|-----|------------------------|-----|------------------------|
| KEY |             |     |                        |     |                        |
| ◆   | = No Effect | ▲   | = Slight Increase      | ▼   | = Slight Decrease      |
|     |             | ▲▲  | = Moderate Increase    | ▼▼  | = Moderate Decrease    |
|     |             | ▲▲▲ | = Significant Increase | ▼▼▼ | = Significant Decrease |

FILLED PTFE

In spite of its remarkable properties, pure unmixed PTFE has limited use for applications where high mechanical loading is required, due to its tendency towards cold extrusion (creep). While maintaining its inherent properties and characteristics in material compounds, PTFE can benefit from the improved mechanical strength, stability, and wear resistance provided by an additive. Hallite uses various fillers to optimize PTFE characteristics such as glass, carbon, graphite, MoS<sub>2</sub>, bronze, and mineral.

Hallite’s experienced team of engineers can help you carefully select fillers based on the application media and seal geometry. We can also custom blend if you need material properties that go beyond the limits of our listed materials. Give us a call and we can partner with you to find the best material choice for your application.

|                                 |                                                                                                                                                                               |                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| IDEAL FOR                       | Filled PTFE has improved mechanical properties and is excellent for dynamic applications and high pressures (up to 6000 psi). Different fillers provide different properties. |                                                                                                                                                   |
| ADVANTAGES                      | <ul style="list-style-type: none"><li>Improved wear resistance</li><li>Improved heat transfer</li><li>Increase in mechanical strength</li></ul>                               | <ul style="list-style-type: none"><li>Improved extrusion resistance</li><li>Decreased friction</li><li>Increase in thermal conductivity</li></ul> |
| DISADVANTAGES                   | <ul style="list-style-type: none"><li>Less flexibility in processing (requires machining)</li></ul>                                                                           |                                                                                                                                                   |
| COMMON FILLERS                  | <b>Glass Fibers</b><br>The most common filler. Minor effect on electrical properties. Increased abrasion on mating metal surfaces.                                            |                                                                                                                                                   |
|                                 | <b>Carbon/Carbon Fibers</b><br>Low abrasion and wear. Good deformation and extrusion resistance.                                                                              |                                                                                                                                                   |
|                                 | <b>Graphite</b><br>Non-abrasive. Low friction. Minor effect on deformation properties.                                                                                        |                                                                                                                                                   |
|                                 | <b>MoS<sub>2</sub></b><br>Lowers break-in wear and starting friction.                                                                                                         |                                                                                                                                                   |
|                                 | <b>Bronze</b><br>Very high wear resistance and load-bearing capability. Poor chemical resistance.                                                                             |                                                                                                                                                   |
|                                 | <b>Mineral</b><br>Properties similar to glass, but less abrasive.                                                                                                             |                                                                                                                                                   |
| TEMPERATURE RANGE<br>(DRY HEAT) | -200 to 260°C                                                                                                                                                                 | -328 to 500°F                                                                                                                                     |

| HALLITE HIGH-PERFORMANCE ARMORLENE® MATERIALS                                                                                                                                                                                                                                                                      |                            |                     |            |                     |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|------------|---------------------|---------------------|
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                                                 | FILLER                     | MATERIAL DESIGNATOR | COLOR      | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F |
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"> <li>Standard material for hydraulic applications</li> <li>High compressive strength</li> <li>Excellent extrusion resistance</li> <li>Extended wear resistance</li> </ul>                                                                                  | Special Bronze Compound    | HLX                 | Gold       | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"> <li>Excellent in all hydraulic fluids</li> <li>Excellent wear resistance</li> <li>Excellent low-friction properties</li> <li>Good extrusion resistance</li> </ul>                                                                                         | Special Mineral Compound   | HLA                 | Gray       | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"> <li>Excellent in lubricating and non-lubricating hydraulic fluids</li> <li>Good low-friction properties</li> <li>Excellent extrusion resistance</li> <li>Good chemical resistance</li> </ul>                                                              | Glass Molybdenum Disulfide | 702                 | Gray       | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"> <li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li> <li>Not recommended for gas sealing applications</li> <li>Not recommended for electrical conductive fluids</li> </ul>                            | Carbon Fiber Filled        | HCF                 | Gray/Black | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® HCV</b> <ul style="list-style-type: none"> <li>Recommended for lubricating and non-lubricating fluids</li> <li>Excellent for high-frequency and short-stroke applications</li> <li>Not recommended for gas sealing applications</li> <li>Not recommended for electrical conductive fluids</li> </ul> | High Carbon Fiber Filled   | HCV                 | Gray/Black | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"> <li>Excellent in all hydraulic fluids</li> <li>Recommended for hard mating surfaces only</li> <li>Low friction and no stick-slip</li> </ul>                                                                                                               | Unfilled                   | 700                 | White      | -184 to 204°C       | -300 to 400°F       |
| <b>ARMORLENE® 780</b> <ul style="list-style-type: none"> <li>Excellent in all hydraulic fluids</li> <li>Recommended for hard mating surfaces only</li> <li>Low friction and no stick-slip</li> </ul>                                                                                                               | Unfilled                   | 780                 | Turquoise  | -184 to 232°C       | -300 to 450°F       |
| <b>ARMORLENE® 706</b> <ul style="list-style-type: none"> <li>Excellent in lubricating and non-lubricating hydraulic fluids</li> <li>Excellent extrusion resistance</li> <li>Good chemical resistance</li> <li>Good dielectrical properties</li> </ul>                                                              | 15% Glass                  | 706                 | Off-White  | -73 to 260°C        | -100 to 500°F       |

| HALLITE HIGH-PERFORMANCE ARMORLENE® MATERIALS                                                                                                                                                                                                                                                    |                              |                     |           |                     |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------|-----------|---------------------|---------------------|
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                               | FILLER                       | MATERIAL DESIGNATOR | COLOR     | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F |
| <b>ARMORLENE® 701</b> <ul style="list-style-type: none"> <li>Excellent in lubricating and non-lubricating hydraulic fluids</li> <li>Excellent extrusion resistance</li> <li>Good chemical resistance</li> <li>Good dielectrical properties</li> </ul>                                            | 25% Glass                    | 701                 | Off-White | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"> <li>Excellent in all lubricating fluids and pneumatic applications</li> <li>High chemical resistance</li> <li>Excellent extrusion resistance</li> <li>Excellent wear properties</li> </ul>                                              | 25% Carbon/Graphite          | 711                 | Black     | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® 734</b> <ul style="list-style-type: none"> <li>Excellent in all lubricating fluids and pneumatic applications</li> <li>High chemical resistance</li> <li>Excellent extrusion resistance</li> </ul>                                                                                 | 10% Carbon/Graphite          | 734                 | Black     | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 716</b> <ul style="list-style-type: none"> <li>Excellent in all lubricating fluids and pneumatic applications</li> <li>High chemical resistance</li> </ul>                                                                                                                         | Graphite                     | 716                 | Black     | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"> <li>High compressive strength</li> <li>Excellent extrusion resistance</li> <li>Excellent wear properties</li> </ul>                                                                                                                     | 60% Bronze Content           | 713                 | Bronze    | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® HQ6</b> <ul style="list-style-type: none"> <li>Standard material for G16 and G54 profiles</li> <li>Excellent in lubricating and non-lubricating hydraulic fluids</li> <li>Excellent extrusion resistance</li> <li>Excellent chemical resistance</li> </ul>                         | Special Glass Compound       | HQ6                 | White     | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® 782</b> <ul style="list-style-type: none"> <li>Good abrasion resistance</li> <li>Recommended for lubricating and non-lubricating fluids</li> <li>Recommended for high frequency and short-stroke applications</li> <li>Not recommended for electrical conductive fluids</li> </ul> | Modified Carbon Fiber Filled | 782                 | Black     | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® H1G</b> <ul style="list-style-type: none"> <li>Excellent in lubricating and non-lubricating fluids</li> <li>Excellent extrusion resistance</li> <li>Good chemical resistance</li> <li>Good dielectical properties</li> </ul>                                                       | 15% Glass                    | H1G                 | Gold      | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® H2B</b> <ul style="list-style-type: none"> <li>Excellent in lubricating and non-lubricating fluids</li> <li>Excellent extrusion resistance</li> <li>Good chemical resistance</li> <li>Good dielectical properties</li> </ul>                                                       | 25% Glass                    | H2B                 | Blue      | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® PME</b> <ul style="list-style-type: none"> <li>Special formulated PTFE for PME back up rings</li> <li>Does not require resizing after assembly</li> <li>Provides excellent extrusion resistance</li> </ul>                                                                         | Unfilled                     | PME                 | White     | -184 to 204°C       | -300 to 400°F       |

HALLITE HIGH-PERFORMANCE HYTHANE® MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                      | FILLER                | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|-------------|---------------------|---------------------|
| <b>HYTHANE® 9270061 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• High chemical resistance</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul>                                               | Standard              | 061                 | Red         | -40 to 120°C        | -40 to 250°F        |
| <b>HYTHANE® 9270111 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Hydrolysis stabilized</li><li>• Strong chemical resistance</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul>             | Hydrolysis Stabilized | 111                 | Gray        | -40 to 120°C        | -40 to 250°F        |
| <b>HYTHANE® 9270261 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Internal lubrication provides extended wear in high-speed applications</li><li>• Excellent extrusion resistance</li><li>• Excellent wear resistance</li></ul> | Internally Lubricated | 261                 | Off-White   | -40 to 120°C        | -40 to 250°F        |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Excellent extrusion resistance</li><li>• Excellent wear resistance</li></ul>                                                                                            | Standard              | HU5                 | Yellow      | -20 to 115°C        | -4 to 240°F         |
| <b>HU9 - POLYURETHANE, 95A</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Excellent extrusion resistance</li><li>• Excellent wear resistance</li></ul>                                                                                            | Standard              | HU9                 | Red         | -20 to 115°C        | -4 to 240°F         |
| <b>HE5 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Excellent extrusion resistance</li><li>• Excellent wear resistance</li></ul>                                                                                               | Standard              | HE5                 | Gray/Black  | -20 to 115°C        | -20 to 240°F        |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>• Excellent impact resistance</li><li>• Good dielectrical properties</li><li>• Excellent abrasion resistance</li><li>• Low coefficient of friction</li></ul>                                                                  | Standard              | 748                 | Translucent | -184 to 82°C        | -300 to 180°F       |
| <b>7HP - UHMWPE</b> <ul style="list-style-type: none"><li>• High temperature resistance</li><li>• Good dielectrical properties</li><li>• Excellent abrasion and impact resistance</li><li>• Low coefficient of friction</li></ul>                                                       | Modified              | 7HP                 | Translucent | -30 to 135°C        | -22 to 275°F        |

**NOTE** The above data provides guidance to maximum operating values of the profile. Both values are not to be used at the same time. Maximum speeds and pressures are dependent upon type of material being used, gap, and operating temperature of the application. If you do not find the material that you require, please contact your local Hallite sales office.

MASTER ENERGIZER MATERIALS

Often PTFE seals utilize an elastomeric energizer to provide proper contact load on initial sealing. The choice of elastomer depends on the operating temperature and media. Please refer to the Master Energizer Index below for elastomer type and service temperature limits. For most hydraulic applications, bronze-filled PTFE with 70A NBR O-ring is commonly used throughout this catalog.

| ENERGIZER MATERIAL (SHORE A)                  | ENERGIZER TYPE | ENERGIZER DESIGNATION | ENERGIZER OPERATING TEMPERATURE°C | ENERGIZER OPERATING TEMPERATURE°F |
|-----------------------------------------------|----------------|-----------------------|-----------------------------------|-----------------------------------|
| <b>NBR - 70A</b>                              | O-ring         | N                     | -30 to 100°C                      | -22 to 212°F                      |
| <b>NBR - 70A Low temp.</b>                    | O-ring         | L                     | -45 to 80°C                       | -49 to 176°F                      |
| <b>FKM - 75A</b>                              | O-ring         | F                     | -10 to 200°C                      | 14 to 392°F                       |
| <b>EPDM - 70A</b>                             | O-ring         | E                     | -45 to 145°C                      | -49 to 293°F                      |
| <b>HNBR - 70A</b>                             | O-ring         | H                     | -25 to 150°C                      | -13 to 302°F                      |
| <b>NBR - 90A</b>                              | O-ring         | Q                     | -30 to 100°C                      | -22 to 212°F                      |
| <b>HNBR - 90A</b>                             | O-ring         | U                     | -25 to 150°C                      | -13 to 302°F                      |
| <b>NBR - 70A (GPS Inch, PCA and PFR only)</b> | Square         | R                     | -30 to 100°C                      | -22 to 212°F                      |
| <b>FKM - 75A NBR - 70A (GPS Inch and PCA)</b> | Square         | K                     | -10 to 200°C                      | 14 to 392°F                       |
| <b>No Energizer*</b>                          | None           | X                     | -                                 | -                                 |
| <b>NBR - 80A</b>                              | Capped T       | N                     | -30 to 100°C                      | -22 to 212°F                      |
| <b>NBR - 80A Low temp.</b>                    | Capped T       | L                     | -45 to 80°C                       | -50 to 175°F                      |
| <b>HNBR - 80A</b>                             | Capped T       | H                     | -25 to 150°C                      | -13 to 300°F                      |
| <b>FKM - 85A</b>                              | Capped T       | F                     | -10 to 200°C                      | 15 to 400°F                       |

OTHER OPTIONS

|                            |                 |   |              |              |
|----------------------------|-----------------|---|--------------|--------------|
| <b>NBR - 85A</b>           | O-ring          | A | -30 to 110°C | -22 to 230°F |
| <b>NBR - 80A Low temp.</b> | O-ring          | C | -50 to 110°C | -58 to 230°F |
| <b>FKM - 85A</b>           | O-ring          | G | -20 to 200°C | -4 to 392°F  |
| <b>EPDM - 85A</b>          | O-ring          | M | -45 to 130°C | -49 to 266°F |
| <b>HNBR - 90A</b>          | O-ring          | T | -20 to 150°C | -4 to 302°F  |
| <b>NBR - 85A</b>           | Square/Capped T | B | -30 to 110°C | -22 to 230°F |
| <b>NBR - 80A Low temp.</b> | Square/Capped T | D | -50 to 110°C | -58 to 230°F |
| <b>FKM - 85A</b>           | Square/Capped T | J | -20 to 210°C | -4 to 392°F  |
| <b>EPDM - 85A</b>          | Square          | P | -45 to 130°C | -49 to 266°F |
| <b>HNBR - 90A</b>          | Square/Capped T | S | -20 to 150°C | -4 to 302°F  |

\*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 & FLUID COMPATIBILITY

| MATERIAL FEATURES AND APPLICATIONS | FILLER                     | COLOR      | ABRASION RESISTANCE | METAL MATING WEAR | RELATIVE SEALABILITY | RELATIVE EXTRUSION RESISTANCE | HYDROCARBONS | OXYGENATED SOLVENTS | STEAM | ACIDS | BASES |
|------------------------------------|----------------------------|------------|---------------------|-------------------|----------------------|-------------------------------|--------------|---------------------|-------|-------|-------|
| Armortlene® HLX                    | Special Bronze Compound    | Gold       | E                   | M                 | A                    | G                             | E            | E                   | E     | NR    | W     |
| Armortlene® HLA                    | Special Mineral Compound   | Gray       | G                   | M                 | G                    | G                             | E            | E                   | E     | W     | S     |
| Armortlene® 702                    | Glass Molybdenum Disulfide | Gray       | E                   | H                 | G                    | G                             | E            | E                   | E     | S     | S     |
| Armortlene® HCF                    | Carbon Fiber Filled        | Gray/Black | G                   | M                 | G                    | G                             | E            | E                   | E     | S     | S     |
| Armortlene® HCV                    | High Carbon Fiber Filled   | Gray/Black | G                   | M                 | G                    | G                             | E            | E                   | E     | S     | S     |
| Armortlene® 700                    | Unfilled                   | White      | P                   | L                 | E                    | P                             | E            | E                   | E     | S     | S     |
| Armortlene® 780                    | Unfilled                   | Turquoise  | A                   | L                 | E                    | A                             | E            | E                   | E     | S     | S     |
| Armortlene® 706                    | 15% Glass                  | Off-White  | E                   | H                 | G                    | G                             | E            | E                   | E     | S     | S     |
| Armortlene® 701                    | 25% Glass                  | Off-White  | E                   | H                 | G                    | G                             | E            | E                   | E     | S     | S     |
| Armortlene® 711                    | 25% Carbon/Graphite        | Black      | G                   | M                 | G                    | E                             | E            | E                   | E     | S     | S     |
| Armortlene® 734                    | 10% Carbon/Graphite        | Black      | G                   | M                 | G                    | G                             | E            | E                   | E     | S     | S     |

KEY

E = Excellent  
G = Good  
H = High  
A = Average  
M = Medium

L = Low  
P = Poor  
NR = Not Recommended  
W = Resistant to weak acid/base  
S = Resistant to strong acid/base

MATERIALS & FLUID COMPATIBILITY

| MATERIAL FEATURES AND APPLICATIONS | FILLER                       | COLOR       | ABRASION RESISTANCE | METAL MATING WEAR | RELATIVE SEALABILITY | RELATIVE EXTRUSION RESISTANCE | HYDROCARBONS | OXYGENATED SOLVENTS | STEAM | ACIDS | BASES |
|------------------------------------|------------------------------|-------------|---------------------|-------------------|----------------------|-------------------------------|--------------|---------------------|-------|-------|-------|
| Armortlene® 716                    | Graphite                     | Black       | A                   | M                 | E                    | G                             | E            | E                   | E     | S     | S     |
| Armortlene® 713                    | 60% Bronze Content           | Bronze      | E                   | M                 | A                    | G                             | E            | E                   | E     | NR    | W     |
| Armortlene® HQ6                    | Special Glass Compound       | White       | E                   | H                 | G                    | G                             | E            | E                   | E     | S     | S     |
| Armortlene® 782                    | Modified Carbon Fiber Filled | Black       | G                   | M                 | G                    | G                             | E            | E                   | E     | S     | S     |
| Armortlene® H1G                    | 15% Glass                    | Gold        | E                   | H                 | G                    | G                             | E            | E                   | E     | S     | S     |
| Armortlene® H2B                    | 25% Glass                    | Blue        | E                   | H                 | G                    | G                             | E            | E                   | E     | S     | S     |
| HYTHANE® 9270061 - POLYESTER       | Standard                     | Red         | E                   | E                 | E                    | E                             | E            | NR                  | L     | NR    | NR    |
| HYTHANE® 9270111 - POLYESTER       | Hydrolysis Stabilized        | Gray        | E                   | E                 | E                    | E                             | E            | NR                  | L     | NR    | NR    |
| HYTHANE® 9270261 - POLYESTER       | Internally Lubricated        | Off-White   | E                   | E                 | E                    | E                             | E            | NR                  | L     | NR    | NR    |
| HU5 - POLYURETHANE, 55D            | Standard                     | Yellow      | E                   | E                 | E                    | E                             | E            | NR                  | L     | NR    | NR    |
| HU9 - POLYURETHANE, 95A            | Standard                     | Red         | E                   | E                 | E                    | E                             | E            | NR                  | L     | NR    | NR    |
| HE5 - POLYESTER                    | Standard                     | Gray/Black  | E                   | E                 | E                    | E                             | E            | NR                  | L     | NR    | NR    |
| 748 - UHMWPE                       | Standard                     | Translucent | E                   | L                 | E                    | G                             | E            | E                   | E     | S     | S     |
| 7HP - UHMWPE                       | Standard                     | Translucent | E                   | L                 | E                    | G                             | E            | E                   | E     | S     | S     |

HALLITE SEAL DESIGN AND SELECTION INDEX

The Seal Design and Selection Index is designed to aid the customer in narrowing down practical seal design options for common applications. As such, we have used variables such as applications, groove efficiency, seal size, typical industry materials, and cost-effectiveness to create the ratings.

This should not be expressly interpreted as an indication that a seal design will not perform well in an application given an “acceptable” rating, for example. Rather it may be more costly than other seal design choices, and therefore its rating is not noted as preferred. These are general guidelines to help narrow down seal design options and are not intended to replace the specific technical application assistance your Hallite technical representatives can provide.

|           | PROFILE DESIGNATION | OPERATING CONDITIONS                                                                |               |                 | MAX DIAMETER     | SINGLE OR DOUBLE ACTING | APPLICATION CONSIDERATIONS |             |            |            |                         |           | PAGE # |    |
|-----------|---------------------|-------------------------------------------------------------------------------------|---------------|-----------------|------------------|-------------------------|----------------------------|-------------|------------|------------|-------------------------|-----------|--------|----|
|           |                     | PARAMETER                                                                           | METRIC        | INCH            |                  |                         | LIGHT DUTY                 | MEDIUM DUTY | HEAVY DUTY | HIGH SPEED | HIGH FREQUENCY (DITHER) | PNEUMATIC |        |    |
| ROD SEALS | R16                 |    | Maximum Speed | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in)          | Single                     | o           | +          | –          | +                       | +         | –      | 39 |
|           |                     | Temperature Range*                                                                  | -45 to 200°C  | -49 to 392°F    |                  |                         |                            |             |            |            |                         |           |        |    |
|           |                     | Maximum Dynamic Pressure**                                                          | 600 bar       | 8700 psi        |                  |                         |                            |             |            |            |                         |           |        |    |
|           | 716SPN              |   | Maximum Speed | Up to 1.0m/sec  | Up to 3.3ft/sec  | 2500mm (98in)           | Single                     | o           | +          | o          | o (+)                   | o (+)     | o      | 51 |
|           |                     | Temperature Range*                                                                  | -40 to 100°C  | -40 to 212°F    |                  |                         |                            |             |            |            |                         |           |        |    |
|           |                     | Maximum Dynamic Pressure**                                                          | 400 bar       | 5800 psi        |                  |                         |                            |             |            |            |                         |           |        |    |
|           | RDA                 |  | Maximum Speed | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in)          | Double                     | o           | +          | o          | o                       | o         | o      | 55 |
|           |                     | Temperature Range*                                                                  | -45 to 200°C  | -49 to 392°F    |                  |                         |                            |             |            |            |                         |           |        |    |
|           |                     | Maximum Dynamic Pressure**                                                          | 600 bar       | 8700 psi        |                  |                         |                            |             |            |            |                         |           |        |    |
|           | RDS                 |  | Maximum Speed | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in)          | Double                     | o           | +          | -          | o                       | o         | –      | 65 |
|           |                     | Temperature Range*                                                                  | -45 to 200°C  | -49 to 392°F    |                  |                         |                            |             |            |            |                         |           |        |    |
|           |                     | Maximum Dynamic Pressure                                                            | 350 bar       | 5000 psi        |                  |                         |                            |             |            |            |                         |           |        |    |
|           | RCG                 |  | Maximum Speed | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in)          | Double                     | +           | o          | o          | o                       | o         | o      | 73 |
|           |                     | Temperature Range*                                                                  | -45 to 200°C  | -49 to 392°F    |                  |                         |                            |             |            |            |                         |           |        |    |
|           |                     | Maximum Dynamic Pressure                                                            | 200 bar       | 2900 psi        |                  |                         |                            |             |            |            |                         |           |        |    |

\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above the maximum pressure listed, contact Hallite Engineering.

KEY  
+ = Preferred  
o = Acceptable  
- = Not Recommended

(+) When working as secondary rod seal

HALLITE SEAL DESIGN AND SELECTION INDEX

|                       | PROFILE DESIGNATION | OPERATING CONDITIONS                                                                |               |                | MAX DIAMETER     | SINGLE OR DOUBLE ACTING | APPLICATION CONSIDERATIONS |             |            |            |                         |           | PAGE # |
|-----------------------|---------------------|-------------------------------------------------------------------------------------|---------------|----------------|------------------|-------------------------|----------------------------|-------------|------------|------------|-------------------------|-----------|--------|
|                       |                     | PARAMETER                                                                           | METRIC        | INCH           |                  |                         | LIGHT DUTY                 | MEDIUM DUTY | HEAVY DUTY | HIGH SPEED | HIGH FREQUENCY (DITHER) | PNEUMATIC |        |
| ROD SEALS (CONTINUED) | SRS                 |  | Maximum Speed | Up to 4.0m/sec | Up to 12.0ft/sec | 2600mm (103in)          | Single                     | o           | +          | o          | o                       | o         | 81     |
|                       |                     | Temperature Range*                                                                  | -45 to 200°C  | -49 to 392°F   |                  |                         |                            |             |            |            |                         |           |        |
|                       |                     | Maximum Dynamic Pressure**                                                          | 400 bar       | 5800 psi       |                  |                         |                            |             |            |            |                         |           |        |
|                       | SRB                 |  | Maximum Speed | Up to 4.0m/sec | Up to 12.0ft/sec | 2600mm (103in)          | Single                     | o           | o          | +          | o                       | o         | 87     |
|                       |                     | Temperature Range*                                                                  | -45 to 200°C  | -49 to 392°F   |                  |                         |                            |             |            |            |                         |           |        |
|                       |                     | Maximum Dynamic Pressure**                                                          | 600 bar       | 8700 psi       |                  |                         |                            |             |            |            |                         |           |        |

|              |     |                                                                                       |                            |                 |                  |                |        |   |   |   |   |   |   |     |
|--------------|-----|---------------------------------------------------------------------------------------|----------------------------|-----------------|------------------|----------------|--------|---|---|---|---|---|---|-----|
| PISTON SEALS | CT  |   | Maximum Speed              | Up to 1.5m/sec  | Up to 5.0ft/sec  | 1270mm (50in)  | Double | o | o | + | o | o | o | 95  |
|              |     |                                                                                       | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                |        |   |   |   |   |   |   |     |
|              |     |                                                                                       | Maximum Dynamic Pressure** | 600 bar         | 8700 psi         |                |        |   |   |   |   |   |   |     |
|              | P54 |  | Maximum Speed              | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in) | Double | o | + | o | o | o | o | 105 |
|              |     |                                                                                       | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                |        |   |   |   |   |   |   |     |
|              |     |                                                                                       | Maximum Dynamic Pressure** | 600 bar         | 8700 psi         |                |        |   |   |   |   |   |   |     |
|              | P16 |  | Maximum Speed              | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in) | Single | o | + | o | + | o | o | 115 |
|              |     |                                                                                       | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                |        |   |   |   |   |   |   |     |
|              |     |                                                                                       | Maximum Dynamic Pressure** | 600 bar         | 8700 psi         |                |        |   |   |   |   |   |   |     |
|              | GPS |  | Maximum Speed              | Up to 2.0m/sec  | Up to 6.5ft/sec  | 1270mm (50in)  | Double | o | + | o | + | o | o | 127 |
|              |     |                                                                                       | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                |        |   |   |   |   |   |   |     |
|              |     |                                                                                       | Maximum Dynamic Pressure** | 500 bar         | 7200 psi         |                |        |   |   |   |   |   |   |     |

\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above the maximum pressure listed, contact Hallite Engineering.

KEY  
+ = Preferred  
o = Acceptable  
- = Not Recommended



HALLITE SEAL DESIGN AND SELECTION INDEX

|                          | PROFILE DESIGNATION | OPERATING CONDITIONS                                                                |                            |                 | MAX DIAMETER     | SINGLE OR DOUBLE ACTING | APPLICATION CONSIDERATIONS |             |            |            |                         |           | PAGE # |     |
|--------------------------|---------------------|-------------------------------------------------------------------------------------|----------------------------|-----------------|------------------|-------------------------|----------------------------|-------------|------------|------------|-------------------------|-----------|--------|-----|
|                          |                     | PARAMETER                                                                           | METRIC                     | INCH            |                  |                         | LIGHT DUTY                 | MEDIUM DUTY | HEAVY DUTY | HIGH SPEED | HIGH FREQUENCY (DITHER) | PNEUMATIC |        |     |
| PISTON SEALS (CONTINUED) | GP2                 |    | Maximum Speed              | Up to 3.0m/sec  | Up to 10.0ft/sec | 1270mm (50in)           | Double                     | o           | o          | +          | +                       | o         | o      | 137 |
|                          |                     |                                                                                     | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                         |                            |             |            |            |                         |           |        |     |
|                          |                     |                                                                                     | Maximum Dynamic Pressure** | 600 bar         | 8700 psi         |                         |                            |             |            |            |                         |           |        |     |
|                          | PFR                 |    | Maximum Speed              | Up to 4.0m/sec  | Up to 13.0ft/sec | 1270mm (50in)           | Double                     | o           | +          | o          | o                       | o         | o      | 145 |
|                          |                     |                                                                                     | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                         |                            |             |            |            |                         |           |        |     |
|                          |                     |                                                                                     | Maximum Dynamic Pressure   | 350 bar         | 5000 psi         |                         |                            |             |            |            |                         |           |        |     |
|                          | G54                 |   | Maximum Speed              | Up to 4.0m/sec  | Up to 12.0ft/sec | 2600mm (103in)          | Double                     | o           | +          | o          | o                       | o         | o      | 149 |
|                          |                     |                                                                                     | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                         |                            |             |            |            |                         |           |        |     |
|                          |                     |                                                                                     | Maximum Dynamic Pressure** | 400 bar         | 5800 psi         |                         |                            |             |            |            |                         |           |        |     |
|                          | PDS                 |  | Maximum Speed              | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in)          | Double                     | o           | +          | -          | o                       | o         | -      | 157 |
|                          |                     |                                                                                     | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                         |                            |             |            |            |                         |           |        |     |
|                          |                     |                                                                                     | Maximum Dynamic Pressure   | 350 bar         | 5000 psi         |                         |                            |             |            |            |                         |           |        |     |
|                          | PCG                 |  | Maximum Speed              | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in)          | Double                     | o           | +          | o          | o                       | o         | o      | 165 |
|                          |                     |                                                                                     | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                         |                            |             |            |            |                         |           |        |     |
|                          |                     |                                                                                     | Maximum Dynamic Pressure   | 200 bar         | 2900 psi         |                         |                            |             |            |            |                         |           |        |     |
|                          | PCA                 |  | Maximum Speed              | Up to 4.0m/sec  | Up to 13.0ft/sec | 1270mm (50in)           | Double                     | o           | +          | o          | o                       | o         | o      | 173 |
|                          |                     |                                                                                     | Temperature Range*         | -45 to 200°C    | -49 to 392°F     |                         |                            |             |            |            |                         |           |        |     |
|                          |                     |                                                                                     | Maximum Dynamic Pressure** | 350 bar         | 5000 psi         |                         |                            |             |            |            |                         |           |        |     |

\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above the maximum pressure listed, contact Hallite Engineering.

KEY  
+ = Preferred  
o = Acceptable  
- = Not Recommended

HALLITE SEAL DESIGN AND SELECTION INDEX

|        | PROFILE DESIGNATION | OPERATING CONDITIONS                                                                  |               |                 | MAX DIAMETER     | APPLICATION CONSIDERATIONS |             |            |            |                         |           | PAGE # |     |
|--------|---------------------|---------------------------------------------------------------------------------------|---------------|-----------------|------------------|----------------------------|-------------|------------|------------|-------------------------|-----------|--------|-----|
|        |                     | PARAMETER                                                                             | METRIC        | INCH            |                  | LIGHT DUTY                 | MEDIUM DUTY | HEAVY DUTY | HIGH SPEED | HIGH FREQUENCY (DITHER) | PNEUMATIC |        |     |
| WIPERS | E2W                 |    | MAXIMUM SPEED | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in)             | o           | +          | o          | +                       | +         | o      | 181 |
|        |                     | TEMPERATURE RANGE*                                                                    | -45 to 200°C  | -49 to 392°F    |                  |                            |             |            |            |                         |           |        |     |
|        | E5W                 |    | MAXIMUM SPEED | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in)             | o           | o          | +          | +                       | o         | o      | 189 |
|        |                     | TEMPERATURE RANGE*                                                                    | -45 to 200°C  | -49 to 392°F    |                  |                            |             |            |            |                         |           |        |     |
|        | ELA                 |    | MAXIMUM SPEED | Up to 4.0m/sec  | Up to 13.0ft/sec | 2600mm (103in)             | o           | +          | o          | +                       | +         | +      | 197 |
|        |                     | TEMPERATURE RANGE*                                                                    | -45 to 200°C  | -49 to 392°F    |                  |                            |             |            |            |                         |           |        |     |
|        | EXF                 |   | MAXIMUM SPEED | Up to 15.0m/sec | Up to 50.0ft/sec | 2600mm (103in)             | o           | o          | +          | +                       | o         | o      | 203 |
|        |                     | TEMPERATURE RANGE*                                                                    | -45 to 200°C  | -49 to 392°F    |                  |                            |             |            |            |                         |           |        |     |
|        | EXG                 |  | MAXIMUM SPEED | Up to 5.0m/sec  | Up to 16.4ft/sec | 2600mm (103in)             | o           | o          | +          | +                       | o         | o      | 209 |
|        |                     | TEMPERATURE RANGE*                                                                    | -45 to 200°C  | -49 to 392°F    |                  |                            |             |            |            |                         |           |        |     |

\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above the maximum pressure listed, contact Hallite Engineering.

KEY  
+ = Preferred  
o = Acceptable  
- = Not Recommended



OTHER HALLITE PRODUCTS INDEX

OTHER HALLITE PRODUCTS INDEX

|              | PROFILE DESIGNATION |                                                                                   | OPERATING CONDITIONS       |                |                 | PAGE # |
|--------------|---------------------|-----------------------------------------------------------------------------------|----------------------------|----------------|-----------------|--------|
|              |                     |                                                                                   | PARAMETER                  | METRIC         | INCH            |        |
| SWIVEL SEALS | SSP                 |  | Maximum Speed              | Up to 2.0m/sec | Up to 6.5ft/sec | 215    |
|              |                     |                                                                                   | Temperature Range*         | -45 to 200°C   | -49 to 392°F    |        |
|              |                     |                                                                                   | Maximum Dynamic Pressure** | 300 bar        | 4350 psi        |        |
|              | SSR                 |  | Maximum Speed              | Up to 2.0m/sec | Up to 6.5ft/sec | 223    |
|              |                     |                                                                                   | Temperature Range*         | -45 to 200°C   | -49 to 392°F    |        |
|              |                     |                                                                                   | Maximum Dynamic Pressure** | 300 bar        | 4350 psi        |        |

Application limit PV ≤ 25 bar m/s (40 bar for interrupted rotary).

|           | PROFILE DESIGNATION                                                                | DESCRIPTION                                                                                                                                                                                                                                                                                                                        | PAGE # |
|-----------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| OPTISEAL® |  | Complete Range of spring-energized OptiSeal®, designed for application.<br><br>OptiSeal® is designed using a wide range of jacket materials including filled virgin PEEK, various Armorlene® PTFE compounds, UHMWPE, and POM. Paired with V-springs, J-springs, and canted and helical flat coils made out of a variety of alloys. | 233    |

|               | PROFILE DESIGNATION |                                                                                     | OPERATING CONDITIONS |              |              | PAGE # |
|---------------|---------------------|-------------------------------------------------------------------------------------|----------------------|--------------|--------------|--------|
|               |                     |                                                                                     | PARAMETER            | METRIC       | INCH         |        |
| BACK-UP RINGS | PME                 |  | Temperature Range    | -30 to 200°C | -22 to 392°F | 257    |
|               | OTHER BACK-UP RINGS |  | Temperature Range    | -30 to 200°C | -22 to 392°F | 259    |

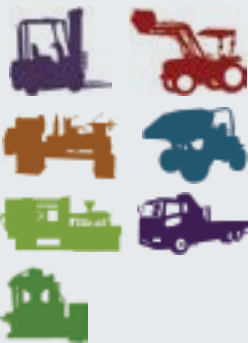
\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above the maximum pressure listed, contact Hallite Engineering.

|                             | PROFILE DESIGNATION |                                                                                     | OPERATING CONDITIONS |                |                  | PAGE # |
|-----------------------------|---------------------|-------------------------------------------------------------------------------------|----------------------|----------------|------------------|--------|
|                             |                     |                                                                                     | PARAMETER            | METRIC         | INCH             |        |
| BEARINGS AND GUIDE ELEMENTS | T87                 |  | Maximum Speed        | Up to 5.0m/sec | Up to 16.4ft/sec | 263    |
|                             |                     |                                                                                     | Temperature Range    | -50 to 200°C   | -58 to 390°F     |        |
|                             | 506                 |  | Maximum Speed        | Up to 5.0m/sec | Up to 16.4ft/sec | 269    |
|                             |                     |                                                                                     | Temperature Range    | -40 to 120°C   | -40 to 250°F     |        |
|                             | 533                 |  | Maximum Speed        | Up to 5.0m/sec | Up to 16.4ft/sec | 275    |
|                             |                     |                                                                                     | Temperature Range    | -40 to 120°C   | -40 to 250°F     |        |
|                             | G-SERIES            |  | Maximum Speed        | Up to 5.0m/sec | Up to 16.4ft/sec | 279    |
|                             |                     |                                                                                     | Temperature Range    | -200 to 300°C  | -328 to 572°F    |        |

|                  | PROFILE DESIGNATION | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | PAGE # |
|------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| RELATED PRODUCTS | ROD SEALS           | Hallite offers many less common seal profiles that are often made out of Armolene® PTFE materials. In addition, Hallite custom designs and manufactures seals developed for specific applications as a standard service. Over the years, this has resulted in accumulating an extensive library of profiles and designs that are purpose-built to suit demanding applications. Custom seals usually can be manufactured in short lead times and often do not require large volume minimums to be met. | 285    |
|                  | PISTON SEALS        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |
|                  | WIPERS SEALS        | In this section, we show some common Armolene® based design variants that are semi-standard for your reference. If you do not see what you need or would like Hallite to purpose-design a seal for your application, please contact your Hallite technical representative.                                                                                                                                                                                                                            |        |
|                  | SWIVEL SEALS        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |

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.

CYLINDER OPERATING CONDITIONS

| CYLINDER SPECIFICATION |         | LIGHT DUTY                                                                                                                                                                                                                                                                                                 |          | MEDIUM DUTY                                                                                                                                                                                                                                                                                                                                                                                                                |          | HEAVY DUTY                                                                                                                                                                                                                                  |           |
|------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| PRESSURE               | Max     | 350 bar                                                                                                                                                                                                                                                                                                    | 5000 psi | 500 bar                                                                                                                                                                                                                                                                                                                                                                                                                    | 7500 psi | 700 bar                                                                                                                                                                                                                                     | 10000 psi |
|                        | Normal  | 160 bar                                                                                                                                                                                                                                                                                                    | 2300 psi | 250 bar                                                                                                                                                                                                                                                                                                                                                                                                                    | 3625 psi | 400 bar                                                                                                                                                                                                                                     | 5800 psi  |
|                        | Working | No pressure peaks                                                                                                                                                                                                                                                                                          |          | Intermittent pressure peaks                                                                                                                                                                                                                                                                                                                                                                                                |          | 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 the 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 indoors and outdoors but some protection from the weather.                                                                                                                                                                                                                                                                                                                                                      |          | Outdoors all the time or dirty indoor area. Wide variations in temperature, both ambient and working. Difficult service conditions.                                                                                                         |           |
| Usage                  |         | Irregular with short section of stroke at working pressures. Regular usage but at low pressure.                                                                                                                                                                                                            |          | Regular usage with most of the stroke at working pressure.                                                                                                                                                                                                                                                                                                                                                                 |          | Large amount of usage at high pressure with peaks throughout the stroke.                                                                                                                                                                    |           |
| Typical Applications   |         | <ul style="list-style-type: none"><li>Machine tools</li><li>Lifting equipment</li><li>Mechanical handling</li><li>Injection molding machines</li><li>Control and robot equipment</li><li>Agricultural machinery</li><li>Packaging equipment</li><li>Aircraft equipment</li><li>Light duty tipper</li></ul> |          | <ul style="list-style-type: none"><li>Heavy duty lifting equipment</li><li>Agricultural equipment</li><li>Light duty off-road vehicles</li><li>Cranes and lifting platforms</li><li>Heavy duty machine tools</li><li>Injection molding machines</li><li>Some auxiliary mining machinery</li><li>Aircraft equipment</li><li>Presses</li><li>Heavy duty tipper (telescopic)</li><li>Heavy duty mechanical handling</li></ul> |          | <ul style="list-style-type: none"><li>Foundry and metal fabrication plant</li><li>Mining machinery</li><li>Roof supports</li><li>Heavy duty earthmoving machinery</li><li>Heavy duty off-road vehicles</li><li>Heavy duty presses</li></ul> |           |
|                        |         |                                                                                                                                                                                                                         |          |                                                                                                                                                                                                                                                                                                                                         |          |                                                                                                                                                        |           |

**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.

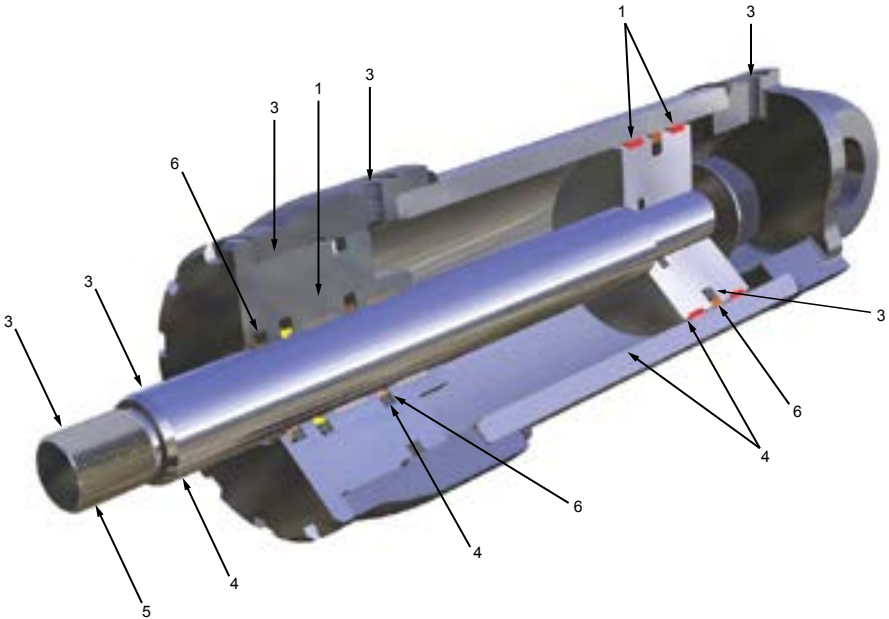
PRESSURE, SPEED, AND TEMPERATURE RANGE

From many years of application experience with sealing hydraulic equipment, supported by the results from an extensive test program, we know that it is necessary to link the three main operating features — 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 details to your local Hallite sales office.

USE & 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 of 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 sidelading, causing damage to the rod or the tube surface and hence the seal, if the bearings are inadequate.
- 2 Ensure that seals are stored distortion free in a cool, dry, and dark place prior to fitting. See “Storage of Seals” directions.
- 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 upon 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 localized 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.



FACE RING AND OPTISEAL® INSTALLATION

For OptiSeal® installations, it is highly recommended that the two-piece, step-cut, or snap-ring gland be used. A full one-piece gland should only be used when modification of the existing gland is impossible. The following applies only to one-piece gland installation.

Both PTFE face ring and OptiSeal® are subjected to stretch during installation, and care must be taken to not damage the seal. Avoid the use of any sharp objects to push the seal into the groove. If possible, heating the seal in a conventional oven or soaking in hot water at 100°C for 10 to 15 minutes will make the installation process much easier.



ONE-PIECE PISTON GROOVE

Place the installation cone on the piston. For OptiSeal® place it on the cone so that the spring faces the installed direction on the piston. For an energized face seal assembly, install the energizer into the groove, then place the face ring on the cone. Push seal over the cone and into the groove using the installation expander.

If the seal does not return to its original size, use the resizing sleeve to reshape the seal. The installation cone, expander, and resizing sleeve are all available from Hallite. Additional tooling can be designed and manufactured for step-cut glands. Please contact your sales representative for more information, or submit your inquiry to [sales@hallite.com](mailto:sales@hallite.com).

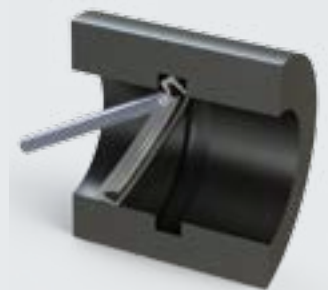


ONE-PIECE ROD GROOVE

For OptiSeal®, this type of gland should not be used for rods less than 1.500in (38mm). Below this diameter a two-piece or step-cut gland must be used.

Begin installation by squeezing the seal into an elliptical shape, enabling it to fit onto the gland bore. With fingers or a radiused tool, push approximately 1/3 of the seal into the grove, being careful the seal component does not sustain damage.

Following this step, use a pusher tool the same diameter as the rod to push the remainder of the seal into the groove.



SPECIFIED TOLERANCE TABLES

HALLITE 87, 506 & 533 BEARING STRIP

Hallite 87 strip is a low-friction bronze-filled PTFE compound produced in a flat tape style ready to be cut to size to suit individual applications. It is particularly effective in friction-conscious applications, such as servo cylinders.

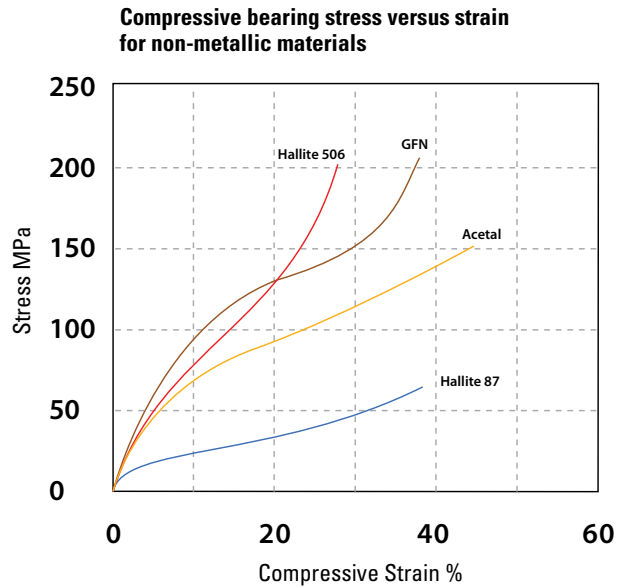
Hallite 506 can be supplied in spiral lengths, generally in 10 meter lengths, as individual cut bearings, and also in 10 meter lengths, packed flat in a box dispenser. Hallite 506 bearing strip is manufactured to extremely accurate thickness tolerances, ensuring reliable cylinder alignment. Other sizes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

Hallite 533 are formed glass-filled nylon rings made for many different housing sizes.

| BEARING TYPE | STANDARD MATERIAL |
|--------------|-------------------|
| 87           | PTFE + Bronze     |
| 506          | Polyester + PTFE  |
| 533          | GFN               |

BEARING STRIP HOUSING TOLERANCES

Please refer to the detailed bearing information located at the back of this catalog or in the EMEA catalog.



| HALLITE 506<br>SPECIFIED<br>TOLERANCES | METRIC         |                       | INCH             |                       |
|----------------------------------------|----------------|-----------------------|------------------|-----------------------|
|                                        | BEARING LENGTH | BEARING CROSS SECTION | BEARING LENGTH   | BEARING CROSS SECTION |
|                                        | L <sub>1</sub> | S                     | L <sub>1</sub>   | S                     |
| Tolerances                             | -0.1 to -0.6   | -0.02 to -0.08        | -0.005 to -0.025 | -0.001 to -0.003      |

| HALLITE 533<br>SPECIFIED<br>TOLERANCES | BEARING LENGTH   | BEARING CROSS SECTION |
|----------------------------------------|------------------|-----------------------|
|                                        | L <sub>1</sub>   | S                     |
| Tolerances (in)                        | -0.000 to -0.010 | -0.001 to -0.004      |

| HALLITE 87<br>SPECIFIED<br>TOLERANCES | BEARING LENGTH | BEARING CROSS SECTION |
|---------------------------------------|----------------|-----------------------|
|                                       | L <sub>1</sub> | S                     |
| Tolerances (mm)                       | -0.1 to -0.5   | +0.03 to -0.05        |

SPECIFIED TOLERANCE TABLES

CYLINDER HOUSING AND ROD, PISTON, BORE, AND GLAND TOLERANCES

| NOMINAL SIZES mm |     | SHAFTS (OUTSIDE DIAMETER) UNITS 0.01 mm |             |           |           |           |           |              |                | BORE (INSIDE DIAMETER) UNITS 0.01 mm |           |           |           |                |
|------------------|-----|-----------------------------------------|-------------|-----------|-----------|-----------|-----------|--------------|----------------|--------------------------------------|-----------|-----------|-----------|----------------|
| over             | to  | f8                                      | f9          | h8        | h9        | h10       | h11       | js10         | js11           | H8                                   | H9        | H10       | H11       | Js11           |
| 1.6              | 3   | -6<br>-20                               | -6<br>-31   | 0<br>-14  | 0<br>-25  | 0<br>-40  | 0<br>-60  | +20<br>-20   | +30<br>-30     | +14<br>0                             | +25<br>0  | +40<br>0  | +60<br>0  | +30<br>-30     |
| 3                | 6   | -10<br>-28                              | -10<br>-40  | 0<br>-18  | 0<br>-30  | 0<br>-48  | 0<br>-75  | +24<br>-24   | +37.5<br>-37.5 | +18<br>0                             | +30<br>0  | +48<br>0  | +75<br>0  | +37.5<br>-37.5 |
| 6                | 10  | -13<br>-35                              | -13<br>-49  | 0<br>-22  | 0<br>-36  | 0<br>-58  | 0<br>-90  | +29<br>-29   | +45<br>-45     | +22<br>0                             | +36<br>0  | +58<br>0  | +90<br>0  | +45<br>-45     |
| 10               | 18  | -16<br>-43                              | -16<br>-59  | 0<br>-27  | 0<br>-43  | 0<br>-70  | 0<br>-110 | +35<br>-35   | +55<br>-55     | +27<br>0                             | +43<br>0  | +70<br>0  | +110<br>0 | +55<br>-55     |
| 18               | 30  | -20<br>-53                              | -20<br>-72  | 0<br>-33  | 0<br>-52  | 0<br>-84  | 0<br>-130 | +42<br>-42   | +65<br>-65     | +33<br>0                             | +52<br>0  | +84<br>0  | +130<br>0 | +65<br>-65     |
| 30               | 50  | -25<br>-64                              | -25<br>-87  | 0<br>-39  | 0<br>-62  | 0<br>-100 | 0<br>-160 | +50<br>-50   | +80<br>-80     | +39<br>0                             | +62<br>0  | +100<br>0 | +160<br>0 | +80<br>-80     |
| 50               | 80  | -30<br>-76                              | -30<br>-104 | 0<br>-46  | 0<br>-74  | 0<br>-120 | 0<br>-190 | +60<br>-60   | +95<br>-95     | +46<br>0                             | +74<br>0  | +120<br>0 | +190<br>0 | +95<br>-95     |
| 80               | 120 | -36<br>-90                              | -36<br>-123 | 0<br>-54  | 0<br>-87  | 0<br>-140 | 0<br>-220 | +70<br>-70   | +110<br>-110   | +54<br>0                             | +87<br>0  | +140<br>0 | +220<br>0 | +110<br>-110   |
| 120              | 180 | -43<br>-106                             | -43<br>-143 | 0<br>-63  | 0<br>-100 | 0<br>-160 | 0<br>-250 | +80<br>-80   | +125<br>-125   | +63<br>0                             | +100<br>0 | +160<br>0 | +250<br>0 | +125<br>-125   |
| 180              | 250 | -50<br>-122                             | -50<br>-165 | 0<br>-72  | 0<br>-115 | 0<br>-185 | 0<br>-290 | +92<br>-92   | +145<br>-145   | +72<br>0                             | +115<br>0 | +185<br>0 | +290<br>0 | +145<br>-145   |
| 250              | 315 | -56<br>-137                             | -56<br>-186 | 0<br>-81  | 0<br>-130 | 0<br>-210 | 0<br>-320 | +105<br>-105 | +160<br>-160   | +81<br>0                             | +130<br>0 | +210<br>0 | +320<br>0 | +160<br>-160   |
| 315              | 400 | -62<br>-151                             | -62<br>-202 | 0<br>-89  | 0<br>-140 | 0<br>-230 | 0<br>-360 | +115<br>-115 | +180<br>-180   | +89<br>0                             | +140<br>0 | +230<br>0 | +360<br>0 | +180<br>-180   |
| 400              | 500 | -68<br>-165                             | -68<br>-223 | 0<br>-97  | 0<br>-155 | 0<br>-250 | 0<br>-400 | +125<br>-125 | +200<br>-200   | +97<br>0                             | +155<br>0 | +250<br>0 | +400<br>0 | +200<br>-200   |
| 500              | 630 | -76<br>-186                             | -76<br>-251 | 0<br>-110 | 0<br>-175 | 0<br>-280 | 0<br>-440 | +140<br>-140 | +220<br>-220   | +110<br>0                            | +175<br>0 | +280<br>0 | +440<br>0 | +220<br>-220   |
| 630              | 800 | -80<br>-205                             | -80<br>-280 | 0<br>-125 | 0<br>-200 | 0<br>-320 | 0<br>-500 | +160<br>-160 | +250<br>-250   | +125<br>0                            | +200<br>0 | +320<br>0 | +500<br>0 | +250<br>-250   |

| NOMINAL SIZES in |       | SHAFTS (OUTSIDE DIAMETER) UNITS 0.001 in |               |           |           |            |            |              |              | BORE (INSIDE 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<br>-0.9                             | -0.3<br>-1.2  | 0<br>-0.6 | 0<br>-1.0 | 0<br>-1.6  | 0<br>-2.5  | +0.8<br>-0.8 | +1.3<br>-1.3 | +0.6<br>0                             | +1.0<br>0 | +1.6<br>0  | +2.5<br>0  | +1.3<br>-1.3 |
| 0.12             | 0.24  | -0.4<br>-1.1                             | -0.4<br>-1.6  | 0<br>-0.7 | 0<br>-1.2 | 0<br>-1.8  | 0<br>-3.0  | +0.9<br>-0.9 | +1.5<br>-1.5 | +0.7<br>0                             | +1.2<br>0 | +1.8<br>0  | +3.0<br>0  | +1.5<br>-1.5 |
| 0.24             | 0.40  | -0.5<br>-1.4                             | -0.5<br>-1.9  | 0<br>-0.9 | 0<br>-1.4 | 0<br>-2.2  | 0<br>-3.5  | +1.1<br>-1.1 | +1.8<br>-1.8 | +0.9<br>0                             | +1.4<br>0 | +2.2<br>0  | +3.5<br>0  | +1.8<br>-1.8 |
| 0.40             | 0.71  | -0.6<br>-1.6                             | -0.6<br>-2.3  | 0<br>-1.0 | 0<br>-1.6 | 0<br>-2.8  | 0<br>-4.0  | +1.4<br>-1.4 | +2.0<br>-2.0 | +1.0<br>0                             | +1.6<br>0 | +2.8<br>0  | +4.0<br>0  | +2.0<br>-2.0 |
| 0.71             | 1.19  | -0.8<br>-2.0                             | -0.8<br>-2.8  | 0<br>-1.2 | 0<br>-2.0 | 0<br>-3.5  | 0<br>-5.0  | +1.8<br>-1.8 | +2.5<br>-2.5 | +1.2<br>0                             | +2.0<br>0 | +3.5<br>0  | +5.0<br>0  | +2.5<br>-2.5 |
| 1.19             | 1.97  | -1.0<br>-2.6                             | -1.0<br>-3.4  | 0<br>-1.6 | 0<br>-2.5 | 0<br>-4.0  | 0<br>-6.0  | +2.0<br>-2.0 | +3.0<br>-3.0 | +1.6<br>0                             | +2.5<br>0 | +4.0<br>0  | +6.0<br>0  | +3.0<br>-3.0 |
| 1.97             | 3.15  | -1.2<br>-3.0                             | -1.2<br>-4.1  | 0<br>-1.8 | 0<br>-3.0 | 0<br>-4.5  | 0<br>-7.0  | +2.3<br>-2.3 | +3.5<br>-3.5 | +1.8<br>0                             | +3.0<br>0 | +4.5<br>0  | +7.0<br>0  | +3.5<br>-3.5 |
| 3.15             | 4.73  | -1.4<br>-3.6                             | -1.4<br>-4.8  | 0<br>-2.2 | 0<br>-3.5 | 0<br>-5.0  | 0<br>-9.0  | +2.5<br>-2.5 | +4.5<br>-4.5 | +2.2<br>0                             | +3.5<br>0 | +5.0<br>0  | +9.0<br>0  | +4.5<br>-4.5 |
| 4.73             | 7.09  | -1.6<br>-4.1                             | -1.6<br>-5.6  | 0<br>-2.5 | 0<br>-4.0 | 0<br>-6.0  | 0<br>-10.0 | +3.0<br>-3.0 | +5.0<br>-5.0 | +2.5<br>0                             | +4.0<br>0 | +6.0<br>0  | +10.0<br>0 | +5.0<br>-5.0 |
| 7.09             | 9.85  | -2.0<br>-4.8                             | -2.0<br>-6.5  | 0<br>-2.8 | 0<br>-4.5 | 0<br>-7.0  | 0<br>-12.0 | +3.5<br>-3.5 | +6.0<br>-6.0 | +2.8<br>0                             | +4.5<br>0 | +7.0<br>0  | +12.0<br>0 | +6.0<br>-6.0 |
| 9.85             | 12.41 | -2.2<br>-5.2                             | -2.2<br>-7.3  | 0<br>-3.0 | 0<br>-5.0 | 0<br>-8.0  | 0<br>-12.0 | +4.0<br>-4.0 | +6.0<br>-6.0 | +3.0<br>0                             | +5.0<br>0 | +8.0<br>0  | +13.0<br>0 | +6.0<br>-6.0 |
| 12.41            | 15.75 | -2.5<br>-6.0                             | -2.8<br>-8.0  | 0<br>-3.5 | 0<br>-6.0 | 0<br>-9.0  | 0<br>-14.0 | +4.5<br>-4.5 | +7.0<br>-7.0 | +3.5<br>0                             | +6.0<br>0 | +9.0<br>0  | +14.0<br>0 | +7.0<br>-7.0 |
| 15.75            | 19.69 | -2.8<br>-6.5                             | -2.8<br>-8.8  | 0<br>-4.0 | 0<br>-6.0 | 0<br>-10.0 | 0<br>-16.0 | +5.0<br>-5.0 | +8.0<br>-8.0 | +4.0<br>0                             | +6.0<br>0 | +10.0<br>0 | +16.0<br>0 | +8.0<br>-8.0 |
| 19.69            | 24.80 | -3.0<br>-7.0                             | -3.0<br>-9.9  | 0<br>-4.3 | 0<br>-6.9 | 0<br>-11.0 | 0<br>-17.3 | +5.5<br>-5.5 | +8.7<br>-8.7 | +4.3<br>0                             | +6.9<br>0 | +11.0<br>0 | +17.3<br>0 | +8.7<br>-8.7 |
| 24.80            | 31.49 | -3.1<br>-8.1                             | -3.1<br>-11.0 | 0<br>-4.9 | 0<br>-7.9 | 0<br>-12.6 | 0<br>-19.7 | +6.3<br>-6.3 | +9.8<br>-9.8 | +4.9<br>0                             | +7.9<br>0 | +12.6<br>0 | +19.7<br>0 | +9.8<br>-9.8 |

HOUSING DESIGNS AND EXTRUSION GAPS

HALLITE 87, 506 & 533 BEARING STRIP

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

- Maximum extrusion gap = F max (see drawing below).
- F max is the maximum extrusion gap for the seal.
- Minimum metal-to-metal clearance = F min (see drawing below).

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

RODS

Maximum extrusion gap

$$F \text{ max} = \frac{(\varnothing D_3 \text{ max} + \varnothing D_2 \text{ max})}{2} - S \text{ min} - \varnothing d_1 \text{ min}$$

Minimum metal-to-metal clearance (extrusion gap)

$$F \text{ min} = S \text{ min} - \frac{(\varnothing D_2 \text{ max} - \varnothing D_3 \text{ min})}{2}$$

PISTONS

Maximum extrusion gap

$$F \text{ max} = \varnothing D_1 \text{ max} - S \text{ min} - \frac{(\varnothing d_3 \text{ min} + \varnothing d_2 \text{ min})}{2} + \text{dilation}$$

Minimum metal-to-metal clearance (extrusion gap)

$$F \text{ min} = S \text{ min} - \frac{(\varnothing d_3 \text{ max} - \varnothing d_2 \text{ min})}{2}$$

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.

For F max:

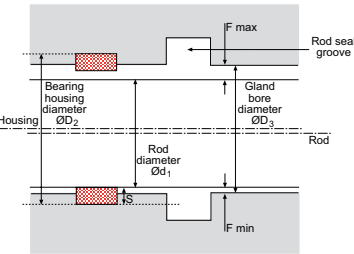
$$\text{Rod} = \varnothing D_3 \text{ max} - \varnothing d_1 \text{ min}$$

$$\text{Piston} = \varnothing D_1 \text{ max} - \varnothing d_3 \text{ min} + \text{dilation}$$

F min must be zero.

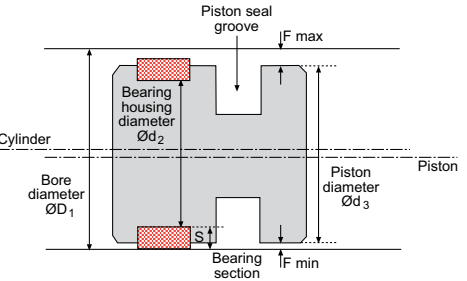
ROD BEARING

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)

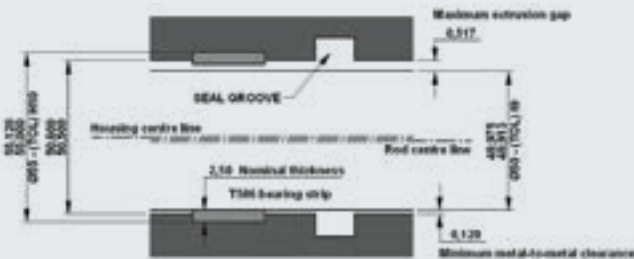


HOUSING DESIGNS

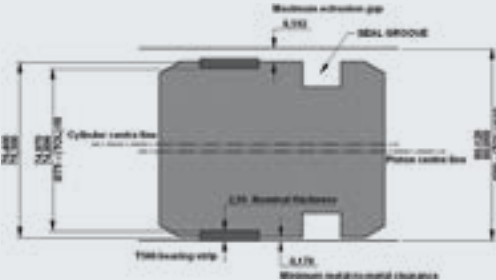
EXTRUSION GAPS AND METAL-TO-METAL CLEARANCE

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

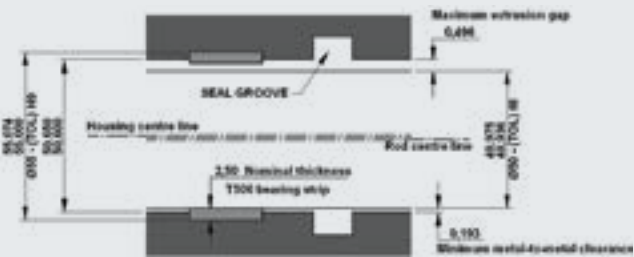
Gland for 50mm rod using ‘standard’ tolerances.



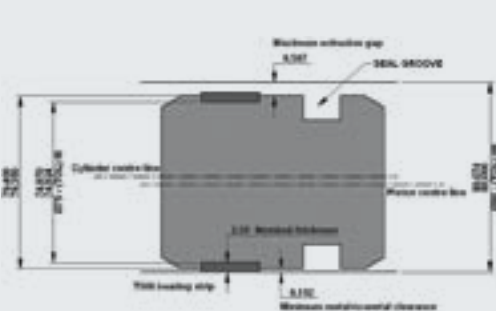
Piston for 80mm bore using ‘standard’ tolerances.



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



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



Once the maximum extrusion gap has been calculated, the correct seal can be specified with regard to the required operating pressure of the cylinder. For further advice, please contact Hallite Seals.

STORAGE 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 50°C. Low temperatures are not permanently harmful, provided the rubber items are handled carefully and not distorted. When taken from low temperatures, items should be raised to approximately 30°C before they are used.
- 2 Humidity** - Optimum humidity is about 65% in a draft-free atmosphere.
- 3 Light** - Protection from direct sunlight and strong artificial light with a high ultraviolet content is important. Unless packed in opaque containers, it is advisable to cover windows with red or orange screens or coatings.
- 4 Oxygen and Ozone** - Wrapping, storage in airtight containers, or other suitable means should be used for vulcanized rubber items. Storage in containers that limit exposure to environmental conditions (e.g. sealed plastic bags) should be used for all materials when possible.
- 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 minimizes 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, 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, water, and methylated spirits are the least harmful, and all parts should be dried at room temperature before use.
- 11 Shelf Life** - The table on the next page 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 of the component.

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

- Mechanical damage
- Permanent distortion
- Cracks or surface crazing
- Tackiness or surface softening/hardening

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

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



STORAGE OF SEALS

| BASE POLYMER<br>(ISO DESIGNATION)                                                                                                | PRIMARY STORAGE PERIOD<br>(YEARS) | EXTENSION OF STORAGE PERIOD<br>AFTER RE-INSPECTION (YEARS) |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------------------------------------------|
| FLUOROCARBON (FKM)<br>ETHYLENE PROPYLENE (EPDM)                                                                                  | 10                                | 5                                                          |
| NITRILE (NBR)<br>HYTHANE® (EU)<br>HYTHANE (TPE)<br>ARMORLENE®                                                                    | 7                                 | 3                                                          |
| POLYURETHANE (AU)                                                                                                                | 5                                 | 2                                                          |
| ENGINEERING THERMOPLASTICS:<br>ACETAL (POM)<br>POLYAMIDE (PA)<br>GLASS FILLED NYLON (PA)<br>PTFE<br>POLYPHENYLENE SULPHIDE (PPS) | UNLIMITED                         | -                                                          |
| ENGINEERING THERMOSETS:<br>T560 BEARING STRIP                                                                                    | UNLIMITED                         | -                                                          |

SURFACE FINISH

The dynamic surface finish has an immense influence on operation and service life of a sealing component. If the surface is too smooth, it will not properly retain lubrication and will cause excessive seal wear due to frictional heat. If the surface is too coarse, premature seal failure may occur due to the roughness of the surface, hence causing small cuts or scores in the sealing lip. Proper surface finish is critical in assuring maximum seal performance and life within a given application.

The static sealing and housing surface also has a significant influence on the operation and service life of a seal. Though the surface finish requirements are not as severe, it is critical to ensure surface finish recommendations are met to maximize seal performance and life.

SURFACE FINISH

DYNAMIC SURFACE FINISHES

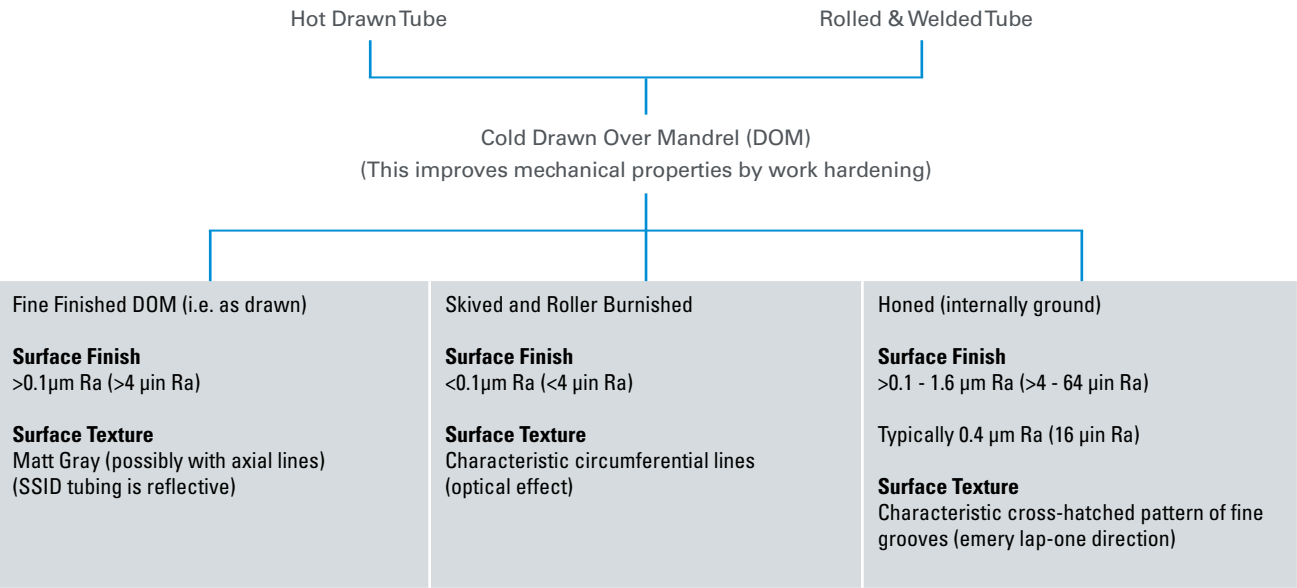
Piston rods are generally hard chrome plated. The hardness target should be at least 67 Rockwell C (900 HV/10). This gives an excellent tribological surface, and provided the rods are produced by an established supplier within a surface finish range of 0.1 to 0.3 µm Ra (4-12 µin Ra), no major problem should ensue. The optimum surface finish may also depend on the seal material. Bore surface finishes can be more problematic. The typical methods of achieving bore finishes are summarized in the figure below and bulleted details:

- Drawn Over Mandrel (DOM) tubing as produced, can be either adequate or inadequate depending on the actual surface texture achieved and the application.
- Special Smooth Inside Diameter (SSID) DOM: With the advent of improved manufacturing processes, SSID tubing is more commonplace than it was years ago. In certain circumstances however, SSID finishes, just like its rougher finish relative DOM tube, can lead to premature wear of the seal through flow erosion. Careful specification and regular quality inspections are recommended if SSID tube is to be used.
- Optimally, Skived & Roller Burnished or Honed Tube is preferred.
  - o Skived & Roller Burnished tubing is very smooth (less than 0.1µm Ra) (4 µin Ra). Rubber sealing elements are more susceptible to damage due to the smoother surfaces.
  - o Honed Tube (produced between 0.1 and 0.4 µm Ra) (4-16 µin Ra) is potentially the most expensive, but has the best finish and is known to be the friendliest to mating sealing elements.

STATIC SURFACE FINISHES

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

METHODS OF MANUFACTURING OF TUBES FOR HYDRAULIC CYLINDERS AND RESULTING SURFACE TEXTURES

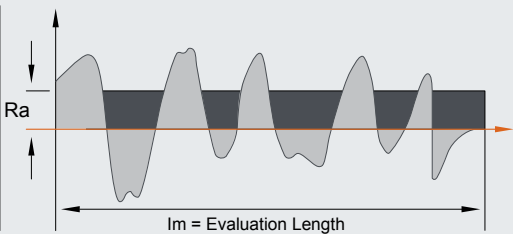


SURFACE FINISH

CRITICAL SURFACE FINISH MEASUREMENTS FOR SEALING

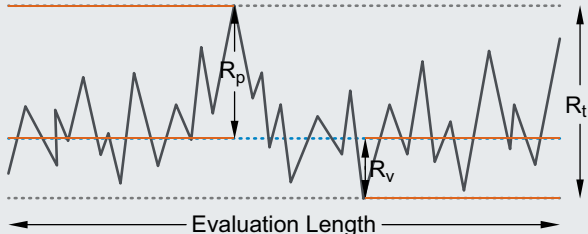
Many parameters can be used to define surface finishes, which are explained in ISO 4287 and ISO 4288. The most commonly used in the fluid power industry include:

**Ra – Surface Finish Measurement**



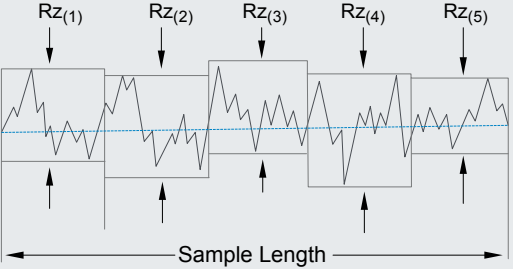
$R_a$  = Arithmetical mean deviation of an absolute ordinate over the evaluation length

**Rt – Surface Finish Measurement**



$R_t$  = Sum of height of the largest profile peak height  $R_p$  and the largest profile valley  $R_v$  over the evaluation length

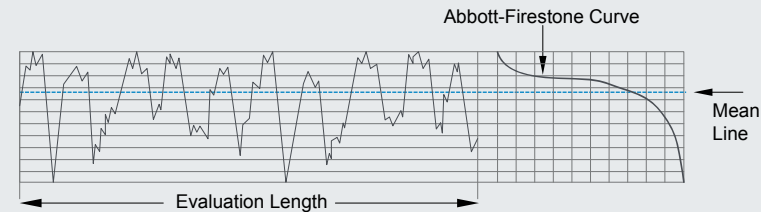
**Rz – Surface Finish Measurement**



$R_z = (R_{z(1)} + R_{z(2)} + R_{z(3)} + R_{z(4)} + R_{z(5)})/5$

$R_{z(n)}$  = Sum of height of the largest profile peak height  $R_p$  and the largest profile valley  $R_v$  within a sampling length

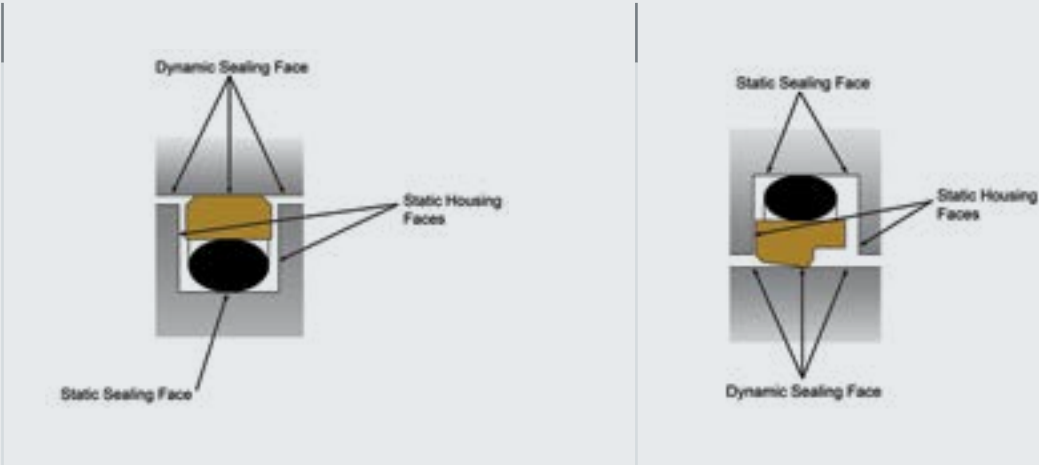
**Rmr – Surface Finish Measurement**



The 'sharpness' of the surface using a material ratio taken from the Abbott-Firestone curve. The material ratio at a particular height is a slice through the profile giving the percentage length of the cut at that height compared to the evaluation length. The Rmr values are at a depth of 25% of the  $R_z$  value from a reference level of 5%.

Plastic Seals 45-70% | PTFE Seals 60-90% | Rubber 55-85%

SEALING FACE PROFILES



SURFACE FINISH

SURFACE FINISH RECOMMENDATIONS - PTFE MATERIALS

| SURFACE ROUGHNESS                      | METRIC     |           |           | INCH       |            |            | Rmr*      |
|----------------------------------------|------------|-----------|-----------|------------|------------|------------|-----------|
|                                        | $\mu mRa$  | $\mu mRz$ | $\mu mRt$ | $\mu inRa$ | $\mu inRz$ | $\mu inRt$ |           |
| Dynamic Sealing Face $\varnothing d_1$ | 0.05 - 0.2 | 1.6 max   | 2 max     | 2 - 8      | 63 max     | 157 max    | 60% - 90% |
| Static Sealing Face $\varnothing D_1$  | 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  $R_z$  value based upon a reference level (zero line) at 5% material/bearing area.

SURFACE FINISH RECOMMENDATIONS - TPU & TPE MATERIALS

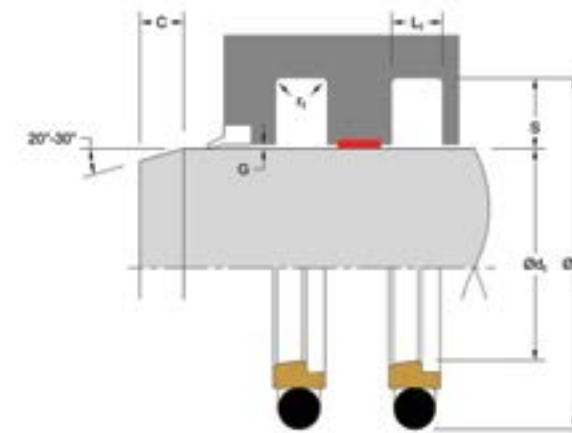
| SURFACE ROUGHNESS                      | METRIC    |           |           | INCH       |            |            | Rmr*      |
|----------------------------------------|-----------|-----------|-----------|------------|------------|------------|-----------|
|                                        | $\mu mRa$ | $\mu mRz$ | $\mu mRt$ | $\mu inRa$ | $\mu inRz$ | $\mu inRt$ |           |
| Dynamic Sealing Face $\varnothing d_1$ | 0.1 - 0.4 | 1.6 max   | 4 max     | 4 - 16     | 63 max     | 157 max    | 45% - 70% |
| Static Sealing Face $\varnothing D_1$  | 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  $R_z$  value based upon a reference level (zero line) at 5% material/bearing area.



# ROD SEALS





# R16

## ROD SEAL

Single-Acting



### TECHNICAL DETAILS

The Hallite R16 is a single-acting, O-ring energized, low-friction rod seal proven to be ideal in a variety of applications. The seal is made with our high-quality Armorlene® products combined with an elastomer energizer for superior performance. High performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility.

Unlike other designs, the R16 can be used in tandem installations to provide optimum sealing in high-speed applications. The R16 is also commonly used as a pressure buffer seal protecting the primary rod seal from high-frequency pressure spikes that might be found in a system. This design also fits standard ISO 7425-2 grooves and is offered in a wide range of metric and inch options.

### F E A T U R E S

- Low break-away force
- Design eliminates occurrence of stick-slip
- Design offers excellent dynamic and static sealing properties
- Long wear and high extrusion resistance
- Able to absorb shock loads created from pressure spikes

### Part Number Structure

R16MR00500NHLX \_

| R16                 | M                                             | R                                                                                                      | 00500                                                    | N                                                                                    | HLX                                                                              | —                                      |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile |

OPERATING CONDITIONS

|                                       | METRIC          | INCH             |
|---------------------------------------|-----------------|------------------|
| Maximum Speed                         | Up to 15.0m/sec | Up to 50.0ft/sec |
| Temperature Range*                    | -45 to 200°C    | -49 to 392°F     |
| Maximum Dynamic Pressure**            | 600 bar         | 8700 psi         |
| Used as Buffer Seal / Pressure Spikes | 800 bar         | 11000 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

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

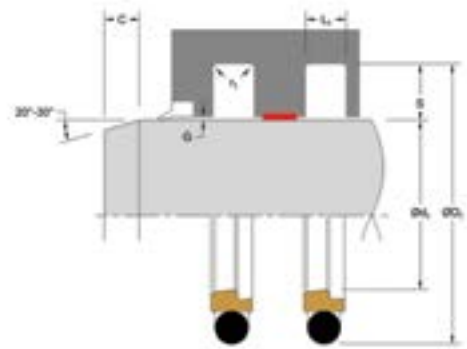
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

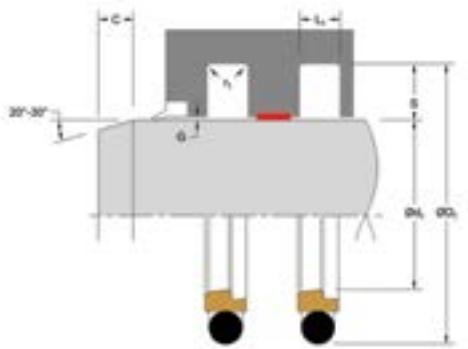
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                                            | FILLER                       | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------|-------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                                                  | Special Bronze Compound      | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                                                                                      | 60% Bronze Content           | 713                 | Bronze      | -73 to 288°C        | -100 to 550°F       | 600 bar                        | 8700 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul>                           | Carbon Fiber Filled          | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 250 bar                        | 3600 psi                       |
| <b>ARMORLENE® HCV</b> <ul style="list-style-type: none"><li>Recommended for lubricating and non-lubricating fluids</li><li>Excellent for high-frequency and short-stroke applications</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | High Carbon Fiber Filled     | HCV                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for hard mating surfaces only</li><li>Low friction and no stick-slip</li></ul>                                                                                                              | Unfilled                     | 700                 | White       | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® 706</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li><li>Good dielectrical properties</li></ul>                                                              | 15% Glass                    | 706                 | Off-White   | -73 to 260°C        | -100 to 500°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Good low-friction properties</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li></ul>                                                              | Glass Molybdenum Disulfide   | 702                 | Gray        | -73 to 260°C        | -100 to 500°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>Excellent in all lubricating fluids and pneumatic applications</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                | 25% Carbon/Graphite          | 711                 | Black       | -73 to 288°C        | -100 to 550°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Excellent wear resistance</li><li>Excellent low-friction properties</li><li>Good extrusion resistance</li></ul>                                                                                         | Special Mineral Compound     | HLA                 | Gray        | -73 to 260°C        | -100 to 500°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® 782</b> <ul style="list-style-type: none"><li>Good abrasion resistance</li><li>Recommended for lubricating and non-lubricating fluids</li><li>Recommended for high frequency and short-stroke applications</li><li>Not recommended for electrical and conductive fluids</li></ul>               | Modified Carbon Fiber Filled | 782                 | Black       | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>Excellent impact resistance</li><li>Good dielectrical properties</li><li>Excellent abrasion resistance</li><li>Low coefficient of friction</li></ul>                                                                                                | 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.





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.



