



**Norman Richards Pty Ltd**  
PO Box 6268  
Wetherill Park NSW 2164  
Phone: (02) 9757 2555  
Fax: (02) 9757 2511  
Email: Sales@nrseals.com.au



## **Master Seals Catalogue Imperial 2022 / 2023**

### **NR Seals Catalogue**

Website: <http://www.nrseals.com.au>

Email: [sales@nrseals.com.au](mailto:sales@nrseals.com.au)

Copyright © 2022 by Norman Richards Pty Ltd  
All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law.



# Contents

Imperial Seals

## PISTON DOUBLE ACTING

- 16. Piston Seals
- 44. Glide Rings
- 61. Piston Rings

## PISTON SINGLE ACTING

- 65. Piston Seals
- 115. Piston Seals with Wear Rings
- 120. Piston V Pack Sets
- 134. Piston Seals Pneumatic
- 145. Piston Cups

## ROD SEALS

- 161. Hydraulic Seals
- 216. Glide & Buffer Rings
- 229. Pneumatic Seals
- 237. V Pack Sets

## BEARINGS

- 291. Bearing Rings & Strip

## ANCILLARY

- 307. O-rings, Backup Washers & Quad Rings


















# Designs

Double Acting Seals

## Piston Seals


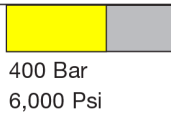
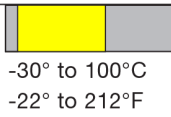
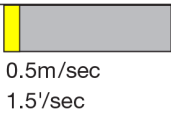

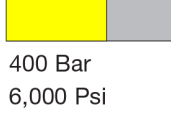
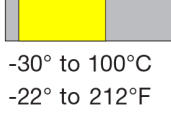
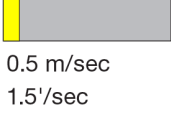

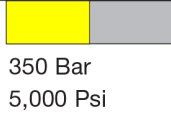
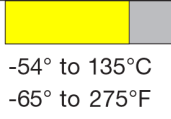
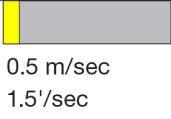


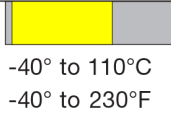
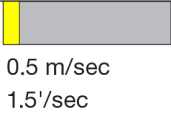

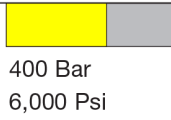
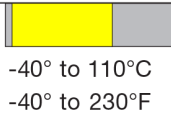
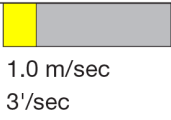
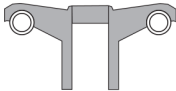
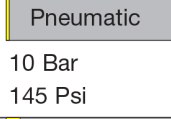

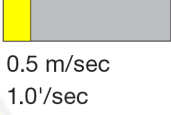
Type	Composition	Pressure	Temperature	Speed
	DPWL NBR fabric element Polyacetal wear rings	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
	DPW NBR fabric element Polyacetal wear rings	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5m/sec 1.5'/sec
	DPE NBR fabric element Polyacetal AE rings	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
	DP NBR fabric element	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5m/sec 1.5'/sec
	SPS NBR element Polyester support rings Polyacetal wear rings	500 Bar 7,000 Psi	-30° to 100°C -22° to 212°F	0.5m/sec 1.5'/sec
	SPL NBR element PTFE support rings Polyacetal wear rings	250 Bar 3,500 Psi	-30° to 100°C -22° to 212°F	0.5m/sec 1.5'/sec
	DSM NBR element Hytlrel support rings Polyacetal wear rings	700 Bar 10,000 Psi	-30° to 100°C -22° to 212°F	0.5m/sec 1.5'/sec
	JSW NBR element Polyester support rings Polyacetal wear rings	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5m/sec 1.5'/sec
	CPW Fluorotrel seal NBR energiser Polyacetal wear rings	350 Bar 5,000 Psi	-55° to 100°C -65° to 212°F	0.5m/sec 1.5'/sec
	TSW NBR element Nylon backing rings Polyacetal wear rings	250 Bar 3,500 Psi	-40° to 100°C -40° to 212°F	0.5m/sec 1.5'/sec
	PDW Polyurethane element Polyacetal split wear rings	400 Bar 6,000 Psi	-40° to 100°C -40° to 212°F	0.5m/sec 1.5'/sec



# Designs

Double Acting Seals

## Piston Seals

Type	Composition	Pressure	Temperature	Speed
	SPE NBR element Hytrek support rings Polyacetal wear rings	 400 Bar 6,000 Psi	 -30° to 100°C -22° to 212°F	 0.5m/sec 1.5'/sec
	JSH NBR element Polyester support rings	 400 Bar 6,000 Psi	 -30° to 100°C -22° to 212°F	 0.5 m/sec 1.5'/sec
	CPS Fluorotrel seal NBR energiser	 350 Bar 5,000 Psi	 -54° to 135°C -65° to 275°F	 0.5 m/sec 1.5'/sec
	TPS NBR element Nylon backing rings	 350 Bar 5,000 Psi	 -40° to 110°C -40° to 230°F	 0.5 m/sec 1.5'/sec
	PDA Polyurethane face Polyurethane energiser	 400 Bar 6,000 Psi	 -40° to 110°C -40° to 230°F	 1.0 m/sec 3'/sec
	TET NBR bonded to Steel Piston	 Pneumatic 10 Bar 145 Psi	 -20° to 100°C -13° to 212°F	 0.5 m/sec 1.0'/sec

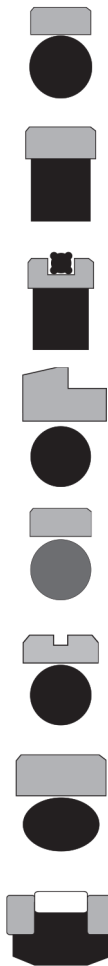




# Designs

Double Acting Seals

## Glide Rings



Type	Composition	Pressure	Temperature	Speed
GP2	Filled PTFE face O-ring expander	350 Bar 5,000 Psi	-40° to 110°C -40° to 230°F	4 m/sec 12'/sec
GP2	Filled PTFE face Square expander	350 Bar 5,000 Psi	-40° to 110°C -40° to 230°F	4 m/sec 12'/sec
GP2	Bronze filled PTFE face + Quad ring Square expander	350 Bar 5,000 Psi	-40° to 110°C -40° to 230°F	3 m/sec 9'/sec
GP3 <i>Made to Order</i>	Bronze filled PTFE face O-ring expander Single acting	350 Bar 5,000 Psi	-40° to 110°C -40° to 230°F	4 m/sec 12'/sec
GP4	Filled PTFE face VITON o-ring expander	350 Bar 5,000 Psi	-20° to 200°C -5° to 392°F	4 m/sec 12'/sec
GP6	Polyurethane face 60 Shore D O-ring expander	350 Bar 5,000 Psi	-40° to 110°C -40° to 230°F	1.0 m/sec 3'/sec
GP8	Step cut nylon face Oval expander	350 Bar 5,000 Psi	-30° to 120°C -22° to 250°F	1.5 m/sec 5'/sec
PHD	Filled PTFE face NBR T-Expander Hard AE rings	400 Bar 6,000 Psi	-30° to 120°C -22° to 250°F	1.5 m/sec 5'/sec

## 03 Piston Rings



PR1	Cast iron	Pressure, temperature and speed have little effect on the piston ring.
-----	-----------	--





# Designs

Single Acting Seals

## Piston Seals



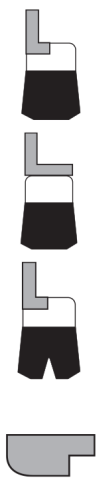
Type	Composition	Pressure	Temperature	Speed
14	Polyurethane u-ring Bevelled lips Asymmetrical	400 Bar 6,000 Psi	-40° to 110°C -40° to 230°F	0.8 m/sec 2.5'/sec
15	Polyurethane u-ring Bevelled lips Symmetrical	400 Bar 6,000 Psi	-40° to 110°C -40° to 230°F	0.8 m/sec 2.5'/sec
30	Polyurethane u-ring Bevelled lips NBR expander	400 Bar 6,000 Psi	-40° to 110°C -40° to 230°F	0.8 m/sec 2.5'/sec
35	Polyurethane u-ring Square lips NBR expander	400 Bar 6,000 Psi	-40° to 110°C -40° to 230°F	0.8 m/sec 2.5'/sec
40	Viton 90 Shore A u-ring Viton expander Bevelled lips	150 Bar 2,000 Psi	-20° to 200°C -5° to 392°F	0.5 m/sec 1.5'/sec
45	Viton 90 Shore A u-ring Viton expander Square lips	150 Bar 2,000 Psi	-20° to 200°C -5° to 392°F	0.5 m/sec 1.5'/sec
CPE	NBR fabric Polyacetal AE ring	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
CP	NBR fabric Bevelled lips	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
GPE	NBR fabric Polyacetal AE ring Bevelled lips	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
GP	NBR fabric Bevelled lips	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec



# Designs

Single Acting Seals

## Piston Seals with Wear Rings



Type	Composition	Pressure	Temperature	Speed
CPL	NBR fabric Polyacetal wear ring	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
CPWL	NBR fabric Polyacetal wear ring	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
GPW	NBR fabric Polyacetal wear ring	400 Bar 6000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
PSR	Polyacetal retainer		-30° to 100°C -22° to 212°F	

## 06 Piston V Pack Sets



VS1	Nylon adapters Hytrel low press. Vees NBR fabric Vees	700 Bar 10,000 Psi	-40° to 110°C -40° to 230°F	0.5 m/sec 1.5'/sec
VS5	Nylon adapters Hytrel low press. Vees Nylon Vees	400 Bar 6,000 Psi	-55° to 135°C -65° to 270°F	0.5 m/sec 1.5'/sec
VS7	Nylon adapters + ret. Hytrel low press. Vees Nylon Vees	400 Bar 6,000 Psi	-55° to 135°C -65° to 270°F	0.5 m/sec 1.5'/sec

## 07 Piston Seals Pneumatic



DE	NBR asymmetrical	16 Bar 230 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
U	NBR symmetrical	16 Bar 230 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec



# Designs

Single Acting Seals

## Piston Cups



Type	Composition	Pressure	Temperature	Speed
CSF	NBR fabric Piston cup seal	175 Bar 2,500 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
CSR	NBR Pneumatic Piston cup seal	41 Bar 600 Psi	-30° to 90°C -22° to 195°F	0.5 m/sec 1.5'/sec
CST	Polyurethane light duty Piston cup seal	100 Bar 1500 Psi	-40° to 110°C -40° to 230°F	0.5 m/sec 1.5'/sec
CSS	Polyurethane medium duty Piston cup seal	350 Bar 5,000 Psi	-40° to 110°C -40° to 230°F	0.5 m/sec 1.5'/sec







# Designs

## Rod Seals

### Hydraulic Seals


















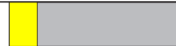




Type	Composition	Pressure	Temperature	Speed
15	Polyurethane u-ring Bevelled lips Symmetrical	400 Bar 6,000 Psi	-40° to 110°C -40° to 230°F	0.8 m/sec 2.5'/sec
23	Polyurethane u-ring Bevelled lips Asymmetrical	400 Bar 6,000 Psi	-40° to 110°C -40° to 230°F	0.8 m/sec 2.5'/sec
30	Polyurethane u-ring Bevelled lips NBR expander	400 Bar 6,000 Psi	-40° to 110°C -40° to 230°F	0.8 m/sec 2.5'/sec
35	Polyurethane u-ring Square lips NBR expander	400 Bar 6,000 Psi	-40° to 110°C -40° to 230°F	0.8 m/sec 2.5'/sec
36	Polyurethane shell Bevelled lips NBR expander	350 Bar 5000 Psi	-54° to 129°C -65° to 265°F	0.8 m/sec 2.5'/sec
38	Polyurethane u-ring NBR expander Polyacetal AE ring	400 Bar 6,000 Psi	-40° to 110°C -40° to 230°F	0.8 m/sec 2.5'/sec
40	Viton 90 Shore A u-ring Bevelled lips Viton expander	150 Bar 2,000 Psi	-20° to 200°C -5° to 392°F	0.5 m/sec 1.5'/sec
45	Viton 90 Shore A u-ring Square lips Viton expander	150 Bar 2,000 Psi	-20° to 200°C -5° to 392°F	0.5 m/sec 1.5'/sec
CP	NBR fabric Bevelled lips	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
CPI	NBR fabric Bevelled lips Polyacetal AE ring	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec




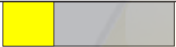

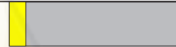
# Designs

Rod Seals


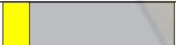

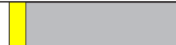

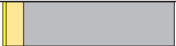

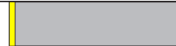
## Glide & Buffer Rings

Type	Composition	Pressure	Temperature	Speed
	GR2 Filled PTFE flat face NBR o-ring	 400 Bar 6,000 Psi	 -30° to 120°C -22° to 250°F	 4 m/sec 12'/sec
	GR3 Filled PTFE stepped face NBR o-ring	 350 Bar 5,000 Psi	 -30° to 120°C -22° to 250°F	 4 m/sec 12'/sec
	GR5 Filled PTFE stepped face Viton o-ring	 350 Bar 5,000 Psi	 -20° to 200°C -4° to 392°F	 4 m/sec 12'/sec
	GRU Polyurethane ring	 400 Bar 6,000 Psi	 -40° to 110°C -40° to 230°F	 0.8 m/sec 2.5'/sec
	HBY Polyurethane Polyacetyl AE ring	 500 Bar 7,000 Psi	 -40° to 110°C -40° to 230°F	 1.0 m/sec 3.0'/sec

## Double Acting Seals

	TRS NBR element Nylon backing rings	 250 Bar 3,500 Psi	 -30° to 100°C -22° to 212°F	 0.5 m/sec 1.5'/sec
---	--	--	---	--

## Pneumatic Seals

	DI NBR asymmetrical	 115 Bar 1,700 Psi	 -30° to 110°C -22° to 230°F	 0.5 m/sec 1.5'/sec
	U NBR symmetrical	 15 - 85 Bar 230 - 1,250 Psi	 -30° to 100°C -22° to 212°F	 0.3 m/sec 1.0'/sec



# Designs

Rod Seals

## V Pack Sets



Type	Composition	Pressure	Temperature	Speed
VS1	Nylon adapters Hytrel low press. Vees NBR fabric Vees	700 Bar 10,000 Psi	-40° to 110°C -40° to 230°F	0.5 m/sec 1.5'/sec
VS5	Nylon adapters Hytrel low press. Vees Nylon Vees	400 Bar 6,000 Psi	-55° to 135°C -65° to 270°F	0.5 m/sec 1.5'/sec
SM1	Hytrel top NBR element Polyacetal AE ring	700 Bar 10,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec
SM3	Hytrel top NBR element	400 Bar 6,000 Psi	-30° to 100°C -22° to 212°F	0.5 m/sec 1.5'/sec





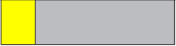





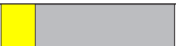











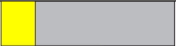
















# Designs

Rod Wipers

## Inserted & Metal Encased

Type	Composition	Temperature	Speed
 940	Polyurethane Machined lip	 -40° to 110°C -40° to 230°F	 1.0 m/sec 3.0'/sec
 CSW	Nylon MOS <sub>2</sub>	 -40° to 100°C -40° to 212°F	 5.0 m/sec 15.0'/sec
 DU	Polyurethane Machined lip	 -40° to 110°C -40° to 230°F	 1.0 m/sec 3.0'/sec
 DV	Viton	 -20° to 200°C -4° to 392°F	 0.5 m/sec 1.5'/sec
 EW	Polyurethane	 -40° to 110°C -40° to 230°F	 3.0 m/sec 9.0'/sec
 GPH	NBR 90 Shore A	 -30° to 100°C -22° to 212°F	 3.0 m/sec 9.0'/sec
 HU	Polyurethane	 -30° to 100°C -22° to 212°F	 1.0 m/sec 3.0'/sec
 PWB	NBR 90 Shore A	 -30° to 100°C -22° to 212°F	 3.0 m/sec 9.0'/sec
 PWK	Polyurethane	 -40° to 110°C -40° to 230°F	 3.0 m/sec 9.0'/sec
 PWM	NBR 90 Shore A	 -30° to 100°C -22° to 212°F	 3.0 m/sec 9.0'/sec
 PWO	NBR 90 Shore A	 -30° to 100°C -22° to 212°F	 3.0 m/sec 9.0'/sec



# Designs

Rod Wipers

## Inserted & Metal Encased



Type	Composition	Temperature	Speed
PWS	NBR 90 Shore A Sealing bead	-30° to 100°C -22° to 212°F	3.0 m/sec 9.0'/sec
RWK	NBR 90 Shore A Machined lip	-30° to 100°C -22° to 212°F	3.0 m/sec 9.0'/sec
WTN	PTFE wiper NBR o-ring	-30° to 120°C -22° to 250°F	15.0 m/sec 50.0'/sec } Please call
MCR	NBR 90 Shore A Metal encased	-30° to 100°C -22° to 212°F	1.0 m/sec 3.0'/sec
MCU	Polyurethane wiper Metal encased	-40° to 105°C -40° to 215°F	1.0 m/sec 3.0'/sec
S34	Brass wiper NBR expander	-30° to 120°C -22° to 250°F	4.0 m/sec 12'/sec
PWC	Polyurethane (cascade)	-50° to 105°C -65° to 220°F	3.0 m/sec 9.0'/sec






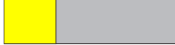














# Designs

Bearings

## Bearing Rings & Strip

Type	Composition	Dynamic Load	Temperature	Speed
 B1	Glass filled Nylon ring	 45N/mm <sup>2</sup> @ 25°C Max	 -40° to 110°C -40° to 230°F	 5 m/sec 15'/sec
 GT	Bronze filled PTFE Strip	 15N/mm <sup>2</sup> @ 25°C Max	 -50° to 200°C -58° to 392°F	 5 m/sec 15'/sec
 B5	Glass filled Polyacetal ring	 40N/mm <sup>2</sup> @ 25°C Max	 -40° to 110°C -40° to 230°F	 5 m/sec 15'/sec
 AWL	Nylon ring	 40N/mm <sup>2</sup> @ 25°C Max	 -40° to 110°C -40° to 230°F	 5 m/sec 15'/sec



















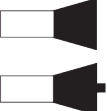
# Designs

Ancillary

## O-rings, Backup Washers & Quad Rings

Type	Composition	
 2	Imperial o-ring NBR70, NBR90 Polyurethane, Viton	
 3	Metric o-ring NBR70, NBR90 Polyurethane, Viton	
 4	Quad ring NBR70	
 8	Imperial backup NBR90, Polyurethane Hytrel, PTFE	
 9	Metric backup Hytrel, PTFE	

## Grab Kits, Flange Seals & Bonded Washers

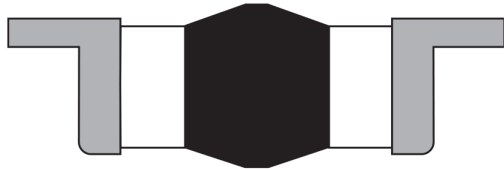
	GKI	O-rings, Backups Bonded washers Flange seals	
	11	Dual durometer Polyurethane Type 61 flange	  200 Bar                      -40° to 95°C 3,000 Psi                    -40° to 195°F
	CFS	Polyurethane Type 61 & 62 flange	  400 Bar                      -40° to 110°C 6,000 Psi                    -40° to 230°F
	BW	Steel ring NBR stabiliser	



# DPWL

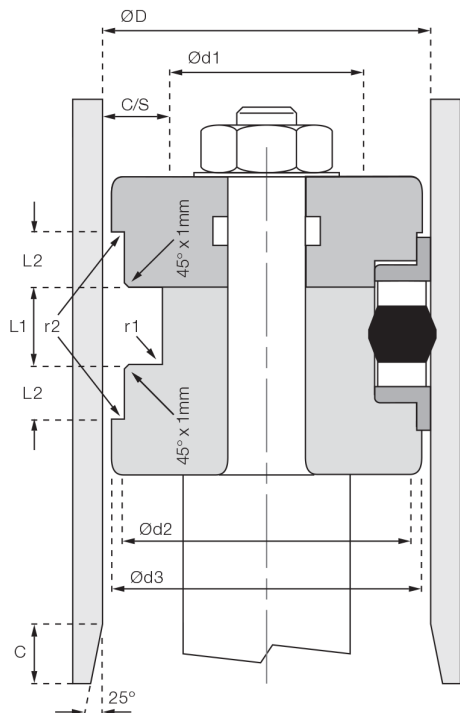
Piston Seals

Double acting seals



## Key Features

- Medium to heavy duty
- Split piston
- Will tolerate contamination
- High load capability
- Proven robust design



## Design

DPWL is for use on split pistons. This precision moulded NBR element is bonded with rubberised fabric reinforcements and with additional full width Polyacetal anti-extrusion bearing rings at each end to allow for larger machining clearances between piston head and cylinder bore and higher system pressures. Designed with enough radial interference to effectively seal at low pressure, its cross section is thicker and shorter than its housing. Can appear to have too much room after fitting to piston however this allows for dramatic expansion upon assembly. Rubberised fabric has the advantage of retaining the sealing media within its surface, reducing friction and wear.

## Operating Conditions

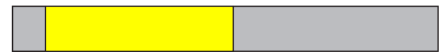
### Pressure

400 Bar  
6,000 Psi



### Temperature

-30° to 100°C  
-22° to 212°F



### Speed

0.5m/sec  
1.5'/sec



### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

### Tolerances

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
H11	js11	H9	js11	-0.000 +0.010	-0.000 +0.005

### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r1	0.008	0.008	0.008	0.008	0.015
r2	0.008	0.008	0.008	0.008	0.015

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

### Similar Styles





# DPW

## Piston Seals

### Design

DPW is for use on split pistons. This precision moulded NBR element is bonded with rubberised fabric reinforcements. The Polyacetal bearing rings also support the piston head under side load conditions preventing metal-to-metal contact. The bearings, being an integral part of the unit, react quickly to increasing pressures closing the extrusion gap. Designed with enough radial interference to effectively seal at low pressure, its cross section is thicker and shorter than its housing. Can appear to have too much room after fitting to piston, however, this allows for dramatic expansion upon assembly. Rubberised fabric has the advantage of retaining the sealing media within its surface, reducing friction and wear.

### Operating Conditions

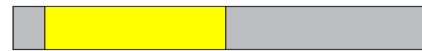
#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-30° to 100°C  
-22° to 212°F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{ØD}$	$\text{Ød1}$	$\text{Ød2}$	$\text{Ød3}$	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

#### Tolerances

$\text{ØD}$	$\text{Ød1}$	$\text{Ød2}$	$\text{Ød3}$	L1	L2
H11	js11	js10	js11	-0.000 +0.010	-0.000 +0.005

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r1	0.008	0.015	0.025	0.031	0.046
r2	0.008	0.008	0.008	0.008	0.015

#### Typical Examples

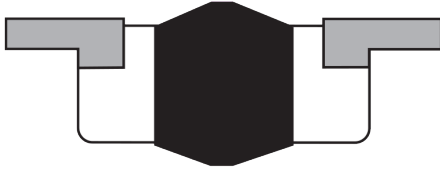
Reciprocating  Rotary  Oscillating  Helix



#### Similar Styles



Double acting seals



### Key Features

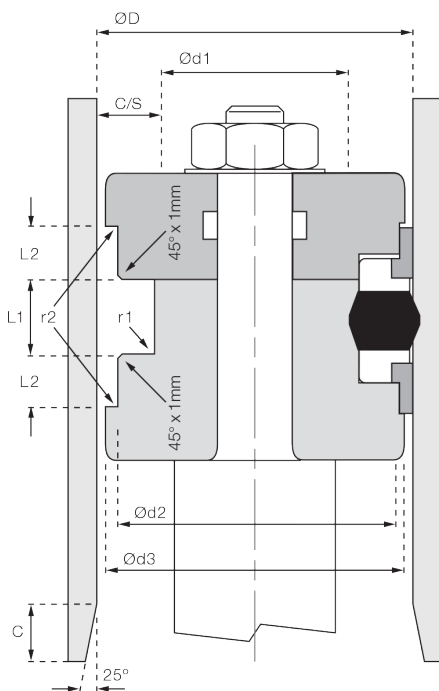
Medium to heavy duty

Split piston

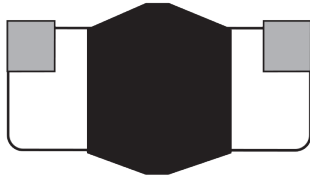
Proven robust design

Will tolerate contamination

Pressure activated bearing rings

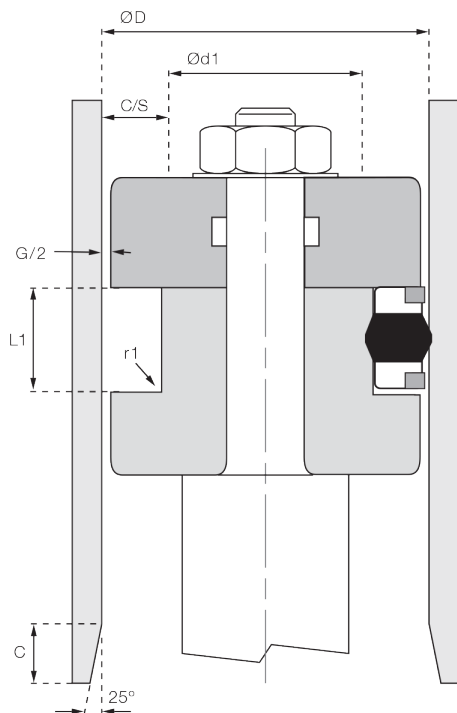


Double acting seals



### Key Features

- Medium to heavy duty
- One piece piston
- Compact piston
- Higher pressure capability



# DPE

## Piston Seals

### Design

DPE is for use on split pistons. This precision moulded NBR element is bonded with rubberised fabric reinforcements. The Polyacetal AE rings allow larger machining clearances and permit higher working pressures. The AE rings, being an integral part of the unit, react quickly to increasing pressures, closing the extrusion gap. Can appear to have too much room after fitting to piston however this allows for dramatic expansion upon assembly. Rubberised fabric has the advantage of retaining the sealing media within its surface, reducing friction and wear.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



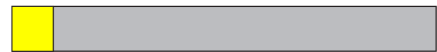
#### Temperature

-30° to 100°C  
-22° to 212°F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{ØD}$	$\text{Ød1}$	L1
0.1-0.25	0.8	2.0

#### Tolerances

$\text{ØD}$	$\text{Ød1}$	L1
H11	js11	-0.000 +0.010

#### Chamfer Radii

C/S	5/16	3/8	1/2
C	0.156	0.187	0.218
r1	0.025	0.031	0.046

#### Extrusion Gap G

Pressure	3,750	6,000
	0.024	0.016

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

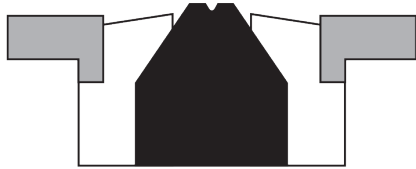




# SPS

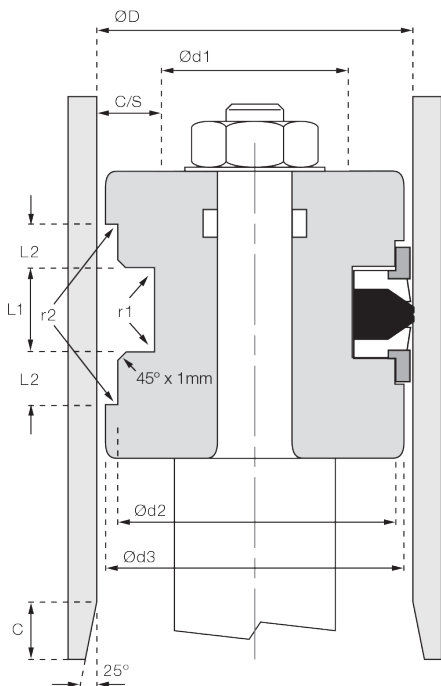
## Piston Seals

Double acting seals



### Key Features

- Medium to heavy duty
- One piece piston
- Relatively compact
- Easy assembly
- Medium / high pressure capability



### Design

SPS are primarily used on one piece pistons, the five part assembly consists of an endless precision moulded NBR sealing element supported at each side with anti-extrusion angle split support rings made of Polyester. The support rings are designed to accommodate split Polyacetal anti-extrusion bearing rings. This design allows the anti-extrusion bearing rings to react to increasing cylinder bores as pressures rise. The final assembly achieves a robust sealing unit designed for work at higher pressures. SPS are also suitable for use on two piece pistons of the same housing dimensions.

### Operating Conditions

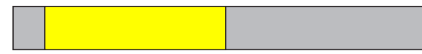
#### Pressure

500 Bar  
7,000 Psi



#### Temperature

-30° to °100 C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5"/sec



#### Surface Finish $\mu mRa$

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

#### Tolerances

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
H10	h9	h9	h11	-0.000 +0.010	-0.000 +0.005

#### Chamfer Radii

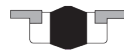
C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r1	0.008	0.008	0.008	0.008	0.015
r2	0.008	0.008	0.008	0.008	0.015

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



#### Similar Styles







# SPL

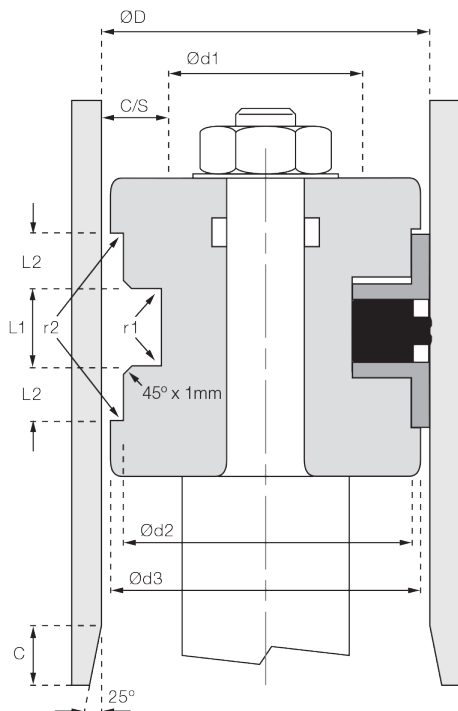
## Piston Seals

Double acting seals



### Key Features

- Light to medium duty
- One piece piston
- Compact design
- Easy assembly
- Low pressure sealing



### Design

SPL five part assembly, comprises a precision moulded NBR sealing element with endless PTFE anti-extrusion rings to the outside diameter. These rings are designed to be pre-loaded on assembly, providing a more positive seal. Split Polyacetal anti-extrusion bearing rings are added on either side to provide support for the piston head. This compact one piece piston seal has proven effective over a wide range of applications.

### Operating Conditions

#### Pressure

250 Bar  
3,500 Psi



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

#### Tolerances

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
H10	h9	h9	h9	-0.000 +0.010	+0.000 -0.005

#### Chamfer Radii

C/S	5/32	3/16	1/4	5/16
C	0.078	0.093	0.125	0.156
r1	0.008	0.008	0.008	0.016
r2	0.008	0.008	0.008	0.016

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



#### Similar Styles



# DSM

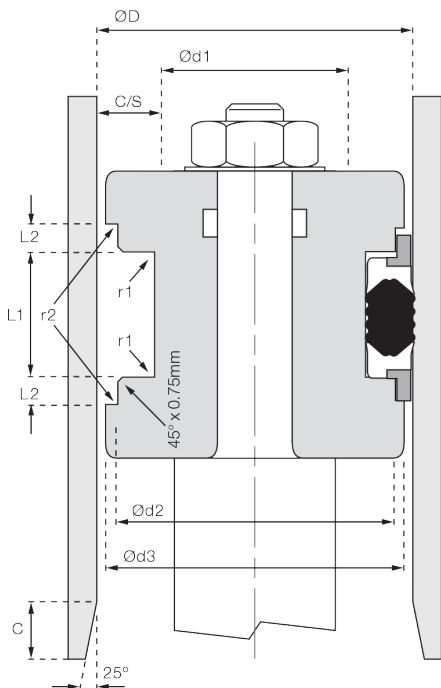
## Piston Seals

Double acting seals



### Key Features

- Heavy duty
- One piece piston
- Solid 5 part design
- High pressure capability
- Shock load resistant



### Design

DSM piston seal is a five piece assembly, consisting of a NBR sealing element supported by two thermoplastic elastomer headers with Polyacetal anti-extrusion bearing rings on the outside diameter. The complete assembly forms a highly robust sealing unit for use in high pressure applications where shock loads and pressure spikes are present. The rubber element has grease/oil retaining grooves to help reduce friction and wear. The two thermoplastic elastomer headers can be angle cut to ease fitting if required.

### Operating Conditions

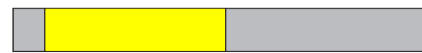
#### Pressure

600 Bar  
8,750 Psi



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

#### Tolerances

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
H11	h10	js10	js11	-0.000 +0.010	-0.000 +0.005

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r1	0.008	0.008	0.008	0.008	0.015
r2	0.008	0.008	0.008	0.008	0.015

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



#### Similar Styles



# JSW

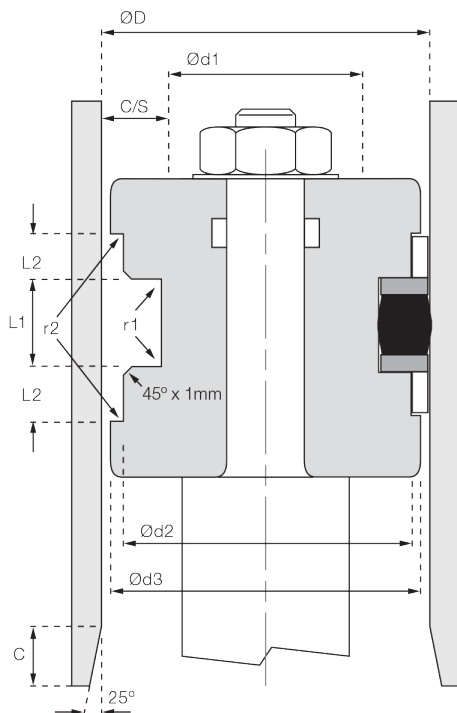
Piston Seals

Double acting seals



## Key Features

- Medium duty
- One piece piston
- Compact design
- Agriculture industry regular



## Design

JSW are used on one and two piece pistons. This five part assembly consists of an endless precision moulded NBR sealing element supported at each side with anti-extrusion angle split support rings made of Polyester. In some sizes an oil retaining groove is present to help reduce wear and friction. The use of bearing rings will help provide better piston and rod alignment therefore avoiding metal to metal contact. This will result in longer lasting cylinder parts and extended seal life as some of the contaminants will embed into the softer bearing ring. They are generally of relatively low cost.

## Operating Conditions

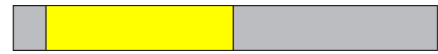
### Pressure

400 Bar  
6,000 Psi



### Temperature

-30° to 100° C  
-22° to 212° F



### Speed

0.5m/sec  
1.5'/sec



### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

### Tolerances

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
H11	h10	f9	h11	-0.000 +0.010	-0.000 +0.005

### Chamfer Radii

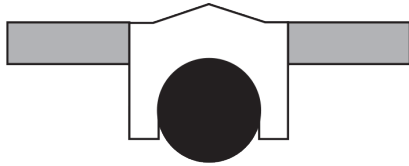
C/S	3/16	1/4	3/8
C	0.093	0.125	0.187
r1	0.008	0.015	0.031
r2	0.008	0.008	0.008

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

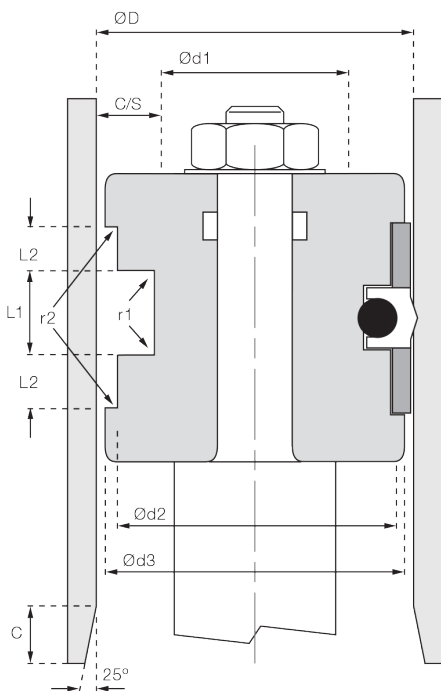


### Similar Styles



### Key Features

- Medium duty
- One piece piston
- Compact piston
- Bearing ring support
- Agriculture industry regular



# CPW

## Piston Seals

### Design

CPW crown seal is a squeeze type double acting seal with bearing support rings. An o-ring is used as a loading spring and to seal the static surface. The crowned sealing surface produces a positive seal from vacuum to high pressure, due to a narrow single line seal contact area. The dynamic sealing element is made from a grade of polyurethane and can give good life on relatively rough sealing surfaces. This seal is designed to retro-fit T seals, PSP, PDA and SS double acting seals as well as o-rings and quad rings.

### Operating Conditions

#### Pressure

350 Bar  
5,000 Psi



#### Temperature

-55° to 100° C  
-65° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish µmRa

ØD	Ød1	Ød2	Ød3	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

#### Tolerances

Replacement seal assembly for existing housings

#### Chamfer Radii

Replacement seal assembly for existing housings

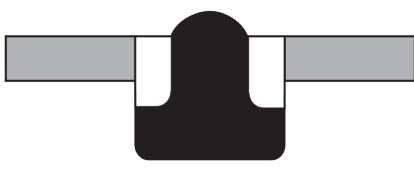
#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



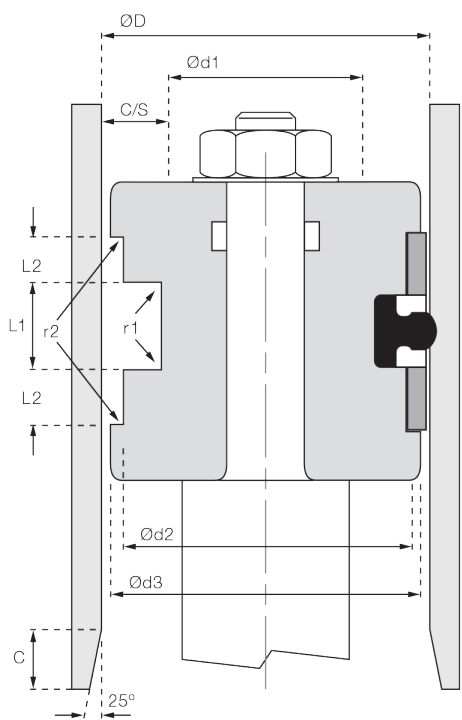
#### Similar Styles

Double acting seals



### Key Features

- Medium duty
- One piece piston
- Compact piston
- Bearing ring support
- Agriculture industry regular



# TSW

## Piston Seals

### Design

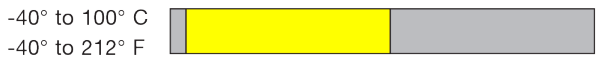
TSW was originally designed as an improvement over using an o-ring by itself in a piston groove. For use on solid pistons this double acting seal is an NBR element with two anti-extrusion back up rings. This design helps eliminate the problems of spiralling and extrusion often associated with using just an o-ring. The use of bearing rings will help provide better piston and rod alignment therefore avoiding metal-to-metal contact. This will result in longer lasting cylinder parts and extended seal life as some of the contaminants will embed into the softer bearing ring. They are generally of relatively low cost.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish µmRa

ØD	Ød1	Ød2	Ød3	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

#### Tolerances

Replacement seal assembly for existing housings

#### Chamfer Radii

Replacement seal assembly for existing housings

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

#### Similar Styles

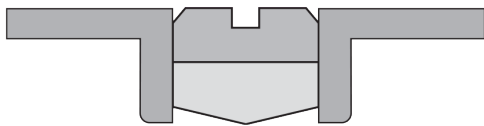




# PDW

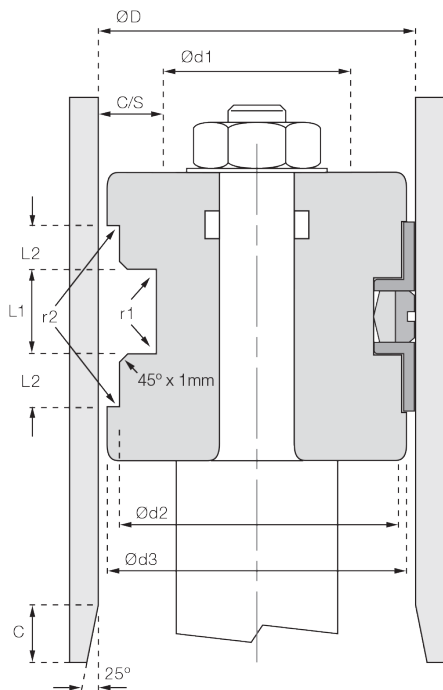
## Piston Seals

Double acting seals



### Key Features

- Compact design
- Unique anti-extrusion design
- Medium duty
- One piece piston



### Design

PDW seal assembly consists of our dual durometer PDA piston seal suitable for one piece pistons with unique split wear rings at each end to avoid metal to metal contact. The unique design protects the seal against extrusion.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-40° to 100°C  
-40° to 212°F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d1$	L1
0.1 to 0.25	0.8	2.0

#### Tolerances

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
H9	js10	-0.001 +0.001	-0.004 +0.004	-0.0 +0.015	-0.0 +0.005

#### Chamfer Radii

C/S	3/16
C	0.093
r1	0.008
r2	0.008

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

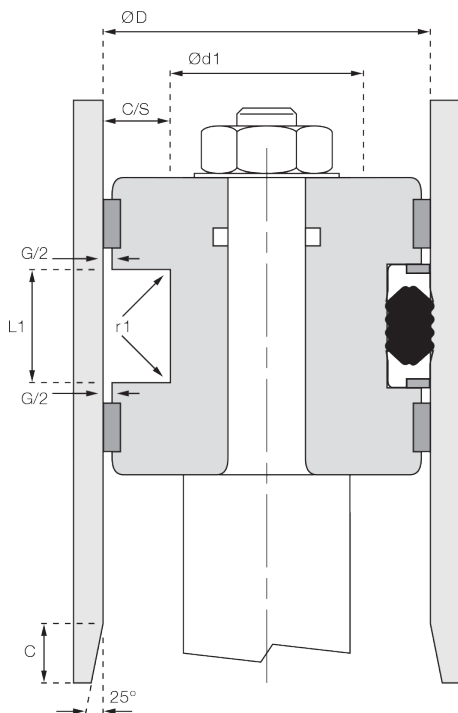


#### Similar Styles



### Key Features

- Medium to heavy duty
- One piece piston
- Compact piston
- Higher pressure capability



# SPE

## Piston Seals

### Design

SPE are primarily used on one piece pistons, the five part assembly consists of an endless precision moulded NBR sealing element supported at each side with anti-extrusion angle split support rings made of Polyester. The support rings are designed to accommodate split Polyacetal anti-extrusion rings. This design allows the anti-extrusion rings to react to increasing cylinder bores as pressures rise. The final assembly achieves a robust sealing unit designed for work at higher pressures.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-30° to 100°C  
-22° to 212°F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish µmRa

ØD	Ød1	L1
0.1-0.25	0.8	2.0

#### Tolerances

ØD	Ød1	L1
H11	H10	-0 + 0.010

#### Chamfer Radii

C/S	1/4	5/16	3/8	1/2
C	0.125	0.156	0.187	0.218
r	0.015	0.025	0.031	0.046

#### Extrusion Gap G

Pressure	2,500	4,750	6,000
	0.024	0.020	0.010

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



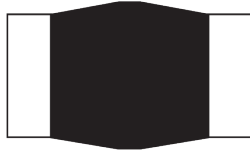
#### Similar Styles



# JSH

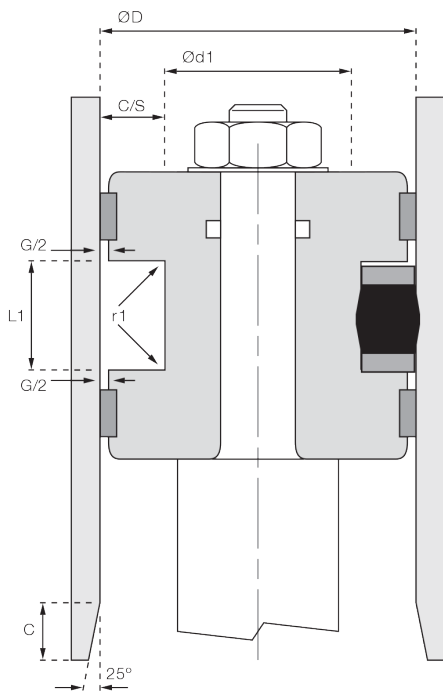
## Piston Seals

Double acting seals



### Key Features

- Medium duty
- One piece piston
- Compact piston
- Bearing ring support



### Design

JSH are used on one and two piece pistons. This three part assembly consists of an endless precision moulded NBR sealing element supported at each side with anti-extrusion angle split support rings made of Polyester. In some sizes an oil retaining groove is present to help reduce wear and friction. Can also be used as a double acting rod seal but should not be used in single acting applications.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish µmRa

ØD	Ød1	L1
0.1-0.25	0.8	2.0

#### Tolerances

ØD	Ød1	L1
H11	js11	-0 +0.010

#### Chamfer Radii

	3/16	1/4	3/8
C/S			
C	0.093	0.125	0.187
r	0.008	0.015	0.031

#### Extrusion Gap G

Pressure	3,750	6,000
G	0.010	0.004

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



#### Similar Styles



# CPS

## Piston Seals

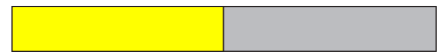
### Design

CPS crown seal is a squeeze type double acting seal for a one piece piston. An o-ring is used as a loading spring and to seal the static surface. The crowned sealing surface produces a positive seal from vacuum to high pressure, due to a narrow single line seal contact area. The dynamic sealing element is made from a grade of polyurethane and can give good life on relatively rough sealing surfaces. This seal is designed to retrofit T seals, PSP, PDA and SS double acting seals as well as o-rings and quad rings.

### Operating Conditions

#### Pressure

350 Bar  
5,000 Psi



#### Temperature

-54° to 135° C  
-65° to 275° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d1$	L1
0.1-0.25	0.8	2.0

#### Tolerances

	$\varnothing D$	$\varnothing d1$	L1
	-0.000	+0.000	-0.000
<2.750	+0.002	-0.002	+0.005
<6.000	+0.004	-0.004	+0.005

#### Chamfer Radii

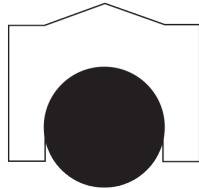
	1/8	3/16	1/4
C/S			
C	0.125	0.156	0.187
r1	0.016	0.032	0.032

#### Extrusion Gap G

Pressure	2,000	5,000
	0.018	0.006

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



### Key Features

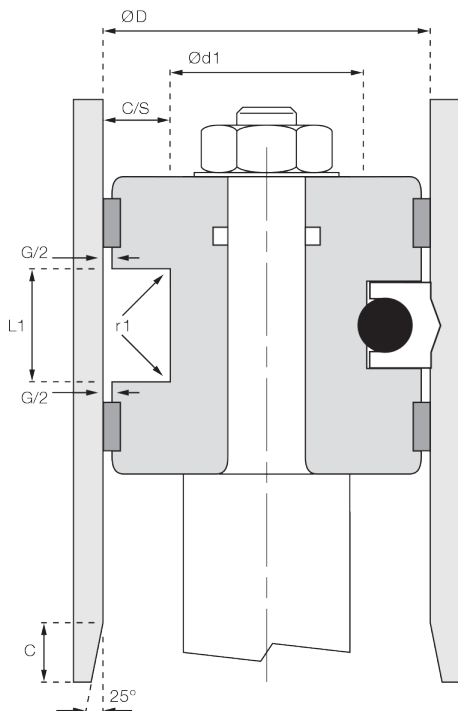
Medium duty

One piece piston

Compact design

Broad temperature range

Agriculture industry regular

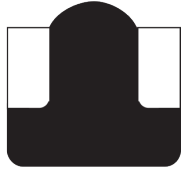




# TPS

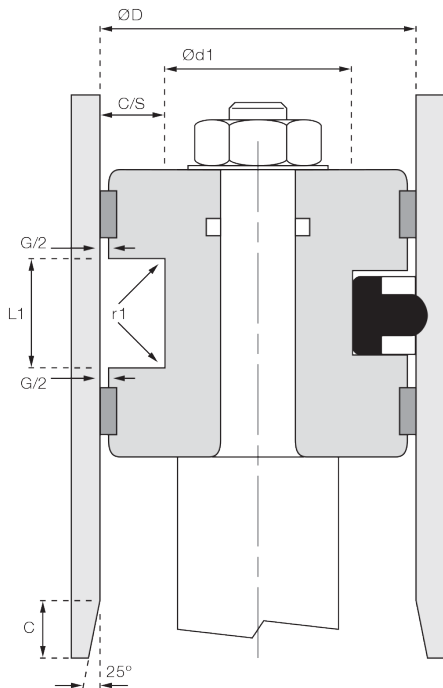
## Piston Seals

Double acting seals



### Key Features

- Medium duty
- One piece piston
- Compact design
- Agriculture industry regular



### Design

TPS was originally designed as an improvement over using an o-ring by itself in a piston groove. For use on solid pistons this double acting seal is an NBR element with two anti-extrusion back up rings generally made from nylon. This design helps eliminate the problems of spiralling and extrusion often associated with using just an o-ring. The popular sizes have interlocking backup rings for easier installation.

### Operating Conditions

#### Pressure

250 Bar 3,500 Psi	Call for advice
----------------------	-----------------

#### Temperature

-40° to 100° C -40° to 212° F	
----------------------------------	--

#### Speed

0.5m/sec 1.5'/sec	
----------------------	--

#### Surface Finish $\mu\text{mRa}$

$\text{ØD}$	$\text{Ød1}$	L1
0.1-0.25	0.8	2.0

#### Tolerances

	$\text{ØD}$	$\text{Ød1}$	L1
	-0.000	-0.000	-0.000
<2.750	+0.002	+0.002	+0.005
<3.750	+0.004	+0.003	+0.005
<6.250	+0.006	+0.004	+0.005

#### Extrusion Gap G

$\text{ØD}$	1/2	1 3/4	4 7/8	9	>9
G	0.004	0.005	0.007	0.009	0.010

#### Chamfer Radii

	1/8	3/16	1/4
C/S			
C	0.125	0.156	0.187
r1	0.016	0.032	0.032

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix







# PDA

## Piston Seals

### Design

PDA are a dual durometer, one piece double acting piston seal. Consisting of a 60 Shore D dynamic sealing and wear lamina bonded to a 57 Shore A static sealing and activation lamina. The material used for the static lamina has high resilience and extremely low compression set. It functions as a seal energising spring element and assures positive sealing performance throughout a broad pressure range. The dynamic sealing element is made of a harder material, selected for its high abrasion resistant qualities. PDA seals can be readily substituted in existing cavities to replace other types of double acting seals such as, TPS, PSP, CPS, MPT seal and some glide ring sizes.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-40° to 100°C  
-40° to 212°F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d1$	L1
0.1-0.25	0.8	2.0

#### Tolerances

	$\varnothing D$	$\varnothing d1$	L1
	-0.000	-0.000	-0.000
<2.750	+0.002	+0.002	+0.005
<3.750	+0.004	+0.003	+0.005
<6.250	+0.006	+0.004	+0.005

#### Extrusion Gap G

Pressure	1,500	2,400	3,750	5,000
	0.024	0.020	0.016	0.012

#### Typical Examples

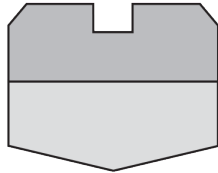
Reciprocating  Rotary  Oscillating  Helix



#### Similar Styles

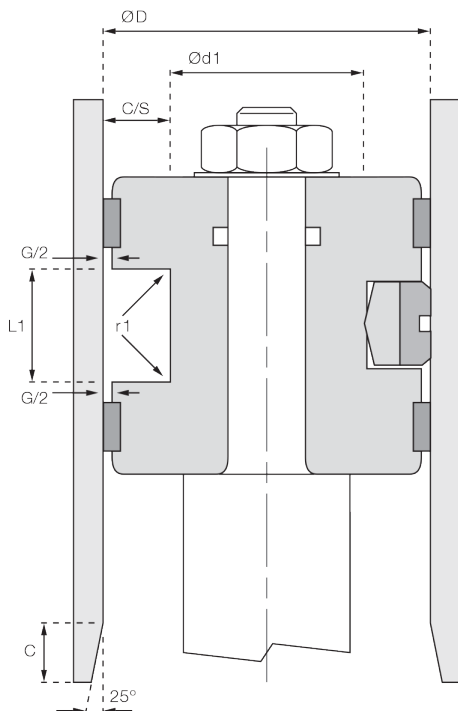


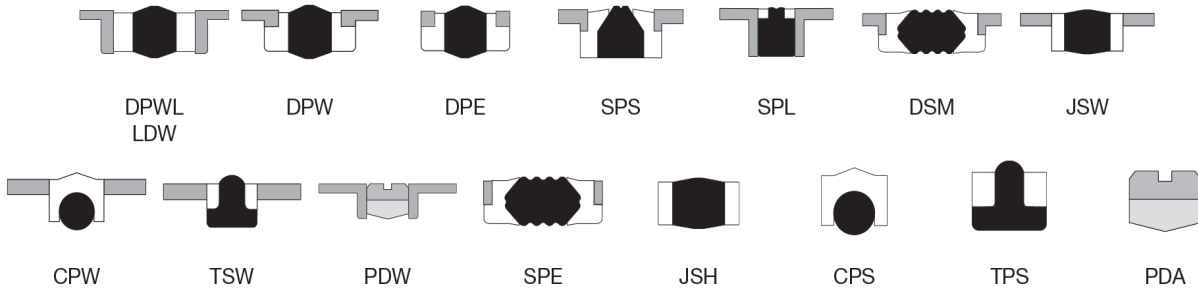
Double acting seals



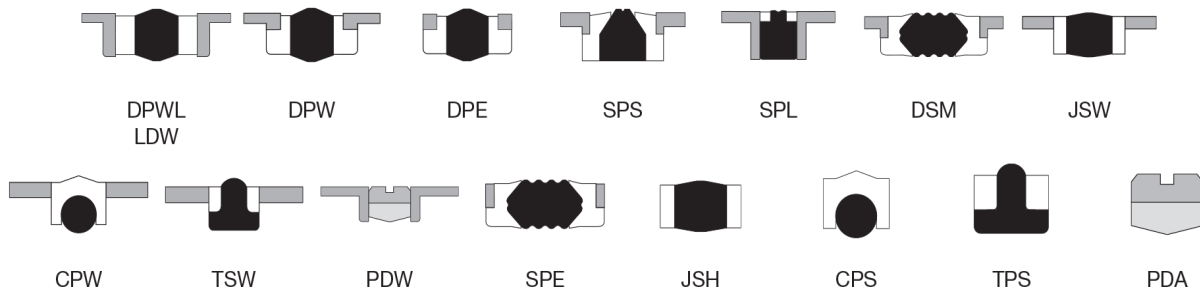
### Key Features

- Medium duty
- One piece piston
- Compact design
- Hard wearing dynamic surface
- One piece piston
- Rero-fit ag. equipment

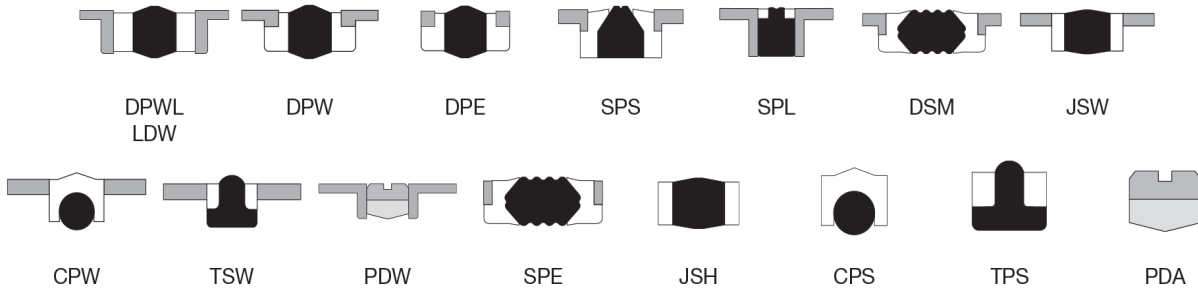




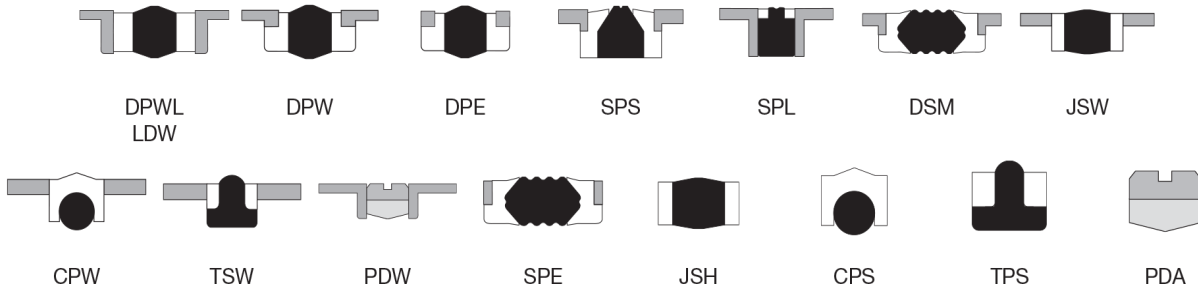
OD	ID	L1	L2	OD2	OD3	Product Name
0.000	0.000	0.000	0.000	0.000	0.000	DAS-0800700-126
0.000	0.000	0.000	0.000	0.000	0.000	TPS-0537487-036
0.500	0.312	0.150	0.000	0.000	0.498	PDA-0050031-015
0.625	0.380	0.000	0.000	0.000	0.000	TPS-0062037-018
0.750	0.505	0.185	0.000	0.000	0.748	TPS-0075050-018
0.750	0.505	0.185	0.000	0.000	0.748	PDA-0075050-018
0.875	0.630	0.185	0.000	0.000	0.873	TPS-0087063-018
1.000	0.625	0.452	0.000	0.000	0.997	JSH-0100062-045
1.000	0.625	0.483	0.250	0.883	0.964	DPW-0100062-048
1.000	0.625	0.608	0.182	0.865	0.964	DPWL-0100062-060
1.000	0.687	0.348	0.125	0.829	0.937	SPL-0100068-034
1.000	0.756	0.185	0.000	0.000	0.998	TPS-0100075-018
1.000	0.756	0.185	0.000	0.000	0.998	PDA-0100075-018
1.062	0.750	0.317	0.062	0.900	1.000	SPL-0106075-031
1.062	0.818	0.185	0.000	0.000	1.060	TPS-0106081-018
1.125	0.750	0.452	0.000	0.000	1.122	JSH-0112075-045
1.125	0.881	0.185	0.000	0.000	0.000	CPS-0112088-018U
1.125	0.881	0.185	0.000	0.000	1.122	PDA-0112088-018
1.125	0.881	0.185	0.000	0.000	1.123	TPS-0112088-018
1.250	0.750	0.640	0.250	1.111	1.208	DPW-0125075-064
1.250	0.750	0.765	0.245	1.115	1.218	DPWL-0125075-076
1.250	0.875	0.452	0.000	0.000	1.247	JSH-0125087-045
1.250	0.937	0.348	0.125	1.079	1.187	SPL-0125093-034
1.250	1.006	0.154	0.187	0.000	0.000	CPS-0125100-018
1.250	1.006	0.185	0.000	0.000	1.248	TPS-0125100-018
1.250	1.006	0.185	0.000	0.000	1.248	PDA-0125100-018
1.375	0.875	0.765	0.245	1.241	1.343	DPWL-0137087-076
1.375	1.000	0.452	0.000	0.000	1.372	JSH-0137100-045
1.375	1.131	0.185	0.000	0.000	0.000	CPS-0137113-018U
1.375	1.131	0.185	0.000	0.000	1.373	PDA-0137113-018
1.437	1.193	0.185	0.000	0.000	1.435	TPS-0143119-018



OD	ID	L1	L2	OD2	OD3	Product Name
1.500	1.000	0.618	0.250	1.363	1.468	LDW-0150100-061
1.500	1.000	0.640	0.250	1.360	1.458	SPS-0150100-064
1.500	1.000	0.640	0.187	1.360	1.458	DPWS-0150100-064
1.500	1.000	0.640	0.250	1.360	1.458	DPW-0150100-064
1.500	1.000	0.765	0.245	1.365	1.468	DPWL-0150100-076
1.500	1.125	0.442	0.150	1.324	1.437	SPL-0150112-044
1.500	1.125	0.442	0.150	1.325	1.437	DS-0150112-044
1.500	1.125	0.452	0.000	0.000	1.497	JSH-0150112-045
1.500	1.125	0.452	0.375	1.312	1.440	JSW-0150112-045/2
1.500	1.125	0.452	0.250	1.321	1.440	JSW-0150112-045/1
1.500	1.125	0.452	0.250	1.321	1.440	JSW-0150112-045/1
1.500	1.256	0.185	0.000	0.000	1.498	PDA-0150125-018
1.500	1.256	0.185	0.000	0.000	1.498	TPS-0150125-018
1.500	1.256	0.185	0.000	0.000	1.498	CPS-0150125-018
1.500	1.256	0.185	0.375	1.312	1.440	CPW-0150125-018
1.500	1.256	0.187	0.375	1.312	1.440	TSW-0150125-018
1.500	1.256	0.437	0.250	1.312	1.437	PDW-0150125-043
1.625	1.000	0.952	0.245	1.428	1.562	DPWL-0162100-095
1.625	1.125	0.640	0.250	1.485	1.583	DPW-0162112-064
1.625	1.250	0.452	0.000	0.000	1.621	JSH-0162125-045
1.625	1.381	0.185	0.000	0.000	1.623	TPS-0162138-018
1.625	1.381	0.185	0.000	0.000	1.623	PDA-0162138-018
1.750	1.000	0.750	0.250	1.570	1.696	SPS-0175100-075
1.750	1.125	0.741	0.250	1.550	1.687	LDW-0175112-074
1.750	1.125	0.745	0.765	0.000	1.747	DPE-0175112-076
1.750	1.125	0.765	0.250	1.570	1.698	SPS-0175112-076
1.750	1.125	0.952	0.245	1.552	1.687	DPWL-0175112-095
1.750	1.375	0.442	0.150	1.574	1.687	SPL-0175137-044
1.750	1.375	0.452	0.000	0.000	1.746	JSH-0175137-045
1.750	1.375	0.505	0.187	1.638	1.710	SPL-0175137-050
1.750	1.506	0.185	0.000	0.000	1.748	TPS-0175150-018

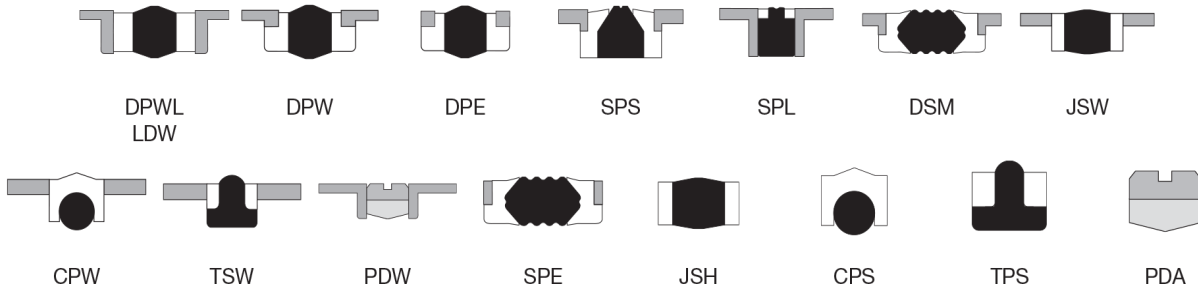


OD	ID	L1	L2	OD2	OD3	Product Name
1.750	1.506	0.185	0.000	0.000	1.748	PDA-0175150-018
1.750	1.506	0.185	0.000	0.000	1.748	CPS-0175150-018
1.875	1.500	0.452	0.000	0.000	1.871	JSH-0187150-045
1.875	1.502	0.280	0.000	0.000	1.873	TPS-0187150-028
1.875	1.502	0.280	0.000	0.000	1.873	PDA-0187150-028
1.875	1.502	0.394	0.000	0.000	1.873	PDA-0187150-039
2.000	1.375	0.741	0.250	1.802	1.937	LDW-0200137-074
2.000	1.375	0.745	0.765	0.000	1.997	DPE-0200137-076
2.000	1.375	0.765	0.250	1.820	1.948	SPS-0200137-076
2.000	1.375	0.952	0.245	1.802	1.937	DPWL-0200137-095
2.000	1.500	0.250	0.000	1.821	1.960	SPS-0200150-058/1
2.000	1.500	0.587	0.000	0.000	1.996	JSH-0200150-058
2.000	1.500	0.587	0.375	1.811	1.940	JSW-0200150-058/2
2.000	1.500	0.587	0.250	1.821	1.940	JSW-0200150-058/1
2.000	1.625	0.442	0.150	1.824	1.937	SPL-0200162-044
2.000	1.625	0.505	0.245	1.888	1.960	SPL-0200162-050
2.000	1.627	0.000	0.000	0.000	0.000	PDA-0200162-039
2.000	1.627	0.280	0.000	0.000	1.998	TPS-0200162-028
2.000	1.627	0.280	0.000	0.000	1.998	PDA-0200162-028
2.000	1.627	0.280	0.000	0.000	1.998	CPS-0200162-028
2.000	1.627	0.280	0.375	1.811	1.940	TSW-0200162-028
2.000	1.627	0.280	0.375	1.811	1.940	CPW-0200162-028
2.000	1.627	0.312	0.334	0.000	1.998	PDA-0200162-033
2.000	1.627	0.334	0.000	0.000	1.998	TPS-0200162-033
2.000	1.627	0.531	0.250	1.811	1.937	PDW-0200162-053
2.125	1.500	0.765	0.250	1.944	2.074	DPW-0212150-076
2.125	1.500	0.765	0.250	1.945	2.074	SPS-0212150-076
2.125	1.500	0.952	0.250	1.928	2.062	DPWL-0212150-095
2.125	1.625	0.587	0.000	0.000	2.121	JSH-0212162-058
2.125	1.752	0.280	0.000	0.000	2.123	TPS-0212175-028
2.125	1.752	0.280	0.000	0.000	2.123	PDA-0212175-028

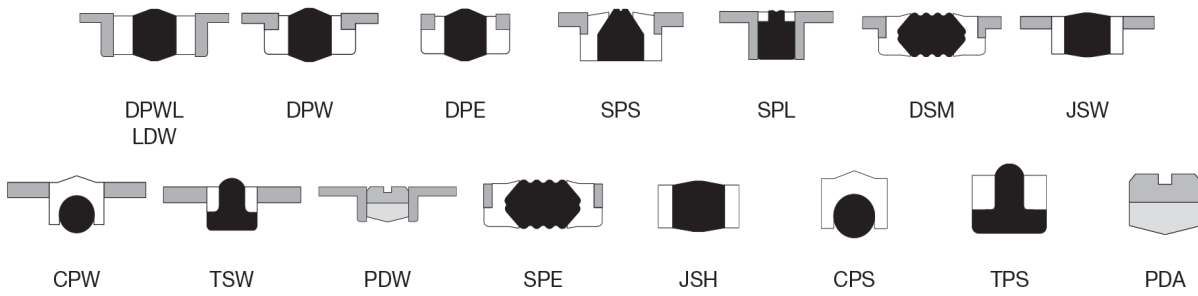


OD	ID	L1	L2	OD2	OD3	Product Name
2.250	1.625	0.740	0.765	0.000	2.247	DPE-0225162-076
2.250	1.625	0.741	0.250	2.050	2.187	LDW-0225162-074
2.250	1.625	0.765	0.250	2.069	2.197	SPS-0225162-076
2.250	1.625	0.765	0.250	2.069	2.197	DPW-0225162-076
2.250	1.625	0.952	0.245	2.052	2.187	DPWL-0225162-095
2.250	1.750	0.587	0.000	0.000	2.246	JSH-0225175-058
2.250	1.875	0.280	0.000	0.000	0.000	CPS-0225187-028U
2.250	1.875	0.442	0.150	2.075	2.187	DS-0225187-044
2.250	1.877	0.280	0.000	0.000	2.248	TPS-0225187-028
2.250	1.877	0.280	0.000	0.000	2.248	PDA-0225187-028
2.250	1.877	0.334	0.000	0.000	2.248	TPS-0225187-033
2.375	1.750	0.745	0.765	0.000	2.372	DPE-0237175-076
2.375	1.750	0.765	0.250	2.194	2.322	SPS-0237175-076
2.375	1.750	0.952	0.245	2.177	2.312	DPWL-0237175-095
2.375	1.875	0.587	0.000	0.000	2.371	JSH-0237187-058
2.375	2.000	0.442	0.150	2.195	2.312	SPL-0237200-044
2.375	2.002	0.280	0.000	0.000	2.373	TPS-0237200-028
2.375	2.002	0.280	0.000	0.000	2.373	PDA-0237200-028
2.375	2.002	0.394	0.000	0.000	2.373	PDA-0237200-039
2.500	1.875	0.000	0.000	0.000	0.000	53-0250187-076
2.500	1.875	0.500	0.000	2.250	2.450	SPS-0250187-076A
2.500	1.875	0.741	0.250	2.300	2.437	LDW-0250187-074
2.500	1.875	0.765	0.250	2.319	2.446	SPS-0250187-076
2.500	1.875	0.952	0.245	2.302	2.437	DPWL-0250187-095
2.500	2.000	0.245	0.000	2.320	2.460	MEL-0250200-065
2.500	2.000	0.250	0.000	0.231	2.460	SPS-0250200-058/1
2.500	2.000	0.394	0.000	0.000	2.498	PDA-0250200-039
2.500	2.000	0.587	0.000	0.000	2.496	JSH-0250200-058
2.500	2.000	0.587	0.375	2.311	2.440	JSW-0250200-058/2
2.500	2.000	0.587	0.250	2.321	2.440	JSW-0250200-058/1
2.500	2.000	0.665	0.245	2.320	2.460	SPL-0250200-066

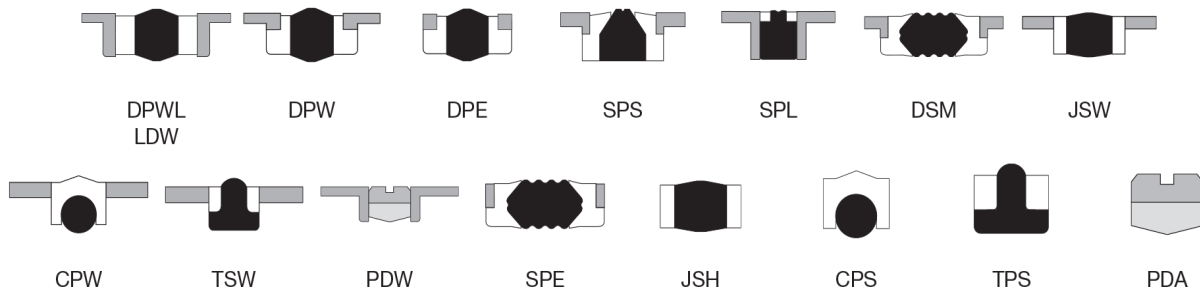




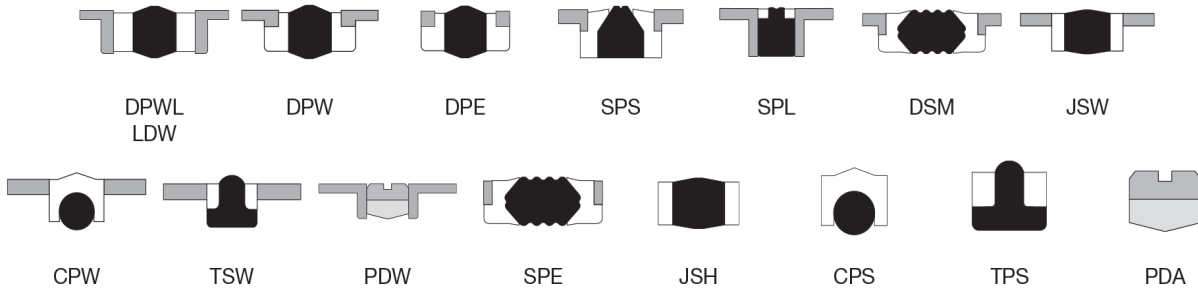
OD	ID	L1	L2	OD2	OD3	Product Name
2.500	2.125	0.442	0.150	2.325	2.437	SPL-0250212-044
2.500	2.127	0.280	0.000	0.000	2.497	CPS-0250212-028
2.500	2.127	0.280	0.000	0.000	2.498	TPS-0250212-028
2.500	2.127	0.280	0.000	0.000	2.498	PDA-0250212-028
2.500	2.127	0.280	0.375	2.311	2.440	TSW-0250212-028
2.500	2.127	0.280	0.375	2.311	2.440	CPW-0250212-028
2.500	2.127	0.394	0.000	0.000	2.498	PDA-0250212-039
2.500	2.127	0.424	0.000	0.000	2.498	TPS-0250212-042
2.500	2.127	0.531	0.250	2.311	2.437	PDW-0250212-053
2.625	2.000	0.745	0.765	0.000	2.622	DPE-0262200-076
2.625	2.000	0.765	0.250	2.443	2.570	SPS-0262200-076
2.625	2.000	0.765	0.250	2.443	2.571	DPW-0262200-076
2.625	2.000	0.952	0.245	2.428	2.562	DPWL-0262200-095
2.625	2.125	0.587	0.000	0.000	2.621	JSH-0262212-058
2.625	2.250	0.394	0.000	0.000	2.623	PDA-0262225-039
2.625	2.252	0.280	0.000	0.000	2.623	TPS-0262225-028
2.750	2.000	0.867	0.250	2.480	2.687	LDW-0275200-086
2.750	2.000	0.930	0.952	0.000	2.747	DPE-0275200-095
2.750	2.000	0.952	0.250	2.522	2.685	SPS-0275200-095
2.750	2.000	0.952	0.250	2.522	2.685	DPW-0275200-095
2.750	2.000	1.202	0.245	2.482	2.687	DPWL-0275200-120
2.750	2.250	0.587	0.000	0.000	2.744	JSH-0275225-058
2.750	2.250	0.655	0.250	2.570	2.710	SPL-0275225-065
2.750	2.375	0.442	0.150	2.575	2.687	SPL-0275237-044
2.750	2.377	0.280	0.000	0.000	0.000	CPS-0275237-028
2.750	2.377	0.280	0.000	0.000	2.747	TPS-0275237-028
2.750	2.377	0.280	0.000	0.000	2.747	PDA-0275237-028
2.875	2.502	0.280	0.000	0.000	2.872	TPS-0287250-028
2.875	2.502	0.280	0.000	0.000	2.872	PDA-0287250-028
2.875	2.502	0.394	0.000	0.000	2.872	PDA-0287250-039
3.000	2.250	0.250	0.000	2.774	2.960	DPWL-0300225-095



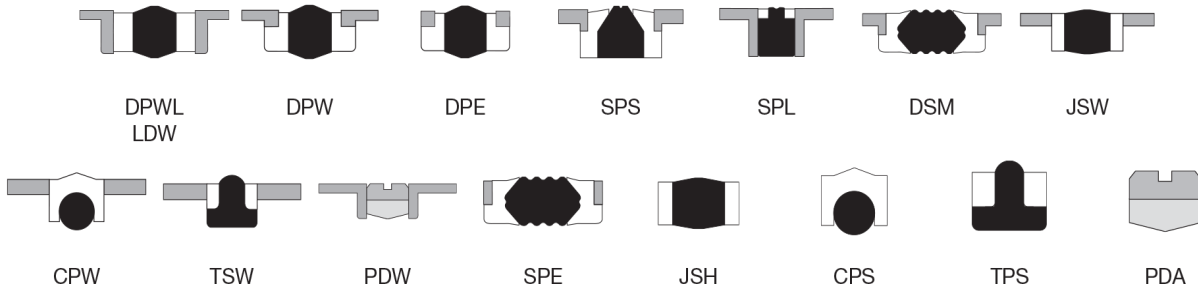
OD	ID	L1	L2	OD2	OD3	Product Name
3.000	2.250	0.858	0.245	2.732	2.937	DPWL-0300225-085
3.000	2.250	0.867	0.250	2.730	2.937	LDW-0300225-086
3.000	2.250	0.930	0.952	0.000	2.997	DPE-0300225-095
3.000	2.250	0.952	0.250	2.772	2.935	SPS-0300225-095
3.000	2.250	1.202	0.245	2.732	2.937	DPWL-0300225-120
3.000	2.375	0.780	0.245	2.772	2.960	SPL-0300237-078
3.000	2.500	0.250	0.250	2.774	2.960	SPS-0300250-058/1
3.000	2.500	0.394	0.000	0.000	2.997	PDA-0300250-039
3.000	2.500	0.587	0.000	0.000	0.000	SPE-0300250-058
3.000	2.500	0.587	0.000	0.000	2.994	JSH-0300250-058
3.000	2.500	0.587	0.250	2.774	2.940	JSW-0300250-058/1
3.000	2.500	0.587	0.375	2.809	2.940	JSW-0300250-058/2
3.000	2.625	0.442	0.150	2.825	2.937	SPL-0300262-044
3.000	2.625	0.442	0.000	2.825	2.937	DS-0300262-044
3.000	2.627	0.280	0.000	0.000	2.997	TPS-0300262-028
3.000	2.627	0.280	0.000	0.000	2.997	CPS-0300262-028
3.000	2.627	0.280	0.375	2.809	2.940	TSW-0300262-028
3.000	2.627	0.280	0.375	2.809	2.940	CPW-0300262-028
3.000	2.627	0.334	0.000	0.000	2.997	PDA-0300262-033
3.000	2.627	0.531	0.250	2.809	2.937	PDW-0300262-053
3.100	2.500	0.587	0.000	0.000	3.094	JSH-0310250-058
3.125	2.375	0.952	0.250	2.896	3.060	DPW-0312237-095
3.125	2.375	1.202	0.250	2.858	3.062	DPWL-0312237-120
3.125	2.752	0.280	0.000	0.000	3.122	TPS-0312275-028
3.187	2.687	0.587	0.000	0.000	3.181	JSH-0318268-058
3.250	2.500	0.867	0.250	2.980	3.187	LDW-0325250-086
3.250	2.500	0.930	0.952	0.000	3.247	DPE-0325250-095
3.250	2.500	0.952	0.250	3.021	3.184	SPS-0325250-095
3.250	2.500	1.202	0.245	2.982	3.187	DPWL-0325250-120
3.250	2.625	0.790	0.250	3.021	3.184	SPS-0325262-079
3.250	2.750	0.587	0.000	0.000	3.244	JSH-0325275-058



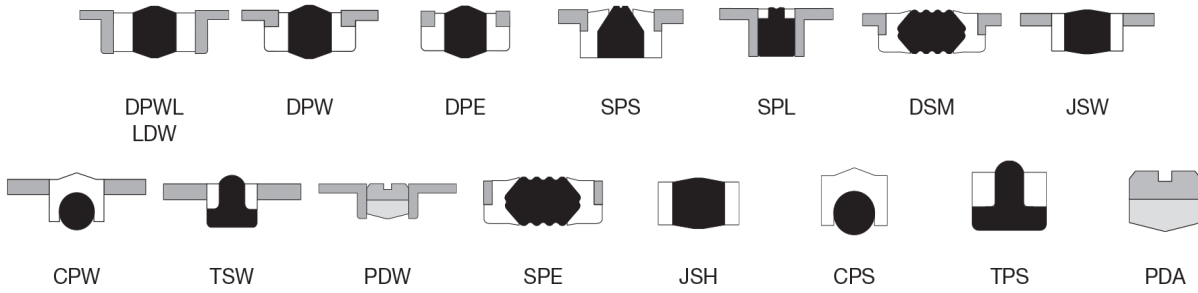
OD	ID	L1	L2	OD2	OD3	Product Name
3.250	2.750	0.587	0.250	3.023	3.190	JSW-0325275-058/1
3.250	2.750	0.587	0.375	3.059	3.190	JSW-0325275-058/2
3.250	2.875	0.442	0.150	3.075	3.187	DS-0325287-044
3.250	2.877	0.000	0.000	0.000	0.000	CPS-0325287-028
3.250	2.877	0.280	0.000	0.000	3.247	TPS-0325287-028
3.250	2.877	0.280	0.000	0.000	3.247	PDA-0325287-028
3.250	2.877	0.280	0.375	3.059	3.190	TSW-0325287-028
3.500	2.750	0.245	0.000	3.232	3.437	SPS-0350275-120
3.500	2.750	0.245	0.000	3.232	3.437	DPWL-0350275-120
3.500	2.750	0.867	0.250	3.230	3.437	LDW-0350275-086
3.500	2.750	0.952	0.250	3.271	3.434	SPS-0350275-095
3.500	2.850	0.790	0.295	3.272	3.460	SPS-0350285-079
3.500	3.000	0.394	0.000	0.000	3.497	PDA-0350300-039
3.500	3.000	0.567	0.210	0.000	0.000	DS-0350300-056
3.500	3.000	0.567	0.210	3.270	3.437	SPL-0350300-056
3.500	3.000	0.587	0.000	0.000	3.494	JSH-0350300-058
3.500	3.000	0.587	0.250	3.274	3.440	JSW-0350300-058/1
3.500	3.000	0.587	0.375	3.309	3.440	JSW-0350300-058/2
3.500	3.128	0.280	0.000	0.000	3.497	PDA-0350312-028
3.500	3.128	0.280	0.000	0.000	3.497	TPS-0350312-028
3.500	3.128	0.280	0.000	0.000	3.497	CPS-0350312-028
3.500	3.128	0.280	0.375	3.309	3.440	TSW-0350312-028
3.500	3.128	0.280	0.375	3.309	3.440	CPW-0350312-028
3.500	3.128	0.334	0.000	0.000	3.497	TPS-0350312-033
3.500	3.128	0.531	0.250	3.309	3.437	PDW-0350312-053
3.625	2.875	1.202	0.245	3.360	3.562	DPWL-0362287-120
3.625	2.875	1.390	0.375	3.330	3.530	DSM-0362287-139
3.625	3.253	0.280	0.000	0.000	3.622	TPS-0362325-028
3.625	3.253	0.280	0.000	0.000	3.622	PDA-0362325-028
3.750	3.000	0.952	0.250	3.520	3.683	SPS-0375300-095
3.750	3.000	1.202	0.245	3.482	3.687	DPWL-0375300-120



OD	ID	L1	L2	OD2	OD3	Product Name
3.750	3.000	1.390	0.375	3.459	3.650	DSM-0375300-139
3.750	3.134	0.250	0.000	0.000	3.747	PDA-0375313-025
3.750	3.250	0.567	0.210	3.520	3.687	SPL-0375325-056
3.750	3.250	0.587	0.000	0.000	3.744	JSH-0375325-058
3.750	3.378	0.280	0.000	0.000	0.000	CPS-0375337-028U
3.750	3.378	0.280	0.000	0.000	3.747	TPS-0375337-028
3.750	3.378	0.280	0.000	0.000	3.747	PDA-0375337-028
3.875	3.125	0.952	0.250	3.646	3.809	DPW-0387312-095
3.875	3.503	0.280	0.000	0.000	3.872	TPS-0387350-028
3.875	3.503	0.280	0.000	0.000	3.872	PDA-0387350-028
4.000	3.250	0.780	0.000	0.000	3.994	JSH-0400325-078
4.000	3.250	0.780	0.500	3.743	3.920	JSW-0400325-078/2
4.000	3.250	0.780	0.250	3.773	3.920	JSW-0400325-078/1
4.000	3.250	0.867	0.250	3.730	3.937	LDW-0400325-086
4.000	3.250	0.952	0.250	3.770	3.933	SPS-0400325-095
4.000	3.250	1.202	0.245	3.732	3.937	DPWL-0400325-120
4.000	3.250	1.390	0.375	3.710	3.900	DSM-0400325-139
4.000	3.375	0.790	0.245	3.772	3.960	SPS-0400337-079
4.000	3.500	0.394	0.000	0.000	3.997	PDA-0400350-039
4.000	3.500	0.567	0.210	3.770	3.937	SPL-0400350-056
4.000	3.500	0.567	0.210	3.777	3.937	DS-0400350-056
4.000	3.628	0.280	0.000	0.000	3.997	TPS-0400362-028
4.000	3.628	0.280	0.000	0.000	3.997	PDA-0400362-028
4.000	3.628	0.280	0.000	0.000	3.997	CPS-0400362-028
4.000	3.628	0.280	0.500	3.743	3.920	TSW-0400362-028
4.000	3.628	0.280	0.500	3.743	3.920	CPW-0400362-028
4.000	3.628	0.424	0.000	0.000	3.997	TPS-0400362-042
4.000	3.628	0.531	0.250	3.809	3.937	PDW-0400362-053
4.125	3.753	0.280	0.000	0.000	4.122	TPS-0412375-028
4.250	3.500	0.780	0.000	0.000	3.994	JSH-0425350-078
4.250	3.500	0.930	0.952	0.000	4.247	DPE-0425350-095

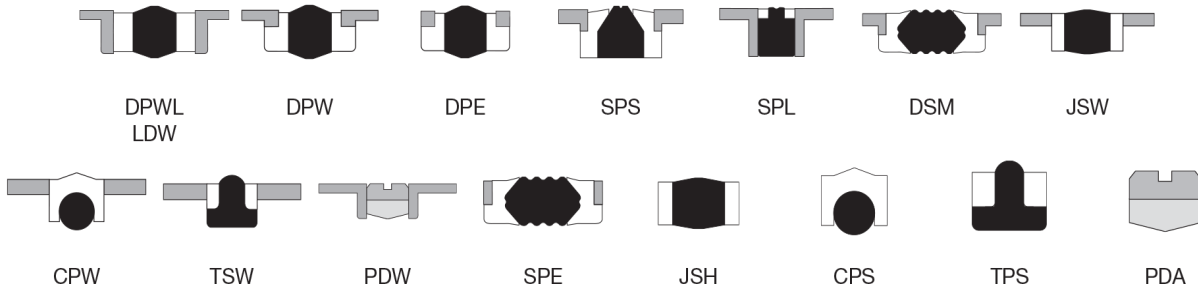


OD	ID	L1	L2	OD2	OD3	Product Name
4.250	3.500	0.952	0.250	4.024	4.187	SPS-0425350-095
4.250	3.500	1.202	0.245	3.982	4.187	DPWL-0425350-120
4.250	3.634	0.250	0.000	0.000	4.247	PDA-0425363-025
4.250	3.750	0.567	0.210	4.020	4.187	DS-0425375-056
4.250	3.878	0.280	0.000	0.000	4.247	TPS-0425387-028
4.250	3.878	0.280	0.000	0.000	4.247	PDA-0425387-028
4.375	4.003	0.280	0.000	0.000	4.372	TPS-0437400-028
4.500	3.500	1.055	0.375	4.230	4.437	LDW-0450350-105
4.500	3.500	1.240	1.265	0.000	4.497	DPE-0450350-126
4.500	3.500	1.265	0.250	4.229	4.422	SPS-0450350-126
4.500	3.500	1.515	0.370	4.232	4.437	DPWL-0450350-151
4.500	3.500	1.765	0.000	0.000	0.000	SPE-0450350-176
4.500	3.500	1.765	0.500	4.180	4.400	DSM-0450350-176
4.500	3.750	0.780	0.000	0.000	4.492	JSH-0450375-078
4.500	3.750	0.780	0.250	4.232	4.428	JSW-0450375-078/1
4.500	3.750	0.780	0.500	4.241	4.420	JSW-0450375-078/2
4.500	3.884	0.250	0.000	0.000	4.497	PDA-0450388-025
4.500	4.000	0.000	0.000	0.000	0.000	PDA-0450400-591
4.500	4.000	0.394	0.000	0.000	4.497	PDA-0450400-039
4.500	4.000	0.567	0.210	4.270	4.437	DS-0450400-056
4.500	4.128	0.280	0.000	0.000	0.000	CPS-0450412-028U
4.500	4.128	0.280	0.000	0.000	4.497	TPS-0450412-028
4.500	4.128	0.280	0.000	0.000	4.497	PDA-0450412-028
4.500	4.128	0.280	0.500	4.241	4.420	TSW-0450412-028
4.625	3.625	1.765	0.500	4.305	4.525	DSM-0462362-176
4.625	4.253	0.000	0.000	0.000	0.000	TPS-0462425-033
4.625	4.253	0.265	0.280	0.000	4.622	TPS-0462425-028
4.750	3.750	1.265	0.375	4.463	4.660	SPS-0475375-126
4.750	3.750	1.265	0.250	4.478	4.671	DPW-0475375-126
4.750	3.750	1.515	0.370	4.482	4.687	DPWL-0475375-151
4.750	4.000	0.780	0.000	0.000	4.742	JSH-0475400-078

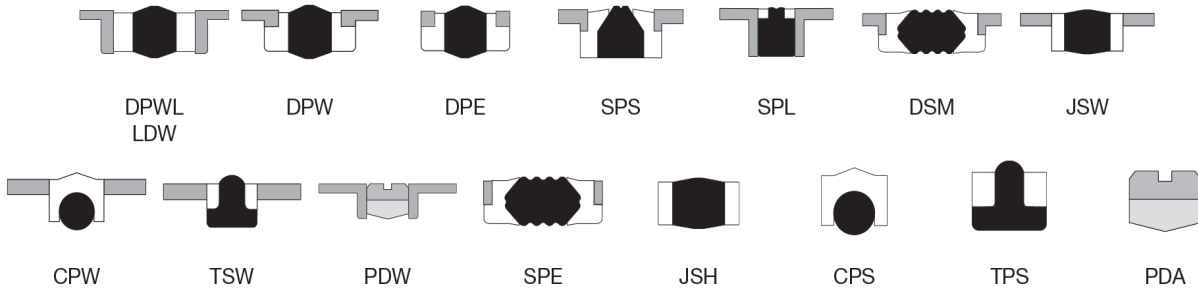


OD	ID	L1	L2	OD2	OD3	Product Name
4.750	4.134	0.250	0.000	0.000	4.747	PDA-0475413-025
4.750	4.378	0.280	0.000	0.000	4.747	TPS-0475437-028
4.750	4.378	0.280	0.000	0.000	4.747	PDA-0475437-028
4.875	4.503	0.280	0.000	0.000	4.872	TPS-0487450-028
5.000	4.000	1.055	0.375	4.730	4.937	LDW-0500400-105
5.000	4.000	1.240	1.265	0.000	4.997	DPE-0500400-126
5.000	4.000	1.265	0.375	4.709	4.902	SPS-0500400-126
5.000	4.000	1.265	0.250	4.728	4.921	SPS-0500400-126/1
5.000	4.000	1.515	0.370	4.732	4.937	DPWL-0500400-151
5.000	4.000	1.765	0.000	0.000	0.000	SPE-0500400-176
5.000	4.000	1.765	0.500	4.675	4.900	DSM-0500400-176
5.000	4.250	0.780	0.000	0.000	4.992	JSH-0500425-078
5.000	4.250	0.780	0.375	4.712	4.910	JSW-0500425-078/1
5.000	4.250	0.780	0.500	4.741	4.920	JSW-0500425-078/2
5.000	4.250	0.978	0.245	4.772	4.960	SPS-0500425-097
5.000	4.375	0.692	0.344	4.689	4.937	DS-0500437-069
5.000	4.384	0.250	0.000	0.000	4.997	PDA-0500438-025
5.000	4.500	0.394	0.000	0.000	4.997	PDA-0500450-039
5.000	4.524	0.579	0.000	0.000	4.997	TPS-0500452-057
5.000	4.629	0.280	0.000	0.000	4.997	TPS-0500462-028
5.000	4.629	0.280	0.000	0.000	4.997	PDA-0500462-028
5.000	4.629	0.280	0.000	0.000	4.997	CPS-0500462-028
5.000	4.629	0.280	0.500	4.741	4.920	TSW-0500462-028
5.000	4.629	0.280	0.500	4.741	4.920	CPW-0500462-028
5.000	4.629	0.424	0.000	0.000	4.997	TPS-0500462-042
5.125	4.629	0.366	0.000	0.000	0.000	TPS-0512462-036
5.250	4.250	1.265	0.250	4.977	5.170	DPW-0525425-126
5.250	4.250	1.515	0.370	4.982	5.187	DPWL-0525425-151
5.250	4.774	0.366	0.000	0.000	5.247	TPS-0525477-036
5.250	4.774	0.366	0.000	0.000	5.247	PDA-0525477-036
5.500	4.500	1.055	0.375	5.230	5.437	LDW-0550450-105

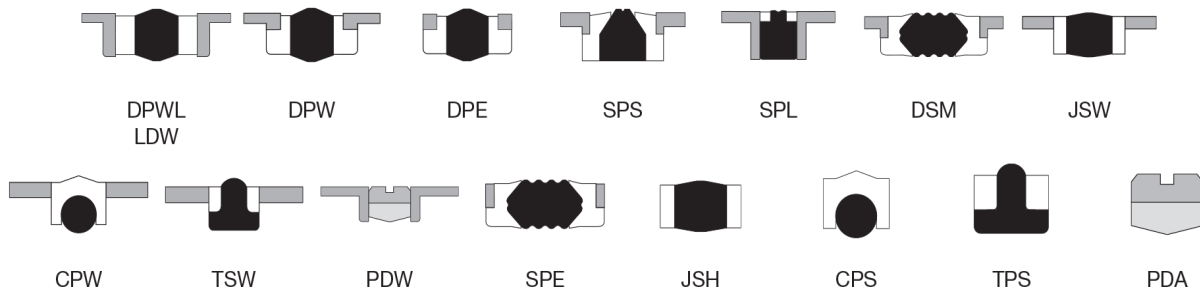




OD	ID	L1	L2	OD2	OD3	Product Name
5.500	4.500	1.265	0.375	5.213	5.410	SPS-0550450-126
5.500	4.500	1.515	0.370	5.232	5.437	DPWL-0550450-151
5.500	4.500	1.765	0.000	5.420	5.227	SPS-0550450-126/1
5.500	4.750	0.780	0.000	0.000	5.492	PDA-0550475-078
5.500	4.750	0.780	0.000	0.000	5.492	JSH-0550475-078
5.500	4.750	1.780	0.000	5.241	0.000	JSW-0550475-078/2
5.500	4.875	0.692	0.344	5.188	5.437	DS-0550487-069
5.500	5.000	0.394	0.000	0.000	5.497	PDA-0550500-039
5.500	5.024	0.366	0.000	0.000	5.497	TPS-0550502-036
5.500	5.024	0.366	0.000	0.000	5.497	PDA-0550502-036
5.500	5.024	0.475	0.000	0.000	5.497	TPS-0550502-047
5.625	5.149	0.350	0.366	0.000	5.622	TPS-0562514-036
5.750	4.750	1.265	0.250	5.475	5.669	DPW-0575475-126
5.750	4.750	1.515	0.375	5.484	5.687	DPWL-0575475-151
5.750	5.274	0.366	0.000	0.000	5.747	TPS-0575527-036
5.875	5.399	0.366	0.000	0.000	5.872	TPS-0587539-036
6.000	5.000	1.055	0.375	5.730	5.937	LDW-0600500-105
6.000	5.000	1.240	1.265	0.000	5.997	DPE-0600500-126
6.000	5.000	1.265	0.375	5.709	5.902	SPS-0600500-126
6.000	5.000	1.265	0.250	5.726	5.919	SPS-0600500-126/1
6.000	5.000	1.515	0.370	5.732	5.937	DPWL-0600500-151
6.000	5.000	1.765	0.500	5.675	5.900	DSM-0600500-176
6.000	5.250	0.780	0.000	0.000	5.992	PDA-0600525-078
6.000	5.250	0.780	0.000	0.000	5.992	JSH-0600525-078
6.000	5.250	0.780	0.375	5.713	5.910	JSW-0600525-078/1
6.000	5.250	0.780	0.500	5.741	5.920	JSW-0600525-078/2
6.000	5.250	1.005	0.500	5.712	5.937	SPL-0600525-100
6.000	5.524	0.366	0.000	0.000	5.997	TPS-0600552-036
6.000	5.524	0.366	0.000	0.000	5.997	PDA-0600552-036
6.000	5.524	0.366	0.000	0.000	5.997	CPS-0600552-036
6.000	5.524	0.366	0.500	5.741	5.920	TSW-0600552-036



OD	ID	L1	L2	OD2	OD3	Product Name
6.000	5.524	0.366	0.500	5.741	5.920	CPW-0600552-036
6.000	5.524	0.579	0.000	0.000	5.997	TPS-0600552-057
6.250	5.774	0.366	0.000	0.000	6.247	TPS-0625577-036
6.250	5.774	0.475	0.000	0.000	6.247	TPS-0625577-047
6.500	5.500	0.375	0.000	6.176	6.402	SPS-0650550-126
6.500	5.500	1.265	0.250	6.226	6.419	SPS-0650550-126/1
6.500	5.500	1.265	0.250	6.226	6.419	DPW-0650550-126
6.500	5.500	1.525	0.370	6.232	6.437	DPWL-0650550-152
6.500	5.750	1.005	0.500	6.212	6.437	SPL-0650575-100
6.500	6.024	0.366	0.000	0.000	6.497	TPS-0650602-036
6.750	5.750	1.525	0.375	6.484	6.687	DPWL-0675575-151
6.750	6.274	0.000	0.000	0.000	0.000	TPS-0675627-036
7.000	6.000	1.265	1.265	0.000	0.000	SPE-0700600-126
7.000	6.000	1.265	0.250	6.724	6.917	DPW-0700600-126
7.000	6.000	1.515	0.370	6.732	6.937	DPWL-0700600-151
7.000	6.250	1.005	0.500	6.712	6.937	SPL-0700625-100
7.000	6.524	0.366	0.000	0.000	6.997	TPS-0700652-036
7.000	6.524	0.366	0.000	0.000	6.997	PDA-0700652-036
7.000	6.524	0.475	0.000	0.000	6.997	TPS-0700652-047
7.000	6.524	0.579	0.000	0.000	6.997	TPS-0700652-057
7.250	6.774	0.350	0.366	0.000	0.000	TPS-0725677-036
7.500	6.250	1.900	0.375	0.000	7.440	DPWL-0750625-190
7.500	7.024	0.366	0.000	0.000	7.497	TPS-0750702-036
7.500	7.024	0.366	0.000	0.000	7.497	PDA-0750702-036
7.750	7.000	0.780	0.000	0.000	7.742	JSH-0775700-078
8.000	6.750	0.250	0.000	7.681	0.000	SPS-0800675-150
8.000	7.000	0.375	0.000	0.000	0.000	SPS-0800700-126A
8.000	7.000	1.265	0.500	7.680	7.937	SPS-0800700-126
8.000	7.000	1.265	0.250	7.723	7.915	DPW-0800700-126
8.000	7.000	1.275	0.370	7.740	7.937	DPWL-0800700-127
8.000	7.250	0.780	0.000	0.000	7.992	PDA-0800725-078



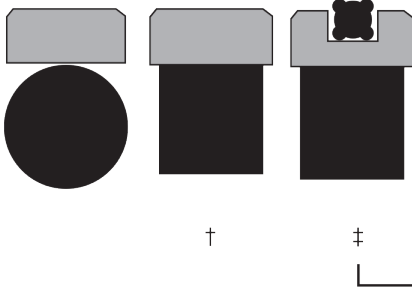
OD	ID	L1	L2	OD2	OD3	Product Name
8.000	7.524	0.366	0.000	0.000	7.997	TPS-0800752-036
8.000	7.524	0.579	0.000	0.000	7.997	TPS-0800752-057
8.250	7.774	0.366	0.000	0.000	8.247	TPS-0825777-036
8.250	7.774	0.366	0.000	0.000	8.247	PDA-0825777-036
8.250	7.774	0.475	0.000	0.000	8.247	TPS-0825777-047
8.500	8.024	0.366	0.000	0.000	8.497	TPS-0850802-036
9.000	7.750	1.900	0.375	8.740	8.937	DPWL-0900775-190
9.000	8.250	0.780	0.000	0.000	8.992	PDA-0900825-078
9.000	8.250	0.780	0.000	0.000	8.992	JSH-0900825-078
9.000	8.524	0.366	0.000	0.000	8.997	TPS-0900852-036
9.500	9.024	0.366	0.000	0.000	9.497	TPS-0950902-036
9.500	9.024	0.366	0.000	0.000	9.497	PDA-0950902-036
9.750	9.000	0.780	0.000	0.000	9.742	JSH-0975900-078
10.000	9.000	1.275	0.375	9.740	9.937	DPWL-1000900-127
10.000	9.524	0.366	0.000	0.000	9.997	TPS-1000952-036
10.000	9.524	0.366	0.000	0.000	9.997	PDA-1000952-036
10.000	9.524	0.475	0.000	0.000	9.997	TPS-1000952-047
10.500	10.024	0.366	0.000	0.000	10.497	TPS-1050100-036
10.500	10.024	0.579	0.000	0.000	0.000	TPS-1050100-057
11.000	10.524	0.366	0.000	0.000	10.997	TPS-1100105-036
11.000	10.524	0.475	0.000	0.000	10.997	TPS-1100105-047
11.500	11.024	0.366	0.000	0.000	11.497	TPS-1150110-036
12.000	11.524	0.366	0.000	0.000	11.997	TPS-1200115-036



# GP2

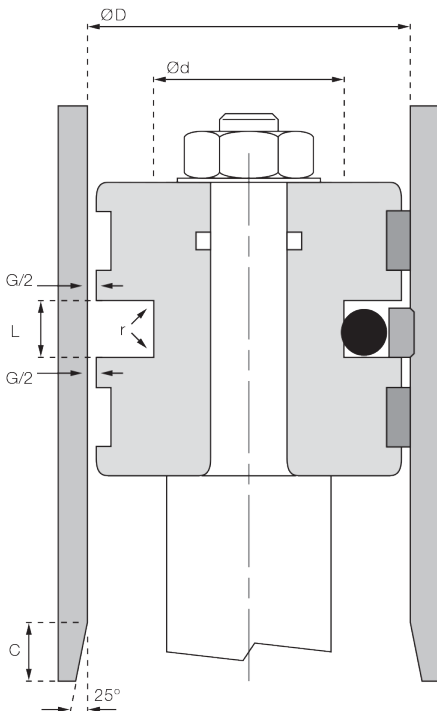
## Glide Rings

Double acting seals



### Key Features

- Medium to heavy duty
- One piece piston
- Very compact
- Low friction
- Excellent wear resistance
- Eliminates slip-stick
- Good pressure capability



### Design

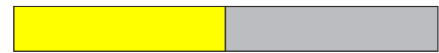
GP2 are designed as high pressure, low friction, double acting piston seals for use in heavy duty hydraulic and pneumatic applications. Standard materials are Bronze filled PTFE with a NBR o-ring or square ring as the energiser. This design results in low stiction and the ability to run at speeds as high as 15 m/s. By changing the energiser material it can easily become a high temperature seal at relatively low cost.