R16  
ROD SEAL  
Single-Acting

INSTALLATION RECOMMENDATIONS

| METRIC                             |                            |                            |                       |                      |                |         |                |                         |               |               |                      |
|------------------------------------|----------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|-------------------------|---------------|---------------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G MAX* |               |               | O-RING CROSS SECTION |
| DIAMETER RANGE                     |                            |                            | ØD <sub>1</sub> H9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | 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 |                       |                      |                |         |                |                         |               |               |                      |
| 3.0 - 7.9                          | 8.0 - 18.9                 | -                          | d <sub>1</sub> + 4.9  | 2.2                  | 0.4            | 2.0     | 2.45           | 0.30                    | 0.20          | 0.15          | 1.78                 |
| 8.0 - 18.9                         | 19.0 - 37.9                | -                          | d <sub>1</sub> + 7.5  | 3.2                  | 0.6            | 3.0     | 3.75           | 0.40                    | 0.25          | 0.15          | 2.62                 |
| 19.0 - 37.9                        | 38.0 - 199.9               | 8.0 - 18.9                 | d <sub>1</sub> + 11.0 | 4.2                  | 1.0            | 4.0     | 5.50           | 0.50                    | 0.30          | 0.20          | 3.53                 |
| 38.0 - 199.9                       | 200.0 - 255.9              | 19.0 - 37.9                | d <sub>1</sub> + 15.5 | 6.3                  | 1.3            | 6.0     | 7.75           | 0.70                    | 0.40          | 0.25          | 5.33                 |
| 200.0 - 255.9                      | 256.0 - 649.9              | 38.0 - 199.9               | d <sub>1</sub> + 21.0 | 8.1                  | 1.8            | 8.0     | 10.50          | 0.80                    | 0.60          | 0.35          | 6.99                 |
| 256.0 - 649.9                      | 650.0 - 999.9              | 200.0 - 255.9              | d <sub>1</sub> + 24.5 | 8.1                  | 2.5            | 9.0     | 12.25          | 0.90                    | 0.70          | 0.40          | 6.99                 |
| 650.0 - 999.9                      | -                          | 256.0 - 649.9              | d <sub>1</sub> + 28.0 | 9.5                  | 3.0            | 10.0    | 14.00          | 1.00                    | 0.80          | 0.50          | 8.40                 |
| ≥ 1000.0                           | -                          | 650.0 - 999.9              | d <sub>1</sub> + 38.0 | 13.8                 | 3.0            | 10.0    | 19.00          | 1.20                    | 0.90          | 0.60          | 12.00                |

At pressure >400 bar use diameter tolerance f8/H8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

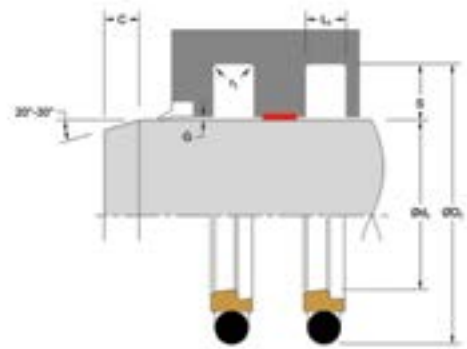
| INCH                               |                            |                            |                        |                       |                |         |                |                         |                |                |                      |
|------------------------------------|----------------------------|----------------------------|------------------------|-----------------------|----------------|---------|----------------|-------------------------|----------------|----------------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            |                            | GROOVE DIAMETER        | GROOVE WIDTH          | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G MAX* |                |                | O-RING CROSS SECTION |
| DIAMETER RANGE                     |                            |                            | ØD <sub>1</sub> H9     | L <sub>1</sub> + .008 | r <sub>1</sub> | C       | S              | Up to 1500 PSI          | Up to 2900 PSI | Up to 5800 PSI | O-ring               |
| Standard Duty Application - R      | Light Duty Application - L | Heavy Duty Application - H |                        |                       |                |         |                |                         |                |                |                      |
| 0.125 - 0.311                      | 0.312 - 0.749              | -                          | d <sub>1</sub> + 0.193 | 0.087                 | 0.016          | 0.079   | 0.097          | 0.012                   | 0.008          | 0.006          | 0.070                |
| 0.312 - 0.749                      | 0.750 - 1.500              | -                          | d <sub>1</sub> + 0.287 | 0.126                 | 0.024          | 0.118   | 0.144          | 0.016                   | 0.010          | 0.006          | 0.103                |
| 0.750 - 1.500                      | 1.501 - 7.874              | 0.312 - 0.749              | d <sub>1</sub> + 0.421 | 0.165                 | 0.039          | 0.157   | 0.211          | 0.020                   | 0.012          | 0.008          | 0.139                |
| 1.501 - 7.874                      | 7.875 - 9.999              | 0.750 - 1.500              | d <sub>1</sub> + 0.594 | 0.248                 | 0.051          | 0.236   | 0.297          | 0.028                   | 0.016          | 0.010          | 0.210                |
| 7.875 - 9.999                      | 10.000 - 25.499            | 1.501 - 7.874              | d <sub>1</sub> + 0.807 | 0.319                 | 0.071          | 0.315   | 0.404          | 0.031                   | 0.024          | 0.014          | 0.275                |
| 10.000 - 25.499                    | 25.500 - 39.999            | 7.875 - 9.999              | d <sub>1</sub> + 0.945 | 0.319                 | 0.071          | 0.315   | 0.473          | 0.035                   | 0.028          | 0.016          | 0.275                |
| 25.500 - 39.999                    | > 40.000                   | 10.000 - 25.499            | d <sub>1</sub> + 1.075 | 0.374                 | 0.098          | 0.354   | 0.538          | 0.039                   | 0.031          | 0.020          | 0.331                |

At pressure >5800 psi use diameter tolerance f8/H8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                |           |                 |                 |                |  |                 |                 |                |
|-----------------|-----------------|----------------|----------------|-----------|-----------------|-----------------|----------------|--|-----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |           | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |  | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |           | Tol. f8/h9      | Tol. H9         | Tol. +0.2      |  | Tol. f8/h9      | Tol. H9         | Tol. +0.2      |
| 8.0             | 15.5            | 3.2            | R16MR00080**** | Also Fits | 8.0             | 15.3            | 3.2            |  | 36.0            | 47.0            | 4.2            |
| 8.0             | 12.9            | 2.2            | R16ML00080**** | Also Fits | -               | -               | -              |  | 36.0            | 43.5            | 3.2            |
| 10.0            | 17.5            | 3.2            | R16MR00100**** | Also Fits | 10.0            | 17.3            | 3.2            |  | 40.0            | 55.5            | 6.3            |
| 10.0            | 14.9            | 2.2            | R16ML00100**** | Also Fits | -               | -               | -              |  | 40.0            | 51.0            | 4.2            |
| 12.0            | 19.5            | 3.2            | R16MR00120**** | Also Fits | 12.0            | 19.3            | 3.2            |  | 43.0            | 58.5            | 6.3            |
| 12.0            | 16.9            | 2.2            | R16ML00120**** | Also Fits | -               | -               | -              |  | 42.0            | 53.0            | 4.2            |
| 14.0            | 21.5            | 3.2            | R16MR00140**** | Also Fits | 14.0            | 21.3            | 3.2            |  | 45.0            | 60.5            | 6.3            |
| 14.0            | 18.9            | 2.2            | R16ML00140**** | Also Fits | -               | -               | -              |  | 45.0            | 56.0            | 4.2            |
| 15.0            | 22.5            | 3.2            | R16MR00150**** | Also Fits | 15.0            | 22.3            | 3.2            |  | 50.0            | 65.5            | 6.3            |
| 15.0            | 19.9            | 2.2            | R16ML00150**** | Also Fits | -               | -               | -              |  | 50.0            | 61.0            | 4.2            |
| 16.0            | 23.5            | 3.2            | R16MR00160**** | Also Fits | 16.0            | 23.3            | 3.2            |  | 55.0            | 70.5            | 6.3            |
| 16.0            | 20.9            | 2.2            | R16ML00160**** | Also Fits | -               | -               | -              |  | 55.0            | 66.0            | 4.2            |
| 18.0            | 25.5            | 3.2            | R16MR00180**** | Also Fits | 18.0            | 25.3            | 3.2            |  | 56.0            | 71.5            | 6.3            |
| 18.0            | 22.9            | 2.2            | R16ML00180**** | Also Fits | -               | -               | -              |  | 56.0            | 67.0            | 4.2            |
| 20.0            | 31.0            | 4.2            | R16MR00200**** | Also Fits | 20.0            | 30.7            | 4.2            |  | 56.0            | 77.0            | 8.1            |
| 20.0            | 27.5            | 3.2            | R16ML00200**** | Also Fits | 20.0            | 27.3            | 3.2            |  | 60.0            | 75.5            | 6.3            |
| 22.0            | 33.0            | 4.2            | R16MR00220**** | Also Fits | 22.0            | 32.7            | 4.2            |  | 60.0            | 71.0            | 4.2            |
| 22.0            | 29.5            | 3.2            | R16ML00220**** | Also Fits | 22.0            | 29.3            | 3.2            |  | 60.0            | 81.0            | 8.1            |
| 25.0            | 36.0            | 4.2            | R16MR00250**** | Also Fits | 25.0            | 35.7            | 4.2            |  | 63.0            | 78.5            | 6.3            |
| 25.0            | 32.5            | 3.2            | R16ML00250**** | Also Fits | 25.0            | 32.3            | 3.2            |  | 63.0            | 74.0            | 4.2            |
| 28.0            | 39.0            | 4.2            | R16MR00280**** | Also Fits | 28.0            | 38.7            | 4.2            |  | 63.0            | 84.0            | 8.1            |
| 28.0            | 35.5            | 3.2            | R16ML00280**** | Also Fits | 28.0            | 35.3            | 3.2            |  | 65.0            | 80.5            | 6.3            |
| 30.0            | 41.0            | 4.2            | R16MR00300**** | Also Fits | 30.0            | 40.7            | 4.2            |  | 65.0            | 76.0            | 4.2            |
| 30.0            | 37.5            | 3.2            | R16ML00300**** | Also Fits | 30.0            | 37.3            | 3.2            |  | 65.0            | 86.0            | 8.1            |
| 32.0            | 43.0            | 4.2            | R16MR00320**** | Also Fits | 32.0            | 42.7            | 4.2            |  | 70.0            | 85.5            | 6.3            |
| 32.0            | 39.5            | 3.2            | R16ML00320**** | Also Fits | 32.0            | 39.3            | 3.2            |  | 70.0            | 81.0            | 4.2            |
| 35.0            | 46.0            | 4.2            | R16MR00350**** | Also Fits | 35.0            | 45.7            | 4.2            |  | 70.0            | 91.0            | 8.1            |
| 35.0            | 42.5            | 3.2            | R16ML00350**** | Also Fits | 35.0            | 42.3            | 3.2            |  | 75.0            | 90.5            | 6.3            |

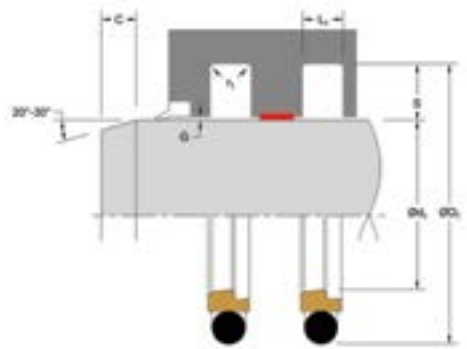




PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |           |  | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|--|-----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |           |  |                 |                 |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |           |  | Tol. f8/h9      | Tol. H9         | Tol. +0.2      |
| 75.0            | 96.0            | 8.1            | R16MH00750**** | Also Fits |  | 75.0            | 95.5            | 8.1            |
| 78.0            | 93.5            | 6.3            | R16MR00780**** | Also Fits |  | 78.0            | 93.1            | 6.3            |
| 78.0            | 99.0            | 8.1            | R16MH00780**** | Also Fits |  | 78.0            | 98.5            | 8.1            |
| 80.0            | 95.5            | 6.3            | R16MR00800**** | Also Fits |  | 80.0            | 95.1            | 6.3            |
| 80.0            | 101.0           | 8.1            | R16MH00800**** | Also Fits |  | 80.0            | 100.5           | 8.1            |
| 85.0            | 100.5           | 6.3            | R16MR00850**** | Also Fits |  | 85.0            | 100.1           | 6.3            |
| 85.0            | 106.0           | 8.1            | R16MH00850**** | Also Fits |  | 85.0            | 105.5           | 8.1            |
| 90.0            | 105.5           | 6.3            | R16MR00900**** | Also Fits |  | 90.0            | 105.1           | 6.3            |
| 90.0            | 111.0           | 8.1            | R16MH00900**** | Also Fits |  | 90.0            | 110.5           | 8.1            |
| 95.0            | 110.5           | 6.3            | R16MR00950**** | Also Fits |  | 95.0            | 110.1           | 6.3            |
| 95.0            | 116.0           | 8.1            | R16MH00950**** | Also Fits |  | 95.0            | 115.5           | 8.1            |
| 97.0            | 112.5           | 6.3            | R16MR00970**** | Also Fits |  | 97.0            | 112.1           | 6.3            |
| 97.0            | 118.0           | 8.1            | R16MH00970**** | Also Fits |  | 97.0            | 117.5           | 8.1            |
| 100.0           | 115.5           | 6.3            | R16MR01000**** | Also Fits |  | 100.0           | 115.1           | 6.3            |
| 100.0           | 121.0           | 8.1            | R16MH01000**** | Also Fits |  | 100.0           | 120.5           | 8.1            |
| 105.0           | 120.5           | 6.3            | R16MR01050**** | Also Fits |  | 105.0           | 120.1           | 6.3            |
| 105.0           | 126.0           | 8.1            | R16MH01050**** | Also Fits |  | 105.0           | 125.5           | 8.1            |
| 110.0           | 125.5           | 6.3            | R16MR01100**** | Also Fits |  | 110.0           | 125.1           | 6.3            |
| 110.0           | 131.0           | 8.1            | R16MH01100**** | Also Fits |  | 110.0           | 130.5           | 8.1            |
| 115.0           | 130.5           | 6.3            | R16MR01150**** | Also Fits |  | 115.0           | 130.1           | 6.3            |
| 115.0           | 136.0           | 8.1            | R16MH01150**** | Also Fits |  | 115.0           | 135.5           | 8.1            |
| 120.0           | 135.5           | 6.3            | R16MR01200**** | Also Fits |  | 120.0           | 135.1           | 6.3            |
| 120.0           | 141.0           | 8.1            | R16MH01200**** | Also Fits |  | 120.0           | 140.5           | 8.1            |
| 125.0           | 140.5           | 6.3            | R16MR01250**** | Also Fits |  | 125.0           | 140.1           | 6.3            |
| 125.0           | 146.0           | 8.1            | R16MH01250**** | Also Fits |  | 125.0           | 145.5           | 8.1            |
| 130.0           | 145.5           | 6.3            | R16MR01300**** | Also Fits |  | 130.0           | 145.1           | 6.3            |
| 130.0           | 151.0           | 8.1            | R16MH01300**** | Also Fits |  | 130.0           | 150.5           | 8.1            |
| 135.0           | 150.5           | 6.3            | R16MR01350**** | Also Fits |  | 135.0           | 150.1           | 6.3            |

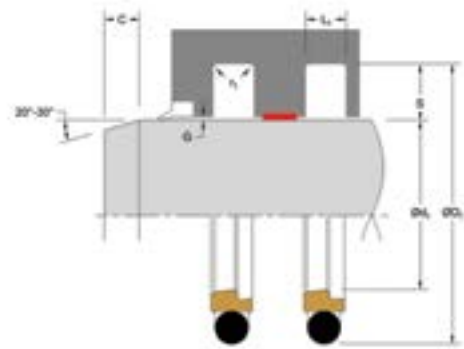
| METRIC          |                 |                | PART NUMBER    |           |  | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|--|-----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |           |  |                 |                 |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |           |  | Tol. f8/h9      | Tol. H9         | Tol. +0.2      |
| 135.0           | 156.0           | 8.1            | R16MH01350**** | Also Fits |  | 135.0           | 155.5           | 8.1            |
| 140.0           | 155.5           | 6.3            | R16MR01400**** | Also Fits |  | 140.0           | 155.1           | 6.3            |
| 140.0           | 161.0           | 8.1            | R16MH01400**** | Also Fits |  | 140.0           | 160.5           | 8.1            |
| 145.0           | 160.5           | 6.3            | R16MR01450**** | Also Fits |  | 145.0           | 160.1           | 6.3            |
| 145.0           | 166.0           | 8.1            | R16MH01450**** | Also Fits |  | 145.0           | 165.5           | 8.1            |
| 150.0           | 165.5           | 6.3            | R16MR01500**** | Also Fits |  | 150.0           | 165.1           | 6.3            |
| 150.0           | 171.0           | 8.1            | R16MH01500**** | Also Fits |  | 150.0           | 170.5           | 8.1            |
| 155.0           | 170.5           | 6.3            | R16MR01550**** | Also Fits |  | 155.0           | 170.1           | 6.3            |
| 155.0           | 176.0           | 8.1            | R16MH01550**** | Also Fits |  | 155.0           | 175.5           | 8.1            |
| 160.0           | 175.5           | 6.3            | R16MR01600**** | Also Fits |  | 160.0           | 175.1           | 6.3            |
| 160.0           | 181.0           | 8.1            | R16MH01600**** | Also Fits |  | 160.0           | 180.5           | 8.1            |
| 170.0           | 185.5           | 6.3            | R16MR01700**** | Also Fits |  | 170.0           | 185.1           | 6.3            |
| 170.0           | 191.0           | 8.1            | R16MH01700**** | Also Fits |  | 170.0           | 190.5           | 8.1            |
| 180.0           | 195.5           | 6.3            | R16MR01800**** | Also Fits |  | 180.0           | 195.1           | 6.3            |
| 180.0           | 201.0           | 8.1            | R16MH01800**** | Also Fits |  | 180.0           | 200.5           | 8.1            |
| 190.0           | 205.5           | 6.3            | R16MR01900**** | Also Fits |  | 190.0           | 205.1           | 6.3            |
| 190.0           | 211.0           | 8.1            | R16MH01900**** | Also Fits |  | 190.0           | 210.5           | 8.1            |
| 200.0           | 215.5           | 6.3            | R16ML02000**** | Also Fits |  | 200.0           | 215.1           | 6.3            |
| 200.0           | 221.0           | 8.1            | R16MR02000**** | Also Fits |  | 200.0           | 220.5           | 8.1            |
| 200.0           | 224.5           | 8.1            | R16MH02000**** | Also Fits |  | 200.0           | 224.0           | 8.1            |
| 210.0           | 231.0           | 8.1            | R16MR02100**** | Also Fits |  | 210.0           | 230.5           | 8.1            |
| 210.0           | 234.5           | 8.1            | R16MH02100**** | Also Fits |  | 210.0           | 234.0           | 8.1            |
| 220.0           | 241.0           | 8.1            | R16MR02200**** | Also Fits |  | 220.0           | 240.5           | 8.1            |
| 220.0           | 244.5           | 8.1            | R16MH02200**** | Also Fits |  | 220.0           | 244.0           | 8.1            |
| 225.0           | 246.0           | 8.1            | R16MR02250**** | Also Fits |  | 225.0           | 245.5           | 8.1            |
| 225.0           | 249.5           | 8.1            | R16MH02250**** | Also Fits |  | 225.0           | 249.0           | 8.1            |
| 240.0           | 261.0           | 8.1            | R16MR02400**** | Also Fits |  | 240.0           | 260.5           | 8.1            |
| 240.0           | 264.5           | 8.1            | R16MH02400**** | Also Fits |  | 240.0           | 264.0           | 8.1            |



PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |           |  | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|--|-----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |           |  |                 |                 |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |           |  | Tol. f8/h9      | Tol. H9         | Tol. +0.2      |
| 250.0           | 271.0           | 8.1            | R16MR02500**** | Also Fits |  | 250.0           | 270.5           | 8.1            |
| 250.0           | 274.5           | 8.1            | R16MH02500**** | Also Fits |  | 250.0           | 274.0           | 8.1            |
| 260.0           | 284.5           | 8.1            | R16MR02600**** | Also Fits |  | 260.0           | 284.0           | 8.1            |
| 260.0           | 288.0           | 9.5            | R16MH02600**** | Also Fits |  | 260.0           | 287.3           | 9.5            |
| 270.0           | 294.5           | 8.1            | R16MR02700**** | Also Fits |  | 270.0           | 294.0           | 8.1            |
| 270.0           | 298.0           | 9.5            | R16MH02700**** | Also Fits |  | 270.0           | 297.3           | 9.5            |
| 280.0           | 304.5           | 8.1            | R16MR02800**** | Also Fits |  | 280.0           | 304.0           | 8.1            |
| 280.0           | 308.0           | 9.5            | R16MH02800**** | Also Fits |  | 280.0           | 307.3           | 9.5            |
| 290.0           | 314.5           | 8.1            | R16MR02900**** | Also Fits |  | 290.0           | 314.0           | 8.1            |
| 290.0           | 318.0           | 9.5            | R16MH02900**** | Also Fits |  | 290.0           | 317.3           | 9.5            |
| 300.0           | 324.5           | 8.1            | R16MR03000**** | Also Fits |  | 300.0           | 324.0           | 8.1            |
| 300.0           | 328.0           | 9.5            | R16MH03000**** | Also Fits |  | 300.0           | 327.3           | 9.5            |
| 320.0           | 344.5           | 8.1            | R16MR03200**** | Also Fits |  | 320.0           | 344.0           | 8.1            |
| 320.0           | 348.0           | 9.5            | R16MH03200**** | Also Fits |  | 320.0           | 347.3           | 9.5            |
| 330.0           | 354.5           | 8.1            | R16MR03300**** | Also Fits |  | 330.0           | 354.0           | 8.1            |
| 330.0           | 358.0           | 9.5            | R16MH03300**** | Also Fits |  | 330.0           | 357.3           | 9.5            |
| 340.0           | 364.5           | 8.1            | R16MR03400**** | Also Fits |  | 340.0           | 364.0           | 8.1            |
| 340.0           | 368.0           | 9.5            | R16MH03400**** | Also Fits |  | 340.0           | 367.3           | 9.5            |
| 350.0           | 374.5           | 8.1            | R16MR03500**** | Also Fits |  | 350.0           | 374.0           | 8.1            |
| 350.0           | 378.0           | 9.5            | R16MH03500**** | Also Fits |  | 350.0           | 377.3           | 9.5            |
| 360.0           | 384.5           | 8.1            | R16MR03600**** | Also Fits |  | 360.0           | 384.0           | 8.1            |
| 360.0           | 388.0           | 9.5            | R16MH03600**** | Also Fits |  | 360.0           | 387.3           | 9.5            |
| 370.0           | 394.5           | 8.1            | R16MR03700**** | Also Fits |  | 370.0           | 394.0           | 8.1            |
| 370.0           | 398.0           | 9.5            | R16MH03700**** | Also Fits |  | 370.0           | 397.3           | 9.5            |
| 380.0           | 404.5           | 8.1            | R16MR03800**** | Also Fits |  | 380.0           | 404.0           | 8.1            |
| 380.0           | 408.0           | 9.5            | R16MH03800**** | Also Fits |  | 380.0           | 407.3           | 9.5            |
| 390.0           | 414.5           | 8.1            | R16MR03900**** | Also Fits |  | 390.0           | 414.0           | 8.1            |
| 390.0           | 418.0           | 9.5            | R16MH03900**** | Also Fits |  | 390.0           | 417.3           | 9.5            |

| METRIC          |                 |                | PART NUMBER    |           |  | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|--|-----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |           |  |                 |                 |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |           |  | Tol. f8/h9      | Tol. H9         | Tol. +0.2      |
| 400.0           | 424.5           | 8.1            | R16MR04000**** | Also Fits |  | 400.0           | 424.0           | 8.1            |
| 400.0           | 428.0           | 9.5            | R16MH04000**** | Also Fits |  | 400.0           | 427.3           | 9.5            |
| 410.0           | 434.5           | 8.1            | R16MR04100**** | Also Fits |  | 410.0           | 437.3           | 9.5            |
| 410.0           | 438.0           | 9.5            | R16MH04100**** | Also Fits |  | 410.0           | 437.3           | 9.5            |
| 420.0           | 444.5           | 8.1            | R16MR04200**** | Also Fits |  | 420.0           | 444.0           | 8.1            |
| 420.0           | 448.0           | 9.5            | R16MH04200**** | Also Fits |  | 420.0           | 447.3           | 9.5            |
| 450.0           | 474.5           | 8.1            | R16MR04500**** | Also Fits |  | 450.0           | 474.0           | 8.1            |
| 450.0           | 478.0           | 9.5            | R16MH04500**** | Also Fits |  | 450.0           | 477.3           | 9.5            |
| 460.0           | 484.5           | 8.1            | R16MR04600**** | Also Fits |  | 460.0           | 484.0           | 8.1            |
| 460.0           | 488.0           | 9.5            | R16MH04600**** | Also Fits |  | 460.0           | 487.3           | 9.5            |
| 480.0           | 504.5           | 8.1            | R16MR04800**** | Also Fits |  | 480.0           | 504.0           | 8.1            |
| 480.0           | 508.0           | 9.5            | R16MH04800**** | Also Fits |  | 480.0           | 507.3           | 9.5            |
| 500.0           | 524.5           | 8.1            | R16MR05000**** | Also Fits |  | 500.0           | 524.0           | 8.1            |
| 500.0           | 528.0           | 9.5            | R16MH05000**** | Also Fits |  | 500.0           | 527.3           | 9.5            |
| 520.0           | 544.5           | 8.1            | R16MR05200**** | Also Fits |  | 520.0           | 544.0           | 8.1            |
| 520.0           | 548.0           | 9.5            | R16MH05200**** | Also Fits |  | 520.0           | 547.3           | 9.5            |
| 550.0           | 574.5           | 8.1            | R16MR05500**** | Also Fits |  | 550.0           | 574.0           | 8.1            |
| 550.0           | 578.0           | 9.5            | R16MH05500**** | Also Fits |  | 550.0           | 577.3           | 9.5            |
| 560.0           | 584.5           | 8.1            | R16MR05600**** | Also Fits |  | 560.0           | 584.0           | 8.1            |
| 560.0           | 588.0           | 9.5            | R16MH05600**** | Also Fits |  | 560.0           | 587.3           | 9.5            |
| 590.0           | 614.5           | 8.1            | R16MR05900**** | Also Fits |  | 590.0           | 614.0           | 8.1            |
| 590.0           | 618.0           | 9.5            | R16MH05900**** | Also Fits |  | 590.0           | 617.3           | 9.5            |
| 600.0           | 624.5           | 8.1            | R16MR06000**** | Also Fits |  | 600.0           | 624.0           | 8.1            |
| 600.0           | 628.0           | 9.5            | R16MH06000**** | Also Fits |  | 600.0           | 627.3           | 9.5            |
| 625.0           | 649.5           | 8.1            | R16MR06250**** | Also Fits |  | 625.0           | 649.0           | 8.1            |
| 625.0           | 653.0           | 9.5            | R16MH06250**** | Also Fits |  | 625.0           | 652.3           | 9.5            |
| 650.0           | 678.0           | 9.5            | R16MR06500**** | Also Fits |  | 650.0           | 677.3           | 9.5            |
| 700.0           | 728.0           | 9.5            | R16MR07000**** | Also Fits |  | 700.0           | 727.3           | 9.5            |



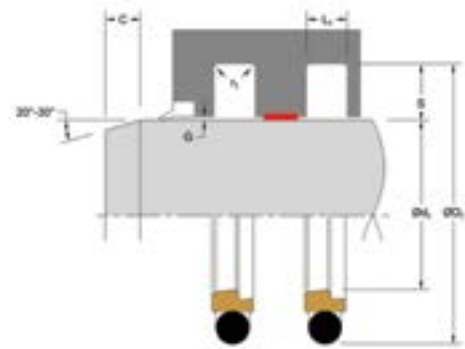
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |           |   | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|---|-----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |           |   |                 |                 |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |           |   | Tol. f8/h9      | Tol. H9         | Tol. +0.2      |
| 750.0           | 778.0           | 9.5            | R16MR07500**** | Also Fits |   | 750.0           | 777.3           | 9.5            |
| 800.0           | 828.0           | 9.5            | R16MR08000**** | Also Fits |   | 800.0           | 827.3           | 9.5            |
| 850.0           | 878.0           | 9.5            | R16MR08500**** | Also Fits |   | 850.0           | 877.3           | 9.5            |
| 900.0           | 928.0           | 9.5            | R16MR09000**** | Also Fits |   | 900.0           | 927.3           | 9.5            |
| 950.0           | 978.0           | 9.5            | R16MR09500**** | Also Fits |   | 950.0           | 977.3           | 9.5            |
| 1000.0          | 1038.0          | 13.8           | R16MR10000**** | Also Fits | - | -               | -               | -              |
| 1050.0          | 1088.0          | 13.8           | R16MR10500**** | Also Fits | - | -               | -               | -              |
| 1100.0          | 1138.0          | 13.8           | R16MR11000**** | Also Fits | - | -               | -               | -              |
| 1150.0          | 1188.0          | 13.8           | R16MR11500**** | Also Fits | - | -               | -               | -              |
| 1200.0          | 1238.0          | 13.8           | R16MR12000**** | Also Fits | - | -               | -               | -              |
| 1250.0          | 1288.0          | 13.8           | R16MR12500**** | Also Fits | - | -               | -               | -              |
| 1300.0          | 1338.0          | 13.8           | R16MR13000**** | Also Fits | - | -               | -               | -              |
| 1350.0          | 1388.0          | 13.8           | R16MR13500**** | Also Fits | - | -               | -               | -              |

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

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |  |  | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|--|--|-----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |  |  |                 |                 |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |  |  | Tol. f8/h9      | Tol. H9         | Tol. +0.008    |
| 0.312           | 0.505           | 0.087          | R16EL00312**** |  |  |                 |                 |                |
| 0.312           | 0.599           | 0.126          | R16ER00312**** |  |  |                 |                 |                |
| 0.312           | 0.733           | 0.165          | R16EH00312**** |  |  |                 |                 |                |
| 0.375           | 0.568           | 0.087          | R16EL00375**** |  |  |                 |                 |                |
| 0.375           | 0.662           | 0.126          | R16ER00375**** |  |  |                 |                 |                |
| 0.375           | 0.796           | 0.165          | R16EH00375**** |  |  |                 |                 |                |
| 0.437           | 0.630           | 0.087          | R16EL00437**** |  |  |                 |                 |                |
| 0.437           | 0.724           | 0.126          | R16ER00437**** |  |  |                 |                 |                |
| 0.437           | 0.858           | 0.165          | R16EH00437**** |  |  |                 |                 |                |
| 0.500           | 0.693           | 0.087          | R16EL00500**** |  |  |                 |                 |                |
| 0.500           | 0.787           | 0.126          | R16ER00500**** |  |  |                 |                 |                |
| 0.500           | 0.921           | 0.165          | R16EH00500**** |  |  |                 |                 |                |
| 0.562           | 0.755           | 0.087          | R16EL00562**** |  |  |                 |                 |                |
| 0.562           | 0.850           | 0.126          | R16ER00562**** |  |  |                 |                 |                |
| 0.562           | 0.983           | 0.165          | R16EH00562**** |  |  |                 |                 |                |
| 0.625           | 0.818           | 0.087          | R16EL00625**** |  |  |                 |                 |                |
| 0.625           | 0.912           | 0.126          | R16ER00625**** |  |  |                 |                 |                |
| 0.625           | 1.046           | 0.165          | R16EH00625**** |  |  |                 |                 |                |
| 0.687           | 0.800           | 0.087          | R16EL00687**** |  |  |                 |                 |                |
| 0.687           | 0.975           | 0.126          | R16ER00687**** |  |  |                 |                 |                |
| 0.687           | 1.108           | 0.165          | R16EH00687**** |  |  |                 |                 |                |
| 0.750           | 1.037           | 0.126          | R16EL00750**** |  |  |                 |                 |                |
| 0.750           | 1.171           | 0.165          | R16ER00750**** |  |  |                 |                 |                |
| 0.750           | 1.344           | 0.248          | R16EH00750**** |  |  |                 |                 |                |
| 0.812           | 1.099           | 0.126          | R16EL00812**** |  |  |                 |                 |                |
| 0.812           | 1.234           | 0.165          | R16ER00812**** |  |  |                 |                 |                |
| 0.812           | 1.406           | 0.248          | R16EH00812**** |  |  |                 |                 |                |
| 0.875           | 1.162           | 0.126          | R16EL00875**** |  |  |                 |                 |                |



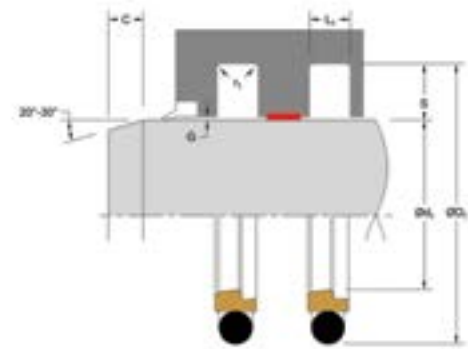
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |  |  | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|--|--|-----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |  |  |                 |                 |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |  |  | Tol. f8/h9      | Tol. H9         | Tol. +0.008    |
| 0.875           | 1.296           | 0.165          | R16ER00875**** |  |  |                 |                 |                |
| 0.875           | 1.469           | 0.248          | R16EH00875**** |  |  |                 |                 |                |
| 0.937           | 1.224           | 0.126          | R16EL00937**** |  |  |                 |                 |                |
| 0.937           | 1.359           | 0.165          | R16ER00937**** |  |  |                 |                 |                |
| 0.937           | 1.531           | 0.248          | R16EH00937**** |  |  |                 |                 |                |
| 1.000           | 1.287           | 0.126          | R16EL01000**** |  |  |                 |                 |                |
| 1.000           | 1.421           | 0.165          | R16ER01000**** |  |  |                 |                 |                |
| 1.000           | 1.594           | 0.248          | R16EH01000**** |  |  |                 |                 |                |
| 1.062           | 1.349           | 0.126          | R16EL01062**** |  |  |                 |                 |                |
| 1.062           | 1.484           | 0.165          | R16ER01062**** |  |  |                 |                 |                |
| 1.062           | 1.656           | 0.248          | R16EH01062**** |  |  |                 |                 |                |
| 1.125           | 1.412           | 0.126          | R16EL01125**** |  |  |                 |                 |                |
| 1.125           | 1.546           | 0.165          | R16ER01125**** |  |  |                 |                 |                |
| 1.125           | 1.719           | 0.248          | R16EH01125**** |  |  |                 |                 |                |
| 1.187           | 1.474           | 0.126          | R16EL01187**** |  |  |                 |                 |                |
| 1.187           | 1.608           | 0.165          | R16ER01187**** |  |  |                 |                 |                |
| 1.187           | 1.781           | 0.248          | R16EH01187**** |  |  |                 |                 |                |
| 1.250           | 1.537           | 0.126          | R16EL01250**** |  |  |                 |                 |                |
| 1.250           | 1.671           | 0.165          | R16ER01250**** |  |  |                 |                 |                |
| 1.250           | 1.844           | 0.248          | R16EH01250**** |  |  |                 |                 |                |
| 1.312           | 1.599           | 0.126          | R16EL01312**** |  |  |                 |                 |                |
| 1.312           | 1.733           | 0.165          | R16ER01312**** |  |  |                 |                 |                |
| 1.312           | 1.906           | 0.248          | R16EH01312**** |  |  |                 |                 |                |
| 1.375           | 1.662           | 0.126          | R16EL01375**** |  |  |                 |                 |                |
| 1.375           | 1.796           | 0.165          | R16ER01375**** |  |  |                 |                 |                |
| 1.375           | 1.969           | 0.248          | R16EH01375**** |  |  |                 |                 |                |
| 1.437           | 1.724           | 0.126          | R16EL01437**** |  |  |                 |                 |                |
| 1.437           | 1.858           | 0.165          | R16ER01437**** |  |  |                 |                 |                |

| INCH            |                 |                | PART NUMBER    |  |  | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|--|--|-----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |  |  |                 |                 |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |  |  | Tol. f8/h9      | Tol. H9         | Tol. +0.008    |
| 1.437           | 2.031           | 0.248          | R16EH01437**** |  |  |                 |                 |                |
| 1.500           | 1.787           | 0.126          | R16EL01500**** |  |  |                 |                 |                |
| 1.500           | 1.921           | 0.165          | R16ER01500**** |  |  |                 |                 |                |
| 1.500           | 2.094           | 0.248          | R16EH01500**** |  |  |                 |                 |                |
| 1.562           | 1.983           | 0.165          | R16EL01562**** |  |  |                 |                 |                |
| 1.562           | 2.156           | 0.248          | R16ER01562**** |  |  |                 |                 |                |
| 1.562           | 2.369           | 0.319          | R16EH01562**** |  |  |                 |                 |                |
| 1.625           | 2.046           | 0.165          | R16EL01625**** |  |  |                 |                 |                |
| 1.625           | 2.219           | 0.248          | R16ER01625**** |  |  |                 |                 |                |
| 1.625           | 2.432           | 0.319          | R16EH01625**** |  |  |                 |                 |                |
| 1.687           | 2.108           | 0.165          | R16EL01687**** |  |  |                 |                 |                |
| 1.687           | 2.281           | 0.248          | R16ER01687**** |  |  |                 |                 |                |
| 1.687           | 2.494           | 0.319          | R16EH01687**** |  |  |                 |                 |                |
| 1.750           | 2.171           | 0.165          | R16EL01750**** |  |  |                 |                 |                |
| 1.750           | 2.344           | 0.248          | R16ER01750**** |  |  |                 |                 |                |
| 1.750           | 2.557           | 0.319          | R16EH01750**** |  |  |                 |                 |                |
| 1.812           | 2.233           | 0.165          | R16EL01812**** |  |  |                 |                 |                |
| 1.812           | 2.406           | 0.248          | R16ER01812**** |  |  |                 |                 |                |
| 1.812           | 2.619           | 0.319          | R16EH01812**** |  |  |                 |                 |                |
| 1.875           | 2.296           | 0.165          | R16EL01875**** |  |  |                 |                 |                |
| 1.875           | 2.469           | 0.248          | R16ER01875**** |  |  |                 |                 |                |
| 1.875           | 2.682           | 0.319          | R16EH01875**** |  |  |                 |                 |                |
| 1.937           | 2.358           | 0.165          | R16EL01937**** |  |  |                 |                 |                |
| 1.937           | 2.531           | 0.248          | R16ER01937**** |  |  |                 |                 |                |
| 1.937           | 2.744           | 0.319          | R16EH01937**** |  |  |                 |                 |                |
| 2.000           | 2.421           | 0.165          | R16EL02000**** |  |  |                 |                 |                |
| 2.000           | 2.594           | 0.248          | R16ER02000**** |  |  |                 |                 |                |
| 2.000           | 2.807           | 0.319          | R16EH02000**** |  |  |                 |                 |                |

R16  
ROD SEAL  
Single-Acting

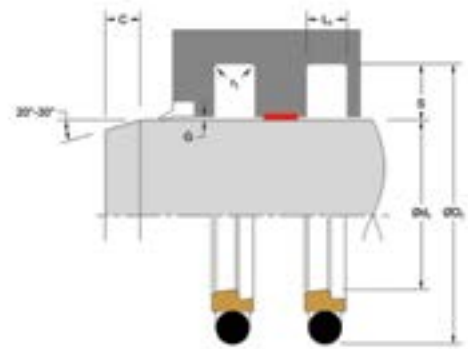




PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 2.125           | 2.546           | 0.165          | R16EL02125**** |
| 2.125           | 2.719           | 0.248          | R16ER02125**** |
| 2.125           | 2.932           | 0.319          | R16EH02125**** |
| 2.250           | 2.671           | 0.165          | R16EL02250**** |
| 2.250           | 2.844           | 0.248          | R16ER02250**** |
| 2.250           | 3.057           | 0.319          | R16EH02250**** |
| 2.375           | 2.796           | 0.165          | R16EL02375**** |
| 2.375           | 2.969           | 0.248          | R16ER02375**** |
| 2.375           | 3.182           | 0.319          | R16EH02375**** |
| 2.500           | 2.921           | 0.165          | R16EL02500**** |
| 2.500           | 3.094           | 0.248          | R16ER02500**** |
| 2.500           | 3.307           | 0.319          | R16EH02500**** |
| 2.625           | 3.046           | 0.165          | R16EL02625**** |
| 2.625           | 3.219           | 0.248          | R16ER02625**** |
| 2.625           | 3.432           | 0.319          | R16EH02625**** |
| 2.750           | 3.171           | 0.165          | R16EL02750**** |
| 2.750           | 3.344           | 0.248          | R16ER02750**** |
| 2.750           | 3.557           | 0.319          | R16EH02750**** |
| 2.875           | 3.296           | 0.165          | R16EL02875**** |
| 2.875           | 3.469           | 0.248          | R16ER02875**** |
| 2.875           | 3.682           | 0.319          | R16EH02875**** |
| 3.000           | 3.421           | 0.165          | R16EL03000**** |
| 3.000           | 3.594           | 0.248          | R16ER03000**** |
| 3.000           | 3.807           | 0.319          | R16EH03000**** |
| 3.125           | 3.546           | 0.165          | R16EL03125**** |
| 3.125           | 3.719           | 0.248          | R16ER03125**** |
| 3.125           | 3.932           | 0.319          | R16EH03125**** |
| 3.250           | 3.671           | 0.165          | R16EL03250**** |

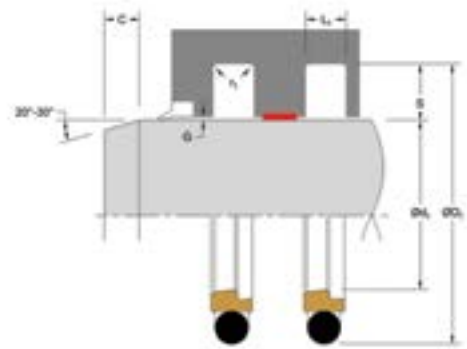
| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 3.25            | 3.844           | 0.248          | R16ER03250**** |
| 3.25            | 4.057           | 0.319          | R16EH03250**** |
| 3.375           | 3.796           | 0.165          | R16EL03375**** |
| 3.375           | 3.969           | 0.248          | R16ER03375**** |
| 3.375           | 4.182           | 0.319          | R16EH03375**** |
| 3.500           | 3.921           | 0.165          | R16EL03500**** |
| 3.500           | 4.094           | 0.248          | R16ER03500**** |
| 3.500           | 4.307           | 0.319          | R16EH03500**** |
| 3.625           | 4.046           | 0.165          | R16EL03625**** |
| 3.625           | 4.219           | 0.248          | R16ER03625**** |
| 3.625           | 4.432           | 0.319          | R16EH03625**** |
| 3.750           | 4.171           | 0.165          | R16EL03750**** |
| 3.750           | 4.344           | 0.248          | R16ER03750**** |
| 3.750           | 4.557           | 0.319          | R16EH03750**** |
| 3.875           | 4.296           | 0.165          | R16EL03875**** |
| 3.875           | 4.469           | 0.248          | R16ER03875**** |
| 3.875           | 4.682           | 0.319          | R16EH03875**** |
| 4.000           | 4.421           | 0.165          | R16EL04000**** |
| 4.000           | 4.594           | 0.248          | R16ER04000**** |
| 4.000           | 4.807           | 0.319          | R16EH04000**** |
| 4.125           | 4.546           | 0.165          | R16EL04125**** |
| 4.125           | 4.719           | 0.248          | R16ER04125**** |
| 4.125           | 4.932           | 0.319          | R16EH04125**** |
| 4.250           | 4.671           | 0.165          | R16EL04250**** |
| 4.250           | 4.844           | 0.248          | R16ER04250**** |
| 4.250           | 5.057           | 0.319          | R16EH04250**** |
| 4.375           | 4.796           | 0.165          | R16EL04375**** |
| 4.375           | 4.969           | 0.248          | R16ER04375**** |



PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 4.375           | 5.182           | 0.319          | R16EH04375**** |
| 4.500           | 4.921           | 0.165          | R16EL04500**** |
| 4.500           | 5.094           | 0.248          | R16ER04500**** |
| 4.500           | 5.307           | 0.319          | R16EH04500**** |
| 4.625           | 5.046           | 0.165          | R16EL04625**** |
| 4.625           | 5.219           | 0.248          | R16ER04625**** |
| 4.625           | 5.432           | 0.319          | R16EH04625**** |
| 4.750           | 5.171           | 0.165          | R16EL04750**** |
| 4.750           | 5.344           | 0.248          | R16ER04750**** |
| 4.750           | 5.557           | 0.319          | R16EH04750**** |
| 4.875           | 5.296           | 0.165          | R16EL04875**** |
| 4.875           | 5.469           | 0.248          | R16ER04875**** |
| 4.875           | 5.682           | 0.319          | R16EH04875**** |
| 5.000           | 5.421           | 0.165          | R16EL05000**** |
| 5.000           | 5.594           | 0.248          | R16ER05000**** |
| 5.000           | 5.807           | 0.319          | R16EH05000**** |
| 5.125           | 5.546           | 0.165          | R16EL05125**** |
| 5.125           | 5.719           | 0.248          | R16ER05125**** |
| 5.125           | 5.932           | 0.319          | R16EH05125**** |
| 5.250           | 5.671           | 0.165          | R16EL05250**** |
| 5.250           | 5.844           | 0.248          | R16ER05250**** |
| 5.250           | 6.057           | 0.319          | R16EH05250**** |
| 5.375           | 5.796           | 0.165          | R16EL05375**** |
| 5.375           | 5.969           | 0.248          | R16ER05375**** |
| 5.375           | 6.182           | 0.319          | R16EH05375**** |
| 5.500           | 5.921           | 0.165          | R16EL05500**** |
| 5.500           | 6.094           | 0.248          | R16ER05500**** |
| 5.500           | 6.307           | 0.319          | R16EH05500**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 5.625           | 6.046           | 0.165          | R16EL05625**** |
| 5.625           | 6.219           | 0.248          | R16ER05625**** |
| 5.625           | 6.432           | 0.319          | R16EH05625**** |
| 5.750           | 6.171           | 0.165          | R16EL05750**** |
| 5.750           | 6.344           | 0.248          | R16ER05750**** |
| 5.750           | 6.557           | 0.319          | R16EH05750**** |
| 6.000           | 6.421           | 0.165          | R16EL06000**** |
| 6.000           | 6.594           | 0.248          | R16ER06000**** |
| 6.000           | 6.807           | 0.319          | R16EH06000**** |
| 6.250           | 6.671           | 0.165          | R16EL06250**** |
| 6.250           | 6.844           | 0.248          | R16ER06250**** |
| 6.250           | 7.057           | 0.319          | R16EH06250**** |
| 6.500           | 6.921           | 0.165          | R16EL06500**** |
| 6.500           | 7.094           | 0.248          | R16ER06500**** |
| 6.500           | 7.307           | 0.319          | R16EH06500**** |
| 6.750           | 7.171           | 0.165          | R16EL06750**** |
| 6.750           | 7.344           | 0.248          | R16ER06750**** |
| 6.750           | 7.557           | 0.319          | R16EH06750**** |
| 7.000           | 7.421           | 0.165          | R16EL07000**** |
| 7.000           | 7.594           | 0.248          | R16ER07000**** |
| 7.000           | 7.807           | 0.319          | R16EH07000**** |
| 7.250           | 7.671           | 0.165          | R16EL07250**** |
| 7.250           | 7.844           | 0.248          | R16ER07250**** |
| 7.250           | 8.057           | 0.319          | R16EH07250**** |
| 7.500           | 7.921           | 0.165          | R16EL07500**** |
| 7.500           | 8.094           | 0.248          | R16ER07500**** |
| 7.500           | 8.307           | 0.319          | R16EH07500**** |
| 7.750           | 8.171           | 0.165          | R16EL07750**** |

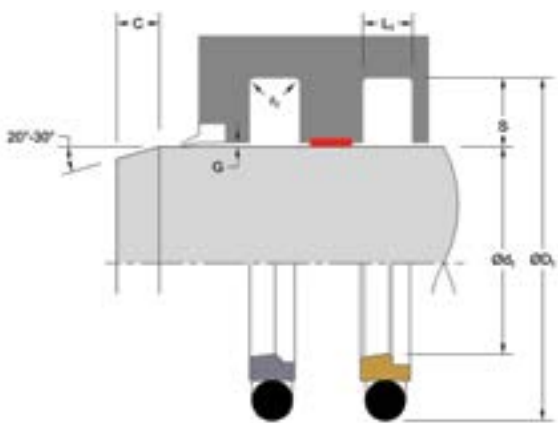


PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 7.750           | 8.344           | 0.248          | R16ER07750**** |
| 7.750           | 8.557           | 0.319          | R16EH07750**** |
| 8.000           | 8.594           | 0.248          | R16EL08000**** |
| 8.000           | 8.807           | 0.319          | R16ER08000**** |
| 8.000           | 8.945           | 0.319          | R16EH08000**** |
| 8.250           | 8.844           | 0.248          | R16EL08250**** |
| 8.250           | 9.057           | 0.319          | R16ER08250**** |
| 8.250           | 9.195           | 0.319          | R16EH08250**** |
| 8.500           | 9.094           | 0.248          | R16EL08500**** |
| 8.500           | 9.307           | 0.319          | R16ER08500**** |
| 8.500           | 9.445           | 0.319          | R16EH08500**** |
| 8.750           | 9.344           | 0.248          | R16EL08750**** |
| 8.750           | 9.557           | 0.319          | R16ER08750**** |
| 8.750           | 9.695           | 0.319          | R16EH08750**** |
| 9.000           | 9.594           | 0.248          | R16EL09000**** |
| 9.000           | 9.807           | 0.319          | R16ER09000**** |
| 9.000           | 9.945           | 0.319          | R16EH09000**** |
| 9.250           | 9.844           | 0.248          | R16EL09250**** |
| 9.250           | 10.057          | 0.319          | R16ER09250**** |
| 9.250           | 10.195          | 0.319          | R16EH09250**** |
| 9.500           | 10.094          | 0.248          | R16EL09500**** |
| 9.500           | 10.307          | 0.319          | R16ER09500**** |
| 9.500           | 10.445          | 0.319          | R16EH09500**** |
| 9.750           | 10.344          | 0.248          | R16EL09750**** |
| 9.750           | 10.557          | 0.319          | R16ER09750**** |
| 9.750           | 10.695          | 0.319          | R16EH09750**** |
| 10.000          | 10.807          | 0.319          | R16EL10000**** |
| 10.000          | 10.945          | 0.319          | R16ER10000**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 10.000          | 11.075          | 0.374          | R16EH10000**** |
| 10.500          | 11.307          | 0.319          | R16EL10500**** |
| 10.500          | 11.445          | 0.319          | R16ER10500**** |
| 10.500          | 11.575          | 0.374          | R16EH10500**** |
| 11.000          | 11.807          | 0.319          | R16EL11000**** |
| 11.000          | 11.945          | 0.319          | R16ER11000**** |
| 11.000          | 12.075          | 0.374          | R16EH11000**** |
| 11.500          | 12.307          | 0.319          | R16EL11500**** |
| 11.500          | 12.445          | 0.319          | R16ER11500**** |
| 11.500          | 12.575          | 0.374          | R16EH11500**** |
| 12.000          | 12.945          | 0.319          | R16ER12000**** |
| 12.500          | 13.445          | 0.319          | R16ER12500**** |
| 12.500          | 13.575          | 0.374          | R16EH12500**** |
| 13.000          | 13.945          | 0.319          | R16ER13000**** |
| 13.500          | 14.445          | 0.319          | R16ER13500**** |
| 14.000          | 14.945          | 0.319          | R16ER14000**** |
| 14.500          | 15.445          | 0.319          | R16ER14500**** |
| 15.000          | 15.945          | 0.319          | R16ER15000**** |
| 15.500          | 16.445          | 0.319          | R16ER15500**** |
| 16.000          | 16.945          | 0.319          | R16ER16000**** |
| 16.500          | 17.445          | 0.319          | R16ER16500**** |
| 17.000          | 17.945          | 0.319          | R16ER17000**** |
| 17.500          | 18.445          | 0.319          | R16ER17500**** |
| 18.000          | 18.945          | 0.319          | R16ER18000**** |
| 18.500          | 19.445          | 0.319          | R16ER18500**** |
| 19.000          | 19.945          | 0.319          | R16ER19000**** |
| 19.500          | 20.445          | 0.319          | R16ER19500**** |
| 20.000          | 20.945          | 0.319          | R16ER20000**** |

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



716SPN  
ROD SEAL  
Single-Acting

TECHNICAL DETAILS

The Hallite 716SPN is a single-acting, O-ring energized rod seal proven to be ideal for a variety of applications. This seal is typically made out of our high-quality Hythane® materials combined with an elastomer energizer design optimized for superior performance.

The Hallite 716SPN can be used as a single rod seal or incorporated into a rod sealing system as the secondary seal. The 716SPN is paired with an R16 made from an Armormene® PTFE material which becomes the primary seal in the system (see drawing above) with the 716SPN as the secondary seal in the system. This tandem arrangement is ideal for long- stroke and high-speed applications, providing optimum sealing performance.

This design fits standard ISO 7425-2 grooves and is offered in a wide range of metric and inch options.



F E A T U R E S

- Low break-away force
- Design minimizes occurrence of stick-slip
- Design offers excellent dynamic and static sealing properties
- Long wear and high extrusion resistance
- Excellent performance as a single or tandem seal system

Part Number Structure

716MR00500N11\_

| 716                 | M                                             | R                                                                                                      | 00500                                                    | N                                                                                    | 111                                                                    | —                                      |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | MATERIAL<br>Refer to <i>Material Table</i> for desired (face) material | SPECIAL FEATURE<br>Blank = Std profile |

OPERATING CONDITIONS

|                                 | METRIC         | INCH            |
|---------------------------------|----------------|-----------------|
| Maximum Speed                   | Up to 1.0m/sec | Up to 3.3ft/sec |
| Temperature Range*              | -40 to 100°C   | -40 to 212°F    |
| Maximum Dynamic Pressure**      | 250 bar        | 3600 psi        |
| When used in Tandem with R16*** | 400 bar        | 5800 psi        |

\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above 250 bar (3600 psi), contact Hallite Engineering. \*\*\*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

|                                      | METRIC    |         |         | INCH    |         |         | Rmr*      |
|--------------------------------------|-----------|---------|---------|---------|---------|---------|-----------|
| SURFACE ROUGHNESS                    | µmRa      | µmRz    | µmRt    | µinRa   | µinRz   | µinRt   |           |
| Dynamic Sealing Face Ød <sub>1</sub> | 0.1 - 0.4 | 1.6 max | 2.5 max | 4 - 16  | 63 max  | 157 max | 45% - 70% |
| Static Sealing Face ØD <sub>1</sub>  | 1.6 max   | 6.3 max | 10 max  | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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. For sealing systems where a PTFE rod seal is used, please refer to the PTFE rod seal surface finish requirements.

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                     | -                                 | -                                 |

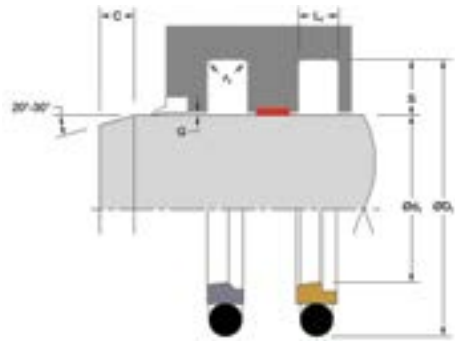
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

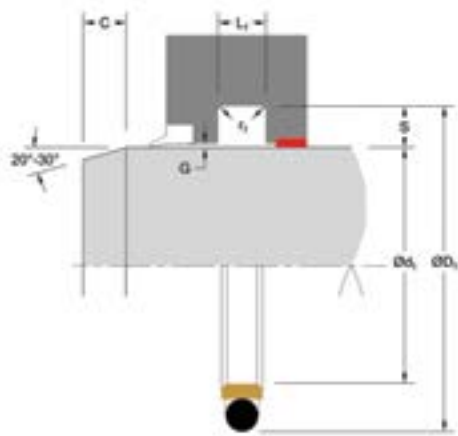
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                                                                             | FILLER                | MATERIAL DESIGNATOR | COLOR      | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>HYTHANE® 9270111 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Hydrolysis stabilized</li><li>• Strong chemical resistance</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li><li>• Available up to 1400mm (55 inches) diameter</li></ul>              | Hydrolysis Stabilized | 111                 | Gray       | -40 to 120°C        | -40 to 250°F        | 250 bar                        | 3600 psi                       |
| <b>HYTHANE® 9270261 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Internal lubrication provides extended wear in high-speed applications</li><li>• Excellent extrusion resistance</li><li>• Excellent wear resistance</li><li>• Available up to 500mm (19.5 inches) diameter</li></ul> | Internally Lubricated | 261                 | Off-White  | -40 to 120°C        | -40 to 250°F        | 250 bar                        | 3600 psi                       |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Excellent extrusion resistance</li><li>• Excellent wear resistance</li><li>• Available up to 2540mm (100 inches) diameter</li></ul>                                                                                            | Standard              | HU5                 | Yellow     | -20 to 115°C        | -20 to 240°F        | 250 bar                        | 3600 psi                       |
| <b>HU9 - POLYURETHANE, 95A</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Excellent extrusion resistance</li><li>• Excellent wear resistance</li><li>• Available up to 2540mm (100 inches) diameter</li></ul>                                                                                            | Standard              | HU9                 | Red        | -20 to 115°C        | -20 to 240°F        | 250 bar                        | 3600 psi                       |
| <b>HE5 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>• Positive position load holding</li><li>• Excellent extrusion resistance</li><li>• Excellent wear resistance</li><li>• Available up to 2540mm (100 inches) diameter</li></ul>                                                                                               | Standard              | HE5                 | Gray/Black | -20 to 115°C        | -20 to 240°F        | 250 bar                        | 3600 psi                       |
| <b>HYTHANE® 9220371 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>• Positive load holding</li><li>• Excellent extrusion resistance</li><li>• Excellent wear resistance</li><li>• Available up to 500mm (19.5 inches) diameter</li></ul>                                                                                        | Standard              | 371                 | Green      | -40 to 100°C        | -40 to 212°F        | 250 bar                        | 3600 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.





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.



# RDA

## ROD SEAL

Double-Acting



### INSTALLATION RECOMMENDATIONS

| METRIC                             |                            |                            |                       |                      |                |         |                |                         |               |               |                      |
|------------------------------------|----------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|-------------------------|---------------|---------------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G MAX* |               |               | O-RING CROSS SECTION |
| DIAMETER RANGE                     |                            |                            | ØD <sub>1</sub> H9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | 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 |                       |                      |                |         |                |                         |               |               |                      |
| 5.0 - 7.9                          | 8.0 - 18.9                 | -                          | d <sub>1</sub> + 4.9  | 2.2                  | 0.4            | 2.0     | 2.45           | 0.30                    | 0.20          | 0.15          | 1.78                 |
| 8.0 - 18.9                         | 19.0 - 37.9                | -                          | d <sub>1</sub> + 7.5  | 3.2                  | 0.6            | 3.0     | 3.75           | 0.40                    | 0.25          | 0.15          | 2.62                 |
| 19.0 - 37.9                        | 38.0 - 199.9               | 8.0 - 18.9                 | d <sub>1</sub> + 11.0 | 4.2                  | 1.0            | 4.0     | 5.50           | 0.50                    | 0.30          | 0.20          | 3.53                 |
| 38.0 - 199.9                       | 200.0 - 255.9              | 19.0 - 37.9                | d <sub>1</sub> + 15.5 | 6.3                  | 1.3            | 6.0     | 7.75           | 0.70                    | 0.40          | 0.25          | 5.33                 |
| 200.0 - 255.9                      | 256.0 - 649.9              | 38.0 - 199.9               | d <sub>1</sub> + 21.0 | 8.1                  | 1.8            | 8.0     | 10.50          | 0.80                    | 0.60          | 0.35          | 6.99                 |
| 256.0 - 649.9                      | 650.0 - 999.9              | 200.0 - 255.9              | d <sub>1</sub> + 24.5 | 8.1                  | 2.5            | 9.0     | 12.25          | 1.00                    | 0.80          | 0.50          | 6.99                 |
| 650.0 - 999.9                      | -                          | 256.0 - 649.9              | d <sub>1</sub> + 28.0 | 9.5                  | 3.0            | 10.0    | 14.00          | 1.20                    | 0.90          | 0.60          | 8.40                 |
| ≥ 1000.0                           | -                          | -                          | d <sub>1</sub> + 38.0 | 13.8                 | 3.0            | 10.0    | 19.00          | 1.20                    | 0.90          | 0.60          | 12.00                |

At pressure >250 bar use diameter tolerance f8/H8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

| INCH                               |                               |                               |                        |                       |                |         |                |                            |                      |                      |                         |
|------------------------------------|-------------------------------|-------------------------------|------------------------|-----------------------|----------------|---------|----------------|----------------------------|----------------------|----------------------|-------------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                               |                               | GROOVE DIAMETER        | GROOVE WIDTH          | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G MAX* |                      |                      | O-RING<br>CROSS SECTION |
|                                    |                               |                               |                        |                       |                |         |                |                            |                      |                      |                         |
| DIAMETER RANGE                     |                               |                               | ØD <sub>1</sub> H9     | L <sub>1</sub> + .008 | r <sub>1</sub> | C       | S              | Up to<br>1500<br>PSI       | Up to<br>2900<br>PSI | Up to<br>5800<br>PSI | O-ring                  |
| Standard Duty<br>Application - R   | Light Duty<br>Application - L | Heavy Duty<br>Application - H |                        |                       |                |         |                |                            |                      |                      |                         |
| 0.125 - 0.311                      | 0.312 - 0.749                 | -                             | d <sub>1</sub> + 0.193 | 0.087                 | 0.016          | 0.079   | 0.097          | 0.012                      | 0.008                | 0.006                | 0.070                   |
| 0.312 - 0.749                      | 0.750 - 1.500                 | -                             | d <sub>1</sub> + 0.287 | 0.126                 | 0.024          | 0.118   | 0.144          | 0.016                      | 0.010                | 0.006                | 0.103                   |
| 0.750 - 1.500                      | 1.501 - 7.874                 | 0.312 - 0.749                 | d <sub>1</sub> + 0.421 | 0.165                 | 0.039          | 0.157   | 0.211          | 0.020                      | 0.012                | 0.008                | 0.139                   |
| 1.501 - 7.874                      | 7.875 - 9.999                 | 0.750 - 1.500                 | d <sub>1</sub> + 0.594 | 0.248                 | 0.051          | 0.236   | 0.297          | 0.028                      | 0.016                | 0.010                | 0.210                   |
| 7.875 - 9.999                      | 10.000 - 25.499               | 1.501 - 7.874                 | d <sub>1</sub> + 0.807 | 0.319                 | 0.071          | 0.315   | 0.404          | 0.031                      | 0.024                | 0.014                | 0.275                   |
| 10.000 - 25.499                    | 25.500 - 39.999               | 7.875 - 9.999                 | d <sub>1</sub> + 0.945 | 0.319                 | 0.071          | 0.315   | 0.473          | 0.035                      | 0.028                | 0.016                | 0.275                   |
| 25.500 - 39.999                    | > 40.000                      | 10.000 - 25.499               | d <sub>1</sub> + 1.075 | 0.374                 | 0.098          | 0.354   | 0.538          | 0.039                      | 0.031                | 0.020                | 0.331                   |

At pressure >3600 psi use diameter tolerance f8/H8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

### TECHNICAL DETAILS

The Hallite RDA is a double-acting, O-ring energized, low-friction rod seal that performs well in both high-and-low pressure systems. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility. The standard RDA seal face includes pressure notches, which makes the seal very responsive to changes in pressure or direction of travel.

Hallite's RDA seal has been used successfully for years in machine tool, injection molding, and many other industrial applications in both single- and double-acting systems. This design also fits standard ISO 7425-2 grooves and is offered in a wide range of metric and inch options. The Hallite RDA, with proper guidance (see Hallite Bearings section), is an excellent long-lasting sealing solution.

This seal is available in a variety of Hallite's high performance Armorlene® and Hythane® materials to suit a wide range of demanding applications.

### FEATURES

- Compact design to save metal spacing
- Excellent in high-speed applications
- Low breakout friction and elimination of stick-slip action
- High service temperature, long wear, and high extrusion resistance

### Part Number Structure

RDAMR00700NHLX \_

| RDA                 | M                                             | R                                                                                                      | 00700                                                    | N                                                                                    | HLX                                                                              | —                                                                                                                                                                         |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <b>Installation Recommendations</b> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <b>Energizer Table</b> for desired energizer material | PTFE MATERIAL<br>Refer to <b>Material Table</b> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile (with notches)<br>X = No Notches<br>Notches not offered with groove widths (L <sub>1</sub> ) of 2.2mm (0.087in) or 3.2mm (0.126in) |



OPERATING CONDITIONS

|                            | METRIC          | INCH             |
|----------------------------|-----------------|------------------|
| Maximum Speed              | Up to 15.0m/sec | Up to 50.0ft/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

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

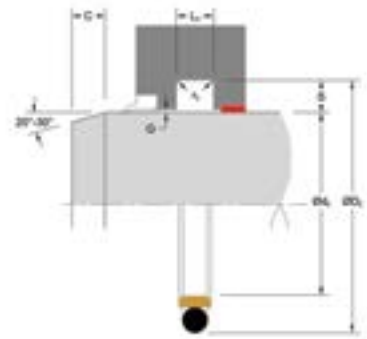
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

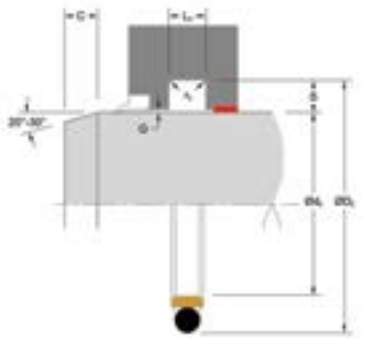
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                                                                   | FILLER                     | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|-------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                                                                         | Special Bronze Compound    | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Excellent wear resistance</li><li>Excellent low-friction properties</li><li>Good extrusion resistance</li></ul>                                                                                                                | Special Mineral Compound   | HLA                 | Gray        | -73 to 260°C        | -100 to 500°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Good low-friction properties</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li></ul>                                                                                     | Glass Molybdenum Disulfide | 702                 | Gray        | -73 to 260°C        | -100 to 500°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 706</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li><li>Good dielectrical properties</li></ul>                                                                                     | 15% Glass                  | 706                 | Off-White   | -73 to 260°C        | -100 to 500°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for hard mating surfaces only</li><li>Low friction and no stick-slip</li></ul>                                                                                                                                     | Unfilled                   | 700                 | White       | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul>                                                  | Carbon Fiber Filled        | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 250 bar                        | 3600 psi                       |
| <b>ARMORLENE® HCV</b> <ul style="list-style-type: none"><li>Recommended for lubricating and non-lubricating fluids</li><li>Excellent for high-frequency and short-stroke applications</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul>                        | High Carbon Fiber Filled   | HCV                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>Excellent in all lubricating fluids and pneumatic applications</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                                       | 25% Carbon/Graphite        | 711                 | Black       | -73 to 288°C        | -100 to 550°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                                                                                                             | 60% Bronze Content         | 713                 | Bronze      | -73 to 288°C        | -100 to 550°F       | 600 bar                        | 8700 psi                       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>Excellent impact resistance</li><li>Good dielectrical properties</li><li>Excellent abrasion resistance</li><li>Low coefficient of friction</li></ul>                                                                                                                       | Standard                   | 748                 | Translucent | -184 to 82°C        | -300 to 180°F       | 350 bar                        | 5000 psi                       |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul>                                                                                                                                               | Standard                   | HU5                 | Yellow      | -20 to 115°C        | -20 to 240°F        | 500 bar                        | 7250 psi                       |
| <b>HYTHANE® 9270111 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Hydrolysis stabilized</li><li>Strong chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li><li>Available up to 1400mm (55 inches) diameter</li></ul>                | Hydrolysis Stabilized      | 111                 | Gray        | -40 to 120°C        | -40 to 250°F        | 500 bar                        | 7250 psi                       |
| <b>HYTHANE® 9270261 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Internal lubrication provides extended wear in high-speed applications</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 500mm (19.5 inches) diameter</li></ul> | Internally Lubricated      | 261                 | Off-White   | -40 to 120°C        | -40 to 250°F        | 500 bar                        | 7250 psi                       |
| <b>HE5 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul>                                                                                                                                                  | Standard                   | HE5                 | Gray/Black  | -20 to 115°C        | -20 to 240°F        | 500 bar                        | 7250 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.





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                             |                            |                            |                       |                      |                |         |                |                         |               |               |                      |
|------------------------------------|----------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|-------------------------|---------------|---------------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G MAX* |               |               | O-RING CROSS SECTION |
| DIAMETER RANGE                     |                            |                            | ØD <sub>1</sub> H9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | 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 |                       |                      |                |         |                |                         |               |               |                      |
| 3.0 - 7.9                          | 8.0 - 18.9                 | -                          | d <sub>1</sub> + 4.9  | 2.2                  | 0.4            | 2.0     | 2.45           | 0.30                    | 0.20          | 0.15          | 1.78                 |
| 8.0 - 18.9                         | 19.0 - 37.9                | -                          | d <sub>1</sub> + 7.5  | 3.2                  | 0.6            | 3.0     | 3.75           | 0.40                    | 0.25          | 0.15          | 2.62                 |
| 19.0 - 37.9                        | 38.0 - 199.9               | 8.0 - 18.9                 | d <sub>1</sub> + 11.0 | 4.2                  | 1.0            | 4.0     | 5.50           | 0.50                    | 0.30          | 0.20          | 3.53                 |
| 38.0 - 199.9                       | 200.0 - 255.9              | 19.0 - 37.9                | d <sub>1</sub> + 15.5 | 6.3                  | 1.3            | 6.0     | 7.75           | 0.70                    | 0.40          | 0.25          | 5.33                 |
| 200.0 - 255.9                      | 256.0 - 649.9              | 38.0 - 199.9               | d <sub>1</sub> + 21.0 | 8.1                  | 1.8            | 8.0     | 10.50          | 0.80                    | 0.60          | 0.35          | 6.99                 |
| 256.0 - 649.9                      | 650.0 - 999.9              | 200.0 - 255.9              | d <sub>1</sub> + 24.5 | 8.1                  | 2.5            | 9.0     | 12.25          | 1.00                    | 0.80          | 0.50          | 6.99                 |
| 650.0 - 999.9                      | -                          | 256.0 - 649.9              | d <sub>1</sub> + 28.0 | 9.5                  | 3.0            | 10.0    | 14.00          | 1.20                    | 0.90          | 0.60          | 8.40                 |
| ≥ 1000.0                           | -                          | -                          | d <sub>1</sub> + 38.0 | 13.8                 | 3.0            | 10.0    | 19.00          | 1.20                    | 0.90          | 0.60          | 12.00                |

At pressure >400 bar use diameter tolerance f8/H8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

| INCH                          |                            |                            |                        |                        |                |         |                |                         |                |                |                      |
|-------------------------------|----------------------------|----------------------------|------------------------|------------------------|----------------|---------|----------------|-------------------------|----------------|----------------|----------------------|
| ROD DIAMETER Ød, f8/h9        |                            |                            | GROOVE DIAMETER        | GROOVE WIDTH           | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G MAX* |                |                | O-RING CROSS SECTION |
|                               |                            |                            |                        |                        |                |         |                |                         |                |                |                      |
| DIAMETER RANGE                |                            |                            | ØD <sub>1</sub> H9     | L <sub>1</sub> + 0.008 | r <sub>1</sub> | C       | S              | Up to 1500 PSI          | Up to 2900 PSI | Up to 5800 PSI | O-ring               |
| Standard Duty Application - R | Light Duty Application - L | Heavy Duty Application - H |                        |                        |                |         |                |                         |                |                |                      |
| 0.312 - 0.624                 | 0.625 - 1.624              | -                          | d <sub>1</sub> + 0.193 | 0.087                  | 0.015          | 0.079   | 0.097          | 0.020                   | 0.012          | 0.008          | 0.070                |
| 0.625 - 1.624                 | 1.625 - 3.249              | -                          | d <sub>1</sub> + 0.287 | 0.126                  | 0.025          | 0.118   | 0.144          | 0.024                   | 0.016          | 0.008          | 0.103                |
| 1.625 - 3.249                 | 3.250 - 5.374              | 0.625 - 1.624              | d <sub>1</sub> + 0.421 | 0.165                  | 0.025          | 0.157   | 0.211          | 0.024                   | 0.016          | 0.008          | 0.139                |
| 3.250 - 5.374                 | 5.375 - 12.999             | 1.625 - 3.249              | d <sub>1</sub> + 0.594 | 0.248                  | 0.035          | 0.236   | 0.297          | 0.031                   | 0.020          | 0.012          | 0.210                |
| 5.375 - 12.999                | 13.000 - 26.000            | 3.250 - 5.374              | d <sub>1</sub> + 0.807 | 0.319                  | 0.035          | 0.315   | 0.404          | 0.031                   | 0.020          | 0.012          | 0.275                |
| 13.000 - 26.000               | -                          | 5.375 - 13.000             | d <sub>1</sub> + 0.945 | 0.319                  | 0.035          | 0.354   | 0.473          | 0.035                   | 0.020          | 0.016          | 0.275                |

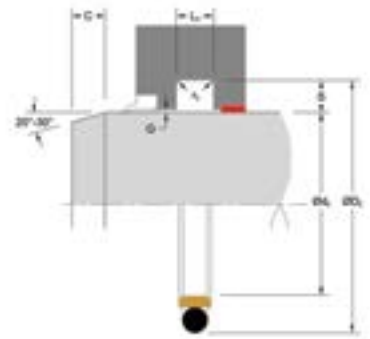
At pressure >5800 psi use diameter tolerance f8/H8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 8.0             | 15.5            | 3.2            | RDAMR00080**** |
| 8.0             | 12.9            | 2.2            | RDAML00080**** |
| 10.0            | 17.5            | 3.2            | RDAMR00100**** |
| 10.0            | 14.9            | 2.2            | RDAML00100**** |
| 12.0            | 19.5            | 3.2            | RDAMR00120**** |
| 12.0            | 16.9            | 2.2            | RDAML00120**** |
| 14.0            | 21.5            | 3.2            | RDAMR00140**** |
| 14.0            | 18.9            | 2.2            | RDAML00140**** |
| 15.0            | 22.5            | 3.2            | RDAMR00150**** |
| 15.0            | 19.9            | 2.2            | RDAML00150**** |
| 16.0            | 23.5            | 3.2            | RDAMR00160**** |
| 16.0            | 20.9            | 2.2            | RDAML00160**** |
| 18.0            | 25.5            | 3.2            | RDAMR00180**** |
| 18.0            | 22.9            | 2.2            | RDAML00180**** |
| 20.0            | 31.0            | 4.2            | RDAMR00200**** |
| 20.0            | 27.5            | 3.2            | RDAML00200**** |
| 22.0            | 33.0            | 4.2            | RDAMR00220**** |
| 22.0            | 29.5            | 3.2            | RDAML00220**** |
| 25.0            | 36.0            | 4.2            | RDAMR00250**** |
| 25.0            | 32.5            | 3.2            | RDAML00250**** |
| 28.0            | 39.0            | 4.2            | RDAMR00280**** |
| 28.0            | 35.5            | 3.2            | RDAML00280**** |
| 30.0            | 41.0            | 4.2            | RDAMR00300**** |
| 30.0            | 37.5            | 3.2            | RDAML00300**** |
| 32.0            | 43.0            | 4.2            | RDAMR00320**** |
| 32.0            | 39.5            | 3.2            | RDAML00320**** |
| 35.0            | 46.0            | 4.2            | RDAMR00350**** |
| 35.0            | 42.5            | 3.2            | RDAML00350**** |

| METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 36.0            | 47.0            | 4.2            | RDAMR00360**** |
| 36.0            | 43.5            | 3.2            | RDAML00360**** |
| 40.0            | 55.5            | 6.3            | RDAMR00400**** |
| 40.0            | 51.0            | 4.2            | RDAML00400**** |
| 43.0            | 58.5            | 6.3            | RDAMR00430**** |
| 42.0            | 53.0            | 4.2            | RDAML00420**** |
| 45.0            | 60.5            | 6.3            | RDAMR00450**** |
| 45.0            | 56.0            | 4.2            | RDAML00450**** |
| 50.0            | 65.5            | 6.3            | RDAMR00500**** |
| 50.0            | 61.0            | 4.2            | RDAML00500**** |
| 55.0            | 70.5            | 6.3            | RDAMR00550**** |
| 55.0            | 66.0            | 4.2            | RDAML00550**** |
| 56.0            | 71.5            | 6.3            | RDAMR00560**** |
| 56.0            | 67.0            | 4.2            | RDAML00560**** |
| 56.0            | 77.0            | 8.1            | RDAMH00560**** |
| 60.0            | 75.5            | 6.3            | RDAMR00600**** |
| 60.0            | 71.0            | 4.2            | RDAML00600**** |
| 60.0            | 81.0            | 8.1            | RDAMH00600**** |
| 63.0            | 78.5            | 6.3            | RDAMR00630**** |
| 63.0            | 74.0            | 4.2            | RDAML00630**** |
| 63.0            | 84.0            | 8.1            | RDAMH00630**** |
| 65.0            | 80.5            | 6.3            | RDAMR00650**** |
| 65.0            | 76.0            | 4.2            | RDAML00650**** |
| 65.0            | 86.0            | 8.1            | RDAMH00650**** |
| 70.0            | 85.5            | 6.3            | RDAMR00700**** |
| 70.0            | 81.0            | 4.2            | RDAML00700**** |
| 70.0            | 91.0            | 8.1            | RDAMH00700**** |
| 75.0            | 90.5            | 6.3            | RDAMR00750**** |

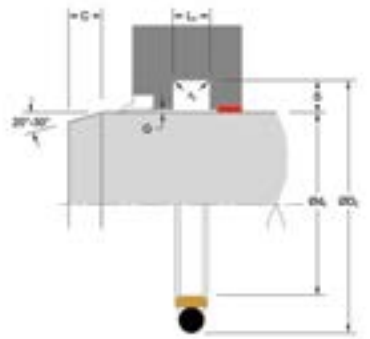




PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 75.0            | 96.0            | 8.1            | RDAMH00750**** |
| 78.0            | 93.5            | 6.3            | RDAMR00780**** |
| 78.0            | 99.0            | 8.1            | RDAMH00780**** |
| 80.0            | 95.5            | 6.3            | RDAMR00800**** |
| 80.0            | 101.0           | 8.1            | RDAMH00800**** |
| 85.0            | 100.5           | 6.3            | RDAMR00850**** |
| 85.0            | 106.0           | 8.1            | RDAMH00850**** |
| 90.0            | 105.5           | 6.3            | RDAMR00900**** |
| 90.0            | 111.0           | 8.1            | RDAMH00900**** |
| 95.0            | 110.5           | 6.3            | RDAMR00950**** |
| 95.0            | 116.0           | 8.1            | RDAMH00950**** |
| 97.0            | 112.5           | 6.3            | RDAMR00970**** |
| 97.0            | 118.0           | 8.1            | RDAMH00970**** |
| 100.0           | 115.5           | 6.3            | RDAMR01000**** |
| 100.0           | 121.0           | 8.1            | RDAMH01000**** |
| 105.0           | 120.5           | 6.3            | RDAMR01050**** |
| 105.0           | 126.0           | 8.1            | RDAMH01050**** |
| 110.0           | 125.5           | 6.3            | RDAMR01100**** |
| 110.0           | 131.0           | 8.1            | RDAMH01100**** |
| 115.0           | 130.5           | 6.3            | RDAMR01150**** |
| 115.0           | 136.0           | 8.1            | RDAMH01150**** |
| 120.0           | 135.5           | 6.3            | RDAMR01200**** |
| 120.0           | 141.0           | 8.1            | RDAMH01200**** |
| 125.0           | 140.5           | 6.3            | RDAMR01250**** |
| 125.0           | 146.0           | 8.1            | RDAMH01250**** |
| 130.0           | 145.5           | 6.3            | RDAMR01300**** |
| 130.0           | 151.0           | 8.1            | RDAMH01300**** |
| 135.0           | 150.5           | 6.3            | RDAMR01350**** |

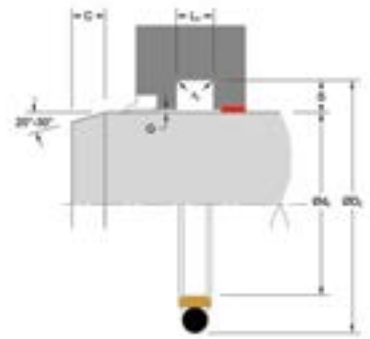
| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 135.0           | 156.0           | 8.1            | RDAMH01350**** |
| 140.0           | 155.5           | 6.3            | RDAMR01400**** |
| 140.0           | 161.0           | 8.1            | RDAMH01400**** |
| 145.0           | 160.5           | 6.3            | RDAMR01450**** |
| 145.0           | 166.0           | 8.1            | RDAMH01450**** |
| 150.0           | 165.5           | 6.3            | RDAMR01500**** |
| 150.0           | 171.0           | 8.1            | RDAMH01500**** |
| 155.0           | 170.5           | 6.3            | RDAMR01550**** |
| 155.0           | 176.0           | 8.1            | RDAMH01550**** |
| 160.0           | 175.5           | 6.3            | RDAMR01600**** |
| 160.0           | 181.0           | 8.1            | RDAMH01600**** |
| 170.0           | 185.5           | 6.3            | RDAMR01700**** |
| 170.0           | 191.0           | 8.1            | RDAMH01700**** |
| 180.0           | 195.5           | 6.3            | RDAMR01800**** |
| 180.0           | 201.0           | 8.1            | RDAMH01800**** |
| 190.0           | 205.5           | 6.3            | RDAMR01900**** |
| 190.0           | 211.0           | 8.1            | RDAMH01900**** |
| 200.0           | 215.5           | 6.3            | RDAML02000**** |
| 200.0           | 224.5           | 8.1            | RDAMR02000**** |
| 210.0           | 231.0           | 8.1            | RDAMR02100**** |
| 210.0           | 234.5           | 8.1            | RDAMH02100**** |
| 220.0           | 241.0           | 8.1            | RDAMR02200**** |
| 220.0           | 244.5           | 8.1            | RDAMH02200**** |
| 225.0           | 246.0           | 8.1            | RDAMR02250**** |
| 225.0           | 249.5           | 8.1            | RDAMH02250**** |
| 240.0           | 261.0           | 8.1            | RDAMR02400**** |
| 240.0           | 264.5           | 8.1            | RDAMH02400**** |
| 250.0           | 271.0           | 8.1            | RDAMR02500**** |



PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 250.0           | 274.5           | 8.1            | RDAMH02500**** |
| 260.0           | 284.5           | 8.1            | RDAMR02600**** |
| 260.0           | 288.0           | 9.5            | RDAMH02600**** |
| 270.0           | 294.5           | 8.1            | RDAMR02700**** |
| 270.0           | 298.0           | 9.5            | RDAMH02700**** |
| 280.0           | 304.5           | 8.1            | RDAMR02800**** |
| 280.0           | 308.0           | 9.5            | RDAMH02800**** |
| 290.0           | 314.5           | 8.1            | RDAMR02900**** |
| 290.0           | 318.0           | 9.5            | RDAMH02900**** |
| 300.0           | 324.5           | 8.1            | RDAMR03000**** |
| 300.0           | 328.0           | 9.5            | RDAMH03000**** |
| 320.0           | 344.5           | 8.1            | RDAMR03200**** |
| 320.0           | 348.0           | 9.5            | RDAMH03200**** |
| 330.0           | 354.5           | 8.1            | RDAMR03300**** |
| 330.0           | 358.0           | 9.5            | RDAMH03300**** |
| 340.0           | 364.5           | 8.1            | RDAMR03400**** |
| 340.0           | 368.0           | 9.5            | RDAMH03400**** |
| 350.0           | 374.5           | 8.1            | RDAMR03500**** |
| 350.0           | 378.0           | 9.5            | RDAMH03500**** |
| 360.0           | 384.5           | 8.1            | RDAMR03600**** |
| 360.0           | 388.0           | 9.5            | RDAMH03600**** |
| 370.0           | 394.5           | 8.1            | RDAMR03700**** |
| 370.0           | 398.0           | 9.5            | RDAMH03700**** |
| 380.0           | 404.5           | 8.1            | RDAMR03800**** |
| 380.0           | 408.0           | 9.5            | RDAMH03800**** |
| 390.0           | 414.5           | 8.1            | RDAMR03900**** |
| 390.0           | 418.0           | 9.5            | RDAMH03900**** |
| 400.0           | 424.5           | 8.1            | RDAMR04000**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 400.0           | 428.0           | 9.5            | RDAMH04000**** |
| 410.0           | 434.5           | 8.1            | RDAMR04100**** |
| 410.0           | 438.0           | 9.5            | RDAMH04100**** |
| 420.0           | 444.5           | 8.1            | RDAMR04200**** |
| 420.0           | 448.0           | 9.5            | RDAMH04200**** |
| 450.0           | 474.5           | 8.1            | RDAMR04500**** |
| 450.0           | 478.0           | 9.5            | RDAMH04500**** |
| 460.0           | 484.5           | 8.1            | RDAMR04600**** |
| 460.0           | 488.0           | 9.5            | RDAMH04600**** |
| 480.0           | 504.5           | 8.1            | RDAMR04800**** |
| 480.0           | 508.0           | 9.5            | RDAMH04800**** |
| 500.0           | 524.5           | 8.1            | RDAMR05000**** |
| 500.0           | 528.0           | 9.5            | RDAMH05000**** |
| 520.0           | 544.5           | 8.1            | RDAMR05200**** |
| 520.0           | 548.0           | 9.5            | RDAMH05200**** |
| 550.0           | 574.5           | 8.1            | RDAMR05500**** |
| 550.0           | 578.0           | 9.5            | RDAMH05500**** |
| 560.0           | 584.5           | 8.1            | RDAMR05600**** |
| 560.0           | 588.0           | 9.5            | RDAMH05600**** |
| 590.0           | 614.5           | 8.1            | RDAMR05900**** |
| 590.0           | 618.0           | 9.5            | RDAMH05900**** |
| 600.0           | 624.5           | 8.1            | RDAMR06000**** |
| 600.0           | 628.0           | 9.5            | RDAMH06000**** |
| 625.0           | 649.5           | 8.1            | RDAMR06250**** |
| 625.0           | 653.0           | 9.5            | RDAMH06250**** |
| 650.0           | 678.0           | 9.5            | RDAMR06500**** |
| 700.0           | 728.0           | 9.5            | RDAMR07000**** |
| 750.0           | 778.0           | 9.5            | RDAMR07500**** |



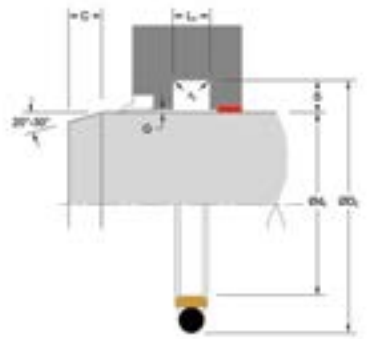
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 800.0           | 828.0           | 9.5            | RDAMR08000**** |
| 850.0           | 878.0           | 9.5            | RDAMR08500**** |
| 900.0           | 928.0           | 9.5            | RDAMR09000**** |
| 950.0           | 978.0           | 9.5            | RDAMR09500**** |
| 1000.0          | 1038.0          | 13.8           | RDAMR10000**** |
| 1050.0          | 1088.0          | 13.8           | RDAMR10500**** |
| 1100.0          | 1138.0          | 13.8           | RDAMR11000**** |
| 1150.0          | 1188.0          | 13.8           | RDAMR11500**** |
| 1200.0          | 1238.0          | 13.8           | RDAMR12000**** |
| 1250.0          | 1288.0          | 13.8           | RDAMR12500**** |
| 1300.0          | 1338.0          | 13.8           | RDAMR13000**** |
| 1350.0          | 1388.0          | 13.8           | RDAMR13500**** |

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

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 0.500           | 0.693           | 0.087          | RDAER00500**** |
| 0.562           | 0.755           | 0.087          | RDAER00562**** |
| 0.625           | 0.912           | 0.126          | RDAER00625**** |
| 0.687           | 0.974           | 0.126          | RDAER00687**** |
| 0.750           | 1.037           | 0.126          | RDAER00750**** |
| 0.812           | 1.099           | 0.126          | RDAER00812**** |
| 0.875           | 1.162           | 0.126          | RDAER00875**** |
| 0.937           | 1.224           | 0.126          | RDAER00937**** |
| 1.000           | 1.287           | 0.126          | RDAER01000**** |
| 1.062           | 1.349           | 0.126          | RDAER01062**** |
| 1.125           | 1.412           | 0.126          | RDAER01125**** |
| 1.187           | 1.474           | 0.126          | RDAER01187**** |
| 1.250           | 1.537           | 0.126          | RDAER01250**** |
| 1.312           | 1.599           | 0.126          | RDAER01312**** |
| 1.375           | 1.662           | 0.126          | RDAER01375**** |
| 1.437           | 1.724           | 0.126          | RDAER01437**** |
| 1.500           | 1.787           | 0.126          | RDAER01500**** |
| 1.562           | 1.849           | 0.126          | RDAER01562**** |
| 1.625           | 2.046           | 0.165          | RDAER01625**** |
| 1.687           | 2.108           | 0.165          | RDAER01687**** |
| 1.750           | 2.171           | 0.165          | RDAER01750**** |
| 1.812           | 2.233           | 0.165          | RDAER01812**** |
| 1.875           | 2.296           | 0.165          | RDAER01875**** |
| 1.937           | 2.358           | 0.165          | RDAER01937**** |
| 2.000           | 2.421           | 0.165          | RDAER02000**** |
| 2.125           | 2.546           | 0.165          | RDAER02125**** |
| 2.250           | 2.671           | 0.165          | RDAER02250**** |
| 2.375           | 2.796           | 0.165          | RDAER02375**** |

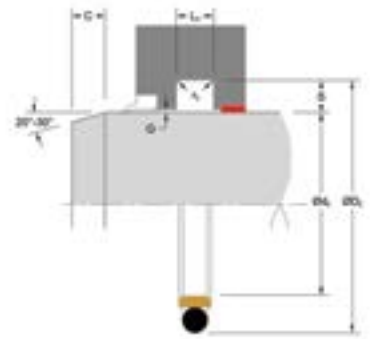


PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 2.500           | 2.921           | 0.165          | RDAER02500**** |
| 2.625           | 3.046           | 0.165          | RDAER02625**** |
| 2.750           | 3.171           | 0.165          | RDAER02750**** |
| 2.875           | 3.296           | 0.165          | RDAER02875**** |
| 3.000           | 3.421           | 0.165          | RDAER03000**** |
| 3.125           | 3.546           | 0.165          | RDAER03125**** |
| 3.250           | 3.844           | 0.248          | RDAER03250**** |
| 3.375           | 3.969           | 0.248          | RDAER03375**** |
| 3.500           | 4.094           | 0.248          | RDAER03500**** |
| 3.625           | 4.219           | 0.248          | RDAER03625**** |
| 3.750           | 4.344           | 0.248          | RDAER03750**** |
| 3.875           | 4.469           | 0.248          | RDAER03875**** |
| 4.000           | 4.594           | 0.248          | RDAER04000**** |
| 4.125           | 4.719           | 0.248          | RDAER04125**** |
| 4.250           | 4.844           | 0.248          | RDAER04250**** |
| 4.375           | 4.969           | 0.248          | RDAER04375**** |
| 4.500           | 5.094           | 0.248          | RDAER04500**** |
| 4.625           | 5.219           | 0.248          | RDAER04625**** |
| 4.750           | 5.344           | 0.248          | RDAER04750**** |
| 4.875           | 5.469           | 0.248          | RDAER04875**** |
| 5.000           | 5.594           | 0.248          | RDAER05000**** |
| 5.125           | 5.719           | 0.248          | RDAER05125**** |
| 5.250           | 5.844           | 0.248          | RDAER05250**** |
| 5.375           | 6.182           | 0.319          | RDAER05375**** |
| 5.500           | 6.307           | 0.319          | RDAER05500**** |
| 5.625           | 6.432           | 0.319          | RDAER05625**** |
| 5.750           | 6.557           | 0.319          | RDAER05750**** |
| 6.000           | 6.807           | 0.319          | RDAER06000**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 6.250           | 7.057           | 0.319          | RDAER06250**** |
| 6.500           | 7.307           | 0.319          | RDAER06500**** |
| 6.750           | 7.557           | 0.319          | RDAER06750**** |
| 7.000           | 7.807           | 0.319          | RDAER07000**** |
| 7.250           | 8.057           | 0.319          | RDAER07250**** |
| 7.500           | 8.307           | 0.319          | RDAER07500**** |
| 7.750           | 8.557           | 0.319          | RDAER07750**** |
| 8.000           | 8.807           | 0.319          | RDAER08000**** |
| 8.250           | 9.057           | 0.319          | RDAER08250**** |
| 8.500           | 9.307           | 0.319          | RDAER08500**** |
| 8.750           | 9.557           | 0.319          | RDAER08750**** |
| 9.000           | 9.807           | 0.319          | RDAER09000**** |
| 9.250           | 10.057          | 0.319          | RDAER09250**** |
| 9.500           | 10.307          | 0.319          | RDAER09500**** |
| 9.750           | 10.557          | 0.319          | RDAER09750**** |
| 10.000          | 10.807          | 0.319          | RDAER10000**** |
| 10.500          | 11.307          | 0.319          | RDAER10500**** |
| 11.000          | 11.807          | 0.319          | RDAER11000**** |
| 11.500          | 12.307          | 0.319          | RDAER11500**** |
| 12.000          | 12.945          | 0.319          | RDAEH12000**** |
| 12.500          | 13.445          | 0.319          | RDAEH12500**** |
| 13.000          | 13.945          | 0.319          | RDAER13000**** |
| 13.500          | 14.445          | 0.319          | RDAER13500**** |
| 14.000          | 14.945          | 0.319          | RDAER14000**** |
| 14.500          | 15.445          | 0.319          | RDAER14500**** |
| 15.000          | 15.945          | 0.319          | RDAER15000**** |
| 15.500          | 16.445          | 0.319          | RDAER15500**** |
| 16.000          | 16.945          | 0.319          | RDAER16000**** |

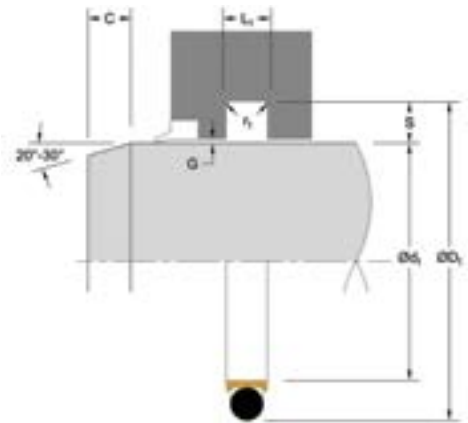




PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 16.500          | 17.445          | 0.319          | RDAER16500**** |
| 17.000          | 17.945          | 0.319          | RDAER17000**** |
| 17.500          | 18.445          | 0.319          | RDAER17500**** |
| 18.000          | 18.945          | 0.319          | RDAER18000**** |
| 18.500          | 19.445          | 0.319          | RDAER18500**** |
| 19.000          | 19.945          | 0.319          | RDAER19000**** |
| 19.500          | 20.445          | 0.319          | RDAER19500**** |
| 20.000          | 20.945          | 0.319          | RDAER20000**** |

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



RDS  
ROD SEAL  
Double-Acting



TECHNICAL DETAILS

The Hallite RDS is a double-acting low-friction rod seal solution for compact O-ring grooves, that extends the service range above what an O-ring alone is capable of supporting. The RDS is designed for light-duty applications, is particularly suited for small-diameter installations, and due to its size and design, is easy to install. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility.

Hallite’s RDS is designed to be used in existing dynamic O-ring grooves and does not require any groove modification. A good choice for pneumatic and hydraulic equipment sealing needs, the RDS is proven to extend the service range and seal longevity over stand-alone O-ring installations.

This seal is available in a variety of Hallite’s high-performance Armorlene® materials to suit a wide range of demanding applications.

F E A T U R E S

- Compact design to save metal spacing
- Low breakout friction and elimination of stick-slip action
- Effective in pneumatic cylinder and light-duty hydraulic cylinder
- Can be used in standard AS-568 dynamic O-ring groove
- Fits groove dimensions per MIL-G-5514F
- Recommended for light-duty and smaller-diameter applications

Part Number Structure

RDSMR00700NHLX \_

| RDS                 | M                                             | R                                                                                                      | 00700                                                    | N                                                                                    | HLX                                                                              | —                                                     |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile<br>N = Notches |

OPERATING CONDITIONS

|                          | METRIC          | INCH             |
|--------------------------|-----------------|------------------|
| Maximum Speed            | Up to 15.0m/sec | Up to 50.0ft/sec |
| Temperature Range*       | -45 to 200°C    | -49 to 392°F     |
| Maximum Dynamic Pressure | 350 bar         | 5000 psi         |

\*Dependent upon energizer used (NBR, FKM, etc.).