Suitable for accumulators

### Operating Conditions

#### Pressure

350 Bar  
5,000 Psi



#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

4.0m/sec  
12"/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing D$	$\varnothing d$	L
H9	h9	-0.002 +0.002

#### Chamfer Radii

C/S	0.096	0.147	0.305	0.413
C	0.048	0.100	0.275	0.375
r	0.012	0.015	0.047	0.063

#### Extrusion Gap G

Pressure	1,500	2,400	3,750	5,000
	0.024	0.020	0.016	0.012

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

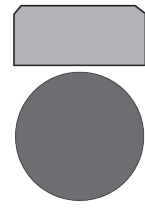




# GP4

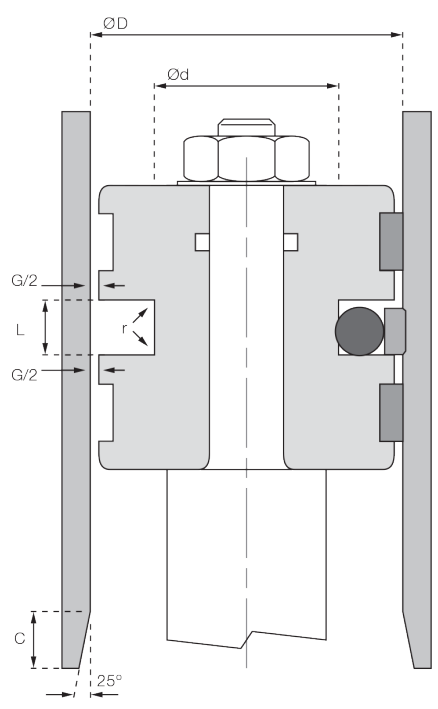
## Glide Rings

Double acting seals



### Key Features

- Medium to heavy duty
- One piece piston
- Cost effective high temperature
- Very compact
- Excellent wear resistance
- Eliminates stiction



### Design

GP4 are designed as high pressure, low friction, double acting piston seals for use in heavy duty hydraulic and pneumatic applications. This variation of GP2 use bronze filled PTFE ring for the outer dynamic sealing ring with an energiser ring of Viton for higher temperature applications. This design results in low stiction and the ability to run at speeds as high as 15 m/s. The result is an economical high speed, high temperature double acting piston seal.

### Operating Conditions

<b>Pressure</b>	
350 Bar	
5,000 Psi	

<b>Temperature</b>	
-20° to 200° C	
-5° to 392° F	

<b>Speed</b>	
4.0m/sec	
12'/sec	

<b>Surface Finish µmRa</b>		
ØD	Ød	L
0.1-0.25	0.8	2.0

<b>Tolerances</b>		
ØD	Ød	L
H9	h9	-0 + 0.008

<b>Chamfer Radii</b>				
C/S	0.096	0.147	0.305	0.413
C	0.048	0.100	0.275	0.375
r	0.012	0.015	0.047	0.063

<b>Extrusion Gap G</b>				
Pressure	1,500	2,400	3,750	5,000
	0.024	0.020	0.016	0.012

**Typical Examples**  
 Reciprocating  Rotary  Oscillating  Helix





# GP6

## Glide Rings

### Design

GP6 glide rings with o-ring expanders consist of NBR 70 Shore A o-ring over which sits an outer sleeve of 60 Shore D abrasion resistant liquid cast Polyurethane. They allow for a very compact piston design, permit higher pressures than o-rings and back up's and are relatively easy to stretch over one piece pistons. Unlike PTFE and Bronze/PTFE rings, Polyurethane will snap back to size quickly. Many sizes are being discontinued.

### Operating Conditions

#### Pressure

350 Bar  
5,000 Psi



#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

1.0m/sec  
3'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing D$	$\varnothing d$	L
H9	h9	-0 + 0.008

#### Chamfer Radii

	0.096	0.147	0.305	0.413
C/S				
C	0.048	0.100	0.275	0.375
r	0.012	0.015	0.047	0.063

#### Extrusion Gap G

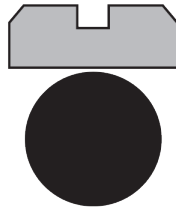
Pressure	1,500	2,400	3,750	5,000
	0.024	0.020	0.016	0.012

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

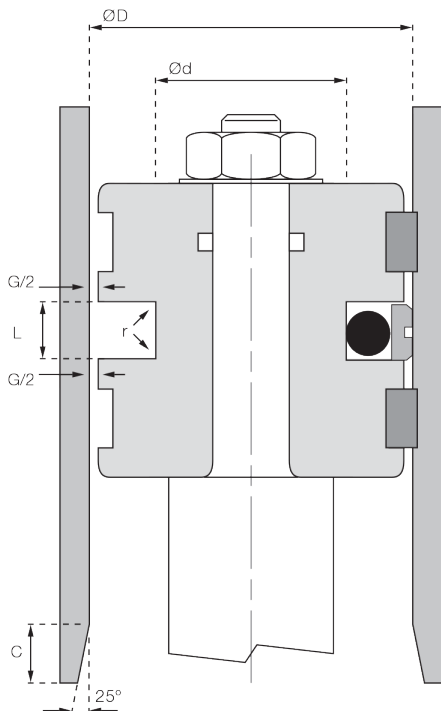


Double acting seals



### Key Features

- Medium duty
- One piece piston
- Snap back to size
- Compact design
- Better abrasive resistance



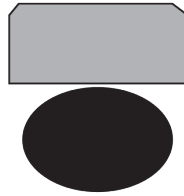




# GP8

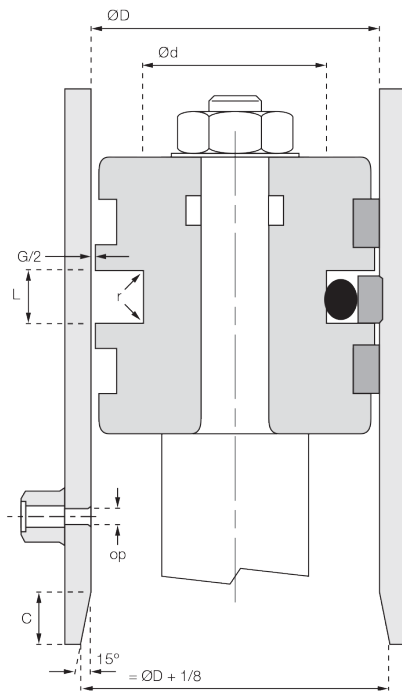
## Glide Rings

Double acting seals



### Key Features

- Heavy duty
- One piece piston
- Higher pressure capability
- Compact design
- Shock load resistant
- Port passing ability



### Design

GP8 two part double acting piston seals consist of a step cut outer dynamic ring of glass filled Nylon with an NBR oval or rectangular section energiser. The outer dynamic ring is very tough, capable of higher pressures and some amount of shock loading. Another advantage is the ability to pass over ports and machined grooves, notches without harm and are relatively easy to install. Never trim or alter the outer nylon ring.

### Operating Conditions

#### Pressure

350 Bar  
5,000 Psi



#### Temperature

-30° to 120° C  
-22° to 250° F



#### Speed

1.5m/sec  
5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{\O}D$	$\text{\O}d$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\text{\O}D$	$\text{\O}d$	L	op
+0.005	+0.000	+0.005	L x 1.1
-0.000	-0.005	-0.000	

#### Chamfer Radii

C	$\text{\O}D + 0.125 @ 15^\circ$
r	0.032

#### Extrusion Gap G

G	$\text{\O}D - 0.065$
---	----------------------

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

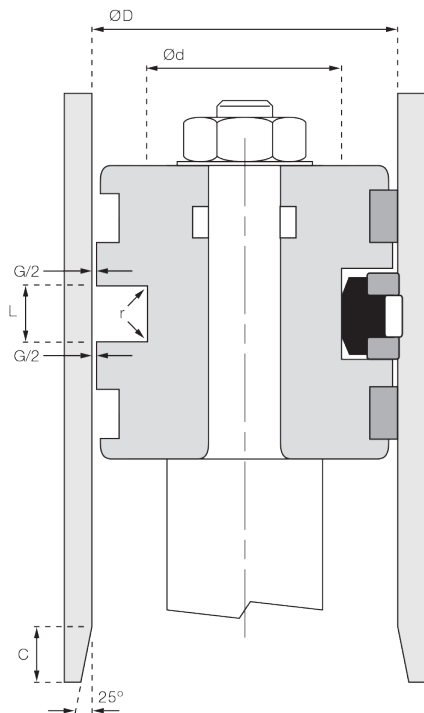


Double acting seals



### Key Features

- Medium to heavy duty
- One piece piston
- Higher pressure capability
- Compact design
- Low stiction
- High shock resistance



# PHD

## Glide Rings

### Design

PHD are used on one piece pistons. The assembly consists of a Bronze filled PTFE high performance outer sleeve, pre loaded and pressure energised by a precision moulded NBR element. These two components are protected from extrusion at either side by fitting two hard anti-extrusion rings. This seal is highly resistant to shock loads due to its excellent anti-extrusion abilities.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



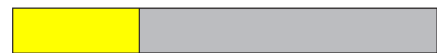
#### Temperature

-30° to 120° C  
-22° to 250° F



#### Speed

1.5m/sec  
5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing D$	$\varnothing d$	L
H9	h9	-0 + 0.010

#### Chamfer Radii

	0.240	0.365	0.470
C/S	0.200	0.250	0.280
C	0.016	0.035	0.035
r			

#### Extrusion Gap G

Pressure	2,500	3,750	6,000
	0.040	0.030	0.024

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





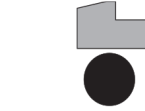
GP2



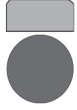
GP2†



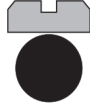
GP2‡



GP3 (Made to order)



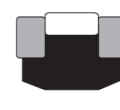
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
0.875	0.616	0.000	0.000	0.000	0.000	GP6-0087061-083
1.000	0.690	0.129	0.000	0.000	0.000	GP2-0100069-012
1.000	0.740	0.083	0.000	0.000	0.000	GP4-0100074-008
1.000	0.740	0.083	0.000	0.000	0.000	GP2-0100074-008
1.000	0.787	0.094	0.000	0.000	0.000	GP2-0100078-009
1.125	0.865	0.083	0.000	0.000	0.000	GP2-0112086-008
1.125	0.912	0.094	0.000	0.000	0.000	GP2-0112091-009
1.250	0.940	0.129	0.000	0.000	0.000	GP2-0125094-012
1.250	0.990	0.083	0.000	0.000	0.000	GP2-0125099-008
1.250	1.006	0.185	0.000	0.000	0.000	GP6-0125100-018
1.250	1.037	0.094	0.000	0.000	0.000	GP2-0125103-009
1.375	1.115	0.083	0.000	0.000	0.000	GP2-0137111-008
1.375	1.162	0.094	0.000	0.000	0.000	GP2-0137116-009
1.500	0.884	0.291	0.000	0.000	0.000	GP2-0150088-029
1.500	1.190	0.129	0.000	0.000	0.000	GP2-0150119-012
1.500	1.204	0.129	0.000	0.000	0.000	GP4-0150120-012
1.500	1.204	0.129	0.000	0.000	0.000	GP2-0150120-012
1.500	1.240	0.083	0.000	0.000	0.000	GP2-0150124-008
1.500	1.256	0.000	0.000	0.000	0.000	GP6-0150125-027
1.500	1.256	0.185	0.000	0.000	0.000	GP6-0150125-018
1.500	1.287	0.094	0.000	0.000	0.000	GP2-0150128-009
1.625	1.233	0.122	0.000	0.000	0.000	GP2-0162123-012
1.750	1.358	0.122	0.000	0.000	0.000	GP2-0175135-012
1.750	1.440	0.129	0.000	0.000	0.000	GP6-0175144-012
1.750	1.440	0.129	0.000	0.000	0.000	GP2-0175144-012
1.750	1.506	0.185	0.000	0.000	0.000	GP6-0175150-018
1.750	1.537	0.094	0.000	0.000	0.000	GP2-0175153-009
1.875	1.483	0.122	0.000	0.000	0.000	GP2-0187148-012
1.875	1.598	0.126	0.000	0.000	0.000	GP2-0187159-012
2.000	1.384	0.291	0.000	0.000	0.000	GP2-0200138-029
2.000	1.462	0.282	0.000	0.000	0.000	GP8-0200146-028



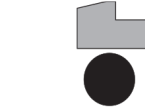
GP2



GP2†



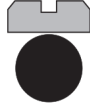
GP2‡



GP3 (Made to order)



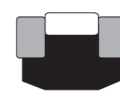
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
2.000	1.567	0.165	0.000	0.000	0.000	GP4-0200156-016
2.000	1.576	0.165	0.000	0.000	0.000	GP6-0200157-016
2.000	1.576	0.165	0.000	0.000	0.000	GP2-0200157-016
2.000	1.608	0.129	0.000	0.000	0.000	GP2-0200160-012
2.000	1.625	0.180	0.192	0.000	0.000	GP2-0200162-019
2.000	1.627	0.280	0.000	0.000	0.000	GP6-0200162-028
2.000	1.627	0.394	0.000	0.000	1.998	GP6-0200162-039B
2.000	1.627	0.424	0.000	0.000	0.000	PHD-0200162-042
2.000	1.630	0.190	0.000	0.000	0.000	GP2-0200163-019
2.000	1.690	0.129	0.000	0.000	0.000	GP2-0200169-012
2.000	1.723	0.126	0.000	0.000	0.000	GP2-0200172-012
2.125	1.733	0.129	0.000	0.000	0.000	GP2-0212173-012
2.250	1.712	0.282	0.000	0.000	0.000	GP8-0225171-028
2.250	1.858	0.129	0.000	0.000	0.000	GP2-0225185-012
2.250	1.875	0.000	0.000	0.000	0.000	GP2-0225187-019
2.250	1.877	0.280	0.000	0.000	0.000	GP6-0225187-028
2.250	1.940	0.129	0.000	0.000	0.000	GP2-0225194-012
2.250	1.972	0.126	0.000	0.000	0.000	GP2-0225197-012
2.375	1.983	0.129	0.000	0.000	0.000	GP2-0237198-012
2.375	2.098	0.126	0.000	0.000	0.000	GP2-0237209-012
2.500	1.884	0.291	0.000	0.000	0.000	GP2-0250188-029
2.500	1.962	0.282	0.000	0.000	0.000	GP8-0250196-028
2.500	2.016	0.000	0.000	0.000	0.000	GP2-0250201-016
2.500	2.067	0.000	0.000	0.000	0.000	GP4-0250206-016
2.500	2.067	0.165	0.000	0.000	0.000	GP4-0250207-016
2.500	2.076	0.165	0.000	0.000	0.000	GP2-0250207-016
2.500	2.106	0.165	0.000	0.000	0.000	GP2-0250210-016
2.500	2.108	0.129	0.000	0.000	0.000	GP2-0250210-012
2.500	2.127	0.280	0.000	0.000	0.000	GP6-0250212-028
2.500	2.127	0.394	0.000	0.000	0.000	GP6-0250212-039B
2.500	2.130	0.190	0.000	0.000	0.000	GP2-0250213-019



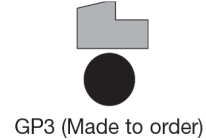
GP2



GP2†



GP2‡



GP3 (Made to order)



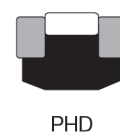
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
2.500	2.190	0.129	0.000	0.000	0.000	GP2-0250219-012
2.500	2.223	0.126	0.000	0.000	0.000	GP2-0250222-012
2.560	2.127	0.424	0.000	0.000	0.000	PHD-0250212-042
2.712	3.250	0.000	0.000	0.000	0.000	GP2-0325271-028
2.750	2.190	0.284	0.000	0.000	0.000	GP2-0275219-028
2.750	2.212	0.283	0.000	0.000	0.000	GP8-0275221-028
2.750	2.353	0.157	0.000	0.000	0.000	GP2-0275235-015
2.750	2.358	0.129	0.000	0.000	0.000	GP2-0275235-012
2.750	2.377	0.000	0.000	0.000	0.000	PHD-0275237-042
2.750	2.377	0.280	0.000	0.000	0.000	GP6-0275237-028
2.750	2.380	0.190	0.000	0.000	0.000	GP2-0275238-019
2.750	2.440	0.129	0.000	0.000	0.000	GP2-0275244-012
3.000	2.384	0.250	0.000	0.000	0.000	GP2-0300238-025
3.000	2.384	0.291	0.000	0.000	0.000	GP2-0300238-029
3.000	2.408	0.312	0.000	0.000	0.000	GP8-0300240-031
3.000	2.433	0.250	0.000	0.000	0.000	GP2-0300243-025
3.000	2.442	0.282	0.000	0.000	0.000	GP8-0300244-028
3.000	2.442	0.282	0.000	0.000	0.000	GP2-0300244-028
3.000	2.460	0.190	0.000	0.000	0.000	GP8-0300246-019
3.000	2.460	0.190	0.000	0.000	0.000	GP2-0300246-019
3.000	2.462	0.283	0.000	0.000	0.000	GP6-0300246-028
3.000	2.512	0.281	0.000	0.000	0.000	GP2-0300251-028
3.000	2.520	0.579	0.000	0.000	0.000	PHD-0300252-057
3.000	2.567	0.165	0.000	0.000	0.000	GP4-0300256-016
3.000	2.567	0.165	0.000	0.000	0.000	GP2-0300256-016
3.000	2.603	0.157	0.000	0.000	0.000	GP2-0300260-015
3.000	2.608	0.129	0.000	0.000	0.000	GP2-0300260-012
3.000	2.627	0.000	0.000	0.000	0.000	GP6-0300262-033B
3.000	2.627	0.280	0.000	0.000	0.000	GP6-0300262-028
3.000	2.627	0.410	0.000	0.000	0.000	GP6-0300262-041
3.040	2.462	0.282	0.000	0.000	0.000	GP8-0304246-028



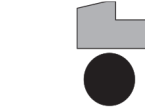
GP2



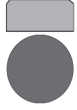
GP2†



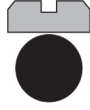
GP2‡



GP3 (Made to order)



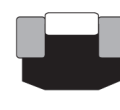
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
3.125	2.692	0.165	0.000	0.000	0.000	GP2-0312269-016
3.125	2.733	0.129	0.000	0.000	0.000	GP2-0312273-012
3.250	2.634	0.250	0.000	0.000	0.000	GP2-0325263-025
3.250	2.634	0.250	0.000	0.000	325,264.000	GP4-0325263-025
3.250	2.634	0.291	0.000	0.000	0.000	GP2-0325263-029
3.250	2.683	0.250	0.000	0.000	0.000	GP2-0325268-025
3.250	2.692	0.282	0.000	0.000	0.000	GP8-0325269-028
3.250	2.692	0.282	0.000	0.000	0.000	GP2-0325269-028
3.250	2.710	0.190	0.000	0.000	0.000	GP2-0325271-019
3.250	2.770	0.579	0.000	0.000	0.000	PHD-0325277-057
3.250	2.853	0.157	0.000	0.000	0.000	GP2-0325285-015
3.250	2.858	0.129	0.000	0.000	0.000	GP2-0325285-012
3.250	2.877	0.280	0.000	0.000	0.000	GP6-0325287-028
3.375	2.983	0.129	0.000	0.000	0.000	GP2-0337298-012
3.500	2.884	0.250	0.000	0.000	0.000	GP4-0350288-025
3.500	2.884	0.250	0.000	0.000	0.000	GP2-0350288-025
3.500	2.884	0.291	0.000	0.000	0.000	GP2-0350288-029
3.500	2.908	0.312	0.000	0.000	0.000	GP8-0350290-031
3.500	2.933	0.250	0.000	0.000	0.000	GP2-0350293-025
3.500	2.942	0.282	0.000	0.000	0.000	GP8-0350294-028
3.500	2.942	0.282	0.000	0.000	0.000	GP2-0350294-028
3.500	2.960	0.190	0.000	0.000	0.000	GP8-0350296-019
3.500	2.960	0.190	0.000	0.000	0.000	GP2-0350296-019
3.500	2.962	0.283	0.000	0.000	0.000	GP6-0350296-028
3.500	2.962	0.283	0.000	0.000	0.000	GP2-0350296-028
3.500	3.020	0.579	0.000	0.000	0.000	PHD-0350302-057
3.500	3.103	0.157	0.000	0.000	0.000	GP2-0350310-015
3.500	3.108	0.129	0.000	0.000	0.000	GP2-0350310-012
3.500	3.128	0.280	0.000	0.000	0.000	GP6-0350312-028
3.540	2.962	0.282	0.000	0.000	0.000	GP8-0354296-028
3.625	3.233	0.129	0.000	0.000	0.000	GP2-0362323-012





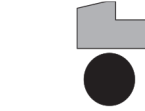
GP2



GP2†



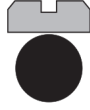
GP2‡



GP3 (Made to order)



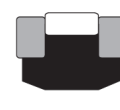
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
3.750	3.183	0.250	0.000	0.000	0.000	GP2-0375318-025
3.750	3.192	0.282	0.000	0.000	0.000	GP8-0375319-028
3.750	3.192	0.282	0.000	0.000	0.000	GP2-0375319-028
3.750	3.210	0.190	0.000	0.000	0.000	GP2-0375321-019
3.750	3.212	0.283	0.000	0.000	0.000	GP6-0375321-028
3.750	3.270	0.579	0.000	0.000	0.000	PHD-0375327-057
3.750	3.353	0.157	0.000	0.000	0.000	GP2-0375335-015
3.750	3.358	0.129	0.000	0.000	0.000	GP2-0375335-012
3.750	3.378	0.280	0.000	0.000	0.000	GP6-0375337-028
4.000	3.340	0.250	0.000	0.000	0.000	GP8-0400334-025
4.000	3.340	0.250	0.000	0.000	0.000	GP2-0400334-025
4.000	3.384	0.250	0.000	0.000	0.000	GP4-0400338-025
4.000	3.384	0.250	0.000	0.000	0.000	GP2-0400338-025
4.000	3.384	0.291	0.000	0.000	0.000	GP2-0400338-029
4.000	3.408	0.312	0.000	0.000	0.000	GP8-0400340-031
4.000	3.433	0.250	0.000	0.000	0.000	GP2-0400343-025
4.000	3.442	0.282	0.000	0.000	0.000	GP8-0400344-028
4.000	3.442	0.282	0.000	0.000	0.000	GP2-0400344-028
4.000	3.462	0.283	0.000	0.000	0.000	GP6-0400346-028
4.000	3.490	0.280	0.000	0.000	0.000	GP2-0400349-028
4.000	3.520	0.579	0.000	0.000	0.000	PHD-0400352-057
4.000	3.603	0.157	0.000	0.000	0.000	GP2-0400360-015
4.000	3.603	0.350	0.000	0.000	0.000	GP2-0400360-035
4.000	3.608	0.129	0.000	0.000	0.000	GP2-0400360-012
4.000	3.625	0.280	0.000	0.000	0.000	GP6-0400362-028
4.040	3.462	0.282	0.000	0.000	0.000	GP8-0404346-028
4.250	3.590	0.250	0.000	0.000	0.000	GP8-0425359-025
4.250	3.590	0.250	0.000	0.000	0.000	GP2-0425359-025
4.250	3.634	0.250	0.000	0.000	0.000	GP2-0425363-025
4.250	3.683	0.250	0.000	0.000	0.000	GP2-0425368-025
4.250	3.692	0.282	0.000	0.000	0.000	GP8-0425369-028



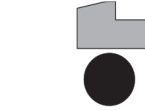
GP2



GP2†



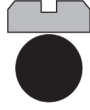
GP2‡



GP3 (Made to order)



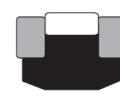
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
4.250	3.692	0.282	0.000	0.000	0.000	GP2-0425369-028
4.250	3.712	0.283	0.000	0.000	0.000	GP6-0425371-028
4.250	3.770	0.579	0.000	0.000	0.000	PHD-0425377-057
4.250	3.853	0.157	0.000	0.000	0.000	GP2-0425385-015
4.250	3.858	0.129	0.000	0.000	0.000	GP2-0425385-012
4.400	4.008	0.129	0.000	0.000	0.000	GP2-0440400-012
4.500	3.840	0.250	0.000	0.000	0.000	GP8-0450384-025
4.500	3.840	0.250	0.000	0.000	0.000	GP2-0450384-025
4.500	3.840	0.500	0.000	0.000	0.000	GP8-0450384-050
4.500	3.884	0.250	0.000	0.000	0.000	GP4-0450388-025
4.500	3.884	0.250	0.000	0.000	0.000	GP2-0450388-025
4.500	3.884	0.291	0.000	0.000	0.000	GP2-0450388-029
4.500	3.933	0.250	0.000	0.000	0.000	GP2-0450393-025
4.500	3.942	0.282	0.000	0.000	0.000	GP8-0450394-028
4.500	3.942	0.282	0.000	0.000	0.000	GP2-0450394-028
4.500	3.962	0.283	0.000	0.000	0.000	GP6-0450396-028
4.500	4.020	0.579	0.000	0.000	0.000	PHD-0450402-057
4.500	4.103	0.157	0.000	0.000	0.000	GP2-0450410-015
4.500	4.108	0.129	0.000	0.000	0.000	GP2-0450410-012
4.540	3.962	0.282	0.000	0.000	0.000	GP8-0454396-028
4.750	4.090	0.250	0.000	0.000	0.000	GP2-0475409-025
4.750	4.134	0.000	0.000	0.000	0.000	GP2-0475413-029
4.750	4.159	0.000	0.000	0.000	0.000	PHD-0475415-492
4.750	4.183	0.250	0.000	0.000	0.000	GP2-0475418-025
4.750	4.192	0.282	0.000	0.000	0.000	GP8-0475419-028
4.750	4.192	0.282	0.000	0.000	0.000	GP2-0475419-028
4.750	4.212	0.283	0.000	0.000	0.000	GP6-0475421-028
4.750	4.270	0.579	0.000	0.000	0.000	PHD-0475427-057
4.750	4.353	0.157	0.000	0.000	0.000	GP2-0475435-015
4.750	4.358	0.129	0.000	0.000	0.000	GP6-0475435-012
4.750	4.358	0.129	0.000	0.000	0.000	GP2-0475435-012



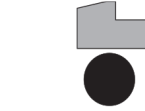
GP2



GP2†



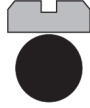
GP2‡



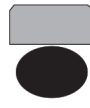
GP3 (Made to order)



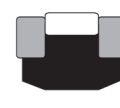
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
5.000	4.230	0.380	0.000	0.000	0.000	GP8-0500423-038
5.000	4.230	0.380	0.000	0.000	0.000	GP2-0500423-038
5.000	4.240	0.377	0.000	0.000	0.000	GP8-0500424-037
5.000	4.270	0.750	0.000	0.000	0.000	PHD-0500427-075
5.000	4.384	0.250	0.000	0.000	0.000	GP4-0500438-025
5.000	4.384	0.250	0.000	0.000	0.000	GP2-0500438-025
5.000	4.384	0.291	0.000	0.000	0.000	GP2-0500438-029
5.000	4.408	0.312	0.000	0.000	0.000	GP8-0500440-031
5.000	4.433	0.250	0.000	0.000	0.000	GP2-0500443-025
5.000	4.442	0.282	0.000	0.000	0.000	GP8-0500444-028
5.000	4.442	0.282	0.000	0.000	0.000	GP2-0500444-028
5.000	4.462	0.283	0.000	0.000	0.000	GP6-0500446-028
5.000	4.490	0.280	0.000	0.000	0.000	GP2-0500449-028
5.000	4.603	0.157	0.000	0.000	0.000	GP2-0500460-015
5.000	4.603	0.312	0.000	0.000	0.000	GP2-0500460-031
5.000	4.608	0.129	0.000	0.000	0.000	GP2-0500460-012
5.000	4.629	0.280	0.000	0.000	0.000	GP6-0500462-028
5.250	4.480	0.380	0.000	0.000	0.000	GP8-0525448-038
5.250	4.480	0.380	0.000	0.000	0.000	GP2-0525448-038
5.250	4.490	0.377	0.000	0.000	0.000	GP8-0525449-037
5.250	4.490	0.377	0.000	0.000	0.000	GP2-0525449-037
5.250	4.520	0.750	0.000	0.000	0.000	PHD-0525452-075
5.250	4.853	0.157	0.000	0.000	0.000	GP2-0525485-015
5.250	4.858	0.129	0.000	0.000	0.000	GP2-0525485-012
5.500	4.594	0.630	0.000	0.000	0.000	PHD-0550459-063
5.500	4.660	0.378	0.000	0.000	0.000	GP2-0550466-037
5.500	4.670	0.322	0.000	0.000	0.000	GP2-0550467-032
5.500	4.730	0.380	0.000	0.000	0.000	GP8-0550473-038
5.500	4.730	0.380	0.000	0.000	0.000	GP2-0550473-038
5.500	4.730	0.630	0.000	0.000	0.000	GP8-0550473-063
5.500	4.740	0.377	0.000	0.000	0.000	GP2-0550474-037



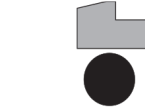
GP2



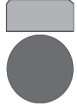
GP2†



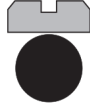
GP2‡



GP3 (Made to order)



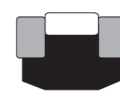
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
5.500	4.770	0.750	0.000	0.000	0.000	PHD-0550477-075
5.500	4.908	0.312	0.000	0.000	0.000	GP8-0550490-031
5.500	5.020	0.579	0.000	0.000	0.000	PHD-0550502-057
5.500	5.103	0.157	0.000	0.000	0.000	GP2-0550510-015
5.500	5.108	0.129	0.000	0.000	0.000	GP2-0550510-012
5.750	4.990	0.377	0.000	0.000	0.000	GP2-0575499-037
5.750	5.232	0.159	0.000	0.000	0.000	GP2-0575523-015
5.750	5.353	0.157	0.000	0.000	0.000	GP2-0575535-015
5.875	5.357	0.159	0.000	0.000	0.000	GP2-0587535-015
6.000	5.090	0.380	0.000	0.000	0.000	GP8-0600509-038
6.000	5.090	0.380	0.000	0.000	0.000	GP2-0600509-038
6.000	5.090	0.630	0.000	0.000	0.000	GP8-0600509-063
6.000	5.160	0.378	0.000	0.000	0.000	GP2-0600516-037
6.000	5.170	0.322	0.000	0.000	0.000	GP4-0600517-032
6.000	5.170	0.322	0.000	0.000	0.000	GP2-0600517-032
6.000	5.240	0.377	0.000	0.000	0.000	GP8-0600524-037
6.000	5.240	0.377	0.000	0.000	0.000	GP2-0600524-037
6.000	5.254	0.378	0.000	0.000	0.000	GP6-0600525-037
6.000	5.270	0.750	0.000	0.000	0.000	PHD-0600527-075
6.000	5.280	0.377	0.000	0.000	0.000	GP2-0600528-037
6.000	5.305	0.293	0.000	0.000	0.000	GP2-0600530-029
6.000	5.482	0.159	0.000	0.000	0.000	GP6-0600548-015
6.000	5.482	0.159	0.000	0.000	0.000	GP2-0600548-015
6.000	5.524	0.366	0.000	0.000	0.000	GP6-0600552-036
6.000	5.524	0.579	0.000	0.000	0.000	PHD-0600552-057
6.015	5.285	0.750	0.000	0.000	0.000	PHD-0601528-075
6.030	5.090	0.000	0.000	0.000	0.000	GP8-0603509-063
6.040	5.240	0.377	0.000	0.000	0.000	GP8-0604524-037
6.125	5.607	0.159	0.000	0.000	0.000	GP2-0612560-015
6.250	5.345	0.380	0.000	0.000	0.000	GP2-0625534-038
6.250	5.345	0.630	0.000	0.000	0.000	PHD-0625534-063



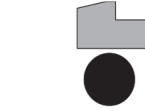
GP2



GP2†



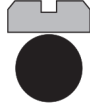
GP2‡



GP3 (Made to order)



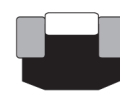
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
6.250	5.490	0.377	0.000	0.000	0.000	GP2-0625549-037
6.250	5.490	0.377	0.000	0.000	0.000	GP8-0625549-037
6.250	5.520	0.750	0.000	0.000	0.000	PHD-0625552-075
6.250	5.732	0.159	0.000	0.000	0.000	GP2-0625573-015
6.500	5.590	0.380	0.000	0.000	0.000	GP2-0650559-038
6.500	5.660	0.378	0.000	0.000	0.000	GP2-0650566-037
6.500	5.670	0.322	0.000	0.000	0.000	GP2-0650567-032
6.500	5.740	0.377	0.000	0.000	0.000	GP8-0650574-037
6.500	5.740	0.377	0.000	0.000	0.000	GP2-0650574-037
6.500	5.770	0.750	0.000	0.000	0.000	PHD-0650577-075
6.500	5.982	0.159	0.000	0.000	0.000	GP2-0650598-015
6.500	6.020	0.579	0.000	0.000	0.000	PHD-0650602-057
6.500	6.024	0.366	0.000	0.000	0.000	GP6-0650602-036
7.000	6.090	0.380	0.000	0.000	0.000	GP2-0700609-038
7.000	6.090	0.630	0.000	0.000	0.000	GP8-0700609-063
7.000	6.160	0.378	0.000	0.000	0.000	GP2-0700616-037
7.000	6.170	0.322	0.000	0.000	0.000	GP4-0700617-032
7.000	6.240	0.377	0.000	0.000	0.000	GP8-0700624-037
7.000	6.240	0.377	0.000	0.000	0.000	GP2-0700624-037
7.000	6.250	0.780	0.000	0.000	6.992	GP2-0700625-078
7.000	6.254	0.378	0.000	0.000	0.000	GP6-0700625-037
7.000	6.270	0.750	0.000	0.000	0.000	PHD-0700627-075
7.000	6.280	0.377	0.000	0.000	0.000	GP2-0700628-037
7.000	6.482	0.159	0.000	0.000	0.000	GP2-0700648-015
7.000	6.524	0.366	0.000	0.000	0.000	GP6-0700652-036
7.250	6.340	0.630	0.000	0.000	0.000	GP8-0725634-063
7.250	6.490	0.377	0.000	0.000	0.000	GP2-0725649-037
7.250	6.520	0.750	0.000	0.000	0.000	PHD-0725652-075
7.250	6.732	0.159	0.000	0.000	0.000	GP2-0725673-015
7.375	6.895	0.579	0.000	0.000	0.000	GP8-0737689-057
7.500	6.590	0.380	0.000	0.000	0.000	GP2-0750659-038



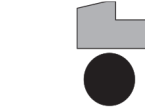
GP2



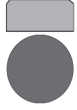
GP2†



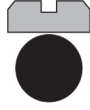
GP2‡



GP3 (Made to order)



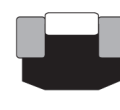
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
7.500	6.594	0.000	0.000	0.000	0.000	PHD-0750659-063
7.500	6.670	0.322	0.000	0.000	0.000	GP2-0750667-032
7.500	6.740	0.377	0.000	0.000	0.000	GP8-0750674-037
7.500	6.740	0.377	0.000	0.000	0.000	GP2-0750674-037
7.500	6.770	0.750	0.000	0.000	0.000	PHD-0750677-075
7.500	6.982	0.150	0.159	0.000	0.000	GP6-0750698-015
7.500	6.982	0.159	0.000	0.000	0.000	GP2-0750698-015
7.500	6.982	0.159	0.000	0.000	0.000	GP2-0750698-015
7.500	7.024	0.366	0.000	0.000	0.000	GP6-0750702-036
7.750	6.840	0.380	0.000	0.000	0.000	GP2-0775684-038
7.750	6.840	0.630	0.000	0.000	0.000	GP8-0775684-063
7.750	6.990	0.377	0.000	0.000	0.000	GP2-0775699-037
8.000	7.160	0.378	0.000	0.000	0.000	GP2-0800716-037
8.000	7.160	0.625	0.000	0.000	0.000	GP2-0800716-062
8.000	7.170	0.322	0.000	0.000	0.000	GP4-0800717-032
8.000	7.170	0.322	0.000	0.000	0.000	GP2-0800717-032
8.000	7.240	0.377	0.000	0.000	0.000	GP8-0800724-037
8.000	7.240	0.377	0.000	0.000	0.000	GP2-0800724-037
8.000	7.270	0.750	0.000	0.000	0.000	PHD-0800727-075
8.000	7.280	0.377	0.000	0.000	0.000	GP2-0800728-037
8.000	7.482	0.159	0.000	0.000	0.000	GP2-0800748-015
8.000	7.524	0.366	0.000	0.000	0.000	GP6-0800752-036
8.125	7.607	0.159	0.000	0.000	0.000	GP2-0812760-015
8.250	7.260	0.380	0.000	0.000	0.000	GP2-0825726-038
8.250	7.260	0.630	0.000	0.000	0.000	GP8-0825726-063
8.250	7.732	0.159	0.000	0.000	0.000	GP2-0825773-015
8.375	7.895	0.579	0.000	0.000	0.000	GP8-0837789-057
8.437	7.677	0.377	0.000	0.000	0.000	GP8-0843767-037
8.500	7.510	0.380	0.000	0.000	0.000	GP2-0850751-038
8.500	7.510	0.630	0.000	0.000	0.000	GP8-0850751-063
8.500	7.624	0.000	0.000	0.000	0.000	GP8-0850762-037





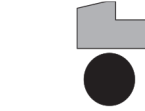
GP2



GP2†



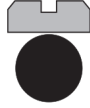
GP2‡



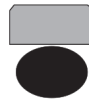
GP3 (Made to order)



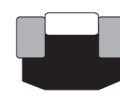
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
8.500	7.740	0.377	0.000	0.000	0.000	GP8-0850774-037
8.500	7.740	0.377	0.000	0.000	0.000	GP2-0850774-037
8.500	7.770	0.750	0.000	0.000	0.000	PHD-0850777-075
8.500	7.982	0.159	0.000	0.000	0.000	GP2-0850798-015
8.530	7.770	0.377	0.000	0.000	0.000	GP8-0853777-037
8.750	8.232	0.159	0.000	0.000	0.000	GP2-0875823-015
9.000	8.122	0.379	0.000	0.000	0.000	GP2-0900812-037
9.000	8.170	0.377	0.000	0.000	0.000	GP2-0900817-037
9.000	8.270	0.750	0.000	0.000	0.000	PHD-0900827-075
9.000	8.482	0.159	0.000	0.000	0.000	GP2-0900848-015
9.250	8.255	0.379	0.000	0.000	0.000	GP8-0925825-037
9.250	8.260	0.380	0.000	0.000	0.000	GP2-0925826-038
9.250	8.732	0.159	0.000	0.000	0.000	GP2-0925873-015
9.500	8.380	0.440	0.000	0.000	0.000	GP2-0950838-044
9.500	8.622	0.379	0.000	0.000	0.000	GP2-0950862-037
9.500	8.670	0.322	0.000	0.000	0.000	GP2-0950867-032
9.500	8.982	0.159	0.000	0.000	0.000	GP2-0950898-015
9.500	9.020	0.579	0.000	0.000	0.000	GP8-0950902-057
9.750	9.232	0.159	0.000	0.000	0.000	GP2-0975923-015
9.875	9.000	0.377	0.000	0.000	0.000	GP8-0987900-037
10.000	8.880	0.690	0.000	0.000	0.000	GP8-1000888-069
10.000	9.122	0.000	0.000	0.000	0.000	GP8-1000912-037
10.000	9.122	0.379	0.000	0.000	0.000	GP2-1000912-037
10.000	9.170	0.322	0.000	0.000	0.000	GP2-1000917-032
10.000	9.270	0.750	0.000	0.000	0.000	PHD-1000927-075
10.000	9.482	0.159	0.000	0.000	0.000	GP2-1000948-015
10.500	9.380	0.690	0.000	0.000	0.000	GP8-1050938-069
10.500	9.982	0.159	0.000	0.000	0.000	GP2-1050998-015
10.500	10.020	0.579	0.000	0.000	0.000	GP8-1050100-057
11.000	10.122	0.379	0.000	0.000	0.000	GP2-1100101-039
11.000	10.270	0.750	0.000	0.000	0.000	PHD-1100102-075



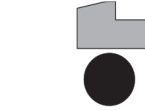
GP2



GP2†



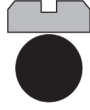
GP2‡



GP3 (Made to order)



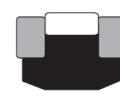
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
11.000	10.482	0.159	0.000	0.000	0.000	GP2-1100104-015
11.500	10.982	0.159	0.000	0.000	0.000	GP2-1150109-015
11.500	11.020	0.579	0.000	0.000	0.000	GP8-1150110-057
11.750	10.872	0.000	0.000	0.000	0.000	GP8-1175108-037
11.750	11.270	0.579	0.000	0.000	0.000	GP8-1175112-057
12.000	11.122	0.000	0.000	0.000	0.000	GP8-1200111-037
12.000	11.170	0.322	0.000	0.000	0.000	GP2-1200111-032
12.000	11.270	0.750	0.000	0.000	0.000	PHD-1200112-075
12.000	11.482	0.159	0.000	0.000	0.000	GP2-1200114-015
12.500	11.624	0.377	0.000	0.000	0.000	GP8-1250116-037
12.500	11.982	0.159	0.000	0.000	0.000	GP2-1250119-015
13.000	12.122	0.379	0.000	0.000	0.000	GP2-1300121-037
13.000	12.250	0.579	0.000	0.000	0.000	GP8-1300125-057
13.000	12.270	0.750	0.000	0.000	1,300,122.00	PHD-1300122-075
13.000	12.482	0.159	0.000	0.000	0.000	GP2-1300124-015
14.000	12.898	0.687	0.000	0.000	0.000	PHD-1400128-068
14.000	13.122	0.379	0.000	0.000	0.000	GP2-1400131-037
14.000	13.270	0.750	0.000	0.000	0.000	PHD-1400132-075
14.000	13.482	0.159	0.000	0.000	0.000	GP2-1400134-015
14.000	13.520	0.579	0.000	0.000	0.000	GP8-1400135-057
75.000	59.500	0.000	0.000	0.000	0.000	GP8-075059-063





# PR1

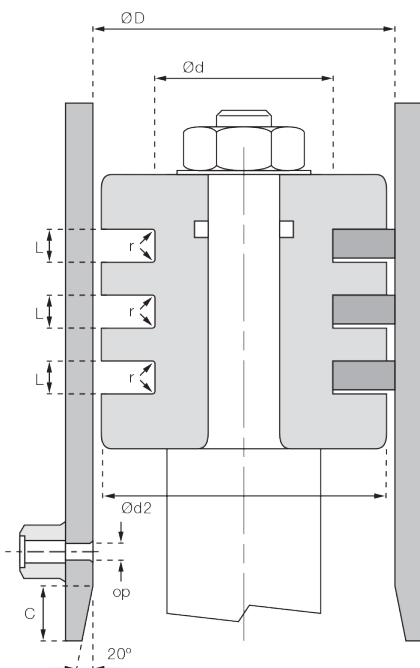
## Piston Ring

Double acting seals



### Key Features

- Heavy duty
- One piece piston
- Very compact design
- Gapping not required
- Port passing ability
- High extrusion resistance
- High shock load resistance
- High speed



### Design

PR1 are manufactured from cast iron. These piston rings are double acting seals. The joint, known as 'Perma-seal', over locks both on cross section and width simultaneously. This prevents the end of the rings from moving radially outward when passing open ports. Cast iron piston rings can withstand higher and lower temperatures, are compatible with most media and will resist wear in rougher cylinder bores. End clearance in the ring not only compensates for cylinder diameter tolerances and thermal expansion, it allows for ring and cylinder wear during operation.

### Operating Conditions

#### Pressure, Speed & Temperature

Pressure, speed and temperature have very little effect on Cast Iron Piston Rings, thermal expansion is allowed for in the joint

#### Surface Finish Ra

Satisfactory results can be obtained in bores ranging from 4 to 80Ra. It has been found, however, that excellent ring sealing takes place in cylinders with a wall finish from 16 to 40Ra. Piston groove 40Ra max.

#### Tolerances

ØD	Ød	L	op
H10	+0.000 -0.006	-0.000 +0.003	L x 4

#### Chamfer Radii

C	0.125
r	0.005

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



#### Other Similar Styles





PR1

OD	ID	L1	L2	OD2	OD3	Product Name
1.250	1.140	0.125	0.000	0.000	0.000	PR1-0125114-012
1.375	1.250	0.106	0.000	0.000	0.000	L102-0137125-010
1.500	1.286	0.125	0.000	0.000	0.000	PR1-0150128-012
1.500	1.286	0.187	0.000	0.000	0.000	PR1-0150128-018
1.750	1.510	0.093	0.000	0.000	0.000	PR1-0175151-093
1.750	1.510	0.125	0.000	0.000	0.000	PR1-0175151-012
2.000	1.750	0.125	0.000	0.000	0.000	PR1-0200175-012
2.000	1.750	0.188	0.000	0.000	0.000	PR1-0200175-018
2.250	1.980	0.125	0.000	0.000	0.000	PR1-0225198-012
2.375	2.025	0.187	0.000	0.000	0.000	L102-0237202-018
2.375	2.093	0.188	0.000	0.000	0.000	PR1-0237209-018
2.500	2.206	0.125	0.000	0.000	0.000	PR1-0250220-012
2.500	2.206	0.188	0.000	0.000	0.000	PR1-0250220-018
2.500	2.324	0.125	0.000	0.000	0.000	L102-0250232-012
2.750	2.438	0.188	0.000	0.000	0.000	PR1-0275243-018
3.000	2.680	0.125	0.000	0.000	0.000	PR1-0300268-012
3.000	2.680	0.188	0.000	0.000	0.000	PR1-0300268-018
3.125	2.775	0.187	0.000	0.000	0.000	L102-0312277-018
3.250	2.914	0.188	0.000	0.000	0.000	PR1-0325291-018
3.250	2.914	0.250	0.000	0.000	0.000	PR1-0325291-025
3.500	3.148	0.188	0.000	0.000	0.000	PR1-0350314-018
3.500	3.148	0.250	0.000	0.000	0.000	PR1-0350314-025
3.500	3.148	0.312	0.000	0.000	0.000	PR1-0350314-031
3.750	3.380	0.250	0.000	0.000	0.000	PR1-0375338-025
4.000	3.612	0.187	0.000	0.000	0.000	PR1-0400361-018
4.000	3.612	0.250	0.000	0.000	0.000	PR1-0400361-025
4.000	3.612	0.312	0.000	0.000	0.000	PR1-0400361-031
4.000	3.650	0.187	0.000	0.000	0.000	L102-0400365-018
4.250	3.844	0.250	0.000	0.000	0.000	PR1-0425384-025
4.500	4.074	0.250	0.000	0.000	0.000	PR1-0450407-025
4.500	4.074	0.312	0.000	0.000	0.000	PR1-0450407-031



PR1

OD	ID	L1	L2	OD2	OD3	Product Name
4.750	4.308	0.250	0.000	0.000	0.000	PR1-0475430-025
5.000	4.540	0.187	0.000	0.000	0.000	PR1-0500454-018
5.000	4.540	0.250	0.000	0.000	0.000	PR1-0500454-025
5.000	4.540	0.313	0.000	0.000	0.000	PR1-0500454-031
5.000	4.540	0.375	0.000	0.000	0.000	PR1-0500454-037
5.000	4.630	0.125	0.000	0.000	0.000	PR1-0500463-012
5.030	4.540	0.250	0.000	0.000	0.000	PR1-0503454-025
5.250	4.782	0.250	0.000	0.000	0.000	PR1-0525478-025
5.500	5.044	0.187	0.000	0.000	0.000	PR1-0550504-018
5.500	5.044	0.250	0.000	0.000	0.000	PR1-0550504-025
5.500	5.044	0.312	0.000	0.000	0.000	PR1-0550504-031
5.750	5.252	0.312	0.000	0.000	0.000	PR1-0575525-031
6.000	5.488	0.187	0.000	0.000	0.000	PR1-0600548-018
6.000	5.488	0.250	0.000	0.000	0.000	PR1-0600548-025
6.000	5.488	0.313	0.000	0.000	0.000	PR1-0600548-031
6.500	5.948	0.313	0.000	0.000	0.000	PR1-0650594-031
7.000	6.414	0.313	0.000	0.000	0.000	PR1-0700641-031
7.000	6.414	0.500	0.000	0.000	0.000	PR1-0700641-050
7.250	6.646	0.313	0.000	0.000	0.000	PR1-0725664-031
7.250	6.790	0.250	0.000	0.000	0.000	PR1-0725679-025
7.250	6.875	0.207	0.000	0.000	0.000	L102-0725687-020
7.500	6.882	0.312	0.000	0.000	0.000	PR1-0750688-031
7.750	7.116	0.312	0.000	0.000	0.000	PR1-0775711-031
8.000	7.350	0.375	0.000	0.000	0.000	PR1-0800735-037
8.500	7.820	0.375	0.000	0.000	0.000	PR1-0850782-037
9.000	8.282	0.375	0.000	0.000	0.000	PR1-0900828-037
9.000	8.282	0.500	0.000	0.000	0.000	PR1-0900828-050
9.000	8.518	0.500	0.000	0.000	0.000	PR1-0900851-050
10.000	9.236	0.375	0.000	0.000	0.000	PR1-1000923-037
10.030	9.236	0.376	0.000	0.000	0.000	PR1-1003923-037
10.100	9.236	0.375	0.000	0.000	0.000	PR1-1010923-037



PR1

OD	ID	L1	L2	OD2	OD3	Product Name
11.000	10.518	0.500	0.000	0.000	0.000	PR1-1100105-050
13.000	12.320	0.500	0.000	0.000	0.000	PR1-1300123-050
14.000	13.000	0.498	0.000	0.000	0.000	PR1-1400130-050



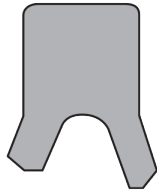




# 14

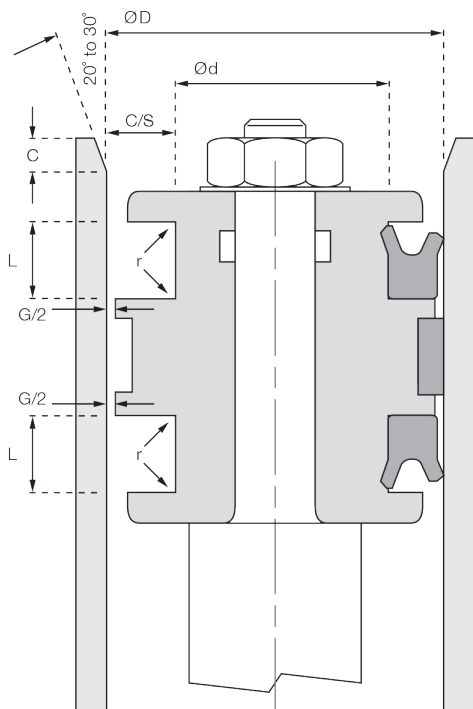
## Piston Seal

Single acting seals



### Key Features

- Medium to heavy duty
- One piece piston
- Asymmetrical design
- Excellent wear resistance
- Good extrusion resistance



### Design

14 style u-cups are a specialised piston seal design manufactured from Polyurethane 92 Shore A. Having an inside diameter smaller than the groove for which it is intended, insures a tight fit in the groove to prevent movement during operation. It also provides sufficient preload to prevent interference with the cylinder wall due to thermal expansion of the seal at higher operating temperatures. The static lip is thinner as its in full contact with groove diameter, the dynamic lip is heavier to improve higher pressure capability. Both lips have precision knife trimmed chamfers to provide complete circumferential lip contact.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

0.8m/sec  
2.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{ØD}$	$\text{Ød}$	L
0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
$\text{ØD}$ (-0.0)	+0.002	+0.002	+0.003	+0.003	+0.004	+0.005
$\text{Ød}$ (+0.0)	-0.002	-0.002	-0.003	-0.004	-0.005	-0.007
L	-0.000 / +.015					

#### Chamfer Radii

C/S	1/8	3/16	1/4	5/16	3/8	1/2
C/S	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

Pressure	2,400	3,750	6,000	7,500	10,000
G	0.018	0.010	0.004	Call	Call

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

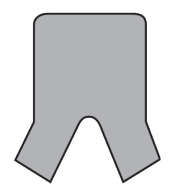




# 15

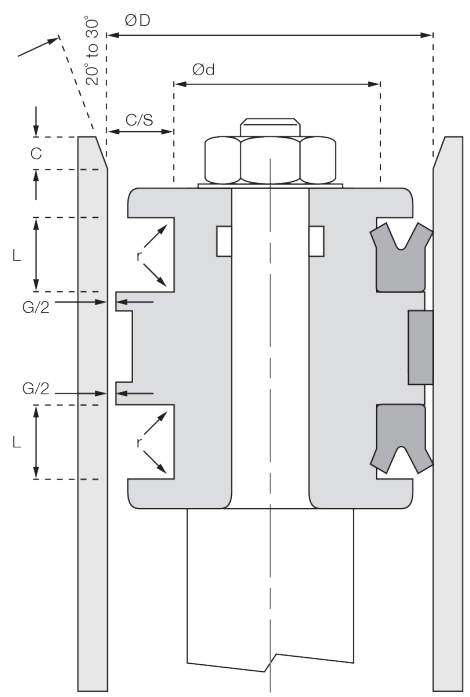
## Piston Seal

Single acting seals



### Key Features

- Medium to heavy duty
- Piston or rod
- Symmetrical lip design
- Excellent wear resistance
- Good extrusion resistance
- Flexible to fit



### Design

15 style symmetrical u-cups are a double chamfered U-ring seal manufactured from Polyurethane 92 Shore A. This material is well known for its superior abrasion resistance, low compression set and resistance to extrusion. The symmetrical configuration, with equal lip interference and equal heel clearance on both the inside and outside diameters, provides a seal which is capable of use in both piston and rod applications. The sealing lips are knife trimmed to eliminate all moulding flash and to provide superior low pressure sealing performance.

### Operating Conditions

<b>Pressure</b>	
400 Bar 6,000 Psi	

<b>Temperature</b>	
-40° to 110° C -40° to 230° F	

<b>Speed</b>	
0.8m/sec 2.5'/sec	

<b>Surface Finish µmRa</b>			
ØD	Ød	L	
0.1-0.25	0.8	2.0	

<b>Tolerances</b>						
	1/8	3/16	1/4	5/16	3/8	1/2
ØD (-0.0)	+0.002	+0.002	+0.003	+0.003	+0.004	+0.005
Ød (+0.0)	-0.002	-0.002	-0.003	-0.004	-0.005	-0.007
L	-0.000 / + .015					

<b>Chamfer Radii</b>						
C/S	1/8	3/16	1/4	5/16	3/8	1/2
	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

<b>Extrusion Gap G</b>					
Pressure	2,400	3,750	6,000	7,500	10,000
	0.018	0.010	0.004	Call	Call

<b>Typical Examples</b>			
Reciprocating	<input checked="" type="checkbox"/>	Rotary	<input type="checkbox"/>
Oscillating	<input type="checkbox"/>	Helix	<input type="checkbox"/>

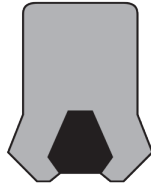




# 30

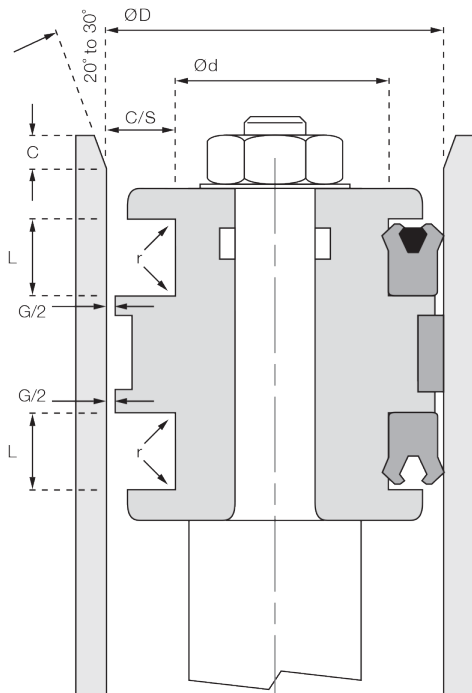
## Piston Seal

single acting seals



### Key Features

- Medium to heavy duty
- Piston or rod
- Symmetrical lip design
- Good lower pressure sealing
- Good extrusion resistance
- Flexible to fit

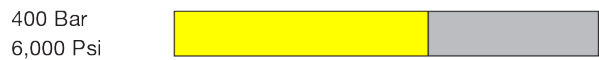


### Design

30 style are loaded U cup combining the superior field tested physical characteristics of liquid cast 92 Shore A Polyurethane with technically advanced design to produce an outstanding all purpose seal. The inner elastomeric spring element of NBR is designed and strategically positioned to create the necessary lip interference without excessive friction. This energiser will not become disengaged when severely distorted as is sometimes necessary when installing U-packs in rod applications. The sealing lips are knife chamfered to maintain circumferential lip contact. This seal is developed to work without energiser to avoid pressure trapping.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish $\mu\text{mRa}$

$\text{\O}D$	$\text{\O}d$	L
0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
$\text{\O}D$ (-0.0)	+0.002	+0.002	+0.003	+0.003	+0.004	+0.005
$\text{\O}d$ (+0.0)	-0.002	-0.002	-0.003	-0.004	-0.005	-0.007
L	-0.000 / + .015					

#### Chamfer Radii

C/S	1/8	3/16	1/4	5/16	3/8	1/2
	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

Pressure	2,400	3,750	6,000	7,500	10,000
	0.018	0.010	0.004	Call	Call

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# 35

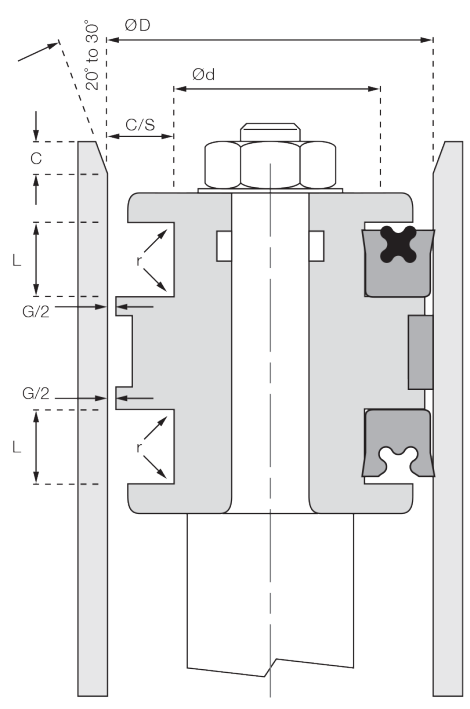
## Piston Seal

Single acting seals



### Key Features

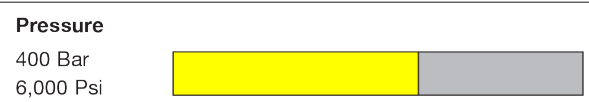
- Medium duty
- Piston or rod
- Symmetrical lip design
- Good lower pressure sealing
- Flexible to fit



### Design

35 style is a standard profile loaded U-pack single acting seal with non chamfered lips consisting of a Polyurethane casing with an o-ring or quad ring NBR energiser. The energising element is designed and strategically positioned to create the necessary lip interference without excessive friction. At low or zero pressure the energiser helps to increase the sealing force preventing any bypass. This seal is developed to work without energiser to avoid pressure trapping.

### Operating Conditions



### Surface Finish $\mu\text{mRa}$

$\text{\O}D$	$\text{\O}d$	L
0.1-0.25	0.8	2.0

### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
$\text{\O}D$ (-0.0)	+0.002	+0.002	+0.003	+0.003	+0.004	+0.005
$\text{\O}d$ (+0.0)	-0.002	-0.002	-0.003	-0.004	-0.005	-0.007
L	-.000 / + .015					

### Chamfer Radii

C/S	1/8	3/16	1/4	5/16	3/8	1/2
	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

### Extrusion Gap G

Pressure	2,400	3,750	6,000	7,500	10,000
	0.018	0.010	0.004	Call	Call

### Typical Examples

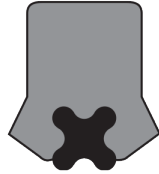
Reciprocating  Rotary  Oscillating  Helix



# 40

## Piston Seal

Single acting seals



### Key Features

- Medium duty
- Piston or rod
- High temperature resistance
- Good wear resistance

### Design

40 style is a standard profile loaded U-pack single acting seal with chamfered lips consisting of a Viton 90 Shore A casing with an energiser of Viton 75 Shore A. The energising element is designed and strategically positioned to create the necessary lip interference without excessive friction. The advantage of Viton is its high temperature abilities and also its toughness and wear resistance. This seal is developed to work without energiser to avoid pressure trapping.

### Operating Conditions

#### Pressure

150 Bar  
2,000 Psi



#### Temperature

-20° to 200° C  
-5° to 392° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
$\varnothing D$ (-0.0)	+0.002	+0.002	+0.003	+0.003	+0.004	+0.005
$\varnothing d$ (+0.0)	-0.002	-0.002	-0.003	-0.004	-0.005	-0.007
L	-0.000 / + .015					

#### Chamfer Radii

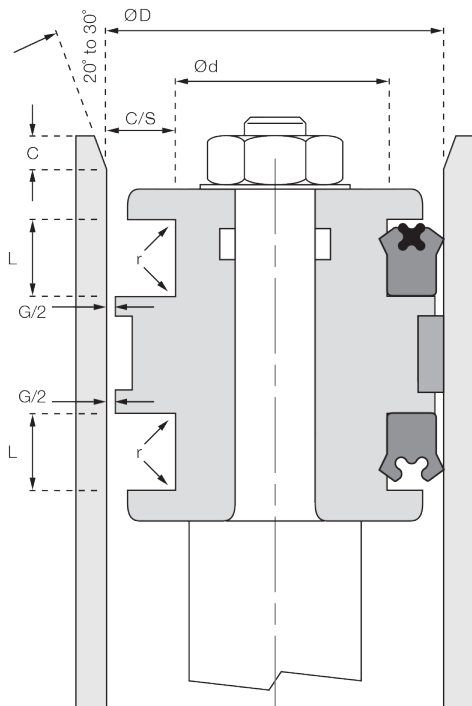
C/S	1/8	3/16	1/4	5/16	3/8	1/2
	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

Pressure	2,000
	0.010

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix







# 45

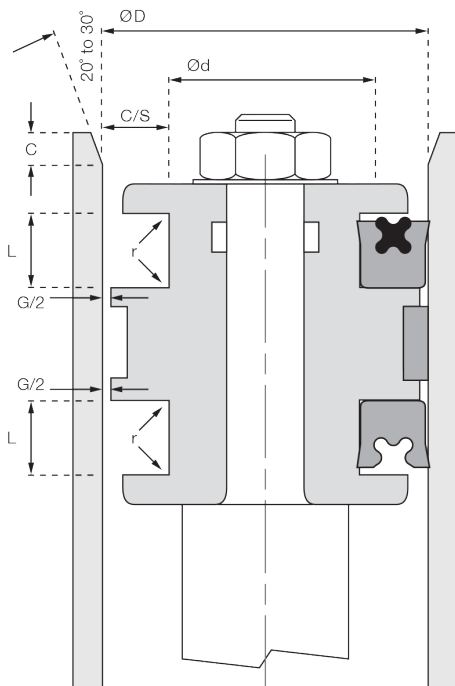
## Piston Seal

Single acting seals



### Key Features

- Medium duty
- Piston or rod
- High temperature resistance
- Good wear resistance



### Design

45 style is a standard profile loaded U-pack single acting seal with non chamfered lips consisting of a Viton 90 Shore A casing with an energiser of Viton 75 Shore A. The energising element is designed and strategically positioned to create the necessary lip interference without excessive friction. The advantage of Viton is it's high temperature abilities and also its toughness and wear resistance. This seal is developed to work without energiser to avoid pressure trapping.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish $\mu\text{mRa}$

$\text{\O}D$	$\text{\O}d$	L
0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
$\text{\O}D$ (-0.0)	+0.002	+0.002	+0.003	+0.003	+0.004	+0.005
$\text{\O}d$ (+0.0)	-0.002	-0.002	-0.003	-0.004	-0.005	-0.007
L	-.000 / + .015					

#### Chamfer Radii

C/S	1/8	3/16	1/4	5/16	3/8	1/2
	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

Pressure	2,000
	0.010

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
0.375	0.125	0.125	0.138	0.000	0.000	35-12500125
0.375	0.125	0.250	0.275	0.000	0.000	30-12500125-250
0.437	0.187	0.125	0.138	0.000	0.000	35-12500187
0.437	0.187	0.250	0.275	0.000	0.000	30-12500187-250
0.500	0.250	0.125	0.138	0.000	0.000	30-12500250
0.500	0.250	0.250	0.275	0.000	0.000	30-12500250-250
0.500	0.250	0.250	0.275	0.000	0.000	15-12500250-250
0.562	0.187	0.187	0.207	0.000	0.000	30-18700187
0.562	0.312	0.125	0.138	0.000	0.000	30-12500312
0.562	0.312	0.250	0.275	0.000	0.000	15-12500312-250
0.625	0.250	0.187	0.207	0.000	0.000	30-18700250
0.625	0.375	0.125	0.138	0.000	0.000	30-12500375
0.625	0.375	0.250	0.275	0.000	0.000	30-12500375-250
0.687	0.187	0.187	0.207	0.000	0.000	30-25000187-187
0.687	0.250	0.250	0.275	0.000	0.000	15-21800250-250
0.687	0.312	0.187	0.207	0.000	0.000	30-18700312
0.687	0.437	0.125	0.138	0.000	0.000	30-12500437
0.687	0.437	0.250	0.275	0.000	0.000	30-12500437-250
0.750	0.250	0.250	0.275	0.000	0.000	35-25000250
0.750	0.375	0.187	0.207	0.000	0.000	35-18700375
0.750	0.375	0.250	0.275	0.000	0.000	30-18700375-250
0.750	0.375	0.312	0.000	0.000	0.000	30-18700375-312
0.750	0.375	0.312	0.344	0.000	0.000	15-18700375-312
0.750	0.437	0.156	0.172	0.000	0.000	35-15600437
0.750	0.500	0.125	0.138	0.000	0.000	45-12500500
0.750	0.500	0.125	0.138	0.000	0.000	30-12500500
0.750	0.500	0.187	0.207	0.000	0.000	30-12500500-187
0.750	0.500	0.250	0.275	0.000	0.000	30-12500500-250
0.812	0.312	0.250	0.275	0.000	0.000	15-25000312
0.812	0.437	0.187	0.207	0.000	0.000	35-18700437
0.812	0.562	0.125	0.138	0.000	0.000	45-12500562





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
0.812	0.562	0.125	0.138	0.000	0.000	30-12500562
0.812	0.562	0.250	0.275	0.000	0.000	15-12500562-250
0.875	0.375	0.250	0.275	0.000	0.000	35-25000375
0.875	0.500	0.187	0.207	0.000	0.000	45-18700500
0.875	0.500	0.187	0.207	0.000	0.000	30-18700500
0.875	0.500	0.312	0.344	0.000	0.000	40-18700500-312
0.875	0.500	0.312	0.343	0.000	0.000	30-18700500-312
0.875	0.625	0.125	0.138	0.000	0.000	40-12500625
0.875	0.625	0.125	0.138	0.000	0.000	30-12500625
0.875	0.625	0.187	0.207	0.000	0.000	30-12500625-187
0.875	0.625	0.250	0.275	0.000	0.000	30-12500625-250
0.937	0.437	0.250	0.275	0.000	0.000	35-25000437
0.937	0.437	0.375	0.413	0.000	0.000	30-25000437-375
0.937	0.562	0.187	0.207	0.000	0.000	35-18700562
0.937	0.562	0.187	0.207	0.000	0.000	30-18700562
0.937	0.562	0.312	0.344	0.000	0.000	15-18700562-312
0.937	0.687	0.125	0.138	0.000	0.000	35-12500687
0.937	0.687	0.250	0.275	0.000	0.000	30-12500687-250
1.000	0.500	0.250	0.275	0.000	0.000	30-25000500
1.000	0.500	0.375	0.413	0.000	0.000	30-25000500-375
1.000	0.625	0.187	0.207	0.000	0.000	45-18700625
1.000	0.625	0.187	0.207	0.000	0.000	30-18700625
1.000	0.625	0.312	0.344	0.000	0.000	30-18700625-312
1.000	0.750	0.125	0.138	0.000	0.000	30-12500750
1.000	0.750	0.125	0.138	0.000	0.000	45-12500750
1.000	0.750	0.125	0.138	0.000	0.000	14-12500750
1.000	0.750	0.187	0.207	0.000	0.000	30-12500750-187
1.000	0.750	0.250	0.275	0.000	0.000	30-12500750-250
1.062	0.562	0.250	0.275	0.000	0.000	35-25000562
1.062	0.687	0.187	0.207	0.000	0.000	35-18700687
1.062	0.750	0.156	0.172	0.000	0.000	35-15600750





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
1.062	0.812	0.125	0.138	0.000	0.000	30-12500812
1.062	0.812	0.250	0.275	0.000	0.000	30-12500812-250
1.125	0.500	0.312	0.344	0.000	0.000	35-31200500
1.125	0.625	0.250	0.275	0.000	0.000	35-25000625
1.125	0.625	0.250	0.275	0.000	0.000	45-25000625
1.125	0.625	0.250	0.275	0.000	0.000	30-25000625
1.125	0.625	0.312	0.344	0.000	0.000	30-25000625-312
1.125	0.625	0.375	0.413	0.000	0.000	30-25000625-375
1.125	0.750	0.187	0.207	0.000	0.000	45-18700750
1.125	0.750	0.187	0.207	0.000	0.000	30-18700750
1.125	0.750	0.250	0.275	0.000	0.000	30-18700750-250
1.125	0.750	0.312	0.344	0.000	0.000	30-18700750-312
1.125	0.750	0.375	0.413	0.000	0.000	30-18700750-375
1.125	0.875	0.125	0.138	0.000	0.000	45-12500875
1.125	0.875	0.125	0.138	0.000	0.000	30-12500875
1.125	0.875	0.187	0.207	0.000	0.000	30-12500875-187
1.125	0.875	0.250	0.275	0.000	0.000	45-12500875-250
1.125	0.875	0.250	0.275	0.000	0.000	30-12500875-250
1.187	0.687	0.250	0.275	0.000	0.000	15-25000687
1.187	0.812	0.187	0.207	0.000	0.000	35-18700812
1.187	0.812	0.312	0.344	0.000	0.000	30-18700812-312
1.187	0.937	0.125	0.138	0.000	0.000	45-12500937
1.187	0.937	0.125	0.138	0.000	0.000	35-12500937
1.187	0.937	0.250	0.275	0.000	0.000	30-12500937-250
1.250	0.500	0.375	0.413	0.000	0.000	35-37500500
1.250	0.625	0.312	0.344	0.000	0.000	35-31200625
1.250	0.750	0.250	0.275	0.000	0.000	30-25000750
1.250	0.750	0.375	0.413	0.000	0.000	30-25000750-375
1.250	0.875	0.187	0.207	0.000	0.000	30-18700875
1.250	0.875	0.250	0.275	0.000	0.000	15-18700875-250
1.250	0.875	0.312	0.344	0.000	0.000	30-18700875-312



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
1.250	1.000	0.125	0.138	0.000	0.000	45-12501000
1.250	1.000	0.125	0.138	0.000	0.000	30-12501000
1.250	1.000	0.187	0.207	0.000	0.000	30-12501000-187
1.250	1.000	0.250	0.275	0.000	0.000	40-12501000-250
1.250	1.000	0.250	0.275	0.000	0.000	30-12501000-250
1.250	1.000	0.250	0.275	0.000	0.000	14-12501000-250
1.312	0.687	0.312	0.343	0.000	31,200,687.000	35-31200687
1.312	0.812	0.250	0.275	0.000	0.000	35-25000812
1.312	0.937	0.187	0.207	0.000	0.000	35-18700937
1.312	0.937	0.312	0.344	0.000	0.000	30-18700937-312
1.312	1.000	0.000	0.000	0.000	0.000	15-15601000-219
1.312	1.000	0.156	0.172	0.000	0.000	40-15601000
1.312	1.000	0.156	0.172	0.000	0.000	35-15601000
1.312	1.062	0.125	0.138	0.000	0.000	30-12501062
1.312	1.062	0.250	0.275	0.000	0.000	30-12501062-250
1.375	0.625	0.375	0.413	0.000	0.000	35-37500625
1.375	0.750	0.312	0.344	0.000	0.000	35-31200750
1.375	0.875	0.000	0.000	0.000	0.000	30-25000875-312
1.375	0.875	0.250	0.275	0.000	0.000	30-25000875
1.375	0.875	0.375	0.413	0.000	0.000	30-25000875-375
1.375	1.000	0.187	0.207	0.000	0.000	45-18701000
1.375	1.000	0.187	0.207	0.000	0.000	30-18701000
1.375	1.000	0.250	0.275	0.000	0.000	30-18701000-250
1.375	1.000	0.312	0.344	0.000	0.000	30-18701000-312
1.375	1.000	0.375	0.413	0.000	0.000	30-18701000-375
1.375	1.000	0.375	0.413	0.000	0.000	40-18701000-375
1.375	1.000	0.375	0.413	0.000	0.000	15-18701000-375
1.375	1.125	0.125	0.138	0.000	0.000	45-12501125
1.375	1.125	0.125	0.138	0.000	0.000	30-12501125
1.375	1.125	0.187	0.207	0.000	0.000	30-12501125-187
1.375	1.125	0.250	0.275	0.000	0.000	30-12501125-250



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
1.437	0.937	0.250	0.275	0.000	0.000	30-25000937
1.437	1.062	0.187	0.207	0.000	0.000	35-18701062
1.437	1.062	0.312	0.344	0.000	0.000	30-18701062-312
1.437	1.125	0.156	0.171	0.000	0.000	35-15601125
1.437	1.187	0.125	0.138	0.000	0.000	30-12501187
1.437	1.187	0.187	0.207	0.000	0.000	30-12501187-187
1.437	1.187	0.250	0.275	0.000	0.000	30-12501187-250
1.500	0.750	0.375	0.413	0.000	0.000	35-37500750
1.500	0.875	0.312	0.344	0.000	0.000	35-31200875
1.500	1.000	0.250	0.275	0.000	0.000	30-25001000
1.500	1.000	0.375	0.413	0.000	0.000	30-25001000-375
1.500	1.000	0.375	0.413	0.000	0.000	40-25001000-375
1.500	1.000	0.375	0.413	0.000	0.000	14-25001000-375
1.500	1.125	0.187	0.207	0.000	0.000	30-18701125
1.500	1.125	0.250	0.275	0.000	0.000	30-18701125-250
1.500	1.125	0.312	0.344	0.000	0.000	30-18701125-312
1.500	1.187	0.156	0.172	0.000	0.000	45-15601187
1.500	1.187	0.156	0.172	0.000	0.000	35-15601187
1.500	1.250	0.125	0.138	0.000	0.000	45-12501250
1.500	1.250	0.125	0.138	0.000	0.000	30-12501250
1.500	1.250	0.187	0.207	0.000	0.000	30-12501250-187
1.500	1.250	0.250	0.275	0.000	0.000	40-12501250-250
1.500	1.250	0.250	0.275	0.000	0.000	30-12501250-250
1.500	1.250	0.250	0.275	0.000	0.000	14-12501250-250
1.562	1.062	0.250	0.275	0.000	0.000	30-25001062
1.562	1.187	0.187	0.207	0.000	0.000	35-18701187
1.562	1.187	0.250	0.275	0.000	0.000	30-18701187-250
1.562	1.187	0.312	0.344	0.000	0.000	30-18701187-312
1.562	1.187	0.375	0.413	0.000	0.000	30-18701187-375
1.562	1.250	0.156	0.172	0.000	0.000	35-15601250
1.562	1.312	0.125	0.138	0.000	0.000	30-12501312



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
1.625	0.875	0.375	0.413	0.000	0.000	35-37500875
1.625	1.000	0.312	0.344	0.000	0.000	30-31201000
1.625	1.000	0.500	0.550	0.000	0.000	30-31201000-500
1.625	1.125	0.250	0.275	0.000	0.000	45-25001125
1.625	1.125	0.250	0.275	0.000	0.000	30-25001125
1.625	1.125	0.312	0.344	0.000	0.000	30-25001125-312
1.625	1.125	0.312	0.344	0.000	0.000	14-25001125-312
1.625	1.125	0.375	0.413	0.000	0.000	30-25001125-375
1.625	1.250	0.187	0.207	0.000	0.000	45-18701250
1.625	1.250	0.187	0.207	0.000	0.000	30-18701250
1.625	1.250	0.250	0.275	0.000	0.000	30-18701250-250
1.625	1.250	0.312	0.344	0.000	0.000	30-18701250-312
1.625	1.250	0.312	0.344	0.000	0.000	40-18701250-312
1.625	1.250	0.312	0.344	0.000	0.000	14-18701250-312
1.625	1.250	0.375	0.413	0.000	0.000	30-18701250-375
1.625	1.375	0.125	0.138	0.000	0.000	45-12501375
1.625	1.375	0.125	0.138	0.000	0.000	30-12501375
1.625	1.375	0.187	0.207	0.000	0.000	30-12501375-187
1.625	1.375	0.250	0.275	0.000	0.000	30-12501375-250
1.687	1.187	0.250	0.275	0.000	0.000	35-25001187
1.687	1.187	0.250	0.275	0.000	0.000	30-25001187
1.687	1.187	0.312	0.344	0.000	0.000	14-25001187-312
1.687	1.187	0.375	0.413	0.000	0.000	30-25001187-375
1.687	1.312	0.187	0.207	0.000	0.000	35-18701312
1.687	1.312	0.312	0.344	0.000	0.000	30-18701312-312
1.687	1.375	0.000	0.000	0.000	0.000	30-15601375-250
1.687	1.375	0.156	0.172	0.000	0.000	40-15601375
1.687	1.375	0.156	0.172	0.000	0.000	30-15601375
1.687	1.437	0.125	0.138	0.000	0.000	30-12501437
1.687	1.437	0.250	0.275	0.000	0.000	30-12501437-250
1.750	1.000	0.375	0.413	0.000	0.000	35-37501000





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
1.750	1.125	0.312	0.344	0.000	0.000	30-31201125
1.750	1.125	0.375	0.413	0.000	0.000	30-31201125-375
1.750	1.125	0.500	0.550	0.000	0.000	30-31201125-500
1.750	1.125	0.500	0.550	0.000	0.000	14-31201125-500
1.750	1.250	0.250	0.275	0.000	0.000	45-25001250
1.750	1.250	0.250	0.275	0.000	0.000	30-25001250
1.750	1.250	0.375	0.413	0.000	0.000	30-25001250-375
1.750	1.250	0.375	0.413	0.000	0.000	14-25001250-375
1.750	1.375	0.187	0.207	0.000	0.000	45-18701375
1.750	1.375	0.187	0.207	0.000	0.000	30-18701375
1.750	1.375	0.250	0.275	0.000	0.000	30-18701375-250
1.750	1.375	0.312	0.344	0.000	0.000	30-18701375-312
1.750	1.375	0.375	0.413	0.000	0.000	30-18701375-375
1.750	1.437	0.156	0.172	0.000	0.000	35-15601437
1.750	1.500	0.125	0.138	0.000	0.000	45-12501500
1.750	1.500	0.125	0.138	0.000	0.000	30-12501500
1.750	1.500	0.187	0.207	0.000	0.000	30-12501500-187
1.750	1.500	0.250	0.275	0.000	0.000	40-12501500-250
1.750	1.500	0.250	0.275	0.000	0.000	30-12501500-250-A
1.750	1.500	0.250	0.275	0.000	0.000	30-12501500-250
1.812	1.187	0.312	0.344	0.000	0.000	35-31201187
1.812	1.312	0.250	0.275	0.000	0.000	35-25001312
1.812	1.312	0.375	0.413	0.000	0.000	30-25001312-375
1.812	1.437	0.187	0.207	0.000	0.000	35-18701437
1.812	1.437	0.312	0.344	0.000	0.000	30-18701437-312
1.812	1.500	0.312	0.344	0.000	0.000	30-15601500-312
1.812	1.562	0.125	0.138	0.000	0.000	35-12501562
1.875	1.125	0.375	0.413	0.000	0.000	35-37501125
1.875	1.125	0.375	0.413	0.000	0.000	30-37501125
1.875	1.250	0.312	0.344	0.000	0.000	30-31201250
1.875	1.250	0.375	0.413	0.000	0.000	30-31201250-375



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
1.875	1.250	0.500	0.550	0.000	0.000	30-31201250-500
1.875	1.375	0.250	0.275	0.000	0.000	35-25001375
1.875	1.375	0.250	0.275	0.000	0.000	45-25001375
1.875	1.375	0.250	0.275	0.000	0.000	30-25001375
1.875	1.375	0.312	0.344	0.000	0.000	30-25001375-312
1.875	1.375	0.375	0.413	0.000	0.000	30-25001375-375
1.875	1.500	0.187	0.207	0.000	0.000	30-18701500
1.875	1.500	0.250	0.275	0.000	0.000	30-18701500-250
1.875	1.500	0.312	0.344	0.000	0.000	30-18701500-312
1.875	1.500	0.375	0.413	0.000	0.000	30-18701500-375
1.875	1.625	0.125	0.138	0.000	0.000	35-12501625
1.875	1.625	0.250	0.275	0.000	0.000	30-12501625-250
1.937	1.437	0.250	0.275	0.000	0.000	35-25001437
1.937	1.437	0.375	0.413	0.000	0.000	30-25001437-375
1.937	1.687	0.125	0.138	0.000	0.000	35-12501687
2.000	1.000	0.500	0.550	0.000	0.000	35-50001000
2.000	1.250	0.375	0.413	0.000	0.000	35-37501250
2.000	1.250	0.500	0.550	0.000	0.000	30-37501250-500
2.000	1.250	0.625	0.687	0.000	0.000	35-37501250-625
2.000	1.375	0.312	0.344	0.000	0.000	30-31201375
2.000	1.375	0.375	0.413	0.000	0.000	30-31201375-375
2.000	1.375	0.500	0.550	0.000	0.000	15-31201375-500
2.000	1.375	0.500	0.550	0.000	0.000	30-31201375-500
2.000	1.375	0.500	0.550	0.000	0.000	14-31201375-500
2.000	1.500	0.250	0.275	0.000	0.000	45-25001500
2.000	1.500	0.250	0.275	0.000	0.000	30-25001500
2.000	1.500	0.312	0.344	0.000	0.000	30-25001500-312
2.000	1.500	0.312	0.344	0.000	0.000	14-25001500-312
2.000	1.500	0.375	0.413	0.000	0.000	30-25001500-375
2.000	1.500	0.375	0.413	0.000	0.000	14-25001500-375
2.000	1.500	0.500	0.550	0.000	0.000	30-25001500-500





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
2.000	1.625	0.187	0.207	0.000	0.000	30-18701625
2.000	1.625	0.250	0.275	0.000	0.000	30-18701625-250
2.000	1.625	0.312	0.344	0.000	0.000	30-18701625-312
2.000	1.625	0.312	0.344	0.000	0.000	14-18701625-312
2.000	1.625	0.375	0.413	0.000	0.000	40-18701625-375
2.000	1.625	0.375	0.413	0.000	0.000	30-18701625-375
2.000	1.750	0.125	0.138	0.000	0.000	45-12501750
2.000	1.750	0.125	0.138	0.000	0.000	30-12501750
2.000	1.750	0.250	0.275	0.000	0.000	30-12501750-250
2.062	1.562	0.250	0.275	0.000	0.000	15-25001562
2.062	1.687	0.187	0.207	0.000	0.000	35-18701687
2.125	1.375	0.375	0.413	0.000	0.000	35-37501375
2.125	1.500	0.312	0.344	0.000	0.000	45-31201500
2.125	1.500	0.312	0.344	0.000	0.000	30-31201500
2.125	1.500	0.375	0.413	0.000	0.000	30-31201500-375
2.125	1.500	0.500	0.550	0.000	0.000	30-31201500-500
2.125	1.625	0.250	0.275	0.000	0.000	30-25001625
2.125	1.625	0.375	0.413	0.000	0.000	30-25001625-375
2.125	1.750	0.187	0.207	0.000	0.000	40-18701750
2.125	1.750	0.187	0.207	0.000	0.000	30-18701750
2.125	1.750	0.250	0.275	0.000	0.000	30-18701750-250
2.125	1.750	0.312	0.344	0.000	0.000	30-18701750-312
2.125	1.750	0.375	0.413	0.000	0.000	40-18701750-375
2.125	1.750	0.375	0.413	0.000	0.000	30-18701750-375
2.125	1.875	0.125	0.138	0.000	0.000	35-12501875
2.125	1.875	0.187	0.207	0.000	0.000	30-12501875-187
2.125	1.875	0.250	0.275	0.000	0.000	30-12501875-250
2.250	1.250	0.500	0.550	0.000	0.000	35-50001250
2.250	1.500	0.375	0.413	0.000	0.000	30-37501500
2.250	1.500	0.500	0.550	0.000	0.000	30-37501500-500
2.250	1.500	0.625	0.687	0.000	0.000	30-37501500-625



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
2.250	1.625	0.312	0.344	0.000	0.000	35-31201625
2.250	1.625	0.375	0.413	0.000	0.000	30-31201625-375
2.250	1.625	0.500	0.550	0.000	0.000	30-31201625-500
2.250	1.750	0.250	0.275	0.000	0.000	30-25001750
2.250	1.750	0.312	0.343	0.000	0.000	30-25001750-312
2.250	1.750	0.375	0.413	0.000	0.000	40-25001750-375
2.250	1.750	0.375	0.413	0.000	0.000	30-25001750-375
2.250	1.750	0.375	0.413	0.000	0.000	14-25001750-375
2.250	1.875	0.187	0.207	0.000	0.000	30-18701875
2.250	1.875	0.312	0.343	0.000	0.000	30-18701875-312
2.250	1.875	0.375	0.413	0.000	0.000	30-18701875-375
2.250	2.000	0.125	0.138	0.000	0.000	30-12502000
2.250	2.000	0.187	0.207	0.000	0.000	30-12502000-187
2.250	2.000	0.250	0.275	0.000	0.000	30-12502000-250
2.312	1.687	0.312	0.344	0.000	0.000	35-31201687
2.375	1.500	0.437	0.481	0.000	0.000	35-43701500
2.375	1.625	0.375	0.413	0.000	0.000	30-37501625
2.375	1.625	0.625	0.687	0.000	0.000	30-37501625-625
2.375	1.750	0.312	0.344	0.000	0.000	35-31201750
2.375	1.750	0.312	0.344	0.000	0.000	45-31201750
2.375	1.750	0.375	0.413	0.000	0.000	30-31201750-375
2.375	1.750	0.500	0.550	0.000	0.000	30-31201750-500
2.375	1.875	0.250	0.275	0.000	0.000	30-25001875
2.375	1.875	0.375	0.413	0.000	0.000	30-25001875-375
2.375	2.000	0.187	0.207	0.000	0.000	40-18702000
2.375	2.000	0.187	0.207	0.000	0.000	30-18702000
2.375	2.000	0.250	0.275	0.000	0.000	30-18702000-250
2.375	2.000	0.312	0.344	0.000	0.000	30-18702000-312
2.375	2.000	0.375	0.413	0.000	0.000	30-18702000-375
2.375	2.125	0.125	0.138	0.000	0.000	30-12502125
2.375	2.125	0.250	0.275	0.000	0.000	30-12502125-250



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
2.437	1.937	0.375	0.413	0.000	0.000	30-25001937-375
2.500	1.500	0.500	0.550	0.000	0.000	15-50001500
2.500	1.750	0.375	0.413	0.000	0.000	30-37501750
2.500	1.750	0.375	0.413	0.000	0.000	15-37501750
2.500	1.750	0.500	0.550	0.000	0.000	30-37501750-500
2.500	1.750	0.600	0.660	0.000	0.000	14-37501750-600
2.500	1.750	0.625	0.687	0.000	0.000	30-37501750-625
2.500	1.875	0.312	0.344	0.000	0.000	35-31201875
2.500	1.875	0.312	0.344	0.000	0.000	30-31201875
2.500	1.875	0.375	0.413	0.000	0.000	30-31201875-375
2.500	1.875	0.500	0.550	0.000	0.000	30-31201875-500
2.500	2.000	0.250	0.275	0.000	0.000	45-25002000
2.500	2.000	0.250	0.275	0.000	0.000	35-25002000
2.500	2.000	0.250	0.275	0.000	0.000	30-25002000
2.500	2.000	0.250	0.275	0.000	0.000	14-25002000
2.500	2.000	0.312	0.344	0.000	0.000	30-25002000-312
2.500	2.000	0.375	0.413	0.000	0.000	30-25002000-375
2.500	2.000	0.375	0.413	0.000	0.000	14-25002000-375
2.500	2.000	0.500	0.550	0.000	0.000	30-25002000-500
2.500	2.125	0.187	0.207	0.000	0.000	45-18702125
2.500	2.125	0.187	0.207	0.000	0.000	30-18702125
2.500	2.125	0.187	0.207	0.000	0.000	14-18702125
2.500	2.125	0.250	0.275	0.000	0.000	30-18702125-250
2.500	2.125	0.281	0.312	0.000	0.000	15-18702125-281
2.500	2.125	0.312	0.344	0.000	0.000	30-18702125-312
2.500	2.125	0.375	0.413	0.000	0.000	30-18702125-375
2.500	2.125	0.375	0.413	0.000	0.000	14-18702125-375
2.500	2.250	0.125	0.138	0.000	0.000	30-12502250
2.500	2.250	0.250	0.275	0.000	0.000	35-12502250-250
2.500	2.250	0.375	0.413	0.000	0.000	30-12502250-375
2.562	1.937	0.312	0.344	0.000	0.000	35-31201937



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
2.562	2.062	0.344	0.375	0.000	0.000	14-25002062-344
2.562	2.187	0.375	0.413	0.000	0.000	30-18702187-375
2.562	2.312	0.125	0.138	0.000	0.000	30-12502312
2.625	1.875	0.375	0.413	0.000	0.000	35-37501875
2.625	2.000	0.312	0.344	0.000	0.000	45-31202000
2.625	2.000	0.312	0.344	0.000	0.000	30-31202000
2.625	2.000	0.375	0.413	0.000	0.000	30-31202000-375
2.625	2.000	0.500	0.550	0.000	0.000	30-31202000-500
2.625	2.000	0.562	0.619	0.000	0.000	15-31202000-562
2.625	2.125	0.250	0.275	0.000	0.000	35-25002125
2.625	2.125	0.375	0.413	0.000	0.000	30-25002125-375
2.625	2.250	0.187	0.207	0.000	0.000	30-18702250
2.625	2.250	0.312	0.344	0.000	0.000	30-18702250-312
2.625	2.250	0.375	0.413	0.000	0.000	30-18702250-375
2.625	2.375	0.125	0.138	0.000	0.000	35-12502375
2.750	1.750	0.500	0.550	0.000	0.000	35-50001750
2.750	1.750	0.750	0.825	0.000	0.000	30-50001750-750
2.750	2.000	0.375	0.413	0.000	0.000	45-37502000
2.750	2.000	0.375	0.413	0.000	0.000	30-37502000
2.750	2.000	0.500	0.550	0.000	0.000	30-37502000-500
2.750	2.000	0.625	0.687	0.000	0.000	30-37502000-625
2.750	2.125	0.312	0.344	0.000	0.000	30-31202125
2.750	2.125	0.500	0.550	0.000	0.000	30-31202125-500
2.750	2.125	0.625	0.687	0.000	0.000	30-31202125-625
2.750	2.250	0.000	0.000	0.000	0.000	30-25002250-312
2.750	2.250	0.250	0.275	0.000	0.000	45-25002250
2.750	2.250	0.250	0.275	0.000	0.000	30-25002250
2.750	2.250	0.375	0.413	0.000	0.000	30-25002250-375
2.750	2.250	0.375	0.413	0.000	0.000	14-25002250-375
2.750	2.250	0.562	0.619	0.000	0.000	35-25002250-562
2.750	2.375	0.187	0.207	0.000	0.000	30-18702375





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
2.750	2.375	0.375	0.413	0.000	0.000	30-18702375-375
2.750	2.375	0.500	0.550	0.000	0.000	30-18702375-500
2.750	2.500	0.125	0.138	0.000	0.000	30-12502500
2.750	2.500	0.250	0.275	0.000	0.000	30-12502500-250
2.875	2.125	0.375	0.413	0.000	0.000	35-37502125
2.875	2.250	0.312	0.344	0.000	0.000	35-31202250
2.875	2.250	0.375	0.413	0.000	0.000	30-31202250-375
2.875	2.250	0.500	0.550	0.000	0.000	30-31202250-500
2.875	2.375	0.250	0.275	0.000	0.000	30-25002375
2.875	2.375	0.375	0.413	0.000	0.000	30-25002375-375
2.875	2.500	0.187	0.207	0.000	0.000	30-18702500
2.875	2.500	0.250	0.275	0.000	0.000	30-18702500-250
2.875	2.500	0.312	0.344	0.000	0.000	30-18702500-312
2.875	2.500	0.375	0.413	0.000	0.000	30-18702500-375A
2.875	2.500	0.375	0.413	0.000	0.000	40-18702500-375
2.875	2.500	0.375	0.413	0.000	0.000	30-18702500-375
2.875	2.625	0.125	0.138	0.000	0.000	35-12502625
2.937	2.500	0.218	0.241	0.000	0.000	40-21802500
2.937	2.500	0.218	0.242	0.000	0.000	35-21802500
3.000	1.750	0.625	0.687	0.000	0.000	35-62501750
3.000	2.000	0.500	0.550	0.000	0.000	30-50002000
3.000	2.000	0.750	0.825	0.000	0.000	30-50002000-750
3.000	2.250	0.375	0.413	0.000	0.000	30-37502250
3.000	2.250	0.500	0.550	0.000	0.000	30-37502250-500
3.000	2.250	0.625	0.687	0.000	0.000	30-37502250-625
3.000	2.375	0.312	0.344	0.000	0.000	30-31202375
3.000	2.375	0.500	0.550	0.000	0.000	30-31202375-500
3.000	2.375	0.562	0.619	0.000	0.000	15-31202375-562
3.000	2.500	0.250	0.275	0.000	0.000	45-25002500
3.000	2.500	0.250	0.275	0.000	0.000	35-25002500
3.000	2.500	0.312	0.344	0.000	0.000	30-25002500-312



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
3.000	2.500	0.375	0.413	0.000	0.000	40-25002500-375
3.000	2.500	0.375	0.413	0.000	0.000	30-25002500-375
3.000	2.625	0.187	0.207	0.000	0.000	45-18702625
3.000	2.625	0.187	0.207	0.000	0.000	30-18702625
3.000	2.625	0.250	0.275	0.000	0.000	30-18702625-250
3.000	2.625	0.312	0.344	0.000	0.000	30-18702625-312
3.000	2.625	0.375	0.413	0.000	0.000	30-18702625-375
3.000	2.625	0.375	0.413	0.000	0.000	14-18702625-375
3.000	2.750	0.125	0.138	0.000	0.000	30-12502750
3.000	2.750	0.250	0.275	0.000	0.000	30-12502750-250
3.000	2.750	0.375	0.413	0.000	0.000	30-12502750-375
3.062	2.562	0.375	0.413	0.000	0.000	30-25002562-375
3.125	2.125	0.500	0.550	0.000	0.000	30-50002125
3.125	2.375	0.375	0.413	0.000	0.000	45-37502375
3.125	2.375	0.375	0.413	0.000	0.000	35-37502375
3.125	2.375	0.375	0.413	0.000	0.000	30-37502375
3.125	2.375	0.625	0.687	0.000	0.000	30-37502375-625
3.125	2.500	0.312	0.344	0.000	0.000	45-31202500
3.125	2.500	0.312	0.344	0.000	0.000	30-31202500
3.125	2.500	0.375	0.413	0.000	0.000	30-31202500-375
3.125	2.500	0.500	0.550	0.000	0.000	30-31202500-500
3.125	2.625	0.250	0.275	0.000	0.000	30-25002625
3.125	2.625	0.375	0.413	0.000	0.000	30-25002625-375
3.125	2.750	0.187	0.207	0.000	0.000	45-18702750
3.125	2.750	0.187	0.207	0.000	0.000	30-18702750
3.125	2.750	0.312	0.344	0.000	0.000	30-18702750-312
3.125	2.750	0.375	0.413	0.000	0.000	30-18702750-375
3.125	2.875	0.125	0.138	0.000	0.000	35-12502875
3.125	2.875	0.250	0.275	0.000	0.000	30-12502875-250
3.250	2.250	0.500	0.550	0.000	0.000	30-50002250
3.250	2.500	0.375	0.413	0.000	0.000	45-37502500





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
3.250	2.500	0.375	0.413	0.000	0.000	30-37502500
3.250	2.500	0.500	0.550	0.000	0.000	30-37502500-500
3.250	2.500	0.500	0.550	0.000	0.000	14-37502500-500
3.250	2.500	0.625	0.687	0.000	0.000	30-37502500-625
3.250	2.625	0.312	0.344	0.000	0.000	30-31202625
3.250	2.625	0.375	0.413	0.000	0.000	15-31202625-375
3.250	2.625	0.500	0.550	0.000	0.000	30-31202625-500
3.250	2.625	0.562	0.619	0.000	0.000	15-31202625-562
3.250	2.750	0.250	0.275	0.000	0.000	45-25002750
3.250	2.750	0.250	0.275	0.000	0.000	30-25002750
3.250	2.750	0.375	0.413	0.000	0.000	40-25002750-375
3.250	2.750	0.375	0.413	0.000	0.000	30-25002750-375
3.250	2.812	0.218	0.241	0.000	0.000	45-21802812
3.250	2.812	0.218	0.242	0.000	0.000	35-21802812
3.250	2.875	0.187	0.207	0.000	0.000	45-18702875
3.250	2.875	0.187	0.207	0.000	0.000	30-18702875
3.250	2.875	0.250	0.275	0.000	0.000	30-18702875-250
3.250	2.875	0.375	0.413	0.000	0.000	30-18702875-375
3.250	3.000	0.125	0.138	0.000	0.000	30-12503000
3.375	2.500	0.437	0.481	0.000	0.000	35-43702500
3.375	2.625	0.625	0.687	0.000	0.000	30-37502625-625
3.375	2.750	0.312	0.344	0.000	0.000	30-31202750
3.375	2.750	0.375	0.413	0.000	0.000	30-31202750-375
3.375	2.750	0.500	0.550	0.000	0.000	30-31202750-500
3.375	2.750	0.562	0.619	0.000	0.000	15-31202750-562
3.375	2.875	0.250	0.275	0.000	0.000	35-25002875
3.375	2.875	0.375	0.413	0.000	0.000	30-25002875-375
3.375	3.000	0.187	0.207	0.000	0.000	45-18703000
3.375	3.000	0.187	0.207	0.000	0.000	30-18703000
3.375	3.000	0.250	0.275	0.000	0.000	30-18703000-250
3.375	3.000	0.250	0.275	0.000	0.000	15-18703000-250