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

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

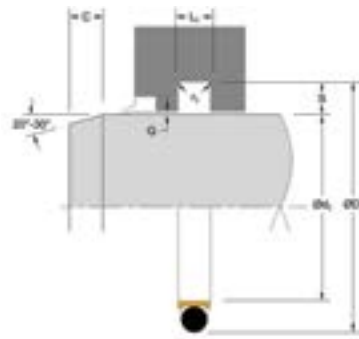
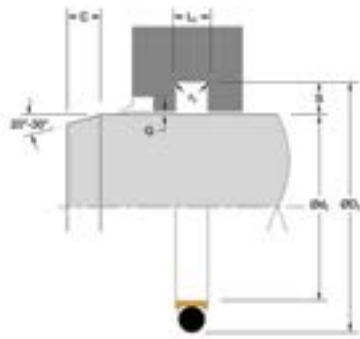
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                     | FILLER                  | MATERIAL DESIGNATOR | COLOR | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|-------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>• Standard material for hydraulic applications</li><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Extended wear resistance</li></ul>                   | Special Bronze Compound | HLX                 | Gold  | -73 to 288°C        | -100 to 550°F       | 350 bar                        | 5000 psi                       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>• Excellent in all lubricating fluids and pneumatic applications</li><li>• High chemical resistance</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul> | 25% Carbon/ Graphite    | 711                 | Black | -73 to 288°C        | -100 to 550°F       | 350 bar                        | 5000 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>• Excellent in all hydraulic fluids</li><li>• Recommended for use with soft mating surfaces</li><li>• Low friction and no stick-slip</li></ul>                                             | Unfilled                | 700                 | White | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 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.





INSTALLATION RECOMMENDATIONS

| METRIC                             |                            |                       |                      |                |         |                |                         |               |               |                      |
|------------------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|-------------------------|---------------|---------------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G MAX* |               |               | O-RING CROSS SECTION |
| DIAMETER RANGE                     |                            | ØD <sub>1</sub> H9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 100 bar           | Up to 200 bar | Up to 350 bar | O-ring               |
| Standard Duty Application - R      | Light Duty Application - L |                       |                      |                |         |                |                         |               |               |                      |
| 4.0 - 9.9                          | 10.0 - 19.9                | d <sub>1</sub> + 2.9  | 2.4                  | 0.4            | 2.0     | 1.45           | 0.10                    | 0.08          | 0.05          | 1.78                 |
| 10.0 - 19.9                        | 20.0 - 39.9                | d <sub>1</sub> + 4.5  | 3.6                  | 0.4            | 3.0     | 2.25           | 0.15                    | 0.10          | 0.07          | 2.62                 |
| 20.0 - 39.9                        | 40.0 - 119.9               | d <sub>1</sub> + 6.2  | 4.8                  | 0.6            | 4.0     | 3.10           | 0.20                    | 0.15          | 0.08          | 3.53                 |
| 40.0 - 119.9                       | 120.0 - 649.9              | d <sub>1</sub> + 9.4  | 7.1                  | 0.8            | 6.0     | 4.70           | 0.25                    | 0.20          | 0.10          | 5.33                 |
| 120.0 - 649.9                      | 650.0 - 999.9              | d <sub>1</sub> + 12.2 | 9.5                  | 0.8            | 8.0     | 6.10           | 0.30                    | 0.25          | 0.15          | 6.99                 |
| 650.0 - 999.9                      | -                          | d <sub>1</sub> + 15.0 | 10.0                 | 1.0            | 1.0     | 7.50           | 0.40                    | 0.30          | 0.20          | 8.40                 |

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

| INCH                               |                            |                            |                        |                |         |                |                         |                |                |                      |
|------------------------------------|----------------------------|----------------------------|------------------------|----------------|---------|----------------|-------------------------|----------------|----------------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            | GROOVE DIAMETER            | GROOVE WIDTH           | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G MAX* |                |                | O-RING CROSS SECTION |
| DIAMETER RANGE                     |                            | ØD <sub>1</sub> H9         | L <sub>1</sub> + .008  | r <sub>1</sub> | C       | S              | Up to 1500 PSI          | Up to 2900 PSI | Up to 5000 PSI | O-ring               |
| Standard Duty Application - R      | Light Duty Application - L | Heavy Duty Application - H |                        |                |         |                |                         |                |                |                      |
| 0.125 - 0.499                      | 0.500 - 0.874              | -                          | d <sub>1</sub> + 0.110 | 0.093          | 0.005   | 0.079          | 0.055                   | 0.004          | 0.003          | 0.070                |
| 0.500 - 0.874                      | 0.875 - 1.624              | 0.125 - 0.499              | d <sub>1</sub> + 0.176 | 0.140          | 0.005   | 0.118          | 0.088                   | 0.006          | 0.004          | 0.103                |
| 0.875 - 1.624                      | 1.625 - 4.499              | 0.500 - 0.874              | d <sub>1</sub> + 0.242 | 0.187          | 0.010   | 0.157          | 0.121                   | 0.008          | 0.006          | 0.139                |
| 1.625 - 4.499                      | 4.500 - 16.000             | 0.875 - 1.624              | d <sub>1</sub> + 0.370 | 0.281          | 0.020   | 0.236          | 0.185                   | 0.010          | 0.008          | 0.210                |
| 4.500 - 16.000                     | -                          | -                          | d <sub>1</sub> + 0.474 | 0.375          | 0.020   | 0.315          | 0.237                   | 0.012          | 0.010          | 0.275                |

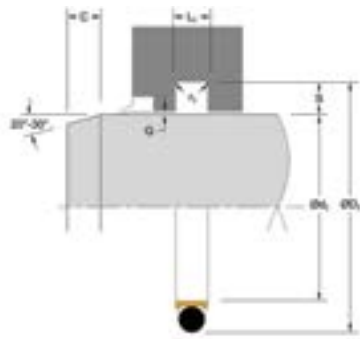
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 4.0             | 6.9             | 2.4            | RDSMR00040**** |
| 5.0             | 7.9             | 2.4            | RDSMR00050**** |
| 6.0             | 8.9             | 2.4            | RDSMR00060**** |
| 8.0             | 10.9            | 2.4            | RDSMR00080**** |
| 10.0            | 14.5            | 3.6            | RDSMR00100**** |
| 12.0            | 16.5            | 3.6            | RDSMR00120**** |
| 14.0            | 18.5            | 3.6            | RDSMR00140**** |
| 15.0            | 19.5            | 3.6            | RDSMR00150**** |
| 16.0            | 20.5            | 3.6            | RDSMR00160**** |
| 18.0            | 22.5            | 3.6            | RDSMR00180**** |
| 20.0            | 26.2            | 4.8            | RDSMR00200**** |
| 22.0            | 28.2            | 4.8            | RDSMR00220**** |
| 25.0            | 31.2            | 4.8            | RDSMR00250**** |
| 28.0            | 34.2            | 4.8            | RDSMR00280**** |
| 30.0            | 36.2            | 4.8            | RDSMR00300**** |
| 32.0            | 38.2            | 4.8            | RDSMR00320**** |
| 35.0            | 41.2            | 4.8            | RDSMR00350**** |
| 36.0            | 42.2            | 4.8            | RDSMR00360**** |
| 40.0            | 49.4            | 7.1            | RDSMR00400**** |
| 42.0            | 51.4            | 7.1            | RDSMR00420**** |
| 45.0            | 54.4            | 7.1            | RDSMR00450**** |
| 48.0            | 57.4            | 7.1            | RDSMR00480**** |
| 50.0            | 59.4            | 7.1            | RDSMR00500**** |
| 52.0            | 61.4            | 7.1            | RDSMR00520**** |
| 55.0            | 64.4            | 7.1            | RDSMR00550**** |
| 56.0            | 65.4            | 7.1            | RDSMR00560**** |
| 60.0            | 69.4            | 7.1            | RDSMR00600**** |
| 63.0            | 72.4            | 7.1            | RDSMR00630**** |

| METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 65.0            | 74.4            | 7.1            | RDSMR00650**** |
| 70.0            | 79.4            | 7.1            | RDSMR00700**** |
| 80.0            | 89.4            | 7.1            | RDSMR00800**** |
| 85.0            | 94.4            | 7.1            | RDSMR00850**** |
| 90.0            | 99.4            | 7.1            | RDSMR00900**** |
| 95.0            | 104.4           | 7.1            | RDSMR00950**** |
| 100.0           | 109.4           | 7.1            | RDSMR01000**** |
| 105.0           | 114.4           | 7.1            | RDSMR01050**** |
| 110.0           | 119.4           | 7.1            | RDSMR01100**** |
| 115.0           | 124.4           | 7.1            | RDSMR01150**** |
| 120.0           | 132.2           | 9.5            | RDSMR01200**** |
| 125.0           | 137.2           | 9.5            | RDSMR01250**** |
| 130.0           | 142.2           | 9.5            | RDSMR01300**** |
| 135.0           | 147.2           | 9.5            | RDSMR01350**** |
| 140.0           | 152.2           | 9.5            | RDSMR01400**** |
| 150.0           | 162.2           | 9.5            | RDSMR01500**** |
| 160.0           | 172.2           | 9.5            | RDSMR01600**** |
| 170.0           | 182.2           | 9.5            | RDSMR01700**** |
| 180.0           | 192.2           | 9.5            | RDSMR01800**** |
| 190.0           | 202.2           | 9.5            | RDSMR01900**** |
| 200.0           | 212.2           | 9.5            | RDSMR02000**** |
| 210.0           | 222.2           | 9.5            | RDSMR02100**** |
| 220.0           | 232.2           | 9.5            | RDSMR02200**** |
| 230.0           | 242.2           | 9.5            | RDSMR02300**** |
| 240.0           | 252.2           | 9.5            | RDSMR02400**** |
| 250.0           | 262.2           | 9.5            | RDSMR02500**** |
| 280.0           | 292.2           | 9.5            | RDSMR02800**** |
| 300.0           | 312.2           | 9.5            | RDSMR03000**** |





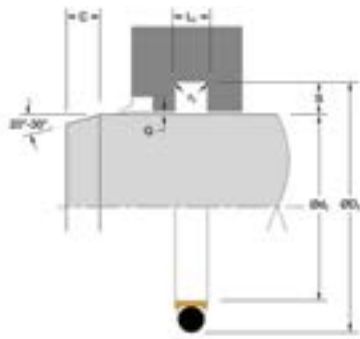
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 320.0           | 332.2           | 9.5            | RDSMR03200**** |
| 350.0           | 362.2           | 9.5            | RDSMR03500**** |
| 360.0           | 372.2           | 9.5            | RDSMR03600**** |
| 400.0           | 412.2           | 9.5            | RDSMR04000**** |
| 500.0           | 512.2           | 9.5            | RDSMR05000**** |
| 600.0           | 612.2           | 9.5            | RDSMR06000**** |
| 650.0           | 665.0           | 10.0           | RDSMR06500**** |
| 700.0           | 715.0           | 10.0           | RDSMR07000**** |
| 800.0           | 815.0           | 10.0           | RDSMR08000**** |
| 900.0           | 915.0           | 10.0           | RDSMR09000**** |
| 950.0           | 965.0           | 10.0           | RDSMR09500**** |

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

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 0.500           | 0.610           | 0.093          | RDSEL00500**** |
| 0.562           | 0.672           | 0.093          | RDSEL00562**** |
| 0.625           | 0.735           | 0.093          | RDSEL00625**** |
| 0.687           | 0.797           | 0.093          | RDSEL00687**** |
| 0.750           | 0.860           | 0.093          | RDSEL00750**** |
| 0.812           | 0.922           | 0.093          | RDSEL00812**** |
| 0.875           | 1.051           | 0.140          | RDSEL00875**** |
| 0.937           | 1.113           | 0.140          | RDSEL00937**** |
| 1.000           | 1.176           | 0.140          | RDSEL01000**** |
| 1.062           | 1.238           | 0.140          | RDSEL01062**** |
| 1.125           | 1.301           | 0.140          | RDSEL01125**** |
| 1.187           | 1.363           | 0.140          | RDSEL01187**** |
| 1.250           | 1.426           | 0.140          | RDSEL01250**** |
| 1.312           | 1.488           | 0.140          | RDSEL01312**** |
| 1.375           | 1.551           | 0.140          | RDSEL01375**** |
| 1.437           | 1.613           | 0.140          | RDSEL01437**** |
| 1.500           | 1.676           | 0.140          | RDSEL01500**** |
| 1.562           | 1.738           | 0.140          | RDSEL01562**** |
| 1.625           | 1.867           | 0.187          | RDSEL01625**** |
| 1.687           | 1.929           | 0.187          | RDSEL01687**** |
| 1.750           | 1.992           | 0.187          | RDSEL01750**** |
| 1.812           | 2.054           | 0.187          | RDSEL01812**** |
| 1.875           | 2.117           | 0.187          | RDSEL01875**** |
| 1.937           | 2.179           | 0.187          | RDSEL01937**** |
| 2.000           | 2.242           | 0.187          | RDSEL02000**** |
| 2.062           | 2.304           | 0.187          | RDSEL02062**** |
| 2.125           | 2.367           | 0.187          | RDSEL02125**** |
| 2.187           | 2.429           | 0.187          | RDSEL02187**** |

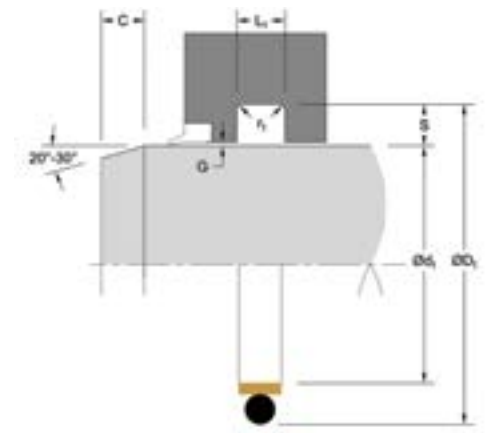


PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 2.250           | 2.492           | 0.187          | RDSEL02250**** |
| 2.312           | 2.554           | 0.187          | RDSEL02312**** |
| 2.375           | 2.617           | 0.187          | RDSEL02375**** |
| 2.437           | 2.679           | 0.187          | RDSEL02437**** |
| 2.500           | 2.742           | 0.187          | RDSEL02500**** |
| 2.625           | 2.867           | 0.187          | RDSEL02625**** |
| 2.750           | 2.992           | 0.187          | RDSEL02750**** |
| 2.875           | 3.117           | 0.187          | RDSEL02875**** |
| 3.000           | 3.242           | 0.187          | RDSEL03000**** |
| 3.125           | 3.367           | 0.187          | RDSEL03125**** |
| 3.250           | 3.492           | 0.187          | RDSEL03250**** |
| 3.375           | 3.617           | 0.187          | RDSEL03375**** |
| 3.500           | 3.742           | 0.187          | RDSEL03500**** |
| 3.625           | 3.867           | 0.187          | RDSEL03625**** |
| 3.750           | 3.992           | 0.187          | RDSEL03750**** |
| 3.875           | 4.117           | 0.187          | RDSEL03875**** |
| 4.000           | 4.242           | 0.187          | RDSEL04000**** |
| 4.125           | 4.367           | 0.187          | RDSEL04125**** |
| 4.250           | 4.492           | 0.187          | RDSEL04250**** |
| 4.375           | 4.617           | 0.187          | RDSEL04375**** |
| 4.500           | 4.870           | 0.281          | RDSEL04500**** |
| 4.625           | 4.995           | 0.281          | RDSEL04625**** |
| 4.750           | 5.120           | 0.281          | RDSEL04750**** |
| 4.875           | 5.245           | 0.281          | RDSEL04875**** |
| 5.000           | 5.474           | 0.375          | RDSER05000**** |
| 5.125           | 5.599           | 0.375          | RDSER05125**** |
| 5.250           | 5.724           | 0.375          | RDSER05250**** |
| 5.375           | 5.849           | 0.375          | RDSER05375**** |

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





# RCG

## ROD SEAL

Double-Acting



### TECHNICAL DETAILS

The Hallite RCG is a double-acting, O-ring energized, low-friction rod seal designed for low- and medium-pressure systems. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility.

The compact design of the RCG provides an ideal sealing solution where housing space is limited. This seal is available in a variety of Hallite's high-performance Armorlene® materials to suit a wide range of demanding applications.

### FEATURES

- Low breakout friction and elimination of stick-slip action
- Compact design to save metal spacing
- High service temperature, long wear, and high extrusion resistance



### Part Number Structure

RCGMR00400NHLX \_

|                     |                                               |                                                                                                        |                                                          |                                                                                      |                                                                                  |                                                       |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|
| RCG                 | M                                             | R                                                                                                      | 00400                                                    | N                                                                                    | HLX                                                                              | —                                                     |
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile<br>N = Notches |

OPERATING CONDITIONS

MATERIALS

|                          | METRIC          | INCH             |
|--------------------------|-----------------|------------------|
| Maximum Speed            | Up to 15.0m/sec | Up to 50.0ft/sec |
| Temperature Range*       | -45 to 200°C    | -49 to 392°F     |
| Maximum Dynamic Pressure | 200 bar         | 2900 psi         |

\*Dependent upon energizer used (NBR, FKM, etc.).

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

|                                      | METRIC     |         |        | INCH    |         |         | Rmr*      |
|--------------------------------------|------------|---------|--------|---------|---------|---------|-----------|
| SURFACE ROUGHNESS                    | µmRa       | µmRz    | µmRt   | µinRa   | µinRz   | µinRt   |           |
| Dynamic Sealing Face Ød <sub>1</sub> | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face ØD <sub>1</sub>  | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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.

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                        | FILLER                  | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|-------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>• Standard material for hydraulic applications</li><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Extended wear resistance</li></ul>                                                      | Special Bronze Compound | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>• Not recommended for gas sealing applications</li><li>• Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled     | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>• Excellent in all hydraulic fluids</li><li>• Recommended for hard mating surfaces only</li><li>• Low friction and no stick-slip</li></ul>                                                                                    | Unfilled                | 700                 | White       | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>• Excellent in all lubricating fluids and pneumatic applications</li><li>• High chemical resistance</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul>                                    | 25% Carbon/Graphite     | 711                 | Black       | -73 to 288°C        | -100 to 550°F       | 200 bar                        | 2900 psi                       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>• Excellent impact resistance</li><li>• Good dielectrical properties</li><li>• Excellent abrasion resistance</li><li>• Low coefficient of friction</li></ul>                                                                    | Standard                | 748                 | Translucent | -184 to 82°C        | -300 to 180°F       | 200 bar                        | 2900 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.

INSTALLATION RECOMMENDATIONS

| METRIC                             |                       |                      |                |                |                         |                      |
|------------------------------------|-----------------------|----------------------|----------------|----------------|-------------------------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | GROOVE SECTION | RADIAL CLEARANCE G MAX* | O-RING CROSS SECTION |
| DIAMETER RANGE                     | ØD <sub>1</sub> H9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | S              | Up to 200 bar           | O-ring               |
| Standard Duty Application - R      |                       |                      |                |                |                         |                      |
| 4.0 - 7.9                          | d <sub>1</sub> + 4.0  | 2.00                 | 0.5            | 2.00           | 0.05                    | 1.78                 |
| 8.0 - 18.9                         | d <sub>1</sub> + 6.0  | 2.85                 | 0.5            | 3.00           | 0.08                    | 2.62                 |
| 19.0 - 37.9                        | d <sub>1</sub> + 7.5  | 3.80                 | 0.5            | 3.75           | 0.08                    | 3.53                 |
| 38.0 - 119.9                       | d <sub>1</sub> + 12.5 | 5.60                 | 0.9            | 6.25           | 0.10                    | 5.33                 |
| 120.0 - 164.9                      | d <sub>1</sub> + 15.0 | 7.55                 | 0.9            | 7.50           | 0.10                    | 6.99                 |
| 165.0 - 219.9                      | d <sub>1</sub> + 18.0 | 7.55                 | 0.9            | 9.00           | 0.10                    | 6.99                 |
| 220.0 - 400.0                      | d <sub>1</sub> + 24.0 | 7.55                 | 0.9            | 12.00          | 0.10                    | 6.99                 |

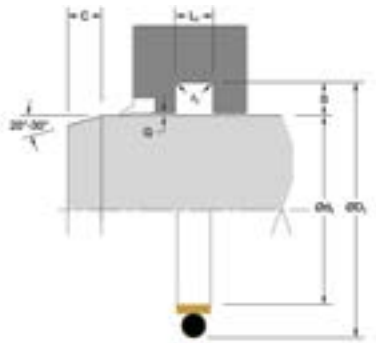
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

| METRIC                             |                       |                      |                |                |                         |                      |
|------------------------------------|-----------------------|----------------------|----------------|----------------|-------------------------|----------------------|
| ROD DIAMETER ØD <sub>1</sub> F7/H8 | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | GROOVE SECTION | RADIAL CLEARANCE G MAX* | O-RING CROSS SECTION |
| DIAMETER RANGE                     | ØD <sub>1</sub> H9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | S              | Up to 200 bar           | O-ring               |
| Standard Duty Application - S      |                       |                      |                |                |                         |                      |
| 10.0 - 22.0                        | d <sub>1</sub> + 6.2  | 3.20                 | 0.5            | 3.1            | 0.08                    | 2.40                 |
| 22.1 - 56.0                        | d <sub>1</sub> + 7.2  | 4.00                 | 0.5            | 3.6            | 0.08                    | 3.00                 |
| 56.1 - 100.0                       | d <sub>1</sub> + 12.2 | 7.50                 | 0.9            | 6.1            | 0.10                    | 5.70                 |

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

| INCH                               |                            |                        |                        |                |                         |                      |
|------------------------------------|----------------------------|------------------------|------------------------|----------------|-------------------------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            | GROOVE DIAMETER        | GROOVE WIDTH           | RADIUS         | RADIAL CLEARANCE G MAX* | O-RING CROSS SECTION |
| DIAMETER RANGE                     |                            | ØD <sub>1</sub> H9     | L <sub>1</sub> + 0.008 | r <sub>1</sub> | Up to 2900 psi          | O-ring               |
| Standard Duty Application - R      | Light Duty Application - L |                        |                        |                |                         |                      |
| 0.250 - 0.999                      | 1.000 - 2.499              | d <sub>1</sub> + 0.172 | 0.079                  | 0.020          | 0.002                   | 0.070                |
| 1.000 - 2.499                      | 2.500 - 3.499              | d <sub>1</sub> + 0.236 | 0.112                  | 0.020          | 0.003                   | 0.103                |
| 2.500 - 3.499                      | 3.500 - 4.499              | d <sub>1</sub> + 0.363 | 0.149                  | 0.030          | 0.003                   | 0.139                |
| 3.500 - 4.499                      | 4.500 - 5.999              | d <sub>1</sub> + 0.491 | 0.221                  | 0.050          | 0.004                   | 0.210                |
| 4.500 - 5.999                      | -                          | d <sub>1</sub> + 0.593 | 0.297                  | 0.060          | 0.004                   | 0.275                |
| 6.000 - 7.999                      | -                          | d <sub>1</sub> + 0.718 | 0.297                  | 0.060          | 0.004                   | 0.275                |
| 8.000 - 15.000                     | -                          | d <sub>1</sub> + 0.968 | 0.297                  | 0.060          | 0.004                   | 0.275                |

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

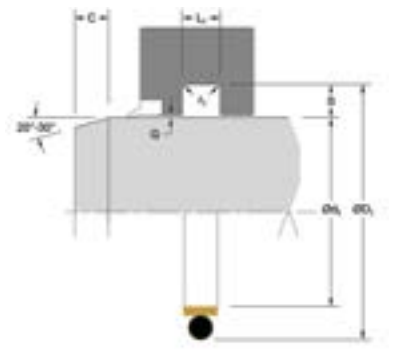


PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 7.0             | 11.0            | 2.00           | RCGMR00070**** |
| 9.0             | 15.0            | 2.85           | RCGMR00090**** |
| 10.0            | 16.0            | 2.85           | RCGMR00100**** |
| 10.0            | 16.2            | 3.20           | RCGMS00100**** |
| 12.0            | 18.0            | 2.85           | RCGMR00120**** |
| 12.0            | 18.2            | 3.20           | RCGMS00120**** |
| 14.0            | 20.0            | 2.85           | RCGMR00140**** |
| 14.0            | 20.2            | 3.20           | RCGMS00140**** |
| 15.0            | 21.2            | 3.20           | RCGMS00150**** |
| 16.0            | 22.0            | 2.85           | RCGMR00160**** |
| 16.0            | 22.2            | 3.20           | RCGMS00160**** |
| 18.0            | 24.0            | 2.85           | RCGMR00180**** |
| 18.0            | 24.2            | 3.20           | RCGMS00180**** |
| 20.0            | 26.2            | 3.20           | RCGMS00200**** |
| 20.0            | 27.5            | 3.80           | RCGMR00200**** |
| 22.0            | 28.2            | 3.20           | RCGMS00220**** |
| 22.0            | 29.5            | 3.80           | RCGMR00220**** |
| 25.0            | 32.5            | 3.80           | RCGMR00250**** |
| 25.0            | 32.2            | 4.00           | RCGMS00250**** |
| 28.0            | 35.5            | 3.80           | RCGMR00280**** |
| 28.0            | 35.2            | 4.00           | RCGMS00280**** |
| 30.0            | 37.5            | 3.80           | RCGMR00300**** |
| 30.0            | 37.2            | 4.00           | RCGMS00300**** |
| 32.0            | 39.5            | 3.80           | RCGMR00320**** |
| 32.0            | 39.2            | 4.00           | RCGMS00320**** |
| 35.0            | 42.5            | 3.80           | RCGMR00350**** |
| 35.0            | 42.2            | 4.00           | RCGMS00350**** |
| 36.0            | 43.5            | 3.80           | RCGMR00360**** |

| METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 36.0            | 43.2            | 4.00           | RCGMS00360**** |
| 38.0            | 45.2            | 4.00           | RCGMS00380**** |
| 40.0            | 47.2            | 4.00           | RCGMS00400**** |
| 40.0            | 52.5            | 5.60           | RCGMR00400**** |
| 42.0            | 49.2            | 4.00           | RCGMS00420**** |
| 42.0            | 54.5            | 5.60           | RCGMR00420**** |
| 45.0            | 52.2            | 4.00           | RCGMS00450**** |
| 45.0            | 57.5            | 5.60           | RCGMR00450**** |
| 48.0            | 55.2            | 4.00           | RCGMS00480**** |
| 50.0            | 57.2            | 4.00           | RCGMS00500**** |
| 50.0            | 62.5            | 5.60           | RCGMR00500**** |
| 52.0            | 59.2            | 4.00           | RCGMS00520**** |
| 55.0            | 62.2            | 4.00           | RCGMS00550**** |
| 55.0            | 67.5            | 5.60           | RCGMR00550**** |
| 56.0            | 63.2            | 4.00           | RCGMS00560**** |
| 60.0            | 72.2            | 7.50           | RCGMS00600**** |
| 60.0            | 72.5            | 5.60           | RCGMR00600**** |
| 63.0            | 75.2            | 7.50           | RCGMS00630**** |
| 63.0            | 75.5            | 5.60           | RCGMR00630**** |
| 65.0            | 77.2            | 7.50           | RCGMS00650**** |
| 65.0            | 77.5            | 5.60           | RCGMR00650**** |
| 70.0            | 82.2            | 7.50           | RCGMS00700**** |
| 70.0            | 82.5            | 5.60           | RCGMR00700**** |
| 75.0            | 87.2            | 7.50           | RCGMS00750**** |
| 75.0            | 87.5            | 5.60           | RCGMR00750**** |
| 80              | 92.2            | 7.50           | RCGMS00800**** |
| 80              | 92.5            | 5.60           | RCGMR00800**** |
| 85              | 97.2            | 7.50           | RCGMS00850**** |





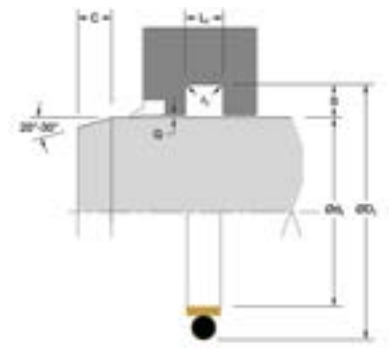
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      |                |
| 85.0            | 97.5            | 5.60           | RCGMR00850**** |
| 90.0            | 102.2           | 7.50           | RCGMS00900**** |
| 90.0            | 102.5           | 5.60           | RCGMR00900**** |
| 92.0            | 104.5           | 5.60           | RCGMR00920**** |
| 95.0            | 107.2           | 7.50           | RCGMS00950**** |
| 100.0           | 112.2           | 7.50           | RCGMS01000**** |
| 100.0           | 112.5           | 5.60           | RCGMR01000**** |
| 105.0           | 117.5           | 5.60           | RCGMR01050**** |
| 110.0           | 122.5           | 5.60           | RCGMR01100**** |
| 115.0           | 127.5           | 5.60           | RCGMR01150**** |
| 120.0           | 135.0           | 7.55           | RCGMR01200**** |
| 125.0           | 140.0           | 7.55           | RCGMR01250**** |
| 130.0           | 145.0           | 7.55           | RCGMR01300**** |
| 140.0           | 155.0           | 7.55           | RCGMR01400**** |
| 150.0           | 165.0           | 7.55           | RCGMR01500**** |
| 160.0           | 175.0           | 7.55           | RCGMR01600**** |
| 200.0           | 218.0           | 7.55           | RCGMR02000**** |

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

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 0.250           | 0.422           | 0.079          | RCGER00250**** |
| 0.312           | 0.484           | 0.079          | RCGER00312**** |
| 0.375           | 0.547           | 0.079          | RCGER00375**** |
| 0.437           | 0.609           | 0.079          | RCGER00437**** |
| 0.500           | 0.672           | 0.079          | RCGER00500**** |
| 0.562           | 0.734           | 0.079          | RCGER00562**** |
| 0.625           | 0.797           | 0.079          | RCGER00625**** |
| 0.687           | 0.859           | 0.079          | RCGER00687**** |
| 0.750           | 0.922           | 0.079          | RCGER00750**** |
| 0.812           | 0.984           | 0.079          | RCGER00812**** |
| 0.875           | 1.047           | 0.079          | RCGER00875**** |
| 0.937           | 1.109           | 0.079          | RCGER00937**** |
| 1.000           | 1.236           | 0.112          | RCGER01000**** |
| 1.062           | 1.298           | 0.112          | RCGER01062**** |
| 1.125           | 1.361           | 0.112          | RCGER01125**** |
| 1.187           | 1.423           | 0.112          | RCGER01187**** |
| 1.250           | 1.486           | 0.112          | RCGER01250**** |
| 1.312           | 1.548           | 0.112          | RCGER01312**** |
| 1.375           | 1.611           | 0.112          | RCGER01375**** |
| 1.437           | 1.673           | 0.112          | RCGER01437**** |
| 1.500           | 1.736           | 0.112          | RCGER01500**** |
| 1.562           | 1.798           | 0.112          | RCGER01562**** |
| 1.625           | 1.861           | 0.112          | RCGER01625**** |
| 1.687           | 1.923           | 0.112          | RCGER01687**** |
| 1.750           | 1.986           | 0.112          | RCGER01750**** |
| 1.812           | 2.048           | 0.112          | RCGER01812**** |
| 1.875           | 2.111           | 0.112          | RCGER01875**** |
| 1.937           | 2.173           | 0.112          | RCGER01937**** |



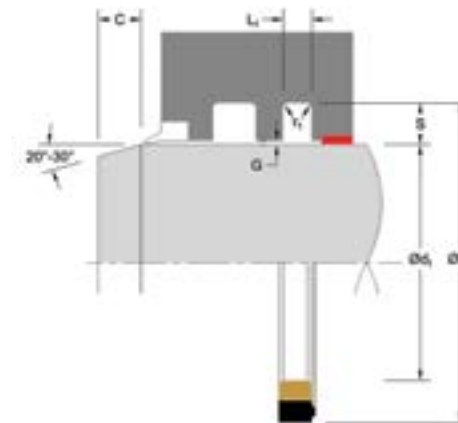
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 2.000           | 2.236           | 0.112          | RCGER02000**** |
| 2.062           | 2.298           | 0.112          | RCGER02062**** |
| 2.125           | 2.361           | 0.112          | RCGER02125**** |
| 2.187           | 2.423           | 0.112          | RCGER02187**** |
| 2.250           | 2.486           | 0.112          | RCGER02250**** |
| 2.312           | 2.548           | 0.112          | RCGER02312**** |
| 2.375           | 2.611           | 0.112          | RCGER02375**** |
| 2.437           | 2.673           | 0.112          | RCGER02437**** |
| 2.500           | 2.736           | 0.112          | RCGER02500**** |
| 2.625           | 2.988           | 0.149          | RCGER02625**** |
| 2.750           | 3.113           | 0.149          | RCGER02750**** |
| 2.875           | 3.238           | 0.149          | RCGER02875**** |
| 3.000           | 3.363           | 0.149          | RCGER03000**** |
| 3.125           | 3.488           | 0.149          | RCGER03125**** |
| 3.250           | 3.613           | 0.149          | RCGER03250**** |
| 3.375           | 3.738           | 0.149          | RCGER03375**** |
| 3.500           | 3.991           | 0.221          | RCGER03500**** |
| 3.625           | 4.116           | 0.221          | RCGER03625**** |
| 3.750           | 4.241           | 0.221          | RCGER03750**** |
| 3.875           | 4.366           | 0.221          | RCGER03875**** |
| 4.000           | 4.491           | 0.221          | RCGER04000**** |
| 4.125           | 4.616           | 0.221          | RCGER04125**** |
| 4.250           | 4.741           | 0.221          | RCGER04250**** |
| 4.375           | 4.866           | 0.221          | RCGER04375**** |
| 4.500           | 5.093           | 0.297          | RCGER04500**** |
| 4.625           | 5.218           | 0.297          | RCGER04625**** |
| 4.750           | 5.343           | 0.297          | RCGER04750**** |
| 4.875           | 5.468           | 0.297          | RCGER04875**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.008    |                |
| 5.000           | 5.593           | 0.297          | RCGER05000**** |
| 5.125           | 5.718           | 0.297          | RCGER05125**** |
| 5.250           | 5.843           | 0.297          | RCGER05250**** |
| 5.375           | 5.968           | 0.297          | RCGER05375**** |
| 5.500           | 6.093           | 0.297          | RCGER05500**** |
| 5.625           | 6.218           | 0.297          | RCGER05625**** |
| 5.750           | 6.343           | 0.297          | RCGER05750**** |
| 5.875           | 6.468           | 0.297          | RCGER05875**** |
| 6.000           | 6.718           | 0.297          | RCGER06000**** |
| 6.250           | 6.968           | 0.297          | RCGER06250**** |
| 6.500           | 7.218           | 0.297          | RCGER06500**** |
| 6.750           | 7.468           | 0.297          | RCGER06750**** |
| 7.000           | 7.718           | 0.297          | RCGER07000**** |
| 7.250           | 7.968           | 0.297          | RCGER07250**** |
| 7.500           | 8.218           | 0.297          | RCGER07500**** |
| 7.750           | 8.468           | 0.297          | RCGER07750**** |
| 8.000           | 8.968           | 0.297          | RCGER08000**** |
| 8.500           | 9.468           | 0.297          | RCGER08500**** |
| 9.000           | 9.968           | 0.297          | RCGER09000**** |
| 9.500           | 10.468          | 0.297          | RCGER09500**** |
| 10.000          | 10.968          | 0.297          | RCGER10000**** |
| 10.500          | 11.468          | 0.297          | RCGER10500**** |
| 11.000          | 11.968          | 0.297          | RCGER11000**** |
| 11.500          | 12.468          | 0.297          | RCGER11500**** |
| 12.000          | 12.968          | 0.297          | RCGER12000**** |

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





# SRS

## ROD BUFFER SEAL

### TECHNICAL DETAILS

The Hallite SRS is a single-acting, low-friction rod buffer seal, designed to be utilized in conjunction with a primary pressure seal. The buffer is designed from proprietary Armorlene® material face ring paired with a specially profiled energizer. The Armorlene® face ring offers low friction and the elimination of stick-slip. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion- resistance properties as well as large range of temperature and media compatibility.

The SRS is a pressure buffer seal that protects the primary rod seal from high-frequency pressure spikes in a system. The design allows oil to pass through to the rod seal while holding back pressure spikes. The Hallite SRS also allows pressure to pass back into the system, preventing a pressure trap situation between the rod seal and the buffer seal. The SRS is an excellent addition to demanding sealing applications, offering extended sealing system life and performance.



### F E A T U R E S

- Self-relieving design prevents pressure trapping
- Low breakout friction and elimination of stick-slip action
- Excellent in high-speed applications
- Wide range of materials for both face ring and energizer available for special applications
- High service temperature, long wear, and high extrusion resistance

### Part Number Structure

SRSMR00700NHLX \_

| SRS                 | M                                             | R                                                                                                      | 00700                                                    | N                                                                                    | HLX                                                                              | —                                      |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile |

OPERATING CONDITIONS

|                            | METRIC         | INCH             |
|----------------------------|----------------|------------------|
| Maximum Speed              | Up to 4.0m/sec | Up to 12.0ft/sec |
| Temperature Range*         | -45 to 200°C   | -49 to 392°F     |
| Maximum Dynamic Pressure** | 400 bar        | 5800 psi         |

\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above 400 bar, 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 <sub>1</sub> | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face ØD <sub>1</sub>  | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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 |
|------------------------------|----------------|-----------------------|------------------------------------|
| NBR - 85A                    | Square/Profile | N                     | -30 to 100°C                       |
| HNBR - 85A                   | Square/Profile | H                     | -20 to 150°C                       |
| FKM - 82A                    | Square/Profile | F                     | -10 to 200°C                       |
| NBR - 80A Low temp.          | Square/Profile | B                     | -45 to 80°C                        |

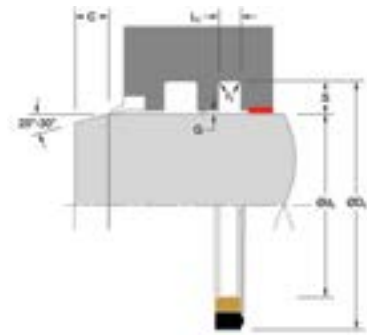
\*Other energizer materials are available. Please contact your local Hallite sales office for further information.

MATERIALS

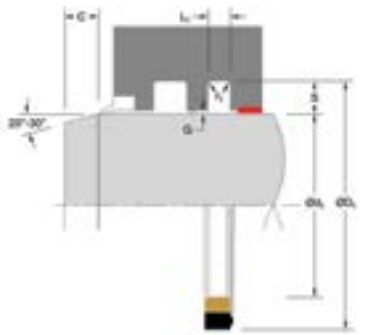
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                        | FILLER                   | MATERIAL DESIGNATOR | COLOR      | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>• Standard material for hydraulic applications</li><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Extended wear resistance</li></ul>                                                      | Special Bronze Compound  | HLX                 | Gold       | -73 to 288°C        | -100 to 550°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"><li>• Excellent in all hydraulic fluids</li><li>• Excellent wear resistance</li><li>• Excellent low-friction properties</li><li>• Good extrusion resistance</li></ul>                                                             | Special Mineral Compound | HLA                 | Gray       | -73 to 260°C        | -100 to 500°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>• Not recommended for gas sealing applications</li><li>• Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled      | HCF                 | Gray/Black | -73 to 260°C        | -100 to 500°F       | 250 bar                        | 3625 psi                       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul>                                                                                                            | 60% Bronze Content       | 713                 | Bronze     | -73 to 288°C        | -100 to 550°F       | 500 bar                        | 7250 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.





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                             |                            |                       |                      |                |         |                |                                     |               |               |
|------------------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|-------------------------------------|---------------|---------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G <sub>max</sub> * |               |               |
| DIAMETER RANGE                     |                            | ØD <sub>1</sub> H9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 100 bar                       | Up to 200 bar | Up to 400 bar |
| Standard Duty Application - R      | Light Duty Application - L |                       |                      |                |         |                |                                     |               |               |
| 40.0 - 199.9                       | 200.0 - 255.9              | d <sub>1</sub> + 15.1 | 6.3                  | 0.4            | 2.0     | 7.55           | 0.50                                | 0.30          | 0.20          |

At pressure >400 bar use diameter tolerance f8/h8.  
\*Radial Clearance G<sub>max</sub> = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

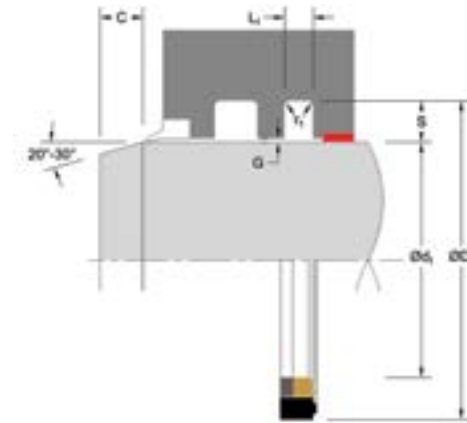
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2 - 0  |                |
| 40.0            | 55.1            | 6.3            | SRSMR00400**** |
| 45.0            | 60.1            | 6.3            | SRSMR00450**** |
| 50.0            | 65.1            | 6.3            | SRSMR00500**** |
| 55.0            | 70.1            | 6.3            | SRSMR00550**** |
| 60.0            | 75.1            | 6.3            | SRSMR00600**** |
| 65.0            | 80.1            | 6.3            | SRSMR00650**** |
| 70.0            | 85.1            | 6.3            | SRSMR00700**** |
| 75.0            | 90.1            | 6.3            | SRSMR00750**** |
| 80.0            | 95.1            | 6.3            | SRSMR00800**** |
| 85.0            | 100.1           | 6.3            | SRSMR00850**** |
| 90.0            | 105.1           | 6.3            | SRSMR00900**** |
| 95.0            | 110.1           | 6.3            | SRSMR00950**** |
| 100.0           | 115.1           | 6.3            | SRSMR01000**** |
| 105.0           | 120.1           | 6.3            | SRSMR01050**** |
| 110.0           | 125.1           | 6.3            | SRSMR01100**** |
| 115.0           | 130.1           | 6.3            | SRSMR01150**** |
| 120.0           | 135.1           | 6.3            | SRSMR01200**** |
| 125.0           | 140.1           | 6.3            | SRSMR01250**** |
| 130.0           | 145.1           | 6.3            | SRSMR01300**** |
| 135.0           | 150.1           | 6.3            | SRSMR01350**** |
| 140.0           | 155.1           | 6.3            | SRSMR01400**** |
| 145.0           | 160.1           | 6.3            | SRSMR01450**** |
| 150.0           | 165.1           | 6.3            | SRSMR01500**** |
| 155.0           | 170.1           | 6.3            | SRSMR01550**** |
| 160.0           | 175.1           | 6.3            | SRSMR01600**** |
| 165.0           | 180.1           | 6.3            | SRSMR01650**** |
| 170.0           | 185.1           | 6.3            | SRSMR01700**** |
| 175.0           | 190.1           | 6.3            | SRSMR01750**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2 - 0  |                |
| 180.0           | 195.1           | 6.3            | SRSMR01800**** |
| 185.0           | 200.1           | 6.3            | SRSMR01850**** |
| 190.0           | 205.1           | 6.3            | SRSMR01900**** |
| 195.0           | 210.1           | 6.3            | SRSMR01950**** |
| 200.0           | 215.1           | 6.3            | SRSML02000**** |
| 205.0           | 220.1           | 6.3            | SRSML02050**** |
| 210.0           | 225.1           | 6.3            | SRSML02100**** |
| 215.0           | 230.1           | 6.3            | SRSML02150**** |
| 220.0           | 235.1           | 6.3            | SRSML02200**** |
| 225.0           | 240.1           | 6.3            | SRSML02250**** |
| 230.0           | 245.1           | 6.3            | SRSML02300**** |
| 235.0           | 250.1           | 6.3            | SRSML02350**** |
| 240.0           | 255.1           | 6.3            | SRSML02400**** |
| 245.0           | 260.1           | 6.3            | SRSML02450**** |
| 250.0           | 265.1           | 6.3            | SRSML02500**** |

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





# SRB

## ROD BUFFER SEAL

*With AE Ring*

### TECHNICAL DETAILS

The Hallite SRB is a single-acting, low-friction rod buffer seal, designed to be utilized in conjunction with a primary pressure seal. The buffer is designed from proprietary Armorlene® material face ring paired with a specially profiled energizer and an integrated anti-extrusion ring. The Armorlene® face ring offers low friction and the elimination of stick-slip. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility.

The SRB is a pressure buffer seal that protects the primary rod seal from high-frequency pressure spikes in a system. The design allows oil to pass through to the rod seal while holding back pressure spikes. The Hallite SRB also allows pressure to pass back into the system, preventing a pressure trap situation between the rod seal and the buffer seal. The SRB is an excellent pressure buffer option in heavy-duty applications, offering extended sealing system life and performance.



### F E A T U R E S

- Self-relieving design prevents pressure trapping
- Low breakout friction and elimination of stick-slip action
- Wide range of materials for both face ring and energizer available for special applications
- Excellent in high-speed applications
- Extended pressure rating through included high extrusion-resistant anti-extrusion ring
- High service temperature, long wear, and high extrusion resistance



### Part Number Structure

SRBMR00700NHLX \_

| SRB                 | M                                             | R                                                                                                      | 00700                                                    | N                                                                                    | HLX                                                                              | —                                                                                    |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | AE RING MATERIAL<br>Blank = POM<br>A = PA MoS <sub>2</sub> Filled<br>B = Virgin PEEK |

OPERATING CONDITIONS

|                                 | METRIC         | INCH             |
|---------------------------------|----------------|------------------|
| Maximum Speed                   | Up to 4.0m/sec | Up to 12.0ft/sec |
| Temperature Range*              | -45 to 200°C   | -49 to 392°F     |
| Maximum Dynamic Pressure**      | 600 bar        | 8700 psi         |
| Maximum Pressure Peaks (Spikes) | 800 bar        | 11000 psi        |

\*Dependent upon energizer used (NBR, FKM, etc.) and AE ring material. \*\*For pressures above 600 bar, 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

|                                      | METRIC     |         |        | INCH    |         |         | Rmr*      |
|--------------------------------------|------------|---------|--------|---------|---------|---------|-----------|
| SURFACE ROUGHNESS                    | µmRa       | µmRz    | µmRt   | µinRa   | µinRz   | µinRt   |           |
| Dynamic Sealing Face Ød <sub>1</sub> | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face ØD <sub>1</sub>  | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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 |
|------------------------------|----------------|-----------------------|------------------------------------|
| NBR - 85A                    | Square/Profile | N                     | -30 to 100°C                       |
| HNBR - 85A                   | Square/Profile | H                     | -20 to 150°C                       |
| FKM - 82A                    | Square/Profile | F                     | -10 to 200°C                       |
| NBR - 80A Low temp.          | Square/Profile | B                     | -45 to 80°C                        |

\*Other energizer materials are available. Please contact your local Hallite sales office for further information.

ANTI-EXTRUSION RING TABLE\*

| AE RING MATERIAL             | AE RING DESIGNATION | AE RING OPERATING TEMPERATURE °C |
|------------------------------|---------------------|----------------------------------|
| POM                          | -                   | -45 to 100°C                     |
| PA - MoS <sub>2</sub> Filled | A                   | -45 to 100°C                     |
| Virgin PEEK                  | B                   | -45 to 200°C                     |

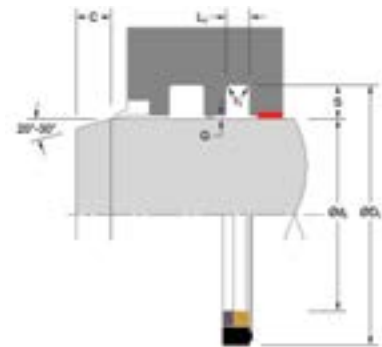
\*Other energizer materials are available. Please contact your local Hallite sales office for further information.

MATERIALS

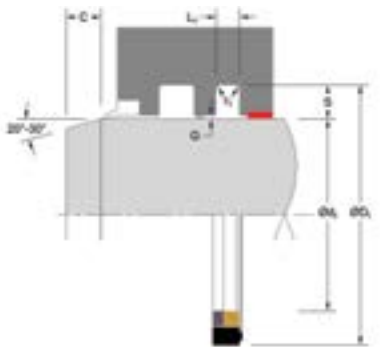
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                  | FILLER                   | MATERIAL DESIGNATOR | COLOR      | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                        | Special Bronze Compound  | HLX                 | Gold       | -73 to 288°C        | -100 to 550°F       | 600 bar                        | 8700 psi                       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Excellent wear resistance</li><li>Excellent low-friction properties</li><li>Good extrusion resistance</li></ul>                                                               | Special Mineral Compound | HLA                 | Gray       | -73 to 260°C        | -100 to 500°F       | 600 bar                        | 8700 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled      | HCF                 | Gray/Black | -73 to 260°C        | -100 to 500°F       | 250 bar                        | 3625 psi                       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                                                            | 60% Bronze Content       | 713                 | Bronze     | -73 to 288°C        | -100 to 550°F       | 600 bar                        | 8700 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.





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                             |                            |                       |                      |                |         |                |                                     |               |               |
|------------------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|-------------------------------------|---------------|---------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G <sub>max</sub> * |               |               |
| DIAMETER RANGE                     |                            | ØD <sub>1</sub> H9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 100 bar                       | Up to 400 bar | Up to 600 bar |
| Standard Duty Application - R      | Light Duty Application - L |                       |                      |                |         |                |                                     |               |               |
| 40.0 - 199.9                       | 200.0 - 255.9              | d <sub>1</sub> + 15.1 | 6.3                  | 0.4            | 2.0     | 7.55           | 0.50                                | 0.30          | 0.20          |

At pressure >600 bar use diameter tolerance f8/h8.  
\*Radial Clearance G<sub>max</sub> = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |  | PART NUMBER    |
|-----------------|-----------------|----------------|--|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |  |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2 - 0  |  |                |
| 40.0            | 55.1            | 6.3            |  | SRBMR00400**** |
| 45.0            | 60.1            | 6.3            |  | SRBMR00450**** |
| 50.0            | 65.1            | 6.3            |  | SRBMR00500**** |
| 55.0            | 70.1            | 6.3            |  | SRBMR00550**** |
| 60.0            | 75.1            | 6.3            |  | SRBMR00600**** |
| 65.0            | 80.1            | 6.3            |  | SRBMR00650**** |
| 70.0            | 85.1            | 6.3            |  | SRBMR00700**** |
| 75.0            | 90.1            | 6.3            |  | SRBMR00750**** |
| 80.0            | 95.1            | 6.3            |  | SRBMR00800**** |
| 85.0            | 100.1           | 6.3            |  | SRBMR00850**** |
| 90.0            | 105.1           | 6.3            |  | SRBMR00900**** |
| 95.0            | 110.1           | 6.3            |  | SRBMR00950**** |
| 100.0           | 115.1           | 6.3            |  | SRBMR01000**** |
| 105.0           | 120.1           | 6.3            |  | SRBMR01050**** |
| 110.0           | 125.1           | 6.3            |  | SRBMR01100**** |
| 115.0           | 130.1           | 6.3            |  | SRBMR01150**** |
| 120.0           | 135.1           | 6.3            |  | SRBMR01200**** |
| 125.0           | 140.1           | 6.3            |  | SRBMR01250**** |
| 130.0           | 145.1           | 6.3            |  | SRBMR01300**** |
| 135.0           | 150.1           | 6.3            |  | SRBMR01350**** |
| 140.0           | 155.1           | 6.3            |  | SRBMR01400**** |
| 145.0           | 160.1           | 6.3            |  | SRBMR01450**** |
| 150.0           | 165.1           | 6.3            |  | SRBMR01500**** |
| 155.0           | 170.1           | 6.3            |  | SRBMR01550**** |
| 160.0           | 175.1           | 6.3            |  | SRBMR01600**** |
| 165.0           | 180.1           | 6.3            |  | SRBMR01650**** |
| 170.0           | 185.1           | 6.3            |  | SRBMR01700**** |
| 175.0           | 190.1           | 6.3            |  | SRBMR01750**** |

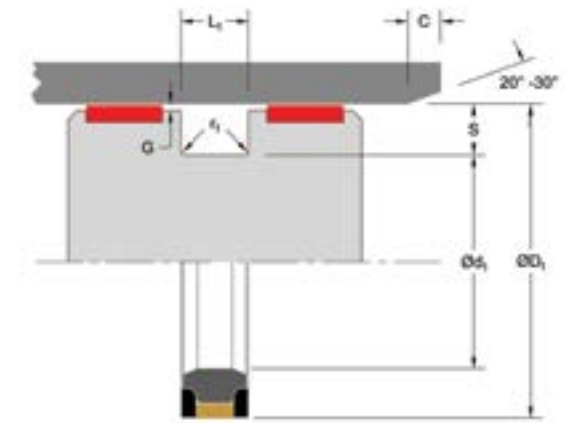
| METRIC          |                 |                |  | PART NUMBER    |
|-----------------|-----------------|----------------|--|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |  |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2 - 0  |  |                |
| 180.0           | 195.1           | 6.3            |  | SRBMR01800**** |
| 185.0           | 200.1           | 6.3            |  | SRBMR01850**** |
| 190.0           | 205.1           | 6.3            |  | SRBMR01900**** |
| 195.0           | 210.1           | 6.3            |  | SRBMR01950**** |
| 200.0           | 215.1           | 6.3            |  | SRBML02000**** |
| 205.0           | 220.1           | 6.3            |  | SRBML02050**** |
| 210.0           | 225.1           | 6.3            |  | SRBML02100**** |
| 215.0           | 230.1           | 6.3            |  | SRBML02150**** |
| 220.0           | 235.1           | 6.3            |  | SRBML02200**** |
| 225.0           | 240.1           | 6.3            |  | SRBML02250**** |
| 230.0           | 245.1           | 6.3            |  | SRBML02300**** |
| 235.0           | 250.1           | 6.3            |  | SRBML02350**** |
| 240.0           | 255.1           | 6.3            |  | SRBML02400**** |
| 245.0           | 260.1           | 6.3            |  | SRBML02450**** |
| 250.0           | 265.1           | 6.3            |  | SRBML02500**** |

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



# PISTON SEALS





CT

HEAVY-DUTY CAPPED SEAL

Featuring special anti-extrusion technology

TECHNICAL DETAILS

The Hallite Capped T seal is a compact, double-acting, high-performance piston seal design capable of handling the high pressure and pressure spikes associated with high-performance systems. Hallite's industry-leading design maximizes performance by employing thicker anti-extrusion rings that protect the seal face and energizer from damaging high-pressure shocks well beyond what standard industry designs are capable of. This design, along with our exclusive high-performance Armorlene® HLX material and high-grade elastomers are what make Hallite's CT a high-performing seal.

The CT consists of a filled PTFE cap, high-grade elastomeric energizer, and two precision anti-extrusion rings. Hallite's CT is suitable for a wide range of PTFE materials, the most common being bronze, moly-glass, or carbon filled. MoS<sub>2</sub> filled PA AE rings are the most commonly used for fluid power service, though glass filled, PA, virgin PEEK, and other high-performance materials are also available to suit your needs. The most commonly used energizer is the NBR Shore 80A. However, your CT seal can be configured using several different elastomer compounds including HNBR, low temp. NBR, and FKM.



F E A T U R E S

- Heavy-duty
- High-pressure capability
- PTFE cap ring
- Compact design
- Low friction
- Long life
- Range of material options to extend service application range

Part Number Structure

CTER08000NHLX27

|                     |                                               |                                                                                                                      |                                                           |                                                                                      |                                                                                  |                                                               |
|---------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------|
| CT                  | E                                             | R                                                                                                                    | 08000                                                     | N                                                                                    | HLX                                                                              | 27                                                            |
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <b>Installation Recommendations</b> and use designator for desired application (R, L, and N) | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <b>Energizer Table</b> for desired energizer material | PTFE MATERIAL<br>Refer to <b>Material Table</b> for desired PTFE (face) material | AE RING MATERIAL<br>Refer to <b>Anti-extrusion Ring Table</b> |

OPERATING CONDITIONS

|                            | METRIC         | INCH            |
|----------------------------|----------------|-----------------|
| Maximum Speed              | Up to 1.5m/sec | Up to 5.0ft/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 500 bar (7250 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 <sub>1</sub> | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face Ød <sub>1</sub>  | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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 - 80A                     | Capped T       | N                     | -30 to 100°C                       | -22 to 212°F                       |
| NBR - 80A Low temp.           | Capped T       | L                     | -45 to 80°C                        | -50 to 175°F                       |
| HNBR - 80A                    | Capped T       | H                     | -25 to 150°C                       | -13 to 300°F                       |
| FKM - 85A                     | Capped T       | F                     | -10 to 200°C                       | 15 to 400°F                        |

MACHINED PRECISION (AE RING TABLE)

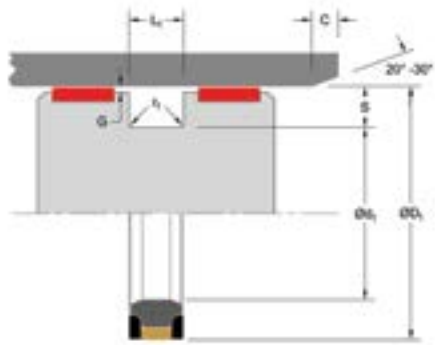
| AE RING MATERIAL           | AE RING DESCRIPTION | AE RING MATERIAL COLOR | NOMENCLATURE PREFIX | TEMPERATURE RANGE °C | TEMPERATURE RANGE °F |
|----------------------------|---------------------|------------------------|---------------------|----------------------|----------------------|
| MoS <sub>2</sub> Filled PA | 707                 | Black                  | -                   | -57 to 130°C         | -70 to 265°F         |
| Glass Filled PA            | 710                 | Green                  | 10                  | -57 to 150°C         | -70 to 300°F         |
| Glass Filled PA            | 727                 | Black                  | 27                  | -57 to 150°C         | -70 to 300°F         |
| POM                        | 728                 | White                  | 28                  | -57 to 130°C         | -70 to 265°F         |
| Virgin PEEK                | 745                 | Tan                    | 45                  | -45 to 200°C         | -49 to 392°F         |

MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                              | FILLER                     | MATERIAL DESIGNATOR | COLOR      | TEMPERATURE RANGE °C | TEMPERATURE RANGE °F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|------------|----------------------|----------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                    | Special Bronze Compound    | HLX                 | Gold       | -73 to 288°C         | -100 to 550°F        | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Good low-friction properties</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li></ul>                                | Glass Molybdenum Disulfide | 702                 | Gray       | -73 to 260°C         | -100 to 500°F        | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 706</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li><li>Good dielectrical properties</li></ul>                                | 15% Glass                  | 706                 | Off-White  | -73 to 260°C         | -100 to 500°F        | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                                                        | 60% Bronze Content         | 713                 | Bronze     | -73 to 288°C         | -100 to 550°F        | 600 bar                        | 8700 psi                       |
| <b>HYTHANE® 9270061 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                               | Standard                   | 061                 | Red        | -40 to 120°C         | -40 to 250°F         | 500 bar                        | 7250 psi                       |
| <b>HYTHANE® 9270111 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Hydrolysis stabilized</li><li>Strong chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>               | Hydrolysis Stabilized      | 111                 | Gray       | -40 to 120°C         | -40 to 250°F         | 500 bar                        | 7250 psi                       |
| <b>HYTHANE® 9270261 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Internal lubrication provides extended wear in high-speed applications</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul> | Internally Lubricated      | 261                 | Off-White  | -40 to 120°C         | -40 to 250°F         | 500 bar                        | 7250 psi                       |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul>                                                                                          | Standard                   | HU5                 | Yellow     | -20 to 115°C         | -20 to 240°F         | 500 bar                        | 7250 psi                       |
| <b>HU9 - POLYURETHANE, 95A</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul>                                                                                          | Standard                   | HU9                 | Red        | -20 to 115°C         | -20 to 240°F         | 500 bar                        | 7250 psi                       |
| <b>HE5 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul>                                                                                             | Standard                   | HE5                 | Gray/Black | -20 to 115°C         | -20 to 240°F         | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® H1G</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating fluids</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li><li>Good dialectical properties</li></ul>                                           | 15% Glass                  | H1G                 | Gold       | -73 to 260°C         | -100 to 500°F        | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® H2B</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating fluids</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li><li>Good dialectical properties</li></ul>                                           | 25% Glass                  | H2B                 | Blue       | -73 to 260°C         | -100 to 500°F        | 500 bar                        | 7250 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.





INSTALLATION RECOMMENDATIONS - STANDARD INDUSTRIAL CT (4 PIECE CAPPED T SEAL)

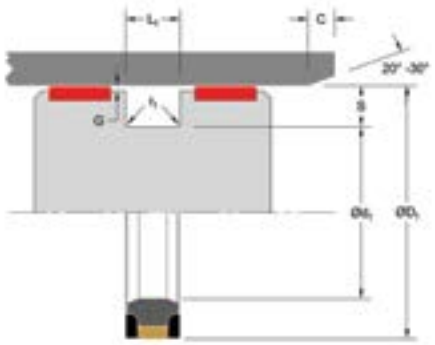
Nomeclature designation: "R" or "L" in part number

| METRIC                           |                            |                       |                      |         |                |                            |               |               |
|----------------------------------|----------------------------|-----------------------|----------------------|---------|----------------|----------------------------|---------------|---------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |               |               |
|                                  |                            |                       |                      |         |                |                            |               |               |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | C       | S              | up to 160 bar              | up to 250 bar | up to 500 bar |
| Standard Duty Application - R    | Light Duty Application - L |                       |                      |         |                |                            |               |               |
| 25.0 - 74.0                      | -                          | D <sub>1</sub> - 10.0 | 8.00                 | 4.00    | 5.00           | 1.0                        | 0.8           | 0.6           |
| 75.0 - 124.0                     | 125.0 - 405.0              | D <sub>1</sub> - 15.0 | 12.00                | 5.00    | 7.50           | 1.0                        | 0.8           | 0.6           |
| 125.0 - 405.0                    | -                          | D <sub>1</sub> - 20.0 | 16.00                | 7.00    | 10.00          | 1.0                        | 0.8           | 0.6           |
| 406.0 - 560.0                    | -                          | D <sub>1</sub> - 25.0 | 20.00                | 8.00    | 12.50          | 1.0                        | 0.8           | 0.6           |

For pressures >500 bar use diameter tolerance H7/f8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

| INCH                             |                            |                        |                       |         |                |                            |                |                |
|----------------------------------|----------------------------|------------------------|-----------------------|---------|----------------|----------------------------|----------------|----------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            | GROOVE DIAMETER        | GROOVE WIDTH          | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |                |                |
|                                  |                            |                        |                       |         |                |                            |                |                |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9     | L <sub>1</sub> +0.008 | C       | S              | up to 2300 psi             | up to 3625 psi | up to 7250 psi |
| Standard Duty Application - R    | Light Duty Application - L |                        |                       |         |                |                            |                |                |
| 1.000 - 2.999                    | -                          | D <sub>1</sub> - 0.374 | 0.424                 | 0.160   | 0.187          | 0.040                      | 0.030          | 0.024          |
| 3.000 - 4.999                    | 5.000 - 16.000             | D <sub>1</sub> - 0.478 | 0.579                 | 0.200   | 0.240          | 0.040                      | 0.030          | 0.024          |
| 5.000 - 16.000                   | -                          | D <sub>1</sub> - 0.725 | 0.750                 | 0.250   | 0.365          | 0.040                      | 0.030          | 0.024          |
| 16.001 - 22.000                  | -                          | D <sub>1</sub> - 0.940 | 0.750                 | 0.250   | 0.470          | 0.040                      | 0.030          | 0.024          |

For pressures >7250 psi use diameter tolerance H7/f8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

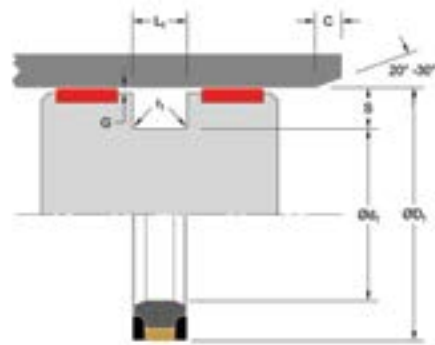


PART NUMBER RANGE (INCH)\* L AND R DESIGNATION

| INCH            |                 |                |                   |                | INCH            |                 |                |                   |                |
|-----------------|-----------------|----------------|-------------------|----------------|-----------------|-----------------|----------------|-------------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | LEGACY REF NUMBER | PART NUMBER    | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | LEGACY REF NUMBER | PART NUMBER    |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                   |                | Tol. H9         | Tol. h9         | Tol. +0.008    |                   |                |
| 1.500           | 1.126           | 0.424          | 71002XX           | CTER01500***** | 9.000           | 8.275           | 0.750          | 71105XX           | CTER09000***** |
| 1.750           | 1.376           | 0.424          | 71003XX           | CTER01750***** | 10.000          | 9.275           | 0.750          | 71110XX           | CTER10000***** |
| 2.000           | 1.626           | 0.424          | 71005XX           | CTER02000***** | 11.000          | 10.275          | 0.750          | 71115XX           | CTER11000***** |
| 2.250           | 1.876           | 0.424          | 71006XX           | CTER02250***** | 12.000          | 11.275          | 0.750          | 71120XX           | CTER12000***** |
| 2.500           | 2.126           | 0.424          | 71007XX           | CTER02500***** | 12.500          | 11.775          | 0.750          | 71122XX           | CTER12500***** |
| 2.750           | 2.376           | 0.424          | 71008XX           | CTER02750***** | 13.000          | 12.700          | 0.750          | 71124XX           | CTER13000***** |
| 3.000           | 2.522           | 0.579          | 71010XX           | CTER03000***** | 14.000          | 13.275          | 0.750          | 71140XX           | CTER14000***** |
| 3.250           | 2.772           | 0.579          | 71015XX           | CTER03250***** | 14.500          | 13.775          | 0.750          | 71128XX           | CTER14500***** |
| 3.500           | 3.022           | 0.579          | 71020XX           | CTER03500***** | 15.000          | 14.275          | 0.750          | 71130XX           | CTER15000***** |
| 3.750           | 3.272           | 0.579          | 71025XX           | CTER03750***** | 16.000          | 15.275          | 0.750          | 71132XX           | CTER16000***** |
| 4.000           | 3.522           | 0.579          | 71030XX           | CTER04000***** | 18.000          | 17.060          | 0.750          | 71138XX           | CTER18000***** |
| 4.250           | 3.772           | 0.579          | 71035XX           | CTER04250***** |                 |                 |                |                   |                |
| 4.500           | 4.022           | 0.579          | 71040XX           | CTER04500***** |                 |                 |                |                   |                |
| 4.750           | 4.272           | 0.579          | 71043XX           | CTER04750***** |                 |                 |                |                   |                |
| 5.000           | 4.522           | 0.579          | 71048XX           | CTEL05000***** |                 |                 |                |                   |                |
| 5.000           | 4.275           | 0.750          | 71045XX           | CTER05000***** |                 |                 |                |                   |                |
| 5.250           | 4.525           | 0.750          | 71050XX           | CTER05250***** |                 |                 |                |                   |                |
| 5.500           | 5.025           | 0.579          | 71060XX           | CTEL05500***** |                 |                 |                |                   |                |
| 5.500           | 4.775           | 0.750          | 71055XX           | CTER05500***** |                 |                 |                |                   |                |
| 6.000           | 5.275           | 0.750          | 71065XX           | CTER06000***** |                 |                 |                |                   |                |
| 6.030           | 5.305           | 0.750          | 71070XX           | CTER06030***** |                 |                 |                |                   |                |
| 6.250           | 5.772           | 0.579          | 71069XX           | CTEL06250***** |                 |                 |                |                   |                |
| 6.500           | 6.022           | 0.579          | 71080XX           | CTEL06500***** |                 |                 |                |                   |                |
| 6.500           | 5.775           | 0.750          | 71075XX           | CTER06500***** |                 |                 |                |                   |                |
| 7.000           | 6.275           | 0.750          | 71085XX           | CTER07000***** |                 |                 |                |                   |                |
| 7.500           | 6.775           | 0.750          | 71090XX           | CTER07500***** |                 |                 |                |                   |                |
| 8.000           | 7.275           | 0.750          | 71095XX           | CTER08000***** |                 |                 |                |                   |                |
| 8.500           | 7.775           | 0.750          | 71100XX           | CTER08500***** |                 |                 |                |                   |                |

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





INSTALLATION RECOMMENDATIONS - NARROW GROOVE CT (4 PIECE CAPPED T SEAL)

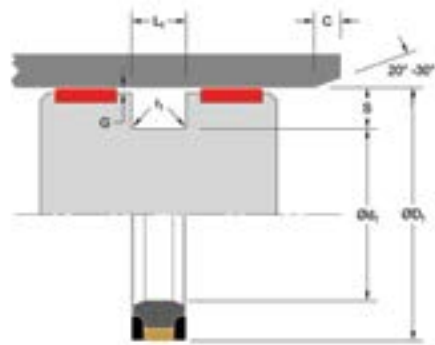
Nomenclature designation: "N" in part number

| METRIC                           |  |                       |                      |         |                |                         |               |
|----------------------------------|--|-----------------------|----------------------|---------|----------------|-------------------------|---------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |  | GROOVE DIAMETER       | GROOVE WIDTH         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G max* |               |
| DIAMETER RANGE                   |  | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | C       | S              | up to 160 bar           | up to 250 bar |
| Standard Duty Application - N    |  |                       |                      |         |                | up to 500 bar           |               |
| 50.0 - 60.0                      |  | D <sub>1</sub> - 14.0 | 9.00                 | 4.00    | 7.00           | 1.0                     | 0.8           |
| 61.0 - 95.0                      |  | D <sub>1</sub> - 15.0 | 11.00                | 5.00    | 7.50           | 1.0                     | 0.8           |
| 96.0 - 120.0                     |  | D <sub>1</sub> - 15.0 | 12.50                | 5.00    | 7.50           | 1.0                     | 0.8           |
| 121.0 - 245.0                    |  | D <sub>1</sub> - 23.0 | 16.00                | 6.35    | 11.50          | 1.0                     | 0.8           |
| 241.0 - 420.0                    |  | D <sub>1</sub> - 28.0 | 17.50                | 7.00    | 14.00          | 1.0                     | 0.8           |

For pressures >500 bar use diameter tolerance H7/f8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

| INCH                             |  |                        |                        |         |                |                         |                |
|----------------------------------|--|------------------------|------------------------|---------|----------------|-------------------------|----------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |  | GROOVE DIAMETER        | GROOVE WIDTH           | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G max* |                |
| DIAMETER RANGE                   |  | Ød <sub>1</sub> h9     | L <sub>1</sub> + 0.008 | C       | S              | up to 2300 psi          | up to 3625 psi |
| Standard Duty Application - N    |  |                        |                        |         |                | up to 7250 psi          |                |
| 1.750 - 2.375                    |  | D <sub>1</sub> - 0.551 | 0.354                  | 0.160   | 0.275          | 0.040                   | 0.030          |
| 2.500 - 3.500                    |  | D <sub>1</sub> - 0.591 | 0.433                  | 0.200   | 0.295          | 0.040                   | 0.030          |
| 3.750 - 4.750                    |  | D <sub>1</sub> - 0.591 | 0.492                  | 0.200   | 0.295          | 0.040                   | 0.030          |
| 5.000 - 9.750                    |  | D <sub>1</sub> - 0.906 | 0.630                  | 0.250   | 0.453          | 0.040                   | 0.030          |
| 10.000 - 15.000                  |  | D <sub>1</sub> - 1.102 | 0.689                  | 0.280   | 0.551          | 0.040                   | 0.030          |

For pressures >7250 psi use diameter tolerance H7/f8.  
\*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

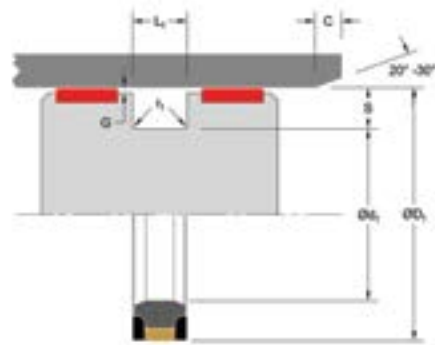


PART NUMBER RANGE (METRIC)\* N DESIGNATION

| METRIC          |                 |                |                   |                | METRIC          |                 |                |                   |                |
|-----------------|-----------------|----------------|-------------------|----------------|-----------------|-----------------|----------------|-------------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | LEGACY REF NUMBER | PART NUMBER    | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | LEGACY REF NUMBER | PART NUMBER    |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                   |                | Tol. H9         | Tol. h9         | Tol. +0.2      |                   |                |
| 50.0            | 36.0            | 9.0            | 71510XX           | CTMN00500***** | 200.0           | 177.0           | 16.0           | 71645XX           | CTMN02000***** |
| 60.0            | 46.0            | 9.0            | 71515XX           | CTMN00600***** | 210.0           | 187.0           | 16.0           | 71650XX           | CTMN02100***** |
| 63.0            | 48.0            | 11.0           | 71520XX           | CTMN00630***** | 215.0           | 192.0           | 16.0           | 71653XX           | CTMN02150***** |
| 65.0            | 50.0            | 11.0           | 71525XX           | CTMN00650***** | 220.0           | 197.0           | 16.0           | 71655XX           | CTMN02200***** |
| 70.0            | 55.0            | 11.0           | 71530XX           | CTMN00700***** | 225.0           | 202.0           | 16.0           | 71660XX           | CTMN02250***** |
| 75.0            | 60.0            | 11.0           | 71535XX           | CTMN00750***** | 230.0           | 207.0           | 16.0           | 71665XX           | CTMN02300***** |
| 80.0            | 65.0            | 11.0           | 71540XX           | CTMN00800***** | 235.0           | 212.0           | 16.0           | 71668XX           | CTMN02350***** |
| 85.0            | 70.0            | 11.0           | 71545XX           | CTMN00850***** | 240.0           | 217.0           | 16.0           | 71670XX           | CTMN02400***** |
| 90.0            | 75.0            | 11.0           | 71550XX           | CTMN00900***** | 250.0           | 222.0           | 17.5           | 71675XX           | CTMN02500***** |
| 95.0            | 80.0            | 11.0           | 71555XX           | CTMN00950***** | 260.0           | 232.0           | 17.5           | 71680XX           | CTMN02600***** |
| 100.0           | 85.0            | 12.5           | 71560XX           | CTMN01000***** | 270.0           | 242.0           | 17.5           | 71682XX           | CTMN02700***** |
| 105.0           | 90.0            | 12.5           | 71565XX           | CTMN01050***** | 275.0           | 247.0           | 17.5           | 71683XX           | CTMN02750***** |
| 110.0           | 95.0            | 12.5           | 71570XX           | CTMN01100***** | 280.0           | 252.0           | 17.5           | 71684XX           | CTMN02800***** |
| 115.0           | 100.0           | 12.5           | 71575XX           | CTMN01150***** | 290.0           | 262.0           | 17.5           | 71685XX           | CTMN02900***** |
| 125.0           | 102.0           | 16.0           | 71585XX           | CTMN01250***** | 300.0           | 272.0           | 17.5           | 71687XX           | CTMN03000***** |
| 120.0           | 105.0           | 12.5           | 71580XX           | CTMN01200***** | 310.0           | 282.0           | 17.5           | 71688XX           | CTMN03100***** |
| 130.0           | 107.0           | 16.0           | 71590XX           | CTMN01300***** | 320.0           | 292.0           | 17.5           | 71689XX           | CTMN03200***** |
| 135.0           | 112.0           | 16.0           | 71595XX           | CTMN01350***** | 330.0           | 302.0           | 17.5           | 71691XX           | CTMN03300***** |
| 140.0           | 117.0           | 16.0           | 71600XX           | CTMN01400***** | 350.0           | 322.0           | 17.5           | 71695XX           | CTMN03500***** |
| 145.0           | 122.0           | 16.0           | 71605XX           | CTMN01450***** | 360.0           | 332.0           | 17.5           | 71696XX           | CTMN03600***** |
| 150.0           | 127.0           | 16.0           | 71610XX           | CTMN01500***** | 400.0           | 372.0           | 17.5           | 71699XX           | CTMN04000***** |
| 160.0           | 137.0           | 16.0           | 71615XX           | CTMN01600***** |                 |                 |                |                   |                |
| 165.0           | 142.0           | 16.0           | 71620XX           | CTMN01650***** |                 |                 |                |                   |                |
| 170.0           | 147.0           | 16.0           | 71625XX           | CTMN01700***** |                 |                 |                |                   |                |
| 175.0           | 152.0           | 16.0           | 71628XX           | CTMN01750***** |                 |                 |                |                   |                |
| 180.0           | 157.0           | 16.0           | 71630XX           | CTMN01800***** |                 |                 |                |                   |                |
| 185.0           | 162.0           | 16.0           | 71635XX           | CTMN01850***** |                 |                 |                |                   |                |
| 190.0           | 167.0           | 16.0           | 71640XX           | CTMN01900***** |                 |                 |                |                   |                |

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





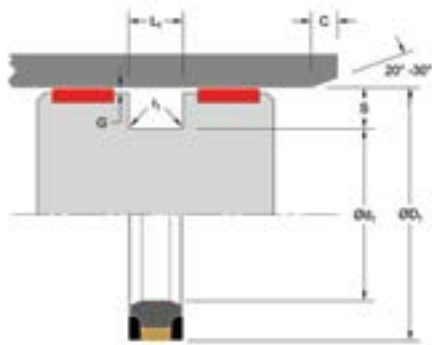
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | LEGACY REF NUMBER | PART NUMBER    |
|-----------------|-----------------|----------------|-------------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                   |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                   |                |
| 4.500           | 3.909           | 0.492          | 71039XX           | CTEN04500***** |
| 4.750           | 4.159           | 0.492          | 71042XX           | CTEN04750***** |
| 5.000           | 4.094           | 0.630          | 71044XX           | CTEN05000***** |
| 5.500           | 4.594           | 0.630          | 71054XX           | CTEN05500***** |
| 6.000           | 5.094           | 0.630          | 71064XX           | CTEN06000***** |
| 6.250           | 5.344           | 0.630          | 71068XX           | CTEN06250***** |
| 6.500           | 5.594           | 0.630          | 71074XX           | CTEN06500***** |
| 7.000           | 6.094           | 0.630          | 71084XX           | CTEN07000***** |
| 7.250           | 6.344           | 0.630          | 71086XX           | CTEN07250***** |
| 7.500           | 6.594           | 0.630          | 71089XX           | CTEN07500***** |
| 7.750           | 6.844           | 0.630          | 71092XX           | CTEN07750***** |
| 8.250           | 7.344           | 0.630          | 71097XX           | CTEN08250***** |
| 8.500           | 7.594           | 0.630          | 71099XX           | CTEN08500***** |
| 10.000          | 8.898           | 0.689          | 71109XX           | CTEN10000***** |
| 10.250          | 9.148           | 0.689          | 71700XX           | CTEN10250***** |
| 10.500          | 9.398           | 0.689          | 71112XX           | CTEN10500***** |
| 11.500          | 10.398          | 0.689          | 71117XX           | CTEN11500***** |
| 14.000          | 12.898          | 0.687          | 71127XX           | CTEN14000***** |

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



HEAVY-DUTY CAPPED SEAL  
Featuring special anti-extrusion technology



OTHER GROOVE SIZES



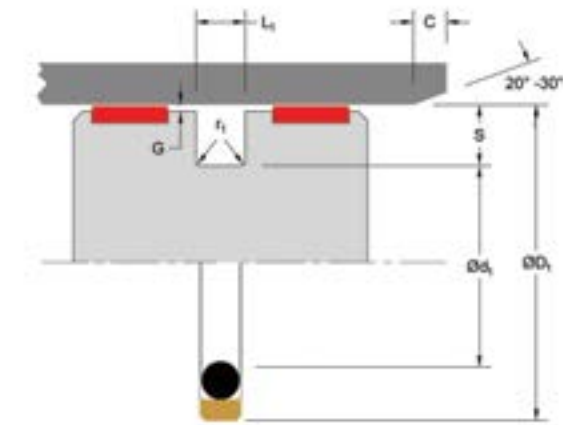
Part Number Structure

CTEZ71021NHLX

| CT                  | E                                             | Z                                       | 71021                                                               | N                                                                                    | HLX                                                                              |                                                               |
|---------------------|-----------------------------------------------|-----------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Z = Non-Standard Grooves | BODY SIZE<br>Legacy serial part number designation (First 5 digits) | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | AE RING MATERIAL<br>Refer to <i>Anti-extrusion Ring Table</i> |

PART NUMBER RANGE Z DESIGNATION

| INCH            |                 |                |                   |                | METRIC          |                 |                |                   |                |
|-----------------|-----------------|----------------|-------------------|----------------|-----------------|-----------------|----------------|-------------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | LEGACY REF NUMBER | PART NUMBER    | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | LEGACY REF NUMBER | PART NUMBER    |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                   |                | Tol. H9         | Tol. h9         | Tol. +0.2      |                   |                |
| 3.525           | 3.020           | 0.584          | 71021XX           | CTEZ71021***** | 105.0           | 88.0            | 14.0           | 71566XX           | CTMZ71566***** |
| 4.500           | 3.835           | 0.500          | 71038XX           | CTEZ71038***** | 115.0           | 98.0            | 14.0           | 71576XX           | CTMZ71576***** |
| 5.000           | 4.225           | 0.630          | 71047XX           | CTEZ71047***** | 125.0           | 108.0           | 14.0           | 71584XX           | CTMZ71584***** |
| 5.500           | 4.725           | 0.630          | 71053XX           | CTEZ71053***** |                 |                 |                |                   |                |
| 6.030           | 5.300           | 0.755          | 71066XX           | CTEZ71066***** |                 |                 |                |                   |                |
| 8.250           | 7.255           | 0.630          | 71096XX           | CTEZ71096***** |                 |                 |                |                   |                |
| 8.250           | 7.344           | 0.635          | 71097XX           | CTEZ71097***** |                 |                 |                |                   |                |
| 8.500           | 7.505           | 0.630          | 71101XX           | CTEZ71101***** |                 |                 |                |                   |                |
| 8.500           | 7.594           | 0.635          | 71099XX           | CTEZ71099***** |                 |                 |                |                   |                |
| 10.000          | 8.898           | 0.693          | 71109XX           | CTEZ71109***** |                 |                 |                |                   |                |
| 10.500          | 9.398           | 0.693          | 71112XX           | CTEZ71112***** |                 |                 |                |                   |                |
| 11.500          | 10.398          | 0.693          | 71117XX           | CTEZ71117***** |                 |                 |                |                   |                |



# P54

## PISTON SEAL

Double-Acting

### TECHNICAL DETAILS

The Hallite P54 is a double-acting, O-ring energized, low-friction piston seal that performs well in both high- and low-pressure systems. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility. The P54 has a proven design pedigree as a high-performance seal used in demanding applications. The standard P54 seal face includes pressure notches, which makes the seal very responsive to changes in pressure or direction of travel. Used successfully for years in performance-critical applications in construction equipment, machine tools, material handling, agricultural equipment, and other industries, the Hallite P54 is a workhorse compact, double- acting, piston-sealing solution. Its design fits a variety of housing sizes, including ISO 7425-1 grooves, and is offered in a wide range of metric and inch options. Hallite recommends proper guidance be used with this seal in heavy-duty applications (see Hallite Bearings section).

This seal is available in a variety of Hallite’s high-performance Armorlene® and Hythane® materials to suit a wide range of demanding applications.



### F E A T U R E S

- No stick-slip
- Low breakout and running friction
- Excellent in high-speed applications
- Compact piston design
- Seal ring component can be machined to any size
- Pressure notches to optimize seal response at all pressures



### Part Number Structure

P54MR00900NHLX \_

| P54                 | M                                             | R                                                                                                      | 00900                                                     | N                                                                                    | HLX                                                                              | —                                                                                                                                                                   |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile (with notches)<br>X = No Notches<br><i>Notches not offered with groove widths (L1) of 2.2mm (0.087in) or 3.2mm (0.126in)</i> |

OPERATING CONDITIONS

|                            | METRIC        | INCH             |
|----------------------------|---------------|------------------|
| Maximum Speed              | Up to 15m/sec | Up to 50.0ft/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

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

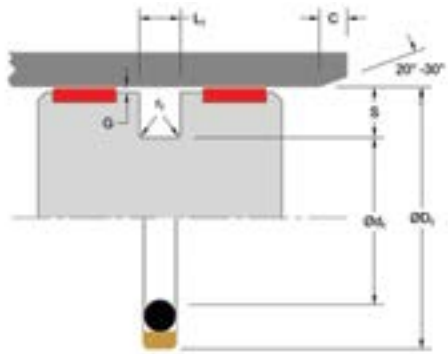
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

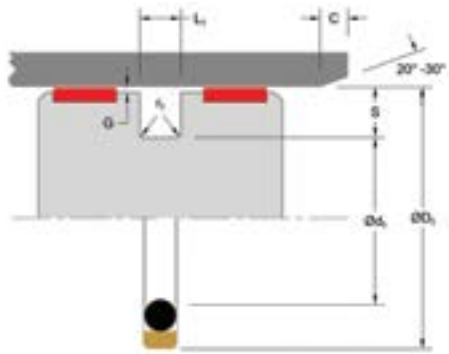
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                                            | FILLER                     | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|-------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                                                  | Special Bronze Compound    | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Excellent wear resistance</li><li>Excellent low-friction properties</li><li>Good extrusion resistance</li></ul>                                                                                         | Special Mineral Compound   | HLA                 | Gray        | -73 to 260°C        | -100 to 500°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Good low-friction properties</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li></ul>                                                              | Glass Molybdenum Disulfide | 702                 | Gray        | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® 706</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li><li>Good dielectrical properties</li></ul>                                                              | 15% Glass                  | 706                 | Off-White   | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for use with soft mating surfaces</li><li>Low friction and no stick-slip</li></ul>                                                                                                          | Unfilled                   | 700                 | White       | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul>                           | Carbon Fiber Filled        | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 250 bar                        | 3600 psi                       |
| <b>ARMORLENE® HCV</b> <ul style="list-style-type: none"><li>Recommended for lubricating and non-lubricating fluids</li><li>Excellent for high-frequency and short-stroke applications</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | High Carbon Fiber Filled   | HCV                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>Excellent in all lubricating fluids and pneumatic applications</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                | 25% Carbon/Graphite        | 711                 | Black       | -73 to 288°C        | -100 to 550°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                                                                                      | 60% Bronze Content         | 713                 | Bronze      | -73 to 288°C        | -100 to 550°F       | 600 bar                        | 8700 psi                       |
| <b>HU9 - POLYURETHANE, 95A</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul>                                                                                                                        | Standard                   | HU9                 | Red         | -20 to 115°C        | -4 to 240°F         | 500 bar                        | 7250 psi                       |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul>                                                                                                                        | Standard                   | HU5                 | Yellow      | -20 to 115°C        | -4 to 240°F         | 500 bar                        | 7250 psi                       |
| <b>HYTHANE® 9270111 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Hydrolysis stabilized</li><li>Strong chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                             | Hydrolysis Stabilized      | 111                 | Gray        | -40 to 120°C        | -40 to 250°F        | 500 bar                        | 7250 psi                       |
| <b>HYTHANE® 9270261 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Internal lubrication provides extended wear in high-speed applications</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul>                               | Internally Lubricated      | 261                 | Off-White   | -40 to 120°C        | -40 to 250°F        | 500 bar                        | 7250 psi                       |
| <b>HE5 - POLYESTER, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li></ul>                                                                                                                           | Standard                   | HE5                 | Gray/Black  | -20 to 115°C        | -40 to 240°F        | 500 bar                        | 7250 psi                       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>Excellent impact resistance</li><li>Good dielectrical properties</li><li>Excellent abrasion resistance</li><li>Low coefficient of friction</li></ul>                                                                                                | 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.





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.