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
3.375	3.000	0.312	0.344	0.000	0.000	30-18703000-312
3.375	3.000	0.375	0.413	0.000	0.000	30-18703000-375
3.436	3.000	0.218	0.241	0.000	0.000	35-21803000
3.437	3.000	0.218	0.241	0.000	0.000	45-21803000
3.437	3.000	0.375	0.413	0.000	0.000	15-21803000-375
3.500	2.500	0.500	0.550	0.000	0.000	30-50002500
3.500	2.500	0.750	0.825	0.000	0.000	30-50002500-750
3.500	2.750	0.375	0.413	0.000	0.000	30-37502750
3.500	2.750	0.375	0.413	0.000	0.000	14-37502750
3.500	2.750	0.500	0.550	0.000	0.000	30-37502750-500
3.500	2.750	0.500	0.550	0.000	0.000	14-37502750-500
3.500	2.750	0.625	0.687	0.000	0.000	30-37502750-625
3.500	2.750	0.625	0.687	0.000	0.000	14-37502750-625
3.500	2.875	0.312	0.344	0.000	0.000	30-31202875
3.500	2.875	0.375	0.413	0.000	0.000	30-31202875-375
3.500	2.875	0.500	0.550	0.000	0.000	30-31202875-500
3.500	2.875	0.500	0.550	0.000	0.000	14-31202875-500
3.500	3.000	0.250	0.275	0.000	0.000	35-25003000
3.500	3.000	0.250	0.275	0.000	0.000	45-25003000
3.500	3.000	0.250	0.275	0.000	0.000	14-25003000
3.500	3.000	0.312	0.344	0.000	0.000	30-25003000-312
3.500	3.000	0.375	0.413	0.000	0.000	30-25003000-375
3.500	3.000	0.375	0.413	0.000	25,003,000.000	40-25003000-375
3.500	3.000	0.500	0.550	0.000	0.000	30-25003000-500
3.500	3.000	0.562	0.619	0.000	0.000	30-25003000-562
3.500	3.125	0.187	0.207	0.000	0.000	30-18703125
3.500	3.125	0.187	0.207	0.000	0.000	15-18703125
3.500	3.125	0.250	0.275	0.000	0.000	30-18703125-250
3.500	3.125	0.375	0.413	0.000	0.000	30-18703125-375
3.500	3.250	0.125	0.138	0.000	0.000	35-12503250
3.625	3.000	0.312	0.344	0.000	0.000	35-31203000



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
3.625	3.000	0.312	0.344	0.000	0.000	15-31203000
3.625	3.000	0.375	0.433	0.000	0.000	30-31203000-375
3.625	3.000	0.500	0.550	0.000	0.000	30-31203000-500
3.625	3.000	0.562	0.619	0.000	0.000	15-31203000-562
3.625	3.125	0.250	0.275	0.000	0.000	35-25003125
3.625	3.125	0.375	0.413	0.000	0.000	30-25003125-375
3.625	3.250	0.187	0.207	0.000	0.000	35-18703250
3.625	3.250	0.312	0.344	0.000	0.000	30-18703250-312
3.625	3.250	0.375	0.413	0.000	0.000	30-18703250-375
3.750	2.750	0.500	0.550	0.000	0.000	35-50002750
3.750	3.000	0.375	0.413	0.000	0.000	30-37503000
3.750	3.000	0.500	0.550	0.000	0.000	30-37503000-500
3.750	3.000	0.625	0.687	0.000	0.000	30-37503000-625
3.750	3.125	0.312	0.344	0.000	0.000	30-31203125
3.750	3.125	0.500	0.550	0.000	0.000	30-31203125-500
3.750	3.125	0.500	0.550	0.000	0.000	14-31203125-500
3.750	3.187	0.500	0.550	0.000	0.000	30-28103187-500
3.750	3.250	0.250	0.275	0.000	0.000	30-25003250
3.750	3.250	0.375	0.413	0.000	0.000	30-25003250-375
3.750	3.250	0.375	0.413	0.000	0.000	14-25003250-375
3.750	3.375	0.187	0.207	0.000	0.000	30-18703375
3.750	3.375	0.250	0.275	0.000	0.000	30-18703375-250
3.750	3.375	0.375	0.413	0.000	0.000	30-18703375-375
3.750	3.500	0.125	0.138	0.000	0.000	35-12503500
3.875	3.125	0.000	0.000	0.000	0.000	30-37503125-500
3.875	3.125	0.375	0.413	0.000	0.000	35-37503125
3.875	3.125	0.625	0.687	0.000	0.000	30-37503125-625
3.875	3.250	0.312	0.344	0.000	0.000	35-31203250
3.875	3.250	0.500	0.550	0.000	0.000	30-31203250-500
3.875	3.250	0.562	0.619	0.000	0.000	15-31203250-562
3.875	3.375	0.250	0.275	0.000	0.000	30-25003375



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
3.875	3.375	0.375	0.413	0.000	0.000	30-25003375-375
3.875	3.500	0.187	0.207	0.000	0.000	45-18703500
3.875	3.500	0.187	0.207	0.000	0.000	30-18703500
3.875	3.500	0.375	0.413	0.000	0.000	30-18703500-375A
3.875	3.500	0.375	0.413	0.000	0.000	30-18703500-375
3.875	3.625	0.187	0.207	0.000	0.000	30-12503625-187
4.000	2.750	0.625	0.687	0.000	0.000	35-62502750
4.000	3.000	0.500	0.550	0.000	0.000	45-50003000
4.000	3.000	0.500	0.550	0.000	0.000	30-50003000
4.000	3.000	0.750	0.825	0.000	0.000	30-50003000-750
4.000	3.125	0.437	0.481	0.000	0.000	35-43703125
4.000	3.250	0.375	0.413	0.000	0.000	30-37503250
4.000	3.250	0.500	0.550	0.000	0.000	30-37503250-500
4.000	3.250	0.500	0.550	0.000	0.000	14-37503250-500
4.000	3.250	0.625	0.687	0.000	0.000	30-37503250-625
4.000	3.375	0.312	0.344	0.000	0.000	30-31203375
4.000	3.375	0.375	0.413	0.000	0.000	14-31203375-375
4.000	3.375	0.500	0.550	0.000	0.000	30-31203375-500
4.000	3.375	0.500	0.550	0.000	0.000	14-31203375-500
4.000	3.375	0.625	0.687	0.000	0.000	30-31203375-625
4.000	3.500	0.250	0.275	0.000	0.000	35-25003500
4.000	3.500	0.250	0.275	0.000	0.000	45-25003500
4.000	3.500	0.250	0.275	0.000	0.000	30-25003500
4.000	3.500	0.312	0.344	0.000	0.000	30-25003500-312
4.000	3.500	0.375	0.413	0.000	0.000	45-25003500-375
4.000	3.500	0.375	0.413	0.000	0.000	30-25003500-375
4.000	3.500	0.500	0.550	0.000	0.000	30-25003500-500
4.000	3.625	0.187	0.207	0.000	0.000	45-18703625
4.000	3.625	0.187	0.207	0.000	0.000	30-18703625
4.000	3.625	0.250	0.275	0.000	0.000	30-18703625-250
4.000	3.625	0.250	0.275	0.000	0.000	15-18703625-250



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
4.000	3.625	0.312	0.344	0.000	0.000	30-18703625-312
4.000	3.625	0.375	0.413	0.000	0.000	30-18703625-375
4.000	3.750	0.125	0.138	0.000	0.000	35-12503750
4.125	3.375	0.375	0.413	0.000	0.000	30-37503375
4.125	3.375	0.562	0.619	0.000	0.000	15-37503375-562C
4.125	3.375	0.562	0.619	0.000	0.000	15-37503375-562
4.125	3.375	0.625	0.687	0.000	0.000	30-37503375-625
4.125	3.375	0.750	0.825	0.000	0.000	30-37503375-750
4.125	3.500	0.312	0.344	0.000	0.000	35-31203500
4.125	3.500	0.500	0.550	0.000	0.000	30-31203500-500
4.125	3.500	0.750	0.825	0.000	0.000	30-31203500-750
4.125	3.625	0.250	0.275	0.000	0.000	35-25003625
4.125	3.625	0.375	0.413	0.000	0.000	30-25003625-375
4.125	3.750	0.187	0.207	0.000	0.000	30-18703750
4.125	3.750	0.375	0.413	0.000	0.000	30-18703750-375
4.125	3.875	0.125	0.138	0.000	0.000	35-12503875
4.125	3.875	0.250	0.275	0.000	0.000	30-12503875-250
4.190	3.690	0.500	0.550	0.000	0.000	30-25003690-500
4.250	3.000	0.625	0.687	0.000	0.000	35-62503000
4.250	3.250	0.500	0.550	0.000	0.000	30-50003250
4.250	3.250	0.500	0.550	0.000	0.000	15-50003250
4.250	3.250	0.750	0.825	0.000	0.000	30-50003250-750
4.250	3.500	0.375	0.413	0.000	0.000	30-37503500
4.250	3.500	0.375	0.413	0.000	0.000	45-37503500
4.250	3.500	0.375	0.413	0.000	0.000	14-37503500
4.250	3.500	0.500	0.550	0.000	0.000	30-37503500-500
4.250	3.500	0.625	0.687	0.000	0.000	30-37503500-625
4.250	3.625	0.312	0.344	0.000	0.000	30-31203625
4.250	3.625	0.500	0.550	0.000	0.000	30-31203625-500
4.250	3.625	0.500	0.550	0.000	0.000	14-31203625-500
4.250	3.625	0.562	0.619	0.000	0.000	15-31203625-562



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
4.250	3.750	0.250	0.275	0.000	0.000	45-25003750
4.250	3.750	0.250	0.275	0.000	0.000	30-25003750
4.250	3.750	0.375	0.413	0.000	0.000	30-25003750-375
4.250	3.750	0.375	0.413	0.000	0.000	14-25003750-375
4.250	3.750	0.562	0.619	0.000	0.000	30-25003750-562
4.250	3.875	0.187	0.207	0.000	0.000	35-18703875
4.250	3.875	0.375	0.413	0.000	0.000	30-18703875-375
4.250	4.000	0.125	0.138	0.000	0.000	35-12504000
4.375	3.625	0.375	0.413	0.000	0.000	30-37503625
4.375	3.625	0.625	0.687	0.000	0.000	30-37503625-625
4.375	3.750	0.312	0.344	0.000	0.000	35-31203750
4.375	3.750	0.375	0.413	0.000	0.000	30-31203750-375
4.375	3.750	0.500	0.550	0.000	0.000	30-31203750-500
4.375	3.750	0.875	0.963	0.000	0.000	30-31203750-875
4.375	3.812	0.500	0.550	0.000	0.000	30-28103812-500
4.375	3.875	0.250	0.275	0.000	0.000	35-25003875
4.375	4.000	0.187	0.207	0.000	0.000	30-18704000
4.375	4.000	0.312	0.344	0.000	0.000	30-18704000-312
4.375	4.000	0.375	0.413	0.000	0.000	30-18704000-375
4.375	4.000	0.500	0.550	0.000	0.000	30-18704000-500
4.500	3.250	0.625	0.687	0.000	0.000	35-62503250
4.500	3.250	1.000	1.100	0.000	0.000	30-62503250-100
4.500	3.500	0.500	0.550	0.000	0.000	30-50003500
4.500	3.500	0.750	0.825	0.000	0.000	30-50003500-750
4.500	3.750	0.375	0.413	0.000	0.000	30-37503750
4.500	3.750	0.375	0.413	0.000	0.000	14-37503750
4.500	3.750	0.500	0.550	0.000	0.000	30-37503750-500
4.500	3.750	0.500	0.550	0.000	0.000	14-37503750-500
4.500	3.750	0.625	0.687	0.000	0.000	30-37503750-625
4.500	3.750	0.625	0.687	0.000	0.000	14-37503750-625
4.500	3.875	0.312	0.344	0.000	0.000	30-31203875



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
4.500	3.875	0.375	0.413	0.000	0.000	30-31203875-375
4.500	3.875	0.500	0.550	0.000	0.000	30-31203875-500
4.500	3.875	0.500	0.550	0.000	0.000	14-31203875-500
4.500	4.000	0.000	0.000	0.000	0.000	30-25004000-312
4.500	4.000	0.250	0.275	0.000	0.000	45-25004000
4.500	4.000	0.250	0.275	0.000	0.000	30-25004000
4.500	4.000	0.312	0.344	0.000	0.000	15-25004000-312
4.500	4.000	0.375	0.413	0.000	0.000	30-25004000-375
4.500	4.000	0.500	0.550	0.000	0.000	30-25004000-500
4.500	4.000	0.562	0.619	0.000	0.000	30-25004000-562
4.500	4.000	0.562	0.619	0.000	0.000	14-25004000-562
4.500	4.125	0.187	0.207	0.000	0.000	35-18704125
4.500	4.125	0.187	0.207	0.000	0.000	30-18704125
4.500	4.125	0.250	0.275	0.000	0.000	30-18704125-250
4.500	4.125	0.375	0.413	0.000	0.000	30-18704125-375
4.625	3.625	0.500	0.550	0.000	0.000	35-50003625
4.625	3.875	0.375	0.413	0.000	0.000	35-37503875
4.625	3.875	0.625	0.687	0.000	0.000	30-37503875-625
4.625	4.000	0.312	0.344	0.000	0.000	30-31204000
4.625	4.000	0.500	0.550	0.000	0.000	30-31204000-500
4.625	4.000	0.562	0.619	0.000	0.000	30-31204000-562
4.625	4.125	0.250	0.275	0.000	0.000	35-25004125
4.625	4.125	0.375	0.413	0.000	0.000	30-25004125-375
4.625	4.250	0.187	0.207	0.000	0.000	35-18704250
4.625	4.250	0.312	0.344	0.000	0.000	30-18704250-312
4.625	4.250	0.375	0.413	0.000	0.000	30-18704250-375
4.750	3.500	0.625	0.687	0.000	0.000	35-62503500
4.750	3.750	0.500	0.550	0.000	0.000	30-50003750
4.750	3.750	0.690	0.750	0.000	0.000	30-50003750-690
4.750	3.750	0.750	0.825	0.000	0.000	30-50003750-750
4.750	3.875	0.750	0.825	0.000	0.000	30-43703875-750



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
4.750	4.000	0.375	0.413	0.000	0.000	30-37504000
4.750	4.000	0.500	0.550	0.000	0.000	30-37504000-500
4.750	4.000	0.625	0.687	0.000	0.000	30-37504000-625
4.750	4.125	0.312	0.344	0.000	0.000	35-31204125
4.750	4.125	0.500	0.550	0.000	0.000	30-31204125-500
4.750	4.125	0.562	0.619	0.000	0.000	30-31204125-562
4.750	4.250	0.250	0.275	0.000	0.000	45-25004250
4.750	4.250	0.250	0.275	0.000	0.000	30-25004250
4.750	4.250	0.375	0.413	0.000	0.000	30-25004250-375
4.750	4.250	0.562	0.619	0.000	0.000	30-25004250-562
4.750	4.375	0.187	0.207	0.000	0.000	30-18704375
4.750	4.375	0.375	0.413	0.000	0.000	30-18704375-375
4.750	4.500	0.187	0.207	0.000	0.000	30-12504500-187
4.875	4.125	0.375	0.413	0.000	0.000	35-37504125
4.875	4.125	0.625	0.687	0.000	0.000	30-37504125-625
4.875	4.125	0.750	0.825	0.000	0.000	30-37504125-750
4.875	4.250	0.312	0.344	0.000	0.000	35-31204250
4.875	4.250	0.500	0.550	0.000	0.000	30-31204250-500
4.875	4.250	0.562	0.619	0.000	0.000	15-31204250-562
4.875	4.375	0.250	0.275	0.000	0.000	35-25004375
4.875	4.375	0.562	0.619	0.000	0.000	30-25004375-562
4.875	4.500	0.187	0.207	0.000	0.000	30-18704500
4.875	4.500	0.375	0.413	0.000	0.000	30-18704500-375A
4.875	4.500	0.375	0.413	0.000	0.000	30-18704500-375
5.000	3.750	0.625	0.687	0.000	0.000	35-62503750
5.000	3.750	1.000	1.100	0.000	0.000	30-62503750-100
5.000	4.000	0.500	0.550	0.000	0.000	30-50004000
5.000	4.000	0.750	0.825	0.000	0.000	40-50004000-750
5.000	4.000	0.750	0.825	0.000	0.000	30-50004000-750
5.000	4.250	0.375	0.413	0.000	0.000	30-37504250
5.000	4.250	0.375	0.413	0.000	0.000	14-37504250





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
5.000	4.250	0.500	0.550	0.000	0.000	30-37504250-500
5.000	4.250	0.500	0.550	0.000	0.000	14-37504250-500
5.000	4.250	0.625	0.687	0.000	0.000	30-37504250-625
5.000	4.375	0.312	0.344	0.000	0.000	45-31204375
5.000	4.375	0.312	0.344	0.000	0.000	30-31204375
5.000	4.375	0.500	0.550	0.000	0.000	30-31204375-500
5.000	4.375	0.562	0.619	0.000	0.000	30-31204375-562
5.000	4.375	0.562	0.619	0.000	0.000	15-31204375-562
5.000	4.500	0.250	0.275	0.000	0.000	45-25004500
5.000	4.500	0.250	0.275	0.000	0.000	30-25004500
5.000	4.500	0.312	0.344	0.000	0.000	30-25004500-312
5.000	4.500	0.375	0.413	0.000	0.000	30-25004500-375
5.000	4.500	0.375	0.413	0.000	0.000	14-25004500-375
5.000	4.500	0.500	0.550	0.000	0.000	30-25004500-500
5.000	4.500	0.562	0.619	0.000	0.000	30-25004500-562
5.000	4.500	0.562	0.619	0.000	0.000	14-25004500-562
5.000	4.500	0.625	0.687	0.000	0.000	30-25004500-625
5.000	4.625	0.187	0.207	0.000	0.000	35-18704625
5.000	4.625	0.250	0.275	0.000	0.000	30-18704625-250
5.000	4.625	0.312	0.344	0.000	0.000	30-18704625-312
5.000	4.625	0.375	0.413	0.000	0.000	35-18704625-375
5.125	4.375	0.375	0.413	0.000	0.000	30-37504375
5.125	4.375	0.625	0.687	0.000	0.000	30-37504375-625
5.125	4.500	0.312	0.344	0.000	0.000	35-31204500
5.125	4.500	0.375	0.343	0.000	0.000	30-31204500-375
5.125	4.500	0.500	0.550	0.000	0.000	30-31204500-500
5.125	4.500	0.625	0.687	0.000	0.000	30-31204500-625
5.125	4.625	0.250	0.275	0.000	0.000	30-25004625
5.125	4.625	0.562	0.619	0.000	0.000	30-25004625-562
5.125	4.750	0.187	0.207	0.000	0.000	35-18704750
5.250	4.000	0.625	0.687	0.000	0.000	35-62504000



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
5.250	4.250	0.500	0.550	0.000	0.000	35-50004250
5.250	4.250	0.750	0.825	0.000	0.000	30-50004250-750
5.250	4.500	0.375	0.413	0.000	0.000	30-37504500
5.250	4.500	0.375	0.413	0.000	0.000	14-37504500
5.250	4.500	0.500	0.550	0.000	0.000	30-37504500-500
5.250	4.500	0.500	0.550	0.000	0.000	14-37504500-500
5.250	4.500	0.625	0.687	0.000	0.000	30-37504500-625
5.250	4.500	0.625	0.687	0.000	0.000	14-37504500-625
5.250	4.625	0.562	0.619	0.000	0.000	15-31204625-562
5.250	4.750	0.000	0.000	0.000	0.000	15-25004750-375
5.250	4.750	0.250	0.275	0.000	0.000	30-25004750
5.250	4.750	0.375	0.413	0.000	0.000	30-25004750-375
5.250	4.750	0.500	0.550	0.000	0.000	30-25004750-500
5.250	4.750	0.562	0.619	0.000	0.000	30-25004750-562
5.250	4.875	0.187	0.207	0.000	0.000	35-18704875
5.375	4.375	0.750	0.825	0.000	0.000	35-50004375-750
5.375	4.500	0.437	0.481	0.000	0.000	35-43704500
5.375	4.625	0.375	0.413	0.000	0.000	35-37504625
5.375	4.625	0.625	0.687	0.000	0.000	30-37504625-625
5.375	4.750	0.312	0.344	0.000	0.000	35-31204750
5.375	4.750	0.500	0.000	0.000	0.000	15-31204750-500
5.375	4.750	0.500	0.550	0.000	0.000	30-31204750-500
5.375	4.750	0.625	0.687	0.000	0.000	30-31204750-625
5.375	4.875	0.250	0.275	0.000	0.000	35-25004875
5.375	4.875	0.625	0.687	0.000	0.000	30-25004875-625
5.375	5.000	0.312	0.344	0.000	0.000	30-18705000-312
5.375	5.000	0.375	0.413	0.000	0.000	30-18705000-375
5.500	4.250	0.625	0.687	0.000	0.000	30-62504250
5.500	4.250	0.750	0.825	0.000	0.000	35-62504250-750
5.500	4.500	0.500	0.550	0.000	0.000	30-50004500
5.500	4.500	0.750	0.825	0.000	0.000	30-50004500-750





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
5.500	4.750	0.375	0.413	0.000	0.000	30-37504750
5.500	4.750	0.500	0.550	0.000	0.000	30-37504750-500
5.500	4.750	0.500	0.550	0.000	0.000	14-37504750-500
5.500	4.750	0.625	0.687	0.000	0.000	30-37504750-625
5.500	4.750	0.625	0.687	0.000	0.000	14-37504750-625
5.500	4.875	0.312	0.344	0.000	0.000	35-31204875
5.500	5.000	0.250	0.275	0.000	0.000	45-25005000
5.500	5.000	0.250	0.275	0.000	0.000	30-25005000
5.500	5.000	0.375	0.413	0.000	0.000	15-25005000-375
5.500	5.000	0.375	0.413	0.000	0.000	30-25005000-375
5.500	5.000	0.375	0.413	0.000	0.000	40-25005000-375
5.500	5.000	0.375	0.413	0.000	0.000	14-25005000-375
5.500	5.000	0.500	0.550	0.000	0.000	30-25005000-500
5.500	5.000	0.562	0.619	0.000	0.000	30-25005000-562
5.500	5.000	0.562	0.619	0.000	0.000	14-25005000-562
5.562	5.000	0.281	0.312	0.000	0.000	35-28105000
5.625	4.750	0.437	0.481	0.000	0.000	35-43704750
5.625	4.750	0.750	0.825	0.000	0.000	30-43704750-750
5.625	4.875	0.375	0.413	0.000	0.000	30-37504875
5.625	4.875	0.562	0.619	0.000	0.000	30-37504875-562
5.625	4.875	0.625	0.687	0.000	0.000	30-37504875-625
5.625	5.000	0.312	0.344	0.000	0.000	45-31205000
5.625	5.000	0.312	0.344	0.000	0.000	35-31205000
5.625	5.000	0.625	0.687	0.000	0.000	30-31205000-625
5.625	5.000	0.625	0.687	0.000	0.000	15-31205000-625
5.625	5.125	0.250	0.275	0.000	0.000	30-25005125
5.750	4.500	0.625	0.687	0.000	0.000	35-62504500
5.750	4.750	0.500	0.550	0.000	0.000	15-50004750
5.750	4.750	0.750	0.825	0.000	0.000	30-50004750-750
5.750	5.000	0.375	0.413	0.000	0.000	45-37505000
5.750	5.000	0.375	0.413	0.000	0.000	30-37505000



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
5.750	5.000	0.500	0.550	0.000	0.000	30-37505000-500
5.750	5.000	0.625	0.687	0.000	0.000	30-37505000-625
5.750	5.125	0.312	0.344	0.000	0.000	35-31205125
5.750	5.125	0.625	0.688	0.000	0.000	30-31205125-625
5.750	5.250	0.250	0.275	0.000	0.000	30-25005250
5.750	5.250	0.375	0.413	0.000	0.000	30-25005250-375
5.750	5.250	0.562	0.619	0.000	0.000	30-25005250-562
5.875	5.125	0.375	0.413	0.000	0.000	35-37505125
5.875	5.125	0.625	0.687	0.000	0.000	30-37505125-625
5.875	5.250	0.312	0.344	0.000	0.000	35-31205250
5.875	5.250	0.625	0.687	0.000	0.000	30-31205250-625
5.875	5.375	0.250	0.275	0.000	0.000	35-25005375
5.875	5.500	0.187	0.207	0.000	0.000	35-18705500
5.875	5.500	0.375	0.413	0.000	0.000	30-18705500-375
6.000	4.750	0.625	0.687	0.000	0.000	35-62504750
6.000	4.750	0.750	0.825	0.000	0.000	35-62504750-750
6.000	5.000	0.500	0.550	0.000	0.000	30-50005000
6.000	5.000	0.500	0.550	0.000	0.000	45-50005000
6.000	5.000	0.500	0.550	0.000	0.000	15-50005000
6.000	5.000	0.500	0.550	0.000	0.000	14-50005000
6.000	5.000	0.750	0.825	0.000	0.000	30-50005000-750
6.000	5.125	0.437	0.481	0.000	0.000	35-43705125
6.000	5.250	0.375	0.413	0.000	0.000	30-37505250
6.000	5.250	0.375	0.413	0.000	0.000	14-37505250
6.000	5.250	0.500	0.550	0.000	0.000	30-37505250-500
6.000	5.250	0.500	0.550	0.000	0.000	14-37505250-500
6.000	5.250	0.625	0.688	0.000	0.000	45-37505250-625
6.000	5.250	0.625	0.687	0.000	0.000	30-37505250-625
6.000	5.375	0.312	0.343	0.000	0.000	45-31205375
6.000	5.375	0.312	0.344	0.000	0.000	30-31205375
6.000	5.375	0.375	0.413	0.000	0.000	30-31205375-375





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
6.000	5.375	0.500	0.550	0.000	0.000	30-31205375-500
6.000	5.375	0.500	0.550	0.000	0.000	15-31205375-500
6.000	5.375	0.500	0.550	0.000	0.000	14-31205375-500
6.000	5.375	0.562	0.619	0.000	0.000	30-31205375-562
6.000	5.375	0.562	0.619	0.000	0.000	15-31205375-562
6.000	5.375	0.625	0.687	0.000	0.000	30-31205375-625
6.000	5.375	0.625	0.687	0.000	0.000	15-31205375-625
6.000	5.437	0.281	0.312	0.000	0.000	35-28105437
6.000	5.500	0.000	0.000	0.000	0.000	30-25005500-500
6.000	5.500	0.250	0.275	0.000	0.000	30-25005500
6.000	5.500	0.250	0.275	0.000	0.000	45-25005500
6.000	5.500	0.250	0.275	0.000	0.000	14-25005500
6.000	5.500	0.375	0.413	0.000	0.000	30-25005500-375
6.000	5.500	0.375	0.413	0.000	0.000	14-25005500-375
6.000	5.500	0.500	0.550	0.000	0.000	14-25005500-500
6.000	5.500	0.562	0.619	0.000	0.000	30-25005500-562
6.000	5.500	0.562	0.619	0.000	0.000	14-25005500-562
6.125	5.250	0.437	0.481	0.000	0.000	35-43705250
6.125	5.375	0.375	0.413	0.000	0.000	35-37505375
6.125	5.375	0.625	0.687	0.000	0.000	30-37505375-625
6.125	5.500	0.312	0.344	0.000	0.000	45-31205500
6.125	5.500	0.312	0.344	0.000	0.000	30-31205500
6.125	5.500	0.375	0.433	0.000	0.000	15-31205500-375
6.125	5.500	0.625	0.687	0.000	0.000	30-31205500-625
6.125	5.625	0.250	0.275	0.000	0.000	30-25005625
6.250	5.000	0.625	0.687	0.000	0.000	35-62505000
6.250	5.250	0.500	0.550	0.000	0.000	35-50005250
6.250	5.250	0.750	0.825	0.000	0.000	30-50005250-750
6.250	5.500	0.375	0.413	0.000	0.000	30-37505500
6.250	5.500	0.375	0.413	0.000	0.000	14-37505500
6.250	5.500	0.500	0.550	0.000	0.000	30-37505500-500



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
6.250	5.500	0.625	0.687	0.000	0.000	30-37505500-625
6.250	5.750	0.250	0.275	0.000	0.000	30-25005750
6.250	5.750	0.375	0.413	0.000	0.000	30-25005750-375
6.250	5.750	0.562	0.619	0.000	0.000	30-25005750-562
6.375	5.375	0.500	0.550	0.000	0.000	30-50005375
6.375	5.625	0.375	0.413	0.000	0.000	35-37505625
6.375	5.750	0.312	0.344	0.000	0.000	30-31205750
6.375	5.750	0.625	0.687	0.000	0.000	30-31205750-625
6.375	5.750	0.875	0.963	0.000	0.000	30-31205750-875
6.375	5.875	0.250	0.275	0.000	0.000	30-25005875
6.375	6.000	0.375	0.413	0.000	0.000	35-18706000-375
6.500	5.250	0.625	0.687	0.000	0.000	35-62505250
6.500	5.500	0.500	0.550	0.000	0.000	30-50005500
6.500	5.500	0.750	0.825	0.000	0.000	30-50005500-750
6.500	5.750	0.375	0.413	0.000	0.000	30-37505750
6.500	5.750	0.375	0.413	0.000	0.000	14-37505750
6.500	5.750	0.500	0.550	0.000	0.000	30-37505750-500
6.500	5.750	0.500	0.550	0.000	0.000	15-37505750-500
6.500	5.750	0.625	0.687	0.000	0.000	30-37505750-625
6.500	5.750	0.625	0.687	0.000	0.000	14-37505750-625
6.500	5.875	0.312	0.344	0.000	0.000	35-31205875
6.500	6.000	0.250	0.275	0.000	0.000	45-25006000
6.500	6.000	0.250	0.275	0.000	0.000	30-25006000
6.500	6.000	0.375	0.413	0.000	0.000	30-25006000-375
6.500	6.000	0.562	0.619	0.000	0.000	30-25006000-562
6.625	5.875	0.375	0.413	0.000	0.000	35-37505875
6.625	6.000	0.312	0.344	0.000	0.000	35-31206000
6.625	6.000	0.625	0.687	0.000	0.000	30-31206000-625
6.750	5.750	0.500	0.550	0.000	0.000	35-50005750
6.750	5.750	0.750	0.825	0.000	0.000	30-50005750-750
6.750	6.000	0.375	0.413	0.000	0.000	35-37506000



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
6.750	6.000	0.500	0.550	0.000	0.000	30-37506000-500
6.750	6.000	0.500	0.550	0.000	0.000	14-37506000-500
6.750	6.000	0.625	0.687	0.000	0.000	30-37506000-625
6.750	6.250	0.250	0.275	0.000	0.000	45-25006250
6.750	6.250	0.250	0.275	0.000	0.000	35-25006250
6.750	6.250	0.375	0.413	0.000	0.000	30-25006250-375
6.750	6.250	0.562	0.619	0.000	0.000	30-25006250-562
6.750	6.750	0.750	0.825	0.000	0.000	30-50006750-750
6.875	6.250	0.312	0.344	0.000	0.000	35-31206250
7.000	5.750	0.625	0.687	0.000	0.000	35-62505750
7.000	6.000	0.500	0.550	0.000	0.000	30-50006000
7.000	6.000	0.750	0.825	0.000	0.000	30-50006000-750A
7.000	6.000	0.750	0.825	0.000	0.000	30-50006000-750
7.000	6.000	0.750	0.825	0.000	0.000	14-50006000-750
7.000	6.250	0.375	0.413	0.000	0.000	30-37506250
7.000	6.250	0.375	0.413	0.000	0.000	14-37506250
7.000	6.250	0.500	0.550	0.000	0.000	30-37506250-500
7.000	6.250	0.500	0.550	0.000	0.000	14-37506250-500
7.000	6.250	0.625	0.687	0.000	0.000	30-37506250-625
7.000	6.250	0.625	0.687	0.000	0.000	14-37506250-625
7.000	6.375	0.312	0.344	0.000	0.000	35-31206375
7.000	6.375	0.562	0.619	0.000	0.000	15-31206375-562
7.000	6.375	0.625	0.687	0.000	0.000	35-31206375-625
7.000	6.375	0.625	0.687	0.000	0.000	30-31206375-625
7.000	6.500	0.250	0.275	0.000	0.000	45-25006500
7.000	6.500	0.250	0.275	0.000	0.000	30-25006500
7.000	6.500	0.375	0.413	0.000	0.000	30-25006500-375
7.000	6.500	0.562	0.619	0.000	0.000	30-25006500-562
7.125	6.375	0.375	0.413	0.000	0.000	35-37506375
7.125	6.500	0.312	0.344	0.000	0.000	35-31206500
7.125	6.500	0.625	0.687	0.000	0.000	30-31206500-625



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
7.125	6.500	0.750	0.825	0.000	0.000	30-31206500-750
7.250	6.000	0.625	0.687	0.000	0.000	35-62506000
7.250	6.250	0.500	0.550	0.000	0.000	30-50006250
7.250	6.250	0.750	0.825	0.000	0.000	30-50006250-750
7.250	6.500	0.375	0.413	0.000	0.000	30-37506500
7.250	6.500	0.500	0.550	0.000	0.000	30-37506500-500
7.250	6.500	0.625	0.687	0.000	0.000	30-37506500-625
7.250	6.500	0.625	0.687	0.000	0.000	14-37506500-625
7.250	6.625	0.312	0.344	0.000	0.000	35-31206625
7.250	6.750	0.250	0.275	0.000	0.000	30-25006750
7.250	6.750	0.375	0.413	0.000	0.000	30-25006750-375
7.250	6.750	0.562	0.619	0.000	0.000	30-25006750-562
7.375	6.750	0.312	0.344	0.000	0.000	30-31206750
7.375	6.750	0.625	0.687	0.000	0.000	30-31206750-625
7.500	6.250	0.625	0.687	0.000	0.000	35-62506250
7.500	6.500	0.500	0.550	0.000	0.000	30-50006500
7.500	6.500	0.750	0.825	0.000	0.000	30-50006500-750
7.500	6.750	0.375	0.413	0.000	0.000	30-37506750
7.500	6.750	0.500	0.550	0.000	0.000	15-37506750-500
7.500	6.750	0.500	0.550	0.000	0.000	14-37506750-500
7.500	6.750	0.625	0.687	0.000	0.000	30-37506750-625
7.500	7.000	0.250	0.275	0.000	0.000	30-25007000
7.500	7.000	0.375	0.413	0.000	0.000	30-25007000-375
7.500	7.000	0.562	0.619	0.000	0.000	30-25007000-562
7.625	6.875	0.625	0.687	0.000	0.000	30-37506875-625
7.625	7.000	0.312	0.344	0.000	0.000	35-31207000
7.625	7.000	0.625	0.687	0.000	0.000	30-31207000-625
7.750	6.500	0.625	0.688	0.000	0.000	35-62506500
7.750	6.750	0.500	0.550	0.000	0.000	35-50006750
7.750	7.000	0.375	0.413	0.000	0.000	35-37507000
7.750	7.000	0.500	0.550	0.000	0.000	30-37507000-500





14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
7.750	7.000	0.625	0.687	0.000	0.000	30-37507000-625
7.750	7.250	0.250	0.275	0.000	0.000	35-25007250
7.750	7.250	0.562	0.619	0.000	0.000	30-25007250-562
7.875	7.250	0.312	0.344	0.000	0.000	35-31207250
7.875	7.250	0.625	0.687	0.000	0.000	30-31207250-625
8.000	6.500	0.750	0.825	0.000	0.000	35-75006500
8.000	6.750	0.625	0.687	0.000	0.000	35-62506750
8.000	6.750	1.000	1.100	0.000	0.000	30-62506750-100
8.000	7.000	0.500	0.550	0.000	0.000	30-50007000
8.000	7.000	0.500	0.550	0.000	0.000	14-50007000
8.000	7.000	0.750	0.825	0.000	0.000	40-50007000-750
8.000	7.000	0.750	0.825	0.000	0.000	30-50007000-750
8.000	7.000	0.750	0.825	0.000	0.000	14-50007000-750
8.000	7.250	0.375	0.413	0.000	0.000	30-37507250
8.000	7.250	0.500	0.550	0.000	0.000	30-37507250-500
8.000	7.250	0.500	0.550	0.000	0.000	14-37507250-500
8.000	7.250	0.562	0.619	0.000	0.000	30-37507250-562
8.000	7.250	0.625	0.687	0.000	0.000	30-37507250-625
8.000	7.250	0.625	0.687	0.000	0.000	14-37507250-625
8.000	7.375	0.312	0.344	0.000	0.000	45-31207375
8.000	7.375	0.312	0.344	0.000	0.000	30-31207375
8.000	7.375	0.562	0.619	0.000	0.000	30-31207375-562
8.000	7.375	0.625	0.687	0.000	0.000	30-31207375-625
8.000	7.500	0.250	0.275	0.000	0.000	30-25007500
8.000	7.500	0.375	0.413	0.000	0.000	30-25007500-375
8.000	7.500	0.562	0.619	0.000	0.000	30-25007500-562
8.125	7.500	0.312	0.344	0.000	0.000	35-31207500
8.250	7.000	0.625	0.687	0.000	0.000	35-62507000
8.250	7.250	0.500	0.550	0.000	0.000	35-50007250
8.250	7.250	0.750	0.825	0.000	0.000	30-50007250-750
8.250	7.500	0.375	0.413	0.000	0.000	35-37507500



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
8.250	7.500	0.500	0.550	0.000	0.000	30-37507500-500
8.250	7.500	0.625	0.687	0.000	0.000	30-37507500-625
8.250	7.750	0.250	0.275	0.000	0.000	30-25007750
8.250	7.750	0.375	0.413	0.000	0.000	30-25007750-375
8.375	7.625	0.375	0.413	0.000	0.000	35-37507625
8.375	7.750	0.312	0.344	0.000	0.000	30-31207750
8.500	7.250	0.625	0.687	0.000	0.000	35-62507250
8.500	7.500	0.500	0.550	0.000	0.000	35-50007500
8.500	7.500	0.750	0.825	0.000	0.000	30-50007500-750
8.500	7.500	0.750	0.825	0.000	0.000	14-50007500-750
8.500	7.750	0.375	0.413	0.000	0.000	35-37507750
8.500	7.750	0.500	0.550	0.000	0.000	30-37507750-500
8.500	7.750	0.625	0.687	0.000	0.000	30-37507750-625
8.500	8.000	0.250	0.275	0.000	0.000	30-25008000
8.500	8.000	0.375	0.413	0.000	0.000	30-25008000-375
8.500	8.000	0.562	0.619	0.000	0.000	30-25008000-562
8.625	8.000	0.312	0.344	0.000	0.000	35-31208000
8.625	8.125	0.562	0.619	0.000	0.000	30-25008125-562
8.750	7.750	0.500	0.550	0.000	0.000	35-50007750
8.750	7.750	0.750	0.825	0.000	0.000	30-50007750-750
8.750	8.000	0.375	0.413	0.000	0.000	35-37508000
8.750	8.000	0.625	0.688	0.000	0.000	40-37508000-625
8.750	8.000	0.625	0.687	0.000	0.000	30-37508000-625
8.750	8.250	0.250	0.275	0.000	0.000	35-25008250
8.750	8.250	0.562	0.619	0.000	0.000	30-25008250-562
8.875	8.250	0.312	0.344	0.000	0.000	30-31208250
9.000	7.750	0.625	0.687	0.000	0.000	35-62507750
9.000	8.000	0.500	0.550	0.000	0.000	35-50008000
9.000	8.000	0.750	0.825	0.000	0.000	30-50008000-750
9.000	8.250	0.375	0.413	0.000	0.000	30-37508250
9.000	8.250	0.500	0.550	0.000	0.000	35-37508250-500



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
9.000	8.250	0.625	0.687	0.000	0.000	30-37508250-625
9.000	8.500	0.250	0.275	0.000	0.000	35-25008500
9.000	8.500	0.375	0.413	0.000	0.000	30-25008500-375
9.000	8.500	0.562	0.619	0.000	0.000	30-25008500-562
9.125	8.125	0.500	0.550	0.000	0.000	30-50008125
9.125	8.500	0.312	0.344	0.000	0.000	30-31208500
9.125	8.500	0.625	0.687	0.000	0.000	30-31208500-625
9.250	8.000	0.625	0.687	0.000	0.000	35-62508000
9.250	8.000	1.000	1.100	0.000	0.000	30-62508000-100
9.250	8.500	0.375	0.413	0.000	0.000	35-37508500
9.250	8.500	0.625	0.687	0.000	0.000	30-37508500-625
9.250	8.750	0.250	0.275	0.000	0.000	35-25008750
9.250	8.750	0.250	0.275	0.000	0.000	30-25008750
9.250	8.750	0.375	0.413	0.000	0.000	30-25008750-375
9.500	8.250	0.625	0.687	0.000	0.000	35-62508250
9.500	8.250	1.000	1.100	0.000	0.000	30-62508250-100
9.500	8.500	0.500	0.550	0.000	0.000	35-50008500
9.500	8.500	0.750	0.825	0.000	0.000	30-50008500-750
9.500	8.750	0.375	0.413	0.000	0.000	35-37508750
9.500	8.750	0.625	0.687	0.000	0.000	35-37508750-625
9.500	9.000	0.250	0.275	0.000	0.000	35-25009000
9.500	9.000	0.562	0.619	0.000	0.000	30-25009000-562
9.750	8.500	1.000	1.100	0.000	0.000	30-62508500-100
9.750	8.750	0.500	0.550	0.000	0.000	35-50008750
9.750	8.750	0.750	0.825	0.000	0.000	30-50008750-750
9.750	9.000	0.375	0.413	0.000	0.000	35-37509000
9.750	9.000	0.625	0.687	0.000	0.000	30-37509000-625
9.750	9.250	0.250	0.275	0.000	0.000	35-25009250
9.875	9.250	0.625	0.687	0.000	0.000	30-31209250-625
10.000	8.750	0.625	0.687	0.000	0.000	35-62508750
10.000	9.000	0.500	0.550	0.000	0.000	30-50009000



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
10.000	9.000	0.625	0.687	0.000	0.000	15-50009000-625
10.000	9.000	0.625	0.687	0.000	0.000	14-50009000-625
10.000	9.000	0.750	0.825	0.000	0.000	30-50009000-750
10.000	9.000	0.750	0.825	0.000	0.000	14-50009000-750
10.000	9.250	0.375	0.413	0.000	0.000	30-37509250
10.000	9.250	0.500	0.550	0.000	0.000	35-37509250-500
10.000	9.250	0.625	0.687	0.000	0.000	30-37509250-625
10.000	9.375	0.625	0.687	0.000	0.000	30-31209375-625
10.000	9.500	0.250	0.275	0.000	0.000	35-25009500
10.000	9.500	0.250	0.275	0.000	0.000	15-25009500
10.000	9.500	0.562	0.619	0.000	0.000	30-25009500-562
10.250	9.000	0.625	0.687	0.000	0.000	35-62509000
10.250	9.000	1.000	1.100	0.000	0.000	30-62509000-100
10.250	9.500	0.375	0.413	0.000	0.000	35-37509500
10.250	9.500	0.625	0.687	0.000	0.000	30-37509500-625
10.250	9.750	0.250	0.275	0.000	0.000	35-25009750
10.250	9.750	0.562	0.619	0.000	0.000	30-25009750-562
10.500	9.000	1.250	1.375	0.000	0.000	30-75009000-125
10.500	9.250	0.625	0.687	0.000	0.000	35-62509250
10.500	9.500	0.500	0.550	0.000	0.000	35-50009500
10.500	9.500	0.750	0.825	0.000	0.000	30-50009500-750
10.500	9.750	0.375	0.413	0.000	0.000	35-37509750
10.500	9.750	0.625	0.687	0.000	0.000	30-37509750-625
10.500	10.000	0.250	0.275	0.000	0.000	30-25010000
10.500	10.000	0.562	0.619	0.000	0.000	30-25010000-562
10.750	9.500	0.625	0.687	0.000	0.000	35-62509500
10.750	10.000	0.375	0.413	0.000	0.000	35-37510000
10.750	10.000	0.625	0.687	0.000	0.000	30-37510000-625
11.000	9.750	0.625	0.687	0.000	0.000	35-62509750
11.000	10.000	0.500	0.550	0.000	0.000	35-50010000
11.000	10.000	0.750	0.825	0.000	0.000	15-50010000-750



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
11.000	10.250	0.375	0.413	0.000	0.000	35-37510250
11.000	10.500	0.250	0.275	0.000	0.000	35-25010500
11.500	10.000	0.750	0.825	0.000	0.000	35-75010000
11.500	10.500	0.500	0.550	0.000	0.000	35-50010500
11.500	10.500	0.750	0.825	0.000	0.000	30-50010500-750
11.500	10.500	1.000	1.100	0.000	0.000	30-50010500-100
11.750	11.000	0.625	0.687	0.000	0.000	30-37511000-625
11.750	11.250	0.250	0.275	0.000	0.000	35-25011250
12.000	10.750	0.625	0.687	0.000	0.000	35-62510750
12.000	11.000	0.500	0.550	0.000	0.000	35-50011000
12.000	11.000	0.500	0.550	0.000	0.000	30-50011000
12.000	11.000	0.625	0.687	0.000	0.000	15-50011000-625
12.000	11.000	0.625	0.687	0.000	0.000	14-50011000-625
12.000	11.000	0.750	0.825	0.000	0.000	30-50011000-750
12.000	11.000	0.750	0.825	0.000	0.000	14-50011000-750
12.000	11.250	0.375	0.413	0.000	0.000	35-37511250
12.000	11.250	0.625	0.687	0.000	0.000	35-37511250-625
12.000	11.250	0.625	0.687	0.000	0.000	30-37511250-625
12.000	11.500	0.250	0.275	0.000	0.000	35-25011500
12.250	11.000	1.000	1.100	0.000	0.000	30-62511000-100
12.250	11.500	0.625	0.687	0.000	0.000	30-37511500-625
12.500	11.250	1.000	1.100	0.000	0.000	30-62511250-100
12.500	11.500	0.750	0.825	0.000	0.000	35-50011500-750
12.500	12.000	0.250	0.275	0.000	0.000	30-25012000
12.750	11.500	1.000	1.100	0.000	62,511,500.000	30-62511500-100
12.750	11.750	0.500	0.550	0.000	0.000	35-50011750
12.750	12.000	0.375	0.413	0.000	0.000	35-37512000
12.750	12.000	0.625	0.687	0.000	0.000	30-37512000-625
13.000	12.000	0.500	0.550	0.000	0.000	35-50012000
13.000	12.000	0.750	0.825	0.000	0.000	30-50012000-750
13.000	12.250	0.375	0.413	0.000	0.000	35-37512250



14



15



30



35



40



45

OD	ID	L1	L2	OD2	OD3	Product Name
13.250	12.000	0.625	0.687	0.000	0.000	35-62512000
13.500	12.000	0.750	0.825	0.000	0.000	35-75012000
13.500	12.250	1.000	1.100	0.000	0.000	30-62512250-100
13.500	12.500	0.750	0.825	0.000	0.000	35-50012500-750
13.750	13.000	0.375	0.413	0.000	0.000	35-37513000
14.000	12.500	0.750	0.825	0.000	0.000	35-75012500
14.000	12.750	0.625	0.687	0.000	0.000	35-62512750
14.000	13.000	0.500	0.550	0.000	0.000	35-50013000
14.000	13.000	0.750	0.825	0.000	0.000	30-50013000-750
14.000	13.250	0.375	0.413	0.000	0.000	35-37513250
14.250	13.250	0.500	0.550	0.000	0.000	35-50013250
14.250	13.250	0.750	0.825	0.000	0.000	30-50013250-750
14.500	13.000	1.000	1.100	0.000	0.000	35-75013000-100
14.500	13.500	0.750	0.825	0.000	0.000	35-50013500-750
14.500	13.750	0.375	0.413	0.000	0.000	35-37513750
14.750	13.750	0.750	0.825	0.000	0.000	35-50013750-750
15.000	13.500	0.750	0.825	0.000	0.000	35-75013500
15.000	14.000	0.500	0.550	0.000	0.000	35-50014000
15.250	14.000	1.000	1.100	0.000	0.000	35-62514000-100
15.750	15.000	0.375	0.413	0.000	0.000	35-37515000
16.000	14.750	1.000	1.100	0.000	0.000	30-62514750-100
16.000	15.000	0.500	0.550	0.000	0.000	35-50015000
16.000	15.000	0.750	0.825	0.000	0.000	35-50015000-750
16.250	15.500	0.375	0.413	0.000	0.000	35-37515500
16.500	15.500	0.750	0.825	0.000	0.000	35-50015500-750
17.000	16.000	0.500	0.550	0.000	0.000	35-50016000
18.000	16.750	0.625	0.687	0.000	0.000	35-62516750
18.000	17.000	0.500	0.550	0.000	0.000	35-50017000
18.000	17.000	0.750	0.825	0.000	50,017,000.000	30-50017000-750
19.000	18.000	0.750	0.825	0.000	0.000	30-50018000-750
20.000	18.750	1.000	1.100	0.000	0.000	30-62518750-100



# CP

## Piston Seal

### Design

CP are a symmetrical profile with chamfered lips. Precision moulded from NBR and fabric reinforced on the heel, style CP can be used on pistons and rods. Manufactured with initial radial interference to effect low pressure sealing, as pressure increases the seal is energised thus increasing the sealing force. Rubberised fabric has the advantage of retaining the sealing media within its surfaces reducing friction and wear.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing D$	$\varnothing d$	L
H10	js11	-0 + 0.010

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

#### Extrusion Gap G

Pressure	1,500	3,750	6,000
	0.016	0.010	0.004

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



single acting seals



### Key Features

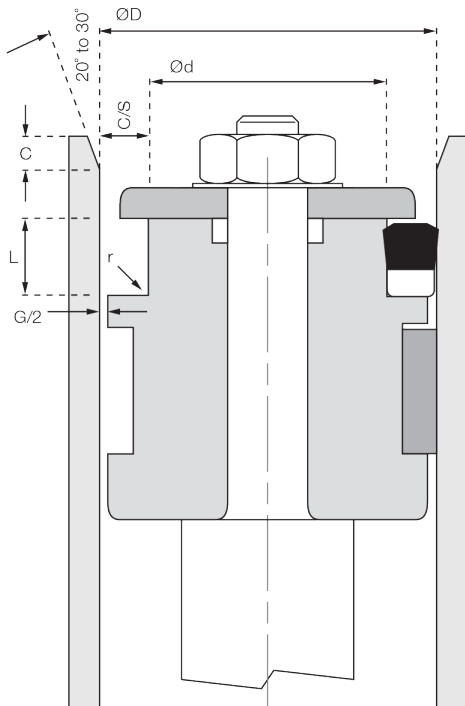
Medium to heavy duty

Piston or rod

Tolerant of surface imperfections

Good service life

Good extrusion resistance

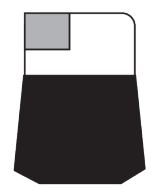




# CPE

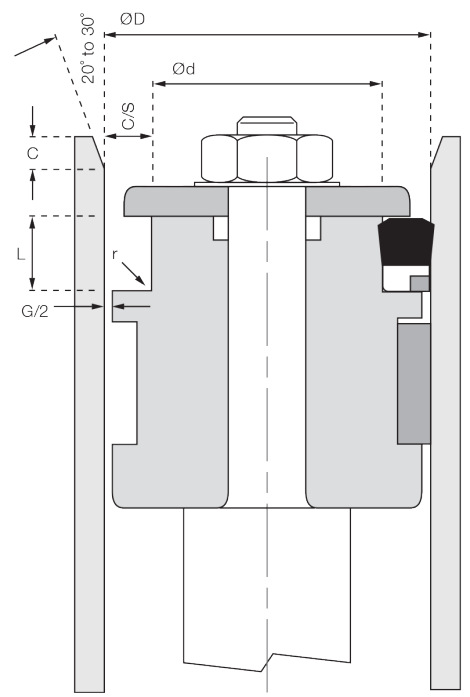
## Piston Seal

Single acting seals



### Key Features

- Medium to heavy duty
- Piston only
- Tolerant of surface imperfections
- Good service life
- Excellent extrusion resistance



### Design

CPE are an asymmetrical profile with chamfered lips and an anti-extrusion ring, for pistons only. Precision moulded from NBR and with a fabric reinforced base, a Polyacetal extrusion ring is incorporated into the outside diameter heel, protecting from rapid pressure changes larger clearances and higher operating pressures. Manufactured with initial radial interference to effect low pressure sealing, as pressure increases the seal is energised thus increasing the sealing force. Rubberised fabric has the advantage of retaining the sealing media within its surfaces reducing friction and wear.

### Operating Conditions

Pressure	Bar	Psi
400 Bar	6,000 Psi	

Temperature	°C	°F
-30° to 100° C	-22° to 212° F	

Speed	m/sec	ft/sec
0.5m/sec	1.5' /sec	

Surface Finish $\mu\text{mRa}$		
$\text{ØD}$	$\text{Ød}$	L
0.1-0.25	0.8	2.0

Tolerances		
$\text{ØD}$	$\text{Ød}$	L
H10	js11	-0 + 0.010

Chamfer Radii					
C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

Extrusion Gap G			
Pressure	1,500	3,750	6,000
	0.025	0.018	0.016

**Typical Examples**  
 Reciprocating  Rotary  Oscillating  Helix







# GP

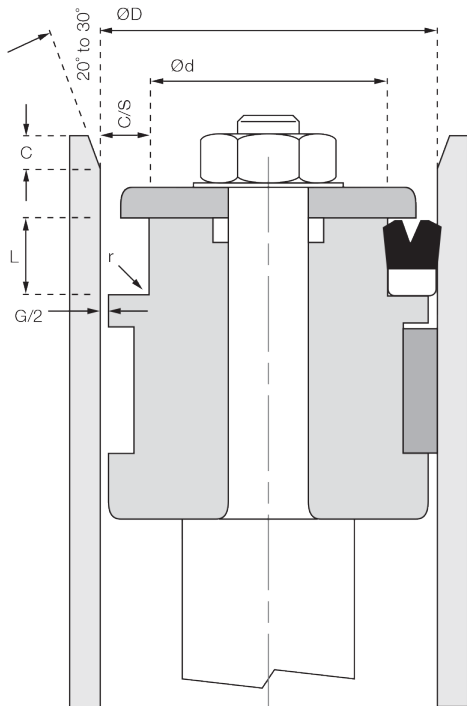
## Piston Seal

single acting seals



### Key Features

- Medium to heavy duty
- Piston or rod
- Low return friction
- Good extrusion resistance



### Design

GP are a symmetrical design with chamfered lips and can be used as a piston or rod seal. GP is precision moulded from NBR with a fabric reinforced base to resist extrusion. Manufactured with initial interference to effect low pressure sealing, the seal is progressively energised at higher pressures thereby increasing the sealing force. Type GP is designed to provide effective low pressure sealing through distortion of the lips rather than 'squeeze'. This give an improved response to pressure variations and reduces low pressure stiction to ensure a smooth return stroke.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



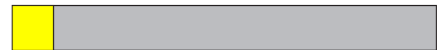
#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish µmRa

ØD	Ød	L
0.1-0.25	0.8	2.0

#### Tolerances

ØD	Ød	L
H10	js11	-0 + 0.010

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

#### Extrusion Gap G

Pressure	1,500	3,750	6,000
G	0.016	0.010	0.004

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

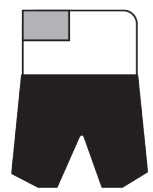




# GPE

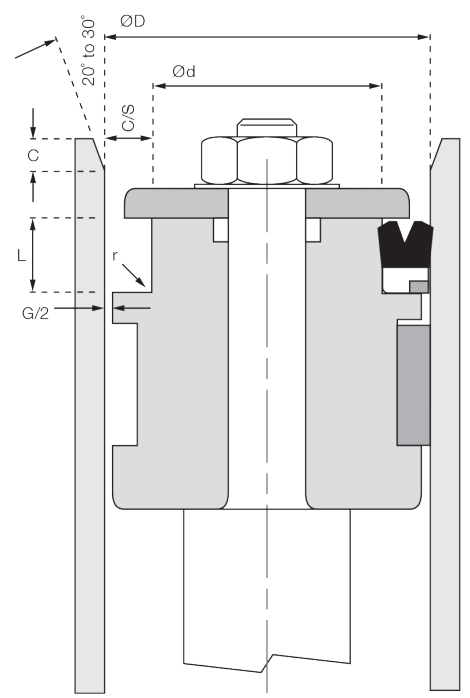
## Piston Seal

Single acting seals



### Key Features

- Medium to heavy duty
- Piston only
- Low return friction
- Excellent extrusion resistance



### Design

GPE are an asymmetrical profile with chamfered lips and an anti-extrusion ring, for pistons only. Precision moulded from NBR and with a fabric reinforced base, a Polyacetal extrusion ring is incorporated in to the outside diameter heel, protecting from rapid pressure changes larger clearances and higher operating pressures. Type GPE is designed to provide effective low pressure sealing through distortion of the lips rather than 'squeeze'. This gives an improved response to pressure variations and reduces low pressure restriction to ensure a smooth return stroke.

### Operating Conditions

Pressure	Operating Range
400 Bar 6,000 Psi	

Temperature	Operating Range
-30° to 100° C -22° to 212° F	

Speed	Operating Range
0.5m/sec 1.5'/sec	

Surface Finish $\mu\text{mRa}$			
$\text{ØD}$	$\text{Ød}$	L	
0.1-0.25	0.8	2.0	

Tolerances			
$\text{ØD}$	$\text{Ød}$	L	
H10	js11	-0 + 0.010	

Chamfer Radii					
C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

Extrusion Gap G			
Pressure	1,500	3,750	6,000
	0.016	0.010	0.004

**Typical Examples**

Reciprocating  Rotary  Oscillating  Helix



CP



CPE



GP



GPE

OD	ID	L1	L2	OD2	OD3	Product Name
0.500	0.187	0.280	0.308	0.000	0.000	CP-050018
0.562	0.250	0.250	0.265	0.000	0.000	CP-056025
0.625	0.312	0.250	0.265	0.000	0.000	CP-062031
0.625	0.375	0.187	0.202	0.000	0.000	CP-062037
0.750	0.375	0.281	0.296	0.000	0.000	CP-075037
0.750	0.500	0.187	0.202	0.000	0.000	CP-075050
0.875	0.500	0.281	0.296	0.000	0.000	CP-087050
0.875	0.625	0.187	0.202	0.000	0.000	CP-087062
1.000	0.500	0.375	0.385	0.000	0.000	CP-100050
1.000	0.625	0.281	0.296	0.000	0.000	CP-100062
1.000	0.750	0.187	0.202	0.000	0.000	CP-100075
1.125	0.625	0.375	0.390	0.000	0.000	CP-112062
1.125	0.750	0.312	0.327	0.000	0.000	CP-112075
1.125	0.875	0.163	0.178	0.000	0.000	CP-112087
1.250	0.750	0.312	0.327	0.000	0.000	CP-125075/1
1.250	0.750	0.375	0.390	0.000	0.000	CP-125075/2
1.250	0.875	0.375	0.390	0.000	0.000	CP-125087
1.250	1.000	0.121	0.136	0.000	0.000	CP-125100/1
1.375	0.875	0.375	0.390	0.000	0.000	CP-137087
1.375	1.000	0.250	0.265	0.000	0.000	CP-137100
1.375	1.125	0.187	0.202	0.000	0.000	CP-137112
1.437	0.937	0.375	0.390	0.000	0.000	CP-143093
1.500	0.875	0.375	0.390	0.000	0.000	CP-150087
1.500	0.980	0.380	0.395	0.000	0.000	CP-150098
1.500	1.000	0.250	0.265	0.000	0.000	CP-150100/1
1.625	1.000	0.437	0.452	0.000	0.000	CP-162100
1.625	1.125	0.375	0.390	0.000	0.000	CP-162112
1.625	1.250	0.250	0.265	0.000	0.000	CP-162125/1
1.625	1.250	0.281	0.296	0.000	0.000	CP-162125
1.687	1.187	0.312	0.327	0.000	0.000	CPE-168118
1.750	1.000	0.375	0.390	0.000	0.000	CP-175100



CP



CPE



GP



GPE

OD	ID	L1	L2	OD2	OD3	Product Name
1.750	1.125	0.437	0.452	0.000	0.000	CP-175112
1.750	1.250	0.281	0.296	0.000	0.000	CP-175125/1
1.750	1.250	0.375	0.390	0.000	0.000	GPE-175125
1.750	1.250	0.375	0.390	0.000	0.000	CP-175125
1.750	1.375	0.281	0.296	0.000	0.000	CP-175137
1.875	1.250	0.437	0.452	0.000	0.000	CP-187125
1.875	1.500	0.172	0.187	0.000	0.000	CP-187150
1.875	1.500	0.250	0.265	0.000	0.000	CP-187150/1
1.937	1.687	0.187	0.202	0.000	0.000	CP-193168
2.000	1.375	0.312	0.327	0.000	0.000	CP-200137/4
2.000	1.375	0.375	0.390	0.000	0.000	CP-200137/1
2.000	1.375	0.437	0.452	0.000	0.000	CPE-200137/2
2.000	1.375	0.437	0.452	0.000	0.000	CP-200137/2
2.000	1.375	0.500	0.515	0.000	0.000	CP-200137/3
2.000	1.500	0.250	0.265	0.000	0.000	CP-200150/4
2.000	1.500	0.375	0.390	0.000	0.000	CP-200150
2.000	1.500	0.468	0.483	0.000	0.000	GP-200150/1
2.125	1.500	0.437	0.452	0.000	0.000	CP-212150/1
2.125	1.750	0.000	0.000	0.000	0.000	CP-212175
2.125	1.750	0.172	0.187	0.000	0.000	CP-212175/1
2.125	1.750	0.281	0.296	0.000	0.000	CP-212175/2
2.187	1.500	0.437	0.452	0.000	0.000	CP-218150
2.250	1.500	0.468	0.483	0.000	0.000	CP-225150
2.250	1.625	0.437	0.452	0.000	0.000	GPE-225162
2.250	1.625	0.437	0.452	0.000	0.000	CP-225162
2.250	1.750	0.375	0.390	0.000	0.000	CP-225175/1
2.250	1.875	0.250	0.281	0.000	0.000	CP-225187
2.375	1.750	0.437	0.452	0.000	0.000	CP-237175
2.500	1.875	0.437	0.452	0.000	0.000	CP-250187
2.500	2.000	0.312	0.327	0.000	0.000	CP-250200
2.500	2.000	0.343	0.358	0.000	0.000	CP-250200/2



CP



CPE



GP



GPE

OD	ID	L1	L2	OD2	OD3	Product Name
2.625	2.000	0.437	0.452	0.000	0.000	GPE-262200
2.750	2.000	0.437	0.452	0.000	0.000	CP-275200
2.750	2.000	0.562	0.577	0.000	0.000	CP-275200/2
2.750	2.125	0.375	0.390	0.000	0.000	CP-275212
2.750	2.250	0.375	0.390	0.000	0.000	CP-275225
2.750	2.312	0.375	0.390	0.000	0.000	CP-275231
2.875	2.250	0.437	0.457	0.000	0.000	CP-287225
3.000	2.250	0.375	0.390	0.000	0.000	CP-300225
3.000	2.250	0.500	0.515	0.000	0.000	GPE-300225/1
3.000	2.250	0.562	0.577	0.000	0.000	CP-300225/2
3.000	2.375	0.468	0.483	0.000	0.000	CP-300237
3.000	2.500	0.312	0.327	0.000	0.000	CP-300250
3.125	2.375	0.562	0.577	0.000	0.000	CP-312237
3.125	2.500	0.375	0.390	0.000	0.000	CP-312250/1
3.250	2.500	0.375	0.390	0.000	0.000	CP-325250
3.250	2.500	0.562	0.577	0.000	0.000	CP-325250/1
3.250	2.625	0.562	0.577	0.000	0.000	GPE-325262
3.250	2.735	0.340	0.355	0.000	0.000	CP-325273
3.375	2.750	0.437	0.452	0.000	0.000	CP-337275/1
3.500	2.500	0.750	0.765	0.000	0.000	CP-350250
3.500	2.750	0.500	0.515	0.000	0.000	CP-350275/3
3.500	2.750	0.562	0.577	0.000	0.000	CP-350275
3.625	3.000	0.375	0.390	0.000	0.000	CP-362300
3.625	3.000	0.437	0.452	0.000	0.000	GPE-362300/1
3.750	3.000	0.375	0.390	0.000	0.000	CP-375300/2
3.750	3.000	0.562	0.577	0.000	0.000	CP-375300
3.750	3.230	0.360	0.375	0.000	0.000	CP-375323
3.875	3.125	0.000	0.000	0.000	0.000	CP-387312
4.000	3.250	0.562	0.577	0.000	0.000	CPE-400325/1
4.000	3.250	0.562	0.577	0.000	0.000	GPE-400325/1
4.000	3.250	0.562	0.577	0.000	0.000	CP-400325/1



CP



CPE



GP



GPE

OD	ID	L1	L2	OD2	OD3	Product Name
4.000	3.500	0.375	0.390	0.000	0.000	CP-400350
4.125	3.375	0.562	0.577	0.000	0.000	CP-412337
4.250	3.500	0.562	0.577	0.000	0.000	CP-425350/1
4.500	3.500	0.750	0.765	0.000	0.000	CP-450350/2
4.500	3.750	0.500	0.515	0.000	0.000	CP-450375
4.500	3.750	0.562	0.577	0.000	0.000	GPE-450375
4.750	3.750	0.750	0.765	0.000	0.000	CP-475375/2
5.000	4.000	0.750	0.765	0.000	0.000	CP-500400
5.000	4.250	0.562	0.577	0.000	0.000	CP-500425
5.250	4.250	0.750	0.765	0.000	0.000	CP-525425
5.250	4.500	0.468	0.483	0.000	0.000	CP-525450
5.500	4.500	0.750	0.765	0.000	0.000	CP-550450
5.875	4.875	0.750	0.765	0.000	0.000	CP-587487
6.000	5.000	0.750	0.765	0.000	0.000	CP-600500
6.250	5.500	0.687	0.702	0.000	0.000	CP-625550
7.000	6.500	0.375	0.390	0.000	0.000	CP-700650
7.500	6.250	1.000	1.015	0.000	0.000	CP-750625
7.750	6.500	1.000	1.100	0.000	0.000	CP-775650
8.000	6.750	1.000	1.015	0.000	0.000	CP-800675
8.250	7.000	1.000	1.040	0.000	0.000	CP-825700
8.500	7.250	1.000	1.015	0.000	0.000	CP-850725
8.750	7.500	1.000	1.015	0.000	0.000	CP-875750
9.250	8.000	1.000	1.015	0.000	0.000	CP-925800
9.500	8.250	1.000	1.100	0.000	0.000	CP-950825
9.750	8.500	1.000	1.015	0.000	0.000	CP-975850
10.250	9.000	1.000	1.015	0.000	0.000	CP-1025900
15.000	13.937	0.812	0.893	0.000	0.000	CP-15001393-081



# CPL

## Piston Seal with Wear Rings

### Design

CPL are for use as a single acting piston seal on solid pistons. The seal is a precision moulded NBR sealing element with a fabric reinforced base. The seal is fitted with a Polyacetal anti-extrusion bearing ring to the outside diameter heel to allow larger machining clearances between the piston head and cylinder bore and to permit higher working pressures. Manufactured with initial radial interference to effect low pressure sealing, as pressure increases the seal is energised thus increasing the sealing force. Rubberised fabric has the advantage of retaining the sealing media within its surfaces reducing friction and wear.

### Operating Conditions

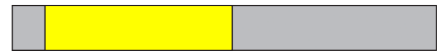
#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{\O}D$	$\text{\O}d1$	$\text{\O}d2$	$\text{\O}d3$	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

#### Tolerances

$\text{\O}D$	$\text{\O}d1$	$\text{\O}d2$	$\text{\O}d3$	L1	L2
H10	js11	js10	js11	-0.000 +0.010	-0.000 +0.005

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r1	0.008	0.015	0.025	0.031	0.046
r2	0.008	0.008	0.008	0.008	0.015

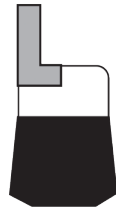
#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



NR SEALS

single acting seals



### Key Features

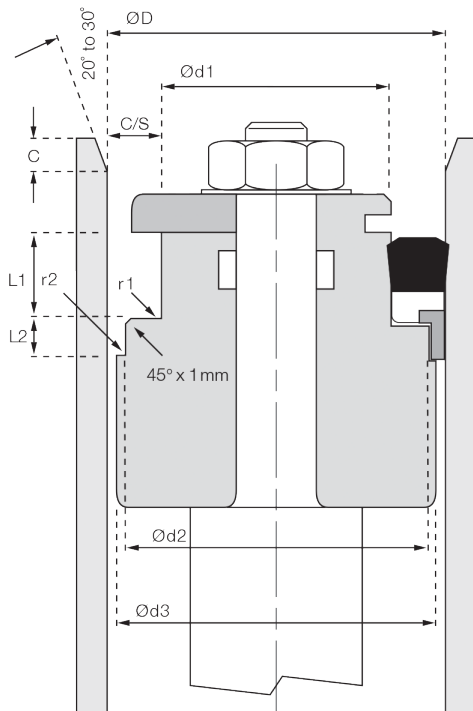
Medium to heavy duty

Piston only

Excellent extrusion resistance

Medium to higher pressures

Excellent wear properties





# CPWL

## Piston Seal with Wear Rings

Single acting seals



### Key Features

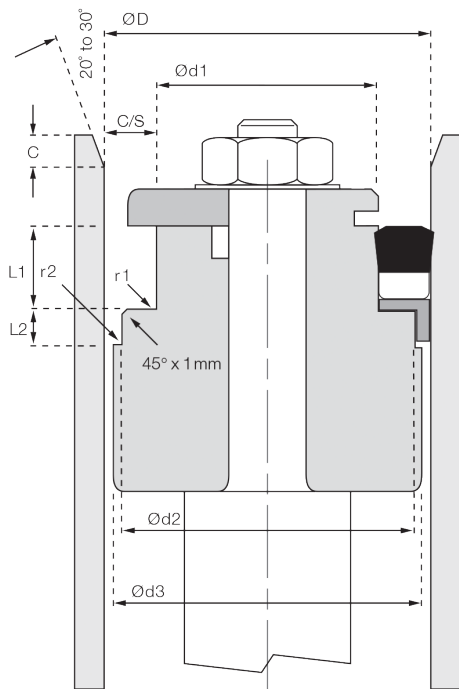
Medium to heavy duty

Piston only

Excellent extrusion resistance

Medium to higher pressures

Excellent wear properties



### Design

CPWL are for use as a single acting piston seal on solid pistons. The seal is a precision moulded NBR sealing element with a fabric reinforced base. The seal is used with an L shaped bearing support ring to allow for larger machining clearances between the piston and cylinder bore. Manufactured with initial radial interference to effect low pressure sealing, as pressure increases the seal is energised thus increasing the sealing force. Rubberised fabric has the advantage of retaining the sealing media within its surfaces reducing friction and wear.

### Operating Conditions

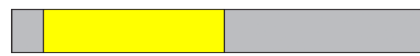
#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

#### Tolerances

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
H10	js11	js10	js11	-0.000 +0.010	-0.000 +0.005

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r1	0.008	0.008	0.008	0.008	0.015
r2	0.008	0.008	0.008	0.008	0.015

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix







# GPW

## Piston Seal with Wear Rings

### Design

GPW are for use as a single acting piston seal on solid or split pistons. The seal is a precision moulded NBR sealing element with a fabric reinforced base. The seal is fitted with a Polyacetal anti-extrusion bearing ring to the outside diameter heel to allow larger machining clearances between the piston head and cylinder bore and to permit higher working pressures. Manufactured with initial radial interference to effect low pressure sealing, as pressure increases the seal is energised thus increasing the sealing force. Rubberised fabric has the advantage of retaining the sealing media within its surfaces reducing friction and wear.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5"/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
0.1-0.25	0.8	1.6	1.6	2.0	2.0

#### Tolerances

$\varnothing D$	$\varnothing d1$	$\varnothing d2$	$\varnothing d3$	L1	L2
H10	js11	js10	js11	-0.000 +0.010	-0.000 +0.005

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r1	0.008	0.008	0.008	0.008	0.015
r2	0.008	0.008	0.008	0.008	0.015

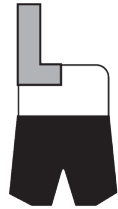
#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



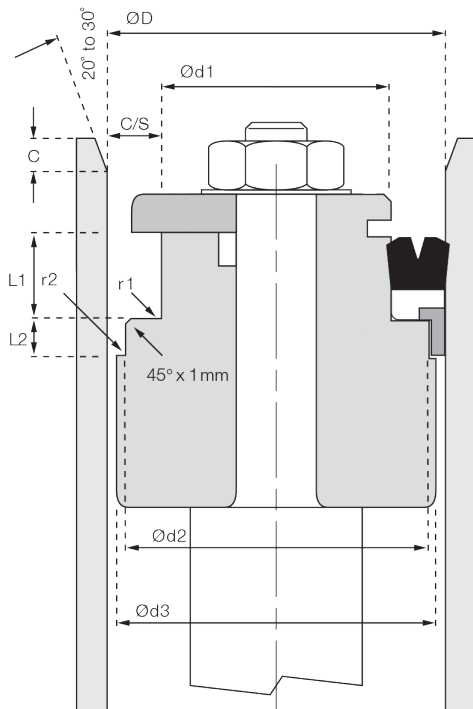
SEALS

single acting seals



### Key Features

- Medium to heavy duty
- Piston only
- Excellent wear properties
- Medium to higher pressures
- Excellent extrusion resistance





CPL



CPLR



CPWL



GPW



PSR

Single Acting  
Piston Seals + Wear Rings

OD	ID	L1	L2	OD2	OD3	Product Name
1.000	0.625	0.296	0.250	0.883	0.964	CPL-100062
1.000	0.625	0.358	0.182	0.868	0.968	CPWL-100062
1.125	0.625	0.477	0.250	0.986	1.085	GPW-112062
1.147	0.875	0.483	0.250	1.277	1.375	GPW-141087
1.417	0.875	0.130	0.195	0.082	0.000	PSR-141087
1.500	1.000	0.130	0.250	0.082	0.000	PSR-150100
1.500	1.000	0.390	0.250	1.360	1.458	CPL-150100
1.500	1.000	0.452	0.245	1.365	1.218	CPWL-150100
1.750	1.250	0.250	0.000	0.000	0.000	PSR-175125
1.750	1.250	0.390	0.250	1.604	1.698	GPW-175125
1.781	1.160	0.130	0.250	0.000	0.000	PSR-178116
1.787	1.161	0.483	0.250	1.606	1.735	GPW-178116
2.000	1.375	0.250	0.000	0.000	0.000	PSR-200137
2.000	1.375	0.452	0.250	1.820	1.948	CPLR-200137/2
2.000	1.375	0.452	0.250	1.820	1.948	CPL-200137/2
2.000	1.375	0.546	0.245	1.802	1.937	CPWL-200137
2.250	1.625	0.250	0.000	0.000	0.000	PSR-225162
2.250	1.625	0.452	0.250	2.070	2.200	GPW-225162
2.250	1.625	0.546	0.245	2.052	2.187	CPWL-225162
2.375	1.750	0.250	0.000	0.000	0.000	PSR-237175
2.500	1.875	0.437	0.250	2.319	2.446	CPL-250187
2.500	1.875	0.452	0.250	2.319	2.446	CPLR-250187
2.500	1.875	0.546	0.245	2.302	2.437	CPWL-250187
2.500	2.000	0.328	0.250	2.360	2.447	CPL-250200
2.625	2.000	0.130	0.250	0.082	0.000	PSR-262200
2.625	2.000	0.452	0.250	2.443	2.571	GPW-262200
2.625	2.000	0.546	0.245	2.428	2.562	CPWL-262200
2.750	2.000	0.130	0.250	0.082	0.000	PSR-275200
2.750	2.000	0.577	0.250	2.522	2.695	GPW-275200/2
2.750	2.000	0.702	0.245	2.482	2.687	CPWL-275200
3.000	2.250	0.130	0.250	0.082	0.000	PSR-300225
3.000	2.250	0.515	0.250	2.772	2.935	GPW-300225/1



CPL



CPLR



CPWL



GPW



PSR

Single Acting  
Piston Seals + Wear Rings

OD	ID	L1	L2	OD2	OD3	Product Name
3.000	2.250	0.702	0.250	2.732	2.937	CPWL-300225
3.250	2.500	0.702	0.245	2.982	3.187	CPWL-325250
3.250	2.625	0.130	0.250	0.082	0.000	PSR-325262
3.250	2.625	0.577	0.250	3.069	3.195	GPW-325262
3.500	2.750	0.130	0.250	0.082	0.000	PSR-350275
3.500	2.750	0.577	0.250	3.271	3.435	GPW-350275
3.500	2.750	0.702	0.245	3.232	3.437	CPWL-350275
3.625	3.000	0.130	0.250	0.082	0.000	PSR-362300
3.750	2.750	0.515	0.250	3.508	3.685	CPL-375275
3.750	3.000	0.687	0.250	3.482	0.000	CPWL-375300
4.000	3.250	0.190	0.275	0.082	0.000	PSR-400325/1
4.000	3.250	0.577	0.250	3.770	3.935	GPW-400325/1
4.000	3.250	0.702	0.245	3.732	3.937	CPWL-400325
4.125	3.375	0.130	0.250	0.082	0.000	PSR-412337
4.250	3.500	0.702	0.245	3.985	4.187	CPWL-425350
4.500	3.500	0.890	0.370	4.232	4.437	CPWL-450350
5.000	4.000	0.890	0.370	4.732	4.937	CPWL-500400
5.250	4.250	0.890	0.370	4.982	5.187	CPWL-525425
5.500	4.500	0.890	0.370	5.232	5.437	CPWL-550450
5.750	5.000	0.190	0.312	0.110	0.000	PSR-575500/1
6.000	5.000	0.890	0.370	5.732	5.937	CPWL-600500
7.000	6.000	0.890	0.370	6.732	6.937	CPWL-700600





# VS1

## Piston Seal V Pack Sets

### Design

VS1 are a single acting rod or piston seal for medium to heavy duty applications. The assembly consists of a male and female adaptor with a series of 'V' shaped rings. The number of 'V' rings may be varied to alter the assembled height and pressure rating. The material is generally Nylon adapters, fabric/NBR & Hytrel V rings, although some sets incorporate Hytrel only 'V' rings to assist low pressure sealing. This is a non preferred design but it still has a place in applications where difficult conditions prevail such as pressure surges and misalignment.

### Operating Conditions

#### Pressure

700 Bar	3V	5V	6V
10,000 Psi			

#### Temperature

-40° to 110° C		
-40° to 230° F		

#### Speed

0.5m/sec		
1.5'/sec		

#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing D$	$\varnothing d$	L
H9	f9	-0 + 0.010

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.250
r	0.020	0.031	0.031	0.031	0.031

#### Extrusion Gap G

Pressure	1,500	2,500	6,000
	0.018	0.015	0.007

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



Single acting seals



### Key Features

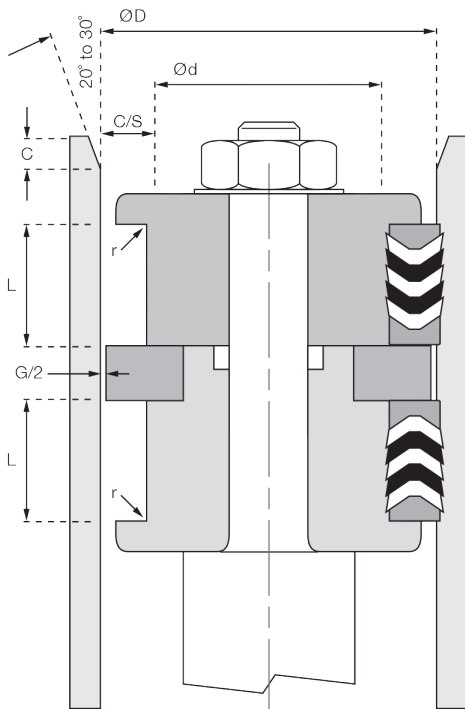
Medium to heavy duty

Piston or rod

Wide size range

Handles some misalignment

Hard wearing





# VS5

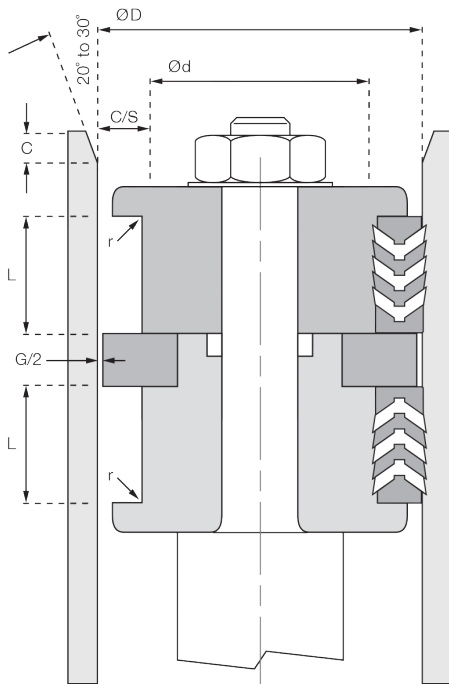
## Piston Seal V Pack Sets

Single acting seals



### Key Features

- Heavy duty
- Shock load resistant
- Extremely hard wearing
- Higher pressure capability
- Excellent extrusion resistance



### Design

VS5 vee sets utilise Hytrel and Nylon vees with the male and female adaptors being made of glass filled Nylon. This forms a sturdy sealing assembly which can handle a wide range of pressures and maintains excellent extrusion resistance. Type VS5 will cope well with pulsating or shock loading during cylinder operation. Sold only as complete sets.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing D$	$\varnothing d$	L
-0.000	-0.005	-0.005
+0.010	+0.000	+0.005

#### Chamfer Radii

C/S	1/4	5/16
C	0.125	0.156
r	0.031	0.031

#### Extrusion Gap G

Pressure	1,500	2,400	3,750	6,000
	0.024	0.020	0.016	0.012

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# VS7

## Piston Seal V Pack Sets

### Design

VS7 Hydro-loc vee sets utilise Hytrel and Nylon vees with the male, female adaptors and retaining ring which also acts as a bearing all being made of glass filled Nylon. This forms a sturdy sealing assembly which can handle a wide range of pressures and maintains excellent extrusion resistance. Type VS7 will cope well with pulsating or shock loading during cylinder operation.  
Sold only as complete sets.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-55° to 135° C  
-65° to 270° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{ØD}$	$\text{Ød}$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\text{ØD}$	$\text{Ød1}$	$\text{Ød2}$	L1	L2	L3
-0.000	-0.005	+0.000	-0.005	see table	min.
+0.010	+0.000	-0.003	+0.005	table	

#### Chamfer Radii

C/S	1/4
C	0.125
r	0.031

#### Extrusion Gap G

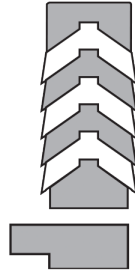
Pressure	1,500	2,400	3,750	6,000
G	0.024	0.020	0.016	0.012

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

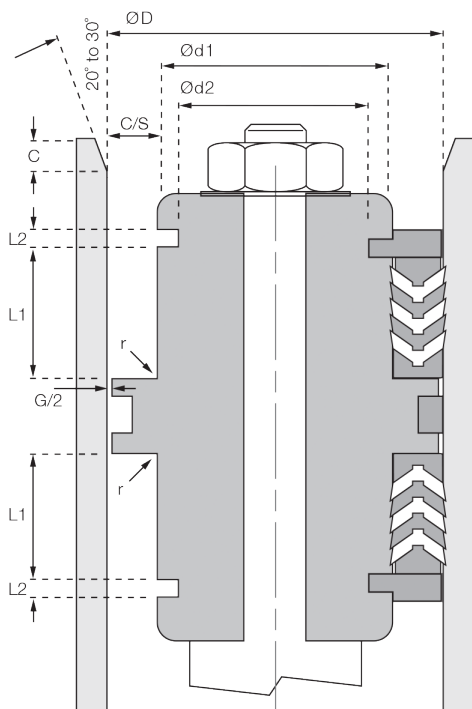


single acting seals



### Key Features

- Heavy duty
- Shock load resistant
- Extremely hard wearing
- Higher pressure capability
- Excellent extrusion resistance

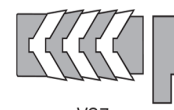




VS1



VS5



VS7

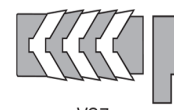
OD	ID	L1	L2	OD2	OD3	Product Name
0.000	0.000	0.000	0.000	0.000	0.000	VS1-0900950-087
0.875	0.500	0.859	0.000	0.000	0.000	VS1-0050087-085
1.000	0.500	0.843	0.000	0.000	0.000	VS1-0050100-084
1.000	0.625	0.859	0.000	0.000	0.000	VS1-0062100-085
1.125	0.500	1.000	0.000	0.000	0.000	VS1-0050112-100
1.125	0.625	0.843	0.000	0.000	0.000	VS1-0062112-084
1.125	0.625	1.000	0.000	0.000	0.000	VS1-0062112-100
1.125	0.750	0.812	0.000	0.000	0.000	VS1-0075112-081
1.187	0.750	0.875	0.000	0.000	0.000	VS1-0075118-087
1.250	0.625	1.000	0.000	0.000	0.000	VS1-0062125-100
1.250	0.750	0.968	0.000	0.000	0.000	VS1-0075125-096
1.250	0.875	0.750	0.000	0.000	0.000	VS1-0087125-075
1.312	0.812	0.843	0.000	0.000	0.000	VS1-0081131-084
1.375	0.750	1.000	0.000	0.000	0.000	VS1-0075137-100
1.375	0.875	0.750	0.000	0.000	0.000	VS1-0087137-075
1.375	0.875	0.843	0.000	0.000	0.000	VS1-0087137-096
1.375	0.875	1.000	0.000	0.000	0.000	VS1-0087137-100
1.375	1.000	0.750	0.000	0.000	0.000	VS1-0100137-075
1.375	1.000	0.859	0.000	0.000	0.000	VS1-0100137-085
1.500	0.750	1.156	0.000	0.000	0.000	VS1-0075150-115
1.500	0.875	1.156	0.000	0.000	0.000	VS1-0087150-115
1.500	1.000	1.000	0.000	0.000	0.000	VS1-0100150-100
1.625	1.000	1.156	0.000	0.000	0.000	VS1-0100162-115
1.625	1.000	10.620	0.000	0.000	0.000	VS1-0100162-106
1.625	1.125	0.875	0.000	0.000	0.000	VS1-0112162-087
1.625	1.125	0.968	0.000	0.000	0.000	VS1-0112162-096
1.625	1.125	1.000	0.000	0.000	0.000	VS1-0112162-100
1.687	1.250	0.000	0.000	0.000	0.000	VR1-0125168-010
1.687	1.250	0.000	0.000	0.000	0.000	VS1-0125168-010
1.687	1.250	0.109	0.000	0.000	0.000	VS1-0125168-010
1.687	1.250	0.875	0.000	0.000	0.000	VS1-0125168-087



VS1



VS5



VS7

OD	ID	L1	L2	OD2	OD3	Product Name
1.750	1.000	0.000	0.000	0.000	0.000	VS1-0100175-156
1.750	1.000	1.156	0.000	0.000	0.000	VS1-0100175-115
1.750	1.125	1.000	0.000	0.000	0.000	VS1-0112175-100
1.750	1.250	0.875	0.000	0.000	0.000	VS5-0125175-087
1.750	1.250	1.000	0.000	0.000	0.000	VS1-0125175-100
1.875	1.125	1.343	0.000	0.000	0.000	VS1-0112187-134
1.875	1.250	1.000	0.000	0.000	0.000	VS1-0125187-112
1.875	1.375	0.968	0.000	0.000	0.000	VS1-0137187-100
1.875	1.375	0.968	0.000	0.000	0.000	VS1-0137187-096
2.000	1.000	1.969	0.000	0.000	0.000	VS1-0100200-196
2.000	1.250	0.968	0.000	0.000	0.000	VS1-0125200-096
2.000	1.375	1.000	0.000	0.000	0.000	VS1-0137200-100
2.000	1.500	1.000	0.000	0.000	0.000	VS5-0150200-100
2.000	1.500	1.000	0.000	0.000	0.000	VS1-0150200-100
2.000	1.500	1.000	0.000	1.250	0.350	VS7-0150200-100
2.125	1.375	1.156	0.000	0.000	0.000	VS1-0137212-115
2.125	1.500	1.000	0.000	0.000	0.000	VS1-0150212-100
2.250	1.500	1.000	0.000	0.000	0.000	VS1-0150225-100
2.250	1.500	1.156	0.000	0.000	0.000	VS1-0150225-115
2.250	1.625	1.032	0.000	0.000	0.000	VS1-0162225-103
2.250	1.625	1.156	0.000	0.000	0.000	VS1-0162225-115
2.250	1.750	1.000	0.000	0.000	0.000	VS5-0175225-100
2.250	1.750	1.000	0.000	0.000	0.000	VS1-0175225-100
2.250	1.750	1.000	0.000	1.500	0.350	VS7-0175225-100
2.265	1.750	0.635	0.000	0.000	0.000	VS1-0175226-063
2.265	1.750	0.780	1,311.000	0.000	0.000	VS1-0175226-078
2.375	1.625	1.156	0.000	0.000	0.000	VS1-0162237-156
2.375	1.750	1.032	0.000	0.000	0.000	VS1-0175237-103
2.375	1.875	0.968	0.000	0.000	0.000	VS1-0187237-096
2.375	1.875	1.125	0.000	0.000	0.000	VS1-0187237-112
2.375	1.875	1.250	0.000	0.000	0.000	VS1-0187237-125

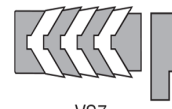




VS1



VS5



VS7

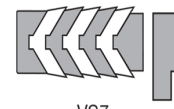
OD	ID	L1	L2	OD2	OD3	Product Name
2.375	2.000	0.750	0.000	0.000	0.000	VS1-0200237-075
2.375	2.000	0.859	0.000	0.000	0.000	VS1-0200237-085
2.500	1.500	1.468	0.000	0.000	0.000	VS1-0150250-146
2.500	1.750	1.156	0.000	0.000	0.000	VS1-0175250-115
2.500	1.750	1.562	0.000	0.000	0.000	VS1-0175250-156
2.500	1.875	1.032	0.000	0.000	0.000	VS1-0187250-103
2.500	2.000	1.000	0.000	0.000	0.000	VS1-0200250-100
2.500	2.000	1.000	0.000	1.750	0.350	VS7-0200250-100
2.500	2.000	1.750	0.000	0.000	0.000	VS5-0200250-175
2.525	1.775	1.271	0.000	0.000	0.000	VS1-0177252-127
2.530	1.875	1.030	0.000	0.000	0.000	VS1-0187253-103
2.625	1.875	1.343	0.000	0.000	0.000	VS1-0187262-134
2.625	2.000	1.032	0.000	0.000	0.000	VS1-0200262-103
2.640	2.125	0.920	0.000	0.000	0.000	VS1-0212264-092
2.750	1.750	1.718	0.000	0.000	0.000	VS1-0175275-171
2.750	2.000	1.156	0.000	0.000	0.000	VS1-0200275-115
2.750	2.000	1.375	0.000	0.000	0.000	VS1-0200275-137
2.750	2.125	1.000	0.000	0.000	0.000	VS1-0212275-100
2.750	2.250	1.000	0.000	0.000	0.000	VS5-0225275-100
2.750	2.250	1.000	0.000	0.000	0.000	VS1-0225275-100
2.750	2.250	1.625	0.000	0.000	225,275.000	VS5-0225275-162
2.750	2.250	1.750	0.000	0.000	0.000	VS5-0225275-175
2.760	2.000	1.218	0.000	0.000	0.000	VS1-0200276-121
2.765	2.200	0.680	0.000	0.000	0.000	VS1-0220276-068
2.765	2.200	0.940	0.000	0.000	56,070.000	VS1-0220276-094
2.875	2.250	1.000	0.000	0.000	0.000	VS1-0225287-100
3.000	2.000	1.750	0.000	0.000	0.000	VS1-0200300-171
3.000	2.250	1.000	0.000	0.000	0.000	VS1-0225300-100
3.000	2.375	1.156	0.000	0.000	0.000	VS1-0237300-115
3.000	2.400	0.937	0.000	0.000	0.000	VS1-0240300-093
3.000	2.500	1.000	0.000	0.000	0.000	VS5-0250300-100



VS1



VS5



VS7

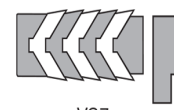
OD	ID	L1	L2	OD2	OD3	Product Name
3.000	2.500	1.000	0.000	0.000	0.000	VS1-0250300-100
3.000	2.500	1.000	0.000	2.250	0.350	VS7-0250300-100
3.000	2.500	1.094	0.000	0.000	0.000	VS1-0250300-109
3.000	2.500	1.750	0.000	0.000	0.000	VS5-0250300-175
3.020	2.250	1.030	0.000	0.000	0.000	VS1-0225302-103
3.020	2.450	0.851	0.000	0.000	0.000	VS1-0245302-085
3.025	2.525	0.873	0.000	0.000	0.000	VS1-0252302-087
3.110	2.580	0.920	0.000	0.000	0.000	VS1-0258311-092
3.125	2.500	1.156	0.000	0.000	0.000	VS1-0250312-115
3.250	2.500	1.375	0.000	0.000	0.000	VS1-0250325-137
3.250	2.750	1.000	1.411	0.000	0.000	VS1-0275325-100
3.250	2.750	1.750	0.000	0.000	275,325.000	VS5-0275325-175
3.270	2.750	0.850	0.000	0.000	0.000	VS1-0275327-085
3.375	2.500	1.093	0.000	0.000	0.000	VS1-0250337-109
3.375	2.750	1.000	0.000	0.000	0.000	VS1-0275337-100
3.375	2.750	1.032	0.000	0.000	0.000	VS1-0275337-103
3.500	2.000	2.000	0.000	0.000	0.000	VS1-0200350-200
3.500	2.500	0.000	0.000	0.000	0.000	VS1-0250350-162
3.500	2.500	1.718	0.000	0.000	0.000	VS1-0250350-171
3.500	2.750	1.187	0.000	0.000	0.000	VS1-0275350-118
3.500	2.950	0.843	0.000	0.000	0.000	VS1-0295350-084
3.500	3.000	1.000	0.000	0.000	0.000	VS5-0300350-100
3.500	3.000	1.000	0.000	0.000	0.000	VS5-0300350-100A
3.500	3.000	1.000	0.000	0.000	0.000	VS1-0300350-100
3.500	3.000	1.000	0.000	2.750	0.350	VS7-0300350-100A
3.500	3.000	1.000	0.000	2.750	0.350	VS7-0300350-100
3.520	2.750	0.671	0.000	0.000	0.000	VS1-0300352-067
3.520	2.750	1.030	0.000	0.000	0.000	VS1-0275352-103
3.520	3.000	0.890	0.000	0.000	0.000	VS1-0300352-089
3.625	2.875	1.343	0.000	0.000	0.000	VS1-0287362-134
3.625	3.000	0.000	0.000	0.000	0.000	VS1-0300362-115



VS1



VS5



VS7

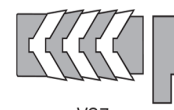
OD	ID	L1	L2	OD2	OD3	Product Name
3.625	3.000	1.032	0.000	0.000	0.000	VS1-0300362-103
3.666	3.000	0.000	0.000	0.000	0.000	VS1-0300366-
3.666	3.000	1.375	0.000	0.000	0.000	VS1-0300366-137
3.750	2.750	1.718	0.000	0.000	0.000	VS1-0275375-171
3.750	3.000	1.375	0.000	0.000	0.000	VS1-0300375-137
3.750	3.250	1.000	0.000	0.000	0.000	VS5-0325375-100
3.770	3.200	0.781	0.000	0.000	0.000	VS1-0320377-078
3.770	3.200	0.828	0.000	0.000	0.000	VS1-0320377-082
3.770	3.200	0.921	0.000	0.000	0.000	VS1-0320377-092
3.875	3.125	1.156	0.000	0.000	0.000	VS1-0312387-115
3.875	3.229	0.643	0.000	0.000	0.000	VS1-0322387-132
3.875	3.250	1.156	0.000	0.000	0.000	VS1-0325387-115
4.000	3.000	1.468	0.000	0.000	0.000	VS1-0300400-146
4.000	3.250	1.187	0.000	0.000	0.000	VS1-0325400-118
4.000	3.375	1.032	0.000	0.000	0.000	VS1-0337400-103
4.000	3.375	1.125	0.000	0.000	0.000	VS1-0337400-112
4.000	3.400	0.812	0.000	0.000	0.000	VS1-0340400-081
4.000	3.500	1.000	0.000	0.000	0.000	VS5-0350400-100
4.000	3.500	1.000	0.000	0.000	0.000	VS1-0350400-100
4.000	3.500	1.000	0.000	3.250	0.480	VS7-0350400-100
4.020	3.250	1.020	0.000	0.000	0.000	VS1-0325402-102
4.020	3.500	0.625	0.000	0.000	0.000	VS1-0350402-062
4.020	3.500	0.921	0.000	0.000	0.000	VS1-0350402-092
4.125	3.500	1.312	0.000	0.000	0.000	VS1-0350412-131
4.250	3.500	0.000	0.000	0.000	0.000	VS1-0350425-137
4.250	3.500	1.210	0.000	0.000	0.000	VS1-0350425-121
4.250	3.750	0.968	0.000	0.000	0.000	VS1-0375425-096
4.250	3.750	1.000	0.000	0.000	0.000	VS1-0375425-100
4.270	3.500	1.030	0.000	0.000	0.000	VS1-0350427-103
4.270	3.500	1.400	0.000	0.000	0.000	VS1-0350427-140
4.375	3.750	1.187	0.000	0.000	0.000	VS1-0375437-118



VS1



VS5



VS7

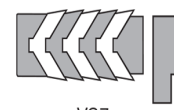
OD	ID	L1	L2	OD2	OD3	Product Name
4.500	3.500	0.000	0.000	0.000	0.000	VS1-0350450-162
4.500	3.500	1.389	0.000	0.000	0.000	VS1-0350450-138
4.500	3.750	1.020	0.000	0.000	0.000	VS1-0375450-102
4.500	3.750	1.187	0.000	0.000	0.000	VS1-0375450-118
4.500	3.875	0.937	0.000	0.000	0.000	VS1-0387450-093
4.500	3.875	1.000	0.000	0.000	0.000	VS1-0387450-100
4.500	4.000	1.000	0.000	0.000	0.000	VS5-0400450-100
4.500	4.000	1.000	0.000	0.000	0.000	VS1-0400450-100
4.500	4.000	1.000	0.000	3.750	0.480	VS7-0400450-100
4.520	3.750	1.000	0.000	0.000	0.000	VS1-0375452-100
4.520	3.750	1.218	0.000	0.000	0.000	VS1-0375452-121
4.625	3.875	1.156	0.000	0.000	0.000	VS1-0387462-115
4.625	4.000	1.000	0.000	0.000	0.000	VS1-0400462-100
4.666	4.000	0.000	0.000	0.000	0.000	VS1-0400466-
4.666	4.000	0.000	0.000	0.000	0.000	VS1-0400466-122
4.666	4.000	1.375	0.000	0.000	0.000	VS1-0400466-137
4.750	3.750	0.000	0.000	0.000	0.000	VS1-0375475-219
4.750	3.750	1.718	0.000	0.000	0.000	VS1-0375475-171
4.750	3.979	1.250	0.000	0.000	0.000	VS1-0397475-125
4.750	4.000	1.187	0.000	0.000	0.000	VS1-0400475-118
4.750	4.250	0.968	0.000	0.000	0.000	VS1-0425475-096
4.770	4.000	0.813	0.000	0.000	0.000	VS1-0400477-081
4.875	4.000	1.312	0.000	0.000	0.000	VS1-0400487-131
5.000	4.000	1.468	0.000	0.000	0.000	VS1-0400500-146
5.000	4.250	1.156	0.000	0.000	0.000	VS1-0425500-115
5.000	4.250	1.375	0.000	0.000	0.000	VS1-0425500-137
5.000	4.375	1.156	0.000	0.000	0.000	VS1-0437500-115
5.000	4.400	0.812	0.000	0.000	0.000	VS1-0440500-081
5.000	4.500	1.000	0.000	0.000	0.000	VS5-0450500-100
5.000	4.500	1.000	0.000	0.000	0.000	VS1-0450500-100
5.000	4.500	1.000	0.000	4.125	0.480	VS7-0450500-100



VS1



VS5



VS7

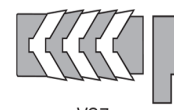
OD	ID	L1	L2	OD2	OD3	Product Name
5.000	4.500	1.125	0.000	0.000	0.000	VS1-0450500-112
5.025	4.275	1.156	0.000	0.000	427,502.000	VS1-0427502-115
5.030	4.250	1.200	0.000	0.000	0.000	VS1-0425503-120
5.030	4.250	1.344	0.000	0.000	0.000	VS1-0425503-134
5.125	4.250	1.312	0.000	0.000	0.000	VS1-0425512-131
5.125	4.500	1.312	0.000	0.000	0.000	VS1-0450512-131
5.125	4.500	1.375	0.000	0.000	0.000	VS1-0450512-137
5.250	4.000	2.093	0.000	0.000	0.000	VS1-0400525-209
5.250	4.500	0.968	0.000	0.000	0.000	VS1-0450525-096
5.250	4.750	1.000	0.000	0.000	0.000	VS1-0475525-100
5.375	4.500	1.312	0.000	0.000	0.000	VS1-0450537-131
5.375	4.750	1.250	0.000	0.000	0.000	VS1-0475537-125
5.500	4.500	0.000	0.000	0.000	0.000	VS1-0450550-162
5.500	4.500	1.218	0.000	0.000	0.000	VS1-0450550-121
5.500	4.500	1.250	0.000	0.000	0.000	VS1-0450550-125
5.500	4.729	1.250	0.000	0.000	0.000	VS1-0472550-132
5.500	4.750	1.156	0.000	0.000	0.000	VS1-0475550-115
5.500	4.750	1.187	0.000	0.000	0.000	VS1-0475550-118
5.500	5.000	0.968	0.000	0.000	0.000	VS1-0500550-100
5.500	5.000	0.968	0.000	0.000	0.000	VS1-0500550-096
5.500	5.000	1.000	0.000	0.000	0.000	VS5-0500550-100
5.500	5.000	1.000	0.000	4.625	0.480	VS7-0500550-100
5.500	5.000	1.125	0.000	0.000	0.000	VS1-0500550-112
5.625	4.750	0.000	0.000	0.000	0.000	VS1-0475562-150
5.625	5.000	1.000	0.000	0.000	0.000	VS1-0500562-100
5.666	5.000	0.000	0.000	0.000	0.000	VS1-0500566-
5.666	5.000	1.375	0.000	0.000	0.000	VS1-0500566-137
5.750	4.750	1.718	0.000	0.000	0.000	VS1-0475575-171
5.750	5.000	1.500	0.000	0.000	0.000	VS1-0500575-162
5.750	5.000	1.500	0.000	0.000	0.000	VS1-0500575-150
5.750	5.250	0.968	0.000	0.000	0.000	VS1-0525575-096



VS1



VS5



VS7

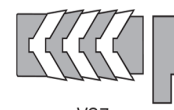
OD	ID	L1	L2	OD2	OD3	Product Name
6.000	5.000	1.265	0.000	0.000	0.000	VS1-0500600-126
6.000	5.000	1.750	0.000	0.000	0.000	VS1-0500600-175A
6.000	5.000	1.750	0.000	0.000	0.000	VS1-0500600-175
6.000	5.250	1.156	0.000	0.000	0.000	VS1-0525600-115
6.000	5.250	1.500	0.000	0.000	0.000	VS1-0525600-150
6.000	5.375	1.156	0.000	0.000	0.000	VS1-0537600-115
6.000	5.400	0.812	0.000	0.000	0.000	VS1-0540600-081
6.000	5.500	1.000	0.000	0.000	0.000	VS5-0550600-100
6.000	5.500	1.000	0.000	0.000	0.000	VS1-0550600-100
6.000	5.500	1.000	0.000	5.125	480.000	VS7-0550600-100
6.000	5.500	1.125	0.000	0.000	0.000	VS5-0550600-112
6.000	5.500	1.125	0.000	0.000	0.000	VS1-0550600-112
6.000	5.500	1.500	0.000	0.000	0.000	VS1-0550600-096
6.125	5.125	1.469	0.000	0.000	0.000	VS1-0512612-146
6.125	5.500	1.312	0.000	0.000	0.000	VS1-0550612-131
6.250	5.500	1.343	0.000	0.000	0.000	VS1-0550625-134
6.375	5.375	1.266	0.000	0.000	0.000	VS1-0537637-126
6.375	5.479	1.250	0.000	0.000	547,637.000	VS1-0547637-132
6.375	5.500	1.312	0.000	0.000	0.000	VS1-0550637-131
6.375	5.500	1.470	0.000	0.000	0.000	VS1-0550637-147
6.375	5.750	1.250	0.000	0.000	0.000	VS1-0575637-125
6.437	5.437	1.219	0.000	0.000	0.000	VS1-0543643-121
6.500	5.500	1.750	0.000	0.000	0.000	VS1-0550650-171
6.500	5.750	1.343	0.000	0.000	0.000	VS1-0575650-134
6.500	5.750	1.375	0.000	0.000	0.000	VS1-0575650-137
6.500	6.000	1.000	0.000	0.000	0.000	VS1-0600650-100
6.500	6.000	1.250	0.000	0.000	0.000	VS5-0600650-125
6.500	6.000	1.250	0.000	5.625	0.480	VS7-0600650-125
6.530	6.000	0.875	0.000	0.000	0.000	VS1-0600653-087
6.625	6.000	1.062	0.000	0.000	0.000	VS1-0600662-106
6.666	6.000	0.000	0.000	0.000	0.000	VS1-0600666-



VS1



VS5



VS7

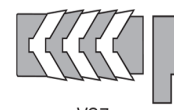
OD	ID	L1	L2	OD2	OD3	Product Name
6.750	5.750	1.750	0.000	0.000	0.000	VS1-0575675-175
6.750	6.000	1.000	0.000	0.000	0.000	VS1-0600675-100
6.750	6.000	1.156	0.000	0.000	0.000	VS1-0600675-115
7.000	6.000	1.468	0.000	0.000	0.000	VS1-0600700-146
7.000	6.000	1.718	0.000	0.000	0.000	VS1-0600700-171
7.000	6.250	1.156	0.000	0.000	0.000	VS1-0625700-115
7.000	6.375	1.125	0.000	0.000	0.000	VS1-0637700-112
7.000	6.400	0.812	0.000	0.000	0.000	VS1-0640700-081
7.000	6.500	1.000	0.000	0.000	0.000	VS5-0650700-100
7.000	6.500	1.000	0.000	0.000	0.000	VS1-0650700-100
7.000	6.500	1.000	0.000	6.125	0.480	VS7-0650700-100
7.000	6.500	1.125	0.000	0.000	0.000	VS1-0650700-125
7.040	6.500	1.125	0.000	0.000	0.000	VS5-0650704-112
7.040	6.500	1.125	0.000	6.125	0.480	VS7-0650704-112
7.125	6.500	1.156	0.000	0.000	0.000	VS1-0650712-115
7.250	6.229	0.750	0.000	0.000	0.000	VS1-0622725-075
7.250	6.229	1.625	0.000	0.000	0.000	VS1-0622725-162
7.250	6.500	1.343	0.000	0.000	0.000	VS1-0650725-134
7.250	6.750	0.968	0.000	0.000	0.000	VS1-0675725-096
7.375	6.750	1.156	0.000	0.000	0.000	VS1-0675737-115
7.375	6.750	1.250	0.000	0.000	0.000	VS1-0675737-125
7.500	6.500	0.000	0.000	0.000	0.000	VS1-0650750-134
7.500	6.750	1.156	0.000	0.000	0.000	VS1-0675750-115
7.500	7.000	0.000	0.000	0.000	0.000	VS1-0700750-100
7.500	7.000	0.875	0.000	0.000	0.000	VS5-0700750-087
7.500	7.000	0.875	0.000	6.125	0.480	VS7-0700750-087
7.500	7.000	1.000	0.000	0.000	0.000	VS5-0700750-100
7.625	7.000	0.843	0.000	0.000	0.000	VS1-0700762-084
7.666	7.000	0.000	0.000	0.000	0.000	VS1-0700766-
7.750	6.500	1.375	0.000	0.000	0.000	VS1-0650775-137
7.750	6.500	1.687	0.000	0.000	0.000	VS1-0650775-168



VS1



VS5



VS7

OD	ID	L1	L2	OD2	OD3	Product Name
7.750	6.875	1.312	0.000	0.000	0.000	VS1-0687775-131
7.750	7.000	1.200	0.000	0.000	0.000	VS1-0700775-120
8.000	6.750	1.750	0.000	0.000	0.000	VS1-0675800-175
8.000	7.000	0.000	0.000	0.000	0.000	VS1-0700800-137
8.000	7.000	1.460	0.000	0.000	0.000	VS1-0700800-146
8.000	7.000	1.718	0.000	0.000	0.000	VS1-0700800-171
8.000	7.000	2.000	0.000	0.000	0.000	VS1-0700800-200
8.000	7.250	1.343	0.000	0.000	0.000	VS1-0725800-134
8.000	7.375	1.125	0.000	0.000	0.000	VS1-0737800-112
8.000	7.500	0.000	0.000	0.000	0.000	VS1-0750800-100
8.000	7.500	0.843	0.000	0.000	0.000	VS1-0750800-084
8.000	7.500	1.000	0.000	0.000	0.000	VS5-0750800-100
8.000	7.500	1.000	0.000	7.125	0.480	VS7-0750800-100
8.125	7.500	0.812	0.000	0.000	0.000	VS1-0750812-081
8.125	7.500	1.250	0.000	0.000	0.000	VS1-0750812-125
8.250	7.000	2.750	0.000	0.000	0.000	VS1-0700825-275
8.250	7.500	1.250	0.000	0.000	0.000	VS1-0750825-125
8.500	7.479	0.750	0.000	0.000	0.000	VS1-0747850-075
8.500	7.479	1.625	0.000	0.000	0.000	VS1-0747850-162
8.500	7.500	0.000	0.000	0.000	0.000	VS1-0750850-162
8.500	7.500	0.000	0.000	0.000	0.000	VS1-0750850-212
8.500	7.500	1.250	0.000	0.000	0.000	VS1-0750850-146
8.500	8.000	1.000	0.000	0.000	0.000	VS5-0800850-100
8.500	8.000	1.000	0.000	0.000	0.000	VS1-0800850-100
8.543	7.905	1.200	0.000	0.000	0.000	VS1-0790854-120
8.543	7.905	1.250	0.000	0.000	0.000	VS1-0790854-125
8.625	8.125	1.125	0.000	0.000	0.000	VS1-0812862-112
8.750	8.000	1.156	0.000	0.000	0.000	VS1-0800875-115
8.870	8.100	0.000	0.000	0.000	0.000	VS1-0810887-
9.000	8.000	0.000	0.000	0.000	0.000	VS1-0800900-200
9.000	8.000	1.500	0.000	0.000	0.000	VS1-0800900-150

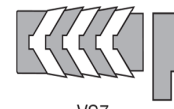




VS1



VS5



VS7

OD	ID	L1	L2	OD2	OD3	Product Name
9.000	8.500	1.000	0.000	0.000	0.000	VS5-0850900-100
9.000	8.500	1.000	0.000	8.125	0.480	VS7-0850900-100
9.250	8.500	1.156	0.000	0.000	0.000	VS1-0850925-115
9.500	8.500	1.875	0.000	0.000	0.000	VS1-0850950-187
9.750	9.000	1.156	0.000	0.000	0.000	VS1-0900975-115
10.000	8.500	2.000	0.000	0.000	0.000	VS1-0850100-200
10.000	8.500	3.125	0.000	0.000	0.000	VS1-0850100-312
10.000	8.750	2.000	0.000	0.000	0.000	VS1-0875100-200
10.000	9.000	1.218	0.000	0.000	0.000	VS1-0900100-121
10.000	9.375	1.218	0.000	0.000	0.000	VS1-0937100-121
10.250	9.000	2.000	0.000	0.000	0.000	VS1-0900102-200
10.500	9.750	1.312	0.000	0.000	0.000	VS1-0975105-134
11.500	10.000	2.468	0.000	0.000	0.000	VS1-1000115-246
12.000	10.750	0.000	0.000	0.000	0.000	VS1-1075120-168
12.500	11.000	3.968	0.000	0.000	0.000	VS1-1100125-396
12.500	11.250	2.000	0.000	0.000	0.000	VS1-1125125-200
13.250	12.000	1.406	0.000	0.000	0.000	VS1-1200132-140
13.500	12.000	2.570	0.000	0.000	0.000	VS1-1200135-250
14.000	12.500	0.953	0.000	0.000	0.000	VS1-1250140-095
14.000	12.500	1.609	0.000	0.000	0.000	VS1-1250140-160
14.500	13.000	1.937	0.000	0.000	0.000	VS1-1300145-193
16.500	15.000	1.734	0.000	0.000	0.000	VS1-1500165-173
17.250	16.000	1.968	0.000	0.000	0.000	VS1-1600172-196
18.250	17.000	1.406	0.000	0.000	0.000	VS1-1700182-140
20.375	18.875	3.250	0.000	0.000	0.000	VS1-1887203-325
23.500	22.000	2.500	0.000	0.000	0.000	VS1-2200235-250
26.750	25.250	1.609	0.000	0.000	0.000	VS1-2525267-160
26.750	25.250	2.600	0.000	0.000	0.000	VS1-2525267-260





# DE

## Pneumatic Piston Seal

### Design

DE are designed as an easy to fit low pressure seal. Manufactured from NBR 75 Shore A with a thicker and longer static sealing lip to form a buffer against axial movement and to ensure that type seal fits snugly in the grooves. Moulded somewhat smaller than groove sizes and in the free state appear to be too small for their respective housings. However, the correct dynamic sealing lip interference is provided when the seal is stretched into its groove. In double acting applications the two seals should always be in separate grooves and facing away from one another to avoid a pressure trap.