P54  
PISTON SEAL  
Double-Acting

INSTALLATION RECOMMENDATIONS

| METRIC                           |                            |                            |                       |                      |                |         |                |                            |               |               |                      |
|----------------------------------|----------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|----------------------------|---------------|---------------|----------------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |               |               | O-RING CROSS SECTION |
|                                  |                            |                            |                       |                      |                |         |                |                            |               |               |                      |
| DIAMETER RANGE                   |                            |                            | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | 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 |                       |                      |                |         |                |                            |               |               |                      |
| 8.0 - 14.9                       | 15.0 - 39.9                | -                          | D <sub>1</sub> - 4.9  | 2.2                  | 0.4            | 2.0     | 2.45           | 0.30                       | 0.20          | 0.15          | 1.78                 |
| 15.0 - 39.9                      | 40.0 - 79.9                | -                          | D <sub>1</sub> - 7.5  | 3.2                  | 0.6            | 3.0     | 3.75           | 0.40                       | 0.25          | 0.15          | 2.62                 |
| 40.0 - 79.9                      | 80.0 - 132.9               | 15.0 - 39.9                | D <sub>1</sub> - 11.0 | 4.2                  | 1.0            | 4.0     | 5.50           | 0.40                       | 0.25          | 0.20          | 3.53                 |
| 80.0 - 132.9                     | 133.0 - 329.9              | 40.0 - 79.9                | D <sub>1</sub> - 15.5 | 6.3                  | 1.3            | 6.0     | 7.75           | 0.50                       | 0.30          | 0.20          | 5.33                 |
| 133.0 - 329.9                    | 330.0 - 669.9              | 80.0 - 132.9               | D <sub>1</sub> - 21.0 | 8.1                  | 1.8            | 8.0     | 10.50          | 0.60                       | 0.35          | 0.25          | 6.99                 |
| 330.0 - 669.9                    | 670.0 - 999.9              | 133.0 - 329.9              | D <sub>1</sub> - 24.5 | 8.1                  | 1.8            | 8.0     | 12.25          | 0.60                       | 0.35          | 0.25          | 6.99                 |
| 670.0 - 999.9                    | ≥ 1000.0                   | 330.0 - 669.9              | D <sub>1</sub> - 28.0 | 9.5                  | 2.5            | 9.0     | 14.00          | 0.70                       | 0.50          | 0.30          | 8.40                 |
| ≥ 1000.0                         | -                          | 670.0 - 999.9              | D <sub>1</sub> - 38.0 | 13.8                 | 3.0            | 10.0    | 19.00          | 1.00                       | 0.70          | 0.60          | 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 <sub>1</sub> H9 |                               |                               | GROOVE DIAMETER        | GROOVE WIDTH          | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |                   |                   | O-RING<br>CROSS SECTION |
|                                  |                               |                               |                        |                       |                |         |                |                            |                   |                   |                         |
| DIAMETER RANGE                   |                               |                               | Ød <sub>1</sub> h9     | L <sub>1</sub> + .008 | r <sub>1</sub> | C       | S              | Up to<br>1500 psi          | Up to<br>2900 psi | Up to<br>5800 psi | O-ring                  |
| Standard Duty<br>Application - R | Light Duty<br>Application - L | Heavy Duty<br>Application - H |                        |                       |                |         |                |                            |                   |                   |                         |
| 0.312 - 0.562                    | 0.563 - 1.562                 | -                             | D <sub>1</sub> - 0.193 | 0.087                 | 0.015          | 0.079   | 0.097          | 0.012                      | 0.008             | 0.006             | 0.070                   |
| 0.563 - 1.562                    | 1.563 - 3.125                 | -                             | D <sub>1</sub> - 0.295 | 0.126                 | 0.025          | 0.118   | 0.148          | 0.016                      | 0.010             | 0.006             | 0.103                   |
| 1.563 - 3.125                    | 3.126 - 5.250                 | 0.563 - 1.562                 | D <sub>1</sub> - 0.433 | 0.165                 | 0.025          | 0.157   | 0.217          | 0.016                      | 0.010             | 0.008             | 0.139                   |
| 3.126 - 5.250                    | 5.251 - 12.500                | 1.563 - 3.125                 | D <sub>1</sub> - 0.610 | 0.248                 | 0.035          | 0.236   | 0.305          | 0.020                      | 0.012             | 0.008             | 0.210                   |
| 5.251 - 12.500                   | 12.501 - 26.000               | 3.126 - 5.250                 | D <sub>1</sub> - 0.827 | 0.319                 | 0.035          | 0.315   | 0.414          | 0.024                      | 0.014             | 0.010             | 0.275                   |
| 12.501 - 26.000                  | -                             | 5.251 - 12.500                | D <sub>1</sub> - 0.965 | 0.319                 | 0.035          | 0.354   | 0.483          | 0.024                      | 0.014             | 0.010             | 0.275                   |

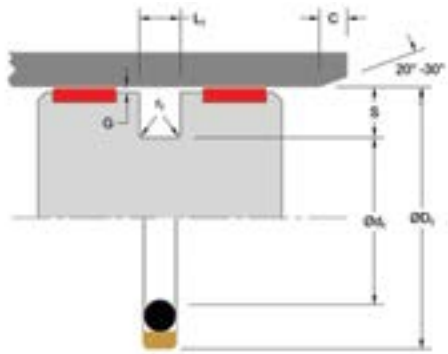
At pressure >5800 psi use diameter tolerance H8/f7.  
\*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 8.0             | 3.1             | 2.2            | P54MR00080**** |
| 10.0            | 5.1             | 2.2            | P54MR00100**** |
| 12.0            | 7.1             | 2.2            | P54MR00120**** |
| 14.0            | 9.1             | 2.2            | P54MR00140**** |
| 15.0            | 7.5             | 3.2            | P54MR00150**** |
| 16.0            | 11.1            | 2.2            | P54ML00160**** |
| 16.0            | 8.5             | 3.2            | P54MR00160**** |
| 18.0            | 13.1            | 2.2            | P54ML00180**** |
| 18.0            | 10.5            | 3.2            | P54MR00180**** |
| 20.0            | 15.1            | 2.2            | P54ML00200**** |
| 20.0            | 12.5            | 3.2            | P54MR00200**** |
| 21.0            | 13.5            | 3.2            | P54MR00210**** |
| 22.0            | 17.1            | 2.2            | P54ML00220**** |
| 22.0            | 14.5            | 3.2            | P54MR00220**** |
| 24.0            | 16.5            | 3.2            | P54MR00240**** |
| 24.0            | 19.1            | 2.2            | P54ML00240**** |
| 25.0            | 20.1            | 2.2            | P54ML00250**** |
| 25.0            | 17.5            | 3.2            | P54MR00250**** |
| 25.0            | 14.0            | 4.2            | P54MH00250**** |
| 28.0            | 20.5            | 3.2            | P54MR00280**** |
| 30.0            | 22.5            | 3.2            | P54MR00300**** |
| 32.0            | 27.1            | 2.2            | P54ML00320**** |
| 32.0            | 24.5            | 3.2            | P54MR00320**** |
| 32.0            | 21.0            | 4.2            | P54MH00320**** |
| 35.0            | 27.5            | 3.2            | P54MR00350**** |
| 35.0            | 24.0            | 4.2            | P54MH00350**** |
| 36.0            | 28.5            | 3.2            | P54MR00360**** |
| 38.0            | 30.5            | 3.2            | P54MR00380**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 40.0            | 32.5            | 3.2            | P54ML00400**** |
| 40.0            | 29.0            | 4.2            | P54MR00400**** |
| 42.0            | 31.0            | 4.2            | P54MR00420**** |
| 45.0            | 34.0            | 4.2            | P54MR00450**** |
| 48.0            | 37.0            | 4.2            | P54MR00480**** |
| 50.0            | 42.5            | 3.2            | P54ML00500**** |
| 50.0            | 39.0            | 4.2            | P54MR00500**** |
| 50.0            | 34.5            | 6.3            | P54MH00500**** |
| 50.8            | 43.3            | 3.2            | P54ML00508**** |
| 50.8            | 39.8            | 4.2            | P54MR00508**** |
| 52.0            | 41.0            | 4.2            | P54MR00520**** |
| 53.0            | 42.0            | 4.2            | P54MR00530**** |
| 55.0            | 44.0            | 4.2            | P54MR00550**** |
| 57.0            | 46.0            | 4.2            | P54MR00570**** |
| 58.0            | 47.0            | 4.2            | P54MR00580**** |
| 60.0            | 49.0            | 4.2            | P54MR00600**** |
| 62.0            | 51.0            | 4.2            | P54MR00620**** |
| 63.0            | 52.0            | 4.2            | P54MR00630**** |
| 63.0            | 47.5            | 6.3            | P54MH00630**** |
| 65.0            | 54.0            | 4.2            | P54MR00650**** |
| 68.0            | 57.0            | 4.2            | P54MR00680**** |
| 70.0            | 59.0            | 4.2            | P54MR00700**** |
| 70.0            | 54.5            | 6.3            | P54MH00700**** |
| 75.0            | 64.0            | 4.2            | P54MR00750**** |
| 75.0            | 59.5            | 6.3            | P54MH00750**** |
| 80.0            | 69.0            | 4.2            | P54ML00800**** |
| 80.0            | 64.5            | 6.3            | P54MR00800**** |
| 80.0            | 59.0            | 8.1            | P54MH00800**** |

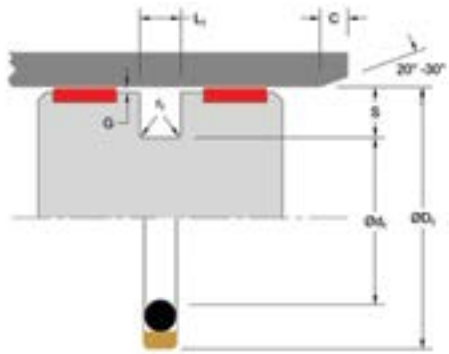




PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 82.5            | 67.0            | 6.3            | P54MR00825**** |
| 85.0            | 69.5            | 6.3            | P54MR00850**** |
| 85.0            | 64.0            | 8.1            | P54MH00850**** |
| 90.0            | 79.0            | 4.2            | P54ML00900**** |
| 90.0            | 74.5            | 6.3            | P54MR00900**** |
| 90.0            | 69.0            | 8.1            | P54MH00900**** |
| 95.0            | 84.0            | 4.2            | P54ML00950**** |
| 95.0            | 79.5            | 6.3            | P54MR00950**** |
| 95.0            | 74.0            | 8.1            | P54MH00950**** |
| 100.0           | 89.0            | 4.2            | P54ML01000**** |
| 100.0           | 84.5            | 6.3            | P54MR01000**** |
| 100.0           | 79.0            | 8.1            | P54MH01000**** |
| 101.6           | 86.1            | 6.3            | P54MR01016**** |
| 105.0           | 94.0            | 4.2            | P54ML01050**** |
| 105.0           | 89.5            | 6.3            | P54MR01050**** |
| 108.0           | 92.5            | 6.3            | P54MR01080**** |
| 110.0           | 99.0            | 4.2            | P54ML01100**** |
| 110.0           | 94.5            | 6.3            | P54MR01100**** |
| 110.0           | 89.0            | 8.1            | P54MH01100**** |
| 115.0           | 99.5            | 6.3            | P54MR01150**** |
| 120.0           | 109.0           | 4.2            | P54ML01200**** |
| 120.0           | 104.5           | 6.3            | P54MR01200**** |
| 120.0           | 99.0            | 8.1            | P54MH01200**** |
| 125.0           | 114.0           | 4.2            | P54ML01250**** |
| 125.0           | 109.5           | 6.3            | P54MR01250**** |
| 125.0           | 104.0           | 8.1            | P54MH01250**** |
| 127.0           | 111.5           | 6.3            | P54MR01270**** |
| 130.0           | 114.5           | 6.3            | P54MR01300**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 130.0           | 109.0           | 8.1            | P54MH01300**** |
| 132.0           | 121.0           | 4.2            | P54ML01320**** |
| 135.0           | 114.0           | 8.1            | P54MR01350**** |
| 140.0           | 124.5           | 6.3            | P54ML01400**** |
| 140.0           | 119.0           | 8.1            | P54MR01400**** |
| 145.0           | 129.5           | 6.3            | P54ML01450**** |
| 145.0           | 124.0           | 8.1            | P54MR01450**** |
| 150.0           | 134.5           | 6.3            | P54ML01500**** |
| 150.0           | 129.0           | 8.1            | P54MR01500**** |
| 155.0           | 134.0           | 8.1            | P54MR01550**** |
| 160.0           | 144.5           | 6.3            | P54ML01600**** |
| 160.0           | 139.0           | 8.1            | P54MR01600**** |
| 165.0           | 144.0           | 8.1            | P54MR01650**** |
| 170.0           | 149.0           | 8.1            | P54MR01700**** |
| 175.0           | 154.0           | 8.1            | P54MR01750**** |
| 180.0           | 164.5           | 6.3            | P54ML01800**** |
| 180.0           | 159.0           | 8.1            | P54MR01800**** |
| 185.0           | 164.0           | 8.1            | P54MR01850**** |
| 190.0           | 169.0           | 8.1            | P54MR01900**** |
| 194.0           | 178.5           | 6.3            | P54ML01940**** |
| 200.0           | 184.5           | 6.3            | P54ML02000**** |
| 200.0           | 179.0           | 8.1            | P54MR02000**** |
| 205.0           | 184.0           | 8.1            | P54MR02050**** |
| 210.0           | 189.0           | 8.1            | P54MR02100**** |
| 215.0           | 194.0           | 8.1            | P54MR02150**** |
| 220.0           | 199.0           | 8.1            | P54MR02200**** |
| 225.0           | 204.0           | 8.1            | P54MR02250**** |
| 230.0           | 214.5           | 6.3            | P54ML02300**** |



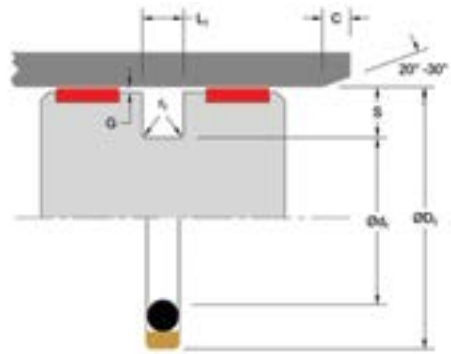
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 230.0           | 209.0           | 8.1            | P54MR02300**** |
| 240.0           | 219.0           | 8.1            | P54MR02400**** |
| 250.0           | 229.0           | 8.1            | P54MR02500**** |
| 250.0           | 225.5           | 8.1            | P54MH02500**** |
| 250.0           | 234.5           | 6.3            | P54ML02500**** |
| 254.0           | 233.0           | 8.1            | P54MR02540**** |
| 260.0           | 239.0           | 8.1            | P54MR02600**** |
| 265.0           | 244.0           | 8.1            | P54MR02650**** |
| 268.0           | 247.0           | 8.1            | P54MR02680**** |
| 270.0           | 249.0           | 8.1            | P54MR02700**** |
| 280.0           | 259.0           | 8.1            | P54MR02800**** |
| 290.0           | 269.0           | 8.1            | P54MR02900**** |
| 300.0           | 279.0           | 8.1            | P54MR03000**** |
| 300.0           | 275.5           | 8.1            | P54MH03000**** |
| 304.8           | 283.8           | 8.1            | P54MR03048**** |
| 310.0           | 289.0           | 8.1            | P54MR03100**** |
| 320.0           | 299.0           | 8.1            | P54MR03200**** |
| 320.0           | 295.5           | 8.1            | P54MH03200**** |
| 330.0           | 305.5           | 8.1            | P54MR03300**** |
| 340.0           | 315.5           | 8.1            | P54MR03400**** |
| 350.0           | 325.5           | 8.1            | P54MR03500**** |
| 360.0           | 335.5           | 8.1            | P54MR03600**** |
| 370.0           | 345.5           | 8.1            | P54MR03700**** |
| 380.0           | 355.5           | 8.1            | P54MR03800**** |
| 390.0           | 365.5           | 8.1            | P54MR03900**** |
| 400.0           | 375.5           | 8.1            | P54MR04000**** |
| 420.0           | 395.5           | 8.1            | P54MR04200**** |
| 430.0           | 405.5           | 8.1            | P54MR04300**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 440.0           | 415.5           | 8.1            | P54MR04400**** |
| 450.0           | 425.5           | 8.1            | P54MR04500**** |
| 460.0           | 435.5           | 8.1            | P54MR04600**** |
| 480.0           | 455.5           | 8.1            | P54MR04800**** |
| 500.0           | 475.5           | 8.1            | P54MR05000**** |
| 555.0           | 530.5           | 8.1            | P54MR05550**** |
| 600.0           | 575.5           | 8.1            | P54MR06000**** |
| 640.0           | 615.5           | 8.1            | P54MR06400**** |
| 660.0           | 635.5           | 8.1            | P54MR06600**** |
| 700.0           | 672.0           | 9.5            | P54MR07000**** |
| 710.0           | 682.0           | 9.5            | P54MR07100**** |
| 740.0           | 712.0           | 9.5            | P54MR07400**** |
| 780.0           | 752.0           | 9.5            | P54MR07800**** |
| 800.0           | 772.0           | 9.5            | P54MR08000**** |
| 900.0           | 872.0           | 9.5            | P54MR09000**** |
| 1000.0          | 972.0           | 9.5            | P54ML10000**** |
| 1000.0          | 962.0           | 13.8           | P54MR10000**** |
| 1050.0          | 1022.0          | 9.5            | P54ML10500**** |
| 1065.0          | 1027.0          | 13.8           | P54MR10650**** |
| 1070.0          | 1032.0          | 13.8           | P54MR10700**** |
| 1200.0          | 1172.0          | 9.5            | P54ML12000**** |
| 1200.0          | 1162.0          | 13.8           | P54MR12000**** |
| 1225.0          | 1187.0          | 13.8           | P54MR12250**** |

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

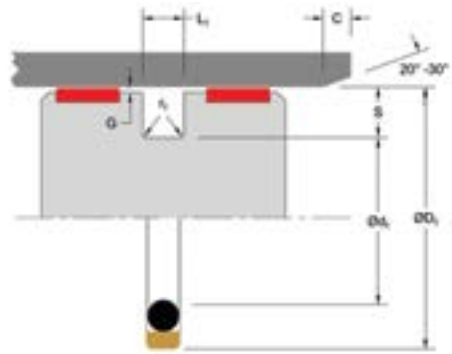




PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 0.500           | 0.307           | 0.087          | P54ER00500**** |
| 0.562           | 0.369           | 0.087          | P54ER00562**** |
| 0.625           | 0.330           | 0.126          | P54ER00625**** |
| 0.687           | 0.392           | 0.126          | P54ER00687**** |
| 0.750           | 0.455           | 0.126          | P54ER00750**** |
| 0.812           | 0.517           | 0.126          | P54ER00812**** |
| 0.875           | 0.580           | 0.126          | P54ER00875**** |
| 0.937           | 0.642           | 0.126          | P54ER00937**** |
| 1.000           | 0.705           | 0.126          | P54ER01000**** |
| 1.062           | 0.767           | 0.126          | P54ER01062**** |
| 1.125           | 0.830           | 0.126          | P54ER01125**** |
| 1.187           | 0.892           | 0.126          | P54ER01187**** |
| 1.250           | 0.955           | 0.126          | P54ER01250**** |
| 1.312           | 1.017           | 0.126          | P54ER01312**** |
| 1.375           | 1.080           | 0.126          | P54ER01375**** |
| 1.437           | 1.142           | 0.126          | P54ER01437**** |
| 1.500           | 1.205           | 0.126          | P54ER01500**** |
| 1.562           | 1.267           | 0.126          | P54ER01562**** |
| 1.625           | 1.192           | 0.165          | P54ER01625**** |
| 1.687           | 1.254           | 0.165          | P54ER01687**** |
| 1.750           | 1.317           | 0.165          | P54ER01750**** |
| 1.812           | 1.379           | 0.165          | P54ER01812**** |
| 1.875           | 1.442           | 0.165          | P54ER01875**** |
| 1.937           | 1.504           | 0.165          | P54ER01937**** |
| 2.000           | 1.567           | 0.165          | P54ER02000**** |
| 2.125           | 1.692           | 0.165          | P54ER02125**** |
| 2.250           | 1.817           | 0.165          | P54ER02250**** |
| 2.375           | 1.942           | 0.165          | P54ER02375**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 2.500           | 2.067           | 0.165          | P54ER02500**** |
| 2.625           | 2.192           | 0.165          | P54ER02625**** |
| 2.750           | 2.317           | 0.165          | P54ER02750**** |
| 2.875           | 2.442           | 0.165          | P54ER02875**** |
| 3.000           | 2.567           | 0.165          | P54ER03000**** |
| 3.125           | 2.692           | 0.165          | P54ER03125**** |
| 3.250           | 2.640           | 0.248          | P54ER03250**** |
| 3.375           | 2.765           | 0.248          | P54ER03375**** |
| 3.500           | 2.890           | 0.248          | P54ER03500**** |
| 3.625           | 3.015           | 0.248          | P54ER03625**** |
| 3.750           | 3.140           | 0.248          | P54ER03750**** |
| 3.875           | 3.265           | 0.248          | P54ER03875**** |
| 4.000           | 3.390           | 0.248          | P54ER04000**** |
| 4.125           | 3.515           | 0.248          | P54ER04125**** |
| 4.250           | 3.640           | 0.248          | P54ER04250**** |
| 4.375           | 3.765           | 0.248          | P54ER04375**** |
| 4.500           | 3.890           | 0.248          | P54ER04500**** |
| 4.625           | 4.015           | 0.248          | P54ER04625**** |
| 4.750           | 4.140           | 0.248          | P54ER04750**** |
| 4.875           | 4.265           | 0.248          | P54ER04875**** |
| 5.000           | 4.390           | 0.248          | P54ER05000**** |
| 5.125           | 4.515           | 0.248          | P54ER05125**** |
| 5.250           | 4.640           | 0.248          | P54ER05250**** |
| 5.375           | 4.548           | 0.319          | P54ER05375**** |
| 5.500           | 4.673           | 0.319          | P54ER05500**** |
| 5.625           | 4.798           | 0.319          | P54ER05625**** |
| 5.750           | 4.923           | 0.319          | P54ER05750**** |
| 6.000           | 5.173           | 0.319          | P54ER06000**** |



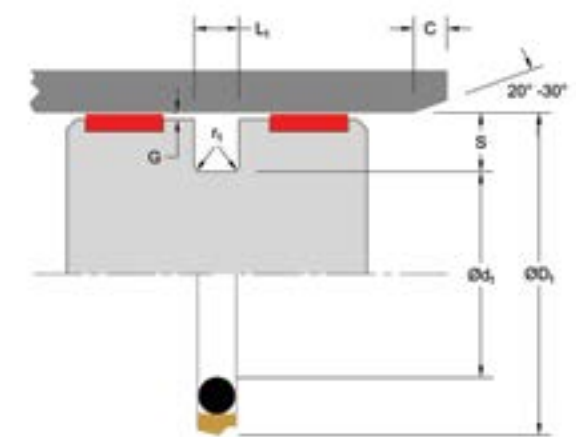
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 6.250           | 5.423           | 0.319          | P54ER06250**** |
| 6.500           | 5.673           | 0.319          | P54ER06500**** |
| 6.750           | 5.923           | 0.319          | P54ER06750**** |
| 7.000           | 6.173           | 0.319          | P54ER07000**** |
| 7.250           | 6.423           | 0.319          | P54ER07250**** |
| 7.500           | 6.673           | 0.319          | P54ER07500**** |
| 7.750           | 6.923           | 0.319          | P54ER07750**** |
| 8.000           | 7.173           | 0.319          | P54ER08000**** |
| 8.250           | 7.423           | 0.319          | P54ER08250**** |
| 8.500           | 7.673           | 0.319          | P54ER08500**** |
| 8.750           | 7.923           | 0.319          | P54ER08750**** |
| 9.000           | 8.173           | 0.319          | P54ER09000**** |
| 9.250           | 8.423           | 0.319          | P54ER09250**** |
| 9.500           | 8.673           | 0.319          | P54ER09500**** |
| 9.750           | 8.923           | 0.319          | P54ER09750**** |
| 10.000          | 9.173           | 0.319          | P54ER10000**** |
| 10.500          | 9.673           | 0.319          | P54ER10500**** |
| 11.000          | 10.173          | 0.319          | P54ER11000**** |
| 11.500          | 10.673          | 0.319          | P54ER11500**** |
| 12.000          | 11.173          | 0.319          | P54ER12000**** |
| 12.500          | 11.673          | 0.319          | P54ER12500**** |
| 13.000          | 12.035          | 0.319          | P54ER13000**** |
| 13.500          | 12.535          | 0.319          | P54ER13500**** |
| 14.000          | 13.035          | 0.319          | P54ER14000**** |
| 14.500          | 13.535          | 0.319          | P54ER14500**** |
| 15.000          | 14.035          | 0.319          | P54ER15000**** |
| 15.500          | 14.535          | 0.319          | P54ER15500**** |
| 16.000          | 15.035          | 0.319          | P54ER16000**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 16.500          | 15.535          | 0.319          | P54ER16500**** |
| 17.000          | 16.035          | 0.319          | P54ER17000**** |
| 17.500          | 16.535          | 0.319          | P54ER17500**** |
| 18.000          | 17.035          | 0.319          | P54ER18000**** |
| 18.500          | 17.535          | 0.319          | P54ER18500**** |
| 19.000          | 18.035          | 0.319          | P54ER19000**** |
| 19.500          | 18.535          | 0.319          | P54ER19500**** |
| 20.000          | 19.035          | 0.319          | P54ER20000**** |

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





# P16

## PISTON SEAL

Single-Acting



### TECHNICAL DETAILS

The Hallite P16 is a single-acting, O-ring energized, low-friction piston seal especially useful where smooth movement and location accuracy is required. The P16 design is based on the very successful R16 rod-seal design which has been proven in the market to be an excellent seal. High- performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and high-speed capabilities.

The P16’s design eliminates the potential for stick-slip and its very low running friction makes it ideal for high-speed applications. In particular, this seal is well-suited for use in piston accumulators in conjunction with other Hallite piston seals. The P16 is designed to fit a variety of inch and metric grooves, including ISO 7425-1 standard.

This seal is available in a variety of Hallite’s high-performance Armorlene® materials to suit a wide range of demanding applications. A tandem arrangement using the P54 or P16 in an Armorlene® material is effective in sealing high-frequency and long-stroke applications.

### FEATURES

- Low breakout friction and elimination of stick-slip action
- Excellent dynamic and static sealability
- Long wear and high extrusion resistance
- Ability to absorb shock loads from pressure spikes



### Part Number Structure

P16MR00500NHLX \_\_

|                     |                                               |                                                                                                        |                                                           |                                                                                      |                                                                                  |                                        |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|
| P16                 | M                                             | R                                                                                                      | 00500                                                     | N                                                                                    | HLX                                                                              | __                                     |
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile |

OPERATING CONDITIONS

|                            | METRIC          | INCH             |
|----------------------------|-----------------|------------------|
| Maximum Speed              | Up to 15.0m/sec | Up to 50.0ft/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 <sub>1</sub> | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face Ød <sub>1</sub>  | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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                     | -                                 | -                                 |

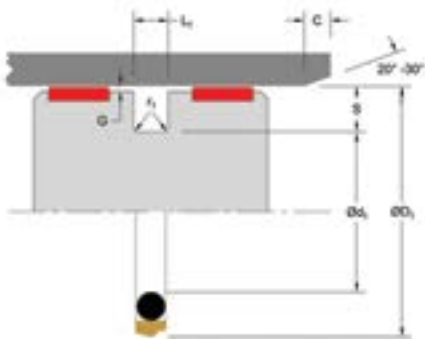
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

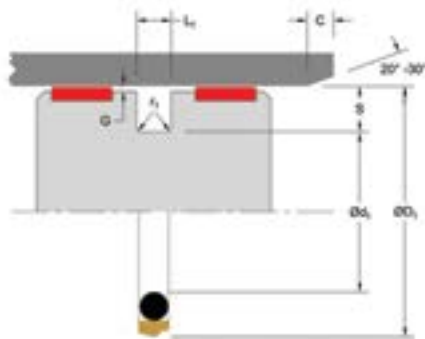
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                                                    | FILLER                       | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------|-------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>• Standard material for hydraulic applications</li><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Extended wear resistance</li></ul>                                                                                  | Special Bronze Compound      | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul>                                                                                                                                        | 60% Bronze Content           | 713                 | Bronze      | -73 to 288°C        | -100 to 550°F       | 600 bar                        | 8700 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>• Not recommended for gas sealing applications</li><li>• Not recommended for electrical conductive fluids</li></ul>                             | Carbon Fiber Filled          | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 250 bar                        | 3600 psi                       |
| <b>ARMORLENE® HCV</b> <ul style="list-style-type: none"><li>• Recommended for lubricating and non-lubricating fluids</li><li>• Excellent for high-frequency and short-stroke applications</li><li>• Not recommended for gas sealing applications</li><li>• Not recommended for electrical conductive fluids</li></ul> | High Carbon Fiber Filled     | HCV                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>• Excellent in all hydraulic fluids</li><li>• Recommended for use with soft mating surfaces</li><li>• Low friction and no stick-slip</li></ul>                                                                                                            | Unfilled                     | 700                 | White       | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® 706</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids</li><li>• Excellent extrusion resistance</li><li>• Good chemical resistance</li><li>• Good dielectrical properties</li></ul>                                                              | 15% Glass                    | 706                 | Off-White   | -73 to 260°C        | -100 to 500°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids</li><li>• Good low-friction properties</li><li>• Excellent extrusion resistance</li><li>• Good chemical resistance</li></ul>                                                              | Glass Molybdenum Disulfide   | 702                 | Gray        | -73 to 260°C        | -100 to 500°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>• Excellent in all lubricating fluids and pneumatic applications</li><li>• High chemical resistance</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul>                                                                | 25% Carbon/Graphite          | 711                 | Black       | -73 to 288°C        | -100 to 550°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"><li>• Excellent in all hydraulic fluids</li><li>• Excellent wear resistance</li><li>• Excellent low-friction properties</li><li>• Good extrusion resistance</li></ul>                                                                                         | Special Mineral Compound     | HLA                 | Gray        | -73 to 260°C        | -100 to 500°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® 782</b> <ul style="list-style-type: none"><li>• Good abrasion resistance</li><li>• Recommended for lubricating and non-lubricating fluids</li><li>• Recommended for high frequency and short-stroke applications</li><li>• Not recommended for electrical and conductive fluids</li></ul>               | Modified Carbon Fiber Filled | 782                 | Black       | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>• Excellent impact resistance</li><li>• Good dielectrical properties</li><li>• Excellent abrasion resistance</li><li>• Low coefficient of friction</li></ul>                                                                                                | 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.





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.



P16  
PISTON SEAL  
Single-Acting

INSTALLATION RECOMMENDATIONS

| METRIC                           |                            |                            |                       |                      |                |         |                |                            |               |               |                      |
|----------------------------------|----------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|----------------------------|---------------|---------------|----------------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |               |               | O-RING CROSS SECTION |
|                                  |                            |                            |                       |                      |                |         |                |                            |               |               |                      |
| DIAMETER RANGE                   |                            |                            | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | 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 |                       |                      |                |         |                |                            |               |               |                      |
| 8.0 - 16.9                       | 17.0 - 26.9                | -                          | D <sub>1</sub> - 4.9  | 2.2                  | 0.4            | 2.0     | 2.45           | 0.30                       | 0.20          | 0.15          | 1.78                 |
| 17.0 - 26.9                      | 27.0 - 59.9                | -                          | D <sub>1</sub> - 7.5  | 3.2                  | 0.6            | 3.0     | 3.75           | 0.40                       | 0.25          | 0.15          | 2.62                 |
| 27.0 - 59.9                      | 60.0 - 199.9               | 17.0 - 26.9                | D <sub>1</sub> - 11.0 | 4.2                  | 1.0            | 4.0     | 5.50           | 0.50                       | 0.30          | 0.20          | 3.53                 |
| 60.0 - 199.9                     | 200.0 - 255.9              | 27.0 - 59.9                | D <sub>1</sub> - 15.5 | 6.3                  | 1.3            | 6.0     | 7.75           | 0.70                       | 0.40          | 0.25          | 5.33                 |
| 200.0 - 255.9                    | 256.0 - 669.9              | 60.0 - 199.9               | D <sub>1</sub> - 21.0 | 8.1                  | 1.8            | 8.0     | 10.50          | 0.80                       | 0.60          | 0.35          | 6.99                 |
| 256.0 - 669.9                    | 670.0 - 999.9              | 200.0 - 255.9              | D <sub>1</sub> - 24.5 | 8.1                  | 1.8            | 8.0     | 12.25          | 0.90                       | 0.70          | 0.40          | 6.99                 |
| 670.0 - 999.9                    | ≥1000.0                    | 256.0 - 669.9              | D <sub>1</sub> - 28.0 | 9.5                  | 2.5            | 9.0     | 14.00          | 1.00                       | 0.80          | 0.60          | 8.40                 |
| ≥1000.0                          | -                          | 670.0 - 999.9              | D <sub>1</sub> - 38.0 | 13.8                 | 3.0            | 10.0    | 19.00          | 1.20                       | 0.90          | 0.60          | 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, H9          |                            |                            | GROOVE DIAMETER        | GROOVE WIDTH           | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |                |                | O-RING CROSS SECTION |
| DIAMETER RANGE                |                            |                            | Ød, h9                 | L <sub>1</sub> + 0.008 | r <sub>1</sub> | C       | S              | Up to 1500 psi             | Up to 2900 psi | Up to 5800 psi | O-ring               |
| Standard Duty Application - R | Light Duty Application - L | Heavy Duty Application - H |                        |                        |                |         |                |                            |                |                |                      |
| 0.312 - 0.749                 | 0.750 - 1.499              | -                          | D <sub>1</sub> - 0.193 | 0.087                  | 0.020          | 0.079   | 0.097          | 0.012                      | 0.009          | 0.007          | 0.070                |
| 0.750 - 1.499                 | 1.500 - 2.499              | -                          | D <sub>1</sub> - 0.287 | 0.126                  | 0.020          | 0.118   | 0.144          | 0.016                      | 0.012          | 0.008          | 0.103                |
| 1.500 - 2.499                 | 2.500 - 7.999              | 0.625 - 1.499              | D <sub>1</sub> - 0.421 | 0.165                  | 0.025          | 0.157   | 0.211          | 0.016                      | 0.012          | 0.009          | 0.139                |
| 2.500 - 7.999                 | 8.000 - 9.999              | 1.000 - 2.499              | D <sub>1</sub> - 0.594 | 0.248                  | 0.030          | 0.236   | 0.297          | 0.020                      | 0.014          | 0.010          | 0.210                |
| 8.000 - 9.999                 | 10.000 - 26.000            | 3.125 - 7.999              | D <sub>1</sub> -0.807  | 0.319                  | 0.035          | 0.315   | 0.404          | 0.024                      | 0.017          | 0.012          | 0.275                |
| 10.000 - 26.000               | -                          | 8.000 - 9.999              | D <sub>1</sub> - 0.945 | 0.319                  | 0.035          | 0.315   | 0.473          | 0.024                      | 0.017          | 0.012          | 0.275                |

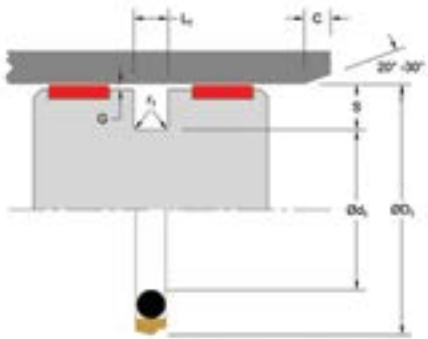
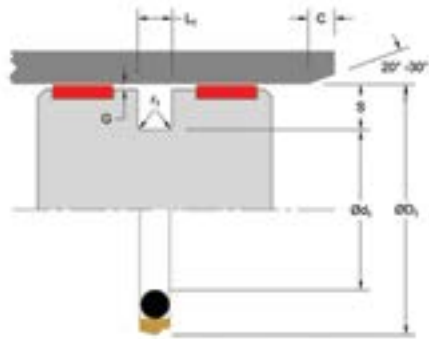
At pressure >5800 psi use diameter tolerance H8/f7.  
\*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                |           |                 |                 |                |
|-----------------|-----------------|----------------|----------------|-----------|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |           | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |           | Tol. H9         | Tol. h9         | Tol. +0.2      |
| 8.0             | 3.1             | 2.2            | P16MR00080**** | Also Fits | -               | -               | -              |
| 9.0             | 4.1             | 2.2            | P16MR00090**** | Also Fits | -               | -               | -              |
| 10.0            | 5.1             | 2.2            | P16MR00100**** | Also Fits | -               | -               | -              |
| 12.0            | 7.1             | 2.2            | P16MR00120**** | Also Fits | -               | -               | -              |
| 14.0            | 9.1             | 2.2            | P16MR00140**** | Also Fits | -               | -               | -              |
| 15.0            | 10.1            | 2.2            | P16MR00150**** | Also Fits | -               | -               | -              |
| 16.0            | 11.1            | 2.2            | P16MR00160**** | Also Fits | -               | -               | -              |
| 18.0            | 10.5            | 3.2            | P16MR00180**** | Also Fits | 18.0            | 10.7            | 3.2            |
| 18.0            | 13.1            | 2.2            | P16ML00180**** | Also Fits | -               | -               | -              |
| 20.0            | 12.5            | 3.2            | P16MR00200**** | Also Fits | 20.0            | 12.7            | 3.2            |
| 20.0            | 15.1            | 2.2            | P16ML00200**** | Also Fits | -               | -               | -              |
| 20.0            | 9.0             | 4.2            | P16MH00200**** | Also Fits | 20.0            | 9.3             | 4.2            |
| 22.0            | 14.5            | 3.2            | P16MR00220**** | Also Fits | 22.0            | 14.7            | 3.2            |
| 22.0            | 11.0            | 4.2            | P16MH00220**** | Also Fits | 22.0            | 11.3            | 4.2            |
| 25.0            | 17.5            | 3.2            | P16MR00250**** | Also Fits | 25.0            | 17.7            | 3.2            |
| 25.0            | 20.1            | 2.2            | P16ML00250**** | Also Fits | -               | -               | -              |
| 25.0            | 14.0            | 4.2            | P16MH00250**** | Also Fits | 25.0            | 14.3            | 4.2            |
| 28.0            | 17.0            | 4.2            | P16MR00280**** | Also Fits | 28.0            | 17.3            | 4.2            |
| 28.0            | 20.5            | 3.2            | P16ML00280**** | Also Fits | 28.0            | 20.7            | 3.2            |
| 28.0            | 12.5            | 6.3            | P16MH00280**** | Also Fits | 28.0            | 12.9            | 6.3            |
| 30.0            | 19.0            | 4.2            | P16MR00300**** | Also Fits | 30.0            | 19.3            | 4.2            |
| 30.0            | 22.5            | 3.2            | P16ML00300**** | Also Fits | 30.0            | 22.7            | 3.2            |
| 30.0            | 14.5            | 6.3            | P16MH00300**** | Also Fits | 30.0            | 14.9            | 6.3            |
| 32.0            | 21.0            | 4.2            | P16MR00320**** | Also Fits | 32.0            | 21.3            | 4.2            |
| 32.0            | 24.5            | 3.2            | P16ML00320**** | Also Fits | 32.0            | 24.7            | 3.2            |
| 35.0            | 24.0            | 4.2            | P16MR00350**** | Also Fits | 35.0            | 24.3            | 4.2            |
| 35.0            | 27.5            | 3.2            | P16ML00350**** | Also Fits | 35.0            | 27.7            | 3.2            |
| 36.0            | 25.0            | 4.2            | P16MR00360**** | Also Fits | 36.0            | 25.3            | 4.2            |

| METRIC          |                 |                |                |           |                 |                 |                |
|-----------------|-----------------|----------------|----------------|-----------|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |           | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |           | Tol. H9         | Tol. h9         | Tol. +0.2      |
| 36.0            | 28.5            | 3.2            | P16ML00360**** | Also Fits | 36.0            | 28.7            | 3.2            |
| 40.0            | 29.0            | 4.2            | P16MR00400**** | Also Fits | 40.0            | 29.3            | 4.2            |
| 40.0            | 32.5            | 3.2            | P16ML00400**** | Also Fits | 40.0            | 32.7            | 3.2            |
| 40.0            | 24.5            | 6.3            | P16MH00400**** | Also Fits | 40.0            | 24.9            | 6.3            |
| 42.0            | 31.0            | 4.2            | P16MR00420**** | Also Fits | 42.0            | 31.3            | 4.2            |
| 42.0            | 34.5            | 3.2            | P16ML00420**** | Also Fits | 42.0            | 34.7            | 3.2            |
| 43.0            | 27.5            | 6.3            | P16MH00430**** | Also Fits | 43.0            | 27.9            | 6.3            |
| 45.0            | 34.0            | 4.2            | P16MR00450**** | Also Fits | 45.0            | 34.3            | 4.2            |
| 45.0            | 37.5            | 3.2            | P16ML00450**** | Also Fits | 45.0            | 37.7            | 3.2            |
| 45.0            | 29.5            | 6.3            | P16MH00450**** | Also Fits | 45.0            | 29.9            | 6.3            |
| 48.0            | 40.5            | 3.2            | P16ML00480**** | Also Fits | 48.0            | 40.7            | 3.2            |
| 50.0            | 39.0            | 4.2            | P16MR00500**** | Also Fits | 50.0            | 39.3            | 4.2            |
| 50.0            | 42.5            | 3.2            | P16ML00500**** | Also Fits | 50.0            | 42.7            | 3.2            |
| 50.0            | 34.5            | 6.3            | P16MH00500**** | Also Fits | 50.0            | 34.9            | 6.3            |
| 52.0            | 44.5            | 3.2            | P16ML00520**** | Also Fits | 52.0            | 44.7            | 3.2            |
| 55.0            | 44.0            | 4.2            | P16MR00550**** | Also Fits | 55.0            | 44.3            | 4.2            |
| 55.0            | 47.5            | 3.2            | P16ML00550**** | Also Fits | 55.0            | 47.7            | 3.2            |
| 55.0            | 39.5            | 6.3            | P16MH00550**** | Also Fits | 55.0            | 39.9            | 6.3            |
| 56.0            | 45.0            | 4.2            | P16MR00560**** | Also Fits | 56.0            | 45.3            | 4.2            |
| 56.0            | 40.5            | 6.3            | P16MH00560**** | Also Fits | 56.0            | 40.9            | 6.3            |
| 60.0            | 44.5            | 6.3            | P16MR00600**** | Also Fits | 60.0            | 44.9            | 6.3            |
| 60.0            | 49.0            | 4.2            | P16ML00600**** | Also Fits | 60.0            | 49.3            | 4.2            |
| 63.0            | 47.5            | 6.3            | P16MR00630**** | Also Fits | 63.0            | 47.9            | 6.3            |
| 63.0            | 52.0            | 4.2            | P16ML00630**** | Also Fits | 63.0            | 52.3            | 4.2            |
| 65.0            | 49.5            | 6.3            | P16MR00650**** | Also Fits | 65.0            | 49.9            | 6.3            |
| 65.0            | 54.0            | 4.2            | P16ML00650**** | Also Fits | 65.0            | 54.3            | 4.2            |
| 70.0            | 54.5            | 6.3            | P16MR00700**** | Also Fits | 70.0            | 54.9            | 6.3            |
| 70.0            | 59.0            | 4.2            | P16ML00700**** | Also Fits | 70.0            | 59.3            | 4.2            |





PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |           |  | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|--|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |           |  |                 |                 |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |           |  | Tol. H9         | Tol. h9         | Tol. +0.2      |
| 75.0            | 59.5            | 6.3            | P16MR00750**** | Also Fits |  | 75.0            | 59.9            | 6.3            |
| 75.0            | 64.0            | 4.2            | P16ML00750**** | Also Fits |  | 75.0            | 63.3            | 4.2            |
| 78.0            | 62.5            | 6.3            | P16MR00780**** | Also Fits |  | 78.0            | 62.9            | 6.3            |
| 78.0            | 67.0            | 4.2            | P16ML00780**** | Also Fits |  | 78.0            | 66.3            | 4.2            |
| 80.0            | 64.5            | 6.3            | P16MR00800**** | Also Fits |  | 80.0            | 64.9            | 6.3            |
| 80.0            | 69.0            | 4.2            | P16ML00800**** | Also Fits |  | 80.0            | 69.3            | 4.2            |
| 80.0            | 59.0            | 8.1            | P16MH00800**** | Also Fits |  | 80.0            | 59.5            | 8.1            |
| 85.0            | 69.5            | 6.3            | P16MR00850**** | Also Fits |  | 85.0            | 69.9            | 6.3            |
| 85.0            | 74.0            | 4.2            | P16ML00850**** | Also Fits |  | 85.0            | 74.3            | 4.2            |
| 85.0            | 64.0            | 8.1            | P16MH00850**** | Also Fits |  | 85.0            | 64.5            | 8.1            |
| 90.0            | 74.5            | 6.3            | P16MR00900**** | Also Fits |  | 90.0            | 74.9            | 6.3            |
| 90.0            | 79.0            | 4.2            | P16ML00900**** | Also Fits |  | 90.0            | 79.3            | 4.2            |
| 90.0            | 69.0            | 8.1            | P16MH00900**** | Also Fits |  | 90.0            | 69.5            | 8.1            |
| 95.0            | 79.5            | 6.3            | P16MR00950**** | Also Fits |  | 95.0            | 79.9            | 6.3            |
| 95.0            | 84.0            | 4.2            | P16ML00950**** | Also Fits |  | 95.0            | 84.3            | 4.2            |
| 95.0            | 74.0            | 8.1            | P16MH00950**** | Also Fits |  | 95.0            | 74.5            | 8.1            |
| 97.0            | 81.5            | 6.3            | P16MR00970**** | Also Fits |  | 97.0            | 81.9            | 6.3            |
| 97.0            | 76.0            | 8.1            | P16MH00970**** | Also Fits |  | 97.0            | 76.5            | 8.1            |
| 100.0           | 84.5            | 6.3            | P16MR01000**** | Also Fits |  | 100.0           | 84.9            | 6.3            |
| 100.0           | 89.0            | 4.2            | P16ML01000**** | Also Fits |  | 100.0           | 89.3            | 4.2            |
| 100.0           | 79.0            | 8.1            | P16MH01000**** | Also Fits |  | 100.0           | 79.5            | 8.1            |
| 105.0           | 89.5            | 6.3            | P16MR01050**** | Also Fits |  | 105.0           | 89.9            | 6.3            |
| 105.0           | 94.0            | 4.2            | P16ML01050**** | Also Fits |  | 105.0           | 94.3            | 4.2            |
| 105.0           | 84.0            | 8.1            | P16MH01050**** | Also Fits |  | 105.0           | 84.5            | 8.1            |
| 110.0           | 94.5            | 6.3            | P16MR01100**** | Also Fits |  | 110.0           | 94.9            | 6.3            |
| 110.0           | 99.0            | 4.2            | P16ML01100**** | Also Fits |  | 110.0           | 99.3            | 4.2            |
| 110.0           | 89.0            | 8.1            | P16MH01100**** | Also Fits |  | 110.0           | 89.5            | 8.1            |
| 115.0           | 99.5            | 6.3            | P16MR01150**** | Also Fits |  | 115.0           | 99.9            | 6.3            |

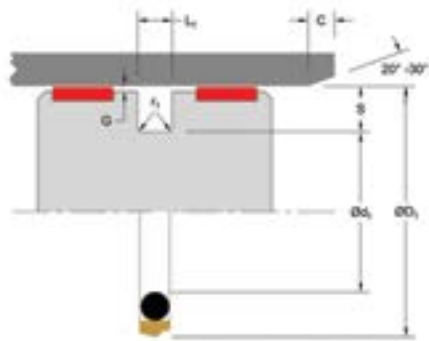
| METRIC          |                 |                | PART NUMBER    |           |  | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|--|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |           |  |                 |                 |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |           |  | Tol. H9         | Tol. h9         | Tol. +0.2      |
| 115.0           | 104.0           | 4.2            | P16ML01150**** | Also Fits |  | 115.0           | 99.3            | 4.2            |
| 115.0           | 94.0            | 8.1            | P16MH01150**** | Also Fits |  | 115.0           | 94.5            | 8.1            |
| 120.0           | 104.5           | 6.3            | P16MR01200**** | Also Fits |  | 120.0           | 104.9           | 6.3            |
| 120.0           | 109.0           | 4.2            | P16ML01200**** | Also Fits |  | 120.0           | 104.3           | 4.2            |
| 120.0           | 99.0            | 8.1            | P16MH01200**** | Also Fits |  | 120.0           | 99.5            | 8.1            |
| 125.0           | 109.5           | 6.3            | P16MR01250**** | Also Fits |  | 125.0           | 109.9           | 6.3            |
| 125.0           | 114.0           | 4.2            | P16ML01250**** | Also Fits |  | 125.0           | 109.3           | 4.2            |
| 125.0           | 104.0           | 8.1            | P16MH01250**** | Also Fits |  | 125.0           | 104.5           | 8.1            |
| 130.0           | 114.5           | 6.3            | P16MR01300**** | Also Fits |  | 130.0           | 114.9           | 6.3            |
| 130.0           | 119.0           | 4.2            | P16ML01300**** | Also Fits |  | 130.0           | 114.3           | 4.2            |
| 130.0           | 109.0           | 8.1            | P16MH01300**** | Also Fits |  | 130.0           | 109.5           | 8.1            |
| 135.0           | 119.5           | 6.3            | P16MR01350**** | Also Fits |  | 135.0           | 119.9           | 6.3            |
| 135.0           | 124.0           | 4.2            | P16ML01350**** | Also Fits |  | 135.0           | 124.3           | 4.2            |
| 135.0           | 114.0           | 8.1            | P16MH01350**** | Also Fits |  | 135.0           | 114.5           | 8.1            |
| 140.0           | 124.5           | 6.3            | P16MR01400**** | Also Fits |  | 140.0           | 124.9           | 6.3            |
| 140.0           | 129.0           | 4.2            | P16ML01400**** | Also Fits |  | 140.0           | 129.3           | 4.2            |
| 140.0           | 119.0           | 8.1            | P16MH01400**** | Also Fits |  | 140.0           | 119.5           | 8.1            |
| 145.0           | 129.5           | 6.3            | P16MR01450**** | Also Fits |  | 145.0           | 129.9           | 6.3            |
| 145.0           | 134.0           | 4.2            | P16ML01450**** | Also Fits |  | 145.0           | 134.3           | 4.2            |
| 145.0           | 124.0           | 8.1            | P16MH01450**** | Also Fits |  | 145.0           | 124.5           | 8.1            |
| 150.0           | 134.5           | 6.3            | P16MR01500**** | Also Fits |  | 150.0           | 134.9           | 6.3            |
| 150.0           | 139.0           | 4.2            | P16ML01500**** | Also Fits |  | 150.0           | 139.3           | 4.2            |
| 150.0           | 129.0           | 8.1            | P16MH01500**** | Also Fits |  | 150.0           | 129.5           | 8.1            |
| 155.0           | 139.5           | 6.3            | P16MR01550**** | Also Fits |  | 155.0           | 139.9           | 6.3            |
| 155.0           | 144.0           | 4.2            | P16ML01550**** | Also Fits |  | 155.0           | 144.3           | 4.2            |
| 155.0           | 134.0           | 8.1            | P16MH01550**** | Also Fits |  | 155.0           | 134.5           | 8.1            |
| 160.0           | 144.5           | 6.3            | P16MR01600**** | Also Fits |  | 160.0           | 144.9           | 6.3            |
| 160.0           | 149.0           | 4.2            | P16ML01600**** | Also Fits |  | 160.0           | 149.3           | 4.2            |

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |           |  | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|--|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |           |  |                 |                 |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |           |  | Tol. H9         | Tol. h9         | Tol. +0.2      |
| 160.0           | 139.0           | 8.1            | P16MH01600**** | Also Fits |  | 160.0           | 139.5           | 8.1            |
| 165.0           | 154.0           | 4.2            | P16ML01650**** | Also Fits |  | 165.0           | 154.3           | 4.2            |
| 170.0           | 154.5           | 6.3            | P16MR01700**** | Also Fits |  | 170.0           | 154.9           | 6.3            |
| 170.0           | 159.0           | 4.2            | P16ML01700**** | Also Fits |  | 170.0           | 159.3           | 4.2            |
| 170.0           | 149.0           | 8.1            | P16MH01700**** | Also Fits |  | 170.0           | 149.5           | 8.1            |
| 175.0           | 164.0           | 4.2            | P16ML01750**** | Also Fits |  | 175.0           | 164.3           | 4.2            |
| 180.0           | 164.5           | 6.3            | P16MR01800**** | Also Fits |  | 180.0           | 164.9           | 6.3            |
| 180.0           | 169.0           | 4.2            | P16ML01800**** | Also Fits |  | 180.0           | 169.3           | 4.2            |
| 180.0           | 159.0           | 8.1            | P16MH01800**** | Also Fits |  | 180.0           | 159.5           | 8.1            |
| 190.0           | 174.5           | 6.3            | P16MR01900**** | Also Fits |  | 190.0           | 174.9           | 6.3            |
| 190.0           | 179.0           | 4.2            | P16ML01900**** | Also Fits |  | 190.0           | 179.3           | 4.2            |
| 190.0           | 169.0           | 8.1            | P16MH01900**** | Also Fits |  | 190.0           | 169.5           | 8.1            |
| 200.0           | 179.0           | 8.1            | P16MR02000**** | Also Fits |  | 200.0           | 179.5           | 8.1            |
| 200.0           | 184.5           | 6.3            | P16ML02000**** | Also Fits |  | 200.0           | 184.9           | 6.3            |
| 205.0           | 189.5           | 6.3            | P16ML02050**** | Also Fits |  | 205.0           | 189.9           | 6.3            |
| 210.0           | 189.0           | 8.1            | P16MR02100**** | Also Fits |  | 210.0           | 189.5           | 8.1            |
| 210.0           | 194.5           | 6.3            | P16ML02100**** | Also Fits |  | 210.0           | 194.9           | 6.3            |
| 210.0           | 185.5           | 8.1            | P16MH02100**** | Also Fits |  | 210.0           | 186.0           | 8.1            |
| 220.0           | 199.0           | 8.1            | P16MR02200**** | Also Fits |  | 220.0           | 199.5           | 8.1            |
| 220.0           | 204.5           | 6.3            | P16ML02200**** | Also Fits |  | 220.0           | 204.9           | 6.3            |
| 220.0           | 195.5           | 8.1            | P16MH02200**** | Also Fits |  | 220.0           | 196.0           | 8.1            |
| 225.0           | 204.0           | 8.1            | P16MR02250**** | Also Fits |  | 225.0           | 204.5           | 8.1            |
| 225.0           | 200.5           | 8.1            | P16MH02250**** | Also Fits |  | 225.0           | 201.0           | 8.1            |
| 230.0           | 214.5           | 6.3            | P16ML02300**** | Also Fits |  | 230.0           | 214.9           | 6.3            |
| 240.0           | 219.0           | 8.1            | P16MR02400**** | Also Fits |  | 240.0           | 219.5           | 8.1            |
| 240.0           | 224.5           | 6.3            | P16ML02400**** | Also Fits |  | 240.0           | 224.9           | 6.3            |
| 240.0           | 215.5           | 8.1            | P16MH02400**** | Also Fits |  | 240.0           | 216.0           | 8.1            |
| 250.0           | 229.0           | 8.1            | P16MR02500**** | Also Fits |  | 250.0           | 229.5           | 8.1            |

| METRIC          |                 |                | PART NUMBER    |           |  | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|--|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |           |  |                 |                 |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |           |  | Tol. H9         | Tol. h9         | Tol. +0.2      |
| 250.0           | 234.5           | 6.3            | P16ML02500**** | Also Fits |  | 250.0           | 234.9           | 6.3            |
| 250.0           | 225.5           | 8.1            | P16MH02500**** | Also Fits |  | 250.0           | 226.0           | 8.1            |
| 260.0           | 235.5           | 8.1            | P16MR02600**** | Also Fits |  | 260.0           | 236.0           | 8.1            |
| 260.0           | 239.0           | 8.1            | P16ML02600**** | Also Fits |  | 260.0           | 239.5           | 8.1            |
| 260.0           | 232.0           | 9.5            | P16MH02600**** | Also Fits |  | -               | -               | -              |
| 270.0           | 245.5           | 8.1            | P16MR02700**** | Also Fits |  | 270.0           | 246.0           | 8.1            |
| 270.0           | 249.0           | 8.1            | P16ML02700**** | Also Fits |  | 270.0           | 249.5           | 8.1            |
| 270.0           | 242.0           | 9.5            | P16MH02700**** | Also Fits |  | -               | -               | -              |
| 280.0           | 255.5           | 8.1            | P16MR02800**** | Also Fits |  | 280.0           | 256.0           | 8.1            |
| 280.0           | 259.0           | 8.1            | P16ML02800**** | Also Fits |  | 280.0           | 259.5           | 8.1            |
| 280.0           | 252.0           | 9.5            | P16MH02800**** | Also Fits |  | -               | -               | -              |
| 290.0           | 265.5           | 8.1            | P16MR02900**** | Also Fits |  | 290.0           | 266.0           | 8.1            |
| 290.0           | 269.0           | 8.1            | P16ML02900**** | Also Fits |  | 290.0           | 269.5           | 8.1            |
| 300.0           | 275.5           | 8.1            | P16MR03000**** | Also Fits |  | 300.0           | 276.0           | 8.1            |
| 300.0           | 279.0           | 8.1            | P16ML03000**** | Also Fits |  | 300.0           | 279.5           | 8.1            |
| 300.0           | 272.0           | 9.5            | P16MH03000**** | Also Fits |  | -               | -               | -              |
| 310.0           | 282.0           | 9.5            | P16MH03100**** | Also Fits |  | -               | -               | -              |
| 320.0           | 295.5           | 8.1            | P16MR03200**** | Also Fits |  | 320.0           | 296.0           | 8.1            |
| 320.0           | 299.0           | 8.1            | P16ML03200**** | Also Fits |  | 320.0           | 299.5           | 8.1            |
| 320.0           | 292.0           | 9.5            | P16MH03200**** | Also Fits |  | -               | -               | -              |
| 330.0           | 305.5           | 8.1            | P16MR03300**** | Also Fits |  | 330.0           | 306.0           | 8.1            |
| 330.0           | 309.0           | 8.1            | P16ML03300**** | Also Fits |  | 330.0           | 309.5           | 8.1            |
| 330.0           | 302.0           | 9.5            | P16MH03300**** | Also Fits |  | -               | -               | -              |
| 340.0           | 315.5           | 8.1            | P16MR03400**** | Also Fits |  | 340.0           | 316.0           | 8.1            |
| 340.0           | 319.0           | 8.1            | P16ML03400**** | Also Fits |  | 340.0           | 319.5           | 8.1            |
| 340.0           | 312.0           | 9.5            | P16MH03400**** | Also Fits |  | -               | -               | -              |
| 345.0           | 320.5           | 8.1            | P16MR03450**** | Also Fits |  | 345.0           | 321.0           | 8.1            |
| 350.0           | 325.5           | 8.1            | P16MR03500**** | Also Fits |  | 350.0           | 326.0           | 8.1            |

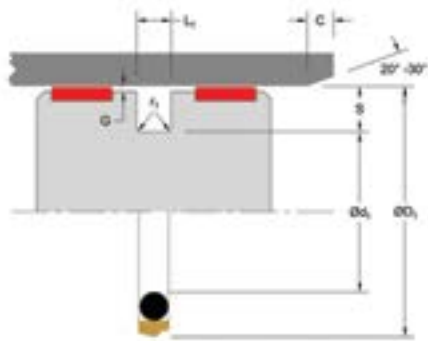




PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |           |       | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|-------|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |           |       |                 |                 |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |           |       | Tol. H9         | Tol. h9         | Tol. +0.2      |
| 350.0           | 329.0           | 8.1            | P16ML03500**** | Also Fits |       | 350.0           | 329.5           | 8.1            |
| 350.0           | 322.0           | 9.5            | P16MH03500**** | Also Fits | -     | -               | -               |                |
| 360.0           | 335.5           | 8.1            | P16MR03600**** | Also Fits | 360.0 | 336.0           | 8.1             |                |
| 360.0           | 339.0           | 8.1            | P16ML03600**** | Also Fits | 360.0 | 339.5           | 8.1             |                |
| 360.0           | 332.0           | 9.5            | P16MH03600**** | Also Fits | -     | -               | -               |                |
| 370.0           | 345.5           | 8.1            | P16MR03700**** | Also Fits | 370.0 | 346.0           | 8.1             |                |
| 370.0           | 349.0           | 8.1            | P16ML03700**** | Also Fits | 370.0 | 349.5           | 8.1             |                |
| 370.0           | 342.0           | 9.5            | P16MH03700**** | Also Fits | -     | -               | -               |                |
| 380.0           | 355.5           | 8.1            | P16MR03800**** | Also Fits | 380.0 | 356.0           | 8.1             |                |
| 380.0           | 359.0           | 8.1            | P16ML03800**** | Also Fits | 380.0 | 359.5           | 8.1             |                |
| 380.0           | 352.0           | 9.5            | P16MH03800**** | Also Fits | -     | -               | -               |                |
| 390.0           | 369.0           | 8.1            | P16ML03900**** | Also Fits | 390.0 | 369.5           | 8.1             |                |
| 390.0           | 362.0           | 9.5            | P16MH03900**** | Also Fits | -     | -               | -               |                |
| 400.0           | 375.5           | 8.1            | P16MR04000**** | Also Fits | 400.0 | 376.0           | 8.1             |                |
| 400.0           | 379.0           | 8.1            | P16ML04000**** | Also Fits | 400.0 | 379.5           | 8.1             |                |
| 400.0           | 372.0           | 9.5            | P16MH04000**** | Also Fits | -     | -               | -               |                |
| 410.0           | 389.0           | 8.1            | P16ML04100**** | Also Fits | 410.0 | 389.5           | 8.1             |                |
| 410.0           | 382.0           | 9.5            | P16MH04100**** | Also Fits | -     | -               | -               |                |
| 420.0           | 395.5           | 8.1            | P16MR04200**** | Also Fits | 420.0 | 396.0           | 8.1             |                |
| 420.0           | 399.0           | 8.1            | P16ML04200**** | Also Fits | 420.0 | 399.5           | 8.1             |                |
| 420.0           | 392.0           | 9.5            | P16MH04200**** | Also Fits | -     | -               | -               |                |
| 430.0           | 405.5           | 8.1            | P16MR04300**** | Also Fits | 430.0 | 406.0           | 8.1             |                |
| 440.0           | 415.5           | 8.1            | P16MR04400**** | Also Fits | 440.0 | 416.0           | 8.1             |                |
| 450.0           | 425.5           | 8.1            | P16MR04500**** | Also Fits | 450.0 | 426.0           | 8.1             |                |
| 450.0           | 429.0           | 8.1            | P16ML04500**** | Also Fits | 450.0 | 429.5           | 8.1             |                |
| 450.0           | 422.0           | 9.5            | P16MH04500**** | Also Fits | -     | -               | -               |                |
| 460.0           | 439.0           | 8.1            | P16ML04600**** | Also Fits | 460.0 | 439.5           | 8.1             |                |
| 460.0           | 432.0           | 9.5            | P16MH04600**** | Also Fits | -     | -               | -               |                |

| METRIC          |                 |                | PART NUMBER    |           |       | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|-------|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |           |       |                 |                 |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |           |       | Tol. H9         | Tol. h9         | Tol. +0.2      |
| 480.0           | 455.5           | 8.1            | P16MR04800**** | Also Fits |       | 480.0           | 456.0           | 8.1            |
| 480.0           | 459.0           | 8.1            | P16ML04800**** | Also Fits | 480.0 | 459.5           | 8.1             |                |
| 480.0           | 452.0           | 9.5            | P16MH04800**** | Also Fits | -     | -               | -               |                |
| 500.0           | 475.5           | 8.1            | P16MR05000**** | Also Fits | 500.0 | 476.0           | 8.1             |                |
| 500.0           | 479.0           | 8.1            | P16ML05000**** | Also Fits | 500.0 | 479.5           | 8.1             |                |
| 500.0           | 472.0           | 9.5            | P16MH05000**** | Also Fits | -     | -               | -               |                |
| 520.0           | 495.5           | 8.1            | P16MR05200**** | Also Fits | 520.0 | 496.0           | 8.1             |                |
| 520.0           | 499.0           | 8.1            | P16ML05200**** | Also Fits | 520.0 | 499.5           | 8.1             |                |
| 520.0           | 492.0           | 9.5            | P16MH05200**** | Also Fits | -     | -               | -               |                |
| 540.0           | 515.5           | 8.1            | P16MR05400**** | Also Fits | 540.0 | 516.0           | 8.1             |                |
| 550.0           | 529.0           | 8.1            | P16ML05500**** | Also Fits | 550.0 | 529.5           | 8.1             |                |
| 550.0           | 522.0           | 9.5            | P16MH05500**** | Also Fits | -     | -               | -               |                |
| 560.0           | 539.0           | 8.1            | P16ML05600**** | Also Fits | 560.0 | 539.5           | 8.1             |                |
| 560.0           | 532.0           | 9.5            | P16MH05600**** | Also Fits | -     | -               | -               |                |
| 590.0           | 569.0           | 8.1            | P16ML05900**** | Also Fits | 590.0 | 569.5           | 8.1             |                |
| 590.0           | 562.0           | 9.5            | P16MH05900**** | Also Fits | -     | -               | -               |                |
| 600.0           | 575.5           | 8.1            | P16MR06000**** | Also Fits | 600.0 | 576.0           | 8.1             |                |
| 600.0           | 579.0           | 8.1            | P16ML06000**** | Also Fits | 600.0 | 579.5           | 8.1             |                |
| 600.0           | 572.0           | 9.5            | P16MH06000**** | Also Fits | -     | -               | -               |                |
| 625.0           | 604.0           | 8.1            | P16ML06250**** | Also Fits | 625.0 | 604.5           | 8.1             |                |
| 625.0           | 597.0           | 9.5            | P16MH06250**** | Also Fits | -     | -               | -               |                |
| 650.0           | 625.5           | 8.1            | P16MR06500**** | Also Fits | 650.0 | 626.0           | 8.1             |                |
| 650.0           | 629.0           | 8.1            | P16ML06500**** | Also Fits | 650.0 | 629.5           | 8.1             |                |
| 650.0           | 622.0           | 9.5            | P16MH06500**** | Also Fits | -     | -               | -               |                |
| 700.0           | 672.0           | 9.5            | P16MR07000**** | Also Fits | -     | -               | -               |                |
| 700.0           | 675.5           | 8.1            | P16ML07000**** | Also Fits | 700.0 | 676.0           | 8.1             |                |
| 700.0           | 662.0           | 13.8           | P16MH07000**** | Also Fits | -     | -               | -               |                |
| 750.0           | 722.0           | 9.5            | P16MR07500**** | Also Fits | -     | -               | -               |                |



PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |           |       | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|-----------|-------|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |           |       |                 |                 |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |           |       | Tol. H9         | Tol. h9         | Tol. +0.2      |
| 800.0           | 772.0           | 9.5            | P16MR08000**** | Also Fits | -     | -               | -               |                |
| 800.0           | 775.5           | 8.1            | P16ML08000**** | Also Fits | 800.0 | 776.0           | 8.1             |                |
| 800.0           | 762.0           | 13.8           | P16MH08000**** | Also Fits | -     | -               | -               |                |
| 850.0           | 822.0           | 9.5            | P16MR08500**** | Also Fits | -     | -               | -               |                |
| 850.0           | 812.0           | 13.8           | P16MH08500**** | Also Fits | -     | -               | -               |                |
| 860.0           | 835.5           | 8.1            | P16ML08600**** | Also Fits | 860.0 | 836.0           | 8.1             |                |
| 900.0           | 872.0           | 9.5            | P16MR09000**** | Also Fits | -     | -               | -               |                |
| 900.0           | 875.5           | 8.1            | P16ML09000**** | Also Fits | 900.0 | 876.0           | 8.1             |                |
| 900.0           | 862.0           | 13.8           | P16MH09000**** | Also Fits | -     | -               | -               |                |
| 920.0           | 895.5           | 8.1            | P16ML09200**** | Also Fits | 920.0 | 896.0           | 8.1             |                |
| 920.0           | 882.0           | 13.8           | P16MH09200**** | Also Fits | -     | -               | -               |                |
| 950.0           | 922.0           | 9.5            | P16MR09500**** | Also Fits | -     | -               | -               |                |
| 1000.0          | 962.0           | 13.8           | P16MR10000**** | Also Fits | -     | -               | -               |                |
| 1000.0          | 972.0           | 9.5            | P16ML10000**** | Also Fits | -     | -               | -               |                |
| 1050.0          | 1012.0          | 13.8           | P16MR10500**** | Also Fits | -     | -               | -               |                |
| 1050.0          | 1022.0          | 9.5            | P16ML10500**** | Also Fits | -     | -               | -               |                |
| 1100.0          | 1062.0          | 13.8           | P16MR11000**** | Also Fits | -     | -               | -               |                |
| 1100.0          | 1072.0          | 9.5            | P16ML11000**** | Also Fits | -     | -               | -               |                |
| 1150.0          | 1112.0          | 13.8           | P16MR11500**** | Also Fits | -     | -               | -               |                |
| 1150.0          | 1122.0          | 9.5            | P16ML11500**** | Also Fits | -     | -               | -               |                |
| 1200.0          | 1162.0          | 13.8           | P16MR12000**** | Also Fits | -     | -               | -               |                |
| 1200.0          | 1172.0          | 9.5            | P16ML12000**** | Also Fits | -     | -               | -               |                |
| 1250.0          | 1212.0          | 13.8           | P16MR12500**** | Also Fits | -     | -               | -               |                |
| 1300.0          | 1262.0          | 13.8           | P16MR13000**** | Also Fits | -     | -               | -               |                |
| 1350.0          | 1312.0          | 13.8           | P16MR13500**** | Also Fits | -     | -               | -               |                |

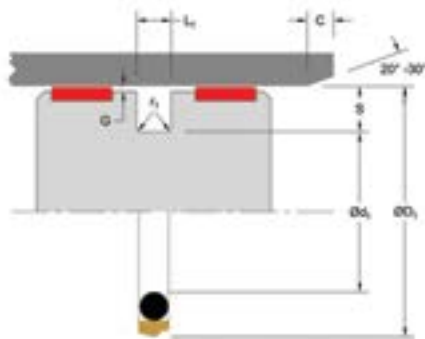
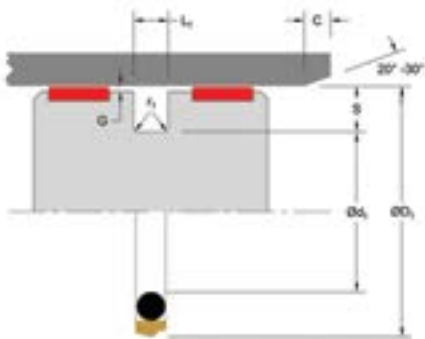
\*Please contact Hallite for custom sizes, material selection, or seal design.

P16  
PISTON SEAL  
Single-Acting

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |  |  | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |
|-----------------|-----------------|----------------|----------------|--|--|-----------------|-----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |  |  |                 |                 |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |  |  | Tol. H9         | Tol. h9         | Tol. +0.008    |
| 0.500           | 0.307           | 0.087          | P16ER00500**** |  |  |                 |                 |                |
| 0.562           | 0.369           | 0.087          | P16ER00562**** |  |  |                 |                 |                |
| 0.625           | 0.432           | 0.087          | P16ER00625**** |  |  |                 |                 |                |
| 0.687           | 0.494           | 0.087          | P16ER00687**** |  |  |                 |                 |                |
| 0.750           | 0.557           | 0.087          | P16EL00750**** |  |  |                 |                 |                |
| 0.750           | 0.329           | 0.165          | P16EH00750**** |  |  |                 |                 |                |
| 0.812           | 0.525           | 0.126          | P16ER00812**** |  |  |                 |                 |                |
| 0.812           | 0.391           | 0.165          | P16EH00812**** |  |  |                 |                 |                |
| 0.875           | 0.588           | 0.126          | P16ER00875**** |  |  |                 |                 |                |
| 0.875           | 0.454           | 0.165          | P16EH00875**** |  |  |                 |                 |                |
| 0.937           | 0.650           | 0.126          | P16ER00937**** |  |  |                 |                 |                |
| 0.937           | 0.516           | 0.165          | P16EH00937**** |  |  |                 |                 |                |
| 1.000           | 0.713           | 0.126          | P16ER01000**** |  |  |                 |                 |                |
| 1.000           | 0.579           | 0.165          | P16EH01000**** |  |  |                 |                 |                |
| 1.062           | 0.775           | 0.126          | P16ER01062**** |  |  |                 |                 |                |
| 1.062           | 0.641           | 0.165          | P16EH01062**** |  |  |                 |                 |                |
| 1.125           | 0.838           | 0.126          | P16ER01125**** |  |  |                 |                 |                |
| 1.125           | 0.704           | 0.165          | P16EH01125**** |  |  |                 |                 |                |
| 1.187           | 0.900           | 0.126          | P16ER01187***  |  |  |                 |                 |                |
| 1.187           | 0.766           | 0.165          | P16EH01187**** |  |  |                 |                 |                |
| 1.250           | 0.963           | 0.126          | P16ER01250**** |  |  |                 |                 |                |
| 1.250           | 0.829           | 0.165          | P16EH01250**** |  |  |                 |                 |                |
| 1.312           | 1.025           | 0.126          | P16ER01312**** |  |  |                 |                 |                |
| 1.312           | 0.891           | 0.165          | P16EH01312**** |  |  |                 |                 |                |
| 1.375           | 1.088           | 0.126          | P16ER01375**** |  |  |                 |                 |                |
| 1.375           | 0.954           | 0.165          | P16EH01375**** |  |  |                 |                 |                |
| 1.437           | 1.150           | 0.126          | P16ER01437**** |  |  |                 |                 |                |
| 1.437           | 1.016           | 0.165          | P16EH01437**** |  |  |                 |                 |                |





# P16

PISTON SEAL

Single-Acting

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 1.500           | 1.213           | 0.126          | P16EL01500**** |
| 1.500           | 1.079           | 0.165          | P16ER01500**** |
| 1.500           | 0.906           | 0.248          | P16EH01500**** |
| 1.562           | 1.141           | 0.165          | P16ER01563**** |
| 1.562           | 0.968           | 0.248          | P16EH01563**** |
| 1.625           | 1.204           | 0.165          | P16ER01625**** |
| 1.625           | 1.031           | 0.248          | P16EH01625**** |
| 1.687           | 1.266           | 0.165          | P16ER01687**** |
| 1.687           | 1.093           | 0.248          | P16EH01687**** |
| 1.750           | 1.329           | 0.165          | P16ER01750**** |
| 1.750           | 1.156           | 0.248          | P16EH01750**** |
| 1.812           | 1.391           | 0.165          | P16ER01812**** |
| 1.812           | 1.218           | 0.248          | P16EH01812**** |
| 1.875           | 1.454           | 0.165          | P16ER01875**** |
| 1.875           | 1.281           | 0.248          | P16EH01875**** |
| 1.937           | 1.516           | 0.165          | P16ER01937**** |
| 1.937           | 1.343           | 0.248          | P16EH01937**** |
| 2.000           | 1.579           | 0.165          | P16ER02000**** |
| 2.000           | 1.406           | 0.248          | P16EH02000**** |
| 2.125           | 1.704           | 0.165          | P16ER02125**** |
| 2.125           | 1.531           | 0.248          | P16EH02125**** |
| 2.250           | 1.829           | 0.165          | P16ER02250**** |
| 2.250           | 1.656           | 0.248          | P16EH02250**** |
| 2.375           | 1.954           | 0.165          | P16ER02375**** |
| 2.375           | 1.781           | 0.248          | P16EH02375**** |
| 2.500           | 2.079           | 0.165          | P16EL02500**** |
| 2.500           | 1.906           | 0.248          | P16ER02500**** |
| 2.625           | 2.204           | 0.165          | P16EL02625**** |

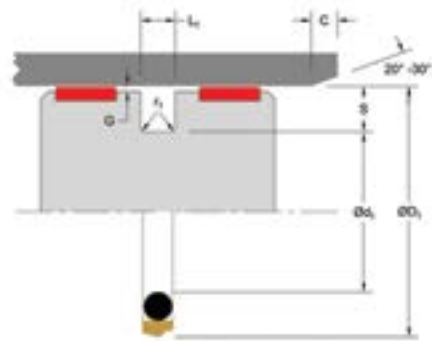
| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 2.625           | 2.031           | 0.248          | P16ER02625**** |
| 2.750           | 2.329           | 0.165          | P16EL02750**** |
| 2.750           | 2.156           | 0.248          | P16ER02750**** |
| 2.875           | 2.454           | 0.165          | P16EL02875**** |
| 2.875           | 2.281           | 0.248          | P16ER02875**** |
| 3.000           | 2.579           | 0.165          | P16EL03000**** |
| 3.000           | 2.406           | 0.248          | P16ER03000**** |
| 3.125           | 2.704           | 0.165          | P16EL03125**** |
| 3.125           | 2.531           | 0.248          | P16ER03125**** |
| 3.250           | 2.829           | 0.165          | P16EL03250**** |
| 3.250           | 2.656           | 0.248          | P16ER03250**** |
| 3.375           | 2.954           | 0.165          | P16EL03375**** |
| 3.375           | 2.781           | 0.248          | P16ER03375**** |
| 3.500           | 3.079           | 0.165          | P16EL03500**** |
| 3.500           | 2.906           | 0.248          | P16ER03500**** |
| 3.625           | 3.204           | 0.165          | P16EL03625**** |
| 3.625           | 3.031           | 0.248          | P16ER03625**** |
| 3.750           | 3.329           | 0.165          | P16EL03750**** |
| 3.750           | 3.156           | 0.248          | P16ER03750**** |
| 3.875           | 3.454           | 0.165          | P16EL03875**** |
| 3.875           | 3.281           | 0.248          | P16ER03875**** |
| 4.000           | 3.579           | 0.165          | P16EL04000**** |
| 4.000           | 3.406           | 0.248          | P16ER04000**** |
| 4.125           | 3.704           | 0.165          | P16EL04125**** |
| 4.125           | 3.531           | 0.248          | P16ER04125**** |
| 4.250           | 3.829           | 0.165          | P16EL04250**** |
| 4.250           | 3.656           | 0.248          | P16ER04250**** |
| 4.375           | 3.954           | 0.165          | P16EL04375**** |

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 4.375           | 3.781           | 0.248          | P16ER04375**** |
| 4.500           | 4.079           | 0.165          | P16EL04500**** |
| 4.500           | 3.906           | 0.248          | P16ER04500**** |
| 4.625           | 4.031           | 0.248          | P16ER04625**** |
| 4.625           | 3.818           | 0.319          | P16EH04625**** |
| 4.750           | 4.156           | 0.248          | P16ER04750**** |
| 4.750           | 3.943           | 0.319          | P16EH04750**** |
| 4.875           | 4.281           | 0.248          | P16ER04875**** |
| 4.875           | 4.068           | 0.319          | P16EH04875**** |
| 5.000           | 4.406           | 0.248          | P16ER05000**** |
| 5.000           | 4.193           | 0.319          | P16EH05000**** |
| 5.125           | 4.531           | 0.248          | P16ER05125**** |
| 5.125           | 4.318           | 0.319          | P16EH05125**** |
| 5.250           | 4.656           | 0.248          | P16ER05250**** |
| 5.250           | 4.443           | 0.319          | P16EH05250**** |
| 5.375           | 4.781           | 0.248          | P16ER05375**** |
| 5.375           | 4.568           | 0.319          | P16EH05375**** |
| 5.500           | 4.906           | 0.248          | P16ER05500**** |
| 5.500           | 4.693           | 0.319          | P16EH05500**** |
| 5.625           | 5.031           | 0.248          | P16ER05625**** |
| 5.625           | 4.818           | 0.319          | P16EH05625**** |
| 5.750           | 5.156           | 0.248          | P16ER05750**** |
| 5.750           | 4.943           | 0.319          | P16EH05750**** |
| 6.000           | 5.406           | 0.248          | P16ER06000**** |
| 6.000           | 5.193           | 0.319          | P16EH06000**** |
| 6.250           | 5.656           | 0.248          | P16ER06250**** |
| 6.250           | 5.443           | 0.319          | P16EH06250**** |
| 6.500           | 5.906           | 0.248          | P16ER06500**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 6.500           | 5.693           | 0.319          | P16EH06500**** |
| 6.750           | 6.156           | 0.248          | P16ER06750**** |
| 6.750           | 5.943           | 0.319          | P16EH06750**** |
| 7.000           | 6.406           | 0.248          | P16ER07000**** |
| 7.000           | 6.193           | 0.319          | P16EH07000**** |
| 7.250           | 6.656           | 0.248          | P16ER07250**** |
| 7.250           | 6.443           | 0.319          | P16EH07250**** |
| 7.500           | 6.906           | 0.248          | P16ER07500**** |
| 7.500           | 6.693           | 0.319          | P16EH07500**** |
| 7.750           | 7.156           | 0.248          | P16ER07750**** |
| 7.750           | 6.943           | 0.319          | P16EH07750**** |
| 8.000           | 7.193           | 0.319          | P16ER08000**** |
| 8.250           | 7.443           | 0.319          | P16ER08250**** |
| 8.500           | 7.693           | 0.319          | P16ER08500**** |
| 8.750           | 7.943           | 0.319          | P16ER08750**** |
| 9.000           | 8.193           | 0.319          | P16ER09000**** |
| 9.250           | 8.443           | 0.319          | P16ER09250**** |
| 9.500           | 8.693           | 0.319          | P16ER09500**** |
| 9.750           | 8.943           | 0.319          | P16ER09750**** |
| 10.000          | 9.193           | 0.319          | P16EL10000**** |
| 10.000          | 9.055           | 0.319          | P16ER10000**** |
| 10.500          | 9.693           | 0.319          | P16EL10500**** |
| 10.500          | 9.555           | 0.319          | P16ER10500**** |
| 11.000          | 10.193          | 0.319          | P16EL11000**** |
| 11.000          | 10.055          | 0.319          | P16ER11000**** |
| 11.500          | 10.693          | 0.319          | P16EL11500**** |
| 11.500          | 10.555          | 0.319          | P16ER11500**** |
| 12.000          | 11.055          | 0.319          | P16ER12000**** |





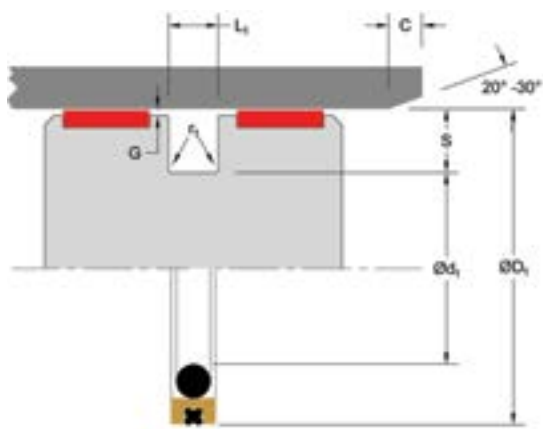
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 12.500          | 11.555          | 0.319          | P16ER12500**** |
| 13.000          | 12.055          | 0.319          | P16ER13000**** |
| 13.500          | 12.555          | 0.319          | P16ER13500**** |
| 14.000          | 13.055          | 0.319          | P16ER14000**** |
| 14.500          | 13.555          | 0.319          | P16ER14500**** |
| 15.000          | 14.055          | 0.319          | P16ER15000**** |
| 15.500          | 14.555          | 0.319          | P16ER15500**** |
| 16.000          | 15.055          | 0.319          | P16ER16000**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 16.500          | 15.555          | 0.319          | P16ER16500**** |
| 17.000          | 16.055          | 0.319          | P16ER17000**** |
| 17.500          | 16.555          | 0.319          | P16ER17500**** |
| 18.000          | 17.055          | 0.319          | P16ER18000**** |
| 18.500          | 17.555          | 0.319          | P16ER18500**** |
| 19.000          | 18.055          | 0.319          | P16ER19000**** |
| 19.500          | 18.555          | 0.319          | P16ER19500**** |
| 20.000          | 19.055          | 0.319          | P16ER20000**** |

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

GPS  
PISTON SEAL  
Double-Acting



TECHNICAL DETAILS

The Hallite GPS is a double-acting piston seal utilizing Hallite’s high-performance Armorlene® HLX PTFE paired with an elastomer energizer and x-ring for optimum performance and durability. The Armorlene® PTFE seal ring and the x-ring together provides the dynamic sealing function, while the elastomeric energizer provides the static sealing. The standard GPS seal face includes pressure notches, which makes the seal very responsive to changes in pressure or direction of travel.

Hallite GPS seals are especially effective in applications where two different types of media need to be separated such as in piston accumulators, intensifiers, and position-holding applications. This makes this seal a good choice for applications such as stabilizers, accumulators, manlifts, and industrial presses. Designed for basic grooves, the GPS seal fits the same ISO 7425-1 housing as the Hallite P16 and P54 series.



F E A T U R E S

- Excellent in separation of two different fluids under pressure
- Compact design and groove structure allow interchangeability with the Hallite P54
- Low breakaway friction and no issues with stick-slip
- Uses energizer and x-ring to maximize sealing response at all pressure ranges to ensure best performance

Part Number Structure

GPSMR00550NHLX \_

| GPS                 | M                                                                          | R                                                                                                      | 00550                                                     | N                                                                                    | HLX                                                                              | —                                                                       |
|---------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch<br>N = Inch/Square Energizer | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile (with notches)<br>X = No notches |

OPERATING CONDITIONS

|                            | METRIC         | INCH            |
|----------------------------|----------------|-----------------|
| Maximum Speed              | Up to 2.0m/sec | Up to 6.5ft/sec |
| Temperature Range*         | -45 to 200°C   | -49 to 392°F    |
| Maximum Dynamic Pressure** | 500 bar        | 7200 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

|                                      | METRIC     |         |        | INCH    |         |         | Rmr*      |
|--------------------------------------|------------|---------|--------|---------|---------|---------|-----------|
| SURFACE ROUGHNESS                    | µmRa       | µmRz    | µmRt   | µinRa   | µinRz   | µinRt   |           |
| Dynamic Sealing Face ØD <sub>1</sub> | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face Ød <sub>1</sub>  | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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 AND X-RING TABLE

| ENERGIZER AND X-RING MATERIAL (SHORE A) | ENERGIZER TYPE | ENERGIZER DESIGNATION | ENERGIZER OPERATING TEMPERATURE°C | ENERGIZER OPERATING TEMPERATURE°F |
|-----------------------------------------|----------------|-----------------------|-----------------------------------|-----------------------------------|
| NBR - 70A                               | O-ring/X-Ring  | N                     | -30 to 100°C                      | -22 to 212°F                      |
| NBR - 70A Low temp.                     | O-ring/X-Ring  | L                     | -45 to 80°C                       | -49 to 176°F                      |
| FKM - 75A                               | O-ring/X-Ring  | F                     | -10 to 200°C                      | 14 to 392°F                       |
| EPDM - 70A                              | O-ring/X-Ring  | E                     | -45 to 145°C                      | -49 to 293°F                      |
| HNBR - 70A                              | O-ring/X-Ring  | H                     | -25 to 150°C                      | -13 to 302°F                      |
| NBR - 90A                               | O-ring/X-Ring  | Q                     | -30 to 100°C                      | -22 to 212°F                      |
| HNBR - 90A                              | O-ring/X-Ring  | U                     | -25 to 150°C                      | -13 to 302°F                      |
| No O-ring Energizer or X-Ring*          | -              | 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.

SQUARE ENERGIZER AND X-RING TABLE

Available for inch sizes only

| ENERGIZER AND X-RING MATERIAL (SHORE A) | ENERGIZER TYPE | ENERGIZER DESIGNATION | ENERGIZER OPERATING TEMPERATURE°C | ENERGIZER OPERATING TEMPERATURE°F |
|-----------------------------------------|----------------|-----------------------|-----------------------------------|-----------------------------------|
| NBR - 70A                               | Square/X-Ring  | R                     | -30 to 100°C                      | -22 to 212°F                      |
| FKM - 75A                               | Square/X-Ring  | K                     | -10 to 200°C                      | 14 to 392°F                       |
| No Energizer or X-Ring*                 | -              | X                     | -                                 | -                                 |

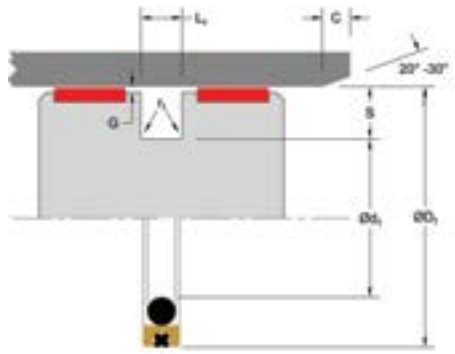
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

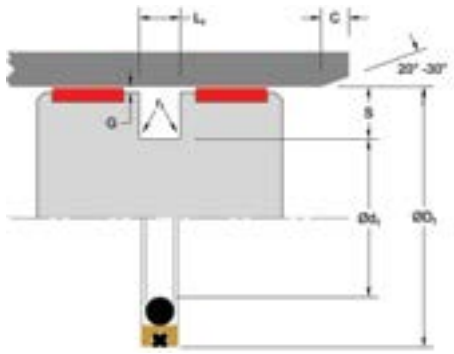
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                  | FILLER                   | MATERIAL DESIGNATOR | COLOR      | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                        | Special Bronze Compound  | HLX                 | Gold       | -73 to 288°C        | -100 to 550°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Excellent wear resistance</li><li>Excellent low-friction properties</li><li>Good extrusion resistance</li></ul>                                                               | Special Mineral Compound | HLA                 | Gray       | -73 to 260°C        | -100 to 500°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled      | HCF                 | Gray/Black | -73 to 260°C        | -100 to 500°F       | 250 bar                        | 3625 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for use with soft mating surfaces</li><li>Low friction and no stick-slip</li></ul>                                                                                | Unfilled                 | 700                 | White      | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                                                            | 60% Bronze Content       | 713                 | Bronze     | -73 to 288°C        | -100 to 550°F       | 500 bar                        | 7250 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.





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 <sub>1</sub> H9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G <sub>max</sub> * |               |               | O-RING CROSS SECTION | X-RING CROSS SECTION |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 100 bar                       | Up to 200 bar | Up to 400 bar | O-ring               | X-Ring               |
| Standard Duty Application - R    | Light Duty Application - L | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 100 bar                       | Up to 200 bar | Up to 400 bar | O-ring               | X-Ring               |
| 15.0 - 39.9                      | 40.0 - 79.9                | D <sub>1</sub> - 11.0 | 4.2                  | 1.0            | 2.0     | 5.5            | 0.25                                | 0.15          | 0.10          | 3.53                 | 1.78                 |
| 40.0 - 79.9                      | 80.0 - 132.9               | D <sub>1</sub> - 15.5 | 6.3                  | 1.3            | 2.5     | 7.75           | 0.30                                | 0.20          | 0.15          | 5.33                 | 1.78                 |
| 80.0 - 132.9                     | 133.0 - 252.9              | D <sub>1</sub> - 21.0 | 8.1                  | 1.8            | 5.0     | 10.5           | 0.30                                | 0.20          | 0.15          | 6.99                 | 2.62                 |
| 133.0 - 252.9                    | -                          | D <sub>1</sub> - 24.5 | 8.1                  | 1.8            | 7.5     | 12.25          | 0.30                                | 0.20          | 0.15          | 6.99                 | 2.62                 |
| 253.0 - 462.9                    | -                          | D <sub>1</sub> - 28.0 | 9.5                  | 2.5            | 10.0    | 14.0           | 0.45                                | 0.30          | 0.25          | 8.40                 | 3.53                 |
| 463.0 - 700.0                    | -                          | D <sub>1</sub> - 35.0 | 11.5                 | 3.0            | 10.0    | 17.5           | 0.55                                | 0.40          | 0.35          | 10.00                | 5.33                 |

At pressure >400 bar use diameter tolerance H8/f7. \*Radial Clearance G<sub>max</sub> = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

| INCH                             |                            |                        |                        |                |         |                |                                     |                |                |                      |                      |
|----------------------------------|----------------------------|------------------------|------------------------|----------------|---------|----------------|-------------------------------------|----------------|----------------|----------------------|----------------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            | GROOVE DIAMETER        | GROOVE WIDTH           | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G <sub>max</sub> * |                |                | O-RING CROSS SECTION | X-RING CROSS SECTION |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9     | L <sub>1</sub> + 0.008 | r <sub>1</sub> | C       | S              | Up to 1500 psi                      | Up to 2900 psi | Up to 5800 psi | O-ring               | X-Ring               |
| Standard Duty Application - R    | Light Duty Application - L | Ød <sub>1</sub> h9     | L <sub>1</sub> + 0.008 | r <sub>1</sub> | C       | S              | Up to 1500 psi                      | Up to 2900 psi | Up to 5800 psi | O-ring               | X-Ring               |
| 0.500 - 1.562                    | 1.563 - 3.125              | D <sub>1</sub> - 0.433 | 0.165                  | 0.040          | 0.016   | 0.217          | 0.010                               | 0.006          | 0.004          | 0.139                | 0.070                |
| 1.563 - 3.125                    | 3.126 - 5.250              | D <sub>1</sub> - 0.610 | 0.248                  | 0.050          | 0.016   | 0.305          | 0.012                               | 0.008          | 0.006          | 0.21                 | 0.070                |
| 3.126 - 5.250                    | 5.251 - 9.999              | D <sub>1</sub> - 0.827 | 0.319                  | 0.070          | 0.032   | 0.414          | 0.012                               | 0.008          | 0.006          | 0.275                | 0.103                |
| 5.251 - 9.999                    | -                          | D <sub>1</sub> - 0.965 | 0.319                  | 0.070          | 0.032   | 0.483          | 0.012                               | 0.008          | 0.006          | 0.275                | 0.103                |
| 10.000 - 18.000                  | -                          | D <sub>1</sub> - 1.102 | 0.374                  | 0.100          | 0.032   | 0.551          | 0.018                               | 0.012          | 0.010          | 0.33                 | 0.139                |
| 18.001 - 27.500                  | -                          | D <sub>1</sub> - 1.378 | 0.453                  | 0.120          | 0.032   | 0.689          | 0.022                               | 0.016          | 0.014          | 0.394                | 0.210                |

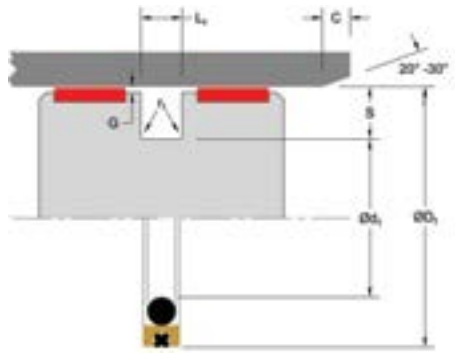
At pressure >5800 psi use diameter tolerance H8/f7. \*Radial Clearance G<sub>max</sub> = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 16.0            | 5.0             | 4.2            | GPSMR00160**** |
| 18.0            | 7.0             | 4.2            | GPSMR00180**** |
| 20.0            | 9.0             | 4.2            | GPSMR00200**** |
| 22.0            | 11.0            | 4.2            | GPSMR00220**** |
| 25.0            | 14.0            | 4.2            | GPSMR00250**** |
| 28.0            | 17.0            | 4.2            | GPSMR00280**** |
| 30.0            | 19.0            | 4.2            | GPSMR00300**** |
| 32.0            | 21.0            | 4.2            | GPSMR00320**** |
| 35.0            | 24.0            | 4.2            | GPSMR00350**** |
| 40.0            | 29.0            | 4.2            | GPSML00400**** |
| 42.0            | 31.0            | 4.2            | GPSML00420**** |
| 45.0            | 34.0            | 4.2            | GPSML00450**** |
| 48.0            | 37.0            | 4.2            | GPSML00480**** |
| 50.0            | 39.0            | 4.2            | GPSML00500**** |
| 50.0            | 34.5            | 6.3            | GPSMR00500**** |
| 50.8            | 39.8            | 4.2            | GPSML00508**** |
| 52.0            | 41.0            | 4.2            | GPSML00520**** |
| 55.0            | 44.0            | 4.2            | GPSML00550**** |
| 60.0            | 49.0            | 4.2            | GPSML00600**** |
| 63.0            | 52.0            | 4.2            | GPSML00630**** |
| 63.0            | 47.5            | 6.3            | GPSMR00630**** |
| 63.5            | 42.5            | 4.2            | GPSML00635**** |
| 65.0            | 54.0            | 4.2            | GPSML00650**** |
| 70.0            | 59.0            | 4.2            | GPSML00700**** |
| 70.0            | 54.5            | 6.3            | GPSMR00700**** |
| 75.0            | 64.0            | 4.2            | GPSML00750**** |
| 80.0            | 64.5            | 6.3            | GPSML00800**** |
| 80.0            | 59.5            | 8.1            | GPSMR00800**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 85.0            | 69.5            | 6.3            | GPSML00850**** |
| 85.0            | 64.0            | 8.1            | GPSMR00850**** |
| 90.0            | 74.5            | 6.3            | GPSML00900**** |
| 90.0            | 69.0            | 8.1            | GPSMR00900**** |
| 95.0            | 79.5            | 6.3            | GPSML00950**** |
| 95.0            | 74.0            | 8.1            | GPSMR00950**** |
| 100.0           | 84.5            | 6.3            | GPSML01000**** |
| 100.0           | 79.0            | 8.1            | GPSMR01000**** |
| 105.0           | 89.5            | 6.3            | GPSML01050**** |
| 105.0           | 84.0            | 8.1            | GPSMR01050**** |
| 110.0           | 94.5            | 6.3            | GPSML01100**** |
| 110.0           | 89.0            | 8.1            | GPSMR01100**** |
| 115.0           | 99.5            | 6.3            | GPSML01150**** |
| 115.0           | 94.0            | 8.1            | GPSMR01150**** |
| 120.0           | 104.5           | 6.3            | GPSML01200**** |
| 120.0           | 99.0            | 8.1            | GPSMR01200**** |
| 125.0           | 109.5           | 6.3            | GPSML01250**** |
| 125.0           | 104.0           | 8.1            | GPSMR01250**** |
| 130.0           | 114.5           | 6.3            | GPSML01300**** |
| 130.0           | 109.0           | 8.1            | GPSMR01300**** |
| 135.0           | 114.0           | 8.1            | GPSML01350**** |
| 140.0           | 119.0           | 8.1            | GPSML01400**** |
| 145.0           | 124.0           | 8.1            | GPSMR01450**** |
| 150.0           | 129.0           | 8.1            | GPSML01500**** |
| 155.0           | 134.0           | 8.1            | GPSMR01550**** |
| 160.0           | 139.0           | 8.1            | GPSML01600**** |
| 165.0           | 144.0           | 8.1            | GPSMR01650**** |
| 170.0           | 149.0           | 8.1            | GPSML01700**** |





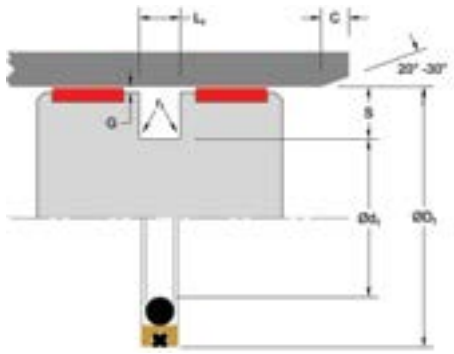
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 175.0           | 154.0           | 8.1            | GPSMR01750**** |
| 180.0           | 159.0           | 8.1            | GPSML01800**** |
| 190.0           | 169.0           | 8.1            | GPSML01900**** |
| 200.0           | 179.0           | 8.1            | GPSML02000**** |
| 210.0           | 189.0           | 8.1            | GPSML02100**** |
| 220.0           | 199.0           | 8.1            | GPSML02200**** |
| 230.0           | 209.0           | 8.1            | GPSMI02300**** |
| 240.0           | 219.0           | 8.1            | GPSML02400**** |
| 250.0           | 229.0           | 8.1            | GPSML02500**** |
| 250.0           | 225.5           | 8.1            | GPSMR02500**** |
| 280.0           | 252.0           | 9.5            | GPSMR02800**** |
| 300.0           | 272.0           | 9.5            | GPSMR03000**** |
| 310.0           | 282.0           | 9.5            | GPSMR03100**** |
| 320.0           | 292.0           | 9.5            | GPSMR03200**** |
| 350.0           | 322.0           | 9.5            | GPSMR03500**** |
| 400.0           | 372.0           | 9.5            | GPSMR04000**** |
| 420.0           | 392.0           | 9.5            | GPSMR04200**** |
| 450.0           | 422.0           | 9.5            | GPSMR04500**** |
| 480.0           | 445.0           | 11.5           | GPSMR04800**** |
| 500.0           | 465.0           | 11.5           | GPSMR05000**** |
| 600.0           | 565.0           | 11.5           | GPSMR06000**** |
| 700.0           | 665.0           | 11.5           | GPSMR07000**** |

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

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 1.500           | 1.067           | 0.165          | GPSE01500****  |
| 1.562           | 1.129           | 0.165          | GPSE01562****  |
| 1.625           | 1.192           | 0.165          | GPSEL01625**** |
| 1.687           | 1.254           | 0.165          | GPSEL01687**** |
| 1.750           | 1.317           | 0.165          | GPSEL01750**** |
| 1.812           | 1.379           | 0.165          | GPSEL01812**** |
| 1.875           | 1.442           | 0.165          | GPSEL01875**** |
| 1.937           | 1.504           | 0.165          | GPSEL01937**** |
| 2.000           | 1.567           | 0.165          | GPSEL02000**** |
| 2.125           | 1.692           | 0.165          | GPSEL02125**** |
| 2.250           | 1.817           | 0.165          | GPSEL02250**** |
| 2.375           | 1.942           | 0.165          | GPSEL02375**** |
| 2.500           | 2.067           | 0.165          | GPSEL02500**** |
| 2.625           | 2.192           | 0.165          | GPSEL02625**** |
| 2.750           | 2.317           | 0.165          | GPSEL02750**** |
| 2.875           | 2.442           | 0.165          | GPSEL02875**** |
| 3.000           | 2.567           | 0.165          | GPSEL03000**** |
| 3.125           | 2.692           | 0.165          | GPSEL03125**** |
| 3.250           | 2.640           | 0.248          | GPSEL03250**** |
| 3.375           | 2.765           | 0.248          | GPSEL03375**** |
| 3.500           | 2.890           | 0.248          | GPSEL03500**** |
| 3.625           | 3.015           | 0.248          | GPSEL03625**** |
| 3.750           | 3.140           | 0.248          | GPSEL03750**** |
| 3.875           | 3.265           | 0.248          | GPSEL03875**** |
| 4.000           | 3.390           | 0.248          | GPSEL04000**** |
| 4.125           | 3.515           | 0.248          | GPSEL04125**** |
| 4.250           | 3.640           | 0.248          | GPSEL04250**** |
| 4.375           | 3.765           | 0.248          | GPSEL04375**** |



PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 4.500           | 3.890           | 0.248          | GPSEL04500**** |
| 4.625           | 4.015           | 0.248          | GPSEL04625**** |
| 4.750           | 4.140           | 0.248          | GPSEL04750**** |
| 4.875           | 4.265           | 0.248          | GPSEL04875**** |
| 5.000           | 4.390           | 0.248          | GPSEL05000**** |
| 5.125           | 4.515           | 0.248          | GPSEL05125**** |
| 5.250           | 4.423           | 0.319          | GPSE05250****  |
| 5.375           | 4.548           | 0.319          | GPSEL05375**** |
| 5.500           | 4.673           | 0.319          | GPSEL05500**** |
| 5.625           | 4.798           | 0.319          | GPSEL05625**** |
| 5.750           | 4.923           | 0.319          | GPSEL05750**** |
| 6.000           | 5.173           | 0.319          | GPSEL06000**** |
| 6.250           | 5.423           | 0.319          | GPSEL06250**** |
| 6.500           | 5.673           | 0.319          | GPSEL06500**** |
| 6.750           | 5.923           | 0.319          | GPSEL06750**** |
| 7.000           | 6.173           | 0.319          | GPSEL07000**** |
| 7.250           | 6.423           | 0.319          | GPSEL07250**** |
| 7.500           | 6.673           | 0.319          | GPSEL07500**** |
| 7.750           | 6.923           | 0.319          | GPSEL07750**** |
| 8.000           | 7.173           | 0.319          | GPSEL08000**** |
| 8.250           | 7.423           | 0.319          | GPSEL08250**** |
| 8.500           | 7.673           | 0.319          | GPSEL08500**** |
| 8.750           | 7.923           | 0.319          | GPSEL08750**** |
| 9.000           | 8.173           | 0.319          | GPSEL09000**** |
| 9.250           | 8.423           | 0.319          | GPSEL09250**** |
| 9.500           | 8.673           | 0.319          | GPSEL09500**** |
| 9.750           | 8.923           | 0.319          | GPSEL09750**** |
| 10.000          | 8.898           | 0.374          | GPSE01000****  |

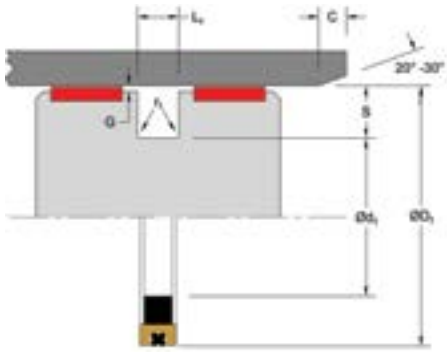
\*Please contact Hallite for custom sizes, material selection, or seal design.





SQUARE ENERGIZER

GPS is also available in a square energizer variant, with alternative part numbers.



SQUARE ENERGIZER PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 1.000           | 0.576           | 0.210          | GPSNR01000**** |
| 1.125           | 0.701           | 0.210          | GPSNR01125**** |
| 1.250           | 0.826           | 0.210          | GPSNR01250**** |
| 1.375           | 0.951           | 0.210          | GPSNR01375**** |
| 1.500           | 1.076           | 0.210          | GPSNR01500**** |
| 1.625           | 1.201           | 0.210          | GPSNR01625**** |
| 1.750           | 1.326           | 0.210          | GPSNR01750**** |
| 1.875           | 1.451           | 0.210          | GPSNR01875**** |
| 2.000           | 1.384           | 0.288          | GPSNR02000**** |
| 2.125           | 1.509           | 0.288          | GPSNR02125**** |
| 2.250           | 1.634           | 0.288          | GPSNR02250**** |
| 2.375           | 1.759           | 0.288          | GPSNR02375**** |
| 2.500           | 1.884           | 0.288          | GPSNR02500**** |
| 2.625           | 2.009           | 0.288          | GPSNR02625**** |
| 2.750           | 2.134           | 0.288          | GPSNR02750**** |
| 2.875           | 2.259           | 0.288          | GPSNR02875**** |
| 3.000           | 2.384           | 0.288          | GPSNR03000**** |
| 3.125           | 2.509           | 0.288          | GPSNR03125**** |
| 3.250           | 2.634           | 0.288          | GPSNR03250**** |
| 3.375           | 2.759           | 0.288          | GPSNR03375**** |
| 3.500           | 2.884           | 0.288          | GPSNR03500**** |
| 3.625           | 3.009           | 0.288          | GPSNR03625**** |
| 3.750           | 3.134           | 0.288          | GPSNR03750**** |
| 3.875           | 3.259           | 0.288          | GPSNR03875**** |
| 4.000           | 3.384           | 0.288          | GPSNR04000**** |
| 4.125           | 3.509           | 0.288          | GPSNR04125**** |
| 4.250           | 3.634           | 0.288          | GPSNR04250**** |
| 4.375           | 3.759           | 0.288          | GPSNR04375**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 4.500           | 3.884           | 0.288          | GPSNR04500**** |
| 4.625           | 4.009           | 0.288          | GPSNR04625**** |
| 4.750           | 4.134           | 0.288          | GPSNR04750**** |
| 4.875           | 4.259           | 0.288          | GPSNR04875**** |
| 5.000           | 4.384           | 0.288          | GPSNR05000**** |
| 5.125           | 4.509           | 0.288          | GPSNR05125**** |
| 5.250           | 4.634           | 0.288          | GPSNR05250**** |
| 5.375           | 4.535           | 0.375          | GPSNR05375**** |
| 5.500           | 4.660           | 0.375          | GPSNR05500**** |
| 5.625           | 4.785           | 0.375          | GPSNR05625**** |
| 5.750           | 4.910           | 0.375          | GPSNR05750**** |
| 5.875           | 5.035           | 0.375          | GPSNR05875**** |
| 6.000           | 5.160           | 0.375          | GPSNR06000**** |
| 6.125           | 5.285           | 0.375          | GPSNR06125**** |
| 6.250           | 5.415           | 0.375          | GPSNR06250**** |
| 6.375           | 5.540           | 0.375          | GPSNR06375**** |
| 6.500           | 5.665           | 0.375          | GPSNR06500**** |
| 6.625           | 5.795           | 0.375          | GPSNR06625**** |
| 6.750           | 5.920           | 0.375          | GPSNR06750**** |
| 6.875           | 6.045           | 0.375          | GPSNR06875**** |
| 7.000           | 6.170           | 0.375          | GPSNR07000**** |
| 7.250           | 6.420           | 0.375          | GPSNR07250**** |
| 7.500           | 6.670           | 0.375          | GPSNR07500**** |
| 7.750           | 6.915           | 0.375          | GPSNR07750**** |
| 8.000           | 7.170           | 0.375          | GPSNR08000**** |
| 8.250           | 7.415           | 0.375          | GPSNR08250**** |
| 8.500           | 7.665           | 0.375          | GPSNR08500**** |
| 8.750           | 7.915           | 0.375          | GPSNR08750**** |

SQUARE ENERGIZER PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 9.000           | 8.165           | 0.375          | GPSNR09000**** |
| 9.250           | 8.420           | 0.375          | GPSNR09250**** |
| 9.500           | 8.665           | 0.375          | GPSNR09500**** |
| 9.750           | 8.920           | 0.375          | GPSNR09750**** |
| 10.000          | 9.165           | 0.375          | GPSNR10000**** |
| 10.250          | 9.340           | 0.375          | GPSNR10250**** |
| 10.500          | 9.580           | 0.375          | GPSNR10500**** |
| 10.750          | 9.840           | 0.375          | GPSNR10750**** |
| 11.000          | 10.080          | 0.375          | GPSNR11000**** |
| 11.250          | 10.340          | 0.375          | GPSNR11250**** |
| 11.500          | 10.580          | 0.375          | GPSNR11500**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 11.750          | 10.840          | 0.375          | GPSNR11750**** |
| 12.000          | 11.080          | 0.375          | GPSNR12000**** |
| 12.250          | 10.340          | 0.375          | GPSNR12250**** |
| 12.500          | 11.580          | 0.375          | GPSNR12500**** |
| 12.750          | 11.840          | 0.375          | GPSNR12750**** |
| 13.000          | 12.080          | 0.375          | GPSNR13000**** |
| 13.250          | 12.335          | 0.375          | GPSNR13250**** |
| 13.500          | 12.580          | 0.375          | GPSNR13500**** |
| 13.750          | 12.840          | 0.375          | GPSNR13750**** |
| 14.000          | 13.080          | 0.375          | GPSNR14000**** |

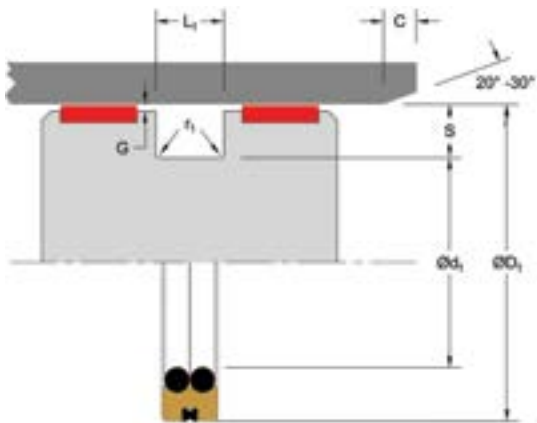
\*Please contact Hallite for custom sizes, material selection, or seal design.



# GP2

## PISTON SEAL

Double-Acting



### TECHNICAL DETAILS

The Hallite GP2 is a double-acting piston seal utilizing Hallite’s proprietary high- performance Armorlene® HLX PTFE paired with twin premium O-ring energizers and an x-ring for optimum performance and durability. The Armorlene® PTFE seal ring and the x-ring together provides the dynamic sealing function, while the O-ring energizers provide the static sealing.

Hallite’s GP2 seals are especially effective in applications where two different types of media need to be separated such as in piston accumulators, intensifiers, and position-holding applications. This makes this seal a good choice for applications in stabilizers, accumulators, manlifts, industrial machinery, and hydraulic suspension. The GP2 is well-suited for larger-diameter heavy-duty systems.



### F E A T U R E S

- Excellent sealing in applications that require separation of two different fluids
- Low breakout friction and elimination of stick-slip action
- Higher pressure rating than original GPS
- Uses an x-ring and 2 energizers to maximize sealing response at all pressure ranges to ensure best performance

### Part Number Structure

GP2MR00550NHLX \_

|                     |                                               |                                                                                                        |                                                           |                                                                                      |                                                                                  |                                                       |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|
| GP2                 | M                                             | R                                                                                                      | 00550                                                     | N                                                                                    | HLX                                                                              | —                                                     |
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile<br>N = Notches |

OPERATING CONDITIONS

|                            | METRIC         | INCH             |
|----------------------------|----------------|------------------|
| Maximum Speed              | Up to 3.0m/sec | Up to 10.0ft/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 300 bar (4350 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

|                                      | METRIC     |         |        | INCH    |         |         | Rmr*      |
|--------------------------------------|------------|---------|--------|---------|---------|---------|-----------|
| SURFACE ROUGHNESS                    | µmRa       | µmRz    | µmRt   | µinRa   | µinRz   | µinRt   |           |
| Dynamic Sealing Face ØD <sub>1</sub> | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face Ød <sub>1</sub>  | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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 AND X-RING TABLE

| ENERGIZER AND X-RING MATERIAL (SHORE A) | ENERGIZER TYPE | ENERGIZER DESIGNATION | ENERGIZER OPERATING TEMPERATURE°C | ENERGIZER OPERATING TEMPERATURE°F |
|-----------------------------------------|----------------|-----------------------|-----------------------------------|-----------------------------------|
| NBR - 70A                               | O-ring/X-Ring  | N                     | -30 to 100°C                      | -22 to 212°F                      |
| NBR - 70A Low temp.                     | O-ring/X-Ring  | L                     | -45 to 80°C                       | -49 to 176°F                      |
| FKM - 75A                               | O-ring/X-Ring  | F                     | -10 to 200°C                      | 14 to 392°F                       |
| EPDM - 70A                              | O-ring/X-Ring  | E                     | -45 to 145°C                      | -49 to 293°F                      |
| HNBR - 70A                              | O-ring/X-Ring  | H                     | -25 to 150°C                      | -13 to 302°F                      |
| NBR - 90A                               | O-ring/X-Ring  | Q                     | -30 to 100°C                      | -22 to 212°F                      |
| HNBR - 90A                              | O-ring/X-Ring  | U                     | -25 to 150°C                      | -13 to 302°F                      |
| No O-ring Energizers or X-Ring*         | -              | X                     | -                                 | -                                 |

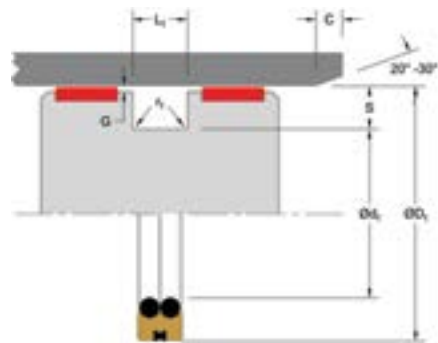
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

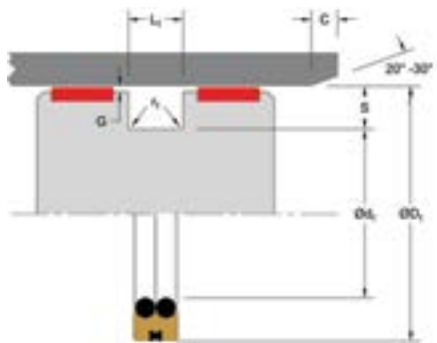
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                  | FILLER                   | MATERIAL DESIGNATOR | COLOR      | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                        | Special Bronze Compound  | HLX                 | Gold       | -73 to 288°C        | -100 to 550°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Excellent wear resistance</li><li>Excellent low-friction properties</li><li>Good extrusion resistance</li></ul>                                                               | Special Mineral Compound | HLA                 | Gray       | -73 to 260°C        | -100 to 500°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled      | HCF                 | Gray/Black | -73 to 260°C        | -100 to 500°F       | 250 bar                        | 3625 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for use with soft mating surfaces</li><li>Low friction and no stick-slip</li></ul>                                                                                | Unfilled                 | 700                 | White      | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® 713</b> <ul style="list-style-type: none"><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                                                            | 60% Bronze Content       | 713                 | Bronze     | -73 to 288°C        | -100 to 550°F       | 600 bar                        | 8700 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.





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 <sub>1</sub> H9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |               |               | O-RING CROSS SECTION | X-RING CROSS SECTION |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 100 bar              | Up to 200 bar | Up to 300 bar | O-ring               | X-Ring               |
| Standard Duty Application - R    | Heavy Duty Application - H |                       |                      |                |         |                |                            |               |               |                      |                      |
| 40.0 - 79.9                      | 25.0 - 39.9                | D <sub>1</sub> - 10.0 | 6.3                  | 0.6            | 2.5     | 5.00           | 0.30                       | 0.20          | 0.15          | 2.62                 | 1.78                 |
| 80.0 - 132.9                     | 50.0 - 79.9                | D <sub>1</sub> - 13.0 | 8.3                  | 1.0            | 5       | 6.50           | 0.40                       | 0.30          | 0.15          | 3.53                 | 2.62                 |
| 133.0 - 462.9                    | 100.0 - 132.9              | D <sub>1</sub> - 18.0 | 12.3                 | 1.3            | 7.5     | 9.00           | 0.40                       | 0.30          | 0.20          | 5.33                 | 3.53                 |
| 463.0 - 700.0                    | 425.0 - 462.9              | D <sub>1</sub> - 31.0 | 16.3                 | 1.8            | 10      | 15.50          | 0.50                       | 0.40          | 0.30          | 6.99                 | 5.33                 |

At pressure >300 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 <sub>1</sub> H9 |                            | GROOVE DIAMETER        | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |                | O-RING CROSS SECTION | X-RING CROSS SECTION |
|                                  |                            |                        |                      |                |         |                |                            |                |                      |                      |
|                                  |                            |                        |                      |                |         |                |                            |                |                      |                      |
|                                  |                            |                        |                      |                |         |                |                            |                |                      |                      |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9     | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 1500 psi             | Up to 4350 psi | O-ring               | X-Ring               |
| Standard Duty Application - R    | Heavy Duty Application - H |                        |                      |                |         |                |                            |                |                      |                      |
| 1.500 - 2.999                    | -                          | D <sub>1</sub> - 0.394 | 0.248                | 0.005          | 2.500   | 0.197          | 0.012                      | 0.009          | 0.103                | 0.070                |
| 3.000 - 4.999                    | 1.500 - 2.999              | D <sub>1</sub> - 0.512 | 0.326                | 0.010          | 5.000   | 0.256          | 0.013                      | 0.010          | 0.139                | 0.103                |
| 5.000 - 11.999                   | 3.000 - 4.999              | D <sub>1</sub> - 0.709 | 0.484                | 0.015          | 7.500   | 0.354          | 0.014                      | 0.011          | 0.210                | 0.139                |
| 12.000 - 26.999                  | 5.000 - 11.999             | D <sub>1</sub> - 1.220 | 0.642                | 0.015          | 10.000  | 0.610          | 0.016                      | 0.013          | 0.275                | 0.210                |

At pressure >4350 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.

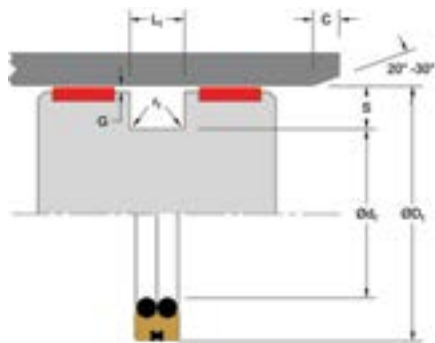
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 40.0            | 30.0            | 6.3            | GP2MR00400**** |
| 42.0            | 32.0            | 6.3            | GP2MR00420**** |
| 45.0            | 35.0            | 6.3            | GP2MR00450**** |
| 48.0            | 38.0            | 6.3            | GP2MR00480**** |
| 50.0            | 40.0            | 6.3            | GP2MR00500**** |
| 52.0            | 42.0            | 6.3            | GP2MR00520**** |
| 55.0            | 45.0            | 6.3            | GP2MR00550**** |
| 60.0            | 50.0            | 6.3            | GP2MR00600**** |
| 63.0            | 53.0            | 6.3            | GP2MR00630**** |
| 65.0            | 55.0            | 6.3            | GP2MR00650**** |
| 70.0            | 60.0            | 6.3            | GP2MR00700**** |
| 75.0            | 65.0            | 6.3            | GP2MR00750**** |
| 80.0            | 67.0            | 8.3            | GP2MR00800**** |
| 85.0            | 72.0            | 8.3            | GP2MR00850**** |
| 90.0            | 77.0            | 8.3            | GP2MR00900**** |
| 95.0            | 82.0            | 8.3            | GP2MR00950**** |
| 100.0           | 87.0            | 8.3            | GP2MR01000**** |
| 105.0           | 92.0            | 8.3            | GP2MR01050**** |
| 110.0           | 97.0            | 8.3            | GP2MR01100**** |
| 115.0           | 102.0           | 8.3            | GP2MR01150**** |
| 120.0           | 107.0           | 8.3            | GP2MR01200**** |
| 125.0           | 112.0           | 8.3            | GP2MR01250**** |
| 130.0           | 117.0           | 8.3            | GP2MR01300**** |
| 135.0           | 117.0           | 12.3           | GP2MR01350**** |
| 140.0           | 122.0           | 12.3           | GP2MR01400**** |
| 150.0           | 132.0           | 12.3           | GP2MR01500**** |
| 160.0           | 142.0           | 12.3           | GP2MR01600**** |
| 170.0           | 152.0           | 12.3           | GP2MR01700**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 180.0           | 162.0           | 12.3           | GP2MR01800**** |
| 190.0           | 172.0           | 12.3           | GP2MR01900**** |
| 200.0           | 182.0           | 12.3           | GP2MR02000**** |
| 210.0           | 192.0           | 12.3           | GP2MR02100**** |
| 220.0           | 202.0           | 12.3           | GP2MR02200**** |
| 230.0           | 212.0           | 12.3           | GP2MR02300**** |
| 240.0           | 222.0           | 12.3           | GP2MR02400**** |
| 250.0           | 232.0           | 12.3           | GP2MR02500**** |
| 280.0           | 262.0           | 12.3           | GP2MR02800**** |
| 300.0           | 282.0           | 12.3           | GP2MR03000**** |
| 320.0           | 302.0           | 12.3           | GP2MR03200**** |
| 350.0           | 332.0           | 12.3           | GP2MR03500**** |
| 400.0           | 382.0           | 12.3           | GP2MR04000**** |
| 420.0           | 402.0           | 12.3           | GP2MR04200**** |
| 450.0           | 432.0           | 12.3           | GP2MR04500**** |
| 480.0           | 449.0           | 16.3           | GP2MR04800**** |
| 500.0           | 469.0           | 16.3           | GP2MR05000**** |
| 600.0           | 569.0           | 16.3           | GP2MR06000**** |
| 700.0           | 669.0           | 16.3           | GP2MR07000**** |

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

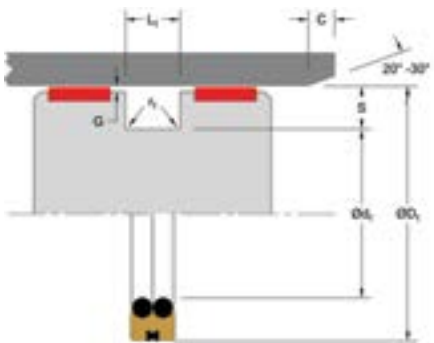




PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 1.500           | 1.106           | 0.248          | GP2ER01500**** |
| 1.562           | 1.168           | 0.248          | GP2ER01562**** |
| 1.625           | 1.231           | 0.248          | GP2ER01625**** |
| 1.687           | 1.293           | 0.248          | GP2ER01687**** |
| 1.750           | 1.356           | 0.248          | GP2ER01750**** |
| 1.812           | 1.418           | 0.248          | GP2ER01812**** |
| 1.875           | 1.481           | 0.248          | GP2ER01875**** |
| 1.937           | 1.543           | 0.248          | GP2ER01937**** |
| 2.000           | 1.606           | 0.248          | GP2ER02000**** |
| 2.125           | 1.731           | 0.248          | GP2ER02125**** |
| 2.250           | 1.856           | 0.248          | GP2ER02250**** |
| 2.375           | 1.981           | 0.248          | GP2ER02375**** |
| 2.500           | 2.106           | 0.248          | GP2ER02500**** |
| 2.625           | 2.231           | 0.248          | GP2ER02625**** |
| 2.750           | 2.356           | 0.248          | GP2ER02750**** |
| 2.875           | 2.481           | 0.248          | GP2ER02875**** |
| 3.000           | 2.488           | 0.326          | GP2ER03000**** |
| 3.125           | 2.613           | 0.326          | GP2ER03125**** |
| 3.250           | 2.738           | 0.326          | GP2ER03250**** |
| 3.375           | 2.863           | 0.326          | GP2ER03375**** |
| 3.500           | 2.988           | 0.326          | GP2ER03500**** |
| 3.625           | 3.113           | 0.326          | GP2ER03625**** |
| 3.750           | 3.238           | 0.326          | GP2ER03750**** |
| 3.875           | 3.363           | 0.326          | GP2ER03875**** |
| 4.000           | 3.488           | 0.326          | GP2ER04000**** |
| 4.125           | 3.613           | 0.326          | GP2ER04125**** |
| 4.250           | 3.738           | 0.326          | GP2ER04250**** |
| 4.375           | 3.863           | 0.326          | GP2ER04375**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 4.500           | 3.988           | 0.326          | GP2ER04500**** |
| 4.625           | 4.113           | 0.326          | GP2ER04625**** |
| 4.750           | 4.238           | 0.326          | GP2ER04750**** |
| 4.875           | 4.363           | 0.326          | GP2ER04875**** |
| 5.000           | 4.291           | 0.484          | GP2ER05000**** |
| 5.125           | 4.416           | 0.484          | GP2ER05125**** |
| 5.250           | 4.541           | 0.484          | GP2ER05250**** |
| 5.375           | 4.666           | 0.484          | GP2ER05375**** |
| 5.500           | 4.791           | 0.484          | GP2ER05500**** |
| 5.625           | 4.916           | 0.484          | GP2ER05625**** |
| 5.750           | 5.041           | 0.484          | GP2ER05750**** |
| 5.875           | 5.166           | 0.484          | GP2ER05875**** |
| 6.000           | 5.291           | 0.484          | GP2ER06000**** |
| 6.250           | 5.541           | 0.484          | GP2ER06250**** |
| 6.500           | 5.791           | 0.484          | GP2ER06500**** |
| 6.750           | 6.041           | 0.484          | GP2ER06750**** |
| 7.000           | 6.291           | 0.484          | GP2ER07000**** |
| 7.250           | 6.541           | 0.484          | GP2ER07250**** |
| 7.500           | 6.791           | 0.484          | GP2ER07500**** |
| 7.750           | 7.041           | 0.484          | GP2ER07750**** |
| 8.000           | 7.291           | 0.484          | GP2ER08000**** |
| 8.250           | 7.541           | 0.484          | GP2ER08250**** |
| 8.500           | 7.791           | 0.484          | GP2ER08500**** |
| 8.750           | 8.041           | 0.484          | GP2ER08750**** |
| 9.000           | 8.291           | 0.484          | GP2ER09000**** |
| 9.250           | 8.541           | 0.484          | GP2ER09250**** |
| 9.500           | 8.791           | 0.484          | GP2ER09500**** |
| 9.750           | 9.041           | 0.484          | GP2ER09750**** |



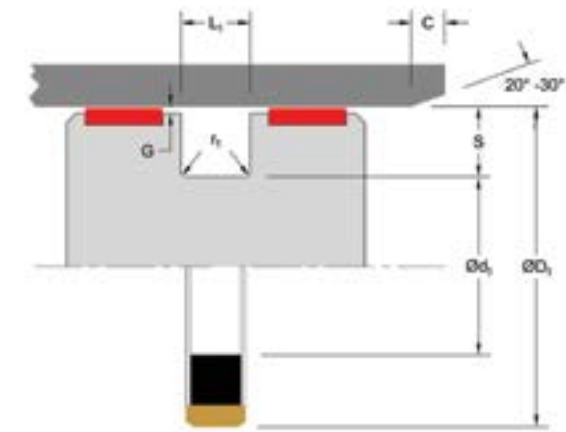
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 10.000          | 9.291           | 0.484          | GP2ER10000**** |
| 10.500          | 9.791           | 0.484          | GP2ER10500**** |
| 11.000          | 10.291          | 0.484          | GP2ER11000**** |
| 11.500          | 10.791          | 0.484          | GP2ER11500**** |
| 12.000          | 10.78           | 0.642          | GP2ER12000**** |
| 12.500          | 11.28           | 0.642          | GP2ER12500**** |
| 13.000          | 11.78           | 0.642          | GP2ER13000**** |
| 13.500          | 12.28           | 0.642          | GP2ER13500**** |
| 14.000          | 12.78           | 0.642          | GP2ER14000**** |
| 14.500          | 13.28           | 0.642          | GP2ER14500**** |
| 15.000          | 13.78           | 0.642          | GP2ER15000**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 15.500          | 14.28           | 0.642          | GP2ER15500**** |
| 16.000          | 14.78           | 0.642          | GP2ER16000**** |
| 16.500          | 15.28           | 0.642          | GP2ER16500**** |
| 17.000          | 15.78           | 0.642          | GP2ER17000**** |
| 17.500          | 16.28           | 0.642          | GP2ER17500**** |
| 18.000          | 16.78           | 0.642          | GP2ER18000**** |
| 18.500          | 17.28           | 0.642          | GP2ER18500**** |
| 19.000          | 17.78           | 0.642          | GP2ER19000**** |
| 19.500          | 18.28           | 0.642          | GP2ER19500**** |
| 20.000          | 18.78           | 0.642          | GP2ER20000**** |

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





# PFR

## PISTON SEAL

Double-Acting

### TECHNICAL DETAILS

The Hallite PFR is a chamfered, double-acting piston seal that performs well in both high- and low-pressure systems. The PFR has chamfers on the primary sealing face paired with either a square or an O-ring elastomer energizer. Typically, the square energizer is preferred for heavy-duty applications, as it provides superior interference and stability in the groove. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility.

Hallite’s PFR seal is well-suited for a variety of hydraulic and pneumatic reciprocating applications. Hallite recommends proper guidance (see Hallite Bearings section) be used with this seal in heavy-duty applications. The PFR seal is available in a variety of Hallite’s high-performance Armorlene® materials to suit a wide range of demanding applications.

This seal is designed to fit the ANSI B93.32-1973 and NFPA T3.19.18 housing size.



### FEATURES

- Precision machined bronze/PTFE cap ring
- Low friction, no stick-slip issues
- High-strength compression-molded material
- Wide range of materials available
- Chamfered corners for easier installation

### Part Number Structure

PFRER01250NHLX \_

| PFR                 | E                                             | R                                                                                                      | 01250                                                     | R                                                                                    | HLX                                                                              | —                                                   |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile<br>N Notches |

OPERATING CONDITIONS

|                          | METRIC         | INCH             |
|--------------------------|----------------|------------------|
| Maximum Speed            | Up to 4.0m/sec | Up to 13.0ft/sec |
| Temperature Range*       | -45 to 200°C   | -49 to 392°F     |
| Maximum Dynamic Pressure | 350 bar        | 5000 psi         |

\*Dependent upon energizer used (NBR, FKM, etc.).

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 <sub>1</sub> | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face Ød <sub>1</sub>  | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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                    | Square         | R                     | -30 to 100°C                      | -22 to 212°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 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|-----------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>• Standard material for hydraulic applications</li><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Extended wear resistance</li></ul>                     | Special Bronze Compound    | HLX                 | Gold      | -73 to 288°C        | -100 to 550°F       | 350 bar                        | 5000 psi                       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids</li><li>• Good low-friction properties</li><li>• Excellent extrusion resistance</li><li>• Good chemical resistance</li></ul> | Glass Molybdenum Disulfide | 702                 | Gray      | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® 706</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids</li><li>• Excellent extrusion resistance</li><li>• Good chemical resistance</li><li>• Good dielectrical properties</li></ul> | 15% Glass                  | 706                 | Off-White | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® 701</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids</li><li>• Excellent extrusion resistance</li><li>• Good chemical resistance</li><li>• Good dielectrical properties</li></ul> | 25% Glass                  | 701                 | Off-White | -73 to 260°C        | -100 to 500°F       | 350 bar                        | 5000 psi                       |

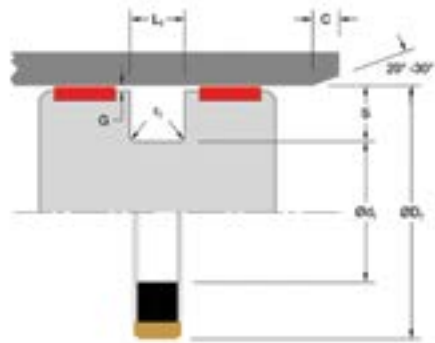
For other material options consult the Master Materials Index at the front of the catalog. If you do not find the material that you require please contact your local Hallite sales office.

INSTALLATION RECOMMENDATIONS

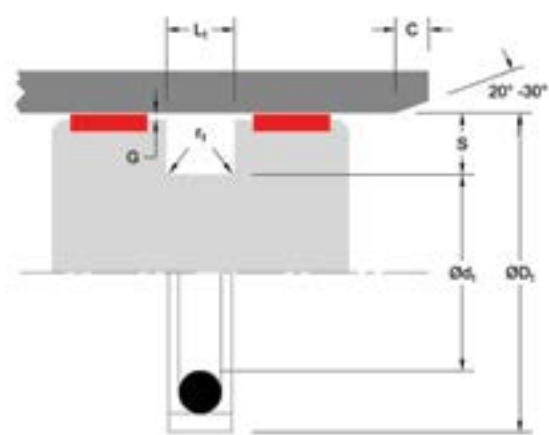
| INCH                             |                            |                    |                        |                |         |                |                            |                |                |
|----------------------------------|----------------------------|--------------------|------------------------|----------------|---------|----------------|----------------------------|----------------|----------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            | GROOVE DIAMETER    | GROOVE WIDTH           | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |                |                |
| Standard Duty Application - R    | Heavy Duty Application - H | Ød <sub>1</sub> h9 | L <sub>1</sub> + 0.008 | r <sub>1</sub> | C       | S              | Up to 1000 psi             | Up to 3000 psi | Up to 5000 psi |
| 1.000 – 2.999                    | -                          | D1 - 0.308         | 0.129                  | 0.016          | 0.125   | 0.154          | 0.026                      | 0.010          | 0.006          |
| 3.000 – 5.000                    | 1.000 - 2.999              | D1 - 0.555         | 0.284                  | 0.024          | 0.260   | 0.278          | 0.040                      | 0.030          | 0.007          |
| 5.001 – 8.999                    | 3.000 - 5.001              | D1 - 0.762         | 0.379                  | 0.032          | 0.325   | 0.381          | 0.050                      | 0.033          | 0.008          |
| 9.000 – 15.000                   | 5.001 – 8.999              | D1 - 0.878         | 0.379                  | 0.032          | 0.325   | 0.439          | 0.064                      | 0.044          | 0.009          |
| 15.001 - 50.000                  | 9.000-15.000               | D1 - 1.396         | 0.505                  | 0.032          | 0.325   | 0.698          | 0.078                      | 0.055          | 0.010          |

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





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.



# G54

PISTON SEAL  
Double-Acting

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 1.000           | 0.692           | 0.129          | PFRER01000RHLX |
| 1.250           | 0.942           | 0.129          | PFRER01250RHLX |
| 1.500           | 1.192           | 0.129          | PFRER01500RHLX |
| 1.750           | 1.442           | 0.129          | PFRER01750RHLX |
| 2.000           | 1.692           | 0.129          | PFRER02000RHLX |
| 2.250           | 1.942           | 0.129          | PFRER02250RHLX |
| 2.500           | 2.192           | 0.129          | PFRER02500RHLX |
| 2.750           | 2.442           | 0.129          | PFRER02750RHLX |
| 3.000           | 2.445           | 0.284          | PFRER03000RHLX |
| 3.250           | 2.695           | 0.284          | PFRER03250RHLX |
| 3.500           | 2.945           | 0.284          | PFRER03500RHLX |
| 3.750           | 3.195           | 0.284          | PFRER03750RHLX |
| 4.000           | 3.445           | 0.284          | PFRER04000RHLX |
| 4.125           | 3.570           | 0.284          | PFRER04125RHLX |
| 4.250           | 3.695           | 0.284          | PFRER04250RHLX |
| 4.500           | 3.945           | 0.284          | PFRER04500RHLX |
| 4.750           | 4.195           | 0.284          | PFRER04750RHLX |
| 5.000           | 4.445           | 0.284          | PFRER05000RHLX |
| 5.250           | 4.488           | 0.379          | PFRER05250RHLX |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 5.500           | 4.738           | 0.379          | PFRER05500RHLX |
| 5.750           | 4.988           | 0.379          | PFRER05750RHLX |
| 6.000           | 5.238           | 0.379          | PFRER06000RHLX |
| 6.250           | 5.488           | 0.379          | PFRER06250RHLX |
| 6.500           | 5.738           | 0.379          | PFRER06500RHLX |
| 7.000           | 6.238           | 0.379          | PFRER07000RHLX |
| 7.250           | 6.488           | 0.379          | PFRER07250RHLX |
| 7.500           | 6.738           | 0.379          | PFRER07500RHLX |
| 7.750           | 6.988           | 0.379          | PFRER07750RHLX |
| 8.000           | 7.238           | 0.379          | PFRER08000RHLX |
| 8.250           | 7.488           | 0.379          | PFRER08250RHLX |
| 8.500           | 7.738           | 0.379          | PFRER08500RHLX |
| 9.000           | 8.122           | 0.379          | PFRER09000RHLX |
| 9.500           | 8.622           | 0.379          | PFRER09500RHLX |
| 10.000          | 9.122           | 0.379          | PFRER10000RHLX |
| 11.000          | 10.122          | 0.379          | PFRER11000RHLX |
| 12.000          | 11.122          | 0.379          | PFRER12000RHLX |
| 13.000          | 12.122          | 0.379          | PFRER13000RHLX |
| 14.000          | 13.122          | 0.379          | PFRER14000RHLX |

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

TECHNICAL DETAILS

The Hallite G54 is a double-acting, O-ring energized, low-friction piston seal that performs well in both high- and low-pressure systems. Its design has square-cut edges and is often preferred in glass-filled high-performance Armorlene® materials, such as HQ6 or 701, to provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility. The G54 has a proven design pedigree as a high-performance seal used in demanding applications.

Used successfully for years in challenging applications in construction equipment, machine tools, material handling, agricultural equipment, and other industries, the Hallite G54 is a proven compact, double-acting piston sealing solution. This seal is available to fit a variety of housing sizes, including the ISO 7425-1 grooves. Hallite recommends proper guidance be used with this seal in heavy-duty applications (see Hallite Bearings section).

This seal is available in a variety of Hallite’s high-performance Armorlene® materials to suit a wide range of demanding applications.



FEATURES

- Compact design to save metal spacing
- High service temperature, long wear, and high extrusion resistance
- Effective O-ring and face ring pressure energized
- Able to handle higher service pressure applications

Part Number Structure

G54MR00900NHQ6 \_

| G54                 | M                                             | R                                                                                                      | 00900                                                     | N                                                                                    | HQ6                                                                              | —                                                     |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile<br>N = Notches |



OPERATING CONDITIONS

|                            | METRIC         | INCH             |
|----------------------------|----------------|------------------|
| Maximum Speed              | Up to 4.0m/sec | Up to 12.0ft/sec |
| Temperature Range*         | -45 to 200°C   | -49 to 392°F     |
| Maximum Dynamic Pressure** | 400 bar        | 5800 psi         |

\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above 300 bar (4350 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

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

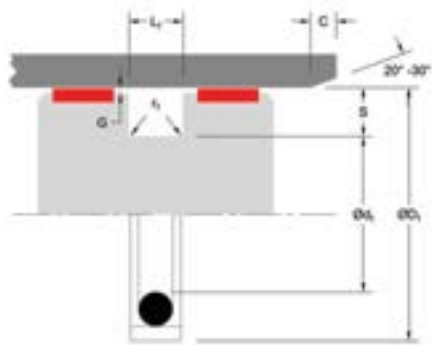
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

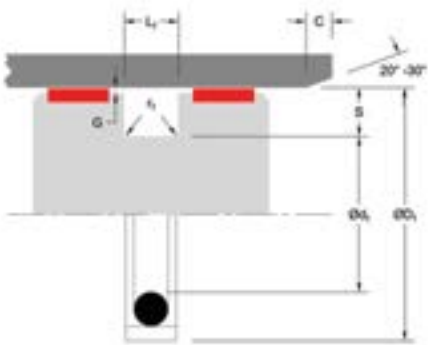
| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                   | FILLER                 | MATERIAL DESIGNATOR | COLOR     | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------|-----------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HQ6*</b> <ul style="list-style-type: none"><li>Standard material for G16 and G54 profiles</li><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Excellent extrusion resistance</li><li>Excellent chemical resistance</li></ul> | Special Glass Compound | HQ6                 | White     | -73 to 288°C        | -100 to 500°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 701</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li><li>Good dielectrial properties</li></ul>                      | 25% Glass              | 701                 | Off-White | -73 to 260°C        | -100 to 500°F       | 400 bar                        | 5800 psi                       |
| <b>ARMORLENE® 706</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li><li>Good dielectrical properties</li></ul>                     | 15% Glass              | 706                 | Off-White | -73 to 260°C        | -100 to 500°F       | 350 bar                        | 5000 psi                       |

\*Available up to 380mm diameter. 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.





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.



# G54

PISTON SEAL  
Double-Acting

### INSTALLATION RECOMMENDATIONS

| METRIC                           |                            |                            |                       |                      |                |         |                |                                     |               |               |
|----------------------------------|----------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|-------------------------------------|---------------|---------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G <sub>max</sub> * |               |               |
| DIAMETER RANGE                   |                            |                            | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 100 bar                       | Up to 200 bar | Up to 300 bar |
| Standard Duty Application - R    | Light Duty Application - L | Heavy Duty Application - H |                       |                      |                |         |                |                                     |               | O-ring        |
| 8.0 - 14.9                       | 15.0 - 39.9                | -                          | D <sub>1</sub> - 4.9  | 2.2                  | 0.4            | 2.0     | 2.45           | 0.30                                | 0.20          | 0.15          |
| 15.0 - 39.9                      | 40.0 - 79.9                | -                          | D <sub>1</sub> - 7.5  | 3.2                  | 0.6            | 3.0     | 3.75           | 0.40                                | 0.25          | 0.15          |
| 40.0 - 79.9                      | 80.0 - 132.9               | 15.0 - 39.9                | D <sub>1</sub> - 11.0 | 4.2                  | 1.0            | 4.0     | 5.50           | 0.40                                | 0.25          | 0.20          |
| 80.0 - 132.9                     | 133.0 - 329.9              | 40.0 - 79.9                | D <sub>1</sub> - 15.5 | 6.3                  | 1.3            | 6.0     | 7.75           | 0.50                                | 0.30          | 0.20          |
| 133.0 - 329.9                    | 330.0 - 669.9              | 80.0 - 132.9               | D <sub>1</sub> - 21.0 | 8.1                  | 1.8            | 8.0     | 10.50          | 0.60                                | 0.35          | 0.25          |
| 330.0 - 669.9                    | 670.0 - 999.9              | 133.0 - 329.9              | D <sub>1</sub> - 24.5 | 8.1                  | 1.8            | 8.0     | 12.25          | 0.60                                | 0.35          | 0.25          |
| 670.0 - 999.9                    | ≥ 1000.0                   | 330.0 - 669.9              | D <sub>1</sub> - 28.0 | 9.5                  | 2.5            | 9.0     | 14.00          | 0.70                                | 0.50          | 0.30          |
| ≥ 1000.0                         | -                          | 670.0 - 999.9              | D <sub>1</sub> - 38.0 | 13.8                 | 3.0            | 10.0    | 19.00          | 1.00                                | 0.70          | 0.60          |

At pressure >300 bar use diameter tolerance H8/f7.  
\*Radial Clearance G<sub>max</sub> = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

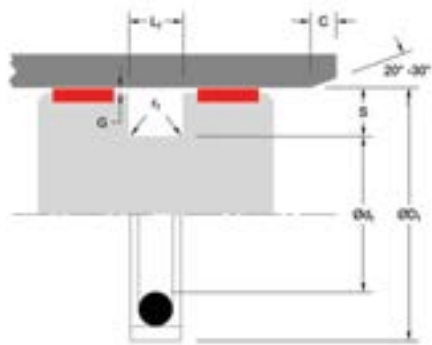
| Temperature Range °C | -30 TO 80 |     | -30 TO 100 |     |
|----------------------|-----------|-----|------------|-----|
| Max. Pressure Bar    | 300       | 200 | 240        | 160 |
| At Speed v m/s       | 2         | 4   | 2          | 4   |

### PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 8.0             | 3.1             | 2.2            | G54MR00080**** |
| 10.0            | 5.1             | 2.2            | G54MR00100**** |
| 12.0            | 7.1             | 2.2            | G54MR00120**** |
| 14.0            | 9.1             | 2.2            | G54MR00140**** |
| 15.0            | 7.5             | 3.2            | G54MR00150**** |
| 16.0            | 11.1            | 2.2            | G54ML00160**** |
| 16.0            | 8.5             | 3.2            | G54MR00160**** |
| 18.0            | 13.1            | 2.2            | G54ML00180**** |
| 18.0            | 10.5            | 3.2            | G54MR00180**** |
| 20.0            | 15.1            | 2.2            | G54ML00200**** |
| 20.0            | 12.5            | 3.2            | G54MR00200**** |
| 21.0            | 13.5            | 3.2            | G54MR00210**** |
| 22.0            | 17.1            | 2.2            | G54ML00220**** |
| 22.0            | 14.5            | 3.2            | G54MR00220**** |
| 24.0            | 16.5            | 3.2            | G54MR00240**** |
| 25.0            | 20.1            | 2.2            | G54ML00250**** |
| 25.0            | 17.5            | 3.2            | G54MR00250**** |
| 25.0            | 14.0            | 4.2            | G54MH00250**** |
| 28.0            | 20.5            | 3.2            | G54MR00280**** |
| 30.0            | 22.5            | 3.2            | G54MR00300**** |
| 32.0            | 27.1            | 2.2            | G54ML00320**** |
| 32.0            | 24.5            | 3.2            | G54MR00320**** |
| 32.0            | 21.0            | 4.2            | G54MH00320**** |
| 35.0            | 27.5            | 3.2            | G54MR00350**** |
| 35.0            | 24.0            | 4.2            | G54MH00350**** |
| 36.0            | 28.5            | 3.2            | G54MR00360**** |
| 38.0            | 30.5            | 3.2            | G54MR00380**** |
| 40.0            | 32.5            | 3.2            | G54ML00400**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 40.0            | 29.0            | 4.2            | G54MR00400**** |
| 42.0            | 31.0            | 4.2            | G54MR00420**** |
| 45.0            | 34.0            | 4.2            | G54MR00450**** |
| 48.0            | 37.0            | 4.2            | G54MR00480**** |
| 50.0            | 42.5            | 3.2            | G54ML00500**** |
| 50.0            | 39.0            | 4.2            | G54MR00500**** |
| 50.0            | 34.5            | 6.3            | G54MH00500**** |
| 50.8            | 43.3            | 3.2            | G54ML00508**** |
| 50.8            | 39.8            | 4.2            | G54MR00508**** |
| 52.0            | 41.0            | 4.2            | G54MR00520**** |
| 53.0            | 42.0            | 4.2            | G54MR00530**** |
| 55.0            | 44.0            | 4.2            | G54MR00550**** |
| 57.0            | 46.0            | 4.2            | G54MR00570**** |
| 58.0            | 47.0            | 4.2            | G54MR00580**** |
| 60.0            | 49.0            | 4.2            | G54MR00600**** |
| 62.0            | 51.0            | 4.2            | G54MR00620**** |
| 63.0            | 52.0            | 4.2            | G54MR00630**** |
| 63.0            | 47.5            | 6.3            | G54MH00630**** |
| 65.0            | 54.0            | 4.2            | G54MR00650**** |
| 68.0            | 57.0            | 4.2            | G54MR00680**** |
| 70.0            | 59.0            | 4.2            | G54MR00700**** |
| 70.0            | 54.5            | 6.3            | G54MH00700**** |
| 75.0            | 64.0            | 4.2            | G54MR00750**** |
| 75.0            | 59.5            | 6.3            | G54MH00750**** |
| 80.0            | 69.0            | 4.2            | G54ML00800**** |
| 80.0            | 64.5            | 6.3            | G54MR00800**** |
| 80.0            | 59.0            | 8.1            | G54MH00800**** |
| 82.5            | 67.0            | 6.3            | G54MR00825**** |

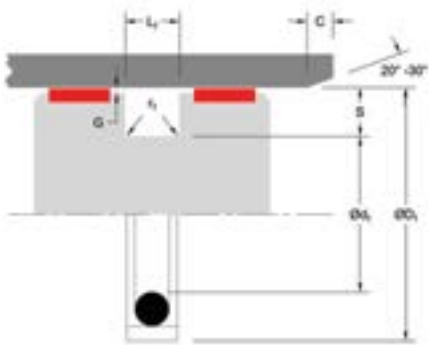




PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 85.0            | 69.5            | 6.3            | G54MR00850**** |
| 85.0            | 64.0            | 8.1            | G54MH00850**** |
| 90.0            | 79.0            | 4.2            | G54ML00900**** |
| 90.0            | 74.5            | 6.3            | G54MR00900**** |
| 90.0            | 69.0            | 8.1            | G54MH00900**** |
| 95.0            | 84.0            | 4.2            | G54ML00950**** |
| 95.0            | 79.5            | 6.3            | G54MR00950**** |
| 95.0            | 74.0            | 8.1            | G54MH00950**** |
| 100.0           | 89.0            | 4.2            | G54ML01000**** |
| 100.0           | 84.5            | 6.3            | G54MR01000**** |
| 100.0           | 79.0            | 8.1            | G54MH01000**** |
| 101.6           | 86.1            | 6.3            | G54MR01016**** |
| 105.0           | 94.0            | 4.2            | G54ML01050**** |
| 105.0           | 89.5            | 6.3            | G54MR01050**** |
| 108.0           | 92.5            | 6.3            | G54MR01080**** |
| 110.0           | 99.0            | 4.2            | G54ML01100**** |
| 110.0           | 94.5            | 6.3            | G54MR01100**** |
| 110.0           | 89.0            | 8.1            | G54MH01100**** |
| 115.0           | 99.5            | 6.3            | G54MR01150**** |
| 120.0           | 109.0           | 4.2            | G54ML01200**** |
| 120.0           | 104.5           | 6.3            | G54MR01200**** |
| 120.0           | 99.0            | 8.1            | G54MH01200**** |
| 125.0           | 114.0           | 4.2            | G54ML01250**** |
| 125.0           | 109.5           | 6.3            | G54MR01250**** |
| 125.0           | 104.0           | 8.1            | G54MH01250**** |
| 127.0           | 111.5           | 6.3            | G54MR01270**** |
| 130.0           | 114.5           | 6.3            | G54MR01300**** |
| 130.0           | 109.0           | 8.1            | G54MH01300**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 132.0           | 121.0           | 4.2            | G54ML01320**** |
| 135.0           | 114.0           | 8.1            | G54MR01350**** |
| 140.0           | 124.5           | 6.3            | G54ML01400**** |
| 140.0           | 119.0           | 8.1            | G54MR01400**** |
| 145.0           | 129.5           | 6.3            | G54ML01450**** |
| 145.0           | 124.0           | 8.1            | G54MR01450**** |
| 150.0           | 134.5           | 6.3            | G54ML01500**** |
| 150.0           | 129.0           | 8.1            | G54MR01500**** |
| 155.0           | 134.0           | 8.1            | G54MR01550**** |
| 160.0           | 144.5           | 6.3            | G54ML01600**** |
| 160.0           | 139.0           | 8.1            | G54MR01600**** |
| 165.0           | 144.0           | 8.1            | G54MR01650**** |
| 170.0           | 149.0           | 8.1            | G54MR01700**** |
| 175.0           | 154.0           | 8.1            | G54MR01750**** |
| 180.0           | 164.5           | 6.3            | G54ML01800**** |
| 180.0           | 159.0           | 8.1            | G54MR01800**** |
| 190.0           | 169.0           | 8.1            | G54MR01900**** |
| 194.0           | 178.5           | 6.3            | G54ML01940**** |
| 200.0           | 184.5           | 6.3            | G54ML02000**** |
| 200.0           | 179.0           | 8.1            | G54MR02000**** |
| 205.0           | 184.0           | 8.1            | G54MR02050**** |
| 210.0           | 189.0           | 8.1            | G54MR02100**** |
| 215.0           | 194.0           | 8.1            | G54MR02150**** |
| 220.0           | 199.0           | 8.1            | G54MR02200**** |
| 230.0           | 214.5           | 6.3            | G54ML02300**** |
| 230.0           | 209.0           | 8.1            | G54MR02300**** |
| 240.0           | 219.0           | 8.1            | G54MR02400**** |
| 250.0           | 229.0           | 8.1            | G54MR02500**** |



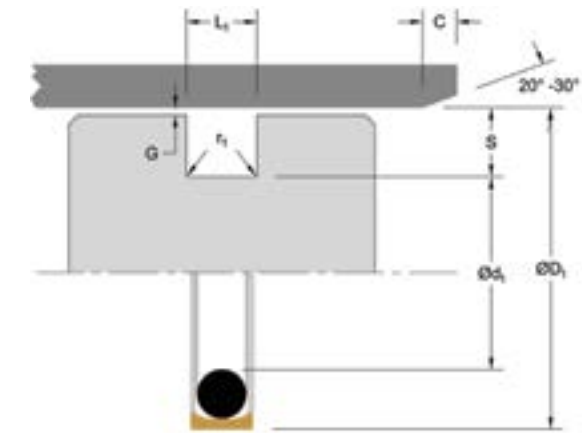
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 250.0           | 225.5           | 8.1            | G54MR02500**** |
| 250.0           | 234.5           | 6.3            | G54ML02500**** |
| 254.0           | 233.0           | 8.1            | G54MR02540**** |
| 260.0           | 239.0           | 8.1            | G54MR02600**** |
| 265.0           | 244.0           | 8.1            | G54MR02650**** |
| 268.0           | 247.0           | 8.1            | G54MR02680**** |
| 270.0           | 249.0           | 8.1            | G54MR02700**** |
| 280.0           | 259.0           | 8.1            | G54MR02800**** |
| 290.0           | 269.0           | 8.1            | G54MR02900**** |
| 300.0           | 279.0           | 8.1            | G54MR03000**** |
| 300.0           | 275.5           | 8.1            | G54ML03000**** |
| 304.8           | 283.8           | 8.1            | G54MR03048**** |
| 310.0           | 289.0           | 8.1            | G54MR03100**** |
| 320.0           | 299.0           | 8.1            | G54MR03200**** |
| 320.0           | 295.5           | 8.1            | G54ML03200**** |
| 330.0           | 305.5           | 8.1            | G54MR03300**** |
| 340.0           | 315.5           | 8.1            | G54MR03400**** |
| 350.0           | 325.5           | 8.1            | G54MR03500**** |
| 360.0           | 335.5           | 8.1            | G54MR03600**** |
| 370.0           | 345.5           | 8.1            | G54MR03700**** |
| 380.0           | 355.5           | 8.1            | G54MR03800**** |
| 400.0           | 375.5           | 8.1            | G54MR04000**** |
| 420.0           | 395.5           | 8.1            | G54MR04200**** |
| 430.0           | 405.5           | 8.1            | G54MR04300**** |
| 440.0           | 415.5           | 8.1            | G54MR04400**** |
| 450.0           | 425.5           | 8.1            | G54MR04500**** |
| 460.0           | 435.5           | 8.1            | G54MR04600**** |
| 480.0           | 455.5           | 8.1            | G54MR04800**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 500.0           | 475.5           | 8.1            | G54MR05000**** |
| 555.0           | 530.5           | 8.1            | G54MR05550**** |
| 600.0           | 575.5           | 8.1            | G54MR06000**** |
| 640.0           | 615.5           | 8.1            | G54MR06400**** |
| 660.0           | 635.5           | 8.1            | G54MR06600**** |
| 700.0           | 672.0           | 9.5            | G54MR07000**** |
| 710.0           | 682.0           | 9.5            | G54MR07100**** |
| 740.0           | 712.0           | 9.5            | G54MR07400**** |
| 780.0           | 752.0           | 9.5            | G54MR07800**** |
| 800.0           | 772.0           | 9.5            | G54MR08000**** |
| 900.0           | 872.0           | 9.5            | G54MR09000**** |
| 1000.0          | 972.0           | 9.5            | G54ML10000**** |
| 1000.0          | 962.0           | 13.8           | G54MR10000**** |
| 1050.0          | 1022.0          | 9.5            | G54ML10500**** |
| 1065.0          | 1027.0          | 13.8           | G54MR10650**** |
| 1070.0          | 1032.0          | 13.8           | G54MR10700**** |
| 1200.0          | 1172.0          | 9.5            | G54ML12000**** |
| 1200.0          | 1162.0          | 13.8           | G54MR12000**** |
| 1225.0          | 1187.0          | 13.8           | G54MR12250**** |

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





# PDS

## PISTON SEAL

Double-Acting

### TECHNICAL DETAILS

The Hallite PDS is a double-acting low-friction piston seal solution for compact O-ring grooves, that extends the service range above what an O-ring alone is capable of supporting. The PDS is designed for light-duty applications, is particularly suited for small-diameter installations, and due to its size and design, is easy to install. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility.

Hallite's PDS is designed to be used in existing dynamic O-ring grooves and does not require any groove modification. A good choice for pneumatic and hydraulic equipment sealing needs, the PDS is proven to extend the service range and seal longevity over stand-alone O-ring installations.

This seal is available in a variety of Hallite's high-performance Armorlene® materials to suit a wide range of demanding applications.



### FEATURES

- Compact design to save metal spacing
- Low breakout friction and elimination of stick-slip action
- Effective in pneumatic cylinder and light-duty hydraulic cylinder
- Can be used in standard AS-568 dynamic O-ring groove
- Fits groove dimensions per MIL-G-5514F
- Recommended for light-duty and small-diameter applications



### Part Number Structure

PDSMR00700NHLX \_

| PDS                 | M                                             | R                                                                                                      | 00700                                                     | N                                                                                    | HLX                                                                              | —                                                     |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile<br>N = Notches |

OPERATING CONDITIONS

|                          | METRIC          | INCH             |
|--------------------------|-----------------|------------------|
| Maximum Speed            | Up to 15.0m/sec | Up to 50.0ft/sec |
| Temperature Range*       | -45 to 200°C    | -49 to 392°F     |
| Maximum Dynamic Pressure | 350 bar         | 5000 psi         |

\*Dependent upon energizer used (NBR, FKM, etc.).

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

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

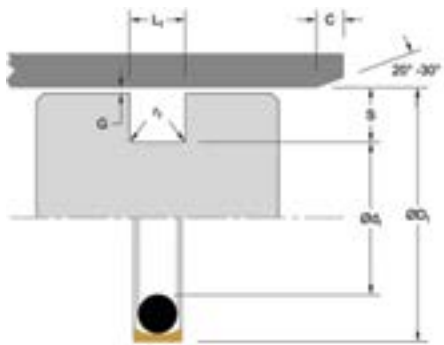
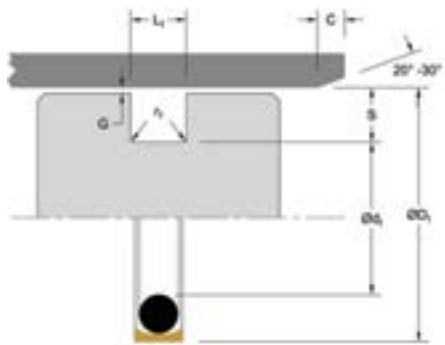
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                     | FILLER                  | MATERIAL DESIGNATOR | COLOR | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|-------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>• Standard material for hydraulic applications</li><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Extended wear resistance</li></ul>                   | Special Bronze Compound | HLX                 | Gold  | -73 to 288°C        | -100 to 550°F       | 350 bar                        | 5000 psi                       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>• Excellent in all lubricating fluids and pneumatic applications</li><li>• High chemical resistance</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul> | 25% Carbon Graphite     | 711                 | Black | -73 to 288°C        | -100 to 550°F       | 350 bar                        | 5000 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>• Excellent in all hydraulic fluids</li><li>• Recommended for use with soft mating surfaces</li><li>• Low friction and no stick-slip</li></ul>                                             | Unfilled                | 700                 | White | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 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.





INSTALLATION RECOMMENDATIONS

| METRIC                           |                            |                       |                      |                |         |                |                            |               |               |               |                      |
|----------------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|----------------------------|---------------|---------------|---------------|----------------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |               |               |               | O-RING CROSS SECTION |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 20 bar               | Up to 100 bar | Up to 200 bar | Up to 350 bar | O-ring               |
| Standard Duty Application - R    | Light Duty Application - L |                       |                      |                |         |                |                            |               |               |               |                      |
| 5.0 - 13.9                       | 14.0 - 24.9                | D <sub>1</sub> - 2.9  | 2.4                  | 0.4            | 2.0     | 1.45           | 0.10                       | 0.10          | 0.08          | 0.05          | 1.78                 |
| 14.0 - 24.9                      | 25.0 - 45.9                | D <sub>1</sub> - 4.5  | 3.6                  | 0.4            | 3.0     | 2.25           | 0.15                       | 0.15          | 0.10          | 0.07          | 2.62                 |
| 25.0 - 45.9                      | 46.0 - 124.9               | D <sub>1</sub> - 6.2  | 4.8                  | 0.6            | 4.0     | 3.10           | 0.25                       | 0.20          | 0.15          | 0.08          | 3.53                 |
| 46.0 - 124.9                     | 125.0 - 669.9              | D <sub>1</sub> - 9.4  | 7.1                  | 0.8            | 6.0     | 4.70           | 0.35                       | 0.25          | 0.20          | 0.10          | 5.33                 |
| 125.0 - 669.9                    | 670.0 - 999.9              | D <sub>1</sub> - 12.2 | 9.5                  | 0.8            | 8.0     | 6.10           | 0.50                       | 0.30          | 0.25          | 0.15          | 6.99                 |
| 670.0 - 999.9                    | > 999.9                    | D <sub>1</sub> - 15.0 | 10.0                 | 1.0            | 1.0     | 7.50           | 0.60                       | 0.40          | 0.30          | 0.20          | 8.40                 |

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

| INCH                             |                            |                        |                       |                |         |                |                            |                |                |                |                      |
|----------------------------------|----------------------------|------------------------|-----------------------|----------------|---------|----------------|----------------------------|----------------|----------------|----------------|----------------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            | GROOVE DIAMETER        | GROOVE WIDTH          | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |                |                |                | O-RING CROSS SECTION |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9     | L <sub>1</sub> + .008 | r <sub>1</sub> | C       | S              | Up to 290 psi              | Up to 1500 psi | Up to 2900 psi | Up to 5000 psi | O-ring               |
| Standard Duty Application - R    | Light Duty Application - L |                        |                       |                |         |                |                            |                |                |                |                      |
| 0.250 - 0.312                    | 0.313 - 0.999              | D <sub>1</sub> - 0.110 | 0.093                 | 0.016          | 0.079   | 0.055          | 0.004                      | 0.004          | 0.003          | 0.002          | 0.070                |
| 0.313 - 0.999                    | 1.000 - 2.500              | D <sub>1</sub> - 0.176 | 0.140                 | 0.016          | 0.118   | 0.088          | 0.006                      | 0.006          | 0.004          | 0.003          | 0.103                |
| 1.000 - 2.500                    | 2.501 - 4.999              | D <sub>1</sub> - 0.242 | 0.187                 | 0.024          | 0.157   | 0.121          | 0.010                      | 0.008          | 0.006          | 0.003          | 0.139                |
| 2.501 - 4.999                    | -                          | D <sub>1</sub> - 0.370 | 0.281                 | 0.032          | 0.236   | 0.185          | 0.014                      | 0.010          | 0.008          | 0.004          | 0.210                |
| 5.000 - 16.000                   | -                          | D <sub>1</sub> - 0.474 | 0.375                 | 0.032          | 0.315   | 0.237          | 0.020                      | 0.012          | 0.010          | 0.006          | 0.275                |

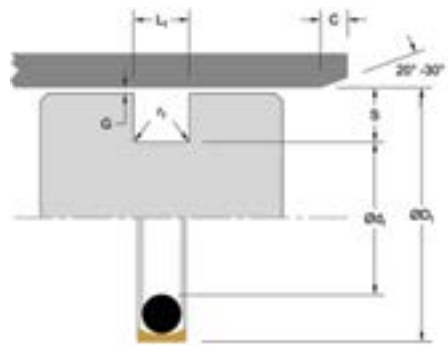
\*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 6.0             | 3.1             | 2.4            | PDSMR00060**** |
| 8.0             | 5.1             | 2.4            | PDSMR00080**** |
| 9.0             | 6.1             | 2.4            | PDSMR00090**** |
| 10.0            | 7.1             | 2.4            | PDSMR00100**** |
| 11.0            | 8.1             | 2.4            | PDSMR00110**** |
| 12.0            | 9.1             | 2.4            | PDSMR00120**** |
| 12.7            | 9.8             | 2.4            | PDSMR00127**** |
| 14.0            | 9.5             | 3.6            | PDSMR00140**** |
| 15.0            | 10.5            | 3.6            | PDSMR00150**** |
| 16.0            | 11.5            | 3.6            | PDSMR00160**** |
| 18.0            | 13.5            | 3.6            | PDSMR00180**** |
| 20.0            | 15.5            | 3.6            | PDSMR00200**** |
| 22.0            | 17.5            | 3.6            | PDSMR00220**** |
| 24.0            | 19.5            | 3.6            | PDSMR00240**** |
| 25.0            | 18.8            | 4.8            | PDSMR00250**** |
| 25.4            | 19.2            | 4.8            | PDSMR00254**** |
| 27.0            | 20.8            | 4.8            | PDSMR00270**** |
| 28.0            | 21.8            | 4.8            | PDSMR00280**** |
| 30.0            | 23.8            | 4.8            | PDSMR00300**** |
| 32.0            | 25.8            | 4.8            | PDSMR00320**** |
| 35.0            | 28.8            | 4.8            | PDSMR00350**** |
| 40.0            | 33.8            | 4.8            | PDSMR00400**** |
| 42.0            | 35.8            | 4.8            | PDSMR00420**** |
| 45.0            | 38.8            | 4.8            | PDSMR00450**** |
| 48.0            | 38.6            | 7.1            | PDSMR00480**** |
| 50.0            | 40.6            | 7.1            | PDSMR00500**** |
| 50.8            | 41.4            | 7.1            | PDSMR00508**** |
| 52.0            | 42.6            | 7.1            | PDSMR00520**** |

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 55.0            | 45.6            | 7.1            | PDSMR00550**** |
| 56.0            | 46.6            | 7.1            | PDSMR00560**** |
| 60.0            | 50.6            | 7.1            | PDSMR00600**** |
| 63.0            | 53.6            | 7.1            | PDSMR00630**** |
| 65.0            | 55.6            | 7.1            | PDSMR00650**** |
| 70.0            | 60.6            | 7.1            | PDSMR00700**** |
| 75.0            | 65.6            | 7.1            | PDSMR00750**** |
| 80.0            | 70.6            | 7.1            | PDSMR00800**** |
| 85.0            | 75.6            | 7.1            | PDSMR00850**** |
| 90.0            | 80.6            | 7.1            | PDSMR00900**** |
| 95.0            | 85.6            | 7.1            | PDSMR00950**** |
| 100.0           | 90.6            | 7.1            | PDSMR01000**** |
| 110.0           | 100.6           | 7.1            | PDSMR01100**** |
| 115.0           | 105.6           | 7.1            | PDSMR01150**** |
| 120.0           | 110.6           | 7.1            | PDSMR01200**** |
| 125.0           | 112.8           | 9.5            | PDSMR01250**** |
| 130.0           | 117.8           | 9.5            | PDSMR01300**** |
| 135.0           | 122.8           | 9.5            | PDSMR01350**** |
| 140.0           | 127.8           | 9.5            | PDSMR01400**** |
| 150.0           | 137.8           | 9.5            | PDSMR01500**** |
| 160.0           | 147.8           | 9.5            | PDSMR01600**** |
| 170.0           | 157.8           | 9.5            | PDSMR01700**** |
| 180.0           | 167.8           | 9.5            | PDSMR01800**** |
| 190.0           | 177.8           | 9.5            | PDSMR01900**** |
| 200.0           | 187.8           | 9.5            | PDSMR02000**** |
| 210.0           | 197.8           | 9.5            | PDSMR02100**** |
| 220.0           | 207.8           | 9.5            | PDSMR02200**** |
| 230.0           | 217.8           | 9.5            | PDSMR02300**** |





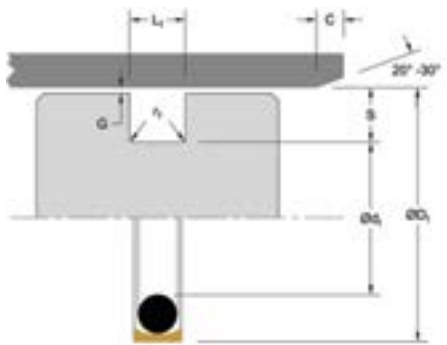
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 240.0           | 227.8           | 9.5            | PDSMR02400**** |
| 250.0           | 237.8           | 9.5            | PDSMR02500**** |
| 280.0           | 267.8           | 9.5            | PDSMR02800**** |
| 300.0           | 287.8           | 9.5            | PDSMR03000**** |
| 320.0           | 307.8           | 9.5            | PDSMR03200**** |
| 350.0           | 337.8           | 9.5            | PDSMR03500**** |
| 400.0           | 387.8           | 9.5            | PDSMR04000**** |
| 420.0           | 407.8           | 9.5            | PDSMR04200**** |
| 450.0           | 437.8           | 9.5            | PDSMR04500**** |
| 480.0           | 467.8           | 9.5            | PDSMR04800**** |
| 500.0           | 487.8           | 9.5            | PDSMR05000**** |
| 600.0           | 587.8           | 9.5            | PDSMR06000**** |
| 650.0           | 637.8           | 9.5            | PDSMR06500**** |

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

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER   |
|-----------------|-----------------|----------------|---------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |               |
| Tol. H9         | Tol. h9         | Tol. +0.008    |               |
| 0.250           | 0.140           | 0.093          | PDSE00250**** |
| 0.281           | 0.171           | 0.093          | PDSE00281**** |
| 0.312           | 0.202           | 0.093          | PDSE00312**** |
| 0.344           | 0.234           | 0.093          | PDSE00344**** |
| 0.375           | 0.265           | 0.093          | PDSE00375**** |
| 0.437           | 0.327           | 0.093          | PDSE00437**** |
| 0.500           | 0.390           | 0.093          | PDSE00500**** |
| 0.562           | 0.452           | 0.093          | PDSE00562**** |
| 0.625           | 0.515           | 0.093          | PDSE00625**** |
| 0.687           | 0.577           | 0.093          | PDSE00687**** |
| 0.750           | 0.640           | 0.093          | PDSE00750**** |
| 0.812           | 0.702           | 0.093          | PDSE00812**** |
| 0.875           | 0.765           | 0.093          | PDSE00875**** |
| 0.937           | 0.827           | 0.093          | PDSE00937**** |
| 1.000           | 0.824           | 0.140          | PDSE01000**** |
| 1.062           | 0.886           | 0.140          | PDSE01062**** |
| 1.125           | 0.949           | 0.140          | PDSE01125**** |
| 1.187           | 1.011           | 0.140          | PDSE01187**** |
| 1.250           | 1.074           | 0.140          | PDSE01250**** |
| 1.312           | 1.136           | 0.140          | PDSE01312**** |
| 1.375           | 1.199           | 0.140          | PDSE01375**** |
| 1.437           | 1.261           | 0.140          | PDSE01437**** |
| 1.500           | 1.324           | 0.140          | PDSE01500**** |
| 1.562           | 1.386           | 0.140          | PDSE01562**** |
| 1.625           | 1.449           | 0.140          | PDSE01625**** |
| 1.687           | 1.511           | 0.140          | PDSE01687**** |
| 1.750           | 1.574           | 0.140          | PDSE01750**** |
| 1.812           | 1.636           | 0.140          | PDSE01812**** |



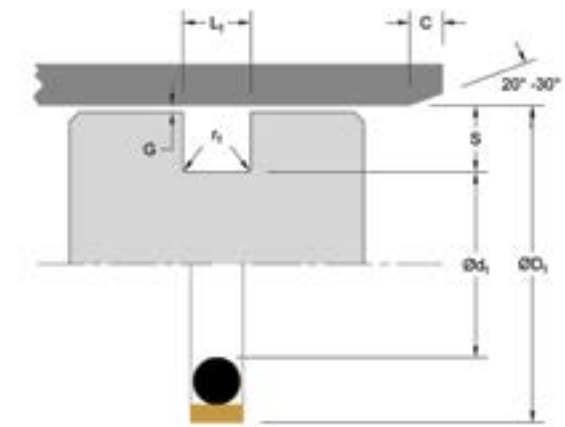
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER   |
|-----------------|-----------------|----------------|---------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |               |
| Tol. H9         | Tol. h9         | Tol. +0.008    |               |
| 1.875           | 1.699           | 0.187          | PDSE01875**** |
| 1.937           | 1.761           | 0.187          | PDSE01937**** |
| 2.000           | 1.824           | 0.187          | PDSE02000**** |
| 2.062           | 1.886           | 0.187          | PDSE02062**** |
| 2.125           | 1.949           | 0.187          | PDSE02125**** |
| 2.187           | 2.011           | 0.187          | PDSE02187**** |
| 2.250           | 2.074           | 0.187          | PDSE02250**** |
| 2.312           | 2.136           | 0.187          | PDSE02312**** |
| 2.375           | 2.199           | 0.187          | PDSE02375**** |
| 2.437           | 2.261           | 0.187          | PDSE02437**** |
| 2.500           | 2.324           | 0.187          | PDSE02500**** |
| 2.625           | 2.383           | 0.187          | PDSE02625**** |
| 2.750           | 2.508           | 0.187          | PDSE02750**** |
| 2.875           | 2.633           | 0.187          | PDSE02875**** |
| 3.000           | 2.758           | 0.187          | PDSE03000**** |
| 3.125           | 2.883           | 0.187          | PDSE03125**** |
| 3.250           | 3.008           | 0.187          | PDSE03250**** |
| 3.375           | 3.133           | 0.187          | PDSE03375**** |
| 3.500           | 3.258           | 0.187          | PDSE03500**** |
| 3.625           | 3.383           | 0.187          | PDSE03625**** |
| 3.750           | 3.508           | 0.187          | PDSE03750**** |
| 3.875           | 3.633           | 0.187          | PDSE03875**** |
| 4.000           | 3.758           | 0.187          | PDSE04000**** |
| 4.125           | 3.883           | 0.187          | PDSE04125**** |
| 4.250           | 4.008           | 0.187          | PDSE04250**** |
| 4.375           | 4.133           | 0.187          | PDSE04375**** |
| 4.500           | 4.258           | 0.187          | PDSE04500**** |
| 4.625           | 4.383           | 0.187          | PDSE04625**** |

| INCH            |                 |                | PART NUMBER   |
|-----------------|-----------------|----------------|---------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |               |
| Tol. H9         | Tol. h9         | Tol. +0.008    |               |
| 4.750           | 4.508           | 0.187          | PDSE04750**** |
| 4.875           | 4.633           | 0.187          | PDSE04875**** |
| 5.000           | 4.526           | 0.375          | PDSE05000**** |
| 5.125           | 4.651           | 0.375          | PDSE05125**** |
| 5.250           | 4.776           | 0.375          | PDSE05250**** |
| 5.375           | 4.901           | 0.375          | PDSE05375**** |
| 5.500           | 5.026           | 0.375          | PDSE05500**** |
| 5.625           | 5.151           | 0.375          | PDSE05625**** |
| 5.750           | 5.276           | 0.375          | PDSE05750**** |
| 5.875           | 5.401           | 0.375          | PDSE05875**** |
| 6.000           | 5.526           | 0.375          | PDSE06000**** |
| 6.125           | 5.651           | 0.375          | PDSE06125**** |
| 6.250           | 5.776           | 0.375          | PDSE06250**** |
| 6.375           | 5.901           | 0.375          | PDSE06375**** |
| 6.500           | 6.026           | 0.375          | PDSE06500**** |
| 6.750           | 6.276           | 0.375          | PDSE06750**** |
| 7.000           | 6.526           | 0.375          | PDSE07000**** |
| 7.250           | 6.776           | 0.375          | PDSE07250**** |
| 7.500           | 7.026           | 0.375          | PDSE07500**** |
| 7.750           | 7.276           | 0.375          | PDSE07750**** |
| 8.000           | 7.526           | 0.375          | PDSE08000**** |
| 8.250           | 7.776           | 0.375          | PDSE08250**** |
| 8.500           | 8.026           | 0.375          | PDSE08500**** |

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





# PCG

## PISTON SEAL

Double-Acting

### TECHNICAL DETAILS

The Hallite PCG is a double-acting, O-ring energized, low-friction piston seal designed for low- and medium-pressure systems. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility.

The compact design of the PCG piston seal provides an ideal sealing solution where housing space is limited. This seal is available in a variety of Hallite's high- performance Armorlene® materials to suit a wide range of demanding applications.



### FEATURES

- Low breakout friction and elimination of stick-slip action
- Compact design to save metal spacing
- High service temperature, long wear, and high extrusion resistance

### Part Number Structure

PCGMR00400NHLX \_

| PCG                 | M                                             | R                                                                                                      | 00400                                                     | N                                                                                    | HLX                                                                              | —                                                     |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile<br>N = Notches |

OPERATING CONDITIONS

|                          | METRIC          | INCH             |
|--------------------------|-----------------|------------------|
| Maximum Speed            | Up to 15.0m/sec | Up to 50.0ft/sec |
| Temperature Range*       | -45 to 200°C    | -49 to 392°F     |
| Maximum Dynamic Pressure | 200 bar         | 2900 psi         |

\*Dependent upon energizer used (NBR, FKM, etc.).