### Operating Conditions

#### Pressure

230 Psi  
16 Bar



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{ØD}$	$\text{Ød}$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\text{ØD}$	$\text{Ød}$	L
H10	js11	-0 + 0.010

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

#### Extrusion Gap G

Pressure	230
	0.020

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

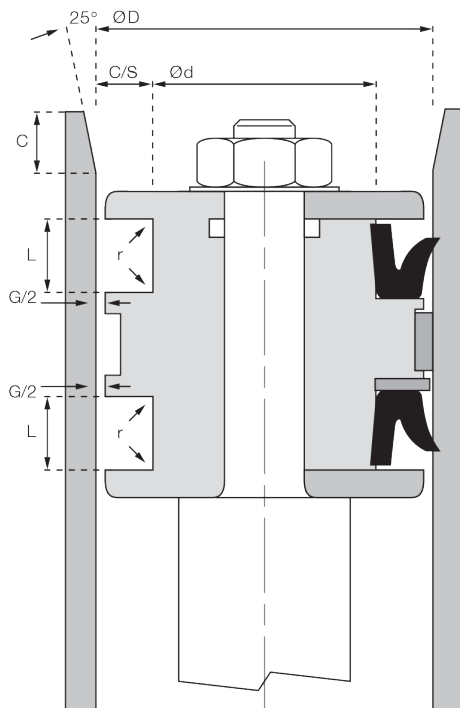


Single acting seals



### Key Features

- Light duty
- Piston only
- Low pressure capability
- Dynamic lip reaction
- Low friction
- Easy to fit





# U

## Pneumatic Piston Seal

Single acting seals



### Key Features

- Light duty
- Piston or rod
- Low pressure capability
- Low friction
- Easy to fit

### Design

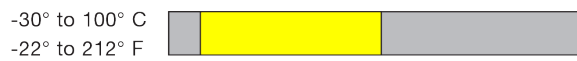
U are designed as an easy to fit low pressure seal manufactured from NBR either 70, 80 or 90 Shore A. In double acting applications the two seals should always be in separate grooves and facing away from one another to avoid a pressure trap. U type rubber single acting seals are designed for rods or pistons. These seals can handle from low to medium pressure applications although predominately used in pneumatic cylinders. These precision moulded seals have equally distributed heel clearance and lip to housing interference.

### Operating Conditions

#### Pressure

Material	NBR70	NBR80	NBR90
Psi	230	1,000	1,250

#### Temperature



#### Speed



#### Surface Finish $\mu\text{mRa}$

$\text{\O}D$	$\text{\O}d$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\text{\O}D$	$\text{\O}d$	L
H10	js11	-0 + 0.010

#### Chamfer Radii

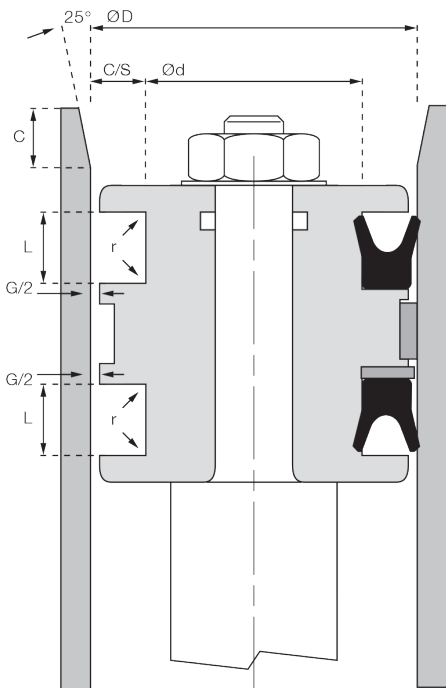
C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

#### Extrusion Gap G

Material	NBR70	NBR80	NBR90
Psi	230	1,000	1,250
G	0.020	0.014	0.016

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





DE



U

OD	ID	L1	L2	OD2	OD3	Product Name
0.250	0.125	0.062	0.077	0.000	0.000	U-025012
0.312	0.125	0.093	0.125	0.000	0.000	U-031012
0.375	0.125	0.125	0.156	0.000	0.000	U-037012
0.375	0.125	0.156	0.218	0.000	0.000	DE-037
0.375	0.187	0.093	0.125	0.000	0.000	U-037018
0.437	0.187	0.125	0.156	0.000	0.000	U-043018
0.437	0.187	0.156	0.218	0.000	0.000	DE-043
0.437	0.250	0.093	0.125	0.000	0.000	U-043025A
0.437	0.250	0.125	0.156	0.000	0.000	U-043025
0.500	0.125	0.187	0.218	0.000	0.000	U-050012
0.500	0.250	0.125	0.156	0.000	0.000	U-050025
0.500	0.250	0.187	0.250	0.000	0.000	DE-050
0.500	0.312	0.093	0.125	0.000	0.000	U-050031A
0.500	0.312	0.187	0.250	0.000	0.000	U-050031
0.562	0.187	0.187	0.218	0.000	0.000	U-056018
0.562	0.312	0.125	0.156	0.000	0.000	U-056031
0.562	0.312	0.187	0.250	0.000	0.000	DE-056
0.625	0.250	0.187	0.218	0.000	0.000	U-062025
0.625	0.312	0.218	0.281	0.000	0.000	DE-062
0.625	0.375	0.125	0.156	0.000	0.000	U-062037
0.625	0.437	0.093	0.125	0.000	0.000	U-062043
0.687	0.312	0.187	0.218	0.000	0.000	U-068031
0.687	0.437	0.125	0.156	0.000	0.000	U-068043A
0.687	0.437	0.187	0.250	0.000	0.000	U-068043
0.687	0.475	0.125	0.187	0.000	0.000	DE-068
0.687	0.500	0.093	0.125	0.000	0.000	U-068050
0.750	0.250	0.250	0.281	0.000	0.000	U-075025
0.750	0.375	0.187	0.218	0.000	0.000	U-075037
0.750	0.375	0.250	0.281	0.000	0.000	DE-075037
0.750	0.437	0.187	0.250	0.000	0.000	U-075043
0.750	0.500	0.125	0.156	0.000	0.000	U-075050



DE



U

OD	ID	L1	L2	OD2	OD3	Product Name
0.750	0.500	0.125	0.187	0.000	0.000	DE-075
0.750	0.562	0.093	0.125	0.000	0.000	U-075056
0.812	0.312	0.250	0.281	0.000	0.000	U-081031
0.812	0.437	0.187	0.218	0.000	0.000	U-081043
0.812	0.500	0.156	0.187	0.000	0.000	U-081050A
0.812	0.500	0.218	0.281	0.000	0.000	U-081050
0.812	0.562	0.125	0.156	0.000	0.000	U-081056
0.812	0.562	0.250	0.312	0.000	0.000	DE-081
0.812	0.625	0.093	0.125	0.000	0.000	U-081062
0.875	0.375	0.250	0.281	0.000	0.000	U-087037
0.875	0.500	0.187	0.218	0.000	0.000	U-087050
0.875	0.500	0.250	0.312	0.000	0.000	DE-087
0.875	0.625	0.125	0.156	0.000	0.000	U-087062
0.937	0.437	0.250	0.281	0.000	0.000	U-093043
0.937	0.562	0.250	0.312	0.000	0.000	DE-093
0.937	0.687	0.125	0.156	0.000	0.000	U-093068
1.000	0.500	0.250	0.281	0.000	0.000	U-100050
1.000	0.625	0.187	0.218	0.000	0.000	U-100062A
1.000	0.625	0.250	0.312	0.000	0.000	U-100062
1.000	0.625	0.250	0.312	0.000	0.000	DE-100
1.000	0.687	0.156	0.187	0.000	0.000	U-100068
1.000	0.750	0.125	0.156	0.000	0.000	U-100075
1.062	0.562	0.250	0.281	0.000	0.000	U-106056
1.062	0.687	0.250	0.312	0.000	0.000	DE-106
1.062	0.750	0.156	0.187	0.000	0.000	U-106075
1.062	0.812	0.125	0.156	0.000	0.000	U-106081
1.125	0.625	0.250	0.281	0.000	0.000	U-112062
1.125	0.750	0.187	0.218	0.000	0.000	U-112075
1.125	0.750	0.250	0.312	0.000	0.000	DE-112
1.125	0.875	0.125	0.156	0.000	0.000	U-112087
1.187	0.687	0.250	0.281	0.000	0.000	U-118068



DE



U

OD	ID	L1	L2	OD2	OD3	Product Name
1.187	0.687	0.312	0.375	0.000	0.000	DE-118068
1.187	0.812	0.250	0.312	0.000	0.000	DE-118
1.250	0.750	0.250	0.281	0.000	0.000	U-125075
1.250	0.750	0.250	0.312	0.000	0.000	DE-125
1.250	0.750	0.312	0.375	0.000	0.000	DE-125075
1.250	0.875	0.187	0.218	0.000	0.000	U-125087
1.250	0.937	0.156	0.187	0.000	0.000	U-125093
1.250	1.000	0.125	0.156	0.000	0.000	U-125100
1.312	0.812	0.250	0.281	0.000	0.000	U-131081
1.312	1.000	0.156	0.187	0.000	0.000	U-131100
1.375	0.875	0.250	0.281	0.000	0.000	U-137087
1.375	0.875	0.250	0.312	0.000	0.000	DE-137
1.375	0.875	0.312	0.375	0.000	0.000	DE-137087
1.375	1.000	0.187	0.218	0.000	0.000	U-137100
1.375	1.062	0.156	0.187	0.000	0.000	U-137106
1.375	1.125	0.125	0.156	0.000	0.000	U-137112
1.437	0.812	0.375	0.437	0.000	0.000	U-143081
1.437	0.937	0.250	0.281	0.000	0.000	U-143093
1.437	0.937	0.312	0.375	0.000	0.000	DE-143093
1.437	1.000	0.250	0.312	0.000	0.000	DE-143
1.500	0.875	0.312	0.375	0.000	0.000	U-150087
1.500	1.000	0.250	0.281	0.000	0.000	U-150100
1.500	1.000	0.312	0.375	0.000	0.000	DE-150100
1.500	1.125	0.187	0.218	0.000	0.000	U-150112
1.500	1.187	0.156	0.187	0.000	0.000	U-150118
1.500	1.187	0.250	0.312	0.000	0.000	DE-150
1.500	1.250	0.125	0.156	0.000	0.000	U-150125
1.562	1.062	0.250	0.281	0.000	0.000	U-156106
1.562	1.062	0.250	0.312	0.000	0.000	DE-156
1.562	1.250	0.156	0.187	0.000	0.000	U-156125
1.625	0.937	0.375	0.437	0.000	0.000	U-162093



DE



U

OD	ID	L1	L2	OD2	OD3	Product Name
1.625	1.000	0.375	0.437	0.000	0.000	DE-162100
1.625	1.125	0.250	0.281	0.000	0.000	U-162112
1.625	1.187	0.250	0.312	0.000	0.000	DE-162
1.625	1.250	0.187	0.218	0.000	0.000	U-162125
1.625	1.375	0.125	0.156	0.000	0.000	U-162137
1.687	1.187	0.250	0.281	0.000	0.000	U-168118
1.687	1.375	0.156	0.187	0.000	0.000	U-168137
1.750	1.000	0.375	0.437	0.000	0.000	U-175100
1.750	1.125	0.375	0.437	0.000	0.000	DE-175112
1.750	1.250	0.250	0.281	0.000	0.000	U-175125
1.750	1.375	0.187	0.218	0.000	0.000	U-175137
1.750	1.375	0.274	0.328	0.000	0.000	DE-175
1.750	1.437	0.156	0.187	0.000	0.000	U-175143
1.750	1.500	0.125	0.156	0.000	0.000	U-175150
1.812	1.500	0.156	0.187	0.000	0.000	U-181150
1.875	1.125	0.375	0.437	0.000	0.000	U-187112
1.875	1.250	0.312	0.344	0.000	0.000	U-187125
1.875	1.250	0.312	0.375	0.000	0.000	DE-187
1.875	1.375	0.250	0.281	0.000	0.000	U-187137
1.875	1.500	0.187	0.218	0.000	0.000	U-187150
1.937	1.387	0.375	0.437	0.000	0.000	DE-193
2.000	1.250	0.375	0.437	0.000	0.000	U-200125
2.000	1.375	0.312	0.344	0.000	0.000	U-200137
2.000	1.375	0.375	0.437	0.000	0.000	DE-200137
2.000	1.625	0.187	0.218	0.000	0.000	U-200162
2.000	1.625	0.281	0.344	0.000	0.000	DE-200
2.000	1.750	0.125	0.156	0.000	0.000	U-200175
2.125	1.375	0.375	0.437	0.000	0.000	U-212137
2.125	1.500	0.312	0.344	0.000	0.000	U-212150
2.125	1.500	0.375	0.437	0.000	0.000	DE-212150
2.125	1.750	0.187	0.218	0.000	0.000	U-212175



DE



U

OD	ID	L1	L2	OD2	OD3	Product Name
2.187	1.500	0.250	0.312	0.000	0.000	U-218150
2.250	1.437	0.312	0.375	0.000	0.000	U-225143
2.250	1.625	0.312	0.344	0.000	0.000	U-225162
2.250	1.625	0.375	0.437	0.000	0.000	DE-225162
2.250	1.750	0.250	0.312	0.000	0.000	DE-225
2.250	1.875	0.187	0.218	0.000	0.000	U-225187
2.250	2.000	0.125	0.156	0.000	0.000	U-225200
2.375	1.625	0.375	0.437	0.000	0.000	U-237162
2.375	1.750	0.312	0.344	0.000	0.000	U-237175
2.375	1.750	0.375	0.437	0.000	0.000	DE-237175
2.375	1.875	0.250	0.312	0.000	0.000	DE-237
2.375	2.000	0.187	0.218	0.000	0.000	U-237200
2.437	2.000	0.312	0.344	0.000	0.000	U-243200
2.500	1.800	0.350	0.406	0.000	0.000	DE-250
2.500	1.875	0.312	0.344	0.000	0.000	U-250187
2.500	1.875	0.375	0.437	0.000	0.000	DE-250187
2.500	2.000	0.250	0.281	0.000	0.000	U-250200
2.500	2.125	0.187	0.218	0.000	0.000	U-250212
2.625	1.750	0.437	0.500	0.000	0.000	U-262175
2.625	2.000	0.312	0.344	0.000	0.000	U-262200
2.625	2.000	0.375	0.437	0.000	0.000	DE-262200
2.625	2.250	0.187	0.207	0.000	0.000	U-262225
2.750	1.937	0.375	0.437	0.000	0.000	U-275193
2.750	2.000	0.500	0.562	0.000	0.000	DE-275200
2.750	2.125	0.312	0.344	0.000	0.000	U-275212
2.750	2.125	0.312	0.375	0.000	0.000	DE-275
2.750	2.375	0.187	0.218	0.000	0.000	U-275237
2.875	2.000	0.375	0.437	0.000	0.000	U-287200
2.875	2.125	0.500	0.562	0.000	0.000	DE-287212
2.875	2.250	0.312	0.344	0.000	0.000	U-287225
2.875	2.500	0.187	0.218	0.000	0.000	U-287250





DE



U

OD	ID	L1	L2	OD2	OD3	Product Name
2.937	2.500	0.218	0.250	0.000	0.000	U-293250
3.000	2.250	0.375	0.437	0.000	0.000	U-300225
3.000	2.250	0.500	0.562	0.000	0.000	DE-300225
3.000	2.281	0.344	0.406	0.000	0.000	DE-300
3.000	2.375	0.312	0.344	0.000	0.000	U-300237
3.000	2.500	0.250	0.281	0.000	0.000	U-300250
3.000	2.562	0.218	0.250	0.000	0.000	U-300256
3.000	2.625	0.187	0.218	0.000	0.000	U-300262
3.125	2.500	0.312	0.344	0.000	0.000	U-312250
3.125	2.625	0.250	0.281	0.000	0.000	U-312262
3.125	2.625	0.250	0.312	0.000	0.000	DE-312
3.187	2.750	0.218	0.250	0.000	0.000	U-318275
3.250	2.500	0.375	0.406	0.000	0.000	U-325250
3.250	2.500	0.500	0.562	0.000	0.000	DE-325250
3.250	2.625	0.312	0.375	0.000	0.000	U-325262
3.250	2.750	0.250	0.281	0.000	0.000	U-325275
3.250	2.812	0.218	0.250	0.000	0.000	U-325281
3.250	2.812	0.276	0.344	0.000	0.000	DE-325
3.250	2.875	0.187	0.218	0.000	0.000	U-325287
3.375	2.375	0.500	0.562	0.000	0.000	U-337237
3.375	2.625	0.375	0.406	0.000	0.000	U-337262
3.375	2.875	0.375	0.437	0.000	0.000	DE-337
3.375	3.000	0.187	0.218	0.000	0.000	U-337300
3.437	3.000	0.218	0.250	0.000	0.000	U-343300
3.500	2.750	0.375	0.437	0.000	0.000	U-350275
3.500	2.750	0.500	0.562	0.000	0.000	DE-350275
3.500	2.875	0.312	0.344	0.000	0.000	U-350287
3.500	3.000	0.250	0.312	0.000	0.000	DE-350
3.500	3.062	0.218	0.250	0.000	0.000	U-350306
3.625	2.875	0.375	0.406	0.000	0.000	U-362287
3.625	3.000	0.312	0.375	0.000	0.000	U-362300



DE



U

OD	ID	L1	L2	OD2	OD3	Product Name
3.625	3.000	0.375	0.437	0.000	0.000	DE-362
3.625	3.250	0.187	0.218	0.000	0.000	U-362325
3.750	3.000	0.375	0.406	0.000	0.000	U-375300
3.750	3.000	0.500	0.562	0.000	0.000	DE-375300
3.750	3.031	0.290	0.344	0.000	0.000	DE-375
3.750	3.312	0.218	0.250	0.000	0.000	U-375331
3.750	3.375	0.187	0.218	0.000	0.000	U-375337
3.875	3.000	0.375	0.437	0.000	0.000	U-387300
3.875	3.375	0.375	0.437	0.000	0.000	DE-387
4.000	3.062	0.500	0.562	0.000	0.000	U-400306
4.000	3.250	0.375	0.406	0.000	0.000	U-400325
4.000	3.250	0.500	0.562	0.000	0.000	DE-400325
4.000	3.500	0.250	0.281	0.000	0.000	U-400350A
4.000	3.500	0.250	0.281	0.000	0.000	U-400350
4.000	3.500	0.375	0.437	0.000	0.000	DE-400
4.125	3.375	0.375	0.437	0.000	0.000	U-412337
4.125	3.500	0.312	0.375	0.000	0.000	DE-412
4.125	3.625	0.250	0.281	0.000	0.000	U-412362
4.250	3.500	0.375	0.437	0.000	0.000	U-425350
4.250	3.500	0.500	0.562	0.000	0.000	DE-425350
4.250	3.750	0.250	0.281	0.000	0.000	U-425375
4.375	3.732	0.312	0.375	0.000	0.000	DE-437
4.500	3.500	0.625	0.687	0.000	0.000	DE-450350
4.500	3.750	0.375	0.437	0.000	0.000	U-450375
4.500	4.000	0.250	0.281	0.000	0.000	U-450400
4.625	3.875	0.375	0.437	0.000	0.000	U-462387
4.625	4.125	0.250	0.281	0.000	0.000	U-462412
4.625	4.125	0.375	0.437	0.000	0.000	DE-462
4.750	3.750	0.625	0.687	0.000	0.000	DE-475375
4.750	4.250	0.250	0.275	0.000	0.000	U-475425
4.750	4.250	0.375	0.437	0.000	0.000	DE-475



DE



U

OD	ID	L1	L2	OD2	OD3	Product Name
4.875	4.375	0.375	0.437	0.000	0.000	DE-487
5.000	4.000	0.625	0.687	0.000	0.000	DE-500400
5.000	4.250	0.375	0.406	0.000	0.000	U-500425
5.000	4.250	0.375	0.437	0.000	0.000	DE-500
5.000	4.375	0.312	0.344	0.000	0.000	U-500437
5.000	4.437	0.281	0.312	0.000	0.000	U-500443
5.000	4.500	0.250	0.281	0.000	0.000	U-500450
5.125	4.562	0.281	0.312	0.000	0.000	U-512456
5.125	4.625	0.375	0.437	0.000	0.000	DE-512
5.250	4.250	0.625	0.687	0.000	0.000	DE-525425
5.250	4.750	0.250	0.281	0.000	0.000	U-525475
5.375	4.875	0.375	0.437	0.000	0.000	DE-537
5.500	4.500	0.625	0.687	0.000	0.000	DE-550450
5.500	5.000	0.375	0.437	0.000	0.000	DE-550
5.562	5.000	0.218	0.281	0.000	0.000	U-562500
5.750	4.750	0.625	0.687	0.000	0.000	DE-575475
5.750	5.000	0.375	0.437	0.000	0.000	U-575500
5.875	5.125	0.375	0.437	0.000	0.000	U-587512
5.875	5.375	0.375	0.437	0.000	0.000	DE-587
6.000	5.000	0.625	0.687	0.000	0.000	DE-600500
6.000	5.125	0.437	0.468	0.000	0.000	U-600512
6.000	5.250	0.375	0.406	0.000	0.000	U-600525
6.000	5.250	0.500	0.531	0.000	0.000	U-600525A
6.000	5.312	0.750	0.813	0.000	0.000	DE-600531
6.000	5.375	0.312	0.344	0.000	0.000	U-600537
6.000	5.437	0.281	0.312	0.000	0.000	U-600543
6.000	5.500	0.250	0.281	0.000	0.000	U-600550
6.000	5.500	0.375	0.406	0.000	0.000	U-600550A
6.125	5.500	0.312	0.344	0.000	0.000	U-612550
6.500	5.500	0.500	0.562	0.000	0.000	U-650550
6.500	5.500	0.688	0.000	0.000	0.000	DE-650550



DE



U

OD	ID	L1	L2	OD2	OD3	Product Name
7.000	6.000	0.500	0.531	0.000	0.000	U-700600
7.000	6.000	0.625	0.687	0.000	0.000	DE-700600
7.000	6.125	0.437	0.468	0.000	0.000	U-700612
7.000	6.250	0.500	0.531	0.000	0.000	U-700625
7.000	6.375	0.312	0.344	0.000	0.000	U-700637
7.000	6.437	0.281	0.312	0.000	0.000	U-700643
7.250	6.500	0.437	0.500	0.000	0.000	DE-725
7.500	6.250	0.750	0.812	0.000	0.000	DE-750625
7.750	6.500	0.750	0.812	0.000	0.000	DE-775650
8.000	6.500	0.750	0.825	0.000	0.000	U-800650
8.000	6.750	0.750	0.812	0.000	0.000	DE-800675
8.000	7.000	0.500	0.531	0.000	0.000	U-800700
8.000	7.375	0.312	0.344	0.000	0.000	U-800737
8.000	7.500	0.250	0.281	0.000	0.000	DE-800
8.250	7.000	0.750	0.812	0.000	0.000	DE-825700
9.750	8.500	0.750	0.812	0.000	0.000	DE-975850
10.000	9.000	0.500	0.531	0.000	0.000	U-1000900
10.000	9.250	0.375	0.406	0.000	0.000	U-1000925
10.000	9.250	0.500	0.562	0.000	0.000	DE-1000
10.000	9.312	0.344	0.375	0.000	0.000	U-1000931
10.250	9.000	0.750	0.812	0.000	0.000	DE-1025900
11.000	9.500	0.875	0.937	0.000	0.000	U-1100950
12.000	10.750	0.750	0.812	0.000	0.000	DE-12001075
12.000	11.000	0.500	0.531	0.000	0.000	U-12001100
12.000	11.000	0.500	0.562	0.000	0.000	DE-1200
12.000	11.250	0.375	0.406	0.000	0.000	U-12001125
13.000	12.250	0.500	0.562	0.000	0.000	DE-1300
14.000	13.000	0.500	0.531	0.000	0.000	U-14001300
14.000	13.187	0.406	0.437	0.000	0.000	U-14001318
14.000	13.190	0.500	0.562	0.000	0.000	DE-1400





# CSF

## Piston Seal Cup

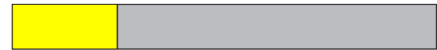
### Design

CSF single acting piston cup manufactured from fabric reinforced NBR suitable for mineral based hydraulic oils and water soluble fluids. The cup is a non-preferred design for modern applications but is available for existing requirements.

### Operating Conditions

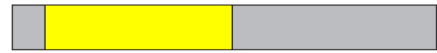
#### Pressure

170 Bar  
2,500 Psi



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{ØD}$	$\text{Ød}$	L
0.1-0.25	0.8	2.0

#### Tolerances

Replacement part only

#### Chamfer Radii

Replacement part only

#### Extrusion Gap G

Replacement part only

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

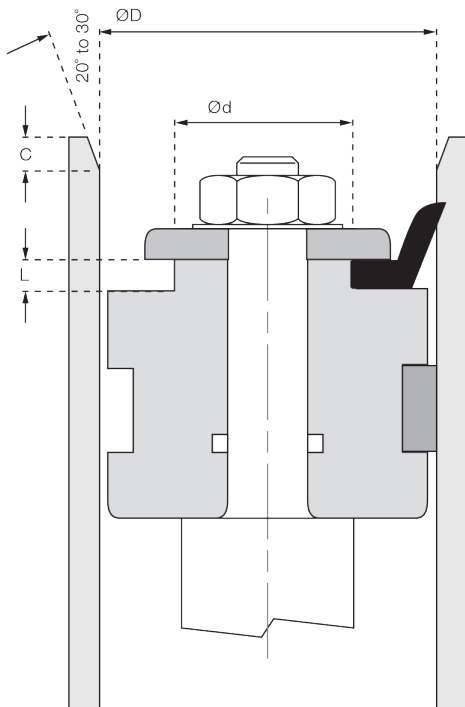
single acting seals



### Key Features

NBR fabric

Suitable for mineral oil  
and water soluble





# CSR

## Piston Seal Cup

Single acting seals



### Key Features

Suitable for pneumatic applications

### Design

CSR are a single acting piston cup manufactured from NBR suitable for pneumatic applications. The cup is a non-preferred design for modern applications but is available for existing requirements.

### Operating Conditions

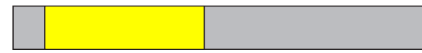
#### Pressure

41 Bar  
600 Psi



#### Temperature

-30° to 90° C  
-22° to 195° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

Replacement part only

#### Chamfer Radii

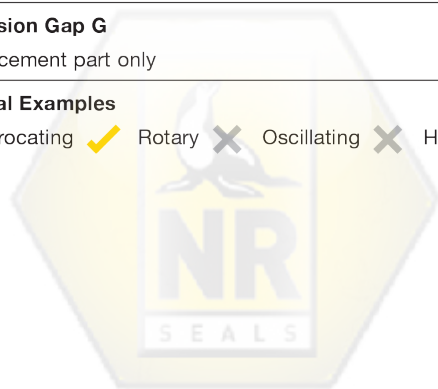
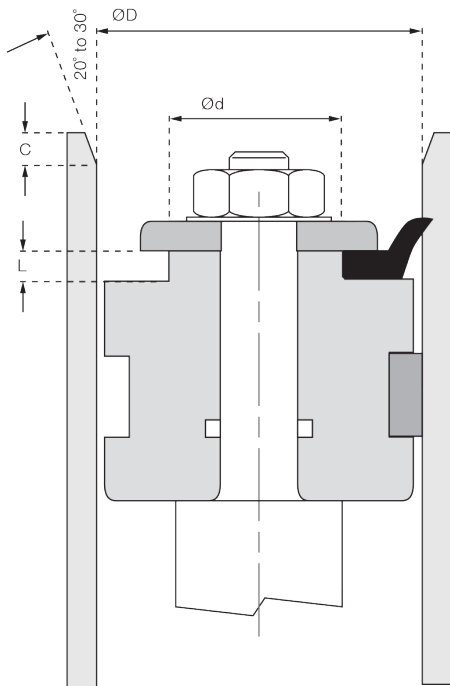
Replacement part only

#### Extrusion Gap G

Replacement part only

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

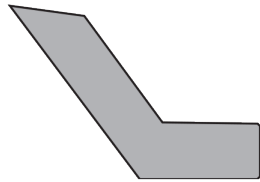




# CSS

## Piston Seal Cup

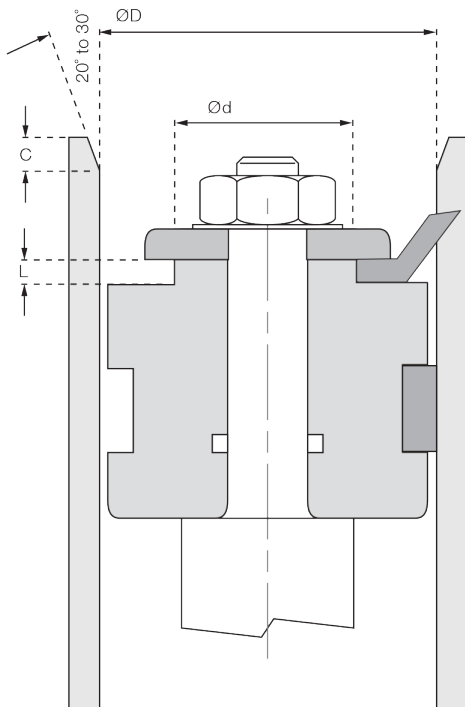
single acting seals



### Key Features

Suitable for mineral oil

Low / medium pressure capability



### Design

CSS are a single acting piston cup manufactured from Polyurethane suitable for mineral based hydraulic oils. The cup is a non-preferred design for modern applications but is available for existing requirements.

### Operating Conditions

#### Pressure

350 Bar  
5,000 Psi



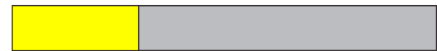
#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{ØD}$	$\text{Ød}$	L
0.1-0.25	0.8	2.0

#### Tolerances

Replacement part only

#### Chamfer Radii

Replacement part only

#### Extrusion Gap G

Replacement part only

#### Typical Examples

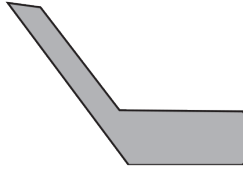
Reciprocating  Rotary  Oscillating  Helix



# CST

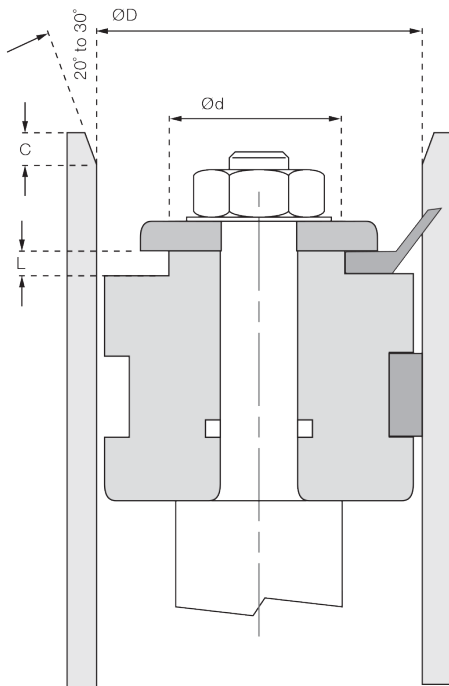
## Piston Seal Cup

Single acting seals



### Key Features

- Thin dynamic lip
- Suitable for mineral oil
- Low pressure capability



### Design

CST single acting piston cup manufactured from Polyurethane is designed with a thin dynamic lip suitable for low pressure mineral based hydraulic oils. The cup is a non-preferred design for modern applications but is available for existing requirements.

### Operating Conditions

#### Pressure

100 Bar  
1,500 Psi



#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

0.5m/sec  
1.5"/sec



#### Surface Finish $\mu\text{mRa}$

$\text{ØD}$	$\text{Ød}$	L
0.1-0.25	0.8	2.0

#### Tolerances

Replacement part only

#### Chamfer Radii

Replacement part only

#### Extrusion Gap G

Replacement part only

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





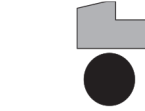
GP2



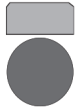
GP2†



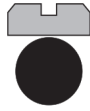
GP2‡



GP3 (Made to order)



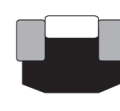
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
0.875	0.616	0.000	0.000	0.000	0.000	GP6-0087061-083
1.000	0.690	0.129	0.000	0.000	0.000	GP2-0100069-012
1.000	0.740	0.083	0.000	0.000	0.000	GP4-0100074-008
1.000	0.740	0.083	0.000	0.000	0.000	GP2-0100074-008
1.000	0.787	0.094	0.000	0.000	0.000	GP2-0100078-009
1.125	0.865	0.083	0.000	0.000	0.000	GP2-0112086-008
1.125	0.912	0.094	0.000	0.000	0.000	GP2-0112091-009
1.250	0.940	0.129	0.000	0.000	0.000	GP2-0125094-012
1.250	0.990	0.083	0.000	0.000	0.000	GP2-0125099-008
1.250	1.006	0.185	0.000	0.000	0.000	GP6-0125100-018
1.250	1.037	0.094	0.000	0.000	0.000	GP2-0125103-009
1.375	1.115	0.083	0.000	0.000	0.000	GP2-0137111-008
1.375	1.162	0.094	0.000	0.000	0.000	GP2-0137116-009
1.500	0.884	0.291	0.000	0.000	0.000	GP2-0150088-029
1.500	1.190	0.129	0.000	0.000	0.000	GP2-0150119-012
1.500	1.204	0.129	0.000	0.000	0.000	GP4-0150120-012
1.500	1.204	0.129	0.000	0.000	0.000	GP2-0150120-012
1.500	1.240	0.083	0.000	0.000	0.000	GP2-0150124-008
1.500	1.256	0.000	0.000	0.000	0.000	GP6-0150125-027
1.500	1.256	0.185	0.000	0.000	0.000	GP6-0150125-018
1.500	1.287	0.094	0.000	0.000	0.000	GP2-0150128-009
1.625	1.233	0.122	0.000	0.000	0.000	GP2-0162123-012
1.750	1.358	0.122	0.000	0.000	0.000	GP2-0175135-012
1.750	1.440	0.129	0.000	0.000	0.000	GP6-0175144-012
1.750	1.440	0.129	0.000	0.000	0.000	GP2-0175144-012
1.750	1.506	0.185	0.000	0.000	0.000	GP6-0175150-018
1.750	1.537	0.094	0.000	0.000	0.000	GP2-0175153-009
1.875	1.483	0.122	0.000	0.000	0.000	GP2-0187148-012
1.875	1.598	0.126	0.000	0.000	0.000	GP2-0187159-012
2.000	1.384	0.291	0.000	0.000	0.000	GP2-0200138-029
2.000	1.462	0.282	0.000	0.000	0.000	GP8-0200146-028

Double Acting  
Glide Rings



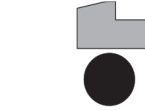
GP2



GP2†



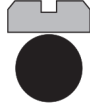
GP2‡



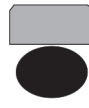
GP3 (Made to order)



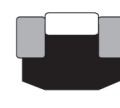
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
2.000	1.567	0.165	0.000	0.000	0.000	GP4-0200156-016
2.000	1.576	0.165	0.000	0.000	0.000	GP6-0200157-016
2.000	1.576	0.165	0.000	0.000	0.000	GP2-0200157-016
2.000	1.608	0.129	0.000	0.000	0.000	GP2-0200160-012
2.000	1.625	0.180	0.192	0.000	0.000	GP2-0200162-019
2.000	1.627	0.280	0.000	0.000	0.000	GP6-0200162-028
2.000	1.627	0.394	0.000	0.000	1.998	GP6-0200162-039B
2.000	1.627	0.424	0.000	0.000	0.000	PHD-0200162-042
2.000	1.630	0.190	0.000	0.000	0.000	GP2-0200163-019
2.000	1.690	0.129	0.000	0.000	0.000	GP2-0200169-012
2.000	1.723	0.126	0.000	0.000	0.000	GP2-0200172-012
2.125	1.733	0.129	0.000	0.000	0.000	GP2-0212173-012
2.250	1.712	0.282	0.000	0.000	0.000	GP8-0225171-028
2.250	1.858	0.129	0.000	0.000	0.000	GP2-0225185-012
2.250	1.875	0.000	0.000	0.000	0.000	GP2-0225187-019
2.250	1.877	0.280	0.000	0.000	0.000	GP6-0225187-028
2.250	1.940	0.129	0.000	0.000	0.000	GP2-0225194-012
2.250	1.972	0.126	0.000	0.000	0.000	GP2-0225197-012
2.375	1.983	0.129	0.000	0.000	0.000	GP2-0237198-012
2.375	2.098	0.126	0.000	0.000	0.000	GP2-0237209-012
2.500	1.884	0.291	0.000	0.000	0.000	GP2-0250188-029
2.500	1.962	0.282	0.000	0.000	0.000	GP8-0250196-028
2.500	2.016	0.000	0.000	0.000	0.000	GP2-0250201-016
2.500	2.067	0.000	0.000	0.000	0.000	GP4-0250206-016
2.500	2.067	0.165	0.000	0.000	0.000	GP4-0250207-016
2.500	2.076	0.165	0.000	0.000	0.000	GP2-0250207-016
2.500	2.106	0.165	0.000	0.000	0.000	GP2-0250210-016
2.500	2.108	0.129	0.000	0.000	0.000	GP2-0250210-012
2.500	2.127	0.280	0.000	0.000	0.000	GP6-0250212-028
2.500	2.127	0.394	0.000	0.000	0.000	GP6-0250212-039B
2.500	2.130	0.190	0.000	0.000	0.000	GP2-0250213-019



Double Acting  
Glide Rings



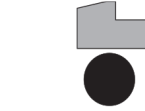
GP2



GP2†



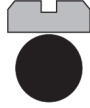
GP2‡



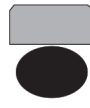
GP3 (Made to order)



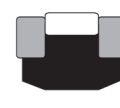
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
2.500	2.190	0.129	0.000	0.000	0.000	GP2-0250219-012
2.500	2.223	0.126	0.000	0.000	0.000	GP2-0250222-012
2.560	2.127	0.424	0.000	0.000	0.000	PHD-0250212-042
2.712	3.250	0.000	0.000	0.000	0.000	GP2-0325271-028
2.750	2.190	0.284	0.000	0.000	0.000	GP2-0275219-028
2.750	2.212	0.283	0.000	0.000	0.000	GP8-0275221-028
2.750	2.353	0.157	0.000	0.000	0.000	GP2-0275235-015
2.750	2.358	0.129	0.000	0.000	0.000	GP2-0275235-012
2.750	2.377	0.000	0.000	0.000	0.000	PHD-0275237-042
2.750	2.377	0.280	0.000	0.000	0.000	GP6-0275237-028
2.750	2.380	0.190	0.000	0.000	0.000	GP2-0275238-019
2.750	2.440	0.129	0.000	0.000	0.000	GP2-0275244-012
3.000	2.384	0.250	0.000	0.000	0.000	GP2-0300238-025
3.000	2.384	0.291	0.000	0.000	0.000	GP2-0300238-029
3.000	2.408	0.312	0.000	0.000	0.000	GP8-0300240-031
3.000	2.433	0.250	0.000	0.000	0.000	GP2-0300243-025
3.000	2.442	0.282	0.000	0.000	0.000	GP8-0300244-028
3.000	2.442	0.282	0.000	0.000	0.000	GP2-0300244-028
3.000	2.460	0.190	0.000	0.000	0.000	GP8-0300246-019
3.000	2.460	0.190	0.000	0.000	0.000	GP2-0300246-019
3.000	2.462	0.283	0.000	0.000	0.000	GP6-0300246-028
3.000	2.512	0.281	0.000	0.000	0.000	GP2-0300251-028
3.000	2.520	0.579	0.000	0.000	0.000	PHD-0300252-057
3.000	2.567	0.165	0.000	0.000	0.000	GP4-0300256-016
3.000	2.567	0.165	0.000	0.000	0.000	GP2-0300256-016
3.000	2.603	0.157	0.000	0.000	0.000	GP2-0300260-015
3.000	2.608	0.129	0.000	0.000	0.000	GP2-0300260-012
3.000	2.627	0.000	0.000	0.000	0.000	GP6-0300262-033B
3.000	2.627	0.280	0.000	0.000	0.000	GP6-0300262-028
3.000	2.627	0.410	0.000	0.000	0.000	GP6-0300262-041
3.040	2.462	0.282	0.000	0.000	0.000	GP8-0304246-028



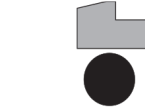
GP2



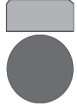
GP2†



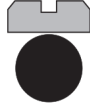
GP2‡



GP3 (Made to order)



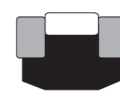
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
3.125	2.692	0.165	0.000	0.000	0.000	GP2-0312269-016
3.125	2.733	0.129	0.000	0.000	0.000	GP2-0312273-012
3.250	2.634	0.250	0.000	0.000	0.000	GP2-0325263-025
3.250	2.634	0.250	0.000	0.000	325,264.000	GP4-0325263-025
3.250	2.634	0.291	0.000	0.000	0.000	GP2-0325263-029
3.250	2.683	0.250	0.000	0.000	0.000	GP2-0325268-025
3.250	2.692	0.282	0.000	0.000	0.000	GP8-0325269-028
3.250	2.692	0.282	0.000	0.000	0.000	GP2-0325269-028
3.250	2.710	0.190	0.000	0.000	0.000	GP2-0325271-019
3.250	2.770	0.579	0.000	0.000	0.000	PHD-0325277-057
3.250	2.853	0.157	0.000	0.000	0.000	GP2-0325285-015
3.250	2.858	0.129	0.000	0.000	0.000	GP2-0325285-012
3.250	2.877	0.280	0.000	0.000	0.000	GP6-0325287-028
3.375	2.983	0.129	0.000	0.000	0.000	GP2-0337298-012
3.500	2.884	0.250	0.000	0.000	0.000	GP4-0350288-025
3.500	2.884	0.250	0.000	0.000	0.000	GP2-0350288-025
3.500	2.884	0.291	0.000	0.000	0.000	GP2-0350288-029
3.500	2.908	0.312	0.000	0.000	0.000	GP8-0350290-031
3.500	2.933	0.250	0.000	0.000	0.000	GP2-0350293-025
3.500	2.942	0.282	0.000	0.000	0.000	GP8-0350294-028
3.500	2.942	0.282	0.000	0.000	0.000	GP2-0350294-028
3.500	2.960	0.190	0.000	0.000	0.000	GP8-0350296-019
3.500	2.960	0.190	0.000	0.000	0.000	GP2-0350296-019
3.500	2.962	0.283	0.000	0.000	0.000	GP6-0350296-028
3.500	2.962	0.283	0.000	0.000	0.000	GP2-0350296-028
3.500	3.020	0.579	0.000	0.000	0.000	PHD-0350302-057
3.500	3.103	0.157	0.000	0.000	0.000	GP2-0350310-015
3.500	3.108	0.129	0.000	0.000	0.000	GP2-0350310-012
3.500	3.128	0.280	0.000	0.000	0.000	GP6-0350312-028
3.540	2.962	0.282	0.000	0.000	0.000	GP8-0354296-028
3.625	3.233	0.129	0.000	0.000	0.000	GP2-0362323-012



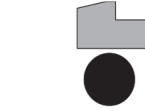
GP2



GP2†



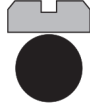
GP2‡



GP3 (Made to order)



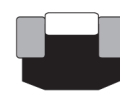
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
3.750	3.183	0.250	0.000	0.000	0.000	GP2-0375318-025
3.750	3.192	0.282	0.000	0.000	0.000	GP8-0375319-028
3.750	3.192	0.282	0.000	0.000	0.000	GP2-0375319-028
3.750	3.210	0.190	0.000	0.000	0.000	GP2-0375321-019
3.750	3.212	0.283	0.000	0.000	0.000	GP6-0375321-028
3.750	3.270	0.579	0.000	0.000	0.000	PHD-0375327-057
3.750	3.353	0.157	0.000	0.000	0.000	GP2-0375335-015
3.750	3.358	0.129	0.000	0.000	0.000	GP2-0375335-012
3.750	3.378	0.280	0.000	0.000	0.000	GP6-0375337-028
4.000	3.340	0.250	0.000	0.000	0.000	GP8-0400334-025
4.000	3.340	0.250	0.000	0.000	0.000	GP2-0400334-025
4.000	3.384	0.250	0.000	0.000	0.000	GP4-0400338-025
4.000	3.384	0.250	0.000	0.000	0.000	GP2-0400338-025
4.000	3.384	0.291	0.000	0.000	0.000	GP2-0400338-029
4.000	3.408	0.312	0.000	0.000	0.000	GP8-0400340-031
4.000	3.433	0.250	0.000	0.000	0.000	GP2-0400343-025
4.000	3.442	0.282	0.000	0.000	0.000	GP8-0400344-028
4.000	3.442	0.282	0.000	0.000	0.000	GP2-0400344-028
4.000	3.462	0.283	0.000	0.000	0.000	GP6-0400346-028
4.000	3.490	0.280	0.000	0.000	0.000	GP2-0400349-028
4.000	3.520	0.579	0.000	0.000	0.000	PHD-0400352-057
4.000	3.603	0.157	0.000	0.000	0.000	GP2-0400360-015
4.000	3.603	0.350	0.000	0.000	0.000	GP2-0400360-035
4.000	3.608	0.129	0.000	0.000	0.000	GP2-0400360-012
4.000	3.625	0.280	0.000	0.000	0.000	GP6-0400362-028
4.040	3.462	0.282	0.000	0.000	0.000	GP8-0404346-028
4.250	3.590	0.250	0.000	0.000	0.000	GP8-0425359-025
4.250	3.590	0.250	0.000	0.000	0.000	GP2-0425359-025
4.250	3.634	0.250	0.000	0.000	0.000	GP2-0425363-025
4.250	3.683	0.250	0.000	0.000	0.000	GP2-0425368-025
4.250	3.692	0.282	0.000	0.000	0.000	GP8-0425369-028



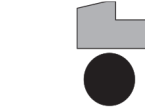
GP2



GP2†



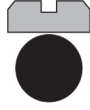
GP2‡



GP3 (Made to order)



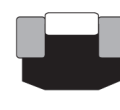
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
4.250	3.692	0.282	0.000	0.000	0.000	GP2-0425369-028
4.250	3.712	0.283	0.000	0.000	0.000	GP6-0425371-028
4.250	3.770	0.579	0.000	0.000	0.000	PHD-0425377-057
4.250	3.853	0.157	0.000	0.000	0.000	GP2-0425385-015
4.250	3.858	0.129	0.000	0.000	0.000	GP2-0425385-012
4.400	4.008	0.129	0.000	0.000	0.000	GP2-0440400-012
4.500	3.840	0.250	0.000	0.000	0.000	GP8-0450384-025
4.500	3.840	0.250	0.000	0.000	0.000	GP2-0450384-025
4.500	3.840	0.500	0.000	0.000	0.000	GP8-0450384-050
4.500	3.884	0.250	0.000	0.000	0.000	GP4-0450388-025
4.500	3.884	0.250	0.000	0.000	0.000	GP2-0450388-025
4.500	3.884	0.291	0.000	0.000	0.000	GP2-0450388-029
4.500	3.933	0.250	0.000	0.000	0.000	GP2-0450393-025
4.500	3.942	0.282	0.000	0.000	0.000	GP8-0450394-028
4.500	3.942	0.282	0.000	0.000	0.000	GP2-0450394-028
4.500	3.962	0.283	0.000	0.000	0.000	GP6-0450396-028
4.500	4.020	0.579	0.000	0.000	0.000	PHD-0450402-057
4.500	4.103	0.157	0.000	0.000	0.000	GP2-0450410-015
4.500	4.108	0.129	0.000	0.000	0.000	GP2-0450410-012
4.540	3.962	0.282	0.000	0.000	0.000	GP8-0454396-028
4.750	4.090	0.250	0.000	0.000	0.000	GP2-0475409-025
4.750	4.134	0.000	0.000	0.000	0.000	GP2-0475413-029
4.750	4.159	0.000	0.000	0.000	0.000	PHD-0475415-492
4.750	4.183	0.250	0.000	0.000	0.000	GP2-0475418-025
4.750	4.192	0.282	0.000	0.000	0.000	GP8-0475419-028
4.750	4.192	0.282	0.000	0.000	0.000	GP2-0475419-028
4.750	4.212	0.283	0.000	0.000	0.000	GP6-0475421-028
4.750	4.270	0.579	0.000	0.000	0.000	PHD-0475427-057
4.750	4.353	0.157	0.000	0.000	0.000	GP2-0475435-015
4.750	4.358	0.129	0.000	0.000	0.000	GP6-0475435-012
4.750	4.358	0.129	0.000	0.000	0.000	GP2-0475435-012



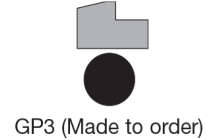
GP2



GP2†



GP2‡



GP3 (Made to order)



GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
5.000	4.230	0.380	0.000	0.000	0.000	GP8-0500423-038
5.000	4.230	0.380	0.000	0.000	0.000	GP2-0500423-038
5.000	4.240	0.377	0.000	0.000	0.000	GP8-0500424-037
5.000	4.270	0.750	0.000	0.000	0.000	PHD-0500427-075
5.000	4.384	0.250	0.000	0.000	0.000	GP4-0500438-025
5.000	4.384	0.250	0.000	0.000	0.000	GP2-0500438-025
5.000	4.384	0.291	0.000	0.000	0.000	GP2-0500438-029
5.000	4.408	0.312	0.000	0.000	0.000	GP8-0500440-031
5.000	4.433	0.250	0.000	0.000	0.000	GP2-0500443-025
5.000	4.442	0.282	0.000	0.000	0.000	GP8-0500444-028
5.000	4.442	0.282	0.000	0.000	0.000	GP2-0500444-028
5.000	4.462	0.283	0.000	0.000	0.000	GP6-0500446-028
5.000	4.490	0.280	0.000	0.000	0.000	GP2-0500449-028
5.000	4.603	0.157	0.000	0.000	0.000	GP2-0500460-015
5.000	4.603	0.312	0.000	0.000	0.000	GP2-0500460-031
5.000	4.608	0.129	0.000	0.000	0.000	GP2-0500460-012
5.000	4.629	0.280	0.000	0.000	0.000	GP6-0500462-028
5.250	4.480	0.380	0.000	0.000	0.000	GP8-0525448-038
5.250	4.480	0.380	0.000	0.000	0.000	GP2-0525448-038
5.250	4.490	0.377	0.000	0.000	0.000	GP8-0525449-037
5.250	4.490	0.377	0.000	0.000	0.000	GP2-0525449-037
5.250	4.520	0.750	0.000	0.000	0.000	PHD-0525452-075
5.250	4.853	0.157	0.000	0.000	0.000	GP2-0525485-015
5.250	4.858	0.129	0.000	0.000	0.000	GP2-0525485-012
5.500	4.594	0.630	0.000	0.000	0.000	PHD-0550459-063
5.500	4.660	0.378	0.000	0.000	0.000	GP2-0550466-037
5.500	4.670	0.322	0.000	0.000	0.000	GP2-0550467-032
5.500	4.730	0.380	0.000	0.000	0.000	GP8-0550473-038
5.500	4.730	0.380	0.000	0.000	0.000	GP2-0550473-038
5.500	4.730	0.630	0.000	0.000	0.000	GP8-0550473-063
5.500	4.740	0.377	0.000	0.000	0.000	GP2-0550474-037



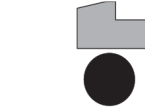
GP2



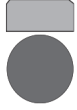
GP2†



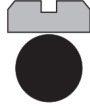
GP2‡



GP3 (Made to order)



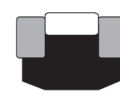
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
5.500	4.770	0.750	0.000	0.000	0.000	PHD-0550477-075
5.500	4.908	0.312	0.000	0.000	0.000	GP8-0550490-031
5.500	5.020	0.579	0.000	0.000	0.000	PHD-0550502-057
5.500	5.103	0.157	0.000	0.000	0.000	GP2-0550510-015
5.500	5.108	0.129	0.000	0.000	0.000	GP2-0550510-012
5.750	4.990	0.377	0.000	0.000	0.000	GP2-0575499-037
5.750	5.232	0.159	0.000	0.000	0.000	GP2-0575523-015
5.750	5.353	0.157	0.000	0.000	0.000	GP2-0575535-015
5.875	5.357	0.159	0.000	0.000	0.000	GP2-0587535-015
6.000	5.090	0.380	0.000	0.000	0.000	GP8-0600509-038
6.000	5.090	0.380	0.000	0.000	0.000	GP2-0600509-038
6.000	5.090	0.630	0.000	0.000	0.000	GP8-0600509-063
6.000	5.160	0.378	0.000	0.000	0.000	GP2-0600516-037
6.000	5.170	0.322	0.000	0.000	0.000	GP4-0600517-032
6.000	5.170	0.322	0.000	0.000	0.000	GP2-0600517-032
6.000	5.240	0.377	0.000	0.000	0.000	GP8-0600524-037
6.000	5.240	0.377	0.000	0.000	0.000	GP2-0600524-037
6.000	5.254	0.378	0.000	0.000	0.000	GP6-0600525-037
6.000	5.270	0.750	0.000	0.000	0.000	PHD-0600527-075
6.000	5.280	0.377	0.000	0.000	0.000	GP2-0600528-037
6.000	5.305	0.293	0.000	0.000	0.000	GP2-0600530-029
6.000	5.482	0.159	0.000	0.000	0.000	GP6-0600548-015
6.000	5.482	0.159	0.000	0.000	0.000	GP2-0600548-015
6.000	5.524	0.366	0.000	0.000	0.000	GP6-0600552-036
6.000	5.524	0.579	0.000	0.000	0.000	PHD-0600552-057
6.015	5.285	0.750	0.000	0.000	0.000	PHD-0601528-075
6.030	5.090	0.000	0.000	0.000	0.000	GP8-0603509-063
6.040	5.240	0.377	0.000	0.000	0.000	GP8-0604524-037
6.125	5.607	0.159	0.000	0.000	0.000	GP2-0612560-015
6.250	5.345	0.380	0.000	0.000	0.000	GP2-0625534-038
6.250	5.345	0.630	0.000	0.000	0.000	PHD-0625534-063





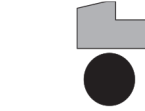
GP2



GP2†



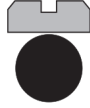
GP2‡



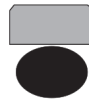
GP3 (Made to order)



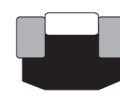
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
6.250	5.490	0.377	0.000	0.000	0.000	GP2-0625549-037
6.250	5.490	0.377	0.000	0.000	0.000	GP8-0625549-037
6.250	5.520	0.750	0.000	0.000	0.000	PHD-0625552-075
6.250	5.732	0.159	0.000	0.000	0.000	GP2-0625573-015
6.500	5.590	0.380	0.000	0.000	0.000	GP2-0650559-038
6.500	5.660	0.378	0.000	0.000	0.000	GP2-0650566-037
6.500	5.670	0.322	0.000	0.000	0.000	GP2-0650567-032
6.500	5.740	0.377	0.000	0.000	0.000	GP8-0650574-037
6.500	5.740	0.377	0.000	0.000	0.000	GP2-0650574-037
6.500	5.770	0.750	0.000	0.000	0.000	PHD-0650577-075
6.500	5.982	0.159	0.000	0.000	0.000	GP2-0650598-015
6.500	6.020	0.579	0.000	0.000	0.000	PHD-0650602-057
6.500	6.024	0.366	0.000	0.000	0.000	GP6-0650602-036
7.000	6.090	0.380	0.000	0.000	0.000	GP2-0700609-038
7.000	6.090	0.630	0.000	0.000	0.000	GP8-0700609-063
7.000	6.160	0.378	0.000	0.000	0.000	GP2-0700616-037
7.000	6.170	0.322	0.000	0.000	0.000	GP4-0700617-032
7.000	6.240	0.377	0.000	0.000	0.000	GP8-0700624-037
7.000	6.240	0.377	0.000	0.000	0.000	GP2-0700624-037
7.000	6.250	0.780	0.000	0.000	6.992	GP2-0700625-078
7.000	6.254	0.378	0.000	0.000	0.000	GP6-0700625-037
7.000	6.270	0.750	0.000	0.000	0.000	PHD-0700627-075
7.000	6.280	0.377	0.000	0.000	0.000	GP2-0700628-037
7.000	6.482	0.159	0.000	0.000	0.000	GP2-0700648-015
7.000	6.524	0.366	0.000	0.000	0.000	GP6-0700652-036
7.250	6.340	0.630	0.000	0.000	0.000	GP8-0725634-063
7.250	6.490	0.377	0.000	0.000	0.000	GP2-0725649-037
7.250	6.520	0.750	0.000	0.000	0.000	PHD-0725652-075
7.250	6.732	0.159	0.000	0.000	0.000	GP2-0725673-015
7.375	6.895	0.579	0.000	0.000	0.000	GP8-0737689-057
7.500	6.590	0.380	0.000	0.000	0.000	GP2-0750659-038



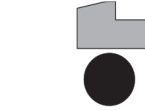
GP2



GP2†



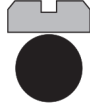
GP2‡



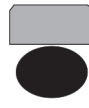
GP3 (Made to order)



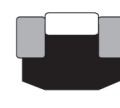
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
7.500	6.594	0.000	0.000	0.000	0.000	PHD-0750659-063
7.500	6.670	0.322	0.000	0.000	0.000	GP2-0750667-032
7.500	6.740	0.377	0.000	0.000	0.000	GP8-0750674-037
7.500	6.740	0.377	0.000	0.000	0.000	GP2-0750674-037
7.500	6.770	0.750	0.000	0.000	0.000	PHD-0750677-075
7.500	6.982	0.150	0.159	0.000	0.000	GP6-0750698-015
7.500	6.982	0.159	0.000	0.000	0.000	GP2-0750698-015
7.500	6.982	0.159	0.000	0.000	0.000	GP2-0750698-015
7.500	7.024	0.366	0.000	0.000	0.000	GP6-0750702-036
7.750	6.840	0.380	0.000	0.000	0.000	GP2-0775684-038
7.750	6.840	0.630	0.000	0.000	0.000	GP8-0775684-063
7.750	6.990	0.377	0.000	0.000	0.000	GP2-0775699-037
8.000	7.160	0.378	0.000	0.000	0.000	GP2-0800716-037
8.000	7.160	0.625	0.000	0.000	0.000	GP2-0800716-062
8.000	7.170	0.322	0.000	0.000	0.000	GP4-0800717-032
8.000	7.170	0.322	0.000	0.000	0.000	GP2-0800717-032
8.000	7.240	0.377	0.000	0.000	0.000	GP8-0800724-037
8.000	7.240	0.377	0.000	0.000	0.000	GP2-0800724-037
8.000	7.270	0.750	0.000	0.000	0.000	PHD-0800727-075
8.000	7.280	0.377	0.000	0.000	0.000	GP2-0800728-037
8.000	7.482	0.159	0.000	0.000	0.000	GP2-0800748-015
8.000	7.524	0.366	0.000	0.000	0.000	GP6-0800752-036
8.125	7.607	0.159	0.000	0.000	0.000	GP2-0812760-015
8.250	7.260	0.380	0.000	0.000	0.000	GP2-0825726-038
8.250	7.260	0.630	0.000	0.000	0.000	GP8-0825726-063
8.250	7.732	0.159	0.000	0.000	0.000	GP2-0825773-015
8.375	7.895	0.579	0.000	0.000	0.000	GP8-0837789-057
8.437	7.677	0.377	0.000	0.000	0.000	GP8-0843767-037
8.500	7.510	0.380	0.000	0.000	0.000	GP2-0850751-038
8.500	7.510	0.630	0.000	0.000	0.000	GP8-0850751-063
8.500	7.624	0.000	0.000	0.000	0.000	GP8-0850762-037



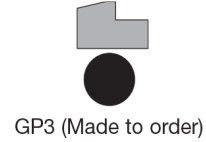
GP2



GP2†



GP2‡



GP3 (Made to order)



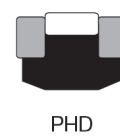
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
8.500	7.740	0.377	0.000	0.000	0.000	GP8-0850774-037
8.500	7.740	0.377	0.000	0.000	0.000	GP2-0850774-037
8.500	7.770	0.750	0.000	0.000	0.000	PHD-0850777-075
8.500	7.982	0.159	0.000	0.000	0.000	GP2-0850798-015
8.530	7.770	0.377	0.000	0.000	0.000	GP8-0853777-037
8.750	8.232	0.159	0.000	0.000	0.000	GP2-0875823-015
9.000	8.122	0.379	0.000	0.000	0.000	GP2-0900812-037
9.000	8.170	0.377	0.000	0.000	0.000	GP2-0900817-037
9.000	8.270	0.750	0.000	0.000	0.000	PHD-0900827-075
9.000	8.482	0.159	0.000	0.000	0.000	GP2-0900848-015
9.250	8.255	0.379	0.000	0.000	0.000	GP8-0925825-037
9.250	8.260	0.380	0.000	0.000	0.000	GP2-0925826-038
9.250	8.732	0.159	0.000	0.000	0.000	GP2-0925873-015
9.500	8.380	0.440	0.000	0.000	0.000	GP2-0950838-044
9.500	8.622	0.379	0.000	0.000	0.000	GP2-0950862-037
9.500	8.670	0.322	0.000	0.000	0.000	GP2-0950867-032
9.500	8.982	0.159	0.000	0.000	0.000	GP2-0950898-015
9.500	9.020	0.579	0.000	0.000	0.000	GP8-0950902-057
9.750	9.232	0.159	0.000	0.000	0.000	GP2-0975923-015
9.875	9.000	0.377	0.000	0.000	0.000	GP8-0987900-037
10.000	8.880	0.690	0.000	0.000	0.000	GP8-1000888-069
10.000	9.122	0.000	0.000	0.000	0.000	GP8-1000912-037
10.000	9.122	0.379	0.000	0.000	0.000	GP2-1000912-037
10.000	9.170	0.322	0.000	0.000	0.000	GP2-1000917-032
10.000	9.270	0.750	0.000	0.000	0.000	PHD-1000927-075
10.000	9.482	0.159	0.000	0.000	0.000	GP2-1000948-015
10.500	9.380	0.690	0.000	0.000	0.000	GP8-1050938-069
10.500	9.982	0.159	0.000	0.000	0.000	GP2-1050998-015
10.500	10.020	0.579	0.000	0.000	0.000	GP8-1050100-057
11.000	10.122	0.379	0.000	0.000	0.000	GP2-1100101-039
11.000	10.270	0.750	0.000	0.000	0.000	PHD-1100102-075



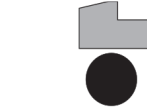
GP2



GP2†



GP2‡



GP3 (Made to order)



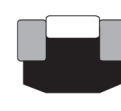
GP4



GP6



GP8



PHD

OD	ID	L1	L2	OD2	OD3	Product Name
11.000	10.482	0.159	0.000	0.000	0.000	GP2-1100104-015
11.500	10.982	0.159	0.000	0.000	0.000	GP2-1150109-015
11.500	11.020	0.579	0.000	0.000	0.000	GP8-1150110-057
11.750	10.872	0.000	0.000	0.000	0.000	GP8-1175108-037
11.750	11.270	0.579	0.000	0.000	0.000	GP8-1175112-057
12.000	11.122	0.000	0.000	0.000	0.000	GP8-1200111-037
12.000	11.170	0.322	0.000	0.000	0.000	GP2-1200111-032
12.000	11.270	0.750	0.000	0.000	0.000	PHD-1200112-075
12.000	11.482	0.159	0.000	0.000	0.000	GP2-1200114-015
12.500	11.624	0.377	0.000	0.000	0.000	GP8-1250116-037
12.500	11.982	0.159	0.000	0.000	0.000	GP2-1250119-015
13.000	12.122	0.379	0.000	0.000	0.000	GP2-1300121-037
13.000	12.250	0.579	0.000	0.000	0.000	GP8-1300125-057
13.000	12.270	0.750	0.000	0.000	1,300,122.00	PHD-1300122-075
13.000	12.482	0.159	0.000	0.000	0.000	GP2-1300124-015
14.000	12.898	0.687	0.000	0.000	0.000	PHD-1400128-068
14.000	13.122	0.379	0.000	0.000	0.000	GP2-1400131-037
14.000	13.270	0.750	0.000	0.000	0.000	PHD-1400132-075
14.000	13.482	0.159	0.000	0.000	0.000	GP2-1400134-015
14.000	13.520	0.579	0.000	0.000	0.000	GP8-1400135-057
75.000	59.500	0.000	0.000	0.000	0.000	GP8-075059-063





# 15

## Hydraulic Rod Seal

### Design

15 style symmetrical U-cups are a double chamfered U-ring seal manufactured from Polyurethane 92 Shore A. This material is well known for its superior abrasion resistance, low compression set and resistance to extrusion. The symmetrical configuration, with equal lip interference and equal heel clearance on both the inside and outside diameters, provides a seal which is capable for use in both piston and rod applications. The sealing lips are knife trimmed to eliminate all moulding flash and to provide superior low pressure sealing performance.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

0.8m/sec  
2.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing d$	$\varnothing D$	L
0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
$\varnothing d (+0.0)$	-.001	-.002	-.002	-.002	-.002	-.003
$\varnothing D (-0.0)$	+.002	+.002	+.003	+.004	+.005	+.007
L	-.000 / + .015					

#### Chamfer Radii

	1/8	3/16	1/4	5/16	3/8	1/2
C/S	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

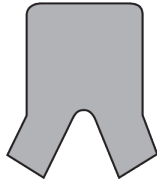
Pressure	2,400	3,750	6,000	7,500	10,000
	0.018	0.010	0.004	Call	Call

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



Rod seals



### Key Features

Medium to heavy duty

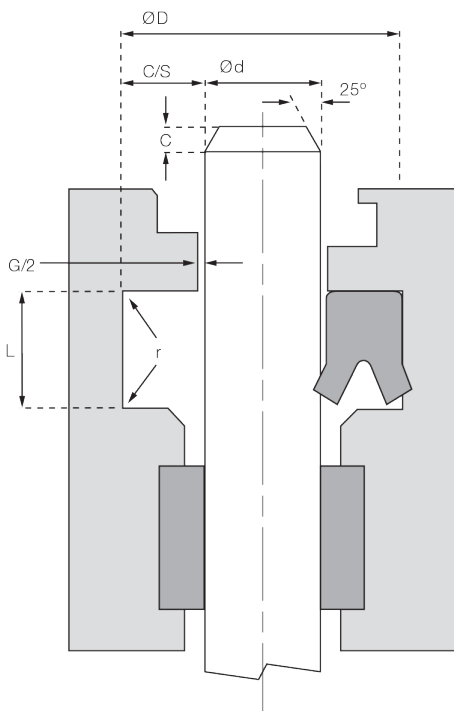
Piston or rod

Symmetrical lip design

Excellent wear resistance

Good extrusion resistance

Flexible to fit

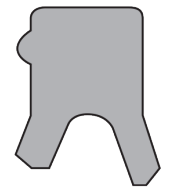




# 23

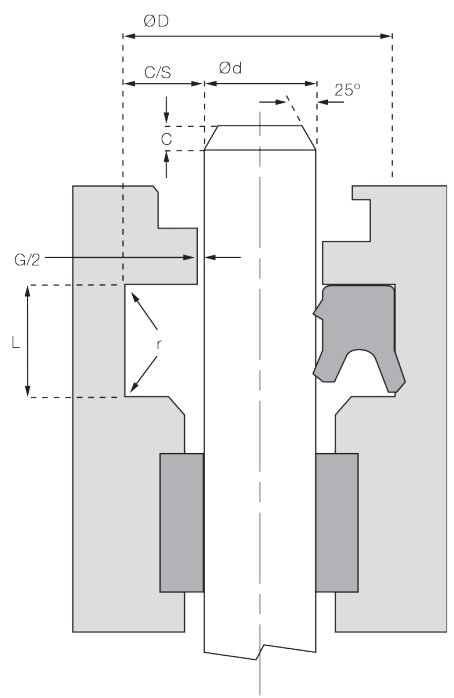
## Hydraulic Rod Seal

Rod seals



### Key Features

- Medium to heavy duty
- Rod seal only
- Good at low temperature
- Excellent stability
- Lower in friction
- Easy to fit



### Design

23 style asymmetrical single acting rod seals have chamfered lips and are manufactured from Polyurethane 92 Shore A and has two sealing lips on the dynamic surface. A fluid ring is moulded behind the primary sealing lip toward the heel of the seal. This provides for a lubrication pocket and helps reduce stick slip. The second sealing lip also has the function of keeping the entire packing in contact with the static housing particularly when temperatures get so low they cause contractions of the sealing ring. Both lips have precision knife trimmed chamfers to provide complete circumferential lip contact.

### Operating Conditions

<b>Pressure</b>	
400 Bar	
6,000 Psi	

<b>Temperature</b>	
-40° to 110° C	
-40° to 230° F	

<b>Speed</b>	
0.8m/sec	
2.5'/sec	

<b>Surface Finish µmRa</b>	
Ød	0.8
ØD	0.8
L	2.0

<b>Tolerances</b>						
	1/8	3/16	1/4	5/16	3/8	1/2
Ød (+0.0)	-.001	-.002	-.002	-.002	-.002	-.003
ØD (-0.0)	+.002	+.002	+.003	+.004	+.005	+.007
L	-.000 / + .015					

<b>Chamfer Radii</b>						
C/S	1/8	3/16	1/4	5/16	3/8	1/2
	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

<b>Extrusion Gap G</b>					
Pressure	2,400	3,750	6,000	7,500	10,000
	0.018	0.010	0.004	Call	Call

**Typical Examples**  
 Reciprocating  Rotary  Oscillating  Helix





# 30

## Hydraulic Rod Seal

### Design

Style 30 are an energised U cup design. They combine the superior field tested physical characteristics of liquid cast 92 Shore A Polyurethane with technically advanced design to produce an outstanding all purpose seal. The inner elastomeric spring element of NBR is designed and strategically positioned to create the necessary lip interference without excessive friction. This energiser will not become disengaged when severely distorted as is sometimes necessary when installing U-packs in rod applications. The sealing lips are knife chamfered to maintain circumferential lip contact.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



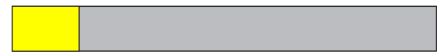
#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

0.8m/sec  
2.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing d$	$\varnothing D$	L
0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
$\varnothing d (+0.0)$	-0.001	-0.002	-0.002	-0.002	-0.002	-0.003
$\varnothing D (-0.0)$	+0.002	+0.002	+0.003	+0.004	+0.005	+0.007
L	-0.000 / + .015					

#### Chamfer Radii

C/S	1/8	3/16	1/4	5/16	3/8	1/2
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

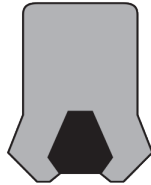
Pressure	2,400	3,750	6,000	7,500	10,000
G	0.018	0.010	0.004	Call	Call

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



Rod seals



### Key Features

Medium to heavy duty

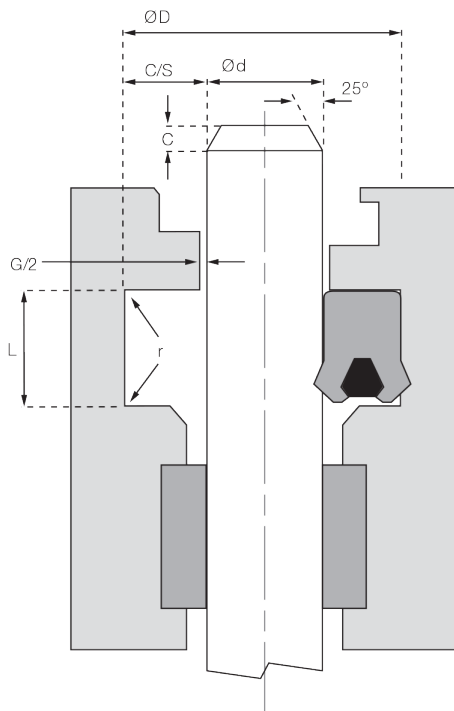
Piston or rod

Symmetrical lip design

Good lower pressure sealing

Good extrusion resistance

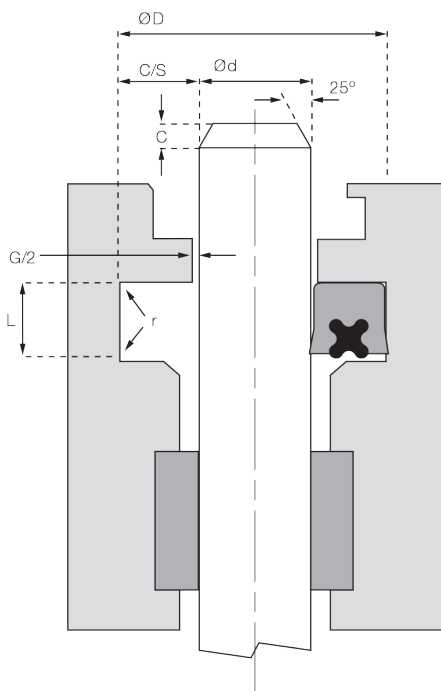
Flexible to fit





### Key Features

- Medium duty
- Piston or rod
- Symmetrical lip design
- Good lower pressure sealing
- Flexible to fit



# 35

## Hydraulic Rod Seal

### Design

35 style are a standard profile loaded U-pack single acting seal with non chamfered lips consisting of a Polyurethane casing with an o-ring or quad ring NBR energiser. The energising element is designed and strategically positioned to create the necessary lip interference without excessive friction. At low or zero pressure the energiser helps to increase the sealing force preventing any bypass. The symmetrical style allows it to be fitted to either rod or piston housings with ease given its flexibility.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

0.8m/sec  
2.5"/sec



#### Surface Finish µmRa

Ød	ØD	L
0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
Ød (+0.0)	-.001	-.002	-.002	-.002	-.002	-.003
ØD (-0.0)	+.002	+.002	+.003	+.004	+.005	+.007
L	-.000 / + .015					

#### Chamfer Radii

	1/8	3/16	1/4	5/16	3/8	1/2
C/S	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

Pressure	2,400	3,750	6,000	7,500	10,000
G	0.018	0.010	0.004	Call	Call

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

Replacement seal only in gland applications





# 36

## Hydraulic Rod Seal

### Design

36 style rod seal combines the excellent sealability and low compression set of a resilient NBR lip with the greater anti-extrusion characteristics of a hard thermoplastic base. Under low pressure conditions, the NBR sealing lip provides its own compressive sealing force. As pressure increases, hydrostatic pressure is mechanically transmitted through the NBR element into the extrusion resistant hard thermoplastic base. The radial force then deflects radially in a controlled manner, closing the extrusion gap behind the NBR sealing lip. Specifically designed with a greater tolerance to side loading and additional compensation for axial run-out.

### Operating Conditions

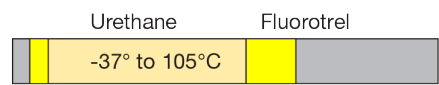
#### Pressure

350 Bar  
5,000 Psi



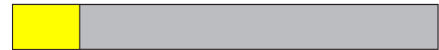
#### Temperature

-54° to 129°C  
-65° to 265°F



#### Speed

0.8m/sec  
2.5'/sec



#### Surface Finish $\mu\text{mRa}$

	$\varnothing d$	$\varnothing D$	L
	0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
$\varnothing d (+0.0)$	-0.001	-0.002	-0.002	-0.002	-0.002	-0.003
$\varnothing D (-0.0)$	+0.002	+0.002	+0.003	+0.004	+0.005	+0.007
L	-0.000 / + .015					

#### Chamfer Radii

	1/8	3/16	1/4	5/16	3/8	1/2
C/S	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

Pressure	2,400	3,750	5,000	7,500	10,000
Urethane base 65°C	0.016	0.010	0.006	call	call
Fluorotrel base 121°C	0.024	0.015	0.009	call	call

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

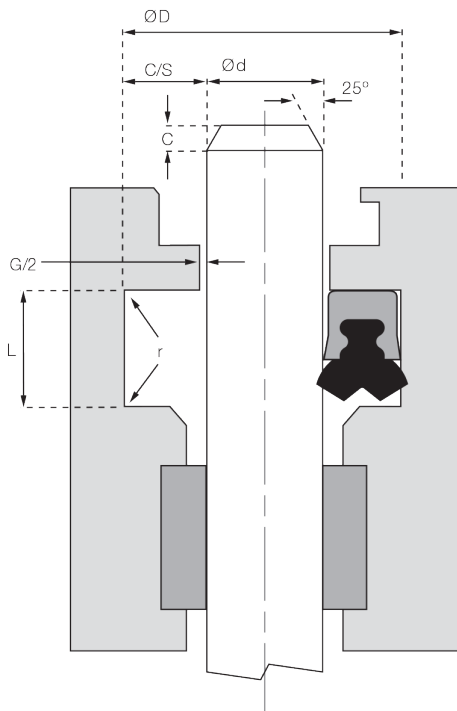


Rod seals



### Key Features

- Heavy Duty to severe
- Excellent sealing throughout pressure & temperature range
- Side load tolerant
- Axial run-out tolerant
- Easy to install





# 38

## Hydraulic Rod Seal

### Design

38 style are a heavier duty single acting seal with chamfered lips, combining the low pressure abilities of energised types with the low temperature abilities provided by the fluid ring moulded between the primary and secondary sealing lips. A low contact area reduces the friction and stick slip phenomena. The second sealing lip has the function of keeping the entire packing in contact with the static housing particularly when temperatures get so low they cause contractions of the sealing ring. Both lips have precision knife trimmed chamfers to provide complete circumferential lip contact. An anti-extrusion ring combines to make a reliable, arduous application seal.

### Operating Conditions

#### Pressure

700 Bar  
10,000 Psi



#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

0.8m/sec  
2.5'/sec



#### Surface Finish µmRa

Ød	ØD	L
0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
Ød (+0.0)	-.001	-.002	-.002	-.002	-.002	-.003
ØD (-0.0)	+.002	+.002	+.003	+.004	+.005	+.007
L	-.000 / +.015					

#### Chamfer Radii

C/S	1/8	3/16	1/4	5/16	3/8	1/2
C/S	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

Pressure	2,400	3,750	6,000	7,500	10,000
G	0.040	0.032	0.024	0.016	0.010

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

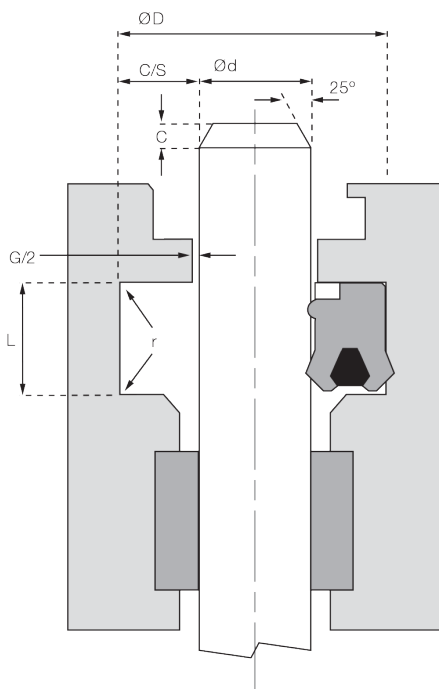


Rod seals



### Key Features

- Higher pressures
- Shock load capability
- Good at low temperature
- Anti-extrusion ring
- Twin lip design for stability





# 40

## Hydraulic Rod Seal

### Design

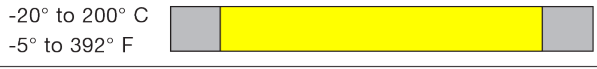
40 style are a standard profile loaded U-pack single acting seal with chamfered lips. They have a Viton 90 Shore A casing with an o-ring or quad ring Viton 75 Shore A energiser. The energising element is designed and strategically positioned to create the necessary lip interference without excessive friction. The symmetrical style allows it to be fitted to either rod or piston housings with ease given its flexibility. The advantage of Viton is its high temperature abilities and also its toughness and wear resistance.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

	1/8	3/16	1/4	5/16	3/8	1/2
$\varnothing D (+0.0)$	-.001	-.002	-.002	-.002	-.002	-.003
$\varnothing d (-0.0)$	+.002	+.002	+.003	+.004	+.005	+.007
L	-.000 / +.015					

#### Chamfer Radii

C/S	1/8	3/16	1/4	5/16	3/8	1/2
	.125	.187	.250	.312	.375	.500
C (Min)	.093	.093	.125	.156	.187	.217
r (Max)	.008	.008	.016	.032	.032	.032

#### Extrusion Gap G

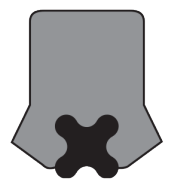
Pressure	2,000
	0.010

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

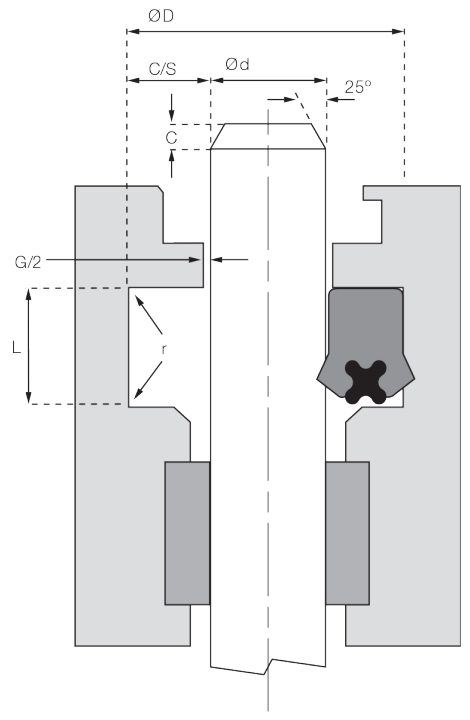


Rod seals



### Key Features

- Medium duty
- Piston or rod
- High temperature resistance
- Wear resistance





# 45

## Hydraulic Rod Seal

Rod seals



### Key Features

- Medium duty
- Piston or rod
- High temperature resistance
- Wear resistance

### Design

45 style are a standard profile loaded U-pack single acting seal with non chamfered lips. They have a Viton 90 Shore A casing with an o-ring or quad ring Viton 75 Shore A energiser. The energising element is designed and strategically positioned to create the necessary lip interference without excessive friction. The symmetrical style allows it to be fitted to either rod or piston housings with ease given its flexibility. The inner elastomeric energiser is designed and strategically positioned to create the necessary lip interference without excessive friction. The advantage of Viton is its high temperature abilities and also its toughness and wear resistance.