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

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

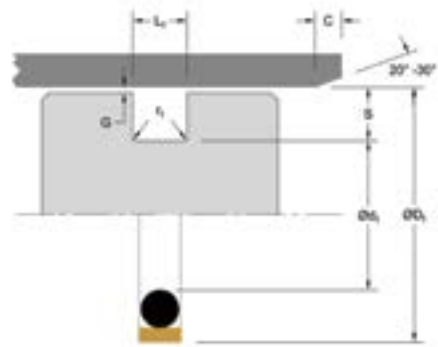
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                        | FILLER                  | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|-------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>• Standard material for hydraulic applications</li><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Extended wear resistance</li></ul>                                                      | Special Bronze Compound | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>• Not recommended for gas sealing applications</li><li>• Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled     | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>• Excellent in all hydraulic fluids</li><li>• Recommended for use with soft mating surfaces</li><li>• Low friction and no stick-slip</li></ul>                                                                                | Unfilled                | 700                 | White       | -184 to 204°C       | -300 to 400°F       | 200 bar                        | 2900 psi                       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>• Excellent in all lubricating fluids and pneumatic applications</li><li>• High chemical resistance</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul>                                    | 25% Carbon/Graphite     | 711                 | Black       | -73 to 288°C        | -100 to 550°F       | 200 bar                        | 2900 psi                       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>• Excellent impact resistance</li><li>• Good dielectrical properties</li><li>• Excellent abrasion resistance</li><li>• Low coefficient of friction</li></ul>                                                                    | Standard                | 748                 | Translucent | -184 to 82°C        | -300 to 180°F       | 200 bar                        | 2900 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.





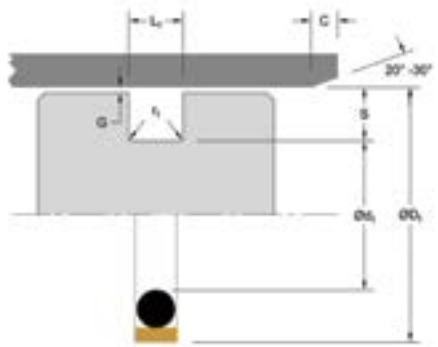
INSTALLATION RECOMMENDATIONS

| Metric                           |  |                       |                      |                |                |                            |               |                      |
|----------------------------------|--|-----------------------|----------------------|----------------|----------------|----------------------------|---------------|----------------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |  | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | GROOVE SECTION | RADIAL CLEARANCE<br>G max* |               | O-RING CROSS SECTION |
| DIAMETER RANGE                   |  | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | S              | Up to 100 bar              | Up to 200 bar | O-ring               |
| Standard Duty Application - R    |  |                       |                      |                |                |                            |               |                      |
| 7.0 - 15.9                       |  | D <sub>1</sub> - 4.0  | 2.00                 | 0.50           | 2.20           | 0.08                       | 0.08          | 1.78                 |
| 16.0 - 26.9                      |  | D <sub>1</sub> - 6.0  | 2.85                 | 0.50           | 3.00           | 0.08                       | 0.08          | 2.62                 |
| 27.0 - 49.9                      |  | D <sub>1</sub> - 7.5  | 3.8                  | 0.80           | 3.75           | 0.08                       | 0.08          | 3.53                 |
| 50.0 - 129.9                     |  | D <sub>1</sub> - 12.5 | 5.6                  | 1.30           | 6.25           | 0.10                       | 0.10          | 5.33                 |
| 130.0 - 179.9                    |  | D <sub>1</sub> - 15.0 | 7.55                 | 1.50           | 7.50           | 0.10                       | 0.10          | 6.99                 |
| 180.0 - 239.9                    |  | D <sub>1</sub> - 18.0 | 7.55                 | 1.50           | 9.00           | 0.10                       | 0.10          | 6.99                 |
| 240.0 - 420.0                    |  | D <sub>1</sub> - 24.0 | 7.55                 | 1.50           | 12.00          | 0.10                       | 0.10          | 6.99                 |

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

| INCH                             |                            |                        |                        |                |                |                         |                |                      |
|----------------------------------|----------------------------|------------------------|------------------------|----------------|----------------|-------------------------|----------------|----------------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            | GROOVE DIAMETER        | GROOVE WIDTH           | RADIUS         | GROOVE SECTION | RADIAL CLEARANCE G max* |                | O-RING CROSS SECTION |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9     | L <sub>1</sub> + 0.008 | r <sub>1</sub> | S              | Up to 1500 psi          | Up to 2900 psi | O-ring               |
| Standard Duty Application - R    | Light Duty Application - L | Ød <sub>1</sub> h9     | L <sub>1</sub> + 0.008 | r <sub>1</sub> | S              | Up to 1500 psi          | Up to 2900 psi | O-ring               |
| 0.250 - 0.937                    | 0.938 - 2.500              | D <sub>1</sub> - 0.172 | 0.079                  | 0.02           | 0.086          | 0.002                   | 0.002          | 0.070                |
| 0.938 - 2.500                    | 2.501 - 3.875              | D <sub>1</sub> - 0.236 | 0.112                  | 0.02           | 0.118          | 0.003                   | 0.003          | 0.103                |
| 2.501 - 3.875                    | 3.876 - 5.000              | D <sub>1</sub> - 0.363 | 0.149                  | 0.03           | 0.182          | 0.003                   | 0.003          | 0.139                |
| 3.876 - 5.000                    | 5.001 - 6.500              | D <sub>1</sub> - 0.491 | 0.221                  | 0.05           | 0.246          | 0.004                   | 0.004          | 0.210                |
| 5.001 - 6.500                    | 6.501 - 8.500              | D <sub>1</sub> - 0.593 | 0.297                  | 0.06           | 0.297          | 0.004                   | 0.004          | 0.275                |
| 6.501 - 8.500                    | 8.501 - 25.500             | D <sub>1</sub> - 0.718 | 0.297                  | 0.06           | 0.359          | 0.004                   | 0.004          | 0.275                |
| 8.501 - 25.500                   | -                          | D <sub>1</sub> - 0.968 | 0.297                  | 0.06           | 0.484          | 0.004                   | 0.004          | 0.275                |

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

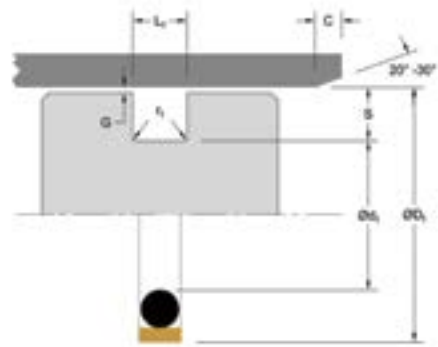


PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 7.0             | 3.0             | 2.00           | PCGMR00070**** |
| 8.0             | 4.0             | 2.00           | PCGMR00080**** |
| 9.0             | 5.0             | 2.00           | PCGMR00090**** |
| 10.0            | 6.0             | 2.00           | PCGMR00100**** |
| 11.0            | 7.0             | 2.00           | PCGMR00110**** |
| 12.0            | 8.0             | 2.00           | PCGMR00120**** |
| 14.0            | 10.0            | 2.00           | PCGMR00140**** |
| 16.0            | 10.0            | 2.85           | PCGMR00160**** |
| 18.0            | 12.0            | 2.85           | PCGMR00180**** |
| 19.0            | 13.0            | 2.85           | PCGMR00190**** |
| 20.0            | 14.0            | 2.85           | PCGMR00200**** |
| 22.0            | 16.0            | 2.85           | PCGMR00220**** |
| 25.0            | 19.0            | 2.85           | PCGMR00250**** |
| 28.0            | 20.5            | 3.80           | PCGMR00280**** |
| 30.0            | 22.5            | 3.80           | PCGMR00300**** |
| 32.0            | 24.5            | 3.80           | PCGMR00320**** |
| 35.0            | 27.5            | 3.80           | PCGMR00350**** |
| 36.0            | 28.5            | 3.80           | PCGMR00360**** |
| 38.0            | 30.5            | 3.80           | PCGMR00380**** |
| 40.0            | 32.5            | 3.80           | PCGMR00400**** |
| 42.0            | 34.5            | 3.80           | PCGMR00420**** |
| 45.0            | 37.5            | 3.80           | PCGMR00450**** |

| METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 48.0            | 40.5            | 3.80           | PCGMR00480**** |
| 50.0            | 37.5            | 5.60           | PCGMR00500**** |
| 55.0            | 42.5            | 5.60           | PCGMR00550**** |
| 60.0            | 47.5            | 5.60           | PCGMR00600**** |
| 63.0            | 50.5            | 5.60           | PCGMR00630**** |
| 65.0            | 52.5            | 5.6            | PCGMR00650**** |
| 70.0            | 57.5            | 5.6            | PCGMR00700**** |
| 74.0            | 61.5            | 5.60           | PCGMR00740**** |
| 75.0            | 62.5            | 5.60           | PCGMR00750**** |
| 80.0            | 67.5            | 5.60           | PCGMR00800**** |
| 85.0            | 72.5            | 5.60           | PCGMR00850**** |
| 90.0            | 77.5            | 5.60           | PCGMR00900**** |
| 92.0            | 79.5            | 5.60           | PCGMR00920**** |
| 100.0           | 87.5            | 5.60           | PCGMR01000**** |
| 105.0           | 92.5            | 5.60           | PCGMR01050**** |
| 110.0           | 97.5            | 5.60           | PCGMR01100**** |
| 115.0           | 102.5           | 5.60           | PCGMR01150**** |
| 120.0           | 107.5           | 5.60           | PCGMR01200**** |
| 125.0           | 112.5           | 5.60           | PCGMR01250**** |
| 130.0           | 115.0           | 7.55           | PCGMR01300**** |
| 140.0           | 125.0           | 7.55           | PCGMR01400**** |

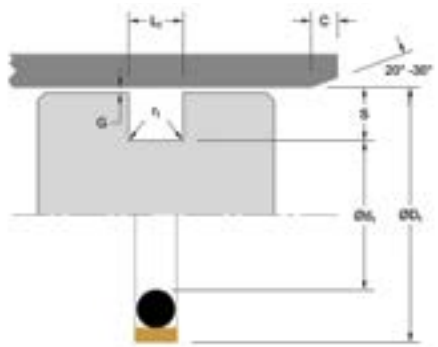
\*Please contact Hallite for custom sizes, material selection, or seal design.



PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 0.250           | 0.078           | 0.079          | PCGER00250**** |
| 0.312           | 0.140           | 0.079          | PCGER00312**** |
| 0.375           | 0.203           | 0.079          | PCGER00375**** |
| 0.437           | 0.265           | 0.079          | PCGER00437**** |
| 0.500           | 0.328           | 0.079          | PCGER00500**** |
| 0.562           | 0.390           | 0.079          | PCGER00562**** |
| 0.625           | 0.453           | 0.079          | PCGER00625**** |
| 0.687           | 0.515           | 0.079          | PCGER00687**** |
| 0.750           | 0.578           | 0.079          | PCGER00750**** |
| 0.812           | 0.640           | 0.079          | PCGER00812**** |
| 0.875           | 0.703           | 0.079          | PCGER00875**** |
| 0.937           | 0.765           | 0.079          | PCGER00937**** |
| 1.000           | 0.764           | 0.112          | PCGER01000**** |
| 1.062           | 0.826           | 0.112          | PCGER01062**** |
| 1.125           | 0.889           | 0.112          | PCGER01125**** |
| 1.187           | 0.951           | 0.112          | PCGER01187**** |
| 1.250           | 1.014           | 0.112          | PCGER01250**** |
| 1.312           | 1.076           | 0.112          | PCGER01312**** |
| 1.375           | 1.139           | 0.112          | PCGER01375**** |
| 1.437           | 1.201           | 0.112          | PCGER01437**** |
| 1.500           | 1.264           | 0.112          | PCGER01500**** |
| 1.562           | 1.326           | 0.112          | PCGER01562**** |
| 1.625           | 1.389           | 0.112          | PCGER01625**** |
| 1.687           | 1.451           | 0.112          | PCGER01687**** |
| 1.750           | 1.514           | 0.112          | PCGER01750**** |
| 1.812           | 1.576           | 0.112          | PCGER01812**** |
| 1.875           | 1.639           | 0.112          | PCGER01875**** |
| 1.937           | 1.701           | 0.112          | PCGER01937**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 2.000           | 1.764           | 0.112          | PCGER02000**** |
| 2.062           | 1.826           | 0.112          | PCGER02062**** |
| 2.125           | 1.889           | 0.112          | PCGER02125**** |
| 2.187           | 1.951           | 0.112          | PCGER02187**** |
| 2.250           | 2.014           | 0.112          | PCGER02250**** |
| 2.312           | 2.076           | 0.112          | PCGER02312**** |
| 2.375           | 2.139           | 0.112          | PCGER02375**** |
| 2.437           | 2.201           | 0.112          | PCGER02437**** |
| 2.500           | 2.264           | 0.112          | PCGER02500**** |
| 2.625           | 2.262           | 0.149          | PCGER02625**** |
| 2.750           | 2.387           | 0.149          | PCGER02750**** |
| 2.875           | 2.512           | 0.149          | PCGER02875**** |
| 3.000           | 2.637           | 0.149          | PCGER03000**** |
| 3.125           | 2.762           | 0.149          | PCGER03125**** |
| 3.250           | 2.887           | 0.149          | PCGER03250**** |
| 3.375           | 3.012           | 0.149          | PCGER03375**** |
| 3.500           | 3.137           | 0.149          | PCGER03500**** |
| 3.625           | 3.262           | 0.149          | PCGER03625**** |
| 3.750           | 3.387           | 0.149          | PCGER03750**** |
| 3.875           | 3.512           | 0.149          | PCGER03875**** |
| 4.000           | 3.509           | 0.221          | PCGER04000**** |
| 4.125           | 3.634           | 0.221          | PCGER04125**** |
| 4.250           | 3.759           | 0.221          | PCGER04250**** |
| 4.375           | 3.884           | 0.221          | PCGER04375**** |
| 4.500           | 4.009           | 0.221          | PCGER04500**** |
| 4.625           | 4.134           | 0.221          | PCGER04625**** |
| 4.750           | 4.259           | 0.221          | PCGER04750**** |
| 4.875           | 4.384           | 0.221          | PCGER04875**** |



PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER     |
|-----------------|-----------------|----------------|-----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                 |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                 |
| 5.000           | 4.509           | 0.221          | PCGER05000****  |
| 5.125           | 4.532           | 0.297          | PCGER05125****  |
| 5.250           | 4.657           | 0.297          | PCGER05250****  |
| 5.375           | 4.782           | 0.297          | PC GER05375**** |
| 5.500           | 4.907           | 0.297          | PCGER05500****  |
| 5.625           | 5.032           | 0.297          | PCGER05625****  |
| 5.750           | 5.157           | 0.297          | PCGER05750****  |
| 5.875           | 5.282           | 0.297          | PCGER05875****  |
| 6.000           | 5.407           | 0.297          | PCGER06000****  |
| 6.125           | 5.532           | 0.297          | PCGER06125****  |
| 6.250           | 5.657           | 0.297          | PCGER06250****  |
| 6.375           | 5.782           | 0.297          | PCGER06375****  |
| 6.500           | 5.907           | 0.297          | PCGER06500****  |

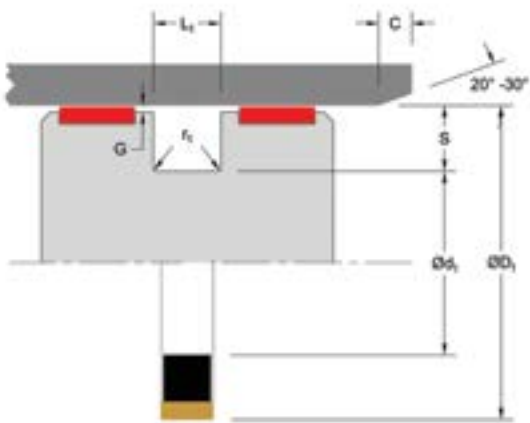
| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 6.750           | 6.032           | 0.297          | PCGER06750**** |
| 7.000           | 6.282           | 0.297          | PCGER07000**** |
| 7.250           | 6.532           | 0.297          | PCGER07250**** |
| 7.500           | 6.782           | 0.297          | PCGER07500**** |
| 7.750           | 7.032           | 0.297          | PCGER07750**** |
| 8.000           | 7.282           | 0.297          | PCGER08000**** |
| 8.250           | 7.532           | 0.297          | PCGER08250**** |
| 8.500           | 7.782           | 0.297          | PCGER08500**** |
| 9.000           | 8.032           | 0.297          | PCGER09000**** |
| 9.500           | 8.532           | 0.297          | PCGER09500**** |
| 10.000          | 9.032           | 0.297          | PCGER10000**** |
| 10.500          | 9.532           | 0.297          | PCGER10500**** |

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



# PCA

PISTON SEAL  
Double-Acting



## TECHNICAL DETAILS

The Hallite PCA is a double-acting piston seal that performs well in both high- and low-pressure systems. The PCA has a square edge design on the primary sealing face paired with a square elastomer energizer. The square ring provides more stable pressure loading to the PTFE face ring, therefore it provides exceptional sealability throughout the pressure ranges. High-performance Armorlene® materials, like HLX, provide outstanding wear and extrusion-resistance properties as well as large range of temperature and media compatibility.

The Hallite PCA seal is well-suited for a variety of hydraulic and pneumatic reciprocating applications. The compact housing allows designers to use a narrow-width piston, but it is recommended that proper guidance be used with this seal, especially in heavy-duty applications (see Hallite Bearings section). The PCA seal is available in a variety of Hallite’s high-performance Armorlene® materials to suit a wide range of demanding applications.



## FEATURES

- Low breakout friction and elimination of stick-slip action
- Compact design to save metal spacing
- High service temperature, long wear, and high extrusion resistance
- Compact design allows for smaller grooves in hardware

## Part Number Structure

PCAMR00400RHLX \_

| PCA                 | M                                             | R                                                                                                      | 00400                                                     | R                                                                                    | HLX                                                                              | —                                                     |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile<br>N = Notches |

OPERATING CONDITIONS

|                            | METRIC          | INCH             |
|----------------------------|-----------------|------------------|
| Maximum Speed              | Up to 15.0m/sec | Up to 50.0ft/sec |
| Temperature Range*         | -45 to 200°C    | -49 to 392°F     |
| Maximum Dynamic Pressure** | 400 bar         | 5800 psi         |

\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above 400 bar, 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

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

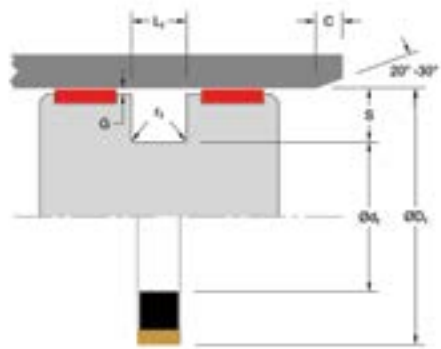
| ENERGIZER MATERIAL (SHORE A) | ENERGIZER TYPE | ENERGIZER DESIGNATION | ENERGIZER OPERATING TEMPERATURE°C | ENERGIZER OPERATING TEMPERATURE°F |
|------------------------------|----------------|-----------------------|-----------------------------------|-----------------------------------|
| NBR - 70A                    | Square         | R                     | -30 to 100°C                      | -22 to 212°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.

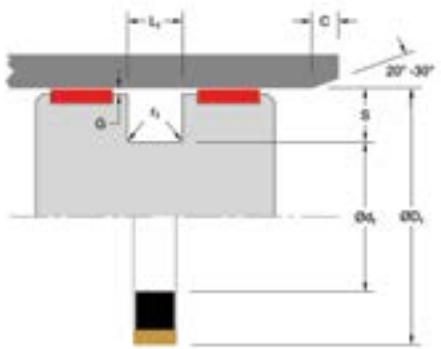
MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                       | FILLER                     | MATERIAL DESIGNATOR | COLOR | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|-------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>• Standard material for hydraulic applications</li><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Extended wear resistance</li></ul>                     | Special Bronze Compound    | HLX                 | Gold  | -73 to 288°C        | -100 to 550°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® HLA</b> <ul style="list-style-type: none"><li>• Excellent in all hydraulic fluids</li><li>• Excellent wear resistance</li><li>• Excellent low-friction properties</li><li>• Good extrusion resistance</li></ul>                            | Special Mineral Compound   | HLA                 | Gray  | -73 to 260°C        | -100 to 500°F       | 500 bar                        | 7250 psi                       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids</li><li>• Good low-friction properties</li><li>• Excellent extrusion resistance</li><li>• Good chemical resistance</li></ul> | Glass Molybdenum Disulfide | 702                 | Gray  | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 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.



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 <sub>1</sub> H9 |  | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G max* |               |               |
| DIAMETER RANGE                   |  | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 100 bar           | Up to 160 bar | Up to 250 bar |
| Standard Duty Application - R    |  |                       |                      |                |         |                | Up to 400 bar           |               |               |
| 20.0 - 60.0                      |  | D <sub>1</sub> - 10.0 | 4.5                  | 0.3            | 4.0     | 5.00           | 0.30                    | 0.25          | 0.22          |
| 61.0 - 107.0                     |  | D <sub>1</sub> - 15.0 | 7.5                  | 0.5            | 6.5     | 7.50           | 0.30                    | 0.25          | 0.22          |
| 108.0 - 160.0                    |  | D <sub>1</sub> - 16.0 | 7.5                  | 0.5            | 6.5     | 8.00           | 0.30                    | 0.25          | 0.22          |
| 161.0 - 250.0                    |  | D <sub>1</sub> - 22.0 | 11.0                 | 0.5            | 6.5     | 11.00          | 0.30                    | 0.25          | 0.22          |
| 251.0 - 400.0                    |  | D <sub>1</sub> - 24.0 | 12.0                 | 0.5            | 10.0    | 12.00          | 0.30                    | 0.25          | 0.22          |
| 401.0 - 900.0                    |  | D <sub>1</sub> - 30.0 | 15.0                 | 0.8            | 15.0    | 15.00          | 0.30                    | 0.25          | 0.22          |
| > 900.0                          |  | D <sub>1</sub> - 40.0 | 20.0                 | 0.8            | 20.0    | 20.00          | 0.30                    | 0.25          | 0.22          |

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

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                | METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | PART NUMBER    | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. H9         | Tol. H9         | Tol. +0.2      |                | Tol. H9         | Tol. H9         | Tol. +0.2      |                |
| 40.0            | 30.0            | 4.5            | PCAMR00400**** | 69.0            | 54.0            | 7.5            | PCAMR00690**** |
| 45.0            | 35.0            | 4.5            | PCAMR00450**** | 70.0            | 55.0            | 7.5            | PCAMR00700**** |
| 50.0            | 40.0            | 4.5            | PCAMR00500**** | 71.0            | 56.0            | 7.5            | PCAMR00710**** |
| 55.0            | 45.0            | 4.5            | PCAMR00550**** | 75.0            | 60.0            | 7.5            | PCAMR00750**** |
| 56.0            | 46.0            | 4.5            | PCAMR00560**** | 80.0            | 65.0            | 7.5            | PCAMR00800**** |
| 60.0            | 50.0            | 4.5            | PCAMR00600**** | 85.0            | 70.0            | 7.5            | PCAMR00850**** |
| 63.0            | 48.0            | 7.5            | PCAMR00630**** | 90.0            | 75.0            | 7.5            | PCAMR00900**** |
| 65.0            | 50.0            | 7.5            | PCAMR00650**** | 95.0            | 80.0            | 7.5            | PCAMR00950**** |

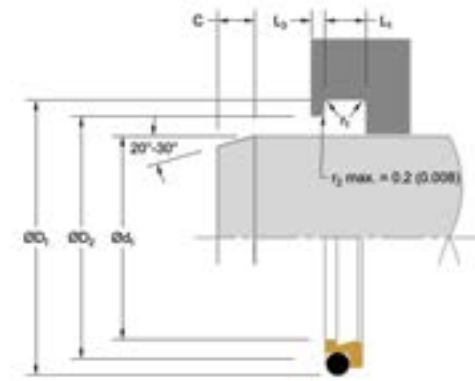
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                | METRIC          |                 |                |                |
|-----------------|-----------------|----------------|----------------|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | PART NUMBER    | ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> | PART NUMBER    |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                | Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 100.0           | 85.0            | 7.5            | PCAMR01000**** | 270.0           | 246.0           | 12.0           | PCAMR02700**** |
| 105.0           | 90.0            | 7.5            | PCAMR01050**** | 280.0           | 256.0           | 12.0           | PCAMR02800**** |
| 108.0           | 92.0            | 7.5            | PCAMR01080**** | 290.0           | 266.0           | 12.0           | PCAMR02900**** |
| 110.0           | 94.0            | 7.5            | PCAMR01100**** | 300.0           | 276.0           | 12.0           | PCAMR03000**** |
| 112.0           | 96.0            | 7.5            | PCAMR01120**** | 310.0           | 286.0           | 12.0           | PCAMR03100**** |
| 120.0           | 104.0           | 7.5            | PCAMR01200**** | 320.0           | 296.0           | 12.0           | PCAMR03200**** |
| 125.0           | 109.0           | 7.5            | PCAMR01250**** | 360.0           | 336.0           | 12.0           | PCAMR03600**** |
| 130.0           | 114.0           | 7.5            | PCAMR01300**** | 400.0           | 376.0           | 12.0           | PCAMR04000**** |
| 135.0           | 119.0           | 7.5            | PCAMR01350**** | 485.0           | 455.0           | 15.0           | PCAMR04850**** |
| 140.0           | 124.0           | 7.5            | PCAMR01400**** | 500.0           | 470.0           | 15.0           | PCAMR05000**** |
| 145.0           | 129.0           | 7.5            | PCAMR01450**** | 600.0           | 570.0           | 15.0           | PCAMR06000**** |
| 150.0           | 134.0           | 7.5            | PCAMR01500**** | 650.0           | 620.0           | 15.0           | PCAMR06500**** |
| 155.0           | 139.0           | 7.5            | PCAMR01550**** | 720.0           | 690.0           | 15.0           | PCAMR07200**** |
| 160.0           | 144.0           | 7.5            | PCAMR01600**** | 900.0           | 870.0           | 15.0           | PCAMR09000**** |
| 170.0           | 148.0           | 11.0           | PCAMR01700**** | 930.0           | 890.0           | 20.0           | PCAMR09300**** |
| 180.0           | 158.0           | 11.0           | PCAMR01800**** | 1000.0          | 960.0           | 20.0           | PCAMR10000**** |
| 190.0           | 168.0           | 11.0           | PCAMR01900**** | 1060.0          | 1020.0          | 20.0           | PCAMR10600**** |
| 200.0           | 178.0           | 11.0           | PCAMR02000**** | 1120.0          | 1080.0          | 20.0           | PCAMR11200**** |
| 204.0           | 182.0           | 11.0           | PCAMR02040**** | 1150.0          | 1110.0          | 20.0           | PCAMR11500**** |
| 210.0           | 188.0           | 11.0           | PCAMR02100**** | 1210.0          | 1170.0          | 20.0           | PCAMR12100**** |
| 215.0           | 193.0           | 11.0           | PCAMR02150**** | 1250.0          | 1210.0          | 20.0           | PCAMR12500**** |
| 220.0           | 198.0           | 11.0           | PCAMR02200**** |                 |                 |                |                |
| 224.0           | 202.0           | 11.0           | PCAMR02240**** |                 |                 |                |                |
| 225.0           | 203.0           | 11.0           | PCAMR02250**** |                 |                 |                |                |
| 230.0           | 208.0           | 11.0           | PCAMR02300**** |                 |                 |                |                |
| 240.0           | 218.0           | 11.0           | PCAMR02400**** |                 |                 |                |                |
| 250.0           | 228.0           | 11.0           | PCAMR02500**** |                 |                 |                |                |
| 260.0           | 236.0           | 12.0           | PCAMR02600**** |                 |                 |                |                |

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

# WIPER SEALS





# E2W

## WIPER/EXCLUDER

Double-Acting

### TECHNICAL DETAILS

The Hallite E2W is a double-acting, O-ring energized, rod wiper/excluder designed to include two different unique wiping lip geometries. The two lips combine to scrape debris from the rod and contain residual oil on rod extension, as well as allowing oil to pump back into the cylinder. The O-ring energizer provides the force necessary to maintain the engagement of the wiping lips against the sliding surface and allow the wiper to adjust for deflection.

Typically made from exclusive Hallite Armorlene® materials, this seal is capable of high-speed applications and eliminates any potential for stick-slip. High-performance Armorlene® materials, like HLX, provide outstanding wear and scraping capability as well as large range of temperature and media compatibility.

The Halite E2W works well paired with rod seals that support the requisite dynamic pressure pump-back, like the Hallite R16 rod seal. When paired, they produce a sealing system capable of handling higher speeds, large range of fluid compatibilities, and temperature range of service. For other rod seal arrangements with E2W, it is necessary to make sure the rod seal will provide proper pressure pump-back, or alternatively vent the system. Hallite recommends proper guidance be used with this seal in heavy-duty applications (see Hallite Bearings section). This seal is available in a variety of Hallite's high-performance Armorlene® and Hythane® materials to suit a wide range of demanding applications.

*\*See Hallite 87, 506 or 533 bearing data sheets.*



### F E A T U R E S

- Low friction and elimination of stick-slip action
- Self-adjustment for side movement of rod
- High-performance PTFE material as standard offering
- Balanced design keeps contamination out of cylinder while also minimizing oil film on rod



### Part Number Structure

E2WMR00500NHLX \_

| E2W                 | M                                             | R                                                                                                      | 00500                                                    | N                                                                                    | HLX                                                                              | —                                      |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile |

OPERATING CONDITIONS

|                    | METRIC          | INCH             |
|--------------------|-----------------|------------------|
| Maximum Speed      | Up to 15.0m/sec | Up to 50.0ft/sec |
| Temperature Range* | -45 to 200°C    | -49 to 392°F     |

\*Dependent upon energizer used (NBR, FKM, etc.).

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

|                                                         | METRIC     |         |        | INCH    |         |         | Rmr*      |
|---------------------------------------------------------|------------|---------|--------|---------|---------|---------|-----------|
| SURFACE ROUGHNESS                                       | µmRa       | µmRz    | µmRt   | µinRa   | µinRz   | µinRt   |           |
| Dynamic Sealing Face Ød <sub>1</sub>                    | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face ØD <sub>1</sub> and ØD <sub>2</sub> | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>                     | 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

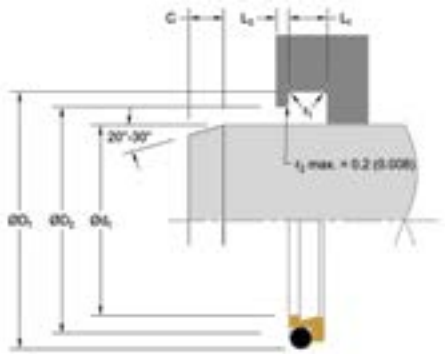
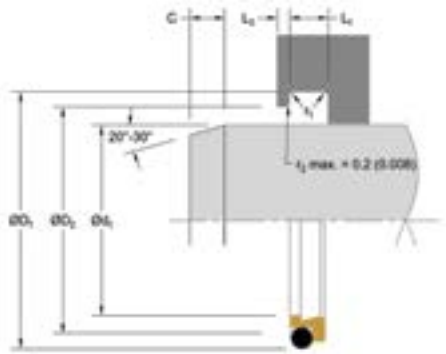
| ENERGIZER MATERIAL (SHORE A) | ENERGIZER TYPE | ENERGIZER DESIGNATION | ENERGIZER OPERATING TEMPERATURE°C | ENERGIZER OPERATING TEMPERATURE°F |
|------------------------------|----------------|-----------------------|-----------------------------------|-----------------------------------|
| NBR - 70A                    | 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 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|-------------|---------------------|---------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                        | Special Bronze Compound    | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled        | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Good low-friction properties</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li></ul>                                    | Glass Molybdenum Disulfide | 702                 | Gray        | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>Excellent in all lubricating fluids and pneumatic applications</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                      | 25% Carbon/Graphite        | 711                 | Black       | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for use with soft mating surfaces</li><li>Low friction and no stick-slip</li></ul>                                                                                | Unfilled                   | 700                 | White       | -184 to 204°C       | -300 to 400°F       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>Excellent impact resistance</li><li>Good dielectrical properties</li><li>Excellent abrasion resistance</li><li>Low coefficient of friction</li></ul>                                                                      | Standard                   | 748                 | Translucent | -184 to 82°C        | -300 to 180°F       |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 inches) diameter</li></ul>                                         | Standard                   | HU5                 | Yellow      | -20 to 115°C        | -4 to 240°F         |
| <b>HU9 - POLYURETHANE, 95A</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 inches) diameter</li></ul>                                         | Standard                   | HU9                 | Red         | -20 to 115°C        | -4 to 240°F         |

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.



INSTALLATION RECOMMENDATIONS

| METRIC                             |                            |                       |                      |                      |                    |                |         |                      |
|------------------------------------|----------------------------|-----------------------|----------------------|----------------------|--------------------|----------------|---------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | BORE DIAMETER        | STEP WIDTH         | RADIUS         | CHAMFER | O-RING CROSS SECTION |
| DIAMETER RANGE*                    |                            | D <sub>1</sub> H9     | L <sub>1</sub> + 0.2 | D <sub>2</sub> H11   | L <sub>3</sub> Min | r <sub>1</sub> | C       | O-ring               |
| Standard Duty Application - R      | Light Duty Application - L |                       |                      |                      |                    |                |         |                      |
| 4.0 - 11.9                         | 12.0 - 64.9                | d <sub>1</sub> + 4.8  | 3.7                  | d <sub>1</sub> + 1.5 | 2.0                | 0.5            | 2.0     | 1.78                 |
| 12.0 - 64.9                        | 65.0 - 250.9               | d <sub>1</sub> + 6.8  | 5.0                  | d <sub>1</sub> + 1.5 | 2.0                | 0.5            | 3.0     | 2.62                 |
| 65.0 - 250.9                       | 251.0 - 420.9              | d <sub>1</sub> + 8.8  | 6.0                  | d <sub>1</sub> + 1.5 | 3.0                | 0.8            | 4.0     | 3.53                 |
| 251.0 - 420.9                      | 421.0 - 650.9              | d <sub>1</sub> + 12.2 | 8.4                  | d <sub>1</sub> + 2.0 | 4.0                | 1.0            | 6.0     | 5.33                 |
| 421.0 - 650.9                      | 651.0 - 999.9              | d <sub>1</sub> + 16.0 | 11.0                 | d <sub>1</sub> + 2.0 | 4.0                | 1.5            | 8.0     | 6.99                 |
| 651.0 - 999.9                      | ≥ 1000.0                   | d <sub>1</sub> + 20.0 | 14.0                 | d <sub>1</sub> + 2.5 | 5.0                | 1.5            | 8.0     | 8.40                 |

\*For diameters >400 mm Hallite recommends using the E5W.

| INCH                               |                            |                            | GROOVE DIAMETER        | GROOVE WIDTH           | BORE DIAMETER          | STEP WIDTH         | RADIUS         | CHAMFER | O-RING CROSS SECTION |
|------------------------------------|----------------------------|----------------------------|------------------------|------------------------|------------------------|--------------------|----------------|---------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            |                            |                        |                        |                        |                    |                |         |                      |
| DIAMETER RANGE*                    |                            |                            |                        |                        |                        |                    |                |         |                      |
| Standard Duty Application - R      | Light Duty Application - L | Heavy Duty Application - H |                        |                        |                        |                    |                |         |                      |
|                                    |                            |                            | D <sub>1</sub> H9      | L <sub>1</sub> + 0.008 | D <sub>2</sub> H11     | L <sub>3</sub> Min | r <sub>1</sub> | C       | O-ring               |
| 0.313 - 0.499                      | 0.500 - 2.499              | -                          | d <sub>1</sub> + 0.190 | 0.146                  | d <sub>1</sub> + 0.060 | 0.079              | 0.015          | 0.079   | 0.070                |
| 0.500 - 2.499                      | 2.500 - 9.999              | 0.375 - 0.499              | d <sub>1</sub> + 0.270 | 0.196                  | d <sub>1</sub> + 0.060 | 0.079              | 0.015          | 0.118   | 0.103                |
| 2.500 - 7.999                      | -                          | 1.000 - 2.499              | d <sub>1</sub> + 0.345 | 0.236                  | d <sub>1</sub> + 0.060 | 0.118              | 0.015          | 0.157   | 0.139                |
| 8.000 - 9.999                      | 10.000 - 15.750            | -                          | d <sub>1</sub> + 0.345 | 0.236                  | d <sub>1</sub> + 0.060 | 0.150              | 0.015          | 0.157   | 0.139                |
| 10.000 - 16.999                    | 17.000 - 19.999            | 2.500 - 9.999              | d <sub>1</sub> + 0.480 | 0.332                  | d <sub>1</sub> + 0.080 | 0.150              | 0.035          | 0.236   | 0.210                |
| 17.000 - 19.999                    | 20.000 - 25.750            | 10.000 - 16.999            | d <sub>1</sub> + 0.630 | 0.434                  | d <sub>1</sub> + 0.080 | 0.150              | 0.035          | 0.315   | 0.275                |

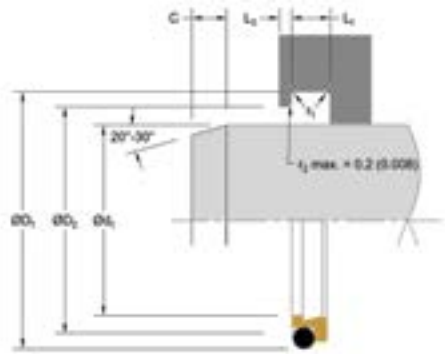
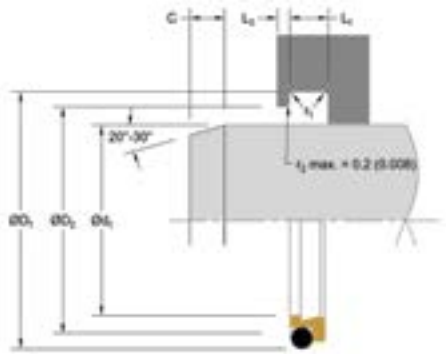
\*For diameters >15.750 inch Hallite recommends using the E5W.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                 |                    | PART NUMBER     |
|-----------------|-----------------|----------------|-----------------|--------------------|-----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                 |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                 |
| 4.0             | 8.8             | 3.7            | 5.5             | 2.0                | E2WMR00040****+ |
| 5.0             | 9.8             | 3.7            | 6.5             | 2.0                | E2WMR00050****+ |
| 6.0             | 10.8            | 3.7            | 7.5             | 2.0                | E2WMR00060****+ |
| 8.0             | 12.8            | 3.7            | 9.5             | 2.0                | E2WMR00080****+ |
| 10.0            | 14.8            | 3.7            | 11.5            | 2.0                | E2WMR00100****+ |
| 12.0            | 18.8            | 5.0            | 13.5            | 2.0                | E2WMR00120****+ |
| 14.0            | 20.8            | 5.0            | 15.5            | 2.0                | E2WMR00140****+ |
| 15.0            | 21.8            | 5.0            | 16.5            | 2.0                | E2WMR00150****  |
| 16.0            | 20.8            | 3.7            | 17.5            | 2.0                | E2WML00160****  |
| 16.0            | 22.8            | 5.0            | 17.5            | 2.0                | E2WMR00160****+ |
| 18.0            | 22.8            | 3.7            | 19.5            | 2.0                | E2WML00180****  |
| 18.0            | 24.8            | 5.0            | 19.5            | 2.0                | E2WMR00180****+ |
| 20.0            | 26.8            | 5.0            | 21.5            | 2.0                | E2WMR00200****+ |
| 22.0            | 28.8            | 5.0            | 23.5            | 2.0                | E2WMR00220****+ |
| 25.0            | 31.8            | 5.0            | 26.5            | 2.0                | E2WMR00250****+ |
| 28.0            | 34.8            | 5.0            | 29.5            | 2.0                | E2WMR00280****+ |
| 30.0            | 34.8            | 3.7            | 31.5            | 2.0                | E2WML00300****  |
| 30.0            | 36.8            | 5.0            | 31.5            | 2.0                | E2WMR00300****  |
| 32.0            | 38.8            | 5.0            | 33.5            | 2.0                | E2WMR00320****+ |
| 35.0            | 41.8            | 5.0            | 36.5            | 2.0                | E2WMR00350****  |
| 36.0            | 42.8            | 5.0            | 37.5            | 2.0                | E2WMR00360****+ |
| 37.0            | 43.8            | 5.0            | 38.5            | 2.0                | E2WMR00370****  |
| 40.0            | 46.8            | 5.0            | 41.5            | 2.0                | E2WMR00400****+ |
| 42.0            | 48.8            | 5.0            | 43.5            | 2.0                | E2WMR00420****  |
| 45.0            | 51.8            | 5.0            | 46.5            | 2.0                | E2WMR00450****+ |
| 49.0            | 55.8            | 5.0            | 50.5            | 2.0                | E2WMR00490****  |
| 50.0            | 56.8            | 5.0            | 51.5            | 2.0                | E2WMR00500****+ |
| 50.8            | 57.6            | 5.0            | 52.3            | 2.0                | E2WMR00508****  |

| METRIC          |                 |                |                 |                    | PART NUMBER     |
|-----------------|-----------------|----------------|-----------------|--------------------|-----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                 |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                 |
| 54.0            | 60.8            | 5.0            | 55.5            | 2.0                | E2WMR00540****  |
| 55.0            | 61.8            | 5.0            | 56.5            | 2.0                | E2WMR00550****  |
| 56.0            | 62.8            | 5.0            | 57.5            | 2.0                | E2WMR00560****+ |
| 60.0            | 66.8            | 5.0            | 61.5            | 2.0                | E2WMR00600****  |
| 63.0            | 69.8            | 5.0            | 64.5            | 2.0                | E2WMR00630****+ |
| 65.0            | 73.8            | 6.0            | 66.5            | 3.0                | E2WMR00650****  |
| 70.0            | 78.8            | 6.0            | 71.5            | 3.0                | E2WMR00700****  |
| 75.0            | 83.8            | 6.0            | 76.5            | 3.0                | E2WMR00750****  |
| 80.0            | 88.8            | 6.0            | 81.5            | 3.0                | E2WMR00800****  |
| 85.0            | 93.8            | 6.0            | 86.5            | 3.0                | E2WMR00850****  |
| 90.0            | 98.8            | 6.0            | 91.5            | 3.0                | E2WMR00900****  |
| 95.0            | 103.8           | 6.0            | 96.5            | 3.0                | E2WMR00950****  |
| 100.0           | 108.8           | 6.0            | 101.5           | 3.0                | E2WMR01000****  |
| 105.0           | 113.8           | 6.0            | 106.5           | 3.0                | E2WMR01050****  |
| 110.0           | 118.8           | 6.0            | 111.5           | 3.0                | E2WMR01100****  |
| 115.0           | 123.8           | 6.0            | 116.5           | 3.0                | E2WMR01150****  |
| 120.0           | 128.8           | 6.0            | 121.5           | 3.0                | E2WMR01200****  |
| 125.0           | 133.8           | 6.0            | 126.5           | 3.0                | E2WMR01250****  |
| 130.0           | 138.8           | 6.0            | 131.5           | 3.0                | E2WMR01300****  |
| 135.0           | 143.8           | 6.0            | 136.5           | 3.0                | E2WMR01350****  |
| 137.0           | 145.8           | 6.0            | 138.5           | 3.0                | E2WMR01370****  |
| 140.0           | 148.8           | 6.0            | 141.5           | 3.0                | E2WMR01400****  |
| 145.0           | 153.8           | 6.0            | 146.5           | 3.0                | E2WMR01450****  |
| 150.0           | 158.8           | 6.0            | 151.5           | 3.0                | E2WMR01500****  |
| 160.0           | 168.8           | 6.0            | 161.5           | 3.0                | E2WMR01600****  |
| 170.0           | 178.8           | 6.0            | 171.5           | 3.0                | E2WMR01700****  |
| 180.0           | 188.8           | 6.0            | 181.5           | 3.0                | E2WMR01800****  |
| 190.0           | 198.8           | 6.0            | 191.5           | 3.0                | E2WMR01900****  |

+ Fits ISO 6195 Type D grooves.



E2W  
WIPER/EXCLUDER  
Double-Acting

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                |
| 200.0           | 208.8           | 6.0            | 201.5           | 3.0                | E2WMR02000**** |
| 210.0           | 218.8           | 6.0            | 211.5           | 3.0                | E2WMR02100**** |
| 220.0           | 228.8           | 6.0            | 221.5           | 3.0                | E2WMR02200**** |
| 230.0           | 238.8           | 6.0            | 231.5           | 3.0                | E2WMR02300**** |
| 240.0           | 248.8           | 6.0            | 241.5           | 3.0                | E2WMR02400**** |
| 250.0           | 258.8           | 6.0            | 251.5           | 3.0                | E2WMR02500**** |
| 260.0           | 272.2           | 8.4            | 262.0           | 4.0                | E2WMR02600**** |
| 280.0           | 292.2           | 8.4            | 282.0           | 4.0                | E2WMR02800**** |
| 300.0           | 312.2           | 8.4            | 302.0           | 4.0                | E2WMR03000**** |
| 320.0           | 332.2           | 8.4            | 322.0           | 4.0                | E2WMR03200**** |
| 350.0           | 362.2           | 8.4            | 352.0           | 4.0                | E2WMR03500**** |
| 360.0           | 372.2           | 8.4            | 362.0           | 4.0                | E2WMR03600**** |
| 370.0           | 382.2           | 8.4            | 372.0           | 4.0                | E2WMR03700**** |
| 400.0           | 412.2           | 8.4            | 402.0           | 4.0                | E2WMR04000**** |
| 440.0           | 456.0           | 11.0           | 442.0           | 4.0                | E2WMR04400**** |
| 480.0           | 496.0           | 11.0           | 482.0           | 4.0                | E2WMR04800**** |
| 600.0           | 616.0           | 11.0           | 602.0           | 4.0                | E2WMR06000**** |
| 630.0           | 646.0           | 11.0           | 632.0           | 4.0                | E2WMR06300**** |
| 680.0           | 700.0           | 14.0           | 682.5           | 5.0                | E2WMR06800**** |
| 700.0           | 720.0           | 14.0           | 702.5           | 5.0                | E2WMR07000**** |
| 770.0           | 790.0           | 14.0           | 772.5           | 5.0                | E2WMR07700**** |
| 828.0           | 848.0           | 14.0           | 830.5           | 5.0                | E2WMR08280**** |
| 880.0           | 900.0           | 14.0           | 882.5           | 5.0                | E2WMR08800**** |
| 900.0           | 920.0           | 14.0           | 902.5           | 5.0                | E2WMR09000**** |
| 1030.0          | 1050.0          | 14.0           | 1032.5          | 5.0                | E2WML10300**** |
| 1180.0          | 1200.0          | 14.0           | 1182.5          | 5.0                | E2WML11800**** |

+ Fits ISO 6195 Type D grooves. \*Please contact Hallite for custom sizes, material selection, or seal design.

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +.008     | Tol. H11        | L <sub>3</sub> Min |                |
| 1.500           | 1.770           | 0.196          | 1.560           | 0.079              | E2WER01500**** |
| 1.562           | 1.832           | 0.196          | 1.623           | 0.079              | E2WER01562**** |
| 1.625           | 1.895           | 0.196          | 1.685           | 0.079              | E2WER01625**** |
| 1.687           | 1.957           | 0.196          | 1.748           | 0.079              | E2WER01687**** |
| 1.750           | 2.020           | 0.196          | 1.810           | 0.079              | E2WER01750**** |
| 1.812           | 2.082           | 0.196          | 1.873           | 0.079              | E2WER01812**** |
| 1.875           | 2.145           | 0.196          | 1.935           | 0.079              | E2WER01875**** |
| 1.937           | 2.207           | 0.196          | 1.998           | 0.079              | E2WER01937**** |
| 2.000           | 2.270           | 0.196          | 2.060           | 0.079              | E2WER02000**** |
| 2.125           | 2.395           | 0.196          | 2.185           | 0.079              | E2WER02125**** |
| 2.250           | 2.520           | 0.196          | 2.310           | 0.079              | E2WER02250**** |
| 2.375           | 2.645           | 0.196          | 2.435           | 0.079              | E2WER02375**** |
| 2.500           | 2.845           | 0.236          | 2.560           | 0.118              | E2WER02500**** |
| 2.625           | 2.970           | 0.236          | 2.685           | 0.118              | E2WER02625**** |
| 2.750           | 3.095           | 0.236          | 2.810           | 0.118              | E2WER02750**** |
| 2.875           | 3.220           | 0.236          | 2.935           | 0.118              | E2WER02875**** |
| 3.000           | 3.345           | 0.236          | 3.060           | 0.118              | E2WER03000**** |
| 3.125           | 3.470           | 0.236          | 3.185           | 0.118              | E2WER03125**** |
| 3.250           | 3.595           | 0.236          | 3.310           | 0.118              | E2WER03250**** |
| 3.375           | 3.720           | 0.236          | 3.435           | 0.118              | E2WER03375**** |
| 3.500           | 3.845           | 0.236          | 3.560           | 0.118              | E2WER03500**** |
| 3.625           | 3.970           | 0.236          | 3.685           | 0.118              | E2WER03625**** |
| 3.750           | 4.095           | 0.236          | 3.810           | 0.118              | E2WER03750**** |
| 3.875           | 4.220           | 0.236          | 3.935           | 0.118              | E2WER03875**** |
| 4.000           | 4.345           | 0.236          | 4.060           | 0.118              | E2WER04000**** |
| 4.125           | 4.470           | 0.236          | 4.185           | 0.118              | E2WER04125**** |
| 4.250           | 4.595           | 0.236          | 4.310           | 0.118              | E2WER04250**** |
| 4.375           | 4.720           | 0.236          | 4.435           | 0.118              | E2WER04375**** |

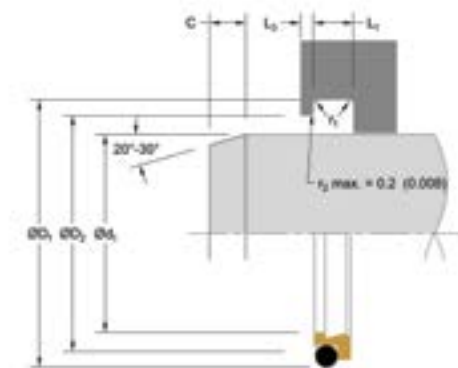
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +.008     | Tol. H11        | L <sub>3</sub> Min |                |
| 4.500           | 4.845           | 0.236          | 4.560           | 0.118              | E2WER04500**** |
| 4.625           | 4.970           | 0.236          | 4.685           | 0.118              | E2WER04625**** |
| 4.750           | 5.095           | 0.236          | 4.810           | 0.118              | E2WER04750**** |
| 4.875           | 5.220           | 0.236          | 4.935           | 0.118              | E2WER04875**** |
| 5.000           | 5.345           | 0.236          | 5.060           | 0.118              | E2WER05000**** |
| 5.125           | 5.470           | 0.236          | 5.185           | 0.118              | E2WER05125**** |
| 5.250           | 5.595           | 0.236          | 5.310           | 0.118              | E2WER05250**** |
| 5.375           | 5.720           | 0.236          | 5.435           | 0.118              | E2WER05375**** |
| 5.500           | 5.845           | 0.236          | 5.560           | 0.118              | E2WER05500**** |
| 5.625           | 5.970           | 0.236          | 5.685           | 0.118              | E2WER05625**** |
| 5.750           | 6.095           | 0.236          | 5.810           | 0.118              | E2WER05750**** |
| 6.000           | 6.345           | 0.236          | 6.060           | 0.118              | E2WER06000**** |
| 6.250           | 6.595           | 0.236          | 6.310           | 0.118              | E2WER06250**** |
| 6.500           | 6.845           | 0.236          | 6.560           | 0.118              | E2WER06500**** |
| 6.750           | 7.095           | 0.236          | 6.810           | 0.118              | E2WER06750**** |
| 7.000           | 7.345           | 0.236          | 7.060           | 0.118              | E2WER07000**** |
| 7.250           | 7.595           | 0.236          | 7.310           | 0.118              | E2WER07250**** |
| 7.500           | 7.845           | 0.236          | 7.560           | 0.118              | E2WER07500**** |
| 7.750           | 8.095           | 0.236          | 7.810           | 0.118              | E2WER07750**** |
| 8.000           | 8.345           | 0.236          | 8.060           | 0.150              | E2WER08000**** |
| 8.250           | 8.595           | 0.236          | 8.310           | 0.150              | E2WER08250**** |
| 8.500           | 8.845           | 0.236          | 8.560           | 0.150              | E2WER08500**** |
| 8.750           | 9.095           | 0.236          | 8.810           | 0.150              | E2WER08750**** |
| 9.000           | 9.345           | 0.236          | 9.060           | 0.150              | E2WER09000**** |
| 9.250           | 9.595           | 0.236          | 9.310           | 0.150              | E2WER09250**** |
| 9.500           | 9.845           | 0.236          | 9.560           | 0.150              | E2WER09500**** |
| 9.750           | 10.095          | 0.236          | 9.810           | 0.150              | E2WER09750**** |
| 10.000          | 10.480          | 0.332          | 10.080          | 0.150              | E2WER10000**** |

| INCH            |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +.008     | Tol. H11        | L <sub>3</sub> Min |                |
| 10.500          | 10.980          | 0.332          | 10.580          | 0.150              | E2WER10500**** |
| 11.000          | 11.480          | 0.332          | 11.080          | 0.150              | E2WER11000**** |
| 11.500          | 11.980          | 0.332          | 11.580          | 0.150              | E2WER11500**** |
| 12.000          | 12.480          | 0.332          | 12.080          | 0.150              | E2WER12000**** |
| 12.500          | 12.980          | 0.332          | 12.580          | 0.150              | E2WER12500**** |
| 13.000          | 13.480          | 0.332          | 13.080          | 0.150              | E2WER13000**** |
| 13.500          | 13.980          | 0.332          | 13.580          | 0.150              | E2WER13500**** |
| 14.000          | 14.480          | 0.332          | 14.080          | 0.150              | E2WER14000**** |
| 14.500          | 14.980          | 0.332          | 14.580          | 0.150              | E2WER14500**** |
| 15.000          | 15.480          | 0.332          | 15.080          | 0.150              | E2WER15000**** |
| 15.500          | 15.980          | 0.332          | 15.580          | 0.150              | E2WER15500**** |
| 16.000          | 16.480          | 0.332          | 16.080          | 0.150              | E2WER16000**** |
| 16.500          | 16.980          | 0.332          | 16.580          | 0.150              | E2WER16500**** |
| 17.000          | 17.630          | 0.434          | 17.080          | 0.150              | E2WER17000**** |
| 17.500          | 18.130          | 0.434          | 17.580          | 0.150              | E2WER17500**** |
| 18.000          | 18.630          | 0.434          | 18.080          | 0.150              | E2WER18000**** |
| 18.500          | 19.130          | 0.434          | 18.580          | 0.150              | E2WER18500**** |
| 19.000          | 19.630          | 0.434          | 19.080          | 0.150              | E2WER19000**** |
| 19.500          | 20.130          | 0.434          | 19.580          | 0.150              | E2WER19500**** |
| 20.000          | 20.630          | 0.434          | 20.080          | 0.150              | E2WEL20000**** |

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





# E5W

## WIPER/EXCLUDER

Double-Acting

### TECHNICAL DETAILS

The Hallite E5W is a double-acting, O-ring energized, rod wiper/excluder designed to include two different unique wiping lip geometries. The two lips combine to scrape debris from the rod and contain residual oil on rod extension, as well as allowing oil to pump back into the cylinder. The O-ring energizer provides the force necessary to maintain the engagement of the wiping lips against the sliding surface and allow the wiper to adjust for deflection.

Typically made from exclusive Hallite Armorlene® materials, this seal is capable of high speed applications and eliminates any potential for stick-slip. High-performance Armorlene® materials, like HLX, provide outstanding wear and scraping capability as well as large range of temperature and media compatibility.

The Halite E5W works well paired with rod seals that support the requisite dynamic pressure pump-back, like the Hallite R16 rod seal. When paired, they produce a sealing system capable of handling higher speeds, large range of fluid compatibilities, and temperature range of service. For other rod seal arrangements with E5W, it is necessary to make sure the rod seal will provide proper pressure pump-back, or alternatively vent the system. The E5W is often preferred for heavier duty and large-diameter applications. Please consult the series part listing for more information.



### FEATURES

- Low friction and elimination of stick-slip action
- Self-adjustment for side movement of rod
- High-performance PTFE material as standard offering
- Balanced design keeps contamination out of cylinder while also minimizing oil film on rod



### Part Number Structure

E5WMR00500NHLX \_

| E5W                 | M                                             | R                                                                                                      | 00500                                                    | N                                                                                    | HLX                                                                              | —                                      |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile |

OPERATING CONDITIONS

|                    | METRIC          | INCH             |
|--------------------|-----------------|------------------|
| Maximum Speed      | Up to 15.0m/sec | Up to 50.0ft/sec |
| Temperature Range* | -45 to 200°C    | -49 to 392°F     |

\*Dependent upon energizer used (NBR, FKM, etc.).

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 <sub>1</sub>                    | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face ØD <sub>1</sub> and ØD <sub>2</sub> | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>                     | 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                     | -                                 | -                                 |

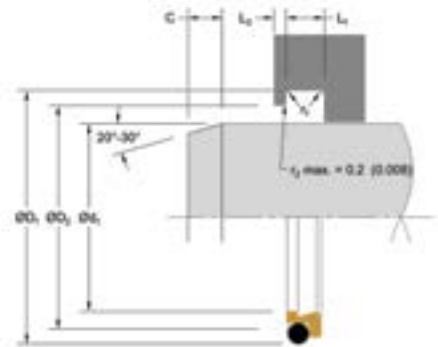
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                  | FILLER                     | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|-------------|---------------------|---------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                        | Special Bronze Compound    | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled        | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Good low-friction properties</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li></ul>                                    | Glass Molybdenum Disulfide | 702                 | Gray        | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>Excellent in all lubricating fluids and pneumatic applications</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                      | 25% Carbon/Graphite        | 711                 | Black       | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for use with soft mating surfaces</li><li>Low friction and no stick-slip</li></ul>                                                                                | Unfilled                   | 700                 | White       | -184 to 204°C       | -300 to 400°F       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>Excellent impact resistance</li><li>Good dielectrical properties</li><li>Excellent abrasion resistance</li><li>Low coefficient of friction</li></ul>                                                                      | Standard                   | 748                 | Translucent | -184 to 82°C        | -300 to 180°F       |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 INCHes) diameter</li></ul>                                         | Standard                   | HU5                 | Yellow      | -20 to 115°C        | -4 to 240°F         |
| <b>HU9 - POLYURETHANE, 95A</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 INCHes) diameter</li></ul>                                         | Standard                   | HU9                 | Red         | -20 to 115°C        | -4 to 240°F         |

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.

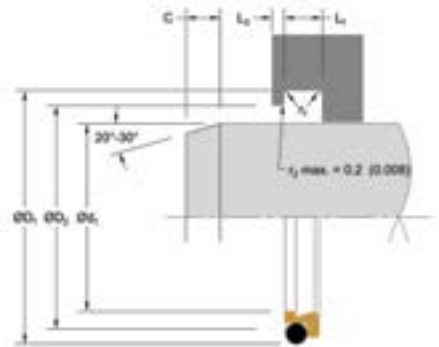




INSTALLATION RECOMMENDATIONS

| METRIC                             |                            |                       |                      |                      |                    |                |         |                      |
|------------------------------------|----------------------------|-----------------------|----------------------|----------------------|--------------------|----------------|---------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | BORE DIAMETER        | STEP WIDTH         | RADIUS         | CHAMFER | O-RING CROSS SECTION |
|                                    |                            |                       |                      |                      |                    |                |         |                      |
| DIAMETER RANGE                     |                            | D <sub>1</sub> H9     | L <sub>1</sub> + 0.2 | D <sub>2</sub> H11   | L <sub>3</sub> Min | r <sub>1</sub> | C       | O-ring               |
| Standard Duty Application - R      | Light Duty Application - L |                       |                      |                      |                    |                |         |                      |
| 19.0 - 39.9                        | 40.0 - 69.9                | d <sub>1</sub> + 7.6  | 4.2                  | d <sub>1</sub> + 1.5 | 3.0                | 0.5            | 3.0     | 2.62                 |
| 40.0 - 69.9                        | 70.0 - 139.9               | d <sub>1</sub> + 8.8  | 6.3                  | d <sub>1</sub> + 1.5 | 3.0                | 0.8            | 4.0     | 2.62                 |
| 70.0 - 139.9                       | 140.0 - 399.9              | d <sub>1</sub> + 12.2 | 8.1                  | d <sub>1</sub> + 2.0 | 4.0                | 1.0            | 6.0     | 3.53                 |
| 140.0 - 399.9                      | 400.0 - 649.9              | d <sub>1</sub> + 16.0 | 9.5                  | d <sub>1</sub> + 2.5 | 5.0                | 1.5            | 6.0     | 5.33                 |
| 400.0 - 649.9                      | 650.0 - 999.9              | d <sub>1</sub> + 24.0 | 14.0                 | d <sub>1</sub> + 2.5 | 8.0                | 1.5            | 8.0     | 6.99                 |
| 650.0 - 999.9                      | ≥ 1000.0                   | d <sub>1</sub> + 27.3 | 16.0                 | d <sub>1</sub> + 2.5 | 10.0               | 2.0            | 9.0     | 8.40                 |

| INCH                               |                            |                            |                        |                       |                        |                    |                |         |                      |
|------------------------------------|----------------------------|----------------------------|------------------------|-----------------------|------------------------|--------------------|----------------|---------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            |                            | GROOVE DIAMETER        | GROOVE WIDTH          | BORE DIAMETER          | STEP WIDTH         | RADIUS         | CHAMFER | O-RING CROSS SECTION |
|                                    |                            |                            |                        |                       |                        |                    |                |         |                      |
| DIAMETER RANGE                     |                            |                            | D <sub>1</sub> H9      | L <sub>1</sub> + .008 | D <sub>2</sub> H11     | L <sub>3</sub> Min | r <sub>1</sub> | C       | O-ring               |
| Standard Duty Application - R      | Light Duty Application - L | Heavy Duty Application - H |                        |                       |                        |                    |                |         |                      |
| 1.500 - 2.749                      | 2.750 - 5.499              | 1.188 - 1.499              | d <sub>1</sub> + 0.346 | 0.248                 | d <sub>1</sub> + 0.060 | 0.079              | 0.015          | 0.157   | 0.103                |
| 2.750 - 5.499                      | 5.500 - 15.749             | 1.500 - 2.749              | d <sub>1</sub> + 0.480 | 0.319                 | d <sub>1</sub> + 0.080 | 0.118              | 0.015          | 0.236   | 0.139                |
| 5.500 - 7.999                      | -                          | 2.750 - 5.499              | d <sub>1</sub> + 0.630 | 0.374                 | d <sub>1</sub> + 0.100 | 0.118              | 0.035          | 0.236   | 0.210                |
| 8.000 - 15.749                     | 15.750 - 25.500            | -                          | d <sub>1</sub> + 0.630 | 0.374                 | d <sub>1</sub> + 0.100 | 0.150              | 0.035          | 0.236   | 0.210                |
| 15.750 - 25.500                    | -                          | 5.500 - 15.749             | d <sub>1</sub> + 0.945 | 0.551                 | d <sub>1</sub> + 0.100 | 0.150              | 0.035          | 0.315   | 0.275                |



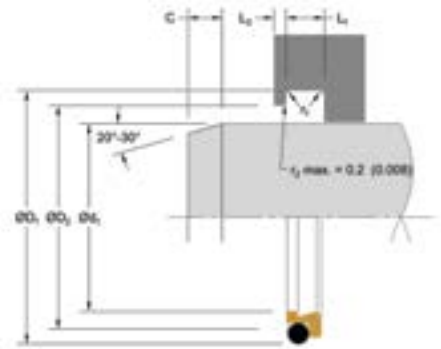
E5W  
WIPER/EXCLUDER  
Double-Acting

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                 |                    | PART NUMBER     |
|-----------------|-----------------|----------------|-----------------|--------------------|-----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                 |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                 |
| 20.0            | 27.6            | 4.2            | 21.5            | 3.0                | E5WMR00200****  |
| 25.0            | 32.6            | 4.2            | 26.5            | 3.0                | E5WMR00250****  |
| 28.0            | 35.6            | 4.2            | 29.5            | 3.0                | E5WMR00280****  |
| 30.0            | 37.6            | 4.2            | 31.5            | 3.0                | E5WMR00300****  |
| 32.0            | 39.6            | 4.2            | 33.5            | 3.0                | E5WMR00320****  |
| 36.0            | 43.6            | 4.2            | 37.5            | 3.0                | E5WMR00360****  |
| 40.0            | 48.8            | 6.3            | 41.5            | 3.0                | E5WMR00400****+ |
| 42.0            | 50.8            | 6.3            | 43.5            | 3.0                | E5WMR00420****  |
| 45.0            | 53.8            | 6.3            | 46.5            | 3.0                | E5WMR00450****+ |
| 50.0            | 58.8            | 6.3            | 51.5            | 3.0                | E5WMR00500****+ |
| 55.0            | 63.8            | 6.3            | 56.5            | 3.0                | E5WMR00550****  |
| 56.0            | 64.8            | 6.3            | 57.5            | 3.0                | E5WMR00560****+ |
| 60.0            | 68.8            | 6.3            | 61.5            | 3.0                | E5WMR00600****  |
| 63.0            | 71.8            | 6.3            | 64.5            | 3.0                | E5WMR00630****+ |
| 65.0            | 73.8            | 6.3            | 66.5            | 3.0                | E5WMR00650****  |
| 70.0            | 78.8            | 6.3            | 71.5            | 3.0                | E5WML00700****+ |
| 70.0            | 82.2            | 8.1            | 72.0            | 4.0                | E5WMR00700****+ |
| 75.0            | 87.2            | 8.1            | 77.0            | 4.0                | E5WMR00750****  |
| 80.0            | 88.8            | 6.3            | 81.5            | 3.0                | E5WML00800****+ |
| 80.0            | 92.2            | 8.1            | 82.0            | 4.0                | E5WMR00800****+ |
| 85.0            | 97.2            | 8.1            | 87.0            | 4.0                | E5WMR00850****  |
| 90.0            | 98.8            | 6.3            | 91.5            | 3.0                | E5WML00900****+ |
| 90.0            | 102.2           | 8.1            | 92.0            | 4.0                | E5WMR00900****+ |
| 97.0            | 109.2           | 8.1            | 99.0            | 4.0                | E5WMR00970****  |
| 99.0            | 111.2           | 8.1            | 101.0           | 4.0                | E5WMR00990****  |
| 100.0           | 108.8           | 6.3            | 101.5           | 3.0                | E5WML01000****+ |
| 100.0           | 112.2           | 8.1            | 102.0           | 4.0                | E5WMR01000****+ |
| 110.0           | 118.8           | 6.3            | 111.5           | 3                  | E5WML01100****+ |

| METRIC          |                 |                |                 |                    | PART NUMBER     |
|-----------------|-----------------|----------------|-----------------|--------------------|-----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                 |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                 |
| 110.0           | 122.2           | 8.1            | 112.0           | 4.0                | E5WMR01100****+ |
| 115.0           | 127.2           | 8.1            | 117.0           | 4.0                | E5WMR01150****  |
| 120.0           | 132.2           | 8.1            | 122.0           | 4.0                | E5WMR01200****  |
| 125.0           | 133.8           | 6.3            | 126.5           | 3.0                | E5WML01250****+ |
| 125.0           | 137.2           | 8.1            | 127.0           | 4.0                | E5WMR01250****+ |
| 125.4           | 137.6           | 8.1            | 127.4           | 4.0                | E5WMR01254****  |
| 130.0           | 142.2           | 8.1            | 132.0           | 4.0                | E5WMR01300****  |
| 135.0           | 147.2           | 8.1            | 137.0           | 4.0                | E5WMR01350****  |
| 140.0           | 152.2           | 8.1            | 142.0           | 4.0                | E5WML01400****+ |
| 140.0           | 156.0           | 9.5            | 142.5           | 5.0                | E5WMR01400****+ |
| 140.5           | 156.5           | 9.5            | 143.0           | 5.0                | E5WMR01405****  |
| 150.0           | 166.0           | 9.5            | 152.5           | 5.0                | E5WMR01500****  |
| 153.0           | 169.0           | 9.5            | 155.5           | 5.0                | E5WMR01530****  |
| 155.0           | 171.0           | 9.5            | 157.5           | 5.0                | E5WMR01550****  |
| 160.0           | 172.2           | 8.1            | 162.0           | 4.0                | E5WML01600****+ |
| 160.0           | 176.0           | 9.5            | 162.5           | 5.0                | E5WMR01600****+ |
| 165.0           | 181.0           | 9.5            | 167.5           | 5.0                | E5WMR01650****  |
| 170.0           | 186.0           | 9.5            | 172.5           | 5.0                | E5WMR01700****  |
| 175.0           | 191.0           | 9.5            | 177.5           | 5.0                | E5WMR01750****  |
| 180.0           | 192.2           | 8.1            | 182.0           | 4.0                | E5WML01800****+ |
| 180.0           | 196.0           | 9.5            | 182.5           | 5.0                | E5WMR01800****+ |
| 188.2           | 204.2           | 9.5            | 190.7           | 5.0                | E5WMR01882****  |
| 190.0           | 206.0           | 9.5            | 192.5           | 5.0                | E5WMR01900****  |
| 192.0           | 208.0           | 9.5            | 194.5           | 5.0                | E5WMR01920****  |
| 200.0           | 212.2           | 8.1            | 202.0           | 4.0                | E5WML02000****+ |
| 200.0           | 216.0           | 9.5            | 202.5           | 5.0                | E5WMR02000****+ |
| 211.0           | 227.0           | 9.5            | 213.5           | 5                  | E5WMR02110****  |
| 220.0           | 232.2           | 8.1            | 222.0           | 4                  | E5WML02200****+ |



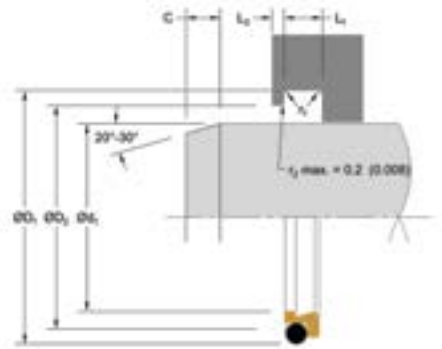


PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                 |                    | PART NUMBER     |
|-----------------|-----------------|----------------|-----------------|--------------------|-----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                 |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                 |
| 220.0           | 236.0           | 9.5            | 222.5           | 5.0                | E5WMR02200****+ |
| 240.0           | 256.0           | 9.5            | 242.5           | 5.0                | E5WMR02400****  |
| 250.0           | 262.2           | 8.1            | 252.0           | 4.0                | E5WML02500****+ |
| 250.0           | 266.0           | 9.5            | 252.5           | 5.0                | E5WMR02500****+ |
| 260.0           | 276.0           | 9.5            | 262.5           | 5.0                | E5WMR02600****  |
| 270.0           | 286.0           | 9.5            | 272.5           | 5.0                | E5WMR02700****  |
| 280.0           | 292.2           | 8.1            | 282.0           | 4.0                | E5WML02800****+ |
| 280.0           | 296.0           | 9.5            | 282.5           | 5.0                | E5WMR02800****+ |
| 300.0           | 316.0           | 9.5            | 302.5           | 5.0                | E5WMR03000****  |
| 320.0           | 332.2           | 8.1            | 322.0           | 4.0                | E5WML03200****+ |
| 320.0           | 336.0           | 9.5            | 322.5           | 5.0                | E5WMR03200****+ |
| 330.0           | 346.0           | 9.5            | 332.5           | 5.0                | E5WMR03300****  |
| 350.0           | 366.0           | 9.5            | 352.5           | 5.0                | E5WMR03500****  |
| 360.0           | 372.2           | 8.1            | 362.0           | 4.0                | E5WML03600****+ |
| 360.0           | 376.0           | 9.5            | 362.5           | 5.0                | E5WMR03600****+ |
| 380.0           | 396.0           | 9.5            | 382.5           | 5.0                | E5WMR03800****  |
| 400.0           | 424.0           | 14.0           | 402.5           | 8.0                | E5WMR04000****  |
| 440.0           | 464.0           | 14.0           | 442.5           | 8.0                | E5WMR04400****  |
| 450.0           | 474.0           | 14.0           | 452.5           | 8.0                | E5WMR04500****  |
| 480.0           | 504.0           | 14.0           | 482.5           | 8.0                | E5WMR04800****  |
| 500.0           | 524.0           | 14.0           | 502.5           | 8.0                | E5WMR05000****  |
| 560.0           | 584.0           | 14.0           | 562.5           | 8.0                | E5WMR05600****  |
| 600.0           | 624.0           | 14.0           | 602.5           | 8.0                | E5WMR06000****  |
| 650.0           | 677.3           | 16.0           | 652.5           | 10.0               | E5WMR06500****  |
| 680.0           | 707.3           | 16.0           | 682.5           | 10.0               | E5WMR06800****  |
| 700.0           | 727.3           | 16.0           | 702.5           | 10.0               | E5WMR07000****  |
| 770.0           | 797.3           | 16.0           | 772.5           | 10.0               | E5WMR07700****  |
| 785.0           | 812.3           | 16.0           | 787.5           | 10.0               | E5WMR07850****  |

| METRIC          |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                |
| 800.0           | 827.3           | 16.0           | 802.5           | 10.0               | E5WMR08000**** |
| 810.0           | 837.3           | 16.0           | 812.5           | 10.0               | E5WMR08100**** |
| 900.0           | 927.3           | 16.0           | 902.5           | 10.0               | E5WMR09000**** |
| 950.0           | 977.3           | 16.0           | 952.5           | 10.0               | E5WMR09500**** |
| 1000.0          | 1027.3          | 16.0           | 1002.5          | 10.0               | E5WML10000**** |
| 1040.0          | 1067.3          | 16.0           | 1042.5          | 10.0               | E5WML10400**** |
| 1130.0          | 1157.3          | 16.0           | 1132.5          | 10.0               | E5WML11300**** |
| 1200.0          | 1227.3          | 16.0           | 1202.5          | 10.0               | E5WML12000**** |

+ Fits ISO 6195 Type D grooves. \*Please contact Hallite for sizes, material selection, or seal design.

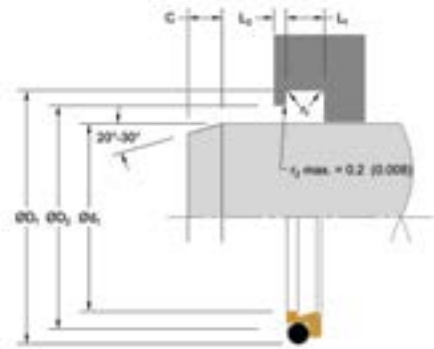


E5W  
WIPER/EXCLUDER  
Double-Acting

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +.008     | Tol. H11        | L <sub>3</sub> Min |                |
| 1.500           | 1.846           | 0.248          | 1.560           | 0.079              | E5WER01500**** |
| 1.562           | 1.908           | 0.248          | 1.623           | 0.079              | E5WER01562**** |
| 1.625           | 1.971           | 0.248          | 1.685           | 0.079              | E5WER01625**** |
| 1.687           | 2.033           | 0.248          | 1.748           | 0.079              | E5WER01687**** |
| 1.750           | 2.096           | 0.248          | 1.810           | 0.079              | E5WER01750**** |
| 1.812           | 2.158           | 0.248          | 1.873           | 0.079              | E5WER01812**** |
| 1.875           | 2.221           | 0.248          | 1.935           | 0.079              | E5WER01875**** |
| 1.937           | 2.283           | 0.248          | 1.998           | 0.079              | E5WER01937**** |
| 2.000           | 2.346           | 0.248          | 2.060           | 0.079              | E5WER02000**** |
| 2.125           | 2.471           | 0.248          | 2.185           | 0.079              | E5WER02125**** |
| 2.250           | 2.596           | 0.248          | 2.310           | 0.079              | E5WER02250**** |
| 2.375           | 2.721           | 0.248          | 2.435           | 0.079              | E5WER02375**** |
| 2.500           | 2.846           | 0.248          | 2.560           | 0.079              | E5WER02500**** |
| 2.625           | 2.971           | 0.248          | 2.685           | 0.079              | E5WER02625**** |
| 2.750           | 3.230           | 0.319          | 2.830           | 0.118              | E5WER02750**** |
| 2.875           | 3.355           | 0.319          | 2.955           | 0.118              | E5WER02875**** |
| 3.000           | 3.480           | 0.319          | 3.080           | 0.118              | E5WER03000**** |
| 3.125           | 3.605           | 0.319          | 3.205           | 0.118              | E5WER03125**** |
| 3.250           | 3.730           | 0.319          | 3.330           | 0.118              | E5WER03250**** |
| 3.375           | 3.855           | 0.319          | 3.455           | 0.118              | E5WER03375**** |
| 3.500           | 3.980           | 0.319          | 3.580           | 0.118              | E5WER03500**** |
| 3.625           | 4.105           | 0.319          | 3.705           | 0.118              | E5WER03625**** |
| 3.750           | 4.230           | 0.319          | 3.830           | 0.118              | E5WER03750**** |
| 3.875           | 4.355           | 0.319          | 3.955           | 0.118              | E5WER03875**** |
| 4.000           | 4.480           | 0.319          | 4.080           | 0.118              | E5WER04000**** |
| 4.125           | 4.605           | 0.319          | 4.205           | 0.118              | E5WER04125**** |
| 4.250           | 4.730           | 0.319          | 4.330           | 0.118              | E5WER04250**** |
| 4.375           | 4.855           | 0.319          | 4.455           | 0.118              | E5WER04375**** |

| INCH            |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +.008     | Tol. H11        | L <sub>3</sub> Min |                |
| 4.500           | 4.980           | 0.319          | 4.580           | 0.118              | E5WER04500**** |
| 4.625           | 5.105           | 0.319          | 4.705           | 0.118              | E5WER04625**** |
| 4.750           | 5.230           | 0.319          | 4.830           | 0.118              | E5WER04750**** |
| 4.875           | 5.355           | 0.319          | 4.955           | 0.118              | E5WER04875**** |
| 5.000           | 5.480           | 0.319          | 5.080           | 0.118              | E5WER05000**** |
| 5.125           | 5.605           | 0.319          | 5.205           | 0.118              | E5WER05125**** |
| 5.250           | 5.730           | 0.319          | 5.330           | 0.118              | E5WER05250**** |
| 5.375           | 5.855           | 0.319          | 5.455           | 0.118              | E5WER05375**** |
| 5.500           | 6.130           | 0.374          | 5.600           | 0.118              | E5WER05500**** |
| 5.625           | 6.255           | 0.374          | 5.725           | 0.118              | E5WER05625**** |
| 5.750           | 6.380           | 0.374          | 5.850           | 0.118              | E5WER05750**** |
| 6.000           | 6.630           | 0.374          | 6.100           | 0.118              | E5WER06000**** |
| 6.250           | 6.880           | 0.374          | 6.350           | 0.118              | E5WER06250**** |
| 6.500           | 7.130           | 0.374          | 6.600           | 0.118              | E5WER06500**** |
| 6.750           | 7.380           | 0.374          | 6.850           | 0.118              | E5WER06750**** |
| 7.000           | 7.630           | 0.374          | 7.100           | 0.118              | E5WER07000**** |
| 7.250           | 7.880           | 0.374          | 7.350           | 0.118              | E5WER07250**** |
| 7.500           | 8.130           | 0.374          | 7.600           | 0.118              | E5WER07500**** |
| 7.750           | 8.380           | 0.374          | 7.850           | 0.118              | E5WER07750**** |
| 8.000           | 8.630           | 0.374          | 8.100           | 0.150              | E5WER08000**** |
| 8.250           | 8.880           | 0.374          | 8.350           | 0.150              | E5WER08250**** |
| 8.500           | 9.130           | 0.374          | 8.600           | 0.150              | E5WER08500**** |
| 8.750           | 9.380           | 0.374          | 8.850           | 0.150              | E5WER08750**** |
| 9.000           | 9.630           | 0.374          | 9.100           | 0.150              | E5WER09000**** |
| 9.250           | 9.880           | 0.374          | 9.350           | 0.150              | E5WER09250**** |
| 9.500           | 10.130          | 0.374          | 9.600           | 0.150              | E5WER09500**** |
| 9.750           | 10.380          | 0.374          | 9.850           | 0.150              | E5WER09750**** |
| 10.000          | 10.630          | 0.374          | 10.100          | 0.150              | E5WER10000**** |



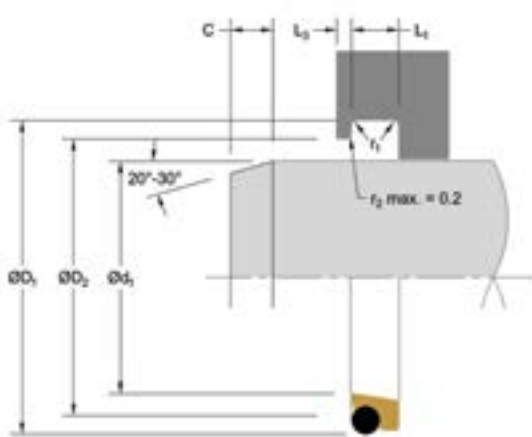
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +.008     | Tol. H11        | L <sub>s</sub> Min |                |
| 10.500          | 11.130          | 0.374          | 10.600          | 0.150              | E5VER10500**** |
| 11.000          | 11.630          | 0.374          | 11.100          | 0.150              | E5VER11000**** |
| 11.500          | 12.130          | 0.374          | 11.600          | 0.150              | E5VER11500**** |
| 12.000          | 12.630          | 0.374          | 12.100          | 0.150              | E5VER12000**** |
| 12.500          | 13.130          | 0.374          | 12.600          | 0.150              | E5VER12500**** |
| 13.000          | 13.630          | 0.374          | 13.100          | 0.150              | E5VER13000**** |
| 13.500          | 14.130          | 0.374          | 13.600          | 0.150              | E5VER13500**** |
| 14.000          | 14.630          | 0.374          | 14.100          | 0.150              | E5VER14000**** |
| 14.500          | 15.130          | 0.374          | 14.600          | 0.150              | E5VER14500**** |
| 15.000          | 15.630          | 0.374          | 15.100          | 0.150              | E5VER15000**** |

| INCH            |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +.008     | Tol. H11        | L <sub>s</sub> Min |                |
| 15.500          | 16.130          | 0.374          | 15.600          | 0.150              | E5WER15500**** |
| 16.000          | 16.945          | 0.551          | 16.100          | 0.150              | E5WER16000**** |
| 16.500          | 17.445          | 0.551          | 16.600          | 0.150              | E5WER16500**** |
| 17.000          | 17.945          | 0.551          | 17.100          | 0.150              | E5WER17000**** |
| 17.500          | 18.445          | 0.551          | 17.600          | 0.150              | E5WER17500**** |
| 18.000          | 18.945          | 0.551          | 18.100          | 0.150              | E5WER18000**** |
| 18.500          | 19.445          | 0.551          | 18.600          | 0.150              | E5WER18500**** |
| 19.000          | 19.945          | 0.551          | 19.100          | 0.150              | E5WER19000**** |
| 19.500          | 20.445          | 0.551          | 19.600          | 0.150              | E5WER19500**** |
| 20.000          | 20.945          | 0.551          | 20.100          | 0.150              | E5WER20000**** |

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

ELA  
WIPER/EXCLUDER  
Single-Acting



TECHNICAL DETAILS

The Hallite ELA rod wiper/excluder uses a single aggressive wiping lip that provides ingress protection. The ELA wiper uses an O-ring energizer to keep the wiper centered, helping to compensate for potential side-to-side movement in the application. Typically made from exclusive Hallite Armorlene® materials, this seal is capable of high-speed applications and eliminates any potential for stick-slip. The ELA wiper is a low-friction design, making it an energy-efficient choice. The ELA wiper follows ISO 6195, Type D dimensions.



FEATURES

- Low friction and elimination of stick-slip
- Excellent in high-speed applications
- More stable design for application with excessive side-to-side movement on rod

Part Number Structure

ELAMR00400NHLX \_

| ELA                 | M                                             | R                                                                                                      | 00400                                                    | N                                                                                    | HLX                                                                              | _                                      |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <b>Installation Recommendations</b> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <b>Energizer Table</b> for desired energizer material | PTFE MATERIAL<br>Refer to <b>Material Table</b> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile |

OPERATING CONDITIONS

|                    | METRIC         | INCH             |
|--------------------|----------------|------------------|
| Maximum Speed      | Up to 4.0m/sec | Up to 13.0ft/sec |
| Temperature Range* | -45 to 200°C   | -49 to 392°F     |

\*Dependent upon energizer used (NBR, FKM, etc.).

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

|                                                         | METRIC     |         |        | INCH    |         |         | Rmr*      |
|---------------------------------------------------------|------------|---------|--------|---------|---------|---------|-----------|
| SURFACE ROUGHNESS                                       | µmRa       | µmRz    | µmRt   | µinRa   | µinRz   | µinRt   |           |
| Dynamic Sealing Face Ød <sub>1</sub>                    | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face ØD <sub>1</sub> and ØD <sub>2</sub> | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>                     | 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                     | -                                 | -                                 |

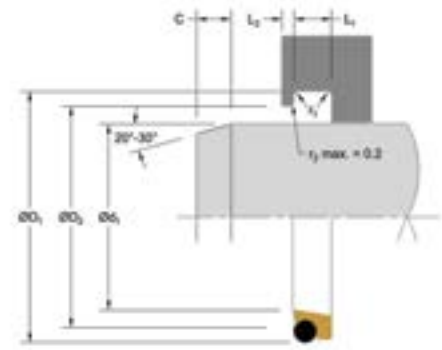
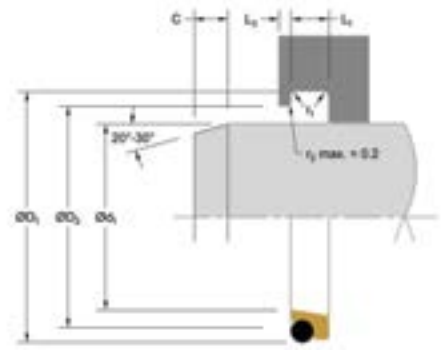
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                  | FILLER                     | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|-------------|---------------------|---------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                        | Special Bronze Compound    | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled        | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Good low-friction properties</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li></ul>                                    | Glass Molybdenum Disulfide | 702                 | Gray        | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>Excellent in all lubricating fluids and pneumatic applications</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                      | 25% Carbon/Graphite        | 711                 | Black       | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for use with soft mating surfaces</li><li>Low friction and no stick-slip</li></ul>                                                                                | Unfilled                   | 700                 | White       | -184 to 204°C       | -300 to 400°F       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>Excellent impact resistance</li><li>Good dielectrical properties</li><li>Excellent abrasion resistance</li><li>Low coefficient of friction</li></ul>                                                                      | Standard                   | 748                 | Translucent | -184 to 82°C        | -300 to 180°F       |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 inches) diameter</li></ul>                                         | Standard                   | HU5                 | Yellow      | -20 to 115°C        | -4 to 240°F         |
| <b>HU9 - POLYURETHANE, 95A</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 inches) diameter</li></ul>                                         | Standard                   | HU9                 | Red         | -20 to 115°C        | -4 to 240°F         |

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.