### Operating Conditions

Pressure	Bar	Psi
150 Bar	2,000 Psi	

Temperature	Celsius	Fahrenheit
-20° to 200° C	-5° to 392° F	

Speed	m/sec	ft/sec
0.5m/sec	1.5' / sec	

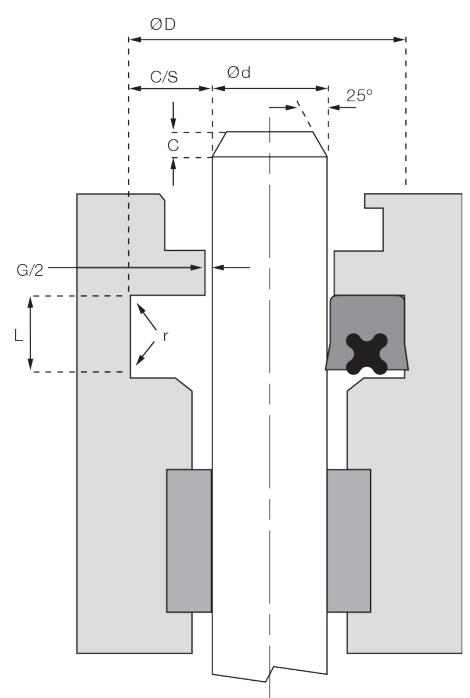
Surface Finish $\mu\text{mRa}$	$\varnothing D$	$\varnothing d$	L
	0.1-0.25	0.8	2.0

Tolerances	1/8	3/16	1/4	5/16	3/8	1/2
$\varnothing D (+0.0)$	-.001	-.002	-.002	-.002	-.002	-.003
$\varnothing d (-0.0)$	+.002	+.002	+.003	+.004	+.005	+.007
L	-.000 / + .015					

Chamfer Radii	C/S	1/8	3/16	1/4	5/16	3/8	1/2
C/S		.125	.187	.250	.312	.375	.500
C (Min)		.093	.093	.125	.156	.187	.217
r (Max)		.008	.008	.016	.032	.032	.032

Extrusion Gap G	Pressure	2,000	0.010

Typical Examples	Reciprocating	Rotary	Oscillating	Helix
	✓	✗	✗	✗





# CP

## Hydraulic Rod Seal

### Design

CP are designed with a symmetrical profile and with chamfered lips, it can be used as a single acting piston or rod seal. The seal is a precision moulded NBR sealing element with a bonded fabric reinforced base to resist extrusion. Manufactured with initial radial interference to effect low pressure sealing, as pressure increases the seal is energised thus increasing the sealing force. Rubberised fabric has the advantage of retaining the sealing media within its surfaces reducing friction and wear.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing d$	$\varnothing D$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing d$	$\varnothing D$	L
js11	H10	-0 + 0.010

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

#### Extrusion Gap G

Pressure	1,500	3,750	6,000
	0.016	0.010	0.004

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



Rod seals



### Key Features

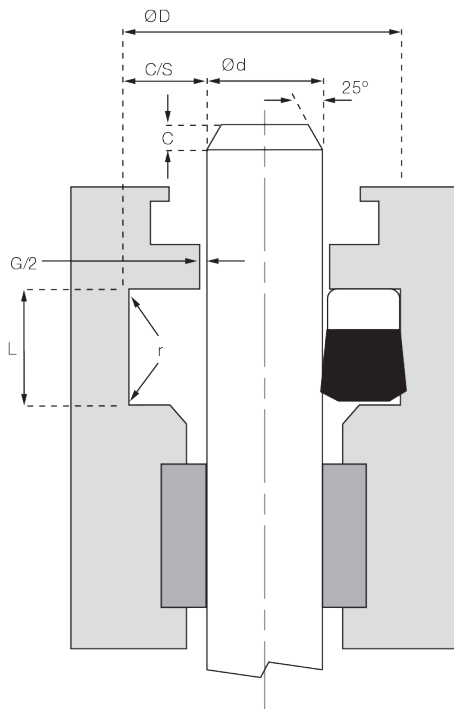
Medium to heavy duty

Piston or rod

Tolerant of surface imperfections

Good service life

Good extrusion resistance



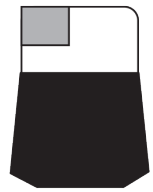




# CPI

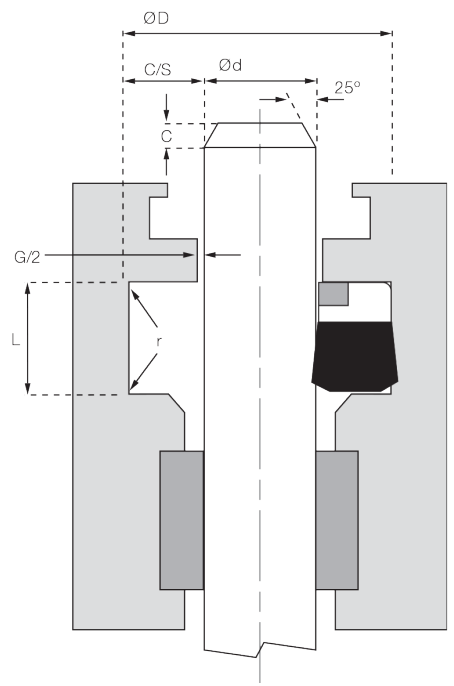
## Hydraulic Rod Seal

Rod seals



### Key Features

- Medium and heavy duty
- Higher pressure
- Hard wearing
- Anti-extrusion ring
- Tolerant of surface imperfections
- Excellent extrusion resistance



### Design

CPI are a single acting rod seal with chamfered lips. This seal is a precision moulded NBR sealing element with a fabric reinforced base and an Polyacetal back up ring to resist extrusion. The anti-extrusion ring allows larger clearances and higher pressures and can be split for easier installation without undermining performance. Designed with initial radial interference to effect low pressure sealing, as pressures increase the seal is progressively energised increasing sealing force. Rubberised fabric has the advantage of retaining the sealing media within its surfaces reducing friction and wear.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish $\mu mRa$

$\varnothing d$	$\varnothing D$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing d$	$\varnothing D$	L
f8	js11	-0 + 0.010

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

#### Extrusion Gap G

Pressure	1,500	3,750	6,000
	0.025	0.018	0.016

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
0.125	0.375	0.125	0.138	0.000	0.000	35-12500125
0.125	0.375	0.250	0.275	0.000	0.000	30-12500125-250
0.187	0.437	0.125	0.138	0.000	0.000	35-12500187
0.187	0.437	0.250	0.275	0.000	0.000	30-12500187-250
0.187	0.500	0.280	0.308	0.000	0.000	CP-050018
0.250	0.500	0.125	0.138	0.000	0.000	30-12500250
0.250	0.500	0.250	0.275	0.000	0.000	30-12500250-250
0.250	0.500	0.250	0.275	0.000	0.000	15-12500250-250
0.187	0.562	0.187	0.207	0.000	0.000	30-18700187
0.250	0.562	0.250	0.265	0.000	0.000	CP-056025
0.250	0.562	0.250	0.275	0.000	0.000	23-15600250-250
0.312	0.562	0.125	0.138	0.000	0.000	30-12500312
0.312	0.562	0.250	0.275	0.000	0.000	15-12500312-250
0.250	0.625	0.187	0.207	0.000	0.000	30-18700250
0.312	0.625	0.250	0.265	0.000	0.000	CP-062031
0.375	0.625	0.125	0.138	0.000	0.000	30-12500375
0.375	0.625	0.187	0.202	0.000	0.000	CP-062037
0.375	0.625	0.250	0.275	0.000	0.000	30-12500375-250
0.187	0.687	0.187	0.207	0.000	0.000	30-25000187-187
0.250	0.687	0.250	0.275	0.000	0.000	15-21800250-250
0.312	0.687	0.187	0.207	0.000	0.000	30-18700312
0.437	0.687	0.125	0.138	0.000	0.000	30-12500437
0.437	0.687	0.250	0.275	0.000	0.000	30-12500437-250
0.250	0.750	0.250	0.275	0.000	0.000	35-25000250
0.375	0.750	0.187	0.207	0.000	0.000	35-18700375
0.375	0.750	0.250	0.275	0.000	0.000	30-18700375-250
0.375	0.750	0.281	0.296	0.000	0.000	CP-075037
0.375	0.750	0.312	0.000	0.000	0.000	30-18700375-312
0.375	0.750	0.312	0.344	0.000	0.000	15-18700375-312
0.437	0.750	0.156	0.172	0.000	0.000	35-15600437
0.500	0.750	0.125	0.138	0.000	0.000	45-12500500



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
0.500	0.750	0.125	0.138	0.000	0.000	30-12500500
0.500	0.750	0.187	0.207	0.000	0.000	30-12500500-187
0.500	0.750	0.187	0.202	0.000	0.000	CP-075050
0.500	0.750	0.250	0.275	0.000	0.000	30-12500500-250
0.312	0.812	0.250	0.275	0.000	0.000	15-25000312
0.437	0.812	0.187	0.207	0.000	0.000	35-18700437
0.562	0.812	0.125	0.138	0.000	0.000	45-12500562
0.562	0.812	0.125	0.138	0.000	0.000	30-12500562
0.562	0.812	0.250	0.275	0.000	0.000	15-12500562-250
0.375	0.875	0.250	0.275	0.000	0.000	35-25000375
0.500	0.875	0.187	0.207	0.000	0.000	45-18700500
0.500	0.875	0.187	0.207	0.000	0.000	30-18700500
0.500	0.875	0.281	0.296	0.000	0.000	CP-087050
0.500	0.875	0.312	0.344	0.000	0.000	40-18700500-312
0.500	0.875	0.312	0.343	0.000	0.000	30-18700500-312
0.625	0.875	0.000	0.000	0.000	0.000	23-12500625-187
0.625	0.875	0.125	0.138	0.000	0.000	40-12500625
0.625	0.875	0.125	0.138	0.000	0.000	30-12500625
0.625	0.875	0.187	0.202	0.000	0.000	CP-087062
0.625	0.875	0.187	0.207	0.000	0.000	30-12500625-187
0.625	0.875	0.250	0.275	0.000	0.000	30-12500625-250
0.625	0.875	0.250	0.275	0.000	0.000	23-12500625-250
0.437	0.937	0.250	0.275	0.000	0.000	35-25000437
0.437	0.937	0.375	0.413	0.000	0.000	30-25000437-375
0.562	0.937	0.187	0.207	0.000	0.000	35-18700562
0.562	0.937	0.187	0.207	0.000	0.000	30-18700562
0.562	0.937	0.312	0.344	0.000	0.000	15-18700562-312
0.687	0.937	0.125	0.138	0.000	0.000	35-12500687
0.687	0.937	0.250	0.275	0.000	0.000	30-12500687-250
0.500	1.000	0.250	0.275	0.000	0.000	30-25000500
0.500	1.000	0.375	0.385	0.000	0.000	CP-100050





CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
0.500	1.000	0.375	0.413	0.000	0.000	30-25000500-375
0.625	1.000	0.187	0.207	0.000	0.000	45-18700625
0.625	1.000	0.187	0.207	0.000	0.000	30-18700625
0.625	1.000	0.281	0.296	0.000	0.000	CPI-100062
0.625	1.000	0.281	0.296	0.000	0.000	CP-100062
0.625	1.000	0.312	0.344	0.000	0.000	30-18700625-312
0.750	1.000	0.125	0.138	0.000	0.000	45-12500750
0.750	1.000	0.125	0.138	0.000	0.000	30-12500750
0.750	1.000	0.125	0.138	0.000	0.000	23-12500750
0.750	1.000	0.187	0.202	0.000	0.000	CP-100075
0.750	1.000	0.187	0.207	0.000	0.000	30-12500750-187
0.750	1.000	0.187	0.207	0.000	0.000	23-12500750-187
0.750	1.000	0.250	0.275	0.000	0.000	30-12500750-250
0.750	1.000	0.250	0.275	0.000	0.000	23-12500750-250
0.562	1.062	0.250	0.275	0.000	0.000	35-25000562
0.687	1.062	0.187	0.207	0.000	0.000	35-18700687
0.750	1.062	0.156	0.172	0.000	0.000	35-15600750
0.812	1.062	0.125	0.138	0.000	0.000	30-12500812
0.812	1.062	0.250	0.275	0.000	0.000	30-12500812-250
0.500	1.125	0.312	0.344	0.000	0.000	35-31200500
0.625	1.125	0.250	0.275	0.000	0.000	45-25000625
0.625	1.125	0.250	0.275	0.000	0.000	35-25000625
0.625	1.125	0.250	0.275	0.000	0.000	30-25000625
0.625	1.125	0.312	0.344	0.000	0.000	30-25000625-312
0.625	1.125	0.375	0.390	0.000	0.000	CP-112062
0.625	1.125	0.375	0.413	0.000	0.000	30-25000625-375
0.750	1.125	0.187	0.207	0.000	0.000	45-18700750
0.750	1.125	0.187	0.207	0.000	0.000	30-18700750
0.750	1.125	0.250	0.275	0.000	0.000	30-18700750-250
0.750	1.125	0.312	0.344	0.000	0.000	30-18700750-312
0.750	1.125	0.312	0.327	0.000	0.000	CP-112075



CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
0.750	1.125	0.312	0.344	0.000	0.000	23-18700750-312
0.750	1.125	0.375	0.413	0.000	0.000	30-18700750-375
0.875	1.125	0.000	0.000	0.000	0.000	23-12500875-187
0.875	1.125	0.125	0.138	0.000	0.000	45-12500875
0.875	1.125	0.125	0.138	0.000	0.000	30-12500875
0.875	1.125	0.163	0.178	0.000	0.000	CP-112087
0.875	1.125	0.187	0.207	0.000	0.000	30-12500875-187
0.875	1.125	0.250	0.275	0.000	0.000	45-12500875-250
0.875	1.125	0.250	0.275	0.000	0.000	30-12500875-250
0.875	1.125	0.250	0.275	0.000	0.000	23-12500875-250
0.687	1.187	0.250	0.275	0.000	0.000	15-25000687
0.812	1.187	0.187	0.207	0.000	0.000	35-18700812
0.812	1.187	0.312	0.344	0.000	0.000	30-18700812-312
0.937	1.187	0.125	0.138	0.000	0.000	45-12500937
0.937	1.187	0.125	0.138	0.000	0.000	35-12500937
0.937	1.187	0.250	0.275	0.000	0.000	30-12500937-250
0.500	1.250	0.375	0.413	0.000	0.000	35-37500500
0.625	1.250	0.312	0.344	0.000	0.000	35-31200625
0.750	1.250	0.250	0.275	0.000	0.000	30-25000750
0.750	1.250	0.312	0.327	0.000	0.000	CP-125075/1
0.750	1.250	0.375	0.390	0.000	0.000	CP-125075/2
0.750	1.250	0.375	0.413	0.000	0.000	30-25000750-375
0.875	1.250	0.187	0.207	0.000	0.000	30-18700875
0.875	1.250	0.250	0.275	0.000	0.000	15-18700875-250
0.875	1.250	0.312	0.344	0.000	0.000	30-18700875-312
0.875	1.250	0.375	0.390	0.000	0.000	CP-125087
1.000	1.250	0.121	0.136	0.000	0.000	CP-125100/1
1.000	1.250	0.125	0.138	0.000	0.000	45-12501000
1.000	1.250	0.125	0.138	0.000	0.000	30-12501000
1.000	1.250	0.187	0.207	0.000	0.000	30-12501000-187
1.000	1.250	0.187	0.202	0.000	0.000	CPI-125100



CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.000	1.250	0.187	0.207	0.000	0.000	23-12501000-187
1.000	1.250	0.250	0.275	0.000	0.000	30-12501000-250
1.000	1.250	0.250	0.275	0.000	0.000	40-12501000-250
1.000	1.250	0.250	0.275	0.000	0.000	23-12501000-250
0.687	1.312	0.312	0.343	0.000	31,200,687.000	35-31200687
0.812	1.312	0.250	0.275	0.000	0.000	35-25000812
0.937	1.312	0.187	0.207	0.000	0.000	35-18700937
0.937	1.312	0.312	0.344	0.000	0.000	30-18700937-312
1.000	1.312	0.000	0.000	0.000	0.000	15-15601000-219
1.000	1.312	0.156	0.172	0.000	0.000	35-15601000
1.000	1.312	0.156	0.172	0.000	0.000	40-15601000
1.000	1.312	0.156	0.172	0.000	0.000	23-15601000
1.062	1.312	0.125	0.138	0.000	0.000	30-12501062
1.062	1.312	0.187	0.207	0.000	0.000	23-12501062-187
1.062	1.312	0.250	0.275	0.000	0.000	30-12501062-250
1.062	1.312	0.250	0.275	0.000	0.000	23-12501062-250
0.625	1.375	0.375	0.413	0.000	0.000	35-37500625
0.750	1.375	0.312	0.344	0.000	0.000	35-31200750
0.875	1.375	0.000	0.000	0.000	0.000	30-25000875-312
0.875	1.375	0.250	0.265	0.000	0.000	CPI-137087/1
0.875	1.375	0.250	0.275	0.000	0.000	30-25000875
0.875	1.375	0.375	0.390	0.000	0.000	CP-137087
0.875	1.375	0.375	0.413	0.000	0.000	30-25000875-375
1.000	1.375	0.187	0.207	0.000	0.000	30-18701000
1.000	1.375	0.187	0.207	0.000	0.000	45-18701000
1.000	1.375	0.187	0.207	0.000	0.000	23-18701000
1.000	1.375	0.250	0.275	0.000	0.000	30-18701000-250
1.000	1.375	0.250	0.265	0.000	0.000	CPI-137100
1.000	1.375	0.250	0.265	0.000	0.000	CP-137100
1.000	1.375	0.250	0.275	0.000	0.000	23-18701000-250
1.000	1.375	0.312	0.344	0.000	0.000	30-18701000-312



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.000	1.375	0.312	0.344	0.000	0.000	23-18701000-312
1.000	1.375	0.375	0.413	0.000	0.000	40-18701000-375
1.000	1.375	0.375	0.413	0.000	0.000	30-18701000-375
1.000	1.375	0.375	0.413	0.000	0.000	15-18701000-375
1.125	1.375	0.125	0.138	0.000	0.000	45-12501125
1.125	1.375	0.125	0.138	0.000	0.000	30-12501125
1.125	1.375	0.187	0.202	0.000	0.000	CP-137112
1.125	1.375	0.187	0.207	0.000	0.000	30-12501125-187
1.125	1.375	0.187	0.207	0.000	0.000	23-12501125-187
1.125	1.375	0.250	0.275	0.000	0.000	30-12501125-250
1.125	1.375	0.250	0.275	0.000	0.000	23-12501125-250
0.937	1.437	0.250	0.275	0.000	0.000	30-25000937
0.937	1.437	0.375	0.390	0.000	0.000	CP-143093
1.062	1.437	0.187	0.207	0.000	0.000	35-18701062
1.062	1.437	0.312	0.344	0.000	0.000	30-18701062-312
1.125	1.437	0.156	0.171	0.000	0.000	35-15601125
1.187	1.437	0.125	0.138	0.000	0.000	30-12501187
1.187	1.437	0.187	0.207	0.000	0.000	30-12501187-187
1.187	1.437	0.250	0.275	0.000	0.000	30-12501187-250
0.750	1.500	0.375	0.413	0.000	0.000	35-37500750
0.875	1.500	0.312	0.344	0.000	0.000	35-31200875
0.875	1.500	0.375	0.390	0.000	0.000	CP-150087
0.980	1.500	0.380	0.395	0.000	0.000	CP-150098
1.000	1.500	0.250	0.265	0.000	0.000	CP-150100/1
1.000	1.500	0.250	0.265	0.000	0.000	CPI-150100/1
1.000	1.500	0.250	0.275	0.000	0.000	30-25001000
1.000	1.500	0.341	0.375	0.000	0.000	23-25001000-341
1.000	1.500	0.375	0.413	0.000	0.000	40-25001000-375
1.000	1.500	0.375	0.413	0.000	0.000	30-25001000-375
1.000	1.500	0.375	0.390	0.000	0.000	CPI-150100
1.000	1.500	0.375	0.413	0.000	0.000	23-25001000-375



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.125	1.500	0.187	0.207	0.000	0.000	30-18701125
1.125	1.500	0.250	0.275	0.000	0.000	30-18701125-250
1.125	1.500	0.312	0.344	0.000	0.000	30-18701125-312
1.187	1.500	0.156	0.172	0.000	0.000	45-15601187
1.187	1.500	0.156	0.172	0.000	0.000	35-15601187
1.250	1.500	0.125	0.138	0.000	0.000	45-12501250
1.250	1.500	0.125	0.138	0.000	0.000	30-12501250
1.250	1.500	0.187	0.207	0.000	0.000	30-12501250-187
1.250	1.500	0.187	0.207	0.000	0.000	23-12501250-187
1.250	1.500	0.250	0.275	0.000	0.000	40-12501250-250
1.250	1.500	0.250	0.275	0.000	0.000	30-12501250-250
1.250	1.500	0.250	0.275	0.000	0.000	23-12501250-250
1.250	1.500	0.312	0.344	0.000	0.000	23-12501250-312
1.062	1.562	0.250	0.275	0.000	0.000	30-25001062
1.125	1.562	0.343	0.358	0.000	0.000	CPI-156112
1.187	1.562	0.187	0.207	0.000	0.000	35-18701187
1.187	1.562	0.250	0.275	0.000	0.000	30-18701187-250
1.187	1.562	0.250	0.275	0.000	0.000	23-18701187-250
1.187	1.562	0.312	0.344	0.000	0.000	30-18701187-312
1.187	1.562	0.375	0.413	0.000	0.000	30-18701187-375
1.250	1.562	0.156	0.172	0.000	0.000	35-15601250
1.312	1.562	0.125	0.138	0.000	0.000	30-12501312
0.875	1.625	0.375	0.413	0.000	0.000	35-37500875
1.000	1.625	0.312	0.344	0.000	0.000	30-31201000
1.000	1.625	0.437	0.452	0.000	0.000	CP-162100
1.000	1.625	0.500	0.550	0.000	0.000	30-31201000-500
1.125	1.625	0.250	0.275	0.000	0.000	45-25001125
1.125	1.625	0.250	0.275	0.000	0.000	30-25001125
1.125	1.625	0.250	0.275	0.000	0.000	23-25001125
1.125	1.625	0.312	0.344	0.000	0.000	30-25001125-312
1.125	1.625	0.375	0.390	0.000	0.000	CP-162112



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.125	1.625	0.375	0.390	0.000	0.000	CPI-162112
1.125	1.625	0.375	0.413	0.000	0.000	30-25001125-375
1.250	1.625	0.187	0.207	0.000	0.000	30-18701250
1.250	1.625	0.187	0.207	0.000	0.000	45-18701250
1.250	1.625	0.187	0.207	0.000	0.000	23-18701250
1.250	1.625	0.250	0.275	0.000	0.000	30-18701250-250
1.250	1.625	0.250	0.275	0.000	0.000	38-18701250-250
1.250	1.625	0.250	0.265	0.000	0.000	CP-162125/1
1.250	1.625	0.250	0.265	0.000	0.000	CPI-162125/1
1.250	1.625	0.250	0.275	0.000	0.000	23-18701250-250
1.250	1.625	0.281	0.296	0.000	0.000	CP-162125
1.250	1.625	0.312	0.344	0.000	0.000	40-18701250-312
1.250	1.625	0.312	0.344	0.000	0.000	30-18701250-312
1.250	1.625	0.312	0.344	0.000	0.000	23-18701250-312
1.250	1.625	0.375	0.413	0.000	0.000	30-18701250-375
1.250	1.625	0.375	0.413	0.000	0.000	23-18701250-375
1.375	1.625	0.125	0.138	0.000	0.000	45-12501375
1.375	1.625	0.125	0.138	0.000	0.000	30-12501375
1.375	1.625	0.187	0.207	0.000	0.000	30-12501375-187
1.375	1.625	0.250	0.275	0.000	0.000	30-12501375-250
1.375	1.625	0.250	0.275	0.000	0.000	23-12501375-250
1.187	1.687	0.250	0.275	0.000	0.000	35-25001187
1.187	1.687	0.250	0.275	0.000	0.000	30-25001187
1.187	1.687	0.375	0.413	0.000	0.000	30-25001187-375
1.312	1.687	0.187	0.207	0.000	0.000	35-18701312
1.312	1.687	0.312	0.344	0.000	0.000	30-18701312-312
1.375	1.687	0.000	0.000	0.000	0.000	30-15601375-250
1.375	1.687	0.156	0.172	0.000	0.000	40-15601375
1.375	1.687	0.156	0.172	0.000	0.000	30-15601375
1.437	1.687	0.125	0.138	0.000	0.000	30-12501437
1.437	1.687	0.250	0.275	0.000	0.000	30-12501437-250



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.000	1.750	0.375	0.390	0.000	0.000	CP-175100
1.000	1.750	0.375	0.413	0.000	0.000	35-37501000
1.125	1.750	0.312	0.344	0.000	0.000	30-31201125
1.125	1.750	0.375	0.413	0.000	0.000	30-31201125-375
1.125	1.750	0.397	0.437	0.000	0.000	23-31201125-397
1.125	1.750	0.437	0.452	0.000	0.000	CP-175112
1.125	1.750	0.500	0.550	0.000	0.000	30-31201125-500
1.250	1.750	0.250	0.275	0.000	0.000	45-25001250
1.250	1.750	0.250	0.275	0.000	0.000	30-25001250
1.250	1.750	0.281	0.296	0.000	0.000	CP-175125/1
1.250	1.750	0.375	0.390	0.000	0.000	CPI-175125
1.250	1.750	0.375	0.390	0.000	0.000	CP-175125
1.250	1.750	0.375	0.413	0.000	0.000	30-25001250-375
1.250	1.750	0.375	0.413	0.000	0.000	23-25001250-375
1.375	1.750	0.187	0.207	0.000	0.000	45-18701375
1.375	1.750	0.187	0.207	0.000	0.000	30-18701375
1.375	1.750	0.250	0.275	0.000	0.000	30-18701375-250
1.375	1.750	0.281	0.296	0.000	0.000	CP-175137
1.375	1.750	0.312	0.344	0.000	0.000	30-18701375-312
1.375	1.750	0.312	0.344	0.000	0.000	23-18701375-312
1.375	1.750	0.341	0.375	0.000	0.000	23-18701375-341
1.375	1.750	0.375	0.413	0.000	0.000	30-18701375-375
1.437	1.750	0.156	0.172	0.000	0.000	35-15601437
1.500	1.750	0.125	0.138	0.000	0.000	45-12501500
1.500	1.750	0.125	0.138	0.000	0.000	30-12501500
1.500	1.750	0.187	0.207	0.000	0.000	30-12501500-187
1.500	1.750	0.250	0.275	0.000	0.000	30-12501500-250-A
1.500	1.750	0.250	0.275	0.000	0.000	40-12501500-250
1.500	1.750	0.250	0.275	0.000	0.000	30-12501500-250
1.500	1.750	0.250	0.275	0.000	0.000	23-12501500-250
1.187	1.812	0.312	0.344	0.000	0.000	35-31201187



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.312	1.812	0.250	0.275	0.000	0.000	35-25001312
1.312	1.812	0.375	0.413	0.000	0.000	30-25001312-375
1.437	1.812	0.187	0.207	0.000	0.000	35-18701437
1.437	1.812	0.312	0.344	0.000	0.000	30-18701437-312
1.500	1.812	0.312	0.344	0.000	0.000	30-15601500-312
1.562	1.812	0.125	0.138	0.000	0.000	35-12501562
1.125	1.875	0.375	0.413	0.000	0.000	35-37501125
1.125	1.875	0.375	0.413	0.000	0.000	30-37501125
1.250	1.875	0.312	0.344	0.000	0.000	30-31201250
1.250	1.875	0.375	0.413	0.000	0.000	30-31201250-375
1.250	1.875	0.397	0.437	0.000	0.000	23-31201250-397
1.250	1.875	0.437	0.452	0.000	0.000	CP-187125
1.250	1.875	0.500	0.550	0.000	0.000	30-31201250-500
1.375	1.875	0.250	0.275	0.000	0.000	45-25001375
1.375	1.875	0.250	0.275	0.000	0.000	35-25001375
1.375	1.875	0.250	0.275	0.000	0.000	30-25001375
1.375	1.875	0.312	0.344	0.000	0.000	30-25001375-312
1.375	1.875	0.375	0.413	0.000	0.000	30-25001375-375
1.375	1.875	0.375	0.343	0.000	0.000	38-25001375-375
1.375	1.875	0.375	0.413	0.000	0.000	23-25001375-375
1.500	1.875	0.172	0.187	0.000	0.000	CP-187150
1.500	1.875	0.187	0.207	0.000	0.000	30-18701500
1.500	1.875	0.250	0.275	0.000	0.000	30-18701500-250
1.500	1.875	0.250	0.265	0.000	0.000	CP-187150/1
1.500	1.875	0.250	0.275	0.000	0.000	38-18701500-250
1.500	1.875	0.250	0.275	0.000	0.000	23-18701500-250
1.500	1.875	0.312	0.344	0.000	0.000	38-18701500-312
1.500	1.875	0.312	0.344	0.000	0.000	30-18701500-312
1.500	1.875	0.312	0.344	0.000	0.000	23-18701500-312
1.500	1.875	0.375	0.413	0.000	0.000	30-18701500-375
1.500	1.875	0.375	0.413	0.000	0.000	23-18701500-375





CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.625	1.875	0.125	0.138	0.000	0.000	35-12501625
1.625	1.875	0.250	0.275	0.000	0.000	30-12501625-250
1.625	1.875	0.250	0.275	0.000	0.000	23-12501625-250
1.437	1.937	0.250	0.275	0.000	0.000	35-25001437
1.437	1.937	0.375	0.413	0.000	0.000	30-25001437-375
1.687	1.937	0.125	0.138	0.000	0.000	35-12501687
1.687	1.937	0.187	0.202	0.000	0.000	CP-193168
1.000	2.000	0.500	0.550	0.000	0.000	35-50001000
1.250	2.000	0.375	0.413	0.000	0.000	35-37501250
1.250	2.000	0.500	0.550	0.000	0.000	30-37501250-500
1.250	2.000	0.625	0.687	0.000	0.000	35-37501250-625
1.375	2.000	0.312	0.327	0.000	0.000	CP-200137/4
1.375	2.000	0.312	0.344	0.000	0.000	30-31201375
1.375	2.000	0.375	0.390	0.000	0.000	CP-200137/1
1.375	2.000	0.375	0.413	0.000	0.000	30-31201375-375
1.375	2.000	0.437	0.452	0.000	0.000	CP-200137/2
1.375	2.000	0.500	0.550	0.000	0.000	30-31201375-500
1.375	2.000	0.500	0.515	0.000	0.000	CP-200137/3
1.375	2.000	0.500	0.550	0.000	0.000	15-31201375-500
1.500	2.000	0.250	0.265	0.000	0.000	CP-200150/4
1.500	2.000	0.250	0.275	0.000	0.000	45-25001500
1.500	2.000	0.250	0.275	0.000	0.000	30-25001500
1.500	2.000	0.250	0.275	0.000	0.000	23-25001500
1.500	2.000	0.312	0.344	0.000	0.000	30-25001500-312
1.500	2.000	0.341	0.375	0.000	0.000	23-25001500-341
1.500	2.000	0.375	0.390	0.000	0.000	CP-200150
1.500	2.000	0.375	0.390	0.000	0.000	CPI-200150
1.500	2.000	0.375	0.413	0.000	0.000	30-25001500-375
1.500	2.000	0.375	0.413	0.000	0.000	36-25001500-375
1.500	2.000	0.375	0.413	0.000	0.000	38-25001500-375
1.500	2.000	0.375	0.413	0.000	0.000	23-25001500-375



CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.500	2.000	0.468	0.483	0.000	0.000	CPI-200150/1
1.500	2.000	0.500	0.550	0.000	0.000	30-25001500-500
1.625	2.000	0.187	0.207	0.000	0.000	30-18701625
1.625	2.000	0.250	0.275	0.000	0.000	30-18701625-250
1.625	2.000	0.281	0.296	0.000	0.000	CPI-200162/1
1.625	2.000	0.281	0.312	0.000	0.000	23-18701625-281
1.625	2.000	0.312	0.344	0.000	0.000	30-18701625-312
1.625	2.000	0.312	0.344	0.000	0.000	23-18701625-312
1.625	2.000	0.375	0.413	0.000	0.000	40-18701625-375
1.625	2.000	0.375	0.413	0.000	0.000	30-18701625-375
1.750	2.000	0.125	0.138	0.000	0.000	45-12501750
1.750	2.000	0.125	0.138	0.000	0.000	30-12501750
1.750	2.000	0.250	0.275	0.000	0.000	23-12501750
1.750	2.000	0.250	0.275	0.000	0.000	30-12501750-250
1.750	2.000	0.250	0.275	0.000	0.000	23-12501750-250
1.562	2.062	0.250	0.275	0.000	0.000	15-25001562
1.687	2.062	0.187	0.207	0.000	0.000	35-18701687
1.375	2.125	0.375	0.413	0.000	0.000	35-37501375
1.500	2.125	0.312	0.344	0.000	0.000	45-31201500
1.500	2.125	0.312	0.344	0.000	0.000	30-31201500
1.500	2.125	0.375	0.413	0.000	0.000	30-31201500-375
1.500	2.125	0.375	0.413	0.000	0.000	23-31201500-375
1.500	2.125	0.397	0.437	0.000	0.000	23-31201500-397
1.500	2.125	0.437	0.452	0.000	0.000	CPI-212150/1
1.500	2.125	0.437	0.452	0.000	0.000	CP-212150/1
1.500	2.125	0.500	0.550	0.000	0.000	30-31201500-500
1.625	2.125	0.250	0.275	0.000	0.000	30-25001625
1.625	2.125	0.375	0.413	0.000	0.000	30-25001625-375
1.750	2.125	0.000	0.000	0.000	0.000	CP-212175
1.750	2.125	0.172	0.187	0.000	0.000	CP-212175/1
1.750	2.125	0.187	0.207	0.000	0.000	40-18701750



CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.750	2.125	0.187	0.207	0.000	0.000	30-18701750
1.750	2.125	0.250	0.275	0.000	0.000	30-18701750-250
1.750	2.125	0.250	0.275	0.000	0.000	38-18701750-250
1.750	2.125	0.250	0.275	0.000	0.000	23-18701750-250
1.750	2.125	0.281	0.296	0.000	0.000	CPI-212175/2
1.750	2.125	0.281	0.296	0.000	0.000	CP-212175/2
1.750	2.125	0.312	0.344	0.000	0.000	30-18701750-312
1.750	2.125	0.312	0.344	0.000	0.000	23-18701750-312
1.750	2.125	0.375	0.413	0.000	0.000	40-18701750-375
1.750	2.125	0.375	0.413	0.000	0.000	38-18701750-375
1.750	2.125	0.375	0.413	0.000	0.000	30-18701750-375
1.750	2.125	0.375	0.413	0.000	0.000	23-18701750-375
1.875	2.125	0.125	0.138	0.000	0.000	35-12501875
1.875	2.125	0.187	0.207	0.000	0.000	30-12501875-187
1.875	2.125	0.250	0.275	0.000	0.000	30-12501875-250
1.500	2.187	0.437	0.452	0.000	0.000	CP-218150
1.250	2.250	0.500	0.550	0.000	0.000	35-50001250
1.500	2.250	0.375	0.413	0.000	0.000	30-37501500
1.500	2.250	0.468	0.483	0.000	0.000	CP-225150
1.500	2.250	0.500	0.550	0.000	0.000	30-37501500-500
1.500	2.250	0.625	0.687	0.000	0.000	30-37501500-625
1.625	2.250	0.312	0.344	0.000	0.000	35-31201625
1.625	2.250	0.375	0.413	0.000	0.000	30-31201625-375
1.625	2.250	0.437	0.452	0.000	0.000	CP-225162
1.625	2.250	0.500	0.550	0.000	0.000	30-31201625-500
1.750	2.250	0.250	0.275	0.000	0.000	30-25001750
1.750	2.250	0.250	0.275	0.000	0.000	23-25001750
1.750	2.250	0.312	0.343	0.000	0.000	30-25001750-312
1.750	2.250	0.312	0.344	0.000	0.000	23-25001750-312
1.750	2.250	0.341	0.375	0.000	0.000	23-25001750-341
1.750	2.250	0.375	0.390	0.000	0.000	CP-225175/1



CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
1.750	2.250	0.375	0.413	0.000	0.000	38-25001750-375
1.750	2.250	0.375	0.390	0.000	0.000	CPI-225175/1
1.750	2.250	0.375	0.413	0.000	0.000	40-25001750-375
1.750	2.250	0.375	0.413	0.000	0.000	30-25001750-375
1.750	2.250	0.375	0.413	0.000	0.000	23-25001750-375
1.750	2.250	0.500	0.550	0.000	0.000	23-25001750-500
1.875	2.250	0.187	0.207	0.000	0.000	30-18701875
1.875	2.250	0.250	0.281	0.000	0.000	CP-225187
1.875	2.250	0.312	0.343	0.000	0.000	30-18701875-312
1.875	2.250	0.375	0.413	0.000	0.000	30-18701875-375
2.000	2.250	0.125	0.138	0.000	0.000	30-12502000
2.000	2.250	0.187	0.207	0.000	0.000	30-12502000-187
2.000	2.250	0.250	0.275	0.000	0.000	30-12502000-250
2.000	2.250	0.250	0.275	0.000	0.000	23-12502000-250
1.687	2.312	0.312	0.344	0.000	0.000	35-31201687
2.000	2.312	0.250	0.265	0.000	0.000	CPI-231200
1.500	2.375	0.437	0.481	0.000	0.000	35-43701500
1.625	2.375	0.375	0.413	0.000	0.000	30-37501625
1.625	2.375	0.625	0.687	0.000	0.000	30-37501625-625
1.750	2.375	0.312	0.344	0.000	0.000	35-31201750
1.750	2.375	0.312	0.344	0.000	0.000	45-31201750
1.750	2.375	0.375	0.413	0.000	0.000	30-31201750-375
1.750	2.375	0.437	0.452	0.000	0.000	CPI-237175
1.750	2.375	0.437	0.452	0.000	0.000	CP-237175
1.750	2.375	0.500	0.550	0.000	0.000	30-31201750-500
1.750	2.375	0.500	0.550	0.000	0.000	23-31201750-500
1.875	2.375	0.250	0.275	0.000	0.000	30-25001875
1.875	2.375	0.375	0.413	0.000	0.000	30-25001875-375
2.000	2.375	0.187	0.207	0.000	0.000	40-18702000
2.000	2.375	0.187	0.207	0.000	0.000	30-18702000
2.000	2.375	0.250	0.275	0.000	0.000	30-18702000-250



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
2.000	2.375	0.250	0.275	0.000	0.000	23-18702000-250
2.000	2.375	0.312	0.344	0.000	0.000	30-18702000-312
2.000	2.375	0.312	0.344	0.000	0.000	23-18702000-312
2.000	2.375	0.375	0.413	0.000	0.000	30-18702000-375
2.000	2.375	0.375	0.413	0.000	0.000	38-18702000-375
2.000	2.375	0.375	0.413	0.000	0.000	23-18702000-375
2.125	2.375	0.125	0.138	0.000	0.000	30-12502125
2.125	2.375	0.250	0.275	0.000	0.000	30-12502125-250
1.937	2.437	0.375	0.413	0.000	0.000	30-25001937-375
1.500	2.500	0.500	0.550	0.000	0.000	15-50001500
1.750	2.500	0.375	0.413	0.000	0.000	30-37501750
1.750	2.500	0.375	0.413	0.000	0.000	15-37501750
1.750	2.500	0.500	0.550	0.000	0.000	30-37501750-500
1.750	2.500	0.625	0.687	0.000	0.000	30-37501750-625
1.875	2.500	0.312	0.344	0.000	0.000	35-31201875
1.875	2.500	0.312	0.344	0.000	0.000	30-31201875
1.875	2.500	0.375	0.413	0.000	0.000	30-31201875-375
1.875	2.500	0.437	0.452	0.000	0.000	CP-250187
1.875	2.500	0.500	0.550	0.000	0.000	30-31201875-500
2.000	2.500	0.250	0.275	0.000	0.000	30-25002000
2.000	2.500	0.250	0.275	0.000	0.000	35-25002000
2.000	2.500	0.250	0.275	0.000	0.000	45-25002000
2.000	2.500	0.250	0.275	0.000	0.000	23-25002000
2.000	2.500	0.312	0.327	0.000	0.000	CP-250200
2.000	2.500	0.312	0.344	0.000	0.000	23-25002000-312
2.000	2.500	0.312	0.344	0.000	0.000	30-25002000-312
2.000	2.500	0.341	0.375	0.000	0.000	23-25002000-341
2.000	2.500	0.343	0.358	0.000	0.000	CP-250200/2
2.000	2.500	0.375	0.413	0.000	0.000	30-25002000-375
2.000	2.500	0.375	0.390	0.000	0.000	CPI-250200/1
2.000	2.500	0.375	0.413	0.000	0.000	38-25002000-375



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
2.000	2.500	0.375	0.413	0.000	0.000	23-25002000-375
2.000	2.500	0.500	0.550	0.000	0.000	30-25002000-500
2.125	2.500	0.187	0.207	0.000	0.000	45-18702125
2.125	2.500	0.187	0.207	0.000	0.000	30-18702125
2.125	2.500	0.250	0.275	0.000	0.000	30-18702125-250
2.125	2.500	0.281	0.312	0.000	0.000	15-18702125-281
2.125	2.500	0.312	0.344	0.000	0.000	30-18702125-312
2.125	2.500	0.375	0.413	0.000	0.000	30-18702125-375
2.125	2.500	0.375	0.413	0.000	0.000	23-18702125-375
2.250	2.500	0.125	0.138	0.000	0.000	30-12502250
2.250	2.500	0.250	0.275	0.000	0.000	35-12502250-250
2.250	2.500	0.375	0.413	0.000	0.000	30-12502250-375
1.937	2.562	0.312	0.344	0.000	0.000	35-31201937
2.187	2.562	0.375	0.413	0.000	0.000	30-18702187-375
2.312	2.562	0.125	0.138	0.000	0.000	30-12502312
1.875	2.625	0.375	0.413	0.000	0.000	35-37501875
2.000	2.625	0.000	0.000	0.000	0.000	23-31202000-437
2.000	2.625	0.312	0.344	0.000	0.000	45-31202000
2.000	2.625	0.312	0.344	0.000	0.000	30-31202000
2.000	2.625	0.375	0.413	0.000	0.000	30-31202000-375
2.000	2.625	0.397	0.437	0.000	0.000	23-31202000-397
2.000	2.625	0.437	0.452	0.000	0.000	CPI-262200
2.000	2.625	0.500	0.550	0.000	0.000	30-31202000-500
2.000	2.625	0.500	0.550	0.000	0.000	23-31202000-500
2.000	2.625	0.562	0.619	0.000	0.000	15-31202000-562
2.125	2.625	0.250	0.275	0.000	0.000	35-25002125
2.125	2.625	0.375	0.413	0.000	0.000	38-25002125-375
2.125	2.625	0.375	0.413	0.000	0.000	30-25002125-375
2.250	2.625	0.187	0.207	0.000	0.000	30-18702250
2.250	2.625	0.187	0.207	0.000	0.000	23-18702250
2.250	2.625	0.312	0.344	0.000	0.000	30-18702250-312



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
2.250	2.625	0.375	0.413	0.000	0.000	30-18702250-375
2.250	2.625	0.375	0.413	0.000	0.000	23-18702250-375
2.375	2.625	0.125	0.138	0.000	0.000	35-12502375
1.750	2.750	0.500	0.550	0.000	0.000	35-50001750
1.750	2.750	0.750	0.825	0.000	0.000	30-50001750-750
2.000	2.750	0.375	0.413	0.000	0.000	45-37502000
2.000	2.750	0.375	0.413	0.000	0.000	30-37502000
2.000	2.750	0.437	0.452	0.000	0.000	CP-275200
2.000	2.750	0.500	0.550	0.000	0.000	30-37502000-500
2.000	2.750	0.562	0.577	0.000	0.000	CP-275200/2
2.000	2.750	0.625	0.687	0.000	0.000	30-37502000-625
2.000	2.750	0.625	0.687	0.000	0.000	23-37502000-625
2.125	2.750	0.312	0.344	0.000	0.000	30-31202125
2.125	2.750	0.375	0.390	0.000	0.000	CP-275212
2.125	2.750	0.500	0.550	0.000	0.000	30-31202125-500
2.125	2.750	0.625	0.687	0.000	0.000	30-31202125-625
2.250	2.750	0.000	0.000	0.000	0.000	30-25002250-312
2.250	2.750	0.250	0.275	0.000	0.000	45-25002250
2.250	2.750	0.250	0.275	0.000	0.000	30-25002250
2.250	2.750	0.341	0.375	0.000	0.000	23-25002250-341
2.250	2.750	0.375	0.390	0.000	0.000	CPI-275225
2.250	2.750	0.375	0.413	0.000	0.000	38-25002250-375
2.250	2.750	0.375	0.413	0.000	0.000	30-25002250-375
2.250	2.750	0.375	0.390	0.000	0.000	CP-275225
2.250	2.750	0.375	0.413	0.000	0.000	23-25002250-375
2.250	2.750	0.562	0.619	0.000	0.000	35-25002250-562
2.312	2.750	0.375	0.390	0.000	0.000	CP-275231
2.375	2.750	0.187	0.207	0.000	0.000	30-18702375
2.375	2.750	0.375	0.413	0.000	0.000	30-18702375-375
2.375	2.750	0.375	0.413	0.000	0.000	23-18702375-375
2.375	2.750	0.500	0.550	0.000	0.000	30-18702375-500



CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
2.500	2.750	0.125	0.138	0.000	0.000	30-12502500
2.500	2.750	0.250	0.275	0.000	0.000	30-12502500-250
2.125	2.875	0.375	0.413	0.000	0.000	35-37502125
2.250	2.875	0.312	0.344	0.000	0.000	35-31202250
2.250	2.875	0.375	0.413	0.000	0.000	30-31202250-375
2.250	2.875	0.437	0.457	0.000	0.000	CP-287225
2.250	2.875	0.500	0.550	0.000	0.000	30-31202250-500
2.375	2.875	0.250	0.275	0.000	0.000	30-25002375
2.375	2.875	0.375	0.413	0.000	0.000	30-25002375-375
2.375	2.875	0.375	0.413	0.000	0.000	38-25002375-375
2.375	2.875	0.375	0.413	0.000	0.000	23-25002375-375
2.500	2.875	0.187	0.207	0.000	0.000	30-18702500
2.500	2.875	0.250	0.275	0.000	0.000	30-18702500-250
2.500	2.875	0.312	0.344	0.000	0.000	30-18702500-312
2.500	2.875	0.312	0.344	0.000	0.000	23-18702500-312
2.500	2.875	0.375	0.413	0.000	0.000	30-18702500-375A
2.500	2.875	0.375	0.413	0.000	0.000	40-18702500-375
2.500	2.875	0.375	0.413	0.000	0.000	30-18702500-375
2.500	2.875	0.375	0.413	0.000	0.000	23-18702500-375
2.625	2.875	0.125	0.138	0.000	0.000	35-12502625
2.500	2.937	0.218	0.241	0.000	0.000	40-21802500
2.500	2.937	0.218	0.242	0.000	0.000	35-21802500
2.500	2.937	0.300	0.330	0.000	0.000	23-21802500-300
1.750	3.000	0.625	0.687	0.000	0.000	35-62501750
2.000	3.000	0.500	0.550	0.000	0.000	30-50002000
2.000	3.000	0.750	0.825	0.000	0.000	30-50002000-750
2.250	3.000	0.375	0.390	0.000	0.000	CP-300225
2.250	3.000	0.375	0.413	0.000	0.000	30-37502250
2.250	3.000	0.500	0.550	0.000	0.000	30-37502250-500
2.250	3.000	0.511	0.562	0.000	0.000	23-37502250-511
2.250	3.000	0.562	0.577	0.000	0.000	CP-300225/2





CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
2.250	3.000	0.625	0.687	0.000	0.000	30-37502250-625
2.375	3.000	0.312	0.344	0.000	0.000	30-31202375
2.375	3.000	0.468	0.483	0.000	0.000	CP-300237
2.375	3.000	0.500	0.550	0.000	0.000	30-31202375-500
2.375	3.000	0.562	0.619	0.000	0.000	15-31202375-562
2.500	3.000	0.250	0.275	0.000	0.000	45-25002500
2.500	3.000	0.250	0.275	0.000	0.000	35-25002500
2.500	3.000	0.281	0.312	0.000	0.000	23-25002500-281
2.500	3.000	0.312	0.327	0.000	0.000	CP-300250
2.500	3.000	0.312	0.344	0.000	0.000	30-25002500-312
2.500	3.000	0.375	0.413	0.000	0.000	30-25002500-375
2.500	3.000	0.375	0.413	0.000	0.000	36-25002500-375
2.500	3.000	0.375	0.413	0.000	0.000	40-25002500-375
2.500	3.000	0.375	0.413	0.000	0.000	38-25002500-375
2.500	3.000	0.375	0.413	0.000	0.000	23-25002500-375
2.625	3.000	0.187	0.207	0.000	0.000	45-18702625
2.625	3.000	0.187	0.207	0.000	0.000	30-18702625
2.625	3.000	0.250	0.275	0.000	0.000	30-18702625-250
2.625	3.000	0.312	0.344	0.000	0.000	30-18702625-312
2.625	3.000	0.375	0.413	0.000	0.000	30-18702625-375
2.750	3.000	0.125	0.138	0.000	0.000	30-12502750
2.750	3.000	0.250	0.275	0.000	0.000	30-12502750-250
2.750	3.000	0.375	0.413	0.000	0.000	30-12502750-375
2.562	3.062	0.375	0.413	0.000	0.000	30-25002562-375
2.125	3.125	0.500	0.550	0.000	0.000	30-50002125
2.375	3.125	0.375	0.413	0.000	0.000	45-37502375
2.375	3.125	0.375	0.413	0.000	0.000	35-37502375
2.375	3.125	0.375	0.413	0.000	0.000	30-37502375
2.375	3.125	0.562	0.577	0.000	0.000	CP-312237
2.375	3.125	0.625	0.687	0.000	0.000	30-37502375-625
2.500	3.125	0.312	0.344	0.000	0.000	45-31202500



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
2.500	3.125	0.312	0.344	0.000	0.000	30-31202500
2.500	3.125	0.375	0.390	0.000	0.000	CP-312250/1
2.500	3.125	0.375	0.413	0.000	0.000	30-31202500-375
2.500	3.125	0.500	0.550	0.000	0.000	30-31202500-500
2.500	3.125	0.500	0.550	0.000	0.000	23-31202500-500
2.625	3.125	0.250	0.275	0.000	0.000	30-25002625
2.625	3.125	0.375	0.413	0.000	0.000	30-25002625-375
2.750	3.125	0.187	0.207	0.000	0.000	45-18702750
2.750	3.125	0.187	0.207	0.000	0.000	30-18702750
2.750	3.125	0.312	0.344	0.000	0.000	30-18702750-312
2.750	3.125	0.375	0.413	0.000	0.000	30-18702750-375
2.750	3.125	0.375	0.413	0.000	0.000	23-18702750-375
2.875	3.125	0.125	0.138	0.000	0.000	35-12502875
2.875	3.125	0.250	0.275	0.000	0.000	30-12502875-250
2.250	3.250	0.500	0.550	0.000	0.000	30-50002250
2.500	3.250	0.375	0.413	0.000	0.000	45-37502500
2.500	3.250	0.375	0.390	0.000	0.000	CP-325250
2.500	3.250	0.375	0.413	0.000	0.000	30-37502500
2.500	3.250	0.500	0.550	0.000	0.000	30-37502500-500
2.500	3.250	0.562	0.577	0.000	0.000	CPI-325250/1
2.500	3.250	0.562	0.577	0.000	0.000	CP-325250/1
2.500	3.250	0.562	0.619	0.000	0.000	23-37502500-562
2.500	3.250	0.625	0.687	0.000	0.000	30-37502500-625
2.625	3.250	0.312	0.344	0.000	0.000	30-31202625
2.625	3.250	0.375	0.413	0.000	0.000	15-31202625-375
2.625	3.250	0.500	0.550	0.000	0.000	30-31202625-500
2.625	3.250	0.562	0.619	0.000	0.000	15-31202625-562
2.735	3.250	0.340	0.355	0.000	0.000	CP-325273
2.750	3.250	0.250	0.275	0.000	0.000	45-25002750
2.750	3.250	0.250	0.275	0.000	0.000	30-25002750
2.750	3.250	0.375	0.413	0.000	0.000	40-25002750-375



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
2.750	3.250	0.375	0.413	0.000	0.000	38-25002750-375
2.750	3.250	0.375	0.413	0.000	0.000	30-25002750-375
2.750	3.250	0.375	0.413	0.000	0.000	23-25002750-375
2.812	3.250	0.218	0.241	0.000	0.000	45-21802812
2.812	3.250	0.218	0.242	0.000	0.000	35-21802812
2.875	3.250	0.187	0.207	0.000	0.000	45-18702875
2.875	3.250	0.187	0.207	0.000	0.000	30-18702875
2.875	3.250	0.250	0.275	0.000	0.000	30-18702875-250
2.875	3.250	0.375	0.413	0.000	0.000	30-18702875-375
3.000	3.250	0.125	0.138	0.000	0.000	30-12503000
2.500	3.375	0.437	0.481	0.000	0.000	35-43702500
2.625	3.375	0.625	0.687	0.000	0.000	30-37502625-625
2.750	3.375	0.312	0.344	0.000	0.000	30-31202750
2.750	3.375	0.375	0.413	0.000	0.000	30-31202750-375
2.750	3.375	0.437	0.452	0.000	0.000	CP-337275/1
2.750	3.375	0.500	0.550	0.000	0.000	30-31202750-500
2.750	3.375	0.500	0.550	0.000	0.000	23-31202750-500
2.750	3.375	0.562	0.619	0.000	0.000	15-31202750-562
2.875	3.375	0.250	0.275	0.000	0.000	35-25002875
2.875	3.375	0.375	0.413	0.000	0.000	30-25002875-375
3.000	3.375	0.187	0.207	0.000	0.000	45-18703000
3.000	3.375	0.187	0.207	0.000	0.000	30-18703000
3.000	3.375	0.250	0.275	0.000	0.000	30-18703000-250
3.000	3.375	0.250	0.275	0.000	0.000	15-18703000-250
3.000	3.375	0.312	0.344	0.000	0.000	30-18703000-312
3.000	3.375	0.375	0.413	0.000	0.000	30-18703000-375
3.000	3.375	0.375	0.413	0.000	0.000	23-18703000-375
3.000	3.436	0.218	0.241	0.000	0.000	35-21803000
3.000	3.437	0.218	0.241	0.000	0.000	45-21803000
3.000	3.437	0.300	0.330	0.000	0.000	23-21803000-300
3.000	3.437	0.375	0.413	0.000	0.000	15-21803000-375



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
2.500	3.500	0.500	0.550	0.000	0.000	30-50002500
2.500	3.500	0.750	0.765	0.000	0.000	CP-350250
2.500	3.500	0.750	0.825	0.000	0.000	30-50002500-750
2.750	3.500	0.375	0.413	0.000	0.000	30-37502750
2.750	3.500	0.500	0.515	0.000	0.000	CP-350275/3
2.750	3.500	0.500	0.550	0.000	0.000	30-37502750-500
2.750	3.500	0.562	0.577	0.000	0.000	CP-350275
2.750	3.500	0.625	0.687	0.000	0.000	30-37502750-625
2.750	3.500	0.625	0.687	0.000	0.000	23-37502750-625
2.875	3.500	0.312	0.344	0.000	0.000	30-31202875
2.875	3.500	0.375	0.413	0.000	0.000	30-31202875-375
2.875	3.500	0.500	0.550	0.000	0.000	30-31202875-500
3.000	3.500	0.250	0.275	0.000	0.000	45-25003000
3.000	3.500	0.250	0.275	0.000	0.000	35-25003000
3.000	3.500	0.312	0.344	0.000	0.000	30-25003000-312
3.000	3.500	0.312	0.343	0.000	0.000	23-25003000-312
3.000	3.500	0.375	0.413	0.000	0.000	38-25003000-375
3.000	3.500	0.375	0.413	0.000	0.000	30-25003000-375
3.000	3.500	0.375	0.413	0.000	0.000	36-25003000-375
3.000	3.500	0.375	0.413	0.000	0.000	23-25003000-375
3.000	3.500	0.375	0.413	0.000	25,003,000.000	40-25003000-375
3.000	3.500	0.500	0.550	0.000	0.000	30-25003000-500
3.000	3.500	0.562	0.619	0.000	0.000	30-25003000-562
3.125	3.500	0.187	0.207	0.000	0.000	30-18703125
3.125	3.500	0.187	0.207	0.000	0.000	15-18703125
3.125	3.500	0.250	0.275	0.000	0.000	30-18703125-250
3.125	3.500	0.375	0.413	0.000	0.000	30-18703125-375
3.125	3.500	0.375	0.413	0.000	0.000	23-18703125-375
3.250	3.500	0.125	0.138	0.000	0.000	35-12503250
3.000	3.625	0.312	0.344	0.000	0.000	35-31203000
3.000	3.625	0.312	0.344	0.000	0.000	15-31203000



CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
3.000	3.625	0.375	0.390	0.000	0.000	CP-362300
3.000	3.625	0.375	0.433	0.000	0.000	30-31203000-375
3.000	3.625	0.500	0.550	0.000	0.000	38-31203000-500
3.000	3.625	0.500	0.550	0.000	0.000	30-31203000-500
3.000	3.625	0.562	0.619	0.000	0.000	15-31203000-562
3.125	3.625	0.250	0.275	0.000	0.000	35-25003125
3.125	3.625	0.375	0.413	0.000	0.000	30-25003125-375
3.250	3.625	0.187	0.207	0.000	0.000	35-18703250
3.250	3.625	0.312	0.344	0.000	0.000	30-18703250-312
3.250	3.625	0.375	0.413	0.000	0.000	30-18703250-375
2.750	3.750	0.500	0.550	0.000	0.000	35-50002750
3.000	3.750	0.375	0.390	0.000	0.000	CP-375300/2
3.000	3.750	0.375	0.413	0.000	0.000	30-37503000
3.000	3.750	0.500	0.550	0.000	0.000	30-37503000-500
3.000	3.750	0.562	0.577	0.000	0.000	CPI-375300
3.000	3.750	0.562	0.577	0.000	0.000	CP-375300
3.000	3.750	0.625	0.687	0.000	0.000	36-37503000-625
3.000	3.750	0.625	0.687	0.000	0.000	38-37503000-625
3.000	3.750	0.625	0.687	0.000	0.000	30-37503000-625
3.000	3.750	0.625	0.687	0.000	0.000	23-37503000-625
3.125	3.750	0.312	0.344	0.000	0.000	30-31203125
3.125	3.750	0.500	0.550	0.000	0.000	30-31203125-500
3.187	3.750	0.500	0.550	0.000	0.000	30-28103187-500
3.230	3.750	0.360	0.375	0.000	0.000	CP-375323
3.250	3.750	0.250	0.275	0.000	0.000	30-25003250
3.250	3.750	0.375	0.413	0.000	0.000	38-25003250-375
3.250	3.750	0.375	0.413	0.000	0.000	30-25003250-375
3.250	3.750	0.375	0.413	0.000	0.000	23-25003250-375
3.375	3.750	0.187	0.207	0.000	0.000	30-18703375
3.375	3.750	0.250	0.275	0.000	0.000	30-18703375-250
3.375	3.750	0.375	0.413	0.000	0.000	30-18703375-375



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
3.500	3.750	0.125	0.138	0.000	0.000	35-12503500
3.125	3.875	0.000	0.000	0.000	0.000	CP-387312
3.125	3.875	0.000	0.000	0.000	0.000	30-37503125-500
3.125	3.875	0.375	0.413	0.000	0.000	35-37503125
3.125	3.875	0.625	0.687	0.000	0.000	30-37503125-625
3.250	3.875	0.312	0.344	0.000	0.000	35-31203250
3.250	3.875	0.500	0.550	0.000	0.000	30-31203250-500
3.250	3.875	0.562	0.619	0.000	0.000	15-31203250-562
3.375	3.875	0.250	0.275	0.000	0.000	30-25003375
3.375	3.875	0.375	0.413	0.000	0.000	30-25003375-375
3.500	3.875	0.187	0.207	0.000	0.000	45-18703500
3.500	3.875	0.187	0.207	0.000	0.000	30-18703500
3.500	3.875	0.375	0.413	0.000	0.000	30-18703500-375A
3.500	3.875	0.375	0.413	0.000	0.000	30-18703500-375
3.625	3.875	0.187	0.207	0.000	0.000	30-12503625-187
2.750	4.000	0.625	0.687	0.000	0.000	35-62502750
3.000	4.000	0.500	0.550	0.000	0.000	45-50003000
3.000	4.000	0.500	0.550	0.000	0.000	30-50003000
3.000	4.000	0.750	0.825	0.000	0.000	30-50003000-750
3.125	4.000	0.437	0.481	0.000	0.000	35-43703125
3.250	4.000	0.375	0.413	0.000	0.000	30-37503250
3.250	4.000	0.500	0.550	0.000	0.000	30-37503250-500
3.250	4.000	0.562	0.577	0.000	0.000	CP-400325/1
3.250	4.000	0.625	0.687	0.000	0.000	30-37503250-625
3.375	4.000	0.312	0.344	0.000	0.000	30-31203375
3.375	4.000	0.500	0.550	0.000	0.000	30-31203375-500
3.375	4.000	0.625	0.687	0.000	0.000	30-31203375-625
3.500	4.000	0.000	0.000	0.000	0.000	36-25003500-375
3.500	4.000	0.250	0.275	0.000	0.000	35-25003500
3.500	4.000	0.250	0.275	0.000	0.000	45-25003500
3.500	4.000	0.250	0.275	0.000	0.000	30-25003500



CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
3.500	4.000	0.312	0.344	0.000	0.000	30-25003500-312
3.500	4.000	0.312	0.344	0.000	0.000	23-25003500-312
3.500	4.000	0.375	0.390	0.000	0.000	CP-400350
3.500	4.000	0.375	0.413	0.000	0.000	30-25003500-375
3.500	4.000	0.375	0.413	0.000	0.000	45-25003500-375
3.500	4.000	0.375	0.413	0.000	0.000	38-25003500-375
3.500	4.000	0.375	0.413	0.000	0.000	23-25003500-375
3.500	4.000	0.500	0.550	0.000	0.000	30-25003500-500
3.625	4.000	0.187	0.207	0.000	0.000	45-18703625
3.625	4.000	0.187	0.207	0.000	0.000	30-18703625
3.625	4.000	0.250	0.275	0.000	0.000	30-18703625-250
3.625	4.000	0.250	0.275	0.000	0.000	15-18703625-250
3.625	4.000	0.312	0.344	0.000	0.000	30-18703625-312
3.625	4.000	0.375	0.413	0.000	0.000	30-18703625-375
3.750	4.000	0.125	0.138	0.000	0.000	35-12503750
3.375	4.125	0.375	0.413	0.000	0.000	30-37503375
3.375	4.125	0.562	0.619	0.000	0.000	15-37503375-562C
3.375	4.125	0.562	0.577	0.000	0.000	CP-412337
3.375	4.125	0.562	0.619	0.000	0.000	15-37503375-562
3.375	4.125	0.625	0.687	0.000	0.000	30-37503375-625
3.375	4.125	0.750	0.825	0.000	0.000	30-37503375-750
3.500	4.125	0.312	0.344	0.000	0.000	35-31203500
3.500	4.125	0.500	0.550	0.000	0.000	30-31203500-500
3.500	4.125	0.500	0.550	0.000	0.000	38-31203500-500
3.500	4.125	0.500	0.550	0.000	0.000	23-31203500-500
3.500	4.125	0.750	0.825	0.000	0.000	30-31203500-750
3.625	4.125	0.250	0.275	0.000	0.000	35-25003625
3.625	4.125	0.375	0.413	0.000	0.000	30-25003625-375
3.750	4.125	0.187	0.207	0.000	0.000	30-18703750
3.750	4.125	0.375	0.413	0.000	0.000	38-18703750-375
3.750	4.125	0.375	0.413	0.000	0.000	30-18703750-375



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
3.875	4.125	0.125	0.138	0.000	0.000	35-12503875
3.875	4.125	0.250	0.275	0.000	0.000	30-12503875-250
3.690	4.190	0.500	0.550	0.000	0.000	30-25003690-500
3.000	4.250	0.625	0.687	0.000	0.000	35-62503000
3.250	4.250	0.500	0.550	0.000	0.000	30-50003250
3.250	4.250	0.500	0.550	0.000	0.000	15-50003250
3.250	4.250	0.750	0.825	0.000	0.000	30-50003250-750
3.500	4.250	0.375	0.413	0.000	0.000	45-37503500
3.500	4.250	0.375	0.413	0.000	0.000	30-37503500
3.500	4.250	0.500	0.550	0.000	0.000	30-37503500-500
3.500	4.250	0.562	0.577	0.000	0.000	CP-425350/1
3.500	4.250	0.562	0.577	0.000	0.000	CPI-425350/1
3.500	4.250	0.562	0.619	0.000	0.000	23-37503500-562
3.500	4.250	0.625	0.687	0.000	0.000	30-37503500-625
3.500	4.250	0.625	0.687	0.000	0.000	38-37503500-625
3.500	4.250	0.625	0.687	0.000	0.000	23-37503500-625
3.625	4.250	0.312	0.344	0.000	0.000	30-31203625
3.625	4.250	0.500	0.550	0.000	0.000	30-31203625-500
3.625	4.250	0.562	0.619	0.000	0.000	15-31203625-562
3.750	4.250	0.250	0.275	0.000	0.000	45-25003750
3.750	4.250	0.250	0.275	0.000	0.000	30-25003750
3.750	4.250	0.375	0.413	0.000	0.000	38-25003750-375
3.750	4.250	0.375	0.413	0.000	0.000	30-25003750-375
3.750	4.250	0.375	0.413	0.000	0.000	23-25003750-375
3.750	4.250	0.562	0.619	0.000	0.000	30-25003750-562
3.750	4.250	0.562	0.619	0.000	0.000	23-25003750-562
3.875	4.250	0.187	0.207	0.000	0.000	35-18703875
3.875	4.250	0.375	0.413	0.000	0.000	30-18703875-375
4.000	4.250	0.125	0.138	0.000	0.000	35-12504000
3.625	4.375	0.375	0.413	0.000	0.000	30-37503625
3.625	4.375	0.625	0.687	0.000	0.000	30-37503625-625





CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
3.750	4.375	0.312	0.344	0.000	0.000	35-31203750
3.750	4.375	0.375	0.413	0.000	0.000	30-31203750-375
3.750	4.375	0.500	0.550	0.000	0.000	30-31203750-500
3.750	4.375	0.875	0.963	0.000	0.000	30-31203750-875
3.812	4.375	0.500	0.550	0.000	0.000	30-28103812-500
3.875	4.375	0.250	0.275	0.000	0.000	35-25003875
4.000	4.375	0.187	0.207	0.000	0.000	30-18704000
4.000	4.375	0.312	0.344	0.000	0.000	30-18704000-312
4.000	4.375	0.375	0.413	0.000	0.000	30-18704000-375
4.000	4.375	0.375	0.413	0.000	0.000	36-18704000-375
4.000	4.375	0.375	0.413	0.000	0.000	23-18704000-375
4.000	4.375	0.500	0.550	0.000	0.000	30-18704000-500
3.250	4.500	0.625	0.687	0.000	0.000	35-62503250
3.250	4.500	1.000	1.100	0.000	0.000	30-62503250-100
3.500	4.500	0.500	0.550	0.000	0.000	30-50003500
3.500	4.500	0.750	0.765	0.000	0.000	CP-450350/2
3.500	4.500	0.750	0.825	0.000	0.000	30-50003500-750
3.750	4.500	0.375	0.413	0.000	0.000	30-37503750
3.750	4.500	0.500	0.515	0.000	0.000	CP-450375
3.750	4.500	0.500	0.550	0.000	0.000	30-37503750-500
3.750	4.500	0.625	0.687	0.000	0.000	30-37503750-625
3.875	4.500	0.312	0.344	0.000	0.000	30-31203875
3.875	4.500	0.375	0.413	0.000	0.000	30-31203875-375
3.875	4.500	0.500	0.550	0.000	0.000	30-31203875-500
4.000	4.500	0.000	0.000	0.000	0.000	30-25004000-312
4.000	4.500	0.250	0.275	0.000	0.000	45-25004000
4.000	4.500	0.250	0.275	0.000	0.000	30-25004000
4.000	4.500	0.312	0.344	0.000	0.000	15-25004000-312
4.000	4.500	0.375	0.413	0.000	0.000	30-25004000-375
4.000	4.500	0.375	0.413	0.000	0.000	38-25004000-375
4.000	4.500	0.375	0.413	0.000	0.000	23-25004000-375



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
4.000	4.500	0.500	0.550	0.000	0.000	30-25004000-500
4.000	4.500	0.562	0.619	0.000	0.000	38-25004000-562
4.000	4.500	0.562	0.619	0.000	0.000	30-25004000-562
4.000	4.500	0.562	0.619	0.000	0.000	23-25004000-562
4.125	4.500	0.187	0.207	0.000	0.000	35-18704125
4.125	4.500	0.187	0.207	0.000	0.000	30-18704125
4.125	4.500	0.250	0.275	0.000	0.000	30-18704125-250
4.125	4.500	0.375	0.413	0.000	0.000	30-18704125-375
3.625	4.625	0.500	0.550	0.000	0.000	35-50003625
3.875	4.625	0.375	0.413	0.000	0.000	35-37503875
3.875	4.625	0.625	0.687	0.000	0.000	30-37503875-625
4.000	4.625	0.312	0.344	0.000	0.000	30-31204000
4.000	4.625	0.375	0.413	0.000	0.000	38-31204000-375
4.000	4.625	0.375	0.413	0.000	0.000	23-31204000-375
4.000	4.625	0.500	0.550	0.000	0.000	30-31204000-500
4.000	4.625	0.562	0.619	0.000	0.000	38-31204000-562
4.000	4.625	0.562	0.619	0.000	0.000	30-31204000-562
4.125	4.625	0.250	0.275	0.000	0.000	35-25004125
4.125	4.625	0.375	0.413	0.000	0.000	30-25004125-375
4.250	4.625	0.187	0.207	0.000	0.000	35-18704250
4.250	4.625	0.312	0.344	0.000	0.000	30-18704250-312
4.250	4.625	0.375	0.413	0.000	0.000	30-18704250-375
3.500	4.750	0.625	0.687	0.000	0.000	35-62503500
3.750	4.750	0.500	0.550	0.000	0.000	30-50003750
3.750	4.750	0.690	0.750	0.000	0.000	30-50003750-690
3.750	4.750	0.750	0.765	0.000	0.000	CP-475375/2
3.750	4.750	0.750	0.825	0.000	0.000	30-50003750-750
3.875	4.750	0.750	0.825	0.000	0.000	30-43703875-750
4.000	4.750	0.375	0.413	0.000	0.000	30-37504000
4.000	4.750	0.500	0.550	0.000	0.000	30-37504000-500
4.000	4.750	0.500	0.550	0.000	0.000	23-37504000-500



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
4.000	4.750	0.625	0.687	0.000	0.000	30-37504000-625
4.000	4.750	0.625	0.687	0.000	0.000	38-37504000-625
4.000	4.750	0.625	0.687	0.000	0.000	23-37504000-625
4.000	4.750	0.687	0.702	0.000	0.000	CPI-475400/1
4.125	4.750	0.312	0.344	0.000	0.000	35-31204125
4.125	4.750	0.500	0.550	0.000	0.000	30-31204125-500
4.125	4.750	0.562	0.619	0.000	0.000	30-31204125-562
4.250	4.750	0.250	0.275	0.000	0.000	45-25004250
4.250	4.750	0.250	0.275	0.000	0.000	30-25004250
4.250	4.750	0.375	0.413	0.000	0.000	30-25004250-375
4.250	4.750	0.562	0.619	0.000	0.000	30-25004250-562
4.375	4.750	0.187	0.207	0.000	0.000	30-18704375
4.375	4.750	0.375	0.413	0.000	0.000	30-18704375-375
4.500	4.750	0.187	0.207	0.000	0.000	30-12504500-187
4.125	4.875	0.375	0.413	0.000	0.000	35-37504125
4.125	4.875	0.625	0.687	0.000	0.000	30-37504125-625
4.125	4.875	0.750	0.825	0.000	0.000	30-37504125-750
4.250	4.875	0.312	0.344	0.000	0.000	35-31204250
4.250	4.875	0.500	0.550	0.000	0.000	30-31204250-500
4.250	4.875	0.562	0.619	0.000	0.000	15-31204250-562
4.375	4.875	0.250	0.275	0.000	0.000	35-25004375
4.375	4.875	0.562	0.619	0.000	0.000	30-25004375-562
4.500	4.875	0.187	0.207	0.000	0.000	30-18704500
4.500	4.875	0.375	0.413	0.000	0.000	30-18704500-375A
4.500	4.875	0.375	0.413	0.000	0.000	30-18704500-375
3.750	5.000	0.625	0.687	0.000	0.000	35-62503750
3.750	5.000	1.000	1.100	0.000	0.000	30-62503750-100
4.000	5.000	0.500	0.550	0.000	0.000	30-50004000
4.000	5.000	0.750	0.765	0.000	0.000	CPI-500400
4.000	5.000	0.750	0.765	0.000	0.000	CP-500400
4.000	5.000	0.750	0.825	0.000	0.000	30-50004000-750



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
4.000	5.000	0.750	0.825	0.000	0.000	40-50004000-750
4.000	5.000	0.750	0.825	0.000	0.000	23-50004000-750
4.250	5.000	0.000	0.000	0.000	0.000	38-37504250-625
4.250	5.000	0.375	0.413	0.000	0.000	30-37504250
4.250	5.000	0.500	0.550	0.000	0.000	30-37504250-500
4.250	5.000	0.500	0.550	0.000	0.000	23-37504250-500
4.250	5.000	0.562	0.577	0.000	0.000	CP-500425
4.250	5.000	0.625	0.687	0.000	0.000	30-37504250-625
4.375	5.000	0.312	0.344	0.000	0.000	45-31204375
4.375	5.000	0.312	0.344	0.000	0.000	30-31204375
4.375	5.000	0.500	0.550	0.000	0.000	30-31204375-500
4.375	5.000	0.562	0.619	0.000	0.000	30-31204375-562
4.375	5.000	0.562	0.619	0.000	0.000	15-31204375-562
4.500	5.000	0.250	0.275	0.000	0.000	45-25004500
4.500	5.000	0.250	0.275	0.000	0.000	30-25004500
4.500	5.000	0.312	0.344	0.000	0.000	30-25004500-312
4.500	5.000	0.375	0.413	0.000	0.000	30-25004500-375
4.500	5.000	0.375	0.413	0.000	0.000	38-25004500-375
4.500	5.000	0.375	0.413	0.000	0.000	23-25004500-375
4.500	5.000	0.500	0.550	0.000	0.000	30-25004500-500
4.500	5.000	0.562	0.619	0.000	0.000	38-25004500-562
4.500	5.000	0.562	0.619	0.000	0.000	30-25004500-562
4.500	5.000	0.562	0.619	0.000	0.000	23-25004500-562
4.500	5.000	0.625	0.687	0.000	0.000	30-25004500-625
4.500	5.000	0.625	0.687	0.000	0.000	23-25004500-625
4.625	5.000	0.187	0.207	0.000	0.000	35-18704625
4.625	5.000	0.250	0.275	0.000	0.000	30-18704625-250
4.625	5.000	0.312	0.344	0.000	0.000	30-18704625-312
4.625	5.000	0.375	0.413	0.000	0.000	35-18704625-375
4.375	5.125	0.375	0.413	0.000	0.000	30-37504375
4.375	5.125	0.625	0.687	0.000	0.000	30-37504375-625





CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
4.500	5.125	0.312	0.344	0.000	0.000	35-31204500
4.500	5.125	0.375	0.343	0.000	0.000	30-31204500-375
4.500	5.125	0.500	0.550	0.000	0.000	30-31204500-500
4.500	5.125	0.500	0.550	0.000	0.000	23-31204500-500
4.500	5.125	0.625	0.687	0.000	0.000	30-31204500-625
4.500	5.125	0.625	0.687	0.000	0.000	38-31204500-625
4.500	5.125	0.625	0.687	0.000	0.000	23-31204500-625
4.625	5.125	0.250	0.275	0.000	0.000	30-25004625
4.625	5.125	0.562	0.619	0.000	0.000	36-25004625-562
4.625	5.125	0.562	0.619	0.000	0.000	30-25004625-562
4.750	5.125	0.187	0.207	0.000	0.000	35-18704750
4.750	5.125	0.375	0.413	0.000	0.000	23-18704750-375
4.000	5.250	0.625	0.687	0.000	0.000	35-62504000
4.250	5.250	0.500	0.550	0.000	0.000	35-50004250
4.250	5.250	0.750	0.765	0.000	0.000	CP-525425
4.250	5.250	0.750	0.825	0.000	0.000	30-50004250-750
4.500	5.250	0.375	0.413	0.000	0.000	30-37504500
4.500	5.250	0.468	0.483	0.000	0.000	CP-525450
4.500	5.250	0.500	0.550	0.000	0.000	30-37504500-500
4.500	5.250	0.625	0.687	0.000	0.000	38-37504500-625
4.500	5.250	0.625	0.687	0.000	0.000	30-37504500-625
4.500	5.250	0.625	0.687	0.000	0.000	23-37504500-625
4.625	5.250	0.562	0.619	0.000	0.000	15-31204625-562
4.750	5.250	0.000	0.000	0.000	0.000	23-25004750-375
4.750	5.250	0.000	0.000	0.000	0.000	15-25004750-375
4.750	5.250	0.250	0.275	0.000	0.000	30-25004750
4.750	5.250	0.375	0.413	0.000	0.000	30-25004750-375
4.750	5.250	0.500	0.550	0.000	0.000	30-25004750-500
4.750	5.250	0.562	0.619	0.000	0.000	30-25004750-562
4.750	5.250	0.562	0.619	0.000	0.000	36-25004750-562
4.750	5.250	0.562	0.619	0.000	0.000	23-25004750-562



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
4.750	5.250	0.625	0.687	0.000	0.000	23-25004750-625
4.875	5.250	0.187	0.207	0.000	0.000	35-18704875
4.375	5.375	0.750	0.825	0.000	0.000	35-50004375-750
4.500	5.375	0.437	0.481	0.000	0.000	35-43704500
4.625	5.375	0.375	0.413	0.000	0.000	35-37504625
4.625	5.375	0.625	0.687	0.000	0.000	30-37504625-625
4.750	5.375	0.312	0.344	0.000	0.000	35-31204750
4.750	5.375	0.500	0.000	0.000	0.000	15-31204750-500
4.750	5.375	0.500	0.550	0.000	0.000	30-31204750-500
4.750	5.375	0.625	0.687	0.000	0.000	30-31204750-625
4.875	5.375	0.250	0.275	0.000	0.000	35-25004875
4.875	5.375	0.625	0.687	0.000	0.000	30-25004875-625
5.000	5.375	0.312	0.344	0.000	0.000	30-18705000-312
5.000	5.375	0.375	0.413	0.000	0.000	30-18705000-375
4.250	5.500	0.625	0.687	0.000	0.000	30-62504250
4.250	5.500	0.750	0.825	0.000	0.000	35-62504250-750
4.500	5.500	0.500	0.550	0.000	0.000	30-50004500
4.500	5.500	0.500	0.550	0.000	0.000	23-50004500
4.500	5.500	0.750	0.765	0.000	0.000	CP-550450
4.500	5.500	0.750	0.825	0.000	0.000	30-50004500-750
4.750	5.500	0.375	0.413	0.000	0.000	30-37504750
4.750	5.500	0.500	0.550	0.000	0.000	30-37504750-500
4.750	5.500	0.625	0.687	0.000	0.000	30-37504750-625
4.875	5.500	0.312	0.344	0.000	0.000	35-31204875
5.000	5.500	0.250	0.275	0.000	0.000	45-25005000
5.000	5.500	0.250	0.275	0.000	0.000	30-25005000
5.000	5.500	0.375	0.413	0.000	0.000	23-25005000-375
5.000	5.500	0.375	0.413	0.000	0.000	40-25005000-375
5.000	5.500	0.375	0.413	0.000	0.000	30-25005000-375
5.000	5.500	0.375	0.413	0.000	0.000	15-25005000-375
5.000	5.500	0.500	0.550	0.000	0.000	30-25005000-500



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
5.000	5.500	0.562	0.619	0.000	0.000	30-25005000-562
5.000	5.500	0.562	0.619	0.000	0.000	38-25005000-562
5.000	5.500	0.562	0.619	0.000	0.000	23-25005000-562
5.000	5.562	0.281	0.312	0.000	0.000	35-28105000
5.000	5.562	0.355	0.390	0.000	0.000	23-28105000-355
4.750	5.625	0.437	0.481	0.000	0.000	35-43704750
4.750	5.625	0.750	0.825	0.000	0.000	30-43704750-750
4.875	5.625	0.375	0.413	0.000	0.000	30-37504875
4.875	5.625	0.562	0.619	0.000	0.000	30-37504875-562
4.875	5.625	0.625	0.687	0.000	0.000	30-37504875-625
5.000	5.625	0.312	0.344	0.000	0.000	45-31205000
5.000	5.625	0.312	0.344	0.000	0.000	35-31205000
5.000	5.625	0.500	0.550	0.000	0.000	23-31205000-500
5.000	5.625	0.562	0.619	0.000	0.000	36-31205000-562
5.000	5.625	0.625	0.687	0.000	0.000	30-31205000-625
5.000	5.625	0.625	0.687	0.000	0.000	38-31205000-625
5.000	5.625	0.625	0.687	0.000	0.000	15-31205000-625
5.125	5.625	0.250	0.275	0.000	0.000	30-25005125
4.500	5.750	0.625	0.687	0.000	0.000	35-62504500
4.750	5.750	0.500	0.550	0.000	0.000	15-50004750
4.750	5.750	0.750	0.825	0.000	0.000	30-50004750-750
5.000	5.750	0.375	0.413	0.000	0.000	45-37505000
5.000	5.750	0.375	0.413	0.000	0.000	30-37505000
5.000	5.750	0.500	0.550	0.000	0.000	30-37505000-500
5.000	5.750	0.625	0.687	0.000	0.000	30-37505000-625
5.000	5.750	0.625	0.687	0.000	0.000	38-37505000-625
5.000	5.750	0.625	0.687	0.000	0.000	23-37505000-625
5.125	5.750	0.312	0.344	0.000	0.000	35-31205125
5.125	5.750	0.625	0.688	0.000	0.000	30-31205125-625
5.250	5.750	0.250	0.275	0.000	0.000	30-25005250
5.250	5.750	0.375	0.413	0.000	0.000	30-25005250-375



CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
5.250	5.750	0.562	0.619	0.000	0.000	30-25005250-562
4.875	5.875	0.750	0.765	0.000	0.000	CP-587487
5.125	5.875	0.375	0.413	0.000	0.000	35-37505125
5.125	5.875	0.625	0.687	0.000	0.000	30-37505125-625
5.250	5.875	0.312	0.344	0.000	0.000	35-31205250
5.250	5.875	0.625	0.687	0.000	0.000	30-31205250-625
5.375	5.875	0.250	0.275	0.000	0.000	35-25005375
5.500	5.875	0.187	0.207	0.000	0.000	35-18705500
5.500	5.875	0.375	0.413	0.000	0.000	30-18705500-375
4.750	6.000	0.625	0.687	0.000	0.000	35-62504750
4.750	6.000	0.750	0.825	0.000	0.000	35-62504750-750
5.000	6.000	0.500	0.550	0.000	0.000	45-50005000
5.000	6.000	0.500	0.550	0.000	0.000	30-50005000
5.000	6.000	0.500	0.550	0.000	0.000	15-50005000
5.000	6.000	0.750	0.825	0.000	0.000	30-50005000-750
5.000	6.000	0.750	0.765	0.000	0.000	CP-600500
5.000	6.000	0.750	0.825	0.000	0.000	23-50005000-750
5.125	6.000	0.437	0.481	0.000	0.000	35-43705125
5.250	6.000	0.375	0.413	0.000	0.000	30-37505250
5.250	6.000	0.500	0.550	0.000	0.000	30-37505250-500
5.250	6.000	0.625	0.688	0.000	0.000	45-37505250-625
5.250	6.000	0.625	0.687	0.000	0.000	30-37505250-625
5.375	6.000	0.312	0.343	0.000	0.000	45-31205375
5.375	6.000	0.312	0.344	0.000	0.000	30-31205375
5.375	6.000	0.375	0.413	0.000	0.000	30-31205375-375
5.375	6.000	0.500	0.550	0.000	0.000	30-31205375-500
5.375	6.000	0.500	0.550	0.000	0.000	15-31205375-500
5.375	6.000	0.562	0.619	0.000	0.000	30-31205375-562
5.375	6.000	0.562	0.619	0.000	0.000	15-31205375-562
5.375	6.000	0.625	0.687	0.000	0.000	30-31205375-625
5.375	6.000	0.625	0.687	0.000	0.000	23-31205375-625





CP



14



15



30



CPI



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
5.375	6.000	0.625	0.687	0.000	0.000	15-31205375-625
5.437	6.000	0.281	0.312	0.000	0.000	35-28105437
5.500	6.000	0.000	0.000	0.000	0.000	30-25005500-500
5.500	6.000	0.250	0.275	0.000	0.000	45-25005500
5.500	6.000	0.250	0.275	0.000	0.000	30-25005500
5.500	6.000	0.375	0.413	0.000	0.000	30-25005500-375
5.500	6.000	0.375	0.413	0.000	0.000	23-25005500-375
5.500	6.000	0.562	0.619	0.000	0.000	36-25005500-562
5.500	6.000	0.562	0.619	0.000	0.000	38-25005500-562
5.500	6.000	0.562	0.619	0.000	0.000	30-25005500-562
5.500	6.000	0.562	0.619	0.000	0.000	23-25005500-562
5.250	6.125	0.437	0.481	0.000	0.000	35-43705250
5.375	6.125	0.375	0.413	0.000	0.000	35-37505375
5.375	6.125	0.625	0.687	0.000	0.000	30-37505375-625
5.500	6.125	0.312	0.344	0.000	0.000	45-31205500
5.500	6.125	0.312	0.344	0.000	0.000	30-31205500
5.500	6.125	0.312	0.344	0.000	0.000	23-31205500
5.500	6.125	0.375	0.433	0.000	0.000	15-31205500-375
5.500	6.125	0.625	0.687	0.000	0.000	30-31205500-625
5.625	6.125	0.250	0.275	0.000	0.000	30-25005625
5.625	6.125	0.562	0.619	0.000	0.000	36-25005625-562
5.000	6.250	0.625	0.687	0.000	0.000	35-62505000
5.250	6.250	0.500	0.550	0.000	0.000	35-50005250
5.250	6.250	0.750	0.825	0.000	0.000	30-50005250-750
5.500	6.250	0.375	0.413	0.000	0.000	30-37505500
5.500	6.250	0.500	0.550	0.000	0.000	30-37505500-500
5.500	6.250	0.625	0.687	0.000	0.000	30-37505500-625
5.500	6.250	0.625	0.687	0.000	0.000	23-37505500-625
5.500	6.250	0.687	0.702	0.000	0.000	CP-625550
5.750	6.250	0.250	0.275	0.000	0.000	30-25005750
5.750	6.250	0.375	0.413	0.000	0.000	30-25005750-375



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
5.750	6.250	0.562	0.619	0.000	0.000	30-25005750-562
5.375	6.375	0.500	0.550	0.000	0.000	30-50005375
5.625	6.375	0.375	0.413	0.000	0.000	35-37505625
5.750	6.375	0.312	0.344	0.000	0.000	30-31205750
5.750	6.375	0.625	0.687	0.000	0.000	30-31205750-625
5.750	6.375	0.875	0.963	0.000	0.000	30-31205750-875
5.875	6.375	0.250	0.275	0.000	0.000	30-25005875
6.000	6.375	0.375	0.413	0.000	0.000	35-18706000-375
5.250	6.500	0.625	0.687	0.000	0.000	35-62505250
5.500	6.500	0.500	0.550	0.000	0.000	30-50005500
5.500	6.500	0.750	0.825	0.000	0.000	30-50005500-750
5.750	6.500	0.375	0.413	0.000	0.000	30-37505750
5.750	6.500	0.500	0.550	0.000	0.000	30-37505750-500
5.750	6.500	0.500	0.550	0.000	0.000	15-37505750-500
5.750	6.500	0.625	0.687	0.000	0.000	30-37505750-625
5.875	6.500	0.312	0.344	0.000	0.000	35-31205875
6.000	6.500	0.250	0.275	0.000	0.000	45-25006000
6.000	6.500	0.250	0.275	0.000	0.000	30-25006000
6.000	6.500	0.375	0.413	0.000	0.000	30-25006000-375
6.000	6.500	0.562	0.619	0.000	0.000	38-25006000-562
6.000	6.500	0.562	0.619	0.000	0.000	30-25006000-562
6.000	6.500	0.562	0.619	0.000	0.000	23-25006000-562
5.875	6.625	0.375	0.413	0.000	0.000	35-37505875
6.000	6.625	0.312	0.344	0.000	0.000	35-31206000
6.000	6.625	0.562	0.619	0.000	0.000	36-31206000-562
6.000	6.625	0.625	0.687	0.000	0.000	30-31206000-625
5.750	6.750	0.500	0.550	0.000	0.000	35-50005750
5.750	6.750	0.750	0.825	0.000	0.000	30-50005750-750
6.000	6.750	0.375	0.413	0.000	0.000	35-37506000
6.000	6.750	0.500	0.550	0.000	0.000	30-37506000-500
6.000	6.750	0.625	0.687	0.000	0.000	30-37506000-625





CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
6.000	6.750	0.625	0.687	0.000	0.000	38-37506000-625
6.000	6.750	0.625	0.687	0.000	0.000	23-37506000-625
6.250	6.750	0.250	0.275	0.000	0.000	45-25006250
6.250	6.750	0.250	0.275	0.000	0.000	35-25006250
6.250	6.750	0.375	0.413	0.000	0.000	30-25006250-375
6.250	6.750	0.562	0.619	0.000	0.000	30-25006250-562
6.750	6.750	0.750	0.825	0.000	0.000	30-50006750-750
6.250	6.875	0.312	0.344	0.000	0.000	35-31206250
5.750	7.000	0.625	0.687	0.000	0.000	35-62505750
6.000	7.000	0.500	0.550	0.000	0.000	30-50006000
6.000	7.000	0.750	0.825	0.000	0.000	30-50006000-750A
6.000	7.000	0.750	0.825	0.000	0.000	30-50006000-750
6.250	7.000	0.375	0.413	0.000	0.000	30-37506250
6.250	7.000	0.500	0.550	0.000	0.000	30-37506250-500
6.250	7.000	0.625	0.687	0.000	0.000	30-37506250-625
6.250	7.000	0.625	0.687	0.000	0.000	23-37506250-625
6.375	7.000	0.312	0.344	0.000	0.000	35-31206375
6.375	7.000	0.562	0.619	0.000	0.000	15-31206375-562
6.375	7.000	0.625	0.687	0.000	0.000	35-31206375-625
6.375	7.000	0.625	0.687	0.000	0.000	30-31206375-625
6.500	7.000	0.250	0.275	0.000	0.000	45-25006500
6.500	7.000	0.250	0.275	0.000	0.000	30-25006500
6.500	7.000	0.375	0.390	0.000	0.000	CP-700650
6.500	7.000	0.375	0.413	0.000	0.000	30-25006500-375
6.500	7.000	0.375	0.413	0.000	0.000	23-25006500-375
6.500	7.000	0.562	0.619	0.000	0.000	36-25006500-562
6.500	7.000	0.562	0.619	0.000	0.000	30-25006500-562
6.375	7.125	0.375	0.413	0.000	0.000	35-37506375
6.500	7.125	0.312	0.344	0.000	0.000	35-31206500
6.500	7.125	0.625	0.687	0.000	0.000	30-31206500-625
6.500	7.125	0.750	0.825	0.000	0.000	30-31206500-750



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
6.000	7.250	0.625	0.687	0.000	0.000	35-62506000
6.250	7.250	0.500	0.550	0.000	0.000	30-50006250
6.250	7.250	0.750	0.825	0.000	0.000	30-50006250-750
6.500	7.250	0.375	0.413	0.000	0.000	30-37506500
6.500	7.250	0.500	0.550	0.000	0.000	30-37506500-500
6.500	7.250	0.625	0.687	0.000	0.000	30-37506500-625
6.500	7.250	0.625	0.687	0.000	0.000	23-37506500-625
6.625	7.250	0.312	0.344	0.000	0.000	35-31206625
6.750	7.250	0.250	0.275	0.000	0.000	30-25006750
6.750	7.250	0.375	0.413	0.000	0.000	30-25006750-375
6.750	7.250	0.562	0.619	0.000	0.000	30-25006750-562
6.750	7.375	0.312	0.344	0.000	0.000	30-31206750
6.750	7.375	0.625	0.687	0.000	0.000	30-31206750-625
6.250	7.500	0.625	0.687	0.000	0.000	35-62506250
6.250	7.500	1.000	1.015	0.000	0.000	CP-750625
6.500	7.500	0.500	0.550	0.000	0.000	30-50006500
6.500	7.500	0.750	0.825	0.000	0.000	30-50006500-750
6.750	7.500	0.375	0.413	0.000	0.000	30-37506750
6.750	7.500	0.500	0.550	0.000	0.000	15-37506750-500
6.750	7.500	0.625	0.687	0.000	0.000	30-37506750-625
7.000	7.500	0.250	0.275	0.000	0.000	30-25007000
7.000	7.500	0.375	0.413	0.000	0.000	30-25007000-375
7.000	7.500	0.562	0.619	0.000	0.000	30-25007000-562
6.875	7.625	0.625	0.687	0.000	0.000	30-37506875-625
7.000	7.625	0.312	0.344	0.000	0.000	35-31207000
7.000	7.625	0.562	0.619	0.000	0.000	36-31207000-562
7.000	7.625	0.625	0.687	0.000	0.000	30-31207000-625
6.500	7.750	0.625	0.688	0.000	0.000	35-62506500
6.500	7.750	1.000	1.100	0.000	0.000	CP-775650
6.750	7.750	0.500	0.550	0.000	0.000	35-50006750
7.000	7.750	0.375	0.413	0.000	0.000	35-37507000



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
7.000	7.750	0.500	0.550	0.000	0.000	30-37507000-500
7.000	7.750	0.625	0.687	0.000	0.000	38-37507000-625
7.000	7.750	0.625	0.687	0.000	0.000	30-37507000-625
7.250	7.750	0.250	0.275	0.000	0.000	35-25007250
7.250	7.750	0.562	0.619	0.000	0.000	30-25007250-562
7.250	7.875	0.312	0.344	0.000	0.000	35-31207250
7.250	7.875	0.625	0.687	0.000	0.000	30-31207250-625
6.500	8.000	0.750	0.825	0.000	0.000	35-75006500
6.750	8.000	0.625	0.687	0.000	0.000	35-62506750
6.750	8.000	1.000	1.100	0.000	0.000	30-62506750-100
6.750	8.000	1.000	1.015	0.000	0.000	CP-800675
7.000	8.000	0.500	0.550	0.000	0.000	30-50007000
7.000	8.000	0.750	0.825	0.000	0.000	40-50007000-750
7.000	8.000	0.750	0.825	0.000	0.000	30-50007000-750
7.250	8.000	0.375	0.413	0.000	0.000	30-37507250
7.250	8.000	0.500	0.550	0.000	0.000	30-37507250-500
7.250	8.000	0.562	0.619	0.000	0.000	30-37507250-562
7.250	8.000	0.625	0.687	0.000	0.000	30-37507250-625
7.375	8.000	0.312	0.344	0.000	0.000	45-31207375
7.375	8.000	0.312	0.344	0.000	0.000	30-31207375
7.375	8.000	0.562	0.619	0.000	0.000	30-31207375-562
7.375	8.000	0.625	0.687	0.000	0.000	30-31207375-625
7.500	8.000	0.250	0.275	0.000	0.000	30-25007500
7.500	8.000	0.375	0.413	0.000	0.000	30-25007500-375
7.500	8.000	0.375	0.413	0.000	0.000	23-25007500-375
7.500	8.000	0.562	0.619	0.000	0.000	36-25007500-562
7.500	8.000	0.562	0.619	0.000	0.000	30-25007500-562
7.500	8.125	0.312	0.344	0.000	0.000	35-31207500
7.000	8.250	0.625	0.687	0.000	0.000	35-62507000
7.000	8.250	1.000	1.040	0.000	0.000	CP-825700
7.250	8.250	0.500	0.550	0.000	0.000	35-50007250



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
7.250	8.250	0.750	0.825	0.000	0.000	30-50007250-750
7.500	8.250	0.375	0.413	0.000	0.000	35-37507500
7.500	8.250	0.500	0.550	0.000	0.000	30-37507500-500
7.500	8.250	0.625	0.687	0.000	0.000	30-37507500-625
7.750	8.250	0.250	0.275	0.000	0.000	30-25007750
7.750	8.250	0.375	0.413	0.000	0.000	30-25007750-375
7.625	8.375	0.375	0.413	0.000	0.000	35-37507625
7.750	8.375	0.312	0.344	0.000	0.000	30-31207750
7.250	8.500	0.625	0.687	0.000	0.000	35-62507250
7.250	8.500	1.000	1.015	0.000	0.000	CP-850725
7.500	8.500	0.500	0.550	0.000	0.000	35-50007500
7.500	8.500	0.750	0.825	0.000	0.000	30-50007500-750
7.750	8.500	0.375	0.413	0.000	0.000	35-37507750
7.750	8.500	0.500	0.550	0.000	0.000	30-37507750-500
7.750	8.500	0.625	0.687	0.000	0.000	30-37507750-625
7.750	8.500	0.625	0.687	0.000	0.000	23-37507750-625
8.000	8.500	0.250	0.275	0.000	0.000	30-25008000
8.000	8.500	0.375	0.413	0.000	0.000	30-25008000-375
8.000	8.500	0.562	0.619	0.000	0.000	30-25008000-562
8.000	8.625	0.312	0.344	0.000	0.000	35-31208000
8.125	8.625	0.562	0.619	0.000	0.000	36-25008125-562
8.125	8.625	0.562	0.619	0.000	0.000	30-25008125-562
7.500	8.750	1.000	1.015	0.000	0.000	CP-875750
7.750	8.750	0.500	0.550	0.000	0.000	35-50007750
7.750	8.750	0.750	0.825	0.000	0.000	30-50007750-750
8.000	8.750	0.375	0.413	0.000	0.000	35-37508000
8.000	8.750	0.625	0.688	0.000	0.000	40-37508000-625
8.000	8.750	0.625	0.687	0.000	0.000	30-37508000-625
8.250	8.750	0.250	0.275	0.000	0.000	35-25008250
8.250	8.750	0.562	0.619	0.000	0.000	30-25008250-562
8.250	8.875	0.312	0.344	0.000	0.000	30-31208250



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
7.750	9.000	0.625	0.687	0.000	0.000	35-62507750
8.000	9.000	0.500	0.550	0.000	0.000	35-50008000
8.000	9.000	0.750	0.825	0.000	0.000	30-50008000-750
8.250	9.000	0.375	0.413	0.000	0.000	30-37508250
8.250	9.000	0.500	0.550	0.000	0.000	35-37508250-500
8.250	9.000	0.625	0.687	0.000	0.000	30-37508250-625
8.500	9.000	0.250	0.275	0.000	0.000	35-25008500
8.500	9.000	0.375	0.413	0.000	0.000	36-25008500-375
8.500	9.000	0.375	0.413	0.000	0.000	30-25008500-375
8.500	9.000	0.562	0.619	0.000	0.000	30-25008500-562
8.125	9.125	0.500	0.550	0.000	0.000	30-50008125
8.500	9.125	0.312	0.344	0.000	0.000	30-31208500
8.500	9.125	0.562	0.619	0.000	0.000	36-31208500-562
8.500	9.125	0.625	0.687	0.000	0.000	30-31208500-625
8.000	9.250	0.625	0.687	0.000	0.000	35-62508000
8.000	9.250	1.000	1.015	0.000	0.000	CP-925800
8.000	9.250	1.000	1.100	0.000	0.000	30-62508000-100
8.500	9.250	0.375	0.413	0.000	0.000	35-37508500
8.500	9.250	0.625	0.687	0.000	0.000	30-37508500-625
8.750	9.250	0.250	0.275	0.000	0.000	35-25008750
8.750	9.250	0.250	0.275	0.000	0.000	30-25008750
8.750	9.250	0.375	0.413	0.000	0.000	30-25008750-375
8.250	9.500	0.625	0.687	0.000	0.000	35-62508250
8.250	9.500	1.000	1.100	0.000	0.000	CP-950825
8.250	9.500	1.000	1.100	0.000	0.000	30-62508250-100
8.500	9.500	0.500	0.550	0.000	0.000	35-50008500
8.500	9.500	0.750	0.825	0.000	0.000	30-50008500-750
8.750	9.500	0.375	0.413	0.000	0.000	35-37508750
8.750	9.500	0.625	0.687	0.000	0.000	35-37508750-625
9.000	9.500	0.250	0.275	0.000	0.000	35-25009000
9.000	9.500	0.562	0.619	0.000	0.000	30-25009000-562



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
8.500	9.750	1.000	1.015	0.000	0.000	CP-975850
8.500	9.750	1.000	1.100	0.000	0.000	30-62508500-100
8.750	9.750	0.500	0.550	0.000	0.000	35-50008750
8.750	9.750	0.750	0.825	0.000	0.000	30-50008750-750
9.000	9.750	0.375	0.413	0.000	0.000	35-37509000
9.000	9.750	0.625	0.687	0.000	0.000	30-37509000-625
9.250	9.750	0.250	0.275	0.000	0.000	35-25009250
9.250	9.875	0.625	0.687	0.000	0.000	30-31209250-625
8.750	10.000	0.625	0.687	0.000	0.000	35-62508750
9.000	10.000	0.500	0.550	0.000	0.000	30-50009000
9.000	10.000	0.625	0.687	0.000	0.000	15-50009000-625
9.000	10.000	0.750	0.825	0.000	0.000	30-50009000-750
9.250	10.000	0.375	0.413	0.000	0.000	30-37509250
9.250	10.000	0.500	0.550	0.000	0.000	35-37509250-500
9.250	10.000	0.625	0.687	0.000	0.000	30-37509250-625
9.375	10.000	0.625	0.687	0.000	0.000	30-31209375-625
9.500	10.000	0.250	0.275	0.000	0.000	35-25009500
9.500	10.000	0.250	0.275	0.000	0.000	15-25009500
9.500	10.000	0.562	0.619	0.000	0.000	30-25009500-562
9.500	10.125	0.562	0.619	0.000	0.000	36-31209500-562
9.000	10.250	0.625	0.687	0.000	0.000	35-62509000
9.000	10.250	1.000	1.100	0.000	0.000	30-62509000-100
9.000	10.250	1.000	1.015	0.000	0.000	CP-1025900
9.500	10.250	0.375	0.413	0.000	0.000	35-37509500
9.500	10.250	0.625	0.687	0.000	0.000	30-37509500-625
9.750	10.250	0.250	0.275	0.000	0.000	35-25009750
9.750	10.250	0.562	0.619	0.000	0.000	30-25009750-562
9.000	10.500	1.250	1.375	0.000	0.000	30-75009000-125
9.250	10.500	0.625	0.687	0.000	0.000	35-62509250
9.500	10.500	0.500	0.550	0.000	0.000	35-50009500
9.500	10.500	0.750	0.825	0.000	0.000	30-50009500-750





CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
9.750	10.500	0.375	0.413	0.000	0.000	35-37509750
9.750	10.500	0.625	0.687	0.000	0.000	30-37509750-625
10.000	10.500	0.250	0.275	0.000	0.000	30-25010000
10.000	10.500	0.562	0.619	0.000	0.000	30-25010000-562
9.500	10.750	0.625	0.687	0.000	0.000	35-62509500
10.000	10.750	0.375	0.413	0.000	0.000	35-37510000
10.000	10.750	0.625	0.000	0.000	0.000	36-37510000-625
10.000	10.750	0.625	0.687	0.000	0.000	30-37510000-625
9.750	11.000	0.625	0.687	0.000	0.000	35-62509750
10.000	11.000	0.500	0.550	0.000	0.000	35-50010000
10.000	11.000	0.750	0.825	0.000	0.000	15-50010000-750
10.250	11.000	0.375	0.413	0.000	0.000	35-37510250
10.500	11.000	0.250	0.275	0.000	0.000	35-25010500
10.500	11.125	0.562	0.619	0.000	0.000	36-31210500-562
10.000	11.500	0.750	0.825	0.000	0.000	35-75010000
10.500	11.500	0.500	0.550	0.000	0.000	35-50010500
10.500	11.500	0.750	0.825	0.000	0.000	30-50010500-750
10.500	11.500	1.000	1.100	0.000	0.000	30-50010500-100
11.000	11.750	0.625	0.687	0.000	0.000	30-37511000-625
11.250	11.750	0.250	0.275	0.000	0.000	35-25011250
10.750	12.000	0.625	0.687	0.000	0.000	35-62510750
11.000	12.000	0.500	0.550	0.000	0.000	35-50011000
11.000	12.000	0.500	0.550	0.000	0.000	30-50011000
11.000	12.000	0.625	0.687	0.000	0.000	15-50011000-625
11.000	12.000	0.750	0.825	0.000	0.000	30-50011000-750
11.250	12.000	0.375	0.413	0.000	0.000	35-37511250
11.250	12.000	0.625	0.687	0.000	0.000	35-37511250-625
11.250	12.000	0.625	0.687	0.000	0.000	30-37511250-625
11.500	12.000	0.250	0.275	0.000	0.000	35-25011500
11.000	12.250	1.000	1.100	0.000	0.000	30-62511000-100
11.500	12.250	0.625	0.687	0.000	0.000	30-37511500-625



CP



CPI



14



35



15



40



30



45

ID	OD	L1	L2	OD2	OD3	Product Name
11.750	12.375	0.562	0.619	0.000	0.000	36-31211750-562
11.250	12.500	1.000	1.100	0.000	0.000	30-62511250-100
11.500	12.500	0.750	0.825	0.000	0.000	35-50011500-750
12.000	12.500	0.250	0.275	0.000	0.000	30-25012000
11.500	12.750	1.000	1.100	0.000	62,511,500.000	30-62511500-100
11.750	12.750	0.500	0.550	0.000	0.000	35-50011750
12.000	12.750	0.375	0.413	0.000	0.000	35-37512000
12.000	12.750	0.625	0.687	0.000	0.000	30-37512000-625
12.000	13.000	0.500	0.550	0.000	0.000	35-50012000
12.000	13.000	0.750	0.825	0.000	0.000	36-50012000-750
12.000	13.000	0.750	0.825	0.000	0.000	30-50012000-750
12.250	13.000	0.375	0.413	0.000	0.000	35-37512250
12.000	13.250	0.625	0.687	0.000	0.000	35-62512000
12.500	13.250	0.375	0.413	0.000	0.000	23-37512500
12.000	13.500	0.750	0.825	0.000	0.000	35-75012000
12.250	13.500	1.000	1.100	0.000	0.000	30-62512250-100
12.500	13.500	0.750	0.825	0.000	0.000	35-50012500-750
13.000	13.625	0.562	0.619	0.000	0.000	36-31213000-562
13.000	13.750	0.375	0.413	0.000	0.000	35-37513000
12.500	14.000	0.750	0.825	0.000	0.000	35-75012500
12.750	14.000	0.625	0.687	0.000	0.000	35-62512750
13.000	14.000	0.500	0.550	0.000	0.000	35-50013000
13.000	14.000	0.750	0.825	0.000	0.000	36-50013000-750
13.000	14.000	0.750	0.825	0.000	0.000	30-50013000-750
13.250	14.000	0.375	0.413	0.000	0.000	35-37513250
13.250	14.250	0.500	0.550	0.000	0.000	35-50013250
13.250	14.250	0.750	0.825	0.000	0.000	30-50013250-750
13.000	14.500	1.000	1.100	0.000	0.000	35-75013000-100
13.500	14.500	0.750	0.825	0.000	0.000	35-50013500-750
13.750	14.500	0.375	0.413	0.000	0.000	35-37513750
13.750	14.750	0.750	0.825	0.000	0.000	35-50013750-750



CP



CPI



14



15



30



35



40



45

ID	OD	L1	L2	OD2	OD3	Product Name
13.500	15.000	0.750	0.825	0.000	0.000	35-75013500
13.937	15.000	0.812	0.893	0.000	0.000	CP-15001393-081
14.000	15.000	0.500	0.550	0.000	0.000	35-50014000
14.000	15.250	1.000	1.100	0.000	0.000	35-62514000-100
15.000	15.750	0.375	0.413	0.000	0.000	35-37515000
14.750	16.000	1.000	1.100	0.000	0.000	30-62514750-100
15.000	16.000	0.500	0.550	0.000	0.000	35-50015000
15.000	16.000	0.750	0.825	0.000	0.000	35-50015000-750
15.500	16.250	0.375	0.413	0.000	0.000	35-37515500
15.500	16.500	0.750	0.825	0.000	0.000	35-50015500-750
16.000	17.000	0.500	0.550	0.000	0.000	35-50016000
16.750	18.000	0.625	0.687	0.000	0.000	35-62516750
17.000	18.000	0.500	0.550	0.000	0.000	35-50017000
17.000	18.000	0.750	0.825	0.000	50,017,000.000	30-50017000-750
18.000	19.000	0.750	0.825	0.000	0.000	30-50018000-750
18.750	20.000	1.000	1.100	0.000	0.000	30-62518750-100



# GR2

## Glide and Buffer Ring

### Design

GR2 are designed as high pressure, low friction double acting rod seals for use in heavy duty hydraulic applications. They consist of an outer NBR o-ring energiser and an inner ring of filled PTFE. This design, often found in rotary couplings, is usually supplied in GR3 standard housing sizes. Through the use of different energising materials a low cost high temperature seal can be created. Due to the properties of Bronze PTFE speeds up to 15 m/s can be accommodated.

MADE TO ORDER

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-30° to 120° C  
-22° to 250° F



#### Speed

4.0m/sec  
12'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{\O}d$	$\text{\O}D$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\text{\O}d$	$\text{\O}D$	L
f8	H9	-0 + 0.008

#### Chamfer Radii

	0.096	0.147	0.305	0.413
C/S				
C	0.048	0.100	0.275	0.375
r	0.012	0.015	0.047	0.063

#### Extrusion Gap G

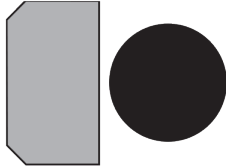
Pressure	1,500	2,400	3,750	5,000
	0.024	0.020	0.016	0.012

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



Rod seals



### Key Features

Medium to heavy duty

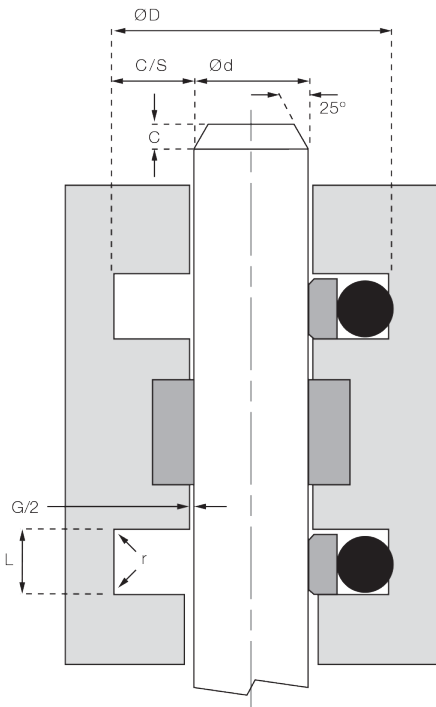
Rod seal only

Higher pressures

High speed capability

Compact housing

Easy to fit





# GR3

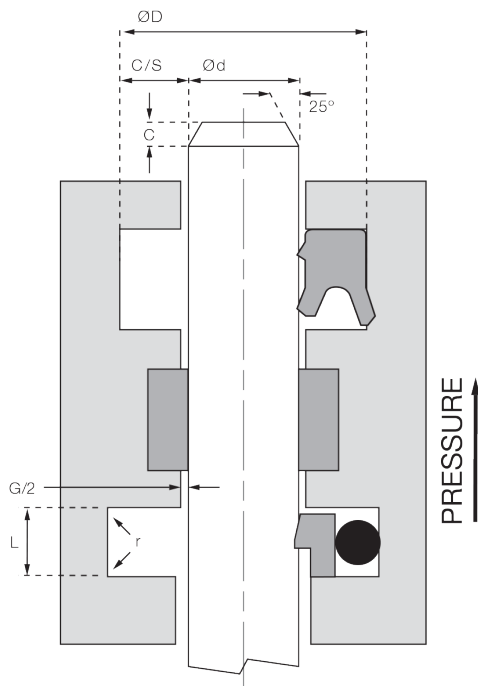
## Glide and Buffer Ring

Rod seals



### Key Features

- Medium to heavy duty
- Rod seal only
- Higher pressures
- High speed capability
- Compact housing
- Easy to fit



### Design

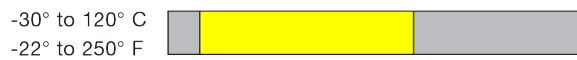
GR3 are designed as high pressure, low friction single acting rod seals for use in heavy duty hydraulic and pneumatic applications. It consists of an outer Nitrile o-ring energiser and an inner ring of Bronze filled PTFE. This inner ring has a step machined into approximately the middle. This step reduces the area which the energiser loads, creating a dry rod seal. The step faces the direction of the pressure. Through the use of different energising materials a low cost high temperature seal can be created. Due to the properties of Bronze PTFE speeds up to 15 m/s can be accommodated.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish $\mu\text{mRa}$

$\text{\O}d$	$\text{\O}D$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\text{\O}D$	$\text{\O}d$	L
f8	H9	-0 + 0.008

#### Chamfer Radii

	0.096	0.147	0.305	0.413
C/S				
C	0.048	0.100	0.275	0.375
r	0.012	0.015	0.047	0.063

#### Extrusion Gap G

Pressure	1,500	2,400	3,750	5,000
	0.024	0.020	0.016	0.012

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# GR5

## Glide and Buffer Ring

### Design

GR5 are designed as high pressure low friction single acting rod seals for use in heavy duty hydraulic and pneumatic applications. They consist of an outer Viton o-ring energiser and an inner ring of Bronze filled or virgin PTFE. This inner ring has a step machined into approximately the middle. This step reduces the area which the energiser loads, creating a dry rod seal. The step faces the direction of the pressure. Due to the properties of Bronze PTFE speeds up to 15 m/s can be accommodated.

### Operating Conditions

<b>Pressure</b>	
350 Bar 5,000 Psi	

<b>Temperature</b>	
-20° to 200°C -4° to 392°F	

<b>Speed</b>	
4.0m/sec 12'/sec	

<b>Surface Finish <math>\mu\text{mRa}</math></b>		
$\varnothing d$	$\varnothing D$	L
0.1-0.25	0.8	2.0

<b>Tolerances</b>		
$\varnothing D$	$\varnothing d$	L
H9	f8	-0 + 0.008

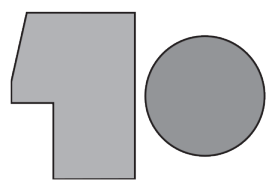
<b>Chamfer Radii</b>				
C/S	0.096	0.147	0.305	0.413
C	0.048	0.100	0.275	0.375
r	0.012	0.015	0.047	0.063

<b>Extrusion Gap G</b>				
Pressure	1,500	2,400	3,750	5,000
	0.024	0.020	0.016	0.012

**Typical Examples**  
 Reciprocating  Rotary  Oscillating  Helix

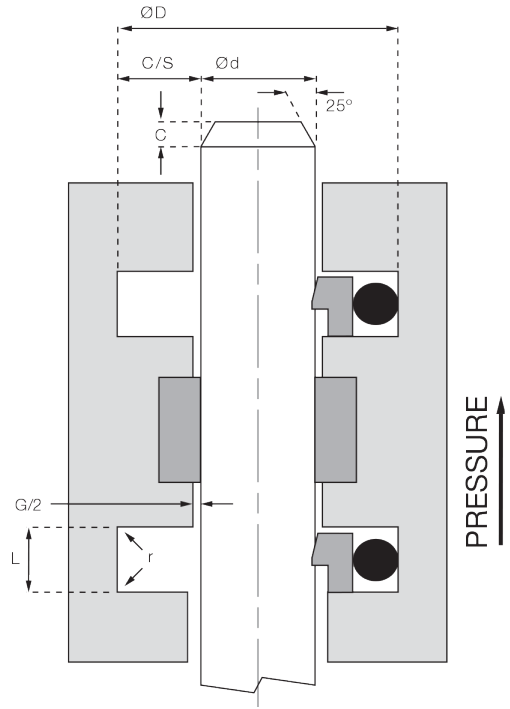


Rod seals



### Key Features

- Medium to heavy duty
- Rod seal only
- Higher pressures
- High speed capability
- Higher temperature capability
- Easy to fit





# GRU

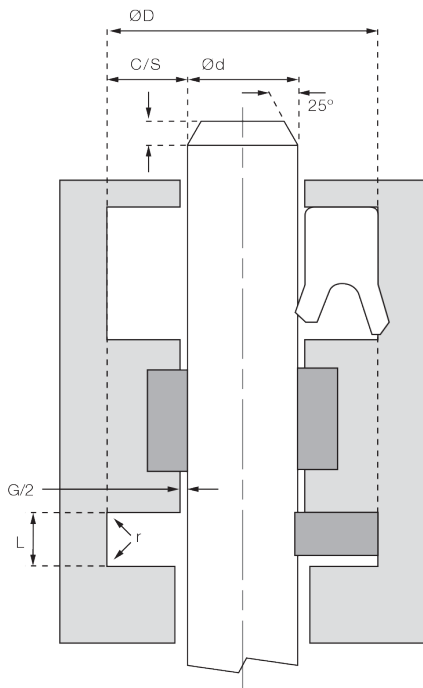
Glide and Buffer Ring

Rod seals



## Key Features

- Medium to heavy duty
- Rod seal only
- Higher pressures
- High speed capability
- Compact housing
- Easy to fit



## Design

GRU are a symmetrical buffer type single acting seal. They are a straight cut polyurethane ring usually with a groove or slot, which faces the pressure, to enable oil to flow to the secondary seal to maintain lubrication and a dry rod. The buffer seal is designed to absorb pressure fluctuations under high load conditions, thus increasing the life of the tandem seal. This type of arrangement is used where both low friction and low leakage are required. The seals high pressure resistance makes it suitable for use in heavy duty applications where shock loads and pressure spikes occur, as found in mobile plant equipment.

## Operating Conditions

### Pressure

400 Bar  
6,000 Psi



### Temperature

-40° to 110°C  
-40° to 230°F



### Speed

0.8m/sec  
2.5'/sec



### Surface Finish $\mu mRa$

$\varnothing d$	$\varnothing D$	L
0.1-0.25	0.8	2.0

### Tolerances

REPLACEMENT PART ONLY

### Chamfer Radii

REPLACEMENT PART ONLY

### Extrusion Gap G

REPLACEMENT PART ONLY

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

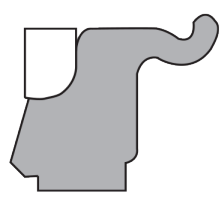




# DYM

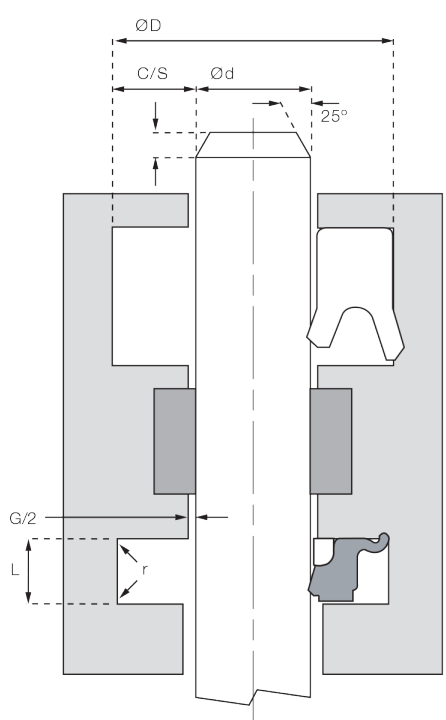
## Glide and Buffer Ring

Rod seals



### Key Features


- Medium to heavy duty
- Rod seal only
- Higher pressures
- High speed capability
- Compact housing
- Easy to fit




### Design

The DYM buffer seal is an asymmetric urethane seal with a hard split nylon anti-extrusion ring. Designed as a high pressure low friction seal for use in second generation tandem sealing arrangements, the design offers improved performance in small diameter applications. Pressure relieving capabilities to prevent pressure entrapment. The seals high pressure resistance makes it suitable for use in heavy duty applications where shock loads and pressure spikes occur, as found in mobile plant equipment. DYM style marked X in data table are available on request.

### Operating Conditions

Pressure	Operating Range
350 Bar 5,000 Psi	

Temperature	Operating Range
-40° to 110° C -40° to 230° F	

Speed	Operating Range
1.0m/sec 3'/sec	

Surface Finish $\mu\text{mRa}$		
$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

Tolerances		
$\varnothing D$	$\varnothing d$	L
H9	h9	-0 + 0.008

Chamfer Radii		
c/s	0.212	0.308
C	0.100	0.156
r	0.015 to 0.035	

Extrusion Gap G					
Pressure	1,000	3,000	5,000	7,500	10,000
C/S 0.212	0.022	0.018	0.012	call	call
C/S 0.308	0.030	0.022	0.018	call	call

**Typical Examples**  
 Reciprocating  Rotary  Oscillating  Helix







# HBY

## Glide and Buffer Ring

### Design

HBY is a single acting buffer seal for gland applications using the same housing design as GR3. The sealing element is manufactured in polyurethane with an Polyacetyl anti-extrusion ring. Designed as a high pressure low friction seal for use in second generation tandem sealing arrangements. The HBY seal is used on the pressure side and a low leak but higher friction seal on the non pressure side to collect oil film during the positive stroke. The seals high pressure resistance makes it suitable for use in heavy duty applications where shock loads and pressure spikes occur, as found in mobile plant equipment. HBY style marked X in data table are available on request.

### Operating Conditions

#### Pressure

500 Bar  
7,000 Psi



#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

1.0m/sec  
3'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing D$	$\varnothing d$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing d$	$\varnothing D$	L
f9	-0 +0.004	-0 +0.008

#### Chamfer Radii

C/S	0.308
C	0.156
r	0.015 to 0.035

#### Extrusion Gap G

Pressure	1,000	3,000	5,000	7,500	10,000
C/S 0.308	0.030	0.022	0.018	call	call

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



Rod seals



### Key Features

Medium to heavy duty

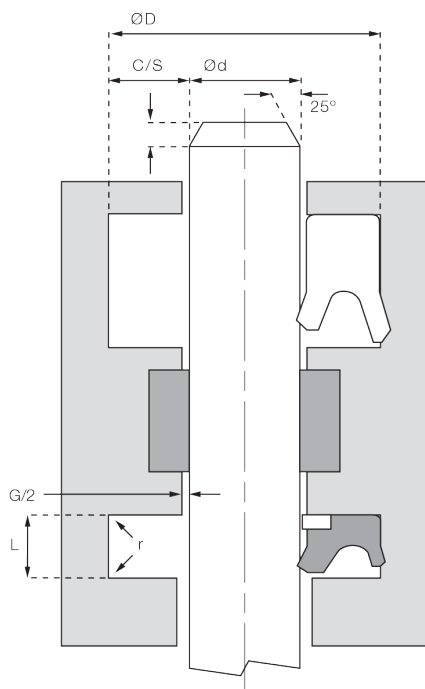
Rod seal only

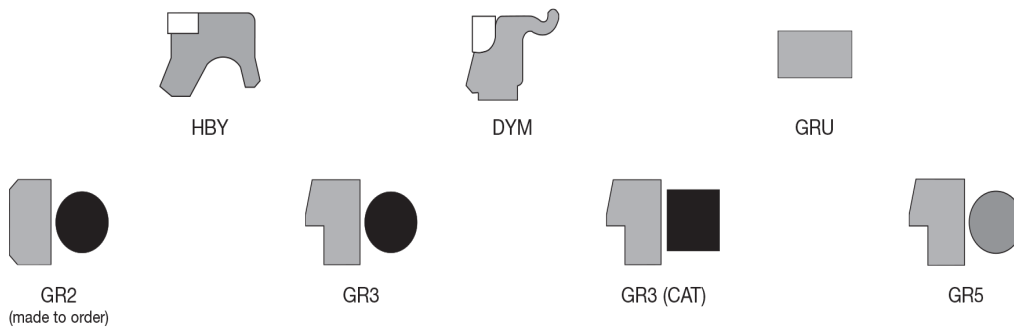
Higher pressures

High speed capability

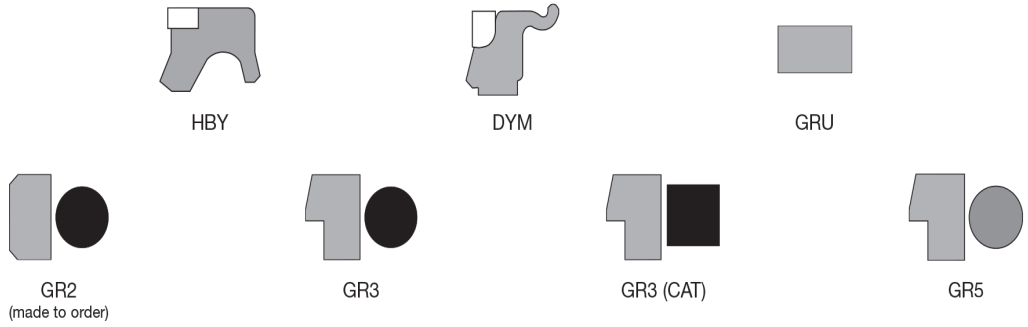
Compact housing

Easy to fit



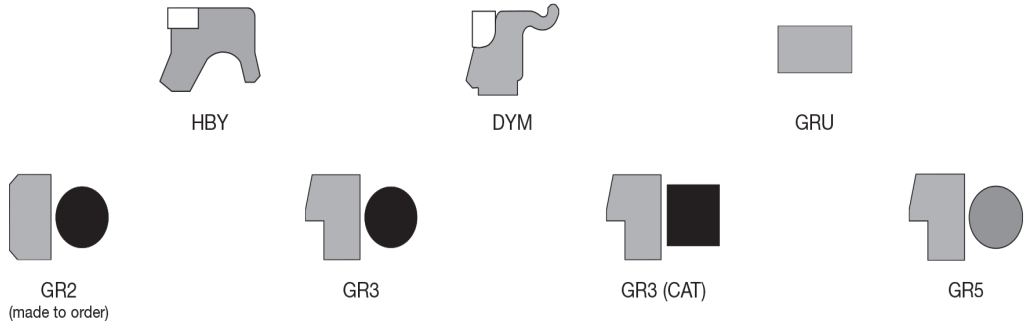


ID	OD	L1	L2	OD2	OD3	Product Name
0.625	0.923	0.122	0.126	0.000	0.000	GR5-0062092-013
0.875	1.090	0.082	0.000	0.000	0.000	GR3-0087109-082
1.000	1.298	0.122	0.126	0.000	0.000	GR3-0100129-012
1.125	1.423	0.122	0.126	0.000	0.000	GR3-0112142-012
1.000	1.433	0.155	0.165	0.000	0.000	GR5-0100143-016
1.000	1.433	0.155	0.165	0.000	0.000	GR3-0100143-016
1.250	1.548	0.122	0.126	0.000	0.000	GR3-0125154-012
1.250	1.674	0.155	0.165	0.000	0.000	GR5-0125167-016
1.250	1.674	0.155	0.166	0.000	0.000	GR3-0125167-016
1.250	1.780	0.140	0.000	0.000	0.000	GRU-0125178-014
1.500	1.798	0.122	0.126	0.000	0.000	GR3-0150179-012
1.500	1.924	0.155	0.166	0.000	0.000	GR3-0150192-016
1.500	2.030	0.125	0.140	0.000	0.000	GRU-0150203-014
1.500	2.030	0.130	0.140	0.000	0.000	GR3-0150203-014
1.750	2.048	0.122	0.126	0.000	0.000	GR3-0175204-012
1.500	2.116	0.235	0.247	0.000	0.000	GR5-0150211-024
1.500	2.116	0.235	0.247	0.000	0.000	GR3-0150211-024
1.750	2.174	0.155	0.166	0.000	0.000	GR3-0175217-016
1.875	2.240	0.000	0.000	0.000	0.000	GRU-0187224-014
1.750	2.280	0.125	0.140	0.000	0.000	GRU-0175228-014
1.750	2.280	0.130	0.140	0.000	0.000	GR3-0175228-014
1.750	2.366	0.235	0.247	0.000	0.000	GR5-0175236-024
1.750	2.366	0.235	0.247	0.000	0.000	GR3-0175236-024
2.000	2.424	0.000	0.000	0.000	0.000	HBY-0200242-016
2.000	2.424	0.155	0.166	0.000	0.000	GR3-0200242-016
2.000	2.530	0.125	0.140	0.000	0.000	GRU-0200253-014
2.000	2.530	0.130	0.140	0.000	0.000	GR3-0200253-014
2.125	2.549	0.155	0.166	0.000	0.000	GR3-0212254-016
2.000	2.616	0.235	0.247	0.000	0.000	GR5-0200261-024
2.000	2.616	0.235	0.247	0.000	0.000	GR3-0200261-024
2.250	2.674	0.155	0.166	0.000	0.000	GR3-0225267-016

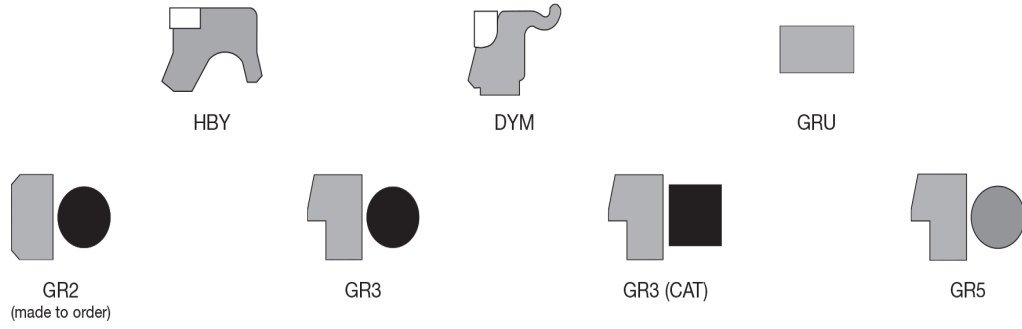


ID	OD	L1	L2	OD2	OD3	Product Name
2.250	2.866	0.235	0.247	0.000	0.000	GR5-0225286-024
2.250	2.866	0.235	0.247	0.000	0.000	GR3-0225286-024
2.250	2.890	0.205	0.220	0.000	0.000	GRU-0225289-022
2.250	2.890	0.205	0.220	0.000	0.000	GR3-0225289-022
2.500	2.924	0.155	0.166	0.000	0.000	GR3-0250292-016
2.375	3.020	0.205	0.220	0.000	0.000	GR3-0237302-022
2.500	3.116	0.235	0.247	0.000	0.000	GR5-0250311-024
2.500	3.116	0.235	0.247	0.000	0.000	GR3-0250311-024
2.500	3.140	0.205	0.220	0.000	0.000	GRU-0250314-022
2.500	3.140	0.205	0.220	0.000	0.000	GR3-0250314-022
2.750	3.174	0.155	0.166	0.000	0.000	HBX-0275317-016
2.750	3.174	0.155	0.166	0.000	0.000	GR3-0275317-016
2.625	3.265	0.205	0.220	0.000	0.000	GRU-0262326-022
2.750	3.390	0.205	0.220	0.000	0.000	GRU-0275339-022
2.750	3.390	0.205	0.220	0.000	0.000	GR3-0275339-022
3.000	3.424	0.155	0.166	0.000	0.000	GR3-0300342-016
2.875	3.491	0.235	0.247	0.000	0.000	GR3-0287349-024
3.000	3.616	0.235	0.247	0.000	0.000	GR5-0300361-024
3.000	3.616	0.235	0.247	0.000	0.000	GR3-0300361-024
3.000	3.640	0.205	0.220	0.000	0.000	GRU-0300364-022
3.000	3.640	0.205	0.220	0.000	0.000	GR3-0300364-022
3.250	3.866	0.235	0.247	0.000	0.000	GR3-0325386-024
3.250	3.890	0.205	0.220	0.000	0.000	GRU-0325389-022
3.250	3.890	0.205	0.220	0.000	0.000	GR3-0325389-022
3.500	4.116	0.235	0.247	0.000	0.000	GR5-0350411-024
3.500	4.116	0.235	0.247	0.000	0.000	GR3-0350411-024
3.500	4.140	0.205	0.220	0.000	0.000	GRU-0350414-022
3.500	4.140	0.205	0.220	0.000	0.000	GR3-0350414-022
3.750	4.366	0.235	0.247	0.000	0.000	GR3-0375436-024
3.750	4.390	0.205	0.220	0.000	0.000	GR3-0375439-022
4.000	4.424	0.155	0.166	0.000	0.000	GR3-0400442-016





ID	OD	L1	L2	OD2	OD3	Product Name
4.000	4.616	0.235	0.247	0.000	0.000	GR5-0400461-024
4.000	4.616	0.235	0.247	0.000	0.000	GR3-0400461-024
4.000	4.640	0.000	0.000	0.000	0.000	HBY-0400464-022
4.000	4.640	0.205	0.220	0.000	0.000	GRU-0400464-022
4.250	4.866	0.235	0.247	0.000	0.000	GR3-0425486-024
4.500	5.116	0.235	0.247	0.000	0.000	GR5-0450511-024
4.500	5.116	0.235	0.247	0.000	0.000	GR3-0450511-024
4.250	5.230	0.230	0.250	0.000	0.000	GR3-0425523-025
4.500	5.330	0.305	0.320	0.000	0.000	GR3-0450533-032
4.750	5.366	0.235	0.247	0.000	0.000	GR3-0475536-024
4.500	5.480	0.238	0.250	0.000	0.000	GR3-0450548-025
5.000	5.616	0.235	0.247	0.000	0.000	GR5-0500561-024
5.000	5.616	0.235	0.247	0.000	0.000	GR3-0500561-024
5.125	5.741	0.235	0.247	0.000	0.000	GR3-0512574-047
5.000	5.960	0.000	0.000	0.000	0.000	GRU-0500596-025
5.000	5.960	0.238	0.250	0.000	0.000	GR3-0500596-025
5.500	6.116	0.235	0.247	0.000	0.000	GR5-0550611-024
5.500	6.116	0.235	0.247	0.000	0.000	GR3-0550611-024
5.500	6.330	0.305	0.320	0.000	0.000	GR3-0550633-032
6.000	6.616	0.235	0.247	0.000	0.000	GR5-0600661-024
6.000	6.616	0.235	0.247	0.000	0.000	GR3-0600661-024
6.000	6.830	0.305	0.320	0.000	0.000	GR3-0600683-032
6.500	7.116	0.235	0.250	0.000	0.000	GR3-0650711-024
6.750	7.557	0.310	0.320	0.000	0.000	GR3-0675755-032
7.000	7.616	0.235	0.247	0.000	0.000	GR5-0700761-024
7.000	7.616	0.235	0.247	0.000	0.000	GR3-0700761-024
7.000	7.830	0.305	0.320	0.000	0.000	GR3-0700783-032
7.000	7.945	0.235	0.250	0.000	0.000	GR3-0700974-025
7.000	7.945	0.238	0.250	0.000	0.000	GR3-0700794-025
7.250	8.080	0.230	0.250	0.000	0.000	GR3-0725808-025
8.000	8.830	0.305	0.320	0.000	0.000	GR5-0800883-032



ID	OD	L1	L2	OD2	OD3	Product Name
8.000	8.830	0.305	0.320	0.000	0.000	GR3-0800883-032
8.500	9.116	0.235	0.247	0.000	0.000	GR3-0850911-024
8.500	9.330	0.305	0.320	0.000	0.000	GR3-0850933-032
9.500	10.116	0.235	0.247	0.000	0.000	GR3-0950101-024
10.500	11.116	0.235	0.247	0.000	0.000	GR3-1050111-024
10.500	11.307	0.305	0.320	0.000	0.000	GR3-1050113-032
11.500	12.116	0.235	0.247	0.000	0.000	GR3-1150121-024
11.750	12.366	0.235	0.247	0.000	0.000	GR3-1175123-024
12.000	12.700	0.000	0.000	0.000	0.000	HBY-1200
12.000	12.700	0.311	0.320	0.000	0.000	HBY-1200127-031
12.000	12.750	0.311	0.320	0.000	0.000	GR3-1200127-032
12.000	12.807	0.322	0.000	0.000	0.000	GR3-1200128-032
13.000	13.000	0.235	0.247	0.000	0.000	GR3-1300136-024
13.000	13.756	0.323	0.330	0.000	0.000	HBY-1300137-032





# TRS

## Double Acting Rod Seal

### Design

TRS range was originally designed as an improvement over using an o-ring by itself in a rod housing. For use in blind or split glands this double acting seal is a NBR element with two anti-extrusion back up rings generally made from hard plastic. This design helps eliminate the problems of spiralling and extrusion often associated with using just an o-ring.

Rod seals



### Key Features

- Low to medium duty
- Compact housing
- Easy to fit
- Double acting
- Replaces o-rings

### Operating Conditions

#### Pressure

200 Bar	call for advice
3,500 Psi	

#### Temperature

-30° to 100° C	
-22° to 212° F	

#### Speed

0.5m/sec	
1.5'/sec	

#### Surface Finish $\mu\text{mRa}$

$\text{Ød}$	$\text{ØD}$	L
0.1-0.25	0.8	2.0

#### Tolerances

	$\text{Ød}$	$\text{ØD}$	L
<2.750	+/-0.001	-0.002	+0.010
<6.000	+/-0.002	-0.003	+0.010

#### Chamfer Radii

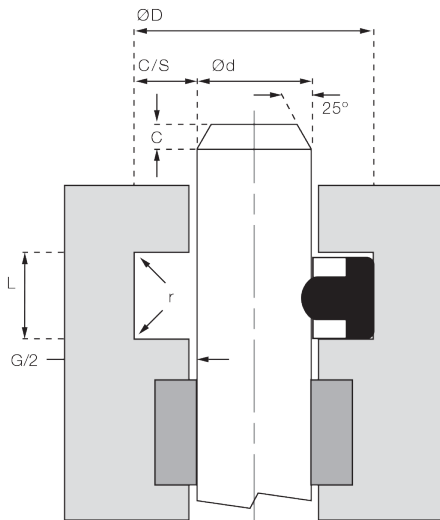
	1/8	3/16	1/4
C/S			
C	0.125	0.156	0.187
r	0.016	0.032	0.032

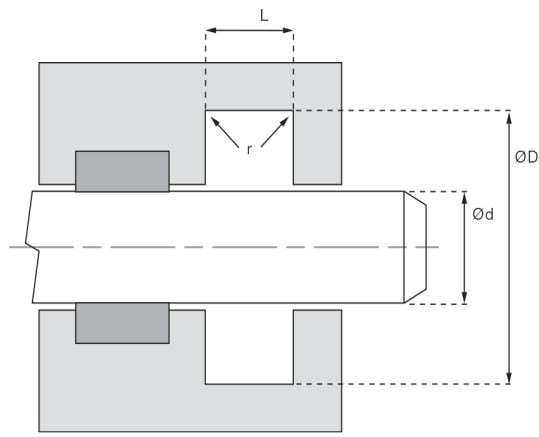
#### Extrusion Gap G

$\text{ØD}$	3/8	1 1/2	4 1/2	8 1/2	>9 1/2
G	0.004	0.005	0.007	0.009	0.010

#### Typical Examples

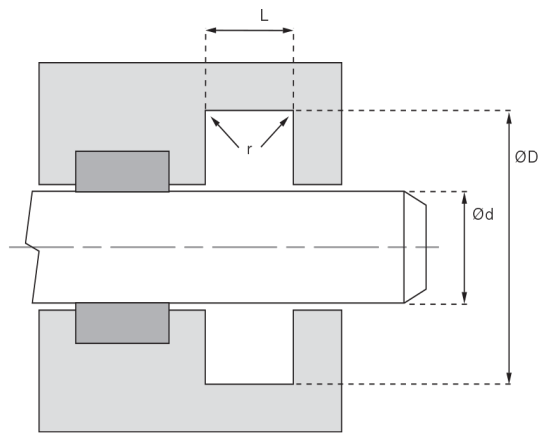
Reciprocating  Rotary  Oscillating  Helix





Rod Seals  
Double Acting

ID	OD	L1	L2	OD2	OD3	Product Name
0.187	0.370	0.150	0.000	0.000	0.000	TRO-01
0.375	0.618	0.185	0.000	0.000	0.000	TRO-04
0.500	0.743	0.185	0.000	0.000	0.000	TRO-06
0.562	0.805	0.185	0.000	0.000	0.000	TRO-07
0.625	0.868	0.185	0.000	0.000	0.000	TRO-08
0.687	0.930	0.185	0.000	0.000	0.000	TRO-09
0.750	0.992	0.185	0.000	0.000	0.000	TRO-10
0.812	1.054	0.185	0.000	0.000	0.000	TRO-11
0.875	1.117	0.185	0.000	0.000	0.000	TRO-12
1.000	1.242	0.185	0.000	0.000	0.000	TRO-14
1.062	1.304	0.185	0.000	0.000	0.000	TRO-15
1.125	1.367	0.185	0.000	0.000	0.000	TRO-16
1.187	1.429	0.185	0.000	0.000	0.000	TRO-17
1.250	1.492	0.185	0.000	0.000	0.000	TRO-18
1.375	1.617	0.185	0.000	0.000	0.000	TRO-20
1.500	1.742	0.185	0.000	0.000	0.000	TRO-22
1.500	1.871	0.280	0.000	0.000	0.000	TRO-23
1.625	1.996	0.280	0.000	0.000	0.000	TRO-24
1.750	2.121	0.280	0.000	0.000	0.000	TRO-25
1.875	2.246	0.280	0.000	0.000	0.000	TRO-26
2.000	2.371	0.280	0.000	0.000	0.000	TRO-27
2.125	2.496	0.280	0.000	0.000	0.000	TRO-28
2.250	2.613	0.280	0.000	0.000	0.000	TRO-29
2.375	2.746	0.280	0.000	0.000	0.000	TRO-30
2.500	2.871	0.280	0.000	0.000	0.000	TRO-31
2.625	2.996	0.280	0.000	0.000	0.000	TRO-32
2.750	3.121	0.280	0.000	0.000	0.000	TRO-33
2.875	3.246	0.280	0.000	0.000	0.000	TRO-34
3.000	3.370	0.280	0.000	0.000	0.000	TRO-35
3.125	3.495	0.280	0.000	0.000	0.000	TRO-36
3.250	3.620	0.280	0.000	0.000	0.000	TRO-37



Rod Seals  
Double Acting

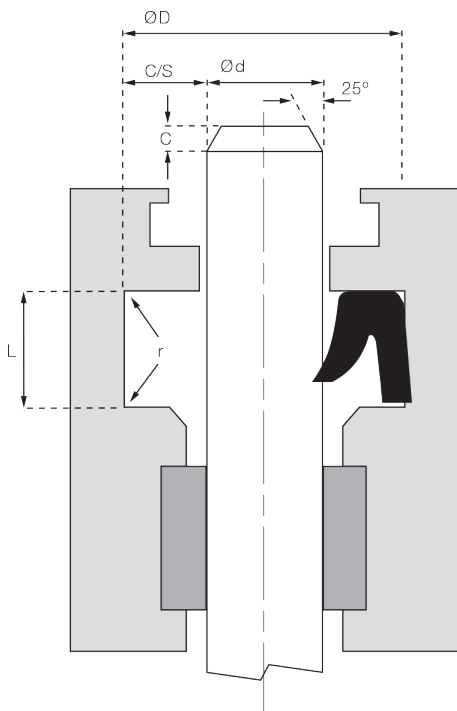
ID	OD	L1	L2	OD2	OD3	Product Name
3.375	3.745	0.280	0.000	0.000	0.000	TRO-38
3.500	3.870	0.280	0.000	0.000	0.000	TRO-39
3.625	3.995	0.280	0.000	0.000	0.000	TRO-40
3.750	4.120	0.280	0.000	0.000	0.000	TRO-41
3.875	4.245	0.280	0.000	0.000	0.000	TRO-42
4.000	4.370	0.280	0.000	0.000	0.000	TRO-43
4.250	4.620	0.280	0.000	0.000	0.000	TRO-45
4.375	4.745	0.280	0.000	0.000	0.000	TRO-46
4.500	4.870	0.280	0.000	0.000	0.000	TRO-47
4.500	4.870	0.366	0.000	0.000	0.000	TRO-48
5.250	5.725	0.366	0.000	0.000	0.000	TRO-49
5.500	5.975	0.366	0.000	0.000	0.000	TRO-50
6.000	6.475	0.366	0.000	0.000	0.000	TRO-52
7.500	7.984	0.366	0.000	0.000	0.000	TRO-58
8.000	8.475	0.366	0.000	0.000	0.000	TRO-59
9.000	9.475	0.366	0.000	0.000	0.000	TRO-60





## Key Features

- Light duty
- Rod only
- Low pressure capability
- Dynamic lip reaction
- Low friction
- Easy to fit



# DI

## Pneumatic Seal

### Design

DI are designed as an easy to fit low pressure seal and are made from NBR 90 Shore A. Type DI have a thicker and longer static sealing lip to form a buffer against axial movement. To ensure that type DI seals are fitted snugly in the grooves, they are moulded slightly larger on the heel outside diameter than the groove size to ensure positive sealing on the static face whilst maintaining dynamic sealing lip interference.

### Operating Conditions

#### Pressure

115 Bar  
1,500 Psi



#### Temperature

-30° to 110° C  
-22° to 230° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing d$	$\varnothing D$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\varnothing d$	$\varnothing D$	L
f7	H8	-0.0 +0.008

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

#### Extrusion Gap G

Pressure	1,500
	0.014

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# U

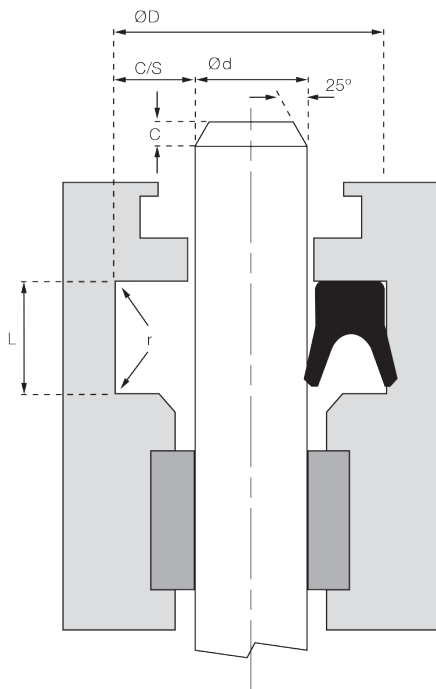
## Pneumatic Seal

Rod seals



### Key Features

- Light duty
- Piston or rod
- Low pressure capability
- Dynamic lip reaction
- Low friction
- Easy to fit



### Design

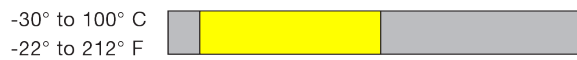
U type rubber single acting seals are symmetrical, designed for rods or pistons. Made from NBR 70, 80 or 90 Shore A, this type can handle from low to medium pressure applications, although predominately used in pneumatic cylinders. These precision moulded seals have equally distributed heel clearance and lip to housing interference.

### Operating Conditions

#### Pressure

Material	NBR70	NBR80	NBR90
Psi	230	1,000	1,250

#### Temperature



#### Speed



#### Surface Finish $\mu\text{mRa}$

$\text{\O}d$	$\text{\O}D$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\text{\O}d$	$\text{\O}D$	L
h9	H9	-0 + 0.010

#### Chamfer Radii

C/S	3/16	1/4	5/16	3/8	1/2
C	0.093	0.125	0.156	0.187	0.218
r	0.008	0.016	0.032	0.032	0.032

#### Extrusion Gap G

Psi	230	1,000	1,250
	0.020	0.014	0.016

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





GSP



DI



U70



U90



19M

ID	OD	L1	L2	OD2	OD3	Product Name
0.19	0.44	0.16	0.22	0.00	0.00	DI-018
3.00	6.00	2.50	3.00	0.00	0.00	GSP-003006-030
4.00	8.00	3.00	3.50	0.00	0.00	GSP-004008-035
5.00	9.00	2.50	3.00	0.00	0.00	GSP-005009-030
6.00	10.00	3.00	3.50	0.00	0.00	GSP-006010-035
6.00	11.00	3.00	3.50	0.00	0.00	GSP-006011-035
6.00	12.00	4.00	4.50	0.00	0.00	GSP-006012-045
7.00	13.00	4.00	4.50	0.00	0.00	GSP-007013-045
8.00	14.00	2.55	3.00	0.00	0.00	GSP-008014-030
8.00	14.00	4.00	4.50	0.00	0.00	GSP-008014-045
8.00	14.00	4.50	5.00	0.00	0.00	GSP-008014-050
8.00	16.00	5.50	7.00	0.00	0.00	DI-008016-070
10.00	16.00	2.55	3.00	0.00	0.00	GSP-010016-030
10.00	16.00	4.50	5.00	0.00	0.00	GSP-010016-050
10.00	16.00	4.50	5.50	0.00	0.00	DI-010016-055
8.00	18.00	2.00	0.00	0.00	0.00	19M-008018-020
10.00	18.00	5.50	6.00	0.00	0.00	GSP-010018-060
10.00	18.00	5.50	7.00	0.00	0.00	DI-010018-070
12.00	18.00	2.55	3.00	0.00	0.00	GSP-012018-030
12.00	20.00	5.50	6.00	0.00	0.00	GSP-012020-060
12.00	20.00	5.50	7.00	0.00	0.00	DI-012020-070
14.00	22.00	5.50	6.00	0.00	0.00	GSP-014022-060
16.00	22.00	2.50	3.00	0.00	0.00	GSP-016022-030
12.00	24.00	6.00	6.50	0.00	0.00	GSP-012024-065
16.00	24.00	5.50	6.00	0.00	0.00	GSP-016024-060
16.00	24.00	5.50	7.00	0.00	0.00	DI-016024-070
17.00	24.00	2.55	3.00	0.00	0.00	GSP-017024-030
18.00	25.00	4.50	6.00	0.00	0.00	DI-018025-060
19.00	25.00	5.20	6.30	0.00	0.00	DI-019025-063
18.00	26.00	5.50	6.00	0.00	0.00	GSP-018026-060
18.00	26.00	5.50	6.00	0.00	0.00	DI-018026-060



GSP



DI



U70



U90



19M

ID	OD	L1	L2	OD2	OD3	Product Name
20.00	28.00	5.50	6.00	0.00	0.00	GSP-020028-060
20.00	28.00	5.50	7.00	0.00	0.00	DI-020028-070
22.00	28.00	4.30	5.00	0.00	0.00	GSP-022028-050
22.00	30.00	5.50	6.00	0.00	0.00	GSP-022030-060
22.00	30.00	5.50	6.00	0.00	0.00	DI-022030-060
25.00	33.00	5.50	6.00	0.00	0.00	GSP-025033-060
25.00	35.00	7.00	8.50	0.00	0.00	DI-025035-085
28.00	35.50	3.00	0.00	0.00	0.00	19M-028035-030
28.00	36.00	5.50	6.00	0.00	0.00	GSP-028036-060
30.00	38.00	5.50	6.00	0.00	0.00	GSP-030038-060
30.00	40.00	3.00	0.00	0.00	0.00	19M-030040-030
30.00	40.00	7.00	7.50	0.00	0.00	GSP-030040-075
32.00	40.00	5.50	6.00	0.00	0.00	GSP-032040-060
32.00	42.00	7.00	8.50	0.00	0.00	DI-032042-085
30.00	43.00	3.00	0.00	0.00	0.00	19M-030043-030
35.00	43.00	8.00	8.50	0.00	0.00	GSP-035043-085
35.00	45.00	3.00	0.00	0.00	0.00	19M-035045-030
35.00	45.00	7.00	7.50	0.00	0.00	GSP-035045-075
36.00	46.00	7.00	7.50	0.00	0.00	GSP-036046-075
32.00	48.00	3.00	0.00	0.00	0.00	19M-032048-030
40.00	48.00	5.50	6.00	0.00	0.00	GSP-040048-060
40.00	50.00	3.00	0.00	0.00	0.00	19M-040050-030
40.00	50.00	7.00	7.50	0.00	0.00	GSP-040050-075
38.00	55.00	10.00	11.50	0.00	0.00	DI-038055-115
40.00	55.00	3.00	0.00	0.00	0.00	19M-040055-030
45.00	55.00	3.00	0.00	0.00	0.00	19M-045055-030
45.00	55.00	7.00	7.50	0.00	0.00	GSP-045055-075
45.00	55.00	7.00	7.50	0.00	0.00	DI-045055-075
45.00	60.00	3.00	0.00	0.00	0.00	19M-045060-030
50.00	60.00	3.00	0.00	0.00	0.00	19M-050060-030
50.00	60.00	7.00	7.50	0.00	0.00	GSP-050060-075



GSP



DI



U70



U90



19M

ID	OD	L1	L2	OD2	OD3	Product Name
50.00	60.00	7.00	7.50	0.00	0.00	DI-050060-075
48.00	63.00	3.00	0.00	0.00	0.00	19M-048063-030
50.00	63.00	3.00	0.00	0.00	0.00	19M-050063-030
50.00	65.00	3.00	0.00	0.00	0.00	19M-050065-030
50.00	65.00	10.00	0.00	0.00	0.00	19M-050065-100
52.00	65.00	3.00	0.00	0.00	0.00	19M-052065-030
55.00	65.00	3.00	0.00	0.00	0.00	19M-055065-030
55.00	65.00	7.00	7.50	0.00	0.00	GSP-055065-075
56.00	66.00	7.00	7.50	0.00	0.00	GSP-056066-075
55.00	68.00	3.00	0.00	0.00	0.00	19M-055068-030
50.00	70.00	3.00	0.00	0.00	0.00	19M-050070-030
55.00	70.00	3.00	0.00	0.00	0.00	19M-055070-030
60.00	70.00	0.00	0.00	0.00	0.00	19M-060070-025
60.00	70.00	3.00	0.00	0.00	0.00	19M-060070-030
60.00	72.00	8.50	9.50	0.00	0.00	GSP-060072-095
60.00	73.00	3.00	0.00	0.00	0.00	19M-060073-030
63.00	73.00	7.00	7.50	0.00	0.00	GSP-063073-075
55.00	75.00	3.00	0.00	0.00	0.00	19M-055075-030
60.00	75.00	3.00	0.00	0.00	0.00	19M-060075-030
63.00	75.00	8.50	9.50	0.00	0.00	GSP-063075-095
63.00	75.00	8.50	10.00	0.00	0.00	DI-063075-100
65.00	75.00	3.00	0.00	0.00	0.00	19M-065075-030
65.00	77.00	8.50	9.50	0.00	0.00	GSP-065077-095
65.00	78.00	3.00	0.00	0.00	0.00	19M-065078-030
60.00	80.00	3.00	0.00	0.00	0.00	19M-060080-030
65.00	80.00	3.00	0.00	0.00	0.00	19M-065080-030
70.00	80.00	3.00	0.00	0.00	0.00	19M-070080-030
70.00	82.00	8.50	9.50	0.00	0.00	GSP-070082-095
70.00	83.00	3.00	0.00	0.00	0.00	19M-070083-030
65.00	85.00	3.00	0.00	0.00	0.00	19M-065085-030
70.00	85.00	3.00	0.00	0.00	0.00	19M-070085-030



GSP



DI



U70



U90



19M

ID	OD	L1	L2	OD2	OD3	Product Name
75.00	85.00	3.00	0.00	0.00	0.00	19M-075085-030
75.00	88.00	3.00	0.00	0.00	0.00	19M-075088-030
70.00	90.00	3.00	0.00	0.00	0.00	19M-070090-030
75.00	90.00	3.00	0.00	0.00	0.00	19M-075090-030
80.00	90.00	3.00	0.00	0.00	0.00	19M-080090-030
80.00	92.00	8.50	9.50	0.00	0.00	GSP-080092-095
80.00	92.00	8.50	9.50	0.00	0.00	DI-080092-095
80.00	93.00	3.00	0.00	0.00	0.00	19M-080093-030
69.00	95.00	10.00	0.00	0.00	0.00	19M-069095-100
75.00	95.00	3.00	0.00	0.00	0.00	19M-075095-030
80.00	95.00	3.00	0.00	0.00	0.00	19M-080095-030
85.00	97.00	8.50	9.50	0.00	0.00	GSP-085097-095
80.00	100.00	3.00	0.00	0.00	0.00	19M-080100-030
85.00	100.00	3.00	0.00	0.00	0.00	19M-085100-030
90.00	102.00	8.50	9.50	0.00	0.00	GSP-090102-095
90.00	102.00	8.50	9.50	0.00	0.00	DI-090102-095
85.00	105.00	3.00	0.00	0.00	0.00	19M-085105-030
90.00	105.00	2.00	0.00	0.00	0.00	19M-090105-020
90.00	105.00	3.00	0.00	0.00	0.00	19M-090105-030
95.00	105.00	3.00	0.00	0.00	0.00	19M-095105-030
90.00	110.00	3.00	0.00	0.00	0.00	19M-090110-030
95.00	110.00	3.00	0.00	0.00	0.00	19M-095110-030
95.00	115.00	3.00	0.00	0.00	0.00	19M-095115-030
100.00	115.00	3.00	0.00	0.00	0.00	19M-100115-030
100.00	115.00	10.00	11.00	0.00	0.00	GSP-100115-110
100.00	115.00	10.00	11.50	0.00	0.00	DI-100115-115
100.00	120.00	3.00	0.00	0.00	0.00	19M-100120-030
105.00	120.00	3.00	0.00	0.00	0.00	19M-105120-030
110.00	125.00	3.00	0.00	0.00	0.00	19M-110125-030
110.00	125.00	10.00	11.00	0.00	0.00	DI-110125-110
110.00	130.00	3.00	0.00	0.00	0.00	19M-110130-030



GSP



DI



U70



U90



19M

ID	OD	L1	L2	OD2	OD3	Product Name
110.00	130.00	14.00	15.50	0.00	0.00	DI-110130-155
115.00	130.00	3.00	0.00	0.00	0.00	19M-115130-030
115.00	135.00	3.00	0.00	0.00	0.00	19M-115135-030
120.00	135.00	3.00	0.00	0.00	0.00	19M-120135-030
120.00	140.00	3.00	0.00	0.00	0.00	19M-120140-030
125.00	140.00	3.00	0.00	0.00	0.00	19M-125140-030
125.00	145.00	3.00	0.00	0.00	0.00	19M-125145-030
130.00	145.00	2.00	0.00	0.00	0.00	19M-130145-020
129.00	150.00	2.30	0.00	0.00	0.00	19M-129150-023
130.00	150.00	3.00	0.00	0.00	0.00	19M-130150-030
136.00	150.00	3.00	0.00	0.00	0.00	19M-136150-030
140.00	155.00	3.00	0.00	0.00	0.00	19M-140155-030
140.00	160.00	3.00	0.00	0.00	0.00	19M-140160-030
145.00	160.00	2.00	0.00	0.00	0.00	19M-145160-020
150.00	165.00	3.00	0.00	0.00	0.00	19M-150165-030
150.00	170.00	3.00	0.00	0.00	0.00	19M-150170-030
150.00	170.00	4.00	0.00	0.00	0.00	19M-150170-040
155.00	170.00	2.00	0.00	0.00	0.00	19M-155170-020
160.00	175.00	10.00	11.00	0.00	0.00	GSP-160175-110
160.00	180.00	4.00	0.00	0.00	0.00	19M-160180-040
165.00	180.00	0.00	0.00	0.00	0.00	19M-165180-030
160.00	185.00	3.00	0.00	0.00	0.00	19M-160185-030
170.00	190.00	4.00	0.00	0.00	0.00	19M-170190-040
175.00	190.00	2.00	0.00	0.00	0.00	19M-175190-020
170.00	195.00	3.00	0.00	0.00	0.00	19M-170195-030
175.00	200.00	4.00	0.00	0.00	0.00	19M-175200-040
180.00	200.00	4.00	0.00	0.00	0.00	19M-180200-040
185.00	205.00	3.00	0.00	0.00	0.00	19M-185205-030
190.00	210.00	4.00	0.00	0.00	0.00	19M-190210-040
195.00	210.00	2.50	0.00	0.00	0.00	19M-195210-025
190.00	215.00	4.00	0.00	0.00	0.00	19M-190215-040



GSP



DI



U70



U90



19M

ID	OD	L1	L2	OD2	OD3	Product Name
210.00	230.00	4.00	0.00	0.00	0.00	19M-210230-040
220.00	240.00	3.00	0.00	0.00	0.00	19M-220240-030
220.00	245.00	0.00	0.00	0.00	0.00	19M-220245-040
240.00	260.00	4.00	0.00	0.00	0.00	19M-240260-040
250.00	270.00	4.00	0.00	0.00	0.00	19M-250270-040
260.00	290.00	4.00	0.00	0.00	0.00	19M-260290-040





# VS1

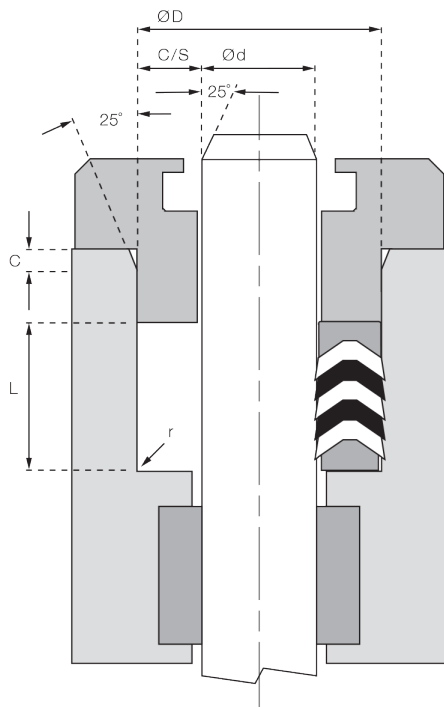
## Rod Seal V Pack Set

Rod seals



### Key Features

- Medium to heavy duty
- Piston or rod
- Wide size range
- Handles some misalignment
- Hard wearing



### Design

VS1 are a single acting rod or piston seal for medium to heavy duty applications. The assembly consists of a male and female adaptor with a series of 'V' shaped rings. The number of 'V' rings may be varied to alter the assembled height and pressure rating. The material is generally Nylon adaptors Fabric/NBR & Hytrel V-rings, although some sets incorporate Hytrel only 'V' rings to assist low pressure sealing. This is a non preferred design but it still has a place in applications where difficult conditions prevail such as pressure surges and misalignment.

### Operating Conditions

#### Pressure

700 Bar  
10,000 Psi



#### Temperature

-30° to 120° C  
-30° to 250° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{Ød}$	$\text{ØD}$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\text{Ød}$	$\text{ØD}$	L
f9	H9	-0 + 0.010

#### Chamfer Radii

	3/16	1/4	5/16	3/8	1/2
C/S					
C	0.093	0.125	0.156	0.187	0.250
r	0.020	0.031	0.031	0.031	0.031

#### Extrusion Gap G

Pressure	1,500	2,500	6,000
G	0.018	0.015	0.007

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# VS5

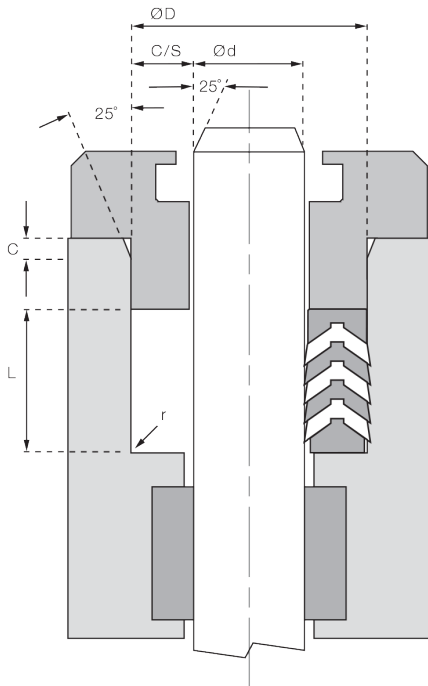
## Rod Seal V Pack Set

Rod seals



### Key Features

- Heavy duty
- Shock load resistant
- Extremely hard wearing
- Higher pressure capability
- Excellent extrusion resistance



### Design

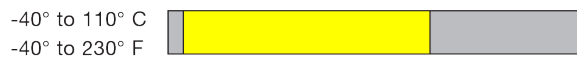
VS5 vee sets utilise Hytrel and Nylon vees with the male and female adaptors being made of glass filled Nylon. This forms a sturdy sealing unit which can handle a wide range of pressures and maintains excellent extrusion resistance. The interlocking vee shape known as 'Hydrolock' is unique to this range of vee sets and will not interchange with standard rubber/fabric vee rings. Type VS5 will cope well with pulsating or shock loading during cylinder operation.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish $\mu\text{mRa}$

$\text{\O}d$	$\text{\O}D$	L
0.1-0.25	0.8	2.0

#### Tolerances

$\text{\O}d$	$\text{\O}D$	L
+0.000	+0.005	-0.005
-0.005	-0.000	+0.005

#### Chamfer Radii


C/S	1/4	5/16
C	0.125	0.156
r	0.031	0.031

#### Extrusion Gap G

Pressure	1,500	2,400	3,750	6,000
G	0.024	0.020	0.016	0.012

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# SM1

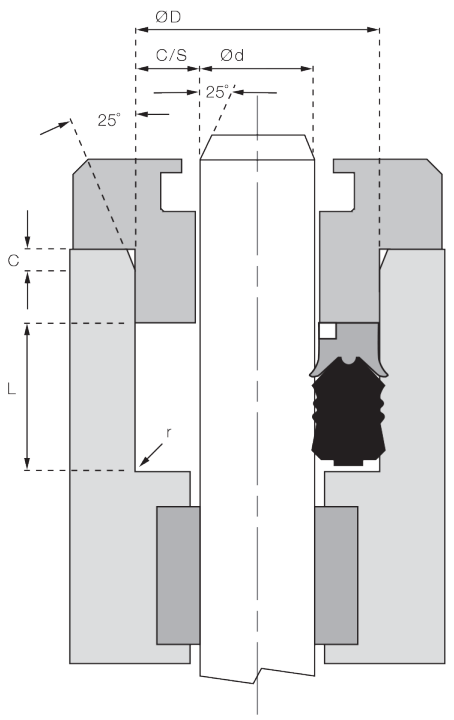
## Rod Seal V Pack Set

Rod seals



### Key Features

- Heavy duty
- Higher pressure
- Will handle mis-alignment
- Anti-extrusion ring
- Vee set replacement
- Nil adjustment required
- Hardy construction



### Design

SM1 is a three piece rod seal consisting of an NBR sealing element which is backed up by a tough Thermoplastic elastomer adaptor with an Polyacetal anti-extrusion ring on the inside diameter heel. The complete assembly forms a highly robust sealing unit for use in high pressure applications where shock loads and pressure spikes are present. The corrugations hold grease/oil and help to reduce friction and increase service life. This design is a modern and common replacement for V-Packing assembly with the main difference that type SM1 does not require preload as this is already built into the rubber element.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish µmRa

Ød	ØD	L
0.1-0.25	0.8	2.0

#### Tolerances

Ød	ØD	L
f8	Js11	-0.0 +0.010

#### Chamfer Radii

C/S	1/4	5/16	3/8	1/2
C	0.125	0.156	0.187	0.250
r	0.031	0.031	0.031	0.031

#### Extrusion Gap G

Pressure	1,500	3,750	6,000
G	0.025	0.018	0.016

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



# SM3

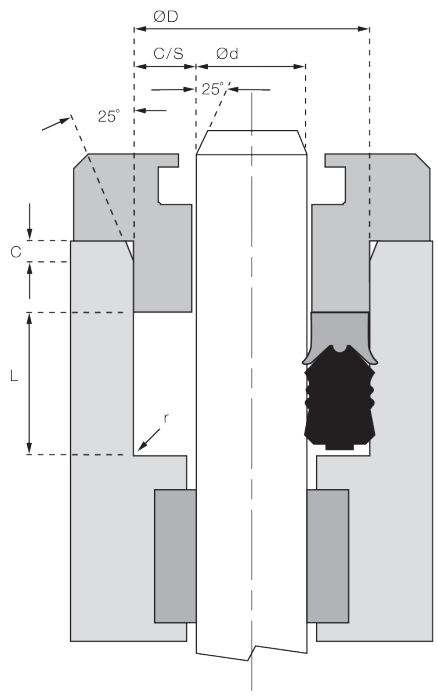
## Rod Seal V Pack Set

Rod seals



### Key Features

- Heavy duty
- Higher pressure
- Will handle mis-alignment
- Vee set replacement
- Nil adjustment required
- Hardy construction

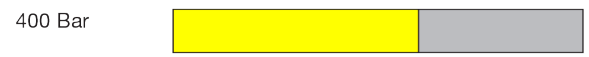


### Design

SM3 rod seal is a 2 piece assembly consisting of an NBR fabric sealing element complete with a tough Thermoplastic header ring. The complete assembly forms a robust sealing unit for use in high pressure applications where shock loads and pressure spikes are present. Widely used in tipping hoists.

### Operating Conditions

#### Pressure



#### Temperature



#### Speed



#### Surface Finish µmRa

Ød	ØD	L
0.1-0.25	0.8	2.0

#### Tolerances

Ød	ØD	L
±0.001	±0.003	-0 + 0.010

#### Chamfer Radii

C/S	1/4	5/16
C	0.125	0.187
r	0.020	0.020

#### Extrusion Gap G

Pressure	1,500	2,400	3,750	5,000
G	0.010	0.010	0.010	0.010

#### Typical Examples

- Reciprocating
- Rotary
- Oscillating
- Helix





ID	OD	L1	L2	OD2	OD3	Product Name
0.000	0.000	0.000	0.000	0.000	0.000	SM3-0828878-075
0.000	0.000	0.000	0.000	0.000	0.000	VS1-0900950-087
0.000	0.000	0.000	0.000	0.000	0.000	SM3-0542592-075
0.500	0.875	0.859	0.000	0.000	0.000	VS1-0050087-085
0.500	1.000	0.843	0.000	0.000	0.000	VS1-0050100-084
0.625	1.000	0.859	0.000	0.000	0.000	VS1-0062100-085
0.500	1.125	1.000	0.000	0.000	0.000	VS1-0050112-100
0.625	1.125	0.843	0.000	0.000	0.000	VS1-0062112-084
0.625	1.125	1.000	0.000	0.000	0.000	VS1-0062112-100
0.750	1.125	0.812	0.000	0.000	0.000	VS1-0075112-081
0.750	1.187	0.875	0.000	0.000	0.000	VS1-0075118-087
0.625	1.250	1.000	0.000	0.000	0.000	VS1-0062125-100
0.750	1.250	0.968	0.000	0.000	0.000	VS1-0075125-096
0.875	1.250	0.750	0.000	0.000	0.000	VS1-0087125-075
0.812	1.312	0.843	0.000	0.000	0.000	VS1-0081131-084
0.750	1.375	1.000	0.000	0.000	0.000	VS1-0075137-100
0.875	1.375	0.750	0.000	0.000	0.000	VS1-0087137-075
0.875	1.375	0.843	0.000	0.000	0.000	VS1-0087137-096
0.875	1.375	1.000	0.000	0.000	0.000	VS1-0087137-100
1.000	1.375	0.750	0.000	0.000	0.000	VS1-0100137-075
1.000	1.375	0.859	0.000	0.000	0.000	VS1-0100137-085
0.750	1.500	1.156	0.000	0.000	0.000	VS1-0075150-115
0.875	1.500	1.156	0.000	0.000	0.000	VS1-0087150-115
1.000	1.500	0.750	0.000	0.000	0.000	SM1-0100150-075
1.000	1.500	1.000	0.000	0.000	0.000	VS1-0100150-100
1.000	1.625	1.156	0.000	0.000	0.000	VS1-0100162-115
1.000	1.625	10.620	0.000	0.000	0.000	VS1-0100162-106
1.125	1.625	0.875	0.000	0.000	0.000	VS1-0112162-087
1.125	1.625	0.968	0.000	0.000	0.000	VS1-0112162-096
1.125	1.625	1.000	0.000	0.000	0.000	VS1-0112162-100
1.250	1.687	0.000	0.000	0.000	0.000	VR1-0125168-010



ID	OD	L1	L2	OD2	OD3	Product Name
1.250	1.687	0.000	0.000	0.000	0.000	VS1-0125168-010
1.250	1.687	0.109	0.000	0.000	0.000	VS1-0125168-010
1.250	1.687	0.875	0.000	0.000	0.000	VS1-0125168-087
1.000	1.750	0.000	0.000	0.000	0.000	VS1-0100175-156
1.000	1.750	1.156	0.000	0.000	0.000	VS1-0100175-115
1.125	1.750	1.000	0.000	0.000	0.000	VS1-0112175-100
1.250	1.750	0.750	0.000	0.000	0.000	SM1-0125175-075
1.250	1.750	0.875	0.000	0.000	0.000	VS5-0125175-087
1.250	1.750	1.000	0.000	0.000	0.000	VS1-0125175-100
1.125	1.875	1.343	0.000	0.000	0.000	VS1-0112187-134
1.250	1.875	1.000	0.000	0.000	0.000	VS1-0125187-112
1.375	1.875	0.968	0.000	0.000	0.000	VS1-0137187-100
1.375	1.875	0.968	0.000	0.000	0.000	VS1-0137187-096
1.000	2.000	1.969	0.000	0.000	0.000	VS1-0100200-196
1.250	2.000	0.968	0.000	0.000	0.000	VS1-0125200-096
1.375	2.000	1.000	0.000	0.000	0.000	VS1-0137200-100
1.500	2.000	0.750	0.000	0.000	0.000	SM1-0150200-075
1.500	2.000	1.000	0.000	0.000	0.000	VS5-0150200-100
1.500	2.000	1.000	0.000	0.000	0.000	VS1-0150200-100
1.375	2.125	1.156	0.000	0.000	0.000	VS1-0137212-115
1.500	2.125	1.000	0.000	0.000	0.000	VS1-0150212-100
1.500	2.250	1.000	0.000	0.000	0.000	VS1-0150225-100
1.500	2.250	1.156	0.000	0.000	0.000	VS1-0150225-115
1.625	2.250	1.032	0.000	0.000	0.000	VS1-0162225-103
1.625	2.250	1.156	0.000	0.000	0.000	VS1-0162225-115
1.750	2.250	1.000	0.000	0.000	0.000	VS5-0175225-100
1.750	2.250	1.000	0.000	0.000	0.000	VS1-0175225-100
1.750	2.265	0.635	0.000	0.000	0.000	VS1-0175226-063
1.750	2.265	0.780	1,311.000	0.000	0.000	VS1-0175226-078
1.625	2.375	1.156	0.000	0.000	0.000	VS1-0162237-156
1.750	2.375	1.032	0.000	0.000	0.000	VS1-0175237-103





ID	OD	L1	L2	OD2	OD3	Product Name
1.750	2.375	1.060	0.000	0.000	0.000	SM1-0175237-106
1.875	2.375	0.968	0.000	0.000	0.000	VS1-0187237-096
1.875	2.375	1.125	0.000	0.000	0.000	VS1-0187237-112
1.875	2.375	1.250	0.000	0.000	0.000	VS1-0187237-125
2.000	2.375	0.750	0.000	0.000	0.000	VS1-0200237-075
2.000	2.375	0.859	0.000	0.000	0.000	VS1-0200237-085
1.500	2.500	1.468	0.000	0.000	0.000	VS1-0150250-146
1.750	2.500	1.156	0.000	0.000	0.000	VS1-0175250-115
1.750	2.500	1.562	0.000	0.000	0.000	VS1-0175250-156
1.875	2.500	1.032	0.000	0.000	0.000	VS1-0187250-103
2.000	2.500	0.850	0.000	0.000	0.000	SM1-0200250-085
2.000	2.500	1.000	0.000	0.000	0.000	VS1-0200250-100
2.000	2.500	1.750	0.000	0.000	0.000	VS5-0200250-175
1.775	2.525	1.271	0.000	0.000	0.000	VS1-0177252-127
1.875	2.530	1.030	0.000	0.000	0.000	VS1-0187253-103
1.875	2.625	1.343	0.000	0.000	0.000	VS1-0187262-134
2.000	2.625	1.000	0.000	0.000	0.000	SM1-0200262-100
2.000	2.625	1.032	0.000	0.000	0.000	VS1-0200262-103
2.125	2.640	0.920	0.000	0.000	0.000	VS1-0212264-092
1.750	2.750	1.718	0.000	0.000	0.000	VS1-0175275-171
2.000	2.750	1.156	0.000	0.000	0.000	VS1-0200275-115
2.000	2.750	1.375	0.000	0.000	0.000	VS1-0200275-137
2.125	2.750	1.000	0.000	0.000	0.000	VS1-0212275-100
2.250	2.750	1.000	0.000	0.000	0.000	VS5-0225275-100
2.250	2.750	1.000	0.000	0.000	0.000	VS1-0225275-100
2.250	2.750	1.625	0.000	0.000	225,275.000	VS5-0225275-162
2.250	2.750	1.750	0.000	0.000	0.000	VS5-0225275-175
2.000	2.760	1.218	0.000	0.000	0.000	VS1-0200276-121
2.200	2.765	0.680	0.000	0.000	0.000	VS1-0220276-068
2.200	2.765	0.940	0.000	0.000	56,070.000	VS1-0220276-094
2.250	2.875	1.000	0.000	0.000	0.000	VS1-0225287-100



ID	OD	L1	L2	OD2	OD3	Product Name
2.000	3.000	1.750	0.000	0.000	0.000	VS1-0200300-171
2.250	3.000	1.000	0.000	0.000	0.000	VS1-0225300-100
2.375	3.000	1.156	0.000	0.000	0.000	VS1-0237300-115
2.400	3.000	0.937	0.000	0.000	0.000	VS1-0240300-093
2.500	3.000	1.000	0.000	0.000	0.000	VS5-0250300-100
2.500	3.000	1.000	0.000	0.000	0.000	VS1-0250300-100
2.500	3.000	1.094	0.000	0.000	0.000	VS1-0250300-109
2.500	3.000	1.750	0.000	0.000	0.000	VS5-0250300-175
2.250	3.020	1.030	0.000	0.000	0.000	VS1-0225302-103
2.450	3.020	0.851	0.000	0.000	0.000	VS1-0245302-085
2.525	3.025	0.873	0.000	0.000	0.000	VS1-0252302-087
2.580	3.110	0.920	0.000	0.000	0.000	VS1-0258311-092
2.500	3.125	1.156	0.000	0.000	0.000	VS1-0250312-115
2.750	3.200	0.765	0.765	0.000	0.000	SM3-0275320-076
2.500	3.250	1.230	0.000	0.000	0.000	SM1-0250325-123
2.500	3.250	1.375	0.000	0.000	0.000	VS1-0250325-137
2.750	3.250	1.000	1.411	0.000	0.000	VS1-0275325-100
2.750	3.250	1.750	0.000	0.000	275,325.000	VS5-0275325-175
2.750	3.270	0.850	0.000	0.000	0.000	VS1-0275327-085
2.500	3.375	1.093	0.000	0.000	0.000	VS1-0250337-109
2.750	3.375	1.000	0.000	0.000	0.000	VS1-0275337-100
2.750	3.375	1.032	0.000	0.000	0.000	VS1-0275337-103
2.000	3.500	2.000	0.000	0.000	0.000	VS1-0200350-200
2.500	3.500	0.000	0.000	0.000	0.000	VS1-0250350-162
2.500	3.500	1.718	0.000	0.000	0.000	VS1-0250350-171
2.750	3.500	1.187	0.000	0.000	0.000	VS1-0275350-118
2.950	3.500	0.843	0.000	0.000	0.000	VS1-0295350-084
3.000	3.500	1.000	0.000	0.000	0.000	VS5-0300350-100
3.000	3.500	1.000	0.000	0.000	0.000	VS5-0300350-100A
3.000	3.500	1.000	0.000	0.000	0.000	VS1-0300350-100
2.750	3.520	0.671	0.000	0.000	0.000	VS1-0300352-067







ID	OD	L1	L2	OD2	OD3	Product Name
2.750	3.520	1.030	0.000	0.000	0.000	VS1-0275352-103
3.000	3.520	0.890	0.000	0.000	0.000	VS1-0300352-089
2.875	3.625	1.343	0.000	0.000	0.000	VS1-0287362-134
3.000	3.625	0.000	0.000	0.000	0.000	VS1-0300362-115
3.000	3.625	1.032	0.000	0.000	0.000	VS1-0300362-103
3.000	3.666	0.000	0.000	0.000	0.000	VS1-0300366-
3.000	3.666	1.375	0.000	0.000	0.000	VS1-0300366-137
2.750	3.750	1.718	0.000	0.000	0.000	VS1-0275375-171
3.000	3.750	1.375	0.000	0.000	0.000	VS1-0300375-137
3.250	3.750	1.000	0.000	0.000	0.000	VS5-0325375-100
3.200	3.770	0.781	0.000	0.000	0.000	VS1-0320377-078
3.200	3.770	0.828	0.000	0.000	0.000	VS1-0320377-082
3.200	3.770	0.921	0.000	0.000	0.000	VS1-0320377-092
3.125	3.875	1.156	0.000	0.000	0.000	VS1-0312387-115
3.229	3.875	0.643	0.000	0.000	0.000	VS1-0322387-132
3.250	3.875	1.156	0.000	0.000	0.000	VS1-0325387-115
3.000	4.000	1.468	0.000	0.000	0.000	VS1-0300400-146
3.250	4.000	1.187	0.000	0.000	0.000	VS1-0325400-118
3.375	4.000	1.032	0.000	0.000	0.000	VS1-0337400-103
3.375	4.000	1.125	0.000	0.000	0.000	VS1-0337400-112
3.400	4.000	0.812	0.000	0.000	0.000	VS1-0340400-081
3.500	4.000	1.000	0.000	0.000	0.000	VS5-0350400-100
3.500	4.000	1.000	0.000	0.000	0.000	VS1-0350400-100
3.500	4.013	0.765	0.765	0.000	0.000	SM3-0350401-076
3.250	4.020	1.020	0.000	0.000	0.000	VS1-0325402-102
3.500	4.020	0.625	0.000	0.000	0.000	VS1-0350402-062
3.500	4.020	0.921	0.000	0.000	0.000	VS1-0350402-092
3.500	4.125	1.312	0.000	0.000	0.000	VS1-0350412-131
3.500	4.250	0.000	0.000	0.000	0.000	VS1-0350425-137
3.500	4.250	1.140	0.000	0.000	0.000	SM1-0350425-114
3.500	4.250	1.210	0.000	0.000	0.000	VS1-0350425-121



ID	OD	L1	L2	OD2	OD3	Product Name
3.750	4.250	0.968	0.000	0.000	0.000	VS1-0375425-096
3.750	4.250	1.000	0.000	0.000	0.000	VS1-0375425-100
3.500	4.270	1.030	0.000	0.000	0.000	VS1-0350427-103
3.500	4.270	1.400	0.000	0.000	0.000	VS1-0350427-140
3.750	4.375	1.187	0.000	0.000	0.000	VS1-0375437-118
3.500	4.500	0.000	0.000	0.000	0.000	VS1-0350450-162
3.500	4.500	1.389	0.000	0.000	0.000	VS1-0350450-138
3.750	4.500	1.020	0.000	0.000	0.000	VS1-0375450-102
3.750	4.500	1.187	0.000	0.000	0.000	VS1-0375450-118
3.875	4.500	0.937	0.000	0.000	0.000	VS1-0387450-093
3.875	4.500	1.000	0.000	0.000	0.000	VS1-0387450-100
4.000	4.500	1.000	0.000	0.000	0.000	VS5-0400450-100
4.000	4.500	1.000	0.000	0.000	0.000	VS1-0400450-100
3.750	4.520	1.000	0.000	0.000	0.000	VS1-0375452-100
3.750	4.520	1.218	0.000	0.000	0.000	VS1-0375452-121
3.875	4.625	1.156	0.000	0.000	0.000	VS1-0387462-115
4.000	4.625	1.000	0.000	0.000	0.000	VS1-0400462-100
4.000	4.666	0.000	0.000	0.000	0.000	VS1-0400466-
4.000	4.666	0.000	0.000	0.000	0.000	VS1-0400466-122
4.000	4.666	1.000	0.000	0.000	0.000	SM3-0400466-100
4.000	4.666	1.375	0.000	0.000	0.000	VS1-0400466-137
3.750	4.750	0.000	0.000	0.000	0.000	VS1-0375475-219
3.750	4.750	1.718	0.000	0.000	0.000	VS1-0375475-171
3.979	4.750	1.250	0.000	0.000	0.000	VS1-0397475-125
4.000	4.750	1.187	0.000	0.000	0.000	VS1-0400475-118
4.250	4.750	0.968	0.000	0.000	0.000	VS1-0425475-096
4.000	4.770	0.813	0.000	0.000	0.000	VS1-0400477-081
4.000	4.875	1.312	0.000	0.000	0.000	VS1-0400487-131
4.375	4.888	0.765	0.765	0.000	0.000	SM3-0437488-076
4.000	5.000	1.468	0.000	0.000	0.000	VS1-0400500-146
4.250	5.000	1.156	0.000	0.000	0.000	VS1-0425500-115



ID	OD	L1	L2	OD2	OD3	Product Name
4.250	5.000	1.375	0.000	0.000	0.000	VS1-0425500-137
4.375	5.000	1.156	0.000	0.000	0.000	VS1-0437500-115
4.400	5.000	0.812	0.000	0.000	0.000	VS1-0440500-081
4.500	5.000	1.000	0.000	0.000	0.000	VS5-0450500-100
4.500	5.000	1.000	0.000	0.000	0.000	VS1-0450500-100
4.500	5.000	1.125	0.000	0.000	0.000	VS1-0450500-112
4.275	5.025	1.156	0.000	0.000	427,502.000	VS1-0427502-115
4.250	5.030	1.200	0.000	0.000	0.000	VS1-0425503-120
4.250	5.030	1.344	0.000	0.000	0.000	VS1-0425503-134
4.250	5.125	1.312	0.000	0.000	0.000	VS1-0425512-131
4.500	5.125	1.312	0.000	0.000	0.000	VS1-0450512-131
4.500	5.125	1.375	0.000	0.000	0.000	VS1-0450512-137
4.000	5.250	2.093	0.000	0.000	0.000	VS1-0400525-209
4.500	5.250	0.968	0.000	0.000	0.000	VS1-0450525-096
4.750	5.250	1.000	0.000	0.000	0.000	VS1-0475525-100
4.500	5.375	1.312	0.000	0.000	0.000	VS1-0450537-131
4.750	5.375	1.250	0.000	0.000	0.000	VS1-0475537-125
4.500	5.500	0.000	0.000	0.000	0.000	VS1-0450550-162
4.500	5.500	1.218	0.000	0.000	0.000	VS1-0450550-121
4.500	5.500	1.250	0.000	0.000	0.000	VS1-0450550-125
4.729	5.500	1.250	0.000	0.000	0.000	VS1-0472550-132
4.750	5.500	1.156	0.000	0.000	0.000	VS1-0475550-115
4.750	5.500	1.187	0.000	0.000	0.000	VS1-0475550-118
5.000	5.500	0.968	0.000	0.000	0.000	VS1-0500550-100
5.000	5.500	0.968	0.000	0.000	0.000	VS1-0500550-096
5.000	5.500	1.000	0.000	0.000	0.000	VS5-0500550-100
5.000	5.500	1.125	0.000	0.000	0.000	VS1-0500550-112
4.750	5.625	0.000	0.000	0.000	0.000	VS1-0475562-150
5.000	5.625	1.000	0.000	0.000	0.000	VS1-0500562-100
5.000	5.666	0.000	0.000	0.000	0.000	VS1-0500566-
5.000	5.666	1.000	0.000	0.000	0.000	SM3-0500566-100



ID	OD	L1	L2	OD2	OD3	Product Name
5.000	5.666	1.375	0.000	0.000	0.000	VS1-0500566-137
4.750	5.750	1.718	0.000	0.000	0.000	VS1-0475575-171
5.000	5.750	1.500	0.000	0.000	0.000	VS1-0500575-162
5.000	5.750	1.500	0.000	0.000	0.000	VS1-0500575-150
5.250	5.750	0.968	0.000	0.000	0.000	VS1-0525575-096
5.250	5.875	0.765	0.765	0.000	0.000	SM3-0525588-076
5.000	6.000	1.265	0.000	0.000	0.000	VS1-0500600-126
5.000	6.000	1.750	0.000	0.000	0.000	VS1-0500600-175A
5.000	6.000	1.750	0.000	0.000	0.000	VS1-0500600-175
5.250	6.000	1.156	0.000	0.000	0.000	VS1-0525600-115
5.250	6.000	1.500	0.000	0.000	0.000	VS1-0525600-150
5.375	6.000	1.156	0.000	0.000	0.000	VS1-0537600-115
5.400	6.000	0.812	0.000	0.000	0.000	VS1-0540600-081
5.500	6.000	1.000	0.000	0.000	0.000	VS5-0550600-100
5.500	6.000	1.000	0.000	0.000	0.000	VS1-0550600-100
5.500	6.000	1.125	0.000	0.000	0.000	VS5-0550600-112
5.500	6.000	1.125	0.000	0.000	0.000	VS1-0550600-112
5.500	6.000	1.500	0.000	0.000	0.000	VS1-0550600-096
5.125	6.125	1.469	0.000	0.000	0.000	VS1-0512612-146
5.500	6.125	1.312	0.000	0.000	0.000	VS1-0550612-131
5.500	6.250	1.343	0.000	0.000	0.000	VS1-0550625-134
5.375	6.375	1.266	0.000	0.000	0.000	VS1-0537637-126
5.479	6.375	1.250	0.000	0.000	547,637.000	VS1-0547637-132
5.500	6.375	1.312	0.000	0.000	0.000	VS1-0550637-131
5.500	6.375	1.470	0.000	0.000	0.000	VS1-0550637-147
5.750	6.375	1.250	0.000	0.000	0.000	VS1-0575637-125
5.437	6.437	1.219	0.000	0.000	0.000	VS1-0543643-121
5.500	6.500	1.750	0.000	0.000	0.000	VS1-0550650-171
5.750	6.500	1.343	0.000	0.000	0.000	VS1-0575650-134
5.750	6.500	1.375	0.000	0.000	0.000	VS1-0575650-137
6.000	6.500	1.000	0.000	0.000	0.000	VS1-0600650-100





ID	OD	L1	L2	OD2	OD3	Product Name
6.000	6.500	1.250	0.000	0.000	0.000	VS5-0600650-125
6.000	6.530	0.875	0.000	0.000	0.000	VS1-0600653-087
6.000	6.625	1.062	0.000	0.000	0.000	VS1-0600662-106
6.000	6.666	0.000	0.000	0.000	0.000	VS1-0600666-
6.000	6.666	1.000	0.000	0.000	0.000	SM3-0600666-100
5.750	6.750	1.750	0.000	0.000	0.000	VS1-0575675-175
6.000	6.750	1.000	0.000	0.000	0.000	VS1-0600675-100
6.000	6.750	1.156	0.000	0.000	0.000	VS1-0600675-115
6.312	6.889	0.765	0.765	0.000	0.000	SM3-0631688-076
6.000	7.000	1.468	0.000	0.000	0.000	VS1-0600700-146
6.000	7.000	1.718	0.000	0.000	0.000	VS1-0600700-171
6.250	7.000	1.156	0.000	0.000	0.000	VS1-0625700-115
6.375	7.000	1.125	0.000	0.000	0.000	VS1-0637700-112
6.400	7.000	0.812	0.000	0.000	0.000	VS1-0640700-081
6.500	7.000	1.000	0.000	0.000	0.000	VS5-0650700-100
6.500	7.000	1.000	0.000	0.000	0.000	VS1-0650700-100
6.500	7.000	1.125	0.000	0.000	0.000	VS1-0650700-125
6.500	7.040	1.125	0.000	0.000	0.000	VS5-0650704-112
6.500	7.125	1.156	0.000	0.000	0.000	VS1-0650712-115
6.229	7.250	0.750	0.000	0.000	0.000	VS1-0622725-075
6.229	7.250	1.625	0.000	0.000	0.000	VS1-0622725-162
6.500	7.250	1.343	0.000	0.000	0.000	VS1-0650725-134
6.750	7.250	0.968	0.000	0.000	0.000	VS1-0675725-096
6.750	7.375	1.156	0.000	0.000	0.000	VS1-0675737-115
6.750	7.375	1.250	0.000	0.000	0.000	VS1-0675737-125
6.500	7.500	0.000	0.000	0.000	0.000	VS1-0650750-134
6.750	7.500	1.156	0.000	0.000	0.000	VS1-0675750-115
7.000	7.500	0.000	0.000	0.000	0.000	VS1-0700750-100
7.000	7.500	0.875	0.000	0.000	0.000	VS5-0700750-087
7.000	7.500	1.000	0.000	0.000	0.000	VS5-0700750-100
7.000	7.625	0.843	0.000	0.000	0.000	VS1-0700762-084



ID	OD	L1	L2	OD2	OD3	Product Name
7.000	7.666	0.000	0.000	0.000	0.000	VS1-0700766-
7.000	7.666	1.000	0.000	0.000	0.000	SM3-0700766-100
6.500	7.750	1.375	0.000	0.000	0.000	VS1-0650775-137
6.500	7.750	1.687	0.000	0.000	0.000	VS1-0650775-168
6.875	7.750	1.312	0.000	0.000	0.000	VS1-0687775-131
7.000	7.750	1.200	0.000	0.000	0.000	VS1-0700775-120
7.312	7.954	0.765	0.765	0.000	0.000	SM3-0731795-076
6.750	8.000	1.750	0.000	0.000	0.000	VS1-0675800-175
7.000	8.000	0.000	0.000	0.000	0.000	VS1-0700800-137
7.000	8.000	1.460	0.000	0.000	0.000	VS1-0700800-146
7.000	8.000	1.718	0.000	0.000	0.000	VS1-0700800-171
7.000	8.000	2.000	0.000	0.000	0.000	VS1-0700800-200
7.250	8.000	1.343	0.000	0.000	0.000	VS1-0725800-134
7.375	8.000	1.125	0.000	0.000	0.000	VS1-0737800-112
7.500	8.000	0.000	0.000	0.000	0.000	VS1-0750800-100
7.500	8.000	0.843	0.000	0.000	0.000	VS1-0750800-084
7.500	8.000	1.000	0.000	0.000	0.000	VS5-0750800-100
7.500	8.125	0.812	0.000	0.000	0.000	VS1-0750812-081
7.500	8.125	1.250	0.000	0.000	0.000	VS1-0750812-125
7.000	8.250	2.750	0.000	0.000	0.000	VS1-0700825-275
7.500	8.250	1.250	0.000	0.000	0.000	VS1-0750825-125
7.479	8.500	0.750	0.000	0.000	0.000	VS1-0747850-075
7.479	8.500	1.625	0.000	0.000	0.000	VS1-0747850-162
7.500	8.500	0.000	0.000	0.000	0.000	VS1-0750850-162
7.500	8.500	0.000	0.000	0.000	0.000	VS1-0750850-212
7.500	8.500	1.250	0.000	0.000	0.000	VS1-0750850-146
8.000	8.500	1.000	0.000	0.000	0.000	VS5-0800850-100
8.000	8.500	1.000	0.000	0.000	0.000	VS1-0800850-100
7.905	8.543	1.200	0.000	0.000	0.000	VS1-0790854-120
7.905	8.543	1.250	0.000	0.000	0.000	VS1-0790854-125
8.125	8.625	1.125	0.000	0.000	0.000	VS1-0812862-112





ID	OD	L1	L2	OD2	OD3	Product Name
8.000	8.750	1.156	0.000	0.000	0.000	VS1-0800875-115
8.100	8.870	0.000	0.000	0.000	0.000	VS1-0810887-
8.100	8.870	1.000	0.000	0.000	0.000	SM3-0810887-100
8.000	9.000	0.000	0.000	0.000	0.000	VS1-0800900-200
8.000	9.000	1.500	0.000	0.000	0.000	VS1-0800900-150
8.375	9.000	0.765	0.765	0.000	0.000	SM3-0837900-076
8.500	9.000	1.000	0.000	0.000	0.000	VS5-0850900-100
8.500	9.250	1.156	0.000	0.000	0.000	VS1-0850925-115
8.500	9.500	1.875	0.000	0.000	0.000	VS1-0850950-187
9.000	9.750	1.156	0.000	0.000	0.000	VS1-0900975-115
8.500	10.000	2.000	0.000	0.000	0.000	VS1-0850100-200
8.500	10.000	3.125	0.000	0.000	0.000	VS1-0850100-312
8.750	10.000	2.000	0.000	0.000	0.000	VS1-0875100-200
9.000	10.000	1.218	0.000	0.000	0.000	VS1-0900100-121
9.375	10.000	1.218	0.000	0.000	0.000	VS1-0937100-121
9.000	10.250	2.000	0.000	0.000	0.000	VS1-0900102-200
9.750	10.500	1.312	0.000	0.000	0.000	VS1-0975105-134
10.000	11.500	2.468	0.000	0.000	0.000	VS1-1000115-246
10.750	12.000	0.000	0.000	0.000	0.000	VS1-1075120-168
11.000	12.500	3.968	0.000	0.000	0.000	VS1-1100125-396
11.250	12.500	2.000	0.000	0.000	0.000	VS1-1125125-200
12.000	13.250	1.406	0.000	0.000	0.000	VS1-1200132-140
12.000	13.500	2.570	0.000	0.000	0.000	VS1-1200135-250
12.500	14.000	0.953	0.000	0.000	0.000	VS1-1250140-095
12.500	14.000	1.609	0.000	0.000	0.000	VS1-1250140-160
13.000	14.500	1.937	0.000	0.000	0.000	VS1-1300145-193
15.000	16.500	1.734	0.000	0.000	0.000	VS1-1500165-173
16.000	17.250	1.968	0.000	0.000	0.000	VS1-1600172-196
17.000	18.250	1.406	0.000	0.000	0.000	VS1-1700182-140
18.875	20.375	3.250	0.000	0.000	0.000	VS1-1887203-325
22.000	23.500	2.500	0.000	0.000	0.000	VS1-2200235-250



ID	OD	L1	L2	OD2	OD3	Product Name
25.250	26.750	1.609	0.000	0.000	0.000	VS1-2525267-160
25.250	26.750	2.600	0.000	0.000	0.000	VS1-2525267-260







# 940

## Flexible Rod Wiper

### Design

940 style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. 940 is classed as a light to medium duty wiper and is precision moulded in polyurethane. Machine trimming provides a precise wiping lip.

### Operating Conditions

#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

1.0m/sec  
3.0'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing d$	$\varnothing D$	$\varnothing D1$	L1
0.1-0.25	0.8	0.8	2.0

#### Tolerances

	$\varnothing d$	$\varnothing D$	$\varnothing D1$	L1
	+0.000	-0.000	-0.000	-0.003
<5.625	-0.002	+0.004	+0.005	+0.003
>5.625	-0.003	+0.005	+0.005	+0.003

#### Chamfer Radii

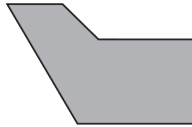
r1	0.010
r2	0.020

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



Rod wipers



### Key Features

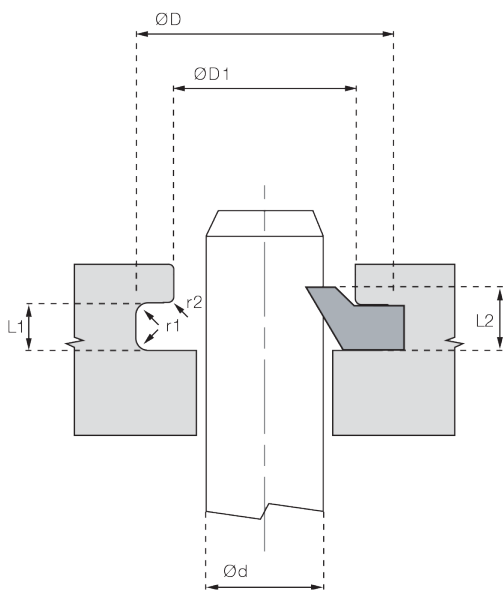
Very compact

Easy to fit

Medium duty

Good abrasion resistance

Precision trimmed  
wiping lip





# CSW

## Flexible Rod Wiper

### Design

CSW style wiper is designed to remove more tenacious mud & ice from a reciprocating rod during the negative stroke. CSW is classed as a heavy duty wiper and is precision moulded in Nylon with a filler, MOS2, to improve the friction and wear characteristics of the material. Additionally the static wiping lip provides positive sealing in the housing preventing moisture / contaminants from entering the system by passing the outside of the wiper.

### Operating Conditions

#### Temperature

-40° to 100° C  
-40° to 212° F



#### Speed

5.0m/sec  
15.0'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing d$	$\varnothing D$	$\varnothing D1$	L1
0.1-0.25	0.8	0.8	2.0

#### Tolerances

$\varnothing d$	$\varnothing D$	$\varnothing D1$	L1
See	+ 0.008	+ 0.008	+ 0.008
Seal	- 0.000	- 0.000	- 0.000

#### Chamfer Radii

r1	0.010
r2	0.062

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



Rod wipers

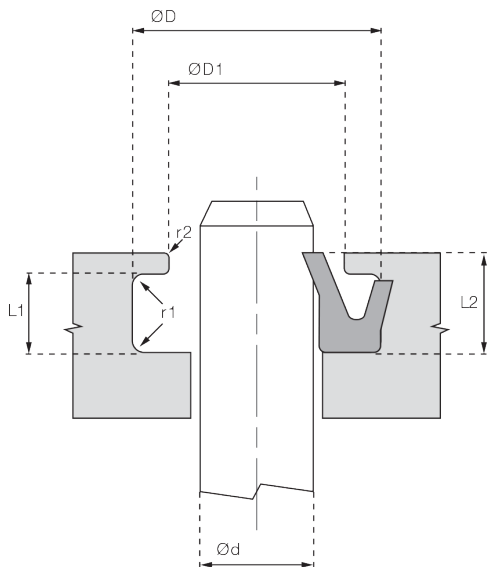


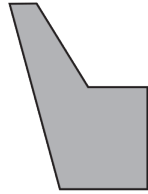
### Key Features

Heavy duty design

Simple snap-in fit

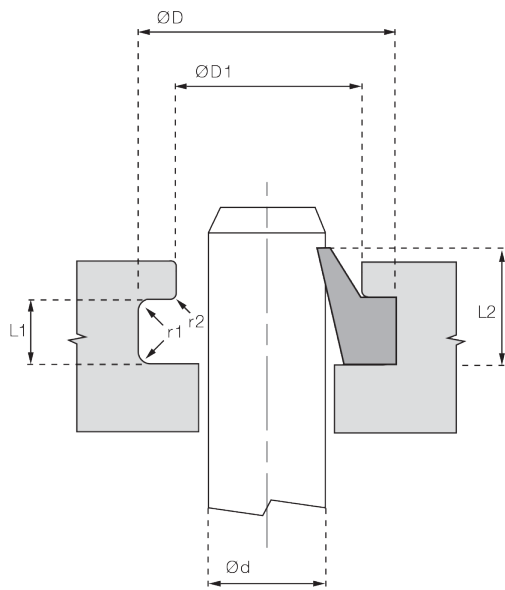
Good abrasion resistance





### Key Features

- Standard USA housing
- Easy to fit
- Pressure relieving heel
- Precision trimmed wiping lip



# DU

## Flexible Rod Wiper

### Design

DU style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. DU is classed as a medium duty wiper and is precision moulded in Polyurethane 92 Shore A. Machine trimming provides a precise wiping lip.

### Operating Conditions

#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

1.0m/sec  
3.0'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing d$	$\varnothing D$	$\varnothing D1$	L1
0.1-0.25	0.8	0.8	2.0

#### Tolerances

$\varnothing d$	$\varnothing D$	$\varnothing D1$	L1
See	+ 0.006	+ 0.010	+ 0.004
Seal	- 0.000	- 0.000	- 0.000

#### Chamfer Radii

r1	0.016
r2	0.016

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

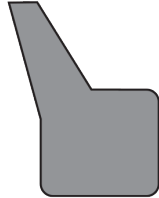




# DV

## Flexible Rod Wiper

Rod wipers



### Key Features

- High temperature
- Standard USA housing
- Easy to fit
- Precision trimmed wiping lip

### Design

DV style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. DV is classed as a light duty wiper and is precision moulded in Viton. Machine trimming provides a precise wiping lip.