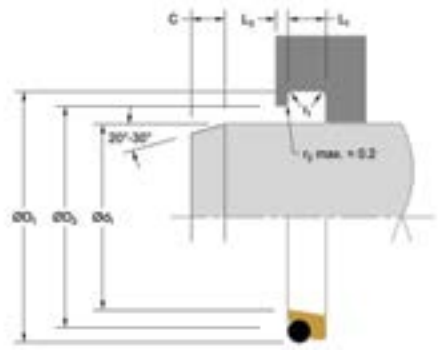
INSTALLATION RECOMMENDATIONS

| METRIC                             |                       |                      |                      |                |         |                      |
|------------------------------------|-----------------------|----------------------|----------------------|----------------|---------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 | GROOVE DIAMETER       | GROOVE WIDTH         | BORE DIAMETER        | RADIUS         | CHAMFER | O-RING CROSS SECTION |
| DIAMETER RANGE                     | D <sub>1</sub> H9     | L <sub>1</sub> + 0.2 | D <sub>2</sub> H11   | r <sub>1</sub> | C       | O-ring               |
| Standard Duty Application - R      |                       |                      |                      |                |         |                      |
| 6.0 - 11.9                         | d <sub>1</sub> + 4.8  | 3.7                  | d <sub>1</sub> + 2.7 | 0.4            | 3.0     | 1.78                 |
| 12.0 - 64.9                        | d <sub>1</sub> + 6.8  | 5.0                  | d <sub>1</sub> + 3.5 | 0.4            | 4.0     | 2.62                 |
| 65.0 - 249.9                       | d <sub>1</sub> + 8.8  | 6.0                  | d <sub>1</sub> + 4.0 | 0.4            | 6.0     | 3.53                 |
| 250.0 - 419.9                      | d <sub>1</sub> + 12.2 | 8.4                  | d <sub>1</sub> + 4.5 | 0.4            | 8.0     | 5.33                 |
| 420.0 - 649.9                      | d <sub>1</sub> + 16.0 | 11.0                 | d <sub>1</sub> + 5.2 | 0.4            | 8.0     | 6.99                 |
| 650.0 - 900.0                      | d <sub>1</sub> + 20.0 | 14.0                 | d <sub>1</sub> + 6.6 | 0.4            | 8.0     | 8.40                 |

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                 |                | METRIC          |                 |                |                 |                |
|-----------------|-----------------|----------------|-----------------|----------------|-----------------|-----------------|----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | PART NUMBER    | Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | PART NUMBER    |
| Tol. f9/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        |                | Tol. f9/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        |                |
| 4               | 8.8             | 3.7            | 6.7             | ELAMR00040**** | 90              | 98.8            | 6.0            | 94.0            | ELAMR00900**** |
| 5               | 9.8             | 3.7            | 7.7             | ELAMR00050**** | 95              | 103.8           | 6.0            | 99.0            | ELAMR00950**** |
| 8               | 12.8            | 3.7            | 10.7            | ELAMR00080**** | 100             | 108.8           | 6.0            | 104.0           | ELAMR01000**** |
| 10              | 14.8            | 3.7            | 12.7            | ELAMR00100**** | 110             | 118.8           | 6.0            | 114.0           | ELAMR01100**** |
| 12              | 18.8            | 5.0            | 15.5            | ELAMR00120**** | 120             | 128.8           | 6.0            | 124.0           | ELAMR01200**** |
| 14              | 20.8            | 5.0            | 17.5            | ELAMR00140**** | 125             | 133.8           | 6.0            | 129.0           | ELAMR01250**** |
| 15              | 21.8            | 5.0            | 18.5            | ELAMR00150**** | 130             | 138.8           | 6.0            | 134.0           | ELAMR01300**** |
| 18              | 24.8            | 5.0            | 21.5            | ELAMR00180**** | 140             | 148.8           | 6.0            | 144.0           | ELAMR01400**** |
| 20              | 26.8            | 5.0            | 23.5            | ELAMR00200**** | 150             | 158.8           | 6.0            | 154.0           | ELAMR01500**** |
| 24              | 30.8            | 5.0            | 27.5            | ELAMR00240**** | 160             | 168.8           | 6.0            | 164.0           | ELAMR01600**** |
| 25              | 31.8            | 5.0            | 28.5            | ELAMR00250**** | 170             | 178.8           | 6.0            | 174.0           | ELAMR01700**** |
| 28              | 34.8            | 5.0            | 31.5            | ELAMR00280**** | 175             | 183.8           | 6.0            | 179.0           | ELAMR01750**** |
| 30              | 36.8            | 5.0            | 33.5            | ELAMR00300**** | 180             | 188.8           | 6.0            | 184.0           | ELAMR01800**** |
| 32              | 38.8            | 5.0            | 35.5            | ELAMR00320**** | 190             | 198.8           | 6.0            | 194.0           | ELAMR01900**** |
| 35              | 41.8            | 5.0            | 38.5            | ELAMR00350**** | 195             | 203.8           | 6.0            | 199.0           | ELAMR01950**** |
| 38              | 44.8            | 5.0            | 41.5            | ELAMR00380**** | 200             | 208.8           | 6.0            | 204.0           | ELAMR02000**** |
| 40              | 46.8            | 5.0            | 43.5            | ELAMR00400**** | 210             | 218.8           | 6.0            | 214.0           | ELAMR02100**** |
| 42              | 48.8            | 5.0            | 45.5            | ELAMR00420**** | 220             | 228.8           | 6.0            | 224.0           | ELAMR02200**** |
| 45              | 51.8            | 5.0            | 48.5            | ELAMR00450**** | 230             | 238.8           | 6.0            | 234.0           | ELAMR02300**** |
| 48              | 54.8            | 5.0            | 51.5            | ELAMR00480**** | 240             | 248.8           | 6.0            | 244.0           | ELAMR02400**** |
| 50              | 56.8            | 5.0            | 53.5            | ELAMR00500**** | 250             | 262.2           | 8.4            | 254.5           | ELAMR02500**** |
| 55              | 61.8            | 5.0            | 58.5            | ELAMR00550**** | 260             | 272.2           | 8.4            | 264.5           | ELAMR02600**** |
| 60              | 66.8            | 5.0            | 63.5            | ELAMR00600**** | 270             | 282.2           | 8.4            | 274.5           | ELAMR02700**** |
| 65              | 73.8            | 6.0            | 69.0            | ELAMR00650**** | 280             | 292.2           | 8.4            | 284.5           | ELAMR02800**** |
| 70              | 78.8            | 6.0            | 74.0            | ELAMR00700**** | 290             | 302.2           | 8.4            | 294.5           | ELAMR02900**** |
| 75              | 83.8            | 6.0            | 79.0            | ELAMR00750**** | 300             | 312.2           | 8.4            | 304.5           | ELAMR03000**** |
| 80              | 88.8            | 6.0            | 84.0            | ELAMR00800**** | 310             | 322.2           | 8.4            | 314.5           | ELAMR03100**** |
| 85              | 93.8            | 6.0            | 89.0            | ELAMR00850**** | 320             | 332.2           | 8.4            | 324.5           | ELAMR03200**** |



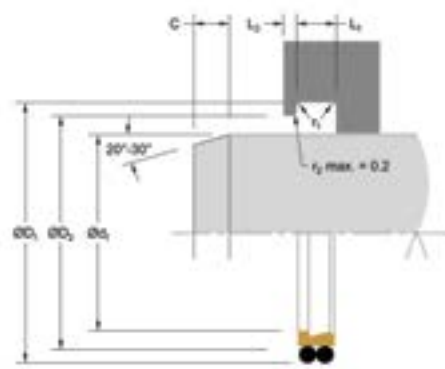


PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                 | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> |                |
| Tol. f9/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        |                |
| 330             | 342.2           | 8.4            | 334.5           | ELAMR03300**** |
| 340             | 352.2           | 8.4            | 344.5           | ELAMR03400**** |
| 350             | 362.2           | 8.4            | 354.5           | ELAMR03500**** |
| 360             | 372.2           | 8.4            | 364.5           | ELAMR03600**** |
| 370             | 382.2           | 8.4            | 374.5           | ELAMR03700**** |
| 380             | 392.2           | 8.4            | 384.5           | ELAMR03800**** |
| 390             | 402.2           | 8.4            | 394.5           | ELAMR03900**** |
| 400             | 412.2           | 8.4            | 404.5           | ELAMR04000**** |
| 410             | 422.2           | 8.4            | 414.5           | ELAMR04100**** |
| 420             | 436.0           | 11.0           | 425.2           | ELAMR04200**** |
| 430             | 446             | 11.0           | 435.2           | ELAMR04300**** |
| 440             | 456             | 11.0           | 445.2           | ELAMR04400**** |
| 450             | 466             | 11.0           | 455.2           | ELAMR04500**** |
| 460             | 476             | 11.0           | 465.2           | ELAMR04600**** |

| METRIC          |                 |                |                 | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> |                |
| Tol. f9/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        |                |
| 470             | 486             | 11.0           | 475.2           | ELAMR04700**** |
| 480             | 496             | 11.0           | 485.2           | ELAMR04800**** |
| 490             | 506             | 11.0           | 495.2           | ELAMR04900**** |
| 500             | 516             | 11.0           | 505.2           | ELAMR05000**** |
| 520             | 536             | 11.0           | 525.2           | ELAMR05200**** |
| 550             | 566             | 11.0           | 555.2           | ELAMR05500**** |
| 570             | 586             | 11.0           | 575.2           | ELAMR05700**** |
| 600             | 616             | 11.0           | 605.2           | ELAMR06000**** |
| 620             | 636             | 11.0           | 625.2           | ELAMR06200**** |
| 640             | 656             | 11.0           | 645.2           | ELAMR06400**** |
| 650             | 670             | 14.0           | 656.6           | ELAMR06500**** |
| 700             | 720             | 14.0           | 706.6           | ELAMR07000**** |
| 800             | 820             | 14.0           | 806.6           | ELAMR08000**** |
| 900             | 920             | 14.0           | 906.6           | ELAMR09000**** |

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



EXF  
WIPER/EXCLUDER  
Double-Acting

TECHNICAL DETAILS

The Hallite EXF is a double-acting, twin O-ring energized, rod wiper designed to include two different unique wiping geometries. The two lips combine to scrape debris from the rod and contain residual oil on rod extension, as well as allowing oil to pump back into the cylinder. The O-ring energizers provide the force necessary to maintain the engagement of the wiping lips against the sliding surface and allow the wiper to adjust for deflection.

Typically made from exclusive Hallite Armorlene® materials, this seal is capable of high speed applications and eliminates any potential for stick-slip. High-performance Armorlene® materials, like HLX, provide outstanding wear and scraping capability as well as large range of temperature and media compatibility.

The Halite EXF works well paired with rod seals that support the requisite dynamic pressure pump-back, like the Hallite R16 rod seal. When paired, they produce a sealing system capable of handling higher speeds, a large range of fluid compatibilities, and temperature range of service. For other rod seal arrangements with EXF, it is necessary to make sure the rod seal will provide proper pressure pump-back, or alternatively vent the system. The Hallite wipers/excluder series EXF is built to service moderate to slightly heavy-duty applications. It has the advantages of improved sealing function due to its twin energizer arrangement. Though it is easier to install in the groove, care must be taken to ensure it is not installed backwards and to ensure the proper fit of three individual components.



FEATURES

- Low friction and elimination of stick-slip
- More stable design for application with excessive side-to-side movement on rod
- Excellent in high-speed applications
- Balanced design keeps contamination out of cylinder while also minimizing oil film on rod

Part Number Structure

EXFMR00400NHLX \_

| EXF                 | M                                             | R                                                                                                      | 00400                                                    | N                                                                                    | HLX                                                                              | —                                      |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <b>Installation Recommendations</b> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <b>Energizer Table</b> for desired energizer material | PTFE MATERIAL<br>Refer to <b>Material Table</b> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile |



OPERATING CONDITIONS

|                    | METRIC          | INCH             |
|--------------------|-----------------|------------------|
| Maximum Speed      | Up to 15.0m/sec | Up to 50.0ft/sec |
| Temperature Range* | -45 to 200°C    | -49 to 392°F     |

\*Dependent upon energizer used (NBR, FKM, etc.).

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 <sub>1</sub>                    | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face ØD <sub>1</sub> and ØD <sub>2</sub> | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>                     | 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

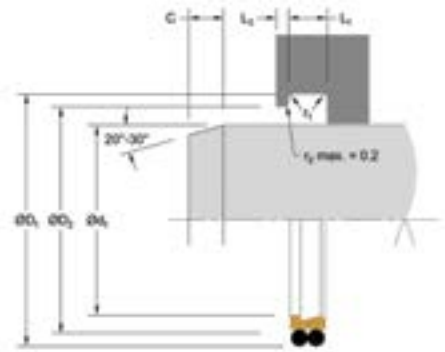
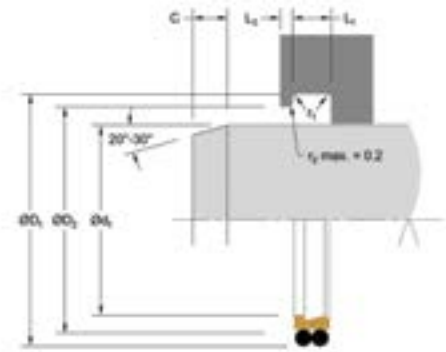
| ENERGIZER MATERIAL (SHORE A) | ENERGIZER TYPE | ENERGIZER DESIGNATION | ENERGIZER OPERATING TEMPERATURE°C | ENERGIZER OPERATING TEMPERATURE°F |
|------------------------------|----------------|-----------------------|-----------------------------------|-----------------------------------|
| NBR - 70A                    | 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 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|-------------|---------------------|---------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                        | Special Bronze Compound    | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled        | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Good low-friction properties</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li></ul>                                    | Glass Molybdenum Disulfide | 702                 | Gray        | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>Excellent in all lubricating fluids and pneumatic applications</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                      | 25% Carbon/Graphite        | 711                 | Black       | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for use with soft mating surfaces</li><li>Low friction and no stick-slip</li></ul>                                                                                | Unfilled                   | 700                 | White       | -184 to 204°C       | -300 to 400°F       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>Excellent impact resistance</li><li>Good dielectrical properties</li><li>Excellent abrasion resistance</li><li>Low coefficient of friction</li></ul>                                                                      | Standard                   | 748                 | Translucent | -184 to 82°C        | -300 to 180°F       |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 inches) diameter</li></ul>                                         | Standard                   | HU5                 | Yellow      | -20 to 115°C        | -4 to 240°F         |
| <b>HU9 - POLYURETHANE, 95A</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 inches) diameter</li></ul>                                         | Standard                   | HU9                 | Red         | -20 to 115°C        | -4 to 240°F         |

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.



INSTALLATION RECOMMENDATIONS

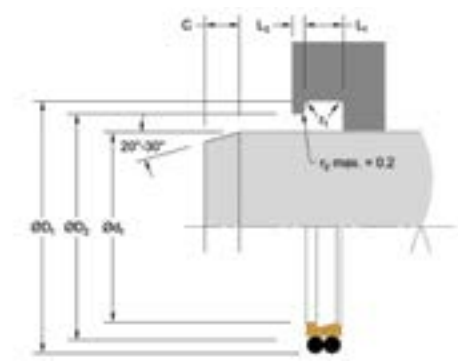
| METRIC                             |                            |                       |                      |                      |                    |                |         |                      |
|------------------------------------|----------------------------|-----------------------|----------------------|----------------------|--------------------|----------------|---------|----------------------|
| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | BORE DIAMETER        | STEP WIDTH         | RADIUS         | CHAMFER | O-RING CROSS SECTION |
|                                    |                            |                       |                      |                      |                    |                |         |                      |
| DIAMETER RANGE                     |                            | D <sub>1</sub> H9     | L <sub>1</sub> + 0.2 | D <sub>2</sub> H11   | L <sub>3</sub> min | r <sub>1</sub> | C       | O-ring               |
| Standard Duty Application - R      | Light Duty Application - L |                       |                      |                      |                    |                |         |                      |
| 19.0 - 39.9                        | 40.0 - 69.9                | d <sub>1</sub> + 7.6  | 4.2                  | d <sub>1</sub> + 1.0 | 3.0                | 0.4            | 3.0     | 1.78                 |
| 40.0 - 69.9                        | 70.0 - 139.9               | d <sub>1</sub> + 8.8  | 6.3                  | d <sub>1</sub> + 1.5 | 3.0                | 1.0            | 4.0     | 2.62                 |
| 70.0 - 139.9                       | 140.0 - 399.9              | d <sub>1</sub> + 12.2 | 8.1                  | d <sub>1</sub> + 2.0 | 4.0                | 1.2            | 6.0     | 3.53                 |
| 140.0 - 399.9                      | 400.0 - 649.9              | d <sub>1</sub> + 16.0 | 11.5                 | d <sub>1</sub> + 2.0 | 5.0                | 2.0            | 8.0     | 5.33                 |
| 400.0 - 649.9                      | 650.0 - 999.9              | d <sub>1</sub> + 24.0 | 15.5                 | d <sub>1</sub> + 2.5 | 8.0                | 2.5            | 8.0     | 6.99                 |
| 650.0 - 999.9                      | ≥ 1000.0                   | d <sub>1</sub> + 27.3 | 18.0                 | d <sub>1</sub> + 2.5 | 10.0               | 2.5            | 11.0    | 8.40                 |

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                 |                    | PART NUMBER                 |
|-----------------|-----------------|----------------|-----------------|--------------------|-----------------------------|
| ØD <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                             |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                             |
| 20.0            | 27.6            | 4.2            | 21.0            | 3.0                | EXFMR00200****              |
| 25.0            | 32.6            | 4.2            | 26.0            | 3.0                | EXFMR00250****              |
| 28.0            | 35.6            | 4.2            | 29.0            | 3.0                | EXFMR00280****              |
| 30.0            | 37.6            | 4.2            | 31.0            | 3.0                | EXFMR00300****              |
| 32.0            | 39.6            | 4.2            | 33.0            | 3.0                | EXFMR00320****              |
| 35.0            | 42.6            | 4.2            | 36.0            | 3.0                | EXFMR00350****              |
| 36.0            | 43.6            | 4.2            | 37.0            | 3.0                | EXFMR00360****              |
| 40.0            | 48.8            | 6.3            | 41.5            | 3.0                | EXFMR00400**** <sub>+</sub> |
| 42.0            | 50.8            | 6.3            | 43.5            | 3.0                | EXFMR00420****              |
| 45.0            | 53.8            | 6.3            | 46.5            | 3.0                | EXFMR00450**** <sub>+</sub> |
| 50.0            | 58.8            | 6.3            | 51.5            | 3.0                | EXFMR00500****              |
| 55.0            | 63.8            | 6.3            | 56.5            | 3.0                | EXFMR00550****              |
| 56.0            | 64.8            | 6.3            | 57.5            | 3.0                | EXFMR00560****              |
| 60.0            | 68.8            | 6.3            | 61.5            | 3.0                | EXFMR00600****              |
| 63.0            | 71.8            | 6.3            | 64.5            | 3.0                | EXFMR00630**** <sub>+</sub> |
| 65.0            | 73.8            | 6.3            | 66.5            | 3.0                | EXFMR00650****              |
| 70.0            | 82.2            | 8.1            | 72.0            | 4.0                | EXFMR00700**** <sub>+</sub> |
| 75.0            | 87.2            | 8.1            | 77.0            | 4.0                | EXFMR00750****              |
| 80.0            | 92.2            | 8.1            | 82.0            | 4.0                | EXFMR00800**** <sub>+</sub> |
| 85.0            | 97.2            | 8.1            | 87.0            | 4.0                | EXFMR00850****              |
| 90.0            | 102.2           | 8.1            | 92.0            | 4.0                | EXFMR00900**** <sub>+</sub> |
| 100.0           | 112.2           | 8.1            | 102.0           | 4.0                | EXFMR01000****              |
| 105.0           | 117.2           | 8.1            | 107.0           | 4.0                | EXFMR01050****              |
| 110.0           | 122.2           | 8.1            | 112.0           | 4.0                | EXFMR01100**** <sub>+</sub> |
| 115.0           | 127.2           | 8.1            | 117.0           | 4.0                | EXFMR01150****              |
| 120.0           | 132.2           | 8.1            | 122.0           | 4.0                | EXFMR01200****              |
| 125.0           | 137.2           | 8.1            | 127.0           | 4.0                | EXFMR01250**** <sub>+</sub> |
| 130.0           | 142.2           | 8.1            | 132.0           | 4.0                | EXFMR01300****              |

| METRIC          |                 |                |                 |                    | PART NUMBER                 |
|-----------------|-----------------|----------------|-----------------|--------------------|-----------------------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                             |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                             |
| 135.0           | 147.2           | 8.1            | 137.0           | 4.0                | EXFMR01350****              |
| 140.0           | 156.0           | 11.5           | 142.0           | 5.0                | EXFMR01400****              |
| 145.0           | 161.0           | 11.5           | 147.0           | 5.0                | EXFMR01450****              |
| 150.0           | 166.0           | 11.5           | 152.0           | 5.0                | EXFMR01500****              |
| 155.0           | 171.0           | 11.5           | 157.0           | 5.0                | EXFMR01550****              |
| 160.0           | 176.0           | 11.5           | 162.0           | 5.0                | EXFMR01600**** <sub>+</sub> |
| 165.0           | 181.0           | 11.5           | 167.0           | 5.0                | EXFMR01650****              |
| 170.0           | 186.0           | 11.5           | 172.0           | 5.0                | EXFMR01700****              |
| 175.0           | 191.0           | 11.5           | 177.0           | 5.0                | EXFMR01750****              |
| 180.0           | 196.0           | 11.5           | 182.0           | 5.0                | EXFMR01800****              |
| 190.0           | 206.0           | 11.5           | 192.0           | 5.0                | EXFMR01900****              |
| 200.0           | 216.0           | 11.5           | 202.0           | 5.0                | EXFMR02000**** <sub>+</sub> |
| 210.0           | 226.0           | 11.5           | 212.0           | 5.0                | EXFMR02100****              |
| 220.0           | 236.0           | 11.5           | 222.0           | 5.0                | EXFMR02200****              |
| 230.0           | 246.0           | 11.5           | 232.0           | 5.0                | EXFMR02300****              |
| 240.0           | 256.0           | 11.5           | 242.0           | 5.0                | EXFMR02400****              |
| 245.0           | 261.0           | 11.5           | 247.0           | 5.0                | EXFMR02450****              |
| 250.0           | 266.0           | 11.5           | 252.0           | 5.0                | EXFMR02500**** <sub>+</sub> |
| 260.0           | 276.0           | 11.5           | 262.0           | 5.0                | EXFMR02600****              |
| 265.0           | 281.0           | 11.5           | 267.0           | 5.0                | EXFMR02650****              |
| 280.0           | 296.0           | 11.5           | 282.0           | 5.0                | EXFMR02800**** <sub>+</sub> |
| 290.0           | 306.0           | 11.5           | 292.0           | 5.0                | EXFMR02900****              |
| 300.0           | 316.0           | 11.5           | 302.0           | 5.0                | EXFMR03000****              |
| 310.0           | 326.0           | 11.5           | 312.0           | 5.0                | EXFMR03100****              |
| 320.0           | 336.0           | 11.5           | 322.0           | 5.0                | EXFMR03200**** <sub>+</sub> |
| 330.0           | 346.0           | 11.5           | 332.0           | 5.0                | EXFMR03300****              |
| 340.0           | 356.0           | 11.5           | 342.0           | 5.0                | EXFMR03400****              |
| 350.0           | 366.0           | 11.5           | 352.0           | 5.0                | EXFMR03500****              |





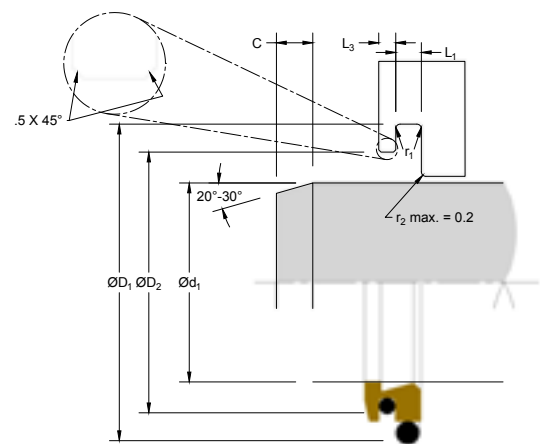
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                |                 |                    | PART NUMBER                 |
|-----------------|-----------------|----------------|-----------------|--------------------|-----------------------------|
| ØD <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                             |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                             |
| 355.0           | 371.0           | 11.5           | 357.0           | 5.0                | EXFMR03550****              |
| 360.0           | 376.0           | 11.5           | 362.0           | 5.0                | EXFMR03600**** <sub>+</sub> |
| 365.0           | 381.0           | 11.5           | 367.0           | 5.0                | EXFMR03650****              |
| 370.0           | 386.0           | 11.5           | 372.0           | 5.0                | EXFMR03700****              |
| 375.0           | 391.0           | 11.5           | 377.0           | 5.0                | EXFMR03750****              |
| 380.0           | 396.0           | 11.5           | 382.0           | 5.0                | EXFMR03800****              |
| 390.0           | 406.0           | 11.5           | 392.0           | 5.0                | EXFMR03900****              |
| 400.0           | 416.0           | 11.5           | 402.0           | 5.0                | EXFML04000****              |
| 400.0           | 424.0           | 15.5           | 402.5           | 8.0                | EXFMR04000****              |
| 410.0           | 434.0           | 15.5           | 412.5           | 8.0                | EXFMR04100****              |
| 420.0           | 444.0           | 15.5           | 422.5           | 8.0                | EXFMR04200****              |
| 430.0           | 454.0           | 15.5           | 432.5           | 8.0                | EXFMR04300****              |
| 440.0           | 464.0           | 15.5           | 442.5           | 8.0                | EXFMR04400****              |
| 445.0           | 469.0           | 15.5           | 447.5           | 8.0                | EXFMR04450****              |
| 450.0           | 474.0           | 15.5           | 452.5           | 8.0                | EXFMR04500****              |
| 460.0           | 484.0           | 15.5           | 462.5           | 8.0                | EXFMR04600****              |
| 465.0           | 489.0           | 15.5           | 467.5           | 8.0                | EXFMR04650****              |
| 470.0           | 494.0           | 15.5           | 472.5           | 8.0                | EXFMR04700****              |
| 475.0           | 499.0           | 15.5           | 477.5           | 8.0                | EXFMR04750****              |

| METRIC          |                 |                |                 |                    | PART NUMBER    |
|-----------------|-----------------|----------------|-----------------|--------------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> | ØD <sub>2</sub> | STEP WIDTH         |                |
| Tol. f8/h9      | Tol. H9         | Tol. +0.2      | Tol. H11        | L <sub>3</sub> Min |                |
| 495.0           | 519.0           | 15.5           | 497.5           | 8.0                | EXFMR04950**** |
| 510.0           | 534.0           | 15.5           | 512.5           | 8.0                | EXFMR05100**** |
| 520.0           | 544.0           | 15.5           | 522.5           | 8.0                | EXFMR05200**** |
| 525.0           | 549.0           | 15.5           | 527.5           | 8.0                | EXFMR05250**** |
| 530.0           | 554.0           | 15.5           | 532.5           | 8.0                | EXFMR05300**** |
| 540.0           | 564.0           | 15.5           | 542.5           | 8.0                | EXFMR05400**** |
| 570.0           | 594.0           | 15.5           | 572.5           | 8.0                | EXFMR05700**** |
| 585.0           | 609.0           | 15.5           | 587.5           | 8.0                | EXFMR05850**** |
| 590.0           | 614.0           | 15.5           | 592.5           | 8.0                | EXFMR05900**** |
| 600.0           | 624.0           | 15.5           | 602.5           | 8.0                | EXFMR06000**** |
| 620.0           | 644.0           | 15.5           | 622.5           | 8.0                | EXFMR06200**** |
| 635.0           | 659.0           | 15.5           | 637.5           | 8.0                | EXFMR06350**** |
| 675.0           | 702.3           | 18.0           | 677.5           | 10.0               | EXFMR06750**** |
| 690.0           | 717.3           | 18.0           | 692.5           | 10.0               | EXFMR06900**** |
| 745.0           | 772.3           | 18.0           | 747.5           | 10.0               | EXFMR07450**** |
| 800.0           | 827.3           | 18.0           | 802.5           | 10.0               | EXFMR08000**** |
| 815.0           | 842.3           | 18.0           | 817.5           | 10.0               | EXFMR08150**** |
| 900.0           | 927.3           | 18.0           | 902.5           | 10.0               | EXFMR09000**** |
| 910.0           | 937.3           | 18.0           | 912.5           | 10.0               | EXFMR09100**** |

+Fits ISO 6195 Type D Grooves \*Please contact Hallite for custom sizes, material selection, or seal design.

EXG  
WIPER/EXCLUDER  
Double-Acting



TECHNICAL DETAILS

The Hallite EXG is a double-acting, two O-ring energized, rod wiper/excluder designed to include two different unique wiping lip geometries. The EXG wiper is primarily designed for environments with heavy contamination, particularly when the rod is facing upwards. The two wiping lips combine to scrape debris from the rod and contain residual oil on rod extension. Hallite's innovative Umbrella® wiper technology is designed to eliminate debris buildup from in front of the primary wiping lip by forcing it to flow to the outer diameter of the cylinder away from the rod. The EXG design requires two O-ring energizers; one O-ring energizer provides downward force to maintain the engagement of the inner wiping lip, while the other O-ring provides the necessary force and static sealing of the primary wiping lip area to the sliding surface.

Typically made from exclusive Hallite Armorlene® materials, this seal is capable of high-speed applications and eliminates any potential for stick-slip. High-performance Armorlene® materials, like HLX, provide outstanding wear and scraping capability as well as large range of temperature and media compatibility. The Halite EXG wiper employs the same basic principles of design function as the Hallite E2W, E5W, and EXF, though the EXG wiper may require a gland drain to properly relieve pressure between the wiper and rod seal.



FEATURES

- Low friction and elimination of stick-slip
- More stable design for application with excessive side-to-side movement on rod
- Excellent in high-speed applications
- Balanced design keeps contamination out of cylinder while also minimizing oil film on rod

Part Number Structure

EXGMR00400NHLX \_

| EXG                 | M                                             | R                                                                                                      | 00400                                                    | N                                                                                    | HLX                                                                              | —                                      |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile |

OPERATING CONDITIONS

|                    | METRIC         | INCH             |
|--------------------|----------------|------------------|
| Maximum Speed      | Up to 5.0m/sec | Up to 16.4ft/sec |
| Temperature Range* | -45 to 200°C   | -49 to 392°F     |

\*Dependent upon energizer used (NBR, FKM, etc.).

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 <sub>1</sub>                    | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face ØD <sub>1</sub> and ØD <sub>2</sub> | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>                     | 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

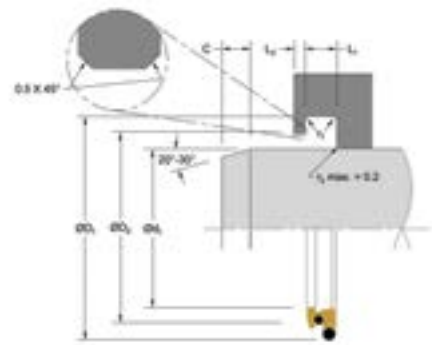
| ENERGIZER MATERIAL (SHORE A) | ENERGIZER TYPE | ENERGIZER DESIGNATION | ENERGIZER OPERATING TEMPERATURE°C | ENERGIZER OPERATING TEMPERATURE°F |
|------------------------------|----------------|-----------------------|-----------------------------------|-----------------------------------|
| NBR - 70A                    | 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 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------|-------------|---------------------|---------------------|
| <b>ARMORLENE® HLX</b> <ul style="list-style-type: none"><li>Standard material for hydraulic applications</li><li>High compressive strength</li><li>Excellent extrusion resistance</li><li>Extended wear resistance</li></ul>                                                        | Special Bronze Compound    | HLX                 | Gold        | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | Carbon Fiber Filled        | HCF                 | Gray/Black  | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 702</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids</li><li>Good low-friction properties</li><li>Excellent extrusion resistance</li><li>Good chemical resistance</li></ul>                                    | Glass Molybdenum Disulfide | 702                 | Gray        | -73 to 260°C        | -100 to 500°F       |
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>Excellent in all lubricating fluids and pneumatic applications</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                      | 25% Carbon/Graphite        | 711                 | Black       | -73 to 288°C        | -100 to 550°F       |
| <b>ARMORLENE® 700</b> <ul style="list-style-type: none"><li>Excellent in all hydraulic fluids</li><li>Recommended for use with soft mating surfaces</li><li>Low friction and no stick-slip</li></ul>                                                                                | Unfilled                   | 700                 | White       | -184 to 204°C       | -300 to 400°F       |
| <b>748 - UHMWPE</b> <ul style="list-style-type: none"><li>Excellent impact resistance</li><li>Good dielectrical properties</li><li>Excellent abrasion resistance</li><li>Low coefficient of friction</li></ul>                                                                      | Standard                   | 748                 | Translucent | -184 to 82°C        | -300 to 180°F       |
| <b>HU5 - POLYURETHANE, 55D</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 inches) diameter</li></ul>                                         | Standard                   | HU5                 | Yellow      | -20 to 115°C        | -4 to 240°F         |
| <b>HU9 - POLYURETHANE, 95A</b> <ul style="list-style-type: none"><li>Positive position load holding</li><li>Excellent extrusion resistance</li><li>Excellent wear resistance</li><li>Available up to 2540mm (100 inches) diameter</li></ul>                                         | Standard                   | HU9                 | Red         | -20 to 115°C        | -4 to 240°F         |

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.



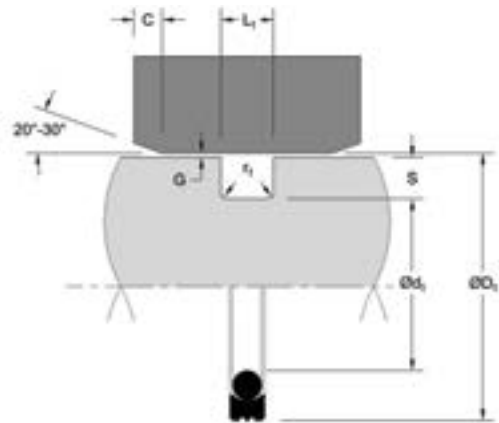
## INSTALLATION RECOMMENDATIONS

## METRIC

| ROD DIAMETER Ød <sub>1</sub> f8/h9 |                    | GROOVE DIAMETER       | GROOVE WIDTH         | BORE DIAMETER         | STEP WIDTH            | RADIUS         | CHAMFER | O-RING CROSS SECTION | O-RING 2 CROSS SECTION |
|------------------------------------|--------------------|-----------------------|----------------------|-----------------------|-----------------------|----------------|---------|----------------------|------------------------|
| DIAMETER RANGE                     |                    | ØD <sub>1</sub> H8    | L <sub>1</sub> + 0.2 | D <sub>2</sub> H8     | L <sub>3</sub> +0-0.1 | r <sub>1</sub> | C       | O-ring               | O-ring                 |
| Standard Duty Application - R      | Extended Range - L |                       |                      |                       |                       |                |         |                      |                        |
| 120.0 - 229.9                      | 230.0 - 299.9      | d <sub>1</sub> + 22.2 | 6.3                  | d <sub>1</sub> + 10.7 | 4.2                   | 1.2            | 4.0     | 5.33                 | 3.53                   |
| 230.0 - 299.9                      | 300.0 - 629.9      | d <sub>1</sub> + 24.2 | 6.3                  | d <sub>1</sub> + 10.7 | 4.2                   | 1.2            | 4.0     | 5.33                 | 3.53                   |
| 300.0 - 629.9                      | 630.0 - 999.9      | d <sub>1</sub> + 33.0 | 8.1                  | d <sub>1</sub> + 15.1 | 6.3                   | 1.2            | 6.0     | 6.99                 | 5.33                   |
| 630.0 - 999.9                      | ≥ 1000.0           | d <sub>1</sub> + 36.5 | 9.5                  | d <sub>1</sub> + 15.1 | 6.3                   | 2.0            | 6.0     | 8.40                 | 5.33                   |

# SWIVEL SEALS





TECHNICAL DETAILS

The Hallite SSP is a double-acting, O-ring energized, rotary swivel seal designed to be used to seal outer diameters of shafts, bores, swivels, and other applications with rotating or oscillating movement. The SSP rotary seal has one or two machined grooves in the face ring, depending on the face-ring cross-section, that function to improve sealing against the surface while trapping lubrication and reducing surface contact area, thereby reducing running friction. The O-ring serves to energize the seal face ring, exerting a designed downward force, and also provides static sealing of the housing.

Hallite’s SSP rotary seal has a specially designed circular inner recess that provides for maximum O-ring contact area to the inner diameter of the seal face, thereby minimizing the possibility of sealing components spinning relative to each other. The standard SSP seal face includes pressure notches, which makes the seal very responsive to changes in pressure. Made from exclusive Hallite Armorlene® 711 or HCF PTFE materials, the SSP rotary seal is energy-efficient due to its low-friction qualities and eliminates any potential sticking on start-up.

High-performance Armorlene® materials, like 711, provide outstanding wear resistance and support a large range of temperature and media compatibilities. The Armorlene® SSP and SSR rotary swivel seals are designed for slow-speed rotary and swivel applications.



F E A T U R E S

- High temperature rating, low-friction and wear-resistant face-ring
- Compact groove design suitable for narrow spacing
- Good anti-extrusion resistance

Part Number Structure

SSPMR00550N711 \_

|                     |                                               |                                                                                                        |                                                           |                                                                                      |                                                                                  |                                                                         |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| SSP                 | M                                             | R                                                                                                      | 00550                                                     | N                                                                                    | 711                                                                              | —                                                                       |
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | BORE DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile (with notches)<br>X = No notches |

OPERATING CONDITIONS

|                            | METRIC         | INCH            |
|----------------------------|----------------|-----------------|
| Maximum Speed              | Up to 2.0m/sec | Up to 6.5ft/sec |
| Temperature Range*         | -45 to 200°C   | -49 to 392°F    |
| Maximum Dynamic Pressure** | 300 bar        | 4350 psi        |

*\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above 300 bar (4350 psi), contact Hallite Engineering. Application limit PV ≤ 25 bar m/s (40 bar m/s for interrupted rotary).*

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 <sub>1</sub> | 0.05 - 0.2 | 1.6 max | 2 max  | 2 - 8   | 63 max  | 157 max | 60% - 90% |
| Static Sealing Face Ød <sub>1</sub>  | 1.6 max    | 6.3 max | 10 max | 63 max  | 250 max | 394 max |           |
| Static Housing Faces L <sub>1</sub>  | 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                     | -                                 | -                                 |

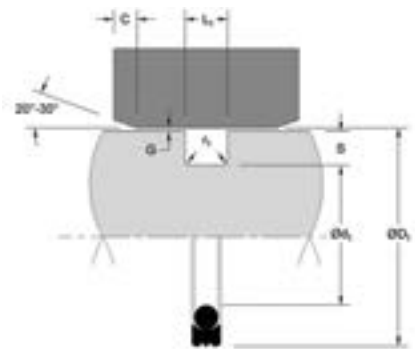
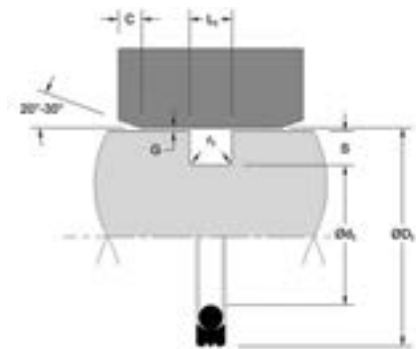
*\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.*

MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                                                    | FILLER                   | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|-------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>• Excellent in all lubricating fluids and pneumatic applications</li><li>• High chemical resistance</li><li>• Excellent extrusion resistance</li><li>• Excellent wear properties</li></ul>                                                                | 25% Carbon/ Graphite     | 711                 | Black       | -73 to 288°C        | -100 to 550°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>• Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>• Not recommended for gas sealing applications</li><li>• Not recommended for electrical conductive fluids</li></ul>                             | Carbon Fiber Filled      | HCF                 | Gray/ Black | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® HCV</b> <ul style="list-style-type: none"><li>• Recommended for lubricating and non-lubricating fluids</li><li>• Excellent for high-frequency and short-stroke applications</li><li>• Not recommended for gas sealing applications</li><li>• Not recommended for electrical conductive fluids</li></ul> | High Carbon Fiber Filled | HCV                 | Gray/ Black | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 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.*





INSTALLATION RECOMMENDATIONS

| METRIC                           |                            |                       |                      |                |         |                |                         |                   |
|----------------------------------|----------------------------|-----------------------|----------------------|----------------|---------|----------------|-------------------------|-------------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G max* | NUMBER OF GROOVES |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to 300 bar           |                   |
| Standard Duty Application - R    | Light Duty Application - L |                       |                      |                |         |                |                         |                   |
| 8.0 - 39.9                       | 40.0 - 79.9                | D <sub>1</sub> - 4.9  | 2.2                  | 0.4            | 2.5     | 2.45           | Tol H8/f7               | 0                 |
| 40.0 - 79.9                      | 80.0 - 132.9               | D <sub>1</sub> - 7.5  | 3.2                  | 0.6            | 3.5     | 3.75           | Tol H8/f7               | 1                 |
| 80.0 - 132.9                     | 133.0 - 329.9              | D <sub>1</sub> - 11.0 | 4.2                  | 1.0            | 4.0     | 5.50           | Tol H8/f7               | 1                 |
| 133.0 - 329.9                    | 330.0 - 649.9              | D <sub>1</sub> - 15.5 | 6.3                  | 1.3            | 6.0     | 7.75           | Tol H8/f7               | 2                 |
| 330.0 - 649.9                    | 650.0 - 999.9              | D <sub>1</sub> - 21.0 | 8.1                  | 1.8            | 8.0     | 10.50          | Tol H8/f7               | 2                 |
| 650.0 - 999.9                    | -                          | D <sub>1</sub> - 28.0 | 9.5                  | 2.5            | 10.0    | 14.00          | Tol H8/f7               | 2                 |

At pressure >300 bar or greater contact Hallite Engineering.  
\*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

| INCH                             |                            |                        |                       |                |         |                |                         |                   |
|----------------------------------|----------------------------|------------------------|-----------------------|----------------|---------|----------------|-------------------------|-------------------|
| BORE DIAMETER ØD <sub>1</sub> H9 |                            | GROOVE DIAMETER        | GROOVE WIDTH          | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE G max* | NUMBER OF GROOVES |
| DIAMETER RANGE                   |                            | Ød <sub>1</sub> h9     | L <sub>1</sub> + .008 | r <sub>1</sub> | C       | S              | Up to 4350 psi          |                   |
| Standard Duty Application - R    | Light Duty Application - L |                        |                       |                |         |                |                         |                   |
| 0.375 - 1.499                    | 1.500 - 2.999              | D <sub>1</sub> - 0.193 | 0.087                 | 0.015          | 0.100   | 0.096          | Tol H8/f7               | 0                 |
| 1.500 - 2.999                    | 3.000 - 5.999              | D <sub>1</sub> - 0.295 | 0.126                 | 0.015          | 0.125   | 0.147          | Tol H8/f7               | 1                 |
| 3.000 - 5.999                    | 6.000 - 11.999             | D <sub>1</sub> - 0.433 | 0.165                 | 0.015          | 0.187   | 0.216          | Tol H8/f7               | 1                 |
| 6.000 - 11.999                   | 12.000-20.000              | D <sub>1</sub> - 0.610 | 0.248                 | 0.035          | 0.250   | 0.305          | Tol H8/f7               | 2                 |
| 12.000-20.000                    | -                          | D <sub>1</sub> - 0.827 | 0.319                 | 0.035          | 0.312   | 0.413          | Tol H8/f7               | 2                 |

At pressure >4350 psi or greater contact Hallite Engineering.  
\*Radial Clearance G max. = maximum permissible gap all on one side using max. tube diameter and min. clearance diameter.

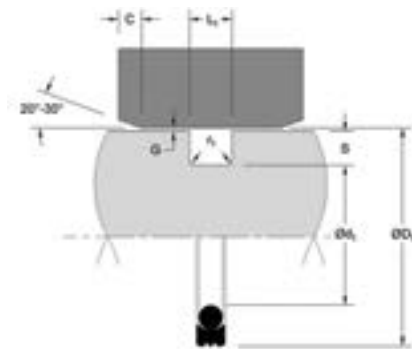
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 16.0            | 11.1            | 2.2            | SSPMR00160**** |
| 18.0            | 13.1            | 2.2            | SSPMR00180**** |
| 20.0            | 15.1            | 2.2            | SSPMR00200**** |
| 22.0            | 17.1            | 2.2            | SSPMR00220**** |
| 25.0            | 20.1            | 2.2            | SSPMR00250**** |
| 28.0            | 23.1            | 2.2            | SSPMR00280**** |
| 30.0            | 25.1            | 2.2            | SSPMR00300**** |
| 32.0            | 27.1            | 2.2            | SSPMR00320**** |
| 35.0            | 30.1            | 2.2            | SSPMR00350**** |
| 40.0            | 32.5            | 3.2            | SSPMR00400**** |
| 42.0            | 34.5            | 3.2            | SSPMR00420**** |
| 45.0            | 37.5            | 3.2            | SSPMR00450**** |
| 48.0            | 40.5            | 3.2            | SSPMR00480**** |
| 50.0            | 42.5            | 3.2            | SSPMR00500**** |
| 52.0            | 44.5            | 3.2            | SSPMR00520**** |
| 55.0            | 47.5            | 3.2            | SSPMR00550**** |
| 60.0            | 52.5            | 3.2            | SSPMR00600**** |
| 63.0            | 55.5            | 3.2            | SSPMR00630**** |
| 65.0            | 57.5            | 3.2            | SSPMR00650**** |
| 70.0            | 62.5            | 3.2            | SSPMR00700**** |
| 75.0            | 67.5            | 3.2            | SSPMR00750**** |
| 80.0            | 69.0            | 4.2            | SSPMR00800**** |
| 85.0            | 74.0            | 4.2            | SSPMR00850**** |
| 90.0            | 79.0            | 4.2            | SSPMR00900**** |
| 95.0            | 84.0            | 4.2            | SSPMR00950**** |
| 100.0           | 89.0            | 4.2            | SSPMR01000**** |
| 105.0           | 94.0            | 4.2            | SSPMR01050**** |
| 110.0           | 99.0            | 4.2            | SSPMR01100**** |

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

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.2      |                |
| 115.0           | 104.0           | 4.2            | SSPMR01150**** |
| 120.0           | 109.0           | 4.2            | SSPMR01200**** |
| 125.0           | 114.0           | 4.2            | SSPMR01250**** |
| 130.0           | 119.0           | 4.2            | SSPMR01300**** |
| 135.0           | 119.5           | 6.3            | SSPMR01350**** |
| 140.0           | 124.5           | 6.3            | SSPMR01400**** |
| 150.0           | 134.5           | 6.3            | SSPMR01500**** |
| 160.0           | 144.5           | 6.3            | SSPMR01600**** |
| 170.0           | 154.5           | 6.3            | SSPMR01700**** |
| 180.0           | 164.5           | 6.3            | SSPMR01800**** |
| 190.0           | 174.5           | 6.3            | SSPMR01900**** |
| 200.0           | 184.5           | 6.3            | SSPMR02000**** |
| 210.0           | 194.5           | 6.3            | SSPMR02100**** |
| 220.0           | 204.5           | 6.3            | SSPMR02200**** |
| 230.0           | 214.5           | 6.3            | SSPMR02300**** |
| 240.0           | 224.5           | 6.3            | SSPMR02400**** |
| 250.0           | 234.5           | 6.3            | SSPMR02500**** |
| 280.0           | 264.5           | 6.3            | SSPMR02800**** |
| 300.0           | 284.5           | 6.3            | SSPMR03000**** |
| 320.0           | 304.5           | 6.3            | SSPMR03200**** |
| 350.0           | 329.0           | 8.1            | SSPMR03500**** |
| 360.0           | 339.0           | 8.1            | SSPMR03600**** |
| 400.0           | 379.0           | 8.1            | SSPMR04000**** |
| 420.0           | 399.0           | 8.1            | SSPMR04200**** |
| 450.0           | 429.0           | 8.1            | SSPMR04500**** |
| 480.0           | 459.0           | 8.1            | SSPMR04800**** |
| 500.0           | 479.0           | 8.1            | SSPMR05000**** |
| 600.0           | 579.0           | 8.1            | SSPMR06000**** |

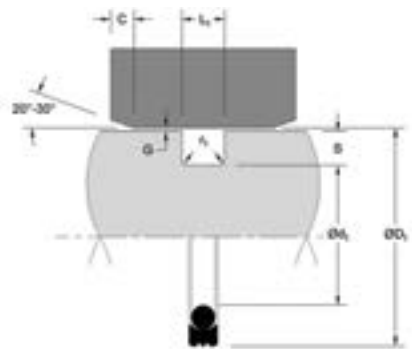




PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 0.375           | 0.182           | 0.087          | SSPER00375**** |
| 0.437           | 0.244           | 0.087          | SSPER00437**** |
| 0.500           | 0.307           | 0.087          | SSPER00500**** |
| 0.562           | 0.369           | 0.087          | SSPER00562**** |
| 0.625           | 0.432           | 0.087          | SSPER00625**** |
| 0.687           | 0.494           | 0.087          | SSPER00687**** |
| 0.750           | 0.557           | 0.087          | SSPER00750**** |
| 0.812           | 0.619           | 0.087          | SSPER00812**** |
| 0.875           | 0.682           | 0.087          | SSPER00875**** |
| 0.937           | 0.744           | 0.087          | SSPER00937**** |
| 1.000           | 0.807           | 0.087          | SSPER01000**** |
| 1.125           | 0.932           | 0.087          | SSPER01125**** |
| 1.250           | 1.057           | 0.087          | SSPER01250**** |
| 1.375           | 1.182           | 0.087          | SSPER01375**** |
| 1.500           | 1.205           | 0.126          | SSPER01500**** |
| 1.625           | 1.330           | 0.126          | SSPER01625**** |
| 1.750           | 1.455           | 0.126          | SSPER01750**** |
| 1.875           | 1.580           | 0.126          | SSPER01875**** |
| 2.000           | 1.705           | 0.126          | SSPER02000**** |
| 2.125           | 1.830           | 0.126          | SSPER02125**** |
| 2.250           | 1.955           | 0.126          | SSPER02250**** |
| 2.375           | 2.080           | 0.126          | SSPER02375**** |
| 2.500           | 2.205           | 0.126          | SSPER02500**** |
| 2.625           | 2.330           | 0.126          | SSPER02625**** |
| 2.750           | 2.455           | 0.126          | SSPER02750**** |
| 2.875           | 2.580           | 0.126          | SSPER02875**** |
| 3.000           | 2.567           | 0.165          | SSPER03000**** |
| 3.125           | 2.692           | 0.165          | SSPER03125**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 3.250           | 2.817           | 0.165          | SSPER03250**** |
| 3.375           | 2.942           | 0.165          | SSPER03375**** |
| 3.500           | 3.067           | 0.165          | SSPER03500**** |
| 3.625           | 3.192           | 0.165          | SSPER03625**** |
| 3.750           | 3.317           | 0.165          | SSPER03750**** |
| 3.875           | 3.442           | 0.165          | SSPER03875**** |
| 4.000           | 3.567           | 0.165          | SSPER04000**** |
| 4.125           | 3.692           | 0.165          | SSPER04125**** |
| 4.250           | 3.817           | 0.165          | SSPER04250**** |
| 4.375           | 3.942           | 0.165          | SSPER04375**** |
| 4.500           | 4.067           | 0.165          | SSPER04500**** |
| 4.625           | 4.192           | 0.165          | SSPER04625**** |
| 4.750           | 4.317           | 0.165          | SSPER04750**** |
| 4.875           | 4.442           | 0.165          | SSPER04875**** |
| 5.000           | 4.567           | 0.165          | SSPER05000**** |
| 5.125           | 4.692           | 0.165          | SSPER05125**** |
| 5.250           | 4.817           | 0.165          | SSPER05250**** |
| 5.375           | 4.942           | 0.165          | SSPER05375**** |
| 5.500           | 5.067           | 0.165          | SSPER05500**** |
| 5.625           | 5.192           | 0.165          | SSPER05625**** |
| 5.750           | 5.317           | 0.165          | SSPER05750**** |
| 5.875           | 5.442           | 0.165          | SSPER05875**** |
| 6.000           | 5.390           | 0.248          | SSPER06000**** |
| 6.250           | 5.640           | 0.248          | SSPER06250**** |
| 6.500           | 5.890           | 0.248          | SSPER06500**** |
| 6.750           | 6.140           | 0.248          | SSPER06750**** |
| 7.000           | 6.390           | 0.248          | SSPER07000**** |
| 7.250           | 6.640           | 0.248          | SSPER07250**** |



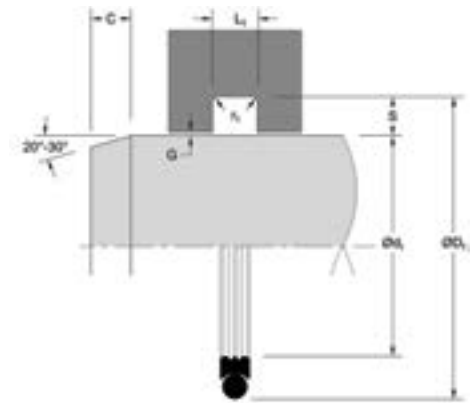
PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 7.500           | 6.890           | 0.248          | SSPER07500**** |
| 7.750           | 7.140           | 0.248          | SSPER07750**** |
| 8.000           | 7.390           | 0.248          | SSPER08000**** |
| 8.250           | 7.640           | 0.248          | SSPER08250**** |
| 8.500           | 7.890           | 0.248          | SSPER08500**** |
| 8.750           | 8.140           | 0.248          | SSPER08750**** |
| 9.000           | 8.390           | 0.248          | SSPER09000**** |
| 9.250           | 8.640           | 0.248          | SSPER09250**** |
| 9.500           | 8.890           | 0.248          | SSPER09500**** |
| 9.750           | 9.140           | 0.248          | SSPER09750**** |
| 10.000          | 9.390           | 0.248          | SSPER10000**** |
| 10.500          | 9.890           | 0.248          | SSPER10500**** |
| 11.000          | 10.390          | 0.248          | SSPER11000**** |
| 11.500          | 10.890          | 0.248          | SSPER11500**** |
| 12.000          | 11.173          | 0.319          | SSPER12000**** |
| 12.500          | 11.673          | 0.319          | SSPER12500**** |

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| ØD <sub>1</sub> | Ød <sub>1</sub> | L <sub>1</sub> |                |
| Tol. H9         | Tol. h9         | Tol. +0.008    |                |
| 13.000          | 12.173          | 0.319          | SSPER13000**** |
| 13.500          | 12.673          | 0.319          | SSPER13500**** |
| 14.000          | 13.173          | 0.319          | SSPER14000**** |
| 14.500          | 13.673          | 0.319          | SSPER14500**** |
| 15.000          | 14.173          | 0.319          | SSPER15000**** |
| 15.500          | 14.673          | 0.319          | SSPER15500**** |
| 16.000          | 15.173          | 0.319          | SSPER16000**** |
| 16.500          | 15.673          | 0.319          | SSPER16500**** |
| 17.000          | 16.173          | 0.319          | SSPER17000**** |
| 17.500          | 16.673          | 0.319          | SSPER17500**** |
| 18.000          | 17.173          | 0.319          | SSPER18000**** |
| 18.500          | 17.673          | 0.319          | SSPER18500**** |
| 19.000          | 18.173          | 0.319          | SSPER19000**** |
| 19.500          | 18.673          | 0.319          | SSPER19500**** |
| 20.000          | 19.173          | 0.319          | SSPER20000**** |

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





# SSR

## SWIVEL SEAL

ID Sealing

### TECHNICAL DETAILS

The Hallite SSR is a double-acting, O-ring energized, rotary swivel seal designed to be used to seal inner diameters of shafts, rods, swivels, and other applications with rotating or oscillating movement. The SSR rotary seal has one or two machined grooves in the face ring, depending on the face ring cross-section, that function to improve sealing against the surface while trapping lubrication and reducing surface contact area, thereby reducing running friction. The O-ring serves to energize the seal face ring, exerting a designed downward force, and also provides static sealing of the housing.

Hallite’s SSR rotary seal has a specially designed circular inner recess that provides for maximum O-ring contact area to the inner diameter of the seal face, thereby minimizing the possibility of sealing components spinning relative to each other. The standard SSR seal face includes pressure notches, which makes the seal very responsive to changes in pressure. Made from exclusive Hallite Armorlene® 711 or HCF PTFE materials, the SSR rotary seal is energy-efficient due to its low-friction qualities and eliminates any potential sticking on start-up.

High-performance Armorlene® materials, like 711, provide outstanding wear resistance and support a large range of temperature and media compatibilities. The SSR rotary swivel seal is designed for slow-speed rotary and swivel applications.



### FEATURES

- High temperature rating, low-friction and wear resistant face-ring
- Good anti-extrusion resistance
- Compact groove design suitable for narrow spacing

### Part Number Structure

SSRmr00550N711 \_

| SSR                 | M                                             | R                                                                                                      | 00550                                                    | N                                                                                    | 711                                                                              | —                                                                       |
|---------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| PROFILE DESIGNATION | UNIT OF MEASUREMENT<br>M = Metric<br>E = Inch | APPLICATION<br>Refer to <i>Installation Recommendations</i> and use designator for desired application | ROD DIAMETER<br>Metric = mm X 10<br>Inch = inches X 1000 | ENERGIZER MATERIAL<br>Refer to <i>Energizer Table</i> for desired energizer material | PTFE MATERIAL<br>Refer to <i>Material Table</i> for desired PTFE (face) material | SPECIAL FEATURE<br>Blank = Std profile (with notches)<br>X = No notches |

OPERATING CONDITIONS

|                            | METRIC         | INCH            |
|----------------------------|----------------|-----------------|
| Maximum Speed              | Up to 2.0m/sec | Up to 6.5ft/sec |
| Temperature Range*         | -45 to 200°C   | -49 to 392°F    |
| Maximum Dynamic Pressure** | 300 bar        | 4350 psi        |

\*Dependent upon energizer used (NBR, FKM, etc.). \*\*For pressures above 300 bar (4350 psi), contact Hallite Engineering. Application limit PV ≤ 25 bar m/s (40 bar for interrupted rotary).

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

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

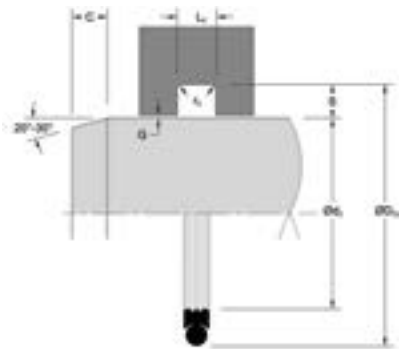
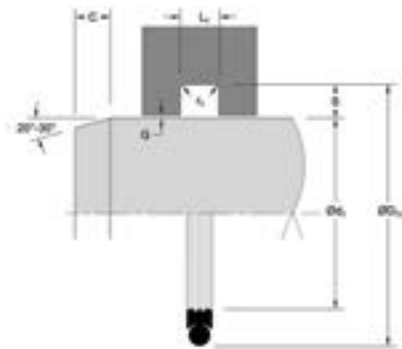
\*Seal ratings are based upon capabilities of its matched material components. Hallite cannot rate seal performance when the seal is mixed with other manufacturers' energizers/components.

MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                                                                                            | FILLER                   | MATERIAL DESIGNATOR | COLOR      | TEMPERATURE RANGE°C | TEMPERATURE RANGE°F | MAXIMUM DYNAMIC PRESSURE - BAR | MAXIMUM DYNAMIC PRESSURE - PSI |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------|------------|---------------------|---------------------|--------------------------------|--------------------------------|
| <b>ARMORLENE® 711</b> <ul style="list-style-type: none"><li>Excellent in all lubricating fluids and pneumatic applications</li><li>High chemical resistance</li><li>Excellent extrusion resistance</li><li>Excellent wear properties</li></ul>                                                                | 25% Carbon/ Graphite     | 711                 | Black      | -73 to 288°C        | -100 to 550°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® HCF</b> <ul style="list-style-type: none"><li>Excellent in lubricating and non-lubricating hydraulic fluids (includes water) w/o zinc content</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul>                           | Carbon Fiber Filled      | HCF                 | Gray/Black | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 psi                       |
| <b>ARMORLENE® HCV</b> <ul style="list-style-type: none"><li>Recommended for lubricating and non-lubricating fluids</li><li>Excellent for high-frequency and short-stroke applications</li><li>Not recommended for gas sealing applications</li><li>Not recommended for electrical conductive fluids</li></ul> | High Carbon Fiber Filled | HCV                 | Gray/Black | -73 to 260°C        | -100 to 500°F       | 300 bar                        | 4350 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.





INSTALLATION RECOMMENDATIONS

| METRIC                           |                               |                       |                      |                |         |                |                            |                   |
|----------------------------------|-------------------------------|-----------------------|----------------------|----------------|---------|----------------|----------------------------|-------------------|
| ROD DIAMETER Ød <sub>1</sub> f8  |                               | GROOVE DIAMETER       | GROOVE WIDTH         | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* | NUMBER OF GROOVES |
| DIAMETER RANGE                   |                               | ØD <sub>1</sub> H9    | L <sub>1</sub> + 0.2 | r <sub>1</sub> | C       | S              | Up to<br>300 bar           |                   |
| Standard Duty<br>Application - R | Light Duty<br>Application - L |                       |                      |                |         |                |                            |                   |
| 6.0 - 18.9                       | 19.0 - 37.9                   | d <sub>1</sub> + 4.9  | 2.2                  | 0.4            | 2.5     | 2.45           | Tol H8/f7                  | 0                 |
| 19.0 - 37.9                      | 38.0 - 199.9                  | d <sub>1</sub> + 7.5  | 3.2                  | 0.6            | 3.5     | 3.75           | Tol H8/f7                  | 1                 |
| 38.0 - 199.9                     | 200.0 - 255.9                 | d <sub>1</sub> + 11.0 | 4.2                  | 1.0            | 4.0     | 5.50           | Tol H8/f7                  | 1                 |
| 200.0 - 255.9                    | 256.0 - 649.9                 | d <sub>1</sub> + 15.5 | 6.3                  | 1.3            | 6.0     | 7.75           | Tol H8/f7                  | 2                 |
| 256.0 - 649.9                    | 650.0 - 999.9                 | d <sub>1</sub> + 21.0 | 8.1                  | 1.8            | 8.0     | 10.50          | Tol H8/f7                  | 2                 |
| 650.0 - 999.9                    | -                             | d <sub>1</sub> + 28.0 | 9.5                  | 2.5            | 10.0    | 14.00          | Tol H8/f7                  | 2                 |

At pressure >300 bar or greater contact Hallite Engineering.  
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

| INCH                             |                               |                        |                       |                |         |                |                            |                   |
|----------------------------------|-------------------------------|------------------------|-----------------------|----------------|---------|----------------|----------------------------|-------------------|
| ROD DIAMETER Ød <sub>1</sub> f8  |                               | GROOVE DIAMETER        | GROOVE WIDTH          | RADIUS         | CHAMFER | GROOVE SECTION | RADIAL CLEARANCE<br>G max* | NUMBER OF GROOVES |
| DIAMETER RANGE                   |                               | ØD <sub>1</sub> H9     | L <sub>1</sub> + .008 | r <sub>1</sub> | C       | S              | Up to<br>4350 psi          |                   |
| Standard Duty<br>Application - R | Light Duty<br>Application - L |                        |                       |                |         |                |                            |                   |
| 1.000 - 1.499                    | 1.500 - 2.999                 | d <sub>1</sub> + 0.193 | 0.087                 | 0.015          | 0.098   | 0.096          | Tol H8/f7                  | 0                 |
| 1.500 - 2.999                    | 3.000 - 5.999                 | d <sub>1</sub> + 0.295 | 0.126                 | 0.015          | 0.138   | 0.147          | Tol H8/f7                  | 1                 |
| 3.000 - 5.999                    | 6.000 - 11.999                | d <sub>1</sub> + 0.433 | 0.165                 | 0.015          | 0.157   | 0.216          | Tol H8/f7                  | 1                 |
| 6.000 - 11.999                   | 12.000 - 20.000               | d <sub>1</sub> + 0.610 | 0.248                 | 0.035          | 0.236   | 0.305          | Tol H8/f7                  | 2                 |
| 12.000 - 20.000                  | -                             | d <sub>1</sub> + 0.827 | 0.319                 | 0.035          | 0.315   | 0.413          | Tol H8/f7                  | 2                 |

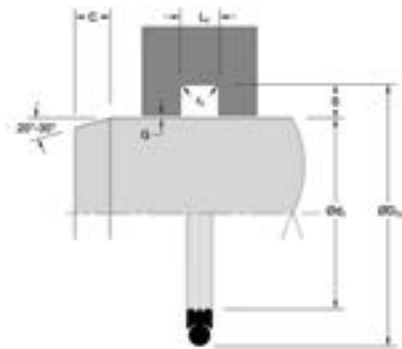
At pressure >4350 psi or greater contact Hallite Engineering.  
\*Radial Clearance G max. = maximum permissible gap all on one side using min. rod diameter and max. clearance diameter.

PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER |                |
|-----------------|-----------------|----------------|-------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |             |                |
| Tol. f8         | Tol. H9         | Tol. +0.2      |             |                |
| 12.0            | 16.9            | 2.2            |             | SSRMR00120**** |
| 14.0            | 18.9            | 2.2            |             | SSRMR00140**** |
| 15.0            | 19.9            | 2.2            |             | SSRMR00150**** |
| 16.0            | 20.9            | 2.2            |             | SSRMR00160**** |
| 18.0            | 22.9            | 2.2            |             | SSRMR00180**** |
| 20.0            | 27.5            | 3.2            |             | SSRMR00200**** |
| 22.0            | 29.5            | 3.2            |             | SSRMR00220**** |
| 25.0            | 32.5            | 3.2            |             | SSRMR00250**** |
| 28.0            | 35.5            | 3.2            |             | SSRMR00280**** |
| 30.0            | 37.5            | 3.2            |             | SSRMR00300**** |
| 32.0            | 39.5            | 3.2            |             | SSRMR00320**** |
| 35.0            | 42.5            | 3.2            |             | SSRMR00350**** |
| 36.0            | 43.5            | 3.2            |             | SSRMR00360**** |
| 40.0            | 51.0            | 4.2            |             | SSRMR00400**** |
| 42.0            | 53.0            | 4.2            |             | SSRMR00420**** |
| 45.0            | 56.0            | 4.2            |             | SSRMR00450**** |
| 48.0            | 59.0            | 4.2            |             | SSRMR00480**** |
| 50.0            | 61.0            | 4.2            |             | SSRMR00500**** |
| 52.0            | 63.0            | 4.2            |             | SSRMR00520**** |
| 55.0            | 66.0            | 4.2            |             | SSRMR00550**** |
| 56.0            | 67.0            | 4.2            |             | SSRMR00560**** |
| 60.0            | 71.0            | 4.2            |             | SSRMR00600**** |
| 63.0            | 74.0            | 4.2            |             | SSRMR00630**** |
| 65.0            | 76.0            | 4.2            |             | SSRMR00650**** |
| 70.0            | 81.0            | 4.2            |             | SSRMR00700**** |
| 75.0            | 86.0            | 4.2            |             | SSRMR00750**** |
| 80.0            | 91.0            | 4.2            |             | SSRMR00800**** |
| 85.0            | 96.0            | 4.2            |             | SSRMR00850**** |

| METRIC          |                 |                | PART NUMBER |                |
|-----------------|-----------------|----------------|-------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |             |                |
| Tol. f8         | Tol. H9         | Tol. +0.2      |             |                |
| 90.0            | 101.0           | 4.2            |             | SSRMR00900**** |
| 95.0            | 106.0           | 4.2            |             | SSRMR00950**** |
| 100.0           | 111.0           | 4.2            |             | SSRMR01000**** |
| 105.0           | 116.0           | 4.2            |             | SSRMR01050**** |
| 110.0           | 121.0           | 4.2            |             | SSRMR01100**** |
| 115.0           | 126.0           | 4.2            |             | SSRMR01150**** |
| 120.0           | 131.0           | 4.2            |             | SSRMR01200**** |
| 125.0           | 136.0           | 4.2            |             | SSRMR01250**** |
| 130.0           | 141.0           | 4.2            |             | SSRMR01300**** |
| 135.0           | 146.0           | 4.2            |             | SSRMR01350**** |
| 140.0           | 151.0           | 4.2            |             | SSRMR01400**** |
| 150.0           | 161.0           | 4.2            |             | SSRMR01500**** |
| 160.0           | 171.0           | 4.2            |             | SSRMR01600**** |
| 170.0           | 181.0           | 4.2            |             | SSRMR01700**** |
| 180.0           | 191.0           | 4.2            |             | SSRMR01800**** |
| 190.0           | 201.0           | 4.2            |             | SSRMR01900**** |
| 200.0           | 215.5           | 6.3            |             | SSRMR02000**** |
| 210.0           | 225.5           | 6.3            |             | SSRMR02100**** |
| 220.0           | 235.5           | 6.3            |             | SSRMR02200**** |
| 230.0           | 245.5           | 6.3            |             | SSRMR02300**** |
| 240.0           | 255.5           | 6.3            |             | SSRMR02400**** |
| 250.0           | 265.5           | 6.3            |             | SSRMR02500**** |
| 280.0           | 301.0           | 8.1            |             | SSRMR02800**** |
| 300.0           | 321.0           | 8.1            |             | SSRMR03000**** |
| 320.0           | 341.0           | 8.1            |             | SSRMR03200**** |
| 350.0           | 371.0           | 8.1            |             | SSRMR03500**** |
| 360.0           | 381.0           | 8.1            |             | SSRMR03600**** |
| 400.0           | 421.0           | 8.1            |             | SSRMR04000**** |





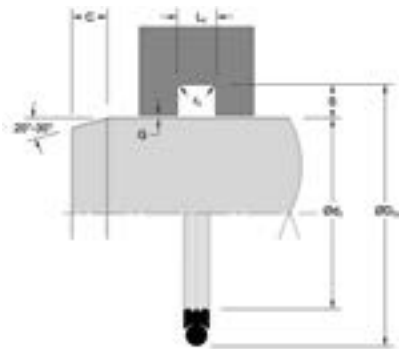
PART NUMBER RANGE (METRIC)\*

| METRIC          |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8         | Tol. H9         | Tol. +0.2      |                |
| 420.0           | 441.0           | 8.1            | SSRMR04200**** |
| 450.0           | 471.0           | 8.1            | SSRMR04500**** |
| 480.0           | 501.0           | 8.1            | SSRMR04800**** |

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

PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8         | Tol. H9         | Tol. +0.008    |                |
| 1.000           | 1.193           | 0.087          | SSRER01000**** |
| 1.125           | 1.318           | 0.087          | SSRER01125**** |
| 1.250           | 1.443           | 0.087          | SSRER01250**** |
| 1.375           | 1.568           | 0.087          | SSRER01375**** |
| 1.500           | 1.795           | 0.126          | SSRER01500**** |
| 1.625           | 1.920           | 0.126          | SSRER01625**** |
| 1.750           | 2.045           | 0.126          | SSRER01750**** |
| 1.875           | 2.170           | 0.126          | SSRER01875**** |
| 2.000           | 2.295           | 0.126          | SSRER02000**** |
| 2.125           | 2.420           | 0.126          | SSRER02125**** |
| 2.250           | 2.545           | 0.126          | SSRER02250**** |
| 2.375           | 2.670           | 0.126          | SSRER02375**** |
| 2.500           | 2.795           | 0.126          | SSRER02500**** |
| 2.625           | 2.920           | 0.126          | SSRER02625**** |
| 2.750           | 3.045           | 0.126          | SSRER02750**** |
| 2.875           | 3.170           | 0.126          | SSRER02875**** |
| 3.000           | 3.433           | 0.165          | SSRER03000**** |
| 3.125           | 3.558           | 0.165          | SSRER03125**** |
| 3.250           | 3.683           | 0.165          | SSRER03250**** |
| 3.375           | 3.808           | 0.165          | SSRER03375**** |
| 3.500           | 3.933           | 0.165          | SSRER03500**** |
| 3.625           | 4.058           | 0.165          | SSRER03625**** |
| 3.750           | 4.183           | 0.165          | SSRER03750**** |
| 3.875           | 4.308           | 0.165          | SSRER03875**** |
| 4.000           | 4.433           | 0.165          | SSRER04000**** |
| 4.125           | 4.558           | 0.165          | SSRER04125**** |
| 4.250           | 4.683           | 0.165          | SSRER04250**** |
| 4.375           | 4.808           | 0.165          | SSRER04375**** |



PART NUMBER RANGE (INCH)\*

| INCH            |                 |                | PART NUMBER    |
|-----------------|-----------------|----------------|----------------|
| Ød <sub>1</sub> | ØD <sub>1</sub> | L <sub>1</sub> |                |
| Tol. f8         | Tol. H9         | Tol. +0.008    |                |
| 4.500           | 4.933           | 0.165          | SSRER04500**** |
| 4.625           | 5.058           | 0.165          | SSRER04625**** |
| 4.750           | 5.183           | 0.165          | SSRER04750**** |
| 4.875           | 5.308           | 0.165          | SSRER04875**** |
| 5.000           | 5.433           | 0.165          | SSRER05000**** |
| 5.125           | 5.558           | 0.165          | SSRER05125**** |
| 5.250           | 5.683           | 0.165          | SSRER05250**** |
| 5.375           | 5.808           | 0.165          | SSRER05375**** |
| 5.500           | 5.933           | 0.165          | SSRER05500**** |
| 5.625           | 6.058           | 0.165          | SSRER05625**** |
| 5.750           | 6.183           | 0.165          | SSRER05750**** |
| 5.875           | 6.308           | 0.165          | SSRER05875**** |
| 6.000           | 6.610           | 0.248          | SSRER06000**** |
| 6.250           | 6.860           | 0.248          | SSRER06250**** |
| 6.500           | 7.110           | 0.248          | SSRER06500**** |
| 6.750           | 7.360           | 0.248          | SSRER06750**** |
| 7.000           | 7.610           | 0.248          | SSRER07000**** |
| 7.250           | 7.860           | 0.248          | SSRER07250**** |
| 7.500           | 8.110           | 0.248          | SSRER07500**** |
| 7.750           | 8.360           | 0.248          | SSRER07750**** |
| 8.000           | 8.610           | 0.248          | SSRER08000**** |
| 8.250           | 8.860           | 0.248          | SSRER08250**** |
| 8.500           | 9.110           | 0.248          | SSRER08500**** |
| 8.750           | 9.360           | 0.248          | SSRER08750**** |
| 9.000           | 9.610           | 0.248          | SSRER09000**** |
| 9.250           | 9.860           | 0.248          | SSRER09250**** |
| 9.500           | 10.110          | 0.248          | SSRER09500**** |
| 9.750           | 10.360          | 0.248          | SSRER09750**** |

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



# OPTISEAL<sup>®</sup>



# OPTISEAL<sup>®</sup>

## HALLITE SPRING-ENERGIZED SYSTEM

### TECHNICAL DETAILS

The OptiSeal<sup>®</sup> system is a high-performance, low-friction, full-spectrum sealing solution. This widely used spring-energized seal offers performance benefits ranging from enhanced media compatibility to superior performance in broad temperature ranges. The basic design consists of a U-shaped jacket made from inert thermoplastic materials specifically selected for the application. The addition of a metal spring actuates the jacket material used in the system, which provides sealing at low system pressures. At higher system pressures, the seal becomes pressure-energized by the fluid media—a sealing combination that ensures adequate sealing throughout the entire pressure range. By coupling the OptiSeal<sup>®</sup> system with other specialty components such as anti-extrusion devices, PakRings, V-Rings, adapters, bushings, and bearings, users can achieve an expanded operational envelope.

With diameters from 0.040in (1mm) to 110in (2.8m), customizable heights and special geometries, the OptiSeal<sup>®</sup> system can be configured to fit in almost any hardware, making it the ideal choice for critical-service sealing.

### F E A T U R E S

- Thermal stability across broad temperature range
- Low coefficient of friction
- Inherent lubricating properties
- Excellent chemical and corrosion capabilities
- Reduced stick-slip
- Unlimited shelf life
- No explosive decompression
- No swelling due to moisture absorption
- Safe for vacuum conditions
- Excellent dielectrical properties
- Sealing across broad pressure range
- Static and dynamic applications
- Flanged and rotating applications

COMMON PTFE JACKET MATERIALS

| COMPOUND | POLYMER | FILLER                  | COLOR      | ABRASIAN RESISTANCE | METAL MATING WEAR | RELATIVE SEALABILITY | RELATIVE EXTRUSION RESISTANCE | MEDIA RESISTANCE     |              |                     |       |       |       | OPERATING TEMPERATURES |               |
|----------|---------|-------------------------|------------|---------------------|-------------------|----------------------|-------------------------------|----------------------|--------------|---------------------|-------|-------|-------|------------------------|---------------|
|          |         |                         |            |                     |                   |                      |                               | NORSOK M710 COMPOUND | HYDROCARBONS | OXYGENATED SOLVENTS | STEAM | ACIDS | BASES |                        |               |
|          |         |                         |            |                     |                   |                      |                               |                      |              |                     |       |       |       | F°                     | C°            |
| 700      | PTFE    | None                    | White      | P                   | L                 | E                    | P                             | Yes                  | E            | E                   | E     | S     | S     | -300 to 400°F          | -184 to 204°C |
| 701      | PTFE    | 25% Glass               | White      | E                   | H                 | G                    | E                             | Yes                  | E            | E                   | E     | S     | S     | -100 to 550°F          | -73 to 288°C  |
| 702      | PTFE    | Glass, MoS <sub>2</sub> | Gray       | E                   | H                 | G                    | G                             | -                    | E            | E                   | E     | S     | S     | -100 to 500°F          | -73 to 260°C  |
| 711      | PTFE    | 25% Carbon/Graphite     | Black      | G                   | M                 | G                    | E                             | Yes                  | E            | E                   | E     | S     | S     | -100 to 550°F          | -73 to 288°C  |
| 777      | MPTFE   | Premium Virgin          | White      | P                   | L                 | E                    | G                             | Yes                  | E            | E                   | E     | S     | S     | -300 to 450°F          | -184 to 232°C |
| HLX      | PTFE    | Special Bronze          | Gold       | G                   | M                 | G                    | G                             | -                    | E            | E                   | E     | S     | S     | -100 to 550°F          | -73 to 288°C  |
| HCF      | PTFE    | Carbon Fiber            | Gray/Black | G                   | M                 | G                    | G                             | -                    | E            | E                   | E     | S     | S     | -100 to 500°F          | -73 to 260°C  |

KEY

E = Excellent  
G = Good  
P = Poor

H = High  
M = Medium  
L = Low

NR = Not Recommended  
W = Resistant to weak acid/base  
S = Resistant to strong acid/base

Conditions shown are approximate. Actual operating conditions are contingent upon media, pressure, and design factors as well as polymer types. Testing in your assembly is always recommended, especially when applications approach or exceed the conditions shown above.



SPECIALTY JACKET MATERIALS

| Compound    | Polymer | Filler                        | Color       | Abrasion Resistance | Metal Mating Wear | Relative Sealability | Relative Extrusion Resistance | Media Resistance     |              |                     |       |       |       | Operating Temperatures |               |
|-------------|---------|-------------------------------|-------------|---------------------|-------------------|----------------------|-------------------------------|----------------------|--------------|---------------------|-------|-------|-------|------------------------|---------------|
|             |         |                               |             |                     |                   |                      |                               | NORSOK M710 Compound | Hydrocarbons | Oxygenated Solvents | Steam | Acids | Bases |                        |               |
|             |         |                               |             |                     |                   |                      |                               |                      |              |                     |       |       |       | F°                     | C°            |
| 703         | PTFE    | PPS, Carbon, MoS <sub>2</sub> | Black       | E                   | M                 | G                    | E                             | -                    | E            | E                   | E     | S     | S     | -100 to 550°F          | -73 to 288°C  |
| 712         | PTFE    | 5% MoS <sub>2</sub>           | Gray        | A                   | L                 | E                    | A                             | -                    | E            | E                   | E     | S     | S     | -200 to 450°F          | -129 to 232°C |
| 716         | PTFE    | 15% Graphite                  | Black       | A                   | M                 | E                    | G                             | Yes                  | E            | E                   | E     | S     | S     | -100 to 500°F          | -73 to 260°C  |
| 720         | PTFE    | 2% Carbon                     | Black       | A                   | L                 | E                    | A                             | -                    | E            | E                   | E     | S     | S     | -200 to 500°F          | -129 to 260°C |
| 733         | PTFE    | 15% Carbon/Graphite           | Black       | G                   | M                 | G                    | G                             | -                    | E            | E                   | E     | S     | S     | -100 to 500°F          | -73 to 260°C  |
| 734         | PTFE    | 10% Carbon/Graphite           | Black       | G                   | M                 | G                    | G                             | -                    | E            | E                   | E     | S     | S     | -100 to 500°F          | -73 to 260°C  |
| 780         | PTFE    | None                          | Turquoise   | A                   | L                 | E                    | A                             | -                    | E            | E                   | E     | S     | S     | -300 to 450°F          | -184 to 232°C |
| 728         | ACETAL  | None                          | Black       | A                   | M                 | A                    | G                             | -                    | E            | E                   | E     | W     | W     | -70 to 300°F           | -56 to 149°C  |
| Arylex™ 745 | PEEK    | None                          | Beige       | A                   | M                 | G                    | G                             | Yes                  | E            | E                   | E     | S     | S     | -70 to 500°F           | -56 to 260°C  |
| 748         | UHMWPE  | None                          | Translucent | E                   | L                 | E                    | G                             | -                    | E            | E                   | E     | S     | S     | -300 to 180°F          | -184 to 82°C  |
| HLA         | PTFE    | Mineral                       | White       | G                   | M                 | G                    | G                             | -                    | E            | E                   | E     | W     | S     | -100 to 500°F          | -73 to 260°C  |
| HCV         | PTFE    | Carbon Fiber                  | Gray/Black  | G                   | M                 | G                    | G                             | -                    | E            | E                   | E     | S     | S     | -100 to 500°F          | -73 to 260°C  |
| 7HP         | UHMWPE  | None                          | Translucent | E                   | L                 | E                    | G                             | -                    | E            | E                   | E     | S     | S     | -22 to 275°F           | -30 to 135°C  |

KEY

E = Excellent  
G = Good  
A = Average  
P = Poor

H = High  
M = Medium  
L = Low

NR = Not Recommended  
W = Resistant to weak acid/base  
S = Resistant to strong acid/base

Conditions shown are approximate. Actual operating conditions are contingent upon media, pressure, and design factors as well as polymer types. Testing in your assembly is always recommended, especially when applications approach or exceed the conditions shown above.

FILLERS

To enhance performance capabilities, a range of fillers and additives can be added to materials. Reinforcing fibers, conductive fillers, and colorants are among the additives available.

COMMON FILLERS

|                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Glass Fibers</b><br>The most common filler. Minor effect on electrical properties. Increased abrasion on mating metal surfaces.     |
| <b>Carbon/Carbon Fibers</b><br>Low abrasion and wear. Good deformation and extrusion resistance.                                       |
| <b>Graphite</b><br>Non-abrasive. Low friction. Minor effect on deformation properties.                                                 |
| <b>MoS<sub>2</sub></b><br>Lowers break-in wear and starting friction.                                                                  |
| <b>Bronze</b><br>Very high wear resistance and load-bearing capability. Poor chemical resistance.                                      |
| <b>Stainless Steel</b><br>High wear resistance and load-bearing capability. Wider chemical resistance than bronze.                     |
| <b>PPS</b><br>Low wear and abrasion. Excellent deformation and extrusion resistance. Large reduction in tensile and elongation values. |
| <b>CAF<sub>2</sub></b><br>Hydrofluoric acid service.                                                                                   |
| <b>Mineral</b><br>Properties similar to glass, but less abrasive.                                                                      |

While maintaining its inherent properties and characteristics in material compounds, PTFE can benefit from the improved mechanical strength, stability, and wear resistance provided by an additive. The various mechanical properties of PTFE can be enhanced by adding a range of fillers, including glass fiber, carbon, and bronze.

| FILLERS AND THEIR<br>RELATIVE EFFECTS ON PTFE | WEAR<br>RESISTANCE | FRICTION | CREEP<br>RESISTANCE | THERMAL<br>CONDUCTIVITY | METAL<br>MATING<br>WEAR | ELECTRICAL<br>RESISTANCE |
|-----------------------------------------------|--------------------|----------|---------------------|-------------------------|-------------------------|--------------------------|
| GLASS FIBERS                                  | ▲▲▲                | ▲▲       | ▲▲                  | ▲                       | ▲▲▲                     | ▲                        |
| CARBON                                        | ▲▲▲                | ▲        | ▲▲▲                 | ▲▲                      | ▲                       | ▼                        |
| GRAPHITE                                      | ▲▲                 | ◆        | ▲▲                  | ▲▲                      | ◆                       | ▼▼                       |
| MoS <sub>2</sub>                              | ▲                  | ◆        | ◆                   | ▲                       | ◆                       | ▼                        |
| BRONZE                                        | ▲▲▲                | ▲▲       | ▲▲                  | ▲▲▲                     | ▲                       | ▼▼                       |
| CARBON FIBERS                                 | ▲▲▲                | ▲        | ▲▲                  | ▲▲                      | ▲                       | ▼                        |
| MINERAL                                       | ▲▲▲                | ▲▲       | ▲▲                  | ▲▲                      | ▲▲                      | ◆                        |
| STAINLESS STEEL                               | ▲▲▲                | ▲▲       | ▲▲                  | ▲▲▲                     | ▲▲                      | ▼▼                       |
| HIGH-TEMPERATURE POLYMERS                     | ▲▲▲                | ▲        | ▲▲▲                 | ◆                       | ◆                       | ◆                        |

KEY

◆ = No Effect

▲ = Slight Increase

▲▲ = Moderate Increase

▲▲▲ = Significant Increase

▼ = Slight Decrease

▼▼ = Moderate Decrease

▼▼▼ = Significant Decrease

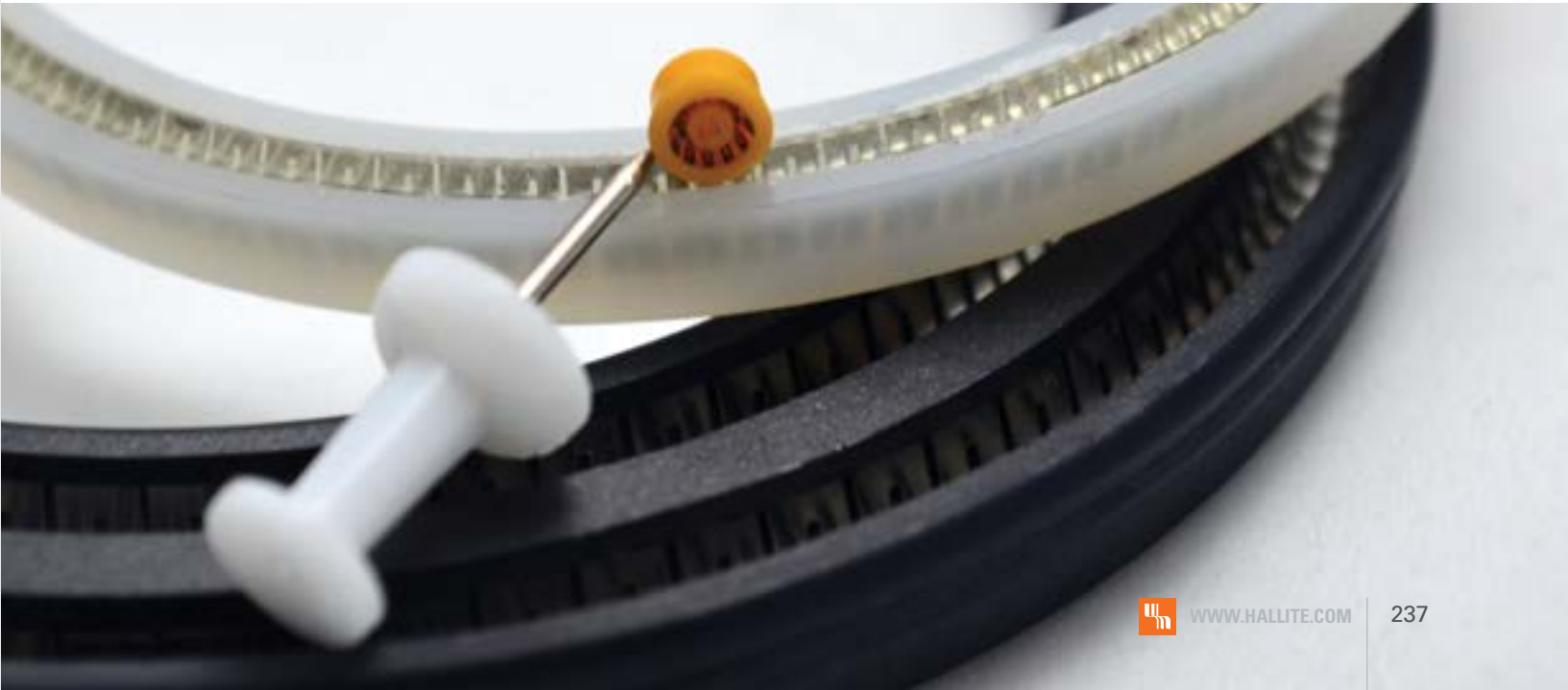


JACKET MATERIAL SUGGESTIONS

The Hallite material portfolio contains additional compounds that are not mentioned in this listing. Our specialists can work with you to provide the ideal engineering solution for your specific needs. If your application requires a custom compound or material that is not listed, visit [Hallite.com](https://www.hallite.com) to submit your inquiry, or submit an inquiry at [sales@hallite.com](mailto:sales@hallite.com), or contact your Hallite representative.

| APPLICATIONS                                                                                                    | STATIC                   |                   |                          |                   |               |                   |               |                   |                   |              |               |                   |                                 |              |                   |
|-----------------------------------------------------------------------------------------------------------------|--------------------------|-------------------|--------------------------|-------------------|---------------|-------------------|---------------|-------------------|-------------------|--------------|---------------|-------------------|---------------------------------|--------------|-------------------|
|                                                                                                                 | LOW PRESSURE             | MEDIUM PRESSURE   | HIGH PRESSURE            | ROTATING          |               |                   |               | OSCILLATING       |                   |              |               | RECIPROCATING     |                                 |              |                   |
|                                                                                                                 |                          |                   |                          | LOW SPEED         |               | HIGH SPEED        |               | LOW SPEED         |                   | HIGH SPEED   |               | LOW SPEED         |                                 | HIGH SPEED   |                   |
|                                                                                                                 |                          |                   |                          | LOW PRESSURE      | HIGH PRESSURE | LOW PRESSURE      | HIGH PRESSURE | LOW PRESSURE      | HIGH PRESSURE     | LOW PRESSURE | HIGH PRESSURE | LOW PRESSURE      | HIGH PRESSURE                   | LOW PRESSURE | HIGH PRESSURE     |
| <b>Hydrocarbon Oils and Lubrication</b><br>Typically fuels and lubricants of petroleum-based products           | 700                      | 777<br>711        | 703<br>745<br>701        | 716<br>720<br>780 | HLX<br>HCF    | 755<br>HCF        | HLX<br>HCF    | 716<br>720<br>780 | HLX<br>HCF<br>711 | HCF<br>755   | HLX<br>HCF    | 780<br>720<br>712 | HLX<br>702<br>7HP<br>711<br>748 | HLX<br>711   | HLX<br>7HP<br>748 |
| <b>Pneumatic and Gases</b><br>Primarily for air and other gases                                                 | 700<br>777<br>7HP<br>748 | 777<br>7HP<br>748 | 777<br>7HP<br>745<br>748 | 780<br>777        | 755<br>HCF    | 711<br>755<br>HCF | HCF<br>756    | 780<br>777        | 755<br>HCF        | HCF<br>755   | HCF<br>756    | 780<br>777        | 7HP<br>777<br>PS3<br>748        | 711<br>HCF   | HLX<br>711        |
| <b>Chemical Processing</b><br>Typical service includes the handling and dispensing of acidic and basic products | 700<br>711               | 777<br>7HP<br>748 | 703<br>745<br>701        | 716<br>720        | HCF<br>711    | 755<br>HCF        | 711<br>703    | 716<br>720<br>712 | HCF<br>711        | HCF<br>755   | 711<br>703    | 720<br>712        | 7HP<br>711<br>748               | 711<br>703   | 7HP<br>703<br>748 |

Conditions shown are approximate. Actual operating conditions are contingent upon media, pressure, and design factors as well as polymer types. Testing in your assembly is always recommended, especially when applications approach or exceed the conditions shown above.