### Operating Conditions

#### Temperature

-20° to 200° C  
-4° to 392° F



#### Speed

0.5m/sec  
1.5'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1
0.1-0.25	0.8	0.8	2.0

#### Tolerances

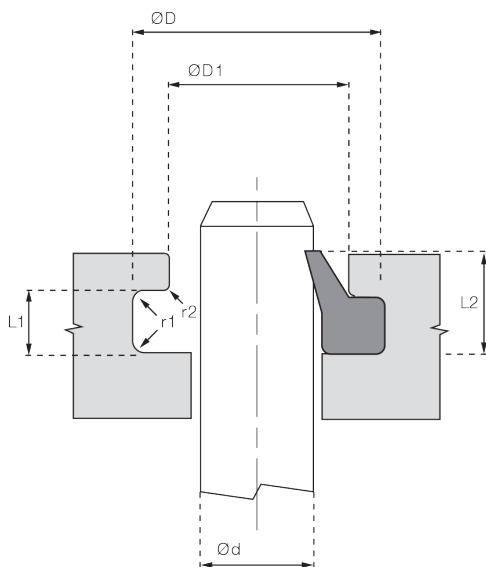
$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1
See	+ 0.006	+ 0.010	+ 0.004
Seal	- 0.000	- 0.000	- 0.000

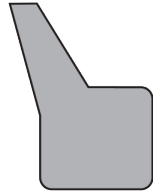
#### Chamfer Radii

r1	0.016
r2	0.016

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



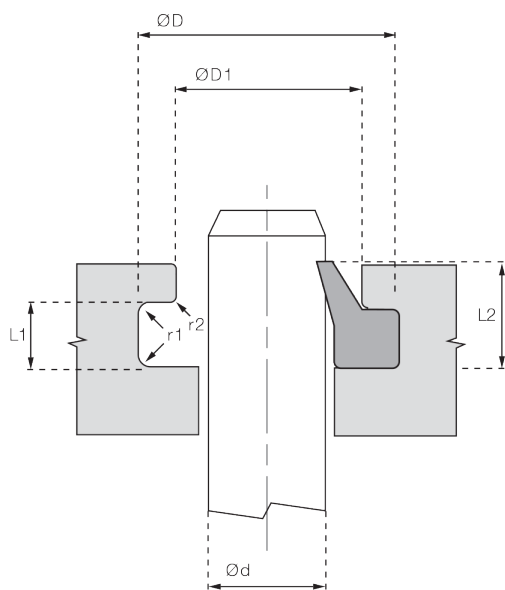


### Key Features

Easy to fit

Good size range

Precision trimmed  
wiping lip



# EW

## Flexible Rod Wiper

### Design

EW style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. EW is classed as a medium duty wiper and is precision moulded in Polyurethane 90 Shore A. Machine trimming provides a precise wiping lip.

### Operating Conditions

#### Temperature

-40° to 110° C  
-40° to 230° F



#### Speed

3.0m/sec  
9'/sec



#### Surface Finish $\mu\text{mRa}$

$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1
0.1-0.25	0.8	0.8	2.0

#### Tolerances

$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1
See	+ 0.006	+ 0.010	+ 0.004
Seal	- 0.000	- 0.000	- 0.000

#### Chamfer Radii

r1	0.020
r2	0.020

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# GPH

Flexible Rod Wiper

Rod wipers



## Key Features

Easy to fit

Good size range

Precision trimmed  
wiping lip

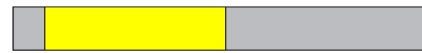
## Design

GPH style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. GPH is classed as a light duty wiper and is precision moulded in NBR 90 Shore A.

## Operating Conditions

### Temperature

-30° to 100° C  
-22° to 212° F



### Speed

3.0m/sec  
9.0'/sec



### Surface Finish $\mu\text{mRa}$

$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1
0.1-0.25	0.8	0.8	2.0

### Tolerances

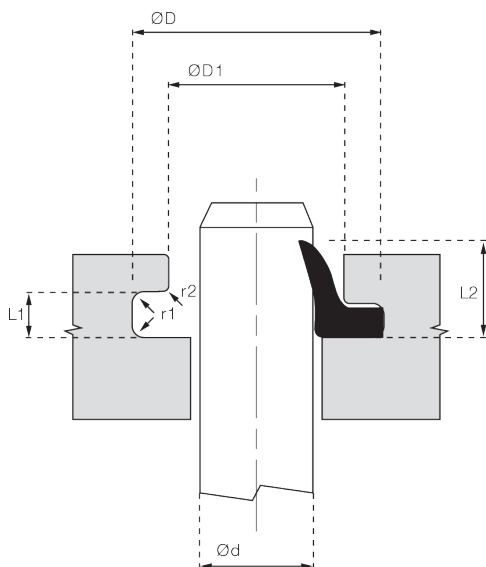
$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1
See	+ 0.000	+ 0.000	+ 0.0
Seal	- 0.005	- 0.005	- 0.010

### Chamfer Radii

r1	0.020
r2	0.032

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix







# HU

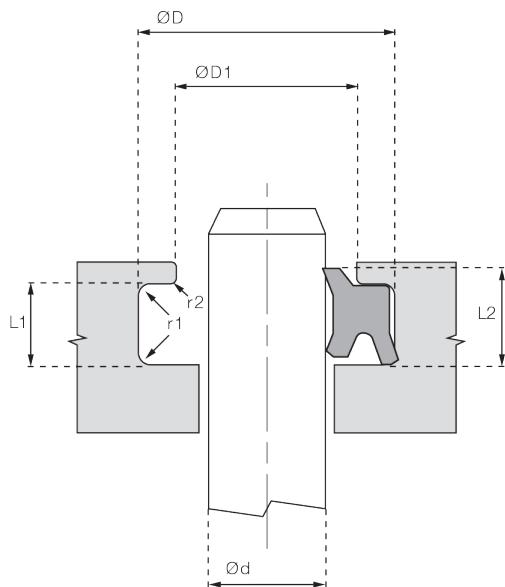
## Flexible Rod Wiper

Rod wipers



### Key Features

- Standard USA housing
- Easy to fit
- Double lip – dryer rod
- Precision trimmed lips



### Design

HU style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke and assist sealing by collecting the fluid film on the positive stroke. HU is classed as a medium duty wiper and is precision moulded in Polyurethane as standard, some sizes also available in NBR and Viton. Machine trimming provides a precise wiping lip.

### Operating Conditions

#### Temperature

HU - Polyurethane	HN -NBR	HV - Viton
-30° to 100° C	-40° to 100° C	-20° to 200° C
-22° to 212° F	-40° to 212° F	-4° to 392° F

#### Speed

Urethane	NBR	Viton
1.0m/sec	0.5m/sec	0.5m/sec
3.0'/sec	1.5'/sec	1.5'/sec

#### Surface Finish µmRa

Ød	ØD	ØD1	L1
0.1-0.25	0.8	0.8	2.0

#### Tolerances

Ød	ØD	ØD1	L1
<0.937	+0.002	+0.002	+0.002
>1.000	+0.003	+0.003	+0.003
	-0.000	-0.000	-0.000

#### Chamfer Radii

r1	0.010
r2	0.020

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# PWB

Flexible Rod Wiper

Rod wipers



## Key Features

- Very compact
- Easy to fit
- Light duty
- Precision trimmed wiping lip

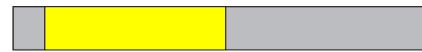
## Design

PWB style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. PWB is classed as a light duty wiper and is precision moulded in NBR 90 Shore A. Machine trimming provides a precise wiping lip.

## Operating Conditions

### Temperature

-30° to 100° C  
-22° to 212° F



### Speed

3.0m/sec  
9.0'/sec



### Surface Finish $\mu\text{mRa}$

$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1
0.1-0.25	0.8	0.8	2.0

### Tolerances

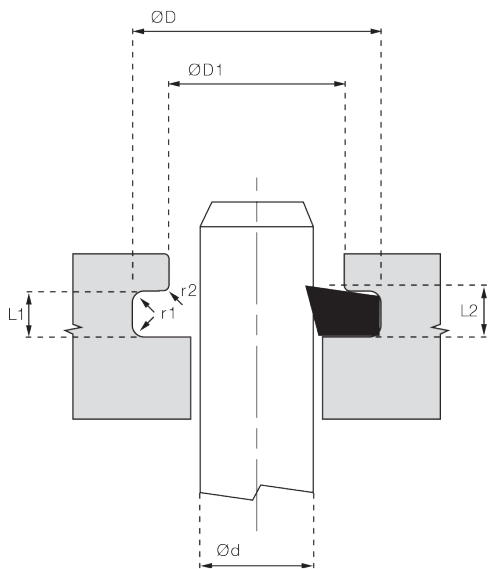
$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1
See	+ 0.000	- 0.000	+/-
Seal	- 0.005	+ 0.005	0.010

### Chamfer Radii

r1	0.020
r2	0.032

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix



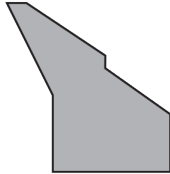




# PWK

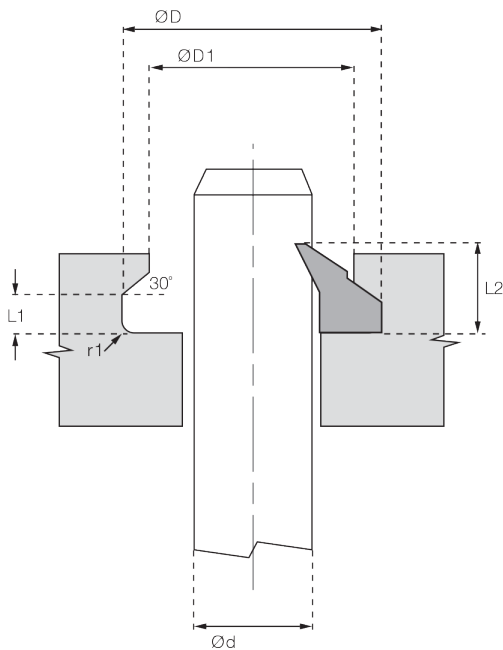
Flexible Rod Wiper

Rod wipers



## Key Features

- Easy to fit
- Pressure relieving heel
- Popular design
- Tough polyurethane



## Design

PWK style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. PWK is classed as a medium duty wiper and is precision moulded in Polyurethane. Machine trimming provides a precise wiping lip.

## Operating Conditions

### Temperature

-40° to 110° C  
-40° to 230° F



### Speed

4.0m/sec  
12.0'/sec



### Surface Finish µmRa

Ød	ØD	ØD1	L1
0.1-0.25	0.8	0.8	2.0

### Tolerances

Ød	ØD	ØD1	L1
See	+ 0.005	+ 0.010	+0.005
Seal	- 0.000	- 0.000	-0.000

### Chamfer Radii

r1	0.010
r2	0.020

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# PWM

Flexible Rod Wiper

Rod wipers

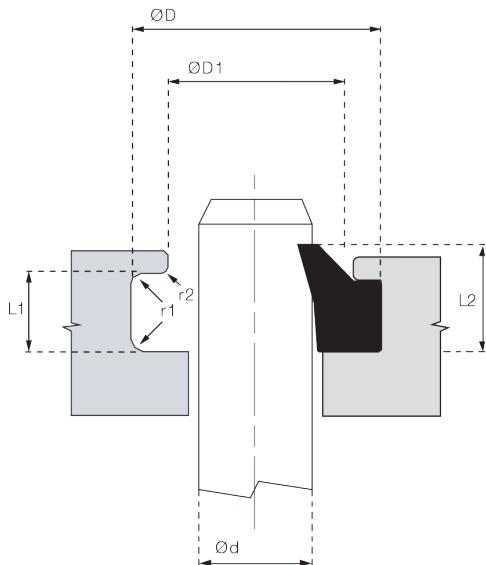


## Key Features

Easy to fit

Good size range

Precision trimmed  
wiping lip



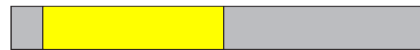
## Design

PWM rod wiper is a light-medium duty wiper manufactured from a hard Nitrile rubber. The wiper is proportioned to prevent mud and moisture from entering the system.

## Operating Conditions

### Temperature

-30° to 100°C  
-22° to 212°F



### Speed

3.0m/sec  
9.0°/sec



### Surface Finish $\mu\text{mRa}$

$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1	L2
0.1-0.25	0.8	0.8	2.0	2.0

### Tolerances

$\text{Ød}$	$\text{ØD}$	$\text{ØD1}$	L1
see seal	-0 +0.008	-0 +0.008	-0 +0.008

### Chamfer Radii

r1	0.016
r2	0.016

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# PWO

Flexible Rod Wiper

Rod wipers

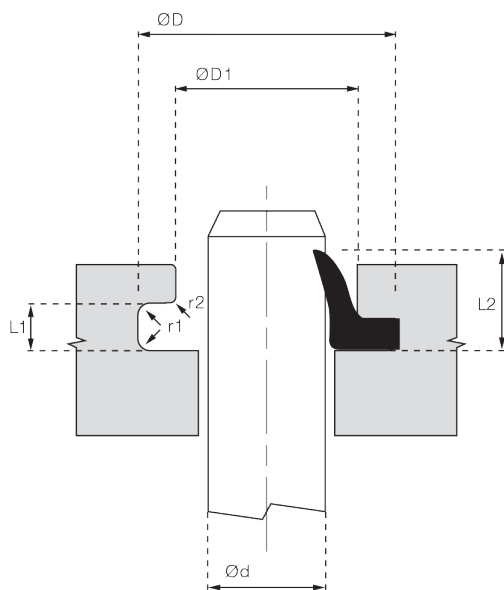


## Key Features

Easy to fit

Good size range

Precision trimmed  
wiping lip



## Design

PWO style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. PWO is classed as a light to medium duty wiper and is precision moulded in NBR 90 Shore A. Machine trimming provides a precise wiping lip.

## Operating Conditions

### Temperature

-30° to 100° C  
-22° to 212° F



### Speed

3.0m/sec  
9.0'/sec



### Surface Finish µmRa

Ød	ØD	ØD1	L1
0.1-0.25	0.8	0.8	2.0

### Tolerances

Ød	ØD	ØD1	L1
See	+ 0.020	+ 0.005	+0.020
Seal	+ 0.010	- 0.005	+0.010

### Chamfer Radii

r1	0.020
r2	0.020

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# PWS

Flexible Rod Wiper

Rod wipers



## Key Features

Excellent static diameter sealing

Easy to fit

Precision trimmed wiping lip

## Design

PWS style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. PWS is classed as a medium duty wiper and is precision moulded in NBR 90 Shore A. Machine trimming provides a precise wiping lip. Additional sealing beads on this wiper provide positive sealing in the housing preventing moisture and contaminants from passing the outside of the wiper.

## Operating Conditions

### Temperature

-30° to 100° C  
-22° to 212° F



### Speed

3.0m/sec  
9.0'/sec



### Surface Finish $\mu\text{mRa}$

$\text{\O}d$	$\text{\O}D$	$\text{\O}D1$	L1
0.1-0.25	0.8	0.8	2.0

### Tolerances

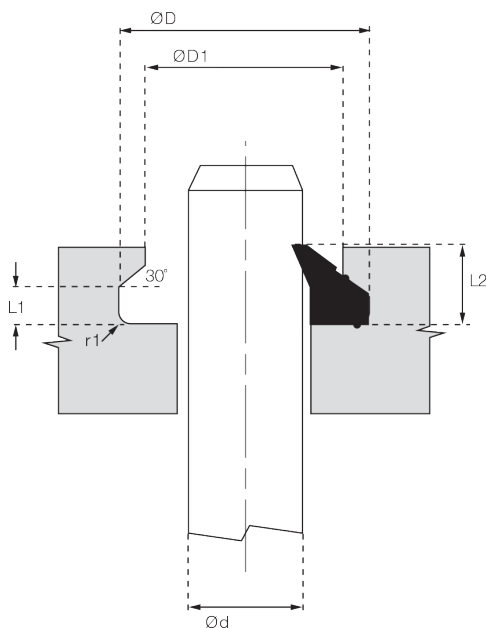
$\text{\O}d$	$\text{\O}D$	$\text{\O}D1$	L1
See	+ 0.008	+ 0.008	+0.008
Seal	- 0.000	- 0.000	-0.000

### Chamfer Radii

r1	0.010
r2	0.020

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# RWK

Flexible Rod Wiper

Rod wipers



## Key Features

Easy to fit

Double lip

Drier rod

## Design

RWK style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke and assist sealing by collecting the fluid film on the positive stroke. RWK is classed as a medium duty wiper and is precision moulded in NBR 90 Shore A. Machine trimming provides a precise wiping lip.

## Operating Conditions

### Temperature

-30° to 100° C  
-22° to 212° F



### Speed

3.0m/sec  
9.0'/sec



### Surface Finish $\mu\text{mRa}$

$\text{\O}d$	$\text{\O}D$	$\text{\O}D1$	L1
0.1-0.25	0.8	0.8	2.0

### Tolerances

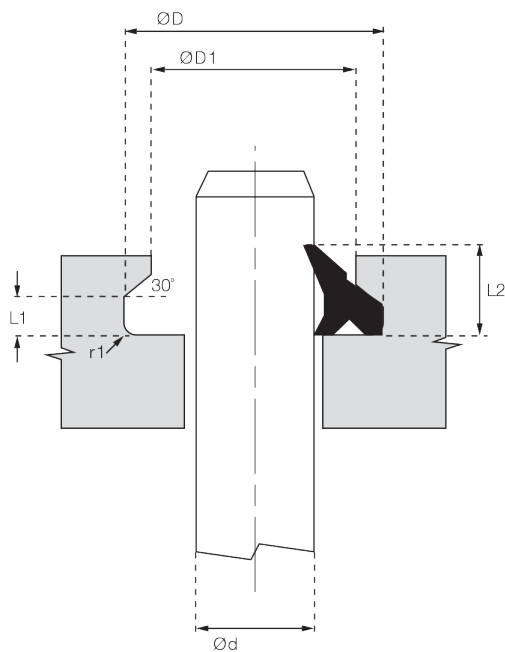
$\text{\O}d$	$\text{\O}D$	$\text{\O}D1$	L1
See	+ 0.005	+ 0.005	+ 0.005
Seal	- 0.000	- 0.000	- 0.000

### Chamfer Radii

r1	0.010
r2	0.020

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# MCR

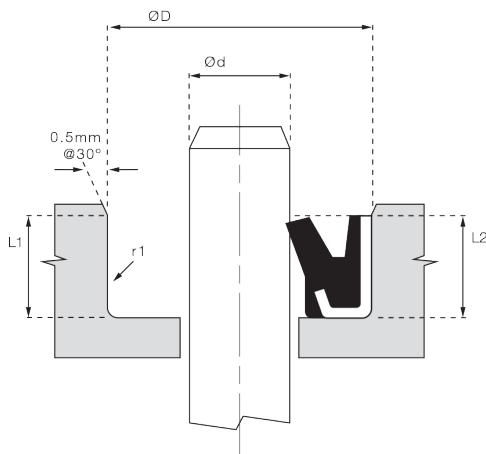
## Encased Rod Wiper

Rod wipers



### Key Features

- Medium duty
- Easy to fit
- Simple housing design
- Good range of sizes
- Precision trimmed wiping lip



### Design

MCR style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. MCR is classed as a medium duty wiper and is precision moulded in NBR 90 Shore A bonded to a metal cage. Machine trimming provides a precise wiping lip.

### Operating Conditions

#### Temperature

-30° to 100° C  
-22° to 212° F



#### Speed

1.0m/sec  
3.0'/sec



#### Surface Finish µmRa

Ød	ØD	L1
0.1-0.25	0.8	2.0

#### Tolerances

Ød	ØD	L1
See	±0.001	+0.015
Seal		-0.000

#### Chamfer Radii

r1	0.016
----	-------

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





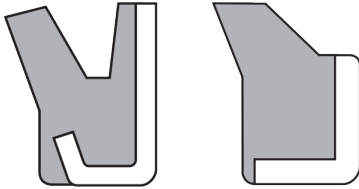
# MCU

## Encased Rod Wiper

### Design

MCU style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. MCU is classed as a medium to heavy duty wiper and is precision moulded in tough Polyurethane bonded to a metal cage. Machine trimming provides a precise wiping lip.

Rod wipers



### Key Features

- Medium/Heavy duty
- Easy to fit
- Simple housing design
- Good range of sizes
- Precision trimmed wiping lip

### Operating Conditions

#### Temperature

-40° to 105° C  
-40° to 215° F



#### Speed

1.0m/sec  
3.0'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing d$	$\varnothing D$	L1
0.1-0.25	0.8	2.0

#### Tolerances

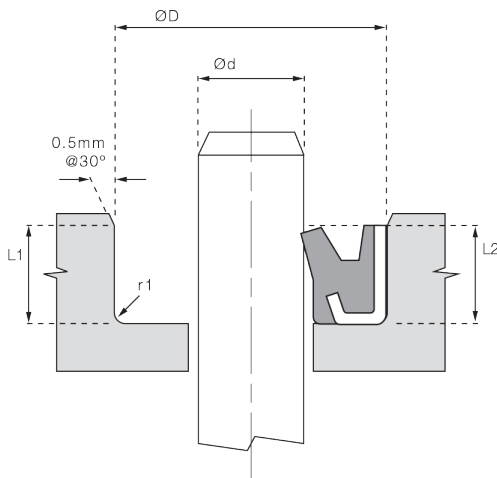
$\varnothing d$	$\varnothing D$	L1
See	$\pm 0.001$	$+0.015$
Seal		$-0.000$

#### Chamfer Radii

r1	0.016
----	-------

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix







# S34

## Metal Lip Rod Wiper

### Design

S34 style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke. Classed as a heavy duty wiper it has dual brass wiping lips with an NBR expander, typically used to scrape ice, aluminium and clay.

### Operating Conditions

#### Temperature

-30° to 120° C  
-22° to 250° F



#### Speed

4.0m/sec  
12'/sec



#### Surface Finish $\mu\text{mRa}$

$\varnothing d$	$\varnothing D$	$\varnothing D1$	L1
0.1-0.25	0.8	0.8	2.0

#### Tolerances

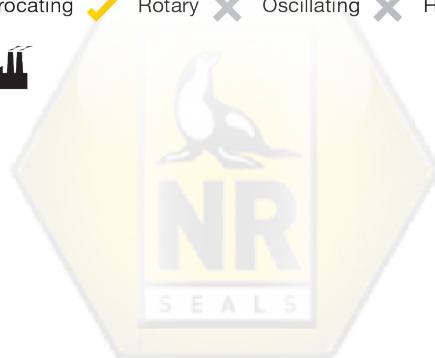
$\varnothing d$	$\varnothing D$	$\varnothing D1$	L1
+0.000	+0.000	-0.000	-0.000
-0.002	-0.010	+0.010	+0.005

#### Chamfer Radii

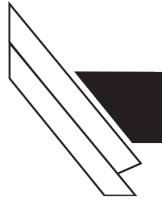
r1	0.016
r2	0.016

#### Typical Examples

Reciprocating  Rotary  Oscillating  Helix

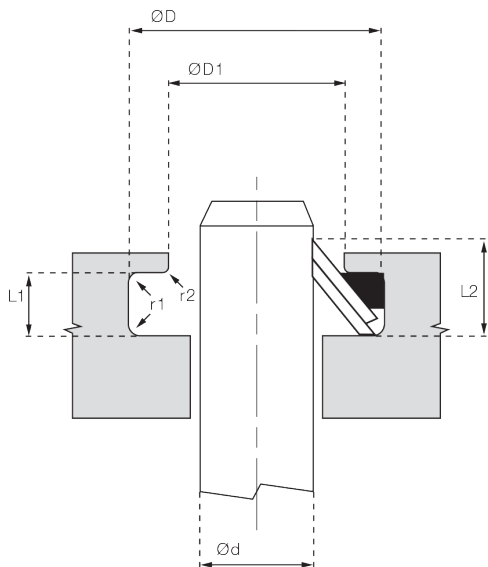


Rod wipers



### Key Features

- Heavy duty scraper
- Handles misalignment
- Easy to fit



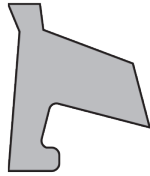




# PWC

Flexible Rod Wiper

Rod wipers



## Key Features

To suit cascade equipment

### Design

PWC style wiper is designed to remove potential contaminants from a reciprocating rod during the negative stroke and assist sealing by collecting the fluid film on the positive stroke. PWC is classed as a medium duty wiper and is precision moulded in Polyurethane.

### Operating Conditions

#### Temperature

-53° to 105° C  
-65° to 220° F



#### Speed

3.0m/sec  
9.0"/sec



#### Surface Finish $\mu\text{mRa}$

REPLACEMENT PART ONLY

#### Tolerances

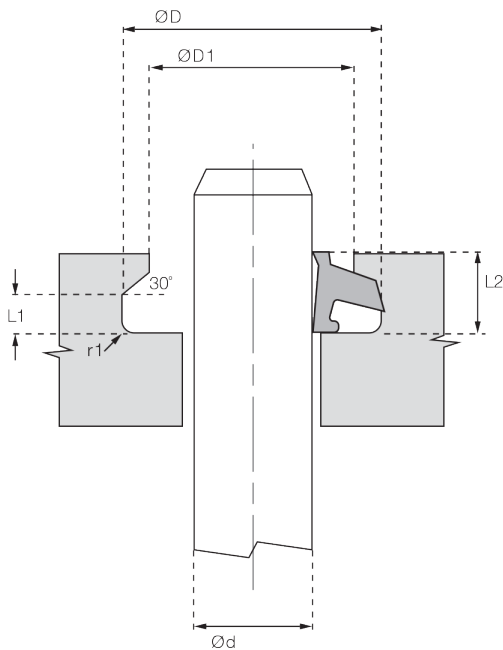
REPLACEMENT PART ONLY

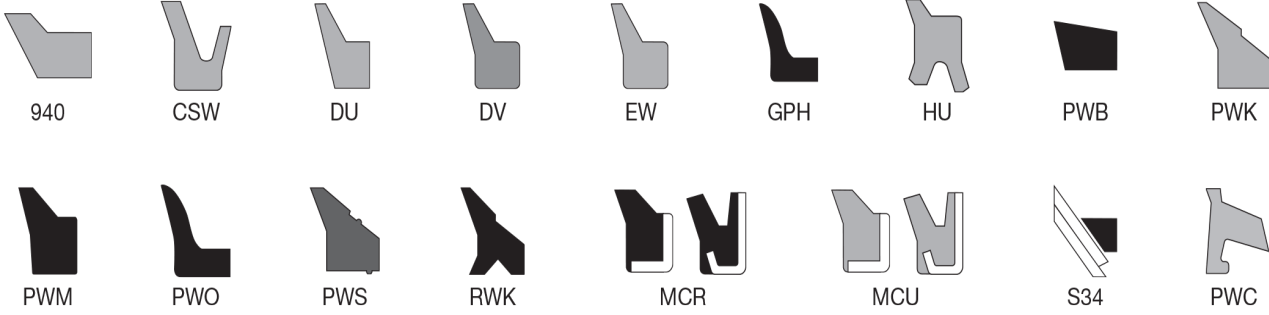
#### Chamfer Radii

REPLACEMENT PART ONLY

#### Typical Examples

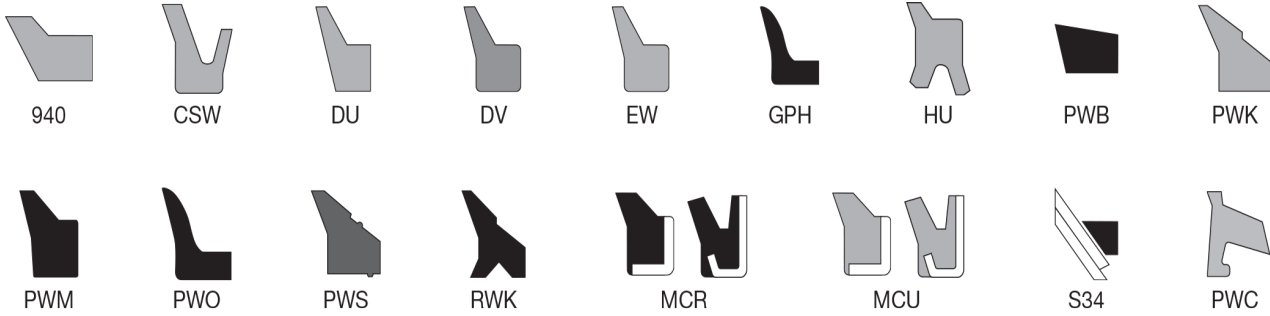
Reciprocating  Rotary  Oscillating  Helix





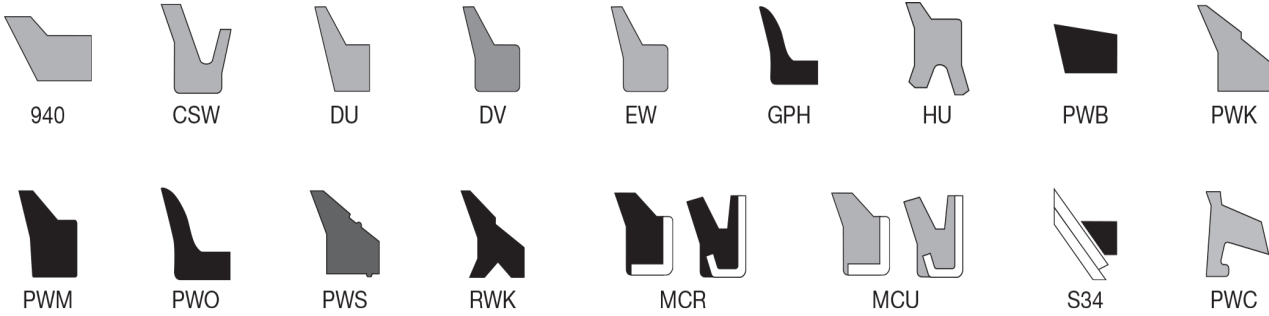
Rod Wipers  
Inserted, Encased & Metal

OD	ID	L1	L2	OD2	OD3	Product Name
0.000	1.375	0.000	0.000	0.000	0.000	S34-1375C
0.000	1.750	0.000	0.000	0.000	0.000	S34-1750B
0.000	2.700	0.000	0.485	0.000	0.000	PWC-2700
0.000	2.825	0.000	0.000	0.000	0.000	PWC-2825
0.000	3.700	0.000	0.000	0.000	0.000	PWC-3700
0.000	5.450	0.000	0.000	0.000	0.000	PWC-5450
0.500	0.250	0.125	0.187	0.470	0.018	S34-0250
0.540	0.375	0.120	0.120	0.430	0.000	PWB-0375
0.610	0.437	0.120	0.120	0.495	0.000	PWB-0437
0.622	0.375	0.124	0.210	0.535	0.000	DU-00375
0.625	0.375	0.125	0.187	0.595	0.018	S34-0375
0.677	0.375	0.000	0.000	0.000	0.000	HN-00375
0.677	0.375	0.203	0.250	0.495	0.000	HU-00375
0.680	0.500	0.125	0.125	0.560	0.000	PWB-0500
0.685	0.437	0.124	0.210	0.600	0.000	DU-00437
0.688	0.500	0.098	0.098	0.000	0.000	MCR-050068-094
0.740	0.562	0.130	0.130	0.630	0.000	PWB-0562
0.747	0.500	0.124	0.210	0.660	0.000	DU-00500
0.750	0.500	0.125	0.125	0.000	0.000	MCR-050075-125
0.750	0.500	0.125	0.187	0.720	0.018	S34-0500
0.750	0.500	0.155	0.275	0.605	0.000	PWK-0500
0.750	0.500	0.176	0.275	0.605	0.000	RWK-0500
0.760	0.500	0.107	0.187	0.647	0.000	940-00500
0.802	0.500	0.203	0.250	0.620	0.000	HU-00500
0.812	0.500	0.187	0.270	0.000	0.000	MCR-050081-187
0.812	0.625	0.083	0.200	0.750	0.000	CSW-0625A
0.820	0.625	0.140	0.140	0.700	0.000	PWB-0625
0.823	0.562	0.107	0.187	0.710	0.000	940-00562
0.872	0.625	0.124	0.210	0.785	0.000	DU-00625
0.875	0.375	0.050	0.187	0.563	0.000	GPH-0375
0.875	0.500	0.172	0.250	0.812	0.000	CSW-0500



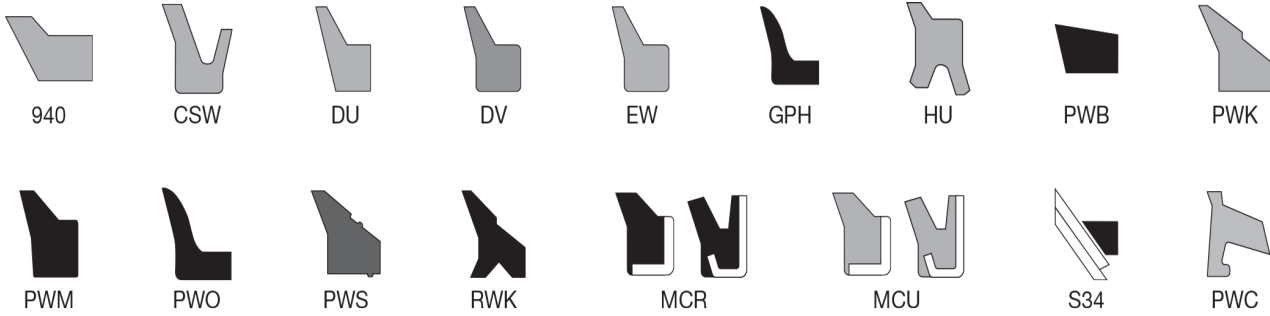
Rod Wipers  
Inserted, Encased & Metal

OD	ID	L1	L2	OD2	OD3	Product Name
0.875	0.625	0.125	0.125	0.000	0.000	MCR-062087-125
0.875	0.625	0.125	0.187	0.845	0.000	S34-0625
0.875	0.625	0.176	0.275	0.730	0.000	RWK-0625A
0.880	0.687	0.140	0.140	0.760	0.000	PWB-0687
0.885	0.625	0.107	0.187	0.772	0.000	940-00625
0.885	0.625	0.155	0.343	0.750	0.000	PWK-0625A
0.910	0.500	0.135	0.250	0.700	0.000	PWO-0500
0.927	0.625	0.203	0.250	0.745	0.000	HU-00625
0.937	0.437	0.110	0.250	0.687	0.000	GPH-0437
0.937	0.687	0.124	0.210	0.850	0.000	DU-00687
0.938	0.625	0.188	0.188	0.000	0.000	MCR-062093-187
0.948	0.687	0.107	0.187	0.834	0.000	940-00687
0.950	0.750	0.140	0.140	0.820	0.000	PWB-0750
1.000	0.500	0.110	0.250	0.719	0.000	GPH-0500
1.000	0.625	0.172	0.250	0.937	0.000	CSW-0625
1.000	0.625	0.175	0.200	0.000	0.000	CSW-0625B
1.000	0.625	0.195	0.343	0.730	0.000	RWK-0625
1.000	0.687	0.188	0.188	0.000	0.000	MCR-068100-187
1.000	0.750	0.125	0.125	0.000	0.000	MCR-075100-125
1.000	0.750	0.176	0.275	0.855	0.000	RWK-0750A
1.010	0.750	0.107	0.187	0.897	0.000	940-00750
1.020	0.812	0.140	0.140	0.880	0.000	PWB-0812
1.035	0.625	0.135	0.250	0.825	0.000	PWO-0625
1.052	0.750	0.203	0.250	0.870	0.000	HU-00750
1.052	0.750	0.250	0.000	0.870	0.000	HN-00750
1.080	0.875	0.000	0.000	0.950	0.000	PWB-0875 EPDM
1.080	0.875	0.150	0.150	0.950	0.000	PWB-0875
1.084	0.812	0.107	0.187	0.960	0.000	940-00812
1.094	0.562	0.110	0.375	0.875	0.000	GPH-0562
1.122	0.750	0.187	0.305	0.995	0.000	DU-00750
1.125	0.625	0.312	0.312	0.000	0.000	MCU-062112-312



Rod Wipers  
Inserted, Encased & Metal

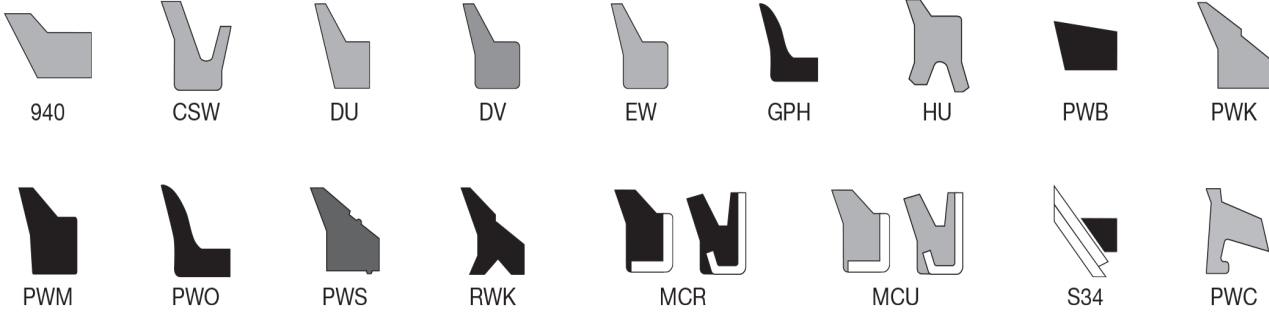
OD	ID	L1	L2	OD2	OD3	Product Name
1.125	0.750	0.187	0.281	1.081	0.022	S34-0750
1.125	0.750	0.188	0.281	0.000	0.000	MCR-075112-187
1.125	0.750	0.195	0.343	0.855	0.000	RWK-0750
1.125	0.750	0.195	0.343	0.855	0.000	PWK-0750
1.125	0.875	0.125	0.125	0.000	0.000	MCR-087112-125
1.125	0.875	0.176	0.275	0.980	0.000	RWK-0875A
1.148	0.875	0.107	0.187	1.023	0.000	940-00875
1.150	0.937	0.000	0.000	1.010	0.000	PWB-0937 EPDM
1.150	0.937	0.150	0.150	1.010	0.000	PWB-0937
1.160	0.750	0.135	0.250	0.950	0.000	PWO-0750
1.185	0.812	0.187	0.305	1.060	0.000	DU-00812
1.209	0.937	0.107	0.187	1.085	0.000	940-00937
1.240	0.875	0.218	0.281	1.010	0.000	HU-00875
1.240	1.000	0.160	0.160	1.080	0.000	PWB-1000
1.247	0.875	0.187	0.305	1.120	0.000	DU-00875
1.250	0.750	0.234	0.345	1.187	0.000	CSW-0750
1.250	0.750	0.250	0.250	0.000	0.000	MCR-075125-250
1.250	0.750	0.312	0.312	0.000	0.000	MCU-075125-312
1.250	0.875	0.187	0.281	1.206	0.022	S34-0875
1.250	0.875	0.188	0.188	0.000	0.000	MCR-087125-187
1.250	0.875	0.195	0.343	0.980	0.000	RWK-0875
1.250	0.875	0.195	0.343	0.980	0.000	PWK-0875
1.250	1.000	0.125	0.125	0.000	0.000	MCR-100125-125
1.250	1.000	0.176	0.275	1.105	0.000	RWK-1000A
1.273	1.000	0.107	0.187	1.148	0.000	940-01000
1.285	0.875	0.135	0.250	1.075	0.000	PWO-0875
1.312	1.000	0.125	0.125	0.000	0.000	MCR-100131-125
1.312	1.000	0.188	0.270	0.000	0.000	MCR-100131-187
1.334	1.062	0.107	0.187	1.210	0.000	940-01062
1.365	1.000	0.218	0.281	1.135	0.000	HU-01000
1.372	1.000	0.187	0.305	1.245	0.000	DV-01000



Rod Wipers  
Inserted, Encased & Metal

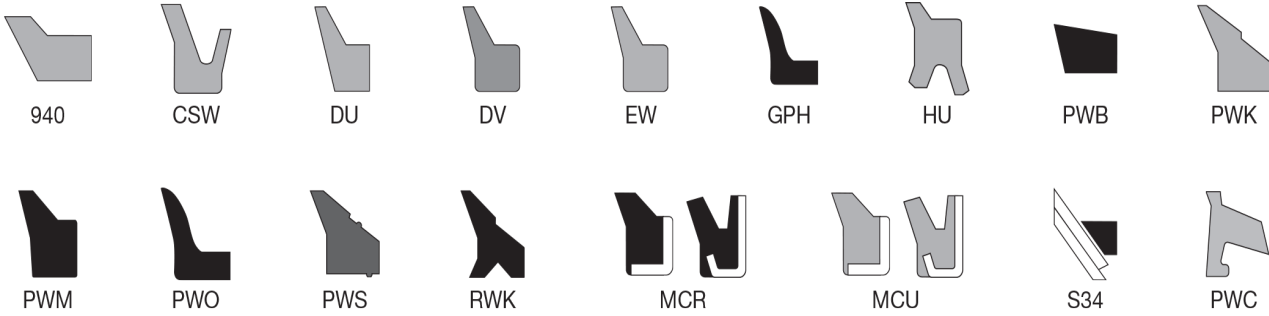
OD	ID	L1	L2	OD2	OD3	Product Name
1.372	1.000	0.187	0.305	1.245	0.000	DU-01000
1.375	0.625	0.110	0.375	0.875	0.000	GPH-0625
1.375	0.875	0.234	0.345	1.312	0.000	CSW-0875
1.375	0.875	0.312	0.312	0.000	0.000	MCR-087137-312
1.375	1.000	0.187	0.281	1.331	0.022	S34-1000
1.375	1.000	0.188	0.188	0.000	0.000	MCR-100137-187
1.375	1.000	0.195	0.343	1.105	0.000	RWK-1000
1.375	1.000	0.195	0.343	1.105	0.000	PWK-1000
1.375	1.125	0.125	0.125	0.000	0.000	MCR-112137-125
1.375	1.125	0.160	0.160	1.210	0.000	PWB-1125
1.398	1.000	0.230	0.300	1.187	0.000	PWM-1000
1.398	1.125	0.107	0.187	1.273	0.000	940-01125
1.410	1.000	0.135	0.250	1.200	0.000	PWO-1000
1.420	1.187	0.160	0.160	1.270	0.000	PWB-1187
1.435	1.062	0.187	0.305	1.310	0.000	DU-01062
1.438	1.000	0.250	0.250	0.000	0.000	MCR-100143-250
1.459	1.187	0.107	0.187	1.335	0.000	940-01187
1.490	1.125	0.218	0.281	1.260	0.000	HU-01125
1.490	1.250	0.170	0.170	1.330	0.000	PWB-1250
1.497	1.125	0.187	0.305	1.370	0.000	DU-01125
1.500	0.750	0.110	0.375	1.094	0.000	GPH-0750
1.500	1.000	0.188	0.188	0.000	0.000	MCR-100150-187
1.500	1.000	0.208	0.350	1.250	0.000	PWS-1000
1.500	1.000	0.234	0.345	1.437	0.000	CSW-1000
1.500	1.000	0.312	0.312	0.000	0.000	MCU-100150-312
1.500	1.062	0.188	0.188	0.000	0.000	MCR-106150-187
1.500	1.125	0.187	0.188	0.000	0.000	MCR-112150-187
1.500	1.125	0.187	0.281	1.456	0.022	S34-1125
1.500	1.125	0.195	0.343	1.230	0.000	PWK-1125
1.500	1.250	0.125	0.125	0.000	0.000	MCR-125150-125
1.500	1.250	0.176	0.275	1.355	0.000	RWK-1250A





Rod Wipers  
Inserted, Encased & Metal

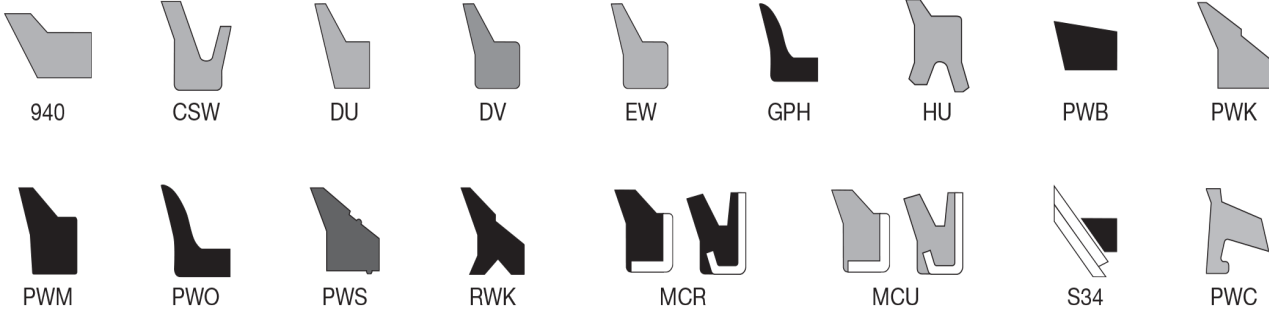
OD	ID	L1	L2	OD2	OD3	Product Name
1.522	1.250	0.107	0.187	1.398	0.000	940-01250V
1.523	1.250	0.107	0.187	1.398	0.000	940-01250
1.560	1.187	0.187	0.305	1.435	0.000	DU-01187
1.563	1.125	0.250	0.250	0.000	0.000	MCR-112156-250
1.614	1.312	0.107	0.187	1.480	0.000	940-01312
1.615	1.250	0.218	0.281	1.385	0.000	HU-01250
1.622	1.250	0.187	0.305	1.495	0.000	DU-01250
1.625	0.687	0.170	0.500	1.156	0.000	GPH-0687
1.625	1.125	0.208	0.350	1.375	0.000	PWS-1125
1.625	1.125	0.234	0.345	1.562	0.000	CSW-1125
1.625	1.125	0.250	0.250	0.000	0.000	MCR-112162-250
1.625	1.125	0.312	0.312	0.000	0.000	MCU-112162-312
1.625	1.187	0.250	0.250	0.000	0.000	MCU-118162-250
1.625	1.250	0.187	0.281	1.581	0.022	S34-1250
1.625	1.250	0.188	0.281	0.000	0.000	MCR-125162-187
1.625	1.250	0.195	0.343	1.355	0.000	PWK-1250
1.625	1.375	0.125	0.125	0.000	0.000	MCR-137162-125
1.625	1.375	0.170	0.170	1.460	0.000	PWB-1375
1.635	1.125	0.135	0.250	1.425	0.000	PWO-1125
1.650	1.500	0.100	0.110	0.000	0.000	PWB-0150165-110
1.677	1.375	0.107	0.187	1.542	0.000	940-01375
1.685	1.312	0.187	0.305	1.560	0.000	DU-01312
1.688	1.250	0.188	0.188	0.000	0.000	MCR-125168-187
1.720	1.500	0.100	0.110	0.000	0.000	PWB-0150172-110
1.739	1.437	0.107	0.187	1.605	0.000	940-01437
1.740	1.375	0.218	0.281	1.510	0.000	HU-01375
1.747	1.375	0.187	0.305	1.620	0.000	DU-01375
1.750	1.000	0.110	0.375	1.375	0.000	GPH-1000
1.750	1.250	0.208	0.350	1.500	0.000	PWS-1250
1.750	1.250	0.234	0.345	1.687	0.000	CSW-1250
1.750	1.250	0.250	0.250	0.000	0.000	MCU-125175-250



Rod Wipers  
Inserted, Encased & Metal

OD	ID	L1	L2	OD2	OD3	Product Name
1.750	1.250	0.312	0.312	0.000	0.000	MCU-125175-312
1.750	1.375	0.187	0.281	1.706	0.022	S34-1375V
1.750	1.375	0.187	0.281	1.706	0.022	S34-1375
1.750	1.375	0.188	0.188	0.000	0.000	MCR-137175-187
1.750	1.375	0.195	0.343	1.480	0.000	PWK-1375
1.750	1.500	0.176	0.275	1.605	0.000	PWK-1500A
1.760	1.250	0.135	0.375	1.550	0.000	PWO-1250
1.770	1.500	0.180	0.180	1.590	0.000	PWB-1500
1.802	1.500	0.107	0.187	1.668	0.000	940-01500
1.865	1.500	0.218	0.281	1.635	0.000	HU-01500
1.872	1.500	0.187	0.305	1.745	0.000	DU-01500
1.875	1.250	0.250	0.250	0.000	0.000	MCR-125187-250
1.875	1.375	0.208	0.350	1.625	0.000	PWS-1375
1.875	1.375	0.234	0.345	1.812	0.000	CSW-1375
1.875	1.375	0.250	0.250	0.000	0.000	MCR-137187-250
1.875	1.375	0.312	0.312	0.000	0.000	MCU-137187-312
1.875	1.500	0.187	0.281	1.831	0.022	S34-1500
1.875	1.500	0.188	0.188	0.000	0.000	MCR-150187-187
1.875	1.500	0.195	0.343	1.605	0.000	PWK-1500
1.875	1.500	0.250	0.250	0.000	0.000	MCR-150187-250
1.880	1.625	0.180	0.180	1.720	0.000	PWB-1625
1.885	1.375	0.135	0.375	1.675	0.000	PWO-1375
1.927	1.625	0.107	0.187	1.793	0.000	940-01625
1.960	1.687	0.190	0.190	1.780	0.000	PWB-1687
1.990	1.625	0.218	0.281	1.760	0.000	HU-01625
1.997	1.625	0.187	0.305	1.870	0.000	DU-01625
2.000	1.500	0.208	0.350	1.750	0.000	PWS-1500
2.000	1.500	0.234	0.345	1.937	0.000	CSW-1500
2.000	1.500	0.250	0.250	0.000	0.000	MCR-150200-250
2.000	1.500	0.312	0.312	0.000	0.000	MCU-150200-312
2.000	1.625	0.188	0.281	0.000	0.000	MCR-162200-187

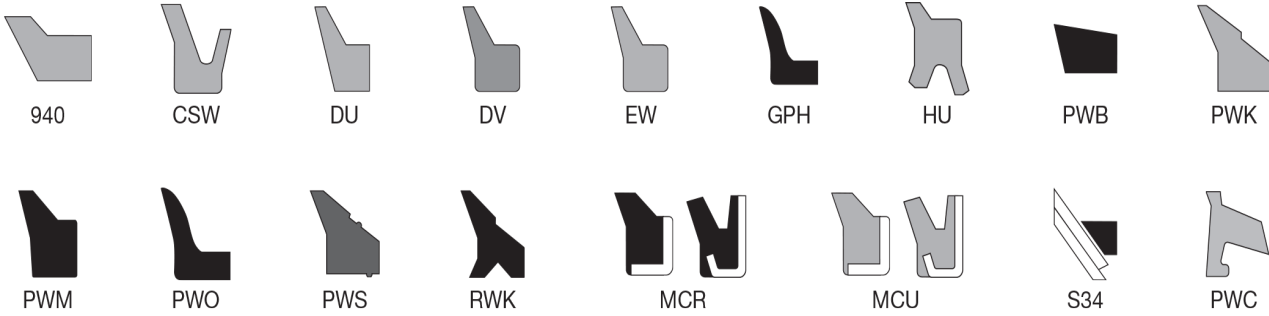




Rod Wipers  
Inserted, Encased & Metal

OD	ID	L1	L2	OD2	OD3	Product Name
2.000	1.625	0.195	0.343	1.730	0.000	PWK-1625
2.010	1.500	0.135	0.375	1.800	0.000	PWO-1500
2.030	1.750	0.190	0.190	1.850	0.000	PWB-1750
2.052	1.750	0.107	0.187	1.918	0.000	940-01750
2.062	1.250	0.375	0.375	0.000	0.000	MCU-125206-375
2.106	1.890	0.148	0.000	0.000	0.000	S34-1750C
2.115	1.750	0.218	0.281	1.885	0.000	HU-01750
2.122	1.750	0.187	0.305	1.995	0.000	DV-01750
2.122	1.750	0.187	0.305	1.995	0.000	DU-01750
2.125	1.500	0.312	0.312	0.000	0.000	MCU-150212-312
2.125	1.625	0.208	0.350	1.875	0.000	PWS-1625
2.125	1.625	0.234	0.345	2.062	0.000	CSW-1625
2.125	1.625	0.250	0.250	0.000	0.000	MCR-162212-250
2.125	1.625	0.312	0.312	0.000	0.000	MCU-162212-312
2.125	1.750	0.187	0.281	0.000	0.000	S34-1750V
2.125	1.750	0.187	0.281	2.081	0.022	S34-1750
2.125	1.750	0.187	0.281	2.082	0.000	S34-1750A
2.125	1.750	0.188	0.281	0.000	0.000	MCU-175212-187
2.125	1.750	0.195	0.343	1.855	0.000	RWK-1750
2.125	1.750	0.195	0.343	1.855	0.000	PWK-1750
2.125	2.000	0.156	0.156	0.000	0.000	PWB-2000E
2.125	2.625	0.312	0.312	0.000	0.000	MCU-212262-312
2.135	1.625	0.135	0.375	1.925	0.000	PWO-1625
2.160	1.875	0.190	0.190	1.970	0.000	PWB-1875
2.177	1.875	0.107	0.187	2.043	0.000	940-01875
2.237	2.000	0.250	0.250	0.000	0.000	MCU-200237-250
2.240	1.875	0.218	0.281	2.010	0.000	HU-01875
2.247	1.875	0.187	0.305	2.120	0.000	DU-01875
2.250	1.500	0.200	0.560	0.000	0.000	DU-0150225-200
2.250	1.500	0.375	0.375	0.000	0.000	MCU-150225-375
2.250	1.750	0.208	0.350	2.000	0.000	PWS-1750

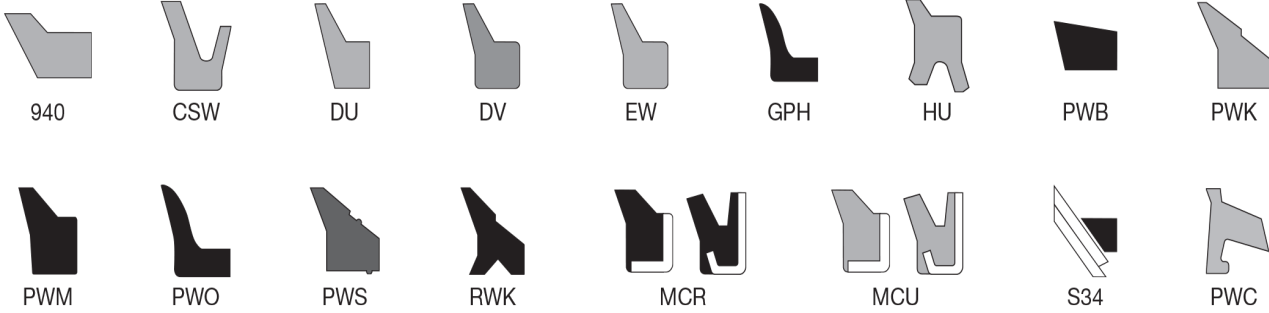




Rod Wipers  
Inserted, Encased & Metal

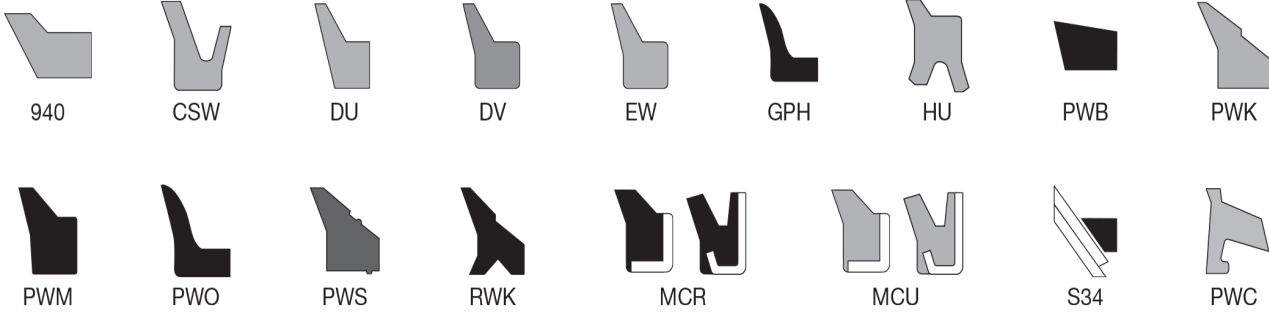
OD	ID	L1	L2	OD2	OD3	Product Name
2.250	1.750	0.234	0.345	2.187	0.000	CSW-1750
2.250	1.750	0.250	0.250	0.000	0.000	MCU-175225-250
2.250	1.750	0.312	0.312	0.000	0.000	MCU-175225-312
2.250	1.875	0.187	0.281	2.206	0.022	S34-1875
2.250	1.875	0.188	0.188	0.000	0.000	MCR-187225-187
2.250	1.875	0.195	0.343	1.980	0.000	RWK-1875
2.250	1.875	0.195	0.343	1.980	0.000	PWK-1875
2.250	2.000	0.176	0.275	2.105	0.000	PWK-2000A
2.260	1.750	0.135	0.375	2.050	0.000	PWO-1750
2.300	2.000	0.200	0.200	2.100	0.000	PWB-2000
2.302	2.000	0.107	0.187	2.178	0.000	940-02000
2.365	2.000	0.218	0.281	2.135	0.000	HU-02000
2.375	1.750	0.250	0.250	0.000	0.000	MCR-175237-250
2.375	1.875	0.135	0.375	0.000	0.000	PWO-1875
2.375	1.875	0.208	0.350	2.125	0.000	PWS-1875
2.375	1.875	0.234	0.345	2.312	0.000	CSW-1875
2.375	1.875	0.312	0.312	0.000	0.000	MCU-187237-312
2.375	2.000	0.188	0.188	0.000	0.000	MCR-200237-187
2.375	2.000	0.195	0.343	2.105	0.000	PWK-2000
2.427	2.125	0.107	0.187	2.303	0.000	940-02125
2.430	2.125	0.210	0.210	2.230	0.000	PWB-2125
2.437	1.750	0.375	0.375	0.000	0.000	MCU-175243-375
2.490	2.125	0.218	0.281	2.260	0.000	HU-02125
2.497	2.000	0.000	0.000	0.000	0.000	DH-02000
2.497	2.000	0.249	0.395	2.327	0.000	DU-02000
2.497	2.000	0.249	0.395	2.327	0.000	DV-02000
2.497	2.000	0.249	0.395	2.327	0.000	DU-02000
2.500	1.625	0.110	0.375	2.000	0.000	GPH-1625
2.500	1.750	0.375	0.375	0.000	0.000	MCU-175250-375
2.500	1.875	0.250	0.250	0.000	0.000	MCR-187250-250
2.500	2.000	0.208	0.350	2.250	0.000	PWS-2000





Rod Wipers  
Inserted, Encased & Metal

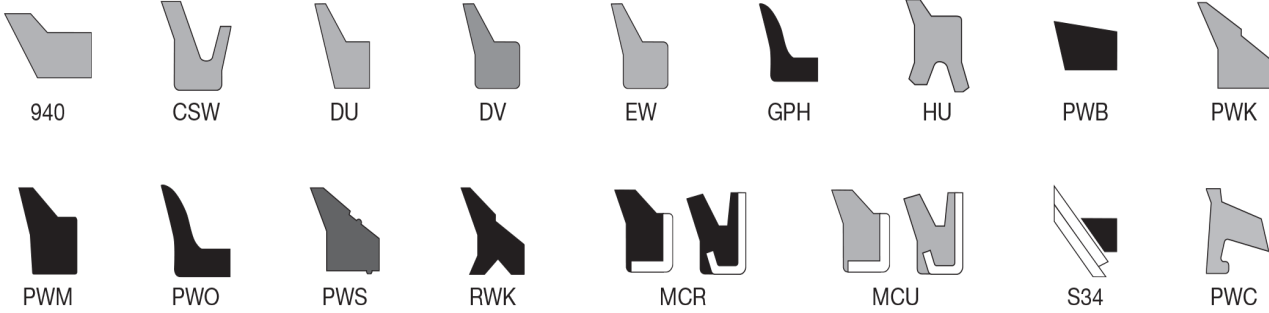
OD	ID	L1	L2	OD2	OD3	Product Name
2.500	2.000	0.234	0.345	2.437	0.000	CSW-2000
2.500	2.000	0.250	0.250	0.000	0.000	MCU-200250-250
2.500	2.000	0.250	0.375	2.440	0.030	S34-2000
2.500	2.000	0.312	0.312	0.000	0.000	MCU-200250-312
2.500	2.125	0.188	0.188	0.000	0.000	MCR-212250-187
2.500	2.125	0.195	0.343	2.207	0.000	PWK-2125
2.510	2.000	0.135	0.375	2.300	0.000	PWO-2000
2.552	2.250	0.107	0.187	2.428	0.000	940-02250
2.562	1.875	0.375	0.375	0.000	0.000	MCU-187256-375
2.570	2.250	0.210	0.210	2.360	0.000	PWB-2250
2.622	2.125	0.249	0.395	2.452	0.000	DU-02125
2.625	1.625	0.250	0.250	0.000	0.000	MCR-162262-250
2.625	1.750	0.250	0.250	0.000	0.000	MCR-175262-250
2.625	2.000	0.250	0.250	0.000	0.000	MCU-200262-250
2.625	2.125	0.208	0.350	2.375	0.000	PWS-2125
2.625	2.250	0.188	0.281	0.000	0.000	MCR-225262-187
2.625	2.250	0.250	0.250	0.000	0.000	MCR-225262-250
2.635	2.125	0.125	0.375	2.425	0.000	PWO-2125
2.640	2.125	0.255	0.468	2.315	0.000	RWK-2125
2.648	2.250	0.230	0.300	2.437	0.000	PWM-2250
2.677	2.375	0.107	0.187	2.553	0.000	940-02375
2.687	2.000	0.375	0.375	0.000	0.000	MCU-200268-375
2.700	2.375	0.220	0.220	2.490	0.000	PWB-2375
2.745	2.250	0.281	0.350	2.385	0.000	HU-02250
2.747	2.250	0.249	0.395	2.577	0.000	DV-02250
2.750	1.500	0.110	0.406	1.875	0.000	GPH-1500
2.750	1.750	0.170	0.437	2.215	0.000	GPH-1750
2.750	2.000	0.110	0.250	2.250	0.000	GPH-2000
2.750	2.000	0.250	0.250	0.000	0.000	MCR-200275-250
2.750	2.000	0.375	0.375	0.000	0.000	MCU-200275-375
2.750	2.250	0.125	0.135	0.000	0.000	PWO-2250



Rod Wipers  
Inserted, Encased & Metal

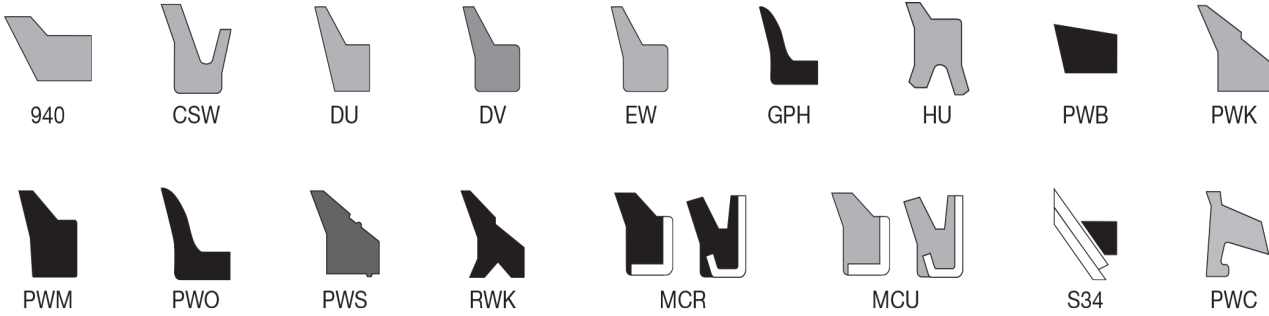
OD	ID	L1	L2	OD2	OD3	Product Name
2.750	2.250	0.234	0.345	2.687	0.000	CSW-2250
2.750	2.250	0.250	0.250	0.000	0.000	MCU-225275-250
2.750	2.250	0.250	0.375	2.690	0.030	S34-2250
2.750	2.250	0.312	0.312	0.000	0.000	MCU-225275-312
2.765	2.250	0.255	0.468	2.440	0.000	RWK-2250
2.765	2.250	0.255	0.468	2.440	0.000	PWK-2250
2.802	2.500	0.107	0.187	2.678	0.000	940-02500
2.812	2.400	0.250	0.250	2.500	0.000	PWB-2400
2.840	2.500	0.220	0.220	2.610	0.000	PWB-2500
2.872	2.375	0.249	0.395	2.702	0.000	DU-02375
2.875	2.125	0.375	0.375	0.000	0.000	MCU-212287-375
2.875	2.250	0.250	0.250	0.000	0.000	MCR-225287-250
2.875	2.375	0.250	0.375	2.815	0.030	S34-2375
2.875	2.375	0.312	0.312	0.000	0.000	MCU-237287-312
2.875	2.500	0.188	0.281	0.000	0.000	MCR-250287-187
2.875	2.500	0.195	0.343	2.685	0.000	PWK-2500A
2.890	2.375	0.255	0.468	2.565	0.000	RWK-2375
2.937	1.250	0.180	0.500	1.625	0.000	GPH-1250
2.970	2.625	0.230	0.230	2.740	0.000	PWB-2625
2.989	2.625	0.122	0.211	2.834	0.000	940-02625
2.995	2.500	0.281	0.350	2.635	0.000	HU-02500
2.997	2.500	0.249	0.395	2.827	0.000	DV-02500
2.997	2.500	0.249	0.395	2.827	0.000	DU-02500
3.000	2.250	0.250	0.250	0.000	0.000	MCU-225300-250
3.000	2.250	0.375	0.375	0.000	0.000	MCU-225300-375
3.000	2.500	0.208	0.350	2.750	0.000	PWS-2500
3.000	2.500	0.234	0.345	2.937	0.000	CSW-2500
3.000	2.500	0.250	0.375	0.000	0.000	S34-2500A
3.000	2.500	0.250	0.250	0.000	0.000	MCR-250300-250
3.000	2.500	0.250	0.375	2.940	0.030	S34-2500
3.000	2.500	0.312	0.312	0.000	0.000	MCU-250300-312





Rod Wipers  
Inserted, Encased & Metal

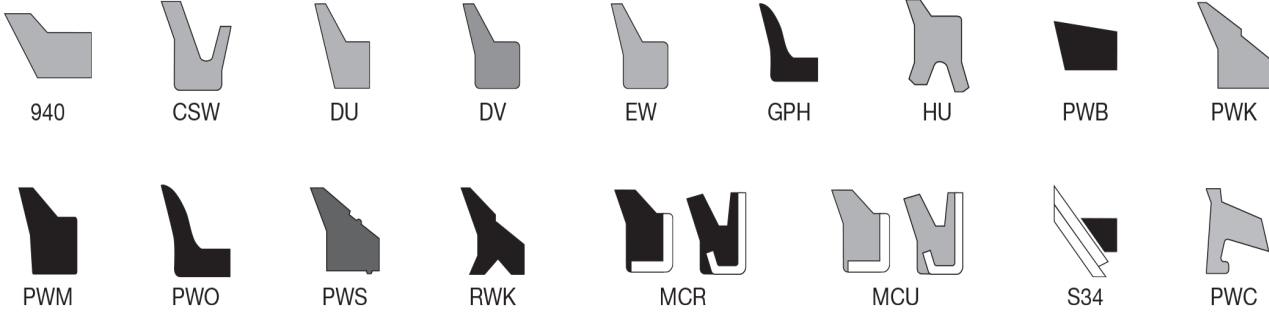
OD	ID	L1	L2	OD2	OD3	Product Name
3.010	2.500	0.135	0.375	2.800	0.000	PWO-2500
3.015	2.500	0.255	0.468	2.690	0.000	RWK-2500
3.015	2.500	0.255	0.468	2.690	0.000	PWK-2500
3.110	2.750	0.230	0.230	2.870	0.000	PWB-2750
3.114	2.750	0.122	0.211	2.959	0.000	940-02750
3.120	2.625	0.281	0.350	2.760	0.000	HU-02625
3.122	2.625	0.249	0.395	2.952	0.000	DU-02625
3.125	2.375	0.000	0.000	0.000	0.000	MCU-237312-437
3.125	2.375	0.375	0.375	0.000	0.000	MCU-237312-375
3.125	2.500	0.110	0.375	2.750	0.000	GPH-2500
3.125	2.500	0.250	0.250	0.000	0.000	MCR-250312-250
3.125	2.625	0.250	0.250	0.000	0.000	MCU-262312-250
3.125	2.625	0.312	0.312	0.000	0.000	MCU-262312-312
3.125	2.750	0.188	0.188	0.000	0.000	MCR-275312-187
3.140	2.625	0.255	0.468	2.815	0.000	RWK-2625
3.140	2.625	0.255	0.468	2.815	0.000	PWK-2625
3.187	2.500	0.375	0.375	0.000	0.000	MCU-250318-375
3.187	2.750	0.187	0.312	2.980	0.000	EW-2750
3.239	2.875	0.122	0.211	3.084	0.000	940-02875
3.245	2.750	0.281	0.350	2.885	0.000	HU-02750
3.247	2.750	0.249	0.395	3.077	0.000	DV-02750
3.247	2.750	0.249	0.395	3.077	0.000	DU-02750
3.250	2.250	0.110	0.375	2.625	0.000	GPH-2250
3.250	2.250	0.500	0.500	0.000	0.000	MCU-225325-500
3.250	2.500	0.250	0.250	0.000	0.000	MCU-250325-250
3.250	2.500	0.375	0.375	0.000	0.000	MCU-250325-375
3.250	2.750	0.208	0.350	3.000	0.000	PWS-2750
3.250	2.750	0.234	0.345	3.187	0.000	CSW-2750
3.250	2.750	0.250	0.250	0.000	0.000	MCR-275325-250
3.250	2.750	0.312	0.312	0.000	0.000	MCU-275325-312
3.260	2.750	0.135	0.375	3.050	0.000	PWO-2750



**Rod Wipers**  
Inserted, Encased & Metal

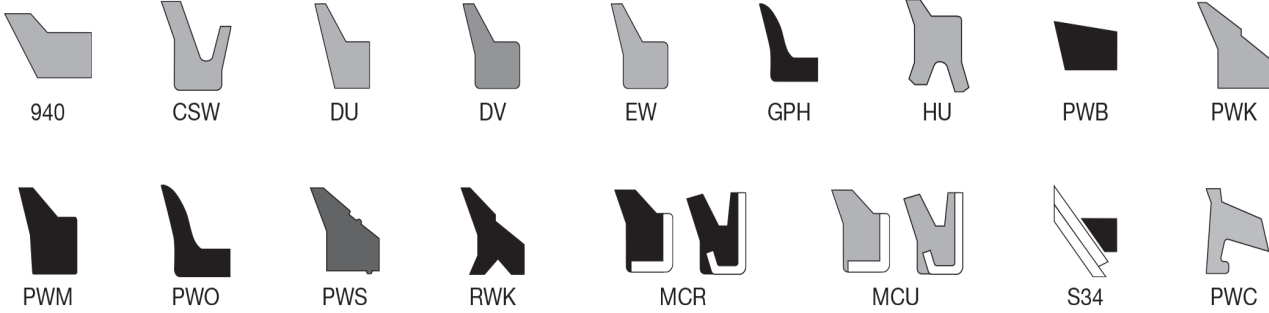
OD	ID	L1	L2	OD2	OD3	Product Name
3.265	2.750	0.255	0.468	2.940	0.000	PWK-2750
3.265	2.750	0.468	0.000	2.940	0.000	RWK-2750
3.364	3.000	0.122	0.211	3.209	0.000	940-03000
3.372	2.875	0.249	0.395	3.202	0.000	DU-02875
3.375	2.875	0.250	0.375	3.315	0.030	S34-2875
3.375	3.000	0.188	0.281	0.000	0.000	MCR-300337-187
3.380	3.000	0.240	0.240	3.130	0.000	PWB-3000
3.398	3.000	0.230	0.300	3.187	0.000	PWM-3000
3.400	3.400	0.236	0.345	3.853	0.000	CSW-3400
3.489	3.125	0.122	0.211	3.334	0.000	940-03125
3.495	3.000	0.281	0.350	3.135	0.000	HU-03000
3.497	3.000	0.249	0.395	3.327	0.000	DU-03000
3.500	2.750	0.375	0.375	0.000	0.000	MCU-275350-375
3.500	2.750	0.500	0.000	0.000	0.000	MCU-275350-500
3.500	3.000	0.187	0.312	3.278	0.000	EW-3000
3.500	3.000	0.208	0.350	3.250	0.000	PWS-3000
3.500	3.000	0.234	0.345	3.437	0.000	CSW-3000
3.500	3.000	0.250	0.250	0.000	0.000	MCR-300350-250
3.500	3.000	0.250	0.375	3.440	0.030	S34-3000
3.500	3.000	0.312	0.312	0.000	0.000	MCU-300350-312
3.500	3.125	0.250	0.250	3.260	0.000	PWB-3125
3.510	3.000	0.135	0.375	3.300	0.000	PWO-3000
3.515	3.000	0.255	0.468	3.190	0.000	PWK-3000
3.614	3.250	0.122	0.211	3.459	0.000	940-03250
3.622	3.125	0.249	0.395	3.452	0.000	DU-03125
3.625	3.125	0.250	0.250	0.000	0.000	MCU-312362-250
3.625	3.250	0.281	0.281	0.000	0.000	MCU-325362-281
3.640	3.125	0.255	0.468	3.315	0.000	RWK-3125
3.650	3.250	0.250	0.250	3.390	0.000	PWB-3250
3.739	3.375	0.122	0.211	3.584	0.000	940-03375
3.745	3.250	0.281	0.350	3.385	0.000	HU-03250





Rod Wipers  
Inserted, Encased & Metal

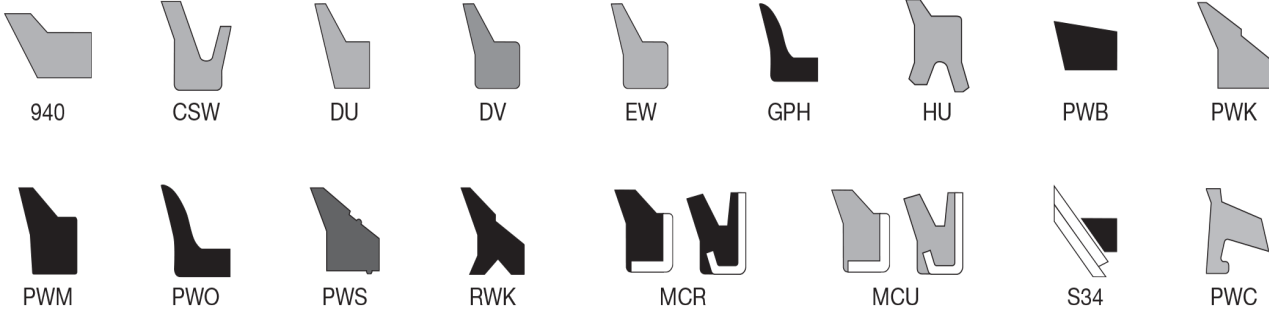
OD	ID	L1	L2	OD2	OD3	Product Name
3.747	3.250	0.249	0.395	3.577	0.000	DU-03250
3.750	2.750	0.110	0.375	3.125	0.000	GPH-2750
3.750	2.750	0.375	0.375	0.000	0.000	MCR-275375-375
3.750	2.750	0.500	0.500	0.000	0.000	MCU-275375-500
3.750	3.000	0.250	0.250	0.000	0.000	MCU-300375-250
3.750	3.000	0.250	0.250	0.000	0.000	MCR-300375-250
3.750	3.000	0.375	0.375	0.000	0.000	MCU-300375-375
3.750	3.125	0.375	0.375	0.000	0.000	MCU-312375-375
3.750	3.250	0.208	0.350	3.500	0.000	PWS-3250
3.750	3.250	0.234	0.345	3.687	0.000	CSW-3250
3.750	3.250	0.250	0.375	3.690	0.030	S34-3250
3.750	3.250	0.312	0.312	0.000	0.000	MCU-325375-312
3.765	3.250	0.255	0.468	3.440	0.000	RWK-3250
3.765	3.250	0.255	0.468	3.440	0.000	PWK-3250
3.780	3.375	0.260	0.260	3.510	0.000	PWB-3375
3.812	3.400	0.250	0.250	3.500	0.000	PWB-3400
3.864	3.500	0.122	0.211	3.709	0.000	940-03500
3.872	3.375	0.249	0.395	3.702	0.000	DU-03375
3.875	2.875	0.110	0.375	3.250	0.000	GPH-2875
3.875	3.250	0.312	0.312	0.000	0.000	MCU-325387-312
3.875	3.375	0.208	0.350	3.625	0.000	PWS-3375
3.890	3.375	0.255	0.468	3.565	0.000	PWK-3375
3.920	3.500	0.270	0.270	3.640	0.000	PWB-3500
3.989	3.625	0.122	0.211	3.834	0.000	940-03625
3.995	3.500	0.281	0.350	3.635	0.000	HU-03500
3.997	3.500	0.249	0.395	3.827	0.000	DU-03500
4.000	3.000	0.500	0.500	0.000	0.000	MCU-300400-500
4.000	3.250	0.250	0.250	0.000	0.000	MCU-325400-250
4.000	3.375	0.312	0.312	0.000	0.000	MCU-337400-312
4.000	3.500	0.208	0.350	3.750	0.000	PWS-3500
4.000	3.500	0.234	0.345	3.937	0.000	CSW-3500



Rod Wipers  
Inserted, Encased & Metal

OD	ID	L1	L2	OD2	OD3	Product Name
4.000	3.500	0.250	0.250	0.000	0.000	MCR-350400-250
4.000	3.500	0.250	0.375	3.940	0.030	S34-3500
4.000	3.500	0.312	0.312	0.000	0.000	MCU-350400-312
4.008	3.500	0.295	0.450	3.750	0.000	PWM-3500
4.010	3.250	0.197	0.500	3.650	0.000	PWO-3250
4.015	3.500	0.255	0.468	3.690	0.000	RWK-3500
4.015	3.500	0.255	0.468	3.690	0.000	PWK-3500
4.050	3.625	0.270	0.270	3.770	0.000	PWB-3625
4.062	3.500	0.187	0.312	3.850	0.000	EW-3500
4.114	3.750	0.122	0.211	3.959	0.000	940-03750
4.122	3.625	0.249	0.395	3.952	0.000	DU-03625
4.125	3.500	0.312	0.312	0.000	0.000	MCU-350412-312
4.125	3.625	0.208	0.350	3.875	0.000	PWS-3625
4.140	3.625	0.255	0.468	3.815	0.000	PWK-3625
4.187	3.625	0.187	0.312	3.950	0.000	EW-3625
4.239	3.875	0.122	0.211	4.084	0.000	940-03875
4.245	3.750	0.281	0.350	3.885	0.000	HU-03750
4.247	3.750	0.249	0.395	4.077	0.000	DU-03750
4.250	3.250	0.110	0.375	3.625	0.000	GPH-3250
4.250	3.250	0.500	0.500	0.000	0.000	MCU-325425-500
4.250	3.500	0.312	0.312	0.000	0.000	MCU-350425-312
4.250	3.750	0.234	0.345	4.187	0.000	CSW-3750
4.250	3.750	0.312	0.312	0.000	0.000	MCU-375425-312
4.260	3.500	0.197	0.500	3.900	0.000	PWO-3500
4.265	3.750	0.255	0.468	3.940	0.000	PWK-3750
4.372	3.875	0.249	0.395	4.202	0.000	DU-03875
4.375	3.375	0.375	0.375	0.000	0.000	MCU-337437-375
4.375	3.750	0.312	0.312	0.000	0.000	MCU-375437-312
4.427	4.000	0.138	0.238	4.240	0.000	940-04000
4.460	4.000	0.290	0.290	4.160	0.000	PWB-4000
4.465	4.250	0.150	0.150	4.330	0.000	PWB-4250A

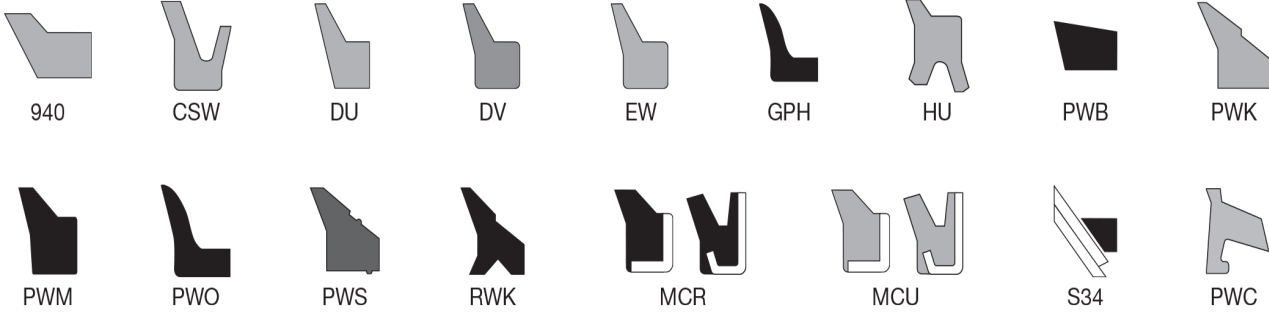




Rod Wipers  
Inserted, Encased & Metal

OD	ID	L1	L2	OD2	OD3	Product Name
4.495	4.000	0.281	0.350	4.135	0.000	HU-04000
4.497	4.000	0.249	0.395	4.327	0.000	DV-04000
4.497	4.000	0.249	0.395	4.327	0.000	DU-04000
4.500	3.000	0.110	0.625	3.375	0.000	GPH-3000
4.500	3.500	0.500	0.500	0.000	0.000	MCU-350450-500
4.500	3.750	0.312	0.312	0.000	0.000	MCU-375450-312
4.500	4.000	0.208	0.350	4.250	0.000	PWS-4000
4.500	4.000	0.234	0.345	4.375	0.000	CSW-4000
4.500	4.000	0.250	0.250	0.000	0.000	MCR-400450-250
4.500	4.000	0.250	0.375	4.440	0.030	S34-4000
4.508	4.000	0.295	0.450	4.250	0.000	PWM-4000
4.510	3.750	0.187	0.500	4.150	0.000	PWO-3750
4.515	4.000	0.255	0.468	4.190	0.000	RWK-4000
4.515	4.000	0.255	0.468	4.190	0.000	PWK-4000
4.552	4.125	0.138	0.238	4.365	0.000	940-04125
4.622	4.125	0.249	0.395	4.452	0.000	DU-04125
4.625	4.000	0.312	0.312	0.000	0.000	MCU-400462-312
4.677	4.250	0.138	0.238	4.490	0.000	940-04250
4.730	4.250	0.300	0.300	4.410	0.000	PWB-4250
4.745	4.250	0.281	0.350	4.385	0.000	HU-04250
4.747	4.250	0.249	0.395	4.577	0.000	DU-04250
4.750	3.750	0.500	0.500	0.000	0.000	MCU-375475-500
4.750	4.000	0.312	0.312	0.000	0.000	MCU-400475-312
4.750	4.250	0.187	0.187	0.000	0.000	MCU-425475-187
4.750	4.250	0.208	0.350	4.500	0.000	PWS-4250
4.750	4.250	0.312	0.312	0.000	0.000	MCU-425475-312
4.760	4.000	0.197	0.500	4.400	0.000	PWO-4000
4.765	4.250	0.255	0.468	4.440	0.000	PWK-4250
4.802	4.375	0.138	0.238	4.615	0.000	940-04375
4.812	4.400	0.250	0.250	4.500	0.000	PWB-4400
4.872	4.375	0.249	0.395	4.702	0.000	DU-04375

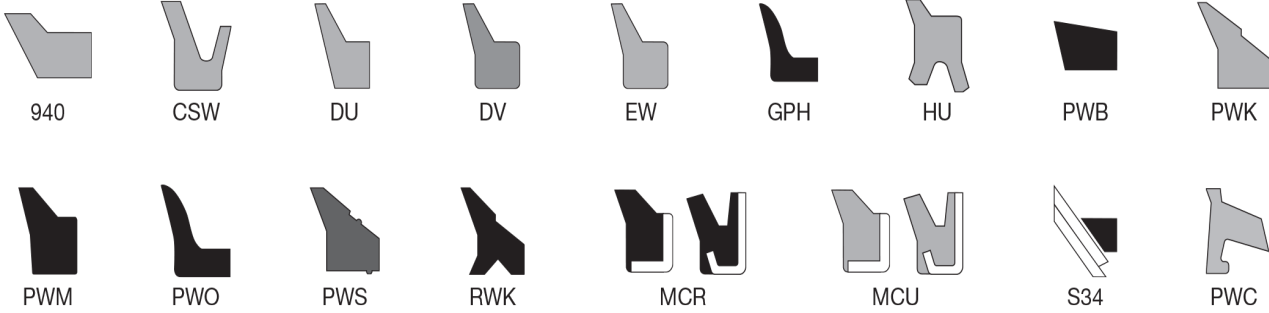




Rod Wipers  
Inserted, Encased & Metal

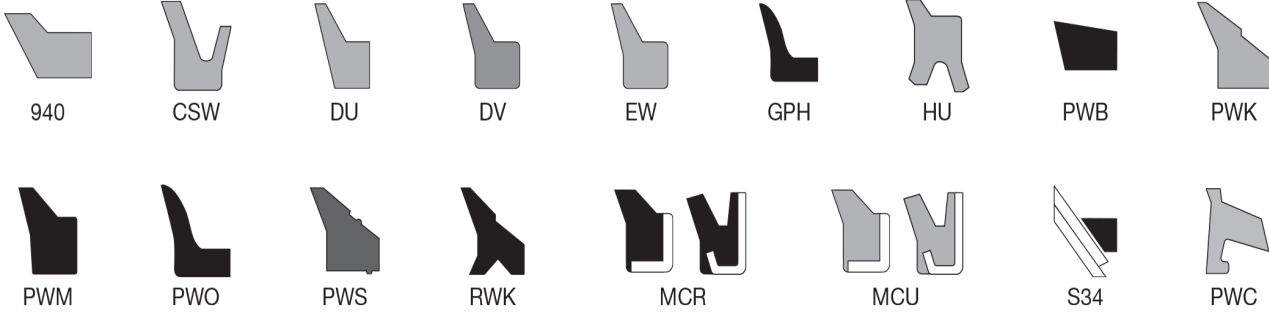
OD	ID	L1	L2	OD2	OD3	Product Name
4.875	3.750	0.170	0.469	4.125	0.000	GPH-3750
4.875	4.250	0.312	0.312	0.000	0.000	MCU-425487-312
4.875	4.375	0.208	0.350	4.625	0.000	PWS-4375
4.875	5.302	0.138	0.238	5.115	0.000	940-04875
4.883	4.375	0.295	0.450	4.625	0.000	PWM-4375
4.890	4.375	0.250	0.468	4.565	0.000	RWK-4375
4.908	4.375	0.187	0.312	4.697	0.000	EW-4375
4.912	4.400	0.236	0.345	4.853	0.000	CSW-4400
4.927	4.500	0.138	0.238	4.740	0.000	940-04500
4.995	4.500	0.281	0.350	4.635	0.000	HU-04500
5.000	4.000	0.110	0.500	4.375	0.000	GPH-4000
5.000	4.000	0.500	0.500	0.000	0.000	MCU-400500-500
5.000	4.250	0.000	0.000	0.000	0.000	MCU-425500-500
5.000	4.375	0.312	0.312	0.000	0.000	MCU-437500-312
5.000	4.500	0.208	0.350	4.750	0.000	PWS-4500
5.000	4.500	0.235	0.345	4.937	0.000	CSW-4500
5.000	4.500	0.250	0.000	0.000	0.000	MCU-450500-250
5.000	4.500	0.310	0.310	4.670	0.000	PWB-4500
5.015	4.500	0.255	0.468	4.690	0.000	RWK-4500
5.015	4.500	0.255	0.468	4.690	0.000	PWK-4500
5.052	4.625	0.138	0.238	4.865	0.000	940-04625
5.125	4.500	0.312	0.312	0.000	0.000	MCU-450512-312
5.125	4.625	0.208	0.350	4.875	0.000	PWS-4625
5.125	4.750	0.187	0.250	4.937	0.000	940-04750A
5.177	4.750	0.138	0.238	4.990	0.000	940-04750
5.245	4.750	0.281	0.350	4.885	0.000	HU-04750
5.247	4.500	0.374	0.585	4.993	0.000	DU-04500
5.250	3.500	0.170	0.500	3.875	0.000	GPH-3500
5.250	4.250	0.500	0.500	0.000	0.000	MCU-425525-500
5.250	4.500	0.312	0.312	0.000	0.000	MCU-450525-312
5.250	4.500	0.375	0.562	5.160	0.045	S34-4500





Rod Wipers  
Inserted, Encased & Metal

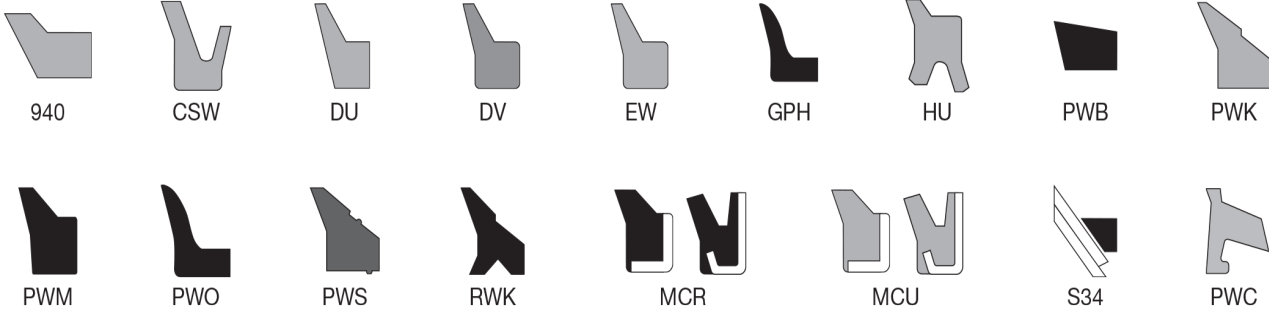
OD	ID	L1	L2	OD2	OD3	Product Name
5.250	4.750	0.208	0.350	5.000	0.000	PWS-4750
5.260	4.500	0.197	0.500	4.900	0.000	PWO-4500
5.265	4.750	0.255	0.468	4.940	0.000	PWK-4750
5.312	4.500	0.190	0.500	4.875	0.000	GPH-4500
5.375	4.750	0.312	0.312	0.000	0.000	MCU-475537-312
5.427	5.000	0.138	0.238	5.240	0.000	940-05000
5.495	5.000	0.281	0.350	5.135	0.000	HU-05000
5.497	4.750	0.374	0.585	5.243	0.000	DU-04750
5.500	4.500	0.500	0.500	0.000	0.000	MCU-450550-500
5.500	5.000	0.234	0.345	5.375	0.000	CSW-5000
5.515	5.000	0.255	0.468	5.190	0.000	PWK-5000
5.552	5.125	0.138	0.238	5.365	0.000	940-05125
5.625	5.000	0.312	0.312	0.000	0.000	MCU-500562-312
5.677	5.250	0.138	0.238	5.490	0.000	940-05250
5.747	5.000	0.374	0.585	5.493	0.000	DU-05000
5.750	4.750	0.500	0.500	0.000	0.000	MCU-475575-500
5.750	5.000	0.187	0.500	5.400	0.000	PWO-5000
5.750	5.000	0.312	0.312	0.000	0.000	MCU-500575-312
5.750	5.000	0.375	0.562	5.660	0.045	S34-5000
5.750	5.250	0.312	0.312	0.000	0.000	MCU-525575-312
5.765	5.250	0.255	0.468	5.440	0.000	PWK-5250
5.802	5.375	0.138	0.238	5.615	0.000	940-05375
5.810	5.250	0.340	0.340	5.440	0.000	PWB-5250
5.812	5.400	0.250	0.250	5.500	0.000	PWB-5400
5.844	5.250	0.187	0.312	5.602	0.000	EW-5250
5.872	5.125	0.374	0.585	5.618	0.000	DU-05125
5.875	5.375	0.208	0.350	5.625	0.000	PWS-5375
5.890	5.375	0.255	0.468	5.565	0.000	RWK-5375
5.912	5.400	0.236	0.345	5.853	0.000	CSW-5400
5.927	5.500	0.138	0.238	5.740	0.000	940-05500
5.995	5.500	0.281	0.350	5.635	0.000	HU-05500



Rod Wipers  
Inserted, Encased & Metal

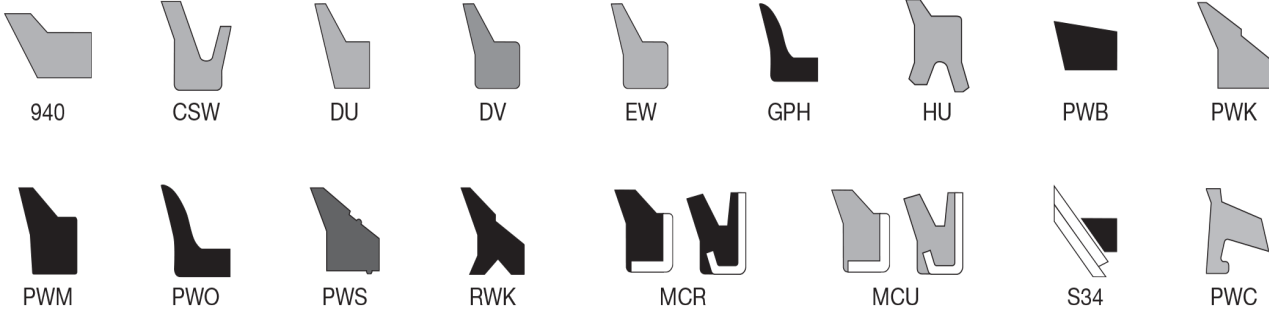
OD	ID	L1	L2	OD2	OD3	Product Name
5.997	5.250	0.374	0.585	5.743	0.000	DU-05250
6.000	5.000	0.230	0.625	5.375	0.000	GPH-5000
6.000	5.000	0.500	0.500	0.000	0.000	MCU-500600-500
6.000	5.250	0.312	0.312	0.000	0.000	MCU-525600-312
6.015	5.500	0.255	0.468	5.690	0.000	RWK-5500
6.015	5.500	0.255	0.468	5.690	0.000	PWK-5500
6.080	5.500	0.350	0.350	5.700	0.000	PWB-5500
6.114	5.625	0.154	0.264	5.896	0.000	940-05625
6.122	5.375	0.374	0.585	5.868	0.000	DU-05375
6.125	5.500	0.375	0.375	0.000	0.000	MCU-550612-375
6.125	5.750	0.187	0.281	0.000	0.000	940-05750A
6.239	5.750	0.154	0.264	6.022	0.000	940-05750
6.247	5.500	0.374	0.585	5.993	0.000	DU-05500
6.250	5.500	0.187	0.500	5.900	0.000	PWO-5500
6.250	5.500	0.312	0.312	0.000	0.000	MCU-550625-312
6.375	5.750	0.375	0.375	0.000	0.000	MCU-575637-375
6.489	6.000	0.154	0.264	6.272	0.000	940-06000
6.495	6.000	0.281	0.350	6.135	0.000	HU-06000
6.497	5.750	0.374	0.585	6.243	0.000	DU-05750
6.500	5.500	0.170	0.500	5.875	0.000	GPH-5500
6.500	5.500	0.555	0.555	0.000	0.000	MCU-550650-555
6.500	5.750	0.187	0.500	0.000	0.000	PWO-5750
6.515	6.000	0.255	0.468	6.190	0.000	RWK-6000
6.515	6.000	0.255	0.468	6.190	0.000	PWK-6000
6.620	6.000	0.380	0.380	6.210	0.000	PWB-6000
6.625	6.000	0.234	0.345	6.562	0.000	CSW-6000
6.625	6.000	0.375	0.375	0.000	0.000	MCU-600662-375
6.739	6.250	0.154	0.264	6.522	0.000	940-06250
6.747	6.000	0.374	0.585	6.493	0.000	DU-06000
6.750	5.750	0.500	0.500	0.000	0.000	MCU-575675-500
6.750	6.000	0.187	0.500	6.400	0.000	PWO-6000





Rod Wipers  
Inserted, Encased & Metal

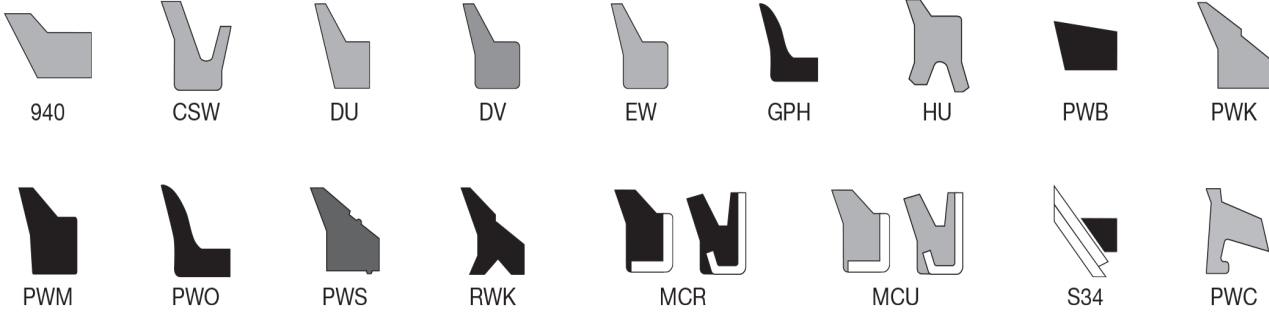
OD	ID	L1	L2	OD2	OD3	Product Name
6.750	6.000	0.375	0.375	0.000	0.000	MCU-600675-375
6.750	6.000	0.375	0.562	6.660	0.045	S34-6000
6.750	6.250	0.312	0.312	0.000	0.000	MCU-625675-312
6.812	6.400	0.250	0.250	6.500	0.000	PWB-6400
6.906	6.312	0.187	0.312	6.665	0.000	EW-6312
6.912	6.400	0.236	0.345	6.853	0.000	CSW-6400
6.989	6.500	0.154	0.264	6.772	0.000	940-06500
6.997	6.250	0.374	0.585	6.743	0.000	DU-06250
7.000	6.000	0.230	0.625	6.375	0.000	GPH-6000
7.000	6.000	0.500	0.500	0.000	0.000	MCU-600700-500
7.125	6.500	0.234	0.345	7.062	0.000	CSW-6500
7.239	6.750	0.154	0.264	7.022	0.000	940-06750
7.247	6.500	0.374	0.585	6.993	0.000	DU-06500
7.250	6.500	0.312	0.312	0.000	0.000	MCU-650725-312
7.295	6.625	0.405	0.405	6.850	0.000	PWB-6625
7.375	6.750	0.375	0.375	0.000	0.000	MCU-675737-375
7.489	7.000	0.154	0.264	7.272	0.000	940-07000
7.495	7.000	0.281	0.350	7.135	0.000	HU-07000
7.497	6.750	0.374	0.585	7.243	0.000	DU-06750
7.500	6.500	0.625	0.625	0.000	0.000	MCU-650750-625
7.739	7.250	0.154	0.264	7.522	0.000	940-07250
7.747	7.000	0.374	0.585	7.493	0.000	DU-07000
7.750	6.750	0.500	0.500	0.000	0.000	MCU-675775-555
7.750	7.000	0.312	0.312	0.000	0.000	MCU-700775-312
7.906	7.312	0.187	0.312	7.665	0.000	EW-7312
7.912	7.400	0.236	0.345	7.853	0.000	CSW-7400
7.912	7.500	0.250	0.250	7.600	0.000	PWB-7500
7.989	7.500	0.154	0.264	7.772	0.000	940-07500
7.997	7.250	0.374	0.585	7.743	0.000	DU-07250
8.000	7.000	0.250	0.625	0.000	0.000	PWO-7000
8.000	7.000	0.500	0.750	7.600	0.000	DU-07000A



Rod Wipers  
Inserted, Encased & Metal

OD	ID	L1	L2	OD2	OD3	Product Name
8.000	8.500	0.250	0.000	0.000	0.000	940-08000A
8.012	7.500	0.236	0.345	7.953	0.000	CSW-7500
8.239	7.750	0.154	0.264	8.022	0.000	940-07750
8.247	7.500	0.374	0.585	7.993	0.000	DU-07500
8.250	7.250	0.500	0.500	0.000	0.000	MCU-725825-500
8.489	8.000	0.154	0.264	8.272	0.000	940-08000
8.495	8.000	0.281	0.350	8.135	0.000	HU-08000
8.497	7.750	0.374	0.585	8.243	0.000	DU-07750
8.500	7.500	0.250	0.625	8.000	0.000	PWO-7500
8.515	8.000	0.255	0.468	0.000	0.000	RWK-8000
8.630	8.125	0.255	0.468	8.315	0.000	PWK-8125
8.747	8.000	0.374	0.585	8.493	0.000	DU-08000
8.750	8.000	0.375	0.375	0.000	0.000	MCU-800875-375
8.969	8.375	0.187	0.312	8.665	0.000	EW-8375
8.989	8.500	0.154	0.264	8.772	0.000	940-08500
8.997	8.250	0.374	0.585	8.743	0.000	DU-08250
9.000	8.000	0.250	0.625	8.500	0.000	PWO-8000
9.000	8.000	0.550	0.550	0.000	0.000	MCU-800900-550
9.000	8.500	0.250	0.000	0.000	0.000	940-08500A
9.247	8.500	0.374	0.585	8.993	0.000	DU-08500
9.489	9.000	0.154	0.264	9.272	0.000	940-09000
9.497	8.750	0.374	0.585	9.243	0.000	DU-08750
9.747	9.000	0.374	0.585	9.493	0.000	DU-09000
9.989	9.500	0.154	0.264	9.772	0.000	940-09500
9.997	9.250	0.374	0.585	9.743	0.000	DU-09250
10.247	9.500	0.374	0.585	9.993	0.000	DU-09500
10.489	10.000	0.154	0.264	10.272	0.000	940-10000
10.497	9.750	0.374	0.585	10.243	0.000	DU-09750
10.500	10.000	0.250	0.375	10.272	0.000	940-10000A
10.989	10.500	0.154	0.264	10.772	0.000	940-10500
10.997	10.000	0.499	0.775	10.659	0.000	DU-10000





Rod Wipers  
Inserted, Encased & Metal

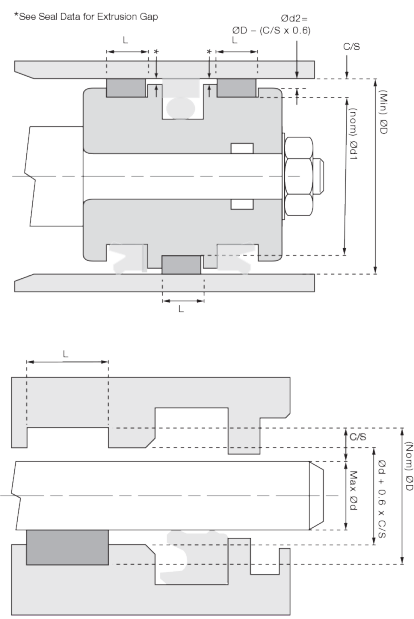
OD	ID	L1	L2	OD2	OD3	Product Name
11.489	11.000	0.154	0.264	11.272	0.000	940-11000
11.500	10.500	0.500	0.775	11.159	0.000	DU-10500
11.989	11.500	0.169	0.289	11.772	0.000	940-11500
11.997	11.000	0.499	0.775	11.659	0.000	DU-11000
11.997	11.500	0.499	0.775	12.159	0.000	DU-11500
12.000	11.000	0.550	0.550	0.000	0.000	MCU-1100120-550
12.997	12.000	0.499	0.775	12.659	0.000	DU-12000
13.497	12.500	0.499	0.775	13.159	0.000	DU-12500
13.500	12.500	0.550	0.550	0.000	0.000	MCU-1250135-550
15.355	14.000	0.750	0.750	0.000	0.000	PWB-14000
18.997	18.000	0.499	0.775	18.659	0.000	DU-18000





### Key Features

- Precision ground tolerances
- Superior material properties
- Economical bearing solution
- Easy to fit
- Provides improved alignment
- Can extend seal life



# B1

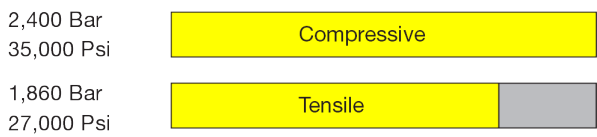
## Bearing

### Design

B1 non-metallic bearing rings are designed for both piston and gland applications. Made from heat stabilised 40% long fibre glass reinforced Nylon, precision ground inside and outside diameters provide for tighter precise tolerances and flat sided rectangular cross section. (eliminates the dog-bone effect that nett moulded bearings produce). The use of bearing rings will help provide better piston and rod alignment therefore avoiding metal-to-metal contact. This will result in longer lasting cylinder parts and extended seal life as some of the contaminates will embed into the softer bearing ring. They are generally of relatively low cost.

### Operating Conditions

#### Strength



#### Dynamic Load



#### Temperature



#### Speed



#### Surface Finish µmRa

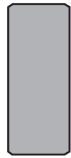
ØD	Ød	L
0.1-0.25	0.8	2.0

#### Tolerances

Piston	Ød = minØD - 2x c/s	H11
Rod	ØD = maxØd + 2x c/s	f9
L	+0.005/+ 0.010	

#### Chamfer Radii

r	0.016 max
---	-----------



# GT



## Bearing

### Design


GT strip is designed for use with glide ring type piston and rod seals. Made from Bronze filled PTFE, the strip allows contaminate particles to embed in the non working surface helping to keep the main seal and cylinder bore/rod free from scoring. The bearing strip allows pressure relief which avoids the possibility of a pressure lock between the seal and the bearing as well as eliminating the possibility of hydrodynamic pressure build up. This relief also avoids the presence of excess pressure during the return stroke which can prevent the transfer of the fluid film back to the pressure side of the seal, so creating the effect of a leaking seal.

### Operating Conditions

#### Strength

115 Bar 1,700 Psi		Compressive
125 Bar 1,800 Psi		Tensile

#### Dynamic Load

15N/mm <sup>2</sup> @ 25°C Max	
-----------------------------------	--

#### Temperature

-50° - 200°C -58° - 392°F	
------------------------------	--

#### Speed

5.0m/sec 15.0'/sec	
-----------------------	--

#### Surface Finish µmRa

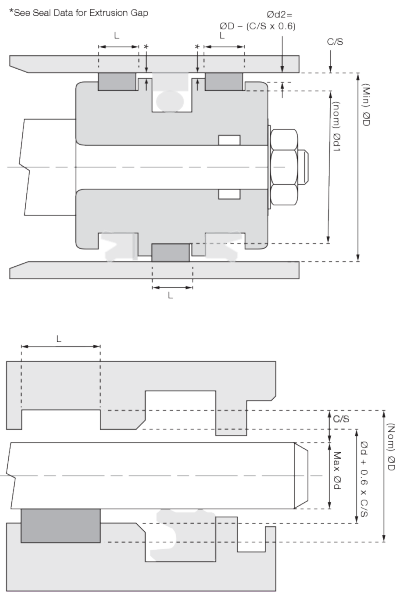
Dynamic	0.1 – 0.25	Optimum
Dynamic	0.1 – 0.4	Range
Static	≤2.6	

#### Tolerances

Piston	Ød = minØD – 2x c/s	h11
Rod	ØD = maxØd + 2x c/s	H11
L	-0.0 + 0.2	

## Key Features

- Medium duty
- One piece piston
- Relatively compact
- Easy assembly
- Medium / high pressure capability

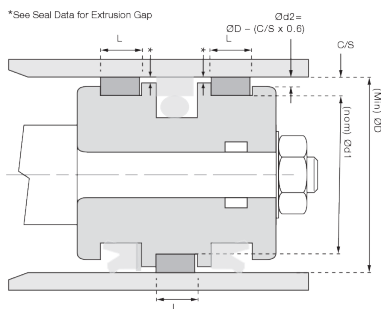






## Key Features

- Light duty
- Allow steel pistons / glands
- Economical to replace
- Easy to fit
- Provides improved alignment
- Longer seal life



# B5

## Bearing

### Design

B5 non-metallic bearing rings, with scallops to the outside diameter, are designed for piston only applications. The use of bearing rings will help provide better piston alignment therefore avoiding metal-to-metal contact.

### Operating Conditions

#### Strength

Replacement part only

#### Dynamic Load

Replacement part only

#### Temperature

Replacement part only

#### Speed

Replacement part only

#### Surface Finish $\mu\text{mRa}$

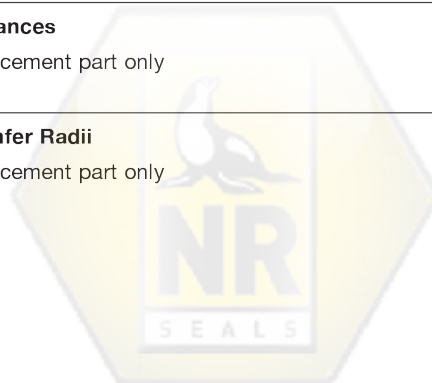
Replacement part only

#### Tolerances

Replacement part only

#### Chamfer Radii

Replacement part only





B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
1.000	0.750	0.000	0.000	0.000	0.000	B8-0100075-037
1.000	0.812	0.250	0.000	0.000	0.000	B5-0100081-025
1.250	1.000	0.375	0.000	0.000	0.000	B1-0125100-037
1.250	1.000	0.500	0.000	0.000	0.000	B1-0125100-050
1.250	1.000	1.000	0.000	0.000	0.000	B1-0125100-100
1.250	1.062	0.250	0.000	0.000	0.000	B5-0125106-025
1.375	1.187	0.250	0.000	0.000	0.000	B5-0137118-025
1.375	1.250	0.750	0.000	0.000	0.000	B1-0137125-075
1.500	1.250	0.250	0.000	0.000	0.000	B1-0150125-025
1.500	1.250	0.375	0.000	0.000	0.000	B1-0150125-037
1.500	1.250	0.500	0.000	0.000	0.000	B1-0150125-050
1.500	1.250	0.750	0.000	0.000	0.000	B1-0150125-075
1.500	1.312	0.375	0.000	0.000	0.000	B5-0150131-037
1.500	1.321	0.250	0.000	0.000	0.000	B5-0150132-025
1.625	1.375	0.375	0.000	0.000	0.000	B1-0162137-037
1.625	1.375	0.500	0.000	0.000	0.000	B1-0162137-050
1.625	1.436	0.375	0.000	0.000	0.000	B5-0162143-037
1.625	1.500	0.980	0.000	0.000	0.000	B1-0162150-098
1.625	1.500	1.250	0.000	0.000	0.000	B1-0162150-125
1.656	1.500	0.625	0.000	165,150.000	0.000	B1-0165150-062
1.750	1.500	0.000	0.000	0.000	0.000	B1-0175150-025
1.750	1.500	0.375	0.000	0.000	0.000	B1-0175150-037
1.750	1.500	0.500	0.000	0.000	0.000	B1-0175150-050
1.750	1.500	0.750	0.000	0.000	0.000	B1-0175150-075
1.750	1.561	0.375	0.000	0.000	0.000	B5-0175156-037
1.875	1.750	0.980	1.000	0.000	0.000	B1-0187175-098
2.000	1.750	0.000	0.000	0.000	0.000	B1-0200175-018
2.000	1.750	0.250	0.000	0.000	0.000	B1-0200175-025
2.000	1.750	0.375	0.000	0.000	0.000	B1-0200175-037
2.000	1.750	0.500	0.000	0.000	0.000	B1-0200175-050
2.000	1.750	0.625	0.000	0.000	0.000	B1-0200175-062



B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
2.000	1.750	0.750	0.000	0.000	0.000	B1-0200175-075
2.000	1.750	1.000	0.000	0.000	0.000	B1-0200175-100
2.000	1.750	1.500	0.000	0.000	0.000	B1-0200175-150
2.000	1.811	0.375	0.000	0.000	0.000	B5-0200181-037
2.000	1.821	0.250	0.000	0.000	0.000	B5-0200182-025
2.000	1.875	0.980	0.000	0.000	0.000	B1-0200187-098
2.125	2.000	0.980	0.000	0.000	0.000	B1-0212200-098
2.125	2.000	1.500	0.000	0.000	0.000	B1-0212200-150
2.250	2.000	0.000	0.000	0.000	0.000	B1-0225200-025
2.250	2.000	0.312	0.000	0.000	0.000	B1-0225200-031
2.250	2.000	0.375	0.000	0.000	0.000	B1-0225200-037
2.250	2.000	0.500	0.000	0.000	0.000	B1-0225200-050
2.250	2.000	0.625	0.000	0.000	0.000	B1-0225200-062
2.250	2.000	0.750	0.000	0.000	0.000	B1-0225200-075
2.250	2.000	1.000	0.000	0.000	0.000	B1-0225200-100
2.250	2.000	1.500	0.000	0.000	0.000	B1-0225200-150
2.250	2.061	0.375	0.000	0.000	0.000	B5-0225206-037
2.375	2.125	0.500	0.000	0.000	0.000	B1-0237212-050
2.375	2.250	0.000	0.000	0.000	0.000	B1-0237225-150
2.375	2.250	1.000	0.000	0.000	0.000	B1-0237225-100
2.375	2.250	1.240	0.000	0.000	0.000	B1-0237225-124
2.500	2.250	0.187	0.000	0.000	0.000	B1-0250225-018
2.500	2.250	0.250	0.000	0.000	0.000	B1-0250225-025
2.500	2.250	0.312	0.000	0.000	0.000	B1-0250225-031
2.500	2.250	0.375	0.000	0.000	0.000	B1-0250225-037
2.500	2.250	0.500	0.000	0.000	0.000	B1-0250225-050
2.500	2.250	0.625	0.000	0.000	0.000	B1-0250225-062
2.500	2.250	0.750	0.000	0.000	0.000	B1-0250225-075
2.500	2.250	1.000	0.000	0.000	0.000	B1-0250225-100
2.500	2.250	1.500	0.000	0.000	0.000	B1-0250225-150
2.500	2.311	0.375	0.000	0.000	0.000	B5-0250231-037



B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
2.500	2.321	0.250	0.000	0.000	0.000	B5-0250232-025
2.500	2.375	0.312	0.000	0.000	250,237.000	B1-0250237-031
2.625	2.375	0.500	0.000	0.000	0.000	B1-0262237-050
2.625	2.436	0.375	0.000	0.000	0.000	B5-0262243-037
2.625	2.500	0.980	0.000	0.000	0.000	B1-0262250-098
2.625	2.500	1.240	1.240	0.000	0.000	B1-0262250-124
2.625	2.500	1.500	1.510	0.000	0.000	B1-0262250-150
2.625	2.500	1.687	1.687	0.000	0.000	B1-0262250-168
2.750	2.500	0.000	0.000	0.000	0.000	B1-0275250-125
2.750	2.500	0.250	0.000	0.000	0.000	B1-0275250-025
2.750	2.500	0.312	0.000	0.000	0.000	B1-0275250-031
2.750	2.500	0.375	0.000	0.000	0.000	B1-0275250-037
2.750	2.500	0.500	0.000	0.000	0.000	B1-0275250-050
2.750	2.500	0.625	0.000	0.000	0.000	B1-0275250-062
2.750	2.500	0.750	0.000	0.000	0.000	B1-0275250-075
2.750	2.500	1.000	0.000	0.000	0.000	B1-0275250-100
2.750	2.500	1.500	0.000	0.000	0.000	B1-0275250-150
2.750	2.559	0.375	0.000	0.000	0.000	B5-0275256-037
2.875	2.684	0.375	0.000	0.000	0.000	B5-0287268-037
2.875	2.750	0.980	0.000	0.000	0.000	B1-0287275-098
2.875	2.750	1.500	0.000	0.000	0.000	B1-0287275-150
2.875	2.750	1.812	1.812	0.000	0.000	B1-0287275-181
3.000	2.750	0.250	0.000	0.000	0.000	B1-0300275-025
3.000	2.750	0.312	0.000	0.000	0.000	B1-0300275-031
3.000	2.750	0.375	0.000	0.000	0.000	B1-0300275-037
3.000	2.750	0.500	0.000	0.000	0.000	B1-0300275-050
3.000	2.750	0.625	0.000	0.000	0.000	B1-0300275-062
3.000	2.750	0.750	0.000	0.000	0.000	B1-0300275-075
3.000	2.750	1.000	0.000	0.000	0.000	B1-0300275-100
3.000	2.774	0.250	0.000	0.000	0.000	B5-0300277-025
3.000	2.809	0.375	0.000	0.000	0.000	B5-0300281-037



B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
3.125	2.750	1.000	0.000	0.000	0.000	B1-0312275-100
3.125	2.875	0.500	0.000	0.000	0.000	B1-0312287-050
3.125	2.875	1.000	0.000	0.000	0.000	B1-0312287-100
3.125	2.934	0.375	0.000	0.000	0.000	B5-0312293-037
3.125	3.000	0.000	0.000	0.000	0.000	B1-0312300-149
3.125	3.000	0.000	0.000	0.000	0.000	B1-0312300-124
3.125	3.000	0.980	0.000	0.000	0.000	B1-0312300-098
3.125	3.000	1.650	1.650	0.000	0.000	B1-0312300-165
3.250	3.000	0.250	0.000	0.000	0.000	B1-0325300-025
3.250	3.000	0.375	0.000	0.000	0.000	B1-0325300-037
3.250	3.000	0.500	0.000	0.000	0.000	B1-0325300-050
3.250	3.000	0.625	0.000	0.000	0.000	B1-0325300-062
3.250	3.000	0.750	0.000	0.000	0.000	B1-0325300-075
3.250	3.000	1.000	0.000	0.000	0.000	B1-0325300-100
3.250	3.000	1.250	0.000	0.000	0.000	B1-0325300-125
3.250	3.000	1.500	0.000	0.000	0.000	B1-0325300-150
3.250	3.000	2.000	0.000	0.000	0.000	B1-0325300-200
3.250	3.024	0.250	0.000	0.000	0.000	B5-0325302-025
3.250	3.059	0.375	0.000	0.000	0.000	B5-0325306-037
3.500	3.250	0.250	0.000	0.000	0.000	B1-0350325-025
3.500	3.250	0.375	0.000	0.000	0.000	B1-0350325-037
3.500	3.250	0.437	0.000	0.000	0.000	B1-0350325-043
3.500	3.250	0.500	0.000	0.000	0.000	B1-0350325-050
3.500	3.250	0.625	0.000	0.000	0.000	B1-0350325-062
3.500	3.250	0.750	0.000	0.000	0.000	B1-0350325-075
3.500	3.250	1.000	0.000	0.000	0.000	B1-0350325-100
3.500	3.250	1.125	0.000	0.000	0.000	B1-0350325-112
3.500	3.250	1.250	0.000	0.000	0.000	B1-0350325-125
3.500	3.250	1.500	0.000	0.000	0.000	B1-0350325-150
3.500	3.274	0.250	0.000	0.000	0.000	B5-0350327-025
3.500	3.309	0.375	0.000	0.000	0.000	B5-0350331-037



B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
3.700	3.500	1.880	0.000	0.000	0.000	B1-0370350-188
3.700	3.500	2.362	0.000	350,370.000	0.000	B1-0370350-236
3.750	3.500	0.375	0.000	0.000	0.000	B1-0375350-037
3.750	3.500	0.500	0.000	0.000	0.000	B1-0375350-050
3.750	3.500	0.625	0.000	0.000	0.000	B1-0375350-062
3.750	3.500	0.750	0.000	0.000	0.000	B1-0375350-075
3.750	3.500	1.000	0.000	0.000	0.000	B1-0375350-100
3.750	3.500	1.240	1.240	0.000	0.000	B1-0375350-124
3.750	3.500	1.500	0.000	0.000	0.000	B1-0375350-150
4.000	3.750	0.250	0.000	0.000	0.000	B1-0400375-025
4.000	3.750	0.312	0.000	0.000	0.000	B1-0400375-031
4.000	3.750	0.375	0.000	0.000	0.000	B1-0400375-037
4.000	3.750	0.500	0.000	0.000	0.000	B5-0400375-050
4.000	3.750	0.500	0.000	0.000	0.000	B1-0400375-050
4.000	3.750	0.625	0.000	0.000	0.000	B1-0400375-062
4.000	3.750	0.750	0.000	0.000	0.000	B1-0400375-075
4.000	3.750	1.000	0.000	0.000	0.000	B1-0400375-100
4.000	3.750	1.250	0.000	0.000	0.000	B1-0400375-125
4.000	3.750	1.500	0.000	0.000	0.000	B1-0400375-150
4.000	3.774	0.250	0.000	0.000	0.000	B5-0400377-025
4.000	3.875	0.187	0.375	0.000	0.000	BRT-0400
4.000	3.875	0.312	0.000	0.000	0.000	B1-0400387-031
4.200	4.000	1.575	0.000	0.000	0.000	B1-0420400-157
4.250	4.000	0.250	0.000	0.000	0.000	B1-0425400-025
4.250	4.000	0.375	0.000	0.000	0.000	B1-0425400-037
4.250	4.000	0.500	0.000	0.000	0.000	B1-0425400-050
4.250	4.000	0.625	0.000	0.000	0.000	B1-0425400-062
4.250	4.000	0.750	0.000	0.000	0.000	B1-0425400-075
4.250	4.000	1.000	0.000	0.000	0.000	B1-0425400-100
4.250	4.000	1.250	0.000	0.000	0.000	B1-0425400-125
4.250	4.000	1.500	0.000	0.000	0.000	B1-0425400-150



B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
4.250	4.000	1.875	0.000	0.000	0.000	B1-0425400-188
4.250	4.000	2.000	0.000	0.000	0.000	B1-0425400-200
4.500	4.187	1.125	0.500	4.375	0.000	BRT-0450418-112
4.500	4.232	0.250	0.000	0.000	450,423.000	B5-0450423-025
4.500	4.250	0.000	0.000	0.000	0.000	B1-0450425-125
4.500	4.250	0.250	0.000	0.000	0.000	B1-0450425-025
4.500	4.250	0.375	0.000	0.000	0.000	B1-0450425-037
4.500	4.250	0.500	0.000	0.000	0.000	B5-0450425-050
4.500	4.250	0.500	0.000	0.000	0.000	B1-0450425-050
4.500	4.250	0.625	0.000	0.000	0.000	B1-0450425-062
4.500	4.250	0.750	0.000	0.000	0.000	B1-0450425-075
4.500	4.250	0.875	0.000	0.000	0.000	B1-0450425-087
4.500	4.250	1.000	0.000	0.000	0.000	B1-0450425-100
4.700	4.500	1.963	0.000	0.000	0.000	B1-0470450-196
4.750	4.500	0.375	0.000	0.000	0.000	B1-0475450-037
4.750	4.500	0.500	0.000	0.000	0.000	B5-0475450-050
4.750	4.500	0.500	0.000	0.000	0.000	B1-0475450-050
4.750	4.500	0.750	0.000	0.000	0.000	B1-0475450-075
4.750	4.500	1.000	0.000	0.000	0.000	B1-0475450-100
4.750	4.500	1.250	0.000	0.000	0.000	B1-0475450-125
4.750	4.500	1.500	0.000	0.000	0.000	B1-0475450-150
4.750	4.500	2.000	0.000	0.000	0.000	B1-0475450-200
4.750	4.500	3.500	0.000	0.000	0.000	B1-0475450-350
5.000	4.625	1.000	0.000	0.000	0.000	B1-0500462-100
5.000	4.625	1.500	0.000	0.000	0.000	B1-0500462-150
5.000	4.713	0.375	0.000	0.000	0.000	B5-0500471-037
5.000	4.750	0.250	0.000	0.000	0.000	B1-0500475-025
5.000	4.750	0.375	0.000	0.000	0.000	B1-0500475-037
5.000	4.750	0.500	0.000	0.000	0.000	B5-0500475-050
5.000	4.750	0.500	0.000	0.000	0.000	B1-0500475-050
5.000	4.750	0.625	0.000	0.000	0.000	B1-0500475-062



B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
5.000	4.750	0.750	0.000	0.000	0.000	B1-0500475-075
5.000	4.750	1.000	0.000	0.000	0.000	B1-0500475-100
5.000	4.750	1.125	0.000	0.000	0.000	B1-0500475-112
5.000	4.750	1.500	0.000	0.000	0.000	B1-0500475-150
5.000	4.750	1.550	1.562	0.000	0.000	B1-0500475-155
5.250	5.000	0.500	0.000	0.000	0.000	B5-0525500-050
5.250	5.000	0.500	0.000	0.000	0.000	B1-0525500-050
5.250	5.000	0.625	0.000	0.000	0.000	B1-0525500-062
5.250	5.000	0.750	0.000	0.000	0.000	B1-0525500-075
5.250	5.000	1.000	0.000	0.000	0.000	B1-0525500-100
5.250	5.000	1.000	0.000	0.000	0.000	B1-0525500-100
5.250	5.000	1.250	0.000	0.000	0.000	B1-0525500-125
5.250	5.000	1.490	1.500	0.000	0.000	B1-0525500-149
5.500	5.125	1.000	0.000	0.000	0.000	B1-0550512-100
5.500	5.125	1.250	1.260	0.000	0.000	B1-0550512-125
5.500	5.250	0.375	0.000	0.000	0.000	B1-0550525-037
5.500	5.250	0.500	0.000	0.000	0.000	B5-0550525-050
5.500	5.250	0.500	0.000	0.000	0.000	B1-0550525-050
5.500	5.250	0.625	0.000	0.000	0.000	B1-0550525-062
5.500	5.250	0.750	0.000	0.000	0.000	B1-0550525-075
5.500	5.250	1.000	0.000	0.000	0.000	B1-0550525-100
5.500	5.250	1.250	0.000	0.000	0.000	B1-0550525-125
5.500	5.250	1.500	0.000	0.000	0.000	B1-0550525-150
5.500	5.250	1.610	0.000	0.000	0.000	B1-0550525-161
5.750	5.500	0.500	0.000	0.000	0.000	B5-0575550-050
5.750	5.500	0.500	0.000	0.000	0.000	B1-0575550-050
5.750	5.500	0.625	0.000	0.000	0.000	B1-0575550-062
5.750	5.500	0.750	0.000	0.000	0.000	B1-0575550-075
5.750	5.500	1.000	0.000	0.000	0.000	B1-0575550-100
5.750	5.500	1.500	0.000	0.000	0.000	B1-0575550-150
5.750	5.500	1.750	0.000	0.000	0.000	B1-0575550-175





B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
5.750	5.500	2.360	0.000	0.000	0.000	B1-0575550-236
5.875	5.625	0.000	0.000	0.000	0.000	B1-0587562-150
6.000	5.625	1.000	0.000	0.000	0.000	B1-0600562-100
6.000	5.625	1.250	0.000	0.000	0.000	B1-0600562-125
6.000	5.713	0.375	0.000	0.000	0.000	B5-0600571-037
6.000	5.750	0.250	0.000	0.000	600,575.000	B1-0600575-025
6.000	5.750	0.375	0.000	0.000	600,575.000	B1-0600575-037
6.000	5.750	0.500	0.000	0.000	0.000	B5-0600575-050
6.000	5.750	0.500	0.000	0.000	0.000	B2-0600575-050
6.000	5.750	0.500	0.000	0.000	0.000	B1-0600575-050
6.000	5.750	0.625	0.000	0.000	0.000	B1-0600575-062
6.000	5.750	0.750	0.000	0.000	0.000	B1-0600575-075
6.000	5.750	1.000	0.000	0.000	0.000	B1-0600575-100
6.000	5.750	1.250	0.000	0.000	0.000	B1-0600575-125
6.000	5.750	1.312	0.000	0.000	0.000	B1-0600575-131
6.000	5.750	1.500	0.000	0.000	0.000	B1-0600575-150
6.030	5.750	1.500	0.000	0.000	0.000	B1-0603575-150
6.250	6.000	0.000	0.000	0.000	0.000	B1-0625600-075
6.250	6.000	0.500	0.000	0.000	0.000	B1-0625600-050
6.250	6.000	0.625	0.000	0.000	0.000	B1-0625600-062
6.250	6.000	1.000	0.000	0.000	0.000	B1-0625600-100
6.250	6.000	2.000	0.000	0.000	0.000	B1-0625600-200
6.375	6.125	1.250	0.000	0.000	0.000	B1-0637612-125
6.500	6.125	1.000	0.000	0.000	0.000	B1-0650612-100
6.500	6.250	0.000	0.000	0.000	0.000	B1-0650625-125
6.500	6.250	0.500	0.000	0.000	0.000	B1-0650625-050
6.500	6.250	0.625	0.000	0.000	0.000	B1-0650625-062
6.500	6.250	0.750	0.000	0.000	0.000	B1-0650625-075
6.500	6.250	1.000	0.000	0.000	0.000	B1-0650625-100
6.500	6.250	1.500	0.000	0.000	0.000	B1-0650625-150
6.500	6.250	2.000	0.000	0.000	0.000	B1-0650625-200





B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
6.700	6.500	3.000	0.000	0.000	0.000	B1-0670650-300
6.750	6.500	0.750	0.000	0.000	0.000	B1-0675650-075
6.750	6.500	1.000	0.000	0.000	0.000	B1-0675650-100
6.750	6.500	1.500	0.000	0.000	0.000	B1-0675650-150
7.000	6.750	0.500	0.000	0.000	0.000	B1-0700675-050
7.000	6.750	0.625	0.000	0.000	0.000	B1-0700675-062
7.000	6.750	0.750	0.000	0.000	0.000	B1-0700675-075
7.000	6.750	1.000	0.000	0.000	0.000	B1-0700675-100
7.000	6.750	1.250	0.000	0.000	0.000	B1-0700675-125
7.000	6.750	1.500	0.000	0.000	0.000	B1-0700675-150
7.000	6.750	3.000	0.000	0.000	0.000	B1-0700675-300
7.125	6.750	1.000	0.000	0.000	0.000	B1-0712675-100
7.250	6.875	1.000	0.000	0.000	0.000	B1-0725687-100
7.250	7.000	0.500	0.000	0.000	0.000	B1-0725700-050
7.250	7.000	0.625	0.000	0.000	0.000	B1-0725700-062
7.250	7.000	0.750	0.000	0.000	0.000	B1-0725700-075
7.250	7.000	1.000	0.000	0.000	0.000	B1-0725700-100
7.250	7.000	2.000	0.000	0.000	0.000	B1-0725700-200
7.250	7.000	7.100	0.000	0.000	0.000	B1-0725700-710
7.375	7.000	1.625	1.625	0.000	0.000	B1-0737700-162
7.375	7.125	1.250	0.000	0.000	0.000	B1-0737712-125
7.450	7.250	2.350	0.000	0.000	0.000	B1-0745725-235
7.500	7.250	0.500	0.000	0.000	0.000	B1-0750725-050
7.500	7.250	0.625	0.000	0.000	0.000	B1-0750725-062
7.500	7.250	0.750	0.000	0.000	0.000	B1-0750725-075
7.500	7.250	1.000	0.000	0.000	0.000	B1-0750725-100
7.500	7.250	1.500	1.510	0.000	0.000	B1-0750725-149
7.500	7.250	2.950	2.950	0.000	0.000	B1-0750725-295
7.750	7.500	0.000	0.000	0.000	0.000	B1-0775750-100
7.750	7.500	0.000	0.000	0.000	0.000	B1-0775750-075
7.750	7.500	0.500	0.000	0.000	0.000	B1-0775750-050



B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
7.750	7.500	1.500	0.000	0.000	0.000	B1-0775750-150
7.750	7.500	1.625	0.000	0.000	0.000	B1-0775750-162
8.000	7.625	0.500	0.000	0.000	0.000	B1-0800762-050
8.000	7.625	1.000	0.000	0.000	0.000	B1-0800762-100
8.000	7.625	1.500	0.000	0.000	0.000	B1-0800762-150
8.000	7.750	0.500	0.000	0.000	0.000	B1-0800775-050
8.000	7.750	0.625	0.000	0.000	0.000	B1-0800775-062
8.000	7.750	0.750	0.000	0.000	0.000	B1-0800775-075
8.000	7.750	1.000	0.000	0.000	0.000	B1-0800775-100
8.000	7.750	1.250	0.000	0.000	0.000	B1-0800775-125
8.000	7.750	1.250	0.000	0.000	0.000	B1-0800775-125
8.000	7.750	1.500	0.000	0.000	0.000	B1-0800775-150
8.000	7.750	5.000	0.000	0.000	0.000	B1-0800775-500
8.250	8.000	1.000	0.000	0.000	0.000	B1-0825800-100
8.250	8.000	1.250	0.000	0.000	0.000	B1-0825800-125
8.250	8.000	1.500	0.000	0.000	0.000	B1-0825800-150
8.250	8.000	2.000	0.000	0.000	0.000	B1-0825800-200
8.250	8.000	2.250	0.000	0.000	0.000	B1-0825800-225
8.375	8.125	1.250	0.000	0.000	0.000	B1-0837812-125
8.500	8.125	1.000	0.000	0.000	850,812.000	B1-0850812-100
8.500	8.125	1.500	0.000	0.000	0.000	B1-0850812-150
8.500	8.250	0.500	0.000	0.000	0.000	B1-0850825-050
8.500	8.250	0.750	0.000	0.000	0.000	B1-0850825-075
8.500	8.250	1.000	0.000	0.000	0.000	B1-0850825-100
8.500	8.250	2.360	0.000	0.000	0.000	B1-0850825-236
8.750	8.500	1.000	0.000	0.000	0.000	B1-0875850-100
8.750	8.500	1.000	0.000	0.000	0.000	B1-0875850-100
8.750	8.500	1.500	0.000	0.000	0.000	B1-0875850-150
9.000	8.750	0.500	0.000	0.000	0.000	B1-0900875-050
9.000	8.750	0.625	0.000	0.000	900,875.000	B1-0900875-062
9.000	8.750	0.750	0.000	0.000	0.000	B1-0900875-075



B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
9.000	8.750	1.000	0.000	0.000	0.000	B1-0900875-100
9.000	8.750	1.500	0.000	0.000	0.000	B1-0900875-150
9.000	8.750	2.000	0.000	0.000	0.000	B1-0900875-200
9.250	9.000	0.000	0.000	0.000	0.000	B1-0925900-175
9.250	9.000	1.000	0.000	0.000	0.000	B1-0925900-100
9.250	9.000	1.970	0.000	0.000	0.000	B1-0925900-197
9.250	9.000	2.250	0.000	0.000	0.000	B1-0925900-225
9.500	9.125	1.930	1.930	0.000	0.000	B1-0950912-191
9.500	9.250	0.750	0.000	0.000	0.000	B1-0950925-075
9.500	9.250	1.250	0.000	0.000	0.000	B1-0950925-125
9.750	9.500	1.000	0.000	0.000	0.000	B1-0975950-100
9.875	9.500	0.500	0.000	0.000	0.000	B1-0987950-050
10.000	9.625	1.250	0.000	0.000	1,000,962.00	B1-1000962-125
10.000	9.625	1.500	0.000	0.000	0.000	B1-1000962-150
10.000	9.750	0.500	0.000	0.000	0.000	B1-1000975-050
10.000	9.750	0.750	0.000	0.000	0.000	B1-1000975-075
10.000	9.750	1.000	0.000	0.000	0.000	B1-1000975-100
10.000	9.750	1.250	0.000	0.000	0.000	B1-1000975-125
10.000	9.750	1.500	0.000	0.000	0.000	B1-1000975-150
10.000	9.750	1.750	0.000	0.000	1,000,975.00	B1-1000975-175
10.250	10.000	0.000	0.000	0.000	0.000	B1-1025100-125
10.250	10.000	1.000	0.000	0.000	0.000	B1-1025100-100
10.250	10.000	2.000	0.000	0.000	0.000	B1-1025100-200
10.375	10.000	3.000	0.000	0.000	0.000	B1-1037100-300
10.500	10.250	1.000	0.000	0.000	0.000	B1-1050102-100
10.500	10.250	1.250	0.000	0.000	0.000	B1-1050102-125
10.500	10.250	2.740	2.750	0.000	0.000	B1-1050102-274
10.750	10.500	1.000	0.000	0.000	0.000	B1-1075105-100
10.750	10.500	2.000	0.000	0.000	0.000	B1-1075105-200
11.000	10.750	0.500	0.000	0.000	0.000	B1-1100107-050



B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
11.000	10.750	1.000	0.000	0.000	0.000	B1-1100107-100
11.250	11.000	1.250	0.000	0.000	0.000	B1-1125110-125
11.250	11.000	3.000	0.000	0.000	0.000	B1-1125110-300
11.375	11.000	2.610	2.613	0.000	0.000	B1-1137110-261
11.500	11.250	4.000	0.000	0.000	0.000	B1-1150112-400
11.750	11.375	3.000	0.000	0.000	0.000	B1-1175113-300
11.750	11.500	1.250	0.000	0.000	0.000	B1-1175115-125
12.000	11.625	2.500	0.000	0.000	0.000	B1-1200116-250
12.000	11.750	1.000	0.000	0.000	0.000	B1-1200117-100
12.000	11.750	1.250	0.000	0.000	0.000	B1-1200117-125
12.000	11.750	1.500	1.510	0.000	0.000	B1-1200117-150
12.000	11.750	2.000	0.000	0.000	0.000	B1-1200117-200
12.250	11.875	4.000	4.000	0.000	0.000	B1-1225118-400
12.250	12.000	3.000	0.000	0.000	0.000	B1-1225120-300
12.500	12.125	3.000	0.000	0.000	0.000	B1-1250121-300
12.500	12.250	4.000	0.000	0.000	0.000	B1-1250122-400
12.875	12.500	2.890	2.890	0.000	0.000	B1-1287125-289
12.875	12.500	12.180	12.180	0.000	0.000	B1-1287125-999
13.000	12.625	1.000	0.000	0.000	0.000	B1-1300126-100
13.000	12.750	0.000	0.000	0.000	0.000	B1-1300127-100
13.000	12.750	1.250	0.000	0.000	0.000	B1-1300127-125
13.250	13.000	1.000	0.000	0.000	0.000	B1-1325130-100
14.000	13.625	1.000	0.000	0.000	0.000	B1-1400136-100
14.000	13.750	0.750	0.000	0.000	0.000	B1-1400137-075
14.000	13.750	1.000	0.000	0.000	0.000	B1-1400137-100
14.000	13.750	1.250	0.000	0.000	0.000	B1-1400137-125
14.000	13.750	2.000	0.000	0.000	0.000	B1-1400137-200
14.250	14.000	3.990	3.990	0.000	0.000	B1-1425140-399
14.500	14.125	1.500	0.000	0.000	0.000	B1-1450141-150
15.125	14.750	7.690	7.690	0.000	0.000	B1-1512147-769





B1



GT



B5

OD	ID	L1	L2	OD2	OD3	Product Name
16.000	15.750	1.000	0.000	0.000	1,600,157.000	B1-1600157-100
16.000	15.750	2.000	0.000	0.000	0.000	B1-1600157-200
18.250	18.000	1.000	0.000	0.000	0.000	B1-1825180-100
18.250	18.000	3.000	0.000	0.000	0.000	B1-1825180-300





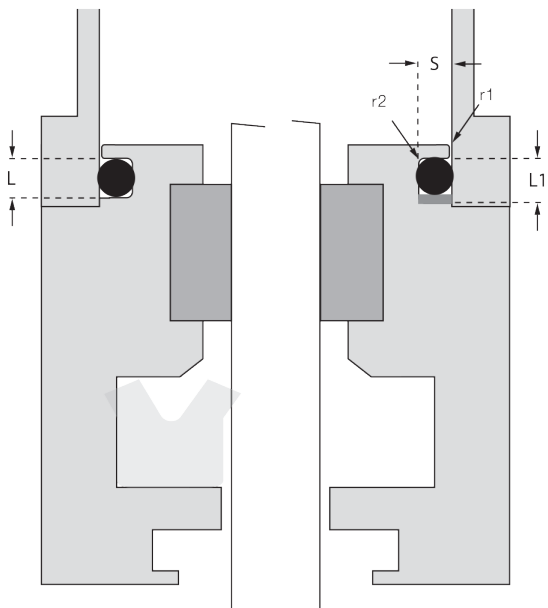
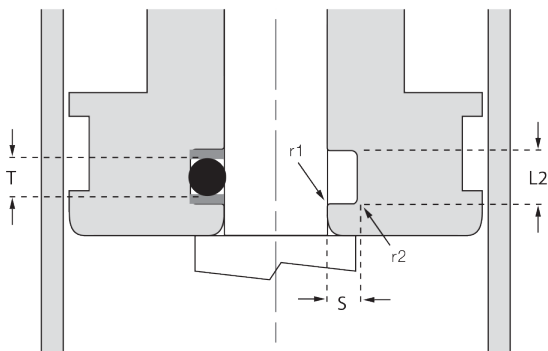
# Ancillary

O-ring, Backup Washer & Quad Rings

## Design

O-rings, Quad rings and Back up washers are almost entirely used as static seals. Generally O-rings and Quad rings should be backed up for pressures above 1500 Psi, however, the operating environment must always be considered, regardless of operating pressure. The groove dimension table below is based on static use only. For dynamic applications, please consult our technical staff.

Ancillary



## Static Housing Data

### Ring and Groove Dimensions

O-ring C/S		Housing Depth		Housing Width			
T	S	L	L1	L2			
Inch	Inch	mm	Max	Min			
0.039		1.00	0.032	0.030	0.051		
0.047		1.20	0.038	0.036	0.061		
0.059		1.50	0.047	0.045	0.077		
0.063		1.60	0.050	0.048	0.082	0.150*	0.205*
0.070	1/16	1.78	0.057	0.055	0.093	0.148	0.203
0.075		1.90	0.060	0.058	0.098	0.154	0.209
0.079		2.00	0.063	0.061	0.102	0.157	0.213
0.094		2.40	0.076	0.074	0.126	0.181	0.236
0.098		2.50	0.079	0.077	0.128	0.183	0.238
0.103	3/32	2.62	0.082	0.080	0.141	0.196	0.251
0.106		2.70	0.084	0.082	0.138	0.196*	0.251*
0.118		3.00	0.098	0.091	0.154	0.209	0.264
0.122		3.10	0.099	0.091	0.161	0.217	0.272
0.138		3.50	0.114	0.106	0.179	0.234	0.289
0.139	1/8	3.53	0.114	0.106	0.187	0.242	0.297
0.157		4.00	0.130	0.122	0.205	0.272*	0.339*
0.197		5.00	0.163	0.152	0.256	0.323*	0.390*
0.210	3/16	5.33	0.174	0.162	0.282	0.348	0.415
0.224		5.70	0.197	0.191	0.295	0.362	0.429
0.236		6.00	0.197	0.191	0.307	0.374*	0.441*
0.275	1/4	6.99	0.236	0.270	0.376	0.474	0.572
0.331		8.40	0.291	0.285	0.433	0.532	0.630

\*Check availability, not normally stocked

### Chamfer Radii

	T	r1	r2
L (no BU's)	0.039 - 0.103	0.004	0.010
	0.118 - 0.331	0.008	0.025
L1 & L2	0.070 - 0.157	0.010	0.010
	0.197 - 0.331	0.010	0.010



# 11

## Flange Seal

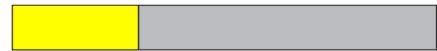
### Design

11 Flange seals are a one piece dual durometer static seal that consists of an outer lamina of Unithane 395A polyurethane. They are designed for use on type 61 Hydraulic Flanged tube, pipe and hose connections, 4 bolt split flange type, as detailed in SAE standard J518c. They provide a direct replacement for o-rings without groove modifications.

### Operating Conditions

#### Pressure

200 Bar  
3,000 Psi



#### Temperature

-40° to 95° C  
-40° to 195° F



#### Surface Finish $\mu\text{mRa}$

mating face	3.0
sealing face	0.8

#### Tolerances

$\text{ØD}$	$\text{Ød}$	L1	L2
-0.000	$\pm 0.010$	$\pm 0.005$	-0.010
+0.005			+0.000

#### Radii

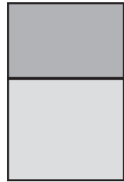
r	0.030
---	-------

#### Typical Examples

Static 



Ancillary



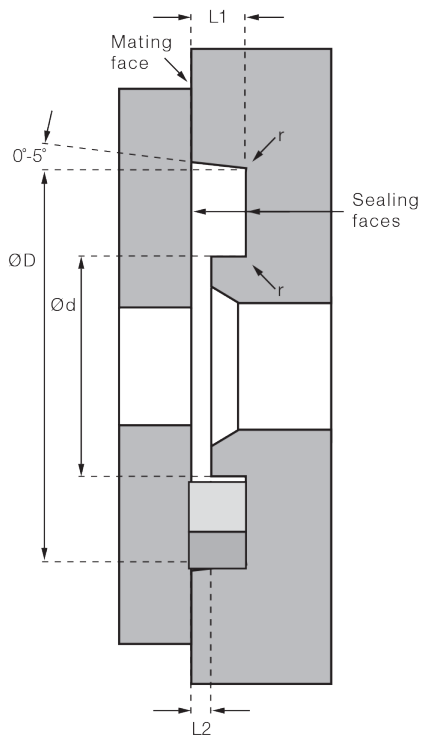
### Key Features

SAE flange sizes

Snap in easy fit

Heavy duty

O-ring replacement



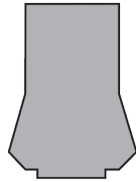




# CFS

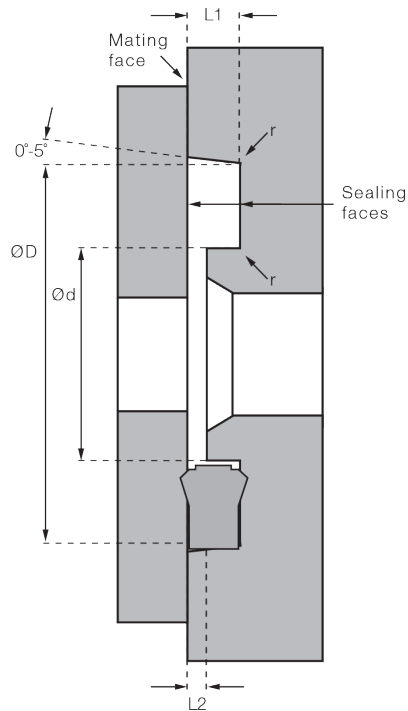
## Flange Seal

Ancillary



### Key Features

- SAE flange sizes
- Snap in easy fit
- Heavy duty
- O-ring replacement



### Design

CFS flange seal is designed to suit the SAE J518, type 61 & 62 range of flanges, and common metric flange sizes. The seal is manufactured in a high performance grade of Polyurethane with excellent resistance to extrusion and compression set over a wide temperature range. They provide a direct replacement for o-rings, without groove modifications. The design offers many performance advantages over common o-ring, or rubber based flange seals, including the elimination of the 'pumping effect'.

### Operating Conditions

#### Pressure

400 Bar  
6,000 Psi



#### Temperature

-40° to 110° C  
-40° to 230° F



#### Surface Finish $\mu\text{mRa}$

mating face 3.0  
sealing face 0.8

#### Tolerances

$\text{ØD}$	$\text{Ød}$	L1	L2
-0.000	$\pm 0.010$	$\pm 0.005$	-0.010
+0.005			+0.000

#### Radii

r 0.030

#### GKI-2009C Grab box

60 pieces 6 sizes

sizes	1/2	3/4	1	1 1/4	1 1/2	2
qty	10	10	10	10	10	10

#### Typical Examples

Static



**Quad ring**



NBR Quad ring

**Order code**

imp. 4-(size)

**Backup rings**



Polyurethane Washer

**Order code**

imp. 8-(size)-P9  
met. 9-(size)-P9



NBR Washer

**Order code**

imp. 8-(size)  
met. 9-(size)



Hytrek Washer

**Order code**

imp. 8-(size)-H  
met. 9-(size)-H



PTFE Washer

**Order code**

imp. 8-(size)-T  
met. 9-(size)-T

OD	ID	L1	L2	OD2	OD3	Product Name
0.000	0.000	0.000	0.000	0.000	0.000	BW-825S
0.000	0.000	0.000	0.000	0.000	0.000	BW-830S
0.000	0.000	0.000	0.000	0.000	0.000	BW-827S
0.000	0.000	0.000	0.000	0.000	0.000	11-115
0.250	0.120	0.048	0.000	0.161	0.000	BW-001
0.286	0.162	0.048	0.000	0.207	0.000	BW-002
0.330	0.205	0.048	0.000	0.250	0.000	BW-003
0.520	0.270	0.048	0.000	0.315	0.000	BW-004
0.525	0.327	0.048	0.000	0.375	0.000	BW-006
0.560	0.340	0.048	0.000	0.395	0.000	BW-007
0.625	0.408	0.079	0.000	0.466	0.000	BW-820
0.750	0.460	0.079	0.000	0.515	0.000	BW-009
0.810	0.541	0.079	0.000	0.599	0.000	BW-821
0.875	0.585	0.079	0.000	0.645	0.000	BW-010
0.875	0.623	0.079	0.000	0.681	0.600	BW-022
0.937	0.680	0.079	0.000	0.738	0.000	BW-823
1.000	0.500	0.078	0.103	0.000	0.000	BW-7500-500
1.000	0.650	0.079	0.000	0.738	0.000	BW-011
1.000	0.670	0.110	0.010	0.000	0.000	CFS-0500
1.000	0.670	0.110	0.010	0.000	0.000	AFS-0500
1.000	0.750	0.130	0.000	0.000	0.000	11-0500
1.012	0.744	0.195	0.000	0.000	0.000	CAT-1P3700
1.052	0.852	0.049	0.000	0.000	0.000	BW-513
1.060	0.775	0.092	0.000	0.835	0.000	BW-024
1.125	0.848	0.092	0.000	0.906	0.000	BW-825
1.187	0.625	0.094	0.187	0.000	0.000	BW-7500-625
1.250	0.920	0.110	0.010	0.000	0.000	CFS-0750
1.250	0.920	0.110	0.010	0.000	0.000	AFS-0750
1.250	0.925	0.092	0.000	0.983	0.000	BW-826
1.262	0.994	0.195	0.000	0.000	0.000	CAT-1P3702
1.280	1.075	0.049	0.000	1.150	0.000	BW-514

**Quad ring**



NBR Quad ring

**Order code**

imp. 4-(size)

**Backup rings**



Polyurethane Washer

**Order code**

imp. 8-(size)-P9  
met. 9-(size)-P9



NBR Washer

**Order code**

imp. 8-(size)  
met. 9-(size)



Hytrel Washer

**Order code**

imp. 8-(size)-H  
met. 9-(size)-H



PTFE Washer

**Order code**

imp. 8-(size)-T  
met. 9-(size)-T

OD	ID	L1	L2	OD2	OD3	Product Name
1.375	1.065	0.092	0.000	1.123	0.000	BW-827
1.440	1.155	0.092	0.000	1.215	0.000	BW-014
1.500	1.213	0.128	0.000	1.275	0.000	BW-829
1.512	1.244	0.195	0.000	0.000	0.000	CAT-1P3703
1.560	1.230	0.110	0.010	0.000	0.000	CFS-1000
1.560	1.230	0.110	0.010	0.000	0.000	AFS-1000
1.630	1.285	0.128	0.000	1.405	0.000	BW-015
1.685	1.334	0.128	0.000	1.452	0.000	BW-830
1.750	1.420	0.110	0.010	0.000	0.000	CFS-1250
1.750	1.420	0.110	0.010	0.000	0.000	AFS-1250
1.762	1.494	0.195	0.000	0.000	0.000	CAT-1P3704
1.880	1.534	0.128	0.000	1.655	0.000	BW-017
2.000	1.750	0.130	0.000	0.000	0.000	11-1750
2.015	1.747	0.195	0.000	0.000	0.000	CAT-1P3705
2.062	1.690	0.128	0.000	1.808	0.000	BW-832
2.125	1.785	0.110	0.010	0.000	0.000	CFS-1500
2.125	1.785	0.110	0.010	0.000	0.000	AFS-1500
2.250	1.785	0.128	0.000	1.905	1,032,004.00	BW-018
2.265	1.997	0.195	0.000	0.000	0.000	CAT-1P3706
2.307	1.907	0.128	0.000	2.023	0.000	BW-833
2.402	2.134	0.195	0.000	0.000	0.000	CAT-1P3707
2.500	2.035	0.128	0.000	2.155	2.000	BW-019
2.500	2.160	0.110	0.010	0.000	0.000	CFS-2000
2.500	2.160	0.110	0.010	0.000	0.000	AFS-2000
2.500	2.250	0.110	0.010	0.000	0.000	Nov-00
2.500	2.250	0.130	0.000	0.000	0.000	11-2000
2.515	2.247	0.195	0.000	0.000	0.000	CAT-1P3708
2.765	2.497	0.195	0.000	0.000	0.000	CAT-1P3709
2.875	2.385	0.128	0.000	2.505	0.000	BW-836
3.005	2.665	0.110	0.010	0.000	0.000	11-2500
3.060	2.535	0.128	0.000	2.655	2.710	BW-037

**Quad ring**

NBR Quad ring

**Order code**

imp. 4-(size)

**Backup rings**

Polyurethane Washer

**Order code**imp. 8-(size)-P9  
met. 9-(size)-P9

NBR Washer

**Order code**imp. 8-(size)  
met. 9-(size)

Hytrel Washer

**Order code**imp. 8-(size)-H  
met. 9-(size)-H

PTFE Washer

**Order code**imp. 8-(size)-T  
met. 9-(size)-T

OD	ID	L1	L2	OD2	OD3	Product Name
3.550	2.995	0.128	0.000	0.000	0.000	BW-839
3.550	2.995	0.128	0.000	3.125	0.000	BW-039
3.625	3.285	0.110	0.010	0.000	0.000	11-3000
4.615	4.275	0.110	0.010	0.000	0.000	11-4000
5.615	5.275	0.110	0.010	0.000	0.000	11-5000



# Grab Kits

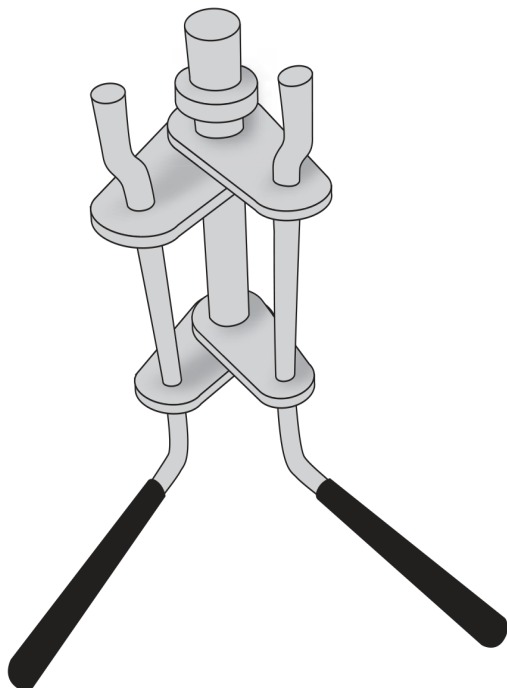
O-rings, Quad Rings, Flange seal, Backup & Bonded washers  
**Design**

Ancillary



## Kit Types

- O-ring
- Quad ring
- Back up washers
- Flange seals
- Bonded washers
- Tools



Full Range of Grab Box kits to suit the Hydraulic Industry.

## Kit Definitions

### O-Ring Kits

NBR70 & 90 Shore A  
Viton, EDPM & other compounds  
Boss Gasket NBR90 Shore A  
Splicing Kit

### Quad Ring Kits

NBR70 Shore A

### Back Up Washer Kits

NBR90 Shore A  
Polyurethane  
PTFE

### Flange Seal Kits (SAE J518)

Polyurethane 92 Shore A - Type 61 & 62 flanges  
NBR90 Shore A o-Rings - Type 61 flanges only

### Bonded Washers

Popular bonded washer sizes (Dowty Washer)

### Tools

O-ring picks  
O-ring measuring cone and chart  
U-ring installation tools and kits



Norman Richards Pty Ltd

**NR Seals**



# Grab Kits

Ancillary

Prod Code	Kit Description	Qty	Contents Desc							
GKM-10919	O-Rings NBR90,European Metric 386 O-Rings, 30 sizes	20ea	3.0	3.1	4.1	7.1				
		16ea	2.0c/s	4.0	6.0	7.0	8.0			
GKI-30017	Quad Rings NBR70 226 Quad Rings, 36 Sizes	10ea	005	006	007	008	009	010	011	012
		6ea	013	014	015	016	110	111	112	113
GKI-20599	Flange Seals, 60 pieces, 6 sizes O-Rings NBR90 Tube boss fittings, 100 O-Rings, 10 sizes Total 160 pieces, 16 sizes	10ea	Flange	1/2	3/4	1	1 1/4	1 1/2	2	
		10 ea	Tube	1/4	5/16	3/8	1/2	5/8		





# Grab Kits

Ancillary

Prod Code	Kit Description	Qty	Contents Description						
GKI-10019W	O-Ring NBR90 Warehouse, 1110 O-Rings, 150 sizes	20ea	001	002	003	004	005	006	007
			008	009	010	011	012	013	014
			015	016					
		15ea	110	111	112	113	114	115	116
		10ea	017	018	019	020	021	022	023
			024	117	118	119	120	121	122
			123	124	210	211	212	213	214
			215	216					
		7ea	025	026	027	028	029	030	031
		5ea	032	033	034	035	036	037	038
			039	040	041	042	043	125	126
			127	128	129	130	131	132	133
134	135		136	137	138	139	140		
141	142		217	218	219	220	221		
222	223		224	225	226	227	228		
229	325		326	327	328	901	902		
903	904		905	906	907	908	909		
910	911		912	913	914	916	918		
920	924		928	932					
4ea	329	330							
3ea	143	144	145	146	230	231	232		
2ea	044	045	046	147	148	149	150		
	151	233	234	235	236	237	331		
	332	333	334	335	336	337	338		
<p>Our warehouse kit is ideally suited for the repair shop that needs a large on-hand selection of o-rings to ensure quick repair of all machine types. Each size is individually packed in a heavy duty Zip-lock bag for protection. All stored in a sturdy styrene cabinet with slide-out draws for easy access. Included is a card showing the size, dimensions and draw location for each ring.</p>									
GKI-10019H	O-Rings NBR90, Hose end & adaptors	8ea	011	012	014	016	018	021	025
			029	210	214	219	221	223	228
			902	903	904	905	906	908	910
			912	914	916	920	924	932	





# Grab Kits

Ancillary

Prod Code	Kit Description	Qty	Contents Description						
GKI-10019M	O-ring NBR90 mega kit, 5-in-1 box, 1415 Pieces in 81 sizes								
	Box 1 – SAE Flange O-Rings	10ea	1/2	3/4	1				
		5ea	1 1/4	1 1/2	2				
	Box 2 – Boss O-Rings NBR90	25ea	904	907	908	910			
		15ea	903	906	912				
		10ea	916						
	Box 3 – 1/16 c/s O-Rings NBR70	25ea	006	007	008	009	010	011	012
			013	014	015	016	017	018	
		20ea	019	020	021				
		15ea	022	023	024	025	026	028	
	Box 4 – 3/32 c/s O-Rings NBR70	10ea	029	030					
		25ea	109	110	111	112	113	114	115
			116	117	118				
		20ea	119	120					
		15ea	121	122	123	124	125	126	127
	Box 5 – 1/8 c/s O-Rings NBR70	10ea	128	129	131	133			
		5ea	135						
		20ea	210	211	212	213	214		
		15ea	215	216	217	218	219	220	221
		10ea	222	223	224	226	228	232	236
GKI-10117	O-Rings NBR70, 276 O-Rings, 25 sizes	20ea	017	023	024				
GKI-10119	O-Rings NBR90	18ea	012						
		10ea	013	014	015	016	018	019	020
			021	022	025	026	027	028	029
8ea	006	007	008	009	010	011			
GKI-10217	O-Rings NBR70, 218 O-rings, 25 sizes	6ea	104	105	106	107	108	109	
		8ea	111	112	113	116	117	118	119
			120	122	123	124	125	126	127
			128						
12ea	110								
16ea	114	115	121						
GKI-10219	O-Rings NBR90, 218 O-rings, 25 sizes	6ea	104	105	106	107	108	109	
		8ea	111	112	113	116	117	118	119
			120	122	123	124	125	126	127
			128						
12ea	110								
16ea	114	115	121						
GKI-10619	O-Rings NBR90, Flange & Tube boss fitting, 160 O-Rings, 16 sizes	10ea	Flange	1/2	3/4	1	1 1/4	1 1/2	2
		10ea	Tube	1/4	5/16	3/8	1/2	5/8	3/4
			7/8	1	1 1/4	1 1/2			





# Grab Kits

Ancillary

Prod Code	Kit Description	Qty	Contents Description							
GKI-10030	O-Rings PTFE, 325 O-Rings, 36 sizes	15ea	005	006	007	008	009	010	011	012
		10ea	013	014	015	016	017	018		
		10ea	110	111	112	113	114	115	116	
		5ea	117	118	119	120	121			
		5ea	210	211	212	213	214	215	216	217
GKM-10817	O-Rings NBR70 Japanese Industrial Metric 380 O-Rings, 36 sizes	25ea	P3							
		20ea	P4	P5	P6					
		15ea	P7	P8	P9	P10	P10A	P11	P11.2	
		12ea	P12	P12.5	P14	P15	P16			
		8ea	P18	P20	P21	P22				
		7ea	G30	P24	P25	P25.5	P26	P28		
		6ea	G25	P29	P29.5	P30	P31	P31.5	V24	
		5ea	P22A	P22.4						
GKM-10819	O-Rings NBR90 Japanese Industrial Metric 396 O-Rings, 30 sizes	20ea	P3	P4						
		18ea	P5	P6	P7	P8	P9			
		14ea	P10A	P11	P12	P14	P16	P18		
		13ea	P20							
		12ea	G22	G25						
		11ea	G20	G30	G35	G40	G45			
		10ea	P22.4	P25	P26	P30	P32	P34	P36	P40
GKM-10917	O-Rings NBR70, European Metric 500 O-Rings, 36 sizes	20ea	1.5c/s	5.0						
		20ea	1.6c/s	2.2	3.1	4.1	7.1			
		20ea	2.0c/s	4.0	6.0					
		15ea	1.5c/s	13.0						
		15ea	1.6c/s	9.1	10.1	13.1				
		15ea	2.0c/s	8.0	9.0	10.0	12.0			
		15ea	2.4c/s	4.3	5.3	5.6	7.6	8.3	8.6	
		10ea	1.5c/s	16.0						
		10ea	2.0c/s	14.0	16.0	19.0	20.0			
		10ea	2.5c/s	10.0	13.0	14.0	15.0	17.0	18.0	19.0
		10ea	3.0c/s	9.0	10.0	11.0				



# Grab Kits

Ancillary

Prod Code	Kit Description	Qty	Contents Description							
GKM-10919	O-Rings NBR90, European Metric 500 O-Rings, 36 sizes	20ea	1.5c/s 5.0							
		20ea	1.6c/s	2.2	3.1	4.1	7.1			
		20ea	2.0c/s 4.0		6.0					
		15ea	1.5c/s 13.0							
		15ea	1.6c/s	9.1	10.1	13.1				
		15ea	2.0c/s	8.0	9.0	10.0	12.0			
		15ea	2.4c/s	4.3	5.3	5.6	7.6	8.3	8.6	
		10ea	1.5c/s 16.0							
		10ea	2.0c/s	14.0	16.0	19.0	20.0			
		10ea	2.5c/s	10.0	13.0	14.0	15.0	17.0	18.0	
		10ea	3.0c/s	9.0	10.0	11.0				
GKI-30017	Quad Rings NBR70 226 Quad Rings, 36 sizes	10ea	005	006	007	008	009	010	011	
			012							
		6ea	013	014	015	016	110	111	112	
			113	114	115	116				
5ea	017	018	210	211	212	213	214			
	215	216	217	218	219					
4ea	117	118	119	120	121					
GKI-20099C	Flange Seals, 60 pieces, 6 sizes	10ea	1/2	3/4	1	1 1/4	1 1/2	2		
GKI-20599	Flange Seals, 60 pieces, 6 sizes O-Rings NBR90 Tube boss fittings, 100 O-Rings, 10 sizes Total 160 pieces, 16 sizes	10ea	Flange	1/2	3/4	1	1 1/4	1 1/2	2	
		10ea	Tube	1/4	5/16	3/8	1/2	5/8	3/4	
			7/8	1	1 1/4	1 1/2				
10ea	o-rings	1/2	3/4	1	1 1/4	1 1/2	2			
GKI-80019	Back up rings NBR90 293 Back ups, 36 sizes	10ea	005	006	007	008	009	010	011	
			012	013	014	015	016	017	018	
			110	111	112	113	114	115	116	
		7ea	210	211	212	213				
		5ea	117	118	119	120	121	214	215	
	216	217	218	219						
GKI-80030	Back up rings PTFE 325 Back ups, 36 sizes Solid, scarf cut	15ea	005	006	007	008	009	010	011	
			012							
		10ea	013	014	015	016	017	018	110	
	111	112	113	114	115	116				
5ea	117	118	119	120	121	210	211			
	212	213	214	215	216	217	218			
	219									
GKM-40010	Bonded Washers, German Metric	25ea	BWM-202	BWM-203		BWM-207				
			BWM-213	BWM-217		BWM-222				
			BWM-229							
		20ea	BWM-232	BWM-233		BWM-238				
	BWM-239	BWM-240								
10ea	BWM-243	BWM-244								
5ea	BWM-247	BWM-248								



# Grab Kits

Ancillary

Prod Code	Tool Type	Description
T-001	Seal / O-Ring picks	4 pieces with handles, pick and hook type
T-002	Seal / O-Ring picks	4 attachments, 1 handle with magnet, pick and hook
T-020	O-Ring Measuring cone	Measures 184 of the most popular Imperial o-ring sizes in 5 standard cross sections
T-021	O-Ring Measuring chart	For measuring most sizes of Imperial o-rings
T-100	U-Ring Installation	Seal range      3/4" to 1 1/4"      19 to 32mm
T-101	U-Ring Installation	Seal range      1 3/8" to 1 7/8"      35 to 48mm
T-102	U-Ring Installation	Seal range      2" to 3"      50 to 76mm
T-105	U-Ring Installation	Tool kit      Contains above 3 tools in a plastic case

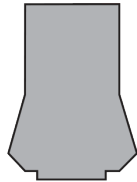




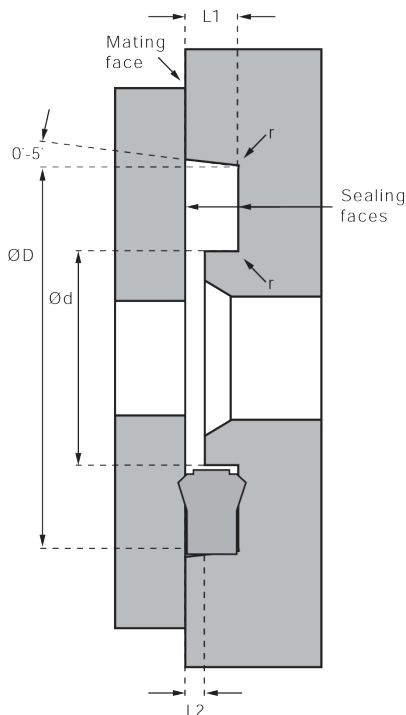
# CFS

Flange Seal

Ancillary



- SAE flange sizes
- Snap in easy fit
- Heavy duty
- O-ring replacement



## Design

CFS flange seal is designed to suit the SAE J518 range of flanges and common metric flange sizes. The seal is manufactured in a high performance grade of Polyurethane with excellent resistance to extrusion and compression set over a wide temperature range. They provide a direct replacement for o-rings without any modifications of existing grooves. This design offers many performance advantages over common o-ring or rubber based flange seals, including the elimination of the 'pumping effect'.

## Operating Conditions

### Pressure

400 Bar  
6,000 Psi



### Temperature

-40° to 110° C  
-40° to 230° F



### Surface Finish µmRa

mating face 3.0  
sealing face 0.8

### Tolerances

ØD	Ød	L1	L2
-0.000	±0.015	-0.000	-0.010
+0.005		+0.005	+0.000

### Radii

r 0.030

### GKI-20099C Grab box

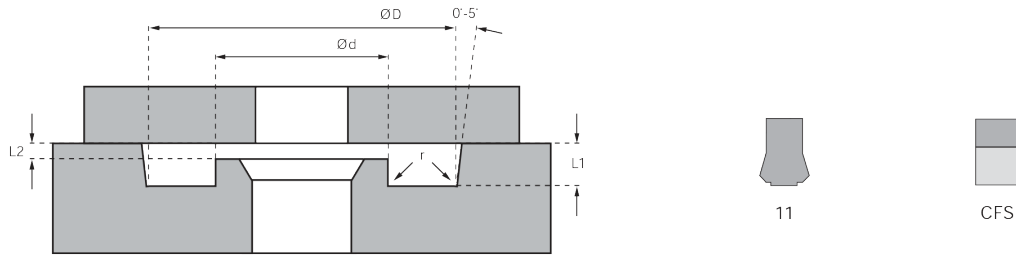
60 pieces 6 sizes

sizes	1/2	3/4	1	1 1/4	1 1/2	2
qty	10	10	10	10	10	10

### Typical Examples

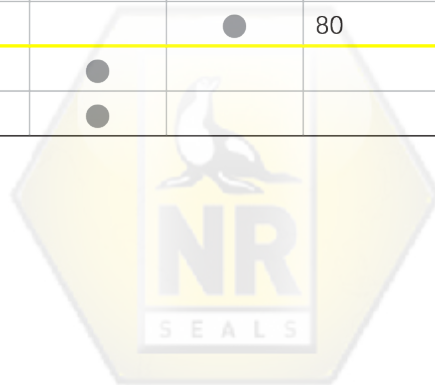
Static





Nominal SAE J518

FLANGE	ØD	Ød	L1	L2	CFS	11	Flange No.	SIZE CODE
1/2	1.000	0.670	0.110	0.010	●		08	0500
3/4	1.250	0.920	0.110	0.010	●		12	0750
1	1.560	1.230	0.110	0.010	●		16	1000
1 1/4	1.750	1.420	0.110	0.010	●		20	1250
1 1/2	2.125	1.785	0.110	0.010	●		24	1500
2	2.500	2.160	0.110	0.010	●		32	2000
2 1/2	3.005	2.665	0.110	0.010		●	40	2500
3	3.625	3.285	0.110	0.010		●	48	3000
3 1/2	4.115	3.775	0.110	0.010		●	56	3500
4	4.615	4.275	0.110	0.010		●	64	4000
5	5.615	5.275	0.110	0.010		●	80	5000
	33.5	26.3	2.2	0.25	●			M20
	45.0	36.2	3.3	0.25	●			M30

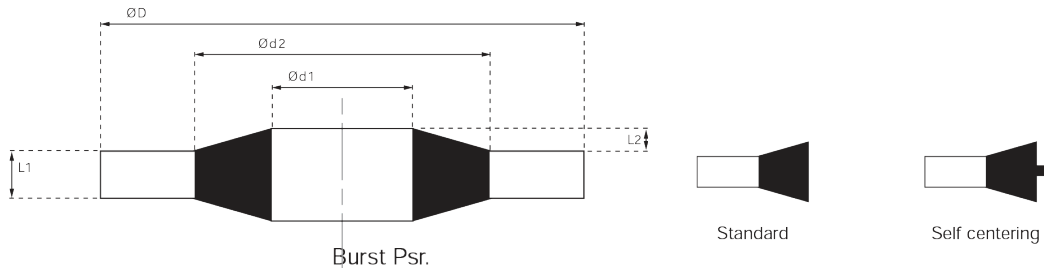






# Ancillary

## Bonded Washer



ØD	Ød1	Ød2	L1	L2	Min BAR	Material	Standard	Type	Product code
+0.15 -0.00	+0.10 -0.10	+0.10 -0.10	+0.01 -0.01	+0.25 -0.00					
7.0	4.5	5.4	1.0	0.3	1270	Steel/NBR90	German M4	Self Centred	BWM-202
9.0	5.7	6.8	1.0	0.3	1400	Steel/NBR90	German M5	Self Centred	BWM-203
10.0	5.7	7.4	1.0	0.3	1500	Steel/NBR90	German M5	Self Centred	BWM-204
9.2	6.2	7.2	1.0	0.3	1220	Steel/NBR90	German M5.5	Standard	BWM-205
10.0	6.7	8.0	1.0	0.3	1120	Steel/NBR90	German M6	Self Centred	BWM-206
11.0	6.7	8.2	1.0	0.3	1480	Steel/NBR90	German M6	Standard	BWM-207
13.0	8.7	10.0	1.0	0.3	1330	Steel/NBR90	German M8	Self Centred	BWM-212
14.0	8.7	10.4	1.0	0.3	1510	Steel/NBR90	German M8	Self Centred	BWM-213
13.3	9.3	10.5	1.0	0.3	1200	Steel/NBR90	German M8.5	Self Centred	BWM-215
16.0	10.7	12.4	1.5	0.4	1300	Steel/NBR90	German M10	Self Centred	BWM-217
18.0	10.7	12.4	1.5	0.4	1880	Steel/NBR90	German M10	Self Centred	BWM-218
19.1	11.8	12.7	1.5	0.4	1250	Steel/NBR90	German M11	Standard	BWM-219
18.0	12.7	14.4	1.5	0.4	1150	Steel/NBR90	German M12	Self Centred	BWM-222
20.0	12.7	14.4	1.5	0.4	1680	Steel/NBR90	German M12	Standard	BWM-223
22.0	13.7	15.4	1.5	0.4	1810	Steel/NBR90	German M13	Self Centred	BWM-225
22.0	14.7	16.4	1.5	0.4	1510	Steel/NBR90	German M14	Self Centred	BWM-227
24.0	16.7	18.4	1.5	0.4	1370	Steel/NBR90	German M16	Self Centred	BWM-229
24.0	17.4	19.2	1.5	0.4	1150	Steel/NBR90	German M17	Standard	BWM-230
24.7	18.0	20.1	1.5	0.4	1070	Steel/NBR90	German M17.5	Standard	BWM-231
26.0	18.7	20.4	1.5	0.4	1260	Steel/NBR90	German M18	Self Centred	BWM-232
28.0	20.7	22.5	1.5	0.4	1140	Steel/NBR90	German M20	Self Centred	BWM-233
28.7	21.5	23.3	2.5	0.4	1080	Steel/NBR90	German M21	Standard	BWM-234
30.0	22.7	24.4	2.0	0.4	1080	Steel/NBR90	German M22	Self Centred	BWM-236
32.0	24.7	26.4	2.0	0.4	1000	Steel/NBR90	German M24	Self Centred	BWM-238
35.0	26.7	28.4	2.0	0.4	1090	Steel/NBR90	German M26	Self Centred	BWM-239
36.0	27.2	29.0	2.0	0.4	1130	Steel/NBR90	German M27	Self Centred	BWM-240
42.0	33.7	35.8	2.0	0.4	840	Steel/NBR90	German M33	Self Centred	BWM-243
43.0	34.3	36.4	2.0	0.4	870	Steel/NBR90	German M34	Standard	BWM-244
53.0	42.7	44.4	3.0	0.4	930	Steel/NBR90	German M42	Standard	BWM-247
59.0	48.7	50.8	3.0	0.4	790	Steel/NBR90	German M48	Standard	BWM-248



# RJS

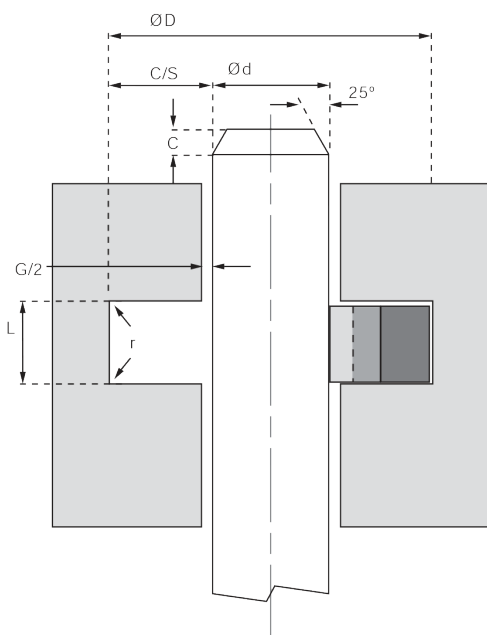
Rotary Joint Seals

Rotary joint seal



## Key Features

- Medium to heavy duty
- Compact housing
- Specifically for swivel joints



## Design

RJS rotary pressure seal is a seal designed specifically for use in hydraulic swivel joints. It is manufactured in high specification dual durometer Polyurethane to provide ease of installation and excellent sealing characteristics. These are a popular replacement seal for Asian excavators.

## Operating Conditions

### Pressure

350 Bar  
5,000 Psi



### Temperature

-40° to 110°C  
-40° to 230°F



### Speed

1.0m/sec  
3.0'/sec



### Surface Finish $\mu\text{mRa}$

REPLACEMENT SEAL ONLY

### Tolerances

REPLACEMENT SEAL ONLY

### Chamfer Radii

REPLACEMENT SEAL ONLY

### Typical Examples

Reciprocating  Rotary  Oscillating  Helix





# Charts

Metric & Imperial Conversion

Frac.	Imp dec.	Met mm	Frac.	Imp dec.	Met mm	Frac.	Imp dec.	Met mm	Frac.	Imp dec.	Met mm
	0.004	0.100		0.335	8.500		0.709	18.000	1 1/4	1.250	31.750
	0.010	0.250	11/32	0.344	8.731	23/32	0.719	18.256		1.260	32.000
1/64	0.016	0.397		0.354	9.000		0.728	18.500	1 9/32	1.281	32.544
	0.020	0.510	23/64	0.359	9.128	47/64	0.734	18.653		1.299	33.000
	0.030	0.762		0.374	9.500		0.748	19.000	1 5/16	1.313	33.338
1/32	0.031	0.794	3/8	0.375	9.525	3/4	0.750	19.050		1.339	34.000
	0.039	1.000	25/64	0.391	9.922	49/64	0.766	19.447	1 11/32	1.344	34.131
3/64	0.047	1.191		0.394	10.000	25/32	0.781	19.844	1 3/8	1.375	34.925
	0.059	1.500	13/32	0.406	10.319		0.787	20.000		1.378	35.000
1/16	0.063	1.588		0.413	10.500	51/64	0.797	20.241	1 13/32	1.406	35.719
5/64	0.078	1.984	27/64	0.422	10.716	13/16	0.813	20.638		1.417	36.000
	0.079	2.000		0.433	11.000		0.827	21.000	1 7/16	1.438	36.513
3/32	0.094	2.381	7/16	0.438	11.113	53/64	0.828	21.034		1.457	37.000
	0.098	2.500		0.452	11.500	27/32	0.844	21.431	1 15/32	1.469	37.306
7/64	0.109	2.778	29/64	0.453	11.510	55/64	0.859	21.828		1.496	38.000
	0.118	3.000	15/32	0.469	11.906		0.866	22.000	1 1/2	1.500	38.100
1/8	0.125	3.175		0.472	12.000	7/8	0.875	22.225	1 17/32	1.531	38.894
	0.138	3.500	31/64	0.484	12.303	57/64	0.891	22.622		1.535	39.000
9/64	0.141	3.572		0.492	12.500		0.906	23.000	1 9/16	1.563	39.688
5/32	0.156	3.969	1/2	0.500	12.700	59/64	0.922	23.416		1.575	40.000
	0.158	4.000		0.512	13.000	15/16	0.938	23.813	1 19/32	1.594	40.481
11/64	0.172	4.366	29/32	0.516	13.097		0.945	24.000		1.614	41.000
	0.177	4.500	17/32	0.531	13.494	61/64	0.953	24.209	1 5/8	1.625	41.275
3/16	0.188	4.763	35/64	0.547	13.891	31/32	0.969	24.606		1.654	42.000
	0.197	5.000		0.551	14.000		0.984	25.000	1 21/32	1.656	42.069
13/64	0.203	5.159	9/16	0.563	14.288	63/64	0.984	25.003	1 11/16	1.688	42.863
	0.217	5.500		0.571	14.500	1	1.000	25.400		1.693	43.000
7/32	0.219	5.556	37/64	0.578	14.684		1.024	26.000	1 23/32	1.719	43.656
15/64	0.234	5.953		0.591	15.000	1 1/32	1.031	26.194		1.732	44.000
	0.236	6.000	19/32	0.594	15.081	1 1/16	1.063	26.988	1 3/4	1.750	44.450
1/4	0.250	6.350	39/64	0.609	15.478		1.063	27.000		1.772	45.000
	0.256	6.500	5/8	0.625	15.875	1 3/32	1.094	27.781	1 25/32	1.781	45.244
17/64	0.266	6.747		0.630	16.000		1.102	28.000		1.811	46.000
	0.276	7.000	41/64	0.641	16.272	1 1/8	1.125	28.575	1 13/16	1.813	46.038
9/32	0.281	7.144		0.650	16.500		1.142	29.000	1 27/32	1.844	46.831
	0.295	7.500	21/32	0.656	16.669	1 5/32	1.156	29.369		1.850	47.000
19/64	0.297	7.541		0.669	17.000		1.181	30.000	1 7/8	1.875	47.625
5/16	0.313	7.938	43/64	0.672	17.066	1 3/16	1.188	30.163		1.890	48.000
	0.315	8.000	11/16	0.688	17.463	1 7/32	1.219	30.956	1 29/32	1.906	48.419
21/64	0.328	8.334	45/64	0.703	17.859		1.221	31.000		1.929	49.000





# Charts

Metric & Imperial Conversion

Frac.	Imp dec.	Met mm	Frac.	Imp dec.	Met mm	Frac.	Imp dec.	Met mm	Frac.	Imp dec.	Met mm
1 15/16	1.938	49.213		2.638	67.000	3 11/32	3.344	84.931	4 3/8	4.375	111.125
	1.969	50.000	2 21/32	2.656	67.469		3.347	85.000	4 7/16	4.438	112.713
1 31/32	1.969	50.006		2.677	68.000	3 3/8	3.375	85.725	4 1/2	4.500	114.300
2	2.000	50.800	2 11/16	2.688	68.263		3.386	86.000		4.528	115.000
	2.008	51.000		2.717	69.000	3 13/32	3.406	86.519	4 9/16	4.563	115.888
2 1/32	2.031	51.594	2 23/32	2.719	69.056		3.425	87.000	4 5/8	4.625	117.475
	2.047	52.000	2 3/4	2.750	69.850	3 7/16	3.438	87.313	4 11/16	4.688	119.063
2 1/16	2.063	52.388		2.756	70.000		3.465	88.000		4.724	120.000
	2.087	53.000	2 25/32	2.781	70.644	3 15/32	3.469	88.106	4 3/4	4.750	120.650
2 3/32	2.094	53.181		2.795	71.000	3 1/2	3.500	88.900	4 13/16	4.813	122.238
2 1/8	2.125	53.975	2 13/16	2.813	71.438		3.504	89.000	4 7/8	4.875	123.825
	2.126	54.000		2.835	72.000	3 17/32	3.531	89.694		4.921	125.000
2 5/32	2.156	54.769	2 27/32	2.844	72.231		3.543	90.000	4 15/16	4.938	125.413
	2.165	55.000		2.874	73.000	3 9/16	3.563	90.488	5	5.000	127.000
2 3/16	2.188	55.563	2 7/8	2.875	73.025		3.583	91.000		5.118	130.000
	2.205	56.000	2 29/32	2.906	73.819	3 19/32	3.594	91.281	5 1/4	5.250	133.350
2 7/32	2.219	56.356		2.913	74.000		3.622	92.000	5 1/2	5.500	139.700
	2.244	57.000	2 15/16	2.938	74.613	3 5/8	3.625	92.075		5.512	140.000
2 1/4	2.250	57.150		2.953	75.000	3 21/32	3.656	92.862	5 3/4	5.750	146.050
2 9/32	2.281	57.944	2 31/32	2.969	75.406	3 11/16	3.687	93.650		5.906	150.000
	2.283	58.000		2.992	76.000	3 23/32	3.719	94.463	6	6.000	152.400
2 5/16	2.313	58.738	3	3.000	76.200	3 3/4	3.750	95.250	6 1/4	6.250	158.750
	2.323	59.000	3 1/32	3.031	76.994	3 25/32	3.781	96.037		6.299	160.000
2 11/32	2.344	59.531		3.032	77.000	3 13/16	3.812	96.825	6 1/2	6.500	165.100
	2.362	60.000	3 1/16	3.063	77.788	3 27/32	3.844	97.638		6.693	170.000
2 3/8	2.375	60.325		3.071	78.000	3 7/8	3.875	98.425	6 3/4	6.750	171.450
	2.402	61.000	3 3/32	3.094	78.581		3.898	99.000	7	7.000	177.800
2 13/32	2.406	61.119		3.110	79.000	3 29/32	3.906	99.219		7.087	180.000
2 7/16	2.438	61.913	3 1/8	3.125	79.375		3.937	100.000		7.480	190.000
	2.441	62.000		3.150	80.000	3 15/16	3.938	100.013	7 1/2	7.500	190.500
2 15/32	2.469	62.706	3 5/32	3.156	80.169	3 31/32	3.969	100.806		7.874	200.000
	2.480	63.000	3 3/16	3.188	80.963		3.976	101.000	8	8.000	203.200
2 1/2	2.500	63.500		3.189	81.000	4	4.000	101.600		8.268	210.000
	2.520	64.000	3 7/32	3.219	81.756	4 1/16	4.063	103.188	8 1/2	8.500	215.900
2 17/32	2.531	64.294		3.228	82.000	4 1/8	4.125	104.775		8.661	220.000
	2.559	65.000	3 1/4	3.250	82.550		4.134	105.000	9	9.000	228.600
2 9/16	2.563	65.088		3.268	83.000	4 3/16	4.188	106.363		9.055	230.000
2 19/32	2.594	65.881	3 9/32	3.281	83.344	4 1/4	4.250	107.950		9.449	240.000
	2.598	66.000		3.307	84.000	4 5/16	4.313	109.538	9 1/2	9.500	241.300
2 5/8	2.625	66.675	3 5/16	3.313	84.138		4.331	110.000		9.843	250.000



# Charts

Metric & Imperial Conversion

Frac.	Imp dec.	Met mm
10	10.000	254.000
	10.236	260.000
	10.630	270.000
11	11.000	279.400
	11.024	280.000
	11.417	290.000
	11.811	300.000
12	12.000	304.800
13	13.000	330.200
	13.780	350.000
14	14.000	355.600
15	15.000	381.000
	15.748	400.000
16	16.000	406.400
17	17.000	431.800
	17.717	450.000
18	18.000	457.200
19	19.000	482.601
	19.685	500.000
20	20.000	508.000





# Charts

## Imperial Tolerance Chart

Nom. Size Inches		Shafts (outside diameters) Units 0.001 inches								Bores (inside diameters) Units 0.001 inches				
over	to	f8	f9	h8	h9	h10	h11	js10	js11	H8	H9	H10	H11	Js11
0.04	0.12	-0.3	-0.3	0	0	0	0	+0.8	+1.3	+0.6	+1.0	+1.6	+2.5	+1.3
		-0.9	-1.2	-0.6	-1.0	-1.6	-2.5	-0.8	-1.3	0	0	0	0	-1.3
0.12	0.24	-0.4	-0.4	0	0	0	0	+0.9	+1.5	+0.7	+1.2	+1.8	+3.0	+1.5
		-1.1	-1.6	-0.7	-1.2	-1.8	-3.0	-0.9	-1.5	0	0	0	0	-1.5
0.24	0.40	-0.5	-0.5	0	0	0	0	+1.1	+1.8	+0.9	+1.4	+2.2	+3.5	+1.8
		-1.4	-1.9	-0.9	-1.4	-2.2	-3.5	-1.1	-1.8	0	0	0	0	-1.8
0.40	0.71	-0.6	-0.6	0	0	0	0	+1.4	+2.0	+1.0	+1.6	+2.8	+4.0	+2.0
		-1.6	-2.3	-1.0	-1.6	-2.8	-4.0	-1.4	-2.0	0	0	0	0	-2.0
0.71	1.19	-0.8	-0.8	0	0	0	0	+1.8	+2.5	+1.2	+2.0	+3.5	+5.0	+2.5
		-2.0	-2.8	-1.2	-2.0	-3.5	-5.0	-1.8	-2.5	0	0	0	0	-2.5
1.19	1.97	-1.0	-1.0	0	0	0	0	+2.0	+3.0	+1.6	+2.5	+4.0	+6.0	+3.0
		-2.6	-3.4	-1.6	-2.5	-4.0	-6.0	-2.0	-3.0	0	0	0	0	-3.0
1.97	3.15	-1.2	-1.2	0	0	0	0	+2.3	+3.5	+1.8	+3.0	+4.5	+7.0	+3.5
		-3.0	-4.1	-1.8	-3.0	-4.5	-7.0	-2.3	-3.5	0	0	0	0	-3.5
3.15	4.73	-1.4	-1.4	0	0	0	0	+2.5	+4.5	+2.2	+3.5	+5.0	+9.0	+4.5
		-3.6	-4.8	-2.2	-3.5	-5.0	-9.0	-2.5	-4.5	0	0	0	0	-4.5
4.73	7.09	-1.6	-1.6	0	0	0	0	+3.0	+5.0	+2.5	+4.0	+6.0	+10.0	+5.0
		-4.1	-5.6	-2.5	-4.0	-6.0	-10.0	-3.0	-5.0	0	0	0	0	-5.0
7.09	9.85	-2.0	-2.0	0	0	0	0	+3.5	+6.0	+2.8	+4.5	+7.0	+12.0	+6.0
		-4.8	-6.5	-2.8	-4.5	-7.0	-12.0	-3.5	-6.0	0	0	0	0	-6.0
9.85	12.41	-2.2	-2.2	0	0	0	0	+4.0	+6.0	+3.0	+5.0	+8.0	+12.0	+6.0
		-5.2	-7.3	-3.0	-5.0	-8.0	-12.0	-4.0	-6.0	0	0	0	0	-6.0
12.41	15.75	-2.5	-2.5	0	0	0	0	+4.5	+7.0	+3.5	+6.0	+9.0	+14.0	+7.0
		-6.0	-8.0	-3.5	-6.0	-9.0	-14.0	-4.5	-7.0	0	0	0	0	-7.0
15.75	19.69	-2.8	-2.8	0	0	0	0	+5.0	+8.0	+4.0	+6.0	+10.0	+16.0	+8.0
		-6.5	-8.8	-4.0	-6.0	-10.0	-16.0	-5.0	-8.0	0	0	0	0	-8.0
16.69	24.80	-3.0	-3.0	0	0	0	0	+5.5	+8.7	+4.3	+6.9	+11.0	+17.3	+8.7
		-7.0	-9.9	-4.3	-6.9	-11.0	-17.3	-5.5	-8.7	0	0	0	0	-8.7
24.80	31.49	-3.1	-3.1	0	0	0	0	+6.3	+9.8	+4.9	+7.9	+12.6	+19.7	+9.8
		-8.1	-11.0	-4.9	-7.9	-12.6	-19.7	-6.3	-9.8	0	0	0	0	-9.8



# Charts

Metric Tolerance Chart

Nom. Sizes mm		Shafts (outside diameters) Units 0.001 mm								Bores (inside diameters) Units 0.001 mm				
over	to	f8	f9	h8	h9	h10	h11	js10	js11	H8	H9	H10	H11	Js11
1.60	3	-6 -20	-6 -31	0 -14	0 -25	0 -40	0 -60	+20 -20	+30 -30	+14 0	+25 0	+40 0	+60 0	+30 -30
3	6	-10 -28	-10 -40	0 -18	0 -30	0 -48	0 -75	+24 -24	+37.5 -37.5	+18 0	+30 0	+48 0	+75 0	+37.5 -37.5
6	10	-13 -35	-13 -49	0 -22	0 -36	0 -58	0 -90	+29 -29	+45 -45	+22 0	+36 0	+58 0	+90 0	+45 -45
10	18	-16 -43	-16 -59	0 -27	0 -43	0 -70	0 -110	+35 -35	+55 -55	+27 0	+43 0	+70 0	+110 0	+55 -55
18	30	-20 -53	-20 -72	0 -33	0 -52	0 -84	0 -130	+42 -42	+65 -65	+33 0	+52 0	+84 0	+130 0	+65 -65
30	50	-25 -64	-25 -87	0 -39	0 -62	0 -100	0 -160	+50 -50	+80 -80	+39 0	+62 0	+100 0	+160 0	+80 -80
50	80	-30 -76	-30 -104	0 -46	0 -74	0 -120	0 -190	+60 -60	+95 -95	+46 0	+74 0	+120 0	+190 0	+95 -95
80	120	-36 -90	-36 -123	0 -54	0 -87	0 -140	0 -220	+70 -70	+110 -110	+54 0	+87 0	+140 0	+220 0	+110 -110
120	180	-43 -106	-43 -143	0 -63	0 -100	0 -160	0 -250	+80 -80	+125 -125	+63 0	+100 0	+160 0	+250 0	+125 -125
180	250	-50 -122	-50 -165	0 -72	0 -115	0 -185	0 -290	+92 -92	+145 -145	+72 0	+115 0	+185 0	+290 0	+145 -145
250	315	-56 -137	-56 -186	0 -81	0 -130	0 -210	0 -320	+105 -105	+160 -160	+81 0	+130 0	+210 0	+320 0	+160 -160
315	400	-62 -151	-62 -212	0 -89	0 -140	0 -230	0 -360	+115 -115	+180 -180	+89 0	+140 0	+230 0	+360 0	+180 -180
400	500	-68 -165	-68 -223	0 -97	0 -155	0 -250	0 -400	+125 -125	+200 -200	+97 0	+155 0	+250 0	+400 0	+200 -200
500	630	-76 -186	-76 -251	0 -110	0 -175	0 -280	0 -440	+140 -140	+220 -220	+110 0	+175 0	+280 0	+440 0	+220 -220
630	800	-80 -205	-80 -280	0 -125	0 -200	0 -320	0 -500	+160 -160	+250 -250	+125 0	+200 0	+320 0	+500 0	+250 -250





# Conditions

## NORMAN RICHARDS PTY LTD COPYRIGHT

Unless otherwise indicated, the material in this catalogue is copyright © of Norman Richards Pty Ltd ABN 43958671889 (Norman Richards) and protected by the copyright laws of Australia. All rights are reserved. You must not modify copy or redistribute this catalogue or any part of it. If this catalogue is in electronic or CD Rom form you also must not print it or any part of it.

### Warranty

This catalogue is for information only. The details of the products in this catalogue were provided by the manufacturer of the products. Norman Richards does not warrant that the products will comply with those details. Norman Richards supplies products strictly in accordance with specifications given by our customers. We do not provide any advice or recommendation about the suitability of products for any particular use. We do not warrant that products are suitable for the use intended by our customers. Before ordering any products from Norman Richards you must satisfy yourself that the products you are ordering are suitable for your intended use of the products.

### Payment terms

When ordering products from Norman Richards you agree that payment must be made in full for all products you order at the time stated in writing by Norman Richards, including in any credit application. If no time is stated in writing by Norman Richards, payment must be made in full within thirty days of the date of the monthly statement. If payment is not made on these terms, Norman Richards may charge you interest on any unpaid amount. Interest will be charged daily and from the date payment is due until payment is received.

### 1 Conditions of sale

#### Definitions

In these conditions:

- (a) The Company means Norman Richards Pty Ltd ABN 43958671 889
- (b) The customer is any party who requests that the company supply Products to it
- (c) The Order means the agreement between the Customer and the Company for the supply of Products by the Company to the Customer
- (d) Products means any of the Company's products that are ordered by the Customer
- (e) Quote means a quote for the cost of the Products given by the Company to the Customer
- (f) Shipping address means the address specified by the customer for delivery of the Products.

### 2 Application

By ordering Products, the Customer accepts these conditions and acknowledges that they:

- (a) Apply to and are incorporated into every order
- (b) May only be changed by a written statement from the Company
- (c) Supersede and are not modified or excluded by any conditions of purchase stated verbally or appearing on any document provided by the Customer.

### 3 Price

- (a) The price of the Products is:
- (b) The price stated in the Quote, if the Customer makes an order within 30 days from the date of the Quote or any other period stated in the Quote, or
- (c) If no quote has been provided, the price stated in the Company's current price list.
- (d) The Customer must pay any GST payable on the supply of the Products.

### 4 Terms of payment

- (a) The Customer must pay the Company in full for the Products by:
  - (i) The time stated in writing by the Company, including in any credit application, or
  - (ii) If no time is stated in writing by the Company, the last day of the month following the month of supply.
- (b) If the Customer does not pay the Company in full for the Products in the time specified in clause 4(a) the Company may charge interest on any unpaid amount
- (c) The interest rate will be the rate equivalent to 2% more than the rate charged to the Company for overdraft accommodation by its bankers at that time. Interest accrues daily and is calculated from the date payment is due to the date of payment in full and payments will be credited to interest first.

### 5 Delivery

- (a) The Company must deliver the Products to the Shipping Address and may deliver the Products in any number of installments.
- (b) The Customer acknowledges that delivery times given by the Company are estimates only and that the Company is not liable for:
  - (i) Any late or non-delivery of the Products or any loss or damage to any installment of the Products whether or not the Company is legally responsible for the party who caused or contributed to that loss or damage
  - (ii) Any loss (including consequential loss), damage or delay suffered by the Customer or any third party arising from any late or non-delivery of, or loss or damage to any installment of the Products.

### 6 Passing of risk

- (a) The risk of loss or damage to the Products passes to the Customer when the Products are delivered to the Shipping Address.
- (b) The Customer must insure all Products that are at the Customer's risk.

### 7 Retention of title

- (a) Despite clause 6(a), title to the Products will not pass to the Customer until all amounts owed by the Customer to the Company are paid in full. Until that time:
  - (i) The Company:
    - (1) May at anytime, repossess the Products from any premises and will not be liable for trespass or any resulting damage
    - (2) May keep or resell any Products repossessed under clause 7(a) (i)
  - (ii) The Customer:
    - (1) Must not claim any lien over the Products
    - (2) Is a bailee of the Products and owes the Company the duties and liabilities of a bailee
    - (3) Must not supply any of the Products to any party outside of its usual or ordinary course of business or allow any party to acquire any security interest in the Products
    - (4) Must properly store and insure the Products.
- (b) Despite clause 7(a), if the Customer sells the Products or anything that incorporates any of the Products before paying the Company in full, then the Customer must:
  - (i) Hold the proceeds of sale representing the price of the Products on trust for the Company as soon as they are received
  - (ii) Either pays the amount of the proceeds referred to in clause 7(b) (i) to the Company as soon as they are received or pay those proceeds into a separate identifiable account as trustee for the Company and pay the Company upon request.

### 8 Cancellation

- (a) The Customer cannot cancel an Order unless authorised in writing by the Company.
- (b) If the Customer cancels an Order it indemnifies the Company against all losses arising from the Order and cancellation.



# Conditions

## 9 Return

- (a) The Customer cannot return:
  - (i) Any machined, cut or non-standard Products under any circumstances
  - (ii) Any other Products unless expressly stated in writing by the Company.
- (b) If the Customer returns any Products, it may have to pay the Company a re stocking fee of 20% (of the value of the Products) or \$5.00 (greater of) surcharge per line item to the Company.
- (c) If the Customer returns any Products — they must be accompanied with a company credit request form.

## 10 Acceptances

- (a) The Customer must notify the Company within fourteen days of delivery of the Products of any allegation that any Products are not in accordance with the original Order.
- (b) Unless the Customer notifies the Company as set out in clause 10(a) the Customer must accept and pay for the products.

## 11 Default by customer

- (a) The Customer is in default under an Order if it:
  - (i) Does not pay the Company in full for the Products in the time specified in clause 4(a)
  - (ii) Has its property seized under any distress or execution
  - (iii) Enters into a scheme or arrangement with creditors
  - (iv) Stops payment of or is unable to pay its debts when they fall due
  - (v) Is placed under any form of insolvency or bankruptcy administration.
- (b) If the Customer is in default under clause 11(a), the Company:
  - (i) Is released from its outstanding obligations to the Customer under any Order and has no liability to the Customer arising out of any Order
  - (ii) Can recover damages from the Customer for the price of the Products, interest payable under clause 4(b), charges or expenses incurred by the Company as a consequence of the Customer's default and any other costs
  - (iii) Repossess the Products under clause 7(a) (i).

## 12 Liabilities and indemnities

- (a) The Customer acknowledges that the Company:
  - (i) Supplies the Products in accordance with the specifications given by the Customer and does not warrant that the products are suitable for the use intended by the Customer
  - (ii) Relies on specifications provided by the manufacturer of the Products and does not warrant that the products will comply with those specifications
  - (iii) Is not liable for any advice or recommendation given by the Company, its employees, servants or agents or any other party in relation to the suitability of the Products for any particular use and the Customer relies on such advice at its own risk.
- (b) The Customer:
  - (i) Must satisfy itself that the Products are suitable for any purpose for which the Customer intends to use or resupply them.
  - (ii) Indemnifies the Company on a continuing and full indemnity basis in relation to any loss (including consequential loss) caused by the Products suffered by any person including a third party who has acquired Products from the Customer.
- (c) Subject to clause 12(d) and except as expressly provided to the contrary in an order:
  - (i) All conditions, warranties, undertakings, inducements and representations whether expressed, implied, statutory or otherwise relating in any way to any Products sold under an Order are excluded
  - (ii) The Company is not liable to the Customer for any loss (including consequential loss) or damage caused by:
    - (1) The Products
    - (2) Any failure or omission by the Company to comply with its obligations
    - (3) Any failure of the Products to comply with the manufacturer's specifications or meet the needs of the Customer.
- (d) Nothing in these conditions will change any condition, warranty or liability that may be implied by any Australian legislation or regulation where to do so is illegal or would render any provision of an Order void. In those cases, the Company's liability will be limited at the option of the Company to any one or more of the following:
  - (i) Replacement of the Products or the supply of equivalent Products
  - (ii) Repair of the Products
  - (iii) Payment of the cost of replacing or repairing the Products or of acquiring equivalent Products
- (e) Title to any Products and any defective or replaced parts of the Products will revert to the Company upon the replacement or repair of the Products.

## 13 General

- (a) These conditions are governed by the laws of New South Wales and the parties submit to the non-exclusive jurisdiction of the courts of New South Wales and courts of appeal from them.
- (b) Any of these conditions held to be prohibited, invalid or unenforceable in any jurisdiction is ineffective to the extent of the prohibition, invalidity or unenforceability as to that jurisdiction without invalidating the rest of these conditions and will not affect the validity or unenforceability of that provision in any other jurisdiction.

APRIL 2005