## SPRING TYPES

The addition of a metal spring or elastomer actuates the jacket material used in the system. Upon seal installation, the spring energizer responds with an outward force, thereby energizing the jacket material and providing positive sealing. Characteristics such as load value, deflection range, and corrosion resistance are among the primary spring factors that affect seal performance in a given application.



### V-SPRING

The most versatile of all the spring types, the V-Spring design is suited for use in a wide range of applications and services, from static applications to those with rotary or reciprocating motion. The materials used in this design option enhance sealing performance without degradation of material properties. Available in our internal and external pressure face seal design, the V-Spring energizer features a wide deflection range and can be designed with medium or heavy spring loads. This spring is a good choice for glands with wide tolerance variations.



### FLAT BAND HELICAL

For applications with less dynamic operating conditions, the flat band helical spring design is an ideal choice because of its small deflection range. The high unit load of this spring-energized design makes it the optimal solution for static applications where wear and friction are not great concerns. In addition, it is the preferred design for cryogenic services.



### CANTED COIL

This spring offers light constant loading over a wide deflection range, reducing frictional drag and seal wear. Typically, applications include measurement and instrumentation, high-speed/low pressure, and single-seal applications.



### J-SPRING

The J-spring has been designed to allow for high flexibility while also providing high loads. Primarily used in large rotating equipment such as FPSO swivels, the J-spring allows for a more robust, heavy cross-section design that can withstand the extremes of high pressure in applications for decades.



### FULL CONTACT SPRING

This heavy-duty spring provides a constant ultra high load over the entire sealing lip. Available in either internal or external face seal configurations, this spring provides the high sealing loads needed for cryogenic fluids, tight gas sealing, and ultra-high vacuum applications.

## SPRING MATERIALS

| MATERIAL               | APPLICATION DESCRIPTION      | MEDIA RESISTANCE |                     |       |       |       | OPERATING TEMPERATURES |               | SPRING TYPE |         |
|------------------------|------------------------------|------------------|---------------------|-------|-------|-------|------------------------|---------------|-------------|---------|
|                        |                              | HYDROCARBONS     | OXYGENATED SOLVENTS | STEAM | ACIDS | BASES |                        |               |             |         |
|                        |                              |                  |                     |       |       |       | F°                     | C°            | V           | HELICAL |
| 301 Stainless Steel*   | General Service Hydraulics   | E                | E                   | E     | W     | S     | -300 to 400°F          | -184 to 204°C | Yes         | Yes     |
| Elgiloy Alloy          | Harsh Service, NACE MR-01-75 | E                | E                   | E     | S     | S     | -300 to 800°F          | -184 to 427°C | Yes         | Yes     |
| 301 SS/Silicone Filled | Food and Pharmaceuticals     | P                | E                   | E     | W     | W     | -300 to 400°F          | -184 to 204°C | Yes         | No      |
| Hastalloy              |                              | E                | E                   | E     | S     | S     | -300 to 800°F          | -184 to 427°C | No          | Yes     |

**KEY**  
E = Excellent  
P = Poor  
W = Resistant to weak acid/base  
S = Resistant to strong acid/base

*\*Certain applications require higher grades of stainless steel; grades such as 300, 304/316 are available.*



V-SPRING LIP PROFILES

Seal characteristics such as sealability, wear, and friction are greatly affected by lip-profile construction and seal geometry. In addition to our standard forms, lip profiles can be customized for specific gland configurations such as highly abrasive environments and rough surface finishes.



S LIP DOUBLE RADIUS LIP

The S lip is the standard lip profile design. It offers redundant sealing surfaces with radiused contact areas for medium unit loading. This design feature provides the best combination of wear and sealability, making the S lip suitable for the widest range of applications.

SEALABILITY = Medium   WEAR = Medium   FRICTION = Medium



A LIP SINGLE RADIUS LIP

The A lip employs a large radius, and therefore low unit loading, resulting in low friction and low wear. This lip profile is recommended for applications with high surface speeds or those that require low friction. The profile also facilitates installation in glands with insufficient lead-in chamfers.

SEALABILITY = Low   WEAR = Low   FRICTION = Low



B LIP BEVEL LIP

The B lip profile produces the highest unit loading of all of the lip profiles offered by Hallite. The B lip is recommended for use in static applications and is required when the OptiSeal® component diameter is less than 3/16" (4.7mm).

SEALABILITY = High   WEAR = High   FRICTION = High



C LIP FLAT LIP

The C lip provides a flat sealing surface which allows for a constant wear rate over the life of the seal, making it ideal for rotary applications where extending seal life is the primary goal.

SEALABILITY = High   WEAR = High   FRICTION = High



D LIP SCRAPER LIP

The D lip profile's low unit loading characteristics offer long wear, with somewhat less effective sealing than higher unit loaded seals. This design is particularly well-suited for reciprocating applications.

SEALABILITY = Medium   WEAR = Low   FRICTION = Medium



E LIP RADIUS END LIP

The E lip profile is a radiused lip profile similar to the S lip, but with a single point of contact. This lip profile generates the lowest friction of any V-Spring Optiseal® and has extremely high sealability. This lip is best suited for static sealing applications and light oscillating applications where tight sealing is required.

SEALABILITY = Medium   WEAR = Low   FRICTION = Medium



F LIP DUAL SCRAPER LIP

The F lip features a profile suitable for systems contaminated with abrasives. Lower unit loadings offer extended seal life in rotary applications.

SEALABILITY = Medium   WEAR = Medium   FRICTION = Low



J LIP SCRAPER RADIUS LIP

The J lip also has redundant sealing surfaces, with the sharp front edge protecting the secondary, radiused surface from abrasive media. Besides use in scraping applications, this lip is also used with step-cut glands and is the preferred profile for use with high-viscosity media.

SEALABILITY = Medium   WEAR = Medium   FRICTION = Medium

V-SPRING PROFILE USAGE GUIDE

| PROFILE & CODE   |  S |  A |  B |  C |  D |  E |  F |  J |
|------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| RECIPROCATING    | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             |
| ROTATING         | Preferred                                                                             | Preferred                                                                             | Neutral                                                                               | Preferred                                                                             | Neutral                                                                               | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             |
| STATIC           | Preferred                                                                             | Neutral                                                                               | Preferred                                                                             | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               |
| OSCILLATING      | Preferred                                                                             | Preferred                                                                             | Neutral                                                                               | Preferred                                                                             | Neutral                                                                               | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             |
| HIGH SEALABILITY | Preferred                                                                             | Neutral                                                                               | Preferred                                                                             | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               |
| EXCLUSION        | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             |
| LOW-FRICTION     | Neutral                                                                               | Preferred                                                                             | Neutral                                                                               | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             | Neutral                                                                               | Neutral                                                                               |
| STEP GLAND       | Do Not Use                                                                            | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             |
| <3/16" ID        | Do Not Use                                                                            | Do Not Use                                                                            | Preferred                                                                             | Do Not Use                                                                            | Preferred                                                                             | Preferred                                                                             | Do Not Use                                                                            | Do Not Use                                                                            |



LIP PROFILES

Seal characteristics such as sealability, wear, and friction are greatly affected by lip-profile construction and seal geometry. In addition to our standard forms, lip profiles can be customized for specific gland configurations such as highly abrasive environments and rough surface finishes.



**K LIP SINGLE RADIUS LIP**

The K lip is similar to the A lip for V-Springs but designed for circular springs in mind. The radiused lip profile provides low unit loading which results in low friction. The radius also allows for easy installation in glands with insufficient lead-in chamfers. Typical applications include high-speed rotary, gas sealing, and cryogenics.

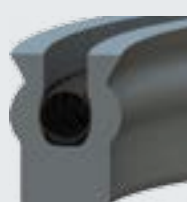
**SEALABILITY = Medium   WEAR = Medium   FRICTION = Medium**



**L LIP SINGLE RADIUS LIP FOR BACK PRESSURE**

The L lip is designed for applications where a single seal is desired and significant back pressure will be seen. The extended lips of this seal protect the sealing surfaces from damage as pressure is reversed. Radial slots through the lips allow pressure to re-energize the seal once normal pressure is restored, preventing fluid blow-by.

**SEALABILITY = Low   WEAR = Low   FRICTION = Low**



**M LIP SCRAPER RADIUS LIP**

The M lip is similar in function to the J lip but designed for use with circular springs. The scraper lip helps to protect the radius lip from damage by abrasive media and acts as a redundant sealing surface. Additionally, the scraper portion of the lip allows this seal to be installed in step cut glands.

**SEALABILITY = High   WEAR = High   FRICTION = High**



**N LIP POINT CONTACT LIP**

The N lip profile features a pointed contact surface, ensuring minimal contact area and maximum unit loading. This profile, when used in conjunction with a helical coil spring, allows for tight sealing of gas and low-viscosity liquids in static applications.

**SEALABILITY = Medium   WEAR = Low   FRICTION = Medium**



**P LIP SUPPORTED HEEL FLAT LIP**

The P lip utilizes a flat sealing surface, allowing for a constant wear rate over the life of the seal. The high load spring is ideal for heavy cross-section geometries used in large rotating equipment. The heel support ensures that seals made from softer materials like PTFE remain parallel to gland walls without distortion.

**SEALABILITY = Medium   WEAR = Medium   FRICTION = Low**

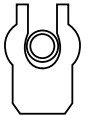
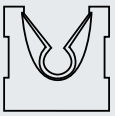
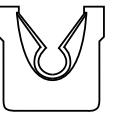


**R LIP FLAT LIP**

The R lip is similar to the P lip, but does not have the additional heel support. This geometry is ideal when used with more rigid materials like UHMW-PE. Additionally, the lack of heel support makes this geometry lower friction than the P lip.

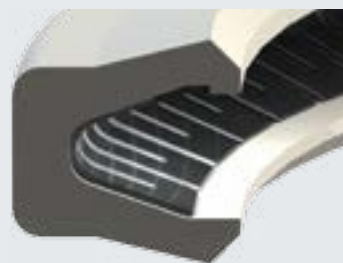
**SEALABILITY = Medium   WEAR = Medium   FRICTION = Medium**

LIP PROFILE USAGE GUIDE

| PROFILE & CODE   |  K |  L |  M |  N |  P |  R |
|------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| RECIPROCATING    | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             |
| ROTATING         | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             |
| STATIC           | Preferred                                                                             | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             |
| OSCILLATING      | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Neutral                                                                               | Preferred                                                                             | Preferred                                                                             |
| HIGH SEALABILITY | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Preferred                                                                             | Neutral                                                                               | Neutral                                                                               |
| EXCLUSION        | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               |
| LOW-FRICTION     | Preferred                                                                             | Preferred                                                                             | Preferred                                                                             | Neutral                                                                               | Neutral                                                                               | Neutral                                                                               |
| STEP GLAND       | Neutral                                                                               | Neutral                                                                               | Preferred                                                                             | Do Not Use                                                                            | Neutral                                                                               | Neutral                                                                               |
| <3/16" ID        | Do Not Use                                                                            | Do Not Use                                                                            | Do Not Use                                                                            | Preferred                                                                             | Do Not Use                                                                            | Do Not Use                                                                            |

## SPECIALITY TYPES

Components based on the basic seal design can be further customized to provide sealing performance that is application- and industry-specific. Our engineering team is able to incorporate a variety of shapes and geometries to optimize seal performance and versatility.



### OPTIFACE™ SEAL

OptiFace seals are used in static seal applications and feature an axial squeeze design offered for either external or internal pressure. As compression against the seal is increased, the lips of the jacket are pressed against the gland surface, providing resistance and sealability while ensuring stability within the gland. The beveled lip featured in this design provides excellent sealability in applications that require high unit loading. The internal or external preload is based on the application. For components such as flanges and swivel joints, the design is configured for internal pressure. In sealing vacuum applications, the design can be configured for external pressure.



### FLANGED OPTISEAL® COMPONENT

Best suited for rotary applications, this seal is designed to prevent seal movement on the static gland surface. The clamped flange prevents seal movement and blocks potential leak paths. In cryogenic applications, the clamped flange also reduces the thermal contraction of the seal OD away from the gland.



### OPTI-OIL™ SEAL

The Opti-Oil seal is the ideal choice for low-pressure, dynamic shaft seals. The outer diameter of this configuration is tightly sealed with an O-ring, reducing slippage on the static surface in rotary applications. The inner diameter contact surface of this seal features a low-friction, spring-loaded jacket, enabling adequate sealing along the surface of the shaft.



### A6R OPTISEAL®

When tight shutoff is required and space is limited, the A6R Optiseal® outperforms PTFE seals. This hybrid elastomer/PTFE seal couples the high sealing capabilities of elastomers with the low-friction characteristics of PTFE. The PTFE ID limits the amount of elastomer contact on the running surface, resulting in significantly lower friction.

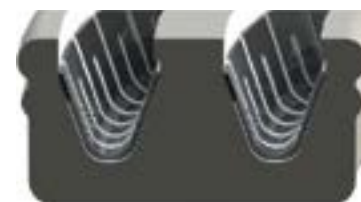
## CUSTOM SEAL CHARACTERISTICS

In addition to jacket and material customization, the standard OptiSeal® design can be further customized based on the service conditions of the individual application, enabling it to perform in a wide range of services and applications.



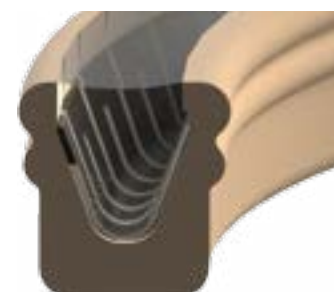
### NESTED SPRINGS OPTISEAL®

Multiple or nested springs are used when greater sealing force is required, such as in low-pressure or low-temperature applications. This design is able to increase the force exerted by the sealing lips without increasing the lip interference. Examples of such applications are valve stems, choke seals, and low-pressure systems.



### LARGE CROSS SECTION OPTISEAL®

In larger diameter applications where existing glands have radial cross sections greater than 0.600" (15.2mm) or have limited axial lengths, two springs may be radially spaced. Dual springs are also used when retrofitting existing glands where the axial gland length is less than the radial gland cross section. This allows the sealing system to be employed in cross sections that are greater than 1" (25.4mm).



### SILICONE-FILLED CAVITY OPTISEAL®

In sanitary applications, the spring cavity of the OptiSeal® system can feature a silicone filling to effectively protect against contamination. This configuration prevents media from becoming trapped in the cavity, enabling excess media to be completely flushed out if necessary.

ADDITIONAL CUSTOM DESIGNS



BIDIRECTIONAL SPRING-ENERGIZED  
FLOATING PISTON SEAL



FLANGED SEAL WITH INTERNAL  
SPRING ENERGIZER

OptiSeal® design principles can be applied to a variety of custom configurations. For custom seal geometries, please contact your Hallite representative.

BACK-UP RINGS/ANTI-EXTRUSION DEVICES

BACK-UP AND ADAPTER MATERIAL SELECTION

The materials and compounds selected in a seal’s design will differ in their ability to resist seal extrusion once installed in a given application. The effects that temperature, pressure, and media have on the compound used are key considerations. When determining whether or not a sealing system requires the use of a back-up ring or anti-extrusion device, the magnitude of pressure a seal must contain and the clearance gap should be considered. The properties of the jacket materials used in the seal design provide varying levels of resistance to seal extrusion in a given application.

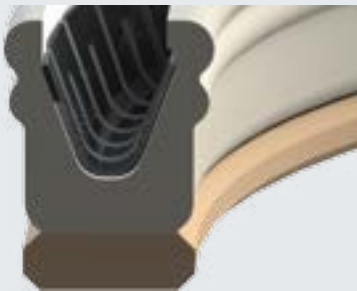


| FDA APPROVED | COMPOUND    | POLYMER | FILLER | COLOR       | ABRASIAN RESISTANCE | METAL MATING WEAR | RELATIVE SEALABILITY | RELATIVE EXTRUSION RESISTANCE | MEDIA RESISTANCE |                     |       |       |       | OPERATING TEMPERATURE |              |
|--------------|-------------|---------|--------|-------------|---------------------|-------------------|----------------------|-------------------------------|------------------|---------------------|-------|-------|-------|-----------------------|--------------|
|              |             |         |        |             |                     |                   |                      |                               | HYDROCARBONS     | OXYGENATED SOLVENTS | STEAM | ACIDS | BASES |                       |              |
| Yes          | 728         | ACETAL  | None   | Black       | A                   | M                 | A                    | G                             | E                | G                   | G     | W     | W     | -70 to 300°F          | -56 to 149°C |
| No           | 744         | PPS     | Glass  | Grey        | G                   | H                 | P                    | E                             | E                | E                   | E     | S     | S     | -70 to 500°F          | -56 to 260°C |
| Yes          | Arylex™ 745 | PEEK    | None   | Beige       | A                   | M                 | G                    | G                             | E                | E                   | E     | S     | S     | -70 to 500°F          | -56 to 260°C |
| No           | Arylex™ 747 | PEEK    | Glass  | Beige       | G                   | H                 | P                    | E                             | E                | E                   | E     | S     | S     | -70 to 550°F          | -56 to 288°C |
| Yes          | 748         | UHMWPE  | None   | Translucent | E                   | L                 | E                    | G                             | G                | G                   | P     | S     | S     | -300 to 180°F         | -184 to 82°C |
| No           | Arylex™ 754 | PEEK    | Carbon | Black       | G                   | H                 | P                    | E                             | E                | E                   | E     | S     | S     | -70 to 550°F          | -56 to 288°C |

**KEY**  
E = Excellent    H = High    NR = Not Recommended  
G = Good        M = Medium    W = Resistant to weak acid/base  
A = Average      L = Low        S = Resistant to strong acid/base  
P = Poor

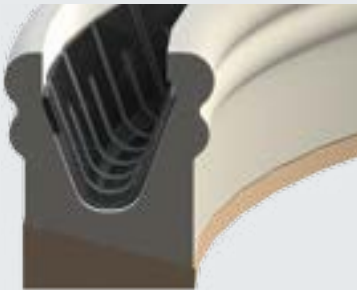
## BACK-UP RING DESIGN OPTIONS

When back-up or auxiliary devices are required, Hallite can provide a range of components that prevent seal extrusion. Several geometries are used for anti-extrusion devices that allow the extrusion-resistant material to move into the clearance gap quickly and efficiently. Constructed from materials that are stronger than the seal jacket, the back-up ring blocks extrusion paths, allowing for maximum seal life in high-temperature and high-pressure applications.



### OPTIBACK™ COMPONENT

The standard back-up ring offered by Hallite features a close-tolerance rectangular OptiBack design. The chamfered edges on the OptiBack ring aid in installation.



### DELTA BACK-UP RING

The Delta Back-Up uses system pressure to prevent seal extrusion when using the OptiSeal® system. The force induced by the system pressure will cause the Delta Back-Up to move into the extrusion gap and close it off.



### INTEGRAL BACK-UP RING

The Integral Back-Up is placed at the corner of the seal where the extrusion gap is located. This configuration is ideal when the axial gland length is so short as to prevent the use of a standard back-up. Its snap-in feature also eliminates loose components, thereby providing easier installation.

## GLAND DESIGN OPTIONS



### STEP-CUT GLAND

This modification of the one-piece gland minimizes the deformation of the OptiSeal® jacket during installation and eliminates the need for a separate retaining piece. Dimensions for step-cut glands are available upon request.



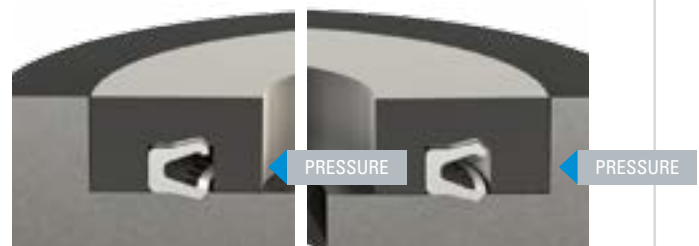
### TWO-PIECE GLAND

The two-piece gland eliminates deformation during installation and is required for small-diameter or large cross-section designs. In reciprocating applications, the gland must be carefully designed, or a PakRing must be used to prevent the sealing lips from shifting on to the installation bevel.



### ONE-PIECE GLAND

The one-piece gland is used only for OptiSeal® systems with larger diameters or small cross sections to prevent damage from stretching or buckling during installation. Please consult Hallite for installation tools and instruction before installing OptiSeal® components into this gland configuration.



### FACE SEAL GLAND

Face seal gland design and seal design are different from the design of radial seals. Gland recommendations are available from Hallite for individual applications, or OptiFace seals may be proposed based upon existing gland dimensions.

GLAND RECOMMENDATIONS: OPTIGLAND

Larger gland diameters require greater tolerances to manufacture at reasonable and comparable costs. OptiSeal® components have a “designed-in” squeeze on the cross section, but manufacturing tolerances determine the minimum and maximum. If the minimum squeeze is too small, the seal can tolerate less wear before it fails. If the maximum squeeze is too large, the friction and wear will be unacceptable.

The Hallite OptiGland system of gland dimension recommendations is centered around the active gland diameter (the bore diameter for piston seals and the rod diameter for rod seals) and takes into account manufacturing capabilities, wear and friction concern, extrusion gaps, and expenses incurred during manufacturing. The OptiGland system calculates the optimal cross-section for a given active gland diameter or, working backwards, the optimal active diameter for a given cross section, giving consideration to the rationale of tolerance selection.

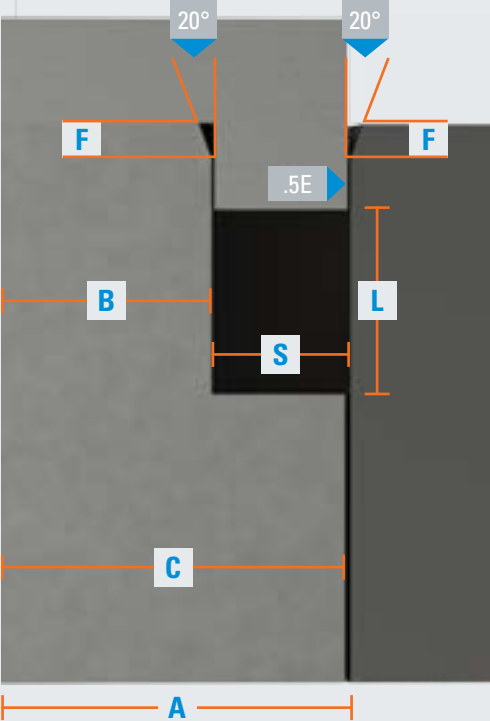
The result is a set of gland dimensions that balances the best seal performance and longevity with the lowest manufacturing costs required for that gland. The processes and examples below demonstrate how to effectively use OptiGland measurements.

PISTON SEALS: 8-STEP PROCESS

| A                     | S                           | B                         | L                          | F                                 | E                     | C                        |
|-----------------------|-----------------------------|---------------------------|----------------------------|-----------------------------------|-----------------------|--------------------------|
| Active gland diameter | Minimum gland cross section | Non-active gland diameter | Minimum axial gland length | Minimum installation bevel length | Diametrical clearance | Gland clearance diameter |

- Step 1: Determine the active gland diameter. For piston seals, “A” equals the bore diameter and is the minimum gland OD.
- Step 2: Determine the minimum gland cross section. This value is based on A and can be found in the Gland Dimension Examples tables on the following pages.
- Step 3: Determine the non-active gland diameter. For piston seals, “B” equals A-2S and is the maximum gland ID.
- Step 4: Determine tolerances for gland diameters. Tolerances are given in the Gland Dimension Examples tables on the following pages, dependent only upon cross section in order to control seal squeeze.
- Step 5: Determine the minimum axial gland length. For pressures less than 10,000 psi (690 bar), use the value L<sub>1</sub>. Value L<sub>2</sub> accommodates the addition of an OptiBack back-up ring and can be used for pressure above 10,000 psi (690 bar) up to 17,000 psi (1,172 bar). For pressures above 17,000 psi (1,172 bar), please consult Hallite. The tolerance for both L<sub>1</sub> and L<sub>2</sub> is 0.010in (0.25mm).
- Step 6: Determine the minimum installation bevel length. This value is also given in the Gland Dimension Examples tables on the following pages, according to the cross section.
- Step 7: Determine the minimum and maximum diametrical clearance. These values are shown in the table. The minimum diametrical clearance will be used to calculate “C” —the gland clearance diameter.
- Step 8: Determine the gland clearance diameter and tolerance. For piston seals, C equals A-E minimum and is the maximum clearance diameter. Shaft and hole tolerances can be applied to these values using the table.

DIAGRAM 1  
PISTON SEAL RECOMMENDATION

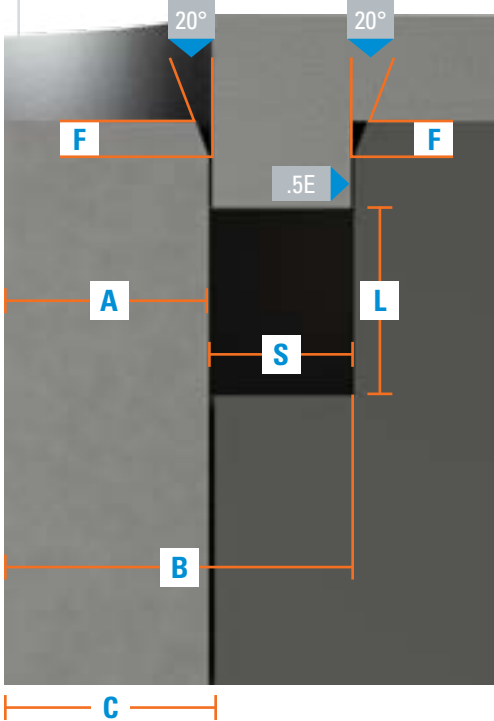


ROD SEALS: 8-STEP PROCESS

| A                     | S                           | B                         | L                          | F                                 | E                     | C                        |
|-----------------------|-----------------------------|---------------------------|----------------------------|-----------------------------------|-----------------------|--------------------------|
| Active gland diameter | Minimum gland cross section | Non-active gland diameter | Minimum axial gland length | Minimum installation bevel length | Diametrical clearance | Gland clearance diameter |

- Step 1: Determine the active gland diameter. For rod seals, “A” equals the rod diameter and is the maximum gland ID.
- Step 2: Determine the minimum gland cross section. This value is based on A and can be found in the Gland Dimension Examples tables on the following pages.
- Step 3: Determine the non-active gland diameter. For rod seals, “B” equals A+2S and is the minimum gland ØD.
- Step 4: Determine tolerances for gland diameters. Tolerances are given in the Gland Dimension Examples tables on the following pages, dependent only upon cross section in order to control seal squeeze.
- Step 5: Determine the minimum axial gland length. For pressures less than 10,000 psi (690 bar), use the value L<sub>1</sub>. Value L<sub>2</sub> accommodates the addition of an OptiBack back-up ring and can be used for pressure above 10,000 psi (690 bar) up to 17,000 psi (1,172 bar). For pressures above 17,000 (1,172 bar), please consult Hallite. The tolerance for both L<sub>1</sub> and L<sub>2</sub> is 0.010in (0.25mm).
- Step 6: Determine the minimum installation bevel length. This value is also given in the Gland Dimension Examples tables on the following pages, according to the cross section.
- Step 7: Determine the minimum and maximum diametrical clearance. These values are shown in the table. The minimum diametrical clearance will be used to calculate “C” —the gland clearance diameter.
- Step 8: Determine the gland clearance diameter and tolerance. For rod seals, C equals A+E min and is the minimum clearance diameter.

DIAGRAM 2  
ROD SEAL RECOMMENDATION



SUGGESTED GLAND SURFACE FINISHES

| STATIC         | DYNAMIC        |
|----------------|----------------|
| Ra 32 max      | Ra 16 max      |
| Ra 0.8 µm max. | Ra 0.4 µm max. |

GLAND DIMENSION EXAMPLES

These examples show a relationship between active diameter and gland cross section.

| METRIC                        |                             |                             |                            |                            |                                   |                               |                               |                 |                |
|-------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------------|-------------------------------|-------------------------------|-----------------|----------------|
| ROD DIAMETER OR CYLINDER BORE | NOMINAL GLAND CROSS SECTION | MINIMUM GLAND CROSS SECTION | MINIMUM AXIAL GLAND LENGTH | MINIMUM AXIAL GLAND LENGTH | MINIMUM INSTALLATION BEVEL LENGTH | MINIMUM DIAMETRICAL CLEARANCE | MAXIMUM DIAMETRICAL CLEARANCE | SHAFT TOLERANCE | HOLE TOLERANCE |
| A                             |                             | S                           | L <sub>1</sub> + 0.25      | L <sub>2</sub> + 0.25      | F min.                            | E min.                        | E max.                        | -.xxx           | +.xxx          |
| 5.0 - 14.9                    | 3.00                        | 2.98                        | 4.06                       | 5.45                       | 0.86                              | 0.02                          | 0.11                          | 0.03            | 0.06           |
| 15.0 - 24.9                   | 4.00                        | 3.97                        | 5.37                       | 7.19                       | 1.14                              | 0.04                          | 0.17                          | 0.05            | 0.08           |
| 25.0 - 59.9                   | 5.00                        | 4.96                        | 6.64                       | 8.92                       | 1.43                              | 0.05                          | 0.20                          | 0.06            | 0.09           |
| 60.0 - 169.9                  | 7.50                        | 7.44                        | 9.82                       | 13.24                      | 2.14                              | 0.09                          | 0.33                          | 0.10            | 0.14           |
| 170.0 - 409.9                 | 10.00                       | 9.92                        | 13.01                      | 17.53                      | 2.85                              | 0.12                          | 0.45                          | 0.15            | 0.18           |
| 410.0 - 500.0                 | 12.50                       | 12.41                       | 16.16                      | 21.81                      | 3.56                              | 0.17                          | 0.60                          | 0.20            | 0.23           |

| INCH                          |                             |                             |                            |                            |                                   |                               |                               |                 |                |
|-------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------------|-------------------------------|-------------------------------|-----------------|----------------|
| ROD DIAMETER OR CYLINDER BORE | NOMINAL GLAND CROSS SECTION | MINIMUM GLAND CROSS SECTION | MINIMUM AXIAL GLAND LENGTH | MINIMUM AXIAL GLAND LENGTH | MINIMUM INSTALLATION BEVEL LENGTH | MINIMUM DIAMETRICAL CLEARANCE | MAXIMUM DIAMETRICAL CLEARANCE | SHAFT TOLERANCE | HOLE TOLERANCE |
| A                             |                             | S                           | L <sub>1</sub> + .010      | L <sub>2</sub> + .010      | F min.                            | E min.                        | E max                         | -.xxx           | +.xxx          |
| 0.215 - 0.749                 | 0.125                       | 0.124                       | 0.169                      | 0.226                      | 0.036                             | 0.001                         | 0.004                         | 0.001           | 0.002          |
| 0.750 - 2.499                 | 0.188                       | 0.186                       | 0.250                      | 0.336                      | 0.054                             | 0.002                         | 0.009                         | 0.003           | 0.004          |
| 2.500 - 6.499                 | 0.250                       | 0.248                       | 0.329                      | 0.443                      | 0.071                             | 0.003                         | 0.012                         | 0.004           | 0.005          |
| 6.500 - 16.999                | 0.375                       | 0.372                       | 0.488                      | 0.658                      | 0.107                             | 0.005                         | 0.018                         | 0.006           | 0.007          |
| 17.000 - 20.000               | 0.500                       | 0.496                       | 0.646                      | 0.872                      | 0.142                             | 0.007                         | 0.023                         | 0.007           | 0.009          |

Notes: For pressures less than 10,000 psi (690 bar), the OptiSeal® system can be used without back-up ring and axial gland length L<sub>1</sub>. For pressures greater than or equal to 10,000 psi (690 bar) but less than 17,000 psi (1,172 bar), the OptiBack back-up ring can be used with the OptiSeal® system and axial gland length L<sub>2</sub>. Contact Hallite regarding: all pressures exceeding 17,000 psi (1,172 bar), and regarding piston seals with bore diameters of .500in/.254m or less.

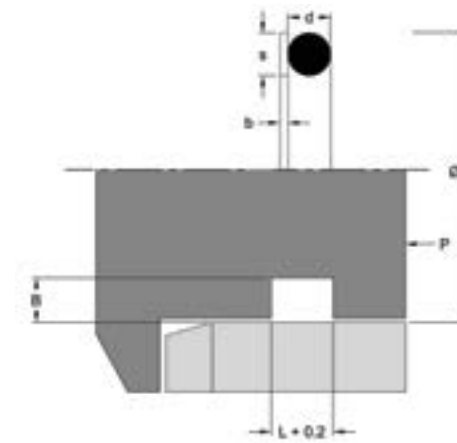
GLAND DIMENSION EXAMPLES

| METRIC                         |                    |           | INCH                           |                    |           |
|--------------------------------|--------------------|-----------|--------------------------------|--------------------|-----------|
| NOMINAL GLAND CROSS SECTION    | 200mm ROD, 125 bar |           | NOMINAL GLAND CROSS SECTION    | 4" ROD, 15,000 PSI |           |
|                                | DIMENSION          | TOLERANCE |                                | DIMENSION          | TOLERANCE |
| Max. Gland ID                  | 181.16             | -0.15     | Max. Gland ID                  | 4.000              | -0.004    |
| Min. Gland OD                  | 200.00             | +0.18     | Min. Gland OD                  | 4.496              | +0.005    |
| Nom. Gland Cross Section       | 10.00              | Nominal   | Nom. Gland Cross Section       | 0.250              | Nominal   |
| Min. Gland Cross Section       | 9.92               | Minimum   | Min. Gland Cross Section       | 0.248              | Minimum   |
| Min. Axial Gland Length        | 13.01              | +0.25     | Min. Axial Gland Length        | 0.443              | 0.010     |
| Min. Installation Bevel Length | 2.85               | Minimum   | Min. Installation Bevel Length | 0.071              | Minimum   |
| Min. Diametrical Clearance     | 0.12               | Minimum   | Min. Diametrical Clearance     | 0.003              | Minimum   |
| Gland Clearance Diameter       | 199.88             | +0.15     | Gland Clearance Diameter       | 4.003              | +0.005    |
| Max. Diametrical Clearance     | 0.45               | Maximum   | Max. Diametrical Clearance     | 0.012              | Maximum   |



# BACK-UP RINGS

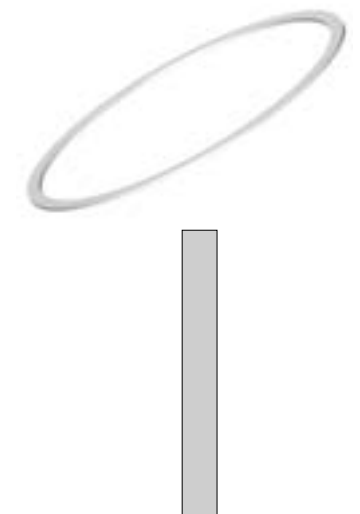




# PME

## UNCUT BACK-UP RINGS

*For External Grooves*



### TECHNICAL DETAILS

Hallite PME back-up rings are uncut back-up rings made from specific conditioned PTFE to be assembled into one-piece external grooves. PME back-up rings are designed to support O-rings mainly in static applications. The cold flow feature of the specially conditioned virgin PTFE grade reliably closes the extrusion gap and protects the O-ring from extruding into the gap and helps to reasonably increase the acceptable system pressure. Hallite PME back-up rings are produced from stocked material and can be supplied on short notice.

### FEATURES

- More extrusion resistant than conventional PTFE back-up rings
- No spiral or cut design; rings will not wrap around the rod jack and be sheared off
- Economical assembly of series with assembling tool
- Uncut design ensures no gap will endanger the O-ring
- Immediate reconversion after termination of assembly so that the back-up ring fits tightly on the bottom of the groove
- Simple assembly of small quantities with synthetic strip

### OPERATING CONDITIONS

|                   | METRIC       | INCH         |
|-------------------|--------------|--------------|
| Temperature Range | -30 to 200°C | -22 to 392°F |

#### 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.

INSTALLATION RECOMMENDATIONS

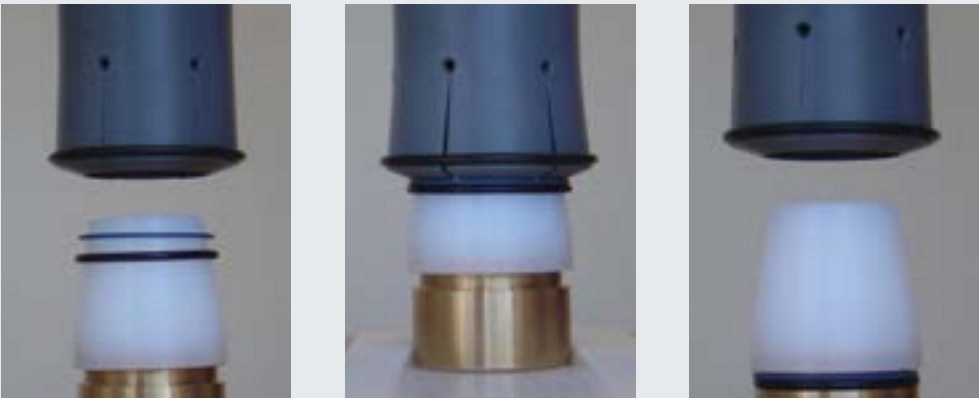
SMALL QUANTITY ASSEMBLY – PME BACK-UP RINGS\*

When assembling small quantities of PME back-up rings, a synthetic strip can be used to best fit the back-up ring into the groove. The back-up ring should first be fitted into the groove at one part of the circumference and held in place in the groove. Work the ring into the groove around the part, using circular motions as quickly as possible. Note that the faster the assembly of the part into the groove, the faster the part will resize into the groove, minimizing time before the seal can be assembled.



LARGE QUANTITY ASSEMBLY – PME BACK-UP RINGS\*

When assembling large quantities of PME back-up rings, the use of an assembly cone can minimize time needed to assemble. With this method, the O-ring and PME back-up can be assembled at the same time. This method provides quick assembly, as the back-up ring will immediately resize in the groove with the O-ring, making the assembly ready for use.



*\*If you choose to heat the part for easier assembly, you will need to verify that the ring has properly resized in the groove as the heat may interfere with the self-sizing function of the part.*

OTHER  
BACK-UP  
RINGS



TECHNICAL DETAILS

Back-up rings offer additional support to a sealing element, extending the performance and durability of the seal. Back-up components also provide protection against extrusion, allowing the applications to operate at higher pressures. Back-up rings are offered in many different configurations from full face to integrated designs. Designs are also available for static and dynamic applications. Depending on the application, Hallite offers a full range of materials to ensure maximum production of the sealing element. Hallite offers a full range of sizes that may be available in small quantities within 24 hours.

OPERATING CONDITIONS

|                   | METRIC       | INCH         |
|-------------------|--------------|--------------|
| Temperature Range | -30 to 200°C | -22 to 392°F |

NOTE

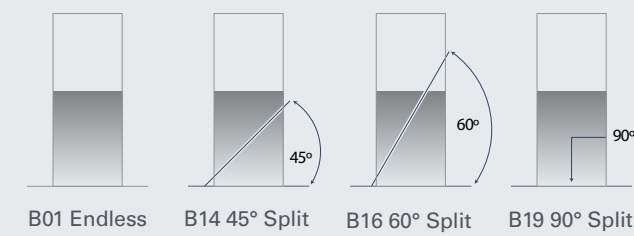
Data given are maximum values and can apply depending on specific application. Maximum ratings of temperature, pressure, or operating speeds are dependent on fluid medium, surface, gap value, and other variables such as dynamic or static service. Maximum values are not intended for use together at the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



OTHER BACK-UP RING TYPES

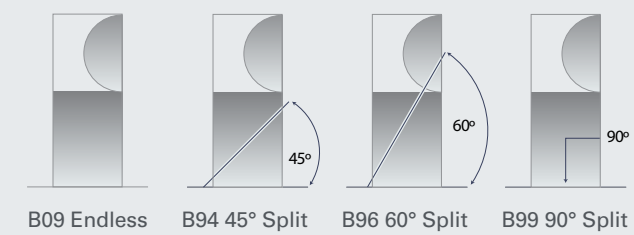
RECTANGULAR BACK-UP AND ANTI-DIESEL RINGS

This is the most common profile used for protecting an O-ring or rod seal from extrusion. This profile is offered in both endless and split profiles for ease of installation and maximum performance. Another common application is anti-contamination/anti-diesel rings. All profiles are available for both static and dynamic applications. Hallite offers many material options for various applications such as Armorlene® PTFE compounds, PEEK, POM, PA, Composites, TPU,TPE, PPS, NBR, HNBR, and FKM.



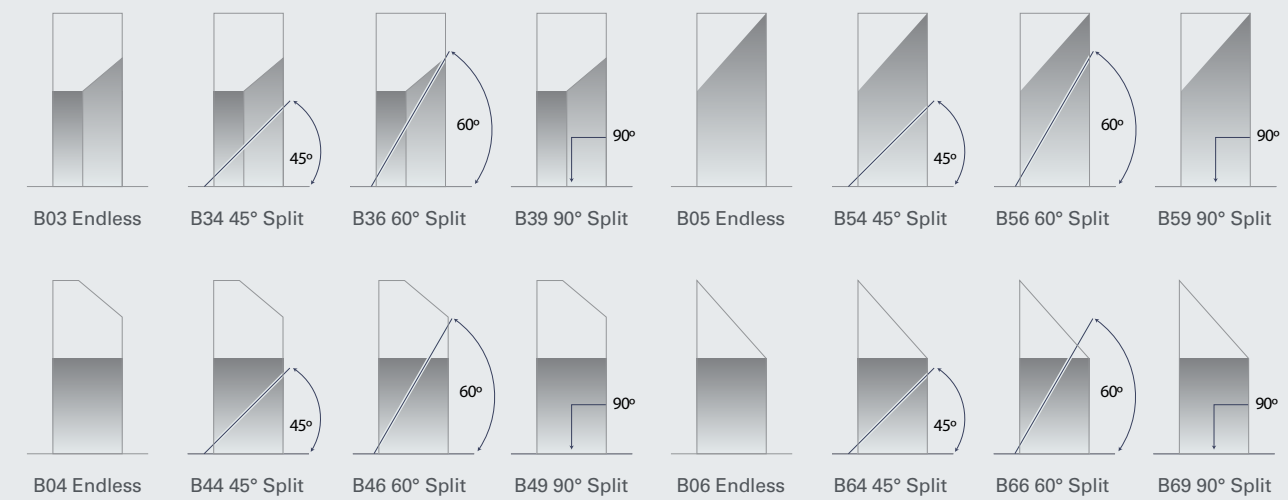
CONTOURED BACK-UP RINGS

The contoured back-up ring design is used with an O-ring to provide additional support and protection from extrusion. The concave feature of this back-up ring offers a pocket that keeps the O-ring centered on the back-up ring, assuring maximum protection in the application. This protection allows the O-ring to function at higher pressures without the occurrence of extrusion. Hallite offers many material options for various applications such as Armorlene® PTFE compounds, PEEK, POM, PA, Composites,TPU,TPE, PPS, NBR, HNBR, and FKM.



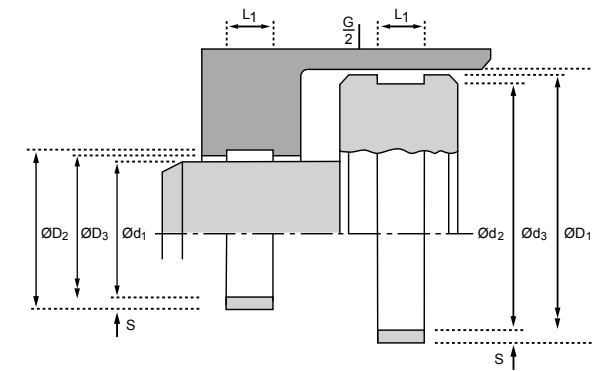
INTEGRATED BACK-UP RINGS

Integrated back-up rings are specially designed to be integrated into the sealing element in order to provide maximum extrusion protection. Hallite offers several different designs to maximize performance of the seal as well as many material options for various applications such as Armorlene® PTFE compounds, PEEK, POM, PA, Composites,TPU,TPE, PPS, NBR, HNBR, and FKM.



BEARINGS AND  
GUIDE ELEMENTS

# T87



## TECHNICAL DETAILS

The Hallite T87 bearing strip has the ability to support side loads and eliminate stick-slip between moving parts. It 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. The Hallite T87 may also be used in many applications other than hydraulic or pneumatic cylinders.

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 150°C. Hallite T87 is offered in uncut strips by the meter or foot. It can also be supplied in cut lengths as defined by the customer. Hallite also offers cut and formed pieces for either a piston or rod application.



## FEATURES

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

## Part Number Structure

CSBE1500RB03125

| CS             | B                                      | E                                                     | 1500                                                | R                                  | B                                                                 | 03125                                                  |
|----------------|----------------------------------------|-------------------------------------------------------|-----------------------------------------------------|------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------|
| CS = Cut Strip | MATERIAL<br>Refer to<br>Material Table | UNITS FOR ALL<br>DIMENSIONS<br>M = Metric<br>E = Inch | WIDTH OF<br>STRIP<br>Metric = XX.XX<br>Inch = X.XXX | Refer to<br>Cross-Section<br>Table | CUT TYPE<br>B = Butt<br>A = 30° (Angle)<br>F = 45°<br>S = Special | LENGTH OF<br>STRIP<br>Metric = XXXX.X<br>Inch = XX.XXX |

OPERATING CONDITIONS\*

|                   | METRIC       | INCH         |
|-------------------|--------------|--------------|
| Maximum Speed     | 5.0m/sec     | 16.4ft/sec   |
| Temperature Range | -50 to 200°C | -58 to 390°F |

\*When using the compressive stress at yield in your calculation, it is suggested a 4:1 factor of saftey is applied.

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\*

|                                                                     | µmRa    | µmRt   | µinRa   | µinRt   |
|---------------------------------------------------------------------|---------|--------|---------|---------|
| Dynamic Sealing Face Ød, ØD <sub>1</sub>                            | 0.4     | 4 max  | 16      | 158     |
| Static Housing Faces ØD <sub>2</sub> L <sub>1</sub> Ød <sub>2</sub> | 3.2 max | 16 max | 125 max | 630 max |

\*Or surface finish of seal being used.

TYPICAL PHYSICAL PROPERTIES

|                                     | METRIC                                |                 | INCH         |          |
|-------------------------------------|---------------------------------------|-----------------|--------------|----------|
| Specific Gravity                    | 3.1                                   |                 | 3.1          |          |
| Compression Stress at Yield         | 23°C                                  | 20 MN/m2        | 73°F         | 2900 psi |
|                                     | 80°C                                  | 9 MN/m2         | 176°F        | 1300 psi |
| Coefficient of Thermal Conductivity | 2.5 W/mK                              |                 | 1.48tu/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 | -            |          |

HOUSING DETAILS & TOLERANCES WITH RADIAL CLEARANCE RECOMMENDATIONS

|        |                                      |                                 |
|--------|--------------------------------------|---------------------------------|
| Rod    | Ød <sub>1</sub>                      | f8/h9                           |
|        | ØD <sub>2</sub> =Ød <sub>1</sub> +2S | up to: Ø80 H10<br>above: Ø80 H9 |
|        | ØD <sub>3</sub> =Ød <sub>1</sub> +2G | G min / max                     |
|        | L <sub>1</sub>                       | -0 + 0.2mm                      |
| Piston | ØD <sub>1</sub>                      | H11                             |
|        | Ød <sub>2</sub> =ØD <sub>1</sub> –2S | h8                              |
|        | Ød <sub>3</sub> =ØD <sub>1</sub> –2G | G min / max                     |
|        | L <sub>1</sub>                       | -0 + 0.2mm                      |

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 the table below.

| METRIC                 |             |                                                        | INCH                   |             |                                                        |
|------------------------|-------------|--------------------------------------------------------|------------------------|-------------|--------------------------------------------------------|
| NOMINAL DIAMETER RANGE | G MIN* (mm) | G MAX                                                  | NOMINAL DIAMETER RANGE | G MIN* (mm) | G MAX                                                  |
| 8.0 - 20.0             | 0.6         | AS REQUIRED BY THE SEAL EXTRUSION GAP (see note below) | 0.315 - 0.787          | 0.024       | AS REQUIRED BY THE SEAL EXTRUSION GAP (see note below) |
| > 20.0 - 120.0         | 0.7         |                                                        | > 0.787 - 4.725        | 0.028       |                                                        |
| > 120.0 - 500.0        | 0.8         |                                                        | > 4.725 - 19.685       | 0.031       |                                                        |
| 500.0 - 1000.0         | 1.0         |                                                        | > 19.685 - 39.370      | 0.039       |                                                        |
| 1000.0                 | 1.2         |                                                        | > 39.370               | 0.047       |                                                        |

\*G min gives the minimum metal-to-metal clearance that is required at all times. G/2 specifies the minimum metal-to-metal clearance on either position of the rod or piston at all times.

FOR APPLICATIONS NOT USING A SEAL G MAX

|               | METRIC      | INCH       |
|---------------|-------------|------------|
| S             | G MIN* (mm) | G MAX (mm) |
| 1.50 - 1.55   | 1.0         | 0.039      |
| > 1.55 - 2.00 | 1.1         | 0.043      |
| > 2.00        | 1.6         | 0.063      |



BEARING STRIP TOLERANCES

| L <sub>1</sub> |          |        |          | S       |          |         |          |
|----------------|----------|--------|----------|---------|----------|---------|----------|
| -0.1mm         | +0.000in | -0.5mm | -0.008in | +0.00mm | +0.000in | -0.05mm | -0.002in |

CUTTING STRIP TO LENGTH

| CALCULATING CUT LENGTH |                        |
|------------------------|------------------------|
| L2                     | Length of strip        |
| Pi                     | 3.1415                 |
| ØD <sub>1</sub>        | Cylinder bore diameter |
| Ød <sub>1</sub>        | Rod diameter           |
| S                      | Cross section of strip |
| W                      | Width of gap           |

Calculating Strip Length:

Piston Applications

$L2 = \text{Pi} \times (\text{ØD}_1 - S) \times 0.99 - 0.8\text{mm} / 0.03\text{in}$

Rod Applications

$L2 = \text{Pi} \times (\text{Ød}_1 + S) \times 0.99 - 0.8\text{mm} / 0.03\text{in}$

Calculating Proper Gap:

Metric: gap W = cut length L2 x 0.01 + 0.8mm

Inch: gap W = cut length L2 x 0.01 + 0.03in

BEARING STRIP CUTTING ANGLES



MATERIALS

| MATERIAL FEATURES AND APPLICATIONS                                                                                                                                                                                                              | MATERIAL DESIGNATOR | COLOR       | TEMPERATURE RANGE °C | TEMPERATURE RANGE °F |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|----------------------|----------------------|
| <b>BRONZE FILLED</b> <ul style="list-style-type: none"><li>• Standard material for hydraulic applications</li><li>• High compressive strength</li><li>• Extended wear resistance</li></ul>                                                      | B                   | Bronze      | -60 to 200°C         | -76 to 392°F         |
| <b>BRONZE/MoS<sub>2</sub> FILLED</b> <ul style="list-style-type: none"><li>• High compressive strength</li><li>• Excellent extrusion resistance</li><li>• Very low running friction</li></ul>                                                   | T                   | Dark Bronze | -60 to 200°C         | -76 to 392°F         |
| <b>CARBON FILLED</b> <ul style="list-style-type: none"><li>• Excellent in all lubricating fluids and pneumatic applications</li><li>• High chemical resistance</li></ul>                                                                        | C                   | Black       | -60 to 200°C         | -76 to 392°F         |
| <b>CARBON FILLED (BAM CERTIFIED)</b> <ul style="list-style-type: none"><li>• Excellent in all lubricating fluids and pneumatic applications</li><li>• High chemical resistance</li><li>• Approved for use with oxygen (BAM certified)</li></ul> | G                   | Black       | -60 to 200°C         | -76 to 392°F         |

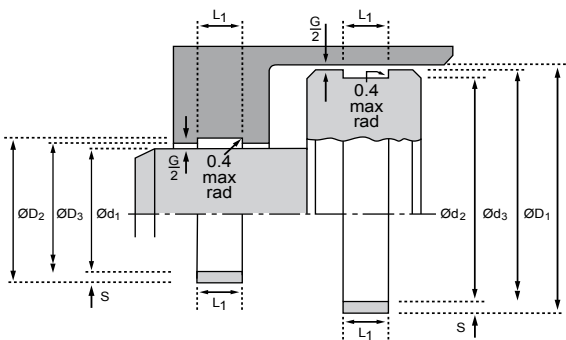
For other material options consult the Master Materials Index at the front of the catalog. If you do not find the material that you require, please contact your local Hallite sales office.

CROSS SECTIONS & DESIGNATION

| METRIC              |             | INCH                |             |
|---------------------|-------------|---------------------|-------------|
| CROSS SECTION TABLE | DESIGNATION | CROSS SECTION TABLE | DESIGNATION |
| 1.00                | A           | 0.062               | M           |
| 1.50                | C           | 0.093               | N           |
| 1.55                | D           | 0.125               | R           |
| 2.00                | E           | -                   | -           |
| 2.20                | F           | -                   | -           |
| 2.50                | G           | -                   | -           |
| 3.00                | H           | -                   | -           |
| 3.50                | J           | -                   | -           |
| 4.00                | K           | -                   | -           |
| 5.00                | L           | -                   | -           |



# 506



## TECHNICAL DETAILS

The 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, the 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, the 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. The rectangular section strip is available in a wide range of inch and metric sizes, including cross sections specified in ISO 10766.



## FEATURES

- Ultra low friction
- Compact housing
- Inch sizes available upon request
- Available in ready-made bearings cut to size and to customer specifications
- Available in coil lengths and flat coils

## OPERATING CONDITIONS

|                                | METRIC       |                | INCH         |              |
|--------------------------------|--------------|----------------|--------------|--------------|
| Temperature Range              | -40 to 120°C |                | -40 to 250°F |              |
|                                | Speed m/sec  | Pressure MN/m2 | Speed ft/sec | Pressure psi |
| Limiting PV Values Lubricated* | 0.1          | 10.0           | 0.3          | 1500         |
|                                | 1.0          | 6.0            | 3.0          | 900          |
|                                | 5.0          | 0.8            | 16.0         | 120          |

### 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.

*\*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.*

SURFACE FINISH RECOMMENDATIONS

|                                                         | µmRa    | µmRt   | µinRa   | µinRt   |
|---------------------------------------------------------|---------|--------|---------|---------|
| Dynamic Sealing Face Ød, ØD <sub>1</sub>                | 0.4     | 4 max  | 16      | 158     |
| Static Housing Faces ØD <sub>2</sub> L, Ød <sub>2</sub> | 3.2 max | 16 max | 125 max | 630 max |

TYPICAL PHYSICAL PROPERTIES

|                                                                          | METRIC                    |                            | INCH                      |                             |
|--------------------------------------------------------------------------|---------------------------|----------------------------|---------------------------|-----------------------------|
| Specific Gravity                                                         | 1.27                      |                            | 1.27                      |                             |
| Compression Stress at Failure                                            | 23°C                      | 450 MN/m2                  | 73°F                      | 65,000 psi                  |
| Compression Stress at Yield                                              | 23°C                      | 115 MN/m2                  | 73°F                      | 16,500 psi                  |
|                                                                          | 80°C                      | 58 MN/m2                   | 176°F                     | 8,500 psi                   |
| Coefficient of Thermal Conductivity                                      | 0.27 W/mK                 |                            | 0.16 Btu/hft °F           |                             |
| Coefficient of Thermal Expansion                                         | Length                    | Thickness                  | Length                    | Thickness                   |
|                                                                          | 9x10 <sup>-5</sup> per °C | 13x10 <sup>-5</sup> per °C | 5x10 <sup>-5</sup> per °F | 7.3x10 <sup>-5</sup> per °F |
| Coefficient of Dynamic Friction on Steel Surface (0.2 µmRa) / (8 µinCLA) | Dry 0.50                  | Lubricated 0.06            | Dry 0.50                  | Lubricated 0.06             |

HOUSING DETAILS & TOLERANCES

|        |                                       |                 |                                       |                  |
|--------|---------------------------------------|-----------------|---------------------------------------|------------------|
| Rod    | Ød <sub>1</sub>                       | f8/h9           | Ød <sub>1</sub>                       | f9               |
|        | ØD <sub>2</sub> = Ød <sub>1</sub> +2S | up to : Ø80 H10 | ØD <sub>2</sub> = Ød <sub>1</sub> +2S | up to : Ø3in H10 |
|        |                                       | above : Ø80 H9  |                                       | above : Ø3in H9  |
|        | ØD <sub>3</sub> = Ød <sub>1</sub> +2G | G min / max     | ØD <sub>3</sub> = Ød <sub>1</sub> +2G | G min / max      |
|        | L <sub>1</sub>                        | + 0.2 -0 mm     |                                       | + 0.008 -0 in    |
| Piston | ØD <sub>1</sub>                       | H11             | ØD <sub>1</sub>                       | H11              |
|        | Ød <sub>2</sub> = ØD <sub>1</sub> -2S | h8              | Ød <sub>2</sub> = ØD <sub>1</sub> -2S | f9               |
|        | Ød <sub>3</sub> = ØD <sub>1</sub> -2G | G min / max     | Ød <sub>3</sub> = ØD <sub>1</sub> -2G | G min / max      |
|        | L <sub>1</sub>                        | + 0.2 -0 mm     | L <sub>1</sub>                        | + 0.008 -0 in    |

RADIAL CLEARANCE RECOMMENDATIONS

| METRIC - SPIRAL LENGTHS |                 | S    | L <sub>1</sub> | G MAX                                                                                                          | G MIN* |
|-------------------------|-----------------|------|----------------|----------------------------------------------------------------------------------------------------------------|--------|
| Ø RANGE                 |                 |      |                |                                                                                                                |        |
| Ød <sub>1</sub>         | ØD <sub>1</sub> |      |                |                                                                                                                |        |
| 25.0 - 41.0             | 45.0 - 90.0     | 2.0  | 10.0           | AS REQUIRED<br>BY THE SEAL<br>EXTRUSION GAP<br><br>For applications<br>not using a seal,<br>G MAX can be 1.6mm | 0.7    |
| 35.0 - 70.0             | 74.0 - 160.0    | 2.0  | 10.0           |                                                                                                                | 0.7    |
| 70.0 -155.0             | 159.0 -310.0    | 2.0  | 10.0           |                                                                                                                | 0.7    |
| 35.0 - 50.0             | 54.0 -110.0     | 2.0  | 15.0           |                                                                                                                | 0.7    |
| 50.0 - 100.0            | 104.0 -210.0    | 2.0  | 15.0           |                                                                                                                | 0.7    |
| 90.0 - 180.0            | 184.0 - 370.0   | 2.0  | 15.0           |                                                                                                                | 0.7    |
| 25.0 - 30.0             | 35.0 - 70.0     | 2.5  | 5.6            |                                                                                                                | 0.7    |
| 25.0 - 50.0             | 55.0 - 110.0    | 2.5  | 5.6            |                                                                                                                | 0.7    |
| 50.0 - 100.0            | 105.0 - 210.0   | 2.5  | 5.6            |                                                                                                                | 0.7    |
| 25.0 - 40.0             | 45.0 - 90.0     | 2.5  | 9.7            |                                                                                                                | 0.7    |
| 35.0 - 70.0             | 75.0 - 150.0    | 2.5  | 9.7            |                                                                                                                | 0.7    |
| 70.0-150.0              | 155.0 - 310.0   | 2.5  | 9.7            |                                                                                                                | 0.7    |
| 40.0 - 50.0             | 55.0 - 110.0    | 2.5  | 13.0           |                                                                                                                | 0.7    |
| 50.0 - 100.0            | 105.0 - 210.0   | 2.5  | 13.0           |                                                                                                                | 0.7    |
| 90.0 - 180.0            | 185.0 - 370.0   | 2.5  | 13.0           |                                                                                                                | 0.8    |
| 40.0 - 50.0             | 55.0 - 110.0    | 2.5  | 15.0           |                                                                                                                | 0.7    |
| 50.0 - 100.0            | 105.0 - 210.0   | 2.5  | 15.0           |                                                                                                                | 0.7    |
| 90.0 - 180.0            | 185.0 - 370.0   | 2.5  | 15.0           |                                                                                                                | 0.8    |
| 50.0 - 80.0             | 85.0 - 170.0    | 2.5  | 20.0           |                                                                                                                | 0.7    |
| 75.0 - 150.0            | 155.0 - 310.0   | 2.5  | 20.0           |                                                                                                                | 0.8    |
| 125.0 - 250.0           | 255.0 - 510.0   | 2.5  | 20.0           |                                                                                                                | 0.8    |
| 60.0 - 80.0             | 85.0 - 170.0    | 2.5  | 25.0           |                                                                                                                | 0.7    |
| 70.0 - 150.0            | 155.0 - 310.0   | 2.5  | 25.0           |                                                                                                                | 0.8    |
| 125.0 - 250.0           | 255.0 - 510.0   | 2.5  | 25.0           |                                                                                                                | 0.8    |
| 40.0 - 50.0             | 56.0 - 100.0    | 3.0  | 9.7            |                                                                                                                | 0.8    |
| 50.0 - 100.0            | 106.0 - 210.0   | 3.0  | 9.7            |                                                                                                                | 0.8    |
| 100.0 - 150.0           | 156.0 - 310.0   | 3.0  | 9.7            |                                                                                                                | 0.8    |
| 50.0 - 60.0             | 66.0 - 120.0    | 3.0  | 12.8           |                                                                                                                | 0.7    |
| 60.0 - 104.0            | 110.0 - 220.0   | 3.0  | 12.8           |                                                                                                                | 0.8    |
| 90.0 - 149.0            | 155.0 - 300.0   | 3.0  | 12.8           |                                                                                                                | 0.8    |
| 55.0 - 80.0             | 86.0 - 170.0    | 3.0  | 20.0           |                                                                                                                | 0.8    |
| 80.0 - 150.0            | 156.0 - 310.0   | 3.0  | 20.0           |                                                                                                                | 0.8    |
| 140.0 - 250.0           | 256.0 - 510.0   | 3.0  | 20.0           |                                                                                                                | 0.8    |
| 50.0 - 75.0             | 81.0 - 160.0    | 3.02 | 15.0           |                                                                                                                | 0.7    |



RADIAL CLEARANCE RECOMMENDATIONS

| METRIC - SPIRAL LENGTHS |                 | S   | L <sub>1</sub> | G MAX                                                                                                          | G MIN* |
|-------------------------|-----------------|-----|----------------|----------------------------------------------------------------------------------------------------------------|--------|
| Ø RANGE                 |                 |     |                |                                                                                                                |        |
| Ød <sub>1</sub>         | ØD <sub>1</sub> |     |                |                                                                                                                |        |
| 60.0 - 80.0             | 68.0 - 170.0    | 4.0 | 6.1            | AS REQUIRED<br>BY THE SEAL<br>EXTRUSION GAP<br><br>For applications<br>not using a seal,<br>G MAX can be 1.6mm | 0.8    |
| 80.0 - 150.0            | 158.0 - 310.0   | 4.0 | 6.1            |                                                                                                                | 0.8    |
| 150.0 - 250.0           | 258.0 - 510.0   | 4.0 | 6.1            |                                                                                                                | 0.8    |
| 60.0 - 80.0             | 88.0 - 170.0    | 4.0 | 9.7            |                                                                                                                | 0.8    |
| 80.0 - 150.0            | 158.0 - 310.0   | 4.0 | 9.7            |                                                                                                                | 0.8    |
| 150.0 - 250.0           | 258.0 - 510.0   | 4.0 | 9.7            |                                                                                                                | 0.8    |
| 60.0 - 80.0             | 88.0 - 170.0    | 4.0 | 20.0           |                                                                                                                | 0.8    |
| 80.0 - 150.0            | 158.0 - 310.0   | 4.0 | 20.0           |                                                                                                                | 0.8    |
| 150.0 - 250.0           | 258.0 - 510.0   | 4.0 | 20.0           |                                                                                                                | 0.8    |
| 120.0 -150.0            | 158.0 - 310.0   | 4.0 | 25.0           |                                                                                                                | 0.8    |
| 150.0 - 250.0           | 258.0 - 510.0   | 4.0 | 25.0           |                                                                                                                | 0.8    |
| 120.0 -150.0            | 158.0 - 310.0   | 4.0 | 30.0           |                                                                                                                | 0.8    |
| 150.0 - 250.0           | 258.0 - 510.0   | 4.0 | 30.0           |                                                                                                                | 0.8    |
| 170.0 - 200.0           | 208.0 - 410.0   | 4.0 | 40.1           |                                                                                                                | 0.8    |
| 200.0 - 300.0           | 308.0 - 610.0   | 4.0 | 40.1           |                                                                                                                | 0.8    |

| INCH - SPIRAL LENGTHS |                 | S     | L <sub>1</sub> | G MAX                                                                                                            | G MIN* |
|-----------------------|-----------------|-------|----------------|------------------------------------------------------------------------------------------------------------------|--------|
| Ø RANGE               |                 |       |                |                                                                                                                  |        |
| Ød <sub>1</sub>       | ØD <sub>1</sub> |       |                |                                                                                                                  |        |
| 1.000 - 1.375         | 1.625 - 3.500   | 0.125 | 0.375          | AS REQUIRED<br>BY THE SEAL<br>EXTRUSION GAP<br><br>For applications<br>not using a seal,<br>G MAX can be 0.080in | 0.031  |
| 1.250 - 1.875         | 2.125 - 4.250   | 0.125 | 0.375          |                                                                                                                  | 0.031  |
| 2.000 - 3.500         | 3.750 - 6.250   | 0.125 | 0.375          |                                                                                                                  | 0.031  |
| 1.250 - 1.750         | 2.000 - 4.000   | 0.125 | 0.500          |                                                                                                                  | 0.031  |
| 1.750 - 3.500         | 3.750 - 6.250   | 0.125 | 0.500          |                                                                                                                  | 0.031  |
| 3.500 - 6.000         | 6.250 - 10.000  | 0.125 | 0.500          |                                                                                                                  | 0.031  |
| 8.000 - 12.500        | 12.750 - 25.000 | 0.125 | 0.500          |                                                                                                                  | 0.031  |
| 2.000 - 3.500         | 3.750 - 6.250   | 0.125 | 0.625          |                                                                                                                  | 0.031  |
| 3.500 - 6.000         | 6.250 - 10.000  | 0.125 | 0.625          |                                                                                                                  | 0.031  |
| 2.000 - 3.500         | 3.750 - 6.250   | 0.125 | 0.750          |                                                                                                                  | 0.031  |
| 3.500 - 6.000         | 6.250 - 10.000  | 0.125 | 0.750          |                                                                                                                  | 0.031  |
| 2.500 - 3.500         | 3.750 - 6.250   | 0.125 | 1.000          |                                                                                                                  | 0.031  |
| 3.500 - 6.000         | 6.250 - 10.000  | 0.125 | 1.000          |                                                                                                                  | 0.031  |
| 8.000 - 12.500        | 12.750 - 25.000 | 0.125 | 1.000          |                                                                                                                  | 0.031  |

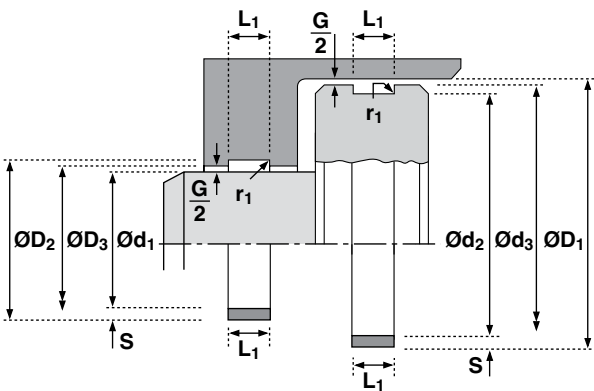
\*This value can be reduced if required by the seal's maximum extrusion gap - Refer to Housing Design section.

BEARING STRIP TOLERANCES

| METRIC         |                  | INCH               |                    |
|----------------|------------------|--------------------|--------------------|
| L1             | S                | L1                 | S                  |
| -0.1 to -0.6mm | -0.02 to -0.08mm | -0.005 to -0.025in | -0.001 to -0.003in |

WIDTH OF BEARING SPLIT - W

| ØD <sub>1</sub> / ØD <sub>1</sub> | W             | ØD <sub>1</sub> / ØD <sub>1</sub> | W           |
|-----------------------------------|---------------|-----------------------------------|-------------|
| Up to 50                          | 3.00 - 1.50   | Up to 2"                          | 0.12 - 0.60 |
| Up to 120                         | 5.00 - 3.50   | Up to 5"                          | 0.19 - 0.14 |
| Up to 250                         | 9.00 - 7.25   | Up tp 10"                         | 0.35 - 0.29 |
| Up to 550                         | 17.00 - 15.00 | Up to 22"                         | 0.67 - 0.59 |



533



T Bearing



T Bearing



Groove



Standard

TECHNICAL DETAILS

The Hallite 533 glass-filled polyamide wear rings are designed for reciprocating piston and rod bearing applications. The material is heat-stabilized 33% glass reinforced polyamide 6/6, which offers excellent bearing properties. The material is compatible with hydraulic and lubricating oils. The material is not recommended for use in water-based fluids (HFA) or where significant water is present, due to the swell of the polyamide. 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.

F E A T U R E S

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

OPERATING CONDITIONS

|                   | METRIC       | INCH         |
|-------------------|--------------|--------------|
| Maximum Speed     | 5.0m/sec     | 16.4ft/sec   |
| Temperature Range | -40 to 120°C | -40 to 250°F |

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

|                                                              | µmRa    | µmRt   | µinRa   | µinRt   |
|--------------------------------------------------------------|---------|--------|---------|---------|
| Dynamic Sealing Face – Rod Ød                                | 0.4     | 4 max  | 16      | 158     |
| Static Sealing Face – Rod ØD <sub>2</sub> L <sub>1</sub>     | 3.2 max | 16 max | 125 max | 630 max |
| Dynamic Sealing Face – Piston Ød <sub>1</sub> L <sub>1</sub> | 0.4     | 4 max  | 16      | 158     |
| Static Sealing Face – Piston Ød <sub>2</sub> L <sub>1</sub>  | 3.2 max | 16 max | 125 max | 630 max |

TYPICAL PHYSICAL PROPERTIES

| PROPERTY                            | TEST METHOD | UNITS          | VALUE             |
|-------------------------------------|-------------|----------------|-------------------|
| Tensile Strength at Yield           | ASTM D638   | psi (Mpa)      | 27,000 (186)      |
| Elongation at Break                 | ASTM D638   | %              | 3                 |
| Flexural Strength at Yield          | ASTM D790   | psi (Mpa)      | 38,000 (262)      |
| Flexural Modulus                    | ASTM D790   | psi (Mpa)      | 1,300,000 (8,965) |
| Izod Impact                         | ASTM D256   | ft-lb/in (J/m) | 2.1 (112)         |
| Specific Gravity                    | ASTM D792   |                | 1.41              |
| Compressive Strength                | ASTM D695   | psi (Mpa)      | 25,500 (176)      |
| Water Absorption                    | ASTM D570   | %              | 0.7               |
| Hardness - Rockwell                 | ASTM D785   | R              | 120               |
| Deformation Under Load at 4,000 psi | ASTM D621   | %              | 0.8               |
| Shear Strength                      | ASTM D732   | psi (Mpa)      | 12,500 (86)       |
| Shrinkage Flow Direction            | ASTM D955   | in/in          | 0.003             |

HOUSING DETAILS & TOLERANCES

|                                  |                     |                |             |
|----------------------------------|---------------------|----------------|-------------|
| L <sub>1</sub> in                | 0.015 +0.010        | -              | -           |
| r <sub>1</sub> in                | 0.016 max           | -              | -           |
| Rod Ød <sub>1</sub> in           | f9                  | -              | -           |
| ØD <sub>2</sub> in               | Ød <sub>1</sub> +2S | +0.004 -0.000  | -           |
| ØD <sub>3</sub> in               | Ød <sub>1</sub> +2G | -              | -           |
| Piston ØD <sub>1</sub> in        | H11                 | -              | -           |
| Ød <sub>2</sub> in               | ØD <sub>1</sub> -2S | +0.000 -0.0004 | -           |
| Ød <sub>3</sub> in               | ØD <sub>1</sub> -2G | -              | -           |
| 1/8 Nominal Cross Sections - in  | S = 0.126           | G max 0.080    | G min 0.031 |
| 3/32 Nominal Cross Sections - in | S = 0.093           | G max 0.060    | G min 0.031 |

RADIAL CLEARANCE RECOMMENDATIONS

|                                              | INCH                |                     |
|----------------------------------------------|---------------------|---------------------|
|                                              | G MIN (MINIMUM GAP) | G MAX (MAXIMUM GAP) |
| 1/8 inch (0.125 inch) nominal cross section  | 0.031               | 0.080               |
| 3/32 inch (0.093 inch) nominal cross section | 0.031               | 0.060               |
| 1/16 inch (0.062 inch) nominal cross section | 0.031               | 0.040               |



# G-SERIES

## TECHNICAL DETAILS

Hallite G-Series guide elements are commonly constructed from high-performance composite materials and produced in several different high-performance bearing material families including: POM, PA, Armorlene® PTFE, UHMWPE, PEEK, and PPS. The Hallite G-Series is machined to precise tolerances, assuring no metal-to-metal contact of components, even in heavy load-bearing applications.

Popular for a myriad of applications, Hallite’s composite materials consist of synthetic fibers, modern resins, and internal lubricating additives. The results are bearings, bushings, and other wear products that support a diverse range of applications including hydraulic cylinders, guides, valves, and pumps.

Hallite’s R1 composite material has excellent compressive strength and wear characteristics and can operate in either lubricated or dry run situations. Hallite G-Series composite bearings have limited stick-slip and frictional drag, as compared to typical hard plastic bearings, and are ideal for use in high loading applications where smooth operation is a must. Additionally, the R1 material is compatible with water, is capable of running immersed, and — since it does not absorb moisture — is a very dimensionally stable material. The R1 material is internally lubricated with PTFE, supporting lower friction, higher speeds, and longevity in applications where lubrication is limited. Being virtually inert, reactions with food and cleaning substances almost never occur.



## FEATURES

- High allowable loads
- Low friction value
- Excellent wear resistance
- Water inert – Does not swell
- Available up to 1270mm (50 inches) diameter
- Available in a variety of widths
- Precision machined to suit application
- Offered in wide range of profiles
- High degree of customizability to suit
- Proven performance replacement for bronze

## OPERATING CONDITIONS

|                   | METRIC        | INCH          |
|-------------------|---------------|---------------|
| Maximum Speed     | 5.0m/sec      | 16.4ft/sec    |
| Temperature Range | -200 to 130°C | -328 to 266°F |

### 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.

R1 POLYESTER RESIN MATERIAL

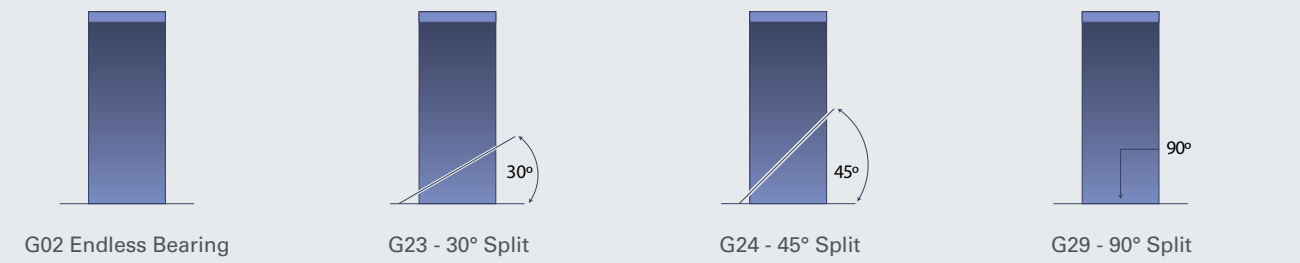
R1 is a high load composite bearing material made from impregnating synthetic fabric into a thermosetting resin system. PTFE is added to reduce friction.

| PROPERTY                         | UNIT                    | VALUE         |
|----------------------------------|-------------------------|---------------|
| Hardness                         | Rockwell M              | 107           |
| Compressive Strength (Flatwise)  | N/mm <sup>2</sup> (Psi) | 338 (49,033)  |
| Compressive Strength (Edgewise)  | N/mm <sup>2</sup> (Psi) | 95 (13,756)   |
| Density                          | g/cc                    | 1.27          |
| Tensile Strength                 | N/mm <sup>2</sup> (Psi) | 64 (9,250)    |
| Coefficient Of Thermal Expansion | 10 <sup>-6</sup> /°F    | 6             |
| Operating Temperatures           | C                       | -200° to 130° |

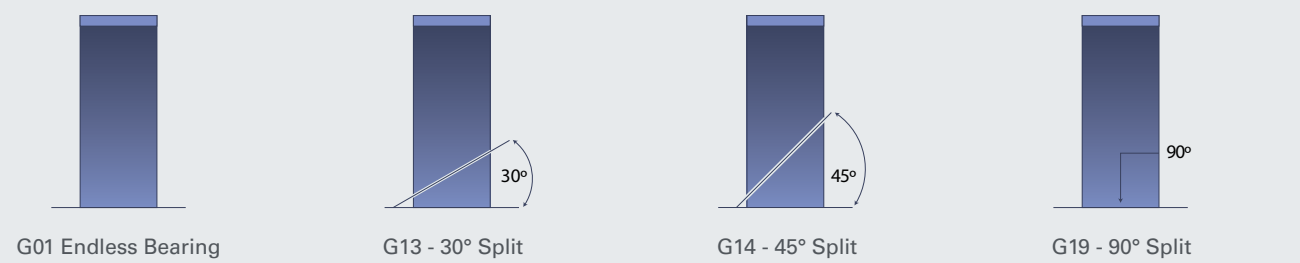
The above values are typical.

HALLITE G-SERIES BEARINGS

RECTANGULAR BACK UP RINGS - SQUARE CUT

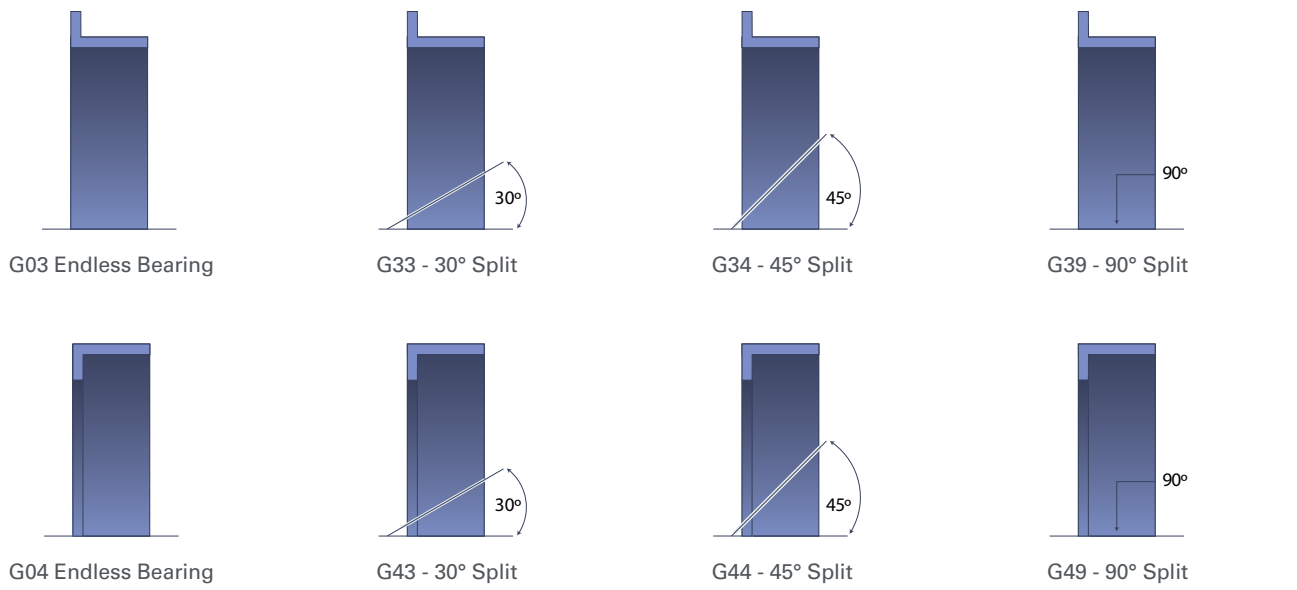


RECTANGULAR BEARINGS - CHAMFERED EDGES

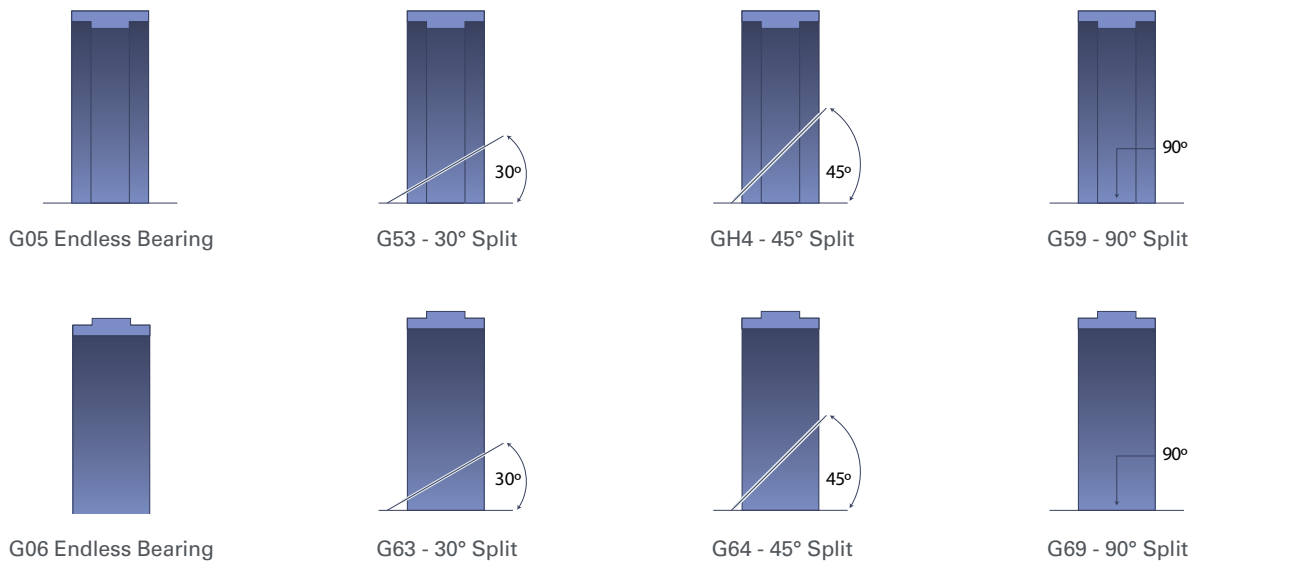


HALLITE G-SERIES BEARINGS

L BEARINGS - LEFT AND RIGHT FACING

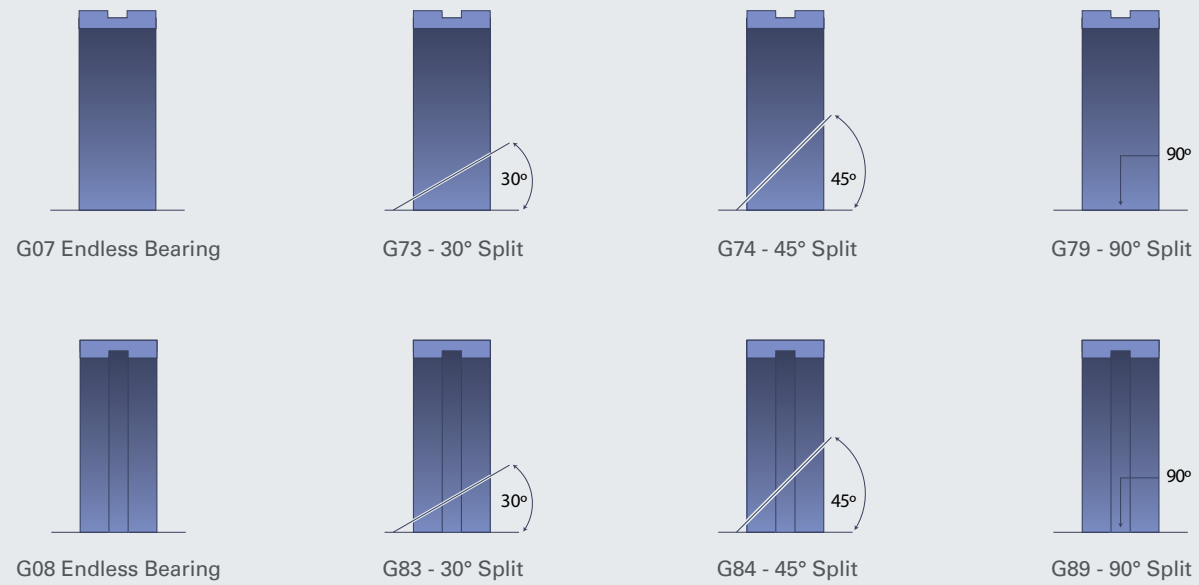


T BEARINGS - ID AND OD



HALLITE G-SERIES BEARINGS

U BEARINGS - ID AND OD



RELATED PRODUCTS

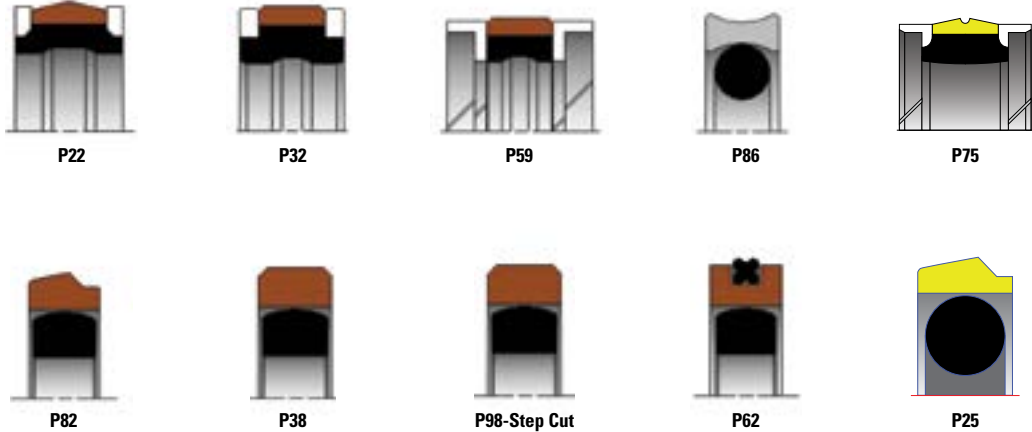


OTHER RELATED HALLITE PRODUCTS AVAILABLE

ROD SEALS



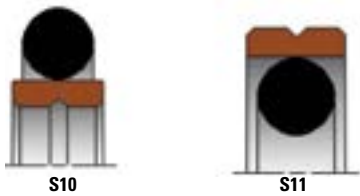
PISTON SEALS



WIPERS



SWIVEL SEALS





HALLITE SEALS

As a global provider of high-performance sealing solutions, Hallite's reputation is backed by 100 years of excellence in engineering, manufacturing, sustained technical support, and customer service. With some of the industry's shortest lead times, we bring to market a diverse portfolio of cataloged and customized sealing solutions made from materials that are formulated for performance-critical environments. From the off-highway equipment used in construction and infrastructure to the landing gear used in aerospace, Hallite fluid seals are key components utilized in the most demanding applications.

To meet growing worldwide demand, Hallite combines carefully chosen and managed inventory in local markets,

supported by fast-track molding and machining capabilities to provide high service levels. Hallite offers a broad range of catalog products, OEM custom molded and machined designs and custom on-demand machining capabilities from design to shipment.

Hallite operations can be found in strategic geographies throughout Asia Pacific, Western Europe, and North America. Combining an expansive global footprint with a dense network of strategic service partners completes our global presence; ensuring that the full range of Hallite products, capabilities, and expertise are always available when and where you need them most.



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